NGIC – Table design and test

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# Table design

This document describes design, implementation and test for rule tables in NGIC. Rule table requirements are defined in the specification TS 29.212. Following are tables designed in NGIC to configure traffic policy and charging rules.

## PCC (Policy and charging control) rules

Each PCC rules is associated with SDF or ADC rules. Following are the key points to note for same:

* PCC rule can be associated with either SDF rule(s) or ADC rule.
* Single PCC rule can be associated with one or multiple SDF rule(s).
* Single PCC rule can be associated with single ADC rule.

|  |  |
| --- | --- |
| Attribute | Sample value |
| RULE\_NAME | String |
| RATING\_GROUP | Integer |
| SERVICE\_ID | Integer |
| RULE\_STATUS | Integer |
| GATE\_STATUS | Integer(1-Accept, 0-Drop) |
| SESSION\_CONT | Integer |
| REPORT\_LEVEL | Integer |
| CHARGING\_MODE | Integer |
| METERING\_METHOD | Integer |
| MUTE\_NOTIFY | Integer |
| MONITORING\_KEY | Integer |
| SPONSOR\_ID | Integer |
| REDIRECT\_INFO | Integer |
| PRECEDENCE | Integer(0-255, 255 is lowest) |
| DROP\_PKT\_COUNT | Integer |
| UL\_MBR\_MTR\_PROFILE\_IDX | Integer - Specify the meter profile index from meter\_profile.cfg |
| DL\_MBR\_MTR\_PROFILE\_IDX | Integer |
| SDF\_FILTER\_IDX | Integer Array |
| ADC\_FILTER\_IDX | Integer |

TBD: Following parameters from the specification are not supported in PCC table yet.

(Reference: section 4.3.1 in 29.212)

* Indication for PS to CS session continuity;
* Other charging parameters;
* Application service provider identity;
* Indication of access network information reporting;
* Traffic steering policy identifier(s).

## ADC (Application detection and control) rules

|  |  |
| --- | --- |
| Attribute | Sample value |
| ADC\_TYPE | Integer: 1-IP, 2-IP+Prefix, 3-Domain name |
| IP | String(IP Address) |
| PREFIX | Integer |
| DOMAIN | String |

## SDF (Service data flow) rules

|  |  |
| --- | --- |
| Attribute | Sample value |
| DIRECTION | String(Bidirectional, Uplink, Downlink) |
| IPV4\_REMOTE | Integer(IP Address) |
| IPV4\_REMOTE\_MASK | Integer |
| PROTOCOL | Integer |
| REMOTE\_LOW\_LIMIT\_PORT | Integer |
| REMOTE\_HIGH\_LIMIT\_PORT | Integer |

## Table relationship

Following diagrams explains sample relationship among PCC and SDF tables (1 to n), and relationship between PCC and ADC table (1 to 1).

|  |
| --- |
| SDF Rule Id : 1  --------------------  Direction  IPv4 Local  IPv4 Local Mask  Protocol  … |

|  |
| --- |
| PCC Rule Id : 1  --------------------  Rating Group  Gate Status  Precedence  SDF Filter Index  … |

|  |
| --- |
| SDF Rule Id : 2  --------------------  Direction  IPv4 Remote  IPv4 Remote Mask  Protocol  … |

|  |
| --- |
| PCC Rule Id : 2  --------------------  Rating Group  Gate Status  Precedence  SDF Filter Index  … |

|  |
| --- |
| PCC Rule Id : 3  --------------------  Rating Group  Gate Status  Precedence  SDF Filter Index  … |

|  |
| --- |
| SDF Rule Id : 3  -------------------------  Direction  IPv4 Local  IPv4 Local Mask  Protocol  … |

|  |
| --- |
| ADC Rule Id : 1  --------------------------  Type  IP |

|  |
| --- |
| PCC Rule Id : 4  --------------------  Rating Group  Gate Status  Precedence  ADC Filter Index  … |

|  |
| --- |
| ADC Rule Id : 2  --------------------------  Type  Domain |

|  |
| --- |
| ADC Rule Id : 3  --------------------------  Type  IP  Prefix |

|  |
| --- |
| PCC Rule Id : 5  --------------------  Gate Status  Precedence  ADC Filter Index  … |

|  |
| --- |
| PCC Rule Id : 6  --------------------  Gate Status  Precedence  ADC Filter Index … |

# Code Flow:

1. Packet is matched against SDF rules, if matching rule found, retrieve associated PCC with highest precedence.
2. Packet is matched against ADC rules (either with IP/Prefix or domain name), if matching rule found, retrieve associated PCC with highest precedence.
3. Out of selected PCC rules (from SDF and ADC searches in 1 and 2), chose the one with highest precedence.
4. If “Gate Status” of short listed PCC is “Closed”, then set packet mask as Drop.
5. Update source and destination MAC in outer Ether header, source and destination IP in outer IP header.
6. Drop packets based on packet mask. Forward other packets as needed.

# Test plan and results

## SDF:

1. Add entry in PCC rule for SDF filter entry. Set gate status to Accept (1). All traffic should pass.

**Result: PASS**

\*\*\*\* Packet Loss \*\*\*\*

DL Loss= AS\_PktTx-S1uPktRx= 0(pkts); 0.00(%)

UL Loss= S1uPktTx-AS\_PktRx= 0(pkts); 0.00(%)

1. Add entry in PCC rule for SDF filter entry. Set gate status to Drop (0). Packet loss should be observed in ng40 test.

**Result: PASS**

\*\*\*\* Packet Loss \*\*\*\*

DL Loss= AS\_PktTx-S1uPktRx= 10(pkts); 100.00(%)

UL Loss= S1uPktTx-AS\_PktRx= 13085(pkts); 100.00(%)

1. Add multiple entries of PCC rules for the same SDF filter entry. Set different precedence for each entry in PCC. Gate status of the PCC rule with highest precedence should get applied. (Gate Status = Drop)

**Result: PASS**

\*\*\*\* Packet Loss \*\*\*\*

DL Loss= AS\_PktTx-S1uPktRx= 10(pkts); 100.00(%)

UL Loss= S1uPktTx-AS\_PktRx= 13085(pkts); 100.00(%)

1. Add entry in PCC rule for multiple SDF entries. Set gate status to Accept (1). All traffic should pass in ng40 test.

**Result: PASS**

\*\*\*\* Packet Loss \*\*\*\*

DL Loss= AS\_PktTx-S1uPktRx= 0(pkts); 0.00(%)

UL Loss= S1uPktTx-AS\_PktRx= 0(pkts); 0.00(%)

1. Add entry in PCC rule for multiple SDF entries. Set gate status to Drop (0). Packet loss should be observed in ng40 test.

**Result: PASS**

\*\*\*\* Packet Loss \*\*\*\*

DL Loss= AS\_PktTx-S1uPktRx= 10(pkts); 100.00(%)

UL Loss= S1uPktTx-AS\_PktRx= 13085(pkts); 100.00(%)

1. Add entry in PCC rule for multiple SDF entries. Set gate status to Drop (0). Packet loss should be observed in ng40 test. SDF rule matching for *uplink* direction.

**Result: PASS**

\*\*\*\* Packet Loss \*\*\*\*

DL Loss= AS\_PktTx-S1uPktRx= 10(pkts); 100.00(%)

UL Loss= S1uPktTx-AS\_PktRx= 13085(pkts); 100.00(%)

1. Add entry in PCC rule for multiple SDF entries. Set gate status to Drop (0). Packet loss should be observed in ng40 test. SDF rule matching for *downlink* direction.

**Result: PASS**

\*\*\*\* Packet Loss \*\*\*\*

DL Loss= AS\_PktTx-S1uPktRx= 35410(pkts); 100.00(%)

UL Loss= S1uPktTx-AS\_PktRx= 0(pkts); 0.00(%)

## ADC:

1. Add entry in PCC rule for ADC filter entry. Set gate status to Accept (1). All traffic should pass.

**Result: PASS**

\*\*\*\* Packet Loss \*\*\*\*

DL Loss= AS\_PktTx-S1uPktRx= 0(pkts); 0.00(%)

UL Loss= S1uPktTx-AS\_PktRx= 0(pkts); 0.00(%)

1. Add entry in PCC rule for ADC filter entry. Set gate status to drop (0). Packet loss should be observed in ng40 test.

**Result: PASS**

\*\*\*\* Packet Loss \*\*\*\*

DL Loss= AS\_PktTx-S1uPktRx= 10(pkts); 100.00(%)

UL Loss= S1uPktTx-AS\_PktRx= 13085(pkts); 100.00(%)

1. Add multiple entries of PCC rules for the same ADC filter entry. Set different precedence for each entry in PCC. Gate status of the PCC rule with highest precedence should get applied.

(Gate Status = Accept)

**Result: PASS**

\*\*\*\* Packet Loss \*\*\*\*

DL Loss= AS\_PktTx-S1uPktRx= 0(pkts); 0.00(%)

UL Loss= S1uPktTx-AS\_PktRx= 0(pkts); 0.00(%)

1. Add multiple entries of PCC rules for the same ADC filter entry. Set different precedence for each entry in PCC. Gate status of the PCC rule with highest precedence should get applied.

(Gate Status = Drop)

**Result: PASS**

\*\*\*\* Packet Loss \*\*\*\*

DL Loss= AS\_PktTx-S1uPktRx= 10(pkts); 100.00(%)

UL Loss= S1uPktTx-AS\_PktRx= 13085(pkts); 100.00(%)

1. In ADC rule mention IP address of one specific UE whose traffic to be filtered. In mapping PCC rule for this ADC rule, set precedence high and (Gate Status = Drop’)

Result

**Result: PASS**

\*\* Packet Loss \*\*

DL Loss= AS\_PktTx-S1uPktRx= 223(pkts); 0.63(%)

UL Loss= S1uPktTx-AS\_PktRx= 0(pkts); 0.00(%)