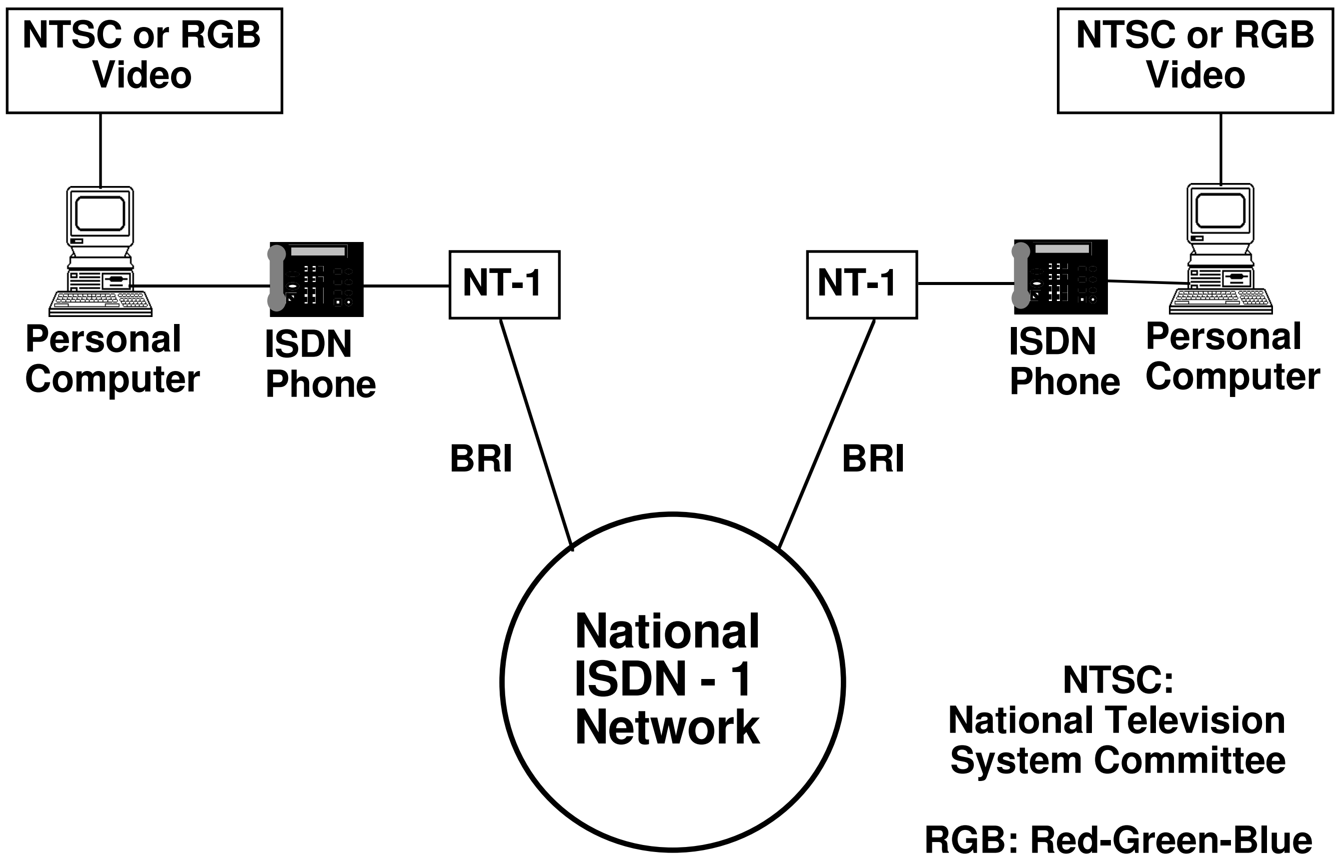
3.1.15 Flexible bandwidth allocation

ISDN provides the ability to fully utilize the capacity of the line for data transmission without losing the ability to make or receive voice calls. A still image for a personal computer attached video/graphic monitor can be transferred at 128 kbps when no voice call is active. When a voice call is made or received, the data transfer can automatically throttle down to 64 kbps and then automatically return to 128 kbps when the voice call is completed.

Configuration: (1, <u>**2**</u>, 3, 4, 5)



How It Works:

During the course of a voice call, the ISDN users decide to transfer a large still image from one computer to the other. The user initiating the transfer places a 64 kbps circuit-data call to the recipient. If the call does not complete, the initiator attempts to place a 56 kbps call. After a circuit-data call has been established, the voice call may be dropped, and a second circuit-data call may be placed. In this case, both the initiator and the recipient equipment must inverse multiplex the two B channel circuit-data calls together.

Obtain Equipment with These Capabilities

Personal Computer

- Application software compatible with communications software and far end.
- Support for desired graphics capabilities. At least 512 x 512 x 8 RGB color or grey scale is recommended. Performance may be improved by the use of accelerator boards optimized for image compression and manipulation.
- Connection to Graphics Monitor (e.g., RS-170 or equivalent).
- Serial connection to ISDN Phone (e.g., RS-232, RS-449, V.35).

Graphics Monitor

- NTSC/RH3 or RGB graphics capability.
- At least 512 x 512 x 8 RGB color or grey scale.
- Connection to Personal Computer (e.g., RS-170 or equivalent).

ISDN Phone

- B channel capabilities:
  - Simultaneous voice and circuit-data calling.
  - Simultaneous circuit-data calling on two B channels.
  - If using NI-1, support for two Directory Numbers (DNs) and Service Profile IDs (SPIDs) will be needed.
  - Optionally combine two 64 kbps signals to/from the BRI into 128 kbps signal in a way that is compatible with far end (BONDING, H.221).
  - Support rate adaptation for rates lower than 64 kbps. For example, asynchronous communications may be rate adapted using V.120.
- Physical interfaces:
  - Serial connection to Personal Computer (e.g., RS-232, RS-449, or V.35).
  - RJ-45 connector to NT-1, or integrated NT-1.

Request These Capabilities From ISDN Service Provider

Network Interface to ISDN Phone

Network Services Required:

- One BRI. (2B)
- One B channel for circuit-data calls, with circuit-data DN and SPID.
- One B channel for alternate voice and circuit-data calls. For NI-1, this requires both a voice DN and SPID and a circuit-data DN and SPID.
- Voice Features:
  - None required.
- Circuit-Data Features:
  - None required.

Subscription or Ordering Information:

- This interface is configured for simultaneous circuit-data calls and alternate voice and circuit-data calls (NIIG 15). Other NIIGs which have this functionality include 17, 25, and 27.

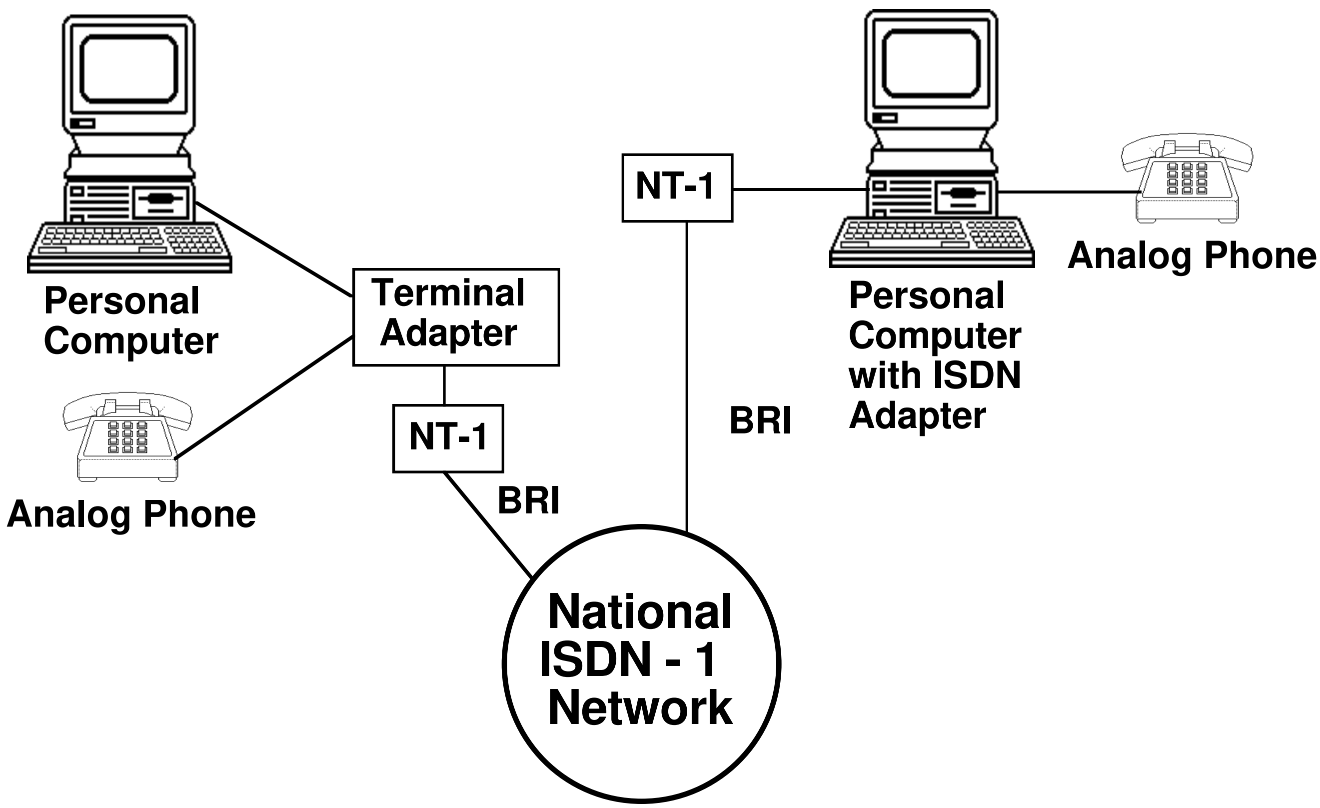
Technical Notes

- The Lower Layer Compatibility Information Element (LLC-IE) can communicate rate-adaptation details end-to-end. For details on V.120 rate adaptation, and the use of the LLC Information Element for circuit-data calls, see Sections 5.1.4 and 5.1.5.
- For details on subscription and ordering information using NIUF ISDN Interface Groups (NIIG) and NIUF Parameter Groups (NIPG) , see Section 5.1.11.
- The Personal Computers and graphic monitors may support any of the following capabilities:
  - 1024 x 1024 x 24 Color scale.
  - JPEG image compression.
  - Photo CD.
  - Voice/Image conferencing software.
- For detailed Signaling Flow Diagrams for this application, see Sections 5.2.1.4 (Voice Call Setup), 5.2.1.5 (Circuit-data Call Setup) and 5.2.1.6 (Voice & Circuit-data Call Clearing).

3.1.16 File transfer between personal computers

Almost everything that is written is now produced using personal computers. Often, these files are printed and faxed to another location. Occasionally, they are then scanned back into another computer. While some people use modems today to transfer files, the process is limited by the speed of modem technology . A single ISDN B channel provides much faster transfer than modems, and the speed may be doubled by using both B channels.

Configuration: (**1**, 2, **3** , 4, 5)



How It Works:

The originator places a 64 kbps circuit-data call to the desired destination. Once the connection is established, the users may transfer files using any of a number of common protocols provided with most communications software packages. If the originator desires a greater transfer rate, he or she may set up an additional call using the other B channel. In this case, the two calls are combined into a single channel, possibly by using the BONDING agreement or the H.221 standard for a total bandwidth of 128 kbps.

Obtain Equipment with These Capabilities

Personal Computer with ISDN Adapter

- Application software compatible with communication software and far end.
- B channel capabilities:
  - Simultaneous voice and circuit-data calling.
  - Simultaneous circuit-data calling on two B channels.
  - If using NI-1, support for two Directory Numbers (DNs) and Service Profile IDs (SPIDs) will be needed.
  - Optionally combine two 64 kbps signals to/from the BRI into 128 kbps signal in a way that is compatible with far end (BONDING, H.221).
  - Support rate adaptation for rates lower than 64 kbps. For example, asynchronous communications may be rate adapted using V.120.
- Physical interfaces:
  - Analog phone jack.
  - RJ-45 connector to NT-1, or integrated NT-1.

Personal Computer

- Application software compatible with communications software and far end.
- Serial connection to Terminal Adapter (e.g., RS-232, RS-449, V.35).

ISDN Terminal Adapter

- B channel capabilities:
  - Simultaneous voice and circuit-data calling.
  - Simultaneous circuit-data calling on two B channels.
  - If using NI-1, support for two Directory Numbers (DNs) and Service Profile IDs (SPIDs) will be needed.
  - Optionally combine two 64 kbps signals to/from the BRI into 128 kbps signal in a way that is compatible with far end (BONDING, H.221).
  - Support rate adaptation for rates lower than 64 kbps. For example, asynchronous communications may be rate adapted using V.120.
- Physical interfaces:
  - Analog phone jack.
  - Serial connection to Personal Computer (e.g., RS-232, RS-449, or V.35).
  - RJ-45 connector to NT-1, or integrated NT-1.

Request These Capabilities From ISDN Service Provider

Network Interfaces to Personal Computer with ISDN Adapter and Terminal Adapter

Network Services Required:

- One BRI. (2B)
- One B channel for circuit-data, with circuit-data DN and SPID.
- One B channel for alternate voice and circuit-data calls. If using NI-1, this requires both a voice DN and SPID and a circuit-data DN and SPID.
- Voice Features:
  - None required.
- Circuit-Data Features:
  - None required.

Subscription or Ordering Information:

- This interface is configured for simultaneous circuit-data calls and alternate voice and circuit-data calls (NIIG 15). Other NIIGs which have this functionality include 17, 25, and 27.

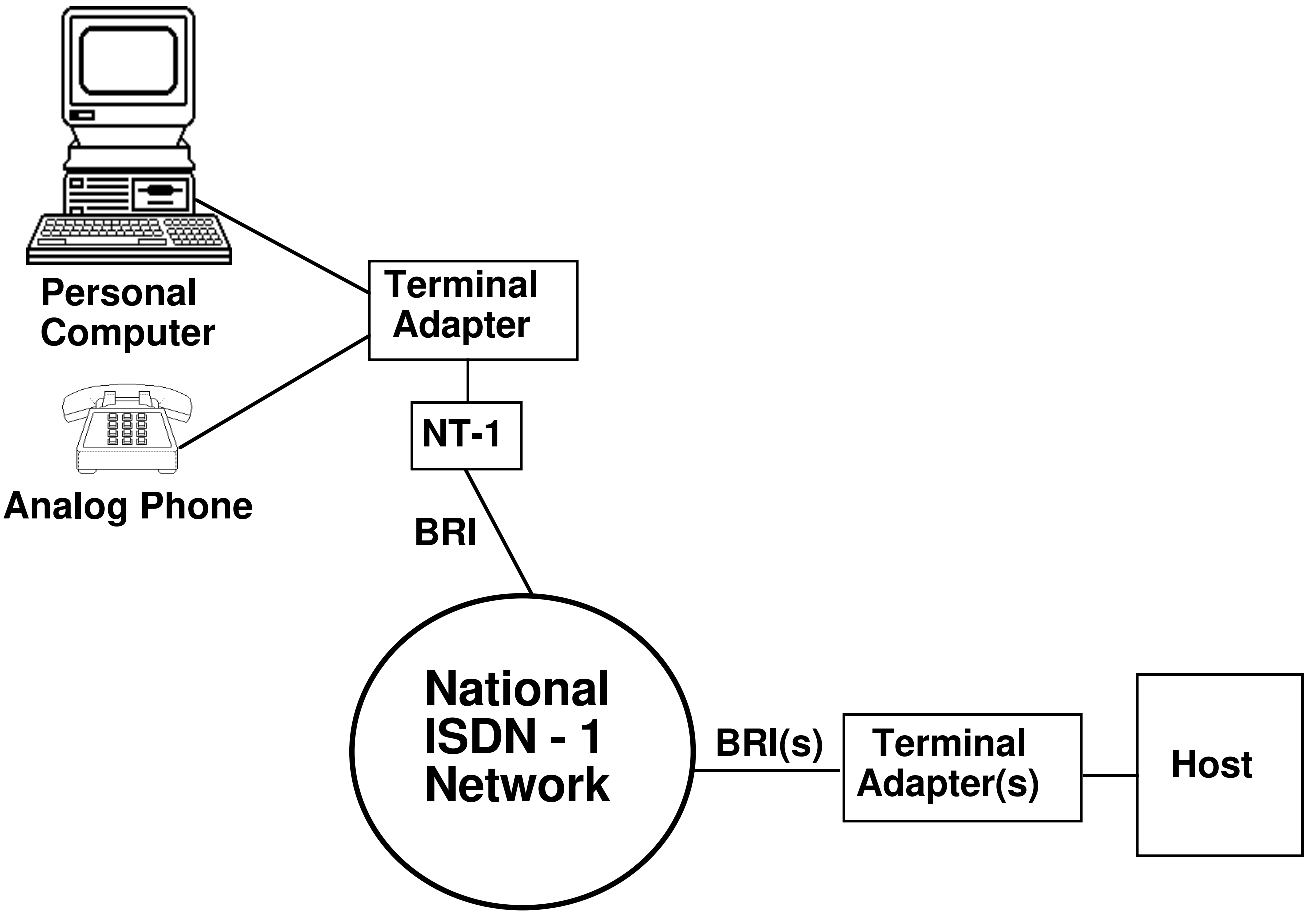
Technical Notes

- The Lower Layer Compatibility Information Element (LLC-IE) can communicate rate-adaptation details end-to-end. For details on V.120 rate adaptation, and the use of the LLC Information Element for circuit-data calls, see Sections 5.1.4 and 5.1.5.
- For details on subscription and ordering information using NIUF ISDN Interface Groups (NIIG) and NIUF Parameter Groups (NIPG) , see Section 5.1.11.
- For detailed Signaling Flow Diagrams for this application, see Sections 5.2.1.4 (Voice Call Setup), 5.2.1.5 (Circuit-data Call Setup) and 5.2.1.6 (Voice & Circuit-data Call Clearing).

3.1.17 File transfer between a personal computer and a host computer

ISDN provides the ability to transfer files to and from a remote host at speeds up to 64 kbps using common protocols such as FTP or Kermit. This contrasts to speeds of 14.4 kbps using today's modems. File transfer at 64 kbps also leaves an additional channel free for voice calls or FAXes. The savings in time for the transfer of text, graphics and numerical data is obvious.

Configuration: (1, 2, **3**, 4, 5)



How It Works:

The Personal Computer user places a 64 kbps circuit-data call to the host. Once the connection is established, the user may transfer files using any of a number of common protocols provided with most communications software packages. In case of compatible terminal adapters, the Personal Computer user may decide to set up an additional call using the other B channel. In this case, the two calls are combined using the BONDING agreement or the H.221 standard for a total bandwidth of 128 kbps.

Obtain Equipment with These Capabilities

Personal Computer

- Application software compatible with communications software and far end.
- Serial connection to Terminal Adapter (e.g., RS-232, RS-449, V.35).

ISDN Terminal Adapter for Personal Computer

- B channel capabilities:
  - Simultaneous voice and circuit-data calling.
  - Simultaneous circuit-data calling on two B channels.
  - If using NI-1, support for two Directory Numbers (DNs) and Service Profile IDs (SPIDs) will be needed.
  - Optionally combine two 64 kbps signals to/from the BRI into 128 kbps signal in a way that is compatible with far end (BONDING, H.221).
  - Support rate adaptation for rates lower than 64 kbps. For example, asynchronous communications may be rate adapted using V.120.
- Physical interfaces:
  - Analog phone jack.
  - Serial connection to Personal Computer (e.g., RS-232, RS-449, or V.35).
  - RJ-45 connector to NT-1, or integrated NT-1.

Host Computer

- Application software compatible with communications software and far end.
- Access security as appropriate for application.
- Serial connection(s) to Terminal Adapter (e.g., RS-232, RS-449, V.35).

ISDN Terminal Adapter (s) for Host Computer

- B channel capabilities:
  - Simultaneous circuit-data calling on two B channels.
  - If using, NI-1, support for two Directory Numbers (DNs) and Service Profile IDs (SPIDs) will be needed.
  - Optionally combine two 64 kbps signals to/from the BRI into 128 kbps signal in a way that is compatible with far end (BONDING, H.221).
  - Support rate adaptation for rates lower than 64 kbps. For example, asynchronous communications may be rate adapted using V.120.
  - Support for Multiline Hunt Group as listed under "Network Interface to ISDN Terminal Adapter for Host Computer".
- Physical interfaces:
  - Serial connection to Host Computer (e.g., RS-232, RS-449, or V.35).
  - RJ-45 connector to NT-1, or integrated NT-1.

Request These Capabilities From ISDN Service Provider

Network Interface to ISDN Terminal Adapter for Personal Computer

Network Services Required:

- One BRI. (2B)
- One B channel for circuit-data calls, with circuit-data DN and SPID.
- One B channel for alternate voice and circuit-data calls. For NI-1, this requires both a voice DN and SPID and a circuit-data DN and SPID.
- Voice Features:
  - None required.
- Circuit-Data Features:
  - None required.

Subscription or Ordering Information:

- This interface is configured for simultaneous circuit-data calls and alternate voice and circuit-data calls (NIIG 15). Other NIIGs which have this functionality include 17, 25, and 27.
- Parameter Groups for Voice Features:
  - None required.
- Parameter Groups for Circuit-Data Features:
  - None required.

Network Interface to ISDN Terminal Adapter for Host Computer

Network Services Required:

- One BRI. (2B) (For each TA.)
- Two B channels for circuit-data calls, with circuit-data DNs and SPIDs.
- Circuit-Data Features:
  - Multiline Hunt Group.

Subscription or Ordering Information:

- This interface is configured for two simultaneous circuit-data calls (NIIG 14). Other NIIGs which have this functionality include 15, 17, 24, 25, and 27.
- Parameter Groups for Circuit-Data Features:
  - A la Carte: Multiline Hunt Group.

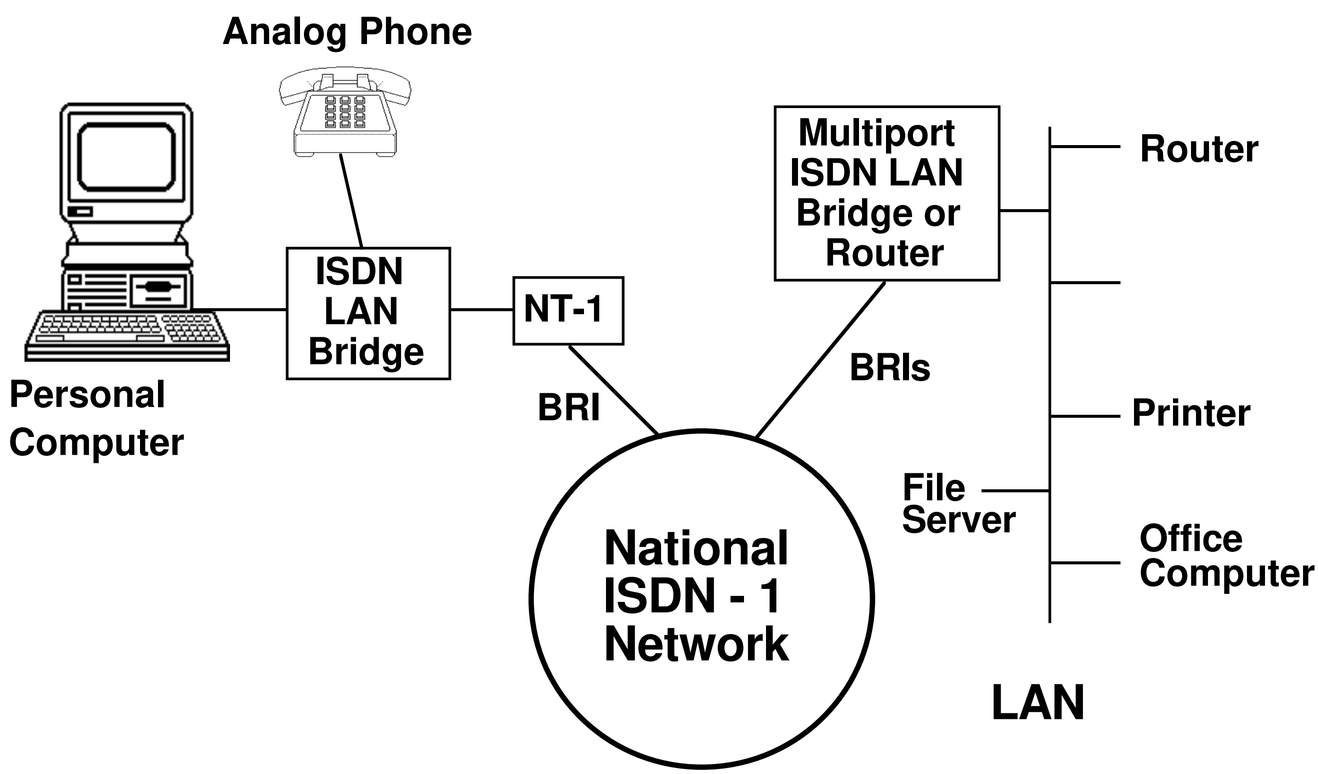
Technical Notes

- The Lower Layer Compatibility Information Element (LLC-IE) can communicate rate-adaption details end - to-end. For details on V.120 rate adaption, and the use of the LLC Information Element for circuit-data calls, see Sections 5.1.4 and 5.1.5.
- For details on subscription and ordering information using NIUF ISDN Interface Groups (NIIG) and NIUF Parameter Groups (NIPG) , see Section 5.1.11.
- For detailed Signaling Flow Diagrams for this application, see Sections 5.2.1.4 (Voice Call Setup), 5.2.1.5 (Circuit-data Call Setup) and 5.2.1.6 (Voice & Circuit-data Call Clearing).

3.1.18 High speed transfer of large text and image files

ISDN can be used to transfer large files of text, graphics, or images between personal computers and distant computing resources, including those on local-area networks, at data rates up to 128 kbps. Both end systems will use the LAN operating system to move files. With one ISDN line, the user has a flexibility of either achieving high speed transfer at data rates up to 128 kbps or benefit from advanced voice features while doing a file transfer at 56 or 64 kbps.

Configuration: (1, 3, 4, **5**)



How It Works:

The ISDN LAN bridge at the personal computer places 64 kbps circuit-mode data call to the multiport ISDN LAN Bridge or Router at the corporate site. A second 64 kbps call is set up by the ISDN LAN Bridge (or router) to its peer and, using the inherent inverse multiplexing capability, the ISDN LAN Bridge provides a 128 kbps data path to the user application. Two 56 kbps calls can also be used in this way to provide a 112 kbps data path to the application. Simultaneous voice and circuit-data calling is also possible when the circuit-data requirements can be met by a single 64 kbps call.

Obtain Equipment with These Capabilities

Personal Computer

- Application software compatible with communication software and far end LAN devices.
- LAN interface (e.g., Ethernet, Token Ring) compatible with far end.

ISDN LAN Bridge

- LAN bridge functions compatible with far end and local LAN (e.g., Ethernet or Token Ring).
- B channel capabilities:
  - Simultaneous voice and circuit-data calling.
  - Simultaneous circuit-data calling on two B channels.
  - If using NI-1, support for two Directory Numbers (DNs) and Service Profile IDs (SPIDs) will be needed.
  - Optionally combine two 64 kbps signals to/from the BRI into 128 kbps signal in a way that is compatible with far end.
- Physical interfaces:
  - Analog phone jack.
  - Local LAN (e.g., Ethernet or Token Ring).
  - RJ-45 connector to NT-1, or integrated NT-1.

Multiport ISDN LAN Bridge or Router

- LAN bridge or router functions compatible with far end and local LAN (e.g., Ethernet or Token Ring).
- Accounting and access control functions may be implemented using Calling Number Identification Service.
- Multiple BRIs to meet network traffic requirements.
- B channel capabilities for each BRI:
  - Simultaneous circuit-data calling on two B channels.
  - If using NI-1, support for two Directory Numbers (DNs) and Service Profile IDs (SPIDs) will be needed.
  - Optionally combine two 64 kbps signals to/from the BRI into 128 kbps signal in a way that is compatible with far end.
- Physical interfaces:
  - Local LAN (e.g., Ethernet or Token Ring).
  - RJ-45 connector to NT-1, or integrated NT-1.

Request These Capabilities From ISDN Service Provider

Network Interface to ISDN LAN Bridge

Network Services Required:

- One BRI. (2B)
- One B channel for circuit-data calls, with circuit-data DN and SPID.
- One B channel for alternate voice and circuit-data calls. For NI-1, this requires both a voice DN and SPID and a circuit-data DN and SPID.
- Voice Features:
  - None required.
- Circuit-Data Features:
  - None required.

Subscription or Ordering Information:

- This interface is configured for simultaneous circuit-data calls and alternate voice and circuit-data calls (NIIG 15). Other NIIGs which have this functionality include 17, 25, and 27.
- Parameter Groups for Voice Features:
  - None required.
- Parameter Groups for Circuit-Data Features:
  - None required.

Network Interfaces to Multiport ISDN LAN Bridge or Router

Network Services Required:

- One or more BRI. (2B)

For each BRI:

- Two B channels for circuit-data calls, with circuit-data DNs and SPIDs.
- Circuit-Data Features:
    - Calling Number Identification Service.

Subscription or Ordering Information:

- This interface is configured for two simultaneous circuit-data calls (NIIG 14). Other NIIGs which have this functionality include 15, 17, 24, 25, and 27.
- Parameter Groups for Circuit-Data Features:
    - A la Carte: Calling Number Identification Service.

Technical Notes

- In some configurations, several "single port bridges" may be used in place of a "multiport" bridge or router.
- Many Multiport LAN Bridges and Routers can utilize a PRI or multiple BRI lines for network access.
- Some ISDN LAN Bridges and Routers support data compression, so effective data throughput may be higher. See Section 4 for products.
- The terminal configuration shown here uses a Personal Computer/Workstation with a standalone ISDN LAN Bridge. Some LAN interface cards may have integrated ISDN LAN bridges.
- The Lower Layer Compatibility Information Element (LLC-IE) can communicate rate-adaptation details end-to-end. For details on V.120 rate adaptation, and the use of the LLC Information Element for circuit-data calls, see Sections 5.1.4 and 5.1.5.
- For details on subscription and ordering information using NIUF ISDN Interface Groups (NIIG) and NIUF Parameter Groups (NIPG) , see Section 5.1.11.
- For detailed Signaling Flow Diagrams for this application, see Sections 5.2.1.4 (Voice Call Setup), 5.2.1.5 (Circuit-data Call Setup) and 5.2.1.6 (Voice & Circuit-data Call Clearing).