IEEE 1914 NGFI

IEEE 1914.3 RoE – Parameter for Prioritization

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The Task and Some Related Questions

• Define a RoE parameter that sets the priority level of a RoE flow
  1. What do we call this RoE parameter?
  2. How many levels of priority can be defined by this parameter?
  3. A parameter configures priority for each unique flowID, but what about the RoE control messages that use the common flowID = 0xFFFF?
     • Slow C&M messages
       • latency requirement is not known
     • Timing Control messages
       • same latency requirements as data messages and thus need same priority
     • OAM TLV messages
       • do they all have same priority? Loopback response messages might need higher priority to allow higher measurement rate
  4. What transport layer mechanisms correspond to this new RoE parameter?
  5. How do we map the transport layer mechanisms to this new RoE parameter
Background Info (1)

- P1914.1
  - Clause 8.2 lists 6 levels of priority, 0 to 6
  - “Priority level 0 means the highest priority”
  - “Priority levels shall have equivalent switched network QoS priority classes”

### Table 2—NGFL transport classes of service

<table>
<thead>
<tr>
<th>Class</th>
<th>Subclass</th>
<th>Max one-way latency</th>
<th>Priority Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synchronization</td>
<td>Synchronization</td>
<td>N/A</td>
<td>0</td>
</tr>
<tr>
<td>RAN Control &amp; Management</td>
<td>Real-time RAN control</td>
<td>$\tau_2$</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Near-real-time RAN Control</td>
<td>$\tau_4$</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Non-real-time control/management</td>
<td>$\tau_5$</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td>Data-plane control</td>
<td>Data-plane latency dependent</td>
<td>Data-plane priority dependent</td>
</tr>
<tr>
<td>Data Plane</td>
<td>Subclass 0</td>
<td>$\tau_0$</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>Subclass 1</td>
<td>$\tau_1$</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>Subclass 2</td>
<td>$\tau_2$</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Subclass 3</td>
<td>$\tau_3$</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Subclass 4</td>
<td>$\tau_4$</td>
<td>5</td>
</tr>
<tr>
<td>Transport Network Control &amp; Management</td>
<td>Transport NW Control</td>
<td>$\tau_2$</td>
<td>3</td>
</tr>
<tr>
<td>Reserved</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**NOTE 1**—Latency requirement is not directly linked to the priority levels. For data plane messages, lower latency data traffic is assigned to higher priority level.
Background Info (2)

- xRAN
  - “Priority marking per packet is needed in each protocol layer. For operation at Layer 2, prioritization is performed by specifying a configurable value for the Priority Code Point in the IEEE 802.1q VLAN header on the outgoing traffic”
  - As per IEEE 802.1Q, PCP = 7 is the highest priority and PCP = 0 is the lowest priority
  - As per IETF RFC 2474, DSCP = 111000 is the highest priority and DSCP = 000000 has the lowest priority

<table>
<thead>
<tr>
<th>Plane</th>
<th>L2 CoS Priority (range 0-7)</th>
<th>L3 DSCP Code</th>
<th>Preemption(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>S-Plane</td>
<td>Default: 7 (1)</td>
<td>Not applicable</td>
<td>non-preemptable</td>
</tr>
<tr>
<td>U-Plane</td>
<td>Default: 7</td>
<td>EF (Expeditied Forwarding)</td>
<td>non-preemptable</td>
</tr>
<tr>
<td>C-Plane</td>
<td>Default: 7</td>
<td>EF (Expeditied Forwarding)</td>
<td>non-preemptable</td>
</tr>
<tr>
<td>M-Plane</td>
<td>Default: 2</td>
<td>AF2x (Assured Forwarding)</td>
<td>preemptable</td>
</tr>
<tr>
<td>Other traffic</td>
<td>Default: 1</td>
<td>BE (Best Effort)</td>
<td>preemptable</td>
</tr>
</tbody>
</table>

(1) Applicable if vLAN is applied which will be possible in the future.
(2) Not all networks will support preemption so this only applies to networks supporting preemption
Background Info (3)

- eCPRI
  - “The Class of Service (CoS) Identifier for Data Service Frames is an EVC per UNI Service Attribute that is of special interest for this document. The following Class of Service identification methods are of interest among the ones described in 10.2.1 of [2]:”
    - “Class of Service Identifier based on the EVC (see section 10.2.1.1 of [2]).”
    - “Class of Service Identifier based on the Priority Code Point Field (see section 10.2.1.2 of [2]).”
    - “Class of Service Identifier based on Internet Protocol (see section 10.2.1.3 of [2]).”


- From the above, we can see that EVC address (or other unique field of the EVC), VLAN PCP, and IP DSCP are used
### Proposed Answers

1. **What do we call this RoE parameter?**
   - See answer to item 5

2. **How many levels of priority can be defined by this parameter?**
   - See answer to item 5

3. **A parameter is used for each unique FlowID, but what about for RoE control messages that use the common FlowID = 0xFFFF?**
   - Add new parameter to each control message type that uses flowID = 0xFFFF to allow it to be defined as high, medium, or low priority
   - Allow configurable transport priority levels for each of these high, medium, and low priority control messages
   - See answer to item 5

4. **What transport layer mechanisms correspond to this new RoE parameter?**
   - IEEE 802.1Q VLAN for Ethernet
   - IETF RFC 2474 DSCP for IPv4 and IPv6
Proposed Answers

5. How do we map the transport layer mechanisms to this new RoE parameter
   • Add the following parameter to each control message that uses flowID = 0xFFFF
     • CTRL_FLOW_PRI[1:0]: 11 = reserved, 10 = high, 01 = med, 00 = low
     • Default value is low priority
   • Add the following parameters to service the flowIDs and the high/medium/low priority control messages (with flowID = 0xFFFF)
     • L2_FLOW_PRI[3:0] → maps to PCP[2:0] & DEI, DEI should be set to 0
     • L3_FLOW_PRI[5:0] → maps to DSCP[0:5], L3_FLOW_PRI[2:0] must be set to 000
     • L2_CTRL_HI_PRI[3:0]
     • L3_CTRL_HI_PRI[5:0]
     • L2_CTRL_MED_PRI[3:0]
     • L3_CTRL_MED_PRI[5:0]
     • L2_CTRL_LO_PRI[3:0]
     • L3_CTRL_LOW_PRI[5:0]
   • These parameters do not have default values. They must be configured.
   • These prioritization values must be set so their preemption characteristics correspond to that of the network