



# Support for Diameter Error Code Counters

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## Feature Summary and Revision History

### Summary Data

Applicable Product(s) or Functional Area	ePDG SaMOG
Applicable Platform(s)	<ul style="list-style-type: none"> <li>• ASR 5500</li> <li>• VPC-DI</li> <li>• VPC-SI</li> </ul>
Feature Default	Enabled - Always-on
Related Changes in This Release	Not applicable
Related Documentation	<ul style="list-style-type: none"> <li>• <i>ePDG Administration Guide</i></li> <li>• <i>SaMOG Administration Guide</i></li> <li>• <i>AAA Interface Administration and Reference</i></li> <li>• <i>Statistics and Counters Reference, StarOS Release Guide</i></li> </ul>

### Revision History

Revision Details	Release
This release supports Diameter error code counters and 5001, 5004 and 5041 experimental result codes for ePDG and SaMOG services.	21.21

## Feature Description

In ePDG and SaMOG services, the diameter result code counters are displayed as aggregate counters for different result code ranges, such as 1000-1999, 2000-2999, 3000-3999, 4000-4999 and 5000-5999. For example, 3xxx counter is the cumulative of all result codes that range 3000–3999. These counters are displayed at the global level, for each AAA server group and AAA server levels.

Each answer message from the diameter server, for the request sent from the ePDG and SaMOG, includes a result code or/and an experimental result code AVP. If both, result code and experimental result code AVPs are present, the result code AVP takes precedence. The result codes and experimental result codes are classified as follows:

- 1xxx (Informational) – Errors that fall within this Informational category are used to inform the requester that a request could not be satisfied, and more action is required on its part before access is granted.
- 2xxx (Success) – Result-code that fall within the Success category are used to inform a peer that a request has been successfully completed..
- 3xxx (Protocol Errors) – Errors that fall within the Protocol Errors category is treated on a per-hop basis, and Diameter proxies attempts to correct the error.




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**Note** Protocol errors must only be used in answer messages whose 'E' bit is set.

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- 4xxx (Transient Failures) – Errors that fall within the Transient failures category are used to inform a peer that the request could not be satisfied at the time it was received but may be able to satisfy the request in the future.




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**Note** Transient errors must be used in answer messages whose 'E' bit is not set.

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- 5xxx (Permanent Failure) – Errors that fall within the Permanent failures category are used to inform the peer that the request failed and should not be attempted again.




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**Note** Permanent errors should be used in answer messages whose 'E' bit is not set.

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Counters on each diameter result code help the operators to understand the type of failures. Result code-specific counters are available in the new show command output and in bulk statistics. These counters are available at each AAA server level or as summary of all the AAA servers associated with this ePDG/SaMOG service.

ePDG and SaMOG support the following set of result code-specific counters.

Table 1: Result Code Specific Counters

Error Category	Result Code	Result Code Value
Protocol Errors [E-bit set] [3XXX]	DIAMETER_UNABLE_TO_DELIVER	3002
	DIAMETER_TOO_BUSY	3004
	DIAMETER_LOOP_DETECTED	3005
	DIAMETER_INVALID_HDR_BITS	3008
	DIAMETER_INVALID_AVP_BITS	3009
Transient Failures [Could not satisfy request at this moment] [4XXX]	DIAMETER_AUTHENTICATION_REJECTED	4001
	DIAMETER_OUT_OF_SPACE	4002
Permanent Failures [To inform peer, request is failed, should not be attempted again] [5XXX]	DIAMETER_ERROR_USER_UNKNOWN	5001
	DIAMETER_UNKNOWN_SESSION_ID	5002
	DIAMETER_AUTHORIZATION_REJECTED	5003
	DIAMETER_ERROR_ROAMING_NOT_ALLOWED	5004
	DIAMETER_MISSING_AVP	5005
	DIAMETER_RESOURCES_EXCEEDED	5006
	DIAMETER_UNABLE_TO_COMPLY	5012
	DIAMETER_USER_UNKNOWN	5030
	DIAMETER_ERROR_USER_UNKNOWN_SUBSCRIPTION	5041

## Monitoring and Troubleshooting

### Show Commands and Outputs

Show diameter aaa-statistics result-code [all ] | [server <server\_name>] [group <group\_name> ]

This command displays the following error codes and descriptions.

Table 2:

Field	Description
Authentication Servers Summary	

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Show diameter aaa-statistics result-code [all ] [server <server_name>] [group <group_name> ]
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Field	Description
<b>Protocol Errors (3xxx)</b>	
Result Code 3002	Shows the aggregate total count of DIAMETER_UNABLE_TO_DELIVER result code value (3002) for all the AAA servers associated with the ePDG service.  This error is displayed, if Diameter cannot deliver the message to the destination, either because no host within the realm supporting the required application was available to process the request or because the Destination-Host AVP was specified without the associated Destination-Realm AVP.
Result Code 3004	Shows the aggregate total count of DIAMETER_TOO_BUSY error result code value (3004) only when a specific server is requested and it cannot provide the requested service.
Result Code 3005	Shows the aggregate total count of DIAMETER_LOOP_DETECTED result code value (3005), when an agent detected a loop while trying to get the message to the intended recipient. The message may be sent to an alternate peer, if one is available, but the peer reporting the error has identified a configuration problem.
Result Code 3008	Shows the aggregate total count of DIAMETER_INVALID_HDR_BITS result code value (3008), if a request was received whose bits in the Diameter header were set either to an invalid combination or to a value that is inconsistent with the Command Code definition.
Result Code 3009	Shows the aggregate total count of DIAMETER_INVALID_AVP_BITS result code value (3009), if a request was received that included an AVP whose flag bits are set to an unrecognized value or that is inconsistent with the AVP definition.
Result Code Others	Total number of aggregate count results for 3xxx result codes. This Result Code Others does not match with any of the other specific result codes counter.
<b>Transient Failures (4xxx)</b>	
Result Code 4001	Shows the aggregate total count of DIAMETER_AUTHENTICATION_REJECTED result code value (4001), when the authentication process fails, due to an invalid password used by the user. Further attempts must only be allowed after prompting the user for a new password.
Result Code 4002	Shows the aggregate total count of DIAMETER_OUT_OF_SPACE Result code value (4002), when a Diameter node receives the accounting request but was unable to commit it to stable storage due to a temporary lack of space.

Field	Description
Result Code Others	Total number of aggregate count result for 4xxx result codes. This Result Code Others does not match with any of the other specific result codes counter.
<b>Permanent Failures (5xxx]</b>	
Result Code 5002	Displays the aggregate total count of DIAMETER_UNKNOWN_SESSION_ID result code value (5002), if the request contains an unknown Session-Id.
Result Code 5003	Displays the aggregate total count of DIAMETER_AUTHORIZATION_REJECTED (5003) result code value, if a request was received for which the user could not be authorized. This error occurs if the requested service is not permitted to the user.
Result Code 5005	Displays the aggregate total count of DIAMETER_MISSING_AVP (5005) result code value, if a request did not contain an AVP that is required by the Command Code definition.  <b>Important</b> If this value is sent in the Result-Code AVP, a Failed-AVP should be included in the message. The Failed-AVP must contain an example of the missing AVP complete with the Vendor-Id if applicable. The value field of the missing AVP should be of correct minimum length and contain zeroes.
Result Code 5006	Displays the aggregate total count of DIAMETER_RESOURCES_EXCEEDED (5006) result code value, when a request was received that cannot be authorized because the user has already used the allowed resources. For example, error occurs when a user is restricted to one dial-up PPP port, attempts to establish a second PPP connection.
Result Code 5012	Displays the aggregate total count of DIAMETER_UNABLE_TO_COMPLY (5012) result code value, if an error is returned when a request is rejected for unspecified reasons.
Result Code 5030	Displays the aggregate total count of DIAMETER_USER_UNKNOWN (5030) result code value.
Result Code Others	Total number of aggregate count result for 5xxx result codes. This Result Code Others does not match with any of the other specific result codes counter.
<b>Experimental Result Code Stats</b>	
Exp Result Code 5001	Total number of times the Experimental-Result-Code DIAMETER_ERROR_USER_UNKNOWN (5001) is received in the authentication response message.

Show diameter aaa-statistics result-code [all ] | [server <server\_name>] [group <group\_name> ]

Field	Description
Exp Result Code 5004	Total number of times the Experimental-Result-Code DIAMETER_ERROR_ROAMING_NOT_ALLOWED (5004) is received in the authentication response message.
<b>Accounting Servers Summary</b>	
<b>Protocol Errors (3xxx)</b>	
Result Code 3002	Shows the aggregate total count of DIAMETER_UNABLE_TO_DELIVER result code value (3002), if Diameter cannot deliver the message to the destination, either because no host within the realm supporting the required application was available to process the request or because the Destination-Host AVP was specified without the associated Destination-Realm AVP.
Result Code 3004	Displays the aggregate total count of DIAMETER_TOO_BUSY error result code value (3004) only when a specific server is requested and it cannot provide the requested service.
Result Code 3005	Shows the aggregate total count of DIAMETER_LOOP_DETECTED result code value (3005), when an agent detected a loop while trying to get the message to the intended recipient. The message may be sent to an alternate peer, if one is available, but the peer reporting the error has identified a configuration problem.
Result Code 3008	Shows the aggregate total count of DIAMETER_INVALID_HDR_BITS result code value (3008), if a request was received whose bits in the Diameter header were set either to an invalid combination or to a value that is inconsistent with the Command Code definition.
Result Code 3009	Shows the aggregate total count of DIAMETER_INVALID_AVP_BITS result code value (3009), if a request was received that included an AVP whose flag bits are set to an unrecognized value or that is inconsistent with the AVP definition.
Result Code Others	Total number of aggregate count results for 3xxx result codes. This Result Code Others does not match with any of the other specific result codes counter.
<b>Transient Failures (4xxx)</b>	
Result Code 4001	Shows the aggregate total count of DIAMETER_AUTHENTICATION_REJECTED result code value (4001), when the authentication process fails, due to an invalid password used by the user. Further attempts must only be allowed after prompting the user for a new password.

Field	Description
Result Code 4002	Shows the aggregate total count of DIAMETER_OUT_OF_SPACE Result code value (4002), when a Diameter node receives the accounting request but was unable to commit it to stable storage due to a temporary lack of space.
Result Code Others	Total number of aggregate count results for 4xxx result codes. This Result Code Others does not match with any of the other specific result codes counter.
<b>Permanent Failures (5xxx]</b>	
Result Code 5002	Displays the aggregate total count of DIAMETER_UNKNOWN_SESSION_ID result code value (5002), if the request contains an unknown Session-Id.
Result Code 5003	Displays the aggregate total count of DIAMETER_AUTHORIZATION_REJECTED (5003) result code value, if a request was received for which the user could not be authorized. This error occurs if the requested service is not permitted to the user.
Result Code 5005	Displays the aggregate total count of DIAMETER_MISSING_AVP (5005) result code value, if a request did not contain an AVP that is required by the Command Code definition.  <b>Important</b> If this value is sent in the Result-Code AVP, a Failed-AVP should be included in the message. The Failed-AVP must contain an example of the missing AVP complete with the Vendor-Id if applicable. The value field of the missing AVP should be of correct minimum length and contain zeroes.
Result Code 5006	Displays the aggregate total count of DIAMETER_RESOURCES_EXCEEDED (5006) result code value, when a request was received that cannot be authorized because the user has already expended allowed resources. For example, error occurs when a user is restricted to one dial-up PPP port, attempts to establish a second PPP connection.
Result Code 5012	Displays the aggregate total count of DIAMETER_UNABLE_TO_COMPLY (5012) result code value, if an error is returned when a request is rejected for unspecified reasons.
Result Code 5030	Displays the aggregate total count of DIAMETER_USER_UNKNOWN (5030) result code value.
Result Code Others	Total number of aggregate count results for 5xxx result codes. This Result Code Others does not match with any of the other specific result codes counter.

Field	Description
<b>Experimental Result Code Stats</b>	
Exp Result Code 5001	Total number of times the Experimental-Result-Code DIAMETER_ERROR_USER_UNKNOWN (5001) is received in the authentication response message.
Exp Result Code 5004	Total number of times the Experimental-Result-Code DIAMETER_ERROR_ROAMING_NOT_ALLOWED (5004) is received in the authentication response message.

## Bulk Statistics

This section provides bulkstats related to diameter-auth and diameter-acct schemas for ePDG and SaMOG services.

### diameter-acct Schema

The following counters are available in the Diameter Accounting schema for the following error codes.

Bulk Statistics	Description
acct-result-unable-to-deliver	Shows the total number of Diameter account results with a result code 3002 that cannot be delivered to the destination.
acct-result-too-busy	Shows the total number of Diameter account results with a result code 3004 that cannot be allowed for the requested service, when specific servers are requested for.
acct-result-loop-detected	Shows the total number of Diameter account results with a result code 3005 that an agent detected a loop while trying to get the message to the intended recipient.
acct-result-invl-d-hdr-bits	Shows the total number of Diameter account results with a result code 3008 for an invalid header bits request received. A request received could be related to bits in the diameter header , which is set either to an invalid combination or to a value that is inconsistent with the definition of the Command Code.
acct-result-invl-d-avp-bits	Shows the total number of Diameter account results with a result code 3009 for a request received. The diameter code includes an AVP whose flag bits are set to an unrecognized value or that is inconsistent with the AVP definition.



Bulk Statistics	Description
acct-result-authen-rej	Shows the total number of Diameter account results with a result code 4001 for the user authentication failure due to an invalid password used by the user.
acct-result-out-of-space	Shows the total number of Diameter account results with a result code 4002 for a Diameter node received but was unable to commit due to a temporary lack of space.
acct-exp-result-user-unknown	Shows the total number of Diameter account expected results with a result code 5001 for the unknown user error.
acct-result-unk-sess-id	Shows the total number of Diameter account results with a result code 5002 that contains unknown session Identifiers.
acct-result-author-rej	Shows the total number of Diameter account results with a result code 5003 where the user requests could not be authorized.
acct-exp-result-roaming-not-allowed	Shows the total number of Diameter expected account results with a result code 5004 for which roaming calls are not allowed.
acct-result-missing-avp	Shows the total number of Diameter account results with a result code 5005 that does not contain an AVP.
acct-result-resrc-exceed	Shows the total number of account results with a result code 5006 that cannot be authorized because the user has already used allowed resources.
acct-result-unable-to-comply	Shows the total number of account results with a result code 5012 rejected for unspecified reasons.
acct-result-user-unknown	Shows the total number of account results with a result code 5030 that contains unknown users.
acct-exp-result-no-wlan-sub	Shows the total number of expected account results with a result code 5041 for no VLAN sub band.

## diameter-auth Schema

The following counters are available in the Diameter Authentication/Authorization schema for the following error codes.

Bulk Statistics	Description
auth-result-unable-to-deliver	Shows the total number of diameter authentication/authroization results with a result code 3002 that cannot be delivered to the destination.

Bulk Statistics	Description
auth-result-too-busy	Shows the total number of Diameter authentication/authorization results with a result code 3004 that cannot be allowed for the requested service, when specific servers are requested for.
auth-result-loop-detected	Shows the total number of Diameter authentication/authorization results with a result code 3005 that an agent detected a loop while trying to get the message to the intended recipient.
auth-result-invld-hdr-bits	Shows the total number of Diameter authentication/authorization results with a result code 3008 for an invalid header bits request received. A request received could be related to bits in the diameter header that is set either to an invalid combination or to a value that is inconsistent with the definition of the Command Code.
auth-result-invld-avp-bits	Shows the total number of Diameter authentication/authorization results with a result code 3009 for a request received. This Diameter authentication/authorization results includes an AVP whose flag bits are set to an unrecognized value or that is inconsistent with the AVP definition.
auth-result-authen-rej	Shows the total number of Diameter authentication/authorization results with a result code 4001 for the user authentication failure due to an invalid password used by the user.
auth-result-out-of-space	Shows the total number of Diameter authentication/authorization results with a result code 4002 for a Diameter node received but was unable to perform stable commit due to a temporary lack of space.
auth-exp-result-user-unknown	Shows the total number of Diameter authentication/authorization expected results with a result code 5001 for the unknown user error.
auth-result-unk-sess-id	Shows the total number of Diameter authentication/authorization results with a result code 5002 that contains unknown session Identifiers.
auth-result-author-rej	Shows the total number of Diameter authentication/authorization results with a result code 5003 where the user requests could not be authorized.

<b>Bulk Statistics</b>	<b>Description</b>
auth-exp-result-roaming-not-allowed	Shows the total number of Diameter authentication/authorization expected results with a result code 5004 for which roaming calls are not allowed.
auth-result-missing-avp	Shows the total number of Diameter authentication/authorization results with a result code 5005 that does not contain an AVP.
auth-result-resrc-exceed	Shows the total number of Diameter authentication/authorization results with a result code 5006 that cannot be authorized because the user has already used allowed resources.
auth-result-unable-to-comply	Shows the total number of Diameter authentication/authorization results with a result code 5012 rejected for unspecified reasons.
auth-result-user-unknown	Shows the total number of Diameter authentication/authorization results with a result code 5030 that contains unknown users.
auth-exp-result-no-wlan-sub	Shows the total number of expected diameter authentication/authorization results with a result code 5041 for no VLAN sub band.

