Texas Instruments
TECHNOLOGY AWARD UPDATE

Project: IBM Token-Ring Adapter

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During 1987 Texas Instruments sponsored various final year electrical engineering projects in the fields of Digital Signal Processing, Local Area Networks, and Parallel Processing.

Local Area Networks allow the sharing of resources such as high speed printers, plotters, large disk storage systems, as well as communications between distributed computing devices which may be personal computers, mini-computers, or mainframes. Currently Local Area Networks are nearly always used exclusively for data communications, however in the future we can expect Local Area Networks to handle both voice and data traffic. In this report we highlight work done on a proposed system for integrated voice and data communications using the IBM Token-Ring LAN.

PRINCIPLE OF OPERATION

The project involved preliminary development of an IBM Token-Ring adapter for use as a stand-alone node for interfacing speech and low speed data onto the IEEE 802.5 LAN. The Token-Ring LAN utilised the Texas Instruments TMS380 Adapter Chipset. The adapter was designed, constructed and tested. In the design and testing of the adapter, various hardware and software aspects of the adapter were considered such as initialisation and testing. An interface circuit suitable for a 68000 style system bus was designed, together with interconnect circuitry for the TMS380 chipset to allow the adapter to be connected to the host system. An extensive evaluation of the Direct I/O Interface feature and the DMA capability of the TMS38030 System Interface was undertaken.

TMS38030 Interfacing

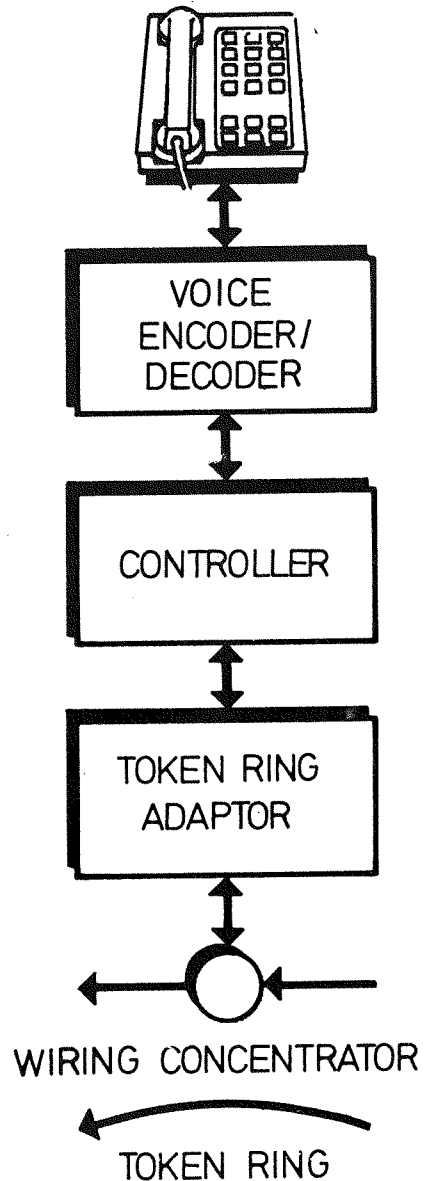The Direct I/O interface provided by the TMS38030 allows the attached system to access a register set within TMS38030 through four word-aligned address locations. The system controls the adapter via these four registers (Interrupt Register, Data Register, Data Register with Auto-Increment, Address Register).

The DMA channel of the TMS38030 provides a full 24 bits of address, and so is potentially capable of accessing up to 16 megabytes of system memory. The TMS38030 also provides parity checking by maintaining a parity bit for each byte of both address and data types. Two modes of DMA may be selected by the attached system: burst mode or cycle-steal mode. The desired mode is selected during the adapter initialisation process.

The software interface with the adapter relies on the hardware interface described above. The adapter is controlled by the attached system through the four registers in the TMS38030 via the Direct I/O interface. Using this interface the system can initialise the adapter, interrupt the adapter (or be interrupted by the adapter), and initiate DMA transfers. The DMA channel enables the attached system to pass commands, parameters and frames to the adapter, and receive completition codes and frames from the adapter.

The Future

The project as described is intended to function as a testbed for investigating suitable protocols for speech communication. The speech node consists of a voice encoder/decoder, a control unit and an IBM Token-Ring LAN interface (or adapter). Such could well be the indication of what we can expect from LANs in the next few years.

Block diagram of Speech Node