

# 12 Gigabit-Per-Second, Ultra-High-Speed Interface Technology for System LSI Chips

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NEC Electronics Corporation announced the development of a super-fast serial interface circuit technology, an essential component of system chips having large-scale integration (LSI) and used in next-generation broadband networks and high-speed computers.

The new technology enables data transmission of 12 gigabits per second (Gb/s) between LSI chips, or between equipment employing LSI chips. This transmission rate is three to four times faster than conventional transmission rates in current high-end servers or routers, despite the use of legacy printed board traces, wires or cables. This rate is, moreover, five times faster than the PCI Express™ standard popularly used for high-speed transmission in personal computers. The new technology employs a duobinary transmission technique, conventionally used for several hundred megabits-per-second (Mb/s) communication in a hard disk drive, which can be applied to high-speed electrical transmissions greater than 10 Gb/s because of the following two NEC-developed technologies.

Signal equalization technology controls the inter-symbol interference (ISI) caused by distortion of waveforms due to the attenuation of signals over the wire or cable. Control is achieved by developing a two-time waveform controller in one data symbol, compared to a conventional one-time controller in one data symbol. Controlling signal bandwidth reduces compression to two-thirds the conventional size and increases a receiver's signal level by one and a half. This means that duobinary interface technology can achieve one-and-a-half times faster - or one-

and-a-half times longer - transmissions than conventional binary interface technology.

NEC's clock-timing recovery technology extracts optimum clock timing to enable receipt of three levels of high-speed duobinary signals. A new data coding technology multiplies clock signals into duobinary data signals that are received correctly and maintain compatibility with conventional receivers for two levels of widely used binary transmissions.

The demand for enhanced performance in high-speed computers and network equipment, the backbone of next-generation broadband networks, is rapidly increasing due to the expanding information technology (IT) society. Amid this environment, high-speed data transmission between LSI chips is particularly important for enhancing the performance of high-speed computers and network equipment. The serial-transmission scheme, which improves transmission speed by aligning the data and transmitting it in a series over a wire at a high speed, has been the transmission scheme of choice to date. However, this scheme has encountered problems such as the ISI caused by distortion of waveforms due to attenuation of signals over the wire, making it difficult to transmit data over long distances at high speed.

"I believe this new ultra-high-speed interface technology will be an essential component in differentiating the NEC system LSI chips used in future high-speed computers and network equipment. Through aggressive R&D activities, we plan to commercialize the circuit technology for cell-based integrated circuits and application-specific standard products in the first half of 2006," said Dr. Masao Fukuma, vice president, R&D Unit, NEC Corporation.

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