CLAIMS

What is claimed is:

1. A method comprising:

computing, by a computing system, a distribution of symbol errors in a forward error correction (FEC) frame transmitted in an optical signal;

comparing the distribution of symbol errors in the FEC frame to an expected, Poisson distribution of symbol errors;

determining, based on the comparison, that the distribution of symbol errors indicates a burst error that satisfies a threshold; and

in response to determining that the distribution of symbol errors indicates the burst error that satisfies the threshold, adjusting a control setting in an optical transceiver module to modify the optical signal.

2. The method of claim 1,

wherein the computing system comprises a receiver optical transceiver module that receives the optical signal, and

wherein computing the distribution of symbol errors in the FEC frame comprises:

obtaining, by the receiver optical transceiver module, the FEC frame from the optical signal;

computing, by the receiver optical transceiver module, the distribution of symbol errors in the FEC frame.

3. The method of claim 1,

wherein the threshold comprises a second threshold,

wherein computing the distribution of symbol errors in the FEC frame transmitted in an optical signal further comprises computing, by the computing system, a partial distribution of symbol errors in the FEC frame from a plurality of ports of a network device,

wherein determining that the distribution of symbol errors indicates a burst error that satisfies the threshold comprises determining that the partial distribution of symbol errors satisfies a first threshold at a particular port of the switch, the method further comprising:

computing, by the computing system, a full distribution of symbol errors of the optical signal for at least the particular port of the network device,

wherein the adjusting, in an optical transceiver module, the control setting in the optical transceiver module to modify the optical signal is in response to determining that the computed, full distribution of symbol errors indicates the burst error satisfies the second threshold.

4. The method of claim 1, further comprising:

obtaining, by a receiver optical transceiver module of a network device, the FEC frame from the optical signal; and

sending the FEC frame from the network device to the computing system.

5. The method of claim 1, wherein computing the distribution of symbol errors in the FEC frame comprises obtaining FEC codewords with varying numbers of errors.

6. The method of claim 1, wherein the collecting the transmitted optical signal is for a predetermined time interval.

7. The method of claim 1, further comprising:

determining, by comparing quantity of indicated burst errors within at least the optical signal satisfies a burst error threshold; and

in response to determining the burst error threshold is satisfied, generating an alarm.

8. The method of claim 1, wherein the FEC frame comprises a first FEC frame, the method further comprising:

computing, by the computing system, after the adjusting**,** a distribution of symbol errors in a second FEC frame transmitted in the optical signal; and

in response to determining that the distribution of symbol errors in the second FEC frame does not indicate a burst error that satisfies the threshold, eschewing adjustment, in the optical transceiver module, of the control setting in the optical transceiver module to modify the optical signal.

9. The method of claim 1, wherein the control setting in the optical transceiver module comprises one or more of a pre-cursor setting, a post-cursor setting, or a signal amplitude for the optical signal.

10. A method comprising:

determining, by a computing system, a pre-forward error correction (FEC) bit error rate (BER) based on a bit interleaved parity (BIP) field within an alignment marker of an electrical signal; and

in response to determining that the pre-FEC BER based on the BIP field exceeds an estimated BER, adjusting, in an optical transceiver module, a signal amplitude for the electrical signal through the optical channel.

11. The method of claim 10, wherein determining the pre-FEC BER based on the BIP field within an alignment marker of the electrical signal is prior to transmission through an optical channel.

12. The method of claim 10, wherein determining that the pre-FEC BER satisfies the threshold indicating a burst error further comprises:

estimating a BER of an FEC frame based on a random distribution; and

comparing the estimated BER to the determined pre-FEC BER.

13. The method of claim 10, further comprising:

determining, by comparing a quantity of indicated burst errors within at least the optical signal, the quantity of indicated burst errors satisfies a burst error threshold; and

in response to determining the burst error threshold is satisfied, generating an alarm.

14. The method of claim 12, wherein the estimating a BER of a FEC frame based on a random distribution further comprises:

performing a curve fitting on a first set of data in the random distribution; and

minimizing an error of the curve fitting according to:

$$Err_{fit} = \sum_{x=0}^{x=l} \left[\frac{Pr_theo(x) - Pr_meas(x)}{Pr_meas(x)} \right]^2 .$$

15. A computing system comprising:

processing circuitry having access to a memory device, the processing circuitry configured to:

compute a distribution of symbol errors in a forward error correction (FEC) frame transmitted in an optical signal;

compare the distribution of symbol errors in the FEC frame to an expected, Poisson distribution of symbol errors;

determine, based on the comparison, that the distribution of symbol errors indicates a burst error that satisfies a threshold; and

in response to determining that the distribution of symbol errors indicates the burst error that satisfies the threshold, adjust, in an optical transceiver module, a control setting in an optical transceiver module to modify the optical signal.

16. The computing system of claim 15, wherein the computing system further comprises a receiver optical transceiver module that receives the optical signal, and

wherein to compute the distribution of symbol errors in the FEC frame the receiver optical transceiver module includes the processing circuitry configured to:

obtain the FEC frame from the optical signal;

compute the distribution of symbol errors in the FEC frame.

17. The computing system of claim 15, wherein the processing circuitry is further configured to:

determine, by comparing quantity of indicated burst errors within at least the optical signal satisfies a burst error threshold; and

in response to determining the burst error threshold is satisfied, generate an alarm.

18. The computing system of claim 15, wherein the FEC frame comprises a first FEC frame, wherein the processing circuitry is further configured to:

compute, after the adjusting**,** a distribution of symbol errors in a second forward error correction (FEC) frame transmitted in the optical signal; and

in response to determining that the distribution of symbol errors in the second FEC frame does not indicate a burst error that satisfies the threshold, eschew adjustment, in the optical transceiver module, the control setting in the optical transceiver module to modify the optical signal.

19. The computing system of claim 15, wherein the control setting in the optical transceiver module comprises one or more of a pre-cursor setting, a post-cursor setting, or a signal amplitude for the optical signal.