Ingress and egress delay impact on 802.1AS clause 13

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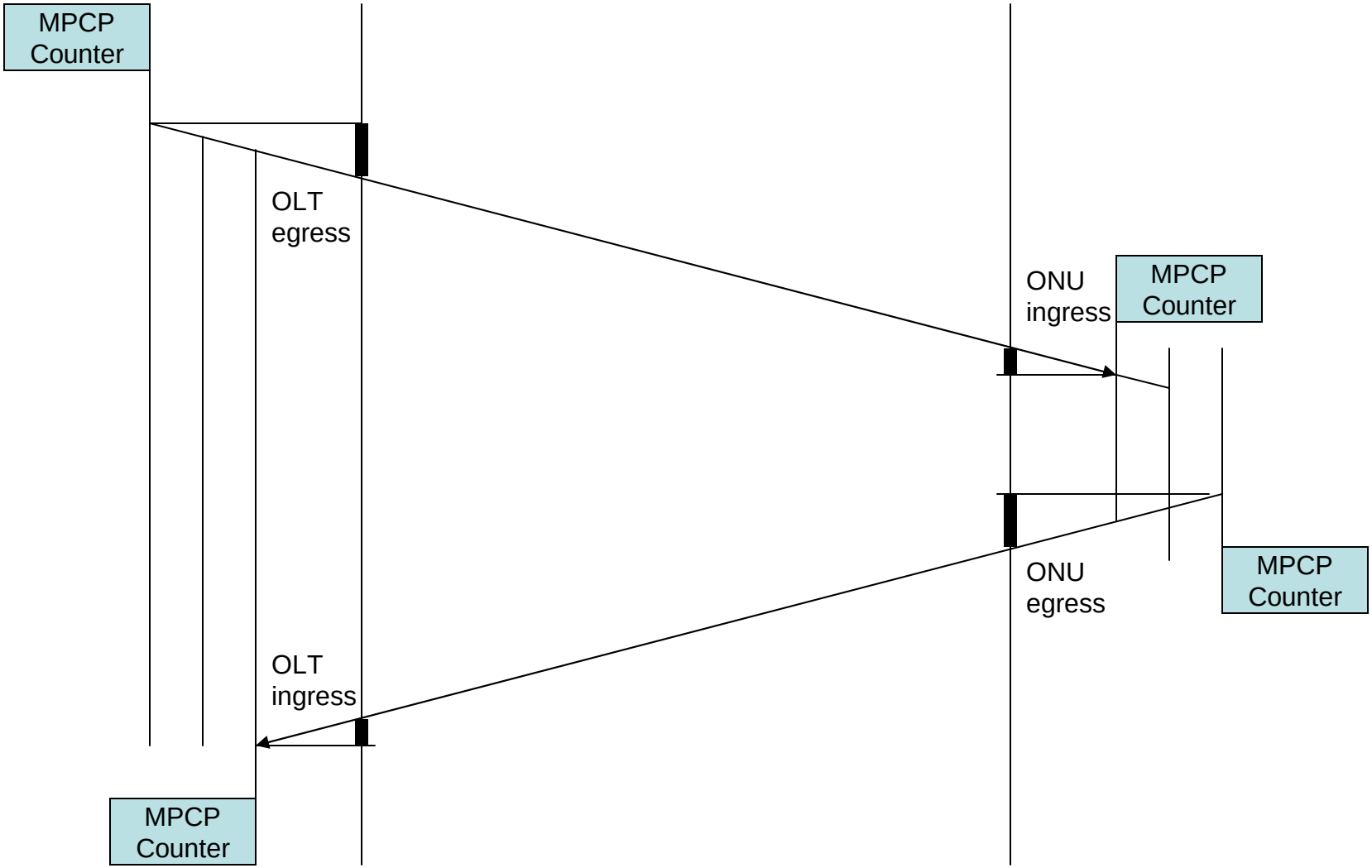
Background of problem

- The previous draft used the message transmission times as the reference points
- When we changed to use the MPCP counter, we needed to add the ingress and egress latencies
- The formulas we generated in San Diego are not quite right
- Here, we calculate the right values

MPCP and reference planes



- Eq(13-1) in 802.1AS 7.0:
  - ToDx,i = ToDx,o + RTT* K
    - Assume K = (IndexFactor/RateRatio)
- RTT measured in EPON
  - RTT = OLTegress + downchannel + ONUingress + ONUegress + upchannel + OLTingress
  - I.e, RTT = (OLTegress + OLTingress) + (downchannel + upchannel) + (ONUingress + ONUegress)

The way we have it now:

- The ideal calculation of ToDx,i
  - If ToDx,i* is the time when the ONU MPCP counter equals X, and
  - ToDx,o* is the time when the OLT MPCP counter equals X,
  - Then: ToDx,i* = ToDx,o* + OLTegress + (downchannel + upchannel)•K + ONUingress Eq. (1)
- The calculation in Eq.(13-1)
  - ToDx,i = ToDx,o + [(OLTegress + OLTingress) + (downchannel + upchannel) + (ONUingress + ONUegress)] • K
- This is not quite right…

- ToDx,i* = ToDx,o* + OLTegress + (downchannel + upchannel)•K + ONUingress
- ToDx,i*-ONUingress +K•(ONUingress+ONUegress)= -ONUingress +K•(ONUingress+ONUegress) +ToDx,o* -OLTegress +K•(OLTingress+OLTegress) +OLTegress -K•(OLTingress+OLTegress) +OLTegress + (downchannel + upchannel)•K +ONUingress
- ToDx,i*-ONUingress +K•(ONUingress+ONUegress) = ToDx,o* +OLTegress -K•(OLTingress+OLTegress) +K•(OLTingress+OLTegress) +K•(ONUingress+ONUegress) +(downchannel+upchannel)•K

The right way

- If we define:
  - ToDx,i = ToDx,i*-ONUingress +K•(ONUingress+ONUegress)
  - ToDx,o = ToDx,o* +OLTegress -K•(OLTingress+OLTegress)
- Then we can say
- ToDx,i = ToDx,o +RTT •K
  - This is what we want
- The key definitions:
- ToDx,i is the time when the MPCP counter at clock slave i equals X minus the ONUlatencyfactor.
  - ONUlatencyfactor = ONUingress -K•(ONUingress+ONUegress)
- ToDx,o is the time when the MPCP counter at the OLT equals X plus the OLTlatencyfactor
  - OLTlatencyfactor = OLTegress -K•(OLTingress+OLTegress)