TECHNICAL CODE

SPECIFICATION FOR ANALOGUE CALLING LINE IDENTITY PRESENTATION (A-CLIP) FACILITY FOR CONNECTION TO PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)

First Revision

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The Fixed Terminal Working Group under the Malaysian Technical Standards Forum Bhd (MTSFB) which developed this Technical Code consists of representatives from the following organisations:

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Epson Malaysia

NEC Corporation of Malaysia Sdn. Bhd.

Packet One Networks (Malaysia) Sdn. Bhd.

SIRIM QAS International Sdn Bhd

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Panasonic System Networks

FOREWORD

This technical code for the Specification for Analogue Calling Line Identity Presentation (A-CLIP) Facility for Connection to Public Switched Telephone Network (PSTN) ('this Technical Code') was developed pursuant to section 185 of the Act 588 by the Malaysian Technical Standard Forum Berhad ('MTSFB') via its Fixed Terminal Working Group.

This Technical Code was developed for the purpose of certifying communications equipment under the Communications and Multimedia (Technical Standards) Regulations 2000.

This Technical Code cancels and replaces Technical Specification for Analogue Calling Line Identity Presentation (A-CLIP) Facility for Technical Specification for Connection to Public Switched Telephone Network (PSTN), SKMM FTS P ACLIP Rev. 1.01:2007.

This Technical Code shall continue to be valid and effective until reviewed or canceled.

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SPECIFICATION FOR ANALOGUE CALLING LINE IDENTITY PRESENTATION (A-CLIP) FACILITY FOR CONNECTION TO PUBLIC SWITCHED TELEPHONE NETWORK (PSTN)

1. Scope

This document describes the requirements for terminal equipment (TE) intended to operate with Analogue Calling Line Identity Presentation (A-CLIP) service provided by voice band on-hook and off-hook data transmission.

The timings and signal levels given are from the TE's perspective and are referred to the connection point between the network and the TE.

Caller Display on Call Waiting is a service where caller number will be delivered by off-hook data transmission using multiple data message format and involves handshaking between the TE and the network.

2. Normative references

The following normative references are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the normative references (including any amendments) applies.

See Annex A.

3. Abbreviations

For the purpose of this document, the following abbreviation applies.

AC	Alternating Current
CLI	Calling line
CSS	Channel Seizure Signal
DATA	Data Transmission
DC	Direct Current
ETSI	European Telecommunications Standards Institute
IEC	International Electrotechnical Commission
SI	Silent Interval
SKMM	Malaysian Communications and Multimedia Commission
T	Transition time

4. Requirements

4.1 General requirements

4.1.1 Power supply requirements

TE may be AC or DC powered. For AC powered TE, the operating voltage shall be 240 V +5 %, −10 % and frequency 50 Hz ± 1 % as according to MS 406 or 230 V ± 10 % and frequency 50 Hz ± 1 % as according to MS IEC 60038 whichever is current.

Where external power supply is used, e.g. AC adaptor or battery, it shall not affect the capability of the TE to meet this specification.

Adaptor shall be pre-approved by the relevant regulatory body before it can be used with the TE.

4.1.2 Power supply cord and mains plug requirements

TE shall be fitted with a suitable and appropriate approved power supply cord and mains plug. Both are regulated products and shall be pre-approved by the relevant regulatory body before it can be used with the TE.

The power supply cord shall be certified according to:

- MS 140; or
- BS 6500; or
- IEC 60227-5; or
- IEC 60245-4.

The main plug shall be certified according to:

- 13 A fused plugs: MS 589: Part 1 or BS 1363: Part 1; or

- 2.5 A, 250 V, flat non-rewirable two-pole plugs: MS 1578 or BS EN 50075.

4.1.3 Polarity

The performance of the TE shall be independent of the PSTN line polarity i.e. the TE shall conform to both polarities of the line feeding (ETSI ES 203 021-1, clause A.3).

4.1.4 Interoperability and connectivity requirements

TE shall comply with the minimum requirement that is specified by the regulatory body.

4.1.4.1 Interoperability

TE shall be able to exchange information and to use the information that has been exchanged between two or more systems or components.

4.1.4.2 Connectivity

TE shall be able to link with other programs and devices to allow interoperability.

4.1.5 Marking requirements

TE shall be marked with the following information:

a) supplier/manufacturer's name or identification mark;

b) supplier/manufacturer's model or type reference; and

c) other markings as required by the relevant standards.

The markings shall be legible, indelible and readily visible.

4.1.6 Language

All markings, software and related documents shall be in Bahasa Melayu or English language.

4.1.7 Electromagnetic Compatibility and electrical safety requirements

4.1.7.1 TE shall comply with the limits for conducted disturbance at the mains terminals and telecommunication ports, and the limits for radiated disturbance defined in the IEC CISPR 22.

4.1.7.2 TE shall comply with the MS IEC 60950-1 safety standard. The requirements in MS IEC 60950-1 that are applicable to the TE [e.g. class of equipment, type of telecommunication network voltage (TNV) circuit and types of components] shall be identified and complied with.

4.2 Technical Requirement

4.2.1 Received Data Signal Parameters

TE shall be able to interact properly with the network for voiceband data transmission by complying the following received data signal parameters:

Table 1. FSK Data Signal Parameters

Link type	simplex, two wire		
Transmission scheme	analogue, phase coherent Frequency Shift Keying (FSK)		
Logical 1 (mark)/ Logical 0 (space)	(1200 ± 12) Hz/ (2200 ± 22) Hz	or	1300 Hz $\pm$ 1.5%/ 2100 Hz $\pm$ 1.5%
Transmission rate	1200 bit/s ± 12 bit/s		
Application of data	serial, binary, asynchronous		
Bit error rate	≤ 1 out of 100,000 bits		
Phase continuity	maintained from beginning of service to end of message		
Receiver sensitivity	-40 dBm ± 2 dBm		
Signal to Noise Ratio	15 dB		
Bit duration	833 ± 80 µs (start and stop bits have the same duration as a standard bit)		

4.2.2 Data message format

Data message shall be transmitted in a series of 8 bit data words each bounded by a start bit (space) and stop bit (mark), and segmented according to one of the two formats: the Single Data Message Format (SDMF) or the Multiple Data Message Format (MDMF) as shown in Figure 1 and Figure 2.

4.2.2.1 Single Data Message Format (SDMF)

A SDMF defines a message consisting of message type, message length, message word and checksum word which is used to detect error. The message type, message length and checksum shall consist of one byte each. The message word shall consist of one byte or more bytes. The message type contains an assigned value for identifying the service. The message length indicates the number of message words that follow (excluding the checksum byte). The message words shall be in alphanumeric characters using 8 bit word.

4.2.2.2 Multiple Data Message Format (MDMF)

A MDMF defines a message consisting of message type, message length, parameter message and error detection words. The parameter message shall consist of one or more parameters. Each parameter consists of a parameter type, parameter length and parameter word. The message type, message length, parameter type, parameter length and checksum word each shall consist of one byte. The message word within the each parameter shall consist of one or more bytes. As in the SDMF, the message type contains an assigned value for identifying the service and the message length indicates the total number of words that follow (excluding the error detection word). In addition, the MDMF allows parameter messages to include several features to be received within the same frame. The parameter type contains an assigned value used to identify the subsequent message word(s). The parameter length indicates the number of message words that follow the preceding parameter type word.

Figure 1. Single Data Message Frame Format

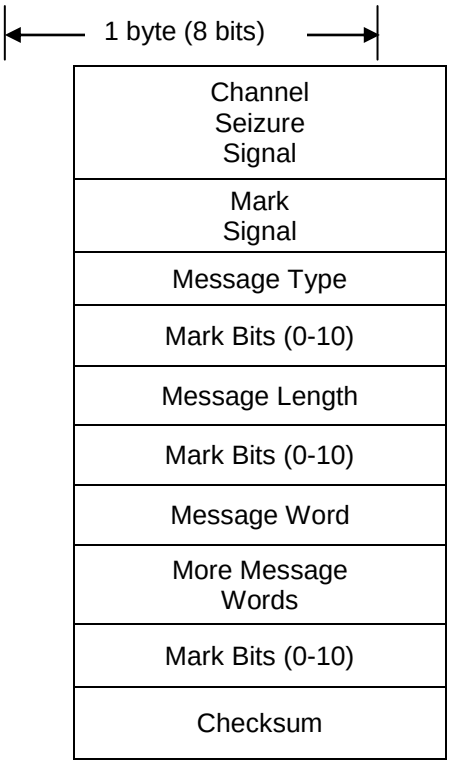
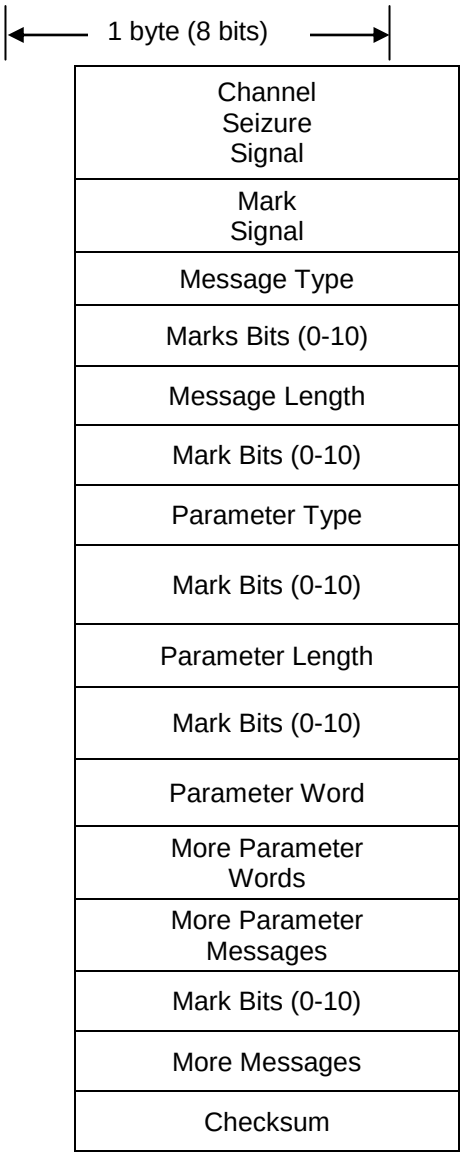


Figure 2. Multiple Data Message Frame Format



4.2.2.3 The data received shall be in the order of the least significant bit of each data byte first.

4.2.2.4 Message words not recognised by the TE shall be ignored (i.e. the corresponding message shall not be displayed). Recognition shall be based on the value used in the message type.

4.2.2.5 If TE recognises the message type of multiple messages but does not recognise one or more of the parameter type words within the multiple message, the TE shall process the message as follows:

a) all recognised parameter types shall continue to be processed (i.e. the corresponding message is displayed); and

b) all unrecognised parameter type words shall be ignored (i.e. the corresponding message is not displayed).

4.2.2.6 On receiving each message (single or multiple) the TE shall be able to switch “ON”, provide the message to be displayed, and then switch “OFF”. Single messages and/or multiple messages shall be received in a sequence, and therefore the TE shall be caused to switch “ON” and “OFF” several times.

4.2.3 Contents of Message

4.2.3.1 Message type indicates service and/or capability associated with the message. Values for the message type of the single and multiple messages shall be in range between the binary equivalence of 0 to 255. The single messages only supported the Calling Number Delivery Service. The content of the single message type word in binary shall be specified in Table 2.

Table 2. Message Type for Calling Number Delivery Service

Bit number	Value	Meaning	Type of message
76543210	00000100	Calling Number Delivery Information	Single Message

4.2.3.2 The multiple message type given in Table 3 is expected to be used in new services and in enhancements to existing service.

Table 3. Message type for additional services

Bit number	Value	Meaning	Type of message
76543210	10000000	Call Setup	Multiple Message

4.2.3.3 Values for the parameter type words within the multiple messages range between the binary equivalence of 0 to 255. The contents of the parameter type words used in the call setup multiple message by the PSTN shall be as in Table 4.

Table 4. Parameter type words for Call Setup message type

Bit Number	Value	Meaning
76543210	00000001	Date and Time
	00000010	Calling Line Identification
	00000100	Reason for Absence of DN
	00000111	Name

4.2.3.4 For the on-hook state, the data transmission may or may not associated with ringing signal. For example, the visual message waiting indication, using on-hook data transmission associated without ringing signal. Data transmission associated with PSTN ringing signal shall be as in Annex B.

4.2.3.5 For on-hook data reception, each Single or Multiple Message shall preceded by a Channel Seizure Signal and a Mark (logic 1) Signal. The purpose of the Channel Seizure Signal and the Mark Signal is to alert and condition the TE for the reception of a message frame. The Channel Seizure Signal shall consists of a block of 300 continuous bits of alternating “0”s and “1”s. The first bit to be received is “0’ and the last bit is “1”. The Mark Signal shall consists of 180 mark bits.

4.2.3.6 Message formats used by PSTN to convey A-CLIP Service information to TE shall be as in Annex C.

4.2.3.7 TE shall be capable of storing at least 12 characters. The information shall be displayed on a narrower display if scrolling is provided such that all 12 characters can be displayed. TE shall be able to display either lower or upper case letters.

4.2.3.8 When Calling Line (MDMF) Identification (CLI) is Not Available, TE shall be able to interpret reason for Absence of Caller Name. The reason may be displayed as received in the first byte of the parameter (the single ASCII characters “P” or “O”). Messages translated to “Private” or “Unavailable” and “Withheld” or “Out Of Area” are also acceptable.

4.2.3.9 The parameter byte for Network Message System Status indicates when messages are waiting in a message system. A value of zero means no messages waiting, a value of 1 means one or more messages waiting. (Optional)

4.2.3.10 TE that supports Call Waiting function shall comply as follows:

For off-hook data transmission, a stable call shall be interrupted, and a clear, voice-free channel established in OSI time interval. The PSTN initiates the process within W duration by muting transmission to and from the far end, and transmitting the alerting sequence Subscriber Alerting Signal (SAS) to alert the TE to new waiting calls. After a short period of X1, the PSTN transmit the TE Alerting Signal (CAS) to alert the TE to prepare for data reception.

Upon detection of the CAS, TE shall mutes the subscriber’s handset to prevent near-end interference, attaches a data receiver to the line, and responds to the PSTN with an Acknowledge Signal (ACK) indicating it readiness.

The PSTN shall wait for the ACK within t1 period. If ACK is detected, the PSTN shall begin to transmit data after Q transition time and re-establish the voice path by un-muting the far-end shortly after the end of data transmission. At about the same time, the TE shall un-mutes the handset, and the stable call is completely re-established.

In the event that the PSTN do not detects ACK signal within t1 period, the data shall not be transmitted and is called unsuccessful attempt. The complete stages of the process of the successful and unsuccessful attempt shall comply with Figure 3 and Figure 4. The detailed timing requirements describing this handshake shall be as described in Annex D.

The TE CAS and ACK shall meet the characteristics specified in Table 5.

Table 5. Handshaking Signal Characteristics

Signal	CAS	ACK
Frequency	(2130 $\pm$ 11) Hz (2750 $\pm$ 14) Hz	941 Hz $\pm$ 1.5 % 1633Hz $\pm$ 1 %
Level	Between -32 dBm and -14 dBm pertone	Between -12.0 dBm and -8.0 dBm (lower tone) Between -10.0 dBm and -6.0 dBm (upper tone) Level between lower tone and upper tone shall be 1 dB to 4 dB higher than the lower tone

Figure 3. Successful attempt

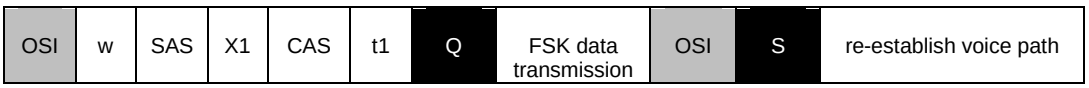
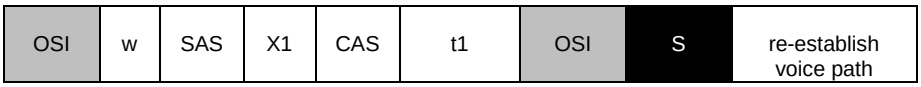


Figure 4. Unsuccessful attempt



4.2.4 Error Detection

The last word of the Single or Multiple Message is a checksum word. The checksum word shall contains two's complement of the modulo 256 sum of each bit in all the other words in the message. At the TE, checksum shall be recomputed and compared with the checksum word received in the message. The received message is considered to be error free if both values are identical. This approach is not able to detect all transmission errors. Specifically, it cannot detect offsetting bit errors occurring in the same message.

If TE detects an error, none of the received message shall be displayed. TE shall not send a message to indicate that an error has been detected as the PSTN would not retransmit the data. Error correction is not supported by this protocol.

Annex A
(Normative)

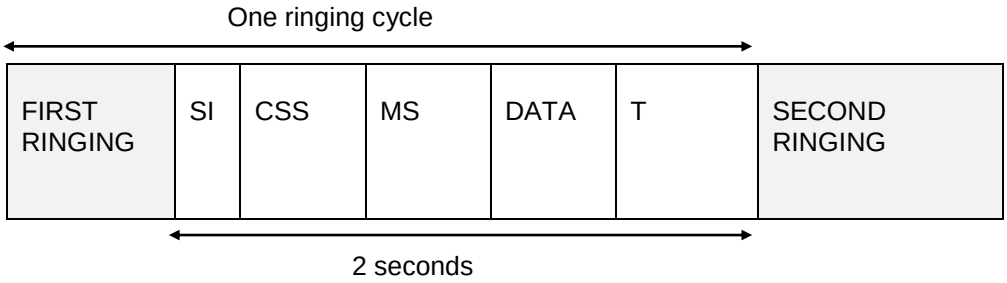
Normative references

BS 1363: Part 1	13 A plugs, socket-outlets, adaptors and connection units - Part 1: Specification for rewirable and non-rewirable 13 A fused plugs
BS 6500	Electric cables Flexible cords rated up to 300/500 V, for use with appliances and equipment intended for domestic, office and similar environments
BS EN 50075	Specification for flat non-wirable two-pole plugs 2.5 A 250 V, with cord, for the connection of class II-equipment for household and similar purposes
GR-30-CORE Issue 1, December 1994	Voiceband Data Transmission Interface
ETSI 300 001	Attachments to Public Switched Telephone Network (PSTN); General technical requirements for equipment connected to an analogue subscriber interface in the PSTN
ETSI ES 203 021	Terminal Equipment (TE); Attachment Requirements for pan-European approval for connection to the analogue Public Switched Telephone Networks (PSTNs) to TE (excluding TE supporting the voice telephony service) in which network addressing, if provided, is by means of Dual Tone Multi Frequency (DTMF) signalling
IEC 60227-5	Polyvinyl chloride insulated cables of rated voltages up to and including 450/750 V - Part 5: Flexible cables (cords)
IEC 60245-4	Rubber insulated cables - Rated voltages up to and including 450/750 V - Part 4: Cords and flexible cables
IEC CISPR 22	Information Technology Equipment - Radio disturbance characteristics - Limits and methods of measurement
ITU-T Recommendation E.161	Arrangement of digits, letters and symbols on telephones and other devices that can be used for gaining access to a telephone network

ITU-T Rec. T.50	Terminal equipment and protocols for telematic services
MS 140	Specification for insulated flexible cords and cables
MS 1578	Specification for flat non-rewirable two-pole plugs, 2.5 A, 250 V, with cord, for the connection of class II-Equipment for household and similar purposes
MS 406	Specification for voltages and frequency for alternating current transmission and distribution systems
MS 589: Part 1	Specification for 13 A plugs, socket outlets, adaptors and connection units Part 1: Specification for rewirable and non-rewirable 13 A fused plugs
MS IEC 60038	IEC standard voltages
MS IEC 60950-1	Information technology equipment - Safety - Part 1: General requirements
SKMM MTFSB TC T001: 2012	Specification for Terminal Equipment connecting to the Public Switched Telephone Network (PSTN)
SKMM MTFSB TC T002: 2012	Specification for Analogue calling line Identity presentation (A-CLIP) facility for connection to Public Switched Telephone Network (PSTN)

Annex B
(Normative)

Data transmission associated with PSTN ringing signal



Parameter	Value	Descriptions
Ringing Current	0.4 s ON, 0.2 s OFF, 0.4 s ON, 2.0 s OFF	One ringing cycle
SI	(0.25 -0.5) s	Silent interval before transmission of data message from PSTN to TE
CSS	0.2 s	Channel Seizure Signal
MS	0.15 s	Mark Signal
DATA	≥ 200 ms	Data Transmission shall stop at least 200 ms before the arrival of the second ringing cycle.
T	≥ 200 ms	Transition time between data transmission and the second ringing where T shall not be less than 200 ms.

Figure B1. Data transmission associated with PSTN ringing signal

Annex C
(Normative)

Message format for A-CLIP service

Table C1. Message format for A-CLIP service

Calling Line (SDMF) Identification (CLI)	Calling Line (MDMF) Identification (CLI) and Name	Calling Line (MDMF) Identification (CLI) Not Available
Date	Date	Date
Time	Time	Time
	CLI	Reason for absence of Directory Number (DN): “P” or “O”
CLI	Name (caller’s name if provided)	Name: For “P” “PRIVATE” fixed characters may be sent For “O” “OUT” may be sent

Annex D
(Normative)

Off-hook parameter values

Table D1. Off-Hook Parameter Values

Parameter and Assignment	Value	Descriptions
OSI	(0-300) ms	An open interval (OSI) where do voltage applied between tip and ring on the line is removed, hence, temporarily suspending line supervision and transmission.
W	(0-60) ms	The PSTN mutes for end for this period prior to sending an Alerting Sequence in the absence of an OSI.
	100=10ms (90-110)	The PSTN continues to silence the far and for this period following in OSI
X	(250 ms-1 sec)	Duration allowed for any SAS including distinctive patterns. The service specific requirements document will contain information on the timing of the various service-specific tones/patterns.
X1	(0-50) ms	The PSTN is allowed this transition time between the generation of different alerting signals.
Y	(80-85)ms	Length of the TE Alerting Signal (CAS)
t1	160 ±5 ms (155-165)	Acknowledgment time-out. Period that the PSTN waits for an ACK. The PSTN shall time out after 165ms if it does not detect an ACK. Upon detection of an ACK, timing for interval t1 should be stopped, and timing for interval Q should start.

Q	(50-500) ms Strong Objective: 50-100	Transition between detection of an ACK and the start of P5K data transmission.
Z	Feature-specific	Time taken to transmit data feature-dependent. .
S	(0-320) ms Strong Objective: 0-120	Time taken by the PSTN to revert back to voice transmission after the end of data transmission or after the end of an OSI if an OSI occurs.

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