Update to Automatic Bandwidth Adjustment procedure of Stateful PCE

draft-peng-pce-stateful-pce-autobw-update-00

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Auto Bandwidth

- Automatic & dynamic adjustment of bandwidth reservations based varying traffic pattern.
- RFC 8733 defines PCEP extension for stateful PCE.
- AUTO-BANDWIDTH-ATTRIBUTES TLV in LSPA object provides various configurable knobs.
  - The TLV is encoded while the auto-bw feature is enabled
  - The absence of the TLV == disable of the feature

- The TLV encodes multiple sub-TLVs.
  - They are included if there is a change since the last information sent
  - Default values are applied for missing sub-TLVs

- But, how to remove an attribute that was earlier set?
  - Not encoding the sub-TLV wont work, as it will be considered as no change!
  - Default values could be used, but not all attributes have one!
  - Missing a mechanism in RFC 8733!!
Attributes sub-TLVs

- Proposal to use a special value of all zeros in the value portion of the sub-TLV to indicate “restore to default”
  - if the default value is set for the sub-TLV:
    ■ Restore to the default values
  - if there is no default value for the sub-TLV:
    ■ Remove the associated attribute

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<tr>
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<th>Len</th>
<th>Name</th>
<th>Default</th>
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<tbody>
<tr>
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<td>Sample-Interval</td>
<td>300 seconds</td>
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<tr>
<td>2</td>
<td>4</td>
<td>Adjustment-Interval</td>
<td>86400 seconds</td>
</tr>
<tr>
<td>3</td>
<td>4</td>
<td>Down-Adjustment-Interval</td>
<td>Adjustment-Interval</td>
</tr>
<tr>
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<td>4</td>
<td>Adjustment-Threshold</td>
<td>none</td>
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<tr>
<td>5</td>
<td>8</td>
<td>Adjustment-Threshold-Percentage</td>
<td>5%, 0</td>
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<tr>
<td>6</td>
<td>4</td>
<td>Down-Adjustment-Threshold</td>
<td>Adjustment-Threshold</td>
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<td>Adjustment-Threshold-Percentage</td>
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<td>4</td>
<td>Minimum-Bandwidth</td>
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<td>Overflow-Threshold</td>
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<td>13</td>
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A special value of all zeros in the value portion of the sub-TLV indicates the attribute identified by the sub-TLV is restored to the default value. The value of all zeros is not considered an invalid value and MUST be checked before individual fields.

For the attributes that have an associated default value, on receiving such a sub-TLV, the PCEP speaker MUST consider it as an instruction to restore to the default values. Note that, the PCEP speaker could also set the default value in the sub-TLV itself.

For the attributes that do not have an associated default value, on receiving such a sub-TLV, the PCEP speaker MUST consider it as a removal of the specific auto-bandwidth attribute.
Capability Flag

- A new flag in the AUTO-BANDWIDTH-CAPABILITY TLV carried in the OPEN Object.
  - Z Flag - indicates that a PCEP speaker supports the use of the special value of all zeros in the value field as specified in this document.
  - The presence of the Z flag can give a clear indication to the PCEP peer if they can use the updated procedures defined in this document.
Example

- Consider an PCE-Initiated LSP with the following information in the AUTO-BANDWIDTH-ATTRIBUTES TLV:
  - Sample-Interval: 600 (in sec)
  - Adjustment-Interval: 172800 (2 days in sec)
  - Adjustment-Threshold: 0x49989680 (10 mbps in bps)

- To remove the Adjustment-Thresholds feature for the LSP and set the Adjustment-Interval to 1 day, it could send the AUTO-BANDWIDTH-ATTRIBUTES TLV in the PCUpd message with the following sub-TLVs:
  - Adjustment-Interval: 86400 (1 day in sec, the default value)
  - Adjustment-Threshold: 0x0

- On receiving the special value of all zeros in the value portion of the Adjustment-Threshold sub-TLV, the PCEP speaker would consider that as removal of the Adjustment-Threshold feature.

- Note that, the PCE could also set the Adjustment-Interval: 0x0 instead of the default value to trigger the restore to default. The Sample-Interval remains unchanged.
Backward Compatibility

● An RFC 8733 compliant implementation could send a PCEP message without AUTO-BANDWIDTH-ATTRIBUTES TLV first and then include the AUTO-BANDWIDTH-ATTRIBUTES TLV with the updated sub-TLV.

● An existing implementation of RFC 8733 that does not support this update (Z flag is not set) could consider a special value of all zeros in the sub-TLV to be a malformed sub-TLV thus ignoring it and keeping the previous value. A PCEP speaker SHOULD use other techniques in this case.
• Do you agree with the motivation?
• Does an update to RFC 8733 seem reasonable?
• Any other comments?

Thanks!