

North American ISDN Users' Forum
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Section Title

Voice Terminal Order Simplification Procedure

Feature Activator/Feature Indicator Master List

Terminal Package Definitions: TP-1 – TP-4
Voice Terminal Call Appearance Ordering

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1. Circuit Switched Data capability was removed from the packages.
2. One B channel was provisioned for each terminal on the BRI. B channel access was restricted to one B channel per terminal.
3. Terminal Packages were designated “Fully Conformant”.
4. Clarification was added to indicate that buttons could be skipped between different directory numbers.

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1 Voice Terminal Order Simplification Procedure

Current ISDN order simplification work (ISDN Ordering Codes [IOCs], based on the NIUF Capability Packages) focuses on single line ISDN applications, in particular, data and limited voice applications. Although the current Capability Packages provide voice features, these packages are too basic, and too limited in the number of call appearances and features, to accommodate complex voice application needs. Extensions to the National IOC Process are needed to accommodate a variety of ISDN complex voice applications for both Centrex and non-Centrex scenarios.

This contribution provides a foundation for simplifying ISDN ordering and provisioning for voice terminals. It consists of a new terminal-based ordering procedure that augments the existing NIUF Order Simplification process. Using this procedure, users can order different functionality for different terminals on a single BRI.

Key aspects of the terminal-based ordering procedure are as follows:

- **Terminal Packages (TPs)** are defined, each one containing a pre-defined set of features. These TPs may be for Centrex or non-Centrex scenarios. For Centrex TPs, the robust set of features includes appropriate Centrex sub-features. In addition, TPs will define the needed bearer capabilities, as well as other functionality (e.g., CACH EKTS).
- The TPs include a pre-defined list of **Feature Activators/Feature Indicators** (i.e., button assignments) for each feature requiring an activator/indicator.
- Each TP **applies to a terminal**. If multiple terminals share a single BRI line, then that line will have more than one TP. (Note that in the National IOC Process, Capability Packages apply to an entire BRI.) If needed, rules will be defined concerning which TPs can co-exist on a BRI.¹
- This process includes **user-defined options**, unlike the National IOC Process. These options include:
 - The number of Directory Numbers (DNs) and Call Appearances (CAs)
 - The number and pattern of shared call appearances, and how they are shared between terminals.
- The terminal-based ordering procedure includes a **structured way to gather this information**.

The terminal-based ordering procedures are based on several assumptions. These include:

- One B Channel is provisioned for each terminal on the BRI. Each terminal is allowed to access only one B channel.
- A maximum of two terminals per BRI is allowed.
- To register CPE with these Terminal Packages, the equipment must be Fully Conformant; that is, the CPE must match and make use of the capabilities of the entire Terminal Package, including its basic line set (channels and bearer capabilities) and features (feature activators and indicators). This rule does not

¹ Assignment of features and call appearances on a per terminal, rather than per BRI, basis, is essential for many voice applications, since independent users with unique terminal requirements often share a common ISDN line in a business environment.

require the CPE to support a specific number or arrangement of directory numbers and call appearances, as these are user-defined in the Voice Terminal Order Simplification Procedure.

The terminal-based ordering procedure is further defined in a companion series of NIUF contributions. These include:

- A Master List of feature assignments that reserves certain key Feature Activator/Feature Indicator (FA/FI) values for all Terminal Packages. This master FA/FI list helps CPE designers to plan uniform cross-package feature implementations and provides a common framework for all Terminal Packages.
- Terminal Package Definitions. These are for Centrex and non-Centrex scenarios.
- A description of the procedure, as well as associated forms, for obtaining user information on Directory Numbers and Call Appearances for the basic Terminal Packages.

2 Feature Activator/Feature Indicator Master List

This contribution provides a master list of feature assignments that reserves uniform Feature Activator/Feature Indicator (FA/FI) assignments for certain key features used in Terminal Package definitions and describes a simple algorithm that can be used by terminal equipment to map physical equipment buttons to network feature activators/feature indicators and call appearances. This document is a companion piece to the Voice Terminal Order Simplification Procedure.

All Terminal Packages are based on this fundamental reserved FA/FI list, each assigning additional FA/FI numbers in contiguous blocks. Wherever possible, common FA/FI assignments between Terminal Packages should be maintained; however, gaps in FA/FI numbering sequences should not be allowed in any package.

The anticipated Customer Premise Equipment (CPE) implementation allows an efficient and straightforward use of flexibly assigned feature keys; both with and without parameter downloading. Terminal equipment with fixed function keys (or automated software functions) for conference, drop, and transfer functions, or fixed message waiting indicators could rely on fixed (reserved) FA/FI values. Other features are not usually assigned to dedicated keys on voice terminals; rather, they are flexibly assigned to generic feature keys on an application by application basis. These features could easily be mapped to physical keys on a voice terminal in a predictable and understandable manner.

The recommended mapping algorithm for CPE would map call appearances to physical CPE buttons in *ascending* order, beginning with CA1 to the CPE designated physical button 1. After any fixed feature buttons (such as conference, drop, and transfer) are mapped, the remaining features would be mapped in *descending* order, beginning with the highest CPE designated physical button number. With parameter downloading, the exact number of call appearances and FA/FIs would be known without user intervention, and the set could be easily and repeatably configured. In configurations without parameter downloading, the user would be required to identify the number of keys used for call appearances vs. feature activators (as is currently done). Then CAs and FA/FIs would be mapped in the same manner.

Reserved Feature Activator/Feature Indicator Assignments

57	Call Forwarding Variable
60	3-Way Conference
61	Transfer
62	Drop
63	Message Waiting Indicator [NI-1] / Deactivate MWI

CPE Configuration Mapping Example:

CPE:

ISDN telephone with fixed function keys for Conference, Drop, and Transfer, fixed Message Waiting Indicator, 10 user assigned Call Appearance/Feature keys

Network Configuration:

TP-2, with 3 Call Appearances

CPE Mapping:

Physical CPE Keys	Network Mapping
1	CA1
2	CA2
3	CA3
4	FA/FI=53, Not Used
5	FA/FI=54, Not Used
6	FA/FI=55, Not Used
7	FA/FI=56, Not Used
8	FA/FI=57, Call Forwarding Variable
9	FA/FI=58, Automatic Callback
10	FA/FI=59, Bridged Call Exclusion (Privacy)
Conference	FA/FI=60, 3 Way Conference
Transfer	FA/FI=61, Transfer
Drop	FA/FI=62, Drop
MWI	FI=63, Message Waiting Indicator

Note: With parameter downloading, no network FA/FI values would be assigned to CPE keys 4-7. These keys could be used for local set functions (such as autodial).

3 Terminal Package Definitions: TP-1 - TP-4

This contribution defines four Terminal Packages to be used with the Voice Terminal Order Simplification Procedure. These Terminal Packages include Feature Activator/Feature Indicator assignments for Centrex and non-Centrex applications, with and without voice mail. The packages are described below:

- **Terminal Package 1:** TP-1 is a basic non-Centrex package that contains some call management features and can be used in a configuration that supports voice capabilities. TP-1 will support applications oriented towards the business employee working at home, including applications that require single or multiple terminals.

- **Terminal Package 2:** TP-2 builds on TP-1, and adds message waiting indication and additional call forwarding features needed for voice mail. Voice mail may be a key adjunct to Work at Home scenarios. However, the features needed for voice mail are not included as part of TP-1, as some customers may not need these. This non-Centrex package can be used in a configuration that supports voice capabilities for small office or home office applications, including applications that require single or multiple terminals.
- **Terminal Package 3:** TP-3 is a basic Centrex package that is similar to TP-1, but adds Group Call Pickup. It can be used in a configuration that supports voice capabilities. TP-3 will support applications oriented towards the business employee working in an office Centrex environment.
- **Terminal Package 4:** TP-4 is a basic Centrex package that is similar to TP-2, but adds Group Call Pickup. It can be used in a configuration that supports voice capabilities. TP-4 will support applications oriented towards the business employee working in an office Centrex environment with voice mail.

Table 2 lists the specific functionality of these Terminal Packages.

Restrictions

Table 1 indicates which Terminal Packages can coexist on the same Basic Rate Interface:

	TP1	TP2	TP3	TP4
TP1	X	X		
TP2	X	X		
TP3			X	X
TP4			X	X

Table 2. TP-1, TP-2, TP-3, and TP-4

Terminal Capability Package	Interface			Voice Features and Feature Activator/Feature Indicator Assignments	Data Features
	B	B	D		
TP-1	V			CACH Flexible Calling Call Forwarding Variable Automatic Callback CNI* RND*	CNI* RND*
				62 – Drop 61 – Transfer (not assigned on SSC EWSD) 60 - 3 Way Conference 59 – Bridged Call Exclusion (Privacy) 58 – Automatic Callback 57 – Call Forwarding Variable	
TP-2	V			CACH Flexible Calling Advanced Call Forwarding Automatic Callback CNI* RND*	CNI* RND
				63 - Message Waiting Indicator 62 – Drop 61 - Transfer (not assigned on SSC EWSD) 60 - 3 Way Conference 59 – Bridged Call Exclusion (Privacy) 58 – Automatic Callback 57 – Call Forwarding Variable	
TP-3	V			CACH Flexible Calling Call Forwarding Variable Automatic Callback Centrex Call Pickup (Group) CNI* RND*	CNI* RND
				62 – Drop 61 – Transfer (not assigned on SSC EWSD) 60 - 3 Way Conference 59 – Bridged Call Exclusion (Privacy) 58 – Automatic Callback 57 – Call Forwarding Variable 56 – Call Pickup	

Terminal Capability Package	Interface			Voice Features and Feature Activator/Feature Indicator Assignments	Data Features
	B	B	D		
TP-4	V			CACH Flexible Calling Advanced Call Forwarding Automatic Callback Centrex Call Pickup (Group) CNI* RND*	CNI* RND*
				63 – Message Waiting Indicator 62 – Drop 61 – Transfer (not assigned on SSC EWSD) 60 - 3 Way Conference 59 – Bridged Call Exclusion (Privacy) 58 – Automatic Callback 57 – Call Forwarding Variable 56 – Call Pickup	

Key

CACH

CACH EKTS

V

Circuit-Switched Voice

C

Circuit-Switched Data (Circuit-mode Data [CMD])

V/C

Alternate Voice and Data

Flexible Calling

Call Hold and Retrieve, Three-way Conference Calling, Add On, Call Drop, and Call Transfer

CNI

Calling Number Identification

RND

Redirecting Number Delivery

Advanced Call Forwarding

Call Forwarding Variable, Call Forwarding Interface Busy, Call Forwarding Don't Answer, Message Waiting Indicator

*

Where available

Notes:

1. Call forwarding is assigned to the Primary DN of the terminal.
2. All Call Appearances have Privacy OFF (Bridging Allowed) and Normal Ringing enabled.
3. No intercom provisioning is included in these packages.

4 Voice Terminal Call Appearance Ordering

This contribution presents a standard method to order call appearances for voice terminal service, consistent with the Universal ISDN Ordering Form initiative and based on the provisions laid out for the Voice Terminal Order Simplification Procedure. Two forms, the Master Directory Number Worksheet and the Voice Terminal Service Ordering Form are included to assist in ISDN service negotiation. Assignment of call appearances and features on a per terminal, rather than per Basic Rate Interface (BRI) basis is essential for most voice applications, since independent users with unique terminal requirements often share a common ISDN line in a typical business environment

Call appearances are assigned at subscription time, along with other predefined configuration parameters specified by the Terminal Packages. There are no restrictions on the number of call appearances or how they might be shared with other terminals, other than those described below.

A maximum number of two terminal configurations (SPIDs) per BRI may be configured using this ordering method. One B channel is provisioned for each terminal on the BRI. Individual terminal access is restricted to one B channel. Other line parameters are defined by the Terminal Packages.

Call Appearance Assignments and Restrictions

Call appearances are assigned sequentially, beginning with Call Appearance 1 (CA1). The number of call appearances, DN assignments, and DN/CA termination restrictions are requested from the service provider at subscription time using the Voice Terminal Service Ordering Form.

It is required that the Primary Directory Number (PDN) be assigned to CA1. This restriction is necessary to support DMS-100 switches and it also simplifies network channel identification. It is recommended that at least one call appearance be configured for Deny Termination. This requirement is intended to allow call transferring, without conflicting with incoming calls and may be enforced as an option of the service provider. Call appearances used for transferring calls should not be assigned to secondary-only directory numbers (DNs that do not appear as Primary on any terminal), since some network features are not supported on this type of call appearance on 5ESS switches.

Each directory number may be shared on no more than 8 different terminals (including the primary terminal). Multiple call appearances of the same directory number must be assigned sequentially and contiguously on each terminal. Button numbers may be skipped between different directory numbers. An individual directory number may have a maximum of 16 call appearances on any single terminal. These restrictions are required for compatibility with 5ESS switches.

The service provider may assign actual directory numbers for each call appearance outside of the order negotiation process with the customer. For example, subaddress reservation is not currently supported on all switch types. To accommodate a call appearance restricted to deny incoming call termination, an additional DN may be assigned by the service provider. Likewise, on the DMS-100 NI-1 interface, individual DNs for each call appearance, arranged in a Key Short Hunt group must be provisioned to support multiple shared call appearances.

These switch related translation issues can be hidden from the customer, and need not be part of the order negotiation process. The order process merely communicates *how* the customer wants his or her terminal to function, but may not specify the *actual* DN assignments that are required to accomplish the desired functionality.

Interaction with Analog Terminals

Directory numbers from analog (POTS) terminals may be configured as shared call appearances on ISDN terminals. The analog terminal must always be the Primary User/Location (PDN location) for the directory number and that number may not be designated for CA1 (PDN) of any ISDN terminal. Analog directory numbers are otherwise specified in the same way as ISDN directory numbers on any call appearances above CA1.

Planning and Ordering ISDN Service

Two forms are provided for planning an ISDN installation and ordering service. The Master Directory Number Worksheet is used to define directory numbers and identify terminal assignments for the overall installation; only one set of master forms is used to plan the entire installation. The Voice Terminal Service Ordering Form is used to specify call appearance assignments for each terminal; one form is used for *each terminal* in the installation. A set of user instructions is included for each type of form.

To plan a new installation, the user (telecom manager, consultant, account executive, etc.) must:

1. Identify each terminal and assign it a unique reference name.
2. Assign each new directory number a unique reference name.
3. Map directory numbers to terminals, using the Master Directory Number Worksheet. This worksheet identifies shared directory numbers between terminals, but does not specify call appearance assignments.
4. Complete a Voice Terminal Service Ordering Form for each terminal. This form specifies individual call appearance assignments for each directory number on the terminal and also identifies the Terminal Package selected for feature button assignments.

For service moves and changes, the same forms and procedures may be used; however, actual directory numbers instead of reference names may be used.

To order new ISDN service or request a change in service, the user must also complete a master Universal ISDN BRI Order Request Form (documented in a separate contribution) which specifies general ISDN installation information (service address, billing address, carrier selection, etc.). Completed Voice Terminal Service Ordering Forms should be attached to the Universal ISDN BRI Order Request Form and transmitted to the service provider. The Master Directory Number Worksheet may also be included for overall installation reference but is not a required part of the order form.

General Instructions for Planning and Ordering ISDN Voice Service

1. Determine which NIUF Terminal Packages (if any) that your voice terminal equipment can support and the maximum number of call appearances that are available on each terminal when it is configured with the desired Terminal Package.
2. Make a master list of voice terminals (user/location name list). Include all analog (POTS) terminals that will have shared call appearances on ISDN terminals. Identify each terminal and assign it a unique reference name.
3. Make a master list of directory numbers (phone number list). Assign each new directory number a unique reference name.
4. Determine which directory numbers should appear on which terminals. Map the directory numbers to terminals, using the Master Directory Number Worksheet(s). This worksheet lists shared directory numbers between terminals, but does not specify individual call appearance assignments. If analog (POTS) terminals are included, they must be the Primary User/Location for a directory number.
5. Determine the desired call appearance key layout and select a Terminal Package for each ISDN terminal. The Terminal Package defines your feature key assignments; you define call appearance assignments for the remaining keys. Consult your ISDN voice terminal documentation for equipment specific recommendations, limitations, and physical key locations.
6. Complete the Voice Terminal Service Ordering Form for each ISDN terminal. This form specifies individual call appearance assignments for each directory number on each terminal and also identifies the Terminal Package selected for feature button assignments.
7. Complete the Master Universal ISDN BRI Order Request Form to specify general ISDN installation information (service address, billing address, carrier selection, etc.). Attach completed Voice Terminal Service Ordering Forms to the Universal ISDN BRI Order Request Form and transmit them to your service provider. The Master Directory Number Worksheet may also be included for overall installation reference but is not part of the order form.

For service moves and changes, the same forms and procedures may be used; however, actual directory numbers instead of reference names should be used.

Instructions for Completing the Master Directory Number Worksheet

1. Make sure that the End User (Directory) **Name** is the same name that is entered on the Voice Terminal Service Ordering Form and the Master Universal ISDN BRI Order Request Form.
2. Enter each **Directory Number** associated with this job (if known) in Column 1 and assign each a unique **Reference Name** in Column 2. Typically reference names will reflect the user name or location where the number appears as a Primary Directory Number. If a user or location has more than one directory number, assign them unique names (e.g., Mary Jones #1, Mary Jones #2). Enter the **Primary User/Location** Name in Column 3. This is the only terminal where the number appears as a Primary Directory Number.
3. For each directory number, list all other terminals that share that directory number on one or more call appearances in Columns 4-10. Names should be entered *exactly* as they are listed in Item 1a of the Voice Terminal Service Ordering Form. If analog (POTS) terminals are included, they must be only designated as the Primary User/Location (in Column 3) for a directory number. Up to 7 additional terminals can share a directory number with the Primary User/Location.

If reference names are used to designate new directory numbers, make sure that the names listed on the Master Directory Number Worksheet are used consistently on all other forms.

Instructions for Completing the Voice Terminal Service Ordering Form

1. Copy from the Master Universal ISDN BRI Order Request Form: (a) End User (Directory) Name from item 3.1, (b) Order Date from item 1.2, (c) *Order No./Agent No.* from item 2.5.
2. **(a) User/Location Name** is the name assigned to this terminal for customer reference, (b) SPID# (1 or 2) is a reference number needed for order confirmation. Enter "1" for the first terminal on the BRI and "2" for a second terminal (if any)
3. Enter the desired **NIUF Terminal Package** for this terminal. Allowable assignments for voice terminals using this ordering form must have the prefix "TP" (e.g. TP-1, TP-2). Only one Terminal Package may be selected. This selection specifies the ISDN feature button assignments for this terminal.
4. For **Other User/Location Name on this BRI**, enter the Primary Directory Number (PDN) or name of the other terminal (if any) sharing this Basic Rate Interface (BRI). A maximum of two terminals may be configured on a single BRI using this form. The other terminal will share a connection to the ISDN line through a common NT1 device. If new directory numbers have not been assigned, enter the user or location name that will be sharing this BRI.
5. For Centrex Terminal Packages, you must specify a Centrex Group and Pickup Group. (a) The **Centrex Group** is a common name assigned to a group of terminals sharing an internal Centrex dialing plan. Typically, you may have to dial an extra digit (such as "9") to place calls outside your Centrex Group. (b) The **Pickup Group** is a group of terminals that share Call Pickup privileges. A ringing call at any terminal in the Pickup Group may be answered with either the Group Call Pickup or Directed Call Pickup feature button. If your service provider has not assigned Centrex and Pickup Group names, select reference names for each group and use them consistently on all forms.
6. In the **Call Appearance Map** table, enter the **Directory Numbers** that you wish to appear on each call appearance button on your terminal. The directory number assigned to Button 1 will be your Primary Directory Number (PDN). If new directory numbers have not been assigned, enter a unique reference name for each directory number (e.g., Mary Jones) in the top half of the box, leaving room to enter a DN below it when assigned. Make sure that identical reference names are used to indicate shared call appearances on different terminals. To indicate multiple call appearances of the same directory number, enter the same name or number on sequential CA Number lines. NOTE: Multiple call appearances of the same directory number must appear sequentially; you cannot skip buttons or put other numbers between multiple call appearances. A maximum of 16 call appearances of the same directory number is allowed.

For each directory number, indicate whether that call appearance will be reserved for **Out Only** (outgoing calls only). In this case, incoming callers dialing that directory number will receive busy tone from the network and will not ring your terminal. NOTE: Out Only must have the same setting (YES or NO) for all call appearances of the same directory number. Your service provider may require that you configure at least one call appearance for Out Only to minimize call collisions and ensure that you can always transfer calls, regardless of the number of simultaneous incoming calls.

CAUTION: Call appearances assigned to secondary-only directory numbers (DNs that do not appear as a PDN on any terminal) may not have access to all features that are available to primary (or shared primary) call appearances on some networks. In general, secondary-only call appearances should not be used to access call pickup, camp-on, park, and in some cases, call transfer.

For each directory number, indicate if that DN is shared. A **Shared DN** is a directory number that is also assigned to one or more call appearances on any other terminal. NOTE: Shared DN must have the same setting (YES or NO) for all call appearances of the same directory number.

MASTER DIRECTORY NUMBER WORKSHEET, ISDN VOICE TERMINAL SERVICE

Customer Name:

Sheet of

Directory Number	Reference Name	Primary User/Location	Terminals Sharing Directory Number with Primary User/Location						
			1	2	3	4	5	6	7
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									

UNIVERSAL ISDN BRI ORDERING FORM, VOICE TERMINAL SERVICE

1a. End User (Directory) Name: _____ **1b. Order Date:** _____

1c. Order No./Agent No: _____

2a. User/Location Name: _____ **2b. SPID# (1 or 2):** ____

3. NIUF Terminal Package: TP- ____

4. Other User/Location Name on this BRI: _____

5a. Centrex Group: _____ **5b. Pickup Group:** _____

6. Call Appearance Map

CA Number	Directory Number	Out Only	Shared DN
1 (PDN)			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			

CA Number	Directory Number	Out Only	Shared DN
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
31			
32			
33			
34			
35			
36			
37			
38			
39			
40			