**Integrated Services Digital Network(ISDN)**

**Integrated Services Digital Network** (**ISDN**) is a set of communications standards for simultaneous [digital](http://en.wikipedia.org/wiki/Digital) [transmission](http://en.wikipedia.org/wiki/Transmission_%28telecommunications%29) of voice, video, data, and other network services over the traditional circuits of the [public switched telephone network](http://en.wikipedia.org/wiki/Public_switched_telephone_network).

ISDN is a [circuit-switched](http://en.wikipedia.org/wiki/Circuit_switching) [telephone network](http://en.wikipedia.org/wiki/Telephone_network) system, which also provides access to [packet switched networks](http://en.wikipedia.org/wiki/Packet_switched_network), designed to allow digital transmission of voice and [data](http://en.wikipedia.org/wiki/Data) over ordinary [telephone copper wires](http://en.wikipedia.org/wiki/Twisted_pair), resulting in potentially better voice quality than an analog phone can provide. It offers circuit-switched connections (for either voice or data), and packet-switched connections (for data), in increments of 64[kilobit](http://en.wikipedia.org/wiki/Kilobit)/s.

In a [videoconference](http://en.wikipedia.org/wiki/Videoconference), ISDN provides simultaneous voice, video, and text transmission between individual desktop videoconferencing systems and group (room) videoconferencing systems.

## ISDN elements

*Integrated services* refers to ISDN's ability to deliver at minimum two simultaneous connections, in any combination of data, voice, [video](http://en.wikipedia.org/wiki/Videotelephony), and[fax](http://en.wikipedia.org/wiki/Fax), over a [single line](http://en.wikipedia.org/wiki/Local_loop). Multiple devices can be attached to the line, and used as needed. That means an ISDN line can take care of most people's complete communications needs (apart from [broadband Internet access](http://en.wikipedia.org/wiki/Broadband_Internet_access) and entertainment [television](http://en.wikipedia.org/wiki/Television)) at a much higher transmission rate, without forcing the purchase of multiple analog phone lines.

There are two types of ISDN:

* [Basic Rate Interface](http://www.webopedia.com/TERM/B/BRI.html) (BRI) -- consists of two 64-Kbps [B-channels](http://www.webopedia.com/TERM/B/B_channel.html) and one [D-channel](http://www.webopedia.com/TERM/D/D_channel.html) for transmitting control information.
* [Primary Rate Interface](http://www.webopedia.com/TERM/P/PRI.html) (PRI) -- consists of 23 B-channels and one D-channel (U.S.) or 30 B-channels and one D-channel

## Basic Rate Interface

The entry level interface to ISDN is the Basic(s) Rate Interface (BRI), a 128 [kbit/s](http://en.wikipedia.org/wiki/Kilobits_per_second) service delivered over a pair of standard telephone copper wires. The 144 kbit/s payload rate is broken down into two 64 kbit/s [bearer channels](http://en.wikipedia.org/wiki/Bearer_channel) ('B' channels) and one 16 kbit/s signaling channel ('D' channel or delta channel). This is sometimes referred to as 2B+D.

***P***rimary-***R***ate***I***nterface

A type of [ISDN](http://www.webopedia.com/TERM/I/ISDN.html) service designed for larger organizations. PRI includes 23 [B-channels](http://www.webopedia.com/TERM/B/B_channel.html) (30 in Europe) and one D-Channel. In contrast, [BRI (Basic-Rate Interface)](http://www.webopedia.com/TERM/B/BRI.html), which is designed for individuals and small businesses, contains just two B-channels and one D-channel.

***D***elta-***channel***

The [channel](http://www.webopedia.com/TERM/C/channel.html) in an [ISDN](http://www.webopedia.com/TERM/I/ISDN.html) connection that carries control and signaling information. Basic Rate ISDN (BRI) service consists of two 64 [Kbps](http://www.webopedia.com/TERM/K/Kbps.html) B-channels, and one D-channel for transmitting control information. Primary ISDN service consists of 23 B-channels (in the U.S.) or 30 B-channels

***B***earer-***channel***

The main data [channel](http://www.webopedia.com/TERM/C/channel.html) in an [ISDN](http://www.webopedia.com/TERM/I/ISDN.html) connection. Basic Rate ISDN (BRI) service consists of two 64 [Kbps](http://www.webopedia.com/TERM/K/Kbps.html) B-channels, and one D-channel for transmitting control information. Primary ISDN service consists of 23 B-channels

The three logical digital communication channels of ISDN perform the following functions:

|  |  |
| --- | --- |
| B-Channel | Carries user service information including: digital data, video, and voice. |
| D-Channel | Carries signals and data packets between the user and the network |
| H-Channel | Performs the same function as B-Channels, but operates at rates exceeding DS-0 (64 Kbps).ISDN Architecture |

ISDN DevicesDevices connecting a CPE and a network. In addition to facsimile, telex, PC, telephone, ISDN devices may include the following:

|  |  |
| --- | --- |
| TA | Terminal Adapters - devices that are used to portray non-ISDN equipment as ISDN compatible. |
| LE | Local Exchange - ISDN central office (CO). The LE implements the ISDN protocol and is part of the network. |
| LT | Local Termination - used to express the LE responsible for the functions associated with the end of the Local Loop. |
| ET | Exchange Termination - used to express the LE responsible for the switching functions. |
| NT | Network Termination equipment exists in two forms and is referred to accordingly. The two forms are each responsible for different operations and functions.* NT1 - Is the termination of the connection between the user sight and the LE. NT1 is responsible for performance, monitoring, power transfer, and multiplexing of the channels.
* NT2 - May be any device that is responsible for providing user sight switching, multiplexing, and concentration: LANs, mainframe computers, terminal controllers, etc. In ISDN residential environments there is no NT2
 |
| TE | Terminal Equipment - any user device e.g.: telephone or facsimile. There are two forms of terminal equipment:* TE1 - Equipment is ISDN compatible.
* TE2 - Equipment is not ISDN compatible
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ISDN Reference Points

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Reference points define the communication points between different devices and suggest that different protocols may be used at each side of the point. The main points are as follows:

|  |  |
| --- | --- |
| R | A communication reference point between a non-ISDN compatible TE and a TA. |
| S | A communication reference link between the TE or TA and the NT equipment. |
| T | A communication reference point between user switching equipment and a Local Loop Terminator. |
| U | A communication reference point between the NT equipment and the LE. This reference point may be referred to as the network boundary when the FCC definition of the Network terminal is used. |

The following diagram illustrates the ISDN Functional Devices and Reference Points: