# 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

| Type | Len | Name | Default |
|---|---|---|---|
| 1 | 4 | Sample-Interval | 300 seconds |
| 2 | 4 | Adjustment-Interval | 86400 seconds |
| 3 | 4 | Down-Adjustment-Interval | Adjustment-Interval |
| 4 | 4 | Adjustment-Threshold | none |
| 5 | 8 | Adjustment-Threshold-Percentage | 5%, 0 |
| 6 | 4 | Down-Adjustment-Threshold | Adjustment-Threshold |
| 7 | 8 | Down-Adjustment-Threshold-Percentage | Adjustment-Threshold-Percentage |
| 8 | 4 | Minimum-Bandwidth | 0 |
| 9 | 4 | Maximum-Bandwidth | none |
| 10 | 8 | Overflow-Threshold | none |
| 11 | 8 | Overflow-Threshold-Percentage | none |
| 12 | 8 | Underflow-Threshold | none |
| 13 | 8 | Underflow-Threshold-Percentage | none |

# Update to RFC 8733

- Add this text in Section 5.2 of RFC 8733

**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 seems reasonable?
- Any other comments?

*Thanks!*