STENTOR
The Power of Telecommunications

Interface Document
ID-0024
February 1996

SUPPRESSED RINGING SERVICE (SRS)

Terminal-to-Network Interface

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DOCUMENT HISTORY

1	November 1995	Initial issue
2	February 1996	Revised Issue - commercial service. Revisions include editorial changes/ clarifications, addition of an optional OI time on forced release, and minor procedural changes resulting from trial experience.

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Readers are specially advised that the technical requirements contained herein may change.

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1.0 GENERAL

The terminal-to-network interfaces described in this document allows an enhanced service provider, that subscribes to Suppressed Ringing Service with a Stentor Telecommunications Company, to access compatible Customer Premise Equipment (CPE) without activating any CPE ringing devices on the line.

Typical applications include the downloading of service related scripts into Analog Display Services Interface (ADSI) type CPE and interrogating customer premise utility metering devices.

Suppressed Ringing Service is planned for deployment as a terminating switch feature on digital local central office switches.

Details of Suppressed Ringing Service as provided by Stentor as well as the underlying facilities and service elements required by potential enhanced service providers may be obtained from the appropriate tariffs of each individual Stentor Telecommunications Company.

2.0 SERVICE DESCRIPTION

2.1 Suppressed Ringing Service

Suppressed Ringing Service (SRS) is the capability of establishing a connection to customer premise equipment (CPE) without applying normal audible ringing on the loop. This is a terminating switch feature which can be accessed through the CCS#7 PSTN network. Figure 1 shows the components of the Suppressed Ringing Service, the enhanced service provider computer (called a server), the public switched telephone network (PSTN) and the customer premise equipment (CPE).

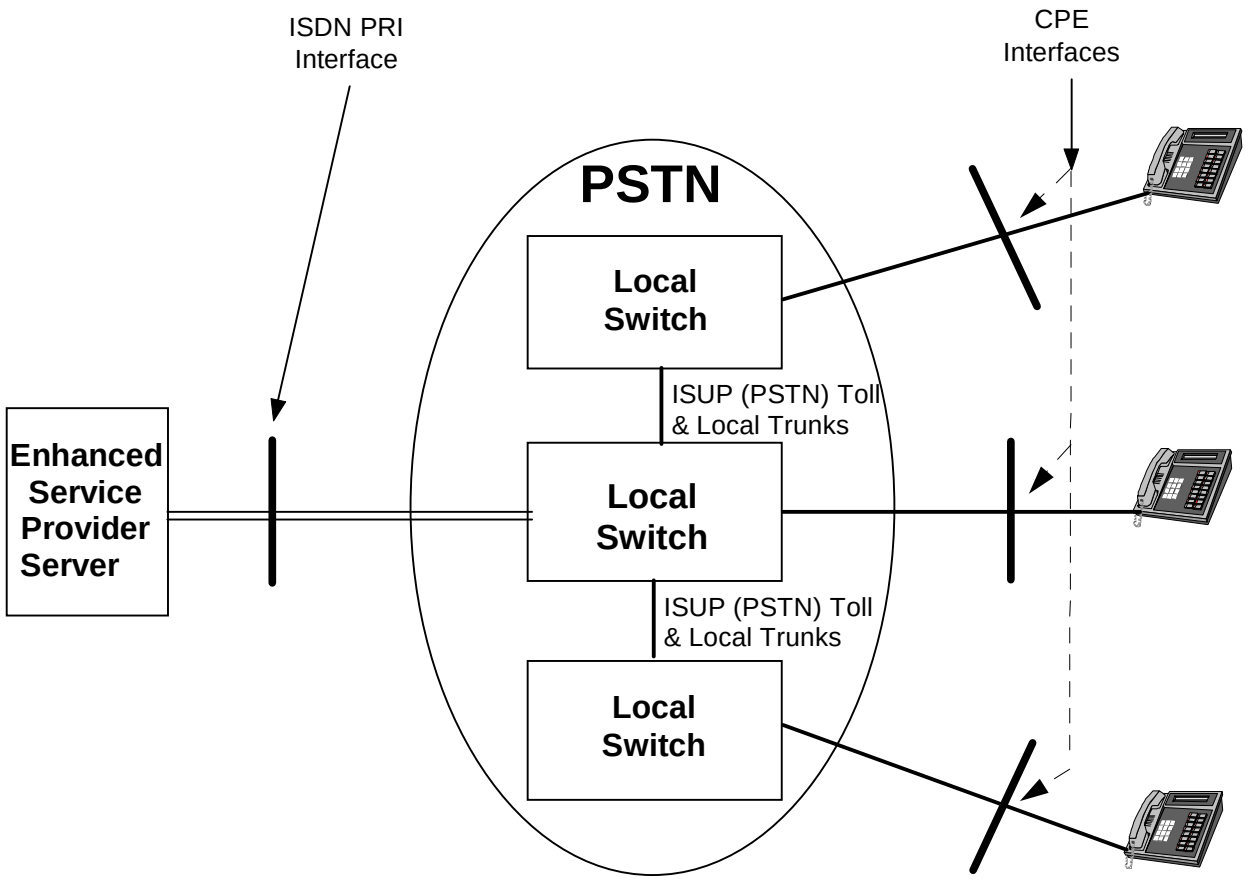
The server interacts with the CPE through appropriately equipped digital local switches in the Public Switched Telephone Network. Suppressed Ringing Service can only be provided where end-to-end CCS#7 connectivity exists between the enhanced services node and the terminating switch(es) that are equipped with the Suppressed Ringing Access software or where the server node PRI trunks and the CPE are connected to the same local switch equipped with the Suppressed Ringing Access software.

The server originates suppressed ringing calls via ISDN PRI trunks. These calls are routed to a suppressed ringing routing number in each terminating switch either through the PSTN CCS#7 network or within the switch if it is an intra-switch call. The originating telephone switch interworks the PRI into ISUP protocol to establish a circuit through the PSTN to the terminating switch. The terminating switch will attempt a suppressed ringing connection if security conditions are met, the line has SRS option enabled and the line is idle. If the CPE and server are not in the same local calling area the server must initiate a toll call. Alternate interexchange carriers can be used as long as end-to-end CCS#7 connectivity is used and all the required ISUP parameters are transported. After the SRS call is established the server and CPE interact via their own protocol which is transparent to the network's switches and suppressed ringing feature.

The local Stentor Telecommunications Company will provide the appropriate SRS routing number to be used for a particular customer group and chosen SRS options.

The detailed protocol of the interfaces are described in later sections of this document.

Figure 1: Example of SRS Service Network Configuration



NOTE: The server may require other tariffed facilities depending on a particular enhanced service.

2.2 Target Market

The potential target market for Suppressed Ringing Service consists of enhanced services providers that need to access their customers' CPE without activating any ringing devices on the line. This service will potentially be used by the telco's to download telephony service scripts into Analog Display Service Interface (ADSI) telephones or by third-parties to download targeted advertising into ADSI telephones or by utility companies for automated meter reading.

3.0 INTERFACE DESCRIPTIONS

3.1 ISDN PRI Interface to Enhanced Service Provider Server

3.1.1 PRI Signalling Parameters

This interface, between the enhanced service provider's server and a Stentor Communications Company local access switch that offers Megalink^{TM} service, is used to communicate with the CPE via the PSTN. This interface has been previously disclosed in TAPAC Bulletin No. 90-07. The technical interface is described in References 4.10 and 4.11.

The server's PRI interface must comply with the requirements specified in Reference 4.1.

The Call Flow messaging descriptions are in Section 3.3 (Figures 2 to 6).
The following special requirements apply at the interface.

When initiating the suppressed ringing call, the server shall assign the parameters in the PRI Set-up message as follows:

PRI Set-up Message Parameters	Content Description	Content Format
Called Party Number (CdPN)	Routing DN	10 digits plus prefix (if required)
Original Called Number (OCN)	End user's DN	10 digits plus prefix (if required)
Calling Party Number (CgPN)	blank	

3.1.2 Routing DN

The Routing DN is used to route the server's call to the terminating switch that serves the end user's CPE. This telephone number will be supplied by the Stentor Communication Company for each terminating switch access which is subscribed to by the service provider. May require prefix and/or equal access PIC codes if the call is long distance.

Each Routing DN can have different options for controlling the Suppressed Ringing Service for a particular application and subscriber line type.

The three types of ringing access available are as follows:

a) Suppressed ringing - Normal option.

b) Suppressed ringing with Open Switch Interval (OSI) - provided for lines served via digital loop carriers compliant with Bellcore TR-NWT-000057.

c) One ring cycle - For lines served via non-integrated digital loop carrier which are non-OSI compliant. The ring pattern is an option.

Other options are the maximum call duration of a suppressed ringing call and whether incoming calls are allowed to interrupt suppressed ringing calls. Refer to the appropriate tariffs to determine which options are available in each Stentor Telecommunications Company.

3.1.3 End User's DN

This is the telephone number of the end user CPE being accessed by the service provider. The Stentor Communication Company will advise the service provider of the appropriate prefix and number of digits required in the OCN field to route the call to this line.

3.1.4 Calling Party Number

This field will be populated by the originating switch with the Calling Line ID and will be used by terminating switch to validate the server access to the subscriber loop.

3.1.5 CPE Wake Up Signal

After the enhanced service provider server receives the Connect Message, indicating a voice path to the CPE is cut through, it must send a voiceband signal or modem burst to alert the target CPE to receive the data transmission. The server must send this signal within 4.5 seconds of receiving the Connect Message. Reference 4.6 provides details of this CPE alerting signal (CAS) for ADSI applications. Other proprietary protocols can be used for non-ADSI applications.

3.1.6 PRI Notify Message

When the CPE goes off-hook a PRI Notify Message is sent to the server with the following parameters:

PRI Notify Message Parameters	Content
Connected Number	End-user's DN
Information Request	Information request completed and connected number provided

Receipt of this message indicates that the SRS call is established and that the CPE is off hook and ready to start the data exchange.

3.1.7 Data Transmission Interruption

The enhanced service provider's server should have the capability of recognizing the interruption of the data transmission session and releasing the circuit promptly. A data transmission interruption could be caused by an extension telephone on the line going off-hook during a data download session or by the switch disconnecting the circuit to allow another non-SRS call to be presented to the end user (optional). An example of the first case is shown in Figure 6.

3.2 Terminal Subscriber Loop Interface

3.2.1 Physical Interface

The physical interface to the customer premise equipment (CPE) is the same as a standard POTS interface. Standard CPE that are compatible with a standard POTS interface will not be rendered incompatible as a result of SRS and can be on the same loop.

Lines which are served via Universal Digital Loop Carriers between the switch line card and local loop require special considerations to establish cut-through to the CPE. If the Digital Loop Carrier is Open Switch Interval (OSI) compliant (Reference 4.7) the Routing number assigned for this option is to be used.

Lines which are served via non OSI compliant Universal Digital Loop Carriers use the routing number which applies a ring burst to establish the connection to the CPE. Non-OSI compliant digital loop carriers only open the circuit to the subscriber when ringing is applied. The server must send the CPE wake up signal in less than 4.5 seconds from reception of the connect message to ensure the voice circuit through the digital loop carrier is still open after the ring burst. CPE equipment in these cases may ring for one ring cycle.

3.2.2 CPE Wake Up Signal

The CPE must be capable of automatically going into off-hook state without an audible ringing signal within 5 seconds of the time the terminating switch sends the Answer Message (inter-switch case) or Connect Message (intra-switch case). It does this by detecting the CPE wake up signal sent by the server on the voiceband circuit. The content of this signal is independent of SRS however Reference 4.6 provides specification of the CPE alerting signal (CAS) to be used for ADSI applications.

3.2.3 Switch Initiated Release

The CPE must go into on-hook state within 2 seconds of a SRS call being terminated by the switch in the middle of an established data transmission session. A SRS call could be released because the call duration exceeded the limit (optional) or to route a new incoming call to the end user (optional) or because of some other error condition such as a loss of carrier. SRS feature can optionally force release the CPE into on-hook state by providing an Open Interval (OI) signal of 800 ms or 2 seconds.

3.2.4 Data Transmission Termination by End-User

The CPE communicating with the server must allow an end-user to terminate a suppressed ringing call to make normal telephone calls. If the CPE device has a handset it must terminate the data transfer session when the handset is picked up or the keypad touched. It must immediately cancel the data transmission and send a disconnect signal (on-hook of at least 1550 ms) to the switch. It then must go back into off-hook state to obtain dial tone from the switch. A release message will be propagated back to the server to release the suppressed ringing circuit. A new non-SRS call then can be initiated by the end-user. This call flow is shown in Figure 5.

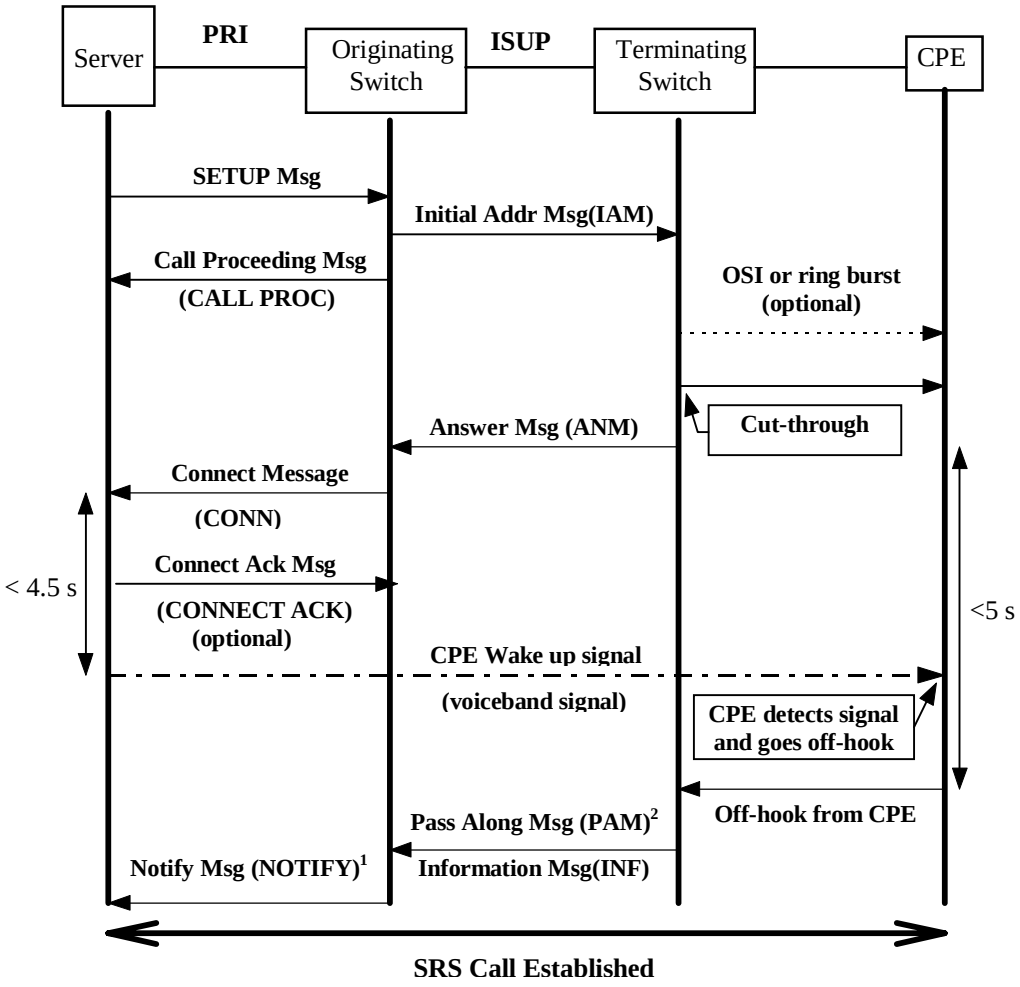
If the end-user picks up an extension telephone not communicating with the server the communicating CPE should detect this event. In this case the CPE must cancel the data transfer session and put itself into the on-hook state. If the circuit is not immediately released by the server the end-user can obtain dial tone by putting the extension telephone back on-hook for a minimum 1550 ms. The end-user will have dial tone when going off-hook again. If the end-user does not place the extension back on-hook the server should detect that the communication session has been interrupted and release the circuit so dial tone can be provided to the end-user promptly. This call flow is illustrated in Figure 6.

3.3 Suppressed Ringing Service Call Flows

The signalling through the PSTN ISUP network is standard CCS#7 protocol. The Suppressed Ringing feature is activated in the terminating switch when a call is received on one of the SRS Routing DN's datafilled in the switch. The following figures provide examples of the progression of the signalling messages on call set-up (Figure 2) and call disconnect (Figures 3 to 6). These call flows show the ISUP messages flows if the server and CPE are connected via ISUP trunking. If the server and CPE are on the same switch (intra-switch call) the ISUP messages will not occur but the PRI messages, CPE interface and signalling timing are the same.

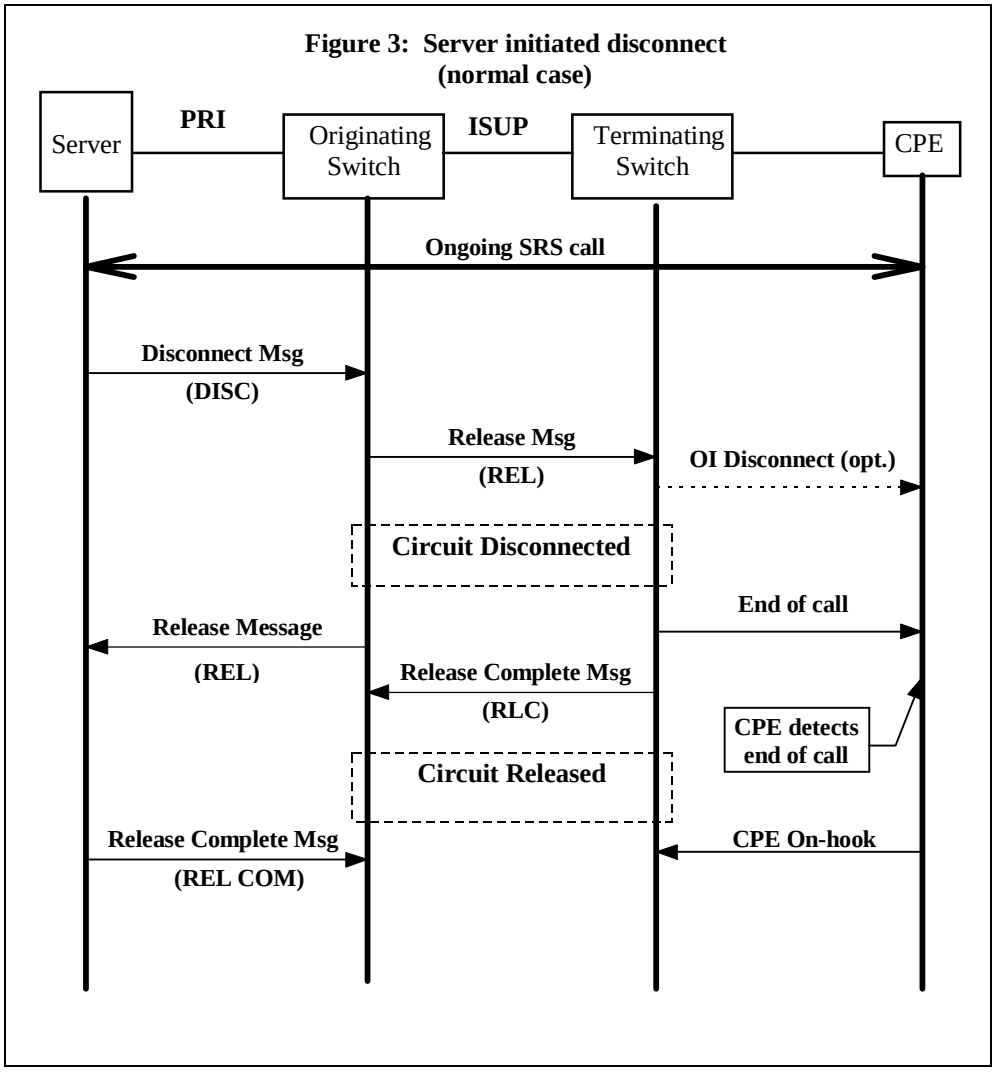
3.3.1 Call Setup Message Flow

Figure 2: Suppressed Ringing Call Setup Signalling



Notes: 1- The notify message contains the End-user's DN
2- Actual message from the terminating switch is a PAM that encapsulates an INF.

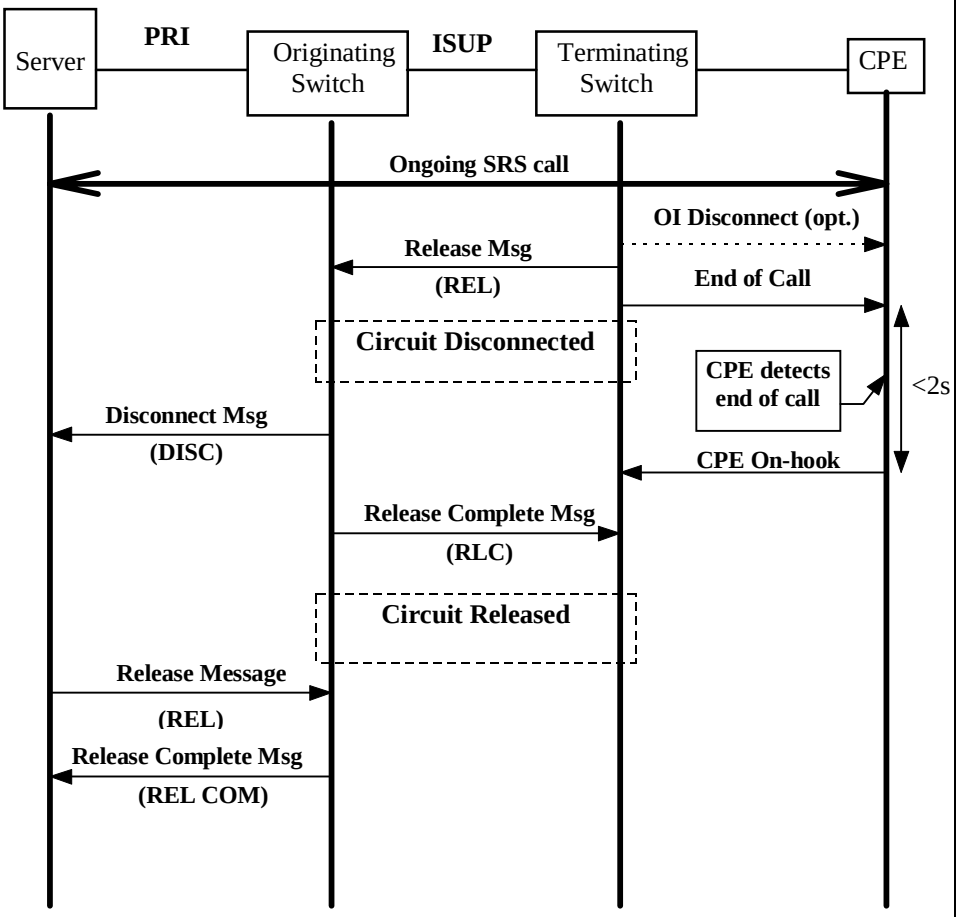
3.3.2 Server Initiated Disconnect Call Flow



A suppressed ringing call will normally be disconnected by the server after the data transmission is completed. Figure 3 shows this call disconnect message flow.

3.3.3 Terminating Switch Initiated Disconnect Call Flow

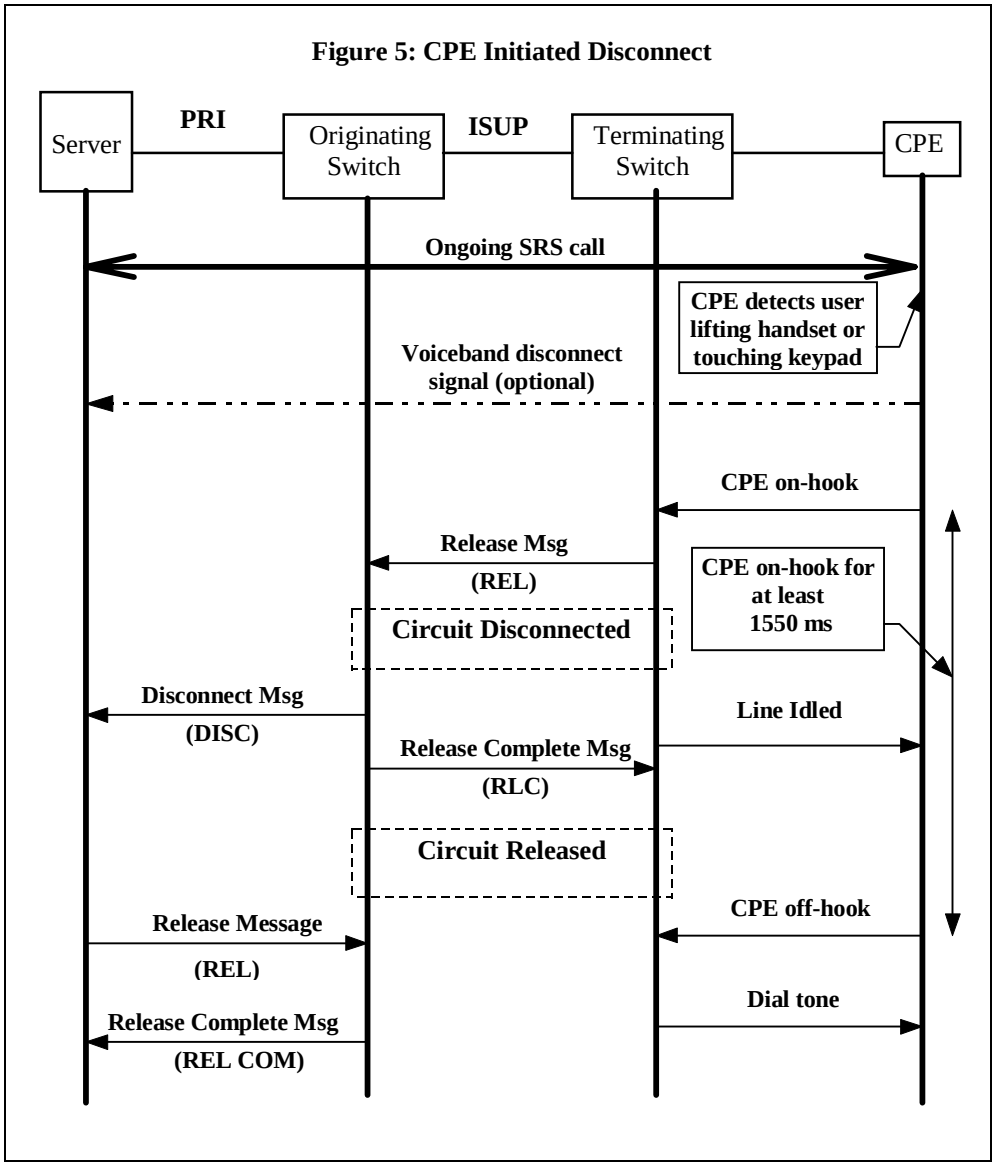
Figure 4: Switch Initiated Disconnect



Suppressed ringing calls can be terminated by the switch in the event of an error condition, expiration of the maximum call duration timer (optional) or expiration of the CPE off-hook timer. Other incoming calls to the end-use line can also interrupt an established SRS call (optional) to ensure regular calls are not blocked by a SRS call. The CPE must go into on-hook state within 2 seconds of the SRS call being terminated by the telephone switch. An example of a switch initiated disconnect message flow is shown in Figure 4.

3.3.4 CPE Initiated Disconnect Call Flow

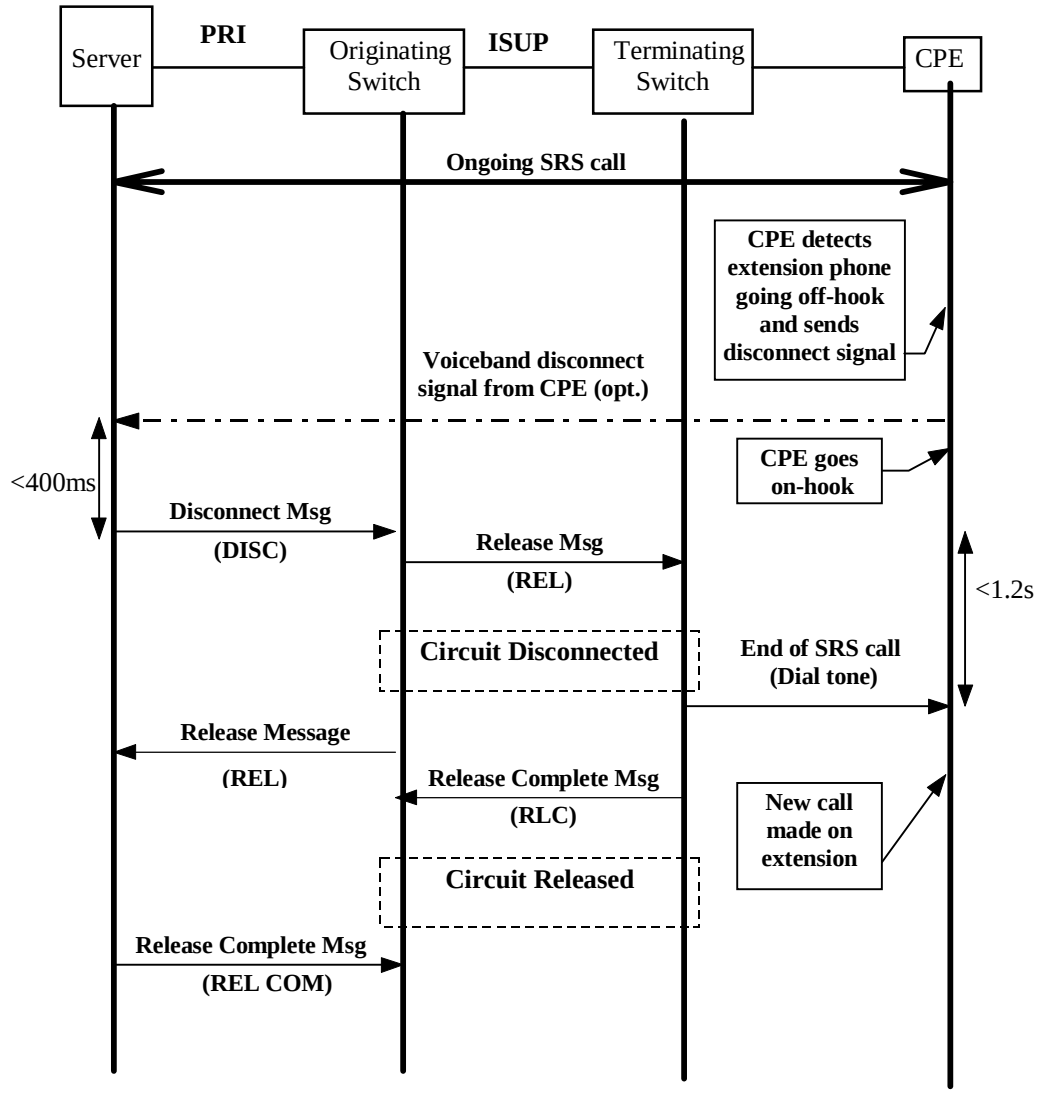
Figure 5: CPE Initiated Disconnect



The call flow in Figure 5 shows the signalling messages in the case the CPE equipment communicating with the server initiates a disconnect. This could occur if the handset of a ADSI telephone is taken off-hook or the keypad is touched during a data transmission session indicating that the end user wishes to initiate a new call.

3.3.5 Telephone Extension Initiated Disconnect Call Flow

Figure 6: Telephone Extension Initiated Disconnect



The message flow in Figure 6 shows the example of when an end user subscriber goes off-hook on an extension telephone during a SRS call already established with another CPE on the same line. It also assumes the case where the extension telephone is not immediately put back on-hook during the SRS disconnection process. If the end user puts the extension telephone immediately back on-hook the message flow in Figure 5 will apply.

4.0 REFERENCES

4.1 Industry Canada Certification Standard CS-03
- Standard for Terminal Equipment, Terminal Systems, Network Protection Devices, Connection Arrangements and Hearing Aids Compatibility.

4.2 Bellcore FR-NWT-000012 - *Analog Display Services Interface (ADSI).* Issue 1, August 1993.
- This is a family of documents that include most of Bellcore's ADSI documents.

4.3 Bellcore TR-NWT-001273 - *Generic Requirements for an SPCS to Customer Premises Equipment Data Interface for Analog Display Services*, Issue 1, December 1992 and Bulletins.

4.4 Bellcore SR-INS-002461 - *CPE Compatibility Guidelines for the Analog Display Services Interface,* Issue 1, December 1992.

4.5 Bellcore SR-002495 - *Guidelines for Writing Applications which Use the Analog Display Services Interface (ADSI) for Data Communications,* Issue 2, Dec. 1994.

4.6 Bellcore GR-30-CORE - *Voiceband Data Transmission Interface, LSSGR Section 6.6,* Issue 1, December 1994.
- Contains details on the CPE alerting signal.

4.7 Bellcore TR-NWT-000057 - *Functional Criteria for Digital Loop Carrier,* Issue 2, January 1993.
- Contains details of the OSI capability on Digital Loop Carriers.

4.8 Bellcore SR-TSV-002476 - *Customer Premises Equipment Compatibility Considerations for the Voiceband Data Transmission Interface*, Issue 1, December 1992.

4.9 ANSI/EIA-470-A-1987 - *Telephone Instruments with Loop Signaling,* Electronic Industries Association, July 1987.
- Specifications of electrical characteristics of CPE equipment.

4.10 Stentor Resource Centre Inc. Interface Document ID-0005 - *Megalink - Terminal to Network Interface*.

4.11 Northern Telecom Inc. Document NIS A211-1, Version 3 - *ISDN Primary Rate User- Network Interface Specification*.

5.0 ACRONYMS

ACM	Address Complete Message
ADSI	Analog Display Services Interface
ANM	Answer Message
CAS	CPE Alerting Signal
CCS#7	Common Channel Signalling # 7
CdPN	Called Party Number
CgPN	Calling Party Number
CLID	Calling Line ID
CPE	Customer Premises Equipment
DN	Directory Number
IAM	Initial Address Message
INF	Information Message
ISDN	Integrated Services Digital Network
ISUP	ISDN User Part
OCN	Original Called Number
OI	Open Interval
OSI	Open Switch Interval
PAM	Pass Along Message
POTS	Plain Old Telephone Service
PRI	Primary Rate Interface
PSTN	Public Switch Telephone Network
RDN	Routing DN
REL	Release Message
RLC	Release Complete Message
SRA	Suppressed Ringing Access
SRS	Suppressed Ringing Service
UDLC	Universal Digital Loop Carrier
UTS	Utility Telemetry Service