Enhance Flow Information in Camara QoD API

To Camara QoD Working Group

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Current Camara QoD API

Current Camara QoD

```
POST /qos-latency-senf/v1/sessions
{
 "ueAddr": "152.190.161.1",
 "asAddr": "192.176.1.84",
 "uePorts": "45342",
 "asPorts": "8082",
 "protocolIn": "TCP",
 "protocolOut": "TCP",
 "qos": "LOW_LATENCY",
 "notificationUri": "http://as.com/notifications"
}
```

3GPP NEF AsSessionWithQoS

```
POST /3gpp-as-session-with-qos/v1/{afId}/subscriptions
{
 "ueIpv4Addr": "152.190.161.1",
 "flowInfo": [
  {
   "flowId": 1,
   "flowDescriptions": [
    "permit in 6 from 152.190.161.1 45342 to 192.176.1.84 8082",
    "permit out 6 192.176.1.84 8082 to 152.190.161.1 45342"
   ]
  }
 ],
 "qosReference": "LOW_LATENCY",
 "notificationDestination": "http://camara-layer.com/notifications"
}
```

Issues

- Clarify the concepts of “protocolIn” and “protocolOut”
  - Please clarify the scenario to designate different protocols for uplink and downlink in a flow
- Weak forward compatibility to the known 3GPP features (e.g., Ethernet flows and external App ID)
- Lose the flexibility to define multiple flows in a QoD session (3GPP AsSessionWithQos API provides this flexibility)

IPFilterRule

- Existing 3GPP Specifications
  - Use the IPFilterRule definition (e.g., RFC 6733, Diameter Base Protocol)
  - Text-based format aligned to ipfw(8) from FreeBSD
  - Example: "permit in 6 from 152.190.161.1 45342 to 192.176.1.84 8082"

```
IPFilterRule filters MUST follow the format:

      action dir proto from src to dst [options]

      action       permit - Allow packets that match the rule.
                   deny   - Drop packets that match the rule.

      dir          "in" is from the terminal, "out" is to the
                   terminal.

      proto        An IP protocol specified by number.  The "ip"
                   keyword means any protocol will match.

      src and dst  <address/mask> [ports]

                   The <address/mask> may be specified as:
                   ipno       An IPv4 or IPv6 number in dotted-
                              quad or canonical IPv6 form.  Only
                              this exact IP number will match the
                              rule.
```

Usage of "protocolIn" and "protocolOut"

- The Camara QoD API allows API invoker to define a QoS Profile to selected IP flow(s)
- Conceptually, an IP flow can be described by a 5-Tuple: Client IP, Server IP, Protocol, Client Port and Server Port
  - TCP (6) is a bi-directional protocol on the same socket pairs
  - UDP (17) can be used uni-directional or bi-directional on the same socket pair
- Question:
  - Since current Camara QoD API only allows to define a single IP flow,
  - Why there are two protocol parameters ("protocolIn" and "protocolOut") needed in one IP flow?
  - And how are they set?


```
"ueAddr": "152.190.161.1",
"asAddr": "192.176.1.84",
"uePorts": "45342",
"asPorts": "8082",
"protocolIn": "TCP",
"protocolOut": "TCP",
"qos": "LOW_LATENCY",
"notificationUri": "http://as.com/notifications"
```

FlowInfo in 3GPP

- "flowInfo" (for IP flows) parameter in 3GPP AsSessionWithQos API may contain 1 or more IP flows
- Each IP flow shall contain at least 1 and maximum 2 IPFilterRules
  - 1 for uplink and 1 for downlink
- Example:

```
"flowInfo": [
 {
  "flowId": 1,
  "flowDescriptions": [
   "permit in 6 from 152.190.161.1 45342 to 192.176.1.84 8082",
   "permit out 6 192.176.1.84 8082 to 152.190.161.1 45342"
  ]
 },
 {
  "flowId": 2,
  "flowDescriptions": [
   "permit in 6 from 152.190.161.1 45343 to 192.176.1.85 8083",
   "permit out 6 192.176.1.85 8083 to 152.190.161.1 45343"
  ]
 }
]
```

Ethernet Flows and External App ID

			subscribe to.	

NOTE 1: Properties marked with a feature as defined in subclause 5.14.4 are applicable as described in subclause 5.2.7. If no features are indicated, the related property applies for all the features.

NOTE 2: One of "ueIpv4Addr", "ueIpv6Addr" or "macAddr" shall be included. If ipv4 or ipv6 address is provided, IP flow information shall be provided. If MAC address is provided and the AppId feature is not supported, Ethernet flow information shall be provided. If the AppId feature is supported, one of IP flow information, Ethernet flow information (if EthChgParty_5G is supported) or External Application Identifier shall be provided.

NOTE 3: The property is only applicable for the NEF.

NOTE 4: The attributes "altQoSReferences" and "altQosReqs" are mutually exclusive. Of the two, only the attribute "altQoSReferences" may be provided if the attribute "qosReference" is provided, while only the attribute "altQosReqs" may be provided if the attribute "qosReference" is not provided.

* Source: 3GPP TS 29.122

Improved Camara QoD API

Improved Camara QoD

```
POST /qos-latency-senf/v1/sessions
{
  "ueAddr": "152.190.161.1",
  "ipFlowInfos": [
    {
      "flowId": 1,
      "flowDescriptions": [
        {
          "direction": "BIDIRECTION",
          "protocol": "TCP",
          "ueIpAddr": "152.190.161.1",
          "uePorts": [
            45342
          ],
          "remoteIpAddr": "192.176.1.84",
          "remotePorts": [
            8082
          ]
        }
      ]
    },
    {
      "flowId": 2,
      "flowDescriptions": [
        {
          "direction": "BIDIRECTION",
          "protocol": "TCP",
          "ueIpAddr": "152.190.161.1",
          "uePorts": [
            45343
          ],
          "remoteIpAddr": "192.176.1.85",
          "remotePorts": [
            8083
          ]
        }
      ]
    }
  ],
  "qos": "LOW_LATENCY",
  "notificationUri": "https://as.com/notifications",
}
```

3GPP NEF AsSessionWithQoS

```
POST /3gpp-as-session-with-qos/v1/{afId}/subscriptions
{
 "ueIpv4Addr": "152.190.161.1",
 "flowInfo": [
  {
   "flowId": 1,
   "flowDescriptions": [
    "permit in 6 from 152.190.161.1 45342 to 192.176.1.84 8082",
    "permit out 6 192.176.1.84 8082 to 152.190.161.1 45342"
   ]
  },
  {
   "flowId": 2,
   "flowDescriptions": [
    "permit in 6 from 152.190.161.1 45343 to 192.176.1.85 8083",
    "permit out 6 192.176.1.85 8083 to 152.190.161.1 45343"
   ]
  }
 ],
 "qosReference": "LOW_LATENCY",
 "notificationDestination": "http://camara-layer.com/notifications"
}
```