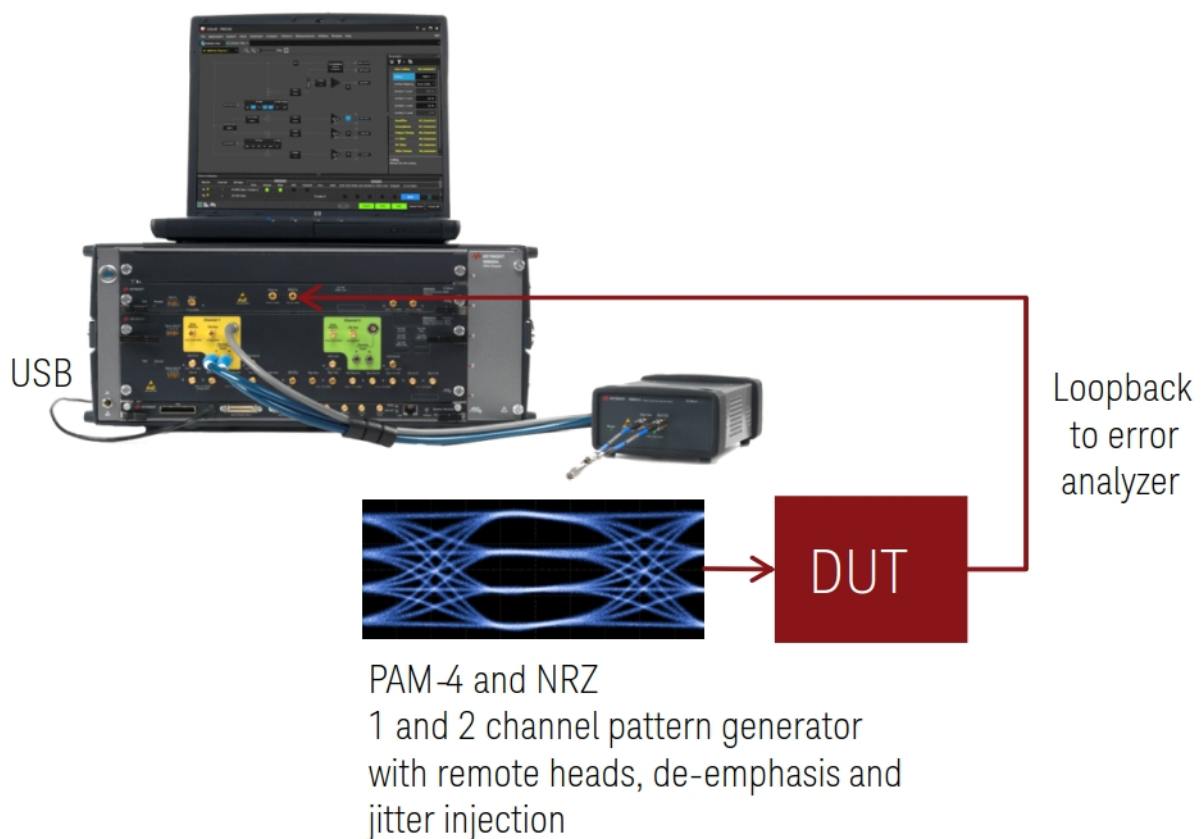


## [Keysight BERT now supports 64 Gbaud NRZ](#)

[Martin Rowe](#) - September 07, 2017

With IEEE 802.3bs and OIF CEI-56G standards and their supporting ICs now in place, 400 Gbit/s (400G) serial links are becoming reality. They're based on 8 lanes of 50 Gbits/s each. Despite all the talk in recent years that PAM-4 modulation will replace NRZ at data rates of 50 Gbits/s and higher per lane, NRZ keeps hanging on. It's just the way we thought the inexpensive FR4 PCB material would go away long ago, but it won't. That's because the signal processing of transmitters and receivers—plus better [PCB design practices](#)—give these technologies ever longer lives. Recognizing that NRZ still has teeth, Keysight Technologies has upgraded its M8040A bit-error-ratio tester (BERT) to support 64 Gbit/s NRZ signaling.



Selected as an [EDN Hot 100 Product of 2016](#), the Keysight M8040A adds 64 Gbit/s NRZ signal analysis to the already implemented 64 Gbaud (112 Gbits/s) PAM-4 signaling, which is available as an option. Other enhancements include clock recovery and an equalizer.

The M8040A is a modular system based on the [AXIe](#) platform that includes signal analyzer and pattern generator modules in a chassis. PC software controls the instrument over a USB link. It's available in two versions, one for signals up to 32 Gbaud, the other for signal up to 64 Gbaud.

An equalizer is now part of the M8040A, which provides:

- Up to 13 dB at 32.4 Gbaud NRZ
- Up to 5 dB at 30 Gbaud PAM-4
- Up to 4 dB at 26.5625 Gbaud PAM-4
- FFE with 15 presets
- For symbol rates above 32 Gbaud:
- Up to 3 dB at 58 Gb/s for NRZ signals. (requires M8046A-0A3 and -A64 options)

The pattern generator also adds de-emphasis to signals through a de-emphasis through a four-tap FIR filter, which emulates losses in transmission paths for receiver testing. It also adds calibrated jitter to signals, for receiver stress testing.

Prices start at \$323,000, which gets you 32 NRZ Gbaud speeds with one channel. PAM-4 (32 Gbaud and 64 Gbaud), 64 Gbaud NRZ, and a second channel are optional. The second channel lets you test for crosstalk conditions.

Keysight Technologies, [M8040A product page](#).

#### **Related articles:**

- [BERT takes on 400 Gbps links](#)
- [PAM-4 PCB best practices](#)
- [PAM4 challenges at DesignCon 2016](#)
- [Serial Links Rev Up to 56 Gbit/s](#)
- [When will PAM4 take over from NRZ?](#)