Signal Conditioner Considerations in CPRI Applications

TI Precision Labs – Signal Conditioning

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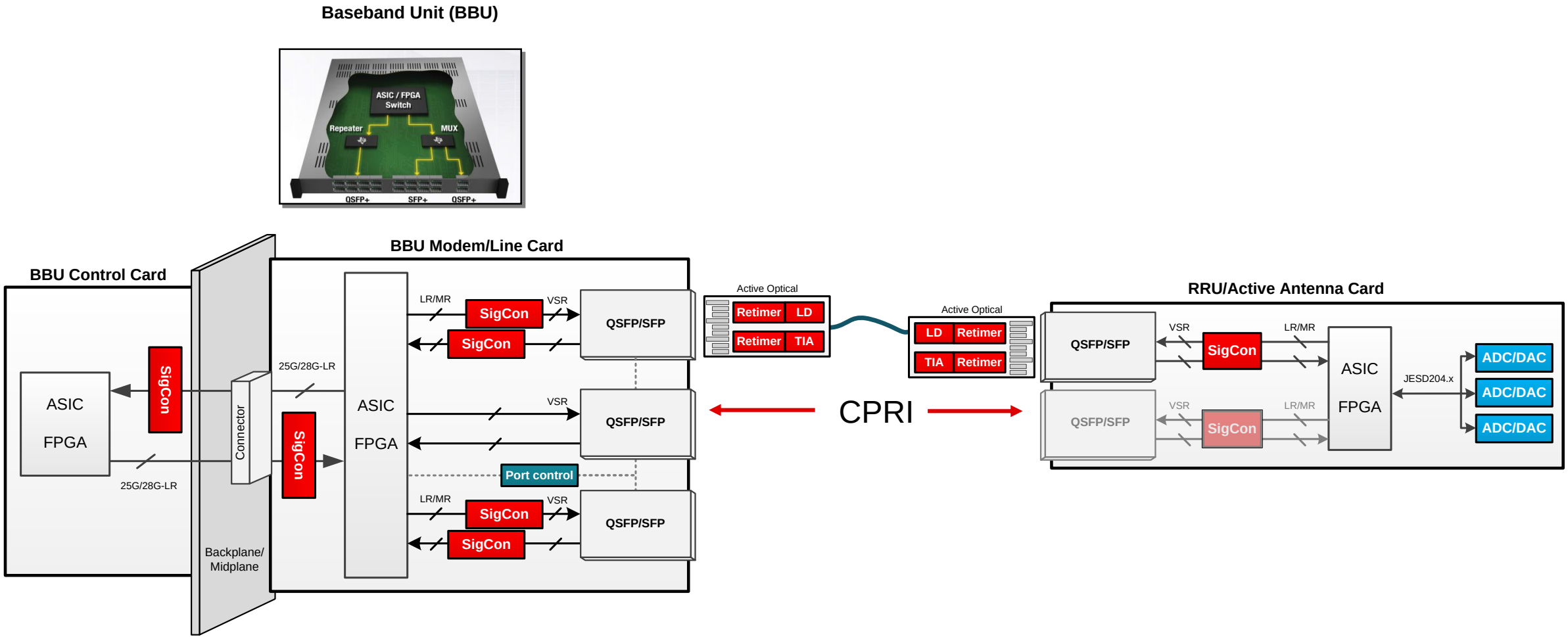
What is CPRI?

CPRI: Common Public Radio Interface

- CPRI defines a serial interface between radio equipment and radio control equipment.
- CPRI links commonly carry data between remote radio units (RRUs) and baseband units (BBUs)

What is CPRI?



CPRI line rates

CPRI Line Rate	Bit Rate	Line Coding
Rate 1	0.6144 Gbps	8b/10b
Rate 2	1.2288 Gbps	8b/10b
Rate 3	2.4576 Gbps	8b/10b
Rate 4	3.0720 Gbps	8b/10b
Rate 5	4.9152 Gbps	8b/10b
Rate 6	6.1440 Gbps	8b/10b
Rate 7A	8.1100 Gbps	64b/66b
Rate 7	9.8304 Gbps	8b/10b
Rate 8	10.1376 Gbps	64b/66b
Rate 9	12.1651 Gbps	64b/66b
Rate 10	24.3302 Gbps	64b/66b

Retimer CDR lock rates

Retimers will typically support locking to range of data rates and sub-rates. It's important to consider if a retimer is capable of locking to a desired CPRI rate.

Retimer 1 Supported CDR Lock Rates		
	Min [Gbps]	Max [Gbps]
Full-rate	19.6	25.8
Half-rate	9.8	12.9
Quarter-rate	4.9	6.45

Retimer 2 Supported CDR Lock Rates		
	Min [Gbps]	Max [Gbps]
Full-rate	9.8	12.5
Half-rate	4.9	6.25
Quarter-rate	2.45	3.125
Eighth-rate	1.225	1.5625

Retimer 1 CDR Supported CPRI Rates:

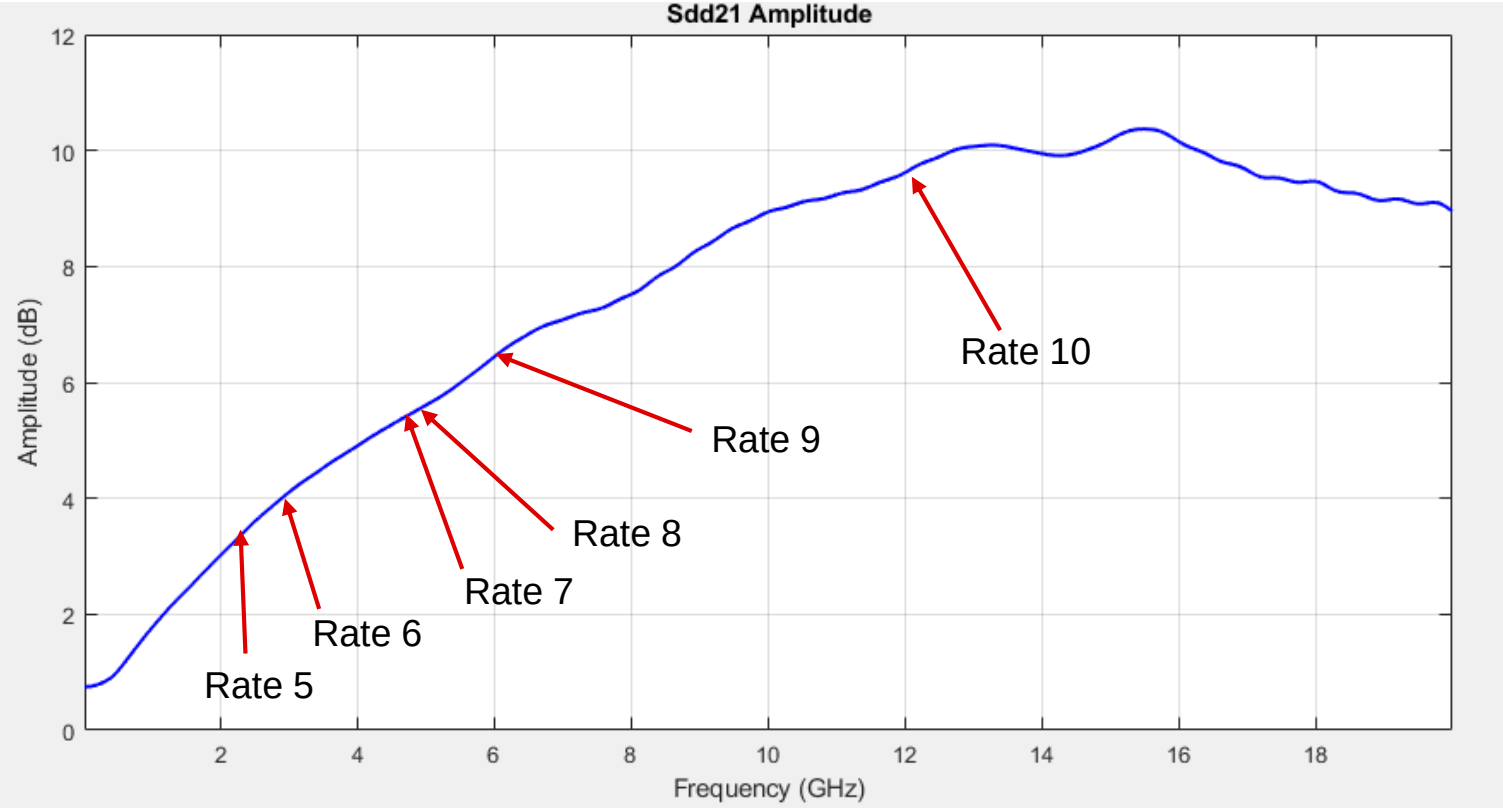
- Rate 5: 4.9152 Gbps
- Rate 6: 6.1440 Gbps
- Rate 7: 9.8304 Gbps
- Rate 8: 10.1376 Gbps
- Rate 9: 12.1651 Gbps
- Rate 10: 24.3302 Gbps

Retimer 2 CDR Supported CPRI Rates:

- Rate 2: 1.2288 Gbps
- Rate 3: 2.4576 Gbps
- Rate 4: 3.0720 Gbps
- Rate 5: 4.9152 Gbps
- Rate 6: 6.1440 Gbps
- Rate 8: 10.1376 Gbps
- Rate 9: 12.1651 Gbps

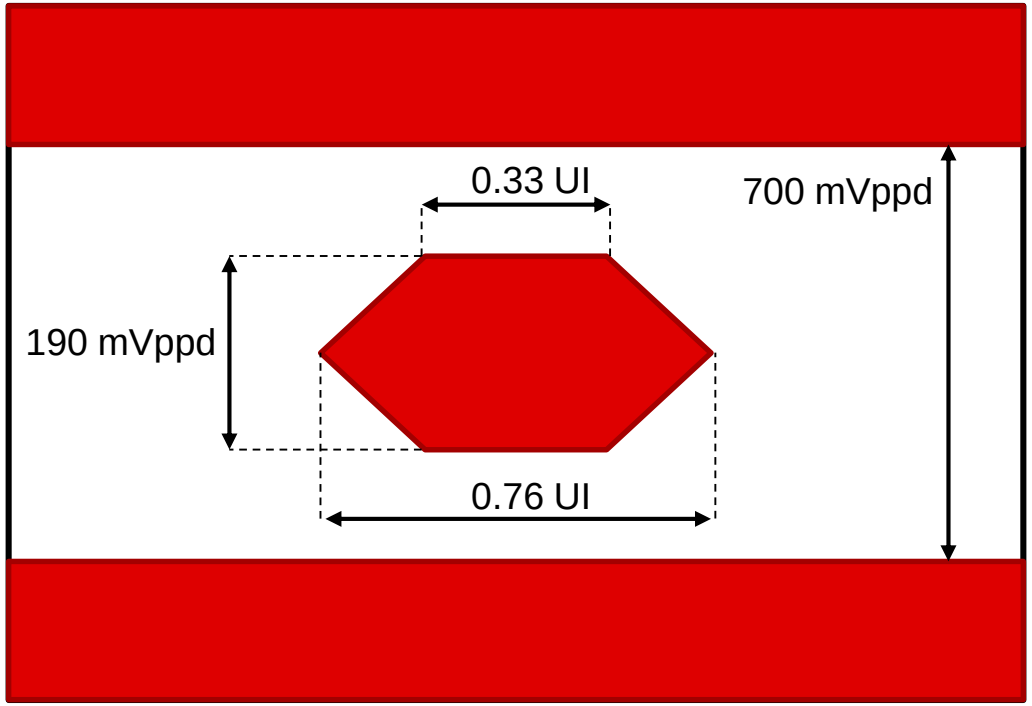
Signal conditioner equalization capability

- Signal conditioning devices use CTLE to compensate for insertion loss.
- CTLE does not apply equal boost across all frequencies.



CPRI electrical specifications (SFI)

- CPRI specification defines several different physical layer specifications.
- One common chip-to-module CPRI interface is SFI.
- SFI host transmitter electrical eye mask is shown below.



Short quiz

1. Which line coding is not used by CPRI?
   a. 8b/10b
   b. 64b/66b
   c. 128b/130b
2. Why is it important to look at CTLE boost at specific frequencies?
   a. CTLE boost applied to a signal is dependent on signal data rate
   b. CTLE boost will improve reflections at certain frequencies
   c. CTLE boost frequencies dictate which rates a retimer can lock to
3. What is the impact of retimer CDR lock range in CPRI applications?
   a. Retimers are always a superior choice to redrivers since they can lock to all line rates.
   b. Some retimers with limited lock ranges may not be suitable for a CPRI application
   c. Retimer lock range determines the propagation delay of the retimer.

To find more Signal Conditioner technical resources and search products, visit **https://www.ti.com/interface/ethernet/retimers-redrivers-mux-buffers/overview.html.**