NBASE-T
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AT-A-GLANCE

NBASE-T Downshift:
Run Your Cables to Their Limits!

With NBASE-T Downshift, you can optimize your transmission rate to get the highest achievable data rate out of installed Category 5e and Category 6 structured cabling. NBASE-T Downshift augments the IEEE 802.3bz™ standard by providing a mechanism to select the best speed available within the constraints of the cabling.

What it is – Simply

NBASE-T Downshift is a protocol specified in the NBASE-T physical layer specification 2.3, which adds functionality to NBASE-T, IEEE 802.3bz and other IEEE 802.3 BASE-T technologies using the proven mechanisms in Ethernet Auto-Negotiation. Downshift selects and automatically adjusts for the maximum achievable sustained speed on installed cabling.

Why it Matters – Removing any Uncertainty

In the vast majority of cases, NBASE-T (and IEEE 802.3bz) provide 2.5Gb/s and 5Gb/s speeds on Cat5e and Cat6 cabling. With more uncertainty, 10GBASE-T may also run on installed cabling. Downshift removes any uncertainty about the cabling, and enables links to adjust to the highest supportable speed. When installations have severe noise, or cabling impairments that limit the bandwidth, NBASE-T Downshift takes over to adjust the data rate and maintain links. Downshift takes over when it detects difficulty establishing or maintaining link, and selects the next best speed, even if the environment changes over time.

The reliable data rate you can expect out of your cabling is primarily determined by two factors – the cable's bandwidth (generally, it's *Insertion Loss*) and the noise environment the receiver sees from outside its own cable. NBASE-T technology is designed to work in most cases of installed Cat5e and Cat6 installations, but Cat5e cables aren't specified for guaranteed performance for the full bandwidth needed for 5Gb/s rates, and neither Cat5e nor Cat6 were specified to control crosstalk between cables, known as *alien crosstalk*. In real life, cabling performance for most of Cat5e extends smoothly out to the 250 MHz needed for 5GBASE-T, and most installations don't have the theoretical worst-case 6-around-1 long bundles of active 5G or 10GBASE-T signals that can result in high levels of alien crosstalk. Because NBASE-T Downshift will sense and mitigate errors from these scenarios, it gives users a simple way to get their networks up and running at the highest speed possible. In addition, when there are severe noise issues, it gives network operators the information to adjust cabling and fix potential problems.

How it Works – In a Nutshell

The IEEE 802.3bz standard Auto-Negotiation protocol provides the key tools. Auto-Negotiation sits on top of the various Ethernet PHY specifications, such as 1000BASE-T, 10GBASE-T, 2.5GBASE-T and 5GBASE-T, and provides a way for the two ends of the link to agree on a common speed. Normally Auto-Negotiation picks the highest speed supported by both PHYs. NBASE-T Downshift adds intelligence to this process, monitoring the training attempts and removing speeds that didn't work, so the speed arrived at by Auto-Negotiation aligns with the link capacity. This dynamic adjustment works even as the noise sources come and go (which can make them difficult to find).

NBASE-T Downshift is a key component enabling seamless deployment of millions of 2.5G/5G BASE-T Ethernet links, and providing reliable communications over the installed base of 70 billion meters of structured cabling.

What to know more? Read the NBASE-T Downshift Whitepaper available at
http://www.nbaset.org/technology/library-category/white-papers/