



AM-TR-NIS-000152

Interconnection to an Ameritech 9-1-1 Selective Routing Switch via SS7 Trunks as a Substitute for CAMA Signaling

This Technical Reference describes a method to deliver a 9-1-1 call to an Ameritech 9-1-1 Selective Routing Switch using SS7 signaling as an alternative to CAMA signaling.

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1. GENERAL INFORMATION

The main purpose of this technical reference is to describe a method to deliver a 9-1-1 call to an Ameritech 9-1-1 Selective Routing Switch using SS7 signaling as an alternative to CAMA signaling. This interface defines signaling parameters that will allow the delivery of both wireline and wireless 9-1-1 calls into the Ameritech 9-1-1 Network.

This interface will allow the delivery of a wireline caller's telephone number (i.e., ANI or CPN) to be used for 9-1-1 selective routing and call delivery purposes. This interface will also allow for the delivery of a pANI representing a wireless caller's location for 9-1-1 selective routing and call delivery purposes. In this document the reference to "T1.113.3" is to a chapter in Telcordia document GR-246-CORE, and not to an American National Standards Institute (ANSI) document.

2. PURPOSE

The purpose of this document is to provide a technical description for interconnecting to an Ameritech 9-1-1 Selective Routing Switch via SS7 Trunking.

3. CHANGE AND REISSUE

This is the second issue of this document. This section will show future changes and modifications.

This document replaces AM-TR-NIS-000152 , Issue 1, January 29, 1999 and incorporates the following significant changes:

- This corrects a typographical omission regarding the screening indicator field (previously defined in ANSI T1.113.3 standard, but missing from text). This field is included in the Calling Party Number parameter of the Initial Address Message.
- This clarifies that 9-1-1 calls do not always provide answer supervision toward the originating caller's office.
- This adds clarification that PSAP conditions may require that a separate trunk group is required per originating NPA from multi-NPA end offices.

4. INTERFACE DESCRIPTION

This section describes how service providers can terminate to an Ameritech 9-1-1 Selective Routing Switch via SS7 Trunking.

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4.1. WIRELINE INTERFACE

When a wireline 9-1-1 call is originated using CAMA signaling, the 9-1-1 network uses what is known as the caller's ANI (Automatic Number Identification) for selective routing purposes. When a wireline 9-1-1 call is originated using SS7 signaling, the 9-1-1 network uses what is known as either the caller's Charge Party Number (Billing Number) or Calling Party Number (CPN) for selective routing purposes.

4.2. WIRELESS INTERFACE

When a wireless 9-1-1 call is originated, the 9-1-1 network uses what is known as a "pseudo-ANI" (pANI) to identify the cell sector from which the wireless 9-1-1 call originates.

In the case of a wireless call, the 9-1-1 system will use a pANI associated with the geographic coverage area of a wireless tower face (of call origination) as the routing key. This document will only address the wireless situation where the pANI, representing the tower face is passed through the 9-1-1 network to the PSAP. This document will NOT address the situation where the call setup is from a wireless caller and both the caller's Mobile Directory Number (MDN) and originating Cell Face Location (pANI) are sent through the network to the PSAP.

4.3. SS7 CALL SET UP FIELD USAGE

A wireline/wireless SS7 call setup is originated by transmitting an Initial Address Message (IAM) between the originating and terminating offices using standard SS7 signaling protocols and hardware interfaces. The dialed number; "9-1-1" is placed in the "Called Party Number" field of the SS7 IAM setup message. The caller's ANI/pANI is placed in either the "Charge Party Number" or the "Calling Party Number" field of the IAM (based on the conditions described in more detail below).

4.4. SS7 HANDLING OF THE CHARGE PARTY NUMBER AND CALLING PARTY NUMBER FIELDS

In SS7 signaling there are two fields that can be used to transmit a telephone number (i.e., ANI/pANI) related to the caller. These are the Charge Party Number, and the Calling Party Number fields. If the SS7 setup contains values in these two fields that differ, then the 9-1-1 Selective Routing Switch is programmed to select one over the other for routing purposes according to an option set in the particular 9-1-1 Selective Routing switch.

In the default condition, the Charge Party Number takes precedence over the Calling Party Number field for routing purposes. However, in certain instances, the Calling party Number field takes precedence over the Charge Party Number field. At this time, most of the Selective Routing Switches in the Ameritech region route according to the default condition.

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NOTE: The 9-1-1 system that service is being provided for will dictate both the Charge Party Number/CPN field precedence, and whether or not SS7 signaling is allowed under legal and/or regulatory conditions.

Each SS7 trunk group is limited to the delivery of a single NPA (of ANI/pANI) until such time as either: A) the E9-1-1 selective routing switch can handle multiple NPA call deliveries on an SS7 trunk -OR- B) ALL of the PSAPs receiving calls from the originating office (whether via primary route, overflow route, or transfer conditions) are converted to 10 digit signaling. The specific 9-1-1 system(s) and router(s) that the trunks are used for will dictate whether or not more than one NPA of ANI/pANI can be delivered on the same incoming SS7 trunk group.

5. 9-1-1 ROUTING VALUES TABLE: CAMA - SS7

The following table (Table 1) compares the particular fields relevant to a 9-1-1 call setup. Since this document describes SS7 as an alternative to CAMA signaling, CAMA signaling values are included for comparative purposes.

Value	CAMA	SS7 (w/Charge Party Number precedence over CPN)	SS7 (w/CPN precedence over Charge Party Number)
Dialed Number	"9-1-1"	"9-1-1"	"9-1-1"
Transmitted Dialed Number	"911" or "11"	"911"	"911"
Transmitted Location of Dialed Number	In Called Number field	In Called party Number field	In Called party Number field
Caller's ANI/pANI Length	7 Digits	10 Digits	10 Digits
Caller's ANI Location (or pANI in case of a wireless call)	In ANI field	In Charge Party Number field or in Calling Party Number field, if Charge Party Number field is Blank/Not Used	In Calling Party Number field or in Charge Party Number field, if Calling Party Number field is Blank/Not Used
Information Digit(s)	Single I Digit	Optional Double II Digit	Optional Double II Digit
Info Digit Location	In ANI field preceding 7 DIGIT ANI	In OLI field (if included)	In OLI field (if included)
Allow Wireless MDN to be transmitted in Call Setup	NO	Yes (In Calling Party Number field)	Yes (In Charge Party Number field)

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MDN Transmitted to PSAP	NO	NO	NO
Originating Condition	Loop Start toward 911 Network	IAM toward 911 Network	IAM toward 911 Network
Far End Response	Wink Start with Reverse Battery Signaling	Standard SS7 Call Setup Messages	Standard SS7 Call Setup Messages
Reference Document for Signaling Standard		Bellcore GR-246-CORE Chapter T1.113.3	Bellcore GR-246-CORE Chapter T1.113.3
Comments	Uses Standard CAMA Signaling	Uses Standard SS7 Signaling Values	Uses Standard SS7 Signaling Values

Table 1, 9-1-1 Routing values table: CAMA - SS7

6. SS7 IAM CALL SETUP FOR 9-1-1

The following items are intended to represent the typical SS7 message parameters in the 9-1-1 IAM Call Setup Message. This list is NOT all inclusive, so any other required SS7 setup parameter items not specifically listed in this section should be treated the same as any other standard SS7 call. Further details, technical specifications, rules, and formatting of the SS7 message set can be found in Bellcore GR-246-CORE. chapter T1.113.3.

This document outlines acceptable values of fields involved with a 9-1-1 IAM call setup message. Alternative values for many of these fields may be acceptable, based on standard SS7 signaling specifications. In the case of a discrepancy between this document, and other formal technical specifications, in reference to the NON-9-1-1 specific fields, the technical specifications supersede this document. In the cases of the Originating Line Identification (OLI), Calling Party Category (CPCat), Called Party Number, Calling Party Number, and Charge Party Number fields, this document represent values that have been found to be acceptable in a 9-1-1 call setup scenario.

6.1. OCTET NAME OR VALUE: COMMENTS

Forward Sequence Number, and Forward Sequence Indicator Bit: Follow the rules in T1.113.3 for Standard SS7 setup messages.

Length Indicator: Follow the rules in T1.113.3 for Standard SS7 setup messages.

Service Indicator Octet: Follow the rules in T1.113.3 for Standard SS7 setup messages. Service Indicator: ISDN user part, Network Indicator: National Network, and Priority 0 or 1 are acceptable values.

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Destination Point Code Octets: Follow the rules in T1.113.3 for Standard SS7 setup messages. Use the Destination Point Code for the far end of the 9-1-1 circuit as provided by Ameritech.

Originating Point Code Octets: Follow the rules in T1.113.3 for Standard SS7 setup messages. Use the Originating Point Code of the switch originating the 9-1-1 call.

Signaling Link Selection: Follow the rules in T1.113.3 for Standard SS7 setup messages.

Circuit Identification Code Octets: Follow the rules in T1.113.3 for Standard SS7 setup messages.

6.1.1. FIXED MANDATORY PARAMETERS

Message Type: 01H (01 - Hex); IAM message type is required on an IAM setup message.

Nature of Connection Indicator: Follow the rules in T1.113.3 for Standard SS7 setup messages for: Satellite Indicator, Continuity Check Indicator, and Echo Control Device Indicator.

Forward Call Indicators: Follow the rules in T1.113.3 for Standard SS7 setup messages for National/International Call Indicator, End to End Method Indicator, Interworking Indicator, ISDN User Part Indicator, ISDN User Part Preference Indicator, ISDN Access Indicator, Translated Called Number Indicator, and QoR Attempt Indicator.

Calling Party Category (CPcat): Follow the rules in T1.113.3 for Standard SS7 setup messages. The CPcat for an ordinary calling subscriber (0AH), or emergency service call (E0H) may be used. Do NOT use the CPcat for a high priority emergency service call (E1H).

6.1.2. VARIABLE MANDATORY PARAMETERS

Pointer Octets: Follow the rules in T1.113.3 for Standard SS7 setup messages.

User Service information Octets: Follow the rules in T1.113.3 for Standard SS7 setup messages.

Called Party Number Octets: Follow the rules in T1.113.3 for Standard SS7 setup messages. The called number "9-1-1" will be an odd number of address signals, a National Significant Number, and use the ISDN telephony numbering plan.

6.1.3. OPTIONAL PARAMETERS

Calling Party Number: Follow the rules in T1.113.3 for Standard SS7 setup messages for quantity of address signals (10 digits), Nature of Address (National Significant Number), Numbering Plan (ISDN Telephony), Screening Indicator (User Provided, Screening Passed OR Network

Provided), and Presentation Indicator (ignored in the case of a 9-1-1 call). In cases where the 9-1-1 network is programmed to have the Calling Party Number supersede the Charge Party Number for routing purposes, then this field will take precedence over the Charge Party Number.

The following two conditions further describe the use of this field:

- A. If this optional parameter is used without a Charge Party Number, this is the caller's ANI (wireline calls) or pANI (wireless calls).

NOTE: The Screening Indicator shall be coded as "user provided, screening passed" 01H when a Calling Party Number is provided by the user and it passes screening. A Screening Indicator value of "network provided" 11H shall be sent when the originating network provides the number in the Calling Party Number parameter. Screening Indicator values of "user provided, screening failed" 10H and "user provided, not screened" 00H will cause the E9-1-1 network to apply default routing to calls where the Charge Party Number is programmed to take precedence over the Calling Party Number.

- B. If this optional parameter is used with a Charge Party Number, then the Charge Party Number will be used for routing and display purposes in the 9-1-1 network (in areas where the Calling Party Number is not programmed to supersede the Charge Party Number). In the case of a wireless call in the standard router configuration, where the Charge Party Number is populated with the pANI, this parameter may be populated with another number, such as the MDN. Note however that the MDN will not be used at all by the 9-1-1 network in this particular situation and the use of separate numbers between the Charge Party Number and the Calling Party Number serves no purpose for the 9-1-1 system.

Jurisdiction Code: Follow the rules in T1.113.3 for Standard SS7 setup messages. The jurisdiction code is populated with the NPANXX combination of the originating MSC.

Charge Party Number: Follow the rules in T1.113.3 for Standard SS7 setup messages. The Nature of Address Indicator should be set for ANI of Calling Party; National Number. The Numbering Plan should be ISDN Telephony. The Odd/Even Indicator should be appropriate for the 10 digit Address Signal used to indicate the ANI (or pANI) of the 9-1-1 caller. See the discussion above regarding the Calling Party Number field for further details as to how this field is affected by various options activated within the Ameritech 9-1-1 network.

Originating Line Identification (OLI): Follow the rules in T1.113.3 for Standard SS7 setup messages. This value is not required, and may be omitted. If this optional parameter is used in the case of a wireless call, it should be populated with the value 3DH (Cellular Service Type 1),

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3EH (Cellular Service Type 2), or 3FH (Cellular Service Roaming). If there is an ANI failure, and the ANI (or pANI as appropriate) is not available, this parameter should be populated with 02H (ANI Failure). Although wireless calls are encouraged to use and populate this parameter with the appropriate wireless value representing the caller's II digit combination, it is not required. If this parameter is not included in the IAM message, the 9-1-1 system will treat it as a value of 00H (wireline service).

7. CAMA AND SS7 CALL COMPLETION AND TEAR DOWN PROCEDURES

When the 9-1-1 caller disconnects, the caller's originating end office is responsible to send either an "on-hook" signal (CAMA signaling) or a "release message" (SS7 signaling) to the far end switch. The far end switch will respond with either an "on-hook" condition (CAMA signaling) or send a "Release Complete" message (SS7 Signaling) to the caller's switch.

In the case where the PSAP disconnects first, the same procedure is applied, but the direction of the signals is reversed.

In the case of SS7 signaling, the Release Message, the Release Complete Message, and other SS7 setup messages are part of the standard SS7 Signaling Message sets. There are no special values specific to a 9-1-1 call. Therefore, this documentation does not elaborate on the details of the other standard SS7 call messages.

NOTE: Calls to 9-1-1 are generally considered to be "free calls." As such, the Ameritech E9-1-1 system may not return answer supervision toward the caller upon the PSAP answering the call. The originating switch must be able to allow 9-1-1 calls to remain stable (i.e, not be torn down after some arbitrary period of time), even if no SS7 answer supervision messages are returned toward the caller's originating office.

8. ACRONYMS

ANI	Automatic Number Identification
CAMA	Centralized Automatic Message Accounting
CPN	Calling Party Number
E9-1-1	Enhanced 9-1-1
FCC	Federal Communications Commission
IAM	Initial Address Message
MDN	Mobile Directory Number

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MSC	Mobile Switching Center
PANI	Pseudo Automatic Number Information
PSAP	Public Safety Answering Point
SCP	Service Control Point
SS7	Signaling System Number 7
SR	Selective Router

9. REFERENCES

Bellcore GR-246-CORE, Issue 1, December 1994. Revision 2, December 1996, Vol. 3
Bell Communications Research Specification of Signaling System Number 7

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