ATTACHMENT IV

IC REPORTS

Need for Information on the Transmission of CIC in SS7 Call Setup Messages

Attachment V

Attachment I (cont'd.)

IC REPORTS ON THE NEED FOR INFORMATION ON THE TRANSMISSION OF CIC IN SS7 CALL SETUP MESSAGES

COMPANY	RESPONSE
Alascom	No comment
AT&T	Presently, different types of interLATA traffic and/or services distinguished by unique CICs require the use of separate access trunk groups - - one for each CIC - - when that traffic is transmitted to the IC. The transmission of the CIC to the IC as part of the SS7 Call Setup signaling messages on domestic calls will allow such traffic to be forwarded to the IC on a single trunk group, thereby making better, more efficient use of the access network.
MCI	Yes, permits combination of multiple CICs on single efficient trunk group.
Metromedia-ITT	Metromedia-ITT has the need for the CIC to continue and to expand the practice of directing multiple CICs to a single access group rather than maintaining a separate group for each CIC.
US Sprint	US Sprint plans to utilize CIC information provided in the SS7 call setup message and is prepared to accept this information. The transmission of CIC information allows consolidation of multiple trunk groups, each carrying a single CIC code's traffic, into one trunk group.
Vyvx Telecom, Inc.	Vyvx Telecom needs the CIC in the ISUP message to allow network efficiencies gained by multiple CICs on a single trunk group, and other applications.

ATTACHMENT V

ICIC

INTEREXCHANGE CARRIERS
INDUSTRY COMMITTEE

Access Requirement
AR-ICIC-101
Issue 1, January
1991

SIGNALING SYSTEM NO. 7 (SS7) ACCESS INTERFACE REQUIREMENTS

ACCESS REQUIREMENTS

ICIC

ICIC

INTEREXCHANGE CARRIERS
INDUSTRY COMMITTEE

Access Requirement
AR-ICIC-101
Issue 1, January
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SIGNALING SYSTEM NO. 7 (SS7)
ACCESS INTERFACE REQUIREMENTS

AR-ICIC-101
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The ICIC is a trade association comprised of interLATA voice and data messaging carriers.

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1. INTRODUCTION

1.1 Purpose

This document conveys the requirements necessary for the transmission (or delivery) of the Carrier Identification Code (CIC) parameter. The CIC parameter is intended to be provided in the delivery of basic internetwork call signalling that occurs between a Local Exchange Carrier (LEC) network when interconnected to an Interexchange Carrier (IC) network. Further, these requirements describe call control using the Signalling System No. 7 (SS7) protocol.

The CIC information is to be carried as a parameter within an SS7 Initial Address Message (IAM). As defined by ANSI (American National Standard Institute), the CIC parameter[1] provides "information sent in the forward direction to the transit network indicating the transit network selected by the originating subscriber."[2] The CIC parameter is to be delivered to the IC on Feature Group D (FG-D), SS7 supported originating call attempts.

.2 Scope of the Document

The scope of this document is to define, specify and modify those features and capabilities which:

1. are not specified elsewhere in other documents such as Bell Operating Company (BOC)/Bellcore requirements documents (e.g., TR-NPL-000905, Issue 1); or

2. are specified elsewhere in a manner inconsistent with the requirements of the IC industry.

This document is further used to notify access providers of features and capabilities which are desired by the ICs and may require development in the access provider's networks.

It is the expectation of the IC industry that those features and capabilities which require standards development should be incorporated in LEC requirements documents prior to final approval of the proposed standards documents. Specifically, SS7

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[1]The CIC code parameter is described in the ANSI, ISDN User Part protocol specification, T1S1/LB90-02, the Letter Ballot version of ANSI T1.113, Issue 2.

[2]As per T1.113.2 section 2.22A

protocol should be considered ready for inclusion in LEC requirements once T1S1 working groups reach consensus on a capability, the coding has moved to the "maturing" classification, and no contributions have been brought to standards against the stable text.

1.3 SS7 Interface Overview

These features of (IC) network switching elements provide the IC with SS7 capability and connectivity to LEC switching systems. Specifically, the ability to exchange signalling messages for setting up and "tearing down"[3] call connections for circuits between switching entities and for calls taking place between interconnecting LEC and IC networks is specified.

For the purposes of this document, the requirements contained herein and provided by these features are intended for all local exchange providers utilizing SS7 interconnection with the IC; including BOCs and Independent Exchange Carriers (IECs).

The capabilities described herein are intended to be a complement of the SS7 Integrated Services Digital Network (ISDN) User Part (ISUP) standard published by ANSI.[4] These procedures use the output of the T1S1 Technical Subcommittee, especially the T1S1.3 Working Group, to further document the use of certain ISUP network protocol capabilities and to provide detail as to how they should be used.

The focus of this document is to specify those capabilities, not currently described elsewhere, required by the IC network provider to setup and release calls. In addition, this document specifies requirements that the LECs should interpret as being necessary for SS7 interconnection with an IC. These requirements should serve as a trigger for the LECs to develop and implement the features specified herein.

1.4 High Level Feature Description

Common Channel Signalling (CCS) Interconnection using SS7 provides a method of signalling out-of-band between LEC and IC

---

[3] "Tearing down" calls is a commonly used telecommunications industry term which refers to the network control and supervisory signals used to properly release an existing call and prepare the network resources for subsequent call attempts.

[4] Refer to ANSI T1 113, Signalling System No. 7 - ISDN User Part Issue 1 - 1988 and future revisions.

switches. These messages may be exchanged via either a fully-associated signalling architecture or a quasi-associated signalling architecture. With fully-associated signalling, SS7 messages are exchanged over a parallel signalling link that is associated with the circuits or circuit group being managed, which is directly connected between the signalling entities. In the quasi-associated signalling mode, these same messages are transmitted and exchanged via a network of Signalling Transfer Point/s (STP) connect to all signalling end points.

When certain events are triggered within network switches, messages are exchanged to inform the adjacent switch of the event. These messages can be setup messages to control a circuit between the two switches, or to release that same circuit. Within the LEC network, the procedures described here are intended to pertain to messages from either end-office or access tandem switches.

1.5 Changes from previous issue

This is the first issue of the document.

2. USER PERSPECTIVE

SS7 signalling, by virtue of its higher throughput capability, is a more efficient signalling protocol than that provided by individual channel signalling (e.g., Multi-Frequency or Dial Pulse) protocols. The end-user initiating a call controlled by SS7 signalling should experience a much faster call setup when all of the circuits are SS7 controlled. When some forms of interworking (conversions from MF to SS7 employed) are used, the protocol conversion steps may produce increased delay.[5]

SS7 signalling also increases the amount of signalling information that can be delivered between network elements, therefore allowing enhancements and new service capabilities that can be offered to the end-user customer.

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[5] The term used within the telecommunications industry to describe this phenomena is referred to as "post dial" delay.

3. NETWORK PERSPECTIVE

SS7 signalling also increases the amount of signalling information that can be exchanged between network elements (i.e., switching entities) and other intelligent network elements, which enables new and enhanced network capabilities. Trunking efficiencies and improved control of network provided tones and announcements are examples of network management and network administrative improvements that are enabled by SS7 signalling.

4. FEATURE REQUIREMENTS

4.1 Feature Operations

A switching entity providing the services described here must meet the criteria for setting up a basic equal access call between networks. These requirements are provided in ANSI T1.104, 1988 and T1.113-1988, Issue 1 and the enhancements described in T1.113 Draft Issue 2.[6]

T1.104 provides the detail necessary to setup a basic internetwork call over a Feature Group D interface to the Interexchange Carrier. T1.113 provides the SS7 protocol to support these call connections.

Chapter T1.113.2 provides the requirements for SS7 messages that enable call control. T1.113.3 provides the format and content of the messages described in T1.113.2.

4.1.1 Originating Call Control

Call initiations are identified by the receipt of an Initial Address message (IAM). An Interexchange Carrier (IC) switch, receiving an IAM, processes the message to determine how to route the call to the next switch. The subsequent switch may be within the IC network or a switch in the terminating exchange carrier network. The IAM will contain the routing label, circuit identification code and message type code as described in T1.113.3. The routing label specifies the point code of the switch receiving the message. The circuit identification code reveals the circuit being

[6] As of this writing, the Draft Issue 2 of the ISDN User Part Specification is in the Letter Ballot approval process. Letter Ballot 102 applies to this information

controlled.[7] The message type code provides the unique coding for each ISDN User Part message.

The IAM contains a number of mandatory, variable, and optional parameters as described in Table 1, Appendix A. For calls specified in this document, the optional parameter, Carrier Identification Code (CIC) parameter, is to be included for all feature group D calls delivered to the interexchange carrier with one exception. The exception case covers call dialed 950+. In these situations, the CIC parameter need not be included.

Calls dialed 700+NXX+XXXX are to be treated the same as calls dialed NPA+NXX+XXXX. Here, the value of the presubscribed, or alternatively dialed carrier will be forwarded. For calls dialed 800+NXX+XXXX and 900+NXX+XXXX, the value of the CIC parameter will contain the carrier value which is determined through an examination and translation of the dialed digits (e.g., 800+NXX translation.

The precise value of the code carried within the CIC parameter will depend upon the dialing characteristics of a particular call. Within an Equal Access End Office (EAEO), the calling user is presubscribed to a particular carrier. The value of the presubscribed information will be forwarded in the usual case. However, when the calling user has dialed the carrier through alternatives means (i.e., 10XXX+7/10 digits or 101XXXX+7/10 digits) the alternative value will be provided in the signalling information flow. The coding of the CIC parameter is as described in Figures 1 and 2 of Appendix A and detailed below. Appendix B provides signalling diagrams depicting the information flow.

The CIC parameter will be coded as described in T1.113.3. The parameter name code will be coded to value "11000101" indicating "Carrier Identification Code."

The information carried within the CIC parameter may be coded to indicate either a three or four digit indication of carrier code. Currently, three digit codes are used to specify the "carrier" network. Local exchange carriers have identified a need for expansion of CICs to four digits, therefore, the CIC parameter must also be capable of forwarding four digits to the interexchange carrier.

---

[7] In some industry forums/arenas (i.e., Industry Carrier Compatibility Forum, ICCF, or Network Operations Forum (NOF), the CIC (circuit identification code) information within the MTP routing label, may be referred to as the "CIC" or trunk.

In those situations where a three digit CIC is to be transmitted, the CIC parameter will be coded as follows (See figure 1 of Appendix A). The CIC parameter will be comprised of three octets. The first octet will carry the "Type of Network Identification" and the "Network Identification Plan." Bits 1 through 4 indicate the "Network Identification Plan."

These bits should be coded to the value "0001" to specify 3 - digit carrier identification code. Bits 5 through 7 indicate the "Type of Network." These bits should be coded to the value "010" to indicate national network identification. Bit 8 is spare. In the remaining octets, the digits of the three digit carrier code are specified. In octet 2, bits 1 through 4 indicate "digit 1," the most significant bit of the carrier code, and bits 5 through 8 indicate "digit 2." In octet 3, bits 1 through 4 indicate "digit 3." The digits will be coded as per the address signal code digits carried in the called party number parameter.[8]

In those situations where a four digit CIC is to be transmitted, the CIC parameter will be coded as follows (See figure 2 of Appendix A). The CIC parameter will be comprised of three octets. The first octet will carry the "Type of Network Identification" and the "Network Identification Plan." Bits 1 through 4 indicate the Network Identification Plan."

These bits should be coded to the value "0010" to specify 4 - digit carrier identification code. Bits 5 through 7 indicate the "Type of Network." These bits should be coded to the value "010" to indicate national network identification. Bit 8 is spare.

In the remaining octets, the digits of the four digit carrier code are specified. In octet 2, bits 1 through 4 indicate "digit 1," the most significant bit of the carrier code, and bits 5 through 8 indicate "digit 2." In octet 3, bits 1 through 4 indicate "digit 3" and bits 5 through 8 indicate "digit 4." The digits will be coded as per the address signal code digits carried in the called party number parameter.[8]

4.1.1.1 Interworking - Feature Group D calls

Situations may arise where the originating access is provided by an SS7 controlled circuit between the IC and the LEC and the IC receives its traffic at the access tandem switch of the LEC. Further, the LEC may be employing alternative signalling methods

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[8] See ANSI T1.113.3, section 2.6(4) for additional coding details in the called party number parameter.

between its access tandem and the equal access end-office switch (i.e., MF signalling). In those cases, the access tandem will need to perform a protocol conversion whereby the "XXX" information contained within the OZZ-XXX[9] information stream will be appropriately mapped into the CIC parameter contained in the Initial Address sent to the IC. If the access tandem is performing a Service Switching Point (SSP) function where the carrier identification function is being performed, then the tandem switch should map the determined carrier value into the CIC parameter and not the pseudo-carrier value as received by the tandem switch in the OZZ-XXX pulse stream.

For those calls received at the LEC access tandem originated from non-conforming end offices, the access tandem should populate the CIC parameter with the interexchange carrier value derived from the trunk selection process.[10]

4.1.1.2 Originating Call Control - Feature Group B

The CIC parameter does not address inband Feature Group B.

4.1.2 Terminating Call Control

The CIC parameter is only required by the interexchange carrier on originating calls.[11] The CIC is not part of terminating or interexchange to exchange carrier call signalling information.

4.1.3 Error Treatments and Abnormal Events

When an IAM is received at the interface the CIC parameter is expected. This is over and above any other optional parameters

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[9]The "OZZ" digits transmit spare tandem center codes; up to four codes may be assigned to a specific interexchange carrier. The "XXX" specifies the CIC, or "carrier" for the call. See Bellcore FSD 20-24-0000, Section 3.1 for further details

[10]The code interpretation and circuit selection process at the access tandem is detailed further in Bellcore LSSGR, TR-TSY-000540, Section 5.2, Tandem Supplement.

[11]The use of the carrier identification parameter does not preclude the use of the express carrier parameter.

(i.e., Calling Party Number) which may be independently provisioned. When an IAM is received which does not contain the CIC, the IC may treat this as an error condition. If the IC determines that the call should be failed because of this condition, an REL message will be sent for that circuit. The REL will contain a cause value of "protocol error - unspecified" and the general location will be coded "local local network"[12] within the Cause Indicators parameter.

4.2 Administration

In addition to administration of the optional SS7 parameters currently used for control of FG-D calls, the LEC switching entity should have the ability to provision or not, the CIC parameter in the IAM, on a per IC basis.

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[12] For further information on SS7 cause values and cause location, see ANSI T1.113.3, section 3.9 (3)

5. GLOSSARY OF TERMS

ANSI	American National Standards Institute
AT	Access Tandem switching entity
BOC	Bell Operating Company
CCS	Common Channel Signalling
CIC	Carrier Identification Code
EAEO	Equal Access End Office switching entity
FSD	Feature Specific Document
IAM	Initial Address Message
IC	Interexchange Carrier
ICIC	Interexchange Carrier Industry Forum
IEC	Independent Exchange Carrier
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
LATA	Local Access Transport Area
LEC	Local Exchange Carrier
LSSGR	LATA Switching Systems Generic Requirement
MF	Multifrequency
NOF	Network Operations Forum
SS7	Signalling System No. 7 Protocol
SSP	Service Switching Point
STP	Signal Transfer Point
TCIC	Trunk Circuit Identification Code

6. REFERENCES

1. Signalling System Number 7 (SS7) Integrated Services Digital Network (ISDN) User Part, American National Standards, ANSI T1.113-1988.

2. Common Channel Signaling (CCS) Network Interface Specification, Bellcore Technical Reference TR-TSV-000905, Issue 1, August, 1989.

3. Exchange - Interexchange Carrier Interfaces - Individual Channel Signaling Protocols, American National Standard for Telecommunications, ANSI T1.104-1988.

4. T1S1 Letter Ballot, T1S1/LB90-02 - Draft Proposed American National Standard - Signaling System No. 7 - ISDN User Part, Revision of ANSI T1.113 - 1988.

APPENDIX A
MESSAGE FORMATS AND CODINGS

SSAGE TYPE: INITIAL ADDRESS MESSAGE

PARAMETER	T1-113 REFERENCE SECTION	TYPE	LENGTH (OCTETS)
Message type	2.1	F	1
Nature of connection indicators	3.24	F	1
Forward call indicators	3.20	F	2
Calling party's category	3.8	F	1
User service information	3.33	V	3 - ?
Called party number	3.6	V	4 - 11
Access transport	3.1A	O	3 - ?
Business Group	3.3A	O	9 - ?
Call reference	3.5	O	8
Calling party number	3.7	O	5 - 12
Carrier identification code	3.8A	O	5
Carrier selection information	3.8B	O	3
Charge number	3.10	O	5 - 12
Connection request	3.15	O	9 - 10
Egress Service	3.16A	O	3 - ?
Generic address	3.20A	O	6 - 13?
Generic digits	3.20B	O	4 - ?
Information request indicators	3.23	O	4
Jurisdiction	3.23A	O	2 - 5
Network Transport	3.24A	O	5 - ?
Original called number	3.26	O	5 - 12
Originating line information	3.26A	O	3
Redirecting number	3.27A	O	5 - 12
Redirection information	3.29	O	4
Service activation parameter	3.29B	O	3 - ?
Service code indicator	3.29C	O	3
Special processing request	3.30A	O	3
Transaction request	3.31	O	8 - ?
Transit network selection	3.3[illegible]	O	5 - [illegible]

APPENDIX A
MESSAGE FORMATS AND CODINGS

8	7	6	5	4	3	2	1
SPARE	TYPE OF NETWORK IDENTIFICATION			NETWORK IDENTIFICATION PLAN			
DIGIT 2				DIGIT 1			
0	0	0	0	DIGIT 3			

NAME CODE: 11000101
REFERENCE: T1.113.3, 3.8A FOR CODING SPECIFICS

NOTE: DIGIT 1 IS THE MOST SIGNIFICANT BIT.

FIGURE 1. CARRIER IDENTIFICATION CODE PARAMETER - 3 DIGIT CARRIER CODE

8	7	6	5	4	3	2	1
SPARE	TYPE OF NETWORK IDENTIFICATION			NETWORK IDENTIFICATION PLAN			
DIGIT 2				DIGIT 1			
DIGIT 4				DIGIT 3			

NAME CODE: 11000101
REFERENCE: T1.113.3, 3.8a FOR CODING SPECIFICS

NOTE: DIGIT 1 IS THE MOST SIGNIFICANT BIT.

FIGURE 2. CARRIER IDENTIFICATION CODE PARAMETER - 4 DIGIT CARRIER CODE

APPENDIX B

CARRIER IDENTIFICATION CODE TRANSMISSION - INFORMATION FLOW DIAGRAMS

```
EAEO---------(SS7)---------IC

     ----------IAM--------->     Containing mandatory, mandatory
                                 variable, and CIC optional parameter
                                 at a minimum.

     ----------COT--------->     If required

     <---------ACM----------

     <---------ANM----------

     <-----Conversation---->

        ----------REL--------->

        <---------RLC----------
```

Legend:

IAM: INITIAL ADDRESS MESSAGE
COT: CONTINUITY MESSAGE
ACM: ADDRESS COMPLETE MESSAGE
ANM: ANSWER MESSAGE
REL: RELEASE MESSAGE
RLC: RELEASE COMPLETE MESSAGE

FIGURE B - 1. SS7 CALL CONTROL - DIRECT TO IC

APPENDIX B

CARRIER IDENTIFICATION CODE TRANSMISSION - INFORMATION FLOW DIAGRAMS

```
EAEO-------(SS7)------- AT ---------(SS7)--------- IC

-----IAM---->

                                  ------IAM----->      Containing
                                                       mandatory, mandatory
                                                       variable, and CIC
                                                       parameter at a
                                                       minimum.

<----EXM----

-----COT---->                                          If required
                                  -----COT---->        If required

                                  <----ACM-----

<----ACM----

                                  <----ANM-----

<----ANM----

<-------------CONVERSATION----------------->

-----REL---->

                                  -----REL---->

                                  <----RLC----

<----RLC
```

KEY:

IAM: INITIAL ADDRESS MESSAGE
COT: CONTINUITY MESSAGE
ACM: ADDRESS COMPLETE MESSAGE
ANM: ANSWER MESSAGE
EXM: EXIT MESSAGE
REL: RELEASE MESSAGE
RLC: RELEASE COMPLETE MESSAGE

FIGURE B-2. SS7 CALL CONTROL - VIA ACCESS TANDEM TO IC

APPENDIX B

CARRIER IDENTIFICATION CODE TRANSMISSION - INFORMATION FLOW DIAGRAMS

```
EAEO----(MF)-----AT-----(SS7)-----IC

-----SEIZE---->

<----WINK-----

--KP+0ZZ+XXX+ST-->
                          -----CRM-----
                          <----CRA-----
<----WINK----
                          ----COT-----          if required

--KP+(II+ANI)+ST--->

--KP+(0)+7/10D+ST-->

<---ACK.WINK----

                          -----IAM----->        Containing mandatory,
                                                mandatory variable, and
                                                CIC parameter at a
                                                minimum.
```

KEY:

CRM: CIRCUIT RESERVATION MESSAGE
CRA: CIRCUIT RESERVATION ACKNOWLEDGEMENT MESSAGE
IAM: INITIAL ADDRESS MESSAGE
COT: CONTINUITY MESSAGE

FIGURE B-3. SS7 CALL CONTROL - INTERWORKING CASE; MF FROM EAEO TO ACCESS TANDEM - SS7 TO IC

ATTACHMENT VI