



DEFINITY®

Enterprise Communications Server

Release 6

Administration and Feature Description

Automatic Routing Module

555-230-526
Comcode 108215773
Issue 4
May 1998

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Part 68: Answer-Supervision Signaling. Allowing this equipment to be operated in a manner that does not provide proper answer-supervision signaling is in violation of Part 68 Rules. This equipment returns answer-supervision signals to the public switched network when:

- Answered by the called station
- Answered by the attendant
- Routed to a recorded announcement that can be administered by the CPE user

This equipment returns answer-supervision signals on all DID calls forwarded back to the public switched telephone network. Permissible exceptions are:

- A call is unanswered
- A busy tone is received
- A reorder tone is received

Canadian Department of Communications (DOC)

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- Telecommunications Terminal Equipment (TTE) i-CTR3 BRI and i-CTR4 PRI

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Acknowledgment

This document was prepared by Product Documentation Development, Lucent Technologies, Denver, CO.

Automatic Routing

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This section contains the following DEFINITY ECS Automatic Routing features. Automatic Routing forms are located at the end of this chapter.

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Automatic Routing — General

DEFINITY ECS provides a variety of automatic-routing features for public and private networks. Automatic Alternate Routing (AAR) and Automatic Route Selection (ARS) are the foundation for these automatic-routing features. They route calls based on the preferred (normally the least expensive) route available at the time the call is placed. Generally, AAR routes calls over a private network and ARS routes calls using the public network numbering plan. However, both AAR and ARS support public and private networks.

When you use AAR and ARS, you can also use the following additional features:

- AAR/ARS Overlap Sending
- AAR/ARS Partitioning
- Facility Restriction Levels (FRL) and Traveling Class Marks (TCM)
- Alternate Facility Restriction Levels (AFRL)
- Generalized Route Selection (GRS)
- Look Ahead Routing (LAR)
- Subnet Trunking
- Time of Day (TOD) Routing

AAR and ARS

AAR

AAR supports private networks. Private network calls originate and terminate at one or many customer locations without accessing the public network. When you dial an access code and phone number, AAR selects the most desirable route for the call and performs any necessary digit conversion. If the first choice is unavailable, another trunk group, if administered, is chosen automatically.

The numbers you call using AAR are normally private-network numbers. However, you can call a public-network number, a service code, an international number, operator access code, or an operator-assisted dialing number. With AAR and Subnet Trunking, you have a convenient way to place international calls to frequently-called foreign cities. Such calls route as far as possible over the private network, and then access the public network. This saves toll charges and allows you to use your private network as much as possible.

Certain domestic calls may reach a point on a private network where they can route no further because tie trunks to the next switch are unavailable. In this case, subnet trunking can delete the location code and insert the appropriate public-network code. Calls of this type route off of the private network to a central office (CO). The CO may be connected to either a private-network tandem or main switch. Toll charges, if any, are from the final ETN switch to the destination.

ARS

ARS selects carriers automatically and routes calls inexpensively over the public network. When there are one or more long-distance carriers or services, DEFINITY ECS selects the most preferred route for the call. Long-distance carrier-code dialing may not be required on routes selected by the system. You assign long-distance carrier-codes and DEFINITY ECS translates them. The system can insert codes as needed to guarantee automatic carrier selection.

ARS can route calls to a variety of types-of-numbers (TON):

- Local dialing
- National dialing
- International dialing
- Operator-assisted dialing
- Service codes
- Inter-exchange carrier (IXC)

ARS can access a variety of types of public-network and private-network trunk groups including CO, FX, ISDN, tie, and WATS. See each trunk group type in other sections of this manual for additional information.

How to administer AAR and ARS

Required forms for AAR

Form	Field	Page
Dial Plan Record	■ Feature Access Code	5-99
Class of Restriction	■ FRL ■ Calling Party Restriction ■ Partitioned Group Number or ■ Time of Day Plan Number	5-72
Feature Access Codes	■ AAR Access Code ■ ARS Access Code	5-113 5-113
AAR and ARS Digit Analysis Table	■ All	8-54
AAR and ARS Digit Conversion Table	■ All	8-63
Node Number Routing (optional)	■ All	12-119
Route Pattern	■ All	8-67
Remote Home Number Plan Area (optional)	■ All	8-76
Time of Day Routing Plan (optional)	■ All	8-78
Feature-Related System Parameters	■ AAR/ARS Dial Tone Required	5-123

- Private Networking must be enabled on the System-Parameters Customer-Options form before you can use an AAR Feature Access Code.
- ARS networking must be enabled on the System-Parameters Customer-Options form before you can use an ARS Feature Access Code.

Required forms for ARS

Form	Field	Page
Class of Restriction	■ FRL	<u>5-72</u>
	■ Calling Party Restriction	
	■ Restricted Call List	
	■ Partitioned Group Number	
	OR	
Dial Plan Record	■ Time of Day Chart	
	■ Area Code	<u>5-99</u>
Feature Access Codes	■ ARS Prefix 1 Required	
	■ ARS Access Code	<u>5-113</u>
Toll Analysis	■ AAR Access Code	<u>5-113</u>
	■ Dialed String	<u>5-299</u>
AAR and ARS Digit Analysis Table	■ Min/Max	
	■ RCL	
	■ UCL (1-10)	
	■ Toll List	
	■ All	<u>8-54</u>
AAR and ARS Digit Conversion Table	■ All	<u>8-63</u>
Route Pattern	■ All	<u>8-67</u>
Remote Home Numbering Plan Area (RHNPA) (optional)	■ All	<u>8-76</u>
ARS Toll Table (optional)	■ All	<u>8-75</u>
Time of Day Routing Plan (optional)	■ All	<u>8-78</u>
Feature-Related System Parameters	■ AAR/ARS Dial Tone Required	<u>5-123</u>

Detailed description

A detailed description of AAR and ARS follows. Included is information on dialing, digit analysis, digit conversion, and route pattern. Considerations and interactions that involve implementation are addressed.

More detailed information is provided in Expanded Technical Information. Included is an explanation of AAR dialing, ARS dialing, call processing, and electronic tandem networks (ETN). Finally, the following additional related features are addressed: AAR/ARS Partitioning, Facility Restriction Levels and Traveling Class Marks, Alternate Facility Restriction Levels, Generalized Route Selection, Look Ahead Routing, Overlap Sending, Subnet Trunking, and Time of Day Routing.

Review [Figure 8-1](#) for an overview of the automatic routing.

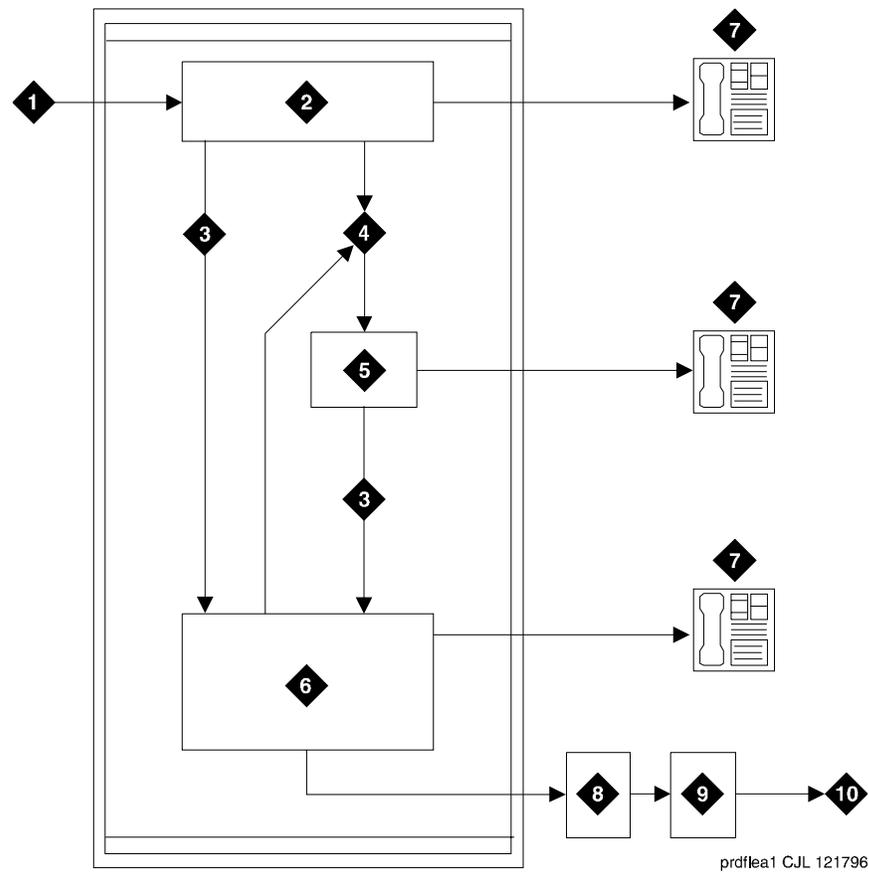


Figure Notes

- | | |
|--|--|
| <ul style="list-style-type: none"> 1. Input from voice terminal, public network trunk, or private network trunk 2. Analyze digits to determine address type (First Digit Table) 3. Direct to AAR/ARS 4. Direct to Uniform Dial Plan (UDP) 5. Analyze digits using UDP to determine route 6. Delete and insert digits (AAR and ARS Digit Conversion Tables) | <ul style="list-style-type: none"> 7. Terminate call at voice terminal 8. Analyze digits (AAR and ARS Digit Analysis Tables) and determine route pattern (Route Pattern, Node Number Routing, Extended Trunk Access forms) 9. Select outgoing trunk group and delete and insert digits 10. Output to public network trunk or private network trunk |
|--|--|

Figure 8-1. Automatic Routing

Dialing

Automatic routing starts when you dial a feature access code followed by the number to be called. For AAR, this access code is usually the digit 8. For ARS, this access code is usually the digit 9 in the US and 0 outside of the US.

As soon as you dial the AAR or ARS access code, the system checks to see if your voice-terminal extension has been origination restricted or outward restricted by its assigned Class of Restriction (COR). The system also checks to see if you have a controlled restriction of either outward or total. If any of these restrictions exist, intercept treatment is applied to the call. Otherwise, the AAR or ARS call continues and you can enter the number to be called.

A second dial tone may or may not be heard after the AAR or ARS access code is dialed, depending on system administration. For more detailed information, see Expanded Technical Information.

Interdigit timeout

DEFINITY ECS uses a long interdigit timer and a short interdigit timer during the dialing process. Normally, a long, 10-second interdigit timer is used between each digit. This timer waits for another digit when the digits dialed are not a valid destination. If this timer runs out, you receive timeout and an intercept tone.

If the digits dialed point to a valid destination, but there is a similar string of digits that is of different length, the short, 3-second interdigit timer is started.

If dialing does not continue before the timers expire, the system assumes that no more digits are to follow, and appends # to indicate end of dialing. You also may override the timer by dialing #. This results in faster call processing.

When no length ambiguity exists and all digits are collected, the call is routed, and no timer or # is required.

Digit analysis

Digit analysis compares the dialed number (or incoming digit string) with entries in the AAR or ARS Digit Analysis Table depending on which Dial Access Code was utilized. When DEFINITY ECS finds a dialed-string entry in the table that matches the incoming digit string, the AAR or ARS Digit Analysis Table maps the incoming digit string to a specific route pattern and call type. The selected route pattern and call type are used to route the call. The AAR or ARS Digit Analysis Table also shows the minimum and maximum number of digits required for the analysis of each incoming digit string. Node-number routing can also be specified on this form.

A dialing pattern can be mapped directly to a specific route pattern and call type. Or, it can be changed in the AAR or ARS Digit Conversion Table. During digit conversion, digits may be inserted or deleted from the digit string. For instance, private network numbers may be converted to other private network

numbers or public network numbers or extensions. This new dialed string is analyzed again in the appropriate analysis table for routing. Matching criteria are (most important first):

- Number of digits (between min and max)
- Most number of matching digits
- Exact match over wildcard match (from left to right)

Digit conversion

When an access code and number are dialed, the dialed string is compared to entries in the *Matching Pattern* field of the ARS or AAR Digit Conversion Table. If all or part of the dialed string matches one of the Matching Patterns, the matching part of the dialed string is replaced by a new number from the Replacement String field. This new number then is used to route the call. The new number is analyzed using the AAR or ARS Digit Analysis Table or is routed directly to an extension. An intercept tone is supplied if a match is not found or if the call fails to route.

Review the following examples. These conditions are assumed for the examples: ARS Access Code = 9, AAR Access Code = 8, Home RNX (Private Network Office Code) = 222, Prefix 1 is required on all long-distance DDD calls, Dashes (-) shown in [Table 8-1](#) are for readability only. The dialed digits are mapped to the matching pattern that most closely matches the dialed number.

Example:

If the dialed string is 957-1234 and matching patterns 957-1 and 957-123 are in the table, the match is on pattern 957-123. The call is routed as dialed.

Table 8-1. ARS Digit Conversion Examples

Operation	Actual Digits Dialed	Matching Pattern	Replacement String	Modified Address	Notes
DDD call to ETN	9-1-303-538-1345	1-303-538	362	362-1345	Call routes via AAR for RNX 362
Long-distance call to presubscribed carrier	9-10222+DDD	10222	(blank)	(blank)	Call routes as dialed with DDD # over private network
Terminating a local DDD call to an internal station	9-1-201-957-5567 or 9-957-5567	1-201-957-5 or 957-5	222-5	222-5567.	Call goes to home RNX 222, ext. 5567
Unauthorized call to intercept treatment	9-1-212-976-1616	1-XXX-976	#	(blank)	"#" means end of dialing. ARS ignores digits dialed after 976. User gets intercept treatment.
International calls to an attendant	9-011-91-672530	011-91	222-0111#	222-0111	Call routes to local switch (RNX 222), then to attendant (222-0111). Call can route to an announcement by replacing 0111 with an announcement extension. ¹
International call from certain European countries needing dial tone detection	0-00-XXXXXXXX	00	+00+ ²	00+XXXX	The first 0 denotes ARS, the second pair of 0s denotes an international call, the pluses denote "wait" for dial tone detection.

1. This method may also be used to block unauthorized IDDD calls.

2. This can be done via subnet trunking

Route pattern

DEFINITY ECS selects a route pattern for a call as a result of the digit analysis performed on the number dialed. The AAR or ARS Digit Analysis Table analyzes up to 28 digits. An RHNPA Table is used to screen 3 additional digits after an area code. A route pattern is a sequence of trunk groups that are used to route the call. (More than one combination of dialed digits can point to the same route pattern.)

You relate a Dialed String (number dialed) to a Rte Pat (route pattern) on the AAR or ARS Digit Analysis Table. You set up the Rte Pat on the Route Pattern form. Usually, you arrange the trunk groups in a route pattern by preference. The least expensive route pattern is generally the preferred route. To select a route pattern, DEFINITY ECS considers preference order and FRL compatibility.

You also assign an FRL to a routing-pattern preference. FRLs are assigned to both trunk groups and voice terminals via the COR. The caller's FRL must be greater than or equal to the preference FRL. See the section on Facility Restriction Levels and Traveling Class Marks for additional information.

When AAR and ARS route calls over ISDN trunk groups, overlap sending can be administered. This allows you to send and receive digits one digit at a time instead of enbloc (digits are not sent until the entire group of digits is received). In countries with complex public-network numbering plans, this decreases call setup time significantly. When overlap receiving is enabled, this is especially significant for tandemed calls.

If AAR routes the call to another switch over a trunk with ISDN overlap sending, the system seizes the outgoing ISDN trunk and starts sending digits while DEFINITY ECS continues to collect (receive) the remaining incoming digits. After receiving the number of digits administered in the Max. digit field of the AAR Digit Conversion Table (or a timeout), the system sends an end-of-dial signal backward to the originating switch. With overlap sending, it also is no longer necessary to enter # to indicate end of dialing. Additional information is provided in the section on Overlap Sending.

Look-Ahead Routing allows you to maximize your route-pattern preferences. It allows you to continue to try to reroute an outgoing ISDN call when initial attempts fail because of congested trunks. You can indicate the next route-pattern preference or indicate that the current route-pattern preference should be attempted a second time before going to the next preference. Additional information is provided in the section on Look-Ahead Routing.

Expanded technical information

The following paragraphs contain further information about AAR dialing and translations, ARS dialing and translations, and trunking facilities.

AAR dialing

Typically, AAR simplifies dialing. You dial the AAR access code (normally 8) followed by a private network or public network number. AAR selects the route and performs whatever digit manipulation is necessary. In addition, AAR selects the most cost-effective public-network or private-network route. If the first-choice preference is not available, another preference is chosen automatically. For outgoing ISDN calls, route selection is dependent on Bearer Capability Class (BCC), Facility Restriction Level (FRL), and type of facility.

AAR allows you to dial a private network number to reach a specific public network. The call can be routed via a private network to an appropriate exit point, where digit insertion is used for conversion to the appropriate access code, country code, city code, and exchange.

You can administer DEFINITY ECS to include RN, RNX, and RXX dial plans, where R = 2 to 9, N = 2 to 9, and X = 0 to 9 (and any other forms). See the following table for default translations associated with AAR Digit Analysis.

Table 8-2. AAR Digit Analysis Default Translations

Dialed String	Total Digits		Call Type
	Min.	Max.	
2	7	7	aar
3	7	7	aar
4	7	7	aar
5	7	7	aar
6	7	7	aar
7	7	7	aar
8	7	7	aar
9	7	7	aar

ARS dialing

You can administer DEFINITY ECS to recognize different types of dialing patterns on outgoing calls and route the call accordingly. The following dialing patterns are supported.

- **Operator Assistance Calls** — The first digit following the ARS access code is a 0. If a 0 is dialed by itself to access an operator, a special interdigit timeout occurs, the route for dial 0 calls is selected and a 0# is outpulsed. If the user dials another 0, the route for 00 is selected, and a 00# is outpulsed. The call is routed to the toll operator (if one exists) instead of the local operator in this case.
- **DDD Calls with Prefix Digit 1 Required** — The `Pfx Mrk` (Prefix Mark) field (on the Route Pattern form) is administered as follows for each of the 6 possible routing choices on the form:

The digit 1 may or may not be required at the public network office to which the call is routing. (If 1 is dialed on 7-digit calls at a stand-alone system (non-ETN), the 1 is outpulsed by the system.) In the other cases, the 1 outpulsing requirements are indicated in the system. Since any given call may have a choice of routes, some of which may require a 1 and some of which may not, this indication is associated with each route. Five

choices are available and are identified in translations by a Prefix Mark. Digit 1 outpulsing only applies to calls administered as "fnpa" or "hnpa" in the ARS Digit Analysis table. The values and meanings of the Prefix Marks are as follows:

- Prefix Mark 0 — Suppress a user-dialed Prefix digit 1 for 10-digit FNPA calls, but leave a user-dialed Prefix digit 1 for the following types of calls:
 - 10-digit calls that are not administered as FNPA or HNPA types in the ARS Routing Table.
 - 7-digit HNPA calls
- Prefix Mark 1 — Send a 1 on 10-digit calls, but not on 7-digit calls.
- Prefix Mark 2 — Send a 1 on all toll calls (for example, all 10-digit calls and 7-digit toll calls).
- Prefix Mark 3 — Send a 1 on all toll calls and keep or insert the NPA to ensure that all toll calls are 10-digit calls. Note that a user-dialed Prefix digit 1 for a 7-digit call makes it a toll call and, hence, NPA is also inserted in this case.
- Prefix Mark 4 — Always suppress a user-dialed Prefix digit 1.

⇒ NOTE:

This capability is required, for example, when routing ISDN calls to an Lucent Technologies 4ESS. If the prefix digit 1 were not suppressed, then the 4ESS would reach calls.

Which of the five possible treatments of the 1 prefix digit should be administered on a given route is based on the characteristics of the distant office. Prefix Mark 0 prevents the system from sending a 1 prefix digit for 10-digit FNPA calls. However, the system leaves a user-dialed prefix digit 1 for 7-digit HNPA calls and 10-digit calls that are not administered as FNPA or HNPA types in the ARS Routing Table. In some areas, all toll calls must be dialed as 1+10 digits. Check with your local network provider.

Prefix Mark 1 causes the system to send a 1 prefix on all 10-digit FNPA calls.

With Prefix Marks 2 and 3, the decision is based on whether the call is a toll call. Toll Lists are provided in the system to furnish this information. A Toll List simply indicates if the office code associated with the call constitutes a toll call from the interconnecting office (not from the local system). Up to 32 Toll Lists are provided. The applicable list number, if any, for the call is assigned in the Routing Pattern.

Prefix Marks are only applicable on 7- or 10-digit DDD public network calls. Requirements for outpulsing a 1 are specified via Prefix Marks and go into effect when the call accesses is outpulsed. Digit 1 outpulsing only applies to calls administered as "fnpa" or "hnpa" in the ARS Digit Analysis table.

- **DDD Calls with Prefix Digit 1 Not Required** — The first digit of a long-distance call following the ARS access code may or may not be a 1 (dialing the 1 prefix before a 10-digit call is optional). In systems where the 1 prefix is dialed (even though not required), the prefix is ignored if no match is found with the “1” included. The default ARS translations include entries starting with “1.”
- **Operator Assisted and International Calls** — The first digits following the ARS access code are a 0 (operator), 00 (toll operator), and optionally followed by a 10-digit DDD number, or by 01 or 010 (international operator) for international dialing and optionally followed by international destination address digits. Because of the variable number of digits required for these calls, an interdigit timeout is used to recognize end of dialing.
- **International Direct Distance Dialing** — An international telephone number consists of a country code (CC) plus the national number (NN). The NN is simply the number used when calling within the country. In the North American Numbering Plan (NANP), NN is a 10-digit address. In the NANP, special prefix codes alert DEFINITY ECS that an international number is being dialed. These codes are outlined as follows:
 - 011 — Indicates that the caller is making a station paid direct international call and CC plus NN digits follow. The term IDDD (International Direct Distance Dialing) is normally associated with 011 plus (011+) station calls.
 - 01 — Indicates that the caller desires operator assistance in an international call, such as person-to-person, credit card, collect call, and so on, and CC and NN digits follow. The term ICDOS (International Customer-Dialed and Operator-Serviced) reflects the nature of 01+ dialing options.

A 01+ (ICDOS) call is similar to 0+ or 00+ (operator-assisted North American Network) call, whereas a 011+ (IDDD) call is similar to a 1+ call.
- **Special Service Codes** — The first digit following the ARS Access Code is a special system or service code. In North America, such codes consist of only three digits in the form N11 (where N = 2 to 9) with or without dialing the “1” prefix digit. These are recognized as complete addresses, and even if no further digits are dialed, are routed to the appropriate facility. The interdigit timeout determines whether the call is a 3- or 7-digit call. For example, if the user dials 911, the call routes to the police or emergency operator, and if the user dials 811-XXXX, the call is translated as a 7-digit call for the repair bureau corresponding to the last 4 digits (811 is a service code for repair).
- **Call Dialed with Inter-Exchange Carrier (IXC) Access** — The IXC Code, if dialed, is comprised of the first digits following the ARS Access Code, usually a 5- or 7-digit IXC code. IXC codes are defined in the Inter-Exchange Carrier Codes form on page [5-177](#). DEFINITY ECS decides the number of digits to collect based on the digits following the

code. The IXC code may be followed by a DDD or IDDD number. This gives you control over which carriers or which facilities are used for routing the call. The call may be routed based on administration of the IXC code in the ARS Digit Analysis Table.

DEFINITY ECS supports three general IXC access arrangements that are commonly referred to as Feature Group A, B, and D (FG A, FG B, FG D). From a caller's perspective, the major differences between use of the various groups are:

- To select an IXC, FG A and FG B require the dialing of 7 digits (NXX-XXXX or 950-0/1XXX, respectively) but FG D requires just 5 digits (10XXX).
- Single-stage dialing is supported for FG D, but FG A and FG B require 2-stage dialing. (Two-stage dialing means that there is a pause for dial tone between the 2 groups of dialed digits.) FG A and FG B calls are analyzed and routed just like normal calls.
- No customer identification digits are required for FG D.
- A touch-tone telephone is required to enter a Personal Identification Number code when using FG A or FG B. (These digits are not collected or analyzed by the switch.) A dial pulse or touch-tone telephone may be used with FG D.

See [Table 8-3](#) for default translations associated with ARS digit analysis.

Table 8-3. ARS Digit Analysis Default Translations

Dialed String	Total Digits		Route Pattern	Call Type
	Min.	Max.		
0	1	1	den	op
0	8	8	den	op
0	11	11	den	op
00	2	2	den	op
01	9	17	den	iop
011	10	18	den	intl
10XXX0	6	6	den	op
10XXX0	16	16	den	op
10XXX1	16	16	den	fnpa
10XXX01	14	22	den	iop
10XXX011	15	23	den	intl

Continued on next page

Table 8-3. ARS Digit Analysis Default Translations — Continued

Dialed String	Total Digits		Route Pattern	Call Type
	Min.	Max.		
1XXX555	11	11	den	fnpa
1XXX976	11	11	den	fnpa
18000555	11	11	den	fnpa
1809	11	11	den	fnpa
1900555	11	11	den	fnpa
411	3	3	den	svct
555	7	7	den	hnpa
611	3	3	1	svcl
811	3	3	1	svcl
911	3	3	1	svcl
976	7	7	den	hnpa
N	7	7	2	hnpa
1N00	11	11	den	fnpa
1NX	11	11	den	fnpa

Legend:

N - 2 through 9
X - any digit (0 - 9)
den - deny
fnpa - foreign number plan area (10-digit call)
hnpa - home number plan area (7-digit call)
intl - international
iop - international operator
op - operator
svcl - service (local)
svct - service (toll)

Trunking facilities

Automatic routing uses a combination of public and private trunking facilities. Off-net facilities include trunks such as CO, FX, and WATS. These trunks carry public network calls. On-net facilities include trunks such as tie, tandem, and private ISDN trunks. These trunks are dedicated to your private network.

DEFINITY ECS can serve as an electronic tandem network (ETN). An ETN is a hierarchical network of privately-owned trunk and switching facilities that provide a cost-effective alternative to toll calling between locations. Tandem trunks are used to interconnect two tandem nodes in an ETN.

An ETN consists of tandem switches, the intertandem tie trunks that interconnect them, the access- or bypass-tie trunks from a tandem switch to a main switch, and the capability to control call routing over these facilities. Within an ETN, each switching facility is identified by a unique private-network office code. Private-network office codes may be 1–8 digits.

Traveling Class Marks (TCM) are appended to AAR and ARS numbers outpulsed on ETNs. Remember, TCMs represent the caller's FRL or the FRL of the caller's access trunk group. Access trunks are used to connect a subtending main switch to a tandem node. Tie trunks are used to interconnect a satellite or tributary and the homing main switch. An ETN tandem node can, however, directly access main and tributary switches that are homed on another tandem node using bypass-access trunks.

Considerations

- ARS and AAR can access the same trunk groups and share the same route patterns, toll lists, and RHNPA tables. ARS calls can be converted to AAR calls and vice-versa.
- Internal memory resources used for digit analysis are shared by ARS and AAR Digit Conversion and Toll Analysis. The Percent Full field on the ARS Digit Analysis and AAR Digit Analysis screens indicates how many of these resources are used for both AAR and ARS.

Interactions

- Abbreviated Dialing
FRL checking is bypassed on ARS and AAR calls made via a privileged Abbreviated Dialing Group List.
- Attendant Control of Trunk Group Access
Attendant control of a trunk group, in effect, removes the trunk group from the route pattern. ARS and AAR do not access controlled trunk groups.
- CAS
A CAS Attendant can extend a call out of a branch switch using ARS and AAR. When you dial the feature access code and number, the call is routed according to the AAR and ARS administration at the branch switch.

- CDR
 - A CDR account code may be required for an AAR call if it crosses over and becomes an ARS call.
 - An ARS or AAR call using a trunk group marked for CDR is indicated by the dialed access code and by a condition code. It is possible to record either the dialed number or the outpulsed number. If the dialed number is recorded, subnet trunking does not affect CDR.
 - Outpulsed digits can be recorded.
 - If CDR generation is administered for a trunk group assigned to a route pattern, data is collected for all calls routed through the trunk group.
 - If a CDR account code is to be dialed with an ARS or AAR call, it must be dialed before the ARS or AAR access code is dialed.
- Controlled Restriction, Origination Restriction, and Outward Restriction

These features prohibit access to ARS and AAR.
- Forced Entry of Account Codes

Prefix marks and other digits inserted from route patterns are not used to determine whether a call is a toll call. See Forced Entry of Account Codes below for more information.
- ISDN-BRI Stations

An ISDN-BRI station does not recognize the conference or transfer buttons until a call is ready to be routed. For calls that require an interdigit timeout, you must delay dialing for 3 seconds or dial a # to indicate that the call is ready to be routed. The routing operation is completed by the switch and then the ISDN-BRI station recognizes the conference or transfer buttons.
- Miscellaneous Trunk Restrictions

Miscellaneous Restrictions are not checked on ARS and AAR calls.
- Personal Central Office Line (PCOL) Trunk

A PCOL trunk group cannot be assigned to a route pattern.
- Ringback Queuing
 - Ringback Queuing can be used on ARS and AAR calls when they originate at a switch that provides the queuing. Incoming tie trunk calls do not queue on an outgoing trunk group.
 - Ringback Queuing is activated automatically when you have an Automatic Callback button, make an ARS or AAR call, and all trunks are busy.

- Toll Restriction

Toll Restriction is checked if calls are dialed as ARS calls; it is not checked on AAR calls even if they digit convert to ARS calls.

- Voice Terminal Display

- The voice terminal display shows the dialed digits (not outpulsed digits) on AAR and ARS calls and then may change to the name of the trunk group.

- On ARS calls, the called party shown on the display is that of the trunk group actually used. The Miscellaneous Call Identification field on the display shows ARS. By administering trunk groups, you can replace the dialed digits with the name of the trunk group and trunk access code (TAC).

- Outgoing AAR calls display the trunk name and TAC.

- An ISDN-BRI station may format these display fields differently, and the timing of display updates may be different.

AAR and ARS Overlap Sending

DEFINITY ECS supports overlap sending for AAR and ARS calls that are routed over ISDN trunk groups. ISDN call-address information is sent one digit at a time instead of enbloc — in other words, all address information in one block. In countries with complex public-network numbering plans, this allows for a significant decrease in call setup time. When overlap receiving is enabled, this is especially significant for tandemed calls.

If AAR or ARS determines that the call is to be routed to another switch over a trunk with ISDN overlap sending, the system seizes the outgoing ISDN trunk and starts sending digits while DEFINITY ECS continues to collect (receive) the remaining incoming digits. After receiving the number of digits administered in the `Max` field of the AAR or ARS Digit Analysis form (or a timeout), the system sends an end-of-dial signal backward to the originating switch. It is no longer necessary to enter # to indicate end of dialing.

How to administer AAR and ARS Overlap Sending

Required forms

Form	Field	Page
ISDN-PRI Trunk Group	■ Digit Handling (in/out)	7-221
ISDN-BRI Trunk Group	■ Digit Handling (in/out)	7-199

AAR and ARS Partitioning

AAR and ARS can be partitioned into 8 user groups within a single DEFINITY ECS. AAR and ARS Partitioning provides individual routing treatment for each of these user groups.

User groups share the same Partition Group Number (PGN). The PGN is not a restriction; it indicates the choice of routing tables used on a particular call. Each Class of Restriction (COR) is assigned a specific PGN or Time of Day specification. Different CORs may be assigned the same PGN.

How to administer AAR and ARS Partitioning

Required forms

Form	Field	Page
Class of Restriction	■ Partitioned Group Number	<u>5-72</u>
Time of Day Routing Plan (optional)	■ All	<u>8-78</u>
AAR and ARS Digit Analysis Table	■ Partitioned Group Number	<u>8-54</u>

- Different Digit Analysis tables must be administered for each partitioned user group.
- A PGN must be assigned to each COR table. A Time of Day Plan Number is assigned to the COR instead of the PGN if Time of Day Routing is used.

Detailed description

This feature allows you to divide users into groups and restrict or allow different access to facilities depending upon the group. In motels, for instance, AAR and ARS Partitioning allows you to group employees and guests and give them different access to facilities. When a guest places an interstate call, the guest user-group's ARS tables can route the call to a telephone-billing information system that bills back or allocates long-distance charges. A similar call placed by an employee can route over a direct-distance dialing (DDD) trunk.

All partitioned user groups share the same pool of route patterns. The translation tables that specify the route-pattern number are unique for each partitioned user group. Route patterns may be shared among the user groups or may be dedicated to a particular user group. Once you activate AAR or ARS and dial enough digits for the system to search for the route pattern, the PGN of the caller's COR is used to select the table to look up the route pattern.

The following can use AAR and ARS Partitioning:

- Voice terminals
- Attendant consoles
- Remote-access users
- Data endpoints
- Incoming trunks

Considerations

- The following situations may require AAR and ARS Partitioning:
 - User groups with different routing preferences for calls to a given area due to special billing needs
 - User groups that have dedicated use of a particular network facility
 - User groups in different businesses in one or more buildings serviced by a single system
 - Data users who require special facility types on outgoing calls
- Partition user groups are only used with AAR, and ARS, and UDP. There is no capability to access the partitioned user groups directly. Operation is transparent to the user.

Interactions

- Bridged Call Appearance

If a Bridged Call Appearance is used for an AAR or ARS call, the system uses the bridged extension's PGN instead of the caller's PGN.
- Call Detail Recording (CDR)

The PGN used to route the call is not recorded in CDR.
- Call Forwarding All Calls

If a call terminates at a voice terminal that has Call Forwarding activate and the forwarded-to number uses AAR or ARS, the caller's COR is used to look up the PGN for the call.
- DCS

When a call routes over DCS, PGN information is not sent to the far-end switch. The far-end switch is only capable of using the incoming trunk's PGN to route the call.
- Remote Access

If a remote-access user activates ARS, the COR assigned to the barrier code dialed (or the Authorization Code, if required) is used to select the PGN for the call.

- **Straightforward Outward Completion and Through Dialing**

If the attendant assists or extends a call and activates ARS, the attendant's COR is used to select the PGN for the call if the individual extension number is assigned, otherwise it refers to the COR set on the console parameter.

- **Time of Day Routing**

TOD Routing allows different AAR and ARS Partitions to be used at different times of the day and different days of the week. If you wish to assign certain users to a particular partition at all times, you must use a default Time-Of-Day Routing Plan that points to the same PGN # at all times.

- **Uniform Dial Plan**

Since UDP calls expand the dialed digits into 7-digit numbers and then use AAR to route the call, these calls use partitioning. Once the call is handled by AAR, the caller's COR is used to select the PGN for the call.

Facility Restriction Levels and Traveling Class Marks

Facility Restriction Levels (FRL) and Traveling Class Marks (TCM) allow certain calls to specific users, while denying the same calls to other users. For example, certain users may be allowed to use central office (CO) trunks to other corporate locations while other users may be restricted to less expensive private-network lines.

FRLs and TCMs provide up to 8 levels of restriction for users of AAR and ARS.

How to administer FRLs and TCMs

Required forms

Form	Field	Page
Class of Restriction	■ FRL	5-72
Route Pattern	■ FRL (0-7)	8-67

NOTE:

FRLs are important to system security. Assign the most restrictive (7) FRL consistent with the FRLs to be used on the COR form and the least restrictive (0) FRL on the Route Pattern form in order to help prevent unauthorized use of system features.

Detailed description

FRLs and TCMs are transparent to the user. The appropriate values are predetermined and programmed into the system. Dialing procedures are unaffected.

Call routing for each call is determined by the dialed area code or office code (either public or private network) or by the administered dial string. Analysis of the called number yields a route pattern. More than one dialed string can point to the same pattern. Each route preference includes:

- Trunk group number
- Minimum FRL required to access the trunk group

Each facility, such as a trunk or voice terminal, that is capable of originating a call also has an associated FRL. Whether a call is allowed or not depends on 2 things: compatibility between FRLs and availability of an idle trunk.

Compatibility is determined by a comparison of the minimum FRL associated with the route preference and the originating-side FRL. Either can have a value of 0–7. Access to the associated trunk group is permitted if the originating-side FRL is greater than or equal to the minimum FRL of the preference. Note that lower originating-side FRLs can access to fewer routing preferences, whereas lower minimum FRLs on the Route Pattern permit greater access. Stated another way, a 0 originating-side FRL is the most restricted and a 7 is the least restricted. A 0 minimum FRL is the least restrictive, and a 7 is the most restrictive (when applied to the route pattern's FRL). Compatibility checking begins with the first-choice route (the first one in the pattern). Assuming that access is permitted, availability is checked; that is, is there an idle trunk in the group? If so, the call continues. If not, compatibility is checked on the next-choice route. The intercept treatment is not received unless all possible routes are inaccessible.

If the compatibility check fails on the next-choice or subsequent route, or if all accessible trunk groups are busy, the call may queue on the first routing preference or first compatible trunk group if trunk queueing is provided.

If the trunk group selected for a call is an intertandem tie-trunk group, then a TCM is outpulsed as the last digit. A TCM is equivalent to the originating-side FRL. At the next tandem switch, compatibility and availability checking are done, as before. In this case, the FRL assigned to the incoming intertandem tie-trunk group is used as the originating-side FRL (to compare with the minimum FRL). If it is sufficient, then the call continues and no comparison between the TCM and minimum FRL is made. If it is not sufficient, then the TCM is compared with the minimum FRL to see if the call is allowed to continue. If this fails to yield a route and if the TCM is higher than the tie-trunk FRL, then the TCM is used in another attempt to complete the call.

Call-originating facilities

At a switch serving as the call-origination point, any of the following can be the originator of an ARS or AAR call:

- Voice terminal
- Remote Access user
- Attendant
- Incoming tie-trunk group from a subtending location
- Data terminal capable of keyboard dialing

At a tandem switch, either of the following can be the originator of an ARS or AAR call:

- Incoming intertandem tie-trunk group
- Incoming access tie-trunk group — links a remote main switch to a tandem switch

Each of these facilities is assigned an FRL via an associated COR, either directly or indirectly.

Voice terminals and all incoming tie-trunk groups use the FRL within the assigned COR. Attendants use the FRL within the COR assigned to the attendant group for extended calls. If Individual Attendant Access is assigned, the individual attendant's COR FRL is used. Data terminals use the FRL within the COR assigned to the associated data module.

Remote Access can be accessed via the following trunk groups: DID, ISDN, tie, dedicated CO, 800-service, or dedicated FX. The applicable originating FRL is contained in the COR assigned to the dialed barrier code. If a barrier code is not required on remote access calls, the applicable FRL is the default (none).

Call terminating facilities

Any of the following trunk types can serve as the termination point for an ARS or AAR call:

- Tie trunk — excluding Release Link Trunks (RLT), but including Common Control Switching Arrangement (CCSA) and Enhanced Private Switched Communications Services (EPSCS) access trunks
- Wide Area Telecommunications Service (WATS)
- CO
- Foreign exchange (FX)
- Integrated Services Digital Network - Primary Rate Interface (ISDN-PRI)

Each of these outgoing trunk groups has an assigned COR that contains an FRL. However, this FRL is never used. Terminating-side FRLs are assigned in the route pattern, not to the outgoing trunk group.

Considerations

- FRLs restrict certain users from placing selected calls while allowing other users to place the same calls.
- A COR is assigned to each trunk group. If the COR specifies an FRL, the FRL is ignored. The minimum FRL specified in the route pattern is the only FRL used on the terminating side of the call.
- On attendant-extended calls, the attendant-group FRL is used rather than the FRL of the calling party.

Guidelines and examples

The following guidelines and examples illustrate some practical aspects of FRLs.

FRLs on the terminating end of a call are not checked unless the terminating facility is a trunk group in a route pattern. This simplifies assignments. At each switch, the trunk groups available to handle a given AAR or ARS call can be listed in any order within the route pattern. Access to each listed trunk group must be determined via an FRL. On a scale of 0–7, the relative value is determined and assigned. Decisions are normally based on the cost, or appropriateness, of using the facility. The same FRL value can be assigned to more than one trunk group if there is no reason to prefer one trunk group over another.

If some users within the system are not allowed to make outside calls, use some value other than 0 for the first-choice route. Then assign these users an FRL of 0 to deny access to any trunk group, because all trunk-group FRLs are greater than 0.

Each route pattern must be individually constructed. The same trunk group can be used in more than one pattern. The associated FRL is assigned within the pattern and is not associated with the trunk group itself. The same trunk group can have a different FRL in a different pattern.

Be consistent in FRL assignments. Do not use a range of 0–5 in one pattern and 2–7 in another pattern if all users can access the first-choice route. Admittedly, the trunk group with an FRL of 2 may be more expensive than the trunk group with an FRL of 0, but there is no reason to assign 2 to a trunk group that everyone can access. For ease of assignments, always use 0 for such a trunk group.

Establish COR for each FRL in a route pattern. Assign the appropriate COR to users who can access the routes restricted by the FRL. For example, a middle executive might be able to access all routes with an FRL of 5 or lower, whereas the president can access all routes. In this case, the executive is assigned a COR with an FRL of 5 and the president is assigned a COR with an FRL of 7.

Remote access users can access system features and services the same as an on-premises user. FRL assignment is via remote-access barrier codes. Up to 10 barrier codes, each with its own COR (and FRL), can be assigned. Although the COR defines other restrictions, 10 barrier codes are enough to provide a range of FRL assignments. Assign barrier code FRLs as if the user were on-premises. The simplest way to assign these FRLs is to duplicate the on-premises FRLs, then relate the appropriate barrier code to users who need remote access.

The following is an example of how FRLs can be assigned in a COR:

- FRL0 — 911 access only
- FRL1 — Local calls only
- FRL2 — FRL1 plus home area-code calls using WATS
- FRL3 — FRL2 plus use of local lines for all calls in the home area code
- FRL4 — FRL3 plus calls to all the USA, using WATS only
- FRL5 — FRL4 plus calls to all the USA, using local lines
- FRL6 — FRL5 plus international calls
- FRL7 — Reserved

Interactions

- AAR and ARS
FRLs apply only on ARS and AAR calls (including Uniform Dial Plan).
- Authorization Codes
Authorizations Codes can be used to raise a user's FRL.
- Call Detail Recording
If 15-digit CDR account codes are used, the FRL field in the CDR record is overwritten.
- Intercept Treatment
The TCM containing the originating facility's FRL is sent over ISDN facilities in the SETUP message.

Alternate Facility Restriction Levels

Alternate Facility Restriction Levels (AFRL) allows DEFINITY ECS to adjust facility restriction levels or authorization codes for lines or trunks. Each line or trunk is normally assigned an FRL. With this feature, alternate FRLs are also assigned. Attendants or System Administrators can change to the alternates, thus changing access to lines and trunks. For example, a company might want to use this feature to disable most long-distance calling at night to prevent unauthorized staff from making long-distance calls.

CAUTION:

AFRL impacts AAR and ARS call routing because it may change the routing preferences. Using AFRL on tandem and tie-trunk applications affects entire networks. Calls that may be part of a cross-country private network may be blocked.

How to administer AFRL

Required forms

Form	Field	Page
Alternate Facility Restriction Level	■ Current Status	<u>8-29</u>
	■ Alternate FRL	
Station	■ Feature Button Assignments	<u>6-28</u>
Attendant Console	■ Feature Button Assignments	<u>5-35</u>

Detailed description

AFRLs affect two types of users: the attendant or System Administrator (who enables and disables the AFRL feature) and a voice-terminal user (who places outgoing trunk calls).

Attendant perspective

You can administer an ALT-FRL button to any attendant console or any station. Pressing the ALT-FRL button activates or deactivates AFRL. Pressing the ALT-FRL button on any console or station may affect the status of other buttons.

When AFRL is activate, the user may notice a sudden change in calling privileges. For example, the user may have been able to make long-distance calls but AFRL (which have been administered to add restrictions to the calling

parties) can no longer do so. When AFRL is active, you can be any one of 3 types of alterable FRL entities:

- An originating line
- An originating trunk (for example, an incoming trunk call)
- A dialed authorization code

Terminal-user perspective

If you use AFRL to restrict calling at certain hours, make sure that users know about those restrictions.

Trunk originator case

In this case, the originator is in reality an incoming trunk. Incoming trunk calls can be direct inward dialing (DID) calls to a station, incoming calls on access tie-trunks, or possibly intertandem tie-trunk calls. The FRL of the device is first used to determine if it is at a high enough level to select the outgoing device. If it is not, then the FRL associated with this signaling entity, called a Traveling Class Mark (TCM), is used. Tandem trunk groups are administered to pass along the FRL level associated with the other switch as part of the interoffice signaling protocol. This can be done inband as part of the addressing information which is sent between two switches using tone sending on the trunk itself, or can be done using special ISDN Q.931 messaging. In either case, the seizure of the outgoing trunk is not done until either the TCM is received or (in the case of inband signaling) an interdigit timeout occurs while waiting for the TCM digit.

If AFRLs are active, the FRL associated with the incoming trunk group is set to a new FRL. If after doing so, the originator is blocked from the trunk facility due to insufficient FRL, the TCM, if any, is used. The TCM, which is in reality just another FRL, is also set to a new FRL value. Therefore, the TCM information recorded in the billing data (CDR) is the AFRL value, not the original TCM.

Due to the application of AFRL on tandem and tie trunk applications, entire networks can be affected by the application of the AFRL feature. Use caution to engineer AFRLs as *now calls* that may be part of a cross-country switch network and that may be blocked from completion due to the engineering of a restrictive AFRL arrangement.

Considerations

- Consider the impact on your operations when there are sudden changes in the calling privileges of your system users. Consider announcing changes and preparing your telecommunications department to handle inquiries.

Guidelines and examples

The following examples should help you understand AFRLs and should illustrate some of their practical aspects.

AFRL mapping

FRLs are used to determine the privileges that an originating party can have when making an outgoing trunk call. This party can be either a line or a trunk. An FRL is assigned to each device and/or device group through its associate COR.

When a device originates an outgoing trunk call, its FRL is compared to the FRL of either the terminating trunk group or (for AAR or ARS) the preference. If the FRL of the originator is greater than or equal to the terminating FRL, the call proceeds. Otherwise, the call is blocked. FRLs restrict outgoing calls by destination, by time of day, or by facility problem (such as trunk outages).

For example, a technician could remap FRLs less than 3 to 3 and FRLs greater than 3 to 7. Any attendant or station with an AFRL button can control whether the original FRL or the AFRL is used.

Authorization codes

Authorization codes prevent unauthorized access to various facilities. You can use them, for example, to restrict access to certain trunk groups or to remote access trunk groups. When a user dials an authorization code, it is validated by the system. If it is not valid, the call routes to an assignable intercept. If the code is valid, the system determines an associated COR. This COR has an FRL associated with it. If AFRL is activated, it is the AFRL level and not the FRL that is used in mapping the AFRL.

For example, a user whose FRL is 1 attempts a toll call. AFRL is active and maps as shown in [Figure 8-2](#) (that is, FRL =1 maps to AFRL=3). The desired trunk has an FRL of 7, and so the user is blocked. If Authorization Codes are enabled, the user is prompted to dial an authorization code to obtain greater calling privileges. As shown in [Figure 8-2](#), an Auth Code set to 1234567 has a COR set to 3 and, therefore, an FRL set to 5. This is still not high enough to permit access to the desired trunk except when the user presses the active AFRL button. Then the AFRL feature is active and maps the FRL of 5 to 7, thus allowing the call to complete.

Authorization code to COR Table		COR to FRL Table		FRL to AFRL Table	
Authorization Code	COR	COR	FRL	FRL	AFRL
1234567	3	1	1	0	3
1234568	2	2	3	1	3
1234569	3	3	5	2	3
2222222	3	4	7	3	3
				4	7
				5	7
				6	7
				7	7

Originator COR is 1
Trunk Desired COR is 4

Figure 8-2. Example of authorization codes with AFRLs

Interactions

- AAR/ARS
ARFL can change route preferences and affect the cost of usage-sensitive calls.
- Facility Restriction Levels and Traveling Class Marks
AFRL sets up alternate levels to those normally provided by FRL.

Generalized Route Selection

Generalized Route Selection (GRS) provides voice and data call-routing capabilities. You use it to select not only the least-cost routing, but also the most optimal routing over the appropriate facilities.

GRS is a capability built onto the AAR and ARS features. In AAR or ARS, routing is based on the dialed number, the FRL of the caller, the partition group number, and the time of day. GRS provides additional parameters in the routing decision. It enhances AAR and ARS and maximizes the chance of using the right facility to route the call. Also, if an endpoint incompatibility exists, it provides a conversion resource (such as a modem from a modem pool) to attempt to match the right facility with the right endpoint.

How to administer GRS

Required forms

Form	Field	Page
Route Pattern	■ IXC	<u>8-67</u>
	■ BCC	
	■ ITC	
	■ BCIE	
	■ Service/Feature	
	■ Band	
Trunk Group	■ BCC	
Access		<u>7-150</u>
CO		<u>7-168</u>
FX		<u>7-194</u>
Tandem		<u>7-259</u>
Tie		<u>7-264</u>

Detailed description

GRS allows customers to use separate routes for voice and data calls. For data calls, DEFINITY ECS distinguishes between restricted and unrestricted digital transmissions. This allows the switch to route data calls onto the appropriate facilities. With GRS, you can integrate voice and data on the same trunk group.

GRS allows the system to use the ISDN Call-by-Call Service Selection feature to access public network services. It also provides interworking between ISDN and non-ISDN entities.

ISDN interworking is the mixture of ISDN trunks and non-ISDN trunks in a call. A mixture of these signaling procedures is required to provide end-to-end connectivity when different type trunking facilities are used.

ISDN services add 5 routing parameters that are specified on each trunk group preference of the route pattern. These parameters are:

- Bearer Capability Class (BCC) — Identifies the type of call, such as voice calls and different types of data calls. For all trunk groups, the BCC is checked to see if the route selected is compatible.
- Information Transfer Capability (ITC) — Identifies the type of data transmission (restricted, unrestricted, or both). For all trunk groups, the ITC is checked to see if the route selected is compatible.
- Network Specific Facility — Identifies the services and features to be used to complete a call.
- Band — Identifies the OUTWATS band (US only). WATS is a voice-grade service providing both voice and low-speed data transmission calls to defined areas (bands) for a flat rate charge.
- Inter-Exchange Carrier (IXC) — Identifies the specific common carrier, such as AT&T, to be used for a call.

In GRS, there are 5 BCCs. Customers may specify routing for each BCC according to their particular transmission needs. See the Expanded Technical Information portion of this section for more information on BCCs and ISDN BCC Parameters.

Expanded technical information on BCC

BCCs

BCCs are the mechanisms by which specialized routing is provided for the various type data calls and voice calls. Each trunk group preference in the AAR or ARS route patterns contains a BCC parameter. When a call is originated, a route is selected based on the BCC of the originating facility. BCCs are used to classify the type of traffic permitted on this trunk in the outgoing direction. Details on how a trunk group preference is determined are given in Guidelines and examples.

A set of ISDN bearer capability and low-layer compatibility parameters are defined by a BCC.

The system will determine the originating endpoint's BCC from one of the following:

- For an ISDN-BRI set, the switch determines the BCC by using information from the Bearer Capability Information Element (IE) and Low-Layer Compatibility IE in the ISDN SETUP message.
- For a non-BRI terminal, the switch creates a BCC by using information about the station administration for the terminal and information obtained by performing a terminal query.
- From the administered value of the incoming trunk. For a non-ISDN trunk group, the switch uses the administered BCC value.
- From the ISDN bearer capability and low-layer compatibility parameters, if the call is an ISDN trunk-originated call.

The BCC associated with the routing preference in the route pattern is administered by the system administrator. More than one BCC can be associated with each preference and the same facility can appear multiple times in a route pattern and in multiple route patterns.

The BCC of the originating endpoint (trunk or terminal) is matched with the BCCs of the routing preferences. An exact match is not always required. The system determines when conversion/insertion resources must be used to successfully complete a call via a compatible, but not identical, BCC.

GRS recognizes one or more of 5 BCCs for each trunk group preference in the route pattern (DCP/DML mode is explained later). See [Table 8-4](#).

Table 8-4. BCC Assignment

Endpoint	Voice/ Data Mode	BCC	Comments
Voice Terminal	Voice	0	
Data Line Circuit Pack	2	2	
Voice Data Set	2	2	
Modular Processor Data Module	0,1,2	1,2,4	See Note
Modular Processor Data Module-M1	1	1	For ACCUNET Switched 56 kbps Service
Modular Trunk Data Module	2	2	
Digital Terminal Data Module	2	2	

Continued on next page

Table 8-4. BCC Assignment — Continued

Endpoint	Voice/ Data Mode	BCC	Comments
510D Personal Terminal	2	2	
Digital Communications Protocol Interface	0,2,3	2,3,4	See Note
7400A Data Module	2	2	
3270T Data Module	3	3	
3270C Data Module	3	3	
3270A Data Module	2,3	2,3	See Note

Legend

BCC	Type	DCP/DMI Mode
0	Voice-Grade Data and Voice	None
1	56 kbps Data (Mode 1)	1
2	64 kbps Data (Mode 2)	2
3	64 kbps Data (Mode 3)	3
4	64 kbps Data (Mode 0)	0

⇒ NOTE:

For all endpoints, the switch automatically determines its current operating mode when the data module originates. Before any call is originated, the default is Mode 2.

Since call origination from a data module determines the mode used on the call, you should press the Originate/Disconnect button once after changing data options. This way, the right mode is sure to be assigned to the next call.

ISDN BCC parameters

The ISDN BCC Parameters are:

- Information Transfer Capability
- Low-Layer Compatibility
- DCP/DMI Mode

Information Transfer Capability

The information to be transferred (or type of call) requires different transmission facilities. For example, transmission needs for voice calls and data calls are generally different. Voice and voice-grade data calls can be sent over analog trunks, while high speed data calls require digital trunks.

The Information Transfer Capability parameter in the Bearer Capability Information Element (BC IE) and Low-Layer Compatibility Information Element (LLC IE) have the following 4 values:

- Voice (speech)
- Voice-grade data (3.1 kHz transmission)
- Unrestricted digital transmission
- Restricted digital transmission.

With data calls, the switch distinguishes the information transfer capability (restricted or unrestricted) of the originating data endpoint (trunk or terminal). It uses the information transfer capability of the data endpoint to route the call to the appropriate facility. For BRI and PRI originating data endpoints, the information transfer capability is contained in the ISDN SETUP message. For non-ISDN data endpoints, the switch uses the information transfer capability specified by the system administrator. The default for the information transfer capability of an endpoint is *restricted*. This can be changed to restricted or unrestricted for each non-ISDN originating endpoint.

More than one Information Transfer Capability can be supported by one BCC. See [Table 8-5](#).

Table 8-5. Assignment of BCC Based on Information Transfer Capability

DCP/DMI MODE	Information Transfer Capability	BCC	Comments
—	Speech, 3.1 kHz	0	Used for Voice/ Voice Grade Data.
M1	Unrestricted/ Restricted Digital	1	Used for Mode 1 Data (56 kbps).
M2 ¹	Unrestricted/ Restricted Digital	2	Used for Mode 2 Data (async data speed up to 19.2 kbps).
M3 ¹	Unrestricted/ Restricted Digital	3	Used for Mode 3 Data (64 kbps).
M0	Unrestricted/ Restricted Digital	4	Used for Mode 0 Data ² (64 kbps clear channel).

1. Typically not used outside of North America.
2. Use BCC 4 for an unknown data mode that requires a 64-KBPS channel.

Low-Layer Compatibility

The low-layer compatibility information element provides remote compatibility checking. This element is used with the bearer capability element and determines the mode of the originating caller. The low-layer compatibility information element is optional and sent only in case of data calls.



NOTE:

DCP Mode 0 does not send an LLC IE.

DCP/DMI Mode

The Digital Communications Protocol (DCP) and the Digital Multiplexed Interface (DMI) modes are data parameters of the originating data facility. These modes are not applicable to voice.

The mode values (0, 1, 2, and 3) are administered for data and Alternate Voice/Data (AVD) non-ISDN trunk groups. These mode values determine the BCC of the trunk groups.

Determination of BCC at tandeming or terminating system

The BCC parameters received on the signaling channel (D-channel) determine the BCC for an incoming call from an ISDN trunk to a tandem or terminating switch. This includes the ITC (restricted or unrestricted) if the call is a data call.

The BCC for an incoming call from a non-ISDN trunk is determined as follows:

- If the incoming trunk is a voice trunk, then the BCC is defaulted to 0.
- If the incoming trunk is a data, AVD, or RBAVD (robbed-bit AVD) trunk, then the BCC and ITC are administrable.

Guidelines and examples

The AAR/ARS route pattern contains an indication for each trunk group preference showing which BCC or BCCs can use that trunk group. A trunk group preference may have more than one BCC.

GRS uses a *look-ahead* algorithm when determining which preference in a route pattern to choose. GRS first attempts to find an exact match between the originator's BCC and the corresponding allowed BCC for any of the preferences in the route pattern. Therefore, if preference 1 does not have an exact match (even though there are available compatible members in preference 1), it is skipped over if a subsequent preference in the same pattern has an allowed BCC that exactly matches the originator's BCC.

After matching the BCCs, DEFINITY ECS matches the ITCs. The originator's ITC is matched to the route preference ITC.

- Unrestricted (unre) matches on "unr" or "both"
- Restricted (rest) matches on "rest" or "both"

⇒ NOTE:

ITC matching only applies to data calls (BCC 1 through 4).

As an example of how GRS chooses a trunk group preference, assume preference 1 in a pattern has BCC 0 and BCC 2 set to yes, while preference 2 has BCC 1, BCC 3, and BCC 4 set to yes. A voice or Mode 2 data call accessing this pattern uses the first preference, while a Mode 1, Mode 3, or Mode 0 data call uses the second. (This is independent of the availability of trunks in the first preference.)

When an exact match is not found in any of the route-pattern preferences, calls are treated as follows:

- Calls With an Originating BCC of 0

A BCC 0-originated call (such as voice or analog modem) is not denied routing by GRS, even if the route pattern lacks a preference with BCC 0 set to yes. This allows you to use voice transfer to data when making a data call, without the need for data preindication.

- If a BCC 0-originated call accesses a route pattern for which there is no preference for BCC 0 set to yes, then GRS chooses a preference with BCC 2 set to yes (if one exists).

- If none exists, the next preferred order would be a preference with BCC 1 set to yes, followed by BCC 3, and finally, BCC 4.

Since each preference must allow at least one BCC to be passed, a BCC 0 (voice) originated call is never blocked by GRS. The call is of course still subject to other restrictions, such as FRL restrictions. The ITC does not help select a preference.

Since BCC 0 (voice) has no ITC, the switch selects an ITC from the route pattern when a BCC 0 call is being routed as a data call. [Table 8-6](#) shows how the ITC codepoint in the Bearer Capability IE is determined.

Table 8-6. Determination of ITC Codepoint

Originating Endpoint's ITC	Routing Preference's ITC				ITC codepoint in BC IE
	restricted	unrestricted	both endpoint	both unrestricted	
voice	x				restricted
voice		x			unrestricted
voice			x		unrestricted
voice				x	unrestricted

- Calls With an Originating BCC of 2
 - If a BCC 2 originated call accesses a route pattern for which no preference has BCC 2 set to yes, then GRS chooses a preference with BCC 0 set to yes (if one exists).
 - If none exists, the call is blocked with intercept treatment.
- Calls With an Originating BCC of 1, 3, or 4

A DCP/DMI Mode 0 (BCC 4), Mode 1 (BCC 1), or Mode 3 (BCC 3) originated call requires an exact match on at least one preference in a route pattern in order for GRS to allow the call to complete.

For example, a Mode 1 originated call completes only if the accessed route pattern has a preference with BCC 1 set to yes. The ITCs must also match.

When an ISDN trunk group preference is accessed, the BCC information is encoded and sent in the outgoing ISDN SETUP message to the distant-end as shown below. The BCC information sent to the far-end is important. The BCC information that the far-end receives in the SETUP message becomes the originating BCC for the far-end's incoming trunk call.

- If an exact match of the originator's BCC and ITC is found, then that Bearer Capability is encoded and sent in the ISDN SETUP message to the far-end. If the call is a data call, the system uses the ITC of the route pattern to encode the SETUP message as shown in [Table 8-7](#).

Table 8-7. Encoding of Setup message

Originating Endpoint's ITC	Routing Preference's ITC				ITC codepoint in BC IE
	restricted	unrestricted	both endpoint	both unrestricted	
restricted	x				restricted
restricted			x		restricted
restricted				x	unrestricted
unrestricted		x			unrestricted
unrestricted			x		unrestricted
unrestricted				x	unrestricted
voice ¹	x				restricted
voice		x			unrestricted
voice			x		unrestricted
voice				x	unrestricted

1. A voice originated call without data preindication that is routed to a route pattern with data preferences only.

- If an exact match is not found, but the call is allowed to proceed, then the BCC encoded in the SETUP message sent to the far-end is that of the route pattern.

For example, if a BCC 2 (for example, DTDM) endpoint originates a call and accesses a pattern that has one preference with only BCC 0 set to yes, then the switch automatically inserts a modem pool for this call. In effect, the modem pool is converting BCC 2 to BCC 0. The far-end cannot distinguish this call from a BCC 0-originated call that has no modem pool inserted. Therefore, BCC 0 is sent in the SETUP message. This may in turn determine routing decisions by the far-end. Additional routing decisions are made as shown in [Table 8-8](#) through [Table 8-12](#).

BCC and ITC Determination on Calls from Endpoints to ISDN Trunks

Table 8-8. Calls from Endpoint to ISDN Trunks

Originating BCC	Chosen BCC from the Route Pattern				
	BCC 0	BCC 1	BCC 2	BCC 3	BCC 4
BCC 0	P	PT	PT	PT	PT
BCC 1	B	P	B	B	B
BCC 2	PM	B	P	B	B
BCC 3	B	B	B	P	B
BCC 4	B	B	B	B	P

Legend

B	Block the call with intercept treatment
P	Allow the call and send the originating endpoint's BCC in the SETUP message. Use the ITC as shown in Table 8-9
PT	Allow the call and send the BCC and ITC chosen from the route pattern in the SETUP message
PM	Insert a pooled modem for the call and send the BCC and ITC chosen from the route pattern in the SETUP message

If BCC 1, 2, 3, or 4 is chosen from [Table 8-8](#), [Table 8-9](#) is used to determine the appropriate ITC.

Table 8-9. Calls from Endpoints to ISDN Trunks

Originating ITC	Chosen ITC from the Route Pattern			
	unr	rest	both endpt	both unr
unr	P	B	P	PU
rest	B	P	P	PU

Legend

B	Block the call with intercept treatment
P	Allow the call and send the originating endpoint's ITC in the SETUP message
PU	Allow the call and send unrestricted in the SETUP message

BCC and ITC Determination on Calls from Trunks to ISDN

Table 8-10. Calls from Trunks to ISDN Trunks

Originating BCC	Chosen BCC from the Route Pattern				
	BCC 0	BCC 1	BCC 2	BCC 3	BCC 4
BCC 0	P	PT	PT	PT	PT
BCC 1	B	P	B	B	B
BCC 2	PT	B	P	B	B
BCC 3	B	B	B	P	B
BCC 4	B	B	B	B	P

Legend

B	Block the call with intercept treatment
P	Allow the call and send the incoming trunk's BCC in the SETUP message. Use the ITC as shown in Table 8-11
PT	Allow the call and send the BCC and ITC chosen from the route pattern in the SETUP message

If BCC 1, 2, 3, or 4 is chosen from [Table 8-10](#), [Table 8-11](#) is used to determine the appropriate ITC.

Table 8-11. Calls from Trunks to ISDN Trunks

Originating ITC	Chosen ITC from the Route Pattern			
	unr	rest	both endpt	both unr
unr	P	B	P	PU
rest	B	P	P	PU

Legend

B	Block the call with intercept treatment
P	Allow the call and send the incoming trunk's ITC in the SETUP message
PU	Allow the call and send unrestricted in the SETUP message

The system does not insert pooled modem for any interworking trunk-to-ISDN trunk calls. The BCC and ITC of an incoming trunk are determined as follows:

- ISDN Trunk BCC and ITC are in the received SETUP message
- AVD Trunk BCC and ITC are the BCC and ITC values administered on the trunk group form
- RBAVD Trunk BCC and ITC are the BCC and ITC values administered on the trunk group form
- Data Trunk BCC and ITC are the BCC and ITC values administered on the trunk group form
- Voice Trunk BCC is 0.

BCC and ITC Determination on Calls from ISDN Trunks to Endpoints (GRS not Involved)

Table 8-12. Calls from ISDN Trunks to Endpoints

Originating BCC	Terminating Endpoint BCC				
	BCC 0	BCC 1	BCC 2	BCC 3	BCC 4
BCC 0	P	P	PM	P	P
BCC 1	P	P	P	P	P
BCC 2	P	P	P	P	P
BCC 3	P	P	P	P	P
BCC 4	P	P	P	P	P

Legend

P	Allow the call, and (1) if it is a voice originated call, let the calling user decide whether the terminating endpoint is the correct endpoint or not based on audible feedback (for example, data tone), or (2) if it is a data call, the data handshake procedure will establish or drop the call based on the compatibility of the endpoints.
PM	Insert a pooled modem and terminate the call to the endpoint. The ITC defaults to restricted in this case.



NOTE:

The system does not use ITCs when terminating to an endpoint.

Look-Ahead Routing

Look-Ahead Routing (LAR) provides an efficient way to use trunking facilities. It allows you to continue to try to reroute an outgoing ISDN call that is not completing. When DEFINITY ECS receives a cause value that indicates congestion, LAR tells the system what to do next. For each routing preference, you can indicate if the next routing preference should be attempted or if the current routing preference should be attempted a second time. If the second attempt fails, the next routing preference is attempted.

LAR can be administered at either an origination switch or a tandem switch. However, it also can be turned off at different points in the network to reduce network load. You use LAR with AAR and ARS, GRS, UDP. You can also use it with the Feature Access Code ISDN Access Code. A LAR field is administered on the Route Pattern form.

How to administer LAR

Required forms

Form	Field	Page
Route Pattern	■ LAR	8-67

⇒ NOTE:

When LAR is used in a mixed network of DEFINITY ECS and pre-DEFINITY ECS switches, LAR ends at the pre-DEFINITY ECS switch and calls are rejected the normal way. However, if a LAR-triggering cause value is passed back in the network to a DEFINITY ECS that is enabled for LAR, LAR is attempted from that switch again.

Detailed description

LAR can be administered for each ISDN route preference per Pattern Number. The maximum number of LAR attempts per call per switch is 2 times the number of route preferences in the route pattern. LAR can be administered at each intermediate node that the call may be tandemmed through to allow all possible routes to be attempted. You can control LAR by:

- Administering it on a per route-preference basis
- Partitioning trunks
- Limiting the number of hop counts

LAR activation

LAR is active when a call is rejected with a cause value in the range of #34–#47 and #3 (no route to destination). The range of #34–#47 indicates congestion and that resources are unavailable. The following cause values activate LAR:

Cause Value	Cause Description
3	■ No route to destination
34	■ No circuit/channel available
38	■ Network out of order
41	■ Temporary failure
42	■ Switching equipment congestion
43	■ Access information discarded
44	■ Requested circuit or channel not available
47	■ Resources unavailable

**NOTE:**

When country code 13, protocol version a, is administered on the DS1 Circuit Pack form, only the cause values #10 and #89 activate LAR.

LAR termination

LAR terminates when:

- Call is successfully routed
- Call is rejected with a non-LAR-triggering cause value
- No further route preference can be used to route the call

LAR measurement

You can measure the number of LAR reroutes that are attempted and successful. A new form, Measurements LAR Route Pattern, displays LAR measurements for a particular route pattern. A route pattern must be selected for measurement before data collection. See *DEFINITY Enterprise Communications Server Release 6 System Monitoring and Reporting* for more information.

Considerations

- LAR cannot be activated by dialing an ISDN TAC or via Extended Trunk Access (ETA).
- If LAR is enabled for an ISDN-PRI route preference and AAR, ARS, GRS, or ISDN Access Code is used, LAR can be active on all outgoing calls using that route preference. This includes: Abbreviated Dialing, ACCUNET

Service, Administered Connections, Call-by-Call Service Selection, Call Forwarding, Call Vectoring, Electronic Tandem Networks, Multimedia, Outgoing Call Management, and QSIG Networks.

Interactions

- Automatic Circuit Assurance

LAR rerouting attempts are recorded as short holding time calls.
- Distributed Communications Systems

If a non-DCS trunk preference is selected for rerouting a DCS call, DCS feature transparency is lost. If LAR for a DCS call is done within the same DCS trunk group, feature transparency is not lost.
- Generalized Route Selection

LAR on a route preference does not change or impact GRS feature operation.
- QSIG Networks

If a non-Supplementary Services B (SS B) trunk preference is selected for rerouting a SS B call, QSIG feature transparency is lost. If LAR for a QSIG call is done through either the same or another SS B trunk group, feature transparency is not lost.
- Ringback Queuing

When a call originates and queues at the trunk group queue, the call can be placed in queue multiple times if LAR is active. The call originator can be called back each time the call is continued automatically.
- Satellite Hop Limit

Satellite Hop Limit always takes precedence over LAR. When the maximum hop limit is reached for a route preference, the last call routing attempt is denied and the call is rejected with a cause value of #28 — invalid number format. (This value does not activate LAR.)
- System Measurements

System resource use during LAR attempts are included in existing system measurements and performance reports. They include the following measurements: route pattern, call rate, call summary, performance summary, processor occupancy, trunk group, and call-by-call measurements. For more information about LAR system measurements, refer to *DEFINITY Enterprise Communications Server Release 6 System Monitoring and Reporting*.

Subnet Trunking

Subnet Trunking modifies the number you dial so an AAR or ARS call can route over different trunk groups. These trunk groups frequently terminate in switches with different dial plans.

Subnet Trunking inserts digits, deletes digits, pauses, and/or waits for dial tone in digit outpulsing, as required, so calls route:

- To or through a remote switch
- Over Tie trunks to a private network switch
- Over CO trunks to the serving CO

Subnet Trunking is not required on calls terminating directly to a party at the local switch. AAR handles these calls.

Subnet Trunking is required on calls routing to or through a remote switch, regardless of the call's destination.

How to administer Subnet Trunking

Required forms

Form	Field	Page
Route Pattern	■ No. Del. Digits	8-67
	■ Inserted Digits	
Feature-Related System Parameters	■ Off Premises Tone Detect Timeout	5-123
	■ Interval	

Detailed description of Subnet Trunking

An AAR or ARS call may ultimately reach a point where it can no longer route on a private network. That is, the call reaches a point where another on-network switch is not available for the call. Assuming the call is not denied at this point, it routes to one of the following:

- Directly to a party at the local switch
- Directly to a WATS serving office
- Directly to a local CO or a FX CO

Calls accessing a local CO or FX CO directly from the terminating switch normally require Subnet Trunking only if access to a long-distance carrier is other than the carrier automatically provided by the CO. In this case, DEFINITY ECS inserts the appropriate dial access code into the digit string. Subnet Trunking is

needed only if the number is modified or if the call passes through some intermediate switch.

Subnet Trunking is used to provide added functionality to the system. For example, it can convert an AAR number into an international number. Also, it can modify a digit string so that a remote access trunk group can be used on calls.

ARS does not use Subnet Trunking to add or delete an area code; it handles it via code conversion.

AAR uses Subnet Trunking to convert an on-network number to a public network number. In this case, the conversion may include an Area Code insertion via Subnet Trunking.

Any of several special characters may be used with Subnet Trunking:

- Pause — Delays outpulsing of subsequent digits for 1.5 seconds
- Wait — Can be administered in one of two ways
 - In the first way, delays outpulsing of subsequent digits for a preprogrammed interval (from 5 to 25 seconds) or, if tone detectors are provided, until dial tone is received from the distant switch or the interval expires, whichever occurs first.
 - In the second way, dial tone must be received before any outpulsing is done.
- Convert-to-tone — Causes all remaining digits to be outpulsed using tone signaling.

Time of Day Routing

Time of Day (TOD) Routing provides the most economical routing of ARS and AAR calls. This routing is based on the time of day and day of the week that each call is made. Up to 8 TOD routing plans may be administered, each scheduled to change up to 6 times a day for each day in the week.

With TOD Routing, you can take advantage of lower calling rates during specific times of the day and week. In addition, companies with locations in different time zones can use different locations that have lower rates at different times of the day or week. This feature is also used to change patterns during the times an office is closed in order to reduce or eliminate unauthorized calls.

How to administer Time of Day Routing

Required forms

Form	Field	Page
Time of Day Routing Plan	■ All	8-78
AAR and ARS Digit Analysis Table	■ All	8-54
Node Number Routing (optional)	■ All	12-119
Class of Restriction	■ Time of Day Plan Number	5-72
Station (multi-appearance) (optional)	■ Button/Feature Button Assignments — man-overid — clk-overid	6-28
Attendant Console (optional)	■ Feature Button Assignments — man-overid — clk-overid	5-35

- Time of Day Routing can only be used if AAR and ARS Partitioning and AAR or ARS are used. Also, it needs to be enabled on the System-Parameters Customer-Options form.

Detailed description

TOD Routing uses the Time of Day Plan Number assigned by the COR feature. A Time of Day Routing Plan can be administered for each of the 8 Time of Day Plan Numbers. When you make an AAR or ARS call, the call is routed according to the Time of Day Routing Plan associated with your Time of Day Plan Number.

After a call passes through AAR or ARS Digit Conversion (with no matching pattern found) and toll analysis allows the call, the Time of Day Plan Number of the calling party is used to make the choice of an associated Time of Day

Routing form. A PGN is identified and AAR or ARS Partitioning selects the specific partition of the AAR or ARS Digit Analysis form and determines how the call is routed.

When TOD Routing is enabled, it applies to all AAR or ARS outgoing calls: voice terminals, attendants, data terminals, remote access users, incoming tie trunks, ISDN-PRI trunks, and trunks used for call forwarding to external numbers.

Overriding the Time of Day Routing Plan

An attendant or a voice terminal user with console permission and a display can temporarily override the activating user's current routing plan. This can be accomplished by either of two methods:

- Immediate Manual Override
- Clocked Manual Override

Both types of override cannot be activated simultaneously. If either type is activated while the other is still in effect, the newly activated override goes into effect and the other override is automatically deactivated.

There is no indication via the management terminal that either type of override is activate. Also, since these overrides are temporary, they are not saved to translations.

Guidelines and examples

Assume the following:

- Jim is the user at extension 1234.
- Extension 1234 is assigned a COR of 2.
- COR 2 is assigned a Time of Day Plan Number of 3.
- The Time of Day Routing Plan table for Time of Day Plan Number 3 is administered as shown in [Screen 8-1](#).

When Jim comes into work on Monday morning at 8:30 and at that time makes an ARS call (dials the ARS access code followed by the number of the person he is calling), the system looks at the Time of Day Plan Number assigned to Jim's COR to determine which Time of Day Routing Plan table is used.

Since Jim has a COR of 2 and COR 2 has a Time of Day Plan Number of 3, the system uses Time of Day Routing Plan 3 to route the call.

According to Time of Day Routing Plan 3, all calls made between 8:00 a.m. and 12:00 p.m. route according to the ARS Digit Analysis Table associated with PGN 2. Therefore, these tables are used to find a route pattern for the call.

If Jim makes a call between 12:00 p.m. and 1:00 p.m. on Monday, the same Time of Day Routing Plan table (number 3) is used and the call is routed according to PGN 1. See [Screen 8-1](#).

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TIME OF DAY ROUTING PLAN 3

Act Time	PGN #	Act Time	PGN #	Act Time	PGN #	Act Time	PGN #	Act Time	PGN #	Act Time
Sun 00:01	1	__:	-	__:	-	__:	-	__:	-	__:
Mon 00:01	1	08:00	2	12:00	1	13:00	2	17:00	1	__:
Tue 00:01	1	08:00	2	12:00	1	13:00	2	17:00	1	__:
Wed 00:01	1	08:00	2	12:00	1	13:00	2	17:00	1	__:
Thu 00:01	1	08:00	2	12:00	1	13:00	2	17:00	1	__:
Fri 00:01	1	08:00	2	12:00	1	13:00	2	17:00	1	__:
Sat 00:01	1	__:	-	__:	-	__:	-	__:	-	__:

Screen 8-1. Time of Day Routing Plan

Interactions

- **Abbreviated Dialing**
For TOD Routing purposes, a user's own COR Time of Day Plan Number is used when accessing an Abbreviated Dialing privileged list. The call is processed the same as if the call had been dialed directly using AAR or ARS.
- **Attendant Extended Calls**
When an attendant extends a call and that call uses AAR or ARS to process the call, the call is routed according to the Time of Day Plan Number of the attendant's COR.
- **Authorization Codes**
If a user's FRL is changed using an Authorization Code, the COR FRL associated with the entered Authorization Code is used in route pattern selection.
- **AAR and ARS**
When Time of Day Routing is assigned, all AAR and ARS calls use the Time of Day Routing Plans for routing calls.
- **Bridged Call Appearance**
The COR Time of Day Plan Number of the primary extension applies to calls originated from a bridged call appearance of the primary extension.
- **Call Detail Recording**
Normal CDR records are generated. Information about the Time of Day Plan Number used to route the call is not provided.

- Call Forwarding

If you enable call forwarding and AAR or ARS routes an incoming call to the forwarded-to number, the COR Time of Day Plan Number of the caller is used to route the call.

- DCS

Care should be taken when making Time of Day Routing assignments in a DCS environment. Depending on a user's Time of Day Plan Number, a user may or may not be routed to a DCS trunk group. If a user is not routed to a DCS trunk group, feature transparency is lost.

When a call routes over a DCS trunk, the switch at the far end routes the call according to the COR Time of Day Plan Number of the incoming trunk.

- Individual Attendant Access

When an individual attendant access call is made, the individual attendant's COR Time of Day Plan Number is used for routing the call.

- Remote Access

When an AAR or ARS call is made via remote access, the COR Time of Day Plan Number of the barrier code and/or authorization code that was entered is used for routing the call.

- UDP

The caller's COR Time of Day Plan Number is used to route UDP calls.

This section contains the forms and associated instructions for implementing automatic routing. Included are:

- AAR and ARS Digit Analysis Table
- AAR and ARS Digit Conversion Table
- AAR and ARS Route Pattern form
- ARS Toll Table
- Remote Home Numbering Plan Area (RHNPA) Table
- Time of Day Routing Plan

AAR and ARS are implemented using similar forms. When fields and their definitions are the same, they are not repeated. When they are different, the difference is noted. Examples of both forms are provided.

⇒ NOTE:

For AAR administration, on the System-Parameters Customer-Options form, either the Private Networking or Uniform Dialing Plan option must be enabled.

For ARS administration, on the System-Parameters Customer-Options form, the Automatic Route Selection must be enabled as well as Time of Day Routing.

Automatic Routing Forms

AAR and ARS Digit Analysis Table

This form maps customer dialed strings to route patterns. When there is a Remote Home Numbering Plan Area (RHNPA) entry in `Rte Pat`, the RHNPA Table translates the next 3 digits.

If RHNPA translations are required for certain dialed strings, enter r1–r32 in the appropriate `Rte Pat` field on the AAR or ARS Digit Analysis Table. The RHNPA Table is used for translating 3-digit codes in the range 000–999. The RHNPA Table is used typically for the DDD of CO codes in a non-local NPA. For additional information, see [“RHNPA Table” on page 8-76](#).

Administration commands

Use the following commands to administer the AAR and ARS Digit Analysis Table form.

Action	Object	Qualifier¹
change	aar analysis ars analysis	Enter digits between 0 to 9, 'x' or 'X' (dialed string) ['part' 1-8] ['min'(1-MAX)]
display	aar analysis ars analysis	Enter digits between 0 to 9, 'x' or 'X' (dialed string) ['part' 1-8] ['min' (1-MAX)] ['print' or 'schedule']
list	aar analysis ars analysis	['start' string] ['count' 1-MAX] ['route'(1-MAX or r1-r32)], ['part' (1-8)], ['node' (1-MAX)], ['to-node' (1-MAX)], ['print' or 'schedule']
list	aar route-chosen ars route-chosen	Enter dialed number, ['partition' (1-8)], ['print' or 'schedule']

1. Some qualifiers are available with R5si and later configurations only. Brackets [] indicate the qualifier is optional. Single quotes (') indicate the text inside the quote must be entered exactly as shown or an abbreviated form of the word may be entered. MAX is the maximum number available in your system configuration.

- **Percent Full** — 3-character display-only field. Displays the percentage of the System’s memory resources that have been used. A common pool of memory resources is shared between the ARS and AAR Analysis tables.
If this field display indicates that the System memory resources are in jeopardy of becoming full (100%), perform any of the following to free-up memory resources:
 - Delete unnecessary entries from any of the shared resources tables
 - Use RHNPA Tables for 6-digit screening. Use ARS analysis to screen on the area code. Then use the RHNPA Table to finish the 6-digit screening in the office code.
 - Reduce `Dialed String` field entries to shortest possible length that accomplishes the desired function.
- **Partitioned Group Number** — Enter the PGN to be associated with this table. Valid entries are **1** (default) to **8**.
- **Dialed String** — Enter the dialed string of significant digits. Up to 18 ARS characters consisting of the digits **0** through **9** or ***** are allowed. Use a wildcard letter (**x** or **X**) to substitute for any digit occurring in the dialed string at the character position where used.

⇒ NOTE:

The user-dialed digits are matched to the `Dialed String` entry that most closely matches the dialed number (referred to as the longest match). For example, if a user dials 297-1234 and the AAR or ARS Analysis Table has dialed string entries of 297-1 and 297-123, the match is on the 297-123 entry. In addition, an exact match is made on dialed string entries of the same number of digits in cases where wildcard characters are used. For example, if 424 is dialed and the table has dialed string entries of 424 and X24, the match is on the 424 entry.

An example of dialed string entries and associated `Min` and `Max` entries is provided in the following table. RNXs 200 through 299 can be assigned on the AAR Analysis Table in the following ways:

Dialed String	Min. # of Digits	Max. # of Digits
2	7	7
	or	
20	7	7
21	7	7
22	7	7
...
29	7	7

- **Min** — Enter the minimum number of digits needed to validate and route the call. Default is blank.
- **Max** — Enter the maximum number of digits to collect, between **Min** and **28**. Default is blank.
- **Rte Pat** (Route Pattern) — Enter the route pattern number or a pointer to an associated Remote Home Number Plan Area (RHNP) form (**r1** to **r32**) to be used to route the call once all identifying digits have been received, **nod** to use node number routing, **n/a** to indicate that routing is not applicable to this PGN, **den** to block the call, or blank (default).
- **Call Type** (for AAR only) — Enter **aar** for regular AAR calls. Enter **intl**, or **pubu** if the administered route pattern contains preferences which are public network ISDN trunks requiring Type of Number (TON) encodings "international" or unknown respectively. Enter **lev0**, **lev1**, or **lev2** or leave blank (default) to specify Private Numbering Plan (PNP) number formats. See the ISDN Protocol Table below for the Numbering Plan Identifier (NPI) and Type of Numbering based on Call Type.

Call Type	Numbering Plan Identifier	Type of Numbering
aar	E.164(1)	national(2)
intl	E.164(1)	international(1)
pubu	E.164(1)	unknown(0)
lev0	PNP(9)	local(4)
lev1	PNP(9)	Regional Level 1(2)
lev2	PNP(9)	Regional Level 2(1)

- **Call Type** (for ARS only) — Valid call types are:

Call Type	Description	China # 1 Call Type
alrt	alerts attendant console for emergency	normal
emer	emergency call	normal
fnpa	10-digit North American Numbering Plan (NANP) call (11 digits with Prefix Digit "1")	attendant
hnpa	7-digit NANP call	normal
intl	public-network international number	toll-auto

Continued on next page

Call Type	Description	China # 1 Call Type
iop	international operator	attendant
locl	public-network local number	normal
lpvt	local private	normal
natl	non-NANP	normal
npvt	national private	normal
nsvc	national service	normal
op	operator	attendant
pubu	public-network number (E.164)-unknown	normal
svcl	national(2)	toll-auto
svct	national(2)	normal

- **Node Number** — The number of the destination node if node number routing or DCS are used.
- **ANI Rq** — Enter **y** if ANI is required on incoming R2-MFC or Russian MF ANI calls. Default is **n**. This field only applies if the *Request Incoming ANI (non-AAR/ARS)* field on the Multifrequency-Signaling-Related System Parameters form is **n**.

AAR and ARS Digit Analysis Default Translations

Table 8-13 lists the AAR and ARS Digit Analysis Default Translations.
Table 8-14 lists the ARS Digit Analysis Default Translations.

Table 8-13. AAR Digit Analysis Default Translations

Dialed String	Total Digits		Call Type
	Min.	Max.	
2	7	7	aar
3	7	7	aar
4	7	7	aar
5	7	7	aar
6	7	7	aar
7	7	7	aar
8	7	7	aar
9	7	7	aar

⇒ NOTE:

Any dialed digit-string not accounted for on the table is considered invalid and the call is routed to intercept. These default translations are used for call processing regardless of whether or not AAR or ARS has been optioned for on the switch.

The translations shown in [Table 8-14](#) appear only once in the switch's memory but are displayed in sorted order (including additions) on each of the 8 possible ARS Digit Analysis Tables.

⇒ NOTE:

For service outside of North America, these defaults should be deleted. You can delete the defaults by entering **change ARS analysis 0**. Then blank out all of the Dialed Strings with spaces.

Table 8-14. ARS Digit Analysis Default Translations

Dialed String	Total Digits		Route Pattern	Call Type
	Min.	Max.		
0	1	1	den	op
0	8	8	den	op
0	11	11	den	op
00	2	2	den	op
01	9	17	den	iop
011	10	18	den	intl
10XXX0	6	6	den	op
10XXX0	16	16	den	op
10XXX01	14	22	den	iop
10XXX011	15	23	den	intl
1XXX555	11	11	den	fnpa
1XXX976	11	11	den	fnpa
18000555	11	11	den	fnpa
1809	11	11	den	fnpa
1900555	11	11	den	fnpa
411	3	3	den	svc
555	7	7	den	hnpa
611	3	3	1	svc
811	3	3	1	svc
911	3	3	1	svc
976	7	7	den	hnpa
N	7	7	2	hnpa
1N00	11	11	den	fnpa

Continued on next page

Table 8-14. ARS Digit Analysis Default Translations
— *Continued*

Total Digits				
Dialed String	Min.	Max.	Route Pattern	Call Type
1NX	11	11	den	fnpa

Legend:

N - 2 through 9

X - any digit (0 - 9)

den - deny

fnpa - foreign number plan area (10-digit call)

hnpa - home number plan area (7-digit call)

intl - international

iop - international operator

op - operator

svc - service

AAR and ARS Digit Conversion Table

This form converts private-network numbers to other private-network or to public-network ARS numbers. It is essential for converting home AAR numbers into extension numbers. Using this table, you can:

- Steer some AAR calls to other switches in the private network
- Change the dialed string to a public-network number and route the call via the ARS feature
- Block or intercept certain private-network calls to the attendant group
- Route unauthorized public-network calls to an attendant or give them intercept tone

The form allows for the replacement of all or part of a dialed string with a modified string and/or change of analysis type. The modified string represents an alternative equivalent address and results in call analysis according to the network type. This table is accessed during call-processing.

Digit conversion enhances the capabilities of the AAR and ARS features so that outgoing public-network calls and private-network calls can be changed to local, private, or public network destinations. The calls are then analyzed by the UDP, AAR, or ARS features and routed according to the associated route patterns.

Administration commands

Use the following commands to administer the AAR and ARS Digit Conversion Table form.

Action	Object	Qualifier¹
change	aar digit-conversion ars digit-conversion	Enter digits between 0 to 9 'x' or 'X'
display	aar digit-conversion ars digit-conversion	Enter digits between 0 to 9 'x' or 'X' ['print' or 'schedule']
list	aar digit-conversion ars digit-conversion	Enter ['start' matching pattern]['count' (1-MAX)] ['print' or 'schedule']

1. Brackets [] indicate the qualifier is optional. Single quotes (' ') indicate the text inside the quote must be entered exactly as shown or an abbreviated form of the word may be entered. MAX is the maximum number available in your system configuration.

Form Instructions

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AAR DIGIT CONVERSION TABLE

Percent Full: ____

Matching Pattern	Min	Max	Del	Replacement String	Net	Conv	ANI	Req
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-

Screen 8-4. AAR Digit Conversion Table

Page 1 of 2

ARS DIGIT CONVERSION TABLE

Percent Full: ____

Matching Pattern	Min	Max	Del	Replacement String	Net	Conv	ANI	Req
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-
_____	__	__	__	_____	__	-		-

Screen 8-5. ARS Digit Conversion Table Form

⇒ NOTE:

When the form is accessed via a **display** or **change** command, the entries are sorted separately in the order of the matching pattern. Specific digits are sorted before the characters "*", "x," or "X."

- **Percent Full** — 3-character display-only field. Displays the percentage of the used system's memory resources. A common pool of memory resources is shared between the ARS and AAR Digit Conversion tables.

If this field indicates that the system memory resources are in jeopardy of becoming full (100%), perform any of the following to free-up memory resources:

- Delete unnecessary entries from any of the shared resources tables
- Use RHNPA Tables for 6-digit screening
- Reduce `Dialed String` entries to shortest possible length that accomplishes the desired function

- **Matching Pattern** — Enter a 1–18-digit string to be matched against a dialed number. Matching Pattern entries must be unique within the table. The string may contain the digits 0–9 or a * and wildcard characters "x" or "X." These are used to match any digit in the range of 0–9 or *. If a Prefix Digit is required for 10-digit DDD numbers, then the Prefix Digit "1" must be present in the Matching Pattern string for the match to succeed.

If the associated `Replacement String` has an entry, `Matching Pattern` must also have an entry.

- **Min** — The minimum number of digits in the dialed string
- **Max** — Enter the maximum number of digits to collect, between `Min` and **28**.
- **Del** — The number of digits to delete from the beginning of the dialed string
- **Replacement String** — Enter a 0–18-digit dialed string that replaces the deleted portion of the dialed number. The dialed string may contain the digits 0–9 or *, a "#" character, or be blank. The "#" character, when used, must be at the end of the digit-string and is used to indicate end-of-dialing.

⇒ NOTE:

A blank `Replacement String` has the effect of just deleting the leading digits from the dialed string. Because the "#" character in the `Replacement String` indicates the end-of-dialing, any digits dialed after the inserted portion of the string are ignored. Deletion of digits and blank replacements are used to crossover from ARS to AAR.

- **Net** — The network in which to analyze the resulting number. Enter **ext**, **aar**, or **ars**. The resulting digit-string is then analyzed as an extension number, an AAR address, or an ARS address respectively.
- **Conv** — Enter **y** or **n**. To allow further conversion enter **y**.
- **ANI Req** — Enter **y** if ANI is required on incoming R2-MFC or Russian MF ANI calls. Default is **n**. This field only applies if the `Request Incoming ANI (non-AAR/ARS)` field on the Multifrequency-Signaling-Related System Parameters form is **n**.

Route Pattern form

The digit translations performed by the AAR and ARS Digit Analysis and RHNPA Tables cause a specific route pattern to be selected for routing the call. The route pattern contains a sequence of trunk groups on which an attempt is made to route the call.

The Route Pattern form implements one route pattern. Each route pattern can contain alternate trunk groups. The maximum number of route patterns and alternate trunk groups allowed depends on the configuration and memory available in your system.

The route patterns specified on the Route Pattern form are used by the following features: AAR, ARS, GRS, and Call-by-Call Service Selection.

Before a call is routed, DEFINITY ECS checks the Facility Restriction Level (FRL) compatibility to ensure:

- Calling party's FRL is greater than or equal to the routing preference's FRL
- Calling party's BCC matches the BCC specified for the routing preference (ISDN calls only)
- Facility type is okay for the call type
- There is an unused circuit (trunk port) available in the selected trunk group

When all checks are complete and compatibility is ensured, digits are outpulsed over the selected trunk group member.

Administration commands

Use the following commands to administer the Route Pattern form

Action	Object	Qualifier ¹
change	route-pattern	1-MAX
display	route-pattern	1-MAX [print]
list	route-pattern	Enter ['trunk' (1-MAX)] ['service'/feature name string] ['print' or 'schedule']

1. Brackets [] indicate the qualifier is optional. Single quotes (') indicate the text inside the quote must be entered exactly as shown or an abbreviated form of the word may be entered. MAX is the maximum number available in your system configuration.

Form Instructions

```

change route-pattern 1                                     Page 1 of X
                                     Pattern Number: 1_

  Grp.  FRL NPA Pfx Hop Toll No. Del Inserted          IXC
  No.   Mrk Lmt List Digits  Digits
1:  ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___ user
2:  ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___ user
3:  ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___ user
4:  ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___ user
5:  ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___ user
6:  ___ - ___ - ___ - ___ - ___ - ___ - ___ - ___ user

  BCC VALUE  TSC CA-TSC  ITC  BCIE Service/Feature          Numbering
  0 1 2 3 4 W   Request  both ept  outwats-bnd  BAND:  ___  Format
1:  Y Y Y Y Y n   y none  rest          outwats-bnd  BAND:  ___  ___
2:  Y Y Y Y Y n   n      rest          ___          ___  ___
3:  Y Y Y Y Y n   n      rest          ___          ___  ___
4:  Y Y Y Y Y n   n      rest          ___          ___  ___
5:  Y Y Y Y Y n   n      rest          ___          ___  ___
6:  Y Y Y Y Y n   n      rest          ___          ___  ___

```

Screen 8-6. Route Pattern form (Page 1 of X)

Make assignments as required for the following fields on the form:

- **Pattern Number** — This is a display-only field when the form is accessed using an administration command such as **change** or **display**.
- **Grp No.** — Enter the desired trunk-group number to specify which trunk-group will be associated with the entries on this line of the form.
- **FRL** — Enter the FRL **0–7** to be assigned this routing preference (this line of parameters on the form). 0 is the least restrictive and 7 is the most restrictive. Trunk-group FRLs are changeable from pattern to pattern. The calling party's FRL must be greater than or equal to this FRL to access the associated trunk-group.

Valid entries are 0 to 7.

NOTE:

For system security reasons, Lucent recommends using the most restrictive FRL possible.

- **NPA** — This entry is not required for AAR. For ARS, enter the NPA of the distant-end (terminating endpoint). For WATS trunks, the NPA is the same as the home NPA unless the LEC wants 10 digits for local NPA calls. For tie trunks, the NPA field is left blank. Valid entries are 3-digits in the form: first digit (**2–9**), second digit (**0–9**), third digit (**0–9**). Default is blank.
- **Prefix Mark** — Not required for AAR. For ARS, enter a number from **0–4** or blank (default) as indicated below. This specifies whether the prefix digit 1 is outpulsed.

For a WAT -trunk, the Prefix Mark is the same as the local CO trunk. Prefix Mark operations only apply to FNPA or HNPA call types (ARS). For tie trunks, leave field this blank.

- 0 Indicates that the Prefix digit 1 is never outpulsed for 10-digit user-dialed FNPA calls, but leaves a user-dialed Prefix digit 1 for 7-digit HNPA calls. Prefix Mark 0 also leaves 1s on 10-digit calls that are not administered as FNPA- or HNPA-types.

 **NOTE:**

FNPA and HNPA are North American Numbering Plan terms.

- 1 Indicates that the Prefix digit 1 is outpulsed if and only if the call is a 10-digit call. Select Prefix Mark 1 for those HNPAs that require users to dial 1 to indicate a toll-call.
- 2 Indicates that the Prefix digit 1 is outpulsed for all toll calls, 7- and 10-digit. Prefix Mark 2 must refer to a Toll Table. See `Toll List` definition.
- 3 Indicates that the Prefix digit 1 is outpulsed for all toll-calls. These calls are always outpulsed as 10-digit numbers, even if they are within the HNPA. Prefix Mark 3 must refer to a Toll Table. See `Toll List` definition.
- 4 Indicates that the user-dialed Prefix digit 1 is always suppressed.

 **NOTE:**

This capability is required, for example, when routing ISDN calls to an Lucent Technologies 4ESS. If the prefix digit 1 were not suppressed, then the 4ESS would reject such calls.

- **Hop Lmt** — Controls the number of hops for each preference. A blank in this field indicates that there is no limit to the number of hops for this preference. Enter a number from **1–9** to limit the number of hops if using the tandem hop feature. Enter a number from **1–32** if using the transit feature. DEFINITY ECS blocks a hop equal to or greater than the number you enter.
- **Toll List** — Not required for AAR. For ARS, enter a number that references the ARS Toll Table associated with the terminating NPA of the trunk group. This field must be completed if `Prefix Mark` is **2** or **3**. Default is blank.
- **No. Del. Digits** — Enter the total number of digits to be deleted from the dialed string when selecting this trunk-group for call-routing. Default is blank.

Any nonblank entry in this field (including 0) causes any user-dialed IXC code to be deleted in addition to the number of digits specified.

**NOTE:**

Use 0 (zero) in this field to suppress user-dialed IXC codes. This capability is useful when the call is routed via ISDN trunks to a 4ESS office. The 4ESS will reject a call if the IXC code is sent along with the address digits.

- **Inserted Digits** — Enter the actual digits to be inserted. Up to 52 digits may be outputted. This includes 36 digits which you enter here plus up to 18-digits originally dialed. When they are used, special symbols count as two digits each. The special characters used in route patterns are described below.

Special Character	Description
*	digit * (See note below ¹ .)
#	digit # (See note below ¹ .)
,	1.5 second pause
+	Wait for dial tone up to the Off Premises Tone Detection Timer and then either output or intercept tone based on <i>Out Pulse Without Tone y/n</i> (Feature-Related System Parameters form). Outputted DTMF digits are sent at the rate specified by the End-to-End Signaling Tone and Pause parameters (Trunk Group Administrable Timers form).
%	Start End-to-End Signaling. Send digits as DTMF inband tones at the rate specified by the End-to-End Signaling tone and Pause parameters (Trunk Group Administrable Timers form).
!	Wait for dial tone without timeout and then output DTMF digits at the rate specified by the End-to-End Signaling Tone and Pause parameters (Trunk Group Administrable Timers form).
&	Wait for ANI (used for Russian pulse trunks to indicate where to wait for ANI prompt and send in-band ANI)

1. If the outgoing trunk is signaling type "mf," the signal administered as the "end-of-digit" in the Outgoing Group column of the System-Parameters Multifrequency-Signaling form is inserted, and not the "*" or the "#."

**NOTE:**

Do not use a comma "," (1.5 second pause) as the first character in the string unless absolutely necessary. Misuse of the character can result in calls, such as Abbreviated Dialing or Last Number Dialed, not completing to the far end.

When an asterisk "*" is translated in the route pattern and the signal "end-of-dial" is translated on the Multifrequency-Signaling form, the MFC tone for the "end-of-digits" is sent out to the CO in place of the asterisk "*."

- **IXC** — Displays when ISDN-PRI or ISDN-BRI Trunks are enabled on the System-Parameters Customer-Options form. For ISDN Preference trunks, enter the last two-to-four digits to represent an equal access inter-exchange carrier (IXC) code number (such as 10XX or 10XXX).

⇒ **NOTE:**

This length should match the format established on the IXC Codes form.

This field is used by all calls that route via an IXC, and is used also for Call Detail Recording (CDR). If an IXC is not specified, a call is transmitted by the presubscribed common carrier.

⇒ **NOTE:**

The IXC field must be **none** for non-ISDN trunk groups and for Bellcore NI-2 Operator Service Access. If you need to send an IXC code for a non-ISDN trunk group, then enter this IXC value in Inserted Digits.

- **BCC Value** (required by GRS feature) — Displays when ISDN-PRI or ISDN-BRI Trunks are enabled on the System-Parameters Customer-Options form. Enter **y** (default) or **n** in the appropriate BCC column (0, 1, 2, 3, 4, or W) to specify whether the BCC is valid for the associated route. The following defines the BCC values:

BCC Value	Description
0	Voice-Grade Data and Voice
1	56-kbps Data (Mode 1)
2	64-kbps Data (Mode 2)
3	64-kbps Data (Mode 3)
4	64-kbps Data (Mode 0)
W	128 to 1984-kbps Data (Wideband)

- **TSC** — Enter **y** to allow incoming Non-Call-Associated TSC requests to be tandemed out and to allow the establishment of Call-Associated TSCs associated with B-channel connections of that preference. To achieve feature transparency, DCS+ calls should be routed via a route pattern that has an ISDN-PRI Used for DCS trunk-group as a first preference.

- **CA-TSC Request** — Appears when TSC is **y**. A CA-TSC uses the call reference value of the call control data packets to exchange user-information messages associated with an ISDN B-channel connection. CA-TSCs are a finite system and trunk group resource. There is a trade-off between the two possible entries — a small time-lag with the first and usage generated by the second. Valid entries are:

as-needed	(Recommended for most situations.) CA-TSC is not established along with the B-channel call. If a CA-TSC is needed due to feature activation somewhere in the lifetime of this B-channel call, then the CA-TSC is established at that time and remains active for the duration of the call.
at-setup	Causes a CA-TSC to be established at the same time as the initial B-channel connection is established. In other words, a CA-TSC is set up for each and every B-channel call whether CA-TSC is ever needed .
none	Disallows the establishment of CA-TSCs associated with B-channel connections of the current preference (tandeming of NCA-TSC setup requests, however, are still permitted).

⇒ NOTE:

With **as-needed**, the need to establish the CA-TSC causes a slight delay in the invocation of the Call-Associated feature. This delay is not present with **at-setup** because the CA-TSC is established already at call-setup and is ready to be used immediately upon feature invocation.

- **ITC** (Information Transfer Capability) — Used to administer the type of traffic (restricted, unrestricted, or both) that is allowed to be carried by this routing preference. If entering **rest** (restricted), then only calls originating from restricted endpoints may access this route pattern. If entering **unre** (unrestricted), then only calls originating from unrestricted endpoints may access this route pattern. If entering **both**, then calls originating from both restricted and unrestricted endpoints may access the route pattern.

This field must be **unre** or **both** if BCC w is **y**.

- **BCIE** (Bearer Capability Information Element) — Used to determine how to create the ITC codepoint in the BCIE of the setup message. This field only applies to ISDN trunks and is displayed and administrable only if ITC is **both**. Valid entries are **ept** (endpoint) and **unr** (unrestricted). Default is **ept**.

- **Service/Feature** (required by the Call-by-Call Service Selection feature) — Displays when ISDN-PRI or ISDN-BRI Trunks is enabled on the System-Parameters Customer-Options form. Enter up to 15 characters that represent the Service/Feature carried by a call in this route pattern. Default is blank. Valid entries are:
 - accunet
 - i800
 - inwats
 - lds
 - mega800
 - megacom
 - multiquest
 - operator
 - outwats-bnd
 - sdn
 - sub-operator
 - wats-max-bnd
- **Band** (required by the Call-by-Call Service Selection feature) — Displays when ISDN-PRI or ISDN-BRI Trunks is enabled on the System-Parameters Customer-Options form. Enter a number that represents the OUTWATS band number. This field displays when Services/Features is **outwats-bnd**. The default is blank.
- **Numbering Format** — Displays when ISDN-PRI or ISDN-BRI Trunks is enabled on the System-Parameters Customer-Options form. This field specifies the format of the routing-number used for the trunk group administered for the preference. You can leave the field blank (default) or you can enter one of the following values from [Table 8-15](#) if the trunk group specified for preference is ISDN:

Table 8-15. Numbering Format Values

Route Pattern Format	Numbering Plan Identifier	Type of Numbering
blank	E.164(1)	1-MAX
natl-pub	E.164(1)	national(2)
intl-pub	E.164(1)	international(1)
locl-pub	E.164(1)	local/subscriber(4)

Continued on next page

Table 8-15. Numbering Format Values — Continued

Route Pattern Format	Numbering Plan Identifier	Type of Numbering
pub-unk	E.164(1)	unknown(0)
lev0-pvt	Private Numbering Plan - PNP(9)	local(4)
lev1-pvt	Private Numbering Plan - PNP(9)	Regional Level 1(2)
lev2-pvt	Private Numbering Plan - PNP(9)	Regional Level 2(1)
unk-unk	unknown(0)	unknown(0)

**NOTE:**

To access Bellcore NI-2 Operator Service Access, Inserted Digits must be **unk-unk**.

- **LAR** — Enter the routing-preference for Look Ahead Routing. The choices are described below.

LAR Value	DEFINITY ECS Actions
next	Go to the next routing-preference and attempt the call again
rehu	Rehunt within the current routing-preference for another trunk to attempt the call again
none	Look Ahead Routing is not enabled for the preference

Implementation Notes

The number of pages displayed depends upon the amount of system memory. Also, many of the fields only display under certain conditions. See field definitions for those conditions.

ARS Toll Table

This form assigns ARS Toll Tables used by Subnet Trunking. Use it to specify whether calls to CO codes listed on the table are toll or non-toll calls. You specify non-toll calls based on the last 2 digits of the distant-end of the trunk group.

Administration commands

Use the following commands to administer the ARS Toll Table form.

Action	Object	Qualifier ¹
change	ars toll	n:xxx (1-MAX:office code) n:xyy: n(1-MAX); ':' ;x(2-MAX;
display	ars toll	n:xxx (1-MAX:office code) ['print' or 'schedule']

1. Brackets [] indicate the qualifier is optional. Single quotes (' ') indicate the text inside the quote must be entered exactly as shown or an abbreviated form of the word may be entered. MAX is the maximum number available in your system configuration.

Form Instructions

ARS TOLL TABLE: Page 1 of 1

OFFICE CODES: x00-x99

00: y	10: y	20: y	30: y	40: y	50: y	60: y	70: y	80: y	90: y
01: y	11: y	21: y	31: y	41: y	51: y	61: y	71: y	81: y	91: y
02: y	12: y	22: y	32: y	42: y	52: y	62: y	72: y	82: y	92: y
03: y	13: y	23: y	33: y	43: y	53: y	63: y	73: y	83: y	93: y
04: y	14: y	24: y	34: y	44: y	54: y	64: y	74: y	84: y	94: y
05: y	15: y	25: y	35: y	45: y	55: y	65: y	75: y	85: y	95: y
06: y	16: y	26: y	36: y	46: y	56: y	66: y	76: y	86: y	96: y
07: y	17: y	27: y	37: y	47: y	57: y	67: y	77: y	87: y	97: y
08: y	18: y	28: y	38: y	48: y	58: y	68: y	78: y	88: y	98: y
09: y	19: y	29: y	39: y	49: y	59: y	69: y	79: y	89: y	99: y

Screen 8-7. ARS Toll Table

- **ARS TOLL TABLE** — Enter the ARS Toll Table number. Up to 8 forms may be required for each table, one for each 100-block, 2 to 9.
- **OFFICE CODES** — Enter a 100-block — 200–299 through 900–999. A separate form is required for each 100-block.
- **00:** through **99:** — Enter **n** beside each CO code to be designated as non-toll. These fields represent the last 2 digits of the codes within the 100-block. If no changes are made, the codes are implemented as toll-type codes (default).

RHNPA Table

The Remote Home Numbering Plan Area (RHNPA) Table assigns additional 3-digit screenings (for instance, on the prefix or nxx numbers) and associated route pattern numbers for up to 32 RHNPA Tables (r1–r32). One form is required for each 100-block of codes in the range 000–999. RHNPA Tables can be used with any call-type and a choice of up to 12 route patterns is provided for each 100-block of codes.

RHNPA Tables typically are used for the DDD prefixes.

The ARS Digit Analysis Table performs translations on the first 3 digits of the dialed string. The RHNPA Table performs translations on the next 3-digit dialed string.

Example

The `Rte Pat` fields on the ARS Digit Analysis Table are set to r1, r10 and r32. These point to the respective RHNPA Tables 1, 10, or 32. Therefore, the next 3 digits dialed represent a CO code in the FNPA. These digits are translated by the RHNPA Table and routed via the assigned route pattern to the CO.

The RHNPA Table can also be used for AAR analysis.

Administration commands

Use the following commands to administer the RHNPA Table form.

Action	Object	Qualifier ¹
change	rhnpa	Enter RHNPA and office code n:xyy n(1-MAX) x(0-MAX) y(0-MAX) y(0-MAX)
display	rhnpa	Enter RHNPA and office code n:xyy n(1-MAX) x(0-MAX) y(0-MAX) y(0-9) ['print' or 'schedule']

-
1. Brackets [] indicate the qualifier is optional. Single quotes (' ') indicate the text inside the quote must be entered exactly as shown or an abbreviated form of the word may be entered. MAX is the maximum number available in your system configuration.

Form Instructions

RHNPA TABLE: __	Page 1 of 1
CODE: x00 - x99	
Pattern Choices	
1: __ 3: __ 5: __ 7: __ 9: __ 11: __	
2: __ 4: __ 6: __ 8: __ 10: __ 12: __	
Code-Pattern Choice Assignments (from 1(en12 above)	
00: 1__ 10: 1__ 20: 1__ 30: 1__ 40: 1__ 50: 1__ 60: 1__ 70: 1__ 80: 1__ 90: 1__	
01: 1__ 11: 1__ 21: 1__ 31: 1__ 41: 1__ 51: 1__ 61: 1__ 71: 1__ 81: 1__ 91: 1__	
02: 1__ 12: 1__ 22: 1__ 32: 1__ 42: 1__ 52: 1__ 62: 1__ 72: 1__ 82: 1__ 92: 1__	
03: 1__ 13: 1__ 23: 1__ 33: 1__ 43: 1__ 53: 1__ 63: 1__ 73: 1__ 83: 1__ 93: 1__	
04: 1__ 14: 1__ 24: 1__ 34: 1__ 44: 1__ 54: 1__ 64: 1__ 74: 1__ 84: 1__ 94: 1__	
05: 1__ 15: 1__ 25: 1__ 35: 1__ 45: 1__ 55: 1__ 65: 1__ 75: 1__ 85: 1__ 95: 1__	
06: 1__ 16: 1__ 26: 1__ 36: 1__ 46: 1__ 56: 1__ 66: 1__ 76: 1__ 86: 1__ 96: 1__	
07: 1__ 17: 1__ 27: 1__ 37: 1__ 47: 1__ 57: 1__ 67: 1__ 77: 1__ 87: 1__ 97: 1__	
08: 1__ 18: 1__ 28: 1__ 38: 1__ 48: 1__ 58: 1__ 68: 1__ 78: 1__ 88: 1__ 98: 1__	
09: 1__ 19: 1__ 29: 1__ 39: 1__ 49: 1__ 59: 1__ 69: 1__ 79: 1__ 89: 1__ 99: 1__	

Screen 8-8. RHNPA Table (Page 1 of 1)

- **RHNPA TABLE** — Enter the applicable table number from **1–32**. Up to 8 forms may be required for each table, one for each 100-block, 2 to 9.
- **CODE** — Enter the desired 100-block; that is, 000 through 099, 100 through 199, 200 through 299,...800 through 899, 900 through 999. A separate form is required for each 100-block.
- **Pattern Choices** — Enter a pattern number representing the route patterns that can be accessed by the RHNPA's identified on this form. Each form on each RHNPA Table may have 12 different route patterns (Pattern Choices). A Pattern choice listed on one form automatically defaults to the other forms of the same RHNPA Table. If one pattern is used most often (that is, accessed by the greatest number of CO codes in this block), assign that as Pattern Choice 1. Otherwise, the correlation between Pattern Choice Numbers and route patterns is completely arbitrary.
- **Code-Pattern Choice Assignments (from 1-12 above)** — Enter a Pattern Choice number from the list above in the field associated with each CO Code. The Code fields represent the last 2-digits of the codes within the 100-block. This field points to the Pattern Choice above, which contains the route pattern to be used.

Time of Day Routing Plan

Use this form to assign Time of Day Routing Plans. Using this form, you can route AAR and ARS calls based on the time of day each call is made. Up to 8 Time of Day Routing Plans can be administered, each scheduled to change up to 6 times a day, for each day in the week.

The calling party's FRL must be greater than or equal to the FRL assigned in the route pattern. The route pattern is selected by matching on the Time of Day Routing Plan the PGN# with the Partitioned Group Number field on the AAR or ARS Digit Analysis Table. Then, the AAR or ARS Digit Analysis Table selects the route pattern.

⇒ NOTE:

The following optional features must be enabled on the System-Parameters Customer-Options form before this form can be administered: Automatic Route Selection (ARS) or Private Networking, AAR/ARS Partitioning, and Time of Day Routing.

Administration commands

Use the following commands to administer the Time of Day Routing Plan form.

Action	Object	Qualifier¹
display	time-of-day	['print' or 'schedule']
display	time-of-day	1-MAX (plan number) ['print' or 'schedule']
change	time-of-day	[time of day routing plan (1-MAX)]

-
1. Brackets [] indicate the qualifier is optional. Single quotes (' ') indicate the text inside the quote must be entered exactly as shown or an abbreviated form of the word may be entered. MAX is the maximum number available in your system configuration.

Form Instructions

TIME OF DAY ROUTING PLAN x												Page 1 of 1	
	Act	PGN											
	Time	#											
Sun	00:00	1	__:__	-	__:__	-	__:__	-	__:__	-	__:__	-	
Mon	00:00	1	__:__	-	__:__	-	__:__	-	__:__	-	__:__	-	
Tue	00:00	1	__:__	-	__:__	-	__:__	-	__:__	-	__:__	-	
Wed	00:00	1	__:__	-	__:__	-	__:__	-	__:__	-	__:__	-	
Thu	00:00	1	__:__	-	__:__	-	__:__	-	__:__	-	__:__	-	
Fri	00:00	1	__:__	-	__:__	-	__:__	-	__:__	-	__:__	-	
Sat	00:00	1	__:__	-	__:__	-	__:__	-	__:__	-	__:__	-	

Screen 8-9. Time Of Day Routing Form (Page 1 of 1)

- **Time of Day Routing Plan** — Specifies the TOD routing plan number. Up to 8 of these plans can be administered. This is a display-only field when the form is accessed using an administration command such as **add** or **change**.
- **Act Time** — Specifies the time of day the route pattern (identified by PGN #) is effective. The time is represented in military time (24:00 hours per day). List times for the same day in increasing order. Valid entries are **00:00–23:59**; default is **00:00**. There must be at least one entry for each day.
- **PGN #** — Enter a PGN that points to the appropriate AAR or ARS Digit Analysis Tables. The AAR or ARS Digit Analysis Tables should have the same PGN #. This is how you point to the route pattern that should be active for the activation time. There must be at least one entry for each day.

The AAR or ARS Digit Analysis Table selected and the route pattern used is based on the dialed string. Default is **1**.

⇒ NOTE:

It is possible to point to an AAR or ARS Digit Analysis Table associated with a PGN that has a different FRL than the FRL assigned to the caller's facility. Proceed with caution when making these assignments.

Before a call is routed, DEFINITY ECS checks to see that the Calling party's FRL is greater than or equal to the routing preference's FRL.

