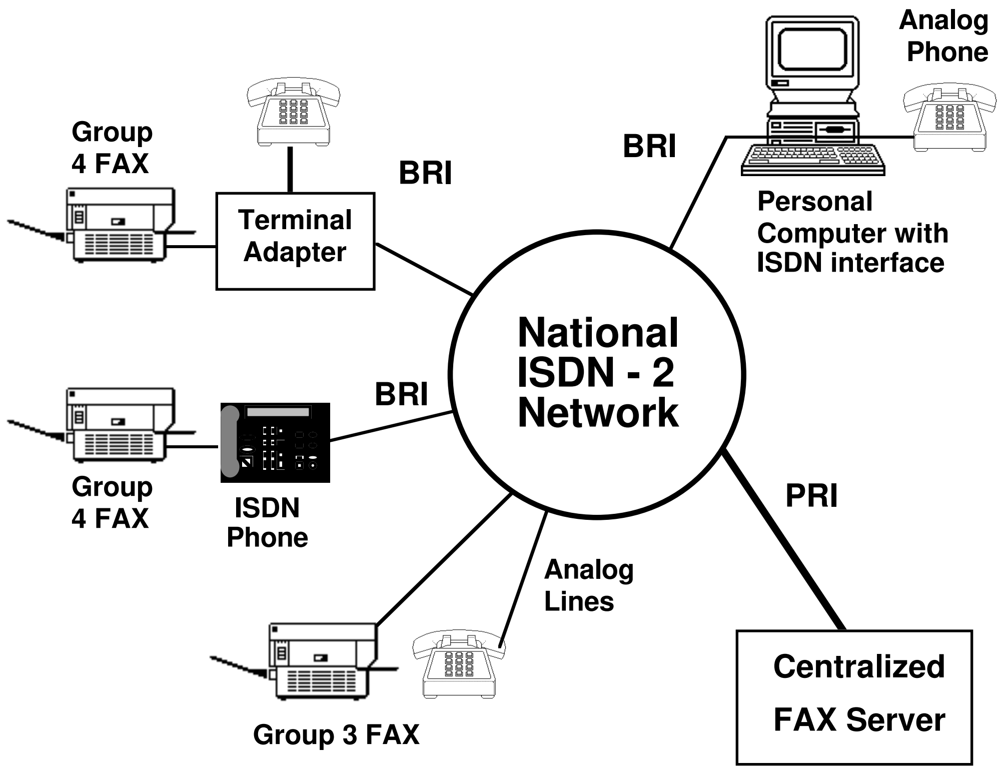
3.3.12 Fax mail

A consulting company wants to keep its force up to date with the latest contracts, marketing information, and industry news. The company opts for a fax-mail approach. Each manager has a mailbox where faxes are stored awaiting convenient retrieval. Broadcast capabilities are available as well. The company also uses high resolution Group 4 fax . Faxed memos can now be long, and graphical material can be faxed, instead of sent by overnight mail, Handwriting on marked up drafts can now be read off the fax. Group 4 faxes can be transmitted more quickly, saving connect time.

Configuration:



How it works:

The centralized fax server stores faxes in mailboxes for each user. Users retrieve faxes from their mailboxes from a touchtone voice response user interface. Faxes are sent to the appropriate machine for printing, in either Group 3 or Group 4 format. Users with high resolution monitors and fax capabilities can send and receive from their personal computer as well. Using packet-data on D channels, the fax server can provide a fax message waiting indication to the personal computer. ISDN users place 64 Kbps circuit data calls for G4 faxes.

Obtain Equipment with These Capabilities

Centralized Fax Server

- Application software for handling Fax files, compatible with communications software and computers
- Management interface and software for handling accounting/security functions
- Generate "Fax Message Waiting" Indicator & send it to user capable of receiving fax on their personal computer using X.25.
- Support G3 and G4 protocols, for incoming & outgoing Fax calls
- Support ISDN PRI, providing alternate voice & circuit data on each B channel.
- Support packet-data on one B channel.

Terminal Adapter for G4 Fax Machine

- B channel capabilities:
  - Simultaneous voice and circuit-data calling.
  - If using NI-1, support for two Directory Numbers (DNs) and Service Profile IDs (SPIDs) will be needed.
- 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.

ISDN Phone

- B channel capabilities:
  - Simultaneous voice and circuit-data calling.
  - If using NI-1, support for two Directory Numbers (DNs) and Service Profile IDs (SPIDs) will be needed.
- Physical interfaces:
  - Serial connection to G4 Fax machine (e.g., RS-232, RS-449, or V.35).
  - RJ-45 connector to NT-1, or integrated NT-1.

Personal Computers with ISDN Adapters

- Application software for processing Fax files, compatible with communications software and Server
- Support G3 and G4 protocols for incoming Fax calls
- Support application to display "Fax Message Waiting" Indicator from Server
- Application software compatible with communication software and far end.
- B channel capabilities:
  - Simultaneous voice and circuit-data calling.
  - If using NI-1, support for two Directory Numbers (DNs) and Service Profile IDs (SPIDs) will be needed.
- D channel capabilities:
  - Packet-data on the D channel.
  - A separate DN (with fixed TEI) will be needed for NI-1 implementations.
  - Packet Assembler & Disassembler (PAD) function, supporting X.3, X.28, X.29 if required by communications software.
  - Support for the packet-data features listed under "Network Interface to Personal Computer with ISDN Adapter".
- Physical interfaces:
  - Analog phone jack.
  - RJ-45 connector to NT-1, or integrated NT-1.

Request These Capabilities From ISDN Service Provider

Network Interface to Centralized Fax Server

- One 23B+D PRI.
- Directory Numbers (DNs) as required by users for voice and circuit-data calls; one for packet-data.
- B channels with:

  Circuit-data (22 channels).

  Packet-data (one channel).
- Features for Voice and Circuit-Data
  - None required.
  - Optional Calling Number Identification Services.
- Features for Packet-data
  - Logical Channels: As many as need to support users.
  - Throughput Class : 9600 bps.
  - Maximum User Data Field: 128 Octets.
  - Packet Window Size: 2.
  - Fast Select (Unrestricted) & Fast Select Acceptance.

Network Interface to Terminal Adapter/ISDN Phone

Network Services Required:

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

Subscription or Ordering Information:

- This interface is configured for simultaneous voice calls and circuit-data calls (NIIG 11). Other NIIGs which have this functionality include 12, 15, 17, 21, 22, 25, and 27.
- Parameter Groups for Voice Features:
  - None required.
- Parameter Groups for Circuit-Data Features:
  - None required.

Network Interfaces to Personal Computer

Network Services Required:

- One BRI. (2B+D)
- If using NI-2, a single DN and SPID.
- One B channel for voice calls, with (for NI-1) voice DN and SPID.
- One B channel for circuit-data calls, with (for NI-1) circuit-data DN and SPID.
- Packet-data on the D channel. If using NI-1, a separate packet-data DN and fixed TEI are needed.
- Voice Features:
  - None required.
- Circuit-Data Features:
  - None required.
- Packet-Data Features:
  - Logical Channels: At Least 1 Two-Way LC.
  - Throughput Class : 9600 bps.
  - Maximum User Data Field: 128 Octets.
  - Packet Window Size: 2.
  - Fast Select (Unrestricted) & Fast Select Acceptance.

Subscription or Ordering Information:

- This interface is configured for simultaneous voice, circuit-data, and packet-data calls (NIIG 27).
- Parameter Groups for Voice Features:
  - None required.
- Parameter Groups for Circuit-Data Features:
  - None required.
- Parameter Groups for Packet-Data Features:
  - NIPG 7 - Basic D Channel Packet-Data.

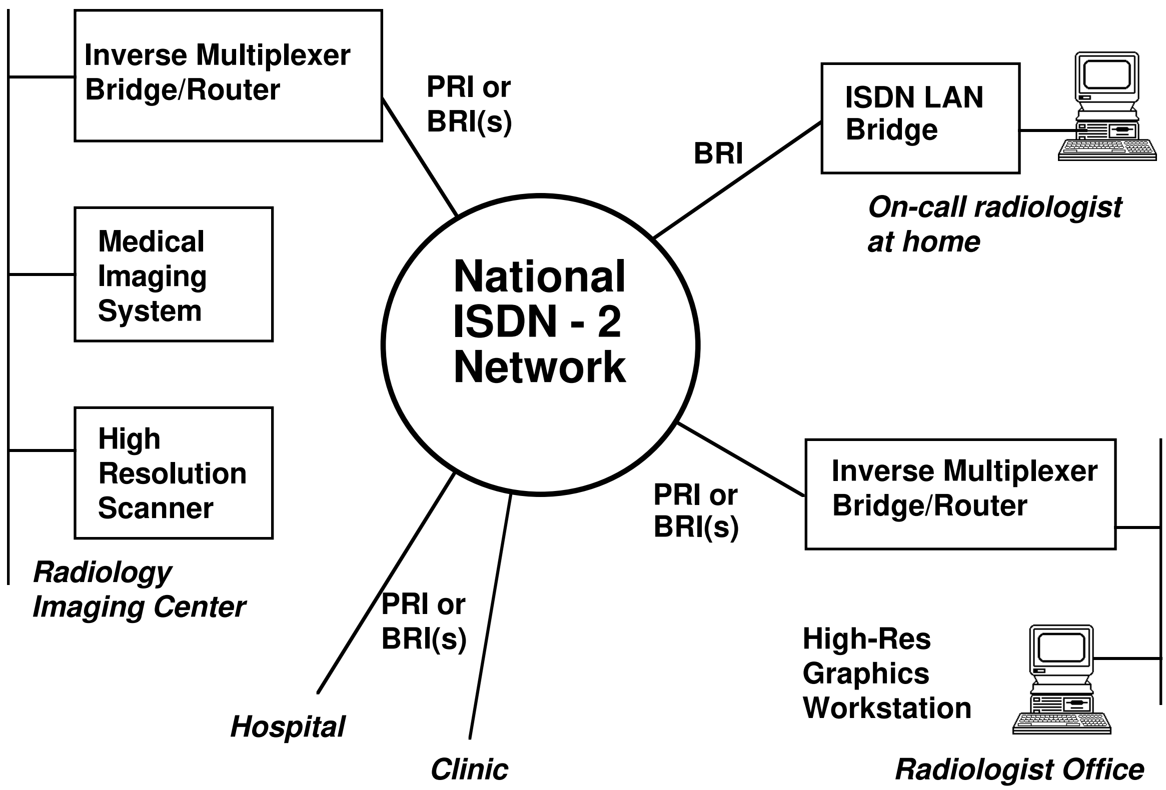
Technical Notes

- After receiving & storing the Faxes, the Server clears the Fax calls and sends "Fax Message Waiting" Indicators to the Personal Computer using packet-data.
- The Personal Computer responds by placing Fax calls to the Server and retrieving its Faxes.
- For G3 Fax calls, the TAs, Server, and Computer use voice calls. For G4 Fax calls, they use circuit-data calls.
- The TAs, the Fax Server, and the personal computer support LLC and HLC signaling, to allow exchange of Physical Layer, Link & Network Layer, G3 Fax, and G4 Fax protocol IDs. See Section 5.1.5.
- For details on subscription and ordering information using NIUF ISDN Interface Groups (NIIGs) and NIUF ISDN Parameter Groups (NIPGs), see Section 5.1.11.
- For detailed Signaling Flow Diagrams, see Section 5.2.1. for BRI calls and 5.2.3 for PRI calls.

3.3.13 Teleradiology

Medical images typically vary from 256 Kilobytes to 8 Megabytes depending on modality (ultrasound, computed radiology, magnetic resonance, etc.). Each case may involve 4 to 50 images. Using ISDN for teleradiology enables radiologists to cover a larger medical community and to confer with other radiologists and specialists.

Configuration:



How It Works:

At each remote location, a bridge/router inverse multiplexer or small BRI ISDN LAN Bridge can initiate access to or respond to access from another location. On receipt of a remote LAN packet, the inverse multiplexer immediately establishes one or more circuit switched data connections to the remote location. The appropriate DN(s) are determined by the LAN routing and addressing information. Based on the traffic volume, the inverse multiplexer establishes any additional circuit switched data connections. The additional circuit switched data connections are inverse multiplexed, providing one logical connection with an aggregate bandwidth comprised of all the circuit switched channels. Alternatively, the network can provide a single wideband channel through SWF-DS1 (Multirate ISDN) on a PRI. As traffic levels decrease the inverse multiplexer will release circuit switched data connections.

Obtain Equipment with These Capabilities

Workstations for Radiologists

- High resolution graphics capability.
- Imaging application, compatible with medical imaging system.
- Communications software, compatible with imaging application and router.
- LAN Adapter (e.g., ethernet, token ring).

Medical Imaging System

- Application, compatible with communications software and far end.
- Interface to LAN.

Bridge/Router Inverse Multiplexer

- Interface to LAN (AUI, 10BaseT, etc.) Filters local addresses, and associates remote addresses with various locations. Each location is associated with one or more Directory Numbers (DNs).
- Supports either ISDN PRI or multiple ISDN BRI ports (RJ-45) .
- Automatically establishes circuit switched data connections to the appropriate remote DNs using LAN addressing and routing information.
- Distributes remote traffic across multiple circuit switched data connections (e.g., n x 56/64 kbps circuit data) and reassembles data stream at the destination.
- Alternatively, the router may support SWF-DS1 on a PRI, placing a nx64 kbps call.

ISDN LAN Bridge

- Compatible interface to Workstation (e.g., Ethernet or Token Ring)
- LAN bridge functions compatible with far end
- BRI ISDN LAN Bridge is compatible with the Imaging Center protocol for framing and inverse multiplexing.
- Automatically establishes circuit switched data connections to the Imaging Center.
- Distributes remote traffic across one or two circuit switched data connections (e.g., n x 56/64 circuit-data) and the Imaging Center reassembles data stream.
- RJ-45 connector to NT-1, or integrated NT-1.

Request These Capabilities From ISDN Service Provider

Network Interface to Bridge/Router Inverse Multiplexer (PRI)

- One 23B+D PRI.
- Directory Numbers (DNs) as required by application.
- B channels with:
  - Circuit-data.
  - SWF-DS1 (Multirate ISDN).
- Features for Circuit-Data
  - None required.
  - Optional Calling Number Identification Services.

Network Interface to Bridge/Router Inverse Multiplexer (BRI)

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:
  - None required.
  - Optional Calling Number Identification Services.

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:
  - None required.
  - A la carte: Calling Number Identification Services. (Optional)

Network Interface to ISDN LAN Bridge

Network Services Required:

- One BRI. (2B)
- Two B channels for circuit-data calls, with circuit-data DNs and SPIDs.
- Circuit-Data Features:
  - None required.
  - Optional Calling Number Identification Services.

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:
  - None required.
  - A la carte: Calling Number Identification Services. (Optional)

Technical Notes

- The inverse multiplexers can utilize a PRI or multiple BRI lines for network access. The choice will depend chiefly on the total required bandwidth and economics of the services and related CPE (NT-1's, CSU, etc.) -- the services are functionally identical in this application.
- By using PRI with SWF-DS1 (Multirate ISDN), the router may use a single nx64 channel provided by the network.
- ISDN LAN Bridges and Bridge/Router Inverse Multiplexers need to use compatible protocols for framing MAC layer packets (e.g., ethernet packets) onto ISDN circuit-data, and compatible protocols for inverse multiplexing.
- Some ISDN LAN Bridges support data compression, so effective data throughput may be higher
- Connections to multiple remote locations (LANs) are supported simultaneously with association of LAN addressing and routing information to multiple DNs.
- Calling Number Identification may be used to provide additional security to the bridge or router.
- For details on subscription and ordering information using NIUF ISDN Interface Groups (NIIGs) and NIUF ISDN Parameter Groups (NIPGs), see Section 5.1.11.
- See Sections 5.2.1 and 5.2.3 for detailed Signaling Flow Diagrams that apply .