Oracle® Communications Policy Management

Policy Management

Policy Variables Reference

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Oracle Communications Policy Management Policy Variables Reference, Release 12.3

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1

Introduction

Topics:

This chapter describes the content and structure of the manual, indicates how to obtain help, details where to find related documentation, and provides other general information.

Introduction

This guide describes variables that can be used in policy rules. These variables provide information about the device, subscriber, or quota for which a policy rule is being executed.

How This Document is Organized

The information in this document is presented in the following order:

- *Introduction* provides general information about the organization of this document, about related documentation, and how to get technical assistance.
- *Policy Variables Overview* explains the use of this document and the purpose of policy variables.
- *Lists of Variables* lists available variables, their data types, and their descriptions.

Scope and Audience

This document is intended for the following trained and qualified service personnel who are responsible for Policy Management devices:

- Application administrators, who install and upgrade Policy Management applications and perform advanced system administration
- Operators, who monitor Policy Management systems daily and perform adjustments
- System administrators, who control access to the CMP system
- System architects, who design carrier network system architectures, including planning for Policy Management systems
- Network administrators, who manage carrier networks

Documentation Admonishments

Admonishments are icons and text throughout this manual that alert the reader to assure personal safety, to minimize possible service interruptions, and to warn of the potential for equipment damage.

Table 1: Admonishments

Icon	Description
DANGER	Danger: (This icon and text indicate the possibility of *personal injury*.)

Icon	Description
WARNING	Warning: (This icon and text indicate the possibility of *equipment damage*.)
CAUTION	Caution: (This icon and text indicate the possibility of *service interruption*.)
TOPPLE	Topple: (This icon and text indicate the possibility of *personal injury* and *equipment damage*.)

Related Publications

For information about additional publications related to this document, refer to the Oracle Help Center site. See *Locate Product Documentation on the Oracle Help Center Site* for more information on related product publications.

Locate Product Documentation on the Oracle Help Center Site

Oracle Communications customer documentation is available on the web at the Oracle Help Center (OHC) site, *http://docs.oracle.com*. You do not have to register to access these documents. Viewing these files requires Adobe Acrobat Reader, which can be downloaded at *http://www.adobe.com*.

1. Access the Oracle Help Center site at *http://docs.oracle.com*.
2. Click **Industries**.
3. Under the Oracle Communications subheading, click the **Oracle Communications documentation** link.
   The Communications Documentation page appears. Most products covered by these documentation sets will appear under the headings "Network Session Delivery and Control Infrastructure" or "Platforms."
4. Click on your Product and then the Release Number.
   A list of the entire documentation set for the selected product and release appears.
5. To download a file to your location, right-click the **PDF** link, select **Save target as** (or similar command based on your browser), and save to a local folder.

Customer Training

Oracle University offers training for service providers and enterprises. Visit our web site to view, and register for, Oracle Communications training:

http://education.oracle.com/communication

To obtain contact phone numbers for countries or regions, visit the Oracle University Education web site:

www.oracle.com/education/contacts

My Oracle Support (MOS)

MOS (*https://support.oracle.com*) is your initial point of contact for all product support and training needs. A representative at Customer Access Support (CAS) can assist you with MOS registration.

Call the CAS main number at 1-800-223-1711 (toll-free in the US), or call the Oracle Support hotline for your local country from the list at *http://www.oracle.com/us/support/contact/index.html*. When calling, make the selections in the sequence shown below on the Support telephone menu:

1. Select **2** for New Service Request
2. Select **3** for Hardware, Networking and Solaris Operating System Support
3. Select one of the following options:

   • For Technical issues such as creating a new Service Request (SR), Select **1**
   • For Non-technical issues such as registration or assistance with MOS, Select **2**

You will be connected to a live agent who can assist you with MOS registration and opening a support ticket.

MOS is available 24 hours a day, 7 days a week, 365 days a year.

Emergency Response

In the event of a critical service situation, emergency response is offered by the Customer Access Support (CAS) main number at 1-800-223-1711 (toll-free in the US), or by calling the Oracle Support hotline for your local country from the list at *http://www.oracle.com/us/support/contact/index.html*. The emergency response provides immediate coverage, automatic escalation, and other features to ensure that the critical situation is resolved as rapidly as possible.

A critical situation is defined as a problem with the installed equipment that severely affects service, traffic, or maintenance capabilities, and requires immediate corrective action. Critical situations affect service and/or system operation resulting in one or several of these situations:

• A total system failure that results in loss of all transaction processing capability
• Significant reduction in system capacity or traffic handling capability
• Loss of the system's ability to perform automatic system reconfiguration

- Inability to restart a processor or the system
- Corruption of system databases that requires service affecting corrective actions
- Loss of access for maintenance or recovery operations
- Loss of the system ability to provide any required critical or major trouble notification

Any other problem severely affecting service, capacity/traffic, billing, and maintenance capabilities may be defined as critical by prior discussion and agreement with Oracle.

Chapter
2

Policy Variables Overview

Topics:

* *About Policy Rule Variables.....12*

This chapter provides an introduction to the variables used in policy rules and tables and their roles in Oracle Communications Policy Management.

About Policy Rule Variables

Under certain circumstances an MPE device can associate additional information with a request. This information can be obtained using policy rule variables and used during policy rule execution. During policy rule execution, variables are replaced with context-specific information. Each time a policy rule is evaluated, the unique set of policy rule variable replacements is referred to as the policy context.

The availability of this information depends on:

- The carrier network environment (wireless, cable, or wireline) in which the MPE device is executing. Some variables are only meaningful in certain modes, while others are available in all modes.
- The device for which a policy rule is being executed. Some variables are only available for certain device types, while others are available for all devices.
- Whether the information is provisioned on the MPE device or, if present, a Subscriber Profile Repository (SPR) database.
- The protocol in use and how much information is available in the request. Some protocols have optional information which, if specified, can be used to associate additional information.

The format of a policy rule variable is as follows:

`{name[:default-value]}`

The name can contain the following characters:

- A–Z
- a–z
- 0–9
- underscore (_)
- period (.)
- backslash (\)

Note: When you create a policy rule, the format and validity of a variable is not checked.

The following are examples of policy rule variables:

```
{Bandwidth}
```

```
{Device.Name}
```

```
{Flow.ARP.PriorityLevel}
```

```
{Policy.Variable.RandVarf:2017-10-24T10:24:54}
```

The following are examples of policy variable use in conditions and actions:

- In a condition to evaluate the value of a policy context property: `where the policy context property` *{Request.DefaultEPSBearerQoS.QoSClassIdentifier}* `is numerically equal to` *8*
- In an action to set a policy context property: `set policy context property` *QCI* `to` *{Flow.QoSClassIdentifier}*

- In an action to substitute textual information into a text message sent to a subscriber: `send sms alert ` `*You have reached 80%% of your quota {User.MSISDN}*` ` to user`
- In an action to substitute textual information into a logging message: `send notification to syslog with ` `*{User.Name}: Allocated {User.Quota.WeekGold.volume}*` ` and severity ` `*Info*` `

Policy rule variables are used in key columns of policy tables. The policy engine obtains the value from the policy context when using the policy table to look up a row. When you define the key, you can either select a basic policy variable from a list or directly enter the name of the variable you want to use.

Chapter

3

Lists of Variables

Topics:

This chapter lists rule variables, their data types, and descriptions.

Basic Policy Rule Variables

When you build a policy table, the policy table wizard provides a selectable list of basic policy rule variables when you define a key column. *Figure 1: Policy Rule Variables Basic List in Policy Wizard* shows an example of the basic list.
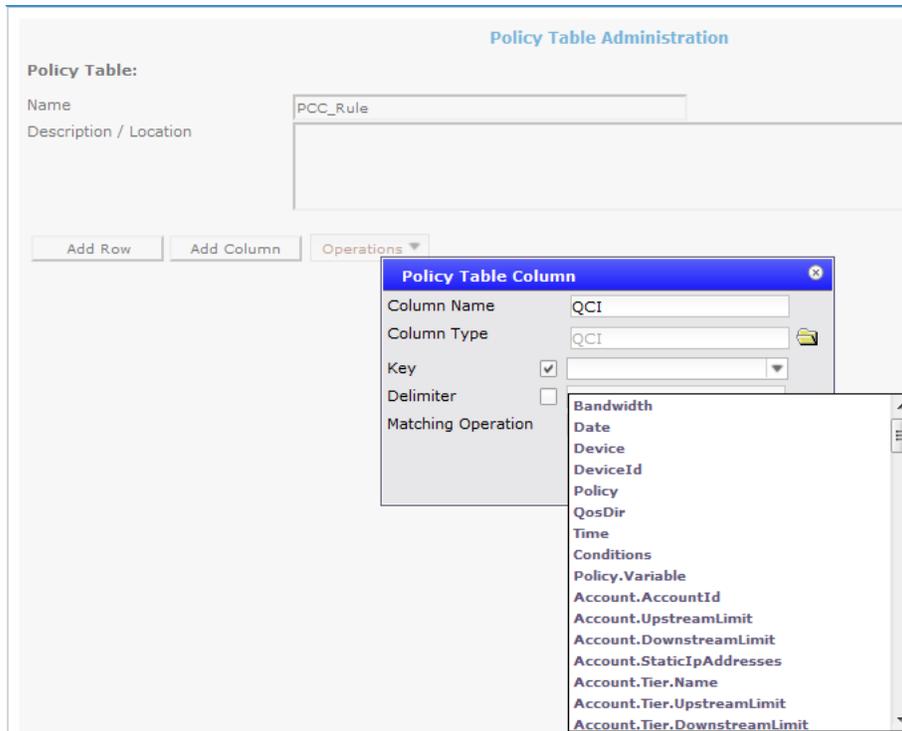
Figure 1: Policy Rule Variables Basic List in Policy Wizard

Selectable Policy Rule Variables describes the selectable policy rule variables.

Selectable Policy Rule Variables

Variable Name	Description
{Bandwidth}	Any mode
	Replaced with the DOCSIS type of the flow for which the policy rule is being evaluated:
	• **BES**
	• **NRTP**
	• **RTP**
	• **UGS**
	• **UGSAD**
{Conditions}	Any mode

Variable Name	Description
	Replaced with a list of (variable, value) tuples that lists the variables whose values were referenced in the conditions of the policy rule. The list is inserted with one variable per line in the following format: **`variable=value`**
{Date}	Any mode
	The date when the policy rule is executed, in the following format: **`MMM[mm]/dd[/yyyy]`**
	where:
	• *MMM* — Specifies the month. For example: **`Feb`**
	• *mm* — Specifies the month numerically. For example: **`02`**
	• *dd* — Specifies the day of the month. For example: **`09`**
	• *yyyy* — Specifies the year. For example: **`2017`**
{Device}	Any mode
	Replaced with the name of the device for which the policy rule is being evaluated.
{DeviceId}	Any mode
	Replaced with the ID of the device for which the policy rule is being evaluated.
{Policy}	Any mode
	Replaced with the name of the policy rule that is being executed.
{Policy.Variable}	Replaced with the name of the policy variable.
{QosDir}	Any mode
	Replaced with the direction of the flow for which the policy rule is being evaluated, either **Up** (uplink) or **Down** (downlink).
{Time}	Any mode
	Replaced with the time when the policy rule is executed, in the following format: *`hh:mm:ss.SSS`*
	where:
	• *hh* — Specifies the hour in 24-hour time.
	• *mm* — Specifies the minutes.
	• *ss* — Specifies the seconds.
	• *SSS* — Specifies the fractional seconds.
{Account.AccountId}	Wireless
	Replaced with the account ID of the account associated with the request.
{Account.DownstreamLimit}	Wireless

Variable Name	Description
	Replaced with the downstream bandwidth limit of the account associated with the request.
{Account.StaticIpAddresses}	Wireless
	Replaced with the static IP address of the account associated with the request.
{Account.Tier.DownstreamLimit} {}	Wireless
	Replaced with the downstream bandwidth limit of the tier of the account associated with the request.
{AccountTier.Entitlements}	Wireless
	Replaced with the entitlements of the tier of the account associated with the request.
{Account.Tier.Name}	Wireless
	Replaced with the name of the tier of the account associated with the request.
{Account.Tier.UpstreamLimit}	Wireless
	Replaced with the upstream bandwidth limit if the tier of the account associated with the request.
{Account.UpstreamLimit}	Wireless
	Replaced with the upstream bandwidth limit of the account associated with the request.
{Application.HDThreshold}	Wireless
{Application.LatencySensitivity}	Wireless
{Application.Name}	Wireless
	Replaced with the name of the application associated with the request.
{DefaultEPSBearerQos.QoSClassIdentifier}	
{Device.DiameterRealm}	Any device
	Replaced with the Diameter realm name for the device.
{Device.FlowCount}	Any device
	Replaced with the number of active flows for the device.
{Device.Name}	Any device
	Replaced with the name (as defined in the CMP database) of the device.
{Element.DiameterRealm}	Wireless
	Replaced with the Diameter realm of the network element associated with the current device.
{Element.Name}	Any device
	Replaced with the name (as defined in the CMP database) of the network element associated with the current device. If the device is a network element, then

Variable Name	Description
	this is the same as {Device.Name}. However, if the device is contained within a network element (as is the case with Interfaces, Channels, and so forth), then this has a different value.
{Flow.AFAppId}	Wireless
	Replaced with a string, which can be used to identify the service being used on the flow associated with an Rx application (for example, **voice** or **gaming**).
{Flow.ARP.PreemptionCapability}	Wireless
	Replaced with an integer representing whether this service data flow or bearer can get resources that were already assigned to another service data flow with a lower priority level: • **0** (PRE-EMPTION_CAPABILITY_ENABLED) — the service data flow or bearer is allowed to get resources • **1** (PRE-EMPTION_CAPABILITY_DISABLED, the default, applied if this AVP is not supplied) — the service data flow or bearer is not allowed to get resources
{Flow.ARP.PreemptionVulnerability}	Wireless
	Replaced with an integer representing whether the resources assigned to this service data flow or bearer can be assigned to another service data flow with a higher priority level: • **0** (PRE-EMPTION_VULNERABILITY_ENABLED, the default, applied if this AVP is not supplied) — the resources can be preempted and allocated to a service data flow or bearer with a higher priority • **1** (PRE-EMPTION_VULNERABILITY_DISABLED) — the resources cannot be preempted and allocated to a service data flow or bearer with a higher priority
{Flow.ARP.PriorityLevel}	Wireless
	Replaced with an integer representing the priority of a resource request, from **1** (highest) to **15** (lowest).
{Flow.BearerUsage}	Wireless
{Flow.Fax}	Wireless
	Replaced with a boolean value representing whether or not the flow associated with an Rx application is transporting fax data.
{Flow.FlowStatus}	Wireless
	Replaced with an integer representing the status of the flow(s) associated with an Rx application:

Variable Name	Description
	• **0** (ENABLED-UPLINK) — associated uplink IP flows are enabled and associated downlink IP flows are disabled
	• **1** (ENABLED-DOWNLINK) — associated downlink IP flows are enabled and associated uplink IP flows are disabled
	• **2** (ENABLED) — associated IP flows in both directions are enabled
	• **3** (DISABLED) — associated IP flows in both directions are disabled
	• **4** (REMOVED) — all associated IP flows in both directions have been removed (and not taken into account when calculating QoS)
{Flow.FlowUsage}	Wireless
{Flow.GuaranteedBitrateDownlink}	Wireless
{Flow.GuaranteedBitrateUplink}	Wireless
{Flow.IsDownstream}	Wireless
	Replaced with a boolean value representing the flow direction associated with an Rx application, either **true** (IP flows are out) or **false** (IP flows are in).
{Flow.IsPrimaryBearer}	Wireless
{Flow.MaxRequestedBandwidthDownlink}	Wireless
{Flow.MaxRequestedBandwidthUplink}	Wireless
{Flow.MediaType}	Wireless
{Flow.MeteringMethod}	Wireless
	Replaced with an integer representing how usage is metered for offline charging; **-1** means that the PCEF uses a provisioned default value.
{Flow.MonitoringKey}	Wireless
	Replaced with an integer representing the unique identifier that associates this rule with a Monitoring-Key used in Gx quota.
{Flow.Offline}	Wireless
	Replaced with an integer representing whether offline charging for the associated PCC rule is enabled or disabled:
	• **-1** — The PCEF uses a provisioned default value
	• **0** (DISABLE_OFFLINE) — The offline charging server is disabled
	• **1** (ENABLE_OFFLINE) — The offline charging server is enabled
{Flow.Online}	Wireless

Variable Name	Description

Replaced with an integer representing whether online charging for the associated PCC rule is enabled or disabled:

- **-1** — The PCEF uses a provisioned default value
- **0** (DISABLE_ONLINE) — The online charging server is disabled
- **1** (ENABLE_ONLINE) — The online charging server is enabled

{Flow.Precedence}

Wireless

Replaced with an integer representing the PCC rule precedence.

{Flow.QoSClassIdentifier}

Wireless

Replaced with an integer representing a QoS-Class-Identifier that indicates standardized characteristics defined in 3GPP TS 23.203(7):

- **1** — QCI_1
- **2** — QCI_2
- **3** — QCI_3
- **4** — QCI_4
- **5** — QCI_5
- **6** — QCI_6
- **7** — QCI_7
- **8** — QCI_8
- **9** — QCI_9
- **65** — QCI_65
- **66** — QCI_66
- **69** — QCI_69
- **70** — QCI_70

{Flow.RatingGroup}

Wireless

Replaced with the charging key for the PCC rule associated with this request.

{Flow.ReportingLevel}

Wireless

Replaced with a value representing the requested level of usage reporting for the PCC rule associated with this request:

- **0** (SERVICE_IDENTIFIER_LEVEL) — Usage is reported on the service ID and rating group combination level, and is applicable when the Service-Identifier and Rating-Group AVPs have been provisioned within the Charging-Rule-Definition AVP
- **1** (RATING_GROUP_LEVEL) — Usage is reported on the rating group level, and is applicable when

Variable Name	Description
	the Rating-Group AVP has been provisioned within the Charging-Rule-Definition AVP
	• **2** (SPONSORED_CONNECTIVITY_LEVEL) — Applicable for offline charging, usage is reported on the sponsored identity and rating group combination level, and is applicable when the Sponsor-Identity, Application-Service-Provider-Identity, and Rating-Group AVPs have been provisioned within the Charging-Rule-Definition AVP
{Flow.ReservationPriority}	Wireless
	Replaced with an integer representing the priority of a flow associated with an Rx application, from **0** (lowest, the default) to **7** (highest).
{Flow.RRBw}	Wireless
{Flow.RSBw}	Wireless
{Flow.RuleName}	Wireless
{Flow.RuleType}	Wireless
{Flow.ServiceFlowDetection}	Wireless
{Flow.ServiceIdentifier}	Wireless
	Replaced with an integer representing the service associated with this request.
{Quota.Limit.*quotaname*.ServiceSpecific}	Wireless
{Quota.Limit.*quotaname*.Time}	Wireless
{Quota.Limit.*quotaname*.Volume}	Wireless
{RAI.LAC}	Wireless
{RAI.MccMnc}	Wireless
{RAI.RAC}	Wireless
{Request.AFAppId}	Wireless
	Replaced with the application function identifier of the application associated with the request.
{Request.AppId}	Wireless
	Replaced with the application identifier of the application associated with the request.
{Request.CalledStationId}	Wireless
{Request.GatewayMccMnc}	Wireless
{Request.IPCANType}	Wireless
{Request.MobilityProtocol}	Wireless
{Request.MsgType}	Wireless

Variable Name	Description
{Request.NetworkRequestSupport}	Wireless
{Request.Primary}	Wireless
{Request.QoSNegotiation}	Wireless
{Request.QoSUpgrade}	Wireless
{Request.RATType}	Wireless
{Request.Reason}	Wireless
{Request.ReservationPriority}	Wireless
{Request.ServiceInfoStatus}	Wireless
{Request.ServingGatewayAddress}	Wireless
{Request.ServingMccMnc}	Wireless
{Session.AFAppId}	Wireless
{Session. APNAggregateMaxBitrateDownlink}	Wireless
{Session.APNAggregateMaxBitrateUplink}	Wireless
{Session.AppId}	Wireless
{Session.CalledStationId}	Wireless
{Session.GatewayMccMnc}	Wireless
{Session.IMEI}	Any device
	Replaced with the IMEI of the phone for the subscriber or for the equipment associated with the request.
{Session.IMEISV}	Any device
	Replaced with the IMEISV of the subscriber's phone or equipment associated with the request.
{Session.IPCANType}	Wireless
{Session.IsPrimary}	Wireless
{Session.MobilityProtocol}	Wireless
{Session.NetworkRequestSupport}	Wireless
{Session.NextBillingDate}	Wireless
	Replaced with the next monthly billing date, in the format *MM[M]/dd/yyyy* (for example, *Oct/24/2017*). The date format can be changed by specifying the new format within parentheses; for example, {Session.NextBillingDate (MM/dd)} could result in *10/24*.
{Session.RATType}	Wireless
{Session.Secondary}	Wireless
{Session.ServiceUrn}	Wireless

Variable Name	Description
{Session.ServingMcc}	Wireless
	Replaced with the serving Mobile Country Code associated with the request.
{Session.ServingMccMnc}	Wireless
{Session.SupportedFeature}	Wireless
{Session.UserEquipmentInfo}	Wireless
{User.BillingDate}	Wireless
	Replaced with the Billing Date value of the subscriber associated with the request.
{User.BillingDay}	Wireless
	Replaced with the Billing Day value of the subscriber associated with the request.
{User.BillingType}	Wireless
	Replaced with the Billing Type value of the subscriber associated with the request.
{User.Custom}	Wireless
{User.DownstreamGuaranteed}	Wireless
{User.DownstreamLimit}	Wireless
{User.E164}	Wireless
	Replaced with the E.164 phone number of the subscriber associated with the request.
{User.Entitlement}	Wireless
	Replaced with the Entitlement value of the subscriber associated with the request.
{User.IMSI}	Wireless
	Replaced with the IMSI of the subscriber associated with the request.
{User.IP}	Wireless
	Replaced with the IP address of the subscriber associated with the request.
{User.MSISDN}	Wireless
	Replaced with the mobile subscriber ISDN of the subscriber associated with the request.
{User.NAI}	Wireless
{User.PoolId}	Wireless
	Replaced with the ID of the pool for the subscriber.
{User.Quota.*quotaName***.ServiceSpecific}**	Wireless
	Replaced with the total number of service-specific events for the subscriber from the quota *quotaName*.

Variable Name	Description
	This variable applies to subscriber-level and pool-level quota defined on the MPE device.
{User.Quota.*quotaname*.Time}	Wireless
	Replaced with the total time in seconds consumed by the subscriber from the quota *quotaname*. This variable applies to subscriber-level and pool-level quota defined on the device.
{User.Quota.*quotaname*.Volume}	Wireless
	Replaced with the total volume in bytes consumed by the subscriber from the quota *quotaname*. This variable applies to subscriber-level and pool-level quota defined on the device.
{User.SIP}	Wireless
	Replaced with the SIP URI of the subscriber associated with the request.
{User.Tier}	Wireless
	Replaced with the Tier value of the subscriber associated with the request.
{User.UpstreamGuaranteed}	Wireless
{User.UpstreamLimit}	Wireless
{VendorId}	Wireless

Policy Rule Variables for Flows

In addition to the basic policy rule variables, you can use the following flow-related variables defined for the Diameter Rx protocol to get information on:

- Rx application provisioning
- PCC/ADC-specific fields from Charging-Rule-Definition
- ADC flows

Rx Application Provisioning Flow Variables defines policy rule variables that can be used with Rx application provisioning. *PCC/ADC Flow Variables* defines policy rule variables that can be used with PCC/ADC-specific fields. *ADC Flow Variables* defines policy rule variables that can be used with ADC flows.

Rx Application Provisioning Flow Variables

In addition to the basic policy rule variables, you can use the following variables to get flow information for Rx applications.

Variable Name	Description
{Flow.AFAppId}	Wireless

Variable Name	Description
	Replaced with a string, which can be used to identify the service being used on the flow associated with an Rx application (for example, **voice** or **gaming**).
{Flow.ApplicationServiceProviderIdentity}	Wireless
	Replaced with a string representing the Application-Service-Provider-Identity AVP, used for sponsored data connectivity purposes as an identifier of the application service provider.
{Flow.BandwidthChangedByPolicy}	Wireless
	Replaced with a boolean value indicating whether or not the field MaxAdjustedRequestedBw was changed by a policy to limit the bandwidth on the flow.
{Flow.ClassifierId}	Cable
	Replaced with an integer representing a classifer ID used to match PCMM and Diameter classifiers.
{Flow.CodecMediaType}	Cable
	Replaced with a string representing the codec media type (indicated by the "m" attribute within the received codec).
{Flow.CodecNameSet}	Cable
	Replaced with a hashset representing the codec name received in the codec data AVP.
{Flow.Fax}	Wireless
	Replaced with a boolean value representing whether or not the flow associated with an Rx application is transporting fax data.
{Flow.FlowNumber}	Wireless
	Replaced with an integer representing the flow number. (This is the same for upstream and downstream flows belonging to the same media.)
{Flow.FlowStatus}	Wireless
	Replaced with an integer representing the status of the flow(s) associated with an Rx application:

- **0** (ENABLED-UPLINK) — associated uplink IP flows are enabled and associated downlink IP flows are disabled
- **1** (ENABLED-DOWNLINK) — associated downlink IP flows are enabled and associated uplink IP flows are disabled
- **2** (ENABLED) — associated IP flows in both directions are enabled
- **3** (DISABLED) — associated IP flows in both directions are disabled

Variable Name	Description
	• **4** (REMOVED) — all associated IP flows in both directions have been removed (and not taken into account when calculating QoS)
{Flow.IsDownstream}	Wireless
	Replaced with a boolean value representing the flow direction associated with an Rx application, either **true** (IP flows are out) or **false** (IP flows are in).
{Flow.ReservationPriority}	Wireless
	Replaced with an integer representing the priority of a flow associated with an Rx application, from **0** (lowest, the default) to **7** (highest).
{Flow.RequiredAccessInfo}	Wireless
	Replaced with an integer representing the RequiredAccessInfo mask.
{Flow.ResourceAllocationNotification}	Wireless
	Replaced with a boolean value representing whether or not resource allocation notification is enabled. 0 represents ENABLE_NOTIFICATION.
{Flow.SponsorIdentity}	Wireless
	Replaced with a string representing the Sponsor-Identity AVP, used for sponsored data connectivity purposes as an identifier of the sponsor.
{Flow. SuccessfulResourcesAllocationReported}	Wireless
	Replaced with a boolean value representing whether or not the MPE device reported SUCCESSFUL_RESOURCES_ALLOCATION for this flow.

PCC/ADC Flow Variables

In addition to the basic policy rule variables, you can use the following variables to get flow information from Policy Charging and Control (PCC)- and Application Detection and Control (ADC)-specific fields in the Diameter Gx Charging-Rule-Definition AVP.

Variable Name	Description
{Flow.ApplicationIdentifier}	Wireless
	Replaced with a string representing the application ID.
{Flow.ARP.PreemptionCapability}	Wireless
	Replaced with an integer representing whether this service data flow or bearer can get resources that were already assigned to another service data flow with a lower priority level:

Variable Name	Description
	• **0** (PRE-EMPTION_CAPABILITY_ENABLED) — the service data flow or bearer is allowed to get resources
	• **1** (PRE-EMPTION_CAPABILITY_DISABLED, the default, applied if this AVP is not supplied) — the service data flow or bearer is not allowed to get resources
{Flow.ARP.PreemptionVulnerability}	Wireless
	Replaced with an integer representing whether the resources assigned to this service data flow or bearer can be assigned to another service data flow with a higher priority level:
	• **0** (PRE-EMPTION_VULNERABILITY_ENABLED, the default, applied if this AVP is not supplied) — the resources can be preempted and allocated to a service data flow or bearer with a higher priority
	• **1** (PRE-EMPTION_VULNERABILITY_DISABLED) — the resources cannot be preempted and allocated to a service data flow or bearer with a higher priority
{Flow.ARP.PriorityLevel}	Wireless
	Replaced with an integer representing the priority of a resource request, from **1** (highest) to **15** (lowest).
{Flow.MeteringMethod}	Wireless
	Replaced with an integer representing how usage is metered for offline charging; **-1** means that the PCEF uses a provisioned default value.
{Flow.MonitoringKey}	Wireless
	Replaced with an integer representing the unique identifier that associates this rule with a Monitoring-Key used in Gx quota.
{Flow.MuteNotification}	Wireless
	Replaced with an integer representing the value of the Mute-Notification AVP, which mutes the notification to the MPE device of the detected application's start or stop for the specific ADC rule(s). By default, start or stop notifications are sent for the detected application. **0** (MUTE_REQUIRED) indicates that the PCEF does not inform the MPE device when the application's start or stop for the specific ADC rule or rules is detected.
{Flow.Offline}	Wireless
	Replaced with an integer representing whether offline charging for the associated PCC rule is enabled or disabled:
	• **-1** — The PCEF uses a provisioned default value
	• **0** (DISABLE_OFFLINE) — The offline charging server is disabled
	• **1** (ENABLE_OFFLINE) — The offline charging server is enabled

Variable Name	Description
{Flow.Online}	Wireless
	Replaced with an integer representing whether online charging for the associated PCC rule is enabled or disabled:
	• **-1** — The PCEF uses a provisioned default value • **0** (DISABLE_ONLINE) — The online charging server is disabled • **1** (ENABLE_ONLINE) — The online charging server is enabled
{Flow.PCEFInfo}	Wireless
	Replaced with an integer representing information that the PCEF applies to traffic, such as VLAN tagging and the next hop gateway.
{Flow.Precedence}	Wireless
	Replaced with an integer representing the PCC rule precedence.
{Flow.RatingGroup}	Wireless
	Replaced with the charging key for the PCC rule associated with this request.
{Flow.RedirectAddressType}	Wireless
	Replaced with a string representing the redirect server address type:
	• **-1** — UNKNOWN • **0** — IPV4_ADDRESS • **1** — IPV6_ADDRESS • **2** — URL • **3** — SIP_URI
{Flow.RedirectServerAddress}	Wireless
	Replaced with a string representing the server address.
{Flow.RedirectSupport}	Wireless
	Replaced with an integer representing whether redirect is enabled:
	• **-1** — UNKNOWN • **0** — DISABLED • **1** — ENABLED
{Flow.ReportingLevel}	Wireless
	Replaced with a value representing the requested level of usage reporting for the PCC rule associated with this request:
	• **0** (SERVICE_IDENTIFIER_LEVEL) — Usage is reported on the service ID and rating group combination level, and is applicable when the Service-Identifier and Rating-Group

Variable Name	Description
	AVPs have been provisioned within the Charging-Rule-Definition AVP
	• **1** (RATING_GROUP_LEVEL) — Usage is reported on the rating group level, and is applicable when the Rating-Group AVP has been provisioned within the Charging-Rule-Definition AVP
	• **2** (SPONSORED_CONNECTIVITY_LEVEL) — Applicable for offline charging, usage is reported on the sponsored identity and rating group combination level, and is applicable when the Sponsor-Identity, Application-Service-Provider-Identity, and Rating-Group AVPs have been provisioned within the Charging-Rule-Definition AVP
{Flow.ReportingReasonMask}	Wireless
	Replaced with an integer value representing the Diameter Result-Code provided in the Multiple-Services-Credit-Control AVP. Only applicable for Granted units.
{Flow.RequiredAccessInfoMask}	Wireless
	Replaced with an integer value representing the requiredAccessInfo.
{Flow.ServiceIdentifier}	Wireless
	Replaced with an integer representing the service associated with this request.
{Flow.tdfApplicationIdentifier}	Wireless
	Replaced with a string representing the TDF application ID.
{Flow.tdfRedirectAddressType}	Wireless
	Replaced with a string representing the redirect TDF server address type:
	• **-1** — UNKNOWN
	• **0** — IPV4_ADDRESS
	• **1** — IPV6_ADDRESS
	• **2** — URL
	• **3** — SIP_URI
{Flow.tdfRedirectServerAddress}	Wireless
	Replaced with a string representing the TDF server redirect address.
{Flow.tdfRedirectSupport}	Wireless
	Replaced with an integer representing whether TDF redirect is enabled:
	• **-1** — UNKNOWN
	• **0** — DISABLED
	• **1** — ENABLED

Variable Name	Description
{Flow.UsageReporting}	Wireless
	Replaced with an integer representing whether usage reporting from the PCEF to the MPE device is enabled or disabled.

ADC Flow Variables

In addition to the basic policy rule variables, you can use the following variables to get flow information from Application Detection and Control (ADC) rules in the Diameter Sd interface.

Variable Name	Description
{AppDetectionFlow.FlowDirection}	Wireless
	Replaced with an integer representing the flow direction:
	• **0** (UNSPECIFIED) — This is unspecified
	• **1** (DOWNLINK) — IP flow(s) are sent to the user equipment
	• **2** (UPLINK) — IP flow(s) are sent from the user equipment
	• **3** (BIDIRECTIONAL) — All IP flow(s) to or from the user equipment
{AppDetectionFlow. InstanceIDRuleName}	Wireless
	Replaced by a string representing the list of dynamic PCC rules installed for this TDF application instance.
{AppDetectionFlow.RuleName}	Wireless
	Replaced by a string representing the list of dynamic PCC rules installed for this flow.
{AppDetectionFlow.TDFAppId}	Wireless
	Replaced with a string, which can be used to identify the service being used on the flow (for example, **voice** or **gaming**).
{AppDetectionFlow. TDFAppInstanceId}	Wireless
	Replaced with a string representing the TDF application instance ID

Policy Rule Variables for Rx Requests

In addition to the basic policy rule variables, you can use the following request variables defined for the Diameter Rx protocol to get charging-related information.

Variable Name	Description
{Request.ChargingCharacteristics}	Wireless
	Replaced with a six-octet string containing (in octets 3–6) the application-based charging characteristics for the IP-CAN bearer. Corresponds to the field 3GPP-Charging-Characteristics of the 3GPP vendor-specific

Variable Name	Description
	attribute defined in 3GPP TS 29.061. The AVP has the M bit cleared.
{Request. CreditManagementStatusMask}	Wireless
	Replaced with an unsigned 32-bit mask representing the credit management status for application-based charging. Corresponds to the field Credit-Management-Status defined in 3GPP TS 29.212. Bit 0 is the least significant bit. When set, the bit values indicate:
	• 0 — END_USER_SERVICE_DENIED (0x1): The charging system denied the service request (for example, to terminate a rating group) due to service restrictions or limitations related to the end user (for example, the end-user's account could not cover the requested service).
	• 1 — CREDIT_CONTROL_NOT_APPLICABLE (0x2): The charging system determined that the service can be granted to the end user but no further credit control is needed for the service (for example, the service is free of charge or is treated for offline charging).
	• 2 — AUTHORIZATION_REJECTED (0x4): The charging system denied the service request in order to terminate the service for which credit is requested.
	• 3 — USER_UNKNOWN (0x8): The specified end user could not be found in the charging system.
	• 4 — RATING_FAILED (0x16): The charging system cannot rate the service request due to insufficient rating input, incorrect AVP combination, or an AVP value that is not recognized or supported in rating.
	• 5 — NO_GYN_SESSION_SERVICE_ALLOWED (0x20): The Gyn session was terminated (for example, because of network failure), but the OCS allowed the service to continue. Applicable only over Sd reference point.
	• 6 — NO_GYN_SESSION_SERVICE_NOT_ALLOWED (0x40): The Gyn session was terminated (for example, because of network failure) and the OCS did not allow the service to continue. Applicable only over Sd reference point.
{Request.DynamicAddressFlag}	Wireless
	Replaced with an integer indicating whether the PDP context/PDN address is statically (0) or dynamically (1) allocated. Corresponds to the field Dynamic-Address-Flag defined in 3GPP TS 32.299. If the AVP is not present, the address is statically allocated.
{Request. DynamicAddressFlagExtension}	Wireless
	Replaced with a boolean value indicating whether the IPv4 PDN address is statically (0) or dynamically (1) allocated for that particular IP-CAN bearer (PDN connection) of PDN type IPv4v6. Corresponds to the field

Variable Name	Description
	Dynamic-Address-Flag-Extension defined in 3GPP TS 32.299. If the address is in IPv6 format and dynamically allocated, it is indicated in Dynamic Address Flag. This field is missing if the IPv4 address is static.
{Request.GgsnAddress3GPP}	Wireless
	Replaced with a six-octet value containing the GGSN address in IPv4 format. Corresponds to the field 3GPP-GGSN-Address defined in 3GPP TS 29.061. The AVP has the M bit cleared.
{Request.GgsnIPv6Address3GPP}	Wireless
	Replaced with an 18-octet value containing the GGSN address in IPv6 format. Corresponds to the field 3GPP-GGSN-IPv6-Address defined in 3GPP TS 29.061. The AVP has the M bit cleared.
{Request.PdnConnectionChargingID}	Wireless
	Replaced with an unsigned 32-bit value containing the charging identifier to identify different records belonging to same PDN connection. Includes the Charging ID of the first IP-CAN bearer activated within the PDN connection (the EPS default bearer for GTP-based connectivity or the unique Charging ID for PMIP-based connectivity). Corresponds to the field PDN-Connection-Charging-ID defined in 3GPP TS 32.299. The AVP has the M bit cleared.
{Request.SelectionMode3GPP}	Wireless
	Replaced with an integer representing whether this service data flow or bearer can get resources that were already assigned to another service data flow with a lower priority level:
	• **0** — MS or network provided APN, subscription verified • **1** — MS provided APN, subscription not verified • **2** — Network provided APN, subscription not verified • **3** — Reserved for future use, not sent; if received interpreted as **2**
	Corresponds to the field 3GPP-Selection-Mode defined in 3GPP TS 29.061. The AVP has the M bit cleared.
{Request.UserCSGInformation. CSGAccessMode}	Wireless
	Replaced with an integer representing information on how the user is accessing a closed subscriber group cell:
	• **0** — Closed mode • **1** — Hybrid mode
	Corresponds to the AVP CSG-Access-Mode of the field User-CSG-Information defined in 3GPP TS 32.299.
{Request.UserCSGInformation. CSGId}	Wireless

Variable Name	Description
	Replaced with a value representing the user's closed subscriber group identifier. Corresponds to the AVP CSG-Id of the field User-CSG-Information defined in 3GPP TS 32.299.
{Request.UserCSGInformation. CSGMembershipIndication}	Wireless
	Replaced with an integer representing whether or not the user is a member of a closed subscriber group cell in hybrid mode:
	• **0** — Not CSG member
	• **1** — CSG member
	Corresponds to the AVP CSG-Membership-Indication of the field User-CSG-Information defined in 3GPP TS 32.299.

Policy Rule Variables for Sy Requests

In addition to the basic policy rule variables, you can use the following request variables defined for the Diameter Sy protocol to get policy counter-related information. This information is provided in an AVP by an offline charging server to an MPE device in an SLA message.

Variable Name	Description
{Sy.PolicyCounterId.*identifier***. Current.CounterStatus}**	Wireless
	Replaced with a string representing the current status of the policy counter *identifier*. Provided in an AVP Policy-Counter-Status.
{Sy.PolicyCounterId.*identifier***. Pending.CounterStatus}**	Wireless
	Replaced with a string representing the pending status of the policy counter *identifier*. Provided in an AVP Pending-Policy-Counter-Information. If multiple Pending-Policy-Counter-Information AVPs are received, only the first one is applied.
{Sy.PolicyCounterId.*identifier***. Pending.pendingPolicyCounterChangeTime}**	Wireless
	Replaced with a long value representing the time when the pending status of the policy counter *identifier* in the AVP Pending-Policy-Counter-Information became the current status. Provided in an AVP Policy-Counter-Status. If multiple Pending-Policy-Counter-Information AVPs are received, only the first one is applied.

Policy Rule Variables for Quotas, Quota Conventions, and Quota Objects

In addition to the basic policy rule variables, you can use the following variables to get quota-related information.

The format of a policy rule variable when used with a quota or quota convention is:

{*object*[.*scope*].*attribute*[.*subAttribute*[.*divisor*]]}

where:

object	An object described in *Quota Object Variables*.
scope **(optional)**	Used to narrow or expand the object. Possible values are: • **lookupname** — The next value is the name of the pass or plan to look up. • **lookupgroup** — The next value is the group of the pass (groups are not defined for plans). • **best** — Selects only the current pass or top-up (if available). • **next** — Selects only the next pass or top-up after the best.
attribute **(required)**	Possible values are: • **name** — Returns the current plan or pass name. • **group** — Returns the current pass group (groups are not defined for plans). • **expirationtime** — Returns any defined expiration time for the best pass unless a scope value of **next** has been used. • **purchasetime** — Returns any defined purchase time for the best pass (unless a scope value of **next** has been used). • **activationtime** — Returns any defined activation time for the best pass (unless a scope value of **next** has been used). • **count** — Returns the number of passes or top-ups in the current selection scope. • **time** — Returns the sum of the time attribute for the current passes or top-ups scope. This value can have a sub-attribute. • **volume** — Returns the sum of the volume attribute for the current passes or top-ups scope. This value can have a sub-attribute. • **upvolume** — Returns the sum of the input-volume (uplink-volume) attribute for the current passes or top-ups scope. This value can have a sub-attribute. • **downvolume** — Returns the sum of the output-volume (downlink-volume) attribute for the current passes or top-ups scope. This value can have a sub-attribute. • **servicespecific** — Returns the sum of the service specific attribute for the current passes or top-ups scope. This value can have a sub-attribute.
subAttribute **(required)**	Allows limits/used/available to be specified for a counter. If a sub-attribute is defined, a *divisor* may also be defined. Possible values are: • **limits** — Returns the sum of all unit limits for all passes or top-ups in the current scop. • **used** — Returns the units used for the ACTIVE pass or top-up.

- **available** — Returns the sum of all units available for all passes or top-ups in the current scope.

divisor A number that tells the system to divide a result by a specified number. Allows values to be specified in higher-division units (days instead of seconds and megabytes instead of bytes).

Quota Object Variables defines quota objects that can be used when creating policies that involve quotas and quota conventions.

Quota and Quota Convention Variables defines policy rule variables that can be used with quotas and quota conventions (passes, rollovers, and topups).

Quota Object Variables

Quota Object	Description
timelimit	The number of seconds with which a pass, plan or top-up started.
totalVolumeLimit	The number of bytes of total volume with which a pass, plan or top-up started.
inputVolumeLimit	The number of bytes of input volume with which a pass, plan or top-up started.
outputVolumeLimit	The number of bytes of output volume with which a pass, plan or top-up started.
serviceSpecificLimit	The number of service-specific events with which a pass, plan or top-up started.
timeConsumed	The number of seconds currently consumed.
totalVolumeConsumed	The number of bytes of total volume currently consumed.
inputVolumeConsumed	The number of bytes of input volume currently consumed.
outputVolumeConsumed	The number of bytes of output volume currently consumed.
serviceSpecificConsumed	The number of service specific units currently consumed.
activationTime	The date-time when the object became active. For plans, the value is null. For roll-overs, the value is the time of the rollover calculation.
expirationTime	The date-time when the MPE device will expire the object.
purchaseTime	The date-time when the object was purchased. For plans and roll-overs, the value is null.
resetTime	The next time the plan has a billing cycle reset. For passes, top-ups and rollovers, the value is null.
name	The name of the pass or plan. For rollovers and top-ups, the name of the associated plan.
field[*name*]	Passes support custom or unknown fields delivered by the SPR. This allows those fields to be accessed and used.
parent	For passes, all the passes that share the same name as the instance. For top-ups, all the top-ups associated with the plan with which that the top-up is associated.

Quota Object	Description
next	The pass or top-up that will be used after the current pass or top-up is exhausted or expired.
best	The best pass/top-up. See the *CMP Wireless User's Guide* for more information.
count	The number of passes or top-ups in the defined collection that are in the Active or Current state.
lookupName	Returns a collection of passes/top-ups for the name of that pass or plan.
lookupGroup	Returns a collection of passes/top-ups for the group of that pass or plan.

Quota and Quota Convention Variables

Variable Name	Description
{allpasses}	All passes associated with a user.
{currentPass}	The current set of passes selected by policy. The default is all passes.
{currentTopup}	The current set of top-ups for a user.
{passes}	All passes associated with a user.
{topups}	All top-ups associated with a user.

Policy Rule Variables for User Quotas

In addition to the basic policy rule variables, you can use the following user quota variables defined for the Diameter Gx protocol to get the current subscriber's quota usage for a specified quota profile and type.

The format of a policy rule variable when used with a user quota is as follows:

{User.Quota.*profilename.type.*[*aggregate*]}

where:

profilename   The name of a quota profile as defined in the CMP database.

type   Specifies the quota type. Possible values are:

- **Time** — Replaced with the total time in seconds consumed by the subscriber from the quota profile.
- **Volume** — Replaced with the total volume in bytes consumed by the subscriber from the quota profile.
- **UpVolume** — Replaced with the total upstream volume in bytes consumed by the subscriber from the quota profile.
- **DownVolume** — Replaced with the total downstream volume in bytes consumed by the subscriber from the quota profile.

- **ServiceSpecific** — Replaced with the total number of service-specific events for the subscriber from the quota profile.

aggregate
(optional)

Possible values are:

- **aggregate** — If the quota is a quota plan with a quota convention, returns the aggregate usage.
- **noaggregate** (the default) — Returns the usage for the specified quota (without aggregation).

For example, the variable `{User.Quota.MonthlyQuota.Volume.aggregate}` returns the subscriber's aggregate volume usage, in bytes, from the quota plan named MonthlyQuota.

Policy Rule Variables for RADIUS

In addition to the basic policy rule variables, you can use the following variables defined for the RADIUS protocol to get TLVs or VSAs as strings.

The syntax of a TLV variable is as follows:

{RADIUS.REQUEST.TLV.*tlv_name_or_id*[.*subfield*]}

The syntax of a VSA variable is as follows:

{RADIUS.REQUEST.vsa.*vendor_name_or_id*.*vendor_attribute_name_or_id*[.*subfield*]}

where:

tlv_name_or_id	A TLV name (as defined in the RADIUS dictionary) or the unique TLV identifier from the RADIUS standards.
vendor_name_or_id	A vendor's name (as defined in the RADIUS dictionary) or the unique vendor identifier (an integer).
vendor_attribute_name_or_id	A VSA name (as defined in the RADIUS dictionary) or the unique VSA identifier defined by the vendor.
subfield	Either the nth field (in order) of the data, or a field name (if the compound structure consists of name-value pairs).

The RADIUS standard does not define a way to support data structures in VSAs, but several vendors have overloaded string definitions to implement CSVs or name-value pairs. (This is sometimes referred to as compound types.) You can use the subfield identifier to parse values out of compound types.

For example, consider the following compound structure from Vendor ID 9, attribute 33:

```
agordon;Pssw3RD!?;GoldPlan
```

The variable `{RADIUS.REQUEST.vsa.9.33.2}` returns the string `Pssw3RD!?` because `Pssw3RD!?` is the second field in the compound structure.

If the compound structure is defined as follows:

```
user=agordon,passwd=Pssw3RD!?,access=GoldPlan
```

The variable {`RADIUS.REQUEST.vsa.9.33.user`} returns the string `agordon` because `agordon` is associated with the field name.

See *RADIUS Policy Rule TLV Variables* for a list of the RADIUS policy rule variables that are available when correlating a RADIUS session with a Gx Plus or Gx-Lite session.

RADIUS Policy Rule TLV Variables

Variable Name	Description
{RADIUS.REQUEST.TLV.User-Name}	The name of the user account. A string value in UTF-8 format.
{RADIUS.REQUEST.TLV.NAS-Port-Type}	The port type used by the GGSN. An integer value greater than 0.
{RADIUS.REQUEST.TLV.NAS-Identifier}	The unique identifier of the NAS that originated the request. A byte value.
{RADIUS.REQUEST.TLV.NAS-IP-Address}	The IP address of the GGSN that is communicating with the MPE device. A valid address in IPv4 format.
{RADIUS.REQUEST.TLV.Framed-IP-Address}	Mandatory field. The IP address of the user account. A valid address in IPv4 format.
{RADIUS.REQUEST.TLV.Acct-Session-Id}	Mandatory field. The unique Accounting ID to make it easy to match start and stop record in a log file. The start and stop records for a given session must have the same Acct-Session-Id. An Accounting-Request packet must have an Acct-Session-Id. A string value in UTF-8 format.
{RADIUS.REQUEST.TLV.Called-Station-Id}	The identifier for the target network (the APN). A byte value.
{RADIUS.REQUEST.TLV.Calling-Station-Id}	The identifier for the MS (the MSISDN). A byte value.
{RADIUS.REQUEST.TLV.3GPP-IMSI}	The IMSI for this user. A 15-byte value.
{RADIUS.REQUEST.TLV.3GPP-IMEISV}	The International Mobile Equipment ID (IMEI) and software version.
{RADIUS.REQUEST.TLV.3GPP-IMSI-MCC-MNC}	The Mobile Country Code (MCC) and Mobile Network Code (MNC) parsed from the user IMSI. A two- and three-byte value.
{RADIUS.REQUEST.TLV.3GPP-SGSN-Address}	The SGSN IP address. A valid address in IPv4 format.
{RADIUS.REQUEST.TLV.3GPP-SGSN-MCC-MNC}	The MCC and MNC parsed from the location information of the SGSN. A two- and three-byte value.
{RADIUS.REQUEST.TLV.3GPP-GGSN-Address}	The GGSN IP address. A valid address in IPv4 format.
{RADIUS.REQUEST.TLV.3GPP-GGSN-MCC-MNC}	The MCC and MNC parsed from the location information of the GGSN. A two- and three-byte value.
{RADIUS.REQUEST.TLV.3GPP-CG-Address}	The associated charging gateway (CG) IP address. A valid address in IPv4 format.

Variable Name	Description
{RADIUS.REQUEST.TLV. 3GPP-User-Location-Info}	The location information of the user equipment. A byte value.
{RADIUS.REQUEST.TLV. 3GPP-GPRS-Negotiated-QOS-Profile}	The QoS profile negotiated by the GGSN. A string value in UTF-8 format.
{RADIUS.REQUEST.TLV. 3GPP-Charging-Characteristics}	For a GGSN, the charging characteristics for this PDP context received in the Create PDP Context Request Message (in R99 and later releases). A two-character value in UTF-8 format.
{RADIUS.REQUEST.TLV. 3GPP-Charging-Id}	For a GGSN, the charging ID for this PDP context. This, together with the GGSN IP address, constitutes a unique identifier for the PDP context. An unsigned integer value.
{RADIUS.REQUEST.TLV. 3GPP-PDP-Type}	For a GGSN, the type of PDP context (IP or PPP). An unsigned integer value.
{RADIUS.REQUEST.TLV. 3GPP-RAT-Type}	Indicates with Radio Access Technology (RAT) type is currently serving the user equipment (UE). A byte value.
{RADIUS.REQUEST.TLV. 3GPP-NSAPI}	For a GGSN, the particular PDP context for the associated PDN and MSISDN/IMSI from creation to deletion. A character value in UTF-8 format.
{RADIUS.REQUEST.TLV. 3GPP-Selection-Mode}	For a GGSN, the selection mode for this PDP context received in the Create PDP Context Request message. A character value in UTF-8 format.
{RADIUS.REQUEST.TLV. 3GPP-MS-Timezone}	The offset between universal time and local time, in 15-minute increments, of where the MS/UE currently resides.