

# Protocol stack for 10G EPON

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# Agenda

1. Protocol stack for Serial 10G EPON
  - PCS layer
2. Coexistence of 10G and 1G on same fiber

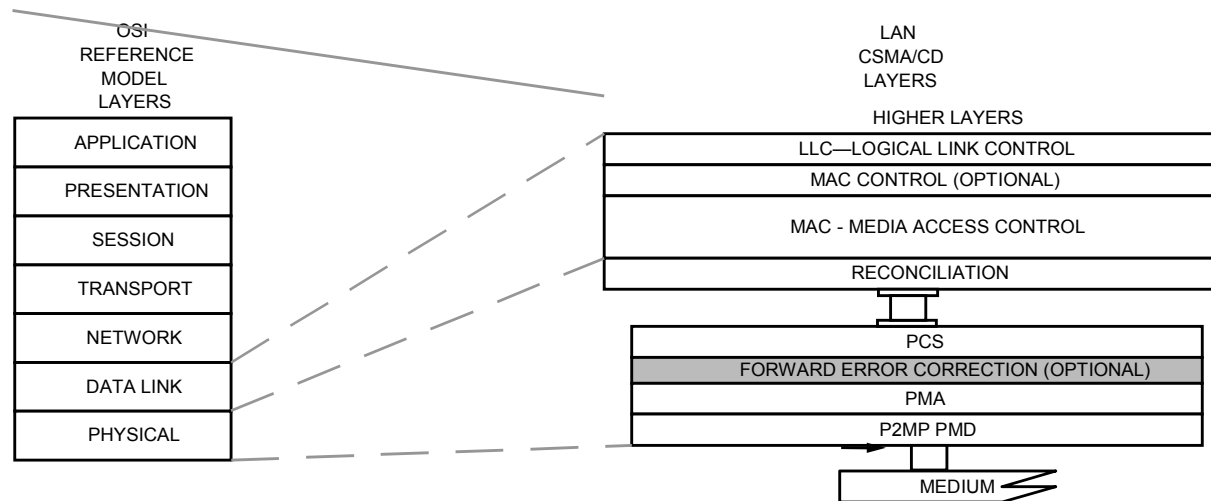
# Starting points

In this presentation, We detail what we regard as some *open questions* regarding the 10G EPON protocol stack

We have some assumptions - including the following:

- a) Serial PHY belongs to 10GBASE-R family (ie. XGMII, 64/66 bit PCS, scrambler)
- b) MAC reuses 1G EPON Multipoint MAC control layer and Reconciliation Sublayer
- c) (at the initial stage at least) will support 10G on downstream only

# Protocol stack for 10G EPON Downstream



- Serial 10G downstream does not create any apparent need to deviate from the frame format used across the XGMII in 1G EPON (ie. insertion of LLID to preamble etc.). Only timing needs to change.
- 10G EPON will use 10GBASE-R XGMII
- (PMA/PMD will obviously change)

# PCS Layer for 10G EPON

- 1G EPON introduced optional FEC (10GBase-T etc. include mandatory FEC)
- 10G has a more stringent loss budget (27 dB ? )
  - Is the coding gain provided by FEC now more significant?
- Should device support for FEC be mandatory in 10G or remain optional?
- Would FEC be activated globally? Or per ONU?

# Our view on Forward Error Correction

Support for to-be-specified algorithm/framing of FEC should be mandatory at both the ONU and the OLT

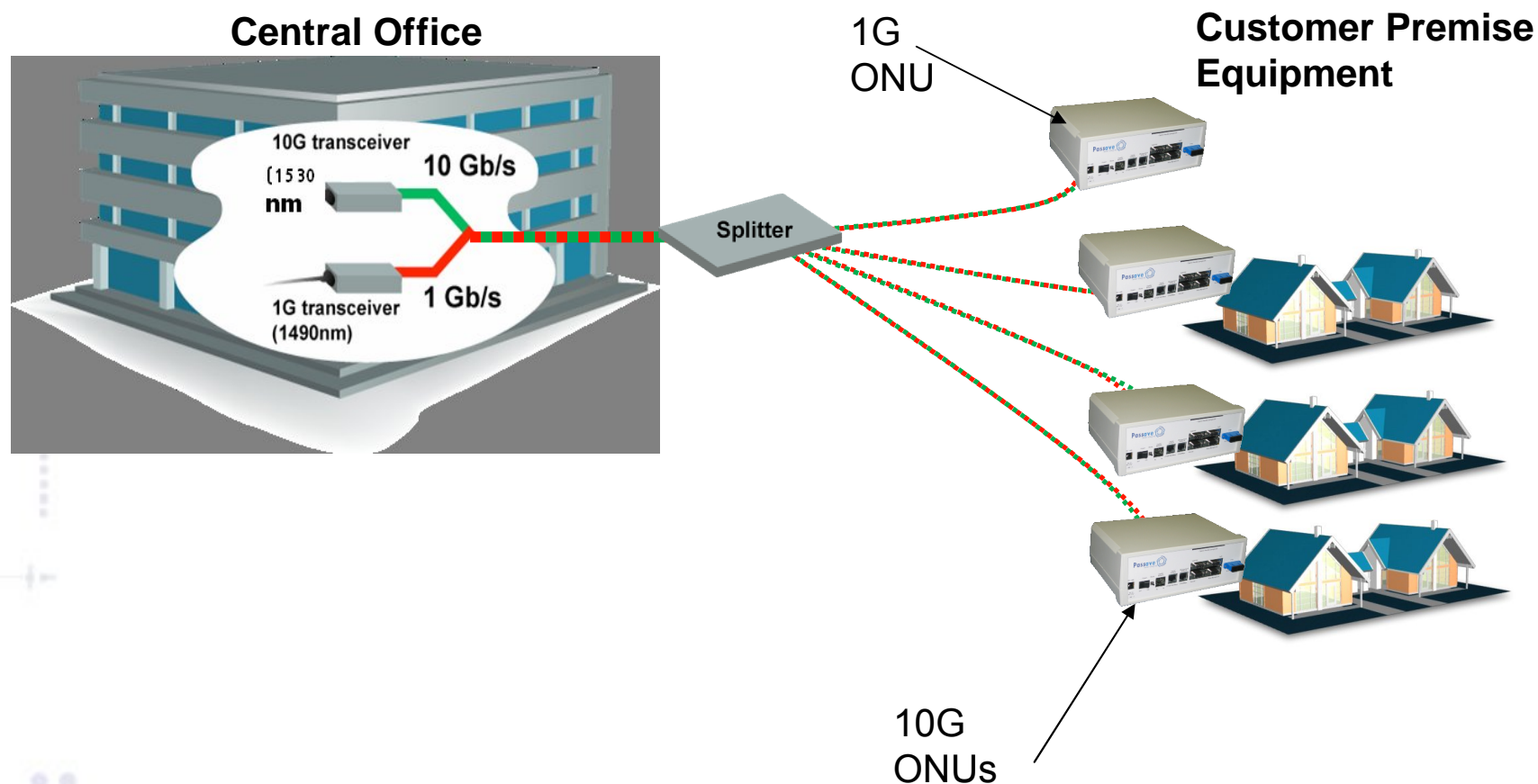
- Which FEC algorithms to include in the 10G standard depends on how much gain is required
  - Choice of FEC algorithm will impact Latency, Effective Thruput, and Implementation Complexity
  - So use of aggressive FEC is wasteful unless the gain requirements make it necessary
- Which FEC framing to use should be dictated by the OLT on a per-ONU basis

# Next Steps on Forward Error Correction

Invite contributions on:

- the PCS-PMA interface frame format (seems to be a central issue)
- FEC algorithms (and their performance tradeoffs)

# Coexistence of 1G and 10G downstream on same fiber





## 1G/10G Coexistence

- 1G/10G must use different downstream lambdas
- Different lambdas should be used on upstream also (so that the return channel of the 10G traffic does not starve the 1G return channel).
- Is it feasible for the 10G ONU to detect whether a 10G downstream is active on the network, and if not then switch to 1G lambda? (autosensing)

# Thank you