Analogue Neural Net Takes Switches to Warp Speed

By James Middleton, Network News, London.

ROUTERS: Human brain processes inspire the next step for scheduling technology.

Technology similar to that used in Star Trek to control android officer Data has been developed by Scottish scientists.

Edinburgh's Heriot-Watt University has developed high availability switches based on neural network technology, which mimics the way the human brain processes information. The final frontier switches use diffractive optical elements to provide inputs to an analog neural network, which takes current digital technology to warp speed.

The project, a collaborative effort between British Telecom Laboratories and Heriot-Watt University, is moving into its second development phase to produce a next generation prototype because the current model is too bulky for commercial use.

John Snowdon, involved in the project at Heriot-Watt, said that, "even in its initial form the system offers a potential speedup over state-of-the-art purely digital scheduling systems and algorithms".

He explained that the combination of fast digital electronics with the communication bandwidth offered by the optical interconnect allows for the building of scalable routing systems. He said: "The use of neural network techniques allows for the toleration of considerable amounts of system noise, which provides a more scalable technology than conventional means."

BT/Heriot-Watt claim that this technology could revolutionise large networks. Rather than data coming in through various channels and being steered through a clear path to its destination simultaneously, a diffractive optics-based system of free-space interconnects optimises the routing process.

By firing a beam from a vertical cavity surface-emitting laser at data carrying neurons, they become less able to fire themselves and only non-blocking routes survive.

According to Snowdon, optimising the time constant of the data-carrying neurons improves speed.

He said: "The next-generation scheduler supports packet prioritisation, making it attractive as an ATM switch controller. It will also be fabricated in smart-pixel rather than discrete technology, leading to a remarkably small footprint and a considerable performance increase."

