Section 5: ISDN Implementation—The Growing Pains of a New Technology

Objectives

After finishing this section you will be able to answer questions like these:

- What is required to implement ISDN service?
- What are ISDN islands?
- What are the obstacles to ISDN implementation?

The Slow, Steady Pace of Conversion

The first ISDN telephone call was made in 1982. So, why isn't this new technology already in every home and business around the world?

In the early 1960s, telephone companies began converting existing rotary dial technology with dial tone multiple frequency (DTMF) technology. AT&T coined the phrase touch-tone dialing for this technology. This conversion is still in progress today and illustrates the pace of technological upgrades in telecommunications.

In the years that ISDN has been in existence, telcos have steadily upgraded their facilities. The enormity of this job is too difficult to imagine because upgrades are just a portion of the forces at work in ISDN implementation. Since that first phone call, both a manufacturing base and a market for the products the manufacturers would create needed to develop. States and telcos have needed to work together to devise a pricing structure for the sale of ISDN services. Finally, the knowledge of ISDN implementation needs to be transferred from those who created the technology to those who will be responsible for getting it to the customer and making it work in the real world.

SO and Local Loop Digital Upgrades

To upgrade their facilities to handle digital data, telcos have to replace the old analog switching office switches with digital switches as well as add software that supports all of the ISDN features. Telcos must add the hardware necessary to enable packet-switched data. In addition, telcos have to replace or upgrade many of the local loops served by each switching office. Eventually this will all need to be done on every street in every community across America.

The local loop has to support 64 kbps digital data. Originally, these facilities were built and put in place for analog transmission only. Many local loops have been designed with analog amplifiers and other network components that will not support digital data. Loop length is another issue. Digital data requires that the signal strength be maintained over the line. As the signal travels over a cable pair, the strength of the signal degrades. A local loop too long to accommodate a digital signal would require the installation of additional network components.

The cost is high for a telco to manage the upgrade to digital data. Telco income is largely based on population per mile of cable and influences the pace at which upgrades occur. On the coasts where population per mile of cable is high, telcos have the resources to invest in the upgrade. In a portion of the western states where population per cable mile is low, the resources are not available; hence, the pace of upgrading network facilities to digital capabilities is slow.

ISDN Islands

ISDN islands resulted from this gradual upgrade process. An ISDN island is a pocket of telephone company switching offices and related facilities, all of which have been upgraded to handle ISDN. Outside of those facilities, some of the features of ISDN like 64 kbps circuit-switched data may not be available.

To complete an ISDN end-to-end 64 kbps digital connection, the local loop connecting the customer to her serving switching office must be capable of handling digital data at 64 kbps and have a distance capable of maintaining a digital signal. The switching office which provides service to the local loop must be upgraded and have the software needed to operate the ISDN features. The terminal device the customer is calling and the switching office that serves it must have compatible capabilities. For an end-to-end digital connection to happen, there must be end-to-end digital capability.

An example of an ISDN island is a business with two offices in different locations in the same city. Both locations have ISDN service, but the facilities between the two locations are not capable of handling the higher bit rates available with ISDN digital transmission. Those two offices are on ISDN islands. If the business has an office in another state, the business' long distance provider must have facilities that support 56 kbps and 64 kbps circuit-switched calls and packet-switched data transmission. Without these facilities, the out-of-state office is also on an ISDN island. This island effect will continue to be an obstacle to ISDN implementation until switching offices, local loops, and long distance networks have been upgraded.

Manufacturers

There are three types of manufacturers of telecommunications products network, switch, and CPE. Each type of manufacturer knows its area of expertise and the standards it needs to meet for ISDN compliance. ISDN's open architecture allows these manufacturers to design and develop products with features that meet the needs of the market. Open architecture also works against product development.

The industry that manufactures digital telecommunications products is young and innovative. New uses and features for ISDN are developed constantly. The standards for all these ISDN features have not kept pace with development. This causes compatibility issues between products. National ISDN standards address some of these growing pains. National ISDN standards work toward defining standards for both new and existing features and getting them out to the manufacturers so that CPE and switch products have matching features sets.

Communication between manufacturers has not fully developed either. The manufacturers of switch software are not aware of all the needs and features being built into CPE. Those who manufacture CPE are not fully aware of the needs of switch software and network hardware. Growth in the demand for ISDN service will have a positive influence on the current difficulty of implementation. There's a growing demand for ISDN service, so manufacturers who develop good communication and work out their compatibility issues will reap a greater profit.

Knowledge Transfer

ISDN was created by engineers, a mysterious and highly educated group of professional men and women. Their knowledge is passed on to the manufacturers who create the products customers purchase to make use of their creations. The implementation of ISDN is not done by engineers or manufacturers. It is done by telco customer service people, sales people, and technical representatives who, more than likely, do not know much about the intricacies of the process. Just as the manufacturers of network, switch, and CPE need to learn about each others' compatibility issues, customer service, sales people, and technical representatives need to know how to implement and troubleshoot ISDN service for the customer.

Until the knowledge of ISDN implementation transfers from engineers and manufacturers to the telco representatives, the burden of knowledge rests with the customer and the providers of services who use ISDN, such as Internet service providers. For example, if a customer purchases a terminal adapter to connect her computer to the Internet, she has to do much more than configure the adapter. She also has to be able to communicate with the telco representative and the Internet service provider representative about ISDN availability and service configuration. Finally, she has to troubleshoot any problem that arises if the connection doesn't work. Essentially, the customer has to learn and speak the language of ISDN and hope that the person to whom she is speaking understands that language.

Telcos and other service providers are educating their representatives about ISDN implementation. Many customers in the United States have ISDN service in their homes and businesses today. Although much of the press regarding ISDN service speaks to the difficulty of obtaining service, this is indicative of the state of the knowledge transfer about ISDN implementation. The language of ISDN is complex. The terminology is unfamiliar and lacks its own standardization. Eventually, like programming a VCR, we will all learn how to keep the clock from blinking "12:00."

Summary

ISDN implementation requires network availability, equipment compatibility, and knowledge of how to configure and troubleshoot a connection successfully. All three of these requirements are moving forward to a point where ISDN service will be as simple to obtain as current analog telecommunications services. ISDN islands may presently impede implementation, but the islands will grow larger, merge together, and become less of a problem as upgrades continue. The driving force behind this movement is customer demand. Customer demand will stimulate telcos, product manufacturers, Internet service providers, etc. to invest the time and resources necessary to work out the bugs currently causing difficulty with ISDN implementation.

Some key points to remember about ISDN implementation:

- The areas telcos need to upgrade in order to provide and implement ISDN service are:
    - Replace analog switch with a digital switch.
    - Add ISDN features software.
    - Upgrade network hardware for packet-switched data.

    - Make the local loop capable of transmitting digital data.

- ISDN islands are pockets of telco switching offices and related facilities that have been upgraded to handle digital data. Analog-only facilities surround these pockets isolating them from each other.

- There are three types of manufacturers for telecommunications products: network, switch, and CPE.

- National ISDN standards work toward developing standards for new and existing ISDN features, as manufacturing brings them to the marketplace.

- ISDN was created by engineers.

- Education for customer service, sales people, and technical representatives will assist the transfer and acquisition of knowledge about ISDN language necessary to make ISDN implementation successful.

Progress Check

1. Which of these is not required for ISDN implementation?

A. Features software

B. Packet-switched data capabilities

C. Analog amplifiers

D. Support for 64 kbps data transfer

Answer: C

2. What are ISDN islands?

_____
_____
_____
_____

Answer: Pockets of ISDN-compliant facilities surrounded by non-ISDN compliant facilities.

3. Which of these is not manufactured for telecommunications?

A. Features

B. Network

C. Switch

D. CPE

Answer: A

4. What does a local loop need to perform for ISDN service compliance?

A. Analog voice transmission

B. 64 kbps digital data transmission

C. Switch software features

D. 56 kbps digital data transmission

Answer: B

5. What do National ISDN Standards provide?

A. Protocol standards for reference points

B. Standards for local loop upgrades

C. Standards for customer-provided equipment design

D. Standards for new and existing features

Answer: D

6. What type of person created ISDN?

A. Manufacturing designer

B. Average human

C. Highly intelligent engineer

D. Mysterious extraterrestrial

Answer: C

7. What is the primary force that will drive the process of telecommunications upgrades, manufacture standardization, and knowledge transfer?

A. Profit

B. Customer Demand

C. Experience

D. Research and development

Answer: B