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Low Power Design –

Proving That Having Environmental Concerns Is Good For Your Business

Access capacity requires a low cost and scalable broadband backhaul infrastructure, which is typically provided by Gigabit Ethernet over WDM solutions. However, there is another very important aspect of equipment selection that needs to be considered and is increasingly now being scrutinized in detail by operators looking at broadband backhaul infrastructure; power consumption. By **Ola Elmeland**, Vice-President of Marketing, Transmode.

As we all know, there is a bright future for broadband networks with huge opportunities on the horizon for high capacity triple play services being rolled out across the globe. Numerous operators are currently starting to offer video on demand and IPTV services but we know there is a long way to go before there is widespread deployment of high capacity triple play services. Regardless of the access media – cable, fibre or existing copper networks, all this access capacity requires a low cost and scalable broadband backhaul infrastructure, which is typically provided by Gigabit Ethernet over WDM solutions. However, there is another very important aspect of equipment selection that needs to be considered and is increasingly now being scrutinized in detail by operators looking at broadband backhaul infrastructure; power consumption.

There are two reasons this is important to the operator, firstly economics as operators continue to drive OPEX costs lower. With the recent increases in energy prices this is naturally very important. Secondly, there is the desire to reduce the environmental impact of networks while offering ever growing bandwidth to the users. A reduction in power consumption can obviously help in the overall reduction of greenhouse gas emissions from the electricity used by the operator. The widespread deployment of very high capacity broadband over

DSL, cable TV or FTTx networks will greatly increase the importance of this in the future.

Almost all vendors will claim low power as even the worst examples are better performing than the previous generations of equipment. But there is still a large difference between vendors. Our studies have shown that the difference between vendors can be as large as 80%, which can have a great impact on OPEX and environmental considerations.

Let's look at triple play broadband backhaul as an example. Operators want solutions for both Ethernet transport and for migrating from SDH to Ethernet. These need to be optimized for the metro WDM environment – meaning cost-efficient solutions with both a low footprint and low power. This can often be a simple 1u node with a single plug-in unit supporting multiple transponders for 10GbE or Muxponders to multiplex multiple GbE signals into 2.5 or 4 Gbit/s wavelengths. A further option is a Multiservice Muxponder that supports the migration from SDH to GbE over a single 4 Gbit/s wavelength.

Transmode's Low Power Design solutions achieve lower power consumption as they are designed with power efficiency and a small footprint from day one. Avoiding unnecessarily complicated backplanes on the chassis and providing single board solutions go a long way to achieving this. In addition, using the right transport protocols can have a large impact. Transmode's iWDM (Intelligent WDM) formats for example provide all the functionality of other formats and often more, whilst enabling designs that can compact a lot of functionality on a much smaller number of integrated circuits, greatly reducing cost and power consumption. Finally, a lower power plug-in unit design means that a lower levels of cooling is required within the chassis, further reducing the power consumption of the whole node as fewer, or slower running, fans are required.

To put a few numbers around this, let's look at 10 Gbit/s backhaul within a broadband backhaul ring network. A number of nodes will sit on a ring each sending a 10 Gbit/s wavelength in both directions around the ring for protection. 10 Gigabit Ethernet is a lot per node but we are considering triple play backhaul here, not simple DSL for PC traffic and with a high contention ratio.

A Low Power Design solution can supply this for less than 20W for the node. Some of the worst offenders in power consumption exceed 100W for the same configuration and here I am referring to widely deployed solutions that are still being deployed in volume today, not end of life products. So, we have a saving of 80W per node, 80% and a little more than a standard light bulb, but it adds up.

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Let's assume the operator is accessing or unbundling 200 exchanges, now our saving of 80W becomes 16,000W or 140 MWh over a year. The average price for electricity in Europe was 88.33€/MWh in 2007. So our annual saving becomes 12,380€ per year based on this figure. If we think about the environmental benefits of this reduction, then the selection of a Low Power Design solution can reduce the amount of CO2 produced by up to 136 tons per year depending on the energy source used.

But the story doesn't end there. There is a further benefit of a Low Power Design in the reduction in air conditioning demands. Naturally air conditioning requirements vary depending on ambient temperature etc, but studies have shown that it takes approximately 5W to cool every 10W of heat generated by systems in a typical telecoms environment. So, for every 10W we save we can lower the air conditioning requirements by 5W, representing a further 50% saving on the figures above. So, increasing the potential financial saving to 18,570€/year and the possible reduction in CO2 emissions up to 204 tons/year.

If we assume a 10 year life for the network, then we are looking at 185,705€ saving and a saving of 2037 tons of CO2 over the life cycle of the network. This represents a substantial saving which is a significant portion of the initial investment in the broadband backhaul network.

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Sometimes there is a further aspect to consider. In some scenarios Low Power Design doesn't reduce overall power consumption but allows better use of it. For example, we have a customer who provides Local Loop Unbundling services to other operators. Today if the end customer unbundles a rack they are allocated a fixed amount of power to that rack by the incumbent operator. If they also use the backhaul service from the incumbent then there is not enough power to fully equip the DSLAM in the rack. Our customer's backhaul solution based on Low Power Design solutions enables the end customer to divert more power to the DSLAM and to therefore supply more customers from the available power. In this example the end customer was able to add around 50 customers (12%) to each unbundled site.

So, Low Power Design can bring great economic advantages to the operators and environmental advantages to us all. These will be become increasing important as bandwidth requirements continue to grow and the pressure on power costs and on our environment continue to grow. Power consumption needs to be strongly considered in all that we do and at Transmode we are convinced Low Power Design is the way to go.