

**Public Switched Telephone Network (PSTN);
Protocol over the local loop for display and related services;
Proposed enhancements and maintenance
of existing standards**



Reference

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Foreword

This Technical Report (TR) has been produced by ETSI Project Analogue Terminals and Access (ATA).

The present document proposes some enhancements for the subscriber line protocol over the local loop to support the following PSTN services:

- Advice Of Charge During the call (AOC-D), and at the End of the call (AOC-E);
- Alarm Call;
- Call Return;
- Completion of Calls to Busy Subscriber (CCBS);
- Completion of Calls on No Reply (CCNR);
- Calling Name Identification Presentation (CNIP);
- Calling Name Identification Restriction (CNIR);
- Connection Type (CT);
- Message Waiting Indication (MWI);
- Monitoring service;
- Multiple Subscriber Number (MSN);
- Short Message Service (SMS);
- Subaddressing (SUB);
- User Procedure Notification.

The enhancement of the already specified PSTN service:

- Calling Line Identification Presentation (CLIP);
- Calling Line Identification Restriction (CLIR);

and extra information:

- User/Network Provided Number (UPN/NPN);
- Network Provider Identity (NPI).

1 Scope

The present document presents the technical implementation of certain PSTN services, as well as the necessary changes to the protocol, defined in [1] and [2], supporting these services.

The result of the present document will allow the design of a system and pertaining terminals able to transmit, receive and process the information (data) pertaining to a specific service. It will be up to the operators to use or not this information in their PSTN services.

For each service, the document proposes a simple service description and how the protocol will support the specific PSTN service. The status (e.g. "mandatory") has been mentioned for each information. This status precise which information is/are primordial for the services in consideration.

The terminal manufacturers choose which services the terminal is intended to support and the terminal shall correctly interpret messages containing the mandatory parameter types related to those services.

2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, subsequent revisions do apply.
- A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

- [1] ETS 300 659-1: "Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 1: On hook data transmission".
- [2] ETS 300 659-2: "Public Switched Telephone Network (PSTN); Subscriber line protocol over the local loop for display (and related) services; Part 2: Off-hook data transmission".
- [3] TR 102 088: "Public Switched Telephone Network (PSTN); Subscriber line protocol for Advice of Charge (AoC) display services".
- [4] TR 102 089: "Public Switched Telephone Network (PSTN); Selection of a Specific Terminal or Terminal Function".
- [5] Void.
- [6] ETS 300 179: "Integrated Services Digital Network (ISDN); Advice Of Charge: charging information during the call (AOC-D) supplementary service; Service description".
- [7] ETS 300 180: "Integrated Services Digital Network (ISDN); Advice of Charge: charging information at the end of the call (AOC-E) supplementary service; Service description".
- [8] ETS 300 648: "Public Switched Telephone Network (PSTN); Calling Line Identification Presentation (CLIP) supplementary service; Service description".
- [9] ETS 300 649: "Public Switched Telephone Network (PSTN); Calling Line Identification Restriction (CLIR) supplementary service; Service description".

3 Abbreviations

For the purposes of the present document, the following abbreviations apply:

AOC-D	Advice Of Charge During the call
AOC-E	Advice Of Charge at the End of the call
CCBS	Completion of Calls to Busy Subscriber
CCNR	Completion of Calls on No Reply
CLIP	Calling Line Identification Presentation
CLIR	Calling Line Identification Restriction
CNIP	Calling Name Identification Presentation
CNIR	Calling Name Identification Restriction
CT	Connection Type
FSK	Frequency Shift Keying
LE	Local Exchange
MSN	Multiple Subscriber Number
MWI	Message Waiting Indication
NPI	Network Provider Identity
NPN	Network Provided Number
PSTN	Public Switched Telephone Network
SMS	Short Message Service
SUB	Subaddressing
TE	Terminal Equipment
UPN	User Provided Number
VPN	Virtual Private Network

4 Service definitions

4.1 Calling Line Identification Presentation (CLIP)

The "Calling Line Identification Presentation" (CLIP) supplementary service provides the called party with the possibility of receiving identification of the calling party.

For more information see DTR/NA-020062 (see Bibliography) and ETS 300 648 [8].

4.2 Calling Line Identification Restriction (CLIR)

The "Calling Line Identification Restriction" (CLIR) supplementary service enables the calling party to prevent presentation of its calling line identity to the called party.

For more information see DTR/NA-020062 (see Bibliography) and ETS 300 649 [9].

4.3 Calling Name Identification Presentation (CNIP)

The "Calling Name Identification Presentation" (CNIP) supplementary service provides the called party with the possibility to receive name information associated with the calling party (calling party name).

For more information see DTR/NA-020062 (see Bibliography).

4.4 Calling Name Identification Restriction (CNIR)

The "Calling Name Identification Restriction" (CNIR) supplementary service enables the calling party to prevent presentation of the user's name information to the called party.

For more information see DTR/NA-020062 (see Bibliography).

4.5 Short Message Service (SMS)

The "Short Message Service" provides the possibility to transfer short text messages between a network provider and a subscriber or between two subscribers.

NOTE: Documents [1] and [2] only describe the protocol from the network provider to the subscriber.

For more information see DTR/NA-020062 (see Bibliography).

4.6 Advice of Charge, During the call (AOC-D)

The "Advice of Charge": Charging information During the call (AOC-D) supplementary service provides the served user with cumulative charging information during the call. The subscriber will automatically receive the message or on request.

NOTE: Information should be restricted not to cause too long interruption in the conversation or any other type of transmission. It should be recommended to send only mandatory information without optional information.

For more information see TR 102 088 [3] and ETS 300 179 [6].

4.7 Advice of Charge, End of call (AOC-E)

The "Advice of Charge": Charging information at the End of the call (AOC-E) supplementary service provides the served user with charging information for a call after the call is terminated.

For more information see TR 102 088 [3] and ETS 300 180 [7].

4.8 Connection Type (CT)

The "Connection Type" (CT) service enables the calling user with the possibility of sending a Connection Type information to the called user.

The network shall deliver the Connection Type information to the called user during call presentation.

The CT provides the called user with the possibility of receiving a Connection Type information.

NOTE: MSN, CT and SUB information are mutually exclusive.

For more information see TR 102 089 [4].

4.9 Multiple Subscriber Number (MSN)

The "Multiple Subscriber Number" (MSN) supplementary service provides the possibility of assigning multiple numbers (not necessarily consecutive) to a single PSTN access. The network shall deliver the MSN information to the called user during call presentation. This enables the selection of one or more terminals attached to the same access.

NOTE: MSN, CT and SUB information are mutually exclusive.

For more information see TR 102 089 [4].

4.10 Subaddressing (SUB)

The "Subaddressing" (SUB) supplementary service allows the called (served) user to expand his addressing capacity beyond the one given by the PSTN number. Only the served user shall define the significance of a subaddress, enabling the selection of a specific terminal or function.

Terminals on the same line are able to decide by themselves if and how to react depending on the received SUB information.

A subaddress, if inserted by a calling user, shall be delivered unchanged to the called analogue line.

The SUB information transmission takes place at the call presentation.

NOTE: MSN, CT and SUB information are mutually exclusive.

For more information see TR 102 089 [4].

4.11 Call Return

The "Call Return" supplementary service allows the called user to recall the last call received. Information about the last calling party can be received when the user invokes the service.

For more information see DTR/NA-020062 (see Bibliography).

4.12 Completion of Calls to Busy Subscriber (CCBS)

The "Completion of Calls to Busy Subscriber" (CCBS) supplementary service allows a calling user A (the served user) encountering a busy destination B to have the call completed, when the busy destination B becomes idle without having to make a new call attempt.

For more information see DTR/NA-020062 (see Bibliography).

4.13 Completion of Calls on No Reply (CCNR)

The "Completion of Calls on No Reply" (CCNR) supplementary service allows a calling user A encountering a not-responding destination B to have the call completed when the not-responding destination B answers, without having to make a new call attempt.

For more information see DTR/NA-020062 (see Bibliography).

4.14 Message Waiting Indication (MWI)

The served user is notified by the network about the presence/absence of message(s) waiting in the mailbox.

For more information see DTR/NA-020062 (see Bibliography).

4.15 Alarm Call

The "Alarm Call" supplementary service provides the possibility for a user to cause an alarm call to be made on his line at a time or times specified in advance by him and to receive an appropriate indication.

For more information see DTR/NA-020062 (see Bibliography).

4.16 User Procedure Notification

The "User Procedure Notification" service enables a user to receive information related to activation/deactivation procedures of supplementary services at the served user's home access.

NOTE: In case of activation/deactivation of call forwarding services the parameter type of a forwarded call can be used to precise the kind of call forwarding service.

4.17 Monitoring Service

The "Monitoring Service" provides the possibility to inform the served user about an incoming call which has been forwarded to a mailbox (e.g. a voice mailbox) and also about the end of such connection. This service enables a terminal to indicate this status and furthermore it can go into a monitoring state.

5 Parameter definitions

5.1 Date and Time

The purpose of the "Date and Time" parameter is to provide the date and the time to the user. It indicates the point in time when the message has been generated by the LE.

5.2 Calling Line Identity and Reason for Absence of Calling Line Identity

The purpose of the "Calling Line Identity" parameter is to identify the origin of a call.

The purpose of the "Reason for Absence of Calling Line Identity" parameter is to describe the reason for absence of "Calling Line Identity".

The parameters "Calling Line Identity" and "Reason for Absence of Calling Line Identity" are mutually exclusive within a message.

5.3 Called Line Identity

The purpose of the "Called Line Identity" parameter is to identify the called party of a call.

5.4 Calling Party Name and Reason for Absence of Calling Party Name

The purpose of the "Calling Party Name" parameter is to identify the name of the calling party.

The purpose of the "Reason for Absence of Calling Party Name" parameter is to describe the reason for absence of the "Calling Party Name".

The parameters "Calling Party Name" and "Reason for Absence of Calling Party Name" are mutually exclusive within a message.

5.5 Visual Indicator

The purpose of the "Visual Indicator" parameter is to switch on/off a TE visual indicator (presence/absence of waiting messages in the mailbox system).

5.6 Message Identification

The purpose of the "Message Identification" parameter is to provide the current reference of the message in the mailbox system.

5.7 Originating Identity

The purpose of the "Originating Identity" parameter is to provide the CLI of the calling party who has left the last message in the mailbox system.

5.8 Complementary Calling Line Identity

The purpose of the "Complementary Calling Line Identity" parameter is to transmit the "Network Provided Number" (NPN) when both, a NPN and a "user provided number" (UPN) are available. The UPN is transmitted in the "Calling Line Identity" parameter.

5.9 Call Type

The purpose of the "Call Type" parameter is to identify the type of the incoming call and/or the associated service (e.g. Normal Call, External Call, Internal Call, Alarm Call, CCBS or CCNR, Calling Name).

5.10 First Called Line Identity

The purpose of "First Called Line Identity" parameter is to identify the first called party in case of forwarded calls.

5.11 Network Message System Status

The purpose of "Network Message System Status" parameter is to specify the number of waiting messages in the mailbox system.

5.12 Type of Forwarded Call

The purpose of "Type of Forwarded Call" parameter is to identify the type of call forwarding in case of forwarded calls (e.g. Unavailable or unknown type, On busy, On no reply, Unconditional, Deflected call after alerting, Deflected call immediate, On inability to reach mobile subscriber).

NOTE: This parameter can also be used within the User Procedure Notification service.

5.13 Type of Calling User

The purpose of "Type of Calling User" parameter is to identify the origin of the call (e.g. Origination unknown or unavailable, Voice Call).

5.14 Redirecting Number

The purpose of "Redirecting Number" parameter is to identify the last redirecting party in case of a chained forwarded call.

5.15 Charge

The purpose of the "Charge" parameter is to provide charge information during a call or at the end of a call or at the end of a session.

NOTE: A session means succeeded/simultaneous calls without going in On-Hook state (e.g. call hold and three party).

5.16 Additional Charge

The purpose of the "Additional Charge" parameter is to provide the cumulated charging information of all calls which have been made until the end of the last call (last call/session included).

As a network provider option, the counter of that cumulated charging information can be set to zero by the network provider or the subscriber or after a specific time period or never at all (overflow when maximum is reached).

5.17 Extra Charge (for further study)

The purpose of the "Extra Charge" parameter is to provide the cumulated charging information of all calls which have not been made directly on an access and have been terminated at the time when the transmission takes place, e.g. call forwarded calls.

As a network provider option, the counter of that cumulated charging information can be set to zero by the network provider or the subscriber or after a specific time period or never at all (overflow when maximum is reached).

This parameter can be transmitted with other charging information.

5.18 Duration of the call

The purpose of the "Duration of the call" parameter is to indicate the chargeable duration of the call.

5.19 Network Provider Identity

The purpose of the "Network Provider Identity" parameter is to indicate the current network provider which the terminal is connected to.

5.20 Carrier Identity

The purpose of the "Carrier Identity" parameter is to indicate the current network carrier identity.

5.21 Selection of Terminal Function

The purpose of the "Selection of Terminal Function" parameter is to provide information to select specific terminal(s) or specific function(s) on the same access.

The selection of terminal(s) or function(s) is based on one of the following services: Multiple Subscriber Number, Connection Type, SUBaddressing.

5.22 Display Information

The purpose of the "Display information" parameter is to transmit a general text information to the served user.

This text can be stored in memory and/or just displayed by the terminal (this indication can be included in the parameter).

NOTE: This parameter can be used with all display services.

5.23 Service Information

This parameter indicates the network status "active" or "not active" of the relevant service.

5.24 Extension for Network Operator use

The purpose of the "Extension for Network Operator use" parameter is to qualify, without ambiguity for the TE, the private extension of the standard used by the network provider.

6 Service implementation overview

From the protocol point of view, services are compatible when their information can be transmitted in the same message type. If different compatible services are invoked at the same time, their relevant information should be transmitted in a unique message, because only one message type is allowed per FSK transmission.

The following table describes how information shall be used associated with services.

			CLIP/CLIR	CNIP/CNIR	AOC-D,E (note 1)	SMS	CCBS/CCNR (note 2)	MWI (note 3)	MSN, SUB,CT	CALL RETURN	ALARM CALL	USER PROCEDURE NOTIFICATION	MONITORING SERVICE
DATA TRANSMISSION													
ON-HOOK STATE			A	A	A	A	A	A	A	-	A	A	A
OFF-HOOK STATE			A	A	A	A	-	A	A	A	A	A	A
MESSAGE TYPE													
CALL SETUP MESSAGE (80H)			A	A	-	-	A	-	A	A	A	-	A
MESSAGE WAITING INDICATOR (82H)			-	-	-	-	-	A	C	-	-	-	-
ADVICE OF CHARGE (86H)			-	-	A	-	-	-	C	-	-	-	-
SHORT MESSAGE SERVICE (89H)			-	-	-	A	-	-	C	-	-	A	-
PARAMETER TYPE													
DATE AND TIME (01H)			O	O	O	O	O	O	O	O	O	O	O
CALLING LINE IDENTITY (02H)			M/	C/	O/	O/	-	O/	C/	M/	-	-	C/
CALLED LINE IDENTITY (03H)			O	C	O	-	O	-	C	N	-	-	O
REASON FOR ABSENCE OF CALLING LINE IDENTITY (04H)			M/	C/	O/	O/	-	O/	C/	M/	-	-	C/
	4FH	Unavailable	M/	C/	O/	O/	-	O/	C/	M/	-	-	C/
	50H	Private	M/	C/	O/	O/	-	O/	C/	M/	-	-	C/
CALLING PARTY NAME (07H)			C/	M/	-	O/	-	O/	C/	O/	-	-	C/
REASON FOR ABSENCE OF CALLING PARTY NAME (08H)			C/	M/	-	O/	-	O/	C/	O/	-	-	C/
	4FH	Unavailable	C/	M/	-	O/	-	O/	C/	O/	-	-	C/
	50H	Private	C/	M/	-	O/	-	O/	C/	O/	-	-	C/
VISUAL INDICATOR (0BH)			-	-	-	-	-	M	C	-	-	-	-
	00H	Indicator off	-	-	-	-	-	M/	C/	-	-	-	-
	FFH	Indicator on	-	-	-	-	-	M/	C/	-	-	-	-
MESSAGE IDENTIFICATION (0DH)			-	-	-	-	-	O	C	-	-	-	-
ORIGINATING IDENTITY (0EH)			-	-	-	-	-	O	C	-	-	-	-
COMPLEMENTARY CALLING LINE IDENTITY (10H)			O	C	O	O	-	O	C	O	-	-	O
CALLTYPE (11H)			O	O	-	-	M	N	C	M	M	-	M
	01H	Normal (voice) Call	O/	O/	-	-	-	-	C/	-	-	-	-
	02H	CCBS or CCNR (ringback)	-	-	-	-	M	-	C/	-	-	-	-
	03H	Calling name Delivery	-	O/	-	-	-	-	C/	-	-	-	-
	04H	Call Return	-	-	-	-	-	-	C/	M	-	-	-
	05H	Alarm Call	-	-	-	-	-	-	C/	-	M	-	-
	06H	Download Function	O/	O/	-	-	-	-	C/	-	-	-	-
	07H	Reverse charging Call	O/	O/	-	-	-	-	C/	-	-	-	-
	10H	External Call (VPN)	O/	O/	-	-	-	-	C/	-	-	-	-
	11H	Internal Call (VPN)	O/	O/	-	-	-	-	C/	-	-	-	-
	50H	Monitoring call Off	-	-	-	-	-	-	C/	-	-	-	M/
	51H	Monitoring call On	-	-	-	-	-	-	C/	-	-	-	M/
	81H	Message Waiting	-	-	-	-	-	-	C/	-	-	-	-

			CLIP/CLIR	CNIP/CNIR	AOC-D,E (note 1)	SMS	CCBS/CCNR (note 2)	MWI (note 3)	MSN, SUB,CT	CALL RETURN	ALARM CALL	USER PROCEDURE NOTIFICATION	MONITORING SERVICE
FIRST CALLED LINE IDENTITY (12H)			O	C	-	-	-	-	C	O	-	-	O
NETWORK MESSAGE SYSTEM STATUS (13H)			-	-	-	-	-	O	C	-	-	-	-
	00H	No messages	-	-	-	-	-	O/	C/	-	-	-	-
	01H	One or unspecified number of messages	-	-	-	-	-	O/	C/	-	-	-	-
	02H-FFH	Number of messages	-	-	-	-	-	O/	C/	-	-	-	-
TYPE OF FORWARDED CALL (15H)			O	C	-	-	-	-	C	O	-	O	O
	00H	Unavailable or unknown type	O/	C/	-	-	-	-	C/	O/	-	O/	O/
	01H	On busy	O/	C/	-	-	-	-	C/	O/	-	O/	O/
	02H	On no reply	O/	C/	-	-	-	-	C/	O/	-	O/	O/
	03H	Unconditional	O/	C/	-	-	-	-	C/	O/	-	O/	O/
	04H	Deflected call after alerting	O/	C/	-	-	-	-	C/	O/	-	O/	O/
	05H	Deflected call immediate	O/	C/	-	-	-	-	C/	O/	-	O/	O/
	06H	On inability to reach mobile subscriber	O/	C/	-	-	-	-	C/	O/	-	O/	O/
TYPE OF CALLING USER (16H)			O	O	-	O	-	O	C	O	-	-	O
	00H	Origin unknown or unavailable	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	01H	Voice Call	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	02H	Text Call	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	03H	VPN	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	04H	Mobile phone	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	05H	Mobile phone + VPN	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	06H	Fax Call	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	07H	Video Call	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	08H	E-mail Call	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	09H	Operator Call	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	0AH	Ordinary calling subscriber	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	0BH	Calling subscriber with priority	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	0CH	Data Call	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	0DH	Test Call	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
	0FH	Payphone	O/	O/	-	O/	-	O/	C/	O/	-	-	O/
REDIRECTING NUMBER (1AH)			O	C	-	-	-	-	C	O	-	-	O
CHARGE (20H)			-	-	M	-	-	-	C	-	-	-	-
ADDITIONAL CHARGE (21H)			-	-	O	-	-	-	C	-	-	-	-
EXTRA CHARGE(22H)			-	-	O	-	-	-	C	-	-	-	-
DURATION OF THE CALL (23H)			-	-	O	-	-	-	C	-	-	-	-
NETWORK PROVIDER IDENTITY (30H)			O	O	O	O	O	O	O	O	O	O	O
CARRIER IDENTITY (31H)			-	-	O	-	O	-	-	-	-	-	-
SELECTION OF TERMINAL FUNCTION(40H)			C	C	C	C	C	C	M	C	C	C	C
	01H	Connection Type	C/	C/	C	C/	-	-	M/	C/	-	-	C/
	02H	MSN	C/	C/	C	C/	C	C	M/	C/	C	C	C/
	03H	SUB	C/	C/	-	C/	-	-	M/	C/	-	-	C/

			CLIP/CLIR	CNIP/CNIR	AOC-D,E (note 1)	SMS	CCBS/CCNR (note 2)	MWI (note 3)	MSN, SUB,CT	CALL RETURN	ALARM CALL	USER PROCEDURE NOTIFICATION	MONITORING SERVICE
<i>DISPLAY INFORMATION (50H)</i>			O	O	O	M	O	O	O	O	O	O	O
	00H	No indication (default)	O/	O/	O/	M/	O/	O/	O/	O/	O/	O/	O/
	01H	Display information not to be stored	O/	O/	O/	M/	O/	O/	O/	O/	O/	O/	O/
	02H	Display information to be stored	O/	O/	O/	M/	O/	O/	O/	O/	O/	O/	O/
<i>SERVICE INFORMATION (55H)</i>			N	N	N	N	N	N	N	N	N	M	N
	00H	Service not active	-	-	-	-	-	-	-	-	-	M/	-
	01H	Service active	-	-	-	-	-	-	-	-	-	M/	-
EXTENSION FOR NETWORK OPERATOR USE (E0H)			O	O	O	O	O	O	O	O	O	O	O

REMARKS

A: Applicable

C: When different compatible services are invoked at the same time, their relevant information should be transmitted in a unique message.

M: Mandatory

- : Not applicable

O: Optional

/: Either of

NOTE 1: The parameter "Calling line ID" shall be used in case of reverse charging.

NOTE 2: As a network provider option the called line identity information might also be sent in the "Calling Line Identity" parameter, to ensure the compatibility with some existing terminals.

NOTE 3: The LE should use the Message Waiting Indicator message type. The same information can be transmitted to the TE using the Call Setup message.

In this context, the mandatory parameter is "Call Type" (parameter type: 11H) coded as "Message waiting call" (81H).

This message (Call Setup) can be completed by optional parameters.

Bibliography

The following material, though not specifically referenced in the body of the present document (or not publicly available), gives supporting information.

- DTR/NA-020062: "Public Switched Telephone Network (PSTN); List of information for PSTN use".

History

Document history		
V1.1.1	July 1999	Publication