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Foreword

This ETSI Technical Report (ETR) has been produced by the Terrestrial Trunked Radio (TETRA) Technical Committee of the European Telecommunications Standards Institute (ETSI).

ETRs are informative documents resulting from ETSI studies which are not appropriate for European Telecommunication Standard (ETS) or Interim European Telecommunication Standard (I-ETS) status.

An ETR may be used to publish material which is either of an informative nature, relating to the use or application of ETSs or I-ETSs, or which is immature and not yet suitable for formal adoption as an ETS or I-ETS.

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1 Scope

This ETSI Technical Report (ETR) defines the user visible numbering and dialling in TETRA terminal equipment for accessing TETRA systems and external systems including e.g. Private Automatic Branch Exchange (PABX) and ITU-T Recommendation E.164 [10] domain, mapping of user visible numbers to TETRA addresses exchanged over the air interface, and further defines TETRA Short Subscriber Identity (SSI) addresses to be used to access these external systems.

The Man Machine Interface (MMI) issues have been addressed in this ETR only to the extent of those strictly related to numbering and dialling.

This ETR is applicable to TETRA terminal equipment with a basic or enhanced number keypad, as in ETR 294 [12], or with a display capable of displaying numbers in decimal format, as well as all the TETRA terminal equipment employing air interface address exchange.

Allocation of predefined SSI addresses in this ETR is also applicable to TETRA Switching and Management Infrastructure (SwMI) applications.

2 References

For the purposes of this ETR, the following references apply:

[1] ETS 300 392-1: "Terrestrial Trunked Radio (TETRA) system; Voice plus Data (V+D); Part 1: General network design".

[2] ETS 300 392-2: "Terrestrial Trunked Radio (TETRA) system; Voice plus Data (V+D); Part 2: Air Interface".

[3] ETS 300 392-5: "Terrestrial Trunked Radio (TETRA) system; Voice plus Data (V+D); Part 5: Peripheral equipment interface".

[4] ETS 300 396-1: "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 1: General network design".

[5] ETS 300 396-3: "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 3: Mobile Station to Mobile Station (MS-MS) Air Interface (AI) protocol".

[6] ETS 300 396-4: "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 4: Repeater type 1".

[7] ETS 300 396-5: "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 5: Gateways".

[8] ETS 300 396-7: "Terrestrial Trunked Radio (TETRA); Technical requirements for Direct Mode Operation (DMO); Part 7: Repeater type 2".

[9] ETS 300 812: "Terrestrial Trunked Radio (TETRA); Security aspects; Subscriber Identity Module to Mobile Equipment (SIM - ME) interface".

[10] ITU-T Recommendation E.164 (1997): "Telephone network and ISDN; Operation, numbering, routing and mobile service; Numbering plan for the ISDN era".

[11] CCITT Recommendation E.331 (1991): "Telephone network and ISDN; Operation, numbering routing and mobile service; Minimum user-terminal interface for a human user entering address information into an ISDN terminal".

[12] ETR 294: "Terrestrial Trunked Radio (TETRA); Voice plus Data (V + D) and Direct Mode Operation (DMO); Mobile Station (MS) Man Machine Interface (MMI)".

[13] Council Decision of 29 July 1991 on the introduction of a single European emergency call number (91/396/EEC).

3 Definitions and abbreviations

3.1 Definitions

For the purposes of this ETR, the following definitions apply:

air interface addressing: TETRA identity exchange mechanism over the air interface as specified in ETS 300 392-2 [2].

dialling: The identity exchange mechanism between the user and a TETRA terminal equipment.

digit: Numbers from 0 to 9, and #, *, A, B, C, and D characters as defined in ETS 300 392-2 [2], subclause 14.8.20.

enhanced numbering: User visible numbering required to address calls to and from networks external to TETRA.

home TETRA network: TETRA network to which the terminal equipment has subscribed.

user numbering: The decimal representation of TETRA V+D air interface addresses, as seen by the user, i.e. user visible numbering.

Additionally, the terms defined in ETS 300 392-2 [2], and ETS 300 396-3 [5] apply.

3.2 Abbreviations

For the purposes of this ETR, the abbreviations in ETS 300 392-2 [2] and ETS 300 396-3 [5] apply.

4 General

The user input in case of establishing a call is defined for the purposes of this ETR as three sequential events:

1) algorithm selection;
2) user dialled digits; and
3) connect event.

Algorithm selection is the selection of dialling algorithm to be applied to the user dialled digits. Connect is the event, which terminates the user input related to the digits and normally causes a call set up.

Methods for algorithm selection are defined in clause 6.

Dialling algorithms defined in clause 7 specify how the user dialled digits are interpreted and how they are transferred over the TETRA V+D air interface.

The connect event itself can be e.g. a user press of a specific connect button or Push-To-Talk (PTT) button, and as such is outside the scope of this document. However, the connect event is required in the implementation to comply with this recommendation.

NOTE: This definition of the user input for call establishment is valid only for the cases when user dials a number using the number keypad or selects a number e.g. from a list of predefined numbers. There may be methods to combine all the three events so that e.g. PTT causes a call establishment using a predefined dialling algorithm to a predefined address requiring no explicit dialling event.

This ETR does not imply any specific allocation scheme of TETRA SSI subscriber addresses within a TETRA network, i.e. TETRA SSIs may be allocated to any functional purpose independently, or in relationship to user numbering in accordance to this ETR. However, some predefined SSI addresses for

accessing external telecommunication systems are specified in clause 12 for the purposes of interworking.

It is possible to implement barring of outgoing calls functionality especially based on attempted communication type for each dialling algorithm defined in this ETR. For example, point-to-multipoint calls would not be allowed using "E.164 domain" dialling algorithm. However, such constraints are outside the scope of this ETR.

5 Numbering within one TETRA network

If a TETRA terminal equipment is intended to be used only within a network with no external connections, then there is no need to implement algorithm selection, neither multiple dialling algorithms in that terminal equipment. All the calls from that terminal could be established e.g. using the "Home TETRA network" dialling algorithm, as defined in subclause 7.1.

6 Enhanced numbering

Networks external to single TETRA network set requirements to numbering used in terminals due to differences of user presentation of numbers in different networks and transfer mechanism of addresses between the networks.

If the network, a TETRA terminal is to be connected to, has one or more connections to other external networks, then the terminal equipment should implement all the appropriate dialling algorithms as required. When more than one dialling algorithms are implemented, then the dialling algorithm selection is required.

6.1 Selection of dialling algorithm

As not to restrict progress in MMI innovation, it is envisaged that dialling selection may be initiated in many ways. Some current MMI examples are; direct number entry via a keypad, mode selection buttons, and soft key menu selection. This dialling algorithm selection may vary according to the terminal type.

One dialling algorithm selection is defined in this ETR, called leading digit method. This method is the recommended one to achieve similar functionality in different implementations. The leading digit method is defined under subclause 6.2.

6.2 Leading digit dialling algorithm selection

The dialling algorithm used may be selected by the first digit in any number input dialled by the user, or selected by user e.g. from a radio short code memory. The sequence of the full number input, as defined in the algorithms in clause 7, is amended by the leading digit, and it becomes part of the user visible numbers, i.e. there is no separator between the leading digit and actual number.

It should be ensured in the terminal implementation, that no non-deterministic user input will result in an ambiguous call set-up attempt over the air interface. For example, if user inputs a leading digit that is not assigned to any of the dialling algorithms, then the terminal should not try to establish the call and appropriate feedback should be given to the user.

6.2.1 Recommended values for first digits

Leading digit value zero is recommended to be used to select "E.164 domain" algorithm, see subclause 7.9. However, it is not mandatory to use leading digit value 0 for that purpose.

6.2.2 Leading digit forwarding

It is an option in the leading digit method to choose whether the first digit is also transferred over the air interface as part of the subscriber number. This option could be set, or not, for each leading digit value independently.

6.2.3 Mapping of first digit values to dialling algorithms

There may be one to one relationship between each first digit and dialling algorithm, or each of the first digits may cause the same algorithm to be applied depending on the terminal equipment implementation.

It is also possible to combine the leading digit method for the dialling algorithm selection with other possible methods so that some of the algorithms are to be selected based on the first digits, while the rest by some other MMI functions.

7 Dialling algorithms

A terminal equipment implementing a dialling algorithm may apply it several times for different purposes, e.g. PABX gateway algorithm may be applied several times to access different PABX gateways. In that case the selection of dialling algorithm should differentiate between the various instances of that algorithm, see subclause 6.1.

The Individual TETRA Subscriber Identity (ITSI), Short Subscriber Identity (SSI), Mobile Network Identity (MNI), Mobile Country Code (MCC), and Mobile Network Code (MNC) are defined in ETS 300 392-1 [1], clause 7.

NOTE: For comparison of TETRA identities and address types in other systems, see ETS 300 392-1 [1], subclause 7.8.4.

If the user dialled digits can not be converted to valid MCC, MNC, or SSI, as defined in algorithms under this clause, then the terminal equipment should not attempt the call set up, but reject the user input and indicate an error in the dial string to the user.

NOTE: Checking the erroneous dial string by terminal is assumed only to the extent of the conversion of the dial string, e.g. if user has dialled a subscriber number of 2 digits when it should be e.g. 7 digits long. The network is responsible for rejecting the call set up, e.g. if a call is attempted using an unallocated SSI.

Air interface Protocol Data Unit (PDU) elements called party SSI, called party extension, and external subscriber number, are defined in ETS 300 392-1 [2], clause 14.

Two stage signalling, as described in ETS 300 392-2 [2], subclauses 14.5.1.2.5 and 14.5.1.2.6, is outside the scope of this ETR.

Most of the dialling algorithms defined in this clause contain overview illustrations. The symbols used in those figures should be interpreted according to the following key:

- D = digit;
- B = bit; and
- E = element.

The number in subscript after the symbol indicates the sequential order of the item, e.g. D_1 is the last digit dialled by the user, and B_1 is the most significant bit.

Dashed line in the figures indicates conditional or optional presence of the item surrounded by the line.

NOTE: Leading digit method is not part of the definitions of the dialling algorithms in this clause.

7.1 Home TETRA network

This dialling algorithm applies to calls to the network the calling party terminal equipment is subscribed to.

The length of the user dialled digits may vary between the number range supported by the SSI element, i.e. from 1 to 8 within the decimal value range from 0 to 16 777 215. The terminal equipment may contain programmable parameters connected to this algorithm prescribing the expected minimum and maximum length of the user dial string.

NOTE: Very large networks with block allocated SSIs might require all the SSI number space for subscriber numbers while small TETRA networks may require e.g. only 4 digit subscriber numbers internally. The requirements for the subscriber number length should be included in the numbering plan of each network.

The recommended subscriber number length to be chosen for TETRA network numbering plans~~the user dialled digits~~ is absolute 7, giving the maximum value 9 999 999 decimal, i.e. 98967F hexadecimal.

The user dialled digits are converted to 24 bit called party SSI using true decimal to binary conversion.

NOTE: If leading zeros are not allowed in SSI numbers in a TETRA network then the total number of SSI addresses is less than 16 777 216 decimal.

Independently of the network the terminal is currently registered in, the address used on the air interface shall be called party SSI, and called party SSI only, when this algorithm is applied.

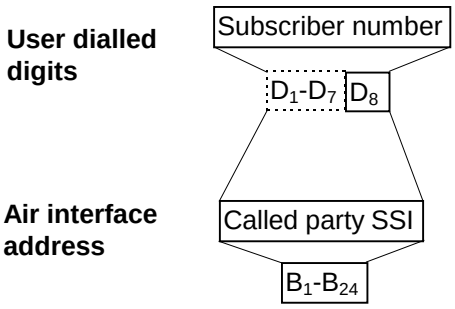

Figure 1: Overview of home TETRA network algorithm

7.2 Shortened dialling to home TETRA network

Shortened dialling to home TETRA network is intended for shortening the dial strings within the subscribers number domain, i.e. for calls to the network the terminal has subscribed to.

NOTE: In general this implies a geographical area or functional group of numbers depending on the allocation of addresses within the network.

The length of user dialled digits is anything from 1 to 8, and they are interpreted as the last digits of the subscriber number. Subscriber's own SSI part of the ITSI is used as a base address, and the last digits of that are replaced by the user dialled digits. The resulting number is then converted to called party SSI using true decimal to binary conversion.

The terminal equipment may contain predefined parameters connected to this algorithm prescribing the expected minimum and maximum length of the user dial string. The maximum length parameter should be set to the maximum length of the subscriber number in the home network. The minimum length parameter may be set according to the user needs, e.g. to disable accidental 1 digit dialling.

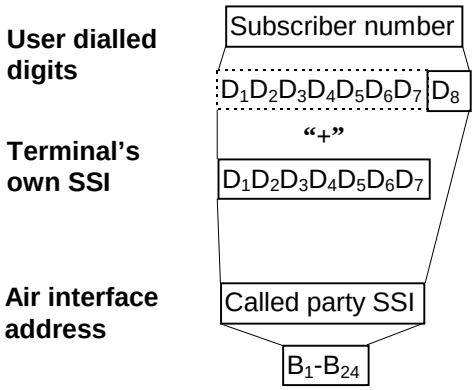

Figure 2: Overview of shortened dialling algorithm

7.3 Relative dialling to home TETRA network

Relative dialling to home TETRA network is intended for shortening the dial strings within a constantly used subscribers number domain, i.e. for calls to a known user group in the network the terminal has subscribed to.

The length of user dialled digits is anything from 1 to 8, and they are interpreted as the last digits of the subscriber number. A predefined base SSI is used as a base address, and the last digits of that are replaced by the user dialled digits. The resulting number is then converted to called party SSI using true decimal to binary conversion.

The terminal equipment may contain predefined parameters connected to this algorithm prescribing the expected minimum and maximum length of the user dial string.

Overview of the shortened dialling algorithm in figure 2 applies, provided that terminal's own SSI is replaced by the predefined base SSI.

7.4 Predefined TETRA network

This dialling algorithm applies to calls to a specific, predefined TETRA network. The network may be any predefined TETRA network other than the home network of the terminal.

The network to be accessed is appointed by a predefined MNI value, i.e. MCC and MNC, which is known to the terminal based on subscription. The predefined MNI is unique to this algorithm, i.e. it is selected by the algorithm selection. The predefined MNI shall not be the same as the MNI part of the terminal's own ITSI address using this algorithm.

The length of the user dialled digits may vary between the number range supported by the SSI element, i.e. from 1 to 8 within the decimal value range from 0 to 16 777 215. The terminal equipment may contain predefined parameters connected to this algorithm prescribing the expected minimum and maximum length of the user dial string.

The recommended length of the user dialled digits is absolute 7.

The user dialled digits are converted to 24 bit called party SSI using true decimal to binary conversion.

The predefined MNI shall always be transferred over the air interface as called party extension element.

NOTE: Terminal equipment may apply this algorithm several times for shortened access to different predefined TETRA networks with different MNIs.

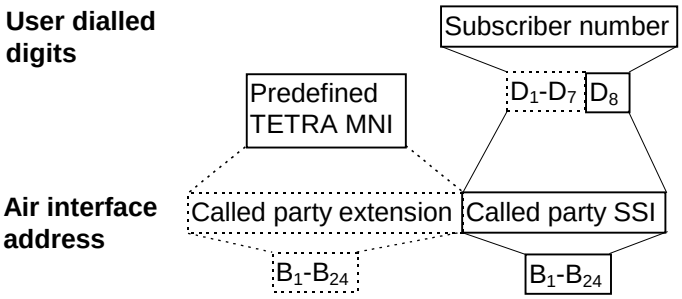

Figure 3: Overview of predefined TETRA network algorithm

7.5 Visited TETRA network

This dialling algorithm applies to calls to the visited network the calling party terminal equipment is currently registered in.

The length of the user dialled digits may vary in the number range supported by the SSI element, i.e. from 1 to 8 digits within the decimal value range from 0 to 16 777 215. The terminal equipment may contain predefined parameters connected to this algorithm prescribing the expected minimum and maximum length of the user dial string.

The recommended length of the user dialled digits is absolute 7.

The user dialled digits are converted to 24 bit called party SSI using true decimal to binary conversion.

NOTE: If leading zeros are not allowed in SSI numbers in a TETRA network then the total number of SSI addresses is less than 9 999 999 decimal.

The address used on the air interface shall be called party SSI and MNI. The MNI shall have the value of the network the terminal is currently registered in. Both SSI and MNI shall always be present, when this algorithm is applied.

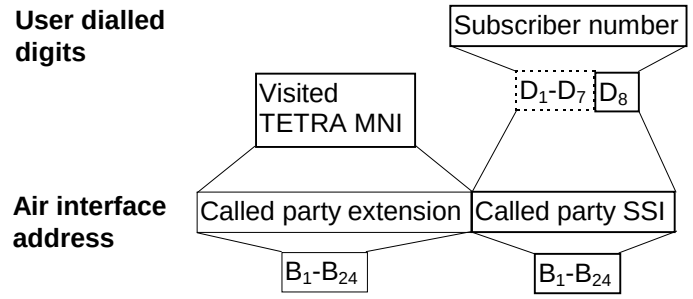

Figure 4: Overview of visited TETRA network algorithm

7.6 Any TETRA network

TETRA networks to be addressed may remain within the same country or they may exist abroad. Using this algorithm to address a domestic TETRA network user shall dial network code and subscriber number. To address a subscriber in a foreign TETRA network user shall dial country code, network code and subscriber number.

Country code, network code, and subscriber number are encoded individually.

Country code is absolute 3 digit number defined for each country. Country code is converted into 10 bit MCC. For the values and encoding of the country code, see ETS 300 392-1 [1], clause 7.

Network code, i.e. operator code, has absolute length of 4 digits. Network code is converted into 14 bit MNC using true decimal to binary conversion.

If user has addressed a subscriber in a domestic network by dialling the network code and subscriber number only, then MCC is the MCC part of the terminal's own ITSI address.

This algorithm has a predefined parameter for the absolute number of digits in the subscriber number. The recommended predefined value for the subscriber number length is 7 digits. The subscriber number is converted into 24 bit called party SSI using true decimal to binary conversion.

NOTE: The predefined subscriber number length parameter should be set according to the maximum subscriber number length used in the TETRA networks to be accessed using this algorithm. Addressing networks with shorter subscriber numbers than appointed by the parameter value requires user to dial appropriate amount of leading zeros in front of the actual subscriber number. This is necessary to achieve the absolute length defined by the parameter so that the terminal may interpret the whole dial string correctly.

The user dialled digits shall be interpreted in the following way:

1) The number of digits defined by the absolute subscriber number length parameter at the end of the dial string as subscriber number;
2) preceding four digits as network code;
3) the remaining three digits, if present, as country code.

MCC and MNC, i.e. MNI, are transferred over the air interface as called party extension element, when applicable.

If the user dialled MNI is the same as the MNI part of the terminal's own ITSI address, then the air interface address used shall be called party SSI only.

If the user dialled MNI is not the same as the MNI part of the terminal's own ITSI address, then the air interface address used shall be called party SSI and address extension containing the user dialled MNI.

NOTE: This dialling algorithm may also be used to address subscribers inside the home TETRA network.

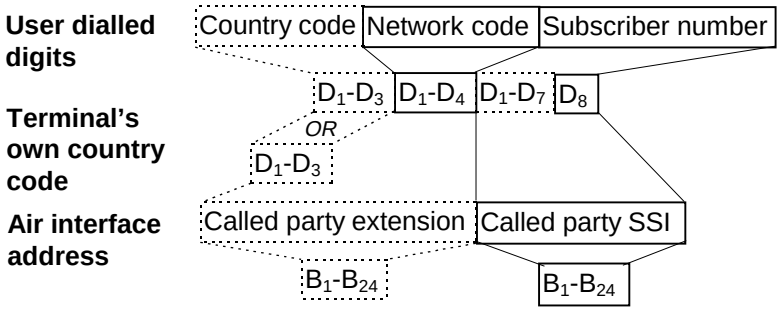

Figure 5: Overview of any TETRA network algorithm

7.7 Short number dialling

User may use network specific short numbers to access subscribers within TETRA domain or in other domains. The knowledge of Short Number Address (SNA) number allocation and values is based on subscription. The final called party numbers are stored in the terminal's home network, and may be transferred upon migration to the visited network, if Supplementary Service (SS) SNA is supported there. The functionality for SS-SNA is defined in the applicable ETS.

The 1 to 3 digit user dial string shall be transferred over the air interface in called party short number address element. The dial string is converted into 8 bit short number address using true decimal to binary conversion. The element encoding shall be as defined in ETS 300 392-2 [2], subclause 14.8.6.

NOTE: The values allowed for the SNA are 0 to 255 decimal.

Independently of the network the terminal is currently registered in, the address used on the air interface shall be called party SNA, and called party SNA only, when this algorithm is applied.

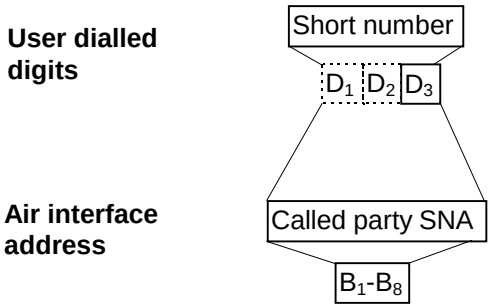

Figure 6: Overview of short number dialling algorithm

7.8 PABX

For accessing a PABX exchange connected to a TETRA network, the user may dial up to 24 digits, that are transferred over the air interface in external subscriber number element. The element encoding shall be as defined in ETS 300 392-2 [2], subclause 14.8.20.

The air interface address used shall be a predefined ITSI address that is dedicated in a TETRA network for accessing a PABX and known by the terminal equipment based on subscription. The PABX gateway may therefore be located in a network other than the terminal's home network.

If the PABX gateway is located in the terminal's home network, as appointed by the MNI part of the predefined PABX ITSI address, then the air interface address used shall always be SSI only.

If the PABX gateway is located in another network than the terminal's home network, then the PABX gateway's full ITSI address shall always be transferred over the air interface as called party SSI and called party extension element.

If the network will either be unable to route the call to the network addressed by the MNI when present, or it will otherwise find the address or dial string erroneous, it should reject the call.

NOTE: The PABX algorithm may be applied to access any suitable private telecommunication network connected to a TETRA network.

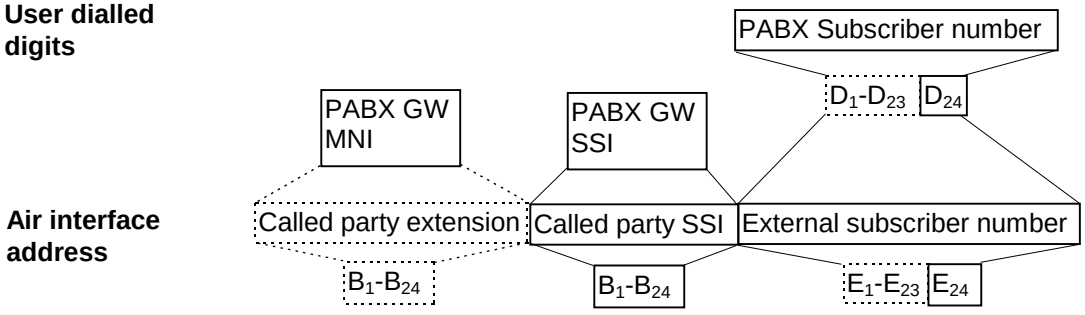

Figure 7: Overview of PABX algorithm

The predefined PABX GW MNI and PABX GW SSI address values may be stored on a Subscriber Identification Module (SIM), see ETS 300 812 [9].

7.9 E.164 domain

For accessing an E.164 gateway connected to a TETRA network, the user may dial up to 24 digits, that are transferred over the air interface in external subscriber number element. The element encoding shall be as defined in ETS 300 392-2 [2], subclause 14.8.20.

The called party SSI address used shall be the PREDEF_E164, unless there are other SSI or ITSI values that are dedicated in a specific network for E164 access and known to the terminal based on subscription. All the TETRA networks supporting E.164 domain access should support at least PREDEF_E164 SSI for interworking purposes. For PREDEF_E164 value, see clause 12.

The called party extension, i.e. MNI, may be used to address the E.164 domain in a specific network.

If a specific MNI, other than the MNI part of the terminal's own ITSI address is defined for the E.164 gateway, then it shall always be transferred over the air interface in the called party extension element. If the called party extension is absent, then the E.164 gateway addressed shall be the one in the terminal's home network.

If the network does not support the E.164 gateway, it should reject the call.

NOTE: A terminal equipment may apply this algorithm several times with different MNI or SSI values to allow user access to E.164 network via different gateways.

The overview of PABX algorithm applies, provided that E.164 GW SSI and E.164 GW MNI are used instead of corresponding PABX addresses, as illustrated in figure 7.

NOTE: TETRA subscribers may also be addressed using the E.164 dialling if they have been allocated an E.164 number.

The predefined PABX GW MNI and PABX GW SSI address values may be stored on a Subscriber Identification Module (SIM), see ETS 300 812 [9].

7.10 ISDN

For accessing an Integrated Services Digital Network (ISDN) gateway connected to a TETRA network, the user may dial up to 24 digits, that are transferred over the air interface in external subscriber number element. The element encoding shall be as defined in ETS 300 392-2 [2], subclause 14.8.20.

ISDN dial strings are defined in CCITT Recommendation E.331 [11].

NOTE: Using ISDN gateway for voice calls implies digital connection instead of analogue connection as is to be expected using the E.164 gateway, see subclause 7.9.

The called party SSI address used shall always be the PREDEF_ISDN, see clause 12.

The called party extension, i.e. MNI, may be used to address the ISDN gateway in a specific network.

If a specific MNI, other than the MNI part of the terminal's own ITSI address is defined for the ISDN gateway, then it shall always be transferred over the air interface in the called party extension element. If the called party extension is absent, then the ISDN gateway addressed shall be the one in the terminal's home network.

If the network does not support the ISDN gateway, it should reject the call.

The overview of PABX algorithm applies, provided that ISDN GW SSI and ISDN GW MNI are used instead of corresponding PABX addresses, as illustrated in figure 7.

NOTE: A terminal equipment may apply this algorithm several times with different MNI values to allow user access to ISDN network via different gateways.

7.11 Summary of address exchange over the air interface

The usage of ETS 300 392-2 [2] PDU information element's contents defined in different dialling algorithms in clause 7 are summarized in table 1.

Table 1: Summary of air interface information element's contents

Dialling algorithm	Called party SSI	Called party extension	Called party short number address	External subscriber number
Home TETRA network	User dialled TETRA subscriber number	N/A	N/A	N/A
Shortened dialling to home TETRA network	User SSI + user dialled short TETRA subscriber number	N/A	N/A	N/A
Relative dialling to home TETRA network	Predefined base SSI + user dialled short TETRA subscriber number	N/A	N/A	N/A
Predefined TETRA network	User dialled TETRA subscriber number	Predefined MNI	N/A	N/A
Visited TETRA network	User dialled TETRA subscriber number	Visited MNI	N/A	N/A
Any TETRA network	User dialled TETRA subscriber number	N/A or MNI	N/A	N/A
Short number dialling	N/A	N/A	User dialled short number	N/A
PABX	Dedicated SSI in a network that is known by the terminal equipment based on subscription	N/A or MNI	N/A	User dialled PABX number
E.164 domain	PREDEF_E164 or dedicated SSI in a network that is known by the terminal equipment based on subscription	N/A or MNI	N/A	User dialled E.164 number
ISDN	PREDEF_ISDN	N/A or MNI	N/A	User dialled ISDN number

8 Data services

The dialling algorithms defined in clause 7 may be applied to TETRA data services employing TETRA air interface address exchange, e.g. Short Data Service (SDS) messages, ISDN data, circuit mode data, packet data using Specific Connectionless Network Protocol (SCLNP), when the destination address is to be selected using the terminal equipment MMI. Service selection may be connected to the algorithm selection, but it does not depend on the dialling algorithm used. Therefore the service selection is outside the scope of this ETR.

Dialling and dialling algorithm used for services employing Connection Oriented Network Protocol (CONP) packet data transfer are outside the scope of this ETR.

NOTE: The data connections are normally established using an ancillary equipment connected to the TETRA terminal, and both destination address selection and numbering used are selected directly by a specific data application. In this case the destination address, i.e. the subscriber number, is invisible to the user. For specification defining the interface for these data equipment, see ETS 300 392-5 [3].

9 Special numbers

In addition to the numbering scheme described in clauses 4 to 8, a TETRA terminal may support one or more special user visible numbers, that bypass the selection of dialling algorithm and the normal allocation of addresses in the network, as seen by the user's point of view.

A predefined user dial string, i.e. a special number, is mapped to a predefined, valid air interface address. When user has dialled a special number, the corresponding predefined air interface address is used instead of the user dial string on the air interface. The combination of the air interface address elements used should comply with one of the dialling algorithms in clause 7.

NOTE: The application of these numbers would be e.g. to provide a method of unifying some of the TETRA user numbers with well-established numbers in other systems. For example user dialled number 118, which is national E.164 directory enquiry number in Finland, could be defined to apply the "E.164 domain" dialling algorithm with external subscriber number value of 118 to unify the user dial strings in both networks.

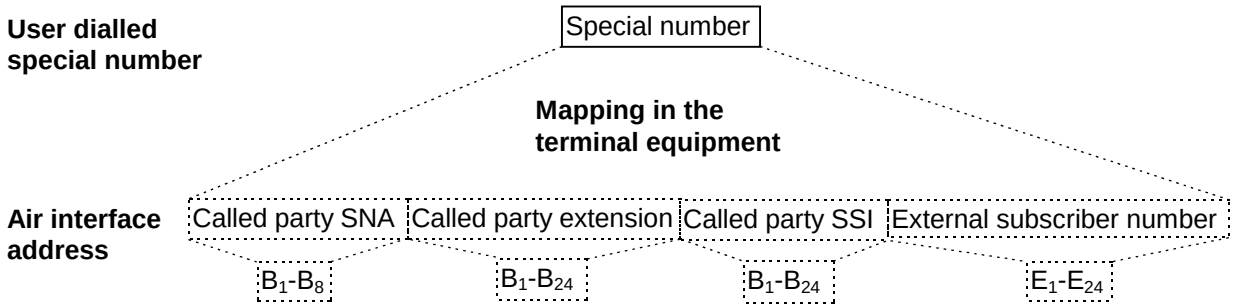

Figure 8: Overview of special numbers

NOTE: User dial string 112 should be reserved. This is the harmonized number in the European Community for the emergency service, see Council Decision 91/396/EEC [13]. Similarly, other service numbers could be harmonized in the future on a national, or international basis.

The special numbers should be interpreted by a terminal equipment so that the algorithm selection takes place only after the number dialled by the user has been recognized not to be a special number. This applies to the case where algorithm selection is related to the dialled number, as is the case e.g. when leading digit algorithm selection is used.

10 Number presentation during incoming calls

The user presentation of the calling subscriber air interface addresses to the called subscriber in a terminal equipment shall be based on calling party SSI, calling party extension, and external subscriber number elements received by the terminal equipment in the call set-up phase. For the definition of these PDU elements, see ETS 300 392-1 [2], clause 14.

Number presentation may be implemented using the TETRA SS-Call Identification (SS-CI) and SS-Talking Party Identification (SS-TPI). In addition to number presentation, also a mnemonic name may be made available to the user using SS-TPI. The functionality for SS-CI and SS-TPI is defined in the applicable ETS.

11 DMO numbering

11.1 General

In general, the dialling algorithms defined in clause 7 are also applicable to Direct Mode Operation (DMO) terminals. The services available in DMO depend on the operating mode used. Therefore numbering used in Mobile Station to Mobile Station (MS-MS) operation, operation under repeaters type 1 and 2, and DMO

gateways vary accordingly. The main difference compared to V+D trunking mode operation is that the subscribers external to TETRA networks may only be addressed when operating under a gateway.

The dialling algorithms applicable to DMO are defined in subclause 11.5. Subclauses 11.2 to 11.4 describe features and services specific to each mode of DMO relevant to dialling.

The air interface address elements in DMO are compatible with the ones used in V+D. However, DMO being a standalone set of standards, the address elements have been re-declared in ETS 300 396-1 [4], clause 6.

NOTE: Called party MNI element in DMO is the equivalent for called party extension element in V+D.

11.2 MS-MS operation

The basic preference for DMO communication is selecting the desired operating frequency. In general, the frequencies are pre-programmed in the radio units, and the method for selecting a frequency is not considered part of the dialling in this ETR. However, the frequency selection may be connected to the dialling algorithm selection.

The basic DMO operation also includes open group communication using predefined open group MNI and SSI addresses. For definition of these addresses, see ETS 300 396-1 [4], clause 6.3.2. Open group communication is intended to be used to address all the DMO terminals currently operating on the same frequency. By definition, open group communication does not include dialling, and is therefore outside the scope of this specification.

The DMO air interface PDU elements for MS-MS operation are defined in ETS 300 396-3 [5].

11.3 Operation under repeaters type 1 and 2

Services available in operation under repeaters include all the services of the MS-MS operation. Additionally it is possible to relay the signalling and calls via the repeater. The repeater is individually addressed on the DMO air interface, i.e. the transmitting DMO terminal shall select, whether the repeater is used to repeat the transmission or not. This selection is normally based on automatic detection of the availability of a repeater on the used frequency and information of the repeaters programmed in the terminal, and therefore is not part of the dialling. However, the repeater selection may be connected to the dialling algorithm selection.

NOTE: In some situations, the user may want to select, whether the repeater is used or whether the normal MS-MS operation is used independently on the availability of a repeater. This is the case when user has sufficient knowledge about the expected signal strengths and location of the other users and repeater, i.e. user may presume to get better service without using the repeater.

The DMO air interface PDU elements for operation under repeater type 1 have been defined in ETS 300 396-4 [6] and for operation under repeater type 2 in ETS 300 396-7 [8].

11.4 Operation under DMO gateway

Operation under a DMO gateway allows user to address external connections in addition to the normal MS-MS operation.

NOTE: The short number dialling is not available in DMO.

As with the repeaters, the selection of whether to use gateway or the normal MS-MS operation is normally performed automatically by a DMO terminal. However, that selection may be connected to the dialling algorithm selection.

The DMO and V+D trunking mode air interface PDU elements for operation under DMO gateway are defined in ETS 300 396-3 [7].

11.5 Dialling algorithms applicable to DMO

The dialling algorithms defined in clause 7, that are applicable to different modes of operation in DMO are presented in table 2.

Table 2: Summary of dialling algorithms applicable to DMO operating modes

Dialling algorithm	MS-MS operation	Operation under repeater type 1	Operation under repeater type 2	Operation under DMO gateway
Home TETRA network	X	X	X	X
Shortened dialling to home TETRA network	X	X	X	X
Relative dialling to home TETRA network	X	X	X	X
Predefined TETRA network	X	X	X	X
Visited TETRA network	X	X	X	X
Any TETRA network	X	X	X	X
Short number dialling				
PABX				X
E.164 domain				X
ISDN				X
NOTE: Table entries marked with "X" may be applied. Empty entries N/A.				

When a dialling algorithm is not applicable to the used operating mode, the DMO terminal should not allow user to use that algorithm for dialling. In the case of user attempted that, proper feedback should given about the unavailability of the service.

The special numbers may also be used in DMO when applicable. The applicability shall be based on the DMO air interface address exchange capability in each operating mode.

11.6 Number presentation during incoming calls

The number presentation in DMO is similar to number presentation in V+D trunking mode, see clause 10.

12 Predefined TETRA SSI addresses

The block of 16~~last 32~~ TETRA SSI identity values defined in table 3 should be allocated in each TETRA network for access dedicated to the dialling algorithms defined in clause 7.

Table 3: Predefined TETRA SSIs

SSI		Function (note)	Usage
Decimal	**Hexadecimal**		
16 777 184	FFFFE0	PREDEF_E164	E.164 gateway
16 777 185	FFFFE1	PREDEF_ISDN	ISDN gateway
16 777 186	FFFFE2	Reserved	Reserved
16 777 187	FFFFE3	Reserved	Reserved
16 777 188	FFFFE4	Reserved	Reserved
16 777 189	FFFFE5	Reserved	Reserved
16 777 190	FFFFE6	Reserved	Reserved
16 777 191	FFFFE7	Reserved	Reserved
16 777 192	FFFFE8	Reserved	Reserved
16 777 193	FFFFE9	Reserved	Reserved
16 777 194	FFFFEA	Reserved	Reserved
16 777 195	FFFFEB	Reserved	Reserved
16 777 196	FFFFEC	Reserved	Reserved
16 777 197	FFFFED	Reserved	Reserved
16 777 198	FFFFEE	Reserved	Reserved
16 777 199	FFFFEF	Reserved	Reserved
NOTE: The functions are referenced in the dialling algorithms, subclause 7, and mapping over the air interface, clause 7.1.			

History

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