



# **Energy Savings with 10GBase-T and Energy Efficient Ethernet**

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## The Status of 10GBase-T

Now that 3rd generation transceiver PHYs are below the 4 watt level, 10GBase-T is now a viable proposition for high density switching in high speed networks. The big advantage this brings end-users however, is its unique ability to deliver massive energy savings through Energy Efficient Ethernet (EEE) when compared to non Base-T competing systems such as SFP+ and CX1.

## Energy Efficient Ethernet (EEE)

Energy Efficient Ethernet is an emerging IEEE802.3az standard due to be ratified in 2010 and focuses on power savings when an Ethernet device is sitting idle.

Studies have shown that servers can consume as much as 70% of their full load power when sitting idle and switch ports by as much as 90%. With industries under pressure to reduce their carbon footprint this presents a major opportunity to reduce energy waste.

EEE provides a solution to improve this with a feature called Low Power Idle (LPI)

### *Low Power Idle*

This feature turns off most of the transceiver circuitry when the link is idle and reduces the standby power level to 2 watts. Upon receipt of a 'magic packet' from another Ethernet device, it brings itself out of 'sleep state' when there is a need to become active.

This feature enables Wake-on-LAN (WoL) which takes advantage of this by closing down all the power to the device but leaving a fraction of its standby power available to the network card as described above.

## Massive Energy Savings

The comparison between an SFP+ solution running 10Gbe and 10GBase-T over structured cabling is not the 3-4 watts per port when the device is active but the real savings when the device is sitting idle. In LPI and WoL mode a 200 watt server could save as much as 138 watts of idle power which cannot be done with SFP+.

## The Impact of Higher Grade Cabling

The 10GBase-T standard, IEEE 802.3an has a feature to reduce transmit power for given lengths below 100m. Since this is based upon the channel insertion loss the transmit power will be reduced irrespective of the cabling media; Cat6A UTP, Cat6A F/UTP or Cat7A. However a higher grade of cabling with a lower insertion loss such as LANmark7A will be calculated as being at a shorter length than a Cat6A cable. This means the Cat7A cable will support a higher reduction in transmit power for

the same distance as a Cat6A cable. Alternatively at the maximum transmit power reduction a Cat7A cable will reach 8 metres further or 10 server racks.

This presents greater design flexibility at lesser power.

### **Improvements to PHY Design**

Due to its high shielding and EMC performance, Cat7A offers PHY vendors the possibility to reduce power consumption in 10GBase-T PHYs even further. The superior pair to pair crosstalk when compared to Cat6A can result in a significant proportion of noise cancellers and decoders being eliminated, significantly reducing power consumption.

Further work is ongoing to establish how much power consumption this could potentially save with some industry experts predicting up to 1w – 1.5w per port.

### **Conclusion**

The industry has come under enormous pressure to reduce carbon emissions. Some are already law such as the Carbon Reduction Commitment (CRC) in the UK. Others that start off as voluntary schemes such as the EU Code of Conduct often lead to new legislation when key positive trends and benefits are observed.

When it comes to upgrading and/or specifying new ICT systems every opportunity must be explored for potential energy savings. Cumulative gains in energy reduction will not only reduce costs but should lead to greater energy efficiency.

Energy Efficient Ethernet presents an ideal opportunity to reduce energy utilisation with better management and controls that offer the potential for significant cost savings.

Specifying LANmark 7 or 7A can yield even higher energy savings and improve PUE.