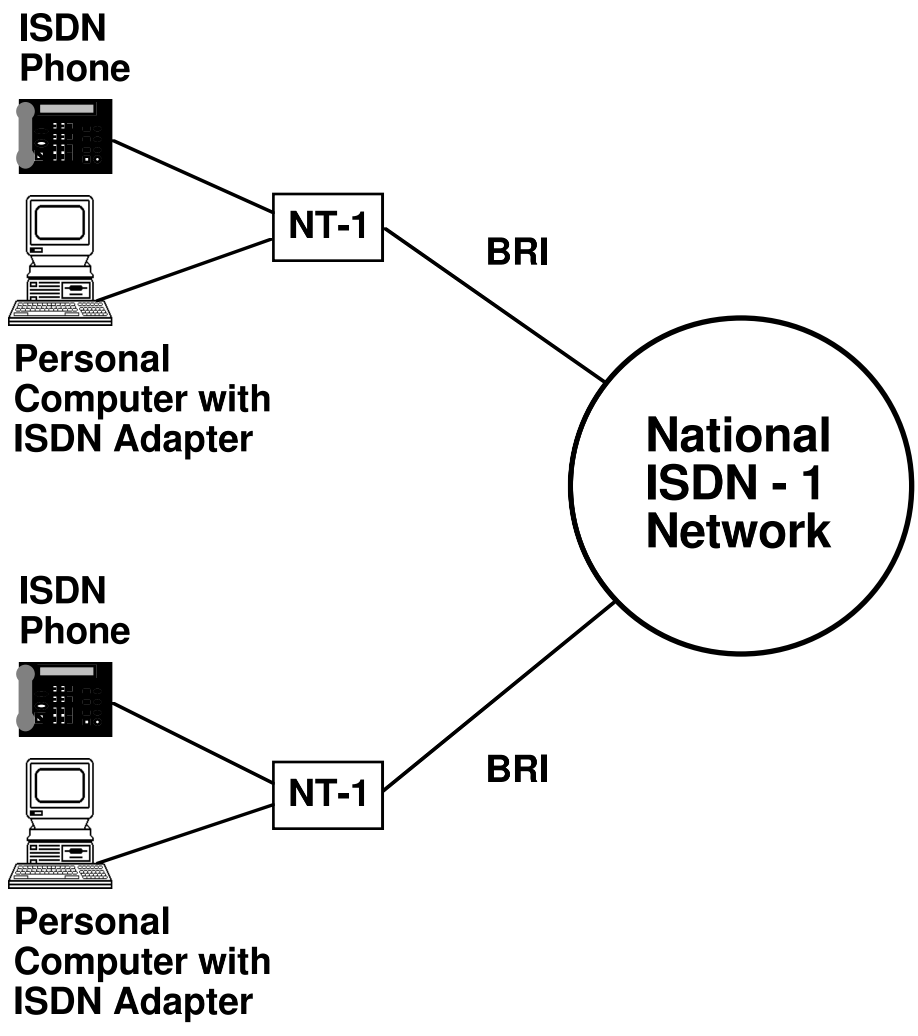
3.1.12 Caller identification

ISDN permits a user to answer, reject, or forward a call based on a display of the number of the person making the call. For example, the user can decide to forward the call to a voice messaging system or to an announcement which can indicate that the call is not wanted. The number can also be saved and used to place a return call without re-keying it. The same capability exists for calls from telephones, fax machines or computers.

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



How It Works:

ISDN calls are established through messages sent between end-systems (terminals) and network switches. These messages make up the protocols of ISDN, and are defined in standards. One information element is the Calling Number (or Redirecting Number when the call has been forwarded to the recipient.) This information is available to the terminal for use in its programming.

Obtain Equipment with These Capabilities

ISDN Phone

- B channel capabilities:
  - Voice calling on a single B channel.
  - If using NI-1, support for one Directory Number (DN) and Service Profile ID (SPID) will be needed.
  - Support for Calling Number Identification Services and network-driven display for voice calls.
- Physical interfaces:
  - RJ-45 connector to NT-1, or integrated NT-1. (Shared with personal computer.)

Personal Computer with ISDN Adapter

- Application software and communication software compatible with communicating partners.
- B channel capabilities:
  - Circuit-data calling on a single B channel.
  - If using NI-1, support for one Directory Number (DN) and Service Profile ID (SPID) will be needed.
  - Support rate adaptation for rates lower then 64 kbps. For example, asynchronous communications may be rate adapted using V.120.
  - Support for Calling Number Identification Services.
- D channel capabilities:
  - Packet-data on the D channel.
  - If using NI-1, support for a separate DN (with fixed TEI) will be needed.
  - Support for the packet-data features listed under "Network Interface to Personal Computer with ISDN Adapter".
- Physical interfaces:
  - RJ-45 connector to NT-1, or integrated NT-1. (Shared with Phone.)

Request These Capabilities From ISDN Service Provider

Network Interface to ISDN Phone and Personal Computer

Network Services Required:

- One BRI. (2B)
- Two B channels for alternate voice and circuit-data, with alternate voice and circuit-data DNs and SPIDs.
- Packet-data on the D channel, with packet-data DN and fixed TEI.
- Voice Features:
  - Calling Number Identification Services
- Circuit-Data Features:
  - Calling Number Identification Services
- 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.

Subscription or Ordering Information:

- This interface is configured for two simultaneous alternate voice and circuit-data calls and a D channel packet-data call (NIIG 27).
- Parameter Groups for Voice Features:
  - A la carte: Calling Number Identification Services.
- Parameter Groups for Circuit-Data Features:
  - A la carte: Calling Number Identification Services.
- Parameter Groups for Packet-Data Features:
  - NIPG 7 - Basic D Channel Packet-Data.

Technical Notes

- Calling Number Identification Services deliver either Calling Line Identification (CLID) or Automatic Number Identification (ANI) to the called user on Voice and circuit-data calls. CLID numbers are delivered with a Type of Number/Numbering Plan ID (TON/NPI) value of "National Number in ISDN Numbering Plan". ANI numbers are delivered with a TON/NPI value of "Unknown Number in Unknown Numbering Plan".

- ISDN Phones & Personal computers may also support applications for answering, rejecting, and forwarding incoming calls based on received Calling & Redirecting Number values. (If the Voice and Circuit-Data DNs both have Call Forwarding Don't Answer to a Message System, the Phone and PC can forward calls to that system by simply ignoring those calls based on the received CLID or ANI.)

- Redirecting Number Delivery applies as part of CLID for Voice and Circuit-Data calls, when the call was previously forwarded by a Voice or Data line. For example, if Data User A calls Data User B, and User B's line forwards the call to Data User C, User C's set will receive User A's CLID as the Calling Number and User B's CLID as the Redirecting Number. A Redirecting Reason (E.g. "B's Line was busy") is also delivered with each Redirecting Number.

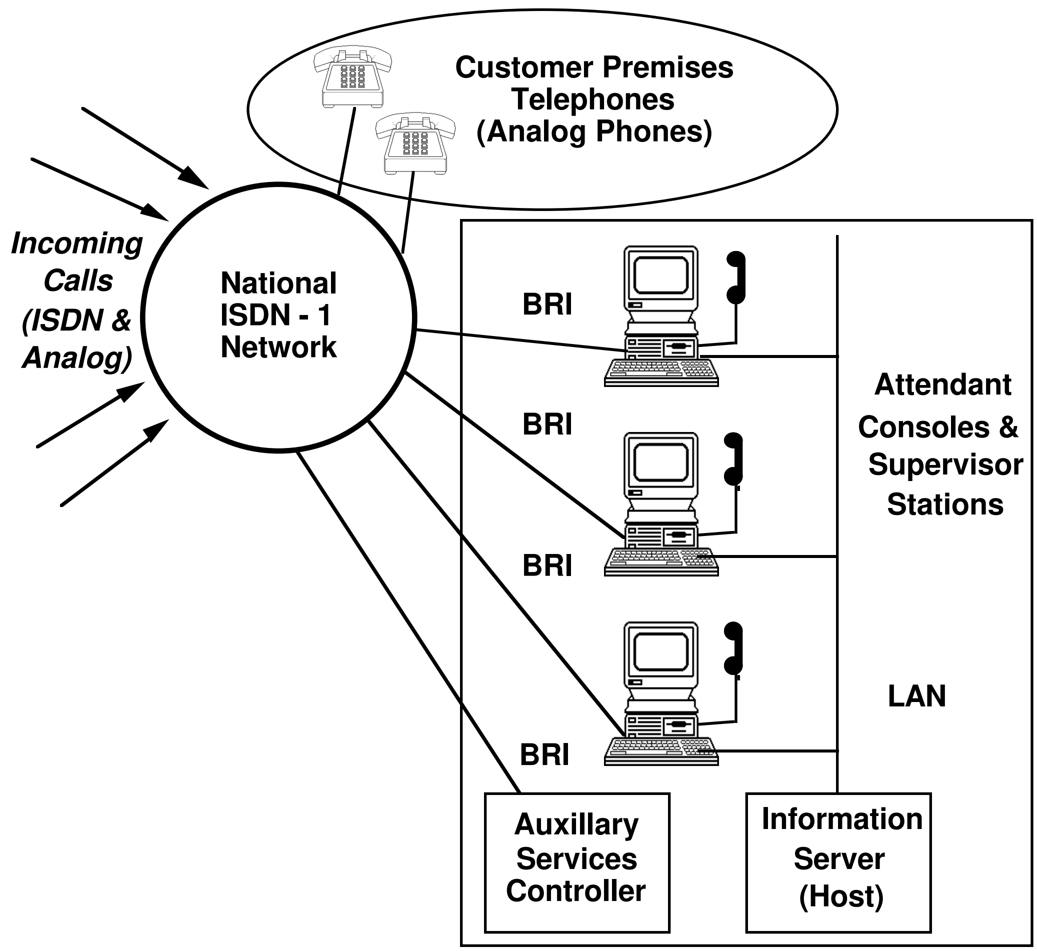
- For details on subscription and ordering information using NIUF ISDN Interface Groups (NIIGs) and NIUF ISDN Parameter Groups (NIPG), see Section 5.1.11.

- 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), 5.2.1.6 (Voice & Circuit-Data Call Clearing), and 5.2.1.7 (Packet-Data Call Setup and Clearing.)

3.1.13 Call coverage

ISDN increases the effectiveness of call coverage attendants by providing more information and a richer set of features to manage calls. Priorities for automatic handling of incoming calls can be established according to their calling numbers, and attendants can be provided with information on the calling and called parties and the status of each call. Many options are available for dealing with calls that cannot be completed, including text and voice messaging, overhead and radio paging, and alternate routing. An Auxiliary Services Controller serves as a call management application processor for enhancing the attendant services for particular business concerns. This processor can also use ISDN to send control signals or status information to the attendant's workstation.

Configuration:



How It Works:

Each attendant is logged on to the call coverage system through a D channel packet-data call to the Controller, and to internal databases through the LAN. Callers dial the hunt group number or direct lines (with call forwarding) that are busy or not answered. These calls are handled by attendants, who provide customized treatment based on information presented on their screen by call management application on their workstations. The application uses calling number and called number identification to automatically bring up key information, for example, appropriate profiles on the caller and called party.

Obtain Equipment with These Capabilities

Attendant Consoles

- Application software for Controller and Host access compatible with communication software and far end.
- Support multiple attendant services applications including company directories, messaging, calendar, bulletin board, statistics and others as appropriate. The console should allow the attendant to run several applications simultaneously and easily switch between them.
- B channel capabilities:
  - Voice calling on a single B channel.
  - If using NI-1, support for one Directory Number (DN) and Service Profile ID (SPID) will be needed.
  - Support for the voice features listed under "Network Interface to Attendant Consoles".
- D channel capabilities:
  - Packet-data on the D channel.
  - For NI-1, support for a separate DN (with fixed TEI) will be needed.
  - Packet Assembler & Disassembler (PAD) function, supporting X.3, X.28, and X.29.
  - Support for the packet-data features listed under "Network Interface to Attendant Consoles".
- Physical interfaces:
  - Analog phone jack (or integrated phone).
  - LAN interface (e.g., Ethernet, Token Ring) compatible with local LAN.
  - RJ-45 connector to NT-1, or integrated NT-1.

Supervisor's Station

- Support all functionality of attendant console.
- Additional support for system performance monitoring and ability to bridge into attendant calls.

Auxiliary Services Controller

- Application software for Attendant and Supervisor access compatible with communication software.
- Voice messaging or recorded announcements.
- B channel capabilities:
  - Simultaneous voice calling on two B channels.
  - For NI-1, support for two Directory Numbers (DNs) and Service Profile IDs (SPIDs) will be needed.
  - Support for the voice features listed under "Network Interface to Auxiliary Services Controller".
- D channel capabilities:
  - Packet-data on the D channel.
  - If using NI-1, support for a separate DN (with fixed TEI) will be needed.
  - Packet Assembler & Disassembler (PAD) function, supporting X.3, X.28, X.29.
  - Support for the packet-data features listed under "Network Interface to Auxiliary Services Controller".
- Physical interfaces:
  - RJ-45 connector to NT-1, or integrated NT-1.

Request These Capabilities From ISDN Service Provider

Network Interface to Attendant Consoles and Supervisor's Station

Network Services Required:

- One BRI. (1B+D) for each attendant
- One B channel for voice calls, with voice DN and SPID.
- Packet-data on the D channel, with packet-data DN and fixed TEI.
- Voice Features:
  - Flexible Calling (includes 3-Way Conference Calling, Hold, Transfer, and Drop).
  - Calling Number Identification Services.
  - Multiline Hunt Group (including Make Busy and Stop Hunt).
- Packet-Data Features:
  - Enough two-way logical channels to serve all Attendant Consoles and Supervisor's Stations.

Subscription or Ordering Information:

- This interface is configured for simultaneous voice calls and packet-data on the D channel (NIIG 6).

Other NIIGs which have this functionality include 8, 20-23, 25, 27, and 28.

- Parameter Groups for Voice Features:
  - NIPG 3 - Flexible Calling for Voice.
  - A la Carte: Calling Number Identification Services.
  - A la Carte: Multiline Hunt Group
- Parameter Groups for Packet-Data Features:
  - NIPG 7 - Basic D Channel Packet Features. Specify number of logical channels.

Network Interface to Auxiliary Services Controller

Network Services Required:

- One BRI. (2B+D)
- Two B channels for voice calls, with voice DNs and SPIDs.
- Packet-data on the D channel, with packet-data DN and fixed TEI.
- Voice Features:
  - Calling Number Identification Services.
- Packet-Data Features:
  - Enough two-way logical channels to serve all Attendant Consoles and Supervisor's Stations.

Subscription or Ordering Information:

- This interface is configured for two simultaneous voice calls and packet-data on the D channel (NIIG 20). Other NIIGs which have this functionality include 22 and 27.
- Parameter Groups for Voice Features:
  - A la carte: Calling Number Identification Services.
- Parameter Groups for Packet-Data Features:
  - NIPG 7 - Basic D Channel Packet Features. Specify number of logical channels.

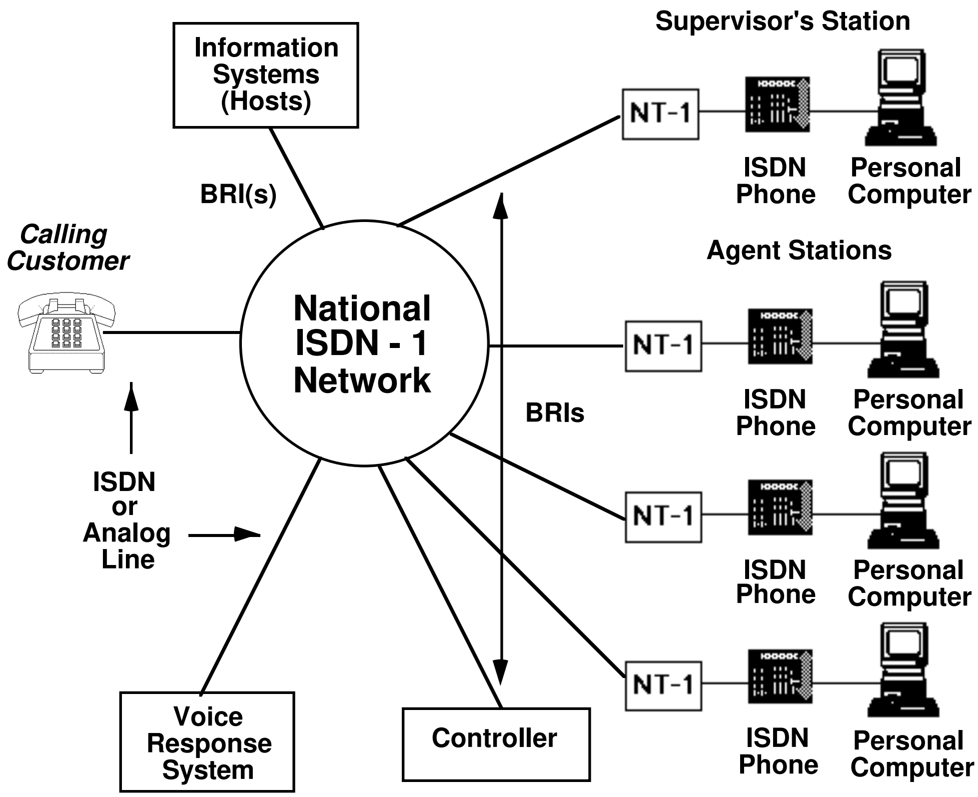
Technical Notes

- If a 2B+D interface is used, two Attendant consoles can be supported on each BRI. In this case, an additional Voice SPID, additional Fixed TEI, and additional packet-data DN are needed on the interface to support that second console.
- Call Forwarding features can also be assigned to the Hunt DNs in this application if needed. Call Forwarding Variable, Call Forwarding Interface Busy, and Call Forwarding Don't Answer can all be supported for each Hunt DN.
- Voice calls to the Controller can provide voice messaging or recorded announcements for forwarded calls.
- The exact nature of the X.25 packet-data features needed from the network will depend on the application demands of the end systems (Consoles, Controller, etc.).
- In cases where the packet-data configuration of the Console and the Controller are not the same, the likelihood of X.25 call completion will be higher if these devices and their packet-data DNs also support Throughput Class Negotiation & Flow Control Parameter Negotiation.
- For additional information on Multiline Hunt Group, see 5.1.7.
- For details on subscription and ordering information using NIUF ISDN Interface Groups (NIIGs) and NIUF ISDN 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), 5.2.1.6 (Voice & Circuit-Data Call Clearing), 5.2.1.7 (Packet-Data Call Setup & Clearing) and 5.2.1.8 (Packet-Data Fast Select Setup & Clearing).

3.1.14 ACD agent at home

ISDN can be used to extend an Automatic Call Distribution (ACD) network so that the ACD agents may work from their homes. The ISDN connection provides nearly the same set of features and performance that is available to the agents working at the office. ACD agents at home provide more flexibility in the deployment of the work force, with the ability of the system to include agents at home in traffic patterns. For example, a regional arts center might use such a system to employ part-time agents working in their own homes to sell tickets.

Configuration: (1, __2__, 3, 4)



How It Works:

Incoming Voice calls are managed by the Controller from the point at which they arrive in the system. The Controller directs calls to available Agents using the Call Hold, Call Conference, and Call Transfer features of ISDN. Multiple call appearances let calls queue in the network. Callers hear only ringing. Components of the system all exchange information using D channel packet-data. The Agent and Supervisor Stations communicate their status and other application-related information with the Controller The Voice Response System also communicates call status and application-related information with the Controller. The Agents, Supervisor Stations, and the Voice Response System access the Corporate Information System Hosts for application-related information *.

* Teloquent Communications, Billerica, MA, has patented this solution. (patent number 5036533)

Obtain Equipment with These Capabilities

Agent and Supervisor Stations

- Application software compatible with communication software and far end.
- Communication software support for Corporate Information Systems access.
- B channel capabilities:
  - Voice calling on a single B channel.
  - If using NI-1, support for one Directory Number (DN) and Service Profile ID (SPID) will be needed.
  - Support for the voice features listed under "Network Interface to Agent and Supervisor Stations".
- D channel capabilities:
  - Packet-data on the D channel.
  - If using NI-1, support for a separate DN (with fixed TEI) will be needed.
  - Packet Assembler & Disassembler (PAD) function, supporting X.3, X.28, and X.29.
  - Support packet-data features listed under "Network Interface to Agent and Supervisor Stations."
- Physical interfaces:
  - Analog phone jack (or integrated phone).
  - RJ-45 connector to NT-1, or integrated NT-1.

Controller

- Same functionality as Agent Station with the following additional capabilities:
- Call distribution functions to remote agents using call hold and call transfer, multiple call appearances.
- Management functions for system configuration and performance.
- Software support for communication with Voice Response System using packet-data.
- Multiple BRIs to meet network traffic requirements, for each BRI:

  B channel capabilities:

  - Simultaneous voice calling on two B channels.
  - For NI-1, support for two Directory Numbers (DNs) and Service Profile IDs (SPIDs) will be needed.
  - Support for Flexible Calling and Calling Number Identification Services as listed under "Network Interface to Controller".

  D channel capabilities:

  - Packet-data on the D channel.
  - If using NI-1, support for a separate DN (with fixed TEI) will be needed.
  - Support packet-data features listed under "Network Interface to Controller"
- Physical interfaces:
  - RJ-45 connector to NT-1, or integrated NT-1.

Voice Response System

- Application-specific software as necessary.
- Software support for communication with Corporate Information Systems and Controller using packet-data.
- B channel capabilities:
  - Simultaneous voice calling on two B channels.
  - 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.
  - If using NI-1, support for a separate DN (with fixed TEI) will be needed.
  - Packet Assembler & Disassembler (PAD) function, supporting X.3, X.28, and X.29.
  - Support packet-data features listed under "Network Interface to Voice Response System"
- Physical interfaces:
  - RJ-45 connector to NT-1, or integrated NT-1.

Corporate Information Systems

- Application software for customer service compatible with communication software and Agent and Supervisor Stations.
- Multiple BRIs to meet network traffic requirements, for each BRI:

  B channel capabilities:

  - Packet-Data on a single Semi-Permanent B channel.
  - Packet Assembler & Disassembler (PAD) function, supporting X.3, X.28, and X.29 for connection to host.
  - Support packet-data features listed under "Network Interface to Corporate Information Systems."
- Physical interfaces:
  - RJ-45 connector to NT-1, or integrated NT-1.

Request These Capabilities From ISDN Service Provider

Network Interfaces to Agent and Supervisor Stations

Network Services Required:

- One BRI. (1B+D)
- One B channel for voice calls, with voice DN and SPID.
- Packet-data on the D channel, with packet-data DN and fixed TEI.
- Voice Features:
  - Flexible Calling (with 6-Way Conference Calling, Hold, Transfer, and Drop).
  - Calling Number Identification Services.
- Packet-Data Features:
  - Logical Channels: At Least 2 Two-Way LC.
  - Throughput Class : 9600 bps.
  - Maximum User Data Field: 256 Octets.
  - Packet Window Size: 3

Subscription or Ordering Information:

- This interface is configured for simultaneous voice calls and packet-data on the D channel (NIIG 6). Other NIIGs which have this functionality include 8, 20-23, 25, 27, and 28.
- Parameter Groups for Voice Features:
  - NIPG 3 - Flexible Calling for Voice. Add 6-way conference calling.
  - A la Carte: Calling Number Identification Services.
- Parameter Groups for Packet-Data Features:
  - NIPG 8: Advanced D-channel Packet. Specify Logical Channels and Packet Window Size.

Network Interface to Controller

Network Services Required:

- One BRI. (2B+D)
- Two B channels for voice calls, with voice DNs and SPIDs.
- Packet-data on the D channel, with packet-data DN and fixed TEI.
- Voice Features:
  - Multiple call appearances
  - Flexible Calling (with 6-Way Conference Calling, Hold, Transfer, and Drop).
  - Calling Number Identification Services.
- Packet-Data Features:
  - Logical Channels: As many as needed to communicate with agents and Voice Response System.
  - Throughput Class : 9600 bps.
  - Maximum User Data Field: 256 Octets.
  - Packet Window Size: 3.

Subscription or Ordering Information:

- This interface is configured for two simultaneous voice calls and packet-data on the D channel (NIIG 20). Other NIIGs which have this functionality include 22, and 27.
- Parameter Groups for Voice Features:
  - NIPG 3 - Flexible Calling for Voice. Specify 6-way conference calling and required number of call appearances.
  - A la carte: Calling Number Identification Services.
- Parameter Groups for Packet-Data Features:
  - NIPG 8: Advanced D-channel Packet. Specify Logical Channels and Packet Window Size.

Network Interface to Voice Response System

Network Services Required:

- One BRI. (2B+D)
- Two B channels for voice calls, with voice DNs and SPIDs.
- Packet-data on the D channel, with packet-data DN and fixed TEI.
- Voice Features:
  - Calling Number Identification Services.
- Packet-Data Features:
  - Logical Channels: At Least 2 Two-Way LC.
  - Throughput Class : 9600 bps.
  - Maximum User Data Field: 256 Octets.
  - Packet Window Size: 3

Subscription or Ordering Information:

- This interface is configured for two simultaneous voice calls and packet-data on the D channel (NIIG 20). Other NIIGs which have this functionality include 22 and 27.
- Parameter Groups for Voice Features:
  - A la Carte: Calling Number Identification Services.
- Parameter Groups for Packet-Data Features:
  - NIPG 8: Advanced D-channel Packet. Specify Logical Channels and Packet Window Size.

Network Interface to Corporate Information Systems

Network Services Required:

- One BRI. (1B)
- Packet-data on one B channel (semi-permanent), with packet-data DN .
- Packet-Data Features:
  - Logical Channels: As many as needed to communicate with agents, voice response system, and hosts
  - Throughput Class : 9600 kbps.
  - Maximum User Data Field: 256 Octets.
  - Packet Window Size: 3

Subscription or Ordering Information:

- This interface is configured for packet-data on the B channel (NIIG 5). Other NIIGs which have this functionality include 19.
- Parameter Groups for Packet-Data Features:
  - NIPG 9 - Basic B Channel Packet-Data. Specify Logical Channels and Packet Window Size.

Technical Notes

- Incoming Voice calls are managed by the Controller from the point at which they arrive in the system. The Controller directs calls to available Agents using the Call Hold, Call Conference, and Call Transfer features of ISDN.
- The Agent and Supervisor Stations and the Voice Response System communicate their status and other application-related information with the Controller using packet-data on the D channel. All stations, the controller, and the Voice Response System access the Corporate Information System Hosts for application-related information using packet-data on the D channel.
- Call Forwarding features can also be assigned to the Stations' Voice DNs in this application if needed. Call Forwarding Variable, Call Forwarding Interface Busy, and Call Forwarding Don't Answer are all supported.
- Since the packet-data configuration and usage of the calling and called devices are generally not the same, the likelihood of X.25 call completion will be higher if these devices and their packet-data DNs also support Throughput Class Negotiation & Flow Control Parameter Negotiation.
- For details on subscription and ordering information using NIUF ISDN Interface Groups (NIIGs) and NIUF ISDN 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), and 5.2.1.6 (Voice & Circuit-Data Call Clearing), 5.2.1.7 (Packet-Data Call Setup & Clearing) and 5.2.1.8 (Packet-Data Fast Select Setup & Clearing).