

## **Public Switched Telephone Network (PSTN); Subscriber line protocol for Advice of Charge (AoC) display services**

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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 Advice of Charge PSTN services:

- during the call (AOC-D);
- at the End of the call (AOC-E).

The Advice of Charge - at call Set-up (AOC-S) has not been included in the present document because it has not been deemed feasible in the PSTN network. The charging information is very complex and not uniform with all operators. The information transfer may interfere with the communication and disturb the user or ongoing data transmission. More investigation has to be made about this service before introduced.

NOTE: For the time being, all charging information is not certified by the network but allows the customer to have an idea about the charge of these calls.

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## 1 Scope

The present document gives a list of information that can be provided with PSTN Advice of Charge services.

These services can be provided using the data modem V23 transmission. This protocol is described in documents [1] and [2].

This protocol has been specified to support PSTN display services and it is now completed. This protocol is generic and can be used by other services. It is appropriate to study AOC services applications of this protocol.

The result of this study would allow to design terminals able to display AOC information on a screen. It will be up to the operator to use or not this information in their PSTN services.

For each service, using data modem V23 transmission, the present document proposes a simple service description associated with a list of information. For each information, the type "mandatory" or "optional" has been mentioned. These types precisely indicate the information is/are primordial for the service in consideration.

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## 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, the latest version applies.
- 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] CCITT Recommendation T.50 (1992): "International Reference Alphabet (IRA) (Formerly International Alphabet No. 5 or IA5) - Information technology - 7 bit coded character set for information interchange".

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## 3 Abbreviations

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

|       |  |
|-------|--|
| AOC-S | Advice of Charge - at call Set-up time |
| AOC-D | Advice of Charge - During call         |
| AOC-E | Advice of Charge - at the End of call  |
| PSTN  | Public Switched Telephone Network      |
| TE    | Terminal Equipment                     |

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## 4 Advice of Charge - During the call (AOC-D)

### 4.1 General description

#### 4.1.1 Definition

The Advice of Charge: charging information during the call (AOC-D) supplementary service enables a user to receive information on the recorded charges for a call during the active phase of the call.

#### 4.1.2 Description

The information transfer take place in the off-hook signaling state.

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.

The message shall contain:

- Charge.

The Charge information provides the charged amount information of a call to the user. It contains such information as: Not available, Free of Charge, Charged or currency units and Charged amount information.

The message may optionally contain:

- Date and time.

The date and time indicates when the message has been generated by the Local Exchange.

- Duration of the call.

The Duration of the call indicates the chargeable duration of the call.

- Called line identity.

The Called line identity indicates the called party identity of a call.

- General information.

The Message information allows to send any text information to the user (commercial information for example).

- Extension for network operator use.
- Network operator information.

### 4.2 Procedures

#### 4.2.1 Provision and withdrawal

The Advice of Charge, during the call, service shall be provided after prior arrangement with the service provider.

The Advice of Charge, during the call, service shall be withdrawn by the service provider upon request of the subscriber, or for service provider reasons.

## 4.2.2 Normal procedures

### 4.2.2.1 Registration and erasure

Not applicable.

### 4.2.2.2 Activation and deactivation

The Advice of Charge, during the call, service shall be activated by the service provider at provision for all calls. As an operator option, it may be possible to deactivate the service on a per call basis. The deactivation on a per call basis shall occur at served user's request.

The AOC-D supplementary service may be activated only on a per call basis at served user's request.

### 4.2.2.3 Invocation and operation

In case of automatic transmission option, the network shall transfer charging information to the served user when an appropriate cost increment occurs. The rate of sending information can be limited such that information shall not be sent more frequently than every T seconds, i.e. information shall be sent every T seconds, or when the increment occurs whichever is latter. The value of T is a network option.

In case of Request transmission option, the network shall transfer charging information to the served user on his request.

If the call is free of charge to the served user, this shall be indicated at the start of the call. If the call becomes free of charge to the served user during the call, the free of charge indication can be given at that time. The free of charge indication shall not be periodically repeated.

When the call is terminated, the overall charge for the call, even if this was a free call, shall be sent to the served user.

### 4.2.2.4 Interrogation

Not applicable.

## 4.2.3 Exceptional procedures

### 4.2.3.1 Registration and erasure

Not applicable.

### 4.2.3.2 Activation and deactivation

Not applicable.

### 4.2.3.3 Invocation and operation

If the charging information related to a call is not available, this shall be indicated to the served user using the specific rate "not available".

If for any reason, no charging information is provided at all on a call, then the user shall assume that the information is not available. The user cannot assume that the call is free of charge.

If the network recognizes that the charge information is incorrect, the charge information "not available" shall be used for that charge item.

If the charging information related to a call is not available, this shall be indicated once at the start of the call and shall not be periodically repeated.



#### 4.2.3.4 Interrogation

Not applicable.

### 4.3 Terminal assignment

Terminals which support the Advice of Charge, during the call, service should store the information in an appropriate memory and display it in an appropriate way relative to the application.

---

## 5 Advice of Charge - End of call (AOC-E)

### 5.1 General description

#### 5.1.1 Definition

The Advice of charge: Charging information at the End of the call (AOC-E) supplementary service enables a user to receive information on the recorded charges for a call when the call is terminated.

#### 5.1.2 Description

The information transfer takes place only in the on-hook signaling state.

The message shall contain:

- Charge.

The Charge information provides the charged amount information of a call to the user. It contains such information as: Not available, Free of Charge, Charged or currency units and total Charged amount information.

The message may optionally contain:

- Date and time.

The date and time indicates when the message has been generated by the Local Exchange.

- Duration of the call.

The Duration of the call indicates the chargeable duration of the call.

- Called line identity.

The Called line identity indicates the called party identity of a call.

- General information.

The Message information allows to send any text information to the user (commercial information for example).

- Extension for network operator use.

- Network operator information.

## 5.2 Procedures

### 5.2.1 Provision and withdrawal

The Advice of Charge, End of call, service shall be provided after prior arrangement with the service provider.

The Advice of Charge, End of call, service shall be withdrawn upon request of the subscriber by the service provider, or for service provider reasons.

### 5.2.2 Normal procedures

#### 5.2.2.1 Registration and erasure

Not applicable.

#### 5.2.2.2 Activation and deactivation

Activation of the AOC-E supplementary service shall either occur for all calls at provision, or it shall be possible to activate the supplementary service on a per call basis. The activation on a per call basis shall occur at served user's request.

If AOC-E supplementary service is activated for all calls at provision, it may, as an operator option, be possible to deactivate the service on a per call basis. The deactivation on a per call basis shall occur at served user's request.

#### 5.2.2.3 Invocation and operation

The charging information shall be provided by the network when the call is terminated. This charging information shall include all the charging information (total) of the last call or session of calls (e.g. 3PTY-connections included).

As an operator option, charging information of forwarded calls may be provided by the network when those calls are terminated. When more calls are forwarded during a call or session of calls, a cumulated charging information shall be provided. The charging total of these calls may be provided in a separate data transmission or within the same data transmission of a normal charging information after a call has been terminated.

#### 5.2.2.4 Interrogation

Not applicable.

### 5.2.3 Exceptional procedures

#### 5.2.3.1 Registration and erasure

Not applicable.

#### 5.2.3.2 Activation and deactivation

The Advice of Charge, End of call, service shall be activated by the service provider at provision.

#### 5.2.3.3 Invocation and operation

If the charging information related to a call is not available this should be indicated to the served user.

#### 5.2.3.4 Interrogation

Not applicable.

## 5.3 Terminal assignment

Terminals which support the Advice of Charge, End of call, service should store the information in an appropriate memory and display it in an appropriate way relative to the application.

## 6 List of parameters

### 6.1 Charge parameters

#### 6.1.1 Charge parameter

Table 1

| Octet number | Octet Binary code | Octet Hex-code | Content   |
|--------------|-------------------|----------------|---|
| 1            | 0010 0000         | 20H            | Charge  |
| 2            | 0000 1110         | 0EH            | Parameter length (14)   |
| 3            |                   |                | Currency: character 1   |
| 4            |                   |                | Currency: character 2   |
| 5            |                   |                | Currency: character 3   |
| 6:<br>bit 1  |                   |                | 0: Normal charging<br>1: Free of Charge                                     |
| 6:<br>bit 2  |                   |                | 0: Total (AOC-E)<br>1: Subtotal (AOC-D)                                     |
| 6:<br>bit 3  |                   |                | 0: Normal charging<br>1: Credit/Debit Card Charging                         |
| 6:<br>bit 4  |                   |                | 0: Charging information available<br>1: Charging information not available  |
| 6:<br>bit 5  |                   |                | 0: Currency amount<br>1: Charged units or, charged units and price per unit |
| 7            |                   |                | Cost (10 digits): Digit 1<br>or<br>Units (5 digits): Digit 1                |
| ...          |                   |                | ...   |
| 11           |                   |                | Costs<br>or<br>Units (5digits): Digit 5                                     |
| 12           |                   |                | Costs<br>or<br>Price per unit (5 digits): Digit 1                           |
| ...          |                   |                | ...   |
| 16           |                   |                | Cost (10 digits): Digit 10<br>or<br>Price per unit (5 digits): Digit 5      |

Currency code according to:

- international monetary 3-letter acronym Characters shall be coded according to [3];
- e.g. "ITL" is Italian Lira, where "I" is the first character; or
- three characters "-" (2/13, 2/13, 2/13), in the case that only the number of units is provided.

One of the octets in the "cost" or "price per unit" fields may be substituted by "," (coma) indicating a decimal coma.

If units are provided without price per units, price per unit digits shall be replaced by the character "-" (2/13).

Digits (0 to 9 and ,) shall be coded according to [3].

If charging information is not available, Currency and Cost shall each be replaced by the character "-" (2/13).

## 6.1.2 Additional Charge parameter

Table 2

| Octet number | Octet Binary code | Octet Hex-code | Content   |
|--------------|-------------------|----------------|---|
| 1            | 0010 0001         | 21H            | Additional charge   |
| 2            | 0000 1110         | 0EH            | Parameter length (14)   |
| 3            |                   |                | Currency: character 1   |
| 4            |                   |                | Currency: character 2   |
| 5            |                   |                | Currency: character 3   |
| 6:<br>bit 1  |                   |                | 0: Normal charging<br>1: Free of Charge                                     |
| 6:<br>bit 2  |                   |                | 0: Total (AOC-E)<br>1: Subtotal (AOC-D)                                     |
| 6:<br>bit 3  |                   |                | 0: Normal charging<br>1: Credit/Debit Card Charging                         |
| 6:<br>bit 4  |                   |                | 0: Charging information available<br>1: Charging information not available  |
| 6:<br>bit 5  |                   |                | 0: Currency amount<br>1: Charged units or, charged units and price per unit |
| 7            |                   |                | Cost (10 digits): Digit 1<br>or<br>Units (5 digits): Digit 1                |
| ...          |                   |                | ...   |
| 11           |                   |                | Costs<br>or<br>Units (5 digits): Digit 5                                    |
| 12           |                   |                | Costs<br>or<br>Price per unit (5 digits): Digit 1                           |
| ...          |                   |                | ...   |
| 16           |                   |                | Cost (10 digits): Digit 10<br>or<br>Price per unit (5 digits): Digit 5      |

Currency code according to:

- international monetary 3-letter acronym Characters shall be coded according to [3].
- e.g. "ITL" is Italian Lira, where "I" is the first character; or
- three characters "-" (2/13, 2/13, 2/13), in the case that only the number of units is provided.

One of the octets in the "cost" or "price per unit" fields may be substituted by ",", (coma) indicating a decimal coma.

If units are provided without price per units, price per unit digits are replaced by the character "-" (2/13).

Digits (0 to 9 and ,) shall be coded according to [3].

If charging information not available, Currency and Cost shall be replaced by the character "-" (2/13).

## 6.2 Date and time

See [1], subclause 7.4.1.

## 6.3 Called Line Identity parameter

See [1], subclause 7.4.3.

## 6.4 Duration of the call

Table 3

| Octet number | Octet Binary code | Octet Hex-code | Content                          |
|--------------|-------------------|----------------|----------------------------------|
| 1            | 0010 0011         | 23H            | Time duration                    |
| 2            | 0000 0110         | 06H            | Parameter length (6)             |
| 3            |                   |                | Hour's most significant octet    |
| 4            |                   |                | Hour's least significant octet   |
| 5            |                   |                | Minute's most significant octet  |
| 6            |                   |                | Minute's least significant octet |
| 7            |                   |                | Second's most significant octet  |
| 8            |                   |                | Second's least significant octet |

Hours shall range from 00 to 99. Minutes shall range from 00 to 59. Seconds shall range from 00 to 59.

Each parameter octet shall be coded according to [3].

## 6.5 General information

See [1], (for further study).

## 6.6 Extension for network operator use parameter

See [1], subclause 7.4.16.

## Annex A (informative): Examples for charge parameter use

### A.1 Example: Currency amount (23,45 FRF)

Table A.1

| Octet number | Octet Binary code | Octet Hex-code | Content  |
|--------------|-------------------|----------------|--|
| 1            | 0010 0000         | 20H            | Charge   |
| 2            | 0000 1110         | 0EH            | Parameter length (14)                          |
| 3            | 0100 0110         | 46H            | Currency: Character 1 "F"                      |
| 4            | 0101 0010         | 52H            | Currency: Character 2 "R"                      |
| 5            | 0100 0110         | 46H            | Currency: Character 3 "F"                      |
| 6:<br>bit 1  | XXXX XXX0         | XXH            | 0: Normal charging                             |
| 6:<br>bit 2  | XXXX XX0X         | XXH            | 0: Total (AOC-E)                               |
| 6:<br>bit 3  | XXXX X0XX         | XXH            | 0: Normal charging                             |
| 6:<br>bit 4  | XXXX 0XXX         | XXH            | 0: Charging information available              |
| 6:<br>bit 5  | XXX0 XXXX         | XXH            | 0: Currency amount                             |
| 7            | 0011 0000         | 30H            | Units : Digit 1 "0" (most significant digit)   |
| 8            | 0011 0000         | 30H            | Units : Digit 2 "0"                            |
| 9            | 0011 0000         | 30H            | Units : Digit 3 "0"                            |
| 10           | 0011 0000         | 30H            | Units : Digit 4 "0"                            |
| 11           | 0011 0000         | 30H            | Units : Digit 5 "0"                            |
| 12           | 0011 0010         | 32H            | Units : Digit 6 "2"                            |
| 13           | 0011 0011         | 33H            | Units : Digit 7 "3"                            |
| 14           | 0010 1100         | 2CH            | Units : Digit 8 ", "                           |
| 15           | 0011 0100         | 34H            | Units : Digit 9 "4"                            |
| 16           | 0011 0101         | 35H            | Units : Digit 10 "5" (least significant digit) |

## A.2 Example: only units (23) without price per unit

Table A.2

| Octet number | Octet Binary code | Octet Hex-code | Content   |
|--------------|-------------------|----------------|---|
| 1            | 0010 0000         | 20H            | Charge  |
| 2            | 0000 1110         | 0EH            | Parameter length (14)                                 |
| 3            | 0010 1101         | 2DH            | Currency: Character 1 "-"                             |
| 4            | 0010 1101         | 2DH            | Currency: Character 2 "-"                             |
| 5            | 0010 1101         | 2DH            | Currency: Character 3 "-"                             |
| 6:<br>bit 1  | XXXX XXX0         | XXH            | 0: Normal charging                                    |
| 6:<br>bit 2  | XXXX XX0X         | XXH            | 0: Total (AOC-E)                                      |
| 6:<br>bit 3  | XXXX X0XX         | XXH            | 0: Normal charging                                    |
| 6:<br>bit 4  | XXXX 0XXX         | XXH            | 0: Charging information available                     |
| 6:<br>bit 5  | XXX1 XXXX         | XXH            | 1: Charged units or, charged units and price per unit |
| 7            | 0011 0000         | 30H            | Cost: Digit 1 "0" (most significant digit)            |
| 8            | 0011 0000         | 30H            | Cost: Digit 2 "0"                                     |
| 9            | 0011 0000         | 30H            | Cost: Digit 3 "0"                                     |
| 10           | 0011 0000         | 30H            | Cost: Digit 4 "2"                                     |
| 11           | 0011 0010         | 32H            | Cost: Digit 5 "3" (least significant digit)           |
| 12           | 0010 1101         | 2DH            | Price per units: Character 1 "-"                      |
| 13           | 0010 1101         | 2DH            | Price per units: Character 2 "-"                      |
| 14           | 0010 1101         | 2DH            | Price per units: Character 3 "-"                      |
| 15           | 0010 1101         | 2DH            | Price per units: Character 4 "-"                      |
| 16           | 0010 1101         | 2DH            | Price per units: Character 5 "-"                      |

## A.3 Example: units (78) with price per unit (0,12 DEM)

Table A.3

| Octet number | Octet Binary code | Octet Hex-code | Content  |
|--------------|-------------------|----------------|--|
| 1            | 0010 0000         | 20H            | Charge   |
| 2            | 0000 1110         | 0EH            | Parameter length (14)                                  |
| 3            | 0100 0100         | 44H            | Currency: Character 1 "D"                              |
| 4            | 0100 0101         | 45H            | Currency: Character 2 "E"                              |
| 5            | 0100 1101         | 4DH            | Currency: Character 3 "M"                              |
| 6:<br>bit 1  | XXXX XXX0         | XXH            | 0: Normal charging                                     |
| 6:<br>bit 2  | XXXX XX0X         | XXH            | 0: Total (AOC-E)                                       |
| 6:<br>bit 3  | XXXX X0XX         | XXH            | 0: Normal charging                                     |
| 6:<br>bit 4  | XXXX 0XXX         | XXH            | 0: Charging information available                      |
| 6:<br>bit 5  | XXX1 XXXX         | XXH            | 1: Charged units or, charged units and price per unit  |
| 7            | 0011 0000         | 30H            | Units: Digit 1 "0" (most significant digit)            |
| 8            | 0011 0000         | 30H            | Units: Digit 2 "0"                                     |
| 9            | 0011 0000         | 30H            | Units: Digit 3 "0"                                     |
| 10           | 0011 0111         | 37H            | Units: Digit 4 "7"                                     |
| 11           | 0011 1000         | 38H            | Units: Digit 5 "8" (least significant digit)           |
| 12           | 0011 0000         | 30H            | Price per units: Digit 1 "0" (most significant digit)  |
| 13           | 0011 0000         | 30H            | Price per units: Digit 2 "0"                           |
| 14           | 0010 1100         | 2CH            | Price per units: Digit 3 ", "                          |
| 15           | 0011 0001         | 31H            | Price per units: Digit 4 "1"                           |
| 16           | 0011 0010         | 32H            | Price per units: Digit 5 "2" (least significant digit) |



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## Bibliography

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

- ETS 300 778-1: "Public Switched Telephone Network (PSTN); Protocol over the local loop for display and related services; Terminal Equipment requirements; Part 1: Off-line data transmission".
- ETS 300 778-2: "Public Switched Telephone Network (PSTN); Protocol over the local loop for display and related services; Terminal Equipment requirements; Part 2: On-line data transmission".

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## History

| <b>Document history</b> |               |             |
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| V1.1.1                  | December 1998 | Publication |
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