Statistics and KPI Reference

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PCF Statistics

PCF Service Category

charging_rule_base_total

Description: Total number of charging rule

Sample Query:

```
sum(irate(charging_rule_base{interface=\"N7\"\"N5\",name=~\".*\",action=\"install\"}[1m]))
by (interface,name,action)
```

Labels:

- Label: `interface`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, Rx etc.

- Label: `name`

  Label Description: Rule name

  Example: cbn#spp-tm etc.

- Label: `action`

  Label Description: Action

  Example: install,remove etc.

charging_rule_total

Description: Total charging rule

Sample Query:
`sum(irate(charging_rule_total{interface=\"N7\"\"N5\",name=\"AF\",action=\"remove\"}[1m])) by (interface,name,action)`

Labels:

- Label: `interface`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, etc.

- Label: `name`

  Label Description: Rule name

  Example: AF etc.

- Label: `action`

  Label Description: Action

  Example: install,remove etc.

input_queue_buffer_action_total

Description: Total number of input queue buffer

Sample Query: `sum(irate(input_queue_buffer_action_total{realm=~\".*\",app_id=\"N7\" message_type=\"NOTIFY-RES\",result=\"bypass\"}[1m])) by (app_id,message_type,result)`

Labels:

- Label: `app_id`

  Label Description: App Id

  Example: N7,Rx etc.

Labels:

- Label: `message_type`

  Label Description: Message Type

  Example: NOTIFY-RES,ASA,RAA etc.

- Label: `result`

  Label Description: Result

  Example: pe-submit-error,drop,rate-limit,bypass,sync,send-x etc.

input_queue_result_total

Description: Total number of queue result

Sample Query: `sum(irate(input_queue_result_total{realm=~\".*\",app_id=\"N7\", message_type=\"NOTIFY-RES\",result=\"bypass\"}[1m])) by (realm,app_id,message_type,result)`

Labels:

- Label: `realm`

  Label Description: realm name

  Example: cisco.com etc.

Labels:

- Label: `app_id`

  Label Description: App Id

  Example: N7,Rx etc.

Labels:

- Label: `message_type`

  Label Description: Message Type

  Example: NOTIFY-RES,ASA,RAA etc.

- Label: `result`

  Label Description: Result

  Example: pe-submit-error,drop,rate-limit,bypass,sync,send-x etc.

input_queue_result_total

Description: Total number of queue result

Sample Query: `sum(irate(input_queue_result_total{realm=~\".*\",app_id=\"N7\", message_type=\"NOTIFY-RES\",result=\"bypass\"}[1m])) by (realm,app_id,message_type,result)`

Labels:

- Label: `realm`

  Label Description: realm name

  Example: cisco.com etc.

Labels:

- Label: `app_id`

  Label Description: App Id

  Example: N7,Rx etc.

Labels:

- Label: `message_type`

  Label Description: Message Type

  Example: NOTIFY-RES,ASA,RAA etc.

Labels:

- Label: `result`

Label Description: Result

Example: pe-submit-error,drop,rate-limit,bypass,sync,send-x etc.

input_queue_total

Description: Total number of Inbound queues

Sample Query: `sum(irate(session_rule{app_id=\"N7\"\"N5\",message_type=~\".*\"}[1m])) by (app_id,message_type)`

Labels:

- Label: `app_id`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7,N5, Rx etc.

Labels:

- Label: `message_type`

  Label Description: Trigger Enum

  Example: CREATE-REQ,DELETE-REQ,UPDATE-REQ,AAR,STR etc.

ldap_policy_request_total

Description: Monitors the total count of the ldap policy requests to evaluate policies that are processed by the PCF Engine.

Sample Query: `sum(irate(ldap_policy_request_total{type=~\".*ldap.*\",result=\"notify error xxx\"}[1m])>0) by (type, result)`

Labels:

- Label: `type`

  Label Description: Message Type as ldap or broadcast

  Example: ldap,broadcast

Labels:

- Label: `result`

  Label Description: The result

  Example: notify_error_xxx, rate_limited

message_total

Description: Monitors the total count of the ldap messages that are processed by the PCF Engine.

Sample Query: `sum(irate(message_total{type=\"ldap-change-res\",status=\"success\"}[1m])) by (type,status)`

Labels:

- Label: `type`

Label Description: Message Type for ldap change or ldap search

Example: ldap-change-res,ldap-search-res

Labels:

- Label: `status`

  Label Description: Status of message as error or success

  Example: success,error

pcf_messages_duration_seconds

Description: Aggregates the total amount of time that the PCF Engine took to process the messages

Sample Query: `sum(irate(pcf_messages_duration_seconds[1m])) by (interface,name,message_type)`

Labels:

- Label: `interface`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N15, N25, N28, LDAP

Labels:

- Label: `name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7_CREATE, N7_UPDATE, N7_DELETE, N7_NOTIFY,etc.

Labels:

- Label: `message_type`

  Label Description: Message Type as Request or Response

  Example: REQ,RES

pcf_messages_total

Description: Monitors the total count of the PCF messages that are processed by the PCF Engine.

Sample Query:

```
sum(irate(pcf_messages_total{interface=\"N7\",name=~\".*\",message_type=\"REQ\"}[1m])) by
(interface,name,message_type)
```

Labels:

- Label: `interface`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N15, N25, N28, LDAP

Labels:

- Label: `name`

Label Description: Interface name that connects PCF to other network functions

Example: N7_CREATE, N7_UPDATE, N7_DELETE, N7_NOTIFY, N15_CREATE, N15_UPDATE, N15_DELETE, N15_NOTIFY, N28_SUBSCRIBE, N28_UNSUBSCRIBE, N28_NOTIFY, N28_TERMINATE, UDR_QUERY_SM, UDR_QUERY_AM

Labels:

- Label: `message_type`

  Label Description: Message Type as Request or Response

  Example: REQ,RES

policy_req_triggers_total

Description: Aggregates the total count of the policy requests triggers toward the PCF Engine

Sample Query: `sum(irate(policy_req_triggers_total{interface=\"N7\",name=~\".*\"}[1m])) by (interface,name)`

Labels:

- Label: `interface`

  Label Description: Interface name that connects PCF to other network functions

  Example: N15,N7

Labels:

- Label: `name`

  Label Description: Trigger Enum

  Example: AN_CH_COR, PLMN_CH, RE_TIMEOUT etc.

ran_nas_total

Description: Total number of rannas cause

Sample Query:
`sum(irate(ran_nas_total{media_type=\"1\",protocol_type=\"1\",cause_type=\"3\"}[1m])) by (media_type, protocol_type,cause_type)`

Labels:

- Label: `media_type`

  Label Description: Media Type

  Example: 1, 2, 3 etc.

Labels:

- Label: `protocol_type`

  Label Description: Protocol Type

  Example: 1, 2, 3 etc.

Labels:

- Label: `cause_type`

  Label Description: Cause Type

  Example: 1, 2, 3 etc.

session_rule_total

Description: Captures the total Session Rule requests

Sample Query: `sum(irate(session_rule{interface=\"N7\",name=~\".*\"}[1m])) by (interface,name)`

Labels:

- Label: `interface`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7

Labels:

- Label: `name`

  Label Description: ARP Priority Level

  Example: 1,2,3 etc.

PCF Endpoint Requests Category

async_svc_runnable_time

Description: Total Async Service Runnable Count

Sample Query: `async_svc_runnable_time{service_name=\"N5\",\"npcf-smpolicycontrol\", operation=\"Npcf_SMPolicyControl_UpdateNotify\",command=\"Notify\",status=\"Success\"}`

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

- Label: `operation`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

- Label: `status`

  Label Description: The Operation was successful or in error state

  Example: Error, Success

async_svc_runnable_total

Description: Total Async Service Runnable Count

Sample Query: `async_svc_runnable_time{service_name=\"N5\","npcf-smpolicycontrol\", operation=\"Npcf_SMPolicyControl_UpdateNotify\",command=\"Notify\",status=\"Success\"}`

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

- Label: `operation`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

- Label: `status`

  Label Description: The Operation was successful or in error state

  Example: Error, Success

async_svc_runnable_total_seconds

Description: Total Async Service Runnable Response Time

Sample Query: `async_svc_runnable_total_seconds{service_name=\"N5\",\"nchf-spendinglimitcontrol\", operation=\"Nchf_SpendingLimitControl_Subscribe\",command=\"Subscribe\",status=\"Success\"}`

Labels:

- Label: `service_name`

  Label Description: Name of the Service for a interface

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `operation`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

- Label: `status`

  Label Description: The Operation was successful or in error state

  Example: Error, Success

inbound_request_threshold_exceeded

Description: Total Inbound Threshold Requests due to Overload

Sample Query:
`inbound_request_threshold_exceeded{interface_name=\"N7\",service_name=\"npcf-smpolicycontrol\", operation_name=\"Npcf_SMPolicyControl_Delete\",command=\"Delete\",action=\"REJECT\"}`

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N15

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

- Label: `operation_name`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

- Label: `action`

  Label Description: Discard behaviour

  Example: REJECT, DROP

inbound_request_total

Description: Total Inbound Request Count

Sample Query:
```
inbound_request_total{interface_name=\"N7\",service_name=\"npcf-smpolicycontrol\",
operation_name=\"Npcf_SMPolicyControl_Delete\",command=\"Delete\"}
```

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

Label Description: Name of the Operation

Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

incoming_request_time

Description: Total Response Time for Incoming Requests

Sample Query:

```
incoming_request_time{interface_name=\"N7\"\"N5\",service_name=\"npcf-smpolicycontrol\",
operation_name=\"Npcf_SMPolicyControl_Delete\",command=\"Delete\",result_code=\"204\"}
```

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

Labels:

- Label: `result_code`

  Label Description: Status Code

  Example: 200, 201, 202, 204, 205, 206, 301, 302, 303, 304, 305, 307, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 500, 501, 502, 503, 504, 505

incoming_request_time

Description: Total Response Time for Incoming Requests

Sample Query:
```
incoming_request_time{interface_name=\"N7\"\"N5\",service_name=\"npcf-smpolicycontrol\",
operation_name=\"Npcf_SMPolicyControl_Delete\",command=\"Delete\",result_code=\"204\"}
```

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5,N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

Labels:

- Label: `result_code`

  Label Description: Status Code

Example: 200, 201, 202, 204, 205, 206, 301, 302, 303, 304, 305, 307, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 500, 501, 502, 503, 504, 505

incoming_request_total

Description: Total Incoming Request Count

Sample Query:

```
incoming_request_total{interface_name=\"N7\"\"N5\",service_name=\"npcf-smpolicycontrol\",
operation_name=\"Npcf_SMPolicyControl_Delete\",command=\"Delete\",result_code=\"204\"}
```

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

Labels:

- Label: `result_code`

  Label Description: Status Code

  Example: 200, 201, 202, 204, 205, 206, 301, 302, 303, 304, 305, 307, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 500, 501, 502, 503, 504, 505

incoming_rpc_request_time

Description: Total RPC Time for Incoming Requests

Sample Query:

```
incoming_rpc_request_time{interface_name=\"N7\"\"N5\",service_name=\"npcf-smpolicycontrol\",
operation_name=\"Npcf_SMPolicyControl_UpdateNotify\",command=\"Notify\",result_code=\"404\"}
```

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

Labels:

- Label: `result_code`

  Label Description: Status Code

  Example: 200, 201, 202, 204, 205, 206, 301, 302, 303, 304, 305, 307, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 500, 501, 502, 503, 504, 505

incoming_rpc_request_total

Description: Total Incoming RPC Request Count

Sample Query:

```
incoming_rpc_request_total{interface_name=\"N7\"\"N5\",service_name=\"npcf-smpolicycontrol\",
operation_name=\"Npcf_SMPolicyControl_UpdateNotify\",command=\"Notify\",result_code=\"200\"}
```

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

Labels:

- Label: `result_code`

  Label Description: Status Code

  Example: 200, 201, 202, 204, 205, 206, 301, 302, 303, 304, 305, 307, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 500, 501, 502, 503, 504, 505

outgoing_request_time

Description: Total Response Time for Outgoing Requests

Sample Query:

```
outgoing_request_time{interface_name=\"N7\"\"N5\",service_name=\"npcf-smpolicycontrol\",
operation_name=\"Npcf_SMPolicyControl_UpdateNotify\",command=\"Notify\",
target_base_url=\"http://192.168.2.138:9081/\",result_code=\"404\"}
```

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

Labels:

- Label: `result_code`

  Label Description: Status Code

  Example: 200, 201, 202, 204, 205, 206, 301, 302, 303, 304, 305, 307, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 500, 501, 502, 503, 504, 505

Labels:

- Label: `target_base_url`

  Label Description: Target Base Url

  Example: http://192.168.2.138:9081/ etc.

outgoing_request_total

Description: Total Outgoing Request Count

Sample Query:

```
outgoing_request_total{interface_name=\"N7\"\"N5\",service_name=\"npcf-smpolicycontrol\",
operation_name=\"Npcf_SMPolicyControl_UpdateNotify\",command=\"Notify\",
target_base_url=\"http://192.168.2.138:9081/\",result_code=\"404\"}
```

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe, Nnrf_NFUpdate

Labels:

- Label: `result_code`

  Label Description: Status Code

  Example: 200, 201, 202, 204, 205, 206, 301, 302, 303, 304, 305, 307, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 500, 501, 502, 503, 504, 505

Labels:

- Label: `target_base_url`

  Label Description: Target Base Url

  Example: http://192.168.2.138:9081/

outgoing_rpc_request_time

Description: Total RPC Time for Outgoing Requests

Sample Query:

```
outgoing_rpc_request_time{interface_name=\"N7\"\"N5\",service_name=\"npcf-smpolicycontrol\",
operation_name=\"Npcf_SMPolicyControl_Update\",command=\"Update\",result_code=\"404\"}
```

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

Labels:

- Label: `result_code`

  Label Description: Status Code

  Example: 200, 201, 202, 204, 205, 206, 301, 302, 303, 304, 305, 307, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 500, 501, 502, 503, 504, 505

outgoing_rpc_request_total

Description: Total Outgoing RPC Request Count

Sample Query:

```
outgoing_rpc_request_total{interface_name=\"N7\"\"N5\",service_name=\"npcf-smpolicycontrol\",
operation_name=\"Npcf_SMPolicyControl_Update\",command=\"Update\",result_code=\"408\"}
```

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

Labels:

- Label: `result_code`

  Label Description: Status Code

  Example: 200, 201, 202, 204, 205, 206, 301, 302, 303, 304, 305, 307, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 500, 501, 502, 503, 504, 505

nrf_registration_status Current Registration Status

Description: Provides current NRF Registration Status

Sample Query:

```
abs(nrf_registration_status)>0
```

Labels:

- Label: `base_url`

  Label Description: Regsistration url to nrf

  example: http://[192.168.x.x]:8183/

- Label: `amService`

  Label Description: Whether registration is towards amService

  example: true or false

- Label: `smService`

  Label Description: Whether registration is towards smService

  example: true or false

- Label: `afService`

  Label Description: Whether registration is towards afService

  example: true or false

route_lookup_requests_duration_seconds

Description: Total Route Lookup Response Time in seconds

Sample Query:
`route_lookup_requests_duration_seconds{interface_name=\"N7\"\"N5\",service_name=\"npcf-smpolicycontrol\", operation_name=\"Npcf_SMPolicyControl_UpdateNotify\",command=\"Notify\",status=\"201\"}`

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

  Label Description: Name of the Operation

Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

Labels:

- Label: `result_code`

  Label Description: Status Code

  Example: 200, 201, 202, 204, 205, 206, 301, 302, 303, 304, 305, 307, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 500, 501, 502, 503, 504, 505

route_lookup_requests_time

Description: Total Route Lookup Response Time

Sample Query:
`route_lookup_requests_time{interface_name=\"N7\"\"N5\",service_name=\"npcf-smpolicycontrol\", operation_name=\"Npcf_SMPolicyControl_UpdateNotify\",command=\"Notify\",status=\"201\"}`

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe,

Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

Labels:

- Label: `result_code`

  Label Description: Status Code

  Example: 200, 201, 202, 204, 205, 206, 301, 302, 303, 304, 305, 307, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 500, 501, 502, 503, 504, 505

route_lookup_requests_total

Description: Total Route Lookup Request Count

Sample Query:
`route_lookup_requests_total{interface_name=\"N7\"\"N5\",service_name=\"npcf-smpolicycontrol\", operation_name=\"Npcf_SMPolicyControl_UpdateNotify\",command=\"Notify\",status=\"201\"}`

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  Example: N7, N5, N15, N25, N28, NRF

Labels:

- Label: `service_name`

  Label Description: Name of the Service

  Example: nnrf-nfm, nnrf-disc, npcf-am-policy-control, npcf-smpolicycontrol, nchf-spendinglimitcontrol

Labels:

- Label: `command`

  Label Description: The Command

  Example: Create, Update, Delete, Notify, Subscribe, Unsubscribe, Terminate, SmDataQuery, AmDataQuery, Discovery, DeRegister, Register, Heartbeat, Unsubscribe

Labels:

- Label: `operation_name`

  Label Description: Name of the Operation

  Example: Npcf_SMPolicyControl_Create, Npcf_SMPolicyControl_Update, Npcf_SMPolicyControl_Delete, Npcf_SMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Create, Npcf_AMPolicyControl_Update, Npcf_AMPolicyControl_UpdateNotify, Npcf_AMPolicyControl_Delete, Nchf_SpendingLimitControl_Subscribe, Nchf_SpendingLimitControl_Unsubscribe, Nchf_SpendingLimitControl_Notify, Nchf_SpendingLimitControl_Terminate, Nudr_Query_PolicyData_SM, Nudr_Query_PolicyData_AM, Nnrf_NfDiscovery, Nnrf_NfDeregister, Nnrf_NfRegister, Nnrf_NfHeartbeat, Nnrf_NfNotify, Nnrf_NfSubsribe, Nnrf_NfUnSubsribe

Labels:

- Label: `result_code`

  Label Description: Status Code

  Example: 200, 201, 202, 204, 205, 206, 301, 302, 303, 304, 305, 307, 400, 401, 402, 403, 404, 405, 406, 407, 408, 409, 410, 411, 412, 413, 414, 415, 416, 417, 500, 501, 502, 503, 504, 505

incoming_request_slice_total

Description: Following stats are implemented to provide the slice based counters on N7/N5/N28 interfaces total incoming requests. These counters are aggregate of “CREATE/DELETE/UPDATE/NOTIFY” (N7/N5) and “SUBSCRIBE/UNSUBSCRIBE” (N28) requests.

Sample Query:

```
incoming_request_slice_total{interface_name="N7",service_name="npcf-smpolicycontrol",result="Success",slice="22:121212",}
2.0
```

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  example: N7, N5

outgoing_request_slice_total

Description: Following stats are implemented to provide the slice based counters on N7/N5/N28 interfaces total outgoing requests. These counters are aggregate of “CREATE/DELETE/UPDATE/NOTIFY” (N7/N5) and “SUBSCRIBE/UNSUBSCRIBE” (N28) requests.

Sample Query:

```
outgoing_request_slice_total{interface_name="N28",service_name="nchf-spendinglimitcontrol",result="Success",slice="22:121212",}
2.0
```

Labels:

- Label: `interface_name`

  Label Description: Interface name that connects PCF to other network functions

  example: N7, N28

record_conflict_merge_total counter

Description: Total number of session records with conflict in CDL merged by PCF.

Sample Query:

```
record_conflict_merge_total{node_type="unknown",actionconflict="ok",} 40035.0
record_conflict_merge_total{node_type="unknown",actionconflict="skip",} 148.0
record_conflict_merge_total{node_type="unknown",actionconflict="submit",} 40183.0
```

Labels:

- Label: `ok`

  Label Description: indicates success processing of conflict notification, i.e records got merged.

- Label: `submit`

  Label Description: indicates how many messages got submitted to engine when conflict notification is received from cdl.

- Label: `skip_<reason for skip>`

  Label Description: indicates that pcf is expecting some data validation before merging the records when cdl notification is received, if that data is missing pcf logs these skip counters with reason for skipping.

PCF Diameter Stats Category

diameter_late_responses_total

Description: Captures the total count of Diameter responses that the PCF Engine took time to process

Sample Query:
`diameter_late_responses_total{command_code=\"AAR\",application=\"rx\",result_code=\"2001\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

- Label: `result_code`

  Label Description: Result Code

  Example: 2001,5012,5065 etc.

diameter_request_total

Description: Collects the total count of Diameter request that the PCF Engine has processed.

Sample Query: `diameter_request_total{command_code=\"AAR\",application=\"rx\"}`

Labels:

- Label: `command_code`

  Label Description: Interface name that connects PCF to other network functions

  Example: AAR,ASR,RAR,STR etc

- Label: `application`

  Label Description: application

Example: rx etc.

diameter_responses_seconds_total

Description: Captures the total amount of time (in seconds) that the PCF Engine took to process a diameter

Sample Query:
`diameter_responses_seconds_total{command_code=\"AAR\",application=\"rx\",result_code=\"2001\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

- Label: `result_code`

  Label Description: Result Code

  Example: 2001,5012,5065 etc.

diameter_responses_total

Description: Records the total count of the Diameter responses that the Policy Engine has processed

Sample Query:
`diameter_responses_total{command_code=\"AAR\",application=\"rx\",result_code=\"2001\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

Labels:

- Label: `result_code`

  Label Description: Result Code

  Example: 2001,5012,5065 etc.

dispatch_error_seconds_total

Description: Captures the total amount of time (in seconds) used to detect messages that encountered the dispatch error

Sample Query:
`dispatch_error_seconds_total{command_code=\"AAR\",application=\"rx\",error_code=\"5002\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

Labels:

- Label: `error_code`

  Label Description: Error Code

  Example: 5002,5065,5012 etc.

dispatch_error_total

Description: Captures the total count of messages that encountered dispatch error through the GRPC Interface

Sample Query: `dispatch_error_total{command_code=\"AAR\",application=\"rx\",error_code=\"5002\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

Labels:

- Label: `error_code`

  Label Description: Error Code

  Example: 5002,5065,5012 etc.

grpc_message_send_total

Description: Collects the total count of messages that are sent over the gRPC toward the PCF Engine

Sample Query:
`grpc_message_send_total{command_code=\"AAR\",application=\"rx\",remote_service=\"diameter-engine\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `remote_service`

  Label Description: Remote Service

  Example: diameter-engine etc.

policy_engine_message_seconds_total

Description: Projects the total amount of time (in seconds) taken to process the round-trip responses for the PCF Engine GRPC messages

Sample Query: `policy_engine_message_seconds_total{command_code=\"AAR\",application=\"rx\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

policy_engine_message_seconds_total

Description: Round trip response timeout total for Policy Engine GRPC message

Sample Query: `policy_engine_message_seconds_total{command_code=\"AAR\",application=\"rx\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

policy_engine_message_total

Description: Round trip response total for Policy Engine GRPC message

Sample Query: `policy_engine_message_total{command_code=\"AAR\",application=\"rx\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

process_message_seconds_total

Description: Projects the total amount of time (in seconds) used to process the messages through the Diameter interface

Sample Query: `process_message_seconds_total{command_code=\"AAR\",application=\"rx\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

process_message_total

Description: Projects the total count of messages that were processed through the Diameter interface

Sample Query: `process_message_total{command_code=\"AAR\",application=\"rx\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

route_avp_seconds_total

Description: Indicates the total time (in seconds) taken to route the AVP requests

Sample Query: `route_avp_seconds_total{command_code=\"AAR\",application=\"rx\",status=\"2001\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

Labels:

- Label: `status`

  Label Description: Status

  Example: error,success

route_avp_total

Description: Captures the total number of the route AVP requests that are built

Sample Query: `route_avp_total{command_code=\"AAR\",application=\"rx\",status=\"success\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

Labels:

- Label: `status`

  Label Description: Status

  Example: error,success

session_binding_lookup_seconds_total

Description: Captures the total time (in seconds) taken to complete the Session Binding Lookup Requests

Sample Query:
`session_binding_lookup_seconds_total{command_code=\"AAR\",application=\"rx\",status=\"success\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

Labels:

- Label: `status`

  Label Description: Status

  Example: error,success

session_binding_lookup_total

Description: Projects the total number of the Session Binding Lookup Requests that were built

Sample Query:
`session_binding_lookup_total{command_code=\"AAR\",application=\"rx\",status=\"success\"}`

Labels:

- Label: `command_code`

  Label Description: Command Code

  Example: AAR,ASR,RAR,STR etc

Labels:

- Label: `application`

  Label Description: Application Name

  Example: rx etc.

Labels:

- Label: `status`

  Label Description: Status

  Example: error,success

Interface KPIs

N7 Data Create Success Rate without timeouts

Description: Counts the N7 data create success rate without timeouts.

Formula:

sum(irate(incoming_request_total{interface_name="N7", command="Create", result_code=~"2.*"}[1m])) * 100 / sum(irate(incoming_request_total{interface_name="N7", command="Create", result_code!="408"}[1m]))

N7 Data Create Success Rate with timeouts

Description: Counts the N7 data create success rate with timeouts.

Formula:

sum(irate(incoming_request_total{interface_name="N7", command="Create", result_code=~"2.*"}[1m])) * 100 / sum(irate(incoming_request_total{interface_name="N7", command="Create"}[1m]))

N7 Data Update Success Rate

Description: Counts the N7 data update success rate.

Formula:

sum(irate(incoming_request_total{interface_name="N7", command="Update", result_code=~"2.*"}[1m])) * 100 / sum(irate(incoming_request_total{interface_name="N7", command="Update"}[1m]))

N7 Data Delete Success Rate

Description: Counts the N7 data delete success rate.

Formula:

sum(irate(incoming_request_total{interface_name="N7", command="Delete", result_code=~"2.*"}[1m])) * 100 / sum(irate(incoming_request_total{interface_name="N7", command="Delete"}[1m]))

N7 Notify Success Rate

Description: Counts the N7 notification success rate.

Formula:

sum(irate(outgoing_request_total{interface_name="N7", command="Notify", result_code=~"2.*"}[1m])) * 100 / sum(irate(outgoing_request_total{interface_name="N7", command="Notify"}[1m]))

N5 Notify Event Success Rate

Description: Counts the N5 notification event success rate.

Formula:

sum(irate(outgoing_request_total{interface_name="N5", command="Notify_Event", result_code=~"2.*"}[1m])) * 100 / sum(irate(outgoing_request_total{interface_name="N5", command="Notify_Event"}[1m]))

N5 Notify Terminate Success Rate

Description: Counts the N5 notifiy terminate success rate.

Formula:

sum(irate(outgoing_request_total{interface_name="N5", command="Notify_Terminate", result_code=~"2.*"}[1m])) * 100 / sum(irate(outgoing_request_total{interface_name="N5", command="Notify_Terminate"}[1m]))

AAR Success Rate

Description: Counts the AAR success rate.

Formula:

sum(irate(diameter_responses_total{exported_application="Rx",command_code="AAA",result_code="2001"}[1m])*100) /sum(irate(diameter_responses_total{exported_application="Rx",command_code="AAA"}[1m]))

ASR Success Rate

Description: Counts the ASR success rate.

Formula:

sum(irate(diameter_responses_total{exported_application="Rx",command_code="ASA",result_code="2001"}[1m])*100) / sum(irate(diameter_responses_total{exported_application="Rx",command_code="ASA"}[1m]))

STR Success Rate

Description: Counts the STR success rate.

Formula:

sum(irate(diameter_responses_total{exported_application="Rx",command_code="STA",result_code="2001"}[1m])*100) / sum(irate(diameter_responses_total{exported_application="Rx",command_code="STA"}[1m]))

Rx RAR Success Rate

Description: Counts the Rx RAR success rate.

Formula:

sum(irate(diameter_responses_total{exported_application="Rx",command_code="RAA",result_code="2001"}[1m])*100) / sum(irate(diameter_responses_total{exported_application="Rx",command_code="RAA"}[1m]))

N28 Subscribe Success Rate without timeouts

Description: Counts the N28 subscribe success rate without timeouts.

Formula:

sum(irate(outgoing_request_total{interface_name="N28", command="Subscribe", result_code=~"2.*"}[1m])) * 100 / sum(irate(outgoing_request_total{interface_name="N28", command="Subscribe", result_code!="408"}[1m]))

N28 Subscribe Success Rate with timeouts

Description: Counts the N28 subscribe success rate with timeouts.

Formula:

sum(irate(outgoing_request_total{interface_name="N28", command="Subscribe", result_code=~"2.*"}[1m])) * 100 / sum(irate(outgoing_request_total{interface_name="N28", command="Subscribe"}[1m]))

N28 Notify Success Rate

Description: Counts the N28 notification success rate.

Formula:

sum(irate(incoming_request_total{interface_name="N28", command="Notify"}[1m])) * 100 / sum(irate(incoming_request_total{interface_name="N28", command="Notify", result_code!="408"}[1m]))

USD Query Success Rate

Description: Counts the interface success rate.

Formula:

sum(irate(message_total{type=~".*_ldap_query", status="success"}[1m])) *100 / sum(irate(message_total{type=~".*_ldap_query"}[1m]))

Note Failed authorization on LDAP query will still count as USD_ldap*.success.

NAP Notification Success Rate

Description:

Formula: Counts the NAP notification success rate.

sum(irate(action_total{type="ldap_notify", status="success"}[1m])) *100 / sum(irate(action_total{type="ldap_notify"}[1m]))

GPASS Count

Description: Counts the number of GPASS triggered from the policy.

Formula:

sum(irate(action_total{type=resolve-virtual-service-gpass, status=”success”}[1m]))

EPASS Count

Description: Counts the number of EPASS triggered from the policy.

Formula:

sum(irate(charging_rule_total{action=”install”, name=”goodwill”}[1m]))

System KPIs

System Health Monitoring KPIs

The following table lists the KPIs and thresholds to track the overall performance of the PCF deployment, including information about the underlying hardware.

CPU Utilization

Description: CPU is a critical system resource. When the demand increases and CPU utilization exceeds 80% utilization, the efficiency of the CPU is reduced. When CPU utilization exceeds 80%, the application processing time will increase, message response will increase, and drops and timeouts will be seen.

Statistics/Formula: (avg without (cpu,mode)(irate(node_cpu_seconds_total{component="node-exporter",mode!="idle"}[1m])))

Warning Threshold: > 60% utilization over 60 second period (assuming that idle is less than 40%)

Major Threshold: > 80% utilization over 60 second period (assuming idle is less than 20%)

CPU Steal

Description: If multiple VMs on the same hypervisor and same hardware have concurrent CPU demands, the hypervisor will “steal” CPU from one VM to satisfy another VM CPU needs. If the CPU Steal statistic is non-zero, there is not enough CPU allocated for the VMs.

Statistics/Formula: (avg without (cpu,mode)(irate(node_cpu_seconds_total{component="node-exporter",mode="steal"}[1m])))

Warning Threshold: NA

Major Threshold: > 2% over 60 second period

CPU I/O Wait

Description: This monitors CPU I/O wait time. High CPU wait times may indicate CPUs waiting on disk access.

Statistics/Formula: (avg without (cpu,mode)(irate(node_cpu_seconds_total{component="node-exporter",mode="wait"}[1m])))

Warning Threshold: > 30 for more than 5 min

Major Threshold: > 50 for more than 10 min

Memory utilization

Description: Memory is a system resource, which needs to be less than 80%. The swap threshold has been reduced, and swapping should occur when the system resources are exhausted and memory utilization hits 99%.

Statistics/Formula: 100 - ((node_memory_MemAvailable_bytes * 100) / node_memory_MemTotal_bytes)

Warning Threshold: > 70% utilization over 60 second period

Major Threshold: > 80% utilization over 60 second period

Disk Utilization

Description: Disk storage is a critical system resource, and when file system utilization exceeds 90% utilization the system can become less efficient. When the file system utilization hits 100%, then application can stop functioning.

Statistics/Formula:

100 - ((node_filesystem_avail_bytes{mountpoint="/",fstype!="rootfs"} * 100) / node_filesystem_size_bytes{mountpoint="/",fstype!="rootfs"})

Warning Threshold: > 80% utilization

Major Threshold: > 90% utilization

In Queue

Description: These statistics monitors how long a message waits in the application queue, waiting to be serviced. The value should be 10ms all the time. higher values indicate the application is too slow, short of resources, or overwhelmed.

Statistics/Formula: sum(irate(input_queue_duration_seconds[1m])) / sum(irate(input_queue_total[1m]))

Warning Threshold: NA

Major Threshold: More than 10 ms over 60 seconds

Diameter 3xxx errors

Description: Diameter Too Busy 3xxx message indicate that the PCF is overwhelmed, or responding too slowly. This can be related to In Queue issues, system resources, database problems, network latency, or issues with other external nodes in the call flow.

Statistics/Formula: sum(irate(diameter_responses_total{result_code=~"3.*"}[1m])) *100/sum(irate(diameter_responses_total{result_code=~"2001"}[1m]))

Warning Threshold: > 0.5% Over 30 minute period

Major Threshold: > 1% Over 30 minute period

Diameter 5xxx errors

Description: Session Not Found and other Diameter 5xxx errors indicate a critical problem with the ability to process the incoming diameter message. This can be related to exhausted system resources, invalid session id or bad message structure, length, or content, or even database corruption.

Statistics/Formula: sum(irate(diameter_responses_total{result_code=~"3.*"}[1m])) *100/sum(irate(diameter_responses_total{result_code=~"2001"}[1m]))

Warning Threshold: > 0.5% Over 5 minute period

Major Threshold: > 1% Over 5 minute period

N7 5xx Errors

Description: N7 errors indicate that the PCF is unable to process N7 requests. This can be related to service timeout or service unavailable or an internal error.

Statistics/Formula: sum(irate(incoming_request_total{interface_name="N7", result_code=~"5.*"}[1m])) * 100 / sum(irate(incoming_request_total{interface_name="N7", result_code=~"2.*"}[1m]))

Warning Threshold: > 0.5% over 30 minute period

Major Threshold: > 1% over 30 minute period

N28 5xx Errors

Description: N28 errors indicate that the PCF is unable to process N28 requests. This can be related to service timeout or service unavailable or an internal error.

Statistics/Formula: sum(irate(outgoing_request_total{interface_name="N28", result_code=~"5.*"}[1m])) * 100 / sum(irate(outgoing_request_total{interface_name="N28", result_code=~"2.*"}[1m]))

Warning Threshold: > 0.5% over 30 minute period

Major Threshold: > 1% over 30 minute period

Active Session Count

Description: Number of total sessions currently active.

Statistics/Formula: avg(db_records_total{session_type="total"})

Warning Threshold:

>80% of the lessor of the dimensioned or licensed capacity for more than 1 hour

or

= 0 for more than 5 minutes

Major Threshold:

>80% of the lessor of the dimensioned or licensed capacity for more than 10 minutes

or

= 0 for more than 10 minutes

% of Messages dropped due to SLA timeout

Description: Messages dropped due to SLA timeouts indicate that the PCF is overwhelmed, or responding too slowly. This can be related to In Queue issues, system resources, database problems, network latency, or issues with other external nodes in the call flow.

Statistics/Formula:
sum(irate(input_queue_result_total{result="drop"}[1m]))*100/(sum(irate(incoming_request_total{result_code=~"2.*"}[1m])) + sum(irate(diameter_responses_total{result_code="2001"}[1m])))

Warning Threshold: > 0.5%

Major Threshold: > 1%

System Status KPIs

system_mode

Description: Indicates the current mode the system is running on.

Statistics/Formula: system_mode

Labels:

- Label: `0`

  Label Description: The system is in shutdown mode.

- Label: `1`

  Label Description: The system is running.

- Label: `2`

  Label Description: The system is under maintenance.

- Label: `-1`

  Label Description: The system mode is unknown.

system_synch_running

Description: Specifies whether the system configuration synch process is running or not.

Statistics/Formula: system_synch_running

Labels:

- Label: `1`

  Label Description: The system configuration sync process is running.

- Label: `0`

  Label Description: The system configuration sync process is not running.

system_running_percent

Description: Captures the percentage of the system currently in use.

Statistics/Formula: system_running_percent

System Configuration KPIs

system_configuration_bac kup_total

Description: Captures the total number of system configuration backups that are executed.

Statistics/Formula: irate(system_configuration_backup_total [1m])

Labels:

- Label: `status`

Label Description: The status of the executed backups. For example, success or error.

configuration_change_total

Description: Captures the total number of configuration changes that are executed.

Statistics/Formula: sum(irate(configuration_change_total[1m]))

CPU Category

node_cpu_seconds_total

Description: Seconds the cpus spent in each mode

Sample Query: `avg(irate(node_cpu_seconds_total{mode=~\"irq|softirq\"}[1m])) by (instance) * 100`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `cpu`

  Label Description: the cpu number

  Example: cpu0, cpu1, etc

- Label: `mode`

  Label Description: the cpu mode

  Example: system, user, sotirq, irq, idle, iowait, etc

Disk Category

node_disk_bytes_read

Description: This metrics gives the total number of bytes read successfully.

Sample Query: `sum(irate(node_disk_bytes_read[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

  Label Description: the name of the disk device

  Example: vdb, vdd, sr0

node_disk_read_time_seconds_total

Description: This metrics gives the total number of seconds spent by all reads

Sample Query: `sum(irate(node_disk_read_time_seconds_total[1m])) by (instance) / sum(irate(node_disk_reads_completed_total[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

  Label Description: the name of the disk device

  Example: vdb, vdd, sr0

node_disk_reads_completed_total

Description: This metrics gives the total number of reads completed successfully.

Sample Query: `sum(irate(node_disk_reads_completed_total[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

Labels:

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

Label Description: the name of the disk device

Example: vdb, vdd, sr0

node_disk_write_time_seconds_total

Description: This metrics gives the total number of seconds spent by all writes

Sample Query: `sum(irate(node_disk_write_time_seconds_total[1m])) by (instance) / sum(irate(node_disk_writes_completed_total[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

Labels:

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

Labels:

- Label: `device`

  Label Description: the name of the disk device

  Example: vdb, vdd, sr0

node_disk_writes_completed_total

Description: This metrics gives the total number of writes completed successfully.

Sample Query: `sum(irate(node_disk_writes_completed[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

Labels:

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

Labels:

- Label: `device`

  Label Description: the name of the disk device

Example: vdb, vdd, sr0

node_disk_written_bytes_total

Description: This metrics gives the total number of bytes written successfully.

Sample Query: `sum(irate(node_disk_written_bytes_total[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

Labels:

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

Labels:

- Label: `device`

  Label Description: the name of the disk device

  Example: vdb, vdd, sr0

File System Category

node_filesystem_free_bytes

Description: This metrics gives the total number of bytes of the free disk space available on the instance

Sample Query: `sum(node_filesystem_free_bytes{mountpoint=\"/data\"}) by (device, instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

  Label Description: the name of the disk device

  Example: /dev/vda3, /dev/vdb

- Label: `fstype`

Label Description: the file system type

Example: ext4

- Label: `mountpoint`

  Label Description: the file system mount directory

  Example: /data, /tootfs

node_filesystem_size_bytes

Description: This metrics gives the total number of bytes of the total disk space provisioned on the instance

Sample Query: `sum(node_filesystem_size_bytes{mountpoint=\"/data\"}) by (device, instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

  Label Description: the name of the disk device

  Example: /dev/vda3, /dev/vdb

- Label: `fstype`

  Label Description: the file system type

  Example: ext4

- Label: `mountpoint`

  Label Description: the file system mount directory

  Example: /data, /tootfs

Load Category

node_load1

Description: This metrics gives the 1m load average.

Metric Type: Gauge

Data Type: Float

Sample Query: `avg(irate(node_load1[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

node_load15

Description: This metrics gives the 15m load average.

Metric Type: Gauge

Data Type: Float

Sample Query: `avg(irate(node_load15[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

node_load5

Description: This metrics gives the 5m load average.

Metric Type: Gauge

Data Type: Float

Sample Query: `avg(irate(node_load5[1m])) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

Labels:

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

Memory Category

node_memory_MemFree_bytes

Description: This metrics gives the total number of bytes of the free memory available on the node

Sample Query: `sum(node_memory_MemFree_bytes) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

node_memory_MemTotal_bytes

Description: This metrics gives the total number of bytes of the total memory provisioned on the node

Sample Query: `sum(node_memory_MemTotal_bytes) by (instance)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

Network Category

node_network_receive_bytes_total

Description: This metrics gives the total number of bytes received over the network device

Sample Query: `sum(irate(node_network_receive_bytes_total[1m])) by (device)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

- Label: `job`

Label Description: the name of job

Example: node_exporter

- Label: `device`

  Label Description: the name of the network device/interface

  Example: ens3, ens4

node_network_transmit_bytes_total

Description: This metrics gives the total number of bytes sent over the network device

Sample Query: `sum(irate(node_network_transmit_bytes_total[1m])) by (device)`

Labels:

- Label: `instance`

  Label Description: the virtual machine/instance

  Example: master-0, control-0, dra-director-1, etc

- Label: `job`

  Label Description: the name of job

  Example: node_exporter

- Label: `device`

  Label Description: the name of the network device/interface

  Example: ens3, ens4