What are HDMI® and Dual-Mode DisplayPort?

TI Precision Labs – Video interface

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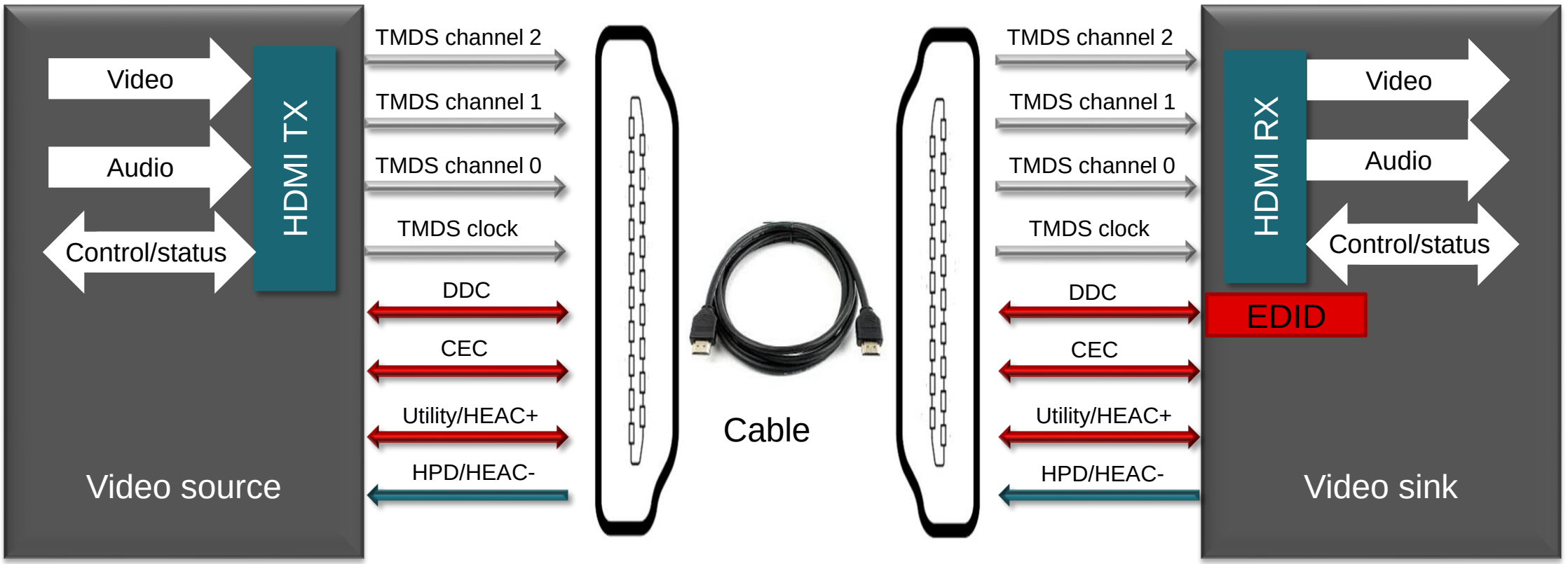
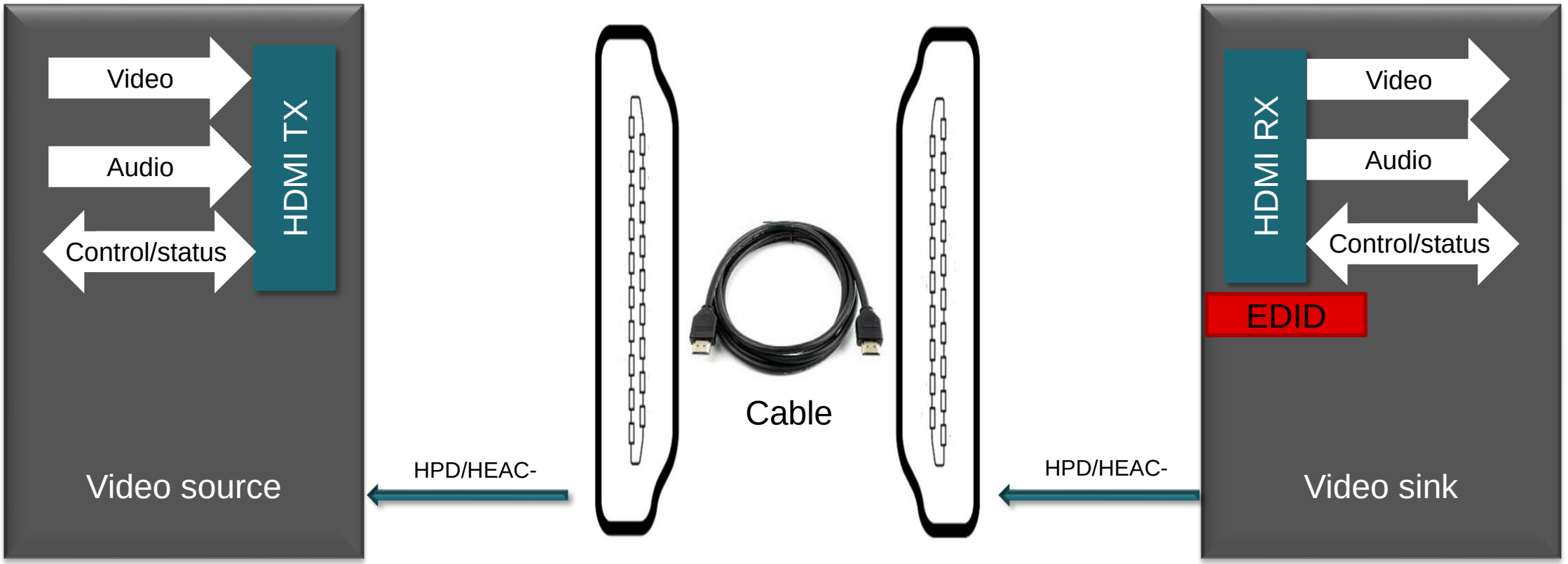
Presented by Nicholaus Malone

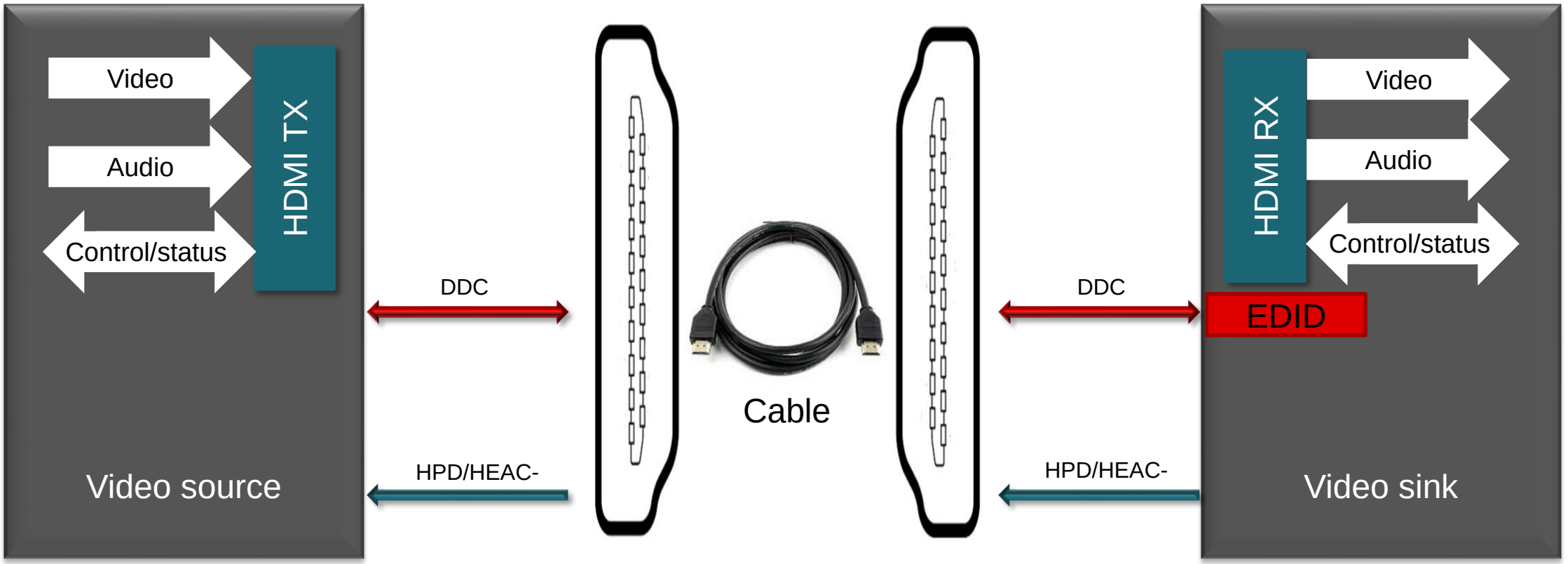
HDMI signal interface



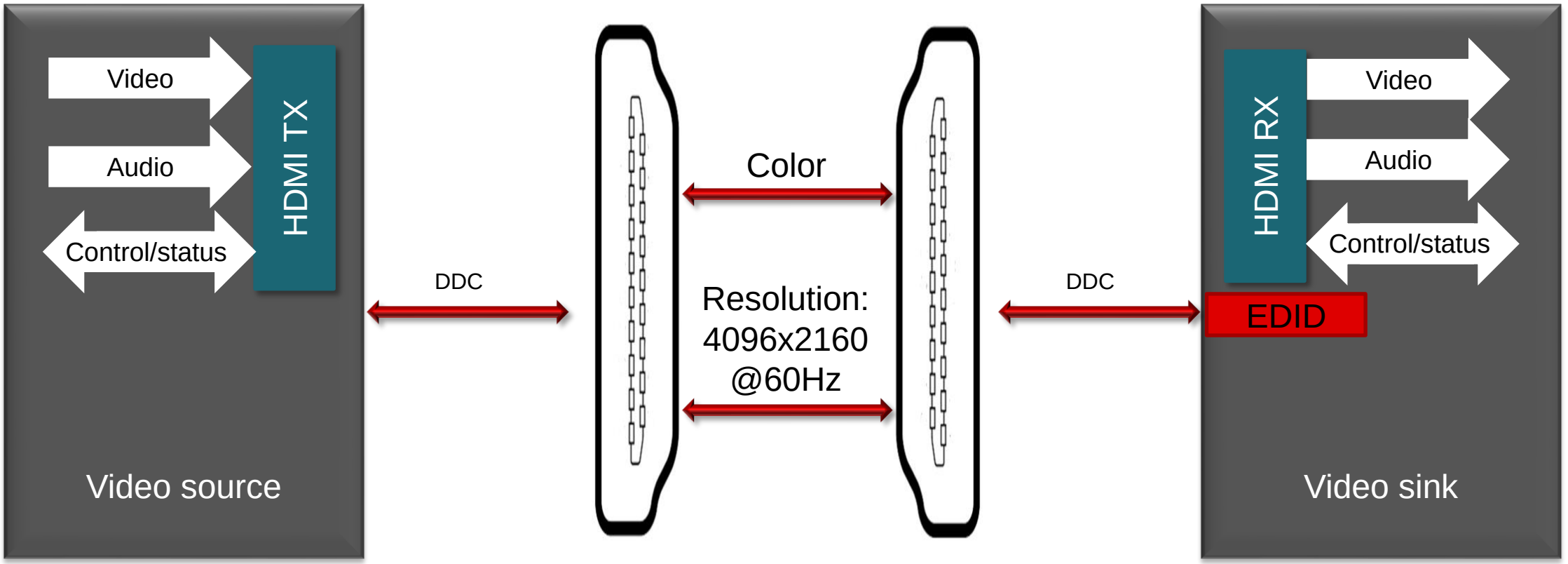
Hot Plug Detect (HPD)



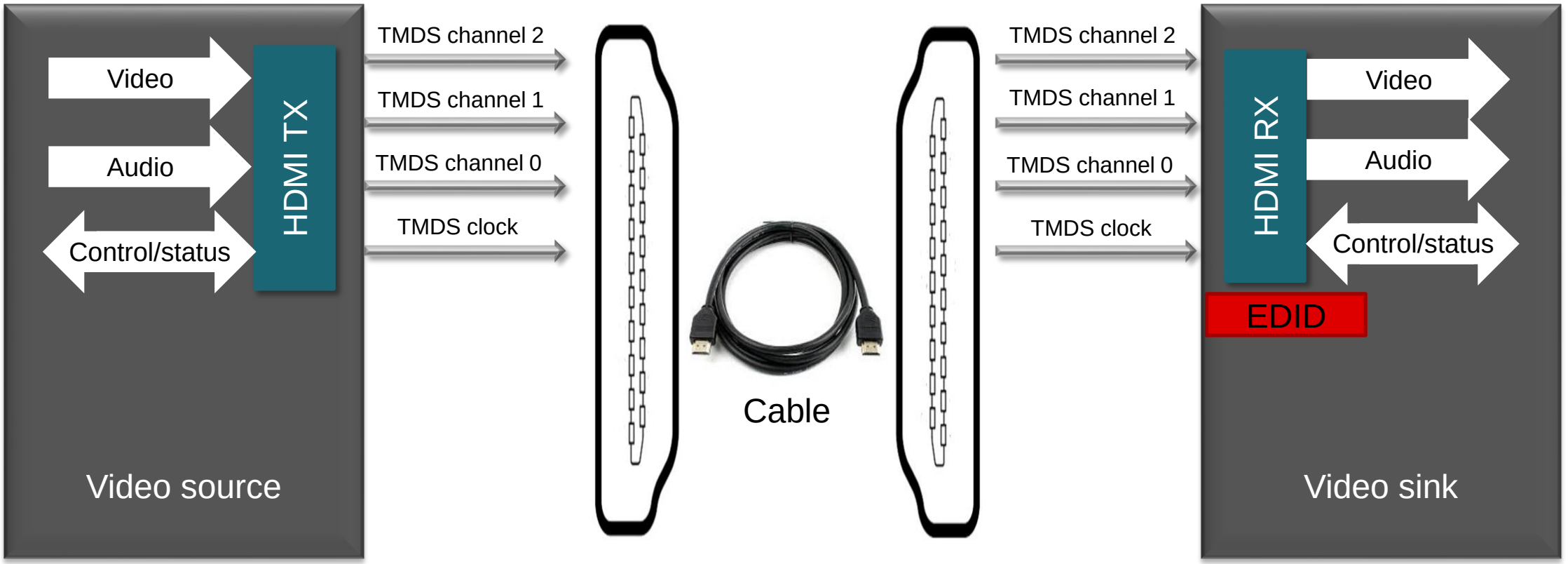
Display Data Channel (DDC)



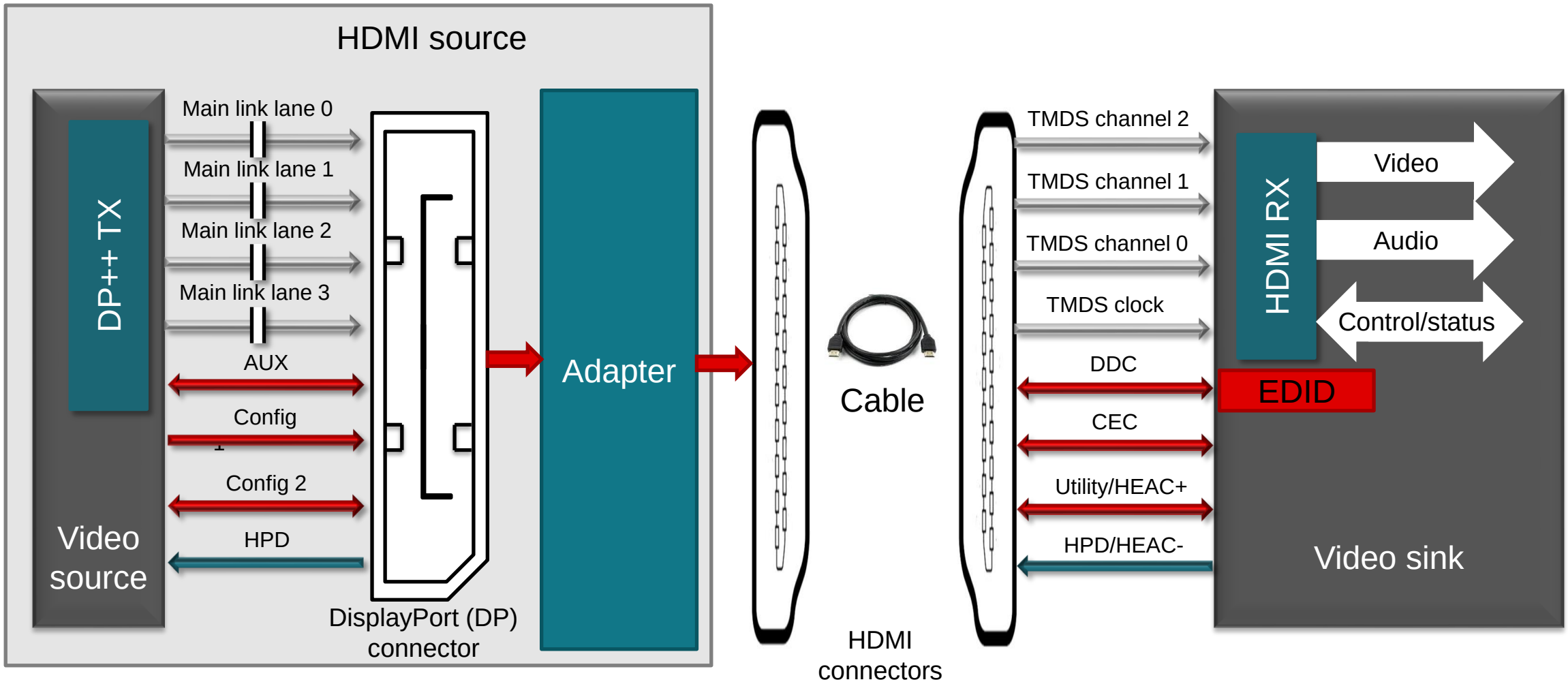
Display Data Channel (DDC)



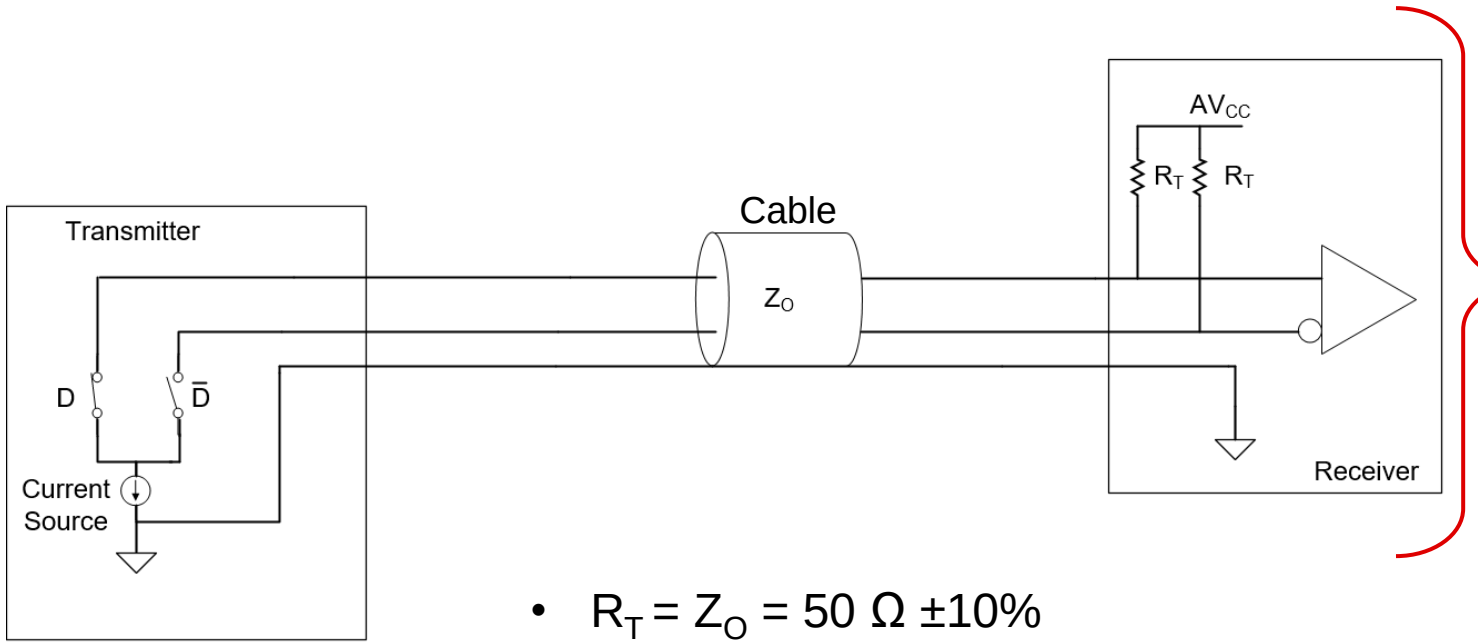
HDMI Transition-Minimized Differential Signaling (TMDS) characteristics

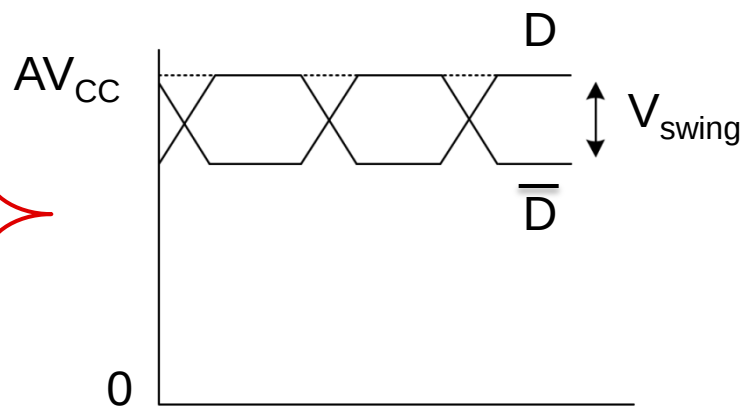


Dual-Mode DisplayPort (DP++) signal interface

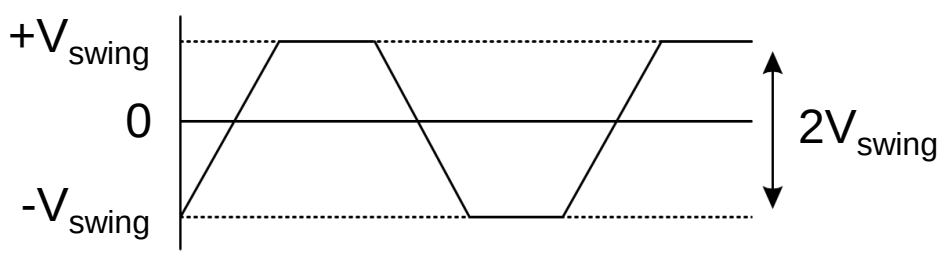


HDMI TMDS characteristics

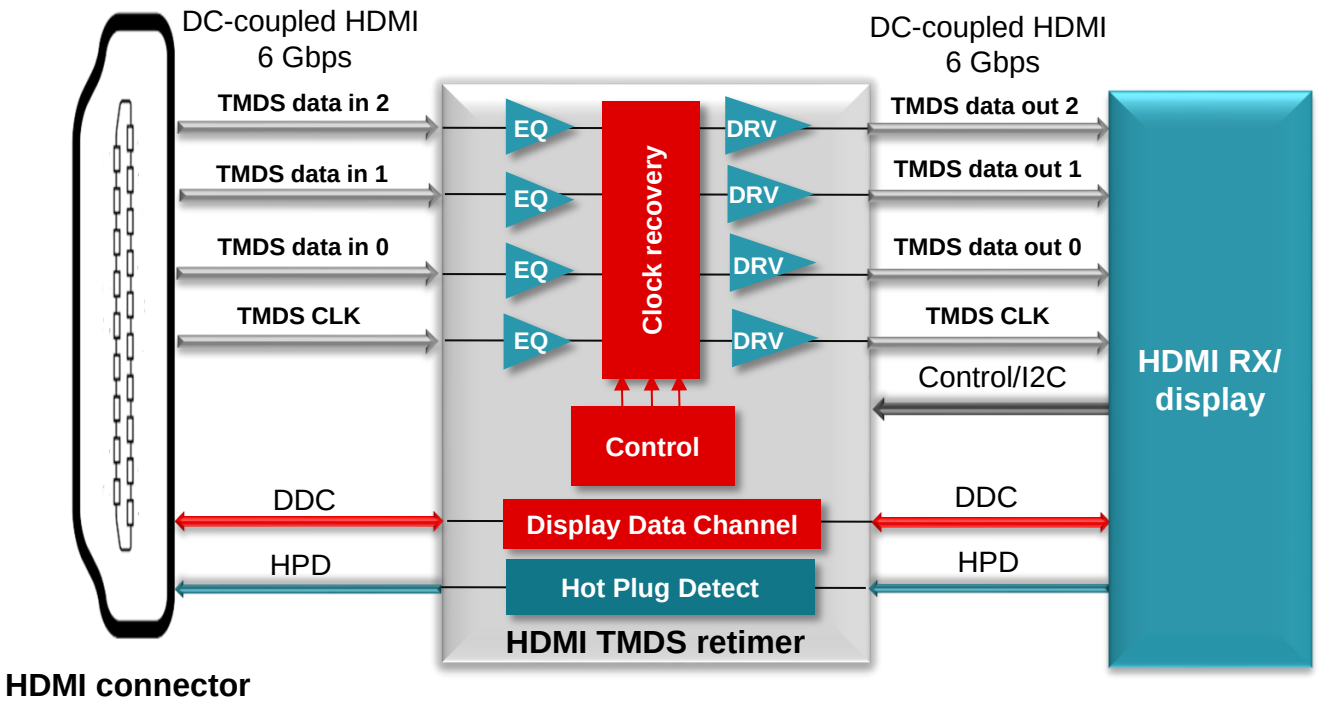




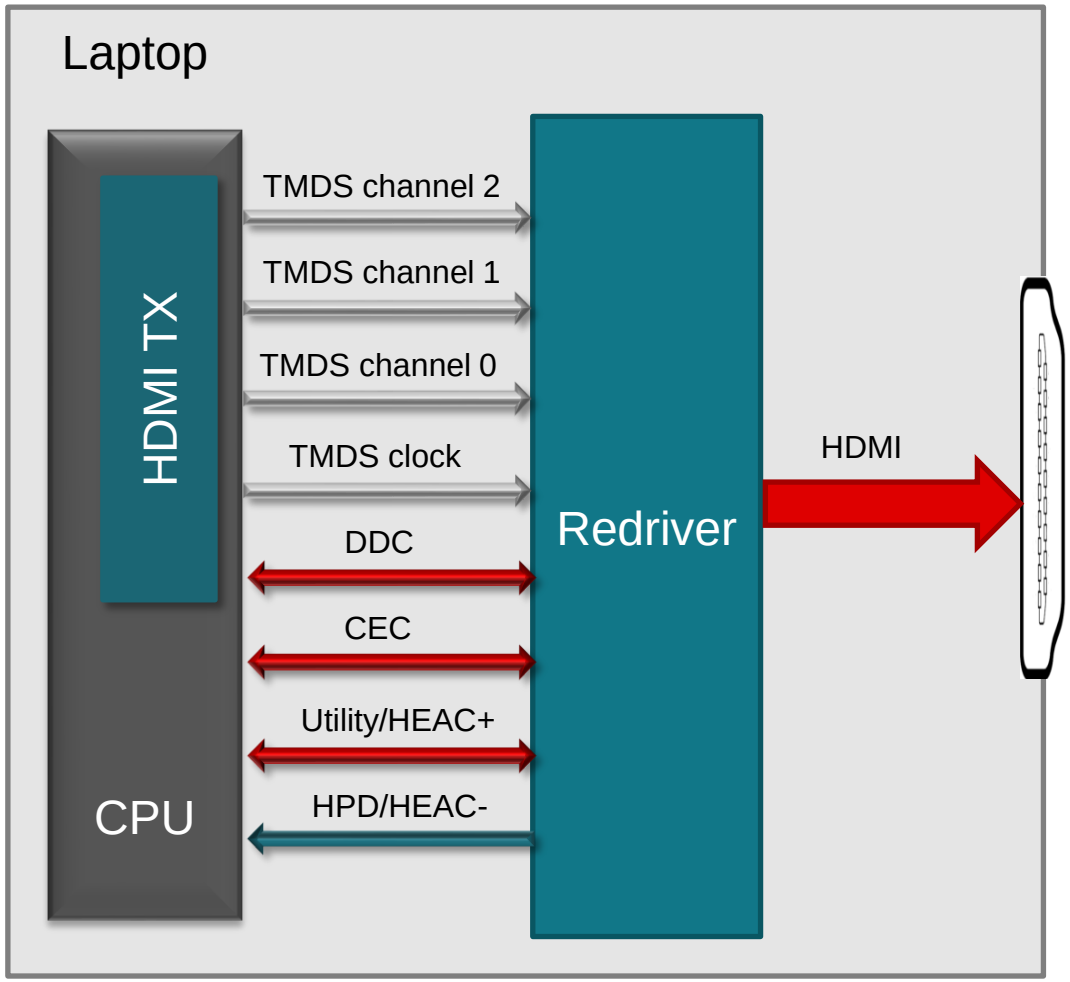
- $R_T = Z_O = 50\ \Omega \pm 10\%$
- $AV_{CC} = 3.3\ V \pm 5\%$



Source TX and sink RX design challenge

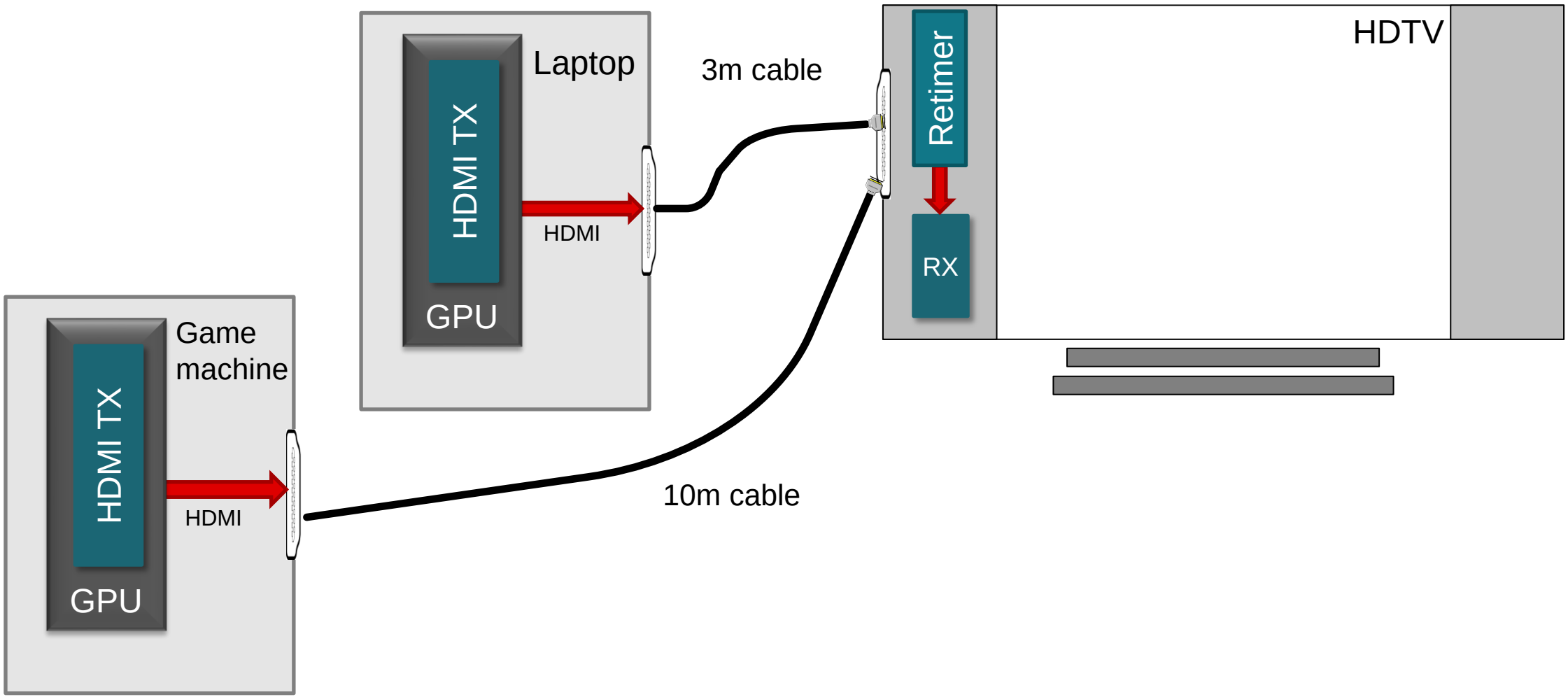


When to use a redriver



Long cable

When to use a retimer

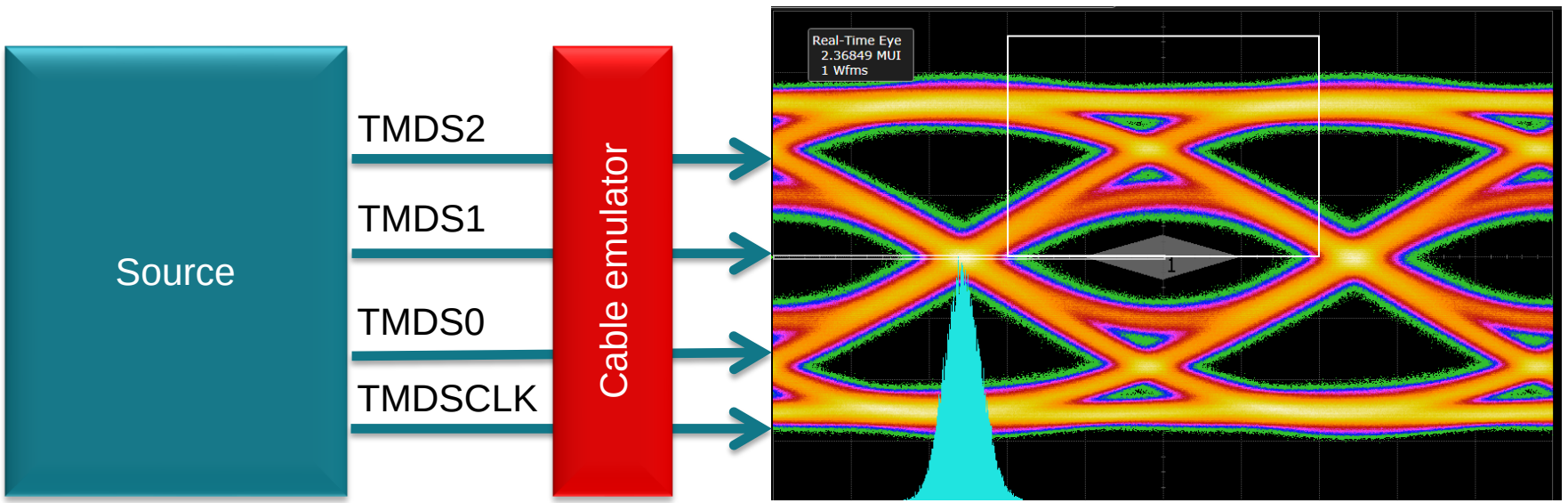


Placement of the redriver / retimer

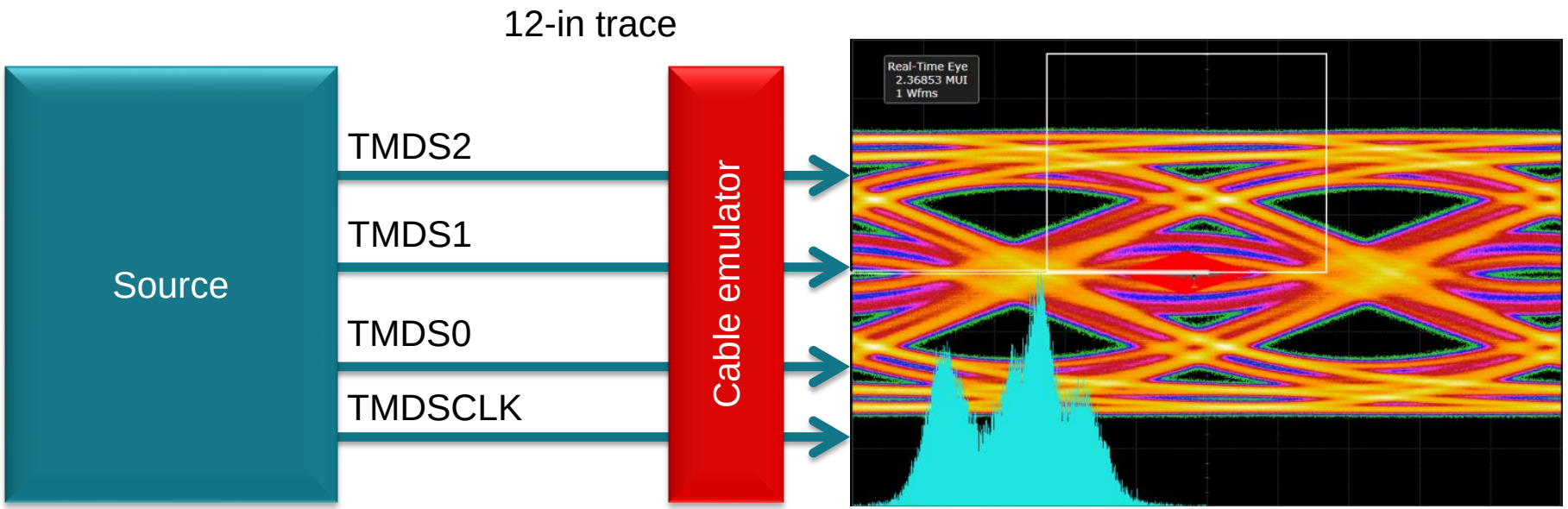
$$Insertion\ Loss\ \left(dB/_{in}\right) \cong \frac{f^{1/2}}{w} + 2.3 \times f \times D_f \times {D_k}^{1/2}$$

- w = trace width [mils]
- f = Nyquist frequency [GHz] → HDMI data rate / 2
- Df = the PCB dissipation factor
- Dk = the PCB dielectric constant

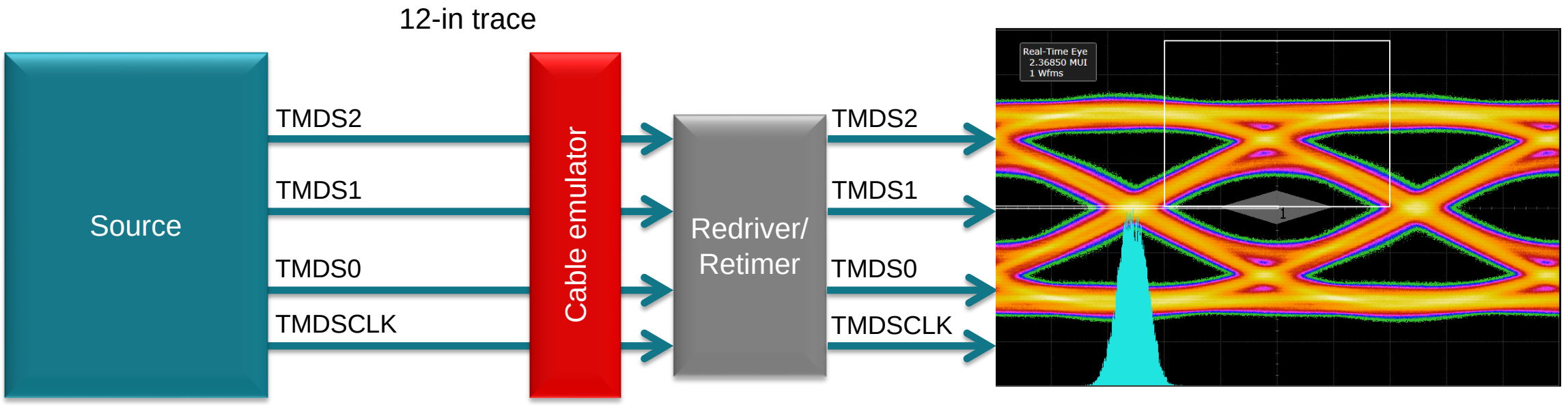
Placement of the redriver / retimer



Placement of the redriver / retimer



Placement of the redriver / retimer



Short quiz

True or false: HDMI is a DC-coupled interface.

Short quiz

True or false: A DP++ source can directly interface with an HDMI sink.

Short quiz

True or false: Hot Plug Detect is used to determine the capabilities of the sink.

Short quiz

True or false: A redriver is best used on the sink side rather than on the source side.

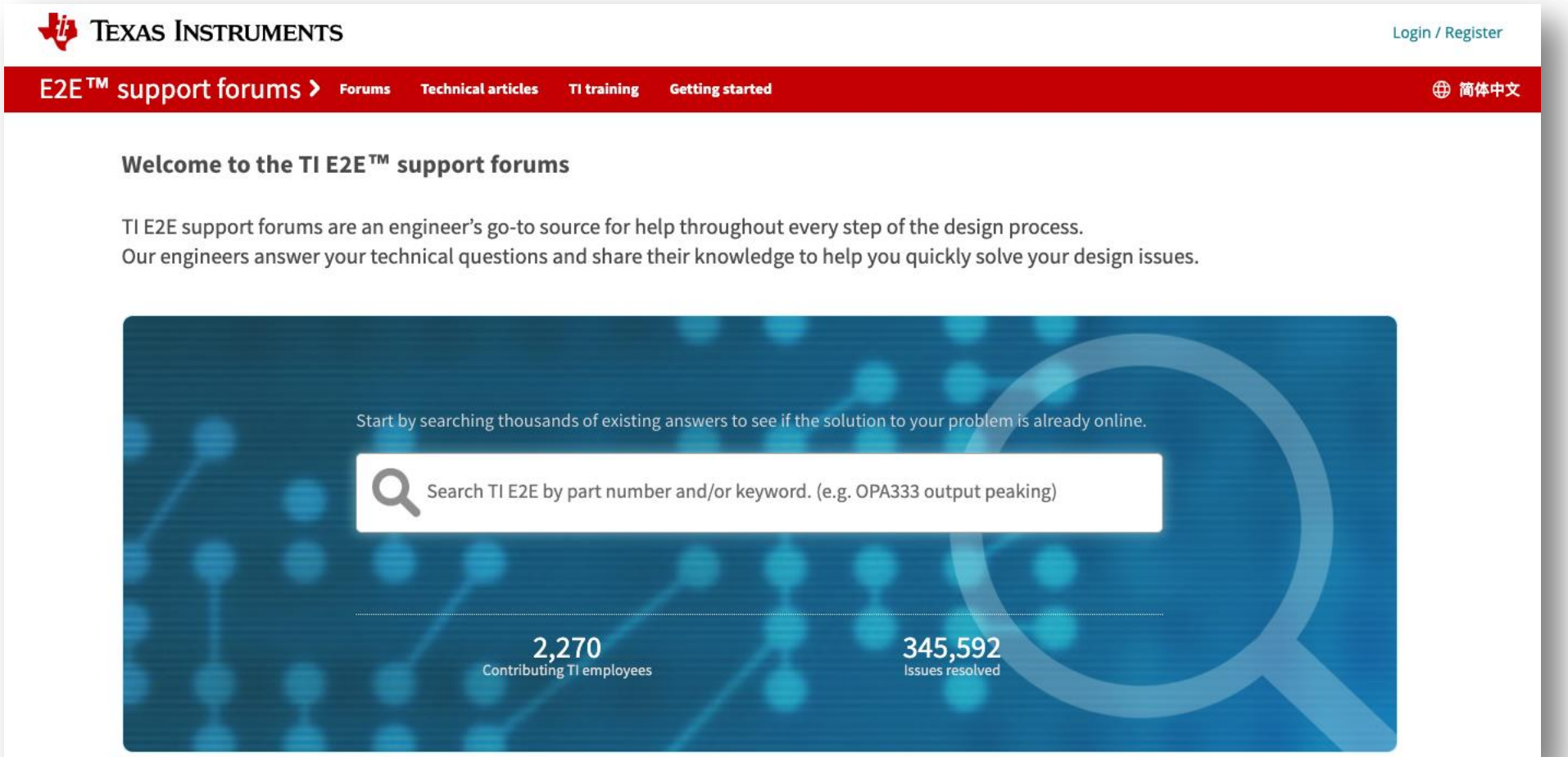
Short quiz

True or false: A retimer can be used anywhere a redriver can be used.

Short quiz

True or false: The correct placement of the HDMI redriver / retimer is important to the design of system signal integrity margin.

Thank you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