



ATIS-1000109.2014

Exchange- Interexchange Carrier Interfaces – 950+XXXX
EC-to-IC Access Signaling Protocols

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ATIS-1000109.2014, *Exchange-Interexchange Carrier Interfaces – 950+XXXX EC-IC Access Signaling Protocols*

Is an American National Standard developed by the **Signaling, Architecture, and Control (SAC)** Subcommittee under the **ATIS Packet Technologies and Systems Committee (PTSC)**.

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American National Standard for Telecommunications

Exchange-Interexchange Carrier Interfaces – 950+XXXX EC-to-IC Access Signaling Protocols

Alliance for Telecommunications Industry Solutions

Approved June, 2014

American National Standards Institute, Inc.

Abstract

The purpose of this standard is to enable an exchange carrier (EC) entity and an interexchange carrier (IC), or consolidated carrier entity to provide interconnecting equipment that operates compatibly. This standard is one of a series of standards that gives individual-channel signaling protocol requirements for the interface located between a public switched EC network within an access area and an IC, INC, or consolidated carrier network.

Foreword

The information contained in this Foreword is not part of this American National Standard (ANS) and has not been processed in accordance with ANSI's requirements for an ANS. As such, this Foreword may contain material that has not been subjected to public review or a consensus process. In addition, it does not contain requirements necessary for conformance to the Standard.

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ANSI guidelines specify two categories of requirements: mandatory and recommendation. The mandatory requirements are designated by the word *shall* and recommendations by the word *should*. Where both a mandatory requirement and a recommendation are specified for the same criterion, the recommendation represents a goal currently identifiable as having distinct compatibility or performance advantages.

Suggestions for improvement of this document are welcome. They should be sent to the Alliance for Telecommunications Industry Solutions, PTSC, 1200 G Street NW, Suite 500, Washington, DC 20005.

At the time of consensus on this document, PTSC , which was responsible for its development, had the following leadership:

- M. Dolly, PTSC Chair (AT&T)
- V. Shaikh, PTSC Vice-Chair (ACS)
- M. Dolly, PTSC SAC Chair (AT&T)

The **SAC** Subcommittee was responsible for the development of this document.

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ATIS Standard on –

Exchange-Interchange Carrier Interfaces – 950+XXXX EC-to-IC Access Signaling Protocols

1 Scope, Purpose, & Application

1.1 Scope

This standard is one of a series of interface compatibility specifications prepared by the Services, Architecture, and Signaling Interfaces Subcommittee of Committee T1. The series provides technical requirements for the interfacing of cellular mobile carriers (CMCs), wireline exchange carriers (ECs), interexchange carriers (ICs), international carriers (INCs), and consolidated carriers in paired interface combinations.

This standard provides technical requirements for EC-to-IC calls using an Exchange-Interexchange (E-1) Interface that interconnects a switching system in the EC network with a switching system in the IC, INC, or consolidated carrier network. The interface is at a point of termination (POT) between the two switching systems.

Technical requirements for IC-to-EC calls are described in American National Standard for Telecommunications - Exchange-Interexchange Carrier Interfaces - Individual Channel Signaling Protocols, ANSI T1.104-1988.

In the remainder of this standard, unless otherwise noted, the term IC connotes IC, INC, or consolidated carrier.

This standard supersedes ATIS-1000109.1990(R2009), in which the carrier access code was specified as 950+WXXX where W = 0 or 1 and X = 0 to 9.

1.2 Purpose

The purpose of this standard is to enable separate entities to provide interconnecting equipment that will operate compatibly. Quantitative descriptions are provided in this standard of the specific characteristics of the interconnecting systems required to achieve this objective.

1.3 Application

1.3.1 Interface

This standard establishes the technical requirements of the interface that is located between a public switched EC network and an IC network that has the following characteristics:

- a) The connection between the POT and the first point of EO switching is on a trunk-signaling basis.
- b) The carrier access code is 950+XXXX, where X= 0 to 9.
- c) On EC-to-IC calls, the EC sends, when applicable, the carrier access code and calling line information to the IC at the times and in the order specified by the signaling protocol.

1.3.2 Compliance

Compliance with these requirements is intended to assure minimum acceptable compatibility, where compatible operation is the ability of an end user to establish, maintain, and disconnect a desired connection through the use of the two networks.

1.3.3 Interfaces

This standard does not specify all possible E-I interfaces. For example, this standard does not provide the technical requirements for E-1 interfaces with either of the following sets of characteristics:

- (1) An E-1 switched access interface using trunk-type signaling where the IC access code is 10XX:X: or any subsequent carrier access code using a larger than 3-digit carrier identification code to access the same interface.
- (2) An E-1 switched access interface using line-type signaling between the IC and the first point of EC switching.

This standard also does not specify E-1 interfaces such as common channel signaling, network management, and switched 56 kilobit per second digital interfaces, or exhaustive electrical signal and timing characteristics.

This standard does not include local interface specification exceptions that are mutually agreed to by the interfacing EO and IC in order to provide access with switching equipment that cannot practically be converted to conform with this standard.

1.3.4 Illustrative Calling User Dialing

This standard describes the E-I interface signaling sequence using illustrative calling user-to-EO dialing (Tables 1 and 2). Other EO calling user dialing sequences, and signaling sequences from other EO interfaces, may also produce the specified E-I interface signaling. The dialing sequences and EO handling of the dialed information are, therefore, only illustrations and are not complete descriptions of dialing plans or EO services. Furthermore, the inclusion of the calling user dialing in this standard does not standardize either the EO dialing plans or the services associated with EO call routing or handling of dialed information.

1.3.5 Illustrative Numeric Values

The assignment of specific numeric values to the codes within the various E-I interface signaling protocol fields is beyond the scope of this document. Some specific numeric codes are included in this document for illustrative purposes; however, no attempt has been made to include exhaustive lists.

2 Related Standards & Publications

The following standards and publications are for information only and are not essential for the completion of the requirements of this standard.

2.1 Related Standards

ATIS-1000104.1991(R2013), *Telecommunications - Exchange-Interexchange Carrier Interfaces - Individual Channel Signaling Protocols*.¹

ITU-T, *Recommendation E.163, Numbering Plan for International Telephone Service*. CCITT Blue Book, Vol II. Fascicle 11.2.²

ITU-T *Recommendation E.164, The International Public Telecommunication Numbering Plan*. CCITT Blue Book, Vol II. Fascicle 11.2.²

2.2 Related Publications

Bellcore, "Numbering Plan and Dialing Procedures". *Notes on the BOO Intra-LATA Networks* - 1986. Technical Reference TR-NPL-000275. Piscataway, New Jersey: Bellcore, 1986³

3 Definitions

The following definitions apply in this standard:

Access service area: A geographic area established for the provision and administration of telecommunications service. An access service area encompasses one or more exchanges, where an exchange is a unit of the telecommunications network consisting of the distribution facilities within the area served by one or more end offices, together with the associated facilities used in furnishing telecommunications service within the area. An exchange is established by the local exchange carrier and usually embraces a city, town, or village and its environs. Exchanges are grouped in access service areas to serve common social, economic, and other purposes.

ANI information digit: A 1-digit code preceding the billing number (ANI) in the information field that either provides information about the type of line originating the call or indicates special characteristics of the billing number.

Automatic number identification (ANI): ANI provides the billing number of the line or trunk that originated a call.

Carrier access code: The number sequence used to obtain access to the switched services of an IC. The carrier access code used with the interface specified in this standard is 950+XXXX, where XXXX is the 4-digit carrier identification code.

Carrier identification code: A 4-digit number that uniquely identifies each IC. A carrier identification code applies to an IC throughout the North American Numbering Plan area. Multiple carrier identification codes for each carrier are not precluded.

Consolidated carrier: A carrier authorized to provide telecommunications service both within and outside World Zone 1 using the North American Numbering Plan and the international dialing plan, respectively.

Disconnect-control office: The switching entity that performs disconnect timing and that decides when the connection is to be cleared. It is usually the calling end office; however, it may be another switching entity such as an office performing centralized automatic message accounting (CAN1A) or an operator services system.

¹ This document is available from the Alliance for Telecommunications Industry Solutions (ATIS), 1200 G Street N.W., Suite 500, Washington, DC 20005 < <https://www.atis.org/docstore/product.aspx?id=27976> >

² This document is available from the International Telecommunications Union. < <http://www.itu.int/ITU-T/> >

³ This document is available from Telcordia, at < <http://telecom-info.telcordia.com> >.

Disconnect signal. An on-hook signal indicating the connection is being cleared. It is initiated by the disconnect-control office (except under maintenance conditions) and is repeated through the trunks composing an established connection. The signal responding to a disconnect signal, but applied in the direction opposite to the direction of propagation of the disconnect signal, may also be considered a disconnect signal.

Disconnect timing: The timing of the period during which a hang-up signal is being received from the called end office and an off-hook signal is being received from the calling end office.

Dual Tone Multifrequency (DTMF) signaling: A set of sixteen signals consisting of tone bursts of two out of eight voice-band frequencies that transmit ten numeric and six control signals.

End Office (EO): An EO switching system that terminates station loops and connects the loops to each other and to trunks.

Exchange Carrier (EO): A carrier authorized to provide telecommunication services within one or more access service areas.

Glare: The simultaneous, or near- simultaneous, seizure of a two-way trunk at both ends. The unguarded interval between the seizure of the trunk at one end and the subsequent making busy of the trunk at the other end allows glare to occur.

Hang-up: End user placement of a telephone handset or other unit of telecommunications equipment in the quiescent state.

Hang-up signal: An on-hook signal sent from an end office toward the disconnect-control office indicating end user hang-up and requesting that the connection be disconnected. The interface remains dedicated to the call until the disconnect-control office responds to the hang-up signal.

Interexchange Carrier (IC): A carrier authorized to provide interexchange telecommunication services within World Zone 1 using the North American Numbering Plan (Bellcore TR-NPL-000275).

International Carrier (INC): A carrier authorized to provide telecommunications services outside World Zone 1 using the international dialing plan (OOITT Recommendations E.163 and E.164); such a carrier also has the option of providing service to World Zone 1 points outside the contiguous forty-eight United States.

Maintenance timing: The timing of the period during which a hang-up signal is being sent by a switching entity to the disconnect-control office before receiving a disconnect signal from the disconnect-control office.

Multifrequency (MF) pulsing: Tone bursts of two out of six voice-band frequencies that transmit ten numeric and five control signals.

Point of termination (POT): The point of demarcation between carriers that establishes the technical interface, test points, and division of operational responsibility.

4 E-I Interface

4.1 Description

4.1.1 Location

The interface is located in a trunk between an EO switching system and an IC switching system; hence, an E-I Interface provides IC access on a trunk-signaling basis to the EO switching system.

4.1.2 Characteristics

The interface has the following characteristics:

- (1) The carrier access code is 950+XXXX, where X = 0 to 9.

- (2) Individual-channel signaling is employed across the interface.
- (3) On EO-to-IC calls, an off-hook signal that is independent of called user answer is provided by the IC.

4.2 Interface Protocol

4.2.1 General

4.2.1.1 Signals

The following signals establish, maintain, and disconnect a connection through the interface:

1. Seizure
2. Winks
3. MF pulses
4. DTMF pulses
5. Dial pulses
6. Off-hook
7. Call progress information
8. Disconnect

4.2.1.2 Protocols

The set of rules that govern the sequence and separation in time of the signals is the signaling protocol. Since different protocols are needed to establish different types of connections, there are several signaling protocols. This standard specifies the following protocols:

I. 950+XXXX Access Signaling With ANI.⁴

The following are the prominent characteristics of the protocol:

- a) Carrier access code is 950+XXXX.
- b) EC forwards an access code field rather than an address field.
- c) EC forwards an identification field.
- d) Any required calling user-to-IC signaling is accomplished through the calling user-to-IC voiceband channel established by the EC.⁵

II. 950+XXXX Access Signaling Without ANI.

The following are the prominent characteristics of the protocol:

- a) Carrier access code is 950+XXXX.
- b) EC forwards an access code field rather than an address field.
- c) EC does not forward an identification field.
- d) Any required calling user-to-IC signaling is accomplished through the calling user-to-IC voiceband channel established by the EC.⁴

III. 950+XXXX Access Seizure-Only Signaling.

The following are the prominent characteristics of the protocol:

⁴ See Appendix A.

⁵ Dial pulse signaling might also be used for this purpose; see Appendix B.

- a) Carrier access code is 950+XXXX.
- b) EC does not forward an access code field.
- c) EC does not forward an identification field.
- d) Any required calling user-to-IC signaling is accomplished through the calling user-to-IC voiceband channel established by the EC.⁴

4.3 Protocol Combinations

No provision is included in the 950+XXXX Access protocols to distinguish one from another at the interface.

4.4 Conventions

4.4.1 Trunk Directionality

Trunk directionality refers to the way a trunk may be used in establishing a connection. A one-way trunk from A to B can only be used to extend a connection in the A-to-B direction. A two-way trunk between A and B can be used for A-to-B and B-to-A connections.

4.4.2 Notations Within Protocol Specifications

Table 1 gives the notation conventions used in this standard.

5 Protocols

5.1 950+XXXX Access Signaling With ANI

5.1.1 Basic Protocol

5.1.1.1 Description

This protocol uses a pulsing stream, generated by EC switching equipment, that consists of two fields of MF pulses. The first field contains all or a subset of the carrier access code (950+XXXX); this field is called the access code field. The second field contains an information digit and the calling user's ANI; this field is called the identification field. After these fields have been sent, the EC equipment provides a voiceband path between the calling user and the IC. Any additional information (e.g., the called number) needed by the IC to provide a service may be transmitted via this path (e.g., with DTJ1F signaling).

5.1.1.2 Nominal Signaling Sequence

The nominal EC-to-IC signaling sequence shall be as follows:

- (1) After receiving the carrier access code from the calling user, the EC shall initiate actions to seize a trunk to the IC.
- (2) The IC shall respond to the seizure with a wink-start signal when it is ready to receive pulsing.
- (3) Upon receipt of the wink-start signal from the IC, the EC shall output the access code field using MF pulsing.
- (4) When the IC has received the access code field, it shall respond with an off-hook signal.
- (5) The EC shall respond to this off-hook signal by outputting the identification field to the IC. After outputting the identification field, the EC shall cut through the voiceband channel from the calling

user to the IC. The IC should not attempt to use the connection to transmit a dial tone or other voiceband communication to the calling user until after receiving the identification field.⁶

- (6) Call progress tones, if required, shall be provided by the IC. Called user answer shall not generate any supervisory signaling from the IC to the originating EC.
- (7) Depending on whether the EC or the IC initiates call clearing, one of the following two sequences shall occur:
 - a) If the EC is the first to be finished with the call (e.g., because of calling user hang-up), the following shall occur:
 - i. The EC shall terminate use of the talking path through the interface, should clear the EC connection, and shall send an EC disconnect signal (on-hook) to the IC.
 - ii. When the IC detects the EC disconnect signal, the IC shall send the IC disconnect signal (on-hook) to the EC and should clear the IC connection.
 - b) If the IC is the first to be finished with the call (e.g., because of called user hang-up), the following shall occur:
 - i. The IC shall send a hang-up signal (on-hook) to the EC. The interface shall remain dedicated to the call, but the IC may interrupt the talking path through the interface to the EC.
 - ii. When the EC receives the IC hang-up signal and determines that disconnect should occur (e.g., when the disconnect-control office either receives the calling user hang-up signal or the EC disconnect timing interval expires), the EC (a) shall send the EC disconnect signal (on-hook) to the IC; (b) shall terminate use of the interface for the call; and (c) should clear the EC connection.

5.1.2 Distinguishing Characteristics

The following are the distinguishing characteristics of the 950+X::X:XX Access Signaling With ANI protocol determined from comparing the signaling protocols in Section 5 of this standard:

- (1) The call seizure signal is sent from the EC to the IC.
- (2) An identification field is always sent by the EC to the IC.

5.1.3 Specific Example

A specific example of a call using this protocol is shown in Figure 1.

5.1.4 Variations

The variations discussed below are illustrated in Table 2.

5.1.4.1 Access Code Field

The 0-7D in the access code field shall be the carrier access code (950+X::X:XX) or a subset thereof. When fewer than seven digits are transmitted, digits shall be deleted from left to right.

⁶ The IC, using the voiceband communication path through the EC network to the calling user, can then prompt the calling user (e.g., via a second dial tone) for information (e.g., the called number) needed to provide service. The calling user likewise can use voiceband communications (e.g., DTMF signaling) to respond to these prompts.

5.1.4.2 Identification Field

The identification field shall be KP+I+0/7D+ST, where I is the ANI information digit. Example assignments of codes for the information digit are given in Table 3. Whether 0 or 7 digits are sent depends on whether ANI information is available, and is indicated by the I digit.

5.1.5 Time Limits

5.1.5.1 Wink-Start Signal

The IC shall return the wink-start signal within 3.5 seconds of the trunk seizure.

5.1.5.2 Wink-Start Guard

The end of the wink-start signal shall not occur before 210 milliseconds after receipt of the incoming seizure signal. The IC shall be prepared to receive MF pulses 35 milliseconds after the end of the wink-start signal. The EC shall begin MF pulsing no sooner than 50 milliseconds after the end of the wink-start signal.

5.1.5.3 Off-Hook Signal

The IC shall send the off-hook signal no sooner than 100 milliseconds and no later than 3.5 seconds after the IC has received the access code field.

5.1.5.4 Disconnect Timing Interval

After receiving the IC hang-up signal, the EC disconnect-control office shall initiate a disconnect timing interval that shall be between 10 and 12 seconds in length.

5.1.5.5 Maintenance Timing Interval

After sending the IC hang-up signal in an IC- initiated call-clearing sequence, the IC may initiate a maintenance timing interval that shall be a minimum of 30 seconds.

5.1.5.6 Trunk Guard Interval

On IC-initiated call-clearing sequences, the EC shall not send a new interface seizure signal for a minimum of 750 milliseconds after the EC sends the EC disconnect signal (on-hook). On EO-initiated call-clearing sequences, the EC shall not send a new interface seizure signal for a minimum of 750 milliseconds after the EC disconnect signal (on hook). On an EO-initiated call-clearing sequence on a two-way trunk, the IC shall not send a new interface seizure signal for a minimum of 750 milliseconds after the IC returns the IC disconnect signal (on-hook).

5.1.6 Incomplete Calls and Irregularities

5.1.6.1 Time Out

If a time out occurs while the EC is waiting for the wink-start signal or the off-hook signal from the IC, the EC shall release the trunk to the IC and return an announcement or tone to the calling user.

5.1.6.2 Invalid Code

If the IC detects an invalid code in the access code or identification field, the IC may return an announcement or tone to the calling user. After the access code field is received, the IC shall send the off-hook signal before returning an announcement or tone.

5.1.6.3 All Trunks Busy

If a trunk from the EC to the IC cannot be seized because all trunks to the IC are busy, the EC shall return an announcement or tone to the calling user.

5.1.6.4 Glare

With wink-start operation, a switching system expects another switching system to respond to a seizure by returning an off-hook wink signal. If the returned off-hook signal on a two-way trunk lasts beyond 350 milliseconds, a glare condition shall be interpreted.

The glare convention applicable at the E-I interface shall be that IC-to-EC calls are given preference over EC-to-IC calls. IC-to-EC calls are given preference because they have usually traversed another exchange network plus the IC's network and are nearing completion.

When the EC detects glare, the EC shall abandon the request and retry the call on another trunk. When the IC detects glare, the IC shall wait for the incoming off-hook to change to on-hook; it shall then proceed with the call protocol in the normal manner.

5.2 950+XXX:X Access Signaling Without ANI

5.2.1 Basic Protocol

5.2.1.1 Description

This protocol uses a pulsing stream, generated by EC switching equipment, that consists of one field of MF pulses. This field contains all or a subset of the carrier access code (950+XXXX), and is called the access code field. After this field has been sent, the EC equipment provides a voiceband path between the calling user and the IC. Any additional information (e.g., the called number) needed by the IC to provide a service may be transmitted via this path (e.g., with DTMF signaling).

5.2.1.2 Nominal Signaling Sequence

The nominal EC-to-IC signaling sequence shall be as follows:

- (1) After receiving the carrier access code from the calling user, the EC shall initiate actions to seize a trunk to the IC.
- (2) The IC shall respond to the seizure with a wink-start signal when it is ready to receive pulsing.
- (3) Upon receipt of the wink-start signal from the IC, the EC shall output the access code field using MF pulsing.
- (4) When the IC has received the access code field, it shall respond with an off-hook signal. The IC should not attempt to use the connection to transmit a dial tone or other voiceband communications to the calling user until after sending this off-hook signal.

- (5) The EC shall respond to this off-hook signal by cutting through the voiceband channel from the calling user to the IC.⁷
- (6) Call progress tones, if required, shall be provided by the IC. Called user answer shall not generate any supervisory signaling from the IC to the originating EC.
- (7) Depending on whether the EC or the IC initiates call clearing, one of the following two sequences shall occur:
 - a) If the EC is the first to be finished with the call (e.g., because of calling user hang-up), the following shall occur:
 - i. The EC shall terminate use of the talking path through the interface, should clear the EC connection, and shall send an EC disconnect signal (on-hook) to the IC.
 - ii. When the IC detects the EC disconnect signal, the IC shall send the IC disconnect signal (on-hook) to the EC and should clear the IC connection.
 - b) If the IC is the first to be finished with the call (e.g., because of called user hang-up), the following shall occur:
 - i. The IC shall send a hang-up signal (on-hook) to the EC. The interface shall remain dedicated to the call, but the IC may interrupt the talking path through the interface to the EC.
 - ii. When the EC receives the IC hang-up signal and determines that disconnect should occur (e.g., when the disconnect-control office either receives the calling user hang-up signal or the EC disconnect timing interval expires), the EC (a) shall send the EC disconnect signal (on-hook) to the IC; (b) shall terminate use of the interface for the call; and (c) should clear the EO connection.

5.2.2 Distinguishing Characteristics

The following are the distinguishing characteristics of the 950+XXXX Access Signaling Without ANI protocol determined from comparing the signaling protocols in Section 5 of this standard:

- (1) The call seizure signal is sent from the EO to the IC.
- (2) An identification field is not sent by the EO to the IC.

5.2.3 Specific Example

A specific example of a call using this protocol is shown in Figure 2.

5.2.4 Variations to the Access Code Field

Same as the corresponding subsection in the 950+XXXX Access Signaling With ANI protocol.

5.2.5 Time Limits

5.2.5.1 Wink-Start Signal

Same as the corresponding subsection in the 950+XXXX Access Signaling With ANI protocol.

⁷ The IC, using the voiceband communication path through the EC network to the calling user, can then prompt the calling user (e.g., via a second dial tone) for information (e.g., the called number) needed to provide service. The calling user likewise can use voiceband communications (e.g., DTMF signaling) to respond to these prompts.

5.2.5.2 Wink-Start Guard

Same as the corresponding subsection in the 950+XXXX Access Signaling With ANI protocol.

5.2.5.3 Off-Hook Signal

Same as the corresponding subsection in the 950+XXXX Access Signaling With ANI protocol.

5.2.5.4 Disconnect Timing Interval

Same as the corresponding subsection in the 950+XXXX Access Signaling With ANI protocol.

5.2.5.5 Maintenance Timing Interval

Same as the corresponding subsection in the 950+XXXX Access Signaling With ANI protocol.

5.2.5.6 Trunk Guard Interval

Same as the corresponding subsection in the 950+XXXX Access Signaling With ANI protocol.

5.2.6 Incomplete Calls and Irregularities

5.2.6.1 Time Out

Same as the corresponding subsection in the 950+XXXX Access Signaling With ANI protocol.

5.2.6.2 Invalid Code

If the IC detects an invalid code in the access code field, the IC may return an announcement or tone to the calling user. After the access code field is received, the IC shall send the off-hook signal before returning an announcement or tone.

5.2.6.3 All Trunks Busy

Same as the corresponding subsection in the 950+XXXX Access Signaling With ANI protocol.

5.2.6.4 Glare

Same as the corresponding subsection in the 950+XXXX Access Signaling With ANI protocol.

5.3 950+XXXX Access Seizure-Only Signaling

5.3.1 Basic Protocol

5.3.1.1 Description

This protocol includes no pulsing streams generated by EO switching equipment (see Table 2). Instead, the EO switch seizes a trunk to the IC after the call is initiated by the calling end user. The IC responds with a wink and an off-hook signal. After this off-hook has been received, the EO equipment provides a voiceband path between the calling user and the IC.

Any additional information (e.g., the called number) needed by the IC to provide a service may be transmitted via this path (e.g., with DTMF signaling).

5.3.1.2 Nominal Signaling Sequence

The nominal EC-to-IC signaling sequence shall be as follows:

- (1) After receiving the carrier access code from the calling user, the EO shall initiate actions to seize a trunk to the IC.
- (2) The IC shall respond to the seizure with a wink-start signal.
- (3) After the IC has sent this wink-start signal, it shall send an off-hook signal. The IC should not attempt to use the connection to transmit a dial tone or other voiceband communications to the calling user until after sending this off-hook signal.
- (4) The EO shall respond to this off-hook signal by cutting through the voiceband channel from the calling user to the IC.⁸
- (5) Call progress tones, if required, shall be provided by the IC. Called user answer shall not generate any supervisory signaling from the IC to the originating EO.
- (6) Depending on whether the EO or the IC initiates call clearing, one of the following two sequences shall occur:
 - a) If the EO is the first to be finished with the call (e.g., because of calling user hang-up), the following shall occur:
 - i. The EO shall terminate use of the talking path through the interface, should clear the EO connection, and shall send an EO disconnect signal (on-hook) to the IC.
 - ii. When the IC detects the EO disconnect signal, the IC shall send the IC disconnect signal (on-hook) to the EC and should clear the IC connection.
 - b) If the IC is the first to be finished with the call (e.g., because of called user hang-up), the following shall occur:
 - i. The IC shall send a hang-up signal (on-hook) to the EC. The interface shall remain dedicated to the call, but the IC may interrupt the talking path through the interface to the EC.
 - ii. When the EC receives the IC hang-up signal and determines that disconnect should occur (e.g., when the disconnect-control office either receives the calling user hang-up signal or the EC disconnect timing interval expires), the EC (a) shall send the EC disconnect signal (on-hook) to the IC; (b) shall terminate use of the interface for the call; and (c) should clear the EC connection.

5.3.2 Distinguishing Characteristics

The following are the distinguishing characteristics of the 950+:XXX:X: Access Seizure-Only Signaling protocol determined from comparing the signaling protocols in Section 5 of this standard:

- (1) The call seizure signal is sent from the EC to the IC.
- (2) An identification field is not sent by the EC to the IC.
- (3) The protocol should not appear on a trunk group with any other EC-to-IC protocol; that is, it should only appear on the following types of trunks:
 - a) EC-to-IC trunks dedicated to the 950+:XXX:X: Access Seizure-Only Signaling protocol.

⁸ The IC, using the voiceband communication path through the EC network to the calling user, can then prompt the calling user (e.g., via a second dial tone) for information (e.g., the called number) needed to provide service. The calling user likewise can use voice band communications (e.g., DTMF signaling) to respond to these prompts.

- b) Two-way trunks on which the 950+:XXX:X: Access Seizure-Only Signaling protocol is the only EC-to-IC protocol allowed.

5.3.3 Specific Example

A specific example of a call using this protocol is shown in Figure 3.

5.3.4 Variations

None.

5.3.5 Time Limits

5.3.5.1 Wink-Start Signal

Same as the corresponding subsection in the 950+:XXX:X: Access Signaling With ANI protocol.

5.3.5.2 Wink-Start Guard

The end of the wink-start signal shall occur no sooner than 210 milliseconds after receipt of the incoming seizure signal.

5.3.5.3 Off-Hook Signal

The IC shall send the off-hook signal no sooner than 250 milliseconds and no later than 3.5 seconds after completing the wink-start signal.

5.3.5.4 Disconnect Timing Interval

Same as the corresponding subsection in the 950+:XXX:X: Access Signaling With ANI protocol.

5.3.5.5 Maintenance Timing Interval

Same as the corresponding subsection in the 950+XXXX Access Signaling With ANI protocol.

5.3.5.6 Trunk Guard Interval

Same as the corresponding subsection in the 950+:XXX:X: Access Signaling With ANI protocol.

5.3.6 Incomplete Calls and Irregularities

5.3.6.1 Time Out

Same as the corresponding subsection in the 950+:XXX:X: Access Signaling With ANI protocol.

5.3.6.2 All Trunks Busy

Same as the corresponding subsection in the 950+:XXX:X: Access Signaling With ANI protocol.

5.3.6.3 Glare

Same as the corresponding subsection in the 950+:XXX:X: Access Signaling With ANI protocol.

Table 1: Notation Conventions for Address and Identification Field Contents

Notation	Name	Description of Contents
Symbols		
D	Digit(s)	Each digit 0 to 9.
KP	Key Pulse	Start of field signal.
ST	Start Pulse	End of field signal.
+	Field separator	Not transmitted.
()	Variable inclusion	Contents may not be required.
Digits		
0 to 9	Digit	Number 0 to 9 as given.
X	Digit	Any number 0 to 9.
0/7D	Number of digits	0 or 7 digits.
0-7D	Number of digits	0 to 7 digits.
Codes		
ANI	Automatic Number Identification	7 digits.
I	ANI information digit	1 digit.
950+XXXX	Carrier Access Code	7 digits, last 4 each 0 to 9; XXXX is carrier identification code.

Table 2: 950+XXXX Access Signaling Protocols

Protocol	Example Customer Dialing*	MF Pulse Field	
		Access	Identification
With ANI	(I)+950+XXXX	KP+0-7D+ST	KP+I+0/7D+ST
Without ANI	(I)+950+XXXX	KP+0-7D+ST	----
Seizure-only	(I)+950+XXXX	----	----

*Depending on local practice, the calling user may or may not be allowed or required to dial "1" before dialing a 950+XXXX access code.

Table 3: Example Assignments of ANI Information (I) Digit

Code	Description
0	Identified line – no special treatment.
1	ONI (multiparty).
2	Hotel/motel.
3	Coinless (hospital, inmate, etc.).

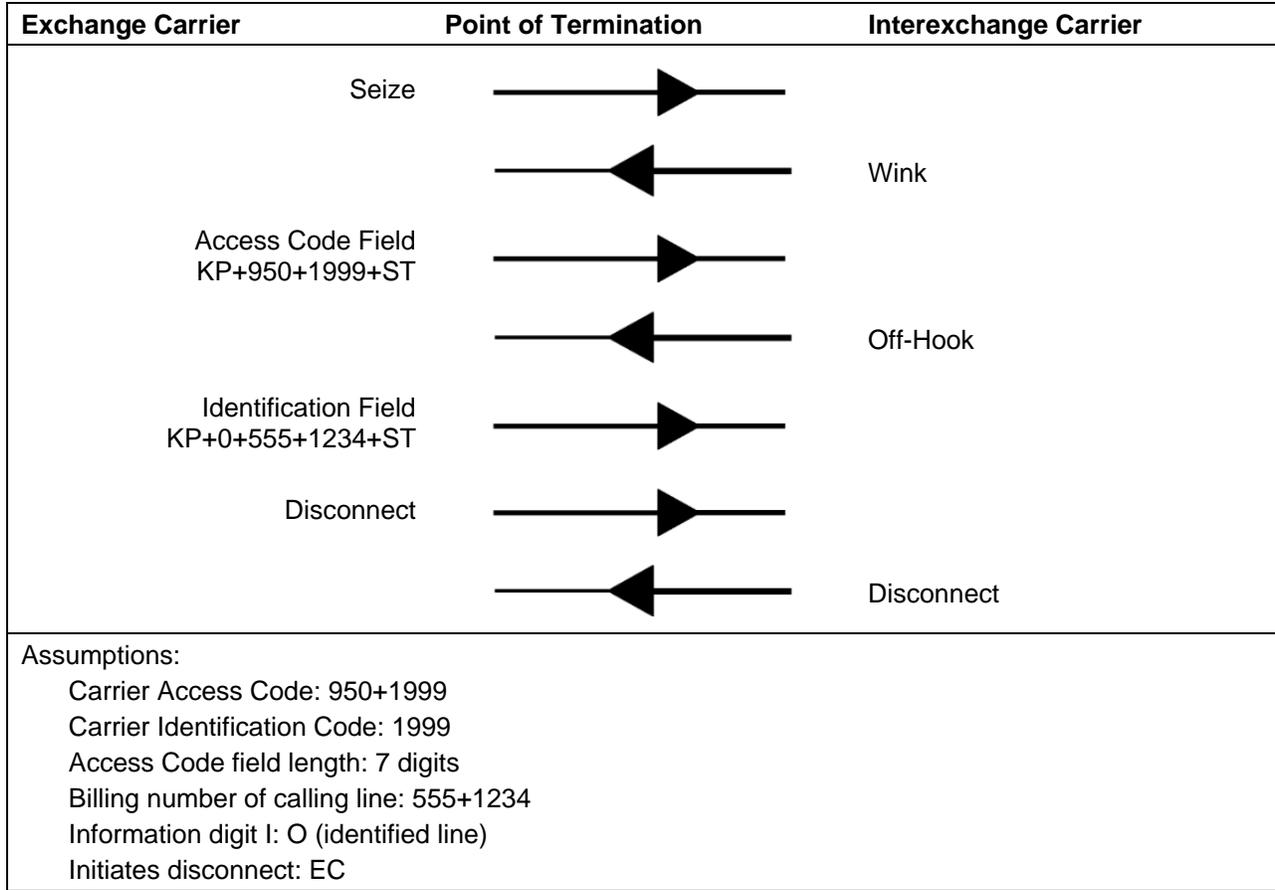
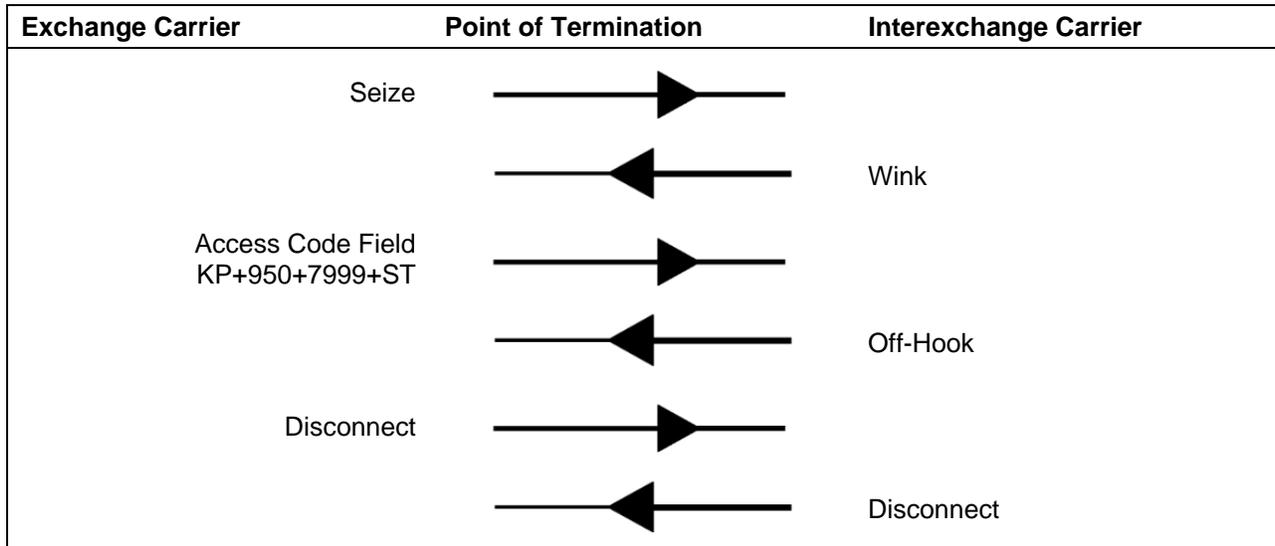


Figure 1: 950+XXXX Access With ANI Call to IC



Exchange Carrier	Point of Termination	Interexchange Carrier
Assumptions: Carrier Access Code: 950+7999 Carrier Identification Code: 7999 Access Code field length: 7 digits Initiates disconnect: EC		

Figure 2: 950+XXXX Access With ANI Call to IC

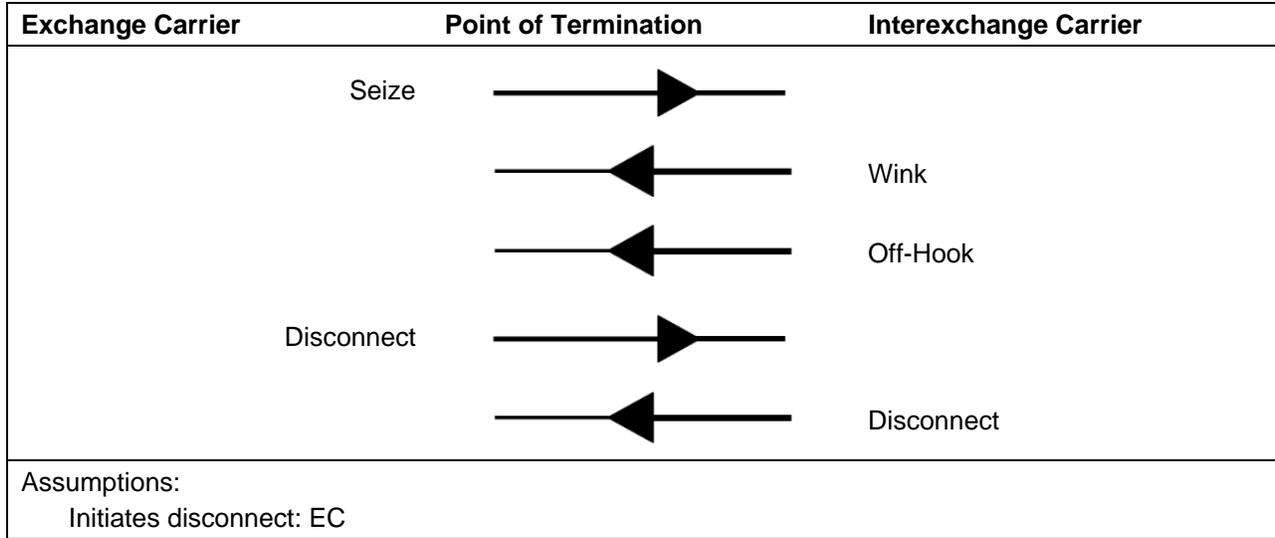


Figure 3: 950+XXXX Access Seizure-Only Call to IC

Appendix A: Provision of 950+xxxx: Access Signaling With ANI Protocol

(informative)

In some locations, 950+XX:X:X: Access Signaling With ANI may be possible only on direct trunk groups from EO end offices to an IC POT.

Appendix B: Post-Access Dial Pulse Signaling Arrangements

(informative)

B.1 Calling User-to-IC Dial Pulse Signaling

From certain EO end offices, and after establishment of the access connection, additional digits can be transmitted to the IC from dial pulse station equipment through the use of dial pulse repeating equipment in the end office. This arrangement is possible only on direct trunks to the IC from suitably equipped end offices.

With this dial pulse signaling arrangement, MF pulsing will still be used to pass the access code field and the identification field (if provided). After the final ST signal has been received from the EO, the IC can prompt the calling user, via the voiceband connection, to dial the destination digits (or other information). The IC will receive these dialed digits as dial pulses.

B.2 Disabling Tone-to-Pulse Converters

Some calling users using DTMF equipment are served by step-by-step (SXS) end offices that use tone-to-pulse converters. These calling users may experience a compatibility problem when accessing an 10 via the 950+XXXX Access Signaling With ANI, the 950+XXXX Access Signaling Without ANI, or the 950+XXXX Access Seizure-Only protocols, since the tone-to-pulse converter may distort the information or signals that the calling user supplies to the 10 after the access connection is established.

Most tone-to-pulse converters currently in use can be disabled by applying the DTMF "#" (number sign) character, which is a combination of a 941-Hz tone and a 1477-Hz tone. Thus, to disable the converters, the IC should do one of the following:

- (1) Provide a burst of DTMF "#" tone before prompting the calling user to dial additional DTMF digits.
- (2) Instruct the calling user to dial a "#" sign immediately after dialing the carrier access code (i.e., to dial 950+XXXX#) in such instances.

If a DTMF "#" signal is sent to disable tone-to-pulse converters, the duration of this signal should be at least 60 milliseconds.