

## **Dynamic Spectrum Management Makes DSL Operations Green**

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The reduction of power consumption by telecommunications equipment has become a global imperative. For DSL operators, a strong desire for ecologically sound operations combined with rising energy costs at central offices and neighborhood distribution points have resulted in a requirement for increased power efficiency while preserving the continuing DSL evolution towards higher data rates. In response, products from industry leaders implementing the recommendations of the recently completed pan-industry report on Dynamic Spectrum Management (DSM) by the ATIS standards body are making it possible for DSL operators to achieve their goals for improved efficiency and performance.

The ATIS DSM Technical Report (ATIS PP-0600007) defines three levels of DSM for managing noise, power and crosstalk in DSL systems of all types – ADSL1, ADSL2/2+ and VDSL – in both single service provider and unbundled, multiple service provider environments. In all cases, DSM techniques seek to minimize transmitted and consumed power subject to a target grade of service. DSM Level 1 manages average power settings on a DSL line. DSM Level 2 adds a “politeness” capability allowing each DSL modem’s power to be set on a frequency-agile basis to avoid noises and reduce the generation of frequency-dependent crosstalk to other DSL lines. Finally, DSM Level 3 adds the ability to actively cancel crosstalk between lines. When used with the upcoming ITU-R G.vector standard, DSM Level 3 offers realizable DSL data rates in excess of 100 Mbps.

DSM is being widely embraced within the DSL industry. In recent months British Telecom, France Telecom, Deutsche Telekom, Telecom Italia, AT&T and other carriers have openly discussed the benefits of DSM in their existing ADSL1 and ADSL2/2+ networks. In addition, the DSM products of leading solutions providers such as ASSIA are already being used to manage many millions of DSL lines. The only requirement for exploiting DSM is infrastructure that supports the standardized G.997.1 DSL management interface.

While most equipment manufacturers support DSM, some are instead choosing to maintain closed management interfaces on their DSL products and to employ proprietary techniques to stabilize DSL lines. “Virtual noise” is one such scheme that has received recent attention. The virtual noise scheme deliberately overestimates noise on DSL lines, tricking DSL modems into either reducing their data rates or increasing their transmitted power, perhaps by as much as three times, or both. In some cases, virtual noise can stabilize the performance of an individual line, but always by less than a comparable application of DSM. On a network-wide basis, the effects of virtual noise are significantly increased power consumption and harmful crosstalk among DSL lines. Power is wasted and crosstalk is increased for all DSL subscribers served by the copper plant. In an unbundled environment, excess interference created by one service provider impacts the customers of other service providers sharing the copper plant. In contrast, products such as ASSIA’s DSL Express® that implement DSM seek to stabilize lines using the minimum necessary power, reducing DSL crosstalk to the subscribers of all service providers sharing the copper plant.

“The growing worldwide use of DSM techniques benefits DSL operators, customers and the environment, alike, through improved power efficiency, higher data rates and extended reach.” said John Cioffi, ASSIA’s Chairman, “While there are still some holdouts promoting unstandardized and technically unproven proprietary approaches, the industry’s well-founded embrace of the open-systems-based DSM indicates that DSM will soon be a requirement in all major DSL deployments.”

### **About ASSIA:**

ASSIA, Inc. is the leading provider of high-performance software tools for Dynamic Spectrum Management of DSL systems. ASSIA’s products manage more than ten million DSL lines worldwide today in ADSL1, ADSL2/2+ and VDSL2 networks, improving rates, extending reach increasing power efficiency, and helping DSL operators to maximize returns on their capital and operating expenditures.