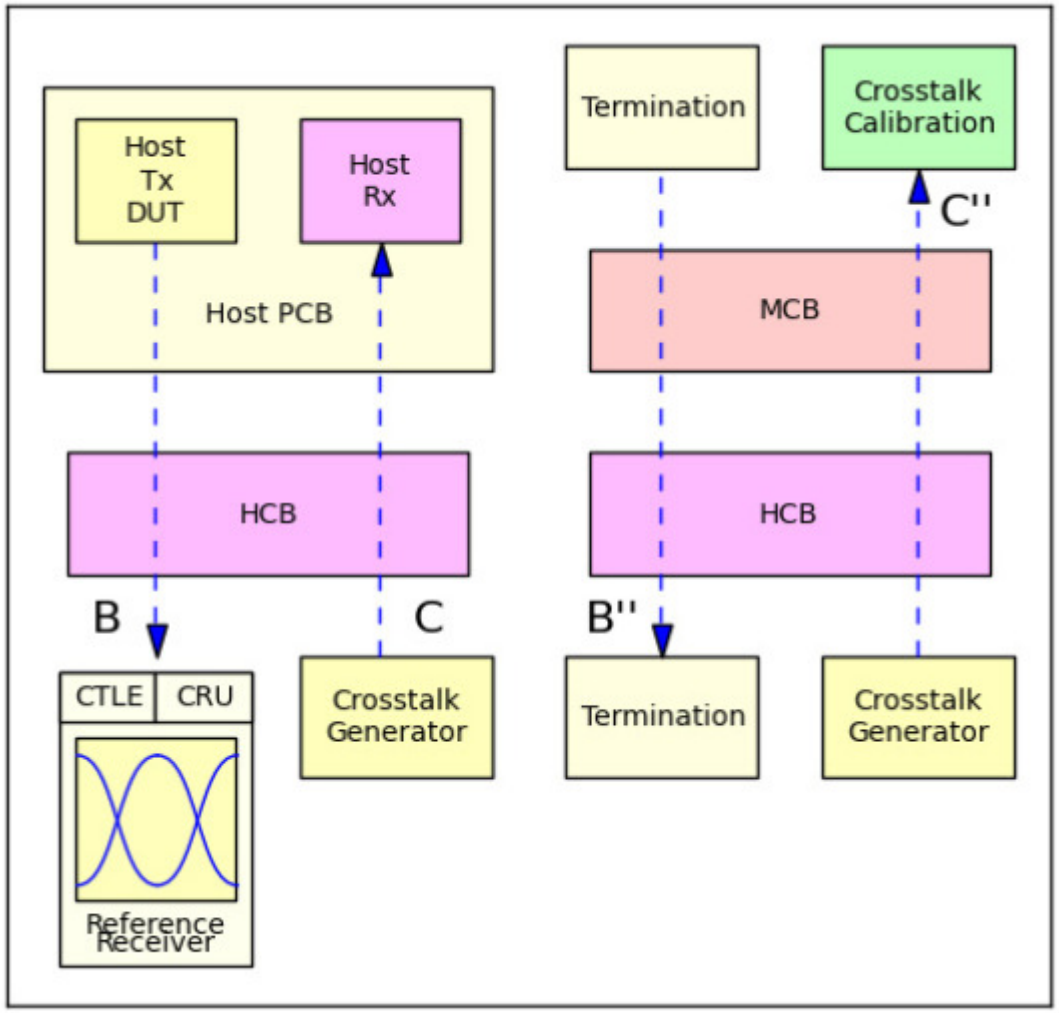
CTLEs used in Sampling Scopes

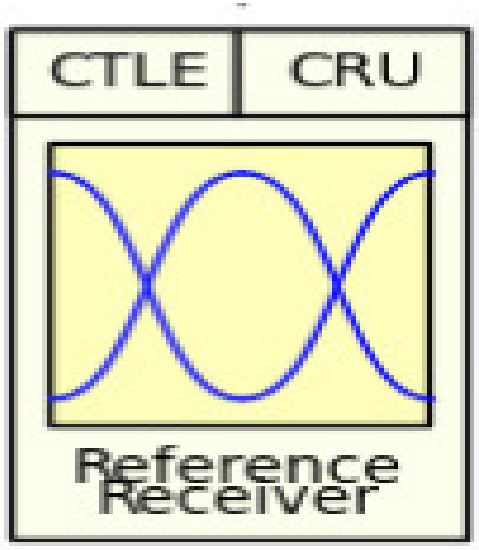
Joachim Vobis

MSQS-2 Figures 6.1

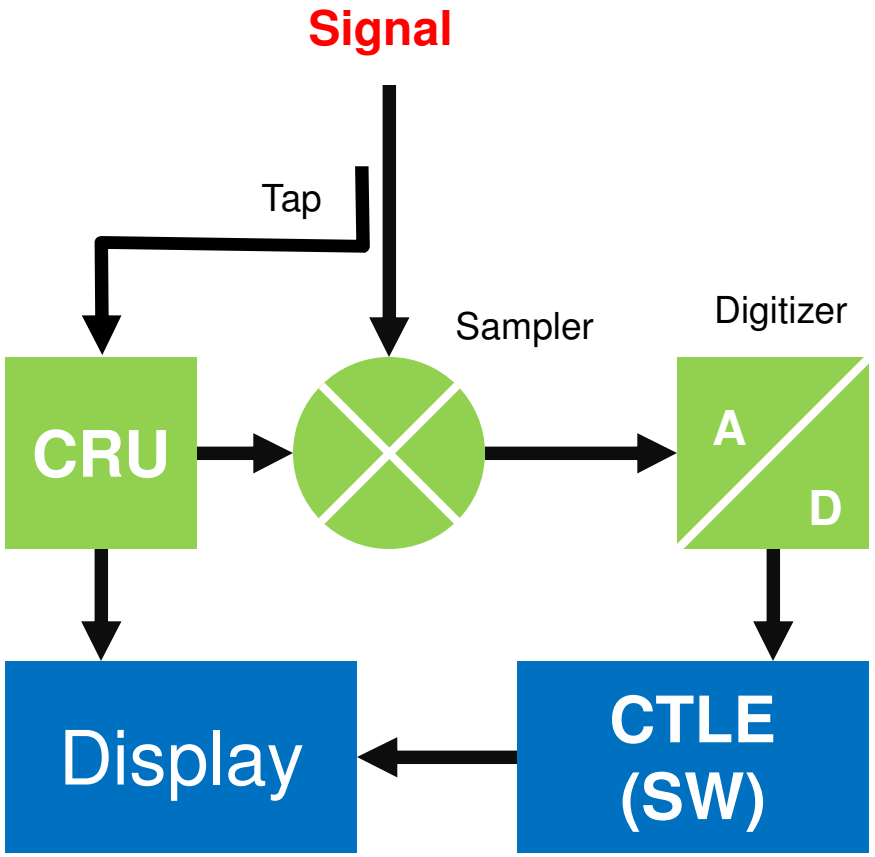


CTLE & CRU

MSQS-2 Icon

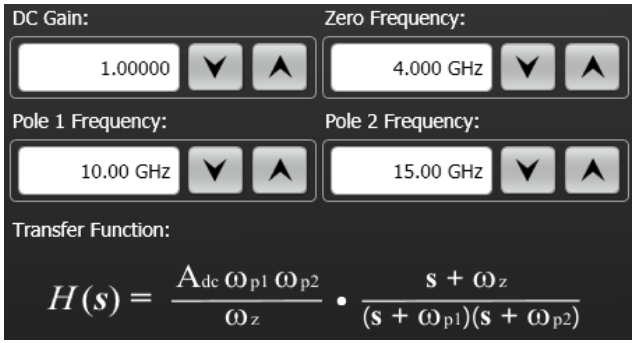


Typical Sampling Scope Implementation



Observations

- CTLE is implemented in software
  - *Provide flexibility and data rate independence*
  - *Limits test patterns length to < 65535 bits*



- Clock recovery occurs before CTLE
- CRU unlikely locks on completely closed eyes
- CRU locks on partially closed eyes
  - If you can “look through the eye” then the CRU can lock on it

Consequences

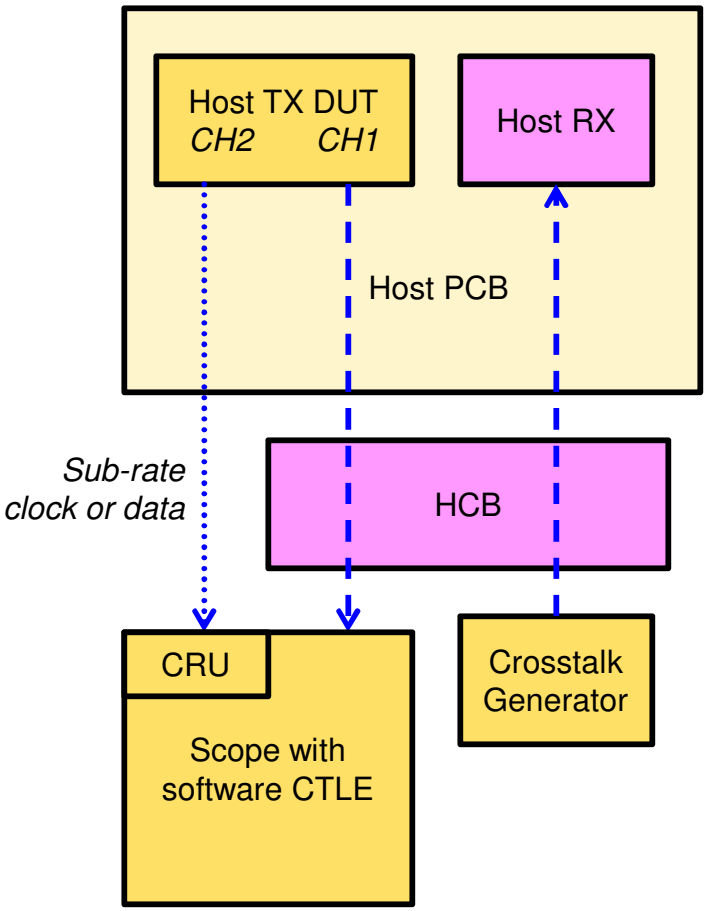
How does the eye look at point B in drawing 6.1?

Can a compliant DUT ever cause a closed eye?

- If the eye is somewhat open
  then software CTLEs are adequate

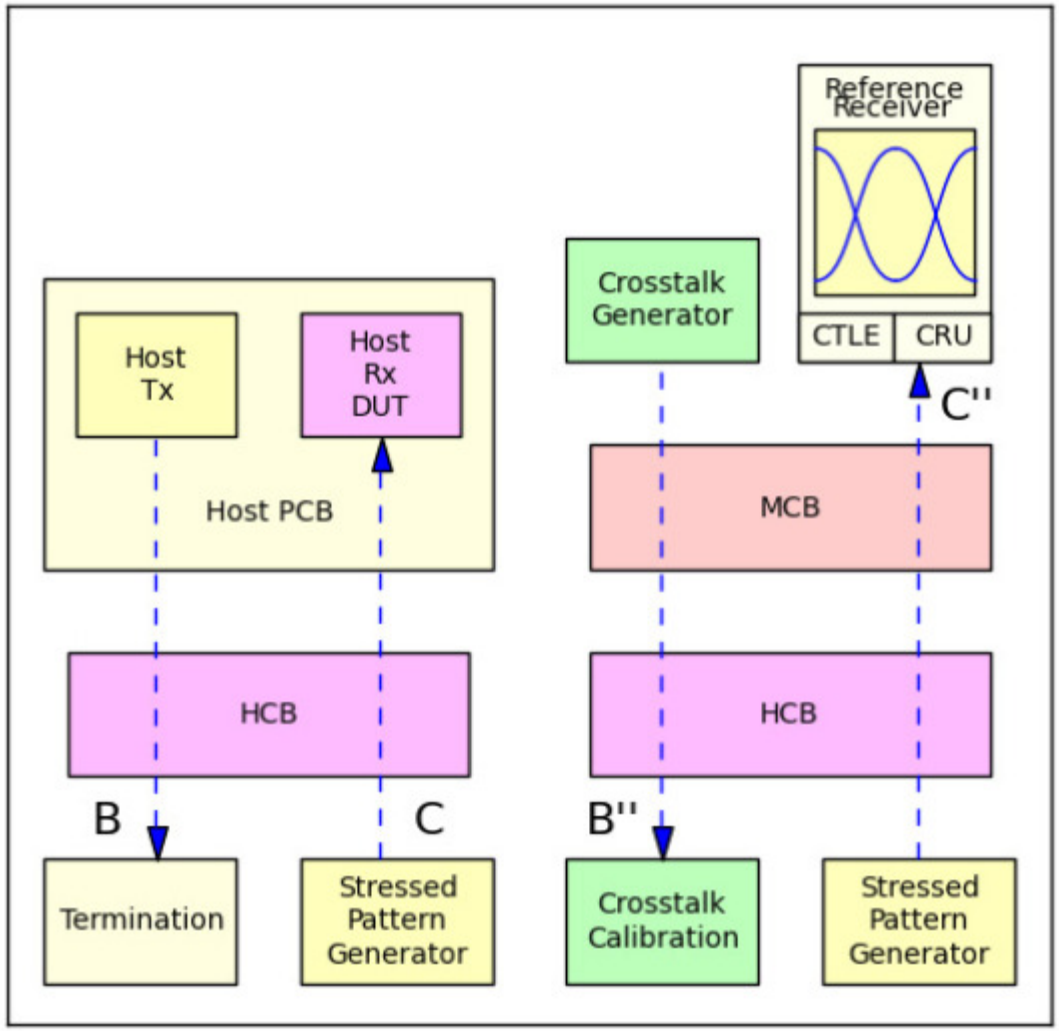
- If the eye is closed (CRU cannot lock)
  then a hardware CTLE is required in the signal path
  - Adds cost, complexity and measurement uncertainty

Alternative Approach
(for DUTs with multiple channels)



- Channel 1 is being tested
  - Runs desired data rate and signal
- Channel 2 provides clock
  - Runs at a sub rate (e.g., ¼)
- Assumptions
  - Lower data rate -> open eye *(less impacted by PCB and HCB)*
  - Timing of CH1 and CH2 highly correlated because same chip *(at least within the LBW of the CRU)*

MSQS-2 Figures 6.2



Stressor Calibration

- Most pattern generators (PG) provide clock outputs adequate for sampling scopes
- MCB and HCB unlikely to affect frequency content within the loop bandwidth of the CRU
  - Recovered clock should be same as clock from PG
- Recommendation to remove CRU from figure 6.2
  - Add a dotted line from PG to scope for clocking