High-Speed Serial Interface

Background

The *High-Speed Serial Interface* (HSSI) is a DTE/DCE interface developed by Cisco Systems and T3plus Networking to address the need for high-speed communication over WAN links. The HSSI specification is available to any organization wanting to implement HSSI.

HSSI is now in the American National Standards Institute (ANSI) Electronic Industries Association (EIA)/TIA TR30.2 committee for formal standardization. It has recently moved into the International Telecommunication Union Telecommunication Standardization Sector (ITU-T) (formerly the Consultative Committee for International Telegraph and Telephone [CCITT]) and the International Organization for Standardization (ISO), and is expected to be standardized by these bodies.

HSSI Interface Basics

HSSI defines both the electrical and the physical DTE/DCE interfaces. It therefore corresponds to the physical layer of the OSI reference model. HSSI technical characteristics are summarized in Table 11-1.

Table 11-1 HSSI technical characteristics.

Characteristic	Value
Maximum signaling rate	52 Mbps
Maximum cable length	50 feet
Number of connector pins	50
Interface	DTE-DCE
Electrical technology	Differential ECL
Typical power consumption	610 mW
Topology	Point-to-point
Cable type	Shielded twisted-pair wire

The maximum signaling rate of HSSI is 52 Mbps. At this rate, HSSI can handle the T3 speeds (45 Mbps) of many of today's fast WAN technologies, as well as the *Office Channel -1* (OC-1) speeds (52 Mbps) of the *synchronous digital hierarchy* (SDH). In addition, HSSI easily can provide high-speed connectivity between LANs, such as Token Ring and Ethernet.

The use of differential *emitter-coupled logic* (ECL) helps HSSI achieve high data rates and low noise levels. ECL has been used in Cray interfaces for years and is specified by the ANSI *High-Performance Parallel Interface* (HIPPI) communications standard for supercomputer LAN communications. ECL is off-the-shelf technology that permits excellent retiming on the receiver, resulting in reliable timing margins.

HSSI uses a subminiature, FCC-approved 50-pin connector that is smaller than its V.35 counterpart. To reduce the need for male-male and female-female adapters, HSSI cable connectors are specified as male. The HSSI cable uses the same number of pins and wires as the *Small Computer Systems Interface* 2 (SCSI-2) cable, but the HSSI electrical specification is tighter.

HSSI Operation

The flexibility of the HSSI clock and data-signaling protocol makes user (or vendor) bandwidth allocation possible. The DCE controls the clock by changing its speed or by deleting clock pulses. In this way, the DCE can allocate bandwidth between applications. A PBX, for example, may require a particular amount of bandwidth, a router another amount, and a channel extender a third amount. Bandwidth allocation is key to making T3 and other broadband services affordable and popular.

HSSI assumes a peer-to-peer intelligence in the DCE and DTE. The control protocol is simplified, with just two control signals required ("DTE available" and "DCE available"). Both signals must be asserted before the data circuit can be is valid. The DCE and DTE are expected to be able to manage the networks behind their interfaces. Reducing the number of control signals improves circuit reliability by reducing the number of circuits that can fail.

Loopback Tests

HSSI provides four loopback tests, which are illustrated in Figure 11-1. The first provides a local cable test as the signal loops back after it reaches the DTE port. The second test reaches the line port of the local DCE. The third test reaches the line port of the remote DCE. Finally, the fourth test is a DCE-initiated test of the DTE's DCE port.

Figure 11-1 HSSI supports four loopback tests.