



ISDN Centrex for Telecommuters: *Frequently Asked Questions*

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ISDN Centrex is designed to provide businesses with advanced voice capabilities. Many businesses are using ISDN Centrex to receive more call management features at lower costs than previously possible. ISDN Centrex allows telecommuters, home offices, and small offices have the same sophisticated calling capabilities and professional appearance that large companies enjoy. The following *Questions and Answers* provide an introduction to ISDN Centrex's value for telecommuting and SOHO applications.

ISDN Centrex Q & A

What is ISDN? What types of things can it do?

ISDN stands for "Integrated Services Digital Network." It is a telecommunications service available from the local telephone companies (i.e., Local Exchange Carriers or LECs). ISDN supports switched digital data services (for high-speed calls to the Internet) as well as voice services with many advanced features.

Basic Rate Interface (BRI) is the type of ISDN popular with consumers. It is also the type of ISDN used with Centrex service. BRI is delivered over the same type of copper wires used for ordinary phone service. But since ISDN uses a digital signal, it has many more capabilities than an ordinary phone line.

A BRI line is composed of two B-channels and one D-channel. Each B-channel can be used for a separate voice or data call. Since both B-channels can be used simultaneously, two users can share a single BRI and still be able to independently make phone calls. In addition, each B-channel can be used to make 64 kilobit per second (kbps) data calls. A user may combine both B-channels together to connect to the Internet at 128 kbps, or the user may use one B-channel for an Internet call (at 64 kbps) and use the other B-channel for a simultaneous voice conversation. Because a BRI provides two B-channels, one BRI can be used as replacement for two ordinary phone lines.

The D-channel is used to control calls on the B-channels. For example, when the user makes a voice call, the digits he dials are carried over the D-channel. In addition, when he receives a call, Caller ID information is sent to his telephone over the D-channel. Ordinary telephone lines do not have a control channel. Consequently, things like dialed digits, Caller ID, and call waiting information are sent over the voice channel. The use of a control channel allows ISDN to improve on popular phone services. For example, call waiting can be provided without an obtrusive beep, and an indication of new voice mail messages can be provided by a visual display rather than by stutter dial tone. This control channel also allows the user to invoke features by pressing clearly labeled buttons instead of memorizing obscure dial codes (like *73).

More information on ISDN is available at
www.nationalisdncouncil.com/isdnassistance

What is Centrex?

Centrex is a service that LECs provide in order to deliver advanced voice features to business users. Ordinary phone lines and BRI lines may be included in a Centrex service.

Centrex allows businesses to purchase phone lines at lower prices than purchasing individual, non-Centrex lines. It also lowers the costs of administering a large number of lines. Centrex supports many additional features that are important to businesses. For example, Centrex allows for abbreviated dialing, where a user dials only the last four digits of another user's phone number.

The Centrex services of major telecommunications companies are described on their web sites, which are provided below.

- *Ameritech*
www.ameritech.com/products/gbs/products/bus_lines/centrex.html
- *Bell Canada*
www.bell.ca/en/ps/bus/local/centrexperagent.asp

- *BellSouth*
www.bellsouth.com/business/products/data/centrex/index.html
- *Lucent*
www.lucent-sas.com/switching/softapps/local
- *Nortel*
www.nortelnetworks.com/products/01/centrex
- *Pacific Bell*
www.pacbell.com (enter CENTREX into the site search function)
- *Southwestern Bell*
www.swbell.com (enter PLEXAR into the site search function)
- *U S WEST*
www.uswest.com/pcat/large_business/product/1,1749,89_4_1,00.html
- *Verizon*
www.bellatlantic.com/largebiz/centrex.htm
www.bellatlantic.com/smallbiz/prodserv/centrex.htm
www.gte.com/products/prods/gtecns.html

How are ISDN and Centrex related? How does ISDN enhance and improve upon Centrex?

A Centrex group can consist of ordinary phone lines, BRIs, or a combination of both types of lines. The D-channel on the BRI, in conjunction with advanced ISDN telephone sets, allows Centrex users to have easier control of voice features than previously possible. For example, ISDN's feature buttons make it easier to set up a three-way call on an ISDN telephone set than on an ordinary telephone. ISDN also allows Centrex users to have digital data capabilities to connect to the Internet or have a videoconference.

What benefits does ISDN Centrex offer to small offices, home offices, and telecommuters?

ISDN Centrex is used by small, medium, and large businesses. ISDN Centrex allows small businesses and telecommuters to have the same advanced calling capabilities as employees at large corporations, without the costs and overhead that corporations incur to get such capabilities.

- **Small businesses (small offices and home offices):** ISDN Centrex levels the playing field between large and small businesses. Large businesses have always been able to afford sophisticated phone systems. However, prior to ISDN Centrex, many small businesses could not justify the expense of corporate phone systems, which required a significant up-front investment in capital equipment. ISDN Centrex provides the same advanced voice features as larger corporate systems, requires fewer (and less expensive) equipment components, and can be scaled for any sized business—including a one-person office.
- **Telecommuters:** ISDN Centrex allows the work-at-home employee to have the same type of advanced calling features at home that they have when they are in the office. ISDN can also help fill telecommuters' data communications needs by providing a digital connection to the LANs in their offices. And since a single ISDN line allows voice calls and data calls to occur

simultaneously (unlike other technologies which support just voice calls or just data calls), ISDN is a complete and cost effective approach for addressing a telecommuter's needs.

ISDN Centrex is flexible and can be configured to meet the needs of the individual customer. This flexibility is what allows ISDN Centrex to meet the disparate needs of so many different businesses. For example, one ISDN line can replace two ordinary phone lines in three different ways:

- One ISDN line can be used by two employees to simultaneously make phone calls.
- One ISDN line can be used by one user to simultaneously make a phone call and 64 kbps data call.
- One ISDN line can be used by one user to make a 128 kbps data call.

In fact, users are free to change the way they use their ISDN lines as their needs vary during the day. For example, a user may have a 128 kbps data call to the Internet and then a phone call comes in. The user can use the Caller ID information to decide to let the call go to voice mail (and keep the Internet connection at 128 kbps) or to answer the phone call (and automatically reduce the Internet connection to 64 kbps). If he answers the call, he can then choose to add from one to five additional parties for a conference call, with no interference to the 64 kbps Internet connection. And when all the voice calls are complete, the Internet connection can automatically increase back to 128 kbps. There is no other widely available telecommunications service that provides small businesses with this much flexibility and integrated voice-data capabilities.

What voice features does Centrex provide to business users?

A myriad of features are available to Centrex users—too many to list here! Some of the most popular features are listed below.

- **Call Forwarding:** ISDN supports many types of Call Forwarding, including forward when the line is busy, forward when there is no answer, or forward all calls.
- **Transfer:** Allows an employee to transfer a call to a co-workers line. The two employees can confer privately (while the third party is hold) before the transfer is completed.
- **Three-way and Six-way conferencing:** Up to 6 parties can participate in a single telephone call.
- **Multiple Call Appearances with Additional Call Offering:** ISDN's advanced version of Call Waiting. Traditional Call Waiting allows the user to receive only one additional call after the first call is established. However, ISDN allows the user to receive up to 5 or more additional calls on a single B-channel. (That means there can be twelve simultaneous calls on a single ISDN line if two users are sharing the two B-channels the line.)
- **Caller ID:** Allows the delivery of the caller's number for inbound calls. Caller ID information can be sent directly to the employee's desktop computer to allow customers' database records to be retrieved before the call is answered.
- **Attendant Coverage of Multiple Lines/Shared Call Appearances:** Allows a secretary or receptionist to answer inbound calls for multiple lines in the group.
- **Call Pickup:** Allows an employee to use his phone to answer a co-worker's line.

- **Call Park:** Allows the user to place a call on hold and then to re-establish the call from a different telephone.
- **Hunt Groups:** Hunting evenly distributes inbound calls to workers in a department or call center.
- **Voice Mail Visual Message Waiting Indication:** A lamp on the phone is lit when new Voice Mail messages are delivered.
- **Multilocation Linking:** Allows for easy dialing and call transfers between branch offices.
- **Speed Dialing:** Allows the user to program a list of frequently dialed numbers, and to place calls to those numbers by pressing a single button on the phone set.

Descriptions of these features, as well as a longer list of available features, can be found on the following web sites:

- www.bellsouth.com/business/products/data/centrex/centrex_prod_features.html
- www.bellatlantic.com/largebiz/cent_cp_cf.htm

How does ISDN Centrex make popular voice features (like call waiting and call forwarding) even better?

ISDN sends special messages over its D-channel to control features. As a consequence, ISDN features are invoked with clearly labeled buttons and displays instead of using obscure dial codes or "flash hooks" (i.e., pressing the receiver cradle or the flash button). This makes it easier for a customer to use ISDN features than comparable features on an ordinary telephone line. Some examples are below.

- **Call Waiting:** When an additional call is offered to an ISDN user who is already on a previous call, the ISDN telephone set produces an electronic ringing sound and a lamp on the set begins blinking. No obtrusive tone or click interrupts the established conversation. ISDN supports Caller ID on Call Waiting, so the user can decide whether the additional call should be answered. To answer the additional call, the user does not perform a flash hook. Instead the user presses the button next to the blinking lamp. This method expands how many calls can be "call waited"—ISDN users may receive 6 or more simultaneous calls.
- **Call Forwarding:** When an ISDN user wants to activate Call Forwarding, all he has to do is press the "Call Forwarding" button on the ISDN telephone set. A lamp next to the button is lit to indicate the feature is on. To turn Call Forwarding off, the same button is pressed again. This is much simpler than dialing codes like *72 and *73 to activate and deactivate Call Forwarding. It's quicker, too, because the user does not need to wait for secondary dial tones or confirmation tones to know the feature is ready. Lastly, with ISDN, the Forwarded-To phone number is stored, so the user does not need to re-enter the phone number unless he wants to change it.
- **Call Transfer:** When an ISDN user needs to transfer a call, the Transfer button on the telephone set is used. The user presses this button and then dials the Transferred-To phone number. There is no risk that the original call will be disconnected during the process. This is much more professional than the traditional way of transferring a call, which involves performing a flash hook, waiting for the secondary dial tone, and dialing the new number (as well as warning the caller that they should call back in case the connection is dropped).

- **Conference Calling:** ISDN's conference calling capabilities are much more advanced than the ordinary 3-way calling available on residential phone lines. ISDN allows the user to be engaged in up to 6 separate simultaneous conversations before deciding to conference them together. And the user has full flexibility to join together any combination or subset of them. Conferencing calls together and dropping selective parties is completed at the touch of a button. In contrast, in ordinary residential 3-way calling, the user must perform flash hooks to put the first call on hold, to conference the two calls together, and, if desired, to subsequently drop one of the parties. Ordinary 3-way calling also requires that the user originate the call to the third party; the calls cannot be conferenced if the third party places the call to the user. However, ISDN allows calls to be conferenced regardless of whether the ISDN user placed or received the calls.
- **Voice Mail:** – When an ISDN user has a voice mail message waiting, the message waiting lamp on the telephone set is lit. This allows ISDN users to get their messages quicker than other voice mail users who have to remember (and sometimes forget) to check for stutter dial tone every time they return to their offices.

If a business does not use ISDN Centrex, what other solutions can be used to obtain voice services?

Private Branch Exchanges (PBXs) and Key Systems are two other approaches for providing sophisticated voice services. Centrex, PBXs, and Key Systems are usually alternatives; a business would select the approach that best fits its needs.

What are PBXs and Key Systems?

Centrex, PBXs, and Key Systems are all approaches for satisfying a business's requirements for voice telephone service. They differ in that Centrex is a service provided by the LEC whereas PBXs and Key Systems are complicated pieces of equipment that customers may purchase on locate on their premises. A PBX or Key System can be used to provide intra-business phone service instead of the LEC providing it. PBXs tend to be aimed at medium-sized and larger businesses, while Key Systems are aimed at small to medium-sized businesses.

What factors affect whether a company uses a PBX, Key System, or ISDN Centrex?

Typically, PBXs and Key Systems have substantially higher start-up costs but lower monthly costs than ISDN Centrex does. Consequently, which approach a business selects is often influenced by its cash flow and its preference for deferring expenses. Also, PBXs and Key Systems make the business responsible for the day-to-day operation and maintenance of the equipment. Many businesses prefer Centrex in order to avoid the effort and expenses associated with PBX operation and maintenance. Some of the advantages that ISDN Centrex has over PBXs and Key Systems are in the attached list of "Benefits of ISDN Centrex."

How are ISDN's data capabilities used in a Centrex environment?

In a small business environment, ISDN's ability to place digital data calls can be used for Internet access and for videoconferencing. ISDN is much faster than analog modems. Since ISDN is often faster than the speed at which the Internet operates, it can give the same effective communications rate that users receive from other technologies (e.g., DSL, cable modem) that advertise faster rates. ISDN has a number of advantages over these other technologies.

- ISDN is widely deployed, whereas DSL and cable modems are not yet available in many communities.

- ISDN allows for simultaneous voice and data services, regardless of which LEC provides the ISDN service. Most DSL service providers do not offer voice service on the same line with the DSL data service. (Although the DSL offerings from the major LECs do include voice service, this service is limited to traditional analog phone calls and does not support ISDN's advanced calling capabilities.) Very few cable companies support voice service over a cable modem connection.
- ISDN allows the customer to connect to the Internet Service Provider of his choice, regardless of which LEC provides the ISDN service. Many DSL and cable modem providers require customers to change Internet Service Providers as well as their e-mail addresses in order to use the DSL or cable modem service.

ISDN can also be used to for LAN interconnections. For example, telecommuters can use ISDN to access the corporate LAN from home.

How does ISDN compare to 56 k modems?

Despite their name, 56 k modems are limited to a maximum speed of 52 kbps (due to FCC power transmission regulation). Most users achieve Internet download speeds of 40-52 kbps, and Internet upload speeds of 28 – 31 kbps. Since ISDN uses a high-quality digital transmission, its speeds do not vary between users. All ISDN users can perform Internet downloads *and* uploads at 64 kbps per B-channel. If an ISDN user wants to use both B-channels for an Internet connection, then the download and upload speeds are 128 kbps. In addition, ISDN provides much shorter call setup and log-in times than 56 k and other analog modems. Lastly, ISDN data calls do not experience random disconnections, unlike analog modem calls.

How much does ISDN Centrex cost?

The price for ISDN Centrex is determined by each LEC. The price is based on a number of factors, including the total number of BRIs in the Centrex group and which voice features the customer wants included.

How does a company order ISDN Centrex service?

A business should contact the LEC's business office or account executive to order ISDN Centrex service. ISDN Centrex can also be ordered from Value-Added Resellers.

Where does a company get ISDN Centrex telephone equipment?

Special ISDN equipment must be used for ISDN Centrex. This equipment includes an ISDN display telephone set, a BRI termination device (known as an NT1), and a power supply. This equipment can be obtained through various telephone suppliers. In most cases, the LEC can help customers obtain equipment.