

An Overview of ISDN Technology

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Originally published: January 1996

Last updated: January 2001

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CAVEAT: Any article written about communication technology has a limited life – this technology can change significantly in a year. A one or two year old article may be out of date – we will try to update this article periodically (check the mast head for the update date).

Introduction to ISDN

ISDN (Integrated **S**ervices **D**igital **N**etwork) is a digital communications technology that enables a small business or an individual to connect directly to both the Internet and other sites/users (e.g.: for videoconferencing). ISDN provides a standard interface for voice, fax, video, graphics, and data – all on a single telephone line.

“*Integrated Services*” refers to ISDN's ability to deliver two simultaneous connections, in any combination of voice, fax, data, and video, over a single line. Multiple devices can be attached to the line, and used as needed.

“*Digital*” refers to the fact that it is a purely digital transmission, as opposed to the analog transmission method used by conventional telephone lines.

“*Network*” refers to the fact that ISDN is not simply a point-to-point connection like a leased telephone line – ISDN networks extend from the local telephone exchange to the remote user, and include all the switching equipment in between. If your ISDN equipment includes analog capabilities, you can also connect to telephones, fax machines, and analog modems – even though they may be connected to standard analog telephone lines.

ISDN service is provided by the same companies that provide telephone service – you get much faster, more dependable connections for voice, fax, data, and video – all through a single connection.

While not new (ISDN has been around for over 15 years), the advent of international standards has made ISDN viable as telephone companies around the world have upgraded their equipment to these ISDN standards. It is now commonly available in Europe, Japan, Australia, and from most major North American telephone companies – AT&T, MCI, and Sprint can provide long-distance ISDN lines for global connections. One of the reasons for its widespread use is that it works on the ordinary copper wire already in place in the telephone system.

One advantage of ISDN over other digital communications technologies is its ability to handle all types of information such as voice, computer data, studio-quality sound, and video. In addition, up to eight devices (such as telephones, computers, and fax machines) can be connected to one ISDN line. These can all be separate telephone numbers or multiples of the same number – allowing one to still “ring through” while another is “busy.”

How Does ISDN Work?

The simplest ISDN connection (called Basic Rate or BRI) consists of two 64 Kbps (kilobits-per-second) data channels (called B-channels) plus a 16 Kbps control channel (called the D-channel). This is sometimes referred to as “2B+D.”

On the other end of the spectrum is Primary Rate ISDN (called PRI) with 23 B-channels plus a D-channel (i.e.: “23B+D”).

To connect to the ISDN line you need a black-box called an NT1 Network Terminator – a power supply (which you also need) is often built-in. This is about a \$300.00 US item – although some manufacturers are starting to build this into their ISDN equipment.

You will also need a Terminal Adapter (often called a “TA”) to connect non-ISDN equipment (such as your computer or fax machine) to the line – these are also available as plug-in cards for PC’s. Some TA’s work as Ethernet bridges so that you can connect your LAN directly to the ISDN line. These can vary in price from about \$500.00 to \$1,500.00 US (depending on needs and capabilities).

What Can ISDN Be Used For?

One of the most common uses for this technology today is videoconferencing. By using from one to four BRI lines, a videoconference can be established between two or more sites – the more lines, the faster the connection. For a videoconference application, higher connection speed translates to higher resolution and video frame rates. The telephone company infrastructure allows these connections to be made in a similar fashion to dialling a telephone.

While videoconferencing has been around for a long time, in the past it has primarily been confined to large corporations. The ability to transmit quality voice and video over long distances used to require expensive equipment and costly leased lines – these could only be justified by the largest of companies. Due to this dependency on leased lines, videoconferences were point-to-point (e.g.: headquarters might be permanently linked to a manufacturing plant). Videoconferencing on the scale of teleconferencing was simply impractical.

The advent of new low-cost videoconference hardware that can utilise ISDN is rapidly changing this. Both desktop conferencing (a participant uses a PC equipped with a microphone, a small video camera, and an ISDN interface) and true videoconferencing (where more sophisticated equipment and remote control cameras allow group participation) have become as easy to set up as voice conferencing. Due to ISDN's versatility, videoconferences can include the sharing of graphic images and presentations, computer applications, documents, and computer files. This capability is proving popular for telecommuting, long distance meetings, workgroup collaboration, security and surveillance, and dozens of other innovative applications.

ISDN videoconferencing can make meetings much more practical and productive than in the past. It can greatly reduce travel expenses and eliminate unproductive travel time – making scheduling much easier. Since meeting participants are at their own offices, they have access to their computers and files during the meeting. Other staff can also be easily called into the meeting as needed.

One of the traditional uses for this technology has also been direct, high-speed Internet access – most Internet providers can provide an ISDN connection. With the advent of ADSL and cable modem service, however, this use is rapidly becoming obsolete.

Other uses include:

- studio quality audio transmission for broadcast;
- image archives (real-estate, medical images, photographic image banks, etc.);
- preparation of printed materials;
- electronic manuals – on-line;
- stock quotes for brokers;
- and credit card authorisation.

One of the key advantages of ISDN is its flexibility – you can use it in several different ways, depending on your needs. For example:

If you want simultaneous voice and data, simply assign a B-channel to each.

If you want higher bandwidth for your data, combine B-channels. Thus, combining two B-channels increases the bandwidth to 128 Kbps.

Using an *inverse multiplexer* you can combine several lines for bandwidth. For example, all 23 lines in a PRI connection would give you over 1.5 Mbps.

What Does ISDN Cost?

Costs can vary greatly – contact your telephone service provider for availability of service and exact costs in your area. Typically, there are three components to the cost of ISDN service: a one-time set-up/installation fee, a monthly line fee, and a usage fee. All vary widely from area to area – the cost of ISDN depends mainly on where you are located.

In general, set-up/installation fees are relatively minimal (\$50 to \$150), and are one-time fees. Monthly line fees tend to be competitive with standard business telephone rates, and, when you consider that each ISDN BRI line is actually two lines, they are usually reasonable. The usage fees (generally a per-minute charge for your actual usage) is the cost to pay the most attention to when evaluating an ISDN provider (assuming you have a choice).

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