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Foreword

This second edition European Telecommunication Standard (ETS) has been produced by the Electromagnetic compatibility and Radio spectrum Matters (ERM) Technical Committee of the European Telecommunications Standards Institute (ETSI).

This ETS comprises seven parts with the generic title "Electromagnetic compatibility and Radio spectrum Matters (ERM)"; Enhanced Radio MEssage System (ERMES)". The title of each part is listed below:

Part 1:   "General aspects";

Part 2:   "Service aspects";

Part 3:   "Network aspects";

Part 4:   "Air interface specification";

Part 5:   "Receiver conformance specification";

Part 6:   "Base station specification";

Part 7:   "Operation and maintenance aspects".

This part, ETS 300 133-2, specifies the services and facilities of the Enhanced Radio MEssage System (ERMES). This part also defines the quality of service aspects and describes the receiver features.

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Date of adoption:	7 November 1997
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1   Scope

This European Telecommunication Standard (ETS), describes the service aspects of the Enhanced Radio MEssage System (ERMES). In particular, a recommended set of basic and supplementary services is defined and described. The features that should be considered for implementation in the paging receivers are also described. Finally, the quality of service that is offered to the users of the system is defined.

2   Normative references

This ETS incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references subsequent amendments to, or revisions of any of these publications apply to this ETS only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

[1]   ETS 300 133-1 (1997): "Radio Equipment and Systems (RES); Enhanced Radio MEssage System (ERMES); Part 1: General aspects".

[2]   ETS 300 133-3 (1997): "Radio Equipment and Systems (RES); Enhanced Radio MEssage System (ERMES); Part 3: Network aspects".

[3]   ETS 300 133-5 (1997): "Radio Equipment and Systems (RES); Enhanced Radio MEssage System (ERMES); Part 5: Receiver conformance specification".

[4]   ISO 10646 (1993): "Information technology - Universal Multiple-Octet Coded Character Set (UCS) - Part 1: Architecture and Basic Multilingual Plane".

[5]   ITU-T Recommendation T.52 (1993): "Non-Latin coded character sets for telematic services".

[6]   Chinese National Standard CNS 11643, X5012: "Chinese Standard Interchange Code".

[7]   ISO 1073: "Alphanumeric character sets for optical recognition".

3   Definitions and abbreviations

3.1   Definitions

For the purposes of this part of this ETS, the following definitions apply:

essential service or facility: A service or facility which is implemented and provided in all operator networks in the system.

optional service or facility: An optional service or facility which is provided at the discretion of the network operators. If implemented it conforms with this ETS.

essential receiver feature: A receiver feature which is implemented in all receivers (if it is relevant to the paging category of a specific receiver).

optional receiver feature: A receiver feature which may be implemented at the manufacturers' discretion. If implemented it conforms with this ETS.

For the definitions of the other terms used in this standard see ETS 300 133-1 [1], clause 3, "Vocabulary".

3.2 Abbreviations

For the purposes of this part of this ETS, the following abbreviations apply:

AdC	Address Code
ACK/NACK	Positive/Negative acknowledgement
BVR	Basic Version Receiver
CUG	Closed User Group
RIC	Radio Identity Code
DTMF	Dual Tone Multi-Frequency
EOM	End Of Message
GAdC	Group Address Code
PNC	Paging Network Controller
PNC-H	Home PNC
PNC-I	Input PNC
PNC-T	Transmitting PNC
PSTN	Public Switched Telephone Network

4 Services and facilities

4.1 General

4.1.1 Introduction

In this clause the set of basic and supplementary services that may be supported by an ERMES network is defined and described. Some services are specified as essential to enable operation of an international paging system. A number of optional services are also described, which operators may include in their systems.

The security aspects of the system are also included in this clause.

4.1.2 Framework for describing the services

The text associated with each service is structured in the following way:

Definition

This paragraph provides a general definition and description of the service as it is seen by the user.

Procedures

- provision:

    - This paragraph indicates if the service should be essential or optional for the network operators of the ERMES system.

- normal procedures:

    - This paragraph gives an indication of who (calling party, fixed or mobile subscriber) is supposed to activate the service and on what conditions it is made available to the users (e.g. per call basis or by registration).

Network capabilities for charging

This paragraph gives an indication of what charging arrangements the system shall be able to support.

Interworking requirements

This paragraph describes the interworking requirements between the different ERMES networks in order to implement a service.

Interaction with other services

This paragraph describes the interactions with other ERMES services when the service being described is activated.

4.1.3 Essential and optional services

Each service shall be considered as essential or optional for the network operator. In table A.1, the essential and optional supplementary services and facilities for each paging category is given.

4.2 Basic services

The system shall offer mobile subscribers levels of basic paging services according to the receiver capabilities. The system shall check that paging calls are not accepted to higher levels than the one corresponding to the subscription. This check shall also take place on activation of a supplementary service, e.g. diversion of traffic.

The ERMES system provides two kinds of call in each basic service:

-   individual calls that are initiated by using one Address Code (AdC) and are intended for only one mobile subscriber;

-   group calls that are initiated by using one Group Address Code (GAdC) and are intended for two or more mobile subscribers.

4.2.1 Tone-only paging

Definition

Tone-only paging is the first basic service level and simplest kind of paging service, corresponding to the traditional type of radio paging. The tone-only service means that paging signals to a particular receiver shall cause the receiver to generate a simple alert signal. The system shall support up to 8 different alert signals per Radio Identity Code (RIC). The system shall transmit the message within a message delivery time depending on the level of priority (see subclause 6.2).

Procedures

-   provision:

    -   This essential service shall be provided by all network operators. It shall be implemented in the Paging Network Controller (PNC) and all types of receivers, except transparent data receivers. The service may be implemented in the transparent data receiver.

-   normal procedures:

    -   Tone-only paging can be activated by the calling party by any Public Switched Telephone Network (PSTN) telephone on a per call basis to a mobile subscriber in the system. It may also be activated by other terminal equipment.

Network capabilities for charging

The service should be charged on subscription and/or on a per call basis according to the network operator's policy.

Interworking requirements

None.

Interaction with other services

A number of supplementary services can not be activated when tone-only calls are sent (see table A.1).

4.2.2 Numeric paging

Definition

Numeric paging is the second service level. It allows transmission of up to at least 20 numeric or special characters. This service is intended for mobile subscribers using pagers with the capability to receive, store and display numeric information in addition to tone-only paging. The character set is included in table B.1. The system shall transmit the message within a message delivery time depending on the level of priority (see subclause 6.2). The maximum message length that the ERMES system can support is 16 000 numeric characters. The network operators shall provide for a maximum message length between 20 and 16 000 numeric characters. Messages longer than the maximum message length that a specific receiver can accept shall not be delivered. The calling party shall be informed that the message is too long (see also subclause 4.2.4 for very long messages).

Procedures

- provision:

    - This essential service shall be provided by all network operators. It shall be implemented in the PNC as well as in numeric and alphanumeric receivers. The service may be implemented in the transparent data receiver.

- normal procedures:

    - The service can be activated by the calling party on a per call basis to a mobile subscriber in the system.

Network capabilities for charging

The service should be charged on subscription and/or on a per call basis according to the network operator's policy.

Interworking requirements

None.

Interaction with other services

None.

4.2.3 Alphanumeric paging

Definition

Alphanumeric paging is the third service level. It allows transmission of text information with up to at least 400 alphanumeric characters. This service is for mobile subscribers using receivers with the capability to receive, store and display text information in addition to tone-only and numeric paging. The basic character set is defined in table B.3. The system shall transmit the message within a message delivery time depending on the level of priority (see subclause 6.2). The maximum message length that the ERMES system can support is 9 000 alphanumeric characters. The network operators shall provide for a maximum message length between 400 and 9 000 alphanumeric characters. Messages longer than the maximum message length that a specific receiver can accept shall not be delivered. The calling party shall be informed that the message is too long (see also subclause 4.2.4 for very long messages).

Procedures

- provision:

    - This essential service shall be provided by all network operators. It shall be implemented in the PNC and in alphanumeric receivers. The service may be implemented in the transparent data receiver.

- normal procedures:

    - The service can be activated by the calling party on a per call basis to a mobile subscriber in the system.

Network capabilities for charging

The service should be charged on subscription and/or on a per call basis according to the network operator's policy.

Interworking requirements

None.

Interaction with other services

None.

4.2.4   Transparent data paging

Definition

Transparent data paging is a service allowing transmission of an arbitrary data stream to the receiver. The system shall transmit the message within a message delivery time depending on the level of priority (see subclause 6.2). The use of the data stream is determined by the application chosen by the subscriber. Only the part of the radio channel dedicated to the message allows a full bit transparency. The maximum message length that the ERMES system can support is 64 kbits. The network operators may provide for a maximum message length of less than 64 kbits. Messages longer than the maximum message length that a specific receiver can accept shall not be delivered. The calling party shall be informed that the message is too long.

Very long messages (longer than the defined maximum) can be sent through the ERMES system only if they are split into messages shorter than the maximum length. Users who wish to send such messages, may define a method of linking the parts of the messages together, between calling party and receiver. This method shall be transparent to the ERMES system, i.e. the parts shall be transmitted as separate messages.

Procedures

- provision:

    - Provision of this service shall be optional for the network operators. Restrictions on the message length can be imposed by the network operator according to his policy. It shall be implemented in the PNC as well as in the receiver. Lower categories may be implemented in the transparent data receiver.

- normal procedures:

    - The service can be activated by the calling party on a per call basis to a mobile subscriber in the system.

Network capabilities for charging

The service should be charged on subscription and/or on a per call basis according to the network operator's policy.

Interworking requirements

None.

Interaction with other services

The bureau service can not be activated when the transparent data service is used.

4.3 Supplementary services

A supplementary service modifies or supplements a basic service. The offered supplementary services may be used by the subscribers/users at their discretion.

4.3.1 Call related supplementary services

4.3.1.1 Acknowledgements

4.3.1.1.1 Valid input acknowledgements

Definition

During the input of a call, acknowledgements shall be generated by the system to the calling party indicating the call status. At least the following three types of acknowledgements shall be provided:

a)   call accepted acknowledgement:

-   The called AdC (individual or GAdC) is (is not) valid and the system is (is not) ready to accept the call. The calling party is invited to enter data referring to additional information or the required supplementary service(s) or to enter the message.

-   A call shall be treated as unconditionally accepted when the home operator is able to guarantee a network status better than a threshold C in the areas in which the page is destined for transmission (for the calculation of network status see ETS 300 133-3 [2]).

-   A call shall be treated as partially accepted when the network operator is only able to guarantee a network status between a threshold UC and a threshold C in the areas in which the page is destined for transmission.

-   The call shall be rejected when the network operator cannot guarantee a network status greater than a threshold UC in the areas in which the page is destined for transmission.

-   Each network operator shall define its own thresholds C and UC, which can be identical if only two call acceptance conditions are to be given to the calling party.

b)   supplementary service acknowledgement:

-   The supplementary service required is (is not) valid. The calling party is invited to enter data referring to additional supplementary services or to enter the message.

c)   page accepted acknowledgement:

-   The message is (is not) valid. The call shall (shall not) be transmitted.

Procedures

-   provision:

    -   This essential service shall be provided by all network operators.

-   normal procedures:

    -   The service shall apply to all calls. Restrictions due to the access method used are described in ETS 300 133-3 [2].

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Network capabilities for charging

There shall be no charging for this service.

Interworking requirements

In the case of a roaming subscriber and/or if diversion of traffic outside home network is activated the PNC shall be informed on the status of transmission networks involved.

Interaction with other services

None.

4.3.1.1.2 Subscriber feature acknowledgement

Definition

The generation of an acknowledgement from the system to the fixed or mobile subscriber indicating whether or not a feature, such as a supplementary service control operation, has been successfully completed.

Procedures

- provision:

    - This essential service shall be offered by all network operators for the subscriber features provided. An all feature reset facility should be provided.

- normal procedures:

    - The service shall apply to all features accessible to the subscriber. Service to the fixed subscriber can only be provided in the subscribed network. Restrictions due to the access method used are described in ETS 300 133-3 [2].

Network capabilities for charging

There shall be no charging for this service.

Interworking requirements

In the case of a roaming subscriber and/or if diversion of traffic outside home network is activated, the PNC shall be informed if the service is offered by the transmitting network.

Interaction with other services

None.

4.3.1.2 Supplementary services related to the destination of the call

4.3.1.2.1 Roaming service

Definition

Roaming is the service which enables the mobile subscriber to choose, for a specific period, in which country(ies) and geographical area(s), outside his service area, he wants his calls transmitted. The subscriber can also roam within his home network. If the requested area is served by several operators the choice of network is according to inter-operator agreements, influenced by tariffs, supplementary services, etc. The mobile subscriber shall have the capability to define the duration of roaming.

Procedures

- provision:

  - This essential service shall be provided by all network operators.

- normal procedures:

  - The service shall be made available to the mobile subscriber on demand. Roaming shall be activated by the subscriber after authentication. Activation shall be for a specific period of time. It can be de-activated either automatically by the PNC when activation time has expired or by the subscriber (after authentication) before the activation time has expired. The service can be activated/de-activated through the home PNC or a visited PNC. In the case that service area and roaming area are adjacent or overlapping the calls shall be transmitted in both areas. According to the network operator's policy the calls may also be transmitted to both areas even if they are not adjacent. A test call may automatically be generated by the system immediately after the start time of roaming, to confirm to the mobile subscriber that roaming has been activated successfully.

Network capabilities for charging

According to the policy of the network operator. Inter-operator charging for this feature shall be according to inter-operator agreements.

Interworking requirements

See subclauses 4.3.1.1.1 and 4.3.1.1.2.

Interaction with other services

When the subscriber is roaming to another network it shall be impossible to use priority 1 service. Level 3 priority and urgent message indication can only be activated if the visited networks offer these services. Activation of diversion of traffic or temporary barring shall suspend provision of the roaming service.

4.3.1.2.2 Diversion of traffic

Definition

The facility of a mobile subscriber to have his calls diverted to another receiver registered in the same network, or in another network within the ERMES system, or to another telecommunication system for a period of time. Diversion can be made only to individual AdCs provided that the AdC is not already diverted. If the divert recipient wishes to activate diversion for his own AdC, he shall be warned that suspension of the already activated diversion of calls to his AdC shall occur. During this period the calls to the originally diverted AdC shall be rejected (see ETS 300 133-3 [2], subclause 7.2).

Procedures

- provision:

  - Provision of this service shall be optional for the network operators. Diversion outside home network can only be provided if there is an agreement between the network operators and/or the operators of other systems involved.

- normal procedures:

  - The service should be made available to mobile subscribers on a registration basis or on demand, according to the network operator's policy. Diversion shall be activated by the subscriber after authentication. Activation shall be for a specific period of time. It can be de-activated either automatically by the PNC when activation time has expired or by the subscriber (after authentication) before the activation time expires.

Network capabilities for charging

According to the policy of the network operator.

In the case of diversion outside the home network, data regarding this feature shall be recorded in both PNCs. Inter-operator charging for this feature shall be according to inter-operator agreements.

Interworking requirements

None.

Interaction with other services

A check shall be made to avoid diversion to AdCs having lower categories of subscriptions. Only those supplementary services supported by the divert recipient's Home PNC (PNC-H) and the divert recipient's receiver can be provided during the period of diversion. The mobile subscriber can not activate any supplementary service, except temporary barring, after activation of diversion of traffic. Request for diversion to another AdC shall suspend the previous divert request. The supplementary services that the mobile subscriber has already activated shall be suspended.

Activation for a group using common RIC affects the whole group. In the case of Closed User Groups (CUGs) it shall be possible to divert the call only within the CUG.

The diverted messages shall follow the message numbering of the divert recipient.

Calls shall be accepted and processed even if the divert recipient does not have all the supplementary services of the subscriber who has activated the service. The calling party shall not be informed that these supplementary services are not supported by the divert recipient.

4.3.1.2.3 Choice of destination

Definition

A service to give the calling party the facility to choose the geographical areas that he wants the call to be transmitted in. The calling party has the following alternatives:

- transmission according to the mobile subscriber location register;

- transmission in one or more areas in addition to the location register.

Procedures

- provision:

    - Provision of this service shall be optional for the network operators. Subject to the policy of the network operator, the service may have restrictions on the number of geographical areas.

- normal procedures:

    - The service shall be provided to the calling party on a per call basis.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

When choice of destination is activated and transmission outside home network of the subscriber is requested, level 1 priority can not be used. Level 3 priority and urgent message indication can only be activated if they are provided in the requested geographical areas.

If the called mobile subscriber has activated diversion of calls this service can not be activated.

4.3.1.3 Supplementary services related to protection against loss of messages

The method used by the system to indicate the loss of a message to the receiver or the mobile subscriber is to allocate a number to each message before transmission. The system shall have one message counter (1 to 31) per RIC. A message number (modulo 32) shall be allocated sequentially in increasing order from 1 to 31 to all messages.

The message number may be provided by the network operator.

The receiver shall have the capability to detect the message number and may take appropriate action (according to receiver specification).

If the message number is not provided with a paging message, the dummy value (00000) shall be used in the message header.

4.3.1.3.1 Repetition

Definition

The facility of the calling party and/or the mobile subscriber to request automatic message repetition.

Repeated messages shall be transmitted within an operator defined time interval from the initial message transmission.

The default value is 5 minutes. In an external network the maximum time between the reception of the first and last message may be increased due to difference of priority in both networks.

The number of repetitions is an operator defined parameter.

The repeated messages shall have the original message number (see message control in the receivers).

Procedures

- provision:

    - Provision of this service shall be optional for the network operators.

- normal procedures:

    - The service should be available on a registration basis for the mobile subscribers and shall affect all messages addressed to them. The calling parties can activate the service on a per call basis. Only one sequence of re-transmission shall take place if the service is requested from both mobile subscriber and calling parties.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

None.

4.3.1.3.2 Message storing and retrieval

a) Message storing

Definition

Message storing enables the mobile subscriber to have all messages stored for a minimum of 24 hours, after submission to the radio path. Together with the actual message, the message number and the date and time of submission to the radio path, or to another PNC, shall be stored.

Procedures

- provision:

    - Provision of this service shall be optional for the network operators.

- normal procedures:

    - The service should be made available to the mobile subscriber on a registration basis if required.

Network capabilities for charging

The mobile subscriber should be charged according to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

None.

b) Message retrieval and retransmission

Definition

The message retrieval service offers the mobile subscriber the capability to retrieve a message. Network operators shall provide for one or more of the following ways to present the retrieved message. The subscriber shall have the capability to choose among the offered alternatives:

- retransmission via the radio path;

- displaying on a specified terminal.

In the case of re-transmission via the radio path, the PNC-H shall process the request further in the same way as an ordinary page input and shall forward the message using the next available message number.

In the case of display on a specified terminal, the message shall be presented together with the original message number and the stored date/time.

Procedures

- provision:

  - Provision of this service shall be optional for the network operators.

- normal procedures:

  - The service shall be activated by the mobile subscriber after authentication.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

None.

4.3.1.3.3 Automatic retransmission of the last message number

Definition

This service offers the receiver the capability to detect a loss of a message by comparing the received last message number with the stored number of the last correctly received message. Retransmission of the last message number is assumed to take place during low traffic time.

Procedures

- provision:

- Provision of this service shall be optional for the network operators.

- normal procedures:

- The service should be made available to the mobile subscriber on a registration basis if required.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

The service can only be activated when the message number is provided.

The service cannot operate when one of the following services is activated:

- diversion of traffic;

- temporary barring of incoming traffic.

4.3.1.4 Bureau services

Definition

The service offered by a bureau which enables a request for a paging call or a subscriber feature initiated via the telephone system to be input by an operator to the paging system. The bureau cannot provide additional features, it can only enable those already subscribed.

Procedures

- provision:

  - The service and terms of provision shall be optional for the network operators.

- normal procedures:

  - This service should be available to all users.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

When a calling party uses bureau services it cannot access recipients within a CUG.

4.3.2 Supplementary services related to priority

The priority function enables certain messages to be sent before or after other messages in a queuing situation. Three different levels of priority are described here.

4.3.2.1 Level 1 priority

Definition

Traffic having level 1 priority shall be sent on the radio path before traffic having lower priority. A level 1 priority message with a message length of less than 400 alphanumeric characters (2 800 bits) shall be sent within 1 minute after page accepted acknowledgement is sent (see also subclause 6.2).

The service is intended mainly for short messages carrying alarm information or radiodistribution traffic consisting, for example, of particularly urgent news. The concept of radiodistribution services is defined in annex C.

Traffic having level 1 priority in the home network shall receive level 2 priority when routed to a visited network.

Procedures

- provision:

  - The service and the terms of provision shall be optional for the network operators. Subject to the policy of the network operator the use of the service may be linked to a restriction on the maximum message length.

- normal procedures:

    - Level 1 priority shall be made available in one or more of the following ways:

        - to all calling parties, activated on a per call basis;

        - on registration to fixed subscribers, activated on a per call basis;

        - on registration to the mobile subscriber, affecting all messages;

        - on registration to the mobile subscriber, activated on a per call basis by the calling party.

    - Legitimization may be required for the calling party.

Network capabilities for charging

The service should be charged on a subscription basis, on a per call basis, and/or based on the amount of traffic according to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

Priority 1 can not be activated when deferred delivery is activated. When roaming, choice of destination and diversion of traffic are activated outside home network, priority 1 can not be activated.

4.3.2.2 Level 2 priority

Definition

This service is intended for the standard calling party generated traffic of normal length and with moderate requirements on the message throughput. This throughput shall not be greater than the message delivery time of between 2,5 minutes and 10 minutes (see also subclause 6.2).

Traffic having level 2 priority shall be sent after sending traffic having level 1 priority and before sending traffic having level 3 priority.

Traffic having level 2 priority in its home network shall be guaranteed level 2 priority in a visited network.

Procedures

- provision:

    - This essential service shall be provided by all network operators.

- normal procedures:

    - Level 2 priority shall be the normal priority level unless level 1 or 3 is indicated.

Network capabilities for charging

The service should be charged according to standard charging (see subclause 4.3.4.1).

Interworking requirements

None.

Interaction with other services

None.

4.3.2.3   Level 3 priority

Definition

The service is intended for users sending information that is not time sensitive. Traffic having level 3 priority shall be handled in such a way that the quality of service limits for traffic of level 1 and level 2 priority are not degraded.

Procedures

-        provision:

        -        The service and terms of provision shall be optional for the network operators.

-        normal procedures:

        -        Level 3 priority shall be made available in one or more of the following ways:

                -        to all calling parties, activated on a per call basis;

                -        on registration to fixed subscribers, activated on a per call basis;

                -        on registration to the mobile subscriber, affecting all messages;

                -        on registration to the mobile subscriber, activated on a per call basis by the calling party.

        -        Legitimization may be required for the calling party.

Network capabilities for charging

A lower charge should be assumed for this service. It may not be possible for traffic having level 3 priority in the home network to be sent with the same priority in a visited network, thus the cost reduction may not be guaranteed.

Interworking requirements

None.

Interaction with other services

When roaming, choice of destination requiring transmission outside the home network or diversion of traffic outside the home network are activated, level 3 priority can be offered only if provided by the visited networks.

4.3.3   Community of interest supplementary services

4.3.3.1   Closed User Group

Definition

The capability for a number of mobile subscribers and fixed subscribers to establish a group with only internal communication possibilities. The fixed subscribers within the group shall only be able to call mobile subscribers within the group. The mobile subscribers can receive calls only from the fixed subscribers in the group. A mobile or fixed subscriber can be a member in one or more CUG. In the CUG, one representative shall be appointed to be responsible for the management of the group.

Procedures

- provision:

  - Provision of this service shall be optional for the network operators.

- normal procedures:

  - The service should be made available to mobile and fixed subscribers on a registration basis.

Network capabilities for charging

The mobile and fixed subscribers in the CUG should be charged for the subscription in addition to normal traffic charges according to the network operator's policy.

Interworking requirements

None.

Interaction with other services

See subclauses 4.3.1.2.2 and 4.3.1.4.

4.3.3.2 Group calls

A group call is a call intended for two or more mobile subscribers.

Group calls can be realized using one of the supplementary services specified in subclauses 4.3.3.2.1 and 4.3.3.2.2.

4.3.3.2.1 Group calls to mobile subscribers using common RIC

Definition

The means to send messages to a group of receivers having one RIC in common.

The common RIC may be in addition to an individual RIC, provided that it complies with the receiver specifications.

This type of group call service can be used as a means of providing radiodistribution services (see annex C).

Procedures

- provision:

  - This essential service shall be provided by all network operators. Terms of provision depend on network operator's policy.

- normal procedures:

  - Only one subscription should be needed for the AdC.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

None.

4.3.3.2.2 Group calls to mobile subscribers using individual RIC

Definitions

A call intended for a group of subscribers which do not have a common RIC. All individual RICs shall be able to receive calls of the same service category and may belong to different networks.

Group address code

Each group shall be given a GAdC with which the group is called.

Address list

The address list identifies a number of mobile subscribers, with individual AdCs and/or GAdCs, enabling them to receive the same calls. The address lists can be programmed by the network operator or by the fixed subscriber.

a) Address list programmed by the network operator

Procedures

- provision:

    - Provision of this service shall be optional for the network operators. Subject to the policy of the network operator the service may be provided with a restriction on number of group members and/or message length.

- normal procedures:

    - This service should be available on a registration basis to the mobile subscribers. The network operator shall be responsible for programming in the PNC.

- One representative shall be appointed to be responsible for the management of the group.

- Group calls may be placed by any calling party or may be restricted to fixed subscribers according to the network operator's policy. The call shall be processed even if some of the AdCs are not valid. The network operator may send an acknowledgement with all the non-valid AdCs.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

It shall be optional for the network operator to decide about combinations with other services, e.g. level 1 priority. Reverse charging shall only be applicable on the GAdC.

b)   Address list programmed by the fixed subscriber

Procedures

-       provision:

    -       The service and terms of provision shall be optional for the network operators. Subject to the policy of the network operator the service may have restrictions on the number of GAdCs and individual AdCs per address list and on the number of address lists allocated to a fixed subscriber.

-       normal procedures:

    -       This service should be available on a registration basis to the fixed and mobile subscriber. A certain memory capacity for storing address lists shall be allocated to the subscribers. Within this memory capacity they are given the capability of editing the address list.

-       Group calls may be placed by any calling party or may be restricted to fixed subscribers according to the network operator's policy. The call shall be processed even if some of the AdCs are not valid. The calling party shall receive an acknowledgement with all the non-valid AdCs.

Network capabilities for charging

According to the policy of the network operator.

The memory storage capacity can be charged for in addition to the normal charging of the service, according to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

It shall be optional for the network operator to decide about combinations with other services, e.g. level 1 priority. Reverse charging shall only be applicable on the GAdC.

4.3.3.3   Multi-address calls to mobile subscribers

Definition

The calling party may enter two or more individual AdCs, GAdCs, or any combination of these, per call. The mobile subscribers identified by the AdCs given shall receive the call.

Procedures

-       provision:

    -       Provision of this service shall be optional for the network operators. Subject to the policy of the network operator, the service may have restrictions on the number of AdCs or GAdCs per call.

-       normal procedures:

    -       The multi-address call service can be available to any calling party.

-       The calling party shall receive an acknowledgement with all the non-valid AdCs. In the case that some AdCs are not valid the calling party shall be given the capability to abandon the call.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

It shall be optional for the network operator to decide about combinations with other services, e.g. level 1 priority. Reverse charging cannot be activated together with this service.

4.3.3.4   Called group indication

Definition

A mobile subscriber may belong to several groups. The called group indication informs the mobile subscriber which group was called by the calling party. The service cannot be offered to pagers without a display.

-        provision:

         -          Provision of this service shall be optional for the network operators.

-        normal procedures:

         -          The service shall be available to the subscriber responsible for the group. All members in the group shall receive the same indication. If called group indication is included in the mobile subscribers group registration or the fixed subscribers address list registration, the PNC shall forward the actual group indication to the receivers.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

None.

4.3.3.5   Remote programming of RIC

Definition

The capability for a network operator to program new RICs from a remote terminal via the radio path. The new RICs are additional to the basic RIC of the receiver. Receivers are addressed with the basic RIC. This service may be a means to establish group calls with common RICs to existing mobile subscribers.

Procedures

-        provision:

         -          Provision of this service shall be optional for the network operators.

-        normal procedures:

         -          The facilities to implement this service shall be available only to the network operator.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

This service shall only be available in the home network.

Interaction with other services

None.

4.3.4 Charging supplementary services

4.3.4.1 Standard charging

Definition

Generation by the system of subscription and/or registration information to enable the following charging methods to be implemented, if required.

Mobile subscriber

a) initial registration charges:

- basic charge;

- charges for supplementary services;

b) subscription charges:

- basic charge;

- charges for supplementary services;

c) traffic charges:

- charges for use of supplementary services.

Calling party

a) initial registration charges (fixed subscriber):

- basic charge;

- charges for supplementary services;

b) subscription charges (fixed subscriber):

- basic charge;

- charges for supplementary services;

c) traffic charges:

- basic traffic charges;

- charges for use of supplementary service;

Traffic registration may be on a toll-ticketing basis.

Procedures

- provision:

    - Provision of this service shall be optional for the network operators. It shall also be optional for the network operators to have toll-ticketing registration.

Interworking requirements

Each network shall provide means for collecting traffic information for accounting purposes. Thus traffic information for accounting purposes can be exchanged between network operators.

Interaction with other services

None.

4.3.4.2 Reverse charging acceptance

Definition

This service enables the mobile subscriber to pay the charges of the calls he receives. Charges for the connection in the access network may be excluded.

Two variations should be provided:

- unconditional: all incoming calls are accepted;

- conditional: only incoming calls from calling parties who state a certain legitimization code are accepted.

The network operator may offer other possibilities with regard to the restricted operation of this service.

Procedures

- provision:

    - Provision of this service shall be optional for the network operators.

- normal procedures:

    - The service should be made available to the mobile subscriber on a registration basis.

Network capabilities for charging

The call charge and the subscription charge should be paid by the mobile subscriber according to the network operator's policy.

Interworking requirements

None.

Interaction with other services

Reverse charging cannot be activated in the case of multi-address calls.

4.3.4.3 Charging information for fixed subscribers

Definition

The capability of a fixed subscriber to obtain the accumulated charges of his account in the ERMES network.

Charging information provided to the fixed subscriber by this procedure shall be consistent with ordinary charging specification.

Procedures

- provision:

  - Provision of this service shall be optional for the network operators.

- normal procedures:

  - The service can be activated by the fixed subscriber.

Network capabilities for charging

The service should be charged according to the network operator's policy.

Interworking requirements

None.

Interaction with other services

None.

4.3.5 Supplementary services related to the restriction of calls

4.3.5.1 Temporary barring of incoming traffic

Definition

Allows a mobile subscriber to temporarily avoid receiving any call regardless of their origin.

The system shall inform the calling party that temporary barring is activated and it shall offer a facility to give suitable information, e.g. duration, to the calling party. This information may be a standard message stored in the system or a message programmed by the mobile subscriber. The mobile subscriber when asking for activation of this service shall be informed if any deferred calls are waiting to be delivered to him. These calls shall be delivered after the de-activation of the temporary barring.

Procedures

- provision:

  - Provision of this service shall be optional for the network operators. It shall be also optional to provide the capability to mobile subscribers to give their own information.

- normal procedures:

  - The service should be made available to mobile subscribers on a registration basis or on demand, according to the network operator's policy. It shall be activated by the subscriber after authentication. Activation shall be for a specific period of time. It can be de-activated either automatically by the PNC when activation time has expired or by the subscriber (after authentication) before the activation time has expired.

Network capabilities for charging

The service should be charged to the mobile subscriber on a subscription basis and/or based on use of the service according to the network operator policy.

Interworking requirements

None.

Interaction with other services

The system shall not accept any calls for AdCs that have this service activated. Messages received before the activation of this service can be retrieved. Activation of this service shall suspend all the supplementary services that the mobile subscriber has already activated.

4.3.5.2 Restriction on all calls

Definition

This subscriber feature enables the mobile subscriber to restrict the input of calls to authorized calling parties only. The use of a legitimization code is expected.

Procedures

- provision:

    - Provision of this service shall be optional for the network operators.

- normal procedures:

    - Service should be made available on a registration basis.

Network capabilities for charging

The service should be charged to the mobile subscriber according to the network operator policy.

Interworking requirements

None.

Interaction with other services

Limitations may occur with group calls using individual RICs and multi-address calls.

4.3.6 Other supplementary services

4.3.6.1 Urgent message indication

Definition

The service gives the calling party the capability to activate an urgent message indicator in the receiver. The receiver shall indicate reception of a message having the urgent message indicator activated.

The service can be used on all RICs and AdCs.

Procedures

- provision:

    - Provision of this service shall be optional for the network operators.

- normal procedures:

    - The service may be available to all calling parties or to calling parties having the authority to use urgent message indication under the control of the mobile subscriber (e.g. legitimization code, membership in a CUG).

Network capabilities for charging

According to policy of the network operator.

Interworking requirements

None.

Interaction with other services

None.

4.3.6.2   Deferred delivery

Definition

The capability of a calling party or a mobile subscriber to instruct the PNC that any message being submitted should be delivered no sooner than a specified date and time. Delivery shall take place as close as possible to the specified date and time, but not before. The capability to specify date and time for deferred delivery may be subject to limitations set by the network operator. If the mobile subscriber has activated the service he may choose to programme a message containing information about this activation. This message shall be sent to the calling party on a per call basis.

Procedures

- provision:

    - Provision of this service shall be optional for the network operators.

- normal procedures:

    - The service should be available to all calling parties and all mobile subscribers. Fixed and mobile subscribers can activate this service after authentication.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

When deferred delivery is activated, priority 1 service cannot be activated. If deferred delivery has been activated by the mobile subscriber, the calling party can activate it only if the deferred delivery time defined by the calling party exceeds that defined by the mobile subscriber.

4.3.6.3   Standard texts

4.3.6.3.1   Standard texts defined by the network operator

Definition

This service offers to a calling party the facility to send a predefined text message simply by stating the identification number of the desired message. A message bank of this type is contained in the PNC. The texts are defined by the network operator. The purpose is to enable use of simple terminal equipment such as Dual Tone Multi-Frequency (DTMF) telephone for message entry.

Procedures

- provision:

    - The service and terms of provision shall be optional for the network operators. The texts and number of messages that are available shall be determined by the operator. The standard texts provided to the calling party shall be those contained in the accessed PNC and the

home PNC of the called mobile subscriber. The service shall only be applicable to the alphanumeric service.

- normal procedures:

    - The service should be available to all calling parties. Simple means should be provided to enable calling parties to obtain accurate and up-to-date information on the content of the standard message bank.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

None.

4.3.6.3.2 Standard texts defined by fixed subscribers

Definition

This service offers the same possibilities as under subclause 4.3.6.3.1 with the difference that the texts are defined by a fixed subscriber.

Procedures

- provision:

    - The service and terms of provision shall be optional for the network operators. Subject to the policy of the network operator the service may have restrictions on maximum message length and on number of texts allocated to a fixed subscriber. The service shall only be applicable to the transparent data and alphanumeric services.

- normal procedures:

    - The service should be available to calling parties defined by the fixed subscriber who controls the actual message bank. Access and use of the message bank can be controlled by a CUG membership, a legitimization code or an equivalent arrangement.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

None.

4.4 Security aspects

4.4.1 General

The security features are designed to protect the subscribers of the system from illegal activities which may either compromise the integrity of their communication (e.g. interception of communication, false calls, penetration into CUGs), or give rise to false traffic charges.

Authentication is a function which enables the PNC to ensure that the identity stated by a fixed or a mobile subscriber is true. Subscribers shall be authenticated each time they access the system in order to activate a supplementary service or a restricted operation. Authentication is used both in the interest of the network operator and the subscriber. Examples of the two cases are:

- to ensure that the correct subscriber is charged;

- to protect information from being retrieved by unauthorized persons.

Several authentication methods exist. Subclauses 4.4.4.1 to 4.4.4.3 list a number of options from which the subscriber can make a choice depending on the technical capabilities of his terminal equipment, his requirements on the strength of the authentication and the capabilities offered by the network operator.

Legitimization is a function which ensures that a calling party trying to carry out a restricted operation (an operation which is not allowed to all calling parties) is authorized to do this.

Legitimization differs from authentication in that it refers to calling parties that are not necessarily identified, but they merely prove their right to carry out the restricted operation, for instance by stating a secret code. This code can be known by several other calling parties which are also authorized (by the subscriber) to carry out the restricted operation. The PNC need not know which calling parties are in possession of the secret code. The secret code is only linked to the restricted operation.

Legitimization is in most cases used in the interest of the subscriber. An example of a restricted operation suitable for protection by legitimization is the transmission of messages to a mobile subscriber who needs to be protected from malicious calls.

4.4.2 Encryption of messages

Definition

Encryption of messages is the facility to have the message encrypted by the network and transmitted via the transparent data paging facility.

Procedures

- provision:

    - The facility shall be optional for the network operators. Implementation of the feature in receivers shall be optional. Manufacturers shall have to follow the decisions of the network operators.

- normal procedures:

    - Encryption shall be made available on a registration basis.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

Some restrictions in connection with group call messages may arise if the receivers have different facilities.

4.4.3 Legitimization code

Definition

The legitimization code is stated by the calling party to prove that he is authorized to carry out a particular restricted operation.

A legitimization code may be known by several calling parties and should not be confused with the password (see subclause 4.4.4.1) which is used for secure identification of a subscriber. In contrast to the password the legitimization code is linked to the restricted operation and not to the subscriber.

Procedures

- provision:

    - This essential facility shall be provided by all network operators who provide services that need such legitimization code. A facility shall be provided to enable the subscriber to change the legitimization code using any appropriate access method defined by the network operator.

- The following supplementary services may be activated with the use of a legitimization code:

    - level 1 and level 3 priority available on a registration basis to the mobile subscribers and activated on a per call basis by the calling party;

    - reverse charging acceptance conditional;

    - standard texts defined by the fixed subscriber;

    - urgent message indication when controlled by the mobile subscriber.

- normal procedures:

    - The calling parties asking for a restricted operation shall state the relevant legitimization code. Changes of a legitimization code can be initiated by the subscriber who controls the restricted operation.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

None.

4.4.4 Authentication

4.4.4.1 Authentication by use of passwords

Definition

The authenticity of the subscriber is ensured by requesting a password known only by the correct, registered subscriber. This password can be changed any time by the registered subscriber.

Procedures

- provision:

    - This essential facility shall be provided by all network operators who provide services that need authentication. A facility shall be provided to enable the subscriber to change the password using any appropriate access method defined by the network operator.

- normal procedures:

    - This facility shall be provided to all fixed and mobile subscribers.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

None.

4.4.4.2 Authentication by reverse calling

Definition

The authenticity of the subscriber accessing the network is ensured by disconnecting the call immediately after identification of the subscriber and setting up a new call in the reverse direction for completion of the transaction. The security of this method is based on the assumption that the subscriber always accesses the PNC from the same, physically protected terminal (in the subscriber's judgement), the address of which needs to be known by the PNC.

Procedures

- provision:

    - Provision of this facility shall be optional for the network operators.

- normal procedures:

    - This facility should be provided to the subscriber on a registration basis if required.

Network capabilities for charging

According to the policy of the network operator.

Interworking requirements

None.

Interaction with other services

None.

4.4.4.3 Authentication by use of certificate

Definition

The authenticity of the subscriber accessing the network is ensured by the subscriber sending a certificate together with the claimed identity, e.g. by using a smart card.

Procedures

- provision:

    - Provision of this facility shall be optional for the network operators.

- normal procedures:

    - This service should be provided to the subscriber on a registration basis if required. The terminal used by the subscriber shall have facilities for generation of the certificate.

Network capabilities for charging

According to the network operator's policy.

Interworking requirements

None.

Interaction with other services

None.

4.5 Subscriber directory

Definition

The facility offering public access to a hard copy catalogue or a database containing information about subscribers. The directory shall be controlled by the network operator and should contain information such as subscriber number, name, address, country and paging category for all subscribers, except those who may explicitly demand to be excluded.

Tone-only subscribers shall not be included in the subscriber directory.

Information in the directory should be a subset of the subscriber register and may also include additional information.

Procedures

- provision:

    - The facility and the terms of provision shall be optional for the network operators.

- normal procedures:

    - The subscriber directory should be implemented off line and may be accessed through the PNC.

    - The method of access to the facility shall be determined by the network operator. The subscriber directory can only be changed by the network operator.

Network capabilities for charging

The facility should be charged according to the network operator's policy.

Interworking requirements

None.

Interaction with other services

None.

5 Receiver features

5.1 Introduction

This clause describes the features that should be considered for implementation in the ERMES receivers and classifies them according to their type. Three types of features are considered:

- basic features, which are directly related to the basic services;

- supplementary features, which are directly related to the supplementary services;

- additional features, which are neither basic nor supplementary.

A complete definition and description of the receiver features is given in ETS 300 133-5 [3].

References are given to the relevant services defined in clause 4. Table D.1 divides the essential and optional receiver features.

5.2 Basic receiver features

5.2.1 Tone-only

The tone-only feature enables the receiver to receive paging signals without any additional information (numeric, alphanumeric or data) and generate the appropriate alert signal (see subclause 4.2.1).

5.2.2 Numeric

The numeric feature enables the receiver to receive paging signals with numeric additional information consisting of up to at least 20 characters and generate the appropriate alert signal (see subclause 4.2.2). The numeric character set is given in table B.1.

5.2.3 Alphanumeric

The alphanumeric feature enables the receiver to receive paging signals with additional text information consisting of up to at least 400 alphanumeric characters and generate the appropriate alert signal (see subclause 4.2.3). The basic alphanumeric character set is given in table B.3.

As an optional feature, the pager may also use any additional character sets, as defined in annex B.

5.2.4 Transparent data

The transparent data feature enables the receiver to receive paging signals with additional information in the form of an arbitrary data stream (see subclause 4.2.4).

5.2.5 Alert signals

This feature offers the capability of transmission of up to 8 different alert signal indicators per RIC. Each alert signal indicator corresponds to a different AdC.

5.2.6 Access to the message

All receivers may have a feature (e.g. display, printer or synthesized voice) that enables the user to access the received messages and/or other information.

5.3 Supplementary receiver features

5.3.1 Repeated call indication

A message may be transmitted more than once. In such a case the message shall have the same message number. The repeated call indication feature enables the receiver to detect duplicated messages and indicate to the mobile subscriber accordingly (see subclause 4.3.1.3.1).

5.3.2 Indication of lost message/message number control

The purpose of this indication is to inform the mobile subscriber that a message has been lost. This gives the mobile subscriber the capability to retrieve lost messages (see subclause 4.3.1.3).

5.3.3 Remote programming of RIC

The receivers may have the capability to be remotely programmed by the network operator for the additional RIC(s) via the radio path.

The purpose is to establish groups of receivers with common RIC remotely (see subclause 4.3.3.5).

5.3.4 Out of range indication

The purpose of this feature is to give the user an indication if the receiver is not able to receive the paging signal.

5.3.5 Urgent message indicator

This feature enables the receiver to indicate that an urgent message has been received when it detects the urgent message indicator in the message header (see subclause 4.3.6.1).

5.4 Additional receiver features

5.4.1 Silent mode

The audible alert receiver shall have a switch by which the alert tone can be set to silent mode. The receiver shall still receive and store paging calls.

5.4.2 Low battery indication

All types of receivers shall give a low battery indication before the receiver performance is significantly impaired.

5.4.3 Message storage and retrieval

All types of receivers shall have a memory, which at minimum can support the Basic Version Receiver (BVR) requirements. Additionally they may have more memory space to store the messages they receive. In this case the messages can be retrieved at a later time by the mobile subscriber.

5.4.4 Memory full

If the receiver memory is full, the oldest message not being protected against deleting shall be erased, to enable the receiver to continue receiving new messages.

5.4.5 Message manipulation

Receivers can have some features for message manipulation and reading.

5.4.6 Display

Receivers may have a display where the message(s) and/or other useful information can be displayed.

5.4.7 Printer interface

A facility to connect a printing device to the receiver (except tone-only) may be available. The purpose is:

- to enable the user to have a print out of the stored messages;

- to have messages printed automatically after reception.

The user should have the choice of printing all messages in memory or selecting single messages for printing.

5.4.8 Data interface

Receivers may have a data interface giving the capability for connection to other equipment for transfer of the received data and/or the alert signal.

5.4.9 Date/time indication

Receivers may be able to generate date/time information which may be stored together with the received message. The capability can be given to the mobile subscriber to have this information shown on the display on request.

5.4.10 Encryption of messages

Encryption of messages may be performed by the PNC-H on forwarding the message. The receivers (except tone-only), may have the capability to decipher encrypted messages.

6 Quality of service

6.1 General

In the following subclause the parameters that affect the quality of service and the limits that shall apply to these parameters are defined. The values of several of these parameters depend also on the performance of the access network used. The values that are specified in this subclause relate only to time limits and performance in the ERMES network and ERMES PNC without taking into account the influence of the access network. Except otherwise noted in this clause all limits specified are based on the performance measured at the busy hour over a one hour period such that the limit is met on 90 % or more occasions. Any contributions from an access network shall be added to the relevant ERMES network values to obtain the "real" values perceived by the user.

6.2 Quality of service parameters

6.2.1 System response delay

The system response delay is the delay experienced by the calling party when waiting for a response from the PNC. This delay is valid only for the interactive access mode and the same value shall apply for both page input and subscriber features.

The system response delay shall be less than two seconds.

6.2.2 Input blocking probability (input grade of service)

The input blocking probability is the probability that a paging network can not accept a call request.

The blocking event can be caused either by a lack of incoming channels from the access network to the paging network, or by an overload in the Input PNC (PNC-I) or other parts of the paging network.

This parameter is only related with two-stage selection access type. The same value shall apply for both page input and subscriber features. This applies to both interactive and automatic access mode.

The input blocking probability shall be less than 3 %.

6.2.3   Call accepted acknowledgement delay

The call accepted acknowledgement delay is the time elapsing between the sending instant of the AdC to the PNC and the reception of the call accepted (or not accepted) Acknowledgement (ACK).

This parameter is the sum of the transmission time of an AdC message to the PNC-H, its validation and checking and the time for receiving back (at PNC-I) the instruction reply message. This shall apply to both interactive and automatic access mode.

The call accepted acknowledgement delay shall be:

- less than two seconds when PNC-I is the PNC-H; and

- less than six seconds when PNC-I is not the PNC-H.

6.2.4   Page accepted acknowledgement delay

The page accepted acknowledgement delay is the time elapsing between the sending instant of the End of Message (EOM) characters and the reception of a page accepted (or not accepted) ACK.

The page accepted acknowledgement delay in interactive mode shall be less than two seconds.

> NOTE: It is assumed that all information of the subscription is available in PNC-I.

The page accepted acknowledgement delay in automatic mode shall be:

- less than three seconds when PNC-I is the PNC-H; and

- less than seven seconds when PNC-I is not the PNC-H.

6.2.5   Subscriber feature acknowledgement delay

The subscriber feature acknowledgement delay is the time elapsing between the sending instant of the EOM characters and the reception of a subscriber feature accepted (or not accepted) ACK.

The subscriber feature acknowledgement delay in interactive mode shall be less than two seconds.

> NOTE: It is assumed that all information of the subscription is available in PNC-I.

The subscriber feature acknowledgement delay in automatic mode shall be:

- less than three seconds when PNC-I is the PNC-H; and

- less than seven seconds when PNC-I is not the PNC-H.

6.2.6   Message delivery time

The message delivery time is the time elapsing between the page accepted ACK message sent to the calling party and the complete transmission of the paging call within the required paging area (or paging areas).

This is a basic quality of service parameter even if not directly perceived by the paging user. Its value depends on transmission times, processing delays and database access and searching times.

The message delivery time shall be less than the following limits:

- priority 1:   1 minute;

     NOTE: This is only relevant within home network and for message lengths less than 400 alphanumeric characters (2 800 bits).

- priority 2:   PNC-I = PNC-H = PNC-T: 2,5 minutes;

     -           PNC-I $\neq$ PNC-H = PNC-T   7 minutes;
     -           PNC-I = PNC-H $\neq$ PNC-T   7 minutes;
     -           PNC-I $\neq$ PNC-H $\neq$ PNC-T   10 minutes;

- priority 3:   24 hours;

     NOTE: PNC-T = Transmitting PNC.

6.2.7 Call success rate

The call success rate is the number of successful calls divided by the number of transmitted calls for one receiver. This parameter refers to the quality of service at the boundary of a coverage area.

A tone-only call is considered to be successful if the addressed receiver is able to generate the appropriate alert signal.

A numeric call is considered to be successful if the addressed receiver is able to display a complete message of up to 20 characters (and nothing else) containing no errors. For numeric messages longer than 20 characters the definition of successful calls for alphanumeric calls shall apply.

An alphanumeric call is considered to be successful if the addressed receiver is able to display the complete message that has been sent without extra characters and if the improperly displayed characters do not exceed the 5 % of the total number of characters in the actual message. The average number of characters which may be in error shall not exceed 1 %.

The call success rate shall be greater than 95 %.

6.2.8 False call rate

A call is considered to be false if it is received by a pager with an AdC different to that transmitted, or if a message or part of a message is received by a pager other than that for which it was intended.

The false call rate shall be less than one false call per pager per year.

6.2.9 Correct message transmitted probability

The correct message transmitted probability is the probability that a message, regularly accepted by the ERMES network is correctly transmitted.

The correct message transmitted probability shall be greater that 99,9 % (1 of 1 000 may be lost or corrupted within the ERMES network).

Annex A (normative): Essential and optional supplementary services

In table A.1 a summary of the essential and optional supplementary services and facilities for each basic service is given.

In table A.2 a summary of access authority to services and facilities for different categories of users is given.

Table A.1: Essential and optional supplementary services and facilities

Supplementary services	Tone only	Numeric	Alpha numeric	Transparent data
Valid input acknowledgement	E	E	E	E
Subscriber feature acknowledge	E	E	E	E
Roaming	E	E	E	E
Diversion of traffic	O	O	O	O
Choice of destination	O	O	O	O
Message number	E	E	E	E
Repetition	O	O	O	O
Message storing - retrieval		O	O	O
Aut.retrans.last message No.	O	O	O	O
Bureau services	O	O	O	
Priority 1	O	O	O	O
Priority 2	E	E	E	E
Priority 3	O	O	O	O
Closed user group	O	O	O	O
Group calls/common RIC	E	E	E	E
Group calls/individual RIC	O	O	O	O
Multi-address calls	O	O	O	O
Called group indication		O	O	O
Remote programming of RIC	O	O	O	O
Standard charging	O	O	O	O
Reverse charging acceptance	O	O	O	O
Charging information	O	O	O	O
Temporary barring	O	O	O	O
Urgent message indication	O	O	O	O
Deferred delivery			O	O
Standard texts			O	O
Encryption		O	O	O
Authentication by password	E	E	E	E
Authentication. by reverse call	O	O	O	O
Authentication. by certificate	O	O	O	O
Legitimization	E	E	E	E
Subscriber directory		O	O	O

NOTE: E: indicates that the service is essential.
O: indicates that the service is optional.

Table A.2: Summary of access authority to services and facilities for different categories of users

Service or facility	Calling party	Mobile subscriber	Fixed subscriber
Tone-only paging	*	-	*H
Numeric paging	*	-	*H
Alphanumeric paging	*	-	*H
Transparent data paging	*	-	*H
Valid input acknowledgement	*	-	*H
Subscriber feature acknowledge	-	*H	*H
Roaming	-	*	-
Diversion of traffic	-	*H	-
Choice of destination	*	-	*H
Repetition	*	*H	*H
Message storing and retrieval	-	*H	-
Automatic retransmission of last message number	-	*H	-
Bureau services	*	*H	*H
Priority 1	*	*H	*H
Priority 2	*	-	*H
Priority 3	*	*H	*H
Closed user group	-	*H	*H
Group calls/common RIC	*	-	*H
Group calls/individual RIC	*	-	*H
Multi-address calls	*	-	*H
Called group indication	-	*H	*H
Standard charging	*	*H	*H
Reverse charging acceptance	-	*H	-
Reverse charging call	*		*H
Charging information	-	-	*H
Temporary barring of incoming traffic	-	*H	-
Restriction on all calls	-	*H	-
Urgent message indication	*	-	*H
Deferred delivery	*	*H	*H
Standard texts defined by the network operator	*	-	*H
Standard texts defined by the fixed subscriber	*	-	*H
Encryption	-	*H	-
Authentication by passwords	-	*H	*H
Authentication by reverse call	-	*H	*H
Authentication by certificate	-	*H	*H
Legitimization	*	-	-
Subscriber directory	*	*H	*H
All features reset	-	*H	-

NOTE:	*:	indicates that the service can be accessed.
	-:	indicates that the service cannot be accessed.
	H:	indicates that the service can only be accessed via the home PNC.

Annex B (normative): Character sets in the ERMES system

B.1 Characters for numeric paging

Numerical messages are coded with 4 bits per character. A numeric or alphanumeric receiver shall be capable of presenting the characters of table B.1.

Table B.1

b4	b3	b2	b1	Character
0	0	0	0	0
0	0	0	1	1
0	0	1	0	2
0	0	1	1	3
0	1	0	0	4
0	1	0	1	5
0	1	1	0	6
0	1	1	1	7
1	0	0	0	8
1	0	0	1	9
1	0	1	0	/
1	0	1	1	(space)
1	1	0	0	U
1	1	0	1	- (hyphen)
1	1	1	0	.(full stop)
1	1	1	1	%
NOTE:				The characters of this set, when displayed, should approximate to the appearance of the relevant characters specified in ISO 1073 [7]. For a simple seven segment display the symbols "/", "." and "%" should be represented as shown in table B.2.

Table B.2

b4	b3	b2	b1	Character	Representation
1	0	1	0	/	⌐
1	1	1	0	.(full stop)	I
1	1	1	1	%	P
NOTE:				Better representations of these characters may be used.	

B.2   Characters for alphanumeric paging

Alphanumeric characters shall be coded with 7 bits per character.

All alphanumeric receivers shall use the character set in table B.3.

Control characters CR and LF.

> When receiving a CR control character, the position of the next printable character should move to the same line first column.

> When receiving a LF control character, the position of the next printable character should move to the same column next line.

Table B.3: The ERMES character set for alphanumeric paging (character set indicator 00000)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
00	COMMERCIAL AT	0	064	40	INVERTED EXCLAMATION MARK	0	161
01	POUND SIGN	0	163	41	LATIN CAPITAL LETTER A	0	065
02	DOLLAR SIGN	0	036	42	LATIN CAPITAL LETTER B	0	066
03	YEN SIGN	0	165	43	LATIN CAPITAL LETTER C	0	067
04	LATIN SMALL LETTER E WITH GRAVE	0	232	44	LATIN CAPITAL LETTER D	0	068
05	LATiN SMALL LETTER E WITH ACUTE	0	233	45	LATIN CAPITAL LETTER E	0	069
06	LATIN SMALL LETTER U WITH GRAVE	0	249	46	LATIN CAPITAL LETTER F	0	070
07	LATIN SMALL LETTER I WITH GRAVE	0	236	47	LATIN CAPITAL LETTER G	0	071
08	LATIN SMALL LETTER 0 WITH GRAVE	0	242	48	LATIN CAPITAL LETTER H	0	072
09	LATIN SMALL LETTER C WITH CEDILLA	0	231	49	LATIN CAPITAL LETTER I	0	073
0A	LINE FEED	0	010	4A	LATIN CAPITAL LETTER J	0	074
0B	LATIN CAPITAL LETTER 0 WITH STROKE	0	216	4B	LATIN CAPITAL LETTER K	0	075
0C	LATIN SMALL LETTER 0 WITH STROKE	0	248	4C	LATIN CAPITAL LETTER L	0	076
0D	CARRIAGE RETURN	0	013	4D	LATIN CAPITAL LETTER M	0	077
0E	LATIN CAPITAL LETTER A WITH RING ABOVE	0	197	4E	LATIN CAPITAL LETTER N	0	078
0F	LATIN SMALL LETTER A WITH RING ABOVE	0	229	4F	LATIN CAPITAL LETTER O	0	079
10	GREEK CAPITAL LETTER DELTA	3	148	50	LATIN CAPITAL LETTER P	0	080
11	DC1 (See note 1)	0	017	51	LATIN CAPITAL LETTER Q	0	081
12	GREEK CAPITAL LETTER PHI	3	166	52	LATIN CAPITAL LETTER R	0	082
13	GREEK CAPITAL LETTER GAMMA	3	147	53	LATIN CAPITAL LETTER S	0	083
14	GREEK CAPITAL LETTER LAMDA	3	155	54	LATIN CAPITAL LETTER T	0	084
15	GREEK CAPITAL LETTER OMEGA	3	169	55	LATIN CAPITAL LETTER U	0	085
16	GREEK CAPITAL LETTER P	3	160	56	LATIN CAPITAL LETTER V	0	086
17	GREEK SMALL LETTER PSI	3	200	57	LATIN CAPITAL LETTER W	0	087
18	GREEK CAPITAL LETTER SIGMA	3	163	58	LATIN CAPITAL LETTER X	0	088
19	GREEKSMALL LETTER THETA	3	181	59	LATIN CAPITAL LETTER Y	0	089
1A	GREEK CAPITAL LETTER XI	3	158	5A	LATIN CAPITAL LETTER Z	0	090
1B	ESCAPE	0	027	5B	LATIN CAPITAL LETTER A WITH DAERESIS	0	196
1C	LATIN CAPITAL LIGATURE AE	0	198	5C	LATIN CAPITAL LETTER 0 WITH DIAERESIS	0	214
1D	LATIN SMALL LIGATURE AE	0	230	5D	LATIN CAPITAL LETTER N WITH TILDE	0	209
1E	LATIN SMALL LETTER SHARP S (German)	0	223	5E	LATIN CAPITAL LETTER U WITH DIAERESIS	0	220
1F	LATIN CAPITAL LETTER E WITH ACUTE	0	201	5F	SECTION SIGN	0	167
20	SPACE	0	032	60	INVERTED QUESTION MARK	0	191
21	EXCLAMATION MARK	0	033	61	LATIN SMALL LETTER A	0	097
22	QUOTATION MARK	0	034	62	LATIN SMALL LETTER B	0	098
23	NUMBER SIGN	0	035	63	LATIN SMALL LETTER C	0	099
24	CURRENCY SIGN	0	164	64	LATIN SMALL LETTER D	0	100
25	PERCENT SIGN	0	037	65	LATIN SMALL LETTER E	0	101
26	AMPERSAND	0	038	66	LATIN SMALL LETTER F	0	102
27	APOSTROPHE	0	039	67	LATIN SMALL LETTER G	0	103
28	LEFT PARENTHESIS	0	040	68	LATIN SMALL LETTER H	0	104
29	RIGHT PARENTHESIS	0	041	69	LATIN SMALL LETTER I	0	105

(continued)

Table B.3 (concluded): The ERMES character set for alphanumeric paging
(character set indicator 00000)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
2A	Asterisk	0	042	6A	LATIN SMALL LETTER J	0	106
2B	PLUS SIGN	0	043	6B	LATIN SMALL LETTER K	0	107
2C	COMMA	0	044	6C	LATIN SMALL LETTER L	0	108
2D	HYPHEN-MINUS	0	045	6D	LATIN SMALL LETTER M	0	109
2E	FULL STOP	0	046	6E	LATIN SMALL LETTER N	0	110
2F	SOLIDUS	0	047	6F	LATIN SMALL LETTER O	0	111
30	DIGIT ZERO	0	048	70	LATIN SMALL LETTER P	0	112
31	DIGIT ONE	0	049	71	LATIN SMALL LETTER Q	0	113
32	DIGIT TWO	0	050	72	LATIN SMALL LETTER R	0	114
33	DIGIT THREE	0	051	73	LATIN SMALL LETTER S	0	115
34	DIGIT FOUR	0	052	74	LATIN SMALL LETTER T	0	116
35	DIGIT FIVE	0	053	75	LATIN SMALL LETTER U	0	117
36	DIGIT SIX	0	054	76	LATIN SMALL LETTER V	0	118
37	DIGIT SEVEN	0	055	77	LATIN SMALL LETTER W	0	119
38	DIGIT EIGHT	0	056	78	LATIN SMALL LETTER X	0	120
39	DIGIT NINE	0	057	79	LATIN SMALL LETTER Y	0	121
3A	COLON	0	058	7A	LATIN SMALL LETTER Z	0	122
3B	SEMI COLON	0	059	7B	LATIN SMALL LETTER A WITH DIAERESIS	0	228
3C	LESS-THAN SIGN	0	060	7C	LATIN SMALL LETTER 0 WITH DIAERESIS	0	246
3D	EQUALS SIGN	0	061	7D	LATIN SMALL LETTER N WITH TILDE	0	241
3E	GREATER-THAN SIGN	0	062	7E	LATIN SMALL LETTER U WITH DIAERESIS	0	252
3F	QUESTION MARK	0	063	7F	LATIN SMALL LETTER A WITH GRAVE	0	224
NOTE:	Row and Columns refer to ISO 10646 [4] Plane 00.						

Table B.4: The ERMES character set for alphanumeric paging (character set indicator 00000)

				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0	@	Δ	SP	0	¡	P	¿	p
0	0	0	1	1	£	DC1	!	1	A	Q	a	q
0	0	1	0	2	$	Φ	"	2	B	R	b	r
0	0	1	1	3	¥	Γ	#	3	C	S	c	s
0	1	0	0	4	è	Λ	¤	4	D	T	d	t
0	1	0	1	5	é	Ω	%	5	E	U	e	u
0	1	1	0	6	ù	Π	&	6	F	V	f	v
0	1	1	1	7	ì	ψ	'	7	G	W	g	w
1	0	0	0	8	ò	Σ	(	8	H	X	h	x
1	0	0	1	9	ç	θ	)	9	I	Y	i	y
1	0	1	0	10	LF	Ξ	*	:	J	Z	j	z
1	0	1	1	11	Ø	ESC	+	;	K	Ä	k	ä
1	1	0	0	12	ø	Æ	,	<	L	Ö	l	ö
1	1	0	1	13	CR	æ	–	=	M	Ñ	m	ñ
1	1	1	0	14	Å	ß	.	>	N	Ü	n	ü
1	1	1	1	15	å	É	/	?	O	§	o	à

NOTE 1: DC1 shall be used only as the End Of Message (EOM) character.
NOTE 2: The characters of this set, when displayed, should approximate to the appearance of the relevant characters specified in ISO 10646 [4] and the corresponding national standards.

Table B.5: Optional character set for alphanumeric paging (character set indicator 00001)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
00	COMMERCIAL AT	0	064	40	INVERTED EXCLAMATION MARK	0	161
01	POUND SIGN	0	163	41	LATIN CAPITAL LETTER A	0	065
02	DOLLAR SIGN	0	036	42	LATIN CAPITAL LETTER B	0	066
03	YEN SIGN	0	165	43	LATIN CAPITAL LETTER C	0	067
04	LATIN SMALL LETTER E WITH GRAVE	0	232	44	LATIN CAPITAL LETTER D	0	068
05	LATIN SMALL LETTER E WITH ACUTE	0	233	45	LATIN CAPITAL LETTER E	0	069
06	LATIN SMALL LETTER U WITH GRAVE	0	249	46	LATIN CAPITAL LETTER F	0	070
07	LATIN SMALL LETTER DOTLESS I	1	049	47	LATIN CAPITAL LETTER G	0	071
08	LATIN SMALL LETTER 0 WITH GRAVE	0	242	48	LATIN CAPITAL LETTER H	0	072
09	LATIN CAPITAL LETTER C WITH CEDILLA	0	199	49	LATIN CAPITAL LETTER I	0	073
0A	LINE FEED	0	010	4A	LATIN CAPITAL LETTER J	0	074
0B	LATIN CAPITAL LETTER 0 WITH STROKE	0	216	4B	LATIN CAPITAL LETTER K	0	075
0C	LATIN SMALL LETTER X WITH BAR			4C	LATIN CAPITAL LETTER L	0	076
0D	CARRIAGE RETURN	0	013	4D	LATIN CAPITAL LETTER M	0	077
0E	LATIN CAPITAL LETTER A WITH RING ABOVE	0	197	4E	LATIN CAPITAL LETTER N	0	078
0F	LATIN SMALL LETTER A WITH RING ABOVE	0	229	4F	LATIN CAPITAL LETTER O	0	079
10	GREEK CAPITAL LETTER DELTA	3	148	50	LATIN CAPITAL LETTER P	0	080
11	DC1 (See note 1)	0	017	51	LATIN CAPITAL LETTER Q	0	081
12	LATIN CAPITAL LETTER SCHWA	1	143	52	LATIN CAPITAL LETTER R	0	082
13	LATIN CAPITAL LETTER G WITH BREVE	1	030	53	LATIN CAPITAL LETTER S	0	083
14	LATIN SMALL LETTER G WITH BREVE	1	031	54	LATIN CAPITAL LETTER T	0	084
15	LATIN CAPITAL LETTER S WITH CEDILLA	1	094	55	LATIN CAPITAL LETTER U	0	085
16	LATIN SMALL LETTER SCHWA	2	089	56	LATIN CAPITAL LETTER V	0	086
17	LATIN CAPITAL LETTER I WITH GRAVE	1	048	57	LATIN CAPITAL LETTER W	0	087
18	LATIN CAPITAL LETTER X WITH BAR			58	LATIN CAPITAL LETTER X	0	088
19	LATIN SMALL LETTER C WITH CEDILLA	0	231	59	LATIN CAPITAL LETTER Y	0	089
1A	LATIN SMALL LETTER S WITH CEDILLA	1	095	5A	LATIN CAPITAL LETTER Z	0	090
1B	ESCAPE	0	027	5B	LATIN CAPITAL LETTER A WITH DAERESIS	0	196
1C	LATIN CAPITAL LIGATURE AE	0	198	5C	LATIN CAPITAL LETTER 0 WITH DIAERESIS	0	214
1D	LATIN SMALL LIGATURE AE	0	230	5D	LATIN CAPITAL LETTER N WITH TILDE	0	209
1E	LATIN SMALL LETTER SHARP S (German)	0	223	5E	LATIN CAPITAL LETTER U WITH DIAERESIS	0	220
1F	LATIN CAPITAL LETTER E WITH ACUTE	0	201	5F	SECTION SIGN	0	167
20	SPACE	0	032	60	INVERTED QUESTION MARK	0	191
21	EXCLAMATION MARK	0	033	61	LATIN SMALL LETTER A	0	097
22	QUOTATION MARK	0	034	62	LATIN SMALL LETTER B	0	098
23	NUMBER SIGN	0	035	63	LATIN SMALL LETTER C	0	099
24	CURRENCY SIGN	0	164	64	LATIN SMALL LETTER D	0	100
25	PERCENT SIGN	0	037	65	LATIN SMALL LETTER E	0	101
26	AMPERSAND	0	038	66	LATIN SMALL LETTER F	0	102
27	APOSTROPHE	0	039	67	LATIN SMALL LETTER G	0	103
28	LEFT PARENTHESIS	0	040	68	LATIN SMALL LETTER H	0	104
29	RIGHT PARENTHESIS	0	041	69	LATIN SMALL LETTER I	0	105

(continued)

Table B.5 (concluded): Optional character set for alphanumeric paging
(character set indicator 00001)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
2A	Asterisk	0	042	6A	LATIN SMALL LETTER J	0	106
2B	PLUS SIGN	0	043	6B	LATIN SMALL LETTER K	0	107
2C	COMMA	0	044	6C	LATIN SMALL LETTER L	0	108
2D	HYPHEN-MINUS	0	045	6D	LATIN SMALL LETTER M	0	109
2E	FULL STOP	0	046	6E	LATIN SMALL LETTER N	0	110
2F	SOLIDUS	0	047	6F	LATIN SMALL LETTER O	0	111
30	DIGIT ZERO	0	048	70	LATIN SMALL LETTER P	0	112
31	DIGIT ONE	0	049	71	LATIN SMALL LETTER Q	0	113
32	DIGIT TWO	0	050	72	LATIN SMALL LETTER R	0	114
33	DIGIT THREE	0	051	73	LATIN SMALL LETTER S	0	115
34	DIGIT FOUR	0	052	74	LATIN SMALL LETTER T	0	116
35	DIGIT FIVE	0	053	75	LATIN SMALL LETTER U	0	117
36	DIGIT SIX	0	054	76	LATIN SMALL LETTER V	0	118
37	DIGIT SEVEN	0	055	77	LATIN SMALL LETTER W	0	119
38	DIGIT EIGHT	0	056	78	LATIN SMALL LETTER X	0	120
39	DIGIT NINE	0	057	79	LATIN SMALL LETTER Y	0	121
3A	COLON	0	058	7A	LATIN SMALL LETTER Z	0	122
3B	SEMI COLON	0	059	7B	LATIN SMALL LETTER A WITH DIAERESIS	0	228
3C	LESS-THAN SIGN	0	060	7C	LATIN SMALL LETTER 0 WITH DIAERESIS	0	246
3D	EQUALS SIGN	0	061	7D	LATIN SMALL LETTER N WITH TILDE	0	241
3E	GREATER-THAN SIGN	0	062	7E	LATIN SMALL LETTER U WITH DIAERESIS	0	252
3F	QUESTION MARK	0	063	7F	LATIN SMALL LETTER A WITH GRAVE	0	224
NOTE: Row and Columns refer to ISO 10646 [4] Plane 00.							

Table B.6: Optional character set for alphanumeric paging (character set indicator 00001)

				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0	@	Δ	SP	0	¡	P	¿	p
0	0	0	1	1	£	DC1	!	1	A	Q	a	q
0	0	1	0	2	$	Ə	"	2	B	R	b	r
0	0	1	1	3	¥	Ğ	#	3	C	S	c	s
0	1	0	0	4	è	ğ	¤	4	D	T	d	t
0	1	0	1	5	é	Ş	%	5	E	U	e	u
0	1	1	0	6	ù	ə	&	6	F	V	f	v
0	1	1	1	7	I	Ì	'	7	G	W	g	w
1	0	0	0	8	ò	✗	(	8	H	X	h	x
1	0	0	1	9	Ç	ç	)	9	I	Y	i	y
1	0	1	0	10	LF	Ş	*	:	J	Z	j	z
1	0	1	1	11	Ø	ESC	+	;	K	Ä	k	ä
1	1	0	0	12	✗	Æ	,	<	L	Ö	l	ö
1	1	0	1	13	CR	æ	–	=	M	Ñ	m	ñ
1	1	1	0	14	Å	ß	.	>	N	Ü	n	ü
1	1	1	1	15	å	É	/	?	O	§	o	à

NOTE 1: DC1 shall be used only as the End Of Message (EOM) character.
NOTE 2: The characters of this set, when displayed, should approximate to the appearance of the relevant characters specified in ISO 10646 [4] and the corresponding national standards.

Table B.7: Optional character set for alphanumeric paging (character set indicator 00010

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
00	COMMERCIAL AT	0	064	40	INVERTED EXCLAMATION MARK	0	161
01	POUND SIGN	0	163	41	LATIN CAPITAL LETTER A	0	065
02	DOLLAR SIGN	0	036	42	LATIN CAPITAL LETTER B	0	066
03	LATIN SMALL LETTER ETH (Icelandic)	0	240	43	LATIN CAPITAL LETTER C	0	067
04	LATIN SMALL LETTER E WITH GRAVE	0	232	44	LATIN CAPITAL LETTER D	0	068
05	LATiN SMALL LETTER E WITH ACUTE	0	233	45	LATIN CAPITAL LETTER E	0	069
06	LATIN SMALL LETTER U WITH GRAVE	0	249	46	LATIN CAPITAL LETTER F	0	070
07	LATIN SMALL LETTER I WITH GRAVE	0	236	47	LATIN CAPITAL LETTER G	0	071
08	LATIN SMALL LETTER 0 WITH GRAVE	0	242	48	LATIN CAPITAL LETTER H	0	072
09	LATIN CAPITAL LETTER C WITH CEDILLA	0	199	49	LATIN CAPITAL LETTER I	0	073
0A	LINE FEED	0	010	4A	LATIN CAPITAL LETTER J	0	074
0B	LATIN CAPITAL LETTER Y WITH ACUTE	0	221	4B	LATIN CAPITAL LETTER K	0	075
0C	LATIN SMALL LETTER Y WITH ACUTE	0	253	4C	LATIN CAPITAL LETTER L	0	076
0D	CARRIAGE RETURN	0	013	4D	LATIN CAPITAL LETTER M	0	077
0E	LATIN CAPITAL LETTER A WITH RING ABOVE	0	197	4E	LATIN CAPITAL LETTER N	0	078
0F	LATIN SMALL LETTER A WITH RING ABOVE	0	229	4F	LATIN CAPITAL LETTER O	0	079
10	GREEK CAPITAL LETTER DELTA	3	148	50	LATIN CAPITAL LETTER P	0	080
11	DC1 (See note 1)	0	017	51	LATIN CAPITAL LETTER Q	0	081
12	LATIN CAPITAL LETTER A WITH ACUTE	0	193	52	LATIN CAPITAL LETTER R	0	082
13	LATIN SMALL LETTER A WITH ACUTE	0	225	53	LATIN CAPITAL LETTER S	0	083
14	LATIN CAPITAL LETTER I WITH ACUTE	0	205	54	LATIN CAPITAL LETTER T	0	084
15	LATIN SMALL LETTER I WITH ACUTE	0	237	55	LATIN CAPITAL LETTER U	0	085
16	LATIN CAPITAL LETTER O WITH ACUTE	0	211	56	LATIN CAPITAL LETTER V	0	086
17	LATIN SMALL LETTER O WITH ACUTE	0	243	57	LATIN CAPITAL LETTER W	0	087
18	LATIN CAPITAL LETTER THORN (Icelandic)	0	222	58	LATIN CAPITAL LETTER X	0	088
19	LATIN SMALL LETTER THORN (Icelandic)	0	254	59	LATIN CAPITAL LETTER Y	0	089
1A	LATIN CAPITAL ETH (Icelandic)	0	208	5A	LATIN CAPITAL LETTER Z	0	090
1B	ESCAPE	0	027	5B	LATIN CAPITAL LETTER A WITH DAERESIS	0	196
1C	LATIN CAPITAL LIGATURE AE	0	198	5C	LATIN CAPITAL LETTER 0 WITH DIAERESIS	0	214
1D	LATIN SMALL LIGATURE AE	0	230	5D	LATIN CAPITAL LETTER N WITH TILDE	0	209
1E	LATIN SMALL LETTER SHARP S (German)	0	223	5E	LATIN CAPITAL LETTER U WITH ACUTE	0	218
1F	LATIN CAPITAL LETTER E WITH ACUTE	0	201	5F	SECTION SIGN	0	167
20	SPACE	0	032	60	INVERTED QUESTION MARK	0	191
21	EXCLAMATION MARK	0	033	61	LATIN SMALL LETTER A	0	097
22	QUOTATION MARK	0	034	62	LATIN SMALL LETTER B	0	098
23	NUMBER SIGN	0	035	63	LATIN SMALL LETTER C	0	099
24	CURRENCY SIGN	0	164	64	LATIN SMALL LETTER D	0	100
25	PERCENT SIGN	0	037	65	LATIN SMALL LETTER E	0	101
26	AMPERSAND	0	038	66	LATIN SMALL LETTER F	0	102
27	APOSTROPHE	0	039	67	LATIN SMALL LETTER G	0	103
28	LEFT PARENTHESIS	0	040	68	LATIN SMALL LETTER H	0	104
29	RIGHT PARENTHESIS	0	041	69	LATIN SMALL LETTER I	0	105

(continued)

Table B.7 (concluded): Optional character set for alphanumeric paging
(character set indicator 00010)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
2A	Asterisk	0	042	6A	LATIN SMALL LETTER J	0	106
2B	PLUS SIGN	0	043	6B	LATIN SMALL LETTER K	0	107
2C	COMMA	0	044	6C	LATIN SMALL LETTER L	0	108
2D	HYPHEN-MINUS	0	045	6D	LATIN SMALL LETTER M	0	109
2E	FULL STOP	0	046	6E	LATIN SMALL LETTER N	0	110
2F	SOLIDUS	0	047	6F	LATIN SMALL LETTER O	0	111
30	DIGIT ZERO	0	048	70	LATIN SMALL LETTER P	0	112
31	DIGIT ONE	0	049	71	LATIN SMALL LETTER Q	0	113
32	DIGIT TWO	0	050	72	LATIN SMALL LETTER R	0	114
33	DIGIT THREE	0	051	73	LATIN SMALL LETTER S	0	115
34	DIGIT FOUR	0	052	74	LATIN SMALL LETTER T	0	116
35	DIGIT FIVE	0	053	75	LATIN SMALL LETTER U	0	117
36	DIGIT SIX	0	054	76	LATIN SMALL LETTER V	0	118
37	DIGIT SEVEN	0	055	77	LATIN SMALL LETTER W	0	119
38	DIGIT EIGHT	0	056	78	LATIN SMALL LETTER X	0	120
39	DIGIT NINE	0	057	79	LATIN SMALL LETTER Y	0	121
3A	COLON	0	058	7A	LATIN SMALL LETTER Z	0	122
3B	SEMI COLON	0	059	7B	LATIN SMALL LETTER A WITH DIAERESIS	0	228
3C	LESS-THAN SIGN	0	060	7C	LATIN SMALL LETTER 0 WITH DIAERESIS	0	246
3D	EQUALS SIGN	0	061	7D	LATIN SMALL LETTER N WITH TILDE	0	241
3E	GREATER-THAN SIGN	0	062	7E	LATIN SMALL LETTER U WITH ACUTE	0	250
3F	QUESTION MARK	0	063	7F	LATIN SMALL LETTER A WITH GRAVE	0	224
NOTE: Row and Columns refer to ISO 10646 [4] Plane 00.							

Table B.8: Optional character set for alphanumeric paging (character set indicator 00010)

				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0	@	Δ	SP	0	¡	P	¿	p
0	0	0	1	1	£	DC1	!	1	A	Q	a	q
0	0	1	0	2	$	Á	"	2	B	R	b	r
0	0	1	1	3	ð	á	#	3	C	S	c	s
0	1	0	0	4	è	Í	¤	4	D	T	d	t
0	1	0	1	5	é	í	%	5	E	U	e	u
0	1	1	0	6	ù	Ó	&	6	F	V	f	v
0	1	1	1	7	ì	ó	'	7	G	W	g	w
1	0	0	0	8	ò	Þ	(	8	H	X	h	x
1	0	0	1	9	Ç	þ	)	9	I	Y	i	y
1	0	1	0	10	LF	Đ	*	:	J	Z	j	z
1	0	1	1	11	Ý	ESC	+	;	K	Ä	k	ä
1	1	0	0	12	ý	Æ	,	<	L	Ö	l	ö
1	1	0	1	13	CR	æ	–	=	M	Ñ	m	ñ
1	1	1	0	14	Å	ß	.	>	N	Ú	n	ú
1	1	1	1	15	å	É	/	?	O	§	o	à

NOTE 1: DC1 shall be used only as the End Of Message (EOM) character.
NOTE 2: The characters of this set, when displayed, should approximate to the appearance of the relevant characters specified in ISO 10646 [4] and the corresponding national standards.

Table B.9: Optional character set for alphanumeric paging (character set indicator 00011)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
00	COMMERCIAL AT	0	064	40	INVERTED EXCLAMATION MARK	0	161
01	POUND SIGN	0	163	41	LATIN CAPITAL LETTER A	0	065
02	DOLLAR SIGN	0	036	42	LATIN CAPITAL LETTER B	0	066
03	LATIN SMALL LETTER U WITH DIAERESIS	0	252	43	LATIN CAPITAL LETTER C	0	067
04	LATIN SMALL LETTER E WITH GRAVE	0	232	44	LATIN CAPITAL LETTER D	0	068
05	LATIN SMALL LETTER E WITH ACUTE	0	233	45	LATIN CAPITAL LETTER E	0	069
06	LATIN SMALL LETTER U WITH GRAVE	0	249	46	LATIN CAPITAL LETTER F	0	070
07	LATIN SMALL LETTER I WITH GRAVE	0	236	47	LATIN CAPITAL LETTER G	0	071
08	LATIN SMALL LETTER O WITH GRAVE	0	242	48	LATIN CAPITAL LETTER H	0	072
09	LATIN SMALL LETTER C WITH CEDILLA	0	231	49	LATIN CAPITAL LETTER I	0	073
0A	LINE FEED	0	010	4A	LATIN CAPITAL LETTER J	0	074
0B	LATIN SMALL LETTER U WITH DOUBLE ACUTE	1	113	4B	LATIN CAPITAL LETTER K	0	075
0C	LATIN CAPITAL LETTER U WITH DOUBLE ACUTE	1	112	4C	LATIN CAPITAL LETTER L	0	076
0D	CARRIAGE RETURN	0	013	4D	LATIN CAPITAL LETTER M	0	077
0E	LATIN CAPITAL LETTER A WITH RING ABOVE	0	197	4E	LATIN CAPITAL LETTER N	0	078
0F	LATIN SMALL LETTER A WITH RING ABOVE	0	229	4F	LATIN CAPITAL LETTER O	0	079
10	GREEK CAPITAL LETTER DELTA	3	148	50	LATIN CAPITAL LETTER P	0	080
11	DC1 (See note 1)	0	017	51	LATIN CAPITAL LETTER Q	0	081
12	LATIN CAPITAL LETTER A WITH ACUTE	0	193	52	LATIN CAPITAL LETTER R	0	082
13	LATIN SMALL LETTER A WITH ACUTE	0	225	53	LATIN CAPITAL LETTER S	0	083
14	LATIN CAPITAL LETTER I WITH ACUTE	0	205	54	LATIN CAPITAL LETTER T	0	084
15	LATIN SMALL LETTER I WITH ACUTE	0	237	55	LATIN CAPITAL LETTER U	0	085
16	LATIN CAPITAL LETTER O WITH ACUTE	0	211	56	LATIN CAPITAL LETTER V	0	086
17	LATIN SMALL LETTER O WITH ACUTE	0	243	57	LATIN CAPITAL LETTER W	0	087
18	LATIN SMALL LETTER O WITH DOUBLE ACUTE	1	081	58	LATIN CAPITAL LETTER X	0	088
19	LATIN CAPITAL LETTER O WITH DOUBLE ACUTE	1	080	59	LATIN CAPITAL LETTER Y	0	089
1A	LATIN CAPITAL LETTER U WITH DIAERESIS	0	220	5A	LATIN CAPITAL LETTER Z	0	090
1B	ESCAPE	0	027	5B	LATIN CAPITAL LETTER A WITH DAERESIS	0	196
1C	LATIN CAPITAL LIGATURE AE	0	198	5C	LATIN CAPITAL LETTER 0 WITH DIAERESIS	0	214
1D	LATIN SMALL LIGATURE AE	0	230	5D	LATIN CAPITAL LETTER N WITH TILDE	0	209
1E	LATIN SMALL LETTER SHARP S (German)	0	223	5E	LATIN CAPITAL LETTER U WITH ACUTE	0	218
1F	LATIN CAPITAL LETTER E WITH ACUTE	0	201	5F	SECTION SIGN	0	167
20	SPACE	0	032	60	INVERTED QUESTION MARK	0	191
21	EXCLAMATION MARK	0	033	61	LATIN SMALL LETTER A	0	097
22	QUOTATION MARK	0	034	62	LATIN SMALL LETTER B	0	098
23	NUMBER SIGN	0	035	63	LATIN SMALL LETTER C	0	099
24	CURRENCY SIGN	0	164	64	LATIN SMALL LETTER D	0	100
25	PERCENT SIGN	0	037	65	LATIN SMALL LETTER E	0	101
26	AMPERSAND	0	038	66	LATIN SMALL LETTER F	0	102
27	APOSTROPHE	0	039	67	LATIN SMALL LETTER G	0	103
28	LEFT PARENTHESIS	0	040	68	LATIN SMALL LETTER H	0	104
29	RIGHT PARENTHESIS	0	041	69	LATIN SMALL LETTER I	0	105

(continued)

Table B.9 (concluded): Optional character set for alphanumeric paging
(character set indicator 00011)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
2A	Asterisk	0	042	6A	LATIN SMALL LETTER J	0	106
2B	PLUS SIGN	0	043	6B	LATIN SMALL LETTER K	0	107
2C	COMMA	0	044	6C	LATIN SMALL LETTER L	0	108
2D	HYPHEN-MINUS	0	045	6D	LATIN SMALL LETTER M	0	109
2E	FULL STOP	0	046	6E	LATIN SMALL LETTER N	0	110
2F	SOLIDUS	0	047	6F	LATIN SMALL LETTER O	0	111
30	DIGIT ZERO	0	048	70	LATIN SMALL LETTER P	0	112
31	DIGIT ONE	0	049	71	LATIN SMALL LETTER Q	0	113
32	DIGIT TWO	0	050	72	LATIN SMALL LETTER R	0	114
33	DIGIT THREE	0	051	73	LATIN SMALL LETTER S	0	115
34	DIGIT FOUR	0	052	74	LATIN SMALL LETTER T	0	116
35	DIGIT FIVE	0	053	75	LATIN SMALL LETTER U	0	117
36	DIGIT SIX	0	054	76	LATIN SMALL LETTER V	0	118
37	DIGIT SEVEN	0	055	77	LATIN SMALL LETTER W	0	119
38	DIGIT EIGHT	0	056	78	LATIN SMALL LETTER X	0	120
39	DIGIT NINE	0	057	79	LATIN SMALL LETTER Y	0	121
3A	COLON	0	058	7A	LATIN SMALL LETTER Z	0	122
3B	SEMI COLON	0	059	7B	LATIN SMALL LETTER A WITH DIAERESIS	0	228
3C	LESS-THAN SIGN	0	060	7C	LATIN SMALL LETTER 0 WITH DIAERESIS	0	246
3D	EQUALS SIGN	0	061	7D	LATIN SMALL LETTER N WITH TILDE	0	241
3E	GREATER-THAN SIGN	0	062	7E	LATIN SMALL LETTER U WITH ACUTE	0	250
3F	QUESTION MARK	0	063	7F	LATIN SMALL LETTER A WITH GRAVE	0	224
NOTE:	Row and Columns refer to ISO 10646 [4] Plane 00.						

Table B.10: Optional character set for alphanumeric paging (character set indicator 00011)

				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0	@	Δ	SP	0	¡	P	¿	p
0	0	0	1	1	£	DC1	!	1	A	Q	a	q
0	0	1	0	2	$	À	"	2	B	R	b	r
0	0	1	1	3	ü	á	#	3	C	S	c	s
0	1	0	0	4	è	Í	¤	4	D	T	d	t
0	1	0	1	5	é	í	%	5	E	U	e	u
0	1	1	0	6	ù	Ó	&	6	F	V	f	v
0	1	1	1	7	ı	ó	'	7	G	W	g	w
1	0	0	0	8	ò	ő	(	8	H	X	h	x
1	0	0	1	9	ç	Ő	)	9	I	Y	i	y
1	0	1	0	10	LF	Ü	*	:	J	Z	j	z
1	0	1	1	11	ű	ESC	+	;	K	Ä	k	ä
1	1	0	0	12	Ű	Æ	,	<	L	Ö	l	ö
1	1	0	1	13	CR	æ	–	=	M	Ñ	m	ñ
1	1	1	0	14	Å	ß	.	>	N	Ú	n	ú
1	1	1	1	15	å	É	/	?	O	§	o	à

NOTE 1:	DC1 shall be used only as the End Of Message (EOM) character.
NOTE 2:	The characters of this set, when displayed, should approximate to the appearance of the relevant characters specified in ISO 10646 [4] and the corresponding national standards.

Table B.11: Optional character set for alphanumeric paging (character set indicator 00100)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
00	COMMERCIAL AT	0	064	40	INVERTED EXCLAMATION MARK	0	161
01	POUND SIGN	0	163	41	LATIN CAPITAL LETTER A	0	065
02	DOLLAR SIGN	0	036	42	LATIN CAPITAL LETTER B	0	066
03	LATIN CAPITAL LETTER L WITH STROKE	1	065	43	LATIN CAPITAL LETTER C	0	067
04	LATIN SMALL LETTER E WITH GRAVE	0	232	44	LATIN CAPITAL LETTER D	0	068
05	LATiN SMALL LETTER E WITH ACUTE	0	233	45	LATIN CAPITAL LETTER E	0	069
06	LATIN SMALL LETTER U WITH GRAVE	0	249	46	LATIN CAPITAL LETTER F	0	070
07	LATIN SMALL LETTER I WITH GRAVE	0	236	47	LATIN CAPITAL LETTER G	0	071
08	LATIN SMALL LETTER 0 WITH GRAVE	0	242	48	LATIN CAPITAL LETTER H	0	072
09	LATIN SMALL LETTER L WITH STROKE	1	066	49	LATIN CAPITAL LETTER I	0	073
0A	LINE FEED	0	010	4A	LATIN CAPITAL LETTER J	0	074
0B	LATIN CAPITAL LETTER S WITH ACUTE	1	090	4B	LATIN CAPITAL LETTER K	0	075
0C	LATIN SMALL LETTER S WITH ACUTE	1	091	4C	LATIN CAPITAL LETTER L	0	076
0D	CARRIAGE RETURN	0	013	4D	LATIN CAPITAL LETTER M	0	077
0E	LATIN CAPITAL LETTER C WITH ACUTE	1	006	4E	LATIN CAPITAL LETTER N	0	078
0F	LATIN SMALL LETTER C WITH ACUTE	1	007	4F	LATIN CAPITAL LETTER O	0	079
10	GREEK CAPITAL LETTER DELTA	3	148	50	LATIN CAPITAL LETTER P	0	080
11	DC1 (See note 1)	0	017	51	LATIN CAPITAL LETTER Q	0	081
12	LATIN CAPITAL LETTER E WITH OGONEK	1	024	52	LATIN CAPITAL LETTER R	0	082
13	LATIN SMALL LETTER E WITH OGONEK	1	025	53	LATIN CAPITAL LETTER S	0	083
14	LATIN CAPITAL LETTER Z WITH ACUTE	1	121	54	LATIN CAPITAL LETTER T	0	084
15	LATIN SMALL LETTER Z WITH ACUTE	1	122	55	LATIN CAPITAL LETTER U	0	085
16	LATIN CAPITAL LETTER N WITH ACUTE	1	067	56	LATIN CAPITAL LETTER V	0	086
17	LATIN SMALL LETTER O WITH ACUTE	0	243	57	LATIN CAPITAL LETTER W	0	087
18	LATIN SMALL LETTER N WITH ACUTE	1	068	58	LATIN CAPITAL LETTER X	0	088
19	LATIN CAPITAL LETTER O WITH ACUTE	0	211	59	LATIN CAPITAL LETTER Y	0	089
1A	GREEK CAPITAL LETTER XI	3	158	5A	LATIN CAPITAL LETTER Z	0	090
1B	ESCAPE	0	027	5B	LATIN CAPITAL LETTER A WITH DAERESIS	0	196
1C	LATIN CAPITAL LETTER Z WITH DOT ABOVE	1	123	5C	LATIN CAPITAL LETTER 0 WITH DIAERESIS	0	214
1D	LATIN SMALL LETTER Z WITH DOT ABOVE	1	124	5D	LATIN SMALL LETTER A WITH OGONEK	1	005
1E	LATiN SMALL LETTER SHARP S (German)	0	223	5E	LATIN CAPITAL LETTER U WITH DIAERESIS	0	220
1F	LATIN CAPITAL LETTER E WITH ACUTE	0	201	5F	SECTION SIGN	0	167
20	SPACE	0	032	60	INVERTED QUESTION MARK	0	191
21	EXCLAMATION MARK	0	033	61	LATIN SMALL LETTER A	0	097
22	QUOTATION MARK	0	034	62	LATIN SMALL LETTER B	0	098
23	NUMBER SIGN	0	035	63	LATIN SMALL LETTER C	0	099
24	CURRENCY SIGN	0	164	64	LATIN SMALL LETTER D	0	100
25	PERCENT SIGN	0	037	65	LATIN SMALL LETTER E	0	101
26	AMPERSAND	0	038	66	LATIN SMALL LETTER F	0	102
27	APOSTROPHE	0	039	67	LATIN SMALL LETTER G	0	103
28	LEFT PARENTHESIS	0	040	68	LATIN SMALL LETTER H	0	104
29	RIGHT PARENTHESIS	0	041	69	LATIN SMALL LETTER I	0	105

(continued)

Table B.11 (concluded): Optional character set for alphanumeric paging
(character set indicator 00100)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
2A	Asterisk	0	042	6A	LATIN SMALL LETTER J	0	106
2B	PLUS SIGN	0	043	6B	LATIN SMALL LETTER K	0	107
2C	COMMA	0	044	6C	LATIN SMALL LETTER L	0	108
2D	HYPHEN-MINUS	0	045	6D	LATIN SMALL LETTER M	0	109
2E	FULL STOP	0	046	6E	LATIN SMALL LETTER N	0	110
2F	SOLIDUS	0	047	6F	LATIN SMALL LETTER O	0	111
30	DIGIT ZERO	0	048	70	LATIN SMALL LETTER P	0	112
31	DIGIT ONE	0	049	71	LATIN SMALL LETTER Q	0	113
32	DIGIT TWO	0	050	72	LATIN SMALL LETTER R	0	114
33	DIGIT THREE	0	051	73	LATIN SMALL LETTER S	0	115
34	DIGIT FOUR	0	052	74	LATIN SMALL LETTER T	0	116
35	DIGIT FIVE	0	053	75	LATIN SMALL LETTER U	0	117
36	DIGIT SIX	0	054	76	LATIN SMALL LETTER V	0	118
37	DIGIT SEVEN	0	055	77	LATIN SMALL LETTER W	0	119
38	DIGIT EIGHT	0	056	78	LATIN SMALL LETTER X	0	120
39	DIGIT NINE	0	057	79	LATIN SMALL LETTER Y	0	121
3A	COLON	0	058	7A	LATIN SMALL LETTER Z	0	122
3B	SEMI COLON	0	059	7B	LATIN SMALL LETTER A WITH DIAERESIS	0	228
3C	LESS-THAN SIGN	0	060	7C	LATIN SMALL LETTER 0 WITH DIAERESIS	0	246
3D	EQUALS SIGN	0	061	7D	LATIN CAPITAL LETTER A WITH OGONEK	1	004
3E	GREATER-THAN SIGN	0	062	7E	LATIN SMALL LETTER U WITH DIAERESIS	0	252
3F	QUESTION MARK	0	063	7F	LATIN SMALL LETTER A WITH GRAVE	0	224
NOTE: Row and Columns refer to ISO 10646 [4] Plane 00.							

Table B.12: Optional character set for alphanumeric paging (character set indicator 00100)

				b7	0	0	0	0	1	1	1	1
				b6	0	0	1	1	0	0	1	1
				b5	0	1	0	1	0	1	0	1
b4	b3	b2	b1		0	1	2	3	4	5	6	7
0	0	0	0	0	@	Δ	SP	0	¡	P	¿	p
0	0	0	1	1	£	DC1	!	1	A	Q	a	q
0	0	1	0	2	$	Ę	"	2	B	R	b	r
0	0	1	1	3	Ł	ę	#	3	C	S	c	s
0	1	0	0	4	è	Ź	¤	4	D	T	d	t
0	1	0	1	5	é	ź	%	5	E	U	e	u
0	1	1	0	6	ù	Ń	&	6	F	V	f	v
0	1	1	1	7	ì	ó	'	7	G	W	g	w
1	0	0	0	8	ò	ń	(	8	H	X	h	x
1	0	0	1	9	Ł	Ó	)	9	I	Y	i	y
1	0	1	0	10	LF	Ξ	*	:	J	Z	j	z
1	0	1	1	11	Ś	ESC	+	;	K	Ä	k	ä
1	1	0	0	12	ś	Ż	,	<	L	Ö	l	ö
1	1	0	1	13	CR	ż	–	=	M	[1]	m	[1]
1	1	1	0	14	Ć	ß	.	>	N	Ü	n	ü
1	1	1	1	15	ć	É	/	?	O	§	o	à

NOTE 1: DC1 shall be used only as the End Of Message (EOM) character.
NOTE 2: The characters of this set, when displayed, should approximate to the appearance of the relevant characters specified in ISO 10646 [4] and the corresponding national standards.

Table B.13: Optional character set for alphanumeric paging (character set indicator 00101)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
00	CYRILLIC CAPITAL LETTER DJE (Serbocroatian)	04	002	40	CYRILLIC CAPITAL LETTER A	04	016
01	CYRILLIC CAPITAL LETTER GJE	04	003	41	CYRILLIC CAPITAL LETTER BE	04	017
02	CYRILLIC SMALL LETTER GJE	04	083	42	CYRILLIC CAPITAL LETTER VE	04	018
03	CYRILLIC CAPITAL LETTER LJE	04	009	43	CYRILLIC CAPITAL LETTER GHE	04	019
04	CYRILLIC CAPITAL LETTER NJE	04	010	44	CYRILLIC CAPITAL LETTER DE	04	020
05	CYRILLIC CAPITAL LETTER KJE	04	012	45	CYRILLIC CAPITAL LETTER IE	04	021
06	CYRILLIC CAPITAL LETTER TSHE (Serbocroatian)	04	011	46	CYRILLIC CAPITAL LETTER ZHE	04	022
07	CYRILLIC CAPITAL LETTER DZHE	04	015	47	CYRILLIC CAPITAL LETTER ZE	04	023
08	CYRILLIC SMALL LETTER DJE (Serbocroatian)	04	082	48	CYRILLIC CAPITAL LETTER I	04	024
09	CYRILLIC SMALL LETTER LJE	04	089	49	CYRILLIC CAPITAL LETTER SHORT I	04	025
0A	LINE FEED	00	010	4A	CYRILLIC CAPITAL LETTER KA	04	026
0B	CYRILLIC SMALL LETTER NJE	04	090	4B	CYRILLIC CAPITAL LETTER EL	04	027
0C	CYRILLIC SMALL LETTER KJE	04	092	4C	CYRILLIC CAPITAL LETTER EM	04	028
0D	CARRIAGE RETURN	00	013	4D	CYRILLIC CAPITAL LETTER EN	04	029
0E	CYRILLIC SMALL LETTER TSHE (Serbocroatian)	04	091	4E	CYRILLIC CAPITAL LETTER O	04	030
0F	CYRILLIC SMALL LETTER DZHE	04	095	4F	CYRILLIC CAPITAL LETTER PE	04	031
10	CYRILLIC CAPITAL LETTER SHORT U (Byelorussian)	04	014	50	CYRILLIC CAPITAL LETTER ER	04	032
11	DC1 (See note 1)	00	017	51	CYRILLIC CAPITAL LETTER ES	04	033
12	CYRILLIC SMALL LETTER SHORT U (Byelorussian)	04	094	52	CYRILLIC CAPITAL LETTER TE	04	034
13	CYRILLIC CAPITAL LETTER JE	04	008	53	CYRILLIC CAPITAL LETTER U	04	035
14	CYRILLIC CAPITAL LETTER GHE WITH UPTURN	04	144	54	CYRILLIC CAPITAL LETTER EF	04	036
15	CYRILLIC CAPITAL LETTER IO	04	001	55	CYRILLIC CAPITAL LETTER HA	04	037
16	CYRILLIC CAPITAL LETTER UKRAINIAN IE	04	004	56	CYRILLIC CAPITAL LETTER TSE	04	038
17	CYRILLIC CAPITAL LETTER YI (Ukrainian)	04	007	57	CYRILLIC CAPITAL LETTER CHE	04	039
18	CYRILLIC CAPITAL LETTER I (Byelorussian-Ukrainian)	04	006	58	CYRILLIC CAPITAL LETTER SHA	04	040
19	CYRILLIC SMALL LETTER I (Byelorussian-Ukrainian)	04	086	59	CYRILLIC CAPITAL LETTER SHCHA	04	041
1A	CYRILLIC SMALL LETTER GHE WITH UP UPTURN	04	145	5A	CYRILLIC CAPITAL LETTER HARD SIGN	04	042
1B	ESCAPE	00	027	5B	CYRILLIC CAPITAL LETTER YERU	04	043
1C	CYRILLIC SMALL LETTER IO	04	081	5C	CYRILLIC CAPITAL LETTER SOFT SIGN	04	044
1D	CYRILLIC SMALL LETTER UKRAINIAN IE	04	084	5D	CYRILLIC CAPITAL LETTER E	04	045
1E	CYRILLIC SMALL LETTER JE	04	088	5E	CYRILLIC CAPITAL LETTER YU	04	046
1F	CYRILLIC CAPITAL LETTER DZE	04	005	5F	CYRILLIC CAPITAL LETTER YA	04	047
20	SPACE	00	032	60	CYRILLIC SMALL LETTER A	04	048
21	EXCLAMATION MARK	00	033	61	CYRILLIC SMALL LETTER BE	04	049
22	QUOTATION MARK	00	034	62	CYRILLIC SMALL LETTER VE	04	050
23	NUMBER SIGN	00	035	63	CYRILLIC SMALL LETTER GHE	04	051
24	CYRILLIC SMALL LETTER DZE	04	085	64	CYRILLIC SMALL LETTER DE	04	052
25	PERCENT SIGN	00	037	65	CYRILLIC SMALL LETTER IE	04	053
26	CYRILLIC SMALL LETTER YI (Ukrainian)	04	087	66	CYRILLIC SMALL LETTER ZHE	04	054
27	APOSTROPHE	00	039	67	CYRILLIC SMALL LETTER ZE	04	055
28	LEFT PARENTHESIS	00	040	68	CYRILLIC SMALL LETTER I	04	056
29	RIGHT PARENTHESIS	00	041	69	CYRILLIC SMALL LETTER SHORT I	04	057
2A	Asterisk	00	042	6A	CYRILLIC SMALL LETTER KA	04	058
2B	PLUS SIGN	00	043	6B	CYRILLIC SMALL LETTER EL	04	059
2C	COMMA	00	044	6C	CYRILLIC SMALL LETTER EM	04	060
2D	HYPHEN-MINUS	00	045	6D	CYRILLIC SMALL LETTER EN	04	061
2E	FULL STOP	00	046	6E	CYRILLIC SMALL LETTER 0	04	062
2F	SOLIDUS	00	047	6F	CYRILLIC SMALL LETTER PE	04	063

(continued)

Table B.13 (concluded): Optional character set for alphanumeric paging
(character set indicator 00101)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
30	DIGIT ZERO	00	048	70	CYRILLIC SMALL LETTER ER	04	064
31	DIGIT ONE	00	049	71	CYRILLIC SMALL LETTER ES	04	065
32	DIGIT TWO	00	050	72	CYRILLIC SMALL LETTER TE	04	066
33	DIGIT THREE	00	051	73	CYRILLIC SMALL LETTER U	04	067
34	DIGIT FOUR	00	052	74	CYRILLIC SMALL LETTER EF	04	068
35	DIGIT FIVE	00	053	75	CYRILLIC SMALL LETTER HA	04	069
36	DIGIT SIX	00	054	76	CYRILLIC SMALL LETTER TSE	04	070
37	DIGIT SEVEN	00	055	77	CYRILLIC SMALL LETTER CHE	04	071
38	DIGIT EIGHT	00	056	78	CYRILLIC SMALL LETTER SHA	04	072
39	DIGIT NINE	00	057	79	CYRILLIC SMALL LETTER SHCHA	04	073
3A	COLON	00	058	7A	CYRILLIC SMALL LETTER HARD SIGN	04	074
3B	SEMI COLON	00	059	7B	CYRILLIC SMALL LETTER YERU	04	075
3C	LESS-THAN SIGN	00	060	7C	CYRILLIC SMALL LETTER SOFT SIGN	04	076
3D	EQUALS SIGN	00	061	7D	CYRILLIC SMALL LETTER E	04	077
3E	GREATER-THAN SIGN	00	062	7E	CYRILLIC SMALL LETTER YU	04	078
3F	QUESTION MARK	00	063	7F	CYRILLIC SMALL LETTER YA	04	079
NOTE:	Row and Columns refer to ISO 10646 [4] Plane 00.						

Table B.14: Optional character set for alphanumeric paging (character set indicator 00101)

b4	b3	b2	b1		b7	0	0	0	0	1	1	1	1
					b6	0	0	1	1	0	0	1	1
					b5	0	1	0	1	0	1	0	1
						0	1	2	3	4	5	6	7
0	0	0	0	0		Ђ	ў̆	SP	0	А	Р	а	р
0	0	0	1	1		Ѓ	DC1	!	1	Б	С	б	с
0	0	1	0	2		ѓ	ў	"	2	В	Т	в	т
0	0	1	1	3		Љ	J	#	3	Г	У	г	у
0	1	0	0	4		Њ	Ѓ	s	4	Д	Ф	д	ф
0	1	0	1	5		Ќ	Ё	%	5	Е	Х	е	х
0	1	1	0	6		Ћ	Є	ï	6	Ж	Ц	ж	ц
0	1	1	1	7		Џ	Ï	'	7	З	Ч	з	ч
1	0	0	0	8		ђ	I	(	8	И	Ш	и	ш
1	0	0	1	9		љ	i	)	9	Й	Щ	й	щ
1	0	1	0	10		LF	г	*	:	К	Ъ	к	ъ
1	0	1	1	11		њ	ESC	+	;	Л	Ы	л	ы
1	1	0	0	12		ќ	ё	,	<	М	Ь	м	ь
1	1	0	1	13		CR	є	–	=	Н	Э	н	э
1	1	1	0	14		ћ	j	.	>	О	Ю	о	ю
1	1	1	1	15		џ	S	/	?	П	Я	п	я

NOTE 1:   DC1 shall be used only at the End Of Message (EOM) character.
NOTE 2:   The characters of this set, when displayed, should approximate to the appearance of the relevant characters specified in ISO 10646 [4] and the corresponding national standards.

Table B.15: Optional character set for alphanumeric paging (character set indicator 00110)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
00	COMMERCIAL AT	0	064	40	ARABIC LIGATURE LAM WITH ALEF WITH MADDA ABOVE	FE	245
01	QUESTION MARK	0	063	41	ARABIC LETTER HAMZA	06	033
02	DOLLAR SIGN	0	036	42	ARABIC LETTER ALEF WITH MADDA ABOVE	06	034
03	LATIN CAPITAL LETTER A	0	065	43	ARABIC LETTER ALEF WITH HAMZA ABOVE	06	035
04	LATIN CAPITAL LETTER B	0	066	44	ARABIC LETTER WAW WITH HAMZA ABOVE	06	036
05	LATIN CAPITAL LETTER C	0	067	45	ARABIC LETTER ALEF WITH HAMZA BELOW	06	037
06	LATIN CAPITAL LETTER D	0	068	46	ARABIC LETTER YEH WITH HAMZA ABOVE	06	038
07	LATIN CAPITAL LETTER E	0	069	47	ARABIC LETTER ALEF	06	039
08	LATIN CAPITAL LETTER F	0	070	48	ARABIC LETTER BEH	06	040
09	LATIN CAPITAL LETTER G	0	071	49	ARABIC LETTER TEH MARBUTA	06	041
0A	LINE FEED	0	010	4A	ARABIC LETTER TEH	06	042
0B	LATIN CAPITAL LETTER H	0	072	4B	ARABIC LETTER THEH	06	043
0C	LATIN CAPITAL LETTER I	0	073	4C	ARABIC LETTER JEEM	06	044
0D	CARRIAGE RETURN	0	013	4D	ARABIC LETTER HAH	06	045
0E	(See note 4)			4E	ARABIC LETTER KHAH	06	046
0F	(See note 4)			4F	ARABIC LETTER DAL	06	047
10	LATIN CAPITAL LETTER J	0	074	50	ARABIC LETTER THAL	06	048
11	DC1(See note 1)	0	017	51	ARABIC LETTER REH	06	049
12	LATIN CAPITAL LETTER K	0	075	52	ARABIC LETTER ZAIN	06	050
13	LATIN CAPITAL LETTER L	0	076	53	ARABIC LETTER SEEN (See note 3)	06	051
14	LATIN CAPITAL LETTER M	0	077	54	ARABIC LETTER SHEEN (See note 3)	06	052
15	LATIN CAPITAL LETTER N	0	078	55	ARABIC LETTER SAD (See note 3)	06	053
16	LATIN CAPITAL LETTER O	0	079	56	ARABIC LETTER DAD (See note 3)	06	054
17	LATIN CAPITAL LETTER P	0	080	57	ARABIC LETTER TAH	06	055
18	LATIN CAPITAL LETTER Q	0	081	58	ARABIC LETTER ZAH	06	056
19	LATIN CAPITAL LETTER R	0	082	59	ARABIC LETTER AIN	06	057
1A	LATIN CAPITAL LETTER S	0	083	5A	ARABIC LETTER GHAIN	06	058
1B	ESCAPE	0	027	5B	ARABIC LETTERS SEEN, SHEEN, SAD, DAD (See note 5)		
1C	LATIN CAPITAL LETTER T	0	084	5C	ARABIC LETTER HEH GOAL	06	193
1D	LATIN CAPITAL LETTER U	0	085	5D	ARABIC LETTER TEH MARBUTA GOAL	06	195
1E	LATIN CAPITAL LETTER V	0	086	5E	ARABIC LIGATURE LAM WITH ALEF WITH HAMZA ABOVE	FE	247
1F	LATIN CAPITAL LETTER W	0	087	5F	ARABIC LETTER SUKUN	06	082
20	SPACE	0	032	60	ARABIC TATWEEL	06	064
21	EXCLAMATION MARK	0	033	61	ARABIC LETTER FEH	06	065
22	QUOTATION MARK	0	034	62	ARABIC LETTER QAF	06	066
23	NUMBER SIGN	0	035	63	ARABIC LETTER KAF	06	067
24	CURRENCY SIGN	0	085	64	ARABIC LETTER LAM	06	068
25	PERCENT SIGN	0	037	65	ARABIC LETTER MEEM	06	069
26	AMPERSAND	0	087	66	ARABIC LETTER NOON	06	070
27	APOSTROPHE	0	039	67	ARABIC LETTER HEH	06	071
28	LEFT PARENTHESIS	0	040	68	ARABIC LETTER WAW	06	072
29	RIGHT PARENTHESIS	0	041	69	ARABIC LETTER ALEF MAKSURA	06	073
2A	Asterisk	0	042	6A	ARABIC LETTER YEH	06	074
2B	PLUS SIGN	0	043	6B	ARABIC LETTER PEH	06	126
2C	COMMA	0	044	6C	ARABIC LETTER JEH	06	152
2D	HYPHEN-MINUS	0	045	6D	ARABIC LETTER GAF	06	175
2E	FULL STOP	0	046	6E	ARABIC LETTER KEHEH	06	169
2F	SOLIDUS	0	047	6F	ARABIC LETTER FARSI KAF	E8	009

(continued)

Table B.15 (concluded): Optional character set for alphanumeric paging
(character set indicator 00110)

NUMBER	NAME	ROW	COL.	NUMBER	NAME	ROW	COL.
30	DIGIT ZERO	0	048	70	ARABIC-INDIC DIGIT ZERO	06	096
31	DIGIT ONE	0	049	71	ARABIC-INDIC DIGIT ONE	06	097
32	DIGIT TWO	0	050	72	ARABIC-INDIC DIGIT TWO	06	098
33	DIGIT THREE	0	051	73	ARABIC-INDIC DIGIT THREE	06	099
34	DIGIT FOUR	0	052	74	ARABIC-INDIC DIGIT FOUR	06	100
35	DIGIT FIVE	0	053	75	ARABIC-INDIC DIGIT FIVE	06	101
36	DIGIT SIX	0	054	76	ARABIC-INDIC DIGIT SIX	06	102
37	DIGIT SEVEN	0	055	77	ARABIC-INDIC DIGIT SEVEN	06	103
38	DIGIT EIGHT	0	056	78	ARABIC-INDIC DIGIT EIGHT	06	104
39	DIGIT NINE	0	057	79	ARABIC-INDIC DIGIT NINE	06	105
3A	COLON	0	058	7A	ARABIC LIGATURE LAM WITH ALEF	FE	FB
3B	ARABIC SEMI COLON	06	027	7B	ARABIC COMMA	06	012
3C	GREATER-THAN SIGN	0	062	7C	SEMI COLON	00	059
3D	EQUALS SIGN	0	061	7D	LATIN CAPITAL LETTER X	00	088
3E	LESS THAN SIGN	0	060	7E	LATIN CAPITAL LETTER Y	00	089
3F	ARABIC QUESTION MARK	06	031	7F	LATIN CAPITAL LETTER Z	00	090
NOTE: Row and Columns refer to ISO 10646 [4] Plane 00.							

Table B.16: Optional character set for alphanumeric paging (character set indicator 00110)

b4	b3	b2	b1		b7=0 b6=0 b5=0 (0)	b7=0 b6=0 b5=1 (1)	b7=0 b6=1 b5=0 (2)	b7=0 b6=1 b5=1 (3)	b7=1 b6=0 b5=0 (4)	b7=1 b6=0 b5=1 (5)	b7=1 b6=1 b5=0 (6)	b7=1 b6=1 b5=1 (7)
0	0	0	0	0	@	J	SP	0	لآ	ذ	ـ	٠
0	0	0	1	1	?	DC1	!	1	ء	ر	ف	١
0	0	1	0	2	$	K	"	2	آ	ز	ق	٢
0	0	1	1	3	A	L	#	3	أ	سـ	ك	٣
0	1	0	0	4	B	M	¤	4	ؤ	شـ	ل	٤
0	1	0	1	5	C	N	%	5	إ	صـ	م	٥
0	1	1	0	6	D	O	&	6	ئـ	ضـ	ن	٦
0	1	1	1	7	E	P	'	7	ا	ط	ه	٧
1	0	0	0	8	F	Q	)	8	ب	ظ	و	٨
1	0	0	1	9	G	R	(	9	ة	ع	ى	٩
1	0	1	0	10	LF	S	*	:	ت	غ	ي	لا
1	0	1	1	11	H	ESC	+	؛	ث	س	پ	'
1	1	0	0	12	I	T	،	<	جـ	ﻤ	ژ	;
1	1	0	1	13	CR	U	-	=	حـ	ﻈ	گ	X
1	1	1	0	14	SO	V	.	>	خـ	لأ	ک	Y
1	1	1	1	15	SI	W	/	؟	د	ْ	گﺉ	Z

NOTE 1: DC1 shall be used only at the End Of Message (EOM) character.
NOTE 2: The characters of this set, when displayed should approximate to the appearance of the relevant characters specified in ISO 10646 [4] and the corresponding national standards.
NOTE 3: The appearance of the characters due to its position in a word shall be handled by the displaying part.
NOTE 4: SI shall be used to select writing from the left to the right side (default). SO shall be used to select writing from the right to the left side (Arabic).
NOTE 5: Character 5B is transmitted when required to end a word.

B.2.1 Optional character set for Chinese Characters (character set indicator 10000)

Each of the pictograms and characters in this character set are to be represented as a sequence of two 7-bit information units. Each of these information units shall be considered as representing an alphanumeric character and all rules and techniques associated with alphanumeric characters shall be followed.

Supported Chinese pictograms are in the Chinese character set defined in ITU-T Recommendation T.52 [5], subclause 8.3. ITU-T Recommendation T.52 [5] contains tables of characters. The table index is printed in bold face type in the uppermost left corner of each table. Each character in the table is referenced by a character index from 1 to 94.

Each pictogram or character is represented by a sequence of two 7 bit information units. The first information unit is generated from the addition of the table index and decimal 32. The second information unit is generated by the addition of the character index and decimal 32. For example, the $ symbol is contained in the table number 1 as character index 71. It will therefore be represented by the information units with decimal value 33 and 103, or in hexadecimal format $21 and $67.

The 7-bit information unit 0010001 (DC1) (see table B.3) shall be used only as the End Of Message (EOM) character.

The characters of this set, when presented, should approximate to the appearance of the relevant characters in ITU-T Recommendation T.52 [5], subclause 8.3.

B.2.2 Optional character set for Chinese characters in Taiwan (character set indicator 10001)

Each of the pictograms and characters in this character set are to be represented as a sequence of two 7-bit information units. Each of these information units shall be considered as representing an alphanumeric character and all rules and techniques associated with alphanumeric characters shall be followed.

Supported Chinese pictograms in Taiwan are as in the Chinese character set CNS 11643, X5012 [6]. In this standard there are tables containing Chinese pictograms. In these tables, positions from 2 121 to 4 241 are occupied by 684 different characters and symbols, so that in each column there is a character code and the corresponding symbol. Positions from 4 421 to 7D4B represent 5,401 most commonly and frequently used Chinese characters, and each column shows a character code, the corresponding Chinese character, the number of handwriting strokes in that character, the radical (i.e. root of the word) and the number of handwriting strokes in the radical. For coding purposes only the character code and the corresponding character or symbol is needed.

Each pictogram or character is represented by a sequence of two 7-bit information units. For example, the @ sign is represented with two hexadecimal characters 22hex and 69hex (character code 2269 in these tables).

The 7-bit information unit 0010001 (DC1) (see table B.3) shall be used only as the End Of Message (EOM) character.

The characters of this set, when presented, should approximate to the appearance of the relevant characters in CNS 11643, X5012 [6].

Annex C (normative): The concept of radiodistribution

The term "radiodistribution" has been used without definition in this ETS. This annex describes radiodistribution as applied in the ERMES system. Radiodistribution is the capability of a calling party, restricted to the information supplier, to broadcast messages to a large but selective group of receivers. Radiodistribution services may be used for selling public information (such as weather forecasts, stock market information, etc.) to groups of people who have signed a subscription for this service, with the information supplier entering the messages into the system. The information supplier would normally be a fixed subscriber.

The radiodistribution service is not a supplementary service of the paging network but an external service using the paging network as a transport link. Radiodistribution messages can be sent in one or more paging areas defined by the information supplier. For implementation of a radiodistribution service in the ERMES system the "group call to mobile subscribers using a common RIC" supplementary service should be used to obtain better spectrum efficiency.

Annex D (normative): Essential and optional receiver features

Table D.1: Essential and optional receiver features

Receiver feature	Tone only	Numeric	Alpha numeric	Transparent data
Tone-only	E	E	E	O
Numeric	-	E	E	O
Alphanumeric	-	-	E	O
Transparent data	-	-	-	E
Alert signals	E	E	E	O
Access to the message	-	O	O	O
Repeated call indication	O	E	E	O
Lost message indication	-	O	O	O
Remote programming of RIC	O	O	O	O
Out of range indication	O	O	O	O
Urgent message indicator	O	O	O	O
Silent mode	E	E	E	O
Battery low indication	E	E	E	E
Message storage / retrieval	O	O	O	O
Memory full	O	O	O	O
Message manipulation	O	O	O	O
Display	O	O	O	O
Printer interface	-	O	O	O
Data interface	O	O	O	O
Date/time indication	O	O	O	O
Encryption	-	O	O	O

NOTE: E: Essential
        O: Optional
        -: Not applicable				

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