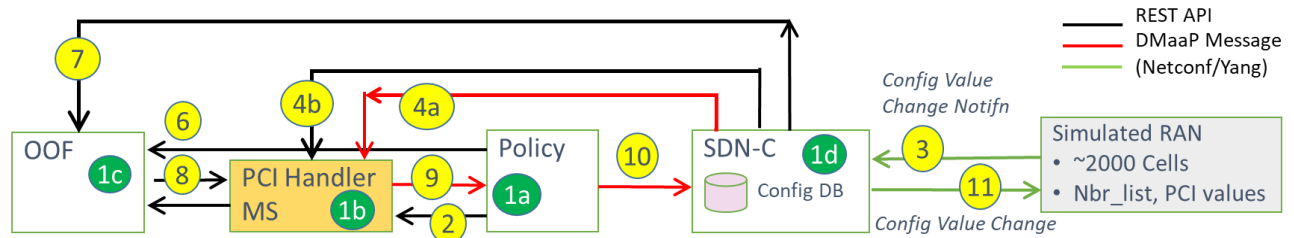


Impacts in Policy for OOF SON PCI optimization use case

1. Message Flow



Step	Functionality
1a-1d	All modules loaded to support PCI
2	PCI-Handler MS fetches configuration policies from Policy
3	Config change notification from RAN to SDN-C (e.g. Nbr list change)
4a	SDN-C publishes config data change on DMaaP to PCI-Handler-MS.
4b	PCI-Handler MS obtains relevant info from SDN-C (REST API call)
5	PCI-Handler MS invokes OOF for pre-defined workflow for PCI Optimization (REST API call)

Step	Functionality
6	OOF gets PCI optimization policies from Policy
7	OOF queries SDN-C database to fetch data for cells in the region (REST API call)
8	OOF provides PCI Optimization result to PCI Handler MS (REST API call)
9	PCI-Handler-MS provides PCI recommendation to Policy on DMaaP
10	Policy sends message to SDN-C with instruction for PCI configuration changes on DMaaP
11	SDN-C applies config changes via Netconf

2. Interfaces to Policy module

Message Source/ Producer	Message Destination/ Consumer	Purpose	Type	Topic/REST call (Note 1)	Contents/Remarks
PCI-MS	Policy	Step 2: Fetch PCI-MS configuration parameters	REST API call	/getConfig (existing API)	
Policy (owner)	PCI-MS	Notify upon PCI-MS config policy update	Websocket	ws://<PDP IP>:8081/pdp/notifications	Policy pushes a websocket notification on config policy change.
PCI MS (owner)	Policy	Step 9: Inform PCI changes recommended by OOF	DMaaP message (CL format)	PCI-NOTIF-TOPIC-PCI-OPT-RECMD	Contents: PCI optimization algorithm result – set of cells requiring PCI change {cell id, new PCI}
Policy (owner)	SDN-R	Step 10: Trigger SDN-R to implement PCI modifications	DMaaP message (CL format)	SDNR-CL	Contents: List of {cell id, new PCI} for the cells whose PCIs have to be changed.
SDN-R (owner)	Policy	Acknowledge receipt of PCI modification trigger & acting	DMaaP message (CL format)	SDNR-CL-RSP	Send this after sending update to RAN

Note: The DMaaP message contents are described in Section 4. There is no change in the existing REST API call to get configuration inputs from Policy (getConfig).

3. Configurations relevant to Policy module

3.1. PCI-HMS config Policy

```
{
  "policyName": "com.Config_PCIMS_CONFIG_POLICY",
  "policyVersion": "1",
  "configBody": "{ \"PCI_NEIGHBOR_CHANGE_CLUSTER_TIMEOUT_IN_SECS\":60,
  \"PCI_MODCONFIG_POLICY_NAME\": \"ControlLoop-vPCI-fb41f388-a5f2-11e8-98d0-529269fb1459\",
  \"PCI_OPTMIZATION_ALGO_CATEGORY_IN_OOF\": \"OOF-PCI-OPTIMIZATION\",
  \"PCI_SDNR_TARGET_NAME\": \"SDNR\" }",
  "policyClass": "Config",
  "policyConfigType": "Base",
  "ttlDate": "2018-08-29T06:28:16.830Z",
  "onapName": "DCAE",
  "configName": "PCIMS_CONFIG_POLICY",
  "configBodyType": "JSON"
}
```

Description of Config Parameters:

PCI_NEIGHBOR_CHANGE_CLUSTER_TIMEOUT_IN_SECS	60	Time in seconds till we wait before triggering the OOF for a cluster.
PCI_MODCONFIG_POLICY_NAME	ControlLoop-vPCI-fb41f388-a5f2-11e8-98d0-529269fb1459	Name of control loop policy for taking PCI config modify action through SDNR
PCI_OPTMIZATION_ALGO_CATEGORY_IN_OOF	OOF-PCI-OPTIMIZATION	The algorithm category to be invoked in OOF for PCI optimization
PCI_SDNR_TARGET_NAME	SDNR	The actor name. The recipe name and topic names are not configurable as it involves drools(drl) file changes.

3.2. OOF config Policy

(Inputs to be provided by OOF team to finalize the configBody).

```
{
  "policyName": "com.Config_OOF_PCI_CONFIG_POLICY ",
  "policyVersion": "1",
  "configBody": "{ \"ALGO_CATEGORY\": \"OOF-PCI-OPTIMIZATION\",
  \"PCI_OPTMIZATION_ALGO_NAME\": \"OOF-PCI-OPTIMIZATION-LEVEL1\",
  \"PCI_OPTMIZATION_NW_CONSTRAINT\": \"MAX5PCICHANGESONLY\",
  \"PCI_OPTMIZATION_PRIORITY\": 2,
  \"PCI_OPTMIZATION_TIME_CONSTRAINT\": \"ONLYATNIGHT\" }",
  "policyClass": "Config",
```

```

"policyConfigType": "Base",
"ttlDate": "2018-08-29T07:28:16.830Z",
"onapName": "OOF",
"configName": "OOF_PCI_CONFIG_POLICY",
"configBodyType": "JSON"
}

```

Description of Config Parameters:

PCI_MODCONFIG_POLICY_NAME	ControlLoop-vPCI-fb41f388-a5f2-11e8-98d0-529269fb1459	Name of control loop policy for taking PCI config modify action through SDNR
ALGO_CATEGORY	OOF-PCI-OPTIMIZATION-LEVEL1	Exactly which algorithm to be used among existing algorithms
PCI_OPTIMIZATION_NW_CONSTRAINT PCI_OPTIMIZATION_PRIORITY PCI_OPTIMIZATION_TIME_CONSTRAINT		These are additional constraints and priorities needed for OOF PCI Optimization algorithm implementation. <i>Should be defined by OOF team</i>

3.3. Control Loop Policy

Reference:

<https://wiki.onap.org/display/DW/R3+Tutorial%3A+Generating+and+Testing+your+own+Control+Loop+Operational+Policy+in+a+standalone+PDP-D>

```

controlLoop:
  version: 2.0.0
  controlLoopName: ControlLoop-vPCI-fb41f388-a5f2-11e8-98d0-529269fb1459
  trigger_policy: PCI-ModifyConfig-Policy1
  timeout: 3600
  abatement: false

policies:
- id: PCI-ModifyConfig-Policy1
  name: PCI-ModifyConfig-Policy1
  description: Instruct SDNR to update the configuration on one or more
RanCells
  actor: SDNR
  recipe: ModifyConfig
  target:
    type: PNF
  retry: 2
  timeout: 1200
  success: final_success
  failure: final_failure
  failure_timeout: final_failure_timeout
  failure_retries: final_failure_retries

```

```
failure_exception: final_failure_exception
failure_guard: final_failure_guard
```

3.4. DMaaP messages

3.4.1. PCI-HMS to Policy

DMaaP topic name: DCAE_EVENT_OUTPUT

This message is sent from PCI-HMS to Policy in Step 9 to trigger the control loop actions in Policy for PCI optimization. The payload contents shall correspond to the proposed Yang model layout for the netconf command to be issued from SDN-R to the netconf server devices (RAN nodes).

```
{
  "closedLoopControlName": "ControlLoop-vPCI-fb41f388-a5f2-11e8-98d0-529269fb1459",
  "closedLoopAlarmStart": 1510187409180,
  "closedLoopEventClient": "microservice.PCI",
  "closedLoopEventStatus": "ONSET",
  "requestID": "9d2d790e-a5f0-11e8-98d0-529269fb1459",
  "AAI": {},
  "from": "PCIMS",
  "version": "1.0.2",
  "Action": "ModifyConfig",
  "Payload": {
    "Configurations": [
      {
        "pnf-name": "RanCell1",
        "data": {
          "FAPService": {
            "alias": "Network1",
            "CellConfig": {
              "LTE": {
                "RAN": {
                  "Common": {
                    "CellIdentity": "1"
                  },
                  "RF": {
                    "PhyCellID": "35"
                  }
                }
              }
            }
          }
        }
      },
      {
        "pnf-name": "RanCell2",
        "data": {
          "FAPService": {
            "alias": "Network1",
            "CellConfig": {
              "LTE": {
                "RAN": {
```



```

    },
    {
      "pnf-name": "RanCell12",
      "data": {
        "FAPService": {
          "alias": "Network1",
          "CellConfig": {
            "LTE": {
              "RAN": {
                "Common": {
                  "CellIdentity": "2"
                },
                "RF": {
                  "PhyCellID": "22"
                }
              }
            }
          }
        }
      }
    }
  ]
}

```

3.4.3. SDN-R to Policy

DMaaP Topic Name: SDNR-CL-RSP

This DMaaP message is sent by SDN-R to Policy as acknowledgement of Step 10, after execution of the actions recommended by Policy in Step 10.

There is an overall status code, as well as a status code per PNF.

```

{
  "CommonHeader": {
    "TimeStamp": 1506051879001,
    "APIVer": "1.01",
    "RequestID": "c7c6a4aa-bb61-4a15-b831-ba1472dd4a65",
    "SubRequestID": "1",
    "RequestTrack": [],
    "Flags": []
  },
  "Status": {
    "Code": 500,
    "Value": "PARTIAL_SUCCESS"
  },
  "Payload": {
    "Configurations": [
      {
        "pnf-name": "RanCell11",
        "Status": {
          "Code": 200,
          "Value": "SUCCESS"
        }
      }
    ]
  }
}

```

```

    },
  },
  {
    "pnf-name": "RanCell2",
    "Status": {
      "Code": 400,
      "Value": "Failure1"
    },
  },
]
}
}

```

4. Impacts in Policy module

4.1. PCI-HMS fetches configuration policies from Policy module (Step 2)

This policy is created at Casablanca controller installation/setup.

The corresponding code changes are needed in `./docker/config/pe/push-policies.sh`

```

curl -v --silent -X PUT --header 'Content-Type: application/json' --header
'Accept: text/plain' --header 'ClientAuth: cH10aG9uOnRlc3Q=' --header
'Authorization: Basic dGVzdHBkcDphbHB0YTEyMw==' --header 'Environment: TEST'
-d '{
  "policyName": "PCIMS_CONFIG_POLICY",
  "policyVersion": "1",
  "configBody": "{ \"PCI_NEIGHBOR_CHANGE_CLUSTER_TIMEOUT_IN_SECS\":60,
  \"PCI_MODCONFIG_POLICY_NAME\": \"ControlLoop-vPCI-fb41f388-a5f2-11e8-98d0-
529269fb1459\", \"PCI_OPTIMIZATION_ALGO_CATEGORY_IN_OOF\": \"OOF-PCI-
OPTIMIZATION\", \"PCI_SDN_TARGET_NAME\": \"SDNR\" }",
  "policyClass": "Config",
  "policyConfigType": "Base",
  "ttlDate": "2018-08-29T06:28:16.830Z",
  "onapName": "DCAE",
  "configName": "PCIMS_CONFIG_POLICY",
  "configBodyType": "JSON"
}' 'http://pdp:8081/pdp/api/createPolicy'

```

4.2. OOF fetches configuration policies from Policy module (Step 6)

This policy is created at casablanca controller installation/setup.

The corresponding code changes are needed in `./docker/config/pe/push-policies.sh`

```

curl -v --silent -X PUT --header 'Content-Type: application/json' --header
'Accept: text/plain' --header 'ClientAuth: cHl0aG9uOnRlc3Q=' --header
'Authorization: Basic dGVzdHBkcDphbHB0YTEyMw==' --header 'Environment: TEST'
-d '{
  "policyName": "OOF_PCI_CONFIG_POLICY",
  "policyVersion": "1",
  "configBody": "{ \"ALGO_CATEGORY\": \"OOF-PCI-OPTIMIZATION\",
\"PCI_OPTIMIZATION_ALGO_NAME\": \"OOF-PCI-OPTIMIZATION-LEVEL1\",
\"PCI_OPTIMIZATION_NW_CONSTRAINT\": \"MAX5PCICHANGESONLY\",
\"PCI_OPTIMIZATION_PRIORITY\": 2,
\"PCI_OPTIMIZATION_TIME_CONSTRAINT\": \"ONLYATNIGHT\" }",
  "policyClass": "Config",
  "policyConfigType": "Base",
  "ttlDate": "2018-08-29T07:28:16.830Z",
  "onapName": "OOF",
  "configName": "OOF_PCI_CONFIG_POLICY",
  "configBodyType": "JSON"
}' 'http://pdp:8081/pdp/api/createPolicy'

```

4.3. PCI-HMS provides PCI changes recommended by OOF to Policy (Step 9)

PCI MS will put the DMaaP notification into DCAE_EVENT_OUTPUT topic which is used by all DCAE micro services.

Refer section “3.4.1 PCI-HMS to Policy” for DMaaP notification content.

```

http://localhost:9696/policy/pdp/engine/topics/sources/ueb/unauthenticated.DCAE_EVENT_OUTPUT/e
vents

```

Note: We will investigate on use of unauthenticated or authenticated topic and update here.

4.4. Policy triggers SDN-C (SDN-R) as part of Control Loop actions and SDNR Response handling (Step 10)

(a) [drools-applications/controlloop/templates/archetype-cl-casablanca/src/main/resources/META-INF/maven/archetype-metadata.xml](#)

- To create vPCI policy when the Casablanca controller is being setup for use case demo
./docker/config/pe/push-policies.sh
- To create initial default Config and Action policies. This will be created and pushed when the "pap" container starts.

(b) drools-applications/controlloop/common/actors/actor.sdnr/src/main/java/org/onap/policy/controlloop/actor/sdnr/SDNRActorServiceProvider.java

- Take care of
 - a. Constructing DMaaP notification (SDNR-CL) for SDNR and posting it.
 - b. Handling DMaaP notification response from SDNR (SDNR-CL-RSP).

(c) drools-applications/controlloop/common/model-impl/sdnr/src/main/java/org/onap/policy/sdnr/*.java

Bean classes for SDNR DMaaP notifications (SDNR-CL and SDNR-CL-RSP) are defined here.

(d) drools-applications/controlloop/common/feature-controlloop-casablanca/src/main/feature/config/casablanca-controller.properties

Add SDNR topic names (SDNR-CL and SDNR-CL-RSP) into ueb.source.topics and ueb.sink.topics , add corresponding topic details section

(e) drools-applications/controlloop/templates/archetype-cl-casablanca/src/main/resources/ archetype-resources/src/main/resources/ closedLoopControlName .drl

- Add PCI related code for rule "EVENT.MANAGER.OPERATION.LOCKED.GUARD_PERMITTED"
- Add SDNR related code for rule "SDNR.RESPONSE"
- Add SDNR related code for rule "SDNR.RESPONSE.CLEANUP"

- END OF DOCUMENT -