6G Data over Legacy Backplanes

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**TX FFE** (feed-forward equalization) & **RX DFE** (decision feedback equalization)

- Combination of FF and FB equalizers work to “remove” ISI (intersymbol interference) caused by high-frequency loss and impedance mismatches.

- Possible to have a “closed eye” at the input of the receiver and still decode data properly.

High Level Specifications

- Data Rates up to 6.4 Gbps
- Signaling over backplanes with >40” FR4 and 2 connectors at target BER<10^{-17}
- Designed to work over “legacy” backplanes designed for 2.5Gbps.
- Designed to meet OIF 6G-LR specification
- Less than 350mW per duplex channel under worst case conditions
Transmitter

Figure 2: Simplified Transmit block diagram
Figure 3: Simplified Receive block diagram
PLL & Test Pattern Logic

Figure 4: PLL and clock generator signals

Four phase differential clock output to HyperPHY circuitry - $\text{pllclkn}, p[3:0]$
Floorplan (simplified)
Why our parents gave us Legos and TinkerToys to play with...
Why our parents gave us crayons to play with…

Figure 12 – Screen shot of 6G HyperPHY Graphical User Interface
Data Eyes

- 6.4 Gbps
- 1 V Swing
- 12% PreEmphasis
- Worst case TX jitter: 45.6 ps peak-to-peak (0.29UI) at 6.4Gbps

Near End

- 6.4 Gbps
- 1 V Swing
- 62% PreEmphasis
- After 35 inches of FR4 plus 2 backplane connectors

Far End