## Chapter Goals

- Discuss the history and standards of HSSI.

- Explain the technical specifications of HSSI.

- Describe the benefits of employing HSSI technology.

- Discuss how HSSI operates.

# High-Speed Serial Interface

## Introduction

The *High-Speed Serial Interface (HSSI)* is a DTE/DCE interface that was 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 Interface Basics

HSSI defines both electrical and physical interfaces on DTE and DCE devices. It operates at 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 points | 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 computer system interfaces for years and is specified by the ANSI High-Performance Parallel Interface (HIPPI) communications standard for supercomputer LAN communications. ECL is an 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 more concise.

# 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. For example, a PBX 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 become valid. The DCE and DTE are expected to be capable of managing 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*
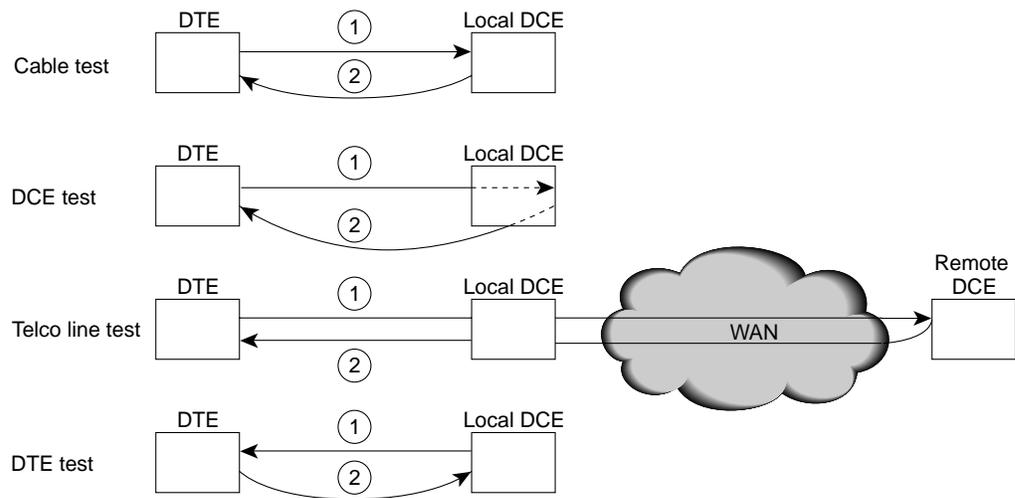


# Summary

HSSI is an interface technology that was developed by Cisco Systems and T3plus Networking in the late 1990s to fill the need for a high-speed data communication solution over WAN links. It uses differential emitter-coupled logic (ECL), which provides high-speed data transfer with low noise levels. HSSI pin connectors are significantly smaller than pin connectors for competing technologies. The HSSI cable uses the same number of pins and wires as the Small Computer Systems Interface 2 (SCSI-2) cable, but its electrical specification is more concise. HSSI makes bandwidth resources easy to allocate, making T3 and other broadband services available and affordable. HSSI requires the presence of only two control signals, making it highly reliable because there are fewer circuits that can fail. HSSI performs four loopback tests for reliability.

# Review Questions

**Q**—*Name at least three benefits of implementing HSSI technology in a network.*

**A**—Benefits include these:

HSSI provides high-speed data communication over WAN and LAN links.

HSSI uses differential emitter-coupled logic (ECL), which provides high-speed data transfer with low noise levels.

HSSI uses a subminiature FCC-approved 50-pin connector that is smaller than its V.35 competitor.

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 more concise.

HSSI makes bandwidth resources easy to allocate, making T3 and other broadband services available and affordable.

HSSI requires the presence of only two control signals ("DTE available" and "DCE available"), making it highly reliable because there are fewer circuits that can fail.

HSSI performs four loopback tests for reliability.

**Q**—*Name the four loopback tests that HSSI performs.*

**A**—Cable test, DCE test, Telco line test, DTE test.