

# IEEE 802.3dg 100BASE-T1L: Downshift

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# Background

- 802.3bz defined 2.5GBASE-T and 5GBASE-T
  - Objectives included 2.5Gb/s over Cat5e and 5Gb/s over Cat6 - [https://www.ieee802.org/3/bz/ngeabt\\_objectives\\_802.3WG\\_approved\\_0315.pdf](https://www.ieee802.org/3/bz/ngeabt_objectives_802.3WG_approved_0315.pdf)
- NBASE-T Alliance specification includes “Downshift”
  - Downshift enables link partners to choose a lower rate than their Highest Common Denominator (HCD) when the link is noisy.
  - Enables communication at common lower rates instead of repeated link failures at HCD.
  - White paper at <https://archive.nbaset.ethernetalliance.org/wp-content/uploads/2017/05/NBASE-T-Downshift-WP-1217.pdf>
  - Specification in section 2.11 of <http://www.nbaset.org/technology/library/nbase-t-physical-layer-specification-version-2-3/>

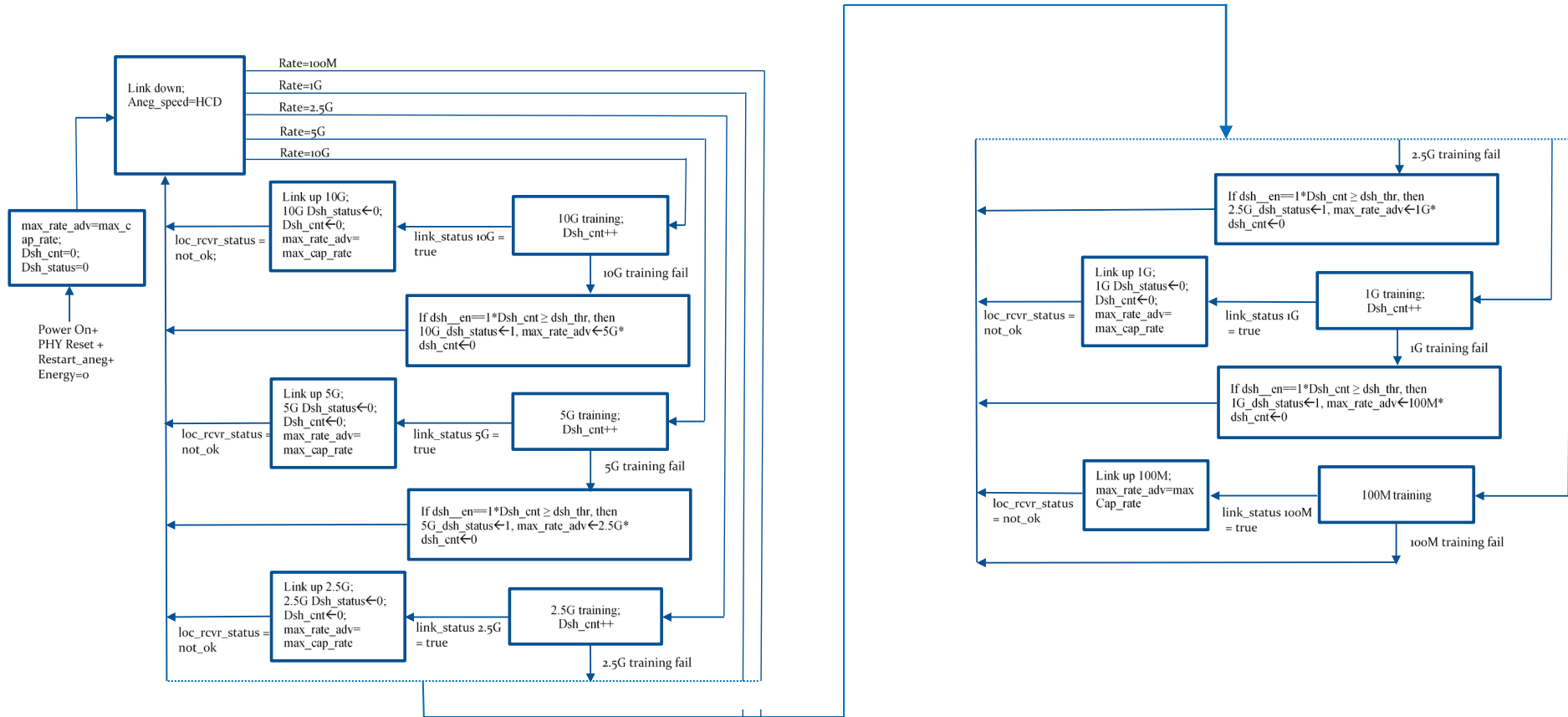
# Downshift and >10Mb/s SPE

- The BASE-T1L PHYs are intended to be used in noisy environments.
- I expect link segment specifications for >10BASE-T1L will be more stringent than 10BASE-T1L.
- Downshift enables communication when the auto negotiated “Highest Common Denominator(HCD)” speed is not reliable and a common slower speed exists.
- P802.3dg should specify a similar capability to improve user experience

# NBASE-T Downshift Overview

1. Auto-negotiation(AN) selects HCD speed
2. Link training/link up for selected speed
3. If training fails or link fails repeatedly, remove the HCD rate from the AN advertisement and restart AN.
4. Functions correctly if supported on only one of the link partners.

# NBASE-T Downshift State Machine



# NBASE-T Downshift Registers and Variables

- Registers
  - Control
    - enable, no energy reset, training counter, threshold status
    - downshift count, downshift rate flags,
  - Variables
    - AN speed, max rate advertised, max capable rate, local receiver status, link status flags (100M/1G/2.5G/5G/10G)

# Conclusion

- NBASE-T Downshift has been widely implemented and deployed in commercial products implementing 802.3bz
- 10BASE-T1L and >10BASE-T1L
  - live in harsh noise environments
  - can use existing installed cabling
  - will not always be connected to the “right cabling”
- P802.3dg should specify a similar capability to improve user experience

# Consensus

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# Backup

Thanks!