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Technical Specification

Digital Enhanced Cordless Telecommunications (DECT);
New Generation DECT;
Part 3: Extended wideband speech services

Reference

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Foreword

This Technical Specification (TS) has been produced by ETSI Project Digital Enhanced Cordless Telecommunications (DECT).

The present document is based on EN 300 175 parts 1 [1] to 8 [8] and EN 300 444 [12]. General attachment requirements and speech attachment requirements are based on EN 301 406 [11] (replacing TBR 006 [i.2]) and EN 300 176-2 [10] (previously covered by TBR 010 [i.3]). Further details of the DECT system may be found in TR 101 178 [i.1].

The present document has been developed in accordance to the rules of documenting a profile specification as described in ISO/IEC 9646-6 [13].

The information in the present document is believed to be correct at the time of publication. However, DECT standardization is a rapidly changing area, and it is possible that some of the information contained in the present document may become outdated or incomplete within relatively short time-scales.

The present document is part 3 of a multi-part deliverable covering the New Generation DECT as identified below:

Part 1: "Wideband speech";

Part 2: "Support of transparent IP packet data";

Part 3: "Extended wideband speech services";

Part 4: "Software Update Over The Air (SUOTA) and Content Download".

1 Scope

The present document specifies a set of functionalities of the New Generation DECT.

The New Generation DECT provides the following basic new functionalities:

- Wideband speech service (part 1).

- Packet-mode data service supporting Internet Protocol with efficient spectrum usage and high data rates (part 2).

- Extended wideband speech services (part 3).

All New Generation DECT devices will offer at least one or several of these services.

The present document describes the part 3: Extended wideband speech services:

- For the description of the wideband speech service, see TS 102 527-1 [21].

- For the description of the support of transparent IP packet data, see TS 102 527-2 [i.4].

The part 3 "Extended wideband speech services" is defined as an extension of part 1 "Wideband speech service". All devices compliant to part 3 specification (the present document) shall implement at least all mandatory features and may implement the optional features defined in part 1 "wideband speech". In addition to that, the present document defines additional mandatory or optional features.

The part 1, and therefore part 3, are also defined as extensions of the "Generic Access Profile (GAP)" [12]. All DECT devices offering Wideband speech services (part 1 or part 1 plus part 3) shall also be compliant with the "Generic Access Profile (GAP)" [12], and shall offer the DECT standard 32 kbit/s voice service according to GAP.

All DECT devices claiming to be compliant with this Application Profile will offer at least the basic services defined as mandatory. In addition to that, optional features can be implemented to offer additional DECT services.

The aim of the present document is to guarantee a sufficient level of interoperability and to provide an easy route for development of DECT wideband speech applications, with the features of the present document being a common fall-back option available in all compliant to this profile equipment.

2 References

References are either specific (identified by date of publication and/or edition number or version number) or non-specific.

- For a specific reference, subsequent revisions do not apply.

- Non-specific reference may be made only to a complete document or a part thereof and only in the following cases:

  - if it is accepted that it will be possible to use all future changes of the referenced document for the purposes of the referring document;

  - for informative references.

Referenced documents which are not found to be publicly available in the expected location might be found at http://docbox.etsi.org/Reference.

For online referenced documents, information sufficient to identify and locate the source shall be provided. Preferably, the primary source of the referenced document should be cited, in order to ensure traceability. Furthermore, the reference should, as far as possible, remain valid for the expected life of the document. The reference shall include the method of access to the referenced document and the full network address, with the same punctuation and use of upper case and lower case letters.

NOTE: While any hyperlinks included in this clause were valid at the time of publication ETSI cannot guarantee their long term validity.

2.1   Normative references

The following referenced documents are indispensable for the application of the present document. For dated references, only the edition cited applies. For non-specific references, the latest edition of the referenced document (including any amendments) applies.

[1]   ETSI EN 300 175-1: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 1: Overview".

[2]   ETSI EN 300 175-2: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 2: Physical layer (PHL)".

[3]   ETSI EN 300 175-3: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 3: Medium Access Control (MAC) layer".

[4]   ETSI EN 300 175-4: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 4: Data Link Control (DLC) layer".

[5]   ETSI EN 300 175-5: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 5: Network (NWK) layer".

[6]   ETSI EN 300 175-6: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 6: Identities and addressing".

[7]   ETSI EN 300 175-7: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 7: Security features".

[8]   ETSI EN 300 175-8: "Digital Enhanced Cordless Telecommunications (DECT); Common Interface (CI); Part 8: Speech and audio coding and transmission".

[9]   Void.

[10]   ETSI EN 300 176-2: "Digital Enhanced Cordless Telecommunications (DECT); Test specification; Part 2: Speech".

[11]   ETSI EN 301 406: "Digital Enhanced Cordless Telecommunications (DECT); Harmonized EN for Digital Enhanced Cordless Telecommunications (DECT) covering essential requirements under article 3.2 of the R&TTE Directive; Generic radio".

[12]   ETSI EN 300 444: "Digital Enhanced Cordless Telecommunications (DECT); Generic Access Profile (GAP)".

[13]   ISO/IEC 9646-6: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 6: Protocol profile test specification".

[14]   ISO/IEC 9646-7: "Information technology - Open Systems Interconnection - Conformance testing methodology and framework - Part 7: Implementation Conformance Statements".

[15]   ITU-T Recommendation G.726 (12/1990): "40, 32, 24, 16 kbit/s Adaptive Differential Pulse Code Modulation (ADPCM) ".

[16]   ITU-T Recommendation G.711 (11/1988): "Pulse code modulation (PCM) of voice frequencies".

[17]   ITU-T Recommendation G.722 (11/1988): "7 kHz audio-coding within 64 kbit/s".

[18]   ITU-T Recommendation G.729.1 (05/2006): "G.729 based Embedded Variable bit-rate coder: An 8-32 kbit/s scalable wideband coder bitstream interoperable with G.729".

[19]   ISO/IEC JTC1/SC29/WG11 (MPEG): International Standard ISO/IEC 14496-3:2005/AMD 1:2007: "Coding of audio-visual objects - Part 3: Audio; AMENDMENT 1: Low Delay AAC profile".

[20]   ISO/IEC JTC1/SC29/WG11 (MPEG): International Standard ISO/IEC 14496-3:2005: "Information Technology - Coding of audio-visual objects – Part 3: Audio".

[21]   ETSI TS 102 527-1: "Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 1: Wideband Speech".

[22]   ETSI TS 122 072: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Call Deflection (CD); Stage 1".

[23]   Void.

[24]   ETSI TS 122 081: "Digital cellular telecommunications system (Phase 2+); Universal Mobile Telecommunications System (UMTS); Line Identification supplementary services; Stage 1".

2.2   Informative references

The following referenced documents are not essential to the use of the present document but they assist the user with regard to a particular subject area**.** For non-specific references, the latest version of the referenced document (including any amendments) applies.

[i.1]   ETSI TR 101 178: "Digital Enhanced Cordless Telecommunications (DECT); A high Level Guide to the DECT Standardization".

[i.2]   ETSI TBR 006: "Digital Enhanced Cordless Telecommunications (DECT); General terminal attachment requirements".

[i.3]   ETSI TBR 010: "Digital Enhanced Cordless Telecommunications (DECT); General terminal attachment requirements: Telephony applications".

[i.4]   ETSI TS 102 527-2: "Digital Enhanced Cordless Telecommunications (DECT); New Generation DECT; Part 2: Support of transparent IP packet data".

[i.5]   ITU-T Recommendation P.311 (06/2005): "Transmission characteristics for wideband (150-7000 Hz) digital handset telephones".

[i.6]   ITU-T Recommendation G.729: "Coding of speech at 8 kbit/s using conjugate structure algebraic-code-excited linear prediction (CS-ACELP)".

3   Definitions, symbols and abbreviations

3.1   Definitions

For the purposes of the present document, the terms and definitions given in EN 300 444 [12] and the following apply:

CALL-INFORMATION completeness principle: independently of the line identification requirements themselves, a party (PP or FP) that implements both the "Line identification" feature and the "Call identification" feature, shall - when it must send a call identifier for an external call-also send the identifier of the line used for this external call together with the call identifier, in the same <<CALL INFORMATION>> information element

NOTE: This only applies if the line identifier is available at the time of sending.

FP-managed line selection: mode for an outgoing external call, in which the PP does not send any line identifier to the FP

NOTE: PPs implementing the "Line identification" feature may use this mode. PPs not implementing the "Line identification" feature (PPs compliant with NG-DECT Part 1 (TS 102 527-1), GAP (EN 300 444) and PPs compliant with the present document not implementing the feature) are also said to (always) implicitly use FP-managed line selection.

line: logical channel, separately accessible from the external world through a dedicated external directory entry (e.g. telephone number, uri, etc.)

> NOTE: These lines may be of various types, for example: PSTN, VoIP or ISDN lines.

multiple call line: line supporting several simultaneous (external) calls

> NOTE: An example of multiple call line is a VoIP line used with the SIP protocol.

multiple-call mode: configuration mode of a multiple call line from a DECT system point of view, enabling several simultaneous incoming or outgoing calls on different PPs (i.e. this possibility is not disabled by configuration)

new generation DECT: further development of the DECT standard introducing wideband speech, improved data services, new slot types and other technical enhancements

single-call mode: configuration mode of a multiple call line from a DECT system point of view, in which the possibility of making several fully parallel call is (temporarily) disabled

> NOTE: This mode may be useful for a user alone in the home. This mode does not prevent several simultaneous calls on the same PP. A line which is not "multiple call" (for instance a PSTN line only enabling double calls) is also said to be in "single call" mode.

super-wideband speech: voice service with enhanced quality compared to ADPCM G.726 and allowing the transmission of a maximum vocal frequency of at least 14 kHz

wideband speech: voice service with enhanced quality compared to ADPCM G.726 and allowing the transmission of a vocal frequency range of at least 150 Hz to 7 kHz, and fulfilling the audio performance requirements described in the ITU-T Recommendation P.311 [i.5]

3.2   Symbols

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

> M   mandatory to support (provision mandatory, process mandatory)
> O   optional to support (provision optional, process mandatory)
> I   out-of-scope (provision optional, process optional) not subject for testing
> C   conditional to support (process mandatory)
> N/A   not applicable (in the given context the specification makes it impossible to use this capability)

Provision mandatory, process mandatory means that the indicated feature service or procedure shall be implemented as described in the present document, and may be subject to testing.

Provision optional, process mandatory means that the indicated feature, service or procedure may be implemented, and if implemented, the feature, service or procedure shall be implemented as described in the present document, and may be subject to testing.

> NOTE: The used notation is based on the notation proposed in ISO/IEC 9646-7 [14].

3.3   Abbreviations

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

> AAC   Advanced Audio Coding (MPEG)
> AC   Authentication Code
> ADPCM   Adaptive Differential Pulse Code Modulation
> AI   Air Interface
> CC   Call Control
> CI   Common Interface
> DECT   Digital Enhanced Cordless Telecommunications
> DLC   Data Link Control
> DTMF   Dual Tone Multi-Frequency
> ER   Error Resilient (MPEG)
> FP   Fixed Part

FT	Fixed radio Termination
GAP	Generic Access Profile
IA	Implementation Alternative
IE	Information Element
IP	Internet Protocol
IPUI	International Portable User Identity
ISDN	Integrated Services Digital Network
IWU	InterWorking Unit
LA	Location Area
LD	Low Delay (MPEG)
LLME	Lower Layer Management Entity
MAC	Medium Access Control
MM	Mobility Management
NG	New Generation
NG-DECT	New Generation DECT
NWK	NetWorK
P	Public (environment)
PARK	Portable Access Rights Key
PHL	PHysical Layer
PP	Portable Part
PT	Portable radio Termination
R/B	Residential/Business (environment)
RFP	Radio Fixed Part
S/T	ISDN S/T Interface
SARI	Secondary Access Rights Identity
TCLw	weighted Telephone Coupling Loss
TPUI	Temporary Portable User Identity
TRUP	TRansparent UnProtected service
U	ISDN U-Interface
VoIP	Voice over IP
WB	WideBand

4   Description of Services

4.1   Enhanced wideband speech

The present document is defined as an extension of New Generation DECT; part 1: wideband speech
(TS 102 527-1 [21]). All devices compliant with the present document shall implement wideband (150 Hz to 7 kHz)
audio with 16 kHz frequency sampling, and shall implement, at least, the speech coding format according to ITU-
T Recommendation G.722 [17]. In addition to that, other wideband and superwideband audio codecs, providing even
better audio quality, may be implemented.

See TS 102 527-1 [21], clause 4.1 for description about wideband speech.

4.1.1   Back-compatibility with GAP

The present document is backcompatible with Generic Access Profile (GAP) EN 300 444 [12]. All devices compliant
with the present document shall implement ADPCM narrowband speech service according to ITU-T recommendation
G.726 [15], with automatic detection of the capabilities of the other peer.

4.1.2   Further enhancement in audio performance requirements

The present document implements a further enhancement in acustic wideband performance compared to
TS 102 527-1 [21]. The more demanding audio speciifications PP types 2b and 2c (see EN 300 175-8 [8]) shall be
mandatory after a transition time. With this extra requirement, the acustic performance of the wideband speech service
will be even better than the ITU standard for wideband audio, ITU-T Recommendation P.311 [i.5].

See also TS 102 527-1 [21], clause 4.1.1.

The present document implements also a further enhancement in acoustic performance for 3,1 kHz narrowband service compared to GAP EN 300 444 [12] and TS 102 527-1 [21]. The more demanding audio specifications for PP types 1c and 1d (see EN 300 175-8 [8]) shall be mandatory after a transition time. With this extra requirement, the acoustic performance of PPs compliant with the present document, when operating in 3,1 kHz narrowband service, will be even better than classic DECT/GAP specification.

4.2   Wideband speech scenarios

See TS 102 527-1 [21], clause 4.2.

4.3   Extended wideband speech services defined in the present document

The following additional services are provided by the present document, compared to TS 102 527-1 [21]:

- More demanding audio specifications for both; wideband and narrowband (see clause 4.1.2).

- New simplified, "easy pairing" procedures.

- New "no-emision" mode in FPs (switching down the dummy bearer when in idle mode).

- Date and time synchronization.

- CLIP and CNIP are now mandatory features.

- Internal call and wideband Internal call (mandatory features).

- CLIP and CNIP for Internal calls (mandatory features).

- Generic Event notification mechanism, providing support for:

    - Message waiting indication.

    - Missed call notification.

- List access service.

- Handling of multiple calls between the same PP and the RFP.

- CLIP and CNIP on call waiting.

- CLIP and CNIP on call transfer.

- Call deflection.

- Call identification and Line identification features.

- CLIR feature.

- Multiple calls and multiple lines features.

- Mutualised parallel calls.

- New system settings and line settings.

- Informative annexes with more examples of flowcharts, including system settings, multiple calls and parallel calls.

The new extended services, take in to account the additional scenarios possible in DECT systems connected to the network via VoIP interfaces.

5 Service and feature definitions

5.1 New Generation DECT Speech Services

For the purposes of the present document, the definitions of TS 102 527-1 [21], clause 5.1 shall apply.

5.2 Network (NWK) features

For the purposes of the present document, all definitions of TS 102 527-1 [21], clause 5.2 and EN 300 444 [12], clause 4.1, plus the following shall apply:

Missed call notification [NG1.N.3]: ability to inform a user that a call has been missed.

Voice message waiting notification [NG1.N.4]: ability to inform a user that a voice message has been left in the voice mailbox to which the user has access.

Date and time synchronization [NG1.N.5]: ability to synchronize the date and time on the DECT system. From FP to all registered PP or from one registered PP to the FP.

Parallel calls [NG1.N.6]: ability to handle in the DECT system two or more simultaneous calls originated or terminated in the same PP.

Common parallel call procedures (external or internal) [NG1.N.7]: set of common procedures for handling PSTN double calls, SIP multiple calls on a single line, as well as parallel call situations occurring in a multiple line DECT system.

Call transfer (internal or external) [NG1.N.8]: ability to create a new call while already involved in a call and connect the remote party to it (kind of parallel calls).

3-party conference call (internal or external) [NG1.N.9]: ability to connect the local party and the two remote parties of two parallels calls into a single conference (kind of parallel calls).

Intrusion call [NG1.N.10]: ability for a PP not participating to an already established call to connect to it (kind of parallel calls). Intrusion call is also known as "barging in".

Call deflection [NG1.N.11]: ability to redirect an incoming call during the call presentation to another user.

Line identification [NG1.N.12]: ability to exchange between the PP and FP a line identifier for external calls.

Call identification [NG1.N.13]: ability to exchange between the PP and FP a call identifier assigned by the FP at call setup.

Multiple lines [NG1.N.14]: ability for a DECT System to handle several external lines.

Multiple calls [NG1.N.15]: ability for a DECT System to handle a line supporting several simultaneous external calls.

List access service [NG1.N.16]: ability to store information on the DECT system in a set of lists on the FP and manage these lists from the PP.

Calling Line Identity Restriction (CLIR) [NG1.N.17]: ability for the user to hide the identity of his line (i.e. Calling Line Identity Presentation) to the called party.

5.3 Data Link Control (DLC) service definitions

For the purposes of the present document, all definitions of TS 102 527-1 [21], clause 5.3 and EN 300 444 [12], clause 5.1 shall apply.

5.4 Medium Access Control (MAC) service definitions

For the purposes of the present document, all definitions of TS 102 527-1 [21], clause 5.4 and EN 300 444 [12], clause 5.2, plus the following shall apply:

"no emission" mode [NG1.M.5]: ability to deactivate all radio transmissions in a DECT FP when it does not handle any call. Power-down is negotiated and an algorithm is provided, that guarantees a short resynchronization time, if an RF-connection is required by any of the peers.

5.5 Physical Layer (PHL) service definitions

For the purposes of the present document, all definitions of TS 102 527-1 [21], clause 5.5 shall apply.

5.6 Speech coding and audio feature definitions

For the purposes of the present document, all definitions of TS 102 527-1 [21], clause 5.6 shall apply.

5.7 Application features

For the purposes of the present document, all definitions of EN 300 444 [12], clause 4.2 plus the following shall apply.

Easy PIN-code registration [NG1.A.1]: ability to invite the user to register a PP that is not registered to a FP. The access rights procedure is triggered by PIN entering.

Easy pairing registration [NG1.A.2]: ability to register a PP that is not registered to a FP by pressing a physical or logical button on the PP and on the FP.

Handset locator [NG1.A.3]: ability to locate physically handsets (have them ring) by pressing a physical or logical button on the FP.

6 Inter-operability requirements

6.1 General

The tables listed in this clause define the status of all protocol elements (i.e. features, services, and procedures) which can be: mandatory, optional, conditional under the provision of another protocol element, outside the scope of the present document, or not applicable. The status is identified by the status column designations defined in clause 3.2, and is described separately for FT and PT. In the case of FT, the status can be different for products intended for the Residential/Business (R/B) market or for the Public market segment.

All optional elements shall be process mandatory according to the procedures described in the present document.

Protocol elements defined as mandatory, optional or conditional in this clause are further defined in the referenced DECT specification, or, if needed, in clause 7 of the present document.

New Generation DECT wideband speech is defined as a backcompatible enhancement of EN 300 444 [12] (Generic Access Profile (GAP)). All procedures not specific of the New Generation DECT, are referenced to their original description in EN 300 444 [12] (GAP).

The requirements of EN 301 406 [11] and EN 300 176-2 [10] shall be met by all equipment conforming to the present document.

6.2 New Generation DECT Speech Services support status

The following end-user services shall be supported by "New Generation DECT; part 3: Extended wideband speech services" devices shall support the following end-user services.

Table 1: Speech service status

Feature supported					
			Status		
				FT	
Item no.	Name of Service	Reference	PT	R/B	P
NG1.1	Narrow band ADPCM G.726 32 kbit/s voice service	5.1 [21]	M	M	M
NG1.2	Narrow band PCM G.711 64 kbit/s voice service	5.1 [21]	O	O	O
NG1.3	Wideband G.722 64 kbit/s voice service	5.1 [21]	M	M	M
NG1.4	Wideband G.729.1 32 kbit/s voice service	5.1 [21]	O	O	O
NG1.5	MPEG-4 ER AAC-LD super wideband 64 kbit/s voice service	5.1 [21]	O	O	O
NG1.6	MPEG-4 ER AAC-LD wideband 32 kbit/s voice service	5.1 [21]	O	O	O

6.3 Services to DECT feature implementation mappings

"New Generation DECT; part 3: Extended wideband speech services" end user services shall be implemented using the DECT features and implementation alternatives defined in table 2.

Table 2: Speech service to DECT features implementation mappings

Service/DECT Feature mapping						
					Status	
					FT	
Service	IA	DECT feature/service	Reference	PT	R/B	P
NG1.1 Narrow band ADPCM G.726 32 kbit/s voice service	**I**		**5.1 [21]**	**M**	**M**	**M**
		NG1.P.1 2 level GFSK modulation	5.5 [21]	M	M	M
		NG1.P.2 Physical Packet P32	5.5 [21]	M	M	M
		NG1.M.1 I$_N$_minimum delay symmetric MAC service type	5.4 [21]	M	M	M
		GAP.M.4 Basic Connections	5.2 [12]	M	M	M
		NG1.M.4 Advanced Connections	5.4 [21]	C201	C201	C201
		NG1.D.1 DLC Service LU1 TRUP Class 0/min_delay	5.3 [21]	M	M	M
		NG1.D.5 DLC frame FU1	5.3 [21]	M	M	M
		NG1.SC.1 ITU-T Recommendation G.726 [15] 32 kbit/s ADPCM codec	5.6 [21]	M	M	M
		NG1.SC.10 PP Audio type 1a (classic GAP handset)	5.6 [21]	I	N/A	N/A
		NG1.SC.11 PP Audio type 1b (improved GAP handset)	5.6 [21]	C702, note 1	N/A	N/A
		NG1.SC.12 PP Audio type 1c (HATS 3,1 kHz handset)	5.6 [21]	C702	N/A	N/A
		NG1.SC.13 PP Audio type 1d (HATS 3,1 kHz improved handset)	5.6 [21]	C702	N/A	N/A
		NG1.SC.17 PP Audio type 3a (HATS 3,1 kHz handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.18 PP Audio type 3b (HATS 3,1 kHz improved handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.23 FP Audio type 1b (new ISDN 3,1 kHz)	5.6 [21]	N/A	C706	C706
		NG1.SC.24 PP echo canceller for FP, narrowband	5.6 [21]	N/A	C707	C707
		NG1.SC.25 PP echo supressor for FP, narrowband	5.6 [21]	N/A	C707	C707
		NG1.SC.26 FP Audio type 2 (analog PSTN 3,1 kHz)	5.6 [21]	N/A	C706	C706

Service/DECT Feature mapping						
					Status	
Service	**IA**	**DECT feature/service**	**Reference**	**PT**	**FT**	
					R/B	**P**
		NG1.SC.27 FP Audio type 3 (VoIP 3,1 kHz)	5.6 [21]	N/A	C706	C706
		NG1.SC.32 FP Audio type 6a (internal call)	5.6 [21]	N/A	M	M
		NG1.SC.33 FP Audio type 6b (internal conference)	5.6 [21]	N/A	O	O
		NG1.SC.34 Adaptive volume control for FP	5.6 [21]	N/A	O	O
NG1.2 Narrow band PCM G.711 64 kbit/s voice service	**I**		**5.1 [21]**	**O**	**O**	**O**
		NG1.P.1 2 level GFSK modulation	5.5 [21]	M	M	M
		NG1.P.3 Physical Packet P64	5.5 [21]	M	M	M
		NG1.M.1 I_N_minimum delay symmetric MAC service type	5.4 [21]	M	M	M
		NG1.M.4 Advanced Connections	5.4 [21]	M	M	M
		NG1.D.1 DLC Service LU1 TRUP Class 0/min_delay	5.3 [21]	M	M	M
		NG1.D.5 DLC frame FU1	5.3 [21]	M	M	M
		NG1.SC.2 ITU-T Recommendation G.711 [16] 64 kbit/s PCM codec	5.6 [21]	M	M	M
		NG1.SC.8 Detection of Fax/modem tone	5.6 [21]	O	O	O
		NG1.SC.9 Codec selection and switching	5.6 [21]	M	M	M
		NG1.SC.10 PP Audio type 1a (classic GAP handset)	5.6 [21]	I	N/A	N/A
		NG1.SC.11 PP Audio type 1b (improved GAP handset)	5.6 [21]	C702, note 1	N/A	N/A
		NG1.SC.12 PP Audio type 1c (HATS 3,1 kHz handset)	5.6 [21]	C702	N/A	N/A
		NG1.SC.13 PP Audio type 1d (HATS 3,1 kHz improved handset)	5.6 [21]	C702	N/A	N/A
		NG1.SC.17 PP Audio type 3a (HATS 3,1 kHz handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.18 PP Audio type 3b (HATS 3,1 kHz improved handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.23 FP Audio type 1b (new ISDN 3,1 kHz)	5.6 [21]	N/A	C706	C706
		NG1.SC.24 PP echo canceller for FP, narrowband	5.6 [21]	N/A	C707	C707
		NG1.SC.25 PP echo supressor for FP, narrowband	5.6 [21]	N/A	C707	C707
		NG1.SC.26 FP Audio type 2 (analog PSTN 3,1 kHz)	5.6 [21]	N/A	C706	C706
		NG1.SC.27 FP Audio type 3 (VoIP 3,1 kHz)	5.6 [21]	N/A	C706	C706
		NG1.SC.32 FP Audio type 6a (internal call)	5.6 [21]	N/A	M	M
		NG1.SC.33 FP Audio type 6b (internal conference)	5.6 [21]	N/A	O	O
		NG1.SC.34 Adaptive volume control for FP	5.6 [21]	N/A	O	O

Service/DECT Feature mapping						
					Status	
Service	IA	DECT feature/service	Reference	PT	FT	
					R/B	P
NG1.2 Narrow band PCM G.711 64 kbit/s voice service	**II**		**5.1 [21]**	**O**	**O**	**O**
		NG1.P.1 2 level GFSK modulation	5.5 [21]	M	M	M
		NG1.P.4 Physical Packet P67	5.5 [21]	M	M	M
		NG1.M.3 I$_{PQ}$_error_detection symmetric MAC service type	5.4 [21]	M	M	M
		NG1.M.4 Advanced Connections	5.4 [21]	M	M	M
		NG1.D.1 DLC Service LU1 TRUP Class 0/min_delay	5.3 [21]	M	M	M
		NG1.D.5 DLC frame FU1	5.3 [21]	M	M	M
		NG1.SC.2 ITU-T Recommendation G.711 [16] 64 kbit/s PCM codec	5.6 [21]	M	M	M
		NG1.SC.8 Detection of Fax/modem tone	5.6 [21]	O	O	O
		NG1.SC.9 Codec selection and switching	5.6 [21]	M	M	M
		NG1.SC.10 PP Audio type 1a (classic GAP handset)	5.6 [21]	I	N/A	N/A
		NG1.SC.11 PP Audio type 1b (improved GAP handset)	5.6 [21]	C702, note 1	N/A	N/A
		NG1.SC.12 PP Audio type 1c (HATS 3,1 kHz handset)	5.6 [21]	C702	N/A	N/A
		NG1.SC.13 PP Audio type 1d (HATS 3,1 kHz improved handset)	5.6 [21]	C702	N/A	N/A
		NG1.SC.17 PP Audio type 3a (HATS 3,1 kHz handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.18 PP Audio type 3b (HATS 3,1 kHz improved handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.23 FP Audio type 1b (new ISDN 3,1 kHz)	5.6 [21]	N/A	C706	C706
		NG1.SC.24 PP echo canceller for FP, narrowband	5.6 [21]	N/A	C707	C707
		NG1.SC.25 PP echo supressor for FP, narrowband	5.6 [21]	N/A	C707	C707
		NG1.SC.26 FP Audio type 2 (analog PSTN 3,1 kHz)	5.6 [21]	N/A	C706	C706
		NG1.SC.27 FP Audio type 3 (VoIP 3,1 kHz)	5.6 [21]	N/A	C706	C706
		NG1.SC.32 FP Audio type 6a (internal call)	5.6 [21]	N/A	M	M
		NG1.SC.33 FP Audio type 6b (internal conference)	5.6 [21]	N/A	O	O
		NG1.SC.34 Adaptive volume control for FP	5.6 [21]	N/A	O	O

Service/DECT Feature mapping						
					Status	
Service	IA	DECT feature/service	Reference	PT	FT	
					R/B	P
NG1.2 Narrow band PCM G.711 64 kbit/s voice service	III		**5.1 [21]**	**O**	**O**	**O**
		NG1.P.1 2 level GFSK modulation	5.5 [21]	M	M	M
		NG1.P.5 Physical Packet P80	5.5 [21]	M	M	M
		NG1.M.2 I$_N$_normal_delay symmetric MAC service type	5.4 [21]	M	M	M
		NG1.M.4 Advanced Connections	5.4 [21]	M	M	M
		NG1.D.3 DLC service LU7 64 kbit/s protected bearer service	5.3 [21]	M	M	M
		NG1.D.6 DLC frame FU7	5.3 [21]	M	M	M
		NG1.SC.2 ITU-T Recommendation G.711 [16] 64 kbit/s PCM codec	5.6 [21]	M	M	M
		NG1.SC.8 Detection of Fax/modem tone	5.6 [21]	O	O	O
		NG1.SC.9 Codec selection and switching	5.6 [21]	M	M	M
		NG1.SC.10 PP Audio type 1a (classic GAP handset)	5.6 [21]	I	N/A	N/A
		NG1.SC.11 PP Audio type 1b (improved GAP handset)	5.6 [21]	C702, note 1	N/A	N/A
		NG1.SC.12 PP Audio type 1c (HATS 3,1 kHz handset)	5.6 [21]	C702	N/A	N/A
		NG1.SC.13 PP Audio type 1d (HATS 3,1 kHz improved handset)	5.6 [21]	C702	N/A	N/A
		NG1.SC.17 PP Audio type 3a (HATS 3,1 kHz handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.18 PP Audio type 3b (HATS 3,1 kHz improved handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.23 FP Audio type 1b (new ISDN 3,1 kHz)	5.6 [21]	N/A	C706	C706
		NG1.SC.24 PP echo canceller for FP, narrowband	5.6 [21]	N/A	C707	C707
		NG1.SC.25 PP echo supressor for FP, narrowband	5.6 [21]	N/A	C707	C707
		NG1.SC.26 FP Audio type 2 (analog PSTN 3,1 kHz)	5.6 [21]	N/A	C706	C706
		NG1.SC.27 FP Audio type 3 (VoIP 3,1 kHz)	5.6 [21]	N/A	C706	C706
		NG1.SC.32 FP Audio type 6a (internal call)	5.6 [21]	N/A	M	M
		NG1.SC.33 FP Audio type 6b (internal conference)	5.6 [21]	N/A	O	O
		NG1.SC.34 Adaptive volume control for FP	5.6 [21]	N/A	O	O

Service/DECT Feature mapping						
					Status	
					FT	
Service	IA	DECT feature/service	Reference	PT	R/B	P
NG1.3 Wideband 7 kHz G.722 64 kbit/s voice service	I		**5.1 [21]**	**M**	**M**	**M**
		NG1.P.1 2 level GFSK modulation	5.5 [21]	M	M	M
		NG1.P.3 Physical Packet P64	5.5 [21]	M	M	M
		NG1.M.1 I$_N$_minimum delay symmetric MAC service type	5.4 [21]	M	M	M
		NG1.M.4 Advanced Connections	5.4 [21]	M	M	M
		NG1.D.1 DLC Service LU1 TRUP Class 0/min_delay	5.3 [21]	M	M	M
		NG1.D.5 DLC frame FU1	5.3 [21]	M	M	M
		NG1.SC.3 ITU-T Recommendation G.722 [17] 64 kbit/s 7 kHz wideband codec	5.6 [21]	M	M	M
		NG1.SC.7 Packet loss Concealment (PLC) for ITU-T Recommendation G.722 [17]	5.6 [21]	O	O	O
		NG1.SC.9 Codec selection and switching	5.6 [21]	M	M	M
		NG1.SC.14 PP Audio type 2a (ITU-T Recommendation P.311 [i.5] 7 kHz handset)	5.6 [21]	C703, note 2	N/A	N/A
		NG1.SC.15 PP Audio type 2b (HATS 7 kHz handset)	5.6 [21]	C703	N/A	N/A
		NG1.SC.16 PP Audio type 2c (HATS 7 kHz improved handset)	5.6 [21]	C703	N/A	N/A
		NG1.SC.19 PP Audio type 4a (HATS 7 kHz handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.20 PP Audio type 4b (HATS 7 kHz improved handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.28 FP Audio type 4 (ISDN wideband)	5.6 [21]	N/A	C708	C708
		NG1.SC.29 FP Audio type 5 (VoIP wideband)	5.6 [21]	N/A	C708	C708
		NG1.SC.30 NG1.SC.24 PP echo canceller for FP, wideband	5.6 [21]	N/A	C709	C709
		NG1.SC.31 NG1.SC.24 PP echo supressor for FP, wideband	5.6 [21]	N/A	C709	C709
		NG1.SC.32 FP Audio type 6a (internal call)	5.6 [21]	N/A	M	M
		NG1.SC.33 FP Audio type 6b (internal conference)	5.6 [21]	N/A	O	O
		NG1.SC.34 Adaptive volume control	5.6 [21]	N/A	O	O

Service/DECT Feature mapping						
					Status	
Service	IA	DECT feature/service	Reference	PT	FT	
					R/B	P
NG1.3 Wideband 7 kHz G.722 64 kbit/s voice service	**II**		**5.1 [21]**	**O**	**O**	**O**
		NG1.P.1 2 level GFSK modulation	5.5 [21]	M	M	M
		NG1.P.3 Physical Packet P67	5.5 [21]	M	M	M
		NG1.M.3 I$_{PQ}$_error_detection symmetric MAC service type	5.4 [21]	M	M	M
		NG1.M.4 Advanced Connections	5.4 [21]	M	M	M
		NG1.D.1 DLC Service LU1 TRUP Class 0/min_delay	5.3 [21]	M	M	M
		NG1.D.5 DLC frame FU1	5.3 [21]	M	M	M
		NG1.SC.3 ITU-T Recommendation G.722 [17] 64 kbit/s 7 kHz wideband codec	5.6 [21]	M	M	M
		NG1.SC.7 Packet loss Concealment (PLC) for ITU-T Recommendation G.722 [17]	5.6 [21]	O	O	O
		NG1.SC.9 Codec selection and switching	5.6 [21]	M	M	M
		NG1.SC.14 PP Audio type 2a (ITU-T Recommendation P.311 [i.5] 7 kHz handset)	5.6 [21]	C703, note 2	N/A	N/A
		NG1.SC.15 PP Audio type 2b (HATS 7 kHz handset)	5.6 [21]	C703	N/A	N/A
		NG1.SC.16 PP Audio type 2c (HATS 7 kHz improved handset)	5.6 [21]	C703	N/A	N/A
		NG1.SC.19 PP Audio type 4a (HATS 7 kHz handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.20 PP Audio type 4b (HATS 7 kHz improved handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.28 FP Audio type 4 (ISDN wideband)	5.6 [21]	N/A	C708	C708
		NG1.SC.29 FP Audio type 5 (VoIP wideband	5.6 [21]	N/A	C708	C708
		NG1.SC.30 NG1.SC.24 PP echo canceller for FP, wideband	5.6 [21]	N/A	C709	C709
		NG1.SC.31 NG1.SC.24 PP echo supressor for FP, wideband	5.6 [21]	N/A	C709	C709
		NG1.SC.32 FP Audio type 6a (internal call)	5.6 [21]	N/A	M	M
		NG1.SC.33 FP Audio type 6b (internal conference)	5.6 [21]	N/A	O	O
		NG1.SC.34 Adaptive volume control	5.6 [21]	N/A	O	O

Service/DECT Feature mapping						
					Status	
Service	IA	DECT feature/service	Reference	PT	FT	
					R/B	P
NG1.4 Wideband 7 kHz G.729.1 32 kbit/s voice service	**I**		**5.1 [21]**	**O**	**O**	**O**
		NG1.P.1 2 level GFSK modulation	5.5 [21]	M	M	M
		NG1.P.3 Physical Packet P32	5.5 [21]	M	M	M
		NG1.M.2 I_N_normal_delay symmetric MAC service type	5.4 [21]	M	M	M
		NG1.M.4 Advanced Connections	5.4 [21]	M	M	M
		NG1.D.4 DLC service LU12 (UNF) Class 0	5.3 [21]	M	M	M
		NG1.D.7 DLC frame FU12 with adaptation for codec G.729.1	5.3 [21]	M	M	M
		NG1.SC.4 ITU-T Recommendation G.729.1 [18] 32 kbit/s 7 kHz wideband codec	5.6 [21]	M	M	M
		NG1.SC.9 Codec selection and switching	5.6 [21]	M	M	M
		NG1.SC.14 PP Audio type 2a (ITU-T Recommendation P.311 [i.5] 7 kHz handset)	5.6 [21]	C703, note 2	N/A	N/A
		NG1.SC.15 PP Audio type 2b (HATS 7 kHz handset)	5.6 [21]	C703	N/A	N/A
		NG1.SC.16 PP Audio type 2c (HATS 7 kHz improved handset)	5.6 [21]	C703	N/A	N/A
		NG1.SC.19 PP Audio type 4a (HATS 7 kHz handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.20 PP Audio type 4b (HATS 7 kHz improved handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.28 FP Audio type 4 (ISDN wideband)	5.6 [21]	N/A	C708	C708
		NG1.SC.29 FP Audio type 5 (VoIP wideband	5.6 [21]	N/A	C708	C708
		NG1.SC.30 NG1.SC.24 PP echo canceller for FP, wideband	5.6 [21]	N/A	C709	C709
		NG1.SC.31 NG1.SC.24 PP echo supressor for FP, wideband	5.6 [21]	N/A	C709	C709
		NG1.SC.32 FP Audio type 6a (internal call)	5.6 [21]	N/A	M	M
		NG1.SC.33 FP Audio type 6b (internal conference)	5.6 [21]	N/A	O	O
		NG1.SC.34 Adaptive volume control	5.6 [21]	N/A	O	O

Service/DECT Feature mapping						
					Status	
Service	**IA**	**DECT feature/service**	**Reference**	**PT**	**FT**	
					R/B	**P**
NG1.5 Superwideband 14 kHz MPEG-4 ER AAC-LD 64 kbit/s voice service	**I**		**5.1 [21]**	**O**	**O**	**O**
		NG1.P.1 2 level GFSK modulation	5.5 [21]	M	M	M
		NG1.P.3 Physical Packet P64	5.5 [21]	M	M	M
		NG1.M.2 $I_{N\_normal\_delay}$ symmetric MAC service type	5.4 [21]	M	M	M
		NG1.M.4 Advanced Connections	5.4 [21]	M	M	M
		NG1.D.2 DLC Service LU1 Class 0	5.4 [21]	M	M	M
		NG1.D.5 DLC frame FU1	5.3 [21]	M	M	M
		NG1.SC.5 MPEG4 AAC-LD 64 kbit/s 14 kHz superwideband codec	5.6 [21]	M	M	M
		NG1.SC.9 Codec selection and switching	5.6 [21]	M	M	M
		NG1.SC.21 PP Audio type 5a (Superwideband 14 KHz handset)	5.6 [21]	M	N/A	N/A
		NG1.SC.22 PP Audio type 5b (Superwideband 14 KHz handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.28 FP Audio type 4 (ISDN wideband)	5.6 [21]	N/A	C708	C708
		NG1.SC.29 FP Audio type 5 (VoIP wideband)	5.6 [21]	N/A	C708	C708
		NG1.SC.32 FP Audio type 6a (internal call)	5.6 [21]	N/A	M	M
		NG1.SC.33 FP Audio type 6b (internal conference)	5.6 [21]	N/A	O	O
		NG1.SC.34 Adaptive volume control for FP	5.6 [21]	N/A	O	O
NG1.5 Superwideband 14 kHz MPEG-4 ER AAC-LD 64 kbit/s voice service	**II**		**5.1 [21]**	**O**	**O**	**O**
		NG1.P.1 2 level GFSK modulation	5.5 [21]	M	M	M
		NG1.P.3 Physical Packet P67	5.5 [21]	M	M	M
		NG1.M.3 $I_{PQ\_error\_detection}$ symmetric MAC service type	5.4 [21]	M	M	M
		NG1.M.4 Advanced Connections	5.4 [21]	M	M	M
		NG1.D.2 DLC service LU1 Class 0	5.3 [21]	M	M	M
		NG1.D.5 DLC frame FU1	5.3 [21]	M	M	M
		NG1.SC.5 MPEG4 AAC-LD 64 kbit/s 14 kHz superwideband codec	5.6 [21]	M	M	M
		NG1.SC.9 Codec selection and switching	5.6 [21]	M	M	M
		NG1.SC.21 PP Audio type 5a (Superwideband 14 KHz handset)	5.6 [21]	M	N/A	N/A
		NG1.SC.22 PP Audio type 5b (Superwideband 14 KHz handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.28 FP Audio type 4 (ISDN wideband)	5.6 [21]	N/A	C708	C708
		NG1.SC.29 FP Audio type 5 (VoIP wideband)	5.6 [21]	N/A	C708	C708
		NG1.SC.32 FP Audio type 6a (internal call)	5.6 [21]	N/A	M	M
		NG1.SC.33 FP Audio type 6b (internal conference)	5.6 [21]	N/A	O	O
		NG1.SC.34 Adaptive volume control for FP	5.6 [21]	N/A	O	O

Service/DECT Feature mapping						
					Status	
Service	IA	DECT feature/service	Reference	PT	FT	
					R/B	P
NG1.6 Wideband 11 kHz MPEG-4 ER AAC-LD 32 kbit/s voice service	**I**		**5.1 [21]**	**O**	**O**	**O**
		NG1.P.1 2 level GFSK modulation	5.5 [21]	M	M	M
		NG1.P.3 Physical Packet P32	5.5 [21]	M	M	M
		NG1.M.2 I$_N$_normal_delay symmetric MAC service type	5.4 [21]	M	M	M
		NG1.M.4 Advanced Connections	5.4 [21]	M	M	M
		NG1.D.2 DLC service LU1 Class 0	5.4 [21]	M	M	M
		NG1.D.5 DLC frame FU1	5.3 [21]	M	M	M
		NG1.SC.6 MPEG4 AAC-LD 32 kbit/s 11 kHz wideband codec	5.6 [21]	M	M	M
		NG1.SC.9 Codec selection and switching	5.6 [21]	M	M	M
		NG1.SC.14 PP Audio type 2a (ITU-T Recommendation P.311 [i.5] 7 kHz handset)	5.6 [21]	C703, note 2	N/A	N/A
		NG1.SC.15 PP Audio type 2b (HATS 7 kHz handset)	5.6 [21]	C703	N/A	N/A
		NG1.SC.16 PP Audio type 2c (HATS 7 kHz improved handset)	5.6 [21]	C703	N/A	N/A
		NG1.SC.19 PP Audio type 4a (HATS 7 kHz handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.20 PP Audio type 4b (HATS 7 kHz improved handsfree)	5.6 [21]	O	N/A	N/A
		NG1.SC.28 FP Audio type 4 (ISDN wideband)	5.6 [21]	N/A	C708	C708
		NG1.SC.29 FP Audio type 5 (VoIP wideband)	5.6 [21]	N/A	C708	C708
		NG1.SC.30 NG1.SC.24 PP echo canceller for FP, wideband	5.6 [21]	N/A	C709	C709
		NG1.SC.31 NG1.SC.24 PP echo supressor for FP, wideband	5.6 [21]	N/A	C709	C709
		NG1.SC.32 FP Audio type 6a (internal call)	5.6 [21]	N/A	M	M
		NG1.SC.33 FP Audio type 6b (internal conference)	5.6 [21]	N/A	O	O
		NG1.SC.34 Adaptive volume control	5.6 [21]	N/A	O	O

IA = Implementation Alternative:
C201:   Advanced connections for Service NG1.1 shall only be used in the case of multiple connections between the same PT-FT pair. The support of this case is optional.
C702:   At least one should be provided. NG1.SC.11 (type 1b) is only allowed temporarely (see note 1).
C703:   At least one should be provided. NG1.SC.14 (type 2a) is only allowed temporarely (see note 2).
C706:   At least one should be provided.
C707:   IF feature NG1.SC.23 (FP type 1b) OR NG1.SC.27 (FP type 3) THEN O ELSE I. Either NG1.SC.24 or NG1.SC.25 may be provided, but not both at the same time.
C708:   At least one should be provided.
C709:   IF feature NG1.SC.28 (FP type 4) OR NG1.SC.29 (FP type 5) THEN O ELSE I. Either NG1.SC.30 or NG1.SC.31 may be provided, but not both at the same time.
NOTE 1: Feature NG1-SC.11 (type 1b) shall become "I" for PP instead of "C702" after 31-December-2009.
NOTE 2: Feature NG1-SC.14 (type 2a) shall become "I" for PP instead of "C703" after 31-December-2009.
NOTE 3: The transition dates given in notes 1 and 2 are linked to the product development and test dates, (based on corresponding ETSI test specification EN 300 176-2 [10]). Example for note 1: For PPs developed and tested before 31-December-2009, the feature NG1.SC.11 is C702. For PPs developed and tested after 31-December-2009, this feature is I.

6.4   NWK features

"New Generation DECT; part 3: Extended wideband speech services" devices shall support the following Network layer features.

Table 3: NWK features status

Item no.	Name of feature	Reference	PT	FT R/B	FT P
	Feature supported				
				Status	
				FT	
			PT	**R/B**	**P**
NG1.N.1	Codec Negotiation	5.2 [21]	M	M	M
NG1.N.2	Codec Switching	5.2 [21]	M	M	M
NG1.N.3	Missed call notification	5.2	M	M	M
NG1.N.4	Voice message waiting notification	5.2	M	M	M
NG1.N.5	Date and Time synchronization	5.2	M	M	M
NG1.N.6	Parallel calls	5.2	M	M	O
NG1.N.7	Common parallel call procedures (external or internal)	5.2	M	M	O
NG1.N.8	Call transfer (external or internal)	5.2	M	M	O
NG1.N.9	3-party conference with established external and/or internal calls	5.2	O	O	O
NG1.N.10	Intrusion call	5.2	O	O	O
NG1.N.11	Call deflection (external or internal)	5.2	O	O	O
NG1.N.12	Line identification	5.2	O	M	M
NG1.N.13	Call identification	5.2	O	M	M
NG1.N.14	Multiple Lines	5.2	O	O	O
NG1.N.15	Multiple calls	5.2	M	O	O
NG1.N.16	List access service	5.2	M	M	O
NG1.N.17	Calling line identity restriction	5.2	O	O	O
GAP.N.1	Outgoing call	4.1 [12]	M	M	M
GAP.N.2	Off hook	4.1 [12]	M	M	M
GAP.N.3	On hook (full release)	4.1 [12]	M	M	M
GAP.N.4	Dialled digits (basic)	4.1 [12]	M	M	M
GAP.N.5	Register recall (see notes 4 and 5)	4.1 [12]	M	O	O
GAP.N.6	Go to DTMF signalling (defined tone length) (see note 1)	4.1 [12]	M	O	M
GAP.N.7	Pause (dialling pause) (see note 3)	4.1 [12]	M	O	O
GAP.N.8	Incoming call	4.1 [12]	M	M	M
GAP.N.9	Authentication of PP	4.1 [12]	M	O	M
GAP.N10	Authentication of user (see note 2)	4.1 [12]	M	O	O
GAP.N.11	Location registration	4.1 [12]	M	O	M
GAP.N.12	On air key allocation (see note 2)	4.1 [12]	M	O	O
GAP.N.13	Identification of PP	4.1 [12]	M	O	O
GAP.N.14	Service class indication/assignment	4.1 [12]	M	O	M
GAP.N.15	Alerting	4.1 [12]	M	M	M
GAP.N.16	ZAP (see note 2)	4.1 [12]	M	O	O
GAP.N.17	Encryption activation FT initiated	4.1 [12]	M	C301	M
GAP.N.18	Subscription registration procedure on-air	4.1 [12]	M	M	M
GAP.N.19	Link control	4.1 [12]	M	M	M
GAP.N.20	Terminate access rights FT initiated (see note 2)	4.1 [12]	M	O	O
GAP.N.21	Partial release	4.1 [12]	O	O	O
GAP.N.22	Go to DTMF (infinite tone length)	4.1 [12]	O	O	O
GAP.N.23	Go to Pulse	4.1 [12]	O	O	O
GAP.N.24	Signalling of display characters	4.1 [12]	O	O	O
GAP.N.25	Display control characters	4.1 [12]	O	O	O
GAP.N.26	Authentication of FT	4.1 [12]	O	O	O
GAP.N.27	Encryption activation PT initiated	4.1 [12]	O	O	O
GAP.N.28	Encryption deactivation FT initiated	4.1 [12]	O	O	O
GAP.N.29	Encryption deactivation PT initiated	4.1 [12]	O	O	O
GAP.N.30	Calling Line Identification Presentation (CLIP)	4.1 [12]	M	M	M
GAP.N.31	Internal call	4.1 [12]	M	M	M
GAP.N.32	Service call	4.1 [12]	O	O	O

Feature supported					
				Status	
			PT	FT	
Item no.	Name of feature	Reference		R/B	P
GAP.N.33	Enhanced U- plane connection	4.1 [12]	O	O	O
GAP.N.34	Calling Name Identification Presentation (CNIP)	4.1 [12]	M	M	M
C301:	IF DECT system "PIN code" setting (clause 7.4.11.3.1) is implemented THEN "M" ELSE "O".				
NOTE 1:	The PT is only required to be able to send the <<MULTI-KEYPAD>> information element containing the DECT standard 8-bit character (EN 300 175-5 [5], annex D) codings "Go to DTMF", defined tone length and the FT is required to be able to understand it in the public environment.				
NOTE 2:	This feature is required to be supported in the PT to guarantee the same level of security among all the handsets that operates in a system. The invocation of the feature is however optional to the operator.				
NOTE 3:	The PT is required to be able to send the <<MULTI-KEYPAD>> information element containing the DECT standard 8-bit character (EN 300 175-5 [5], annex D) codings "Dialling Pause". This guarantees automatic access to secondary or alternative networks.				
NOTE 4:	This feature uses keypad code 15 hex.				
NOTE 5:	The FT is not mandated to receive and understand the register recall DECT character. However, if a FT supports it there may be no corresponding action that the FT can take with the local network as a result of this function.				

6.5 Data Link Control (DLC) services

"New Generation DECT; part 3: Extended wideband speech services" devices shall support the following DLC services.

Table 4: DLC services status

Service supported					
				Status	
			PT	FT	
Item no.	Name of service	Reference		R/B	P
NG1.D.1	LU1 Transparent UnProtected service (TRUP) Class 0 /minimum_delay	5.3 [21]	M	M	M
NG1.D.2	LU1 Transparent UnProtected service (TRUP) Class 0	5.3 [21]	C401	C401	C401
NG1.D.3	LU7 64 kbit/s protected bearer service	5.3 [21]	C401	C401	C401
NG1.D.4	LU 12 Unprotected Framed service (UNF) Class 0	5.3 [21]	C401	C401	C401
NG1.D.5	FU1 DLC frame	5.3 [21]	M	M	M
NG1.D.6	FU7 DLC frame	5.3 [21]	C401	C401	C401
NG1.D.7	FU12 DLC frame with adaptation for codec G.729.1	5.3 [21]	C401	C401	C401
GAP.D.1	LAPC class A service and Lc	5.1 [12]	M	M	M
GAP.D.2	C_S channel fragmentation and recombination	5.1 [12]	M	M	M
GAP.D.3	Broadcast Lb service	5.1 [12]	M	M	M
GAP.D.4	Intra-cell voluntary connection handover	5.1 [12]	M	C402	C402
GAP.D.5	Intercell voluntary connection handover (note)	5.1 [12]	M	O	O
GAP.D.6	Encryption activation	5.1 [12]	M	C404	M
GAP.D.9	Encryption deactivation	5.1 [12]	C403	C403	C403
C401:	Status defined by clause 6.3, table 2.				
C402:	IF service GAP.M.9 THEN O ELSE M.				
C403:	IF feature GAP.N.29 OR GAP.N.28 THEN M ELSE I.				
C404:	IF feature GAP.N.17 OR GAP.N.27 THEN M ELSE I.				
NOTE:	The PT is required to be able to support handover between RFPs. The invocation of the feature is however optional to the operator.				

6.6   Medium Access Control (MAC) services

"New Generation DECT; part 3: Extended wideband speech services" devices shall support the following MAC layer services.

Table 5: MAC services status

Item no.	Name of service	Reference	PT	FT	
				R/B	P
NG1.M.1	I_N_minimum delay symmetric MAC service type	5.4 [21]	M	M	M
NG1.M.2	I_N_normal delay symmetric MAC service type	5.4 [21]	C501	C501	C501
NG1.M.3	I_{PQ}_error_detection symmetric MAC service type	5.4 [21]	C501	C501	C501
NG1.M.4	Advanced connections	5.4 [21]	M	M	M
NG1.M.5	"no emission" mode	5.4	O	O	O
GAP.M.1	General	5.2 [12]	M	M	M
GAP.M.2	Continuous broadcast	5.2 [[12]	M	M	M
GAP.M.3	Paging broadcast	5.2 [12]	M	M	M
GAP.M.4	Basic connections	5.2 [12]	M	M	M
GAP.M.5	C_S higher layer signalling	5.2 [12]	M	M	M
GAP.M.6	Quality control	5.2 [12]	M	M	M
GAP.M.7	Encryption activation	5.2 [12]	M	C505	M
GAP.M.8	Extended frequency allocation (note)	5.2 [12]	M	O	O
GAP.M.9	Bearer Handover, intra-cell	5.2 [12]	M	C502	C502
GAP.M.10	Bearer Handover, inter-cell	5.2 [12]	M	O	O
GAP.M.11	Connection Handover, intra-cell	5.2 [12]	M	C503	C503
GAP.M.12	Connection Handover, inter-cell	5.2 [12]	M	O	O
GAP.M.13	SARI support	5.2 [12]	M	O	O
GAP.M.14	Encryption deactivation	5.2 [12]	C504	C504	C504
C501:	Status defined by clause 6.3, table 2.				
C502:	IF service GAP.M.11 THEN O ELSE M.				
C503:	IF service GAP.M.9 THEN O ELSE M.				
C504:	IF feature GAP.N.29 OR N.28 THEN M ELSE I.				
C505:	IF feature GAP.N.17 OR N.27 THEN M ELSE I.				
NOTE:	Handsets not supporting these extra frequencies need only adapt scanning to allow continued use of the standard DECT frequencies.				

6.7   Physical layer (PHL) services

"New Generation DECT; part 3: Extended wideband speech services" devices shall support the following Physical layer (PHL) services.

Table 6: PHL services status

Item no.	Name of service	Reference	PT	FT	
				R/B	P
NG1.P.1	2 level GFSK modulation	5.5 [21]	M	M	M
NG1.P.2	Physical Packet P32	5.5 [21]	M	M	M
NG1.P.3	Physical Packet P64	5.5 [21]	M	M	M
NG1.P.4	Physical Packet P67	5.5 [21]	O	O	O
NG1.P.5	Physical Packet P80	5.5 [21]	O	O	O

The requirements of EN 300 444 [12], clause 11 also apply.

6.8   Speech coding and audio features

"New Generation DECT; part 3: Extended wideband speech services" devices shall support the following Speech coding and audio related features.

Table 7: Speech Coding and audio features

Item no.	Name of service	Reference	PT	FT R/B	FT P
	Service supported				
				Status	
				FT	
NG1.SC.1	G.726 32 kbit/s ADPCM codec	5.6 [21]	M	M	M
NG1.SC.2	G.711 64 kbit/s PCM codec	5.6 [21]	C701	C701	C701
NG1.SC.3	G.722 64 kbit/s 7 kHz wideband codec	5.6 [21]	M	M	M
NG1.SC.4	G.729.1 32 kbit/s 7 kHz wideband codec	5.6 [21]	C701	C701	C701
NG1.SC.5	MPEG4 AAC-LD 64 kbit/s 14 kHz superwideband codec	5.6 [21]	C701	C701	C701
NG1.SC.6	MPEG4 AAC-LD 32 kbit/s 11 kHz wideband codec	5.6 [21]	C701	C701	C701
NG1.SC.7	Packet Loss Concealment (PLC) for G.722]	5.6 [21]	C701	C701	C701
NG1.SC.8	Detection of Fax/modem tone	5.6 [21]	C701	C701	C701
NG1.SC.9	Codec selection and switching	5.6 [21]	M	M	M
NG1.SC.10	PP Audio profile type 1a (classic GAP handset)	5.6 [21]	I	N/A	N/A
NG1.SC.11	PP Audio profile type 1b (improved GAP handset)	5.6 [21]	C702, note 1	N/A	N/A
NG1.SC.12	PP Audio profile type 1c (HATS 3,1 kHz handset)	5.6 [21]	C702	N/A	N/A
NG1.SC.13	PP Audio profile type 1d (HATS 3,1 kHz improved handset)	5.6 [21]	C702	N/A	N/A
NG1.SC.14	PP Audio profile type 2a (ITU-T Recommendation P.311 [i.5] 7 kHz handset)	5.6 [21]	C703, note 2	N/A	N/A
NG1.SC.15	PP Audio profile type 2b (HATS 7 kHz handset)	5.6 [21]	C703	N/A	N/A
NG1.SC.16	PP Audio profile type 2c (HATS 7 kHz improved handset)	5.6 [21]	C703	N/A	N/A
NG1.SC.17	PP Audio profile type 3a (HATS 3,1 kHz handsfree)	5.6 [21]	O	N/A	N/A
NG1.SC.18	PP Audio profile type 3b (HATS 3,1 kHz improved handsfree)	5.6 [21]	O	N/A	N/A
NG1.SC.19	PP Audio profile type 4a (HATS 7 kHz handsfree)	5.6 [21]	O	N/A	N/A
NG1.SC.20	PP Audio profile type 4b (HATS 7 kHz improved handsfree)	5.6 [21]	O	N/A	N/A
NG1.SC.21	PP Audio profile type 5a superwideband (14 kHz) handset	5.6 [21]	C704	N/A	N/A
NG1.SC.22	PP Audio profile type 5b superwideband (14 kHz) handsfree	5.6 [21]	C705	N/A	N/A
NG1.SC.23	FP Audio type 1b (new ISDN 3,1 kHz)	5.6	N/A	C706	C706
NG1.SC.24	PP echo canceller for FP, narrowband	5.6	N/A	C707	C707
NG1.SC.25	PP echo supressor for FP, narrowband	5.6	N/A	C707	C707
NG1.SC.26	FP Audio type 2 (analog PSTN 3,1 kHz)	5.6	N/A	C706	C706
NG1.SC.27	FP Audio type 3 (VoIP 3,1 kHz)	5.6	N/A	C706	C706
NG1.SC.28	FP Audio type 4 (ISDN wideband)	5.6	N/A	C708	C708
NG1.SC.29	FP Audio type 5 (VoIP wideband)	5.6	N/A	C708	C708
NG1.SC.30	PP echo canceller for FP, wideband	5.6	N/A	C709	C709
NG1.SC.31	PP echo supressor for FP, wideband	5.6	N/A	C709	C709
NG1.SC.32	FP Audio type 6a (internal call)	5.6	N/A	M	M
NG1.SC.33	FP Audio type 6b (internal conference)	5.6	N/A	O	O
NG1.SC.34	Adaptive volume control for FP	5.6	N/A	O	O

C701:   Status defined by clause 6.3, table 2.
C702:   At least one should be provided. NG1.SC.11 (type 1b) is only allowed temporarely (see note 1).
C703:   At least one should be provided. NG1.SC.14 (type 2a) is only allowed temporarely (see note 2).
C704:   IF Service NG1.5 (Superwideband) THEN M ELSE I.
C705:   IF Service NG1.5 (Superwideband) THEN O ELSE I.
C706:   At least one should be provided.
C707:   IF feature NG1.SC.23 (FP type 1b) OR NG1.SC.27 (FP type 3) THEN O ELSE I. Either NG1.SC.24 or
         NG1.SC.25 may be provided, but not both at the same time.
C708:   At least one should be provided.
C709:   IF feature NG1.SC.28 (FP type 4) OR NG1.SC.29 (FP type 5) THEN O ELSE I. Either NG1.SC.30 or
         NG1.SC.31 may be provided, but not both at the same time.

NOTE 1:	Feature NG1-SC.11 (type 1b) shall become "I" for PP instead of "C702" after 31-December-2009.
NOTE 2:	Feature NG1-SC.14 (type 2a) shall become "I" for PP instead of "C703" after 31-December-2009.
NOTE 3:	The transition dates given in notes 1 and 2 are linked to the product development and test dates, (based on corresponding ETSI test specification EN 300 176-2 [10]). Example for note 1: For PPs developed and tested before 31-December-2009, the feature NG1.SC.11 is C702. For PPs developed and tested after 31-December-2009, this feature is I.

NOTE 1: Testing specification for audio features, including handsfree, is provided in EN 300 176-2 [10].

NOTE 2: PP types 1c, 1d, 2b and 2c are based on HATS methodology. This methodology provides objective test results more consistent with subjective tests compared to artificial ear methodology.

NOTE 3: PP type 2a may produce echo issues in combination with VoIP or long delay networks. Types 2b or 2c are recommended for this scenario.

6.9   Application features

"New Generation DECT; part 3: Extended wideband speech services" devices shall support the following Application features.

Table 8: Application features status

Item no.	Name of feature	Reference	PT	FT R/B	FT P
	Feature supported			**Status**	
				FT	
NG1.A.1	Easy PIN-code registration	5.7	M	N/A	N/A
NG1.A.2	Easy pairing registration	5.7	M	O	N/A
NG1.A.3	Handset locator	5.7	M	O	O
GAP.A.1	AC_bitstring_mapping	4.2 [12]	M	C801	M
GAP.A.2	Multiple subscription registration	4.2 [12]	M	N/A	N/A
GAP.A.3	Manual entry of the PARK	4.2 [12]	O	N/A	N/A
GAP.A.4	Terminal identity number assignment in mono cell system	4.2 [12]	M	M	N/A
C801:	IF feature GAP.N.9 OR GAP.N.10 OR GAP.N.12 OR GAP.N.26 THEN M ELSE N/A.				

6.10 Network (NWK) feature to procedure mapping

The NWK features to procedure mapping of EN 300 444 [12] (GAP), clause 6.7 with the following changes and additional features shall apply.

Table 9: NWK feature to procedure mapping

Feature/Procedure mapping					
				Status	
				FT	
Feature	**Procedure**	**Reference**	**PT**	**R/B**	**P**
NG1.N.1 Codec Negotiation		5.2 [21]	M	M	M
	Exchange of codec list during registration and location registration	7.3.1 [21]	M	M	M
	Basic service wideband speech and default attributes	7.3.2 [21]	M	M	M
	Codec Negotiation during call establishment	7.3.3 [21]	M	M	M
NG1.N.2 Codec Switching		5.2 [21]	M	M	M
	Codec Change	7.3.4 [21]	M	M	M
	Slot type modification	7.3.5 [21]	M	M	M
	MAC layer advanced connection slot type modification	7.6.5 [21]			
	MAC layer connection type modification: basic to/from advanced	7.6.6 [21]	M	M	M
NG1.N.3 Missed call notification		5.2	M	M	M
	Generic events notification, general	7.4.1.1	M	M	M
	Missed call notification	7.4.1.2	M	M	M
NG1.N.4 Voice message waiting notification		5.2	M	M	M
	Generic events notification, general	7.4.1.1	M	M	M
	Voice message waiting notification	7.4.1.3	M	M	M
NG1.N.5 Date and Time synchronization		5.2	M	M	M
	Date and Time synchronization	7.4.2	M	M	M
NG1.N.6 Parallel Calls		5.2	M	M	O
	Parallel call common requirements	7.4.3.1	M	M	M
	Control messages	7.4.3.2	M	M	M
	Sending Keypad information	8.10 [12]	M	M	M
	Codec change for parallel calls	7.4.3.3	M	M	M
	Sending negative acknowledgement	7.4.3.4	M	M	M
	Busy system or line notification	7.4.8.3	M	M	M
NG1.N.7 Common parallel call procedures (external or internal)		5.2	M	M	O
	Outgoing parallel call initiation (external or internal)	7.4.3.5.1	M	M	M
	Call waiting indication (external or internal)	7.4.3.5.2	M	M	M
	Call toggle (external or internal)	7.4.3.5.3	M	M	M
	Call release and call release rejection	7.4.3.5.4	M	M	M
	On-hold call release	7.4.3.5.5	C901	M	M
	Call waiting acceptation (from PP to FP)	7.4.3.5.6	M	M	M
	Call waiting rejection (from PP to FP)	7.4.3.5.7	M	M	M
	Putting a call on-hold	7.4.3.5.8	O	M	M
	Resuming a call put on-hold	7.4.3.5.9	O	M	M
	CLIP on call waiting indication	7.4.3.5.10	M	M	M
	CNIP on call waiting indication	7.4.3.5.11	M	M	M
NG1.N.8 Call transfer (external or internal)		5.2	M	M	O
	Announced call transfer	7.4.3.6.1	M	M	M
	Unannounced call transfer	7.4.3.6.2	M	M	M
	Call re-injection to the line (external or internal)	7.4.3.6.3	M	M	M
	Remote party CLIP on call transfer	7.4.3.6.4	M	M	M
	Remote party CNIP on call transfer	7.4.3.6.5	M	M	M
NG1.N.9 3-party conference call (external or internal)		5.2	O	O	O
	3-party Conference with established internal and external calls	7.4.3.7	M	M	M

Feature/Procedure mapping					
				Status	
				FT	
Feature	**Procedure**	**Reference**	**PT**	**R/B**	**P**
NG1.N.10 Intrusion call		5.2	O	O	O
	Implicit call intrusion into a line in "single call" mode	7.4.3.8.1	M	M	M
	Explicit call intrusion (from PP to FP)	7.4.3.8.2	M	M	M
NG1.N.11 Call deflection (internal or external)		5.2	O	O	O
	Call deflection (internal)	7.4.4.2	M	M	M
	Call deflection (external)	7.4.4.2	M	M	M
	Call deflection control messages	7.4.4.1.1	M	M	M
NG1.N.12 Line identification		5.2	O	M	M
	Line identification general requirements	7.4.5.1	M	M	M
	General line identification requirements for external outgoing calls	7.4.5.2.1	M	M	M
	Line identification for a first external outgoing call using <<CALL-INFO>> IE	7.4.5.2.2	M	M	M
	Line identification for a first external outgoing call using <<MULTI-KEYPAD>> IE	7.4.5.2.3	O	M	M
	FP managed line selection for a first external outgoing call	7.4.5.2.4	O	M	M
	General line identification requirements for external incoming calls	7.4.5.3.1	M	M	M
	Line identification for a first external incoming call	7.4.5.3.2	M	M	M
	Line specification in events notification	7.4.5.4	O	M	O
NG1.N.13 Call identification		5.2	O	M	M
	Call identifier general requirements	7.4.6.1	M	M	M
	Call identifier assignment on outgoing call (FP to PP)	7.4.6.2	M	M	M
	Call identifier assignment on incoming call (FP to PP)	7.4.6.3	M	M	M
NG1.N.14 Multiple lines		5.2	O	O	O
	Multiple lines common requirements	7.4.7.1	M	M	M
	Terminal attachment and line settings	7.4.7.2	M	M	M
	Incoming and outgoing external calls on a multiple line system	7.4.7.3	M	M	M
	Internal calls in multiple line context	7.4.7.4	M	M	M
	Compatibility with non multiple line PP or FP	7.4.7.5	M	M	M
NG1.N.15 Multiple calls		5.2	M	O	O
	Multiple calls general requirements	7.4.8.1	M	M	M
	Incoming and outgoing external calls on a multiple call line	7.4.8.2	M	M	M
	Busy system or line notification	7.4.8.3	M	M	M

Feature/Procedure mapping					
				Status	
				FT	
Feature	**Procedure**	**Reference**	**PT**	**R/B**	**P**
NG1.N.16 List access service		5.2	M	M	O
	General considerations	7.4.10.1	M	M	M
	List change notification	7.4.10.2	O	M	M
	Start / end session	7.4.10.4.1	M	M	M
	Query supported entry fields	7.4.10.4.2	O	M	M
	Read entries	7.4.10.4.3	M	M	M
	Edit entry	7.4.10.4.4	O	M	M
	Save entry	7.4.10.4.5	O	M	M
	Delete entry	7.4.10.4.6	O	M	O
	Delete list	7.4.10.4.7	O	O	O
	Search entries	7.4.10.4.8	O	O	O
	Negative acknowledgement	7.4.10.4.9	M	M	M
	Data packet / Last data packet	7.4.10.4.10	M	M	M
	DECT system and line settings considerations	7.4.11.1	M	M	O
	Interactions between registration, attachment of handsets and lists	7.4.11.2	M	M	O
	Fields description	7.4.10.5.1	M	M	M
	[Supported lists]				
	Supported list query	7.4.10.5.2	O	M	M
	Missed calls list	7.4.10.5.3	M	M	M
	Outgoing calls list	7.4.10.5.4	O	O	O
	Incoming accepted calls list	7.4.10.5.5	O	O	O
	All calls list	7.4.10.5.6	O	O	O
	Contact list	7.4.10.5.7	O	O	O
	Internal names list	7.4.10.5.8	M	M	M
	DECT system settings list	7.4.11.3	M	M	O
	Line settings list	7.4.11.4	M	M	O
	Virtual contact list and call list per line	7.4.11.5	C902	C902	O
	[Supported DECT system settings]				
	PIN code	7.4.11.3.1	O	O	O
	Clock master	7.4.11.3.2	M	M	O
	Base reset	7.4.11.3.3	M	M	O
	FP IP address / type	7.4.11.3.4	O	O	O
	FP IP address / value	7.4.11.3.5	O	O	O
	FP IP address / subnet mask	7.4.11.3.6	O	O	O
	FP IP address / gateway	7.4.11.3.7	O	O	O
	FP IP address / DNS server	7.4.11.3.8	O	O	O
	FP version / Firmware version	7.4.11.3.9	M	M	O
	FP version / EEprom version	7.4.11.3.10	O	O	O
	FP version / Hardware version	7.4.11.3.11	O	O	O
	[Supported line settings]				
	Line name	7.4.11.4.1	M	M	O
	Line id	7.4.11.4.2	M	M	O
	Attached handsets	7.4.11.4.3	M	M	O
	Dialling prefix	7.4.11.4.4	O	O	O
	FP melody	7.4.11.4.5	O	O	O
	FP volume	7.4.11.4.6	O	O	O
	Blocked number	7.4.11.4.7	O	O	O
	Multiple calls mode (single/multiple)	7.4.11.4.8	C903	C903	C903
	Intrusion call	7.4.11.4.9	O	O	O
	Permanent CLIR	7.4.11.4.10	C904	C904	C904
	Call forwarding	7.4.11.4.11	O	O	O
NG1.N.17 Calling line identity restriction		5.2	O	O	O
	Considerations	7.4.12.1	M	M	O
	Permanent CLIR mode (all calls)	7.4.12.2	M	M	O
	Temporary CLIR mode (call by call)	7.4.12.3	M	N/A	O

Feature/Procedure mapping					
				Status	
				FT	
Feature	**Procedure**	**Reference**	**PT**	**R/B**	**P**
GAP.N.11 Location registration		4.1 [12]	M	O	M
	Location registration	8.28 [12]	M	M	M
	Location update	8.29 [12]	M	O	O
	Terminal Capability indication	7.4.9.1	M	M	M
GAP.N.14 Service class indication/assignment		4.1 [12]	M	O	M
	Obtaining access rights	8.30 [12]	M	M	M
	Terminal Capability indication	7.4.9.1	M	M	M
	Authentication of PT	8.24 [12]	M	M	M
GAP.N.16 ZAP		4.1 [12]	M	O	O
	Obtaining access rights	8.30 [12]	M	M	M
	Terminal Capability indication	8.17 [12]	M	M	M
	Incrementing the ZAP value	8.26 [12]	M	M	M
	Terminal Capability indication	7.4.9.1	M	M	M
GAP.N.18 Subscription registration user procedure on-air		4.1 [12]	M	M	M
	Obtaining access rights	8.30 [12]	M	M	M
	Terminal Capability indication	7.4.9.1	M	M	M
GAP.N.19 Link control		4.1 [12]	M	M	M
	Indirect FT initiated link establishment	7.3.8 [21]	M	M	M
	Direct PT initiated link establishment	8.36 [12]	M	M	M
	Link release "normal"	8.37 [12]	M	M	M
	Link release "abnormal"	8.38 [12]	M	M	M
	Link release "maintain"	8.39 [12]	M	M	M
GAP.N.24 Signalling of display characters		4.1 [12]	O	O	O
	Display	8.16 [12]	M	M	M
	Terminal capability indication	7.4.9.1	M	M	M
GAP.N.25 Display control characters		4.1 [12]	O	O	O
	Display	8.16 [12]	M	M	M
	Terminal capability indication	7.4.9.1	M	M	M
GAP.N.31 Internal Call		4.1 [12]	M	M	M
	Internal call setup	7.3.6 [21]	M	M	M
	Internal call keypad	8.19 [12]	M	O	O
	Internal call CLIP	8.43 [12]	M	M	M
	Internal call CNIP	8.44 [12]	M	M	M
	Internal call codec priority	7.4.3.9	M	M	M
C901: IF NG1.N.13 THEN "O" ELSE "M".					
C902: IF NG1.N.14 THEN "O" ELSE "I".					
C903: IF NG1.N.15 THEN "M" ELSE "I".					
C904: IF NG1.N.17 THEN "M" ELSE "I".					

6.11   Data Link Control (DLC) Service to procedure mapping

The DLC service to procedure mapping of EN 300 444 [12] (GAP), clause 6.8.1, with the following changes and additional services shall apply.

Table 10: DLC service to procedure mapping

Service/Procedure mapping					
				Status	
Service	**Procedure**	**Reference**	**PT**	**FT**	
				R/B	**P**
NG1.D.1 LU1 Transparent UnProtected service (TRUP) Class 0/minimum_delay		5.3 [12]	M	M	M
	LU1 Transparent UnProtected service (TRUP) operation	11.2 [4]	M	M	M
	Class 0: No Lu$_x$ retransmission or sequencing	14.2.3.1 [4]	M	M	M
	Class 0 procedures	14.3.2 [4]	M	M	M
	Minimum delay (speech) operation	14.2.3 [4]	M	M	M
	LLME U-plane establishment	9.9.1 [12]	M	M	M
NG1.D.2 LU1 Transparent UnProtected service (TRUP) Class 0		5.3 [21]	C401	C401	C401
	LU1 Transparent UnProtected service (TRUP) operation	11.2 [4]	M	M	M
	Class 0: No Lu$_x$ retransmission or sequencing	14.2.3.1 [4]	M	M	M
	Class 0 procedures	14.3.2 [4]	M	M	M
	LLME U-plane establishment	9.9.1 [12]	M	M	M
NG1.D.3 LU7 64 kbit/s protected bearer service		5.3 [21]	C401	C401	C401
	LU7 DLC layer service	11.9.4 [4]	M	M	M
NG1.D.4 LU12 LU 12 Unprotected Framed service (UNF) Class 0		5.3 [12]	C401	C401	C401
	LU12 UNprotected Framed service (UNF) operation	11.14 [4]	M	M	M
	Class 0: No Lu$_x$ retransmission or sequencing	14.2.3.1 [4]	M	M	M
	Class 0 procedures	14.3.2 [4]	M	M	M
	LLME U-plane establishment	9.9.1 [12]	M	M	M
NG1.D.5 FU1 DLC frame		5.3 [12]	M	M	M
	FU1 frame operation	8.19 [12]	M	M	M
	FU1 frame structure	12.2 [4]	M	M	M
NG1.D.6 FU7 DLC frame		5.3 [12]	C401	C401	C401
	FU7 frame structure	11.9.4.2 [4]	M	M	M
NG1.D.7 FU12 DLC frame with adaptation for codec G.729.1		5.3 [12]	C401	C401	C401
	FU12 frame structure	12.12 [4]	M	M	M
	Annex for codec G.729.1	E.1 [4]	M	M	M
	FU12 frame operation	7.5.2 [12]	M	M	M

6.12 Medium Access Control (MAC) service to procedure mapping

The MAC service to procedure mapping of EN 300 444 (GAP) [12], clause 6.8.2, with the following changes and additional services shall apply.

Table 11: MAC service to procedure mapping

Service/Procedure mapping					
				Status	
Service	**Procedure**	**Reference**	**PT**	**FT**	
				R/B	**P**
NG1M.1 I_N_minimum delay symmetric MAC service type		5.4 [21]	M	M	M
	MAC layer procedures: general	7.9.1 [21]	M	M	M
	MAC Connection oriented service	5.6 [3]	M	M	M
	MAC Basic connection	5.6.1.1 [3]	M	M	M
	MAC Advanced connection	5.6.1.2 [3]	M	M	M
	I_N_minimum delay symmetric MAC service, type 1	5.6.2.1 [3]	M	M	M
NG1.M.2 I_N_normal delay symmetric MAC service type		5.4 [21]	O	O	O
	MAC layer procedures: general	7.9.1 [21]	M	M	M
	MAC Connection oriented service	5.6 [3]	M	M	M
	MAC Basic connection	5.6.1.1 [3]	M	M	M
	MAC Advanced connection	5.6.1.2 [3]	M	M	M
	I_N_normal delay symmetric MAC service type 2	5.6.2.1 [3]	M	M	M
NG1.M.3 I_{PQ}_error_detection symmetric MAC service type		5.4 [21]	O	O	O
	MAC layer procedures: general	7.9.1 [21]	M	M	M
	MAC Connection oriented service	5.6 [3]	M	M	M
	MAC Basic connection	5.6.1.1 [3]	M	M	M
	MAC Advanced connection	5.6.1.2 [3]	M	M	M
	I_P_error_detection symmetric MAC service type 3	5.6.2.1 [3]	M	M	M
	Single-subfield protected format	6.2.1.3.4 [3]	M	M	M

Service/Procedure mapping					
				Status	
Service	Procedure	Reference	PT	FT	
				R/B	P
NG1.M.4 Advanced connections		5.4 [21]	M	M	M
	Setup of advanced connection, bearer setup (A-field)	7.6.5 [21]	M	M	M
	Connection type modification: basic to/from advanced	7.6.6 [21]	M	M	M
	Slot type modification	7.6.7 [21]	M	M	M
	Service type modification	7.6.8 [21]	C1101	C1101	C1101
	ECN number modification	7.6.9 [21]	C1102	C1102	C1102
	Connection/bearer release	7.6.10 [21]	M	M	M
NG1.M.5 "no-emision" mode		5.4	O	O	O
	Tail identification for "no emission" mode	7.1.2 [3]	M	M	M
	Extended Physical and Mac layer capabilities (part 2) bit a_{23}	7.2.3.11 [3]	M	M	M
	Bearer handover/replacement information, multiframe-countdown	7.2.4.3 [3]	M	M	M
	"no emission" mode sync information	7.3.5.3 [3]	M	M	M
	"no emission" mode procedures	9.4 [3]	M	M	M
	Management procedures for "no emission" mode	11.11 [3]	M	M	M
GAP.M.2 Continuous broadcast		5.2 [12]	M	M	M
	Downlink broadcast	7.6.3	M	M	M
	Higher Layer information FP broadcast	7.4.9.2	M	M	M
GAP.M.3 Paging broadcast		5.2 [12]	M	M	M
	Paging broadcast	7.6.4 [21]	M	M	M
GAP.M.9 Bearer handover, intra-cell		5.2 [12]	M	C502	C502
	Bearer handover request	7.6.11 [21]	M	M	M
GAP.M.10 Bearer handover, inter-cell		5.2 [12]	M	O	O
	Bearer handover request	7.6.11 [21]	M	M	M
GAP.M.11 Connection handover, intra-cell		5.2 [12]	M	C503	C503
	Connection handover request	7.6.12 [21]	M	M	M
GAP.M.12 Connection handover, inter-cell		5.2 [12]	M	O	O
	Connection handover request	7.6.12 [21]	M	M	M
GAP.M.13 SARI support		5.2 [12]	M	O	O
	Downlink broadcast	7.6.3	M	M	M
	Higher Layer information FP broadcast	7.4.9.2	M	M	M
C502: IF service GAP.M.11 THEN O ELSE M.					
C503: IF service GAP.M.9 THEN O ELSE M.					
C1101: IF service NG1.4 OR NG1.5 OR NG1.6 OR NG1.2 IA II OR NG1.2 IA III THEN M ELSE O.					
C1102: IF multiple connection between the same PT-FT pair THEN M ELSE O					

6.13 Application feature to procedure mapping

The Application feature to procedure mapping of EN 300 444 [12] (GAP), clause 6.8.3, with the following changes shall apply.

Table 12: Application feature to procedure mapping

Feature/Procedure mapping					
				Status	
				FT	
Feature	Procedure	Reference	PT	R/B	P
NG1.A.1 Easy PIN code registration		5.7	M	N/A	N/A
	Registration mode automatic access	7.10.1.3.1	M	N/A	N/A
	Searching mode and PIN code requests	7.10.1.1.1	M	N/A	N/A
	Base station name selection	7.10.1.3.2	O	O	N/A
	Registration user feedback	7.10.1.3.3	M	O	N/A
NG1.A.2 Easy pairing registration		5.7	M	O	N/A
	Easy pairing description	7.10.1.2.1	M	M	N/A
	Registration mode automatic access	7.10.1.3.1	M	N/A	N/A
	Base station limited registration mode	7.10.1.2.2	N/A	M	N/A
	Searching mode request	7.10.1.2.3	M	N/A	N/A
	Base station name selection	7.10.1.3.2	O	O	N/A
	Registration user feedback	7.10.1.3.3	M	O	N/A
NG1.A.3 Handset locator		5.7	M	O	O
	Handset locator	7.10.2	M	M	O
GAP.A.1 AC to bitstring mapping		4.2 [12]	M	C801	M
	AC to bitstring mapping	14.2 [12]	M	M	M
GAP.A.2 Multiple subscription registration		4.2 [12]	M	N/A	N/A
	Subscription control	14.1 [12]	M	N/A	N/A
GAP.A.3 Manual entry of the PARK		4.2 [12]	O	N/A	N/A
	Manual entry of the PARK	14.3 [12]	M	N/A	N/A
GAP.A.4 Terminal identity number assignment in mono cell system		4.2 [12]	M	M	N/A
	Terminal identity number assignment	14.4 [12]	M	M	N/A
C801: IF feature GAP.N.9 OR GAP.N.10 OR GAP.N.12 OR GAP.N.26 THEN M ELSE N/A.					

6.14 General requirements

6.14.1 Network (NWK) layer message contents

The requirements of TS 102 527-1 [21], clause 6.14.1 shall apply.

6.14.2 Transaction identifier

The requirements of TS 102 527-1 [21], clause 6.14.2 shall apply.

6.14.3 Length of a Network (NWK) layer message

The requirements of TS 102 527-1 [21], clause 6.14.3 shall apply.

6.14.4 Handling of error and exception conditions

The requirements of TS 102 527-1 [21], clause 6.14.4 shall apply.

6.14.5 Generic Access Profile (GAP) default setup attributes

The requirements of TS 102 527-1 [21], clause 6.14.5 shall apply.

6.14.6 Coexistence of Mobility Management (MM) and Call Control (CC) procedures

The requirements of TS 102 527-1 [21], clause 6.14.6 shall apply.

6.14.7 Coding rules for information elements

The requirements of TS 102 527-1 [21], clause 6.14.7 shall apply.

7 Procedure description

The following clauses define the process mandatory procedures which are in the scope of the New Generation DECT wideband speech. Each procedure (if appropriate) is divided into three parts:

   a)   normal (i.e. successful) case(s). This part defines the functions and respective protocol element values in normal operation;

   b)   associated procedure(s). This is an integral part of the actual procedure (if defined in the present document), i.e. if a procedure is being declared to be supported, the respective entity shall also support the associated procedures, e.g. timer management, in the clause following the description of the normal case;

   c)   exceptional case(s). This is an integral part of the actual procedure (if defined in the present document), i.e. if a procedure is being declared to be supported, the respective entity shall also support the exception handling defined in the clause following the description of the normal case.

All protocol elements listed in the following clauses are process mandatory, i.e. the FT and PT depending on their role in the procedure shall send or shall receive and process the relevant protocol elements as listed in the respective tables if not explicitly stated as being optional.

The primitives used in procedure descriptions are defined only for the purpose of describing layer-to-layer interactions. The primitives are defined as an abstract list of parameters, and their concrete realization may vary between implementations. No formal testing of primitives is intended. The primitive definitions have no normative significance.

7.1 Backward compatibility with Generic Access Profile (GAP) and with New Generation DECT part 1 (wideband speech) equipment

7.1.1 Backward compatibility with Generic Access Profile (GAP); Requirements for NG-DECT, part 3 Fixed Parts (FPs)

The FP shall support the GAP (EN 300 444 [12]) standard procedures (full slot and ITU-T Recommendation G.726 [15]). In other words, it shall inter-operate with a GAP compliant PP.

   NOTE 1: The FP may detect the type of PP by means of the Information Element <Terminal Capability> provided at registration.

   NOTE 2: It should be noted that GAP compliant PPs may have a more relaxed requirement of TCLw than New Generation DECT part 3 devices. In some scenarios, when combining GAP terminals with poor TCLw with long delay networks (like VoIP) and insufficient echo cancellation in the network , audible echo could be perceived by the far end terminal. This problem is not specific of devices compliant with the present document. For more information refer to EN 300 175-8 [8], annex E.

7.1.2 Backward compatibility with Generic Access Profile (GAP); Requirements for NG-DECT, part 3 Portable Parts (PPs) registered on GAP compliant FPs

The PP shall use the GAP standard procedures (full slot and ITU-T Recommendation G.726 [15]) in front of GAP standard FP.

7.1.3 Backward compatibility with New Generation DECT, part 1; Requirements for NG-DECT, part 3 Fixed Parts (FPs)

The FP shall support DECT New Generation part 1 (TS 102 527-1 [21]) procedures. In other words, a DECT New Generation, part 3 Fixed part shall become exactly as a DECT New Generation, part 1 FP for a New Generation Part 1 PP. All features and services defined in TS 102 527-1 [21] shall be provided.

NOTE 1: The FP may detect the type of PP by means of the Information Element <Terminal Capability> provided at registration.

NOTE 2: It should be noted that New Generation DECT part 1 PPs may have a more relaxed requirement of TCLw than New Generation DECT part 3 devices. Note 2 of clause 7.1.1 may be also applicable this case. For more information refer to EN 300 175-8 [8], annex E.

7.1.4 Backward compatibility with New Generation DECT, part 1; Requirements for NG-DECT, part 3 Portable Parts (PPs) registered on NG-DECT part 1 FPs

The PP shall use the part 1 standard procedures (TS 102 527-1 [21]) in front of NG-DECT part 1 FPs.

7.2 Generic Access Profile (GAP) procedures

Unless otherwise noted, all procedures defined in EN 300 444 [12] GAP are automatically applicable to New Generation DECT wideband speech. Therefore the present document can be considered an extension of GAP.

7.3 New Generation DECT; part 1: Wideband Speech procedures

The present document is defined as an extension of New Generation DECT; part 1: Wideband Speech [21].

Unless otherwise noted, all procedures defined in TS 102 527-1 [21] (New Generation DECT; part 1: Wideband Speech) are automatically applicable to New Generation DECT; part 3: Extended Wideband Speech Services.

The clauses 7.4 to 7.10 describe the additional procedures specific for New Generation DECT; part 3: Extended wideband speech services.

7.3.1 Implementation examples of part 1: Wideband Speech specific procedures

For detailed examples of Wideband speech specific procedures, please refer to the informative annex D of TS 102 527-1 [21].

7.4 Network (NWK) layer procedures specific for part 3

This clause specifies the additional NWK layer procedures, messages and information elements required in New Generation DECT Extended Wideband Speech Services not described in TS 102 527-1 [21] or in EN 300 444 [12] (GAP), or incorporating modifications to the description given in these specifications.

This profile does not prevent any PT or FT from transmitting or receiving and processing any other NWK layer message or information element not specified in the profile. A PT or FT receiving an unsupported NWK layer message or information element, which it does not recognize, shall ignore it, as specified in EN 300 175-5 [5], clause 17.

7.4.1   Generic events notification

7.4.1.1   General

Equipment supporting New Generation DECT wideband voice shall support the generic events notifications as described in this clause.

If there is no existing connection when sending an events notification, the CLSS procedure shall be used as defined in clause 10.4.2.3 of EN 300 175-5 [5] with the <<Event notifications>> information element in the {FACILITY} message.

FP shall use an already established link for the purpose of transmitting the {FACILITY} message containing the <<Events Notification>> information element to the PP. If link is not available, the FP shall initiate indirect link establishment. Direct FP initiated link establishment is out of the scope of the present document. The following requirements apply for the FP and the PP:

- The FP shall send the "Event type" and "Event sub type" argument to indicate the kind of event.

- The PP shall support the "Event multiplicity" argument which should be used to indicate how many unconsulted events of the specific type are waiting, regardless of any previous notification. The PP shall be capable of handling values up to 127. The PP shall ignore events of unknown types or sub-types.

- It is the responsibility of the FP to ensure that Event status information within the PP is up to date.

Optionally more than one event notification can be included by using the extension bit.

Whatever the FACILITY transport mode (CLSS procedure or re-use of already established link), the FACILITY message shall be used with dummy transaction identifier value 6 and the protocol discriminator CISS.

The notification shall be consistent with the procedure "Line specification in events notification" defined in clause 7.4.5.4. If this procedure is implemented, the notification shall include the <<CALL-INFORMATION>> information element with the line identifier (even if one line only is implemented in the DECT system).

Table 13: Values used within {FACILITY} message to convey LineId in notification

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<Call information>>			
	<Identifier type>	0	Line identifier
	<Identifier subtype>	3	Relating-to line identifier
	<Identifier value>	All	The line identifier value itself

Notification of an event shall be sent only to relevant PPs.

If notification is related to a line : the notification shall be sent to registered PPs that are attached to this line. The FP shall use the "Attached handsets" line setting to determine these PPs. For example this is the case for the voice message waiting notification, the missed calls notification and the internal names list change notification.

   NOTE 1: A PP may be attached to several lines.

   NOTE 2: Exception case: the current procedure is still valid in case the notification concerns several lines of the DECT system. In this case Call information IE may include several line ids or may be set to "All lines".

7.4.1.2 Voice Message waiting notification

Upon reception of a voice message waiting indication (MWI) from the network on a dedicated line, the FP shall send to any PP attached to this line, a voice message waiting notification using the generic events notification.

NOTE: The FP is aware of the attached handsets to a line thanks to the line settings list/attached handsets field.

<<Events notification>> information element shall be filled with the values specified in table 14.

Table 14: Values used within {FACILITY} message for voice message waiting indication activation

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<Events notification>>			
	<Event type>	1	Message waiting
	<Event sub type>	1	Voice
	<Event multiplicity >	1..127	Number of messages

Upon reception of a { FACILITY } message with a content as defined in table 14, the PP shall activate the Voice MWI status to the receiving user.

Voice message waiting deactivation (i.e. when voice mail box was consulted) shall be achieved in a similar way to activation except that <Event multiplicity > argument is set to zero.

7.4.1.3 Missed call notification

When an incoming call is not answered on any PP attached to a line, the FP shall send to each PP attached to this line a missed call notification.

If the list change notification procedure is implemented for missed call list in the FP, FP shall send the list change notification concerning the missed calls list in the same generic events notification.

<< Events notification >> information element shall be filled with the values given in table 15.

Table 15: Values used within { FACILITY } message for missed call notification

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<Events notification>>			
	<Event type>	2	Missed call
	<Event sub type>	1	Voice
	<Event multiplicity >	1…127	Number of missed call
	<Event type>	3	List change indication
	<Event sub type>	1	Missed calls list
	<Event multiplicity >	All	Total number of elements in the list

Upon reception of a { FACILITY } message with a content as defined in table 15, the PP shall indicate the missed call to the receiving user. The PP may use the previous calling party information provided with the last incoming call presentation.

After user intervention the PP shall access the missed call list via the list access "Read entries" command (see clause 7.4.10.4.3.1) feature.

The FP shall then send a Missed call deactivation notification (i.e. when call log was consulted). This shall be achieved in a similar way to activation except that <Event multiplicity> argument is set to zero.

7.4.1.4 List change notification

See "List access service", list change notification procedure (clause 7.4.10.2) for the detailed behaviour.

7.4.2   Date and Time synchronization

Equipment supporting New Generation DECT wideband voice shall support the "Date and Time synchronization" feature as described in the present clause.

The DECT entity shall use an already established link for the purpose of transmitting the {FACILITY} message containing the <<Time-Date>> information element to the peer entity. It is the responsibility of the entity to ensure that time and date information within the peer entity is up to date.

If there is no existing connection when sending the FACILITY message, the CLSS procedure may be used as defined in clause 10.4.2.3 of EN 300 175-5 [5] with the <<TimeDate>> information element in the {FACILITY} message.

Whatever the FACILITY transport mode (CLSS procedure or re-use of already established link), the FACILITY message shall be used with dummy transaction identifier value 6 and the protocol discriminator CISS.

For the values used in << TIME-DATE >> information element see table 16.

Table 16: Values used within { FACILITY } message for date and time synchronization

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<Time-Date>>			
	<Coding>	11B	1 1 Time and Date
	<Interpretation>	0	The current time/date
	<Time/date >	All	

Upon reception of a { FACILITY } message with a content as defined in table 16, the peer entity shall set its time and date information to the received one. The date and time on FP side is called "DECT system date and time" in the following text.

The FP and PP shall both support the "FT initiated Date and Time synchronization" procedure of clause 7.4.2.1, for synchronizing all PPs with the DECT system date and time.

The PP should support and the FP shall support the "PT initiated Date and Time synchronization" procedure of clause 7.4.2.2. If used by the PP, the FP should not use clause 7.4.2.1 at the same time with the same PP especially when using the date and time from the network.

The present procedure (clause 7.4.2) shall be consistent with the "Clock master" setting (see clause 7.4.11.3.2) of the DECT system settings list (clause 7.4.11.3), if implemented ("List access service", feature NG1.N.16). When the setting is implemented:

- If the "Clock master" field is equal to "FP", PPs shall not use the "PT initiated Date and Time synchronization" procedure. The FP may set the DECT system date and time as received from the network (e.g. received upon network incoming call, or through NTP), or from a dedicated interface (e.g. local or web interface).

- If the "Clock master" field is equal to "PP": a PP shall be able to define the DECT system date and time on the FP, using procedure "PT initiated Date and Time synchronization" of clause 7.4.2.2. The FP shall ignore any date and time received by any other means (e.g. received from the network).

In both cases, the FP shall use procedure "FT initiated Date and Time synchronization" of clause 7.4.2.1 to update the date and time of all (other) registered handsets.

7.4.2.1   FT initiated Date and Time synchronization

The present procedure shall be used by the FP in order to update the PP date and time and synchronize it with the DECT system date and time. The DECT system date and time could have been provided by the network, or by one of the PPs using procedure "PT initiated Date and Time synchronization" of clause 7.4.2.2.

NOTE: When the the "Clock master" setting is implemented, the DECT system date and time origin is restricted. However a PP should never ignore the FP notification, even if the "Clock master" field is set to PP, because the DECT system date and time may have been set by another PP.

PP   FP

| FACILITY
|<─── << TIME-DATE >>
| |
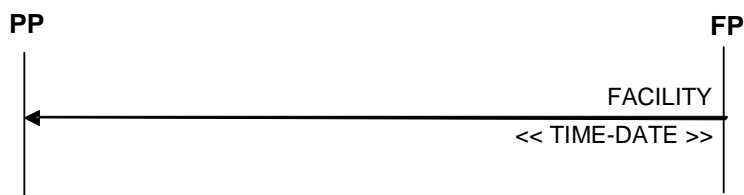
Figure 1: FT initiated Date and time synchronization

7.4.2.2   PT initiated Date and Time synchronization

In some cases (e.g. if the date and time are not provided by the network or erroneous), the DECT system date and time may be provided by one of the PPs, using the present procedure.

When the the "Clock master" field is equal to "PP", the DECT system date and time shall only be provided by one of the PPs using the present procedure. However, procedure "FT initiated Date and Time synchronization" of clause 7.4.2.1 may be used subsequently, in order to transfer the updated date and time to all other registered PPs.

PP   FP

| FACILITY
| << TIME-DATE >>
|──>|
| |
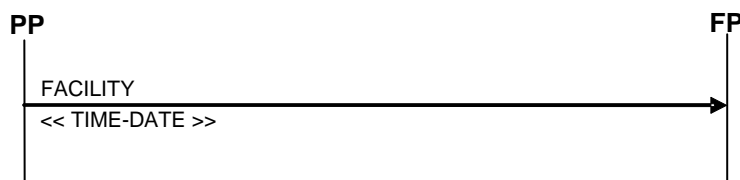
Figure 2: PT initiated Date and time synchronization

7.4.3   Handling of parallel calls

7.4.3.1   Parallel call common requirements

Procedures in clause 7.4.3 apply to DECT systems allowing to handle several simultaneous calls, and offer a common handling of them in various situations (PSTN double calls, VoIP multiple calls on a single line, as well as parallel call situations occurring in a multiple line DECT system). Clause 7.4.3 also includes related procedures (for "Call transfer", "Call intrusion" and "3-party conference with established internal and/or external calls").

The "Parallel call" feature is a prerequisite feature including high level procedures and requirements. Clauses "Common parallel call procedures", "Call transfer", "Call intrusion" and "3-party conference with established internal and/or external calls", are all handled here because they imply implementation of the "Parallel call" feature, but are however handled as separate features.

In all parallel call scenarios there shall always be only one link between FP and PP, with one U-Plane and one call control instance.

7.4.3.2 Control messages

The following control codes shall be transmitted as keypad information in {CC-INFO} messages and shall trigger the corresponding actions in the FP.

Table 17: Control messages for control of parallel calls

Procedure	Control message	Direction	PP Status
Initiating a second call (internal)	17H + number 17H + '*' 17H (see note 1)	PP to FP	M
Initiating a second call (external)	15H + number (see note 2)	PP to FP	M
Call waiting indication (external or internal)	Clip (see note 3) + IE <<SIGNAL = 'call waiting tone' = 07H>>	FP to PP	M
Intrusion call request indication (only internal)	IE <<SIGNAL = 'Intercept tone ON' = 02H>>	FP to PP	O
Call toggle request (external or internal)	1CH 31H	PP to FP	M
3-party conference call request (external or internal)	1CH 32H	PP to FP	O
Call release (of the indicated call), or Active call release (if the PP does not implement "Call identification"	1CH 33H	PP to FP	M
Call transfer request (external or internal)	1CH 34H	PP to FP	M
Call waiting acceptation	1CH 35H	PP to FP	M
Call waiting rejection	1CH 36H	PP to FP	M
On-hold call release (when 2 parallel calls are established)	1CH 37H	PP to FP or FP to PP	C1701
Call release rejection	IE <<SIGNAL, 09H = negative acknowledgement tone>>	FP to PP	M
Explicit call intrusion	1CH 40H	PP to FP	O
Putting a call on-hold	1CH 41H	PP to FP	O
Resuming a call put on-hold	1CH 42H	PP to FP	O
C1701: IF feature NG1.N.13 THEN "O" ELSE "M".			

NOTE 1: In case there is no ambiguity (i.e. when there are only two registered PPs switched on), the number can be omitted.

NOTE 2: Use of 31H, 32H, 33H, 35H, etc., as number after 15H may have a specific meaning for the network. For backward compatibility reasons, the FP may have to interpret these codes as control messages or send them transparently to the network.

NOTE 3: Numbering plan id field of CLIP IE is set to "private numbering plan" for internal calls, any other type for external calls (as specified in TS 102 527-1 [21]).

NOTE 4: The definition of the new C0-control code 1C is proposed for use as described in table 17.

NOTE 5: The new DECT codes may need a translation into network control messages on FP side. These messages are network operator dependent.

NOTE 6: Network control messages may be sent directly by the user as keypad information. The FP should send them transparently to the network.

7.4.3.3 Codec change for parallel calls

In case the parallel calls use different codecs, the standard codec change procedure shall be used (see TS 102 527-1 [21], clause 7.3.4 and annex D).

```
        PP                                          FP
         |                                           |
         |<=============Call established============>|
         |                                           |
         |                 CC-INFO                   |
         |------------------------------------------>|
         |         << MULTI-KEYPAD, 17H/15H >>        |
         |                                           |
         |                 CC-INFO                   |
         |------------------------------------------>|
         |      << MULTI-KEYPAD, number digits >>     |
         |                                           |
         |                 CC-INFO                   |
         |------------------------------------------>|
         |      << MULTI-KEYPAD, number digits >>     |
         |                                           |
         |                                           |
         |            CC-SERVICE-CHANGE               |
         |<------------------------------------------|
         |            << CODEC-LIST >>                |
         |                                           |
         |            CC-SERVICE-ACCEPT               |
         |------------------------------------------>|
         |                                           |
         |                IWU-INFO                   |
         |<------------------------------------------|
         |            << CODEC-LIST >>                |
         |                                           |
         |                IWU-INFO                   |
         |------------------------------------------>|
         |            << CODEC-LIST >>                |
```
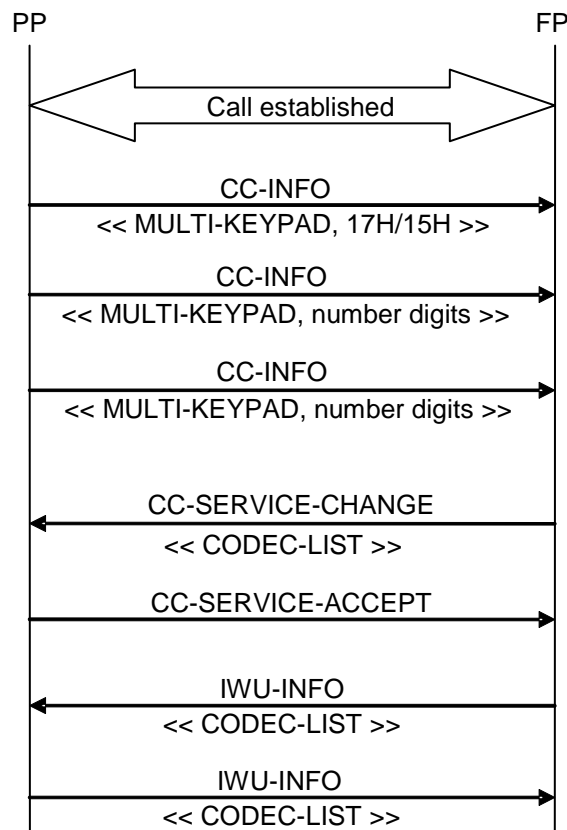
Figure 3: Codec change procedure: example for outgoing call initiation

7.4.3.4   Sending negative acknowledgement

When the FP fails to fulfil a service requested by the PP, the FP shall warn the user by sending the <<SIGNAL>> information element with the value 09H indicating negative acknowledgement tone.

> NOTE 1: A possible cause of failure may be unsuccessful interaction of the FP with the network.

> NOTE 2: Examples of use of this procedure are the "Call release and call release rejection" (clause 7.4.3.5.4), "On-hold call release" (clause 7.4.3.5.5) and "Explicit call intrusion" (clause 7.4.3.8.2) procedures.

> NOTE 3: In the special case where the requested service cannot be fulfilled because it would exceed the DECT system or line capacity, the "Busy system or line notification" procedure of clause 7.4.8.3 is used instead. The main identified use case is in the context of multiple call lines (clause 7.4.8) but other parallel call use cases are relevant (e.g. in the context of a multiple lines DECT system). See also NG1.N.6 in clause 6.10.

7.4.3.5   Common parallel call procedures (external or internal)

This clause details the procedures of a feature entitled "Common parallel call procedures (external or internal)". This feature is a set of common procedures for handling PSTN double calls, VoIP multiple calls on a single line, as well as parallel call situations occurring in a multiple line DECT system (and especially for PPs attached to multiple lines in such a system).

These procedures apply to the FP and a PP already involved in at least one call on a line in a DECT system. If the "Multiple call" feature is implemented on a line, this line may be configured in "single call" mode, or in "multiple call" mode (see clause 3.1).

Implementation of the "Parallel calls" feature is a pre-requisite on PP and FP sides for implementation of the "Common parallel call procedures (external or internal)" feature.

Implementation of the "Call Identification" feature and the "Line Identification" feature on the FP side is a prerequisite for implementation of the "Common parallel call procedures (external or internal)" feature on a DECT system. Conversely, for the PP, the following procedures contain some requirements that are conditional to the implementation of these features.

When implementing the "Common parallel call procedures" feature, the PP shall set the corresponding terminal capability bit. The FP shall set bit a_{31} of the "Extended higher layer capabilities (part 2)" (see EN 300 175-5 [5], clause F.3).

> NOTE: Implementation of the "Common parallel call procedures" feature is mandatory for NG DECT Part 3 PPs. This capability bit is therefore primarily meant for non-NG DECT Part 3 PPs or FPs that would implement the feature.

Implementation of the "Common parallel call procedures" feature is itself a prerequisite for the implementation of the "Multiple calls" feature, or of the "Multiple lines" feature on a DECT system.

7.4.3.5.1   Outgoing parallel call initiation (external or internal)

This procedure applies to the FP and a PP already involved in a call on a DECT system implementing the feature entitled "Common parallel call procedures (external or internal)".

> NOTE 1: Implementation of the "Multiple call" feature or of the "Multiple line" feature implies implementation of the "Common parallel call procedures (external or internal)" feature.

The initiation of an outgoing parallel call shall be done by sending either the *internal call* (17H) or the *register recall* (15H) keypad information in a << MULTI-KEYPAD >> information element in a {CC-INFO} message. In the same or other {CC-INFO} message(s), one or more further keypad information containing the decimal coded digits of an internal number resp. an external number shall follow.

However, in case there is no ambiguity (i.e. when there are only two registered PPs switched on), the number can be omitted.

PP   FP

Ongoing call (external or internal

Outgoing
parallel call   CC-INFO
invitation
                              << MULTI-KEYPAD, < Keypad info = '15/17' H > >>

The FP assigns a call identifier:
                                                     CC-INFO

                                              << CALL-INFORMATION,
Ignored if the PP does not implement   < id   type/subtype = 'Call identifier',
the "Call identification" feature   value = 'assigned call id' >
                                              >>

If the PP does NOT use FP-managed line selection:
                                                     CC-INFO

                                              << CALL-INFORMATION,
Line selected by PP for the call   < id type = 'Line identifier',
using the CALL-INO method   subtype = 'external call',
(external call only)   value = 'u' >
                                               < id   type/subtype = 'Call identifier', value = 'assigned call id' >
                                              >>
OR

Line selected by PP for the call   << MULTI-KEYPAD,
using the KEYPAD method   < Keypad info = '23 3u'H > >>
(external call only)

                                                     CC-INFO

                              << MULTI-KEYPAD,   < Keypad info = 'called number' > >>
                              << CALL-INFORMATION (if PP implements NG1.N.13),
                                  < id   type/subytpe = 'Call identifier',
                                        value = 'assigned call id' >
                              >>

Figure 4: Outgoing parallel call initiation request with line selection by the PP

Line selection: If the PP implements the "Line identification" procedure and the new call is external, it shall send the line identifier for the line it has selected for the new call (see figure 4), unless it uses FP-managed line selection (see clause 3.1 and figure 5).

NOTE 2:   Instead of the sequence given above, the PP might also combine 15/17H, line selection and called number in two or three messages. In these cases the FP will answer correspondingly in two or more messages. See clauses C.3 "Multiple calls diagrams" and C.4 "Parallel call complex or alternative diagrams", for more information.

FP-managed line selection: If FP-managed line selection is used (see figure 5), the FP shall notify back the PP of the selected line for the call, regardless of whether the PP implements the "Line identification" feature or not. However, it shall not send such a notification to a GAP PP.

NOTE 3:   A PP not implementing the "Line identification" feature (i.e. a PPs compliant with NG-DECT Part 1 (TS 102 527-1 [21]), GAP (EN 300 444 [12]) and PPs compliant with the present document not implementing the feature, or a GAP PP) also implicitly uses FP-managed line selection.

Busy tone signal: If the line or the FP cannot support the additional call, it shall not send any call information and send a busy tone signal instead.

PP   FP

Ongoing call (external or internal)

Outgoing call initiation with Line selection by the PP (not FP-managed)

Outgoing
parallel call
invitation

CC-INFO

<< MULTI-KEYPAD, < Keypad info = '15/17'H > >>

Call id assignement by the FP

CC-INFO

possibly ignored if PP does not implement
the "Call identification" feature

<< CALL-INFORMATION,
    < id   type/subtype = 'Call identifier',
           value = 'assigned call id' >
>>

CC-INFO

<< MULTI-KEYPAD, < Keypad info = 'called number' > >>
<< CALL-INFORMATION (if PP implements NG1.N.13),
    < id type/subtype = 'Call identifier',
          value = 'assigned call id' >
>>

FP-managed line selection

CC-INFO

Repeated here as a result of the
CALL-INFO completion principle

<< CALL-INFORMATION,
    < id type = 'Line identifier',   subtype = 'external call',
          value = 'u' >

possibly ignored if PP does not implement
the "Call identification" feature

    < id   type/subtype = 'Call identifier',
           value = 'assigned call id' >
>>

Figure 5: Outgoing parallel call initiation request with FP-managed line selection

NOTE 4: The line identifier is ignored if the PP does not implement the "Line identification" feature; it is present
         here either as a result of a PP using FP-managed line selection, or-if the PP did select a line for the new
         call-as a result of the "CALL-INFORMATION completeness principle" (see clause 3.1). In case the line
         identifier is not yet available in the FP (e.g. because FP decides about line depending on dial progress),
         the FP might omit the line identifier in the message.

The FP may change the audio codec for the parallel call by use of the service change procedure (see clause 7.4.3.3,
"Codec change for parallel calls").

In case the parallel call is internal, the FP shall use the GAP "internal call CLIP" and "internal call CNIP" procedures
for this parallel call (see clause 6.10).

NOTE 5: In case *internal call* (17H) is sent, the '*' character can be sent, meaning general internal call.

7.4.3.5.2   Call waiting indication (external or internal)

This procedure applies to the FP and a PP already involved in a call on a DECT system implementing the feature
entitled "Common parallel call procedures (external or internal)". If the "Multiple call" feature is implemented and used
on a line, the line may be configured in "single call" mode, or in "multiple call" mode.

NOTE 1: Implementation of the "Multiple call" feature or of the "Multiple line" feature implies implementation of
         the "Common parallel call procedures (external or internal)" feature.

NOTE 2: In "single call" mode, PPs not involved in a call do not receive the call waiting indication and do not ring.
         In "multiple call" mode, there may be several PPs already involved in a call and all of them receive the
         call waiting indication; idle PPs receive an incoming call request and ring.

Call waiting shall be indicated by the FP by sending in a {CC-INFO} message the information element <<SIGNAL>> with the value 07H indicating 'call waiting' tone. Together with this procedure, the FP shall use the "CLIP on call waiting" procedure of clause 7.4.3.5.10.

Furthermore, as a result of the "Call identification" feature, the FP shall assign an identifier for the waiting call, and send it in a <<CALL-INFORMATION>> information element included in every {CC-INFO} message used (one or two), regardless of whether the PP implements the "Call identification" feature or not.

If an internal call is waiting, the information element <<Calling Party Number>> shall indicate a private numbering plan.
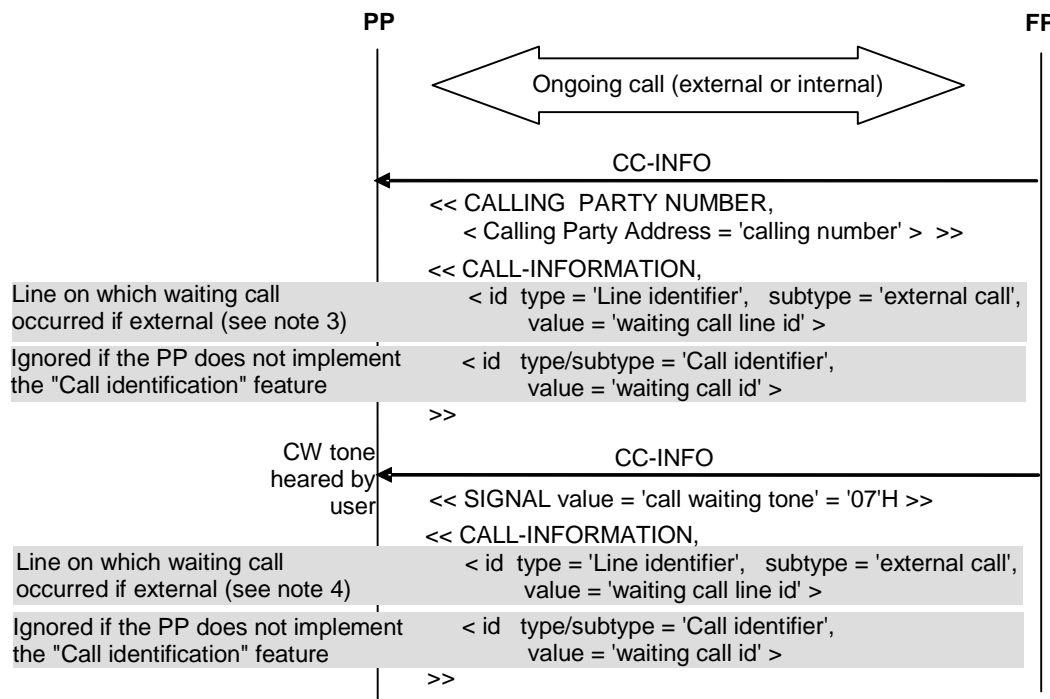
Figure 6: Call waiting indication

NOTE 3: The line identifier indicates to the PP on which line the waiting call occurred (if external). It is however ignored on PP side if the PP does not implement the "Line identification" feature.

NOTE 4: Unlike the call identifier which is a kind a session-id for the waiting call and is always present, the line identifier is only repeated here as a result of the "CALL-INFORMATION completeness principle" (see clause 3.1). It is however ignored if the PP does not implement the "Line identification" feature.

To accept the waiting call, the "Call waiting acceptation" procedure shall be used (see clause 7.4.3.5.6).

To reject the waiting call, the "Call waiting rejection" procedure shall be used (see clause 7.4.3.5.7).

If the remote party hangs up before the waiting call has been accepted or rejected, the FP shall send a call release to the PP, using "Call release and call release rejection" of clause 7.4.3.5.4, if the PP implements the "Call identification" feature, or using "On-hold call release" otherwise.

7.4.3.5.3 Call toggle (external or internal)

This procedure applies to the FP and a PP already involved in a call on a DECT system implementing the feature entitled "Common parallel call procedures (external or internal)".

NOTE 1: Implementation of the "Multiple call" feature or of the "Multiple line" feature implies implementation of the "Common parallel call procedures (external or internal)" feature.

In case two parallel calls are established, in order to toggle between the calls, the PP shall send the control code 1CH as keypad information in a {CC-INFO} message, followed by 31H. Furthermore:

- If the PP implements the "Call identification" feature, it shall send the identifier of the call targeted by the togggle in a <<CALL-INFORMATION>> information element included in the **same** {CC-INFO} message.

NOTE 2: A PP implementing the "Call identification" feature sends the call identifier of the targeted call, even if it toggles between two calls only.

- If the PP implements the "Line identification" feature, and the targeted call is external, it shall send the line identifier of the targeted call in a <<CALL-INFORMATION>> information element (the same one if the call identifier is also sent), even if it is attached to a single line.

NOTE 3: If the call identifier is absent, the line identifier may help determine the targeted call; if the call identifier is present, the line identifier is only added as a result of the <<CALL INFORMATION>> completeness principle (see clause 3.1).

The FP may change the codec using the service change procedure (see clause 7.4.3.3, "Codec change for parallel calls").

The FP may indicate the connected party by sending the <<CALLING PARTY NUMBER>> information element or by sending an appropriate <<"DISPLAY">> information element in a {CC-INFO} message to the PP.
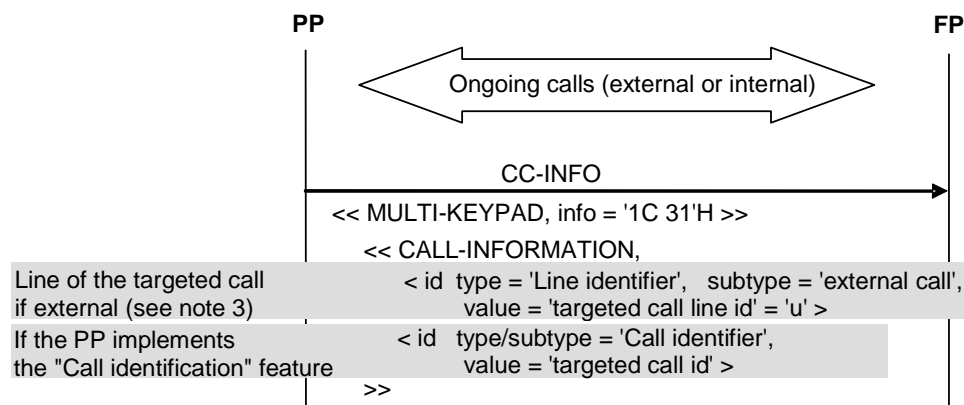
Figure 7: Call toggle request

7.4.3.5.4   Call release and call release rejection

This procedure applies to the FP and a PP already involved in at least two calls on a DECT system implementing the feature entitled "Common parallel call procedures (external or internal)".

NOTE 1: Implementation of the "Multiple call" feature or of the "Multiple line" feature implies implementation of the "Common parallel call procedures (external or internal)" feature.

A "Call release" message may be sent either by the PP, or by the FP.

In case at least two parallel calls are established with one PP, and in order to release one of these calls, the releasing party (either the PP or the FP) shall send the control code 1CH as keypad information in a {CC-INFO} message, followed by 33H. Additionally:

- If the PP implements the "Call identification" feature, the releasing party shall send the identifier of the call to be released in a <<CALL-INFORMATION> information element included in the **same** {CC-INFO} message. Furthermore, if the releasing party also implements the "Line identification" feature (i.e. always if the releasing party is the FP), and the call to be released is external, it shall send the line identifier of the call to be released in the same <<CALL-INFORMATION>> information element.

NOTE 2: As the call identifier is unique within the DECT system, both parties already know in the above case which line is used for the call to be released. The line identifier is therefore present here as a result of the <<CALL INFORMATION>> completeness principle (see clause 3.1).

NOTE 3: If the PP implements the "Call identification" feature, a call release can be sent in any direction as soon as a call identifier has been sent by the FP to the PP (e.g. even before a waiting call has been answered). See also clause C.4.1.5.

- if the PP does not implement the "Call identification" feature, the call release request shall be interpreted by both parties as a request for releasing the active call. If the PP is the releasing party and implements the "Line identification" feature, it shall still send the line identifier of the call to be released in a <<CALL-INFORMATION>> information element included in the **same** {CC-INFO} message. If the FP is the releasing party, it shall still send the line and call identifiers of the active call (to be released) in a <<CALL-INFORMATION>> information element included in the **same** {CC-INFO} message (and regardless of whether the PP implements the "Line identification" feature or not).

If the released call is the active call, the speech path shall be then automatically switched to one of the remaining parties.
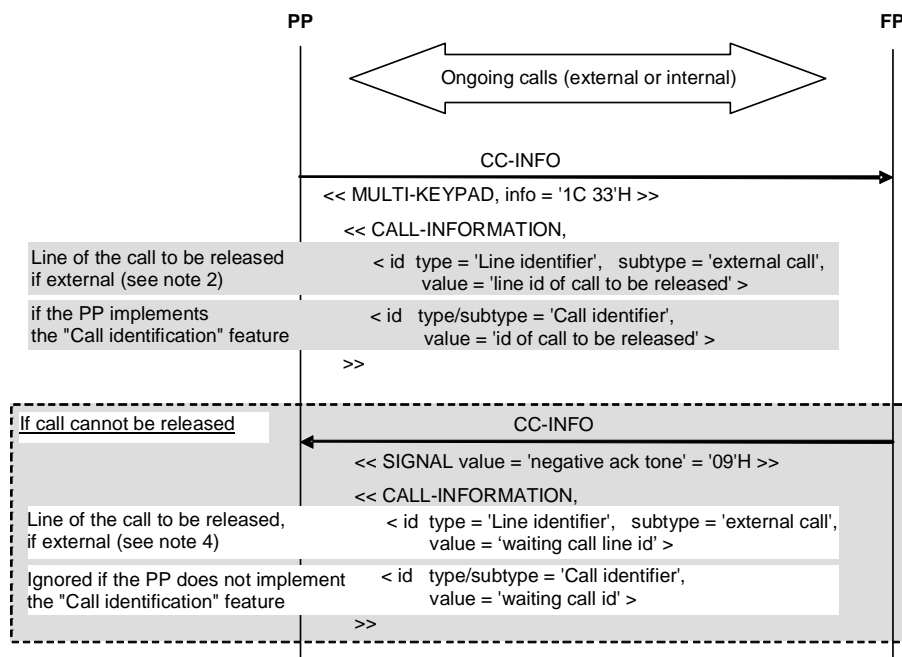
Figure 8: Call release request from the PP

NOTE 4: Unlike the call identifier which is a kind a session-id for a call and is always present, the line identifier is only repeated here as a result of the "CALL-INFORMATION completeness principle" (see clause 3.1). It is however ignored on PP side if the PP does not implement the "Line identification" feature.

In some cases, when the request is sent by the PP, the FP might not be able to fulfil it, for instance when the call to be released is external. In that case, the FP shall warn the user by sending the << SIGNAL >> information element with the value 09H indicating negative acknowledgement tone.

The FP may change the codec using the service change procedure (see clause 7.4.3.3, "Codec change for parallel calls").

The release by the PP of a parallel call shall not be possible in a conference. However, the FP could send a call release according to procedure "Call release and call release rejection" of clause 7.4.3.5.4 (or clause 7.4.3.5.5 if the PP does not implement the "Call identification" feature) if one of the remote parties hangs up.

To release **the last** parallel call, the PP shall not use this procedure, but use a {CC-RELEASE} message instead. A {CC-RELEASE} message shall not convey any call identifier, even if the PP implements the "Call identification" feature.

NOTE 5: To release all parallel calls, the PP may also send a single {CC-RELEASE} to the FP.

7.4.3.5.5   On-hold call release

This procedure applies to the FP and a PP already involved in at least two calls on a DECT system implementing the feature entitled "Common parallel call procedures (external or internal)".

This procedure is provided as an addition to the "Call release" procedure, for the case the PP does not implement the "Call identification" feature. In that case, it shall be used by both parties.

A "On-hold call release" request may be sent either by the PP, or by the FP.

In case at least two parallel calls are established with a PP not implementing the "Call identification" feature, and in order to release the on-hold call, the releasing party (either the PP, or the FP) shall send the control code 1CH as keypad information in a {CC-INFO} message, followed by 37H. Additionally:

- If the releasing party implements the "Line identification" feature, and the call to be released is external, it shall send the line identifier of the call to be released in a <<CALL-INFORMATION>> information element, even if the PP is attached to a single line.

    NOTE 1: As no call identifier is send for this procedure, the line identifier may help the other party determine which call is to be released.

In some cases, when the request is sent by the PP, the FP might not be able to fulfil it, for instance when the call to be released is external. In that case, the FP shall warn the user by sending the information element <<SIGNAL>> with the value 09H indicating negative acknowledgement tone.

The FP may change the codec using the service change procedure (see clause 7.4.3.3, "Codec change for parallel calls").

The release by the PP of a parallel call shall not be possible in a conference. However, the FP shall send a call release according to present procedure to the PP if it initiated a 3-party conference call, and if the remote party that was on-hold when the conference call was initiated hangs up.

    NOTE 2: In order to release all parallel calls, the PP sends a {CC-RELEASE} to the FP.

7.4.3.5.6   Call waiting acceptation (from PP to FP)

This procedure applies to the FP and a PP already involved in a call on a DECT system implementing the feature entitled "Common parallel call procedures (external or internal)". If the "Multiple call" feature is implemented on a line, the line may be configured in "single call" mode, or in "multiple call" mode.

    NOTE 1: Implementation of the "Multiple call" feature or of the "Multiple line" feature implies implementation of the "Common parallel call procedures (external or internal)" feature.

In case the PP is already involved in a call (active call) and after a call waiting has been indicated, the acceptation of the waiting call shall be done by sending the control code 1CH as keypad information in a {CC-INFO} message, followed by 35H. Furthermore,

- If the PP implements the "Call identification" feature, it shall send the call identifier of the accepted waiting call in a <<CALL-INFORMATION>> information element included in the same {CC-INFO} message.

    NOTE 2: A PP implementing the "Call identification" feature sends the call identifier of the waiting call, even if there is a single call waiting.

- If the PP implements the "Line identification" feature, and the waiting call is external, it shall send the line identifier of the waiting call in the same <<CALL-INFORMATION>> information element, even if it is attached to a single line.

    NOTE 3: If the call identifier is absent, the line identifier may help determine the targeted call; if the call identifier is present, the line identifier is only added as a result of the <<CALL INFORMATION>> completeness principle (see clause 3.1).

The active call shall be automatically put on hold and the waiting call shall become active.

In "multiple call" mode, when the PP accepts the waiting call, ongoing procedures for handling the call on other PPs (using the present clause, or EN 300 444 (GAP) [12] clause 8.12, "Incoming call request", if it is a first call for the concerned PP) shall be terminated. In particular, idle PPs shall stop ringing. If several handsets either pick-up or accept the waiting call, only the first action shall be taken into account. The other actions shall be ignored.

The FP may change the audio codec for the accepted call by use of the service change procedure.
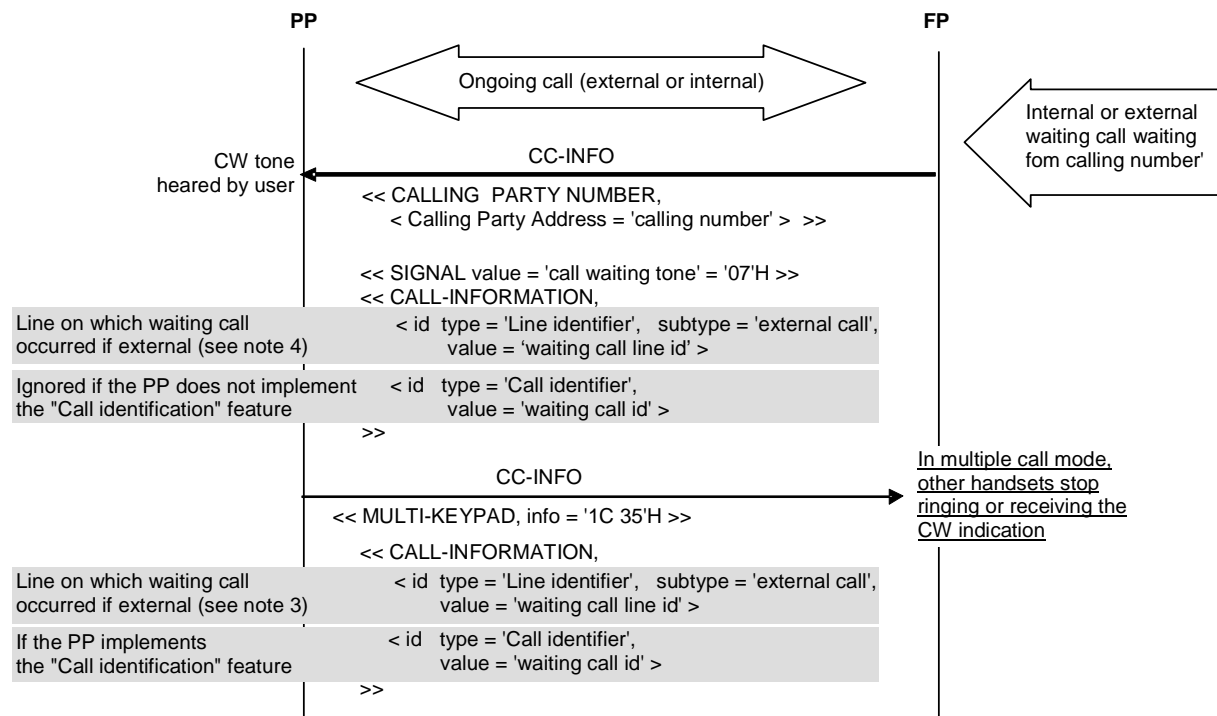
Figure 9: Call waiting acceptation

NOTE 4: The line identifier indicates to the PP on which line the waiting call occurred (if external). It is however ignored on PP side if the PP does not implement the "Line identification" feature.

If the remote party hangs up before the waiting call has been accepted or rejected, the FP shall send a call release to the PP, using "Call release and call release rejection" of clause 7.4.3.5.4, if the PP implements the "Call identification" feature, or using "On-hold call release" otherwise.

7.4.3.5.7   Call waiting rejection (from PP to FP)

This procedure applies to the FP and a PP already involved in a call on a DECT system implementing the feature entitled "Common parallel call procedures (external or internal)". If the "Multiple call" feature is implemented on a line, the line may be configured in "single call" mode, or in "multiple call" mode.

NOTE 1: Implementation of the "Multiple call" feature or of the "Multiple line" feature implies implementation of the "Common parallel call procedures (external or internal)" feature.

In case the PP is already involved in a call (active call) and after a call waiting has been indicated, the rejection of the waiting call shall be done by sending the control code 1CH as keypad information in a {CC-INFO} message, followed by 36H. Furthermore,

- If the PP implements the "Call identification" feature, it shall send the call identifier of the rejected waiting call in a <<CALL-INFORMATION>> information element included in the same {CC-INFO} message.

NOTE 2: A PP implementing the "Call identification" feature sends the call identifier of the waiting call, even if there is a single call waiting.

- If the PP implements the "Line identification" feature, and the waiting call is external, it shall send the line identifier of waiting call in the same <<CALL-INFORMATION>> information element, even if it is attached to a single line.

NOTE 3: If the call identifier is absent, the line identifier may help determine the targeted call; if the call identifier is present, the line identifier is only added as a result of the <<CALL INFORMATION>> completeness principle (see clause 3.1).
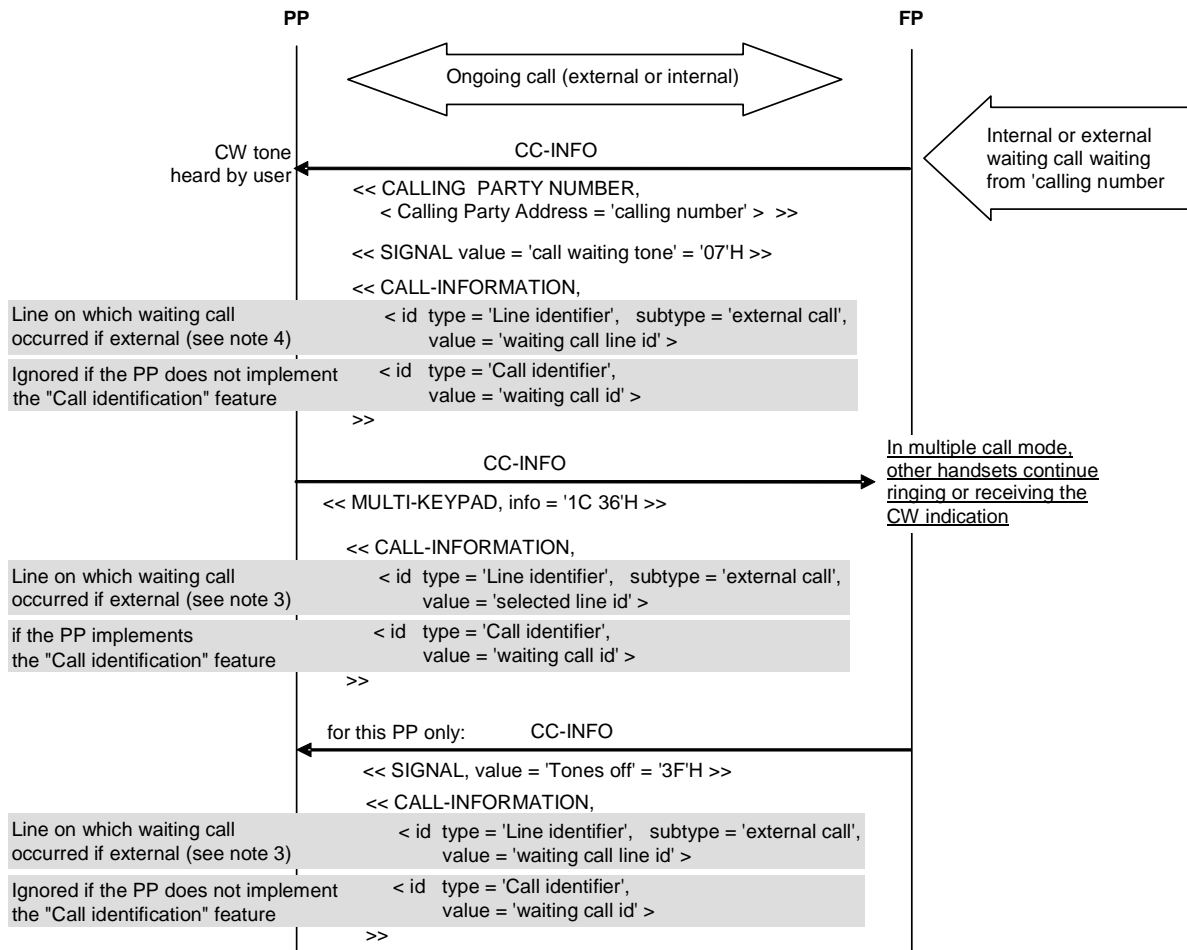
Figure 10: Call waiting rejection

NOTE 4: The line identifier indicates to the PP on which line the waiting call occurred (if external). It is however ignored on PP side if the PP does not implement the "Line identification" feature.

NOTE 5: On a multiple call line configured in "multiple call" mode, "call waiting rejection" does not necessarily imply that the call is rejected by the DECT system.

In "multiple call" mode, when the PP rejects the waiting call, the "Call waiting indication procedure" shall be terminated for this PP, but this shall not affect the handling of this call on other handsets: ongoing procedures for handling the call on other PPs (using the present clause or EN 300 444 [12] (GAP), clause 8.12, "Incoming call request" if it is a first call for the concerned PP) shall not stop. In particular, idle PPs shall not stop ringing.

NOTE 6: To reject the call for the whole DECT system, a call release may be used instead of the present procedure, using the "Call release and call release rejection" of clause 7.4.3.5.4 for the waiting call if the PP implements the "Call identification" feature, or using "On-hold call release" of clause 7.4.3.5.5 otherwise.

If the remote party hangs up before the waiting call has been accepted or rejected, the FP shall send a call release to the PP, using "Call release and call release rejection" of clause 7.4.3.5.4, if the PP implements the "Call identification" feature, or using "On-hold call release" of clause 7.4.3.5.5 otherwise.

7.4.3.5.8 Putting a call on-hold

This procedure applies to the FP and a PP already involved in a call on a DECT system implementing the feature entitled "Common parallel call procedures (external or internal)".

> NOTE 1: Implementation of the "Multiple call" feature or of the "Multiple line" feature implies implementation of the "Common parallel call procedures (external or internal)" feature.

In order to put a call on-hold, the PP shall send the control code 1CH as keypad information in a {CC-INFO} message, followed by 41H. Furthermore:

- If the PP implements the "Call identification" feature, it shall send the identifier of the call to be put on-hold in a <<CALL-INFORMATION>> information element included in the same {CC-INFO} message.

> NOTE 2: A PP implementing the "Call identification" feature sends the call identifier of the call to be put on hold, although it is always the active call.

- If the PP implements the "Line identification" feature, and the call to be put on hold is external, it shall send the line identifier of the call to be put on hold, in the same <<CALL-INFORMATION>> information element, even if it is attached to a single line.

> NOTE 3: If the call identifier is absent, the line identifier may help determine the targeted call; if the call identifier is present, the line identifier is only added a result of the <<CALL INFORMATION>> completeness principle (see clause 3.1).

The FP may indicate the result of the present procedure by sending an appropriate <<"DISPLAY">> information element in a {CC-INFO} message to the PP.
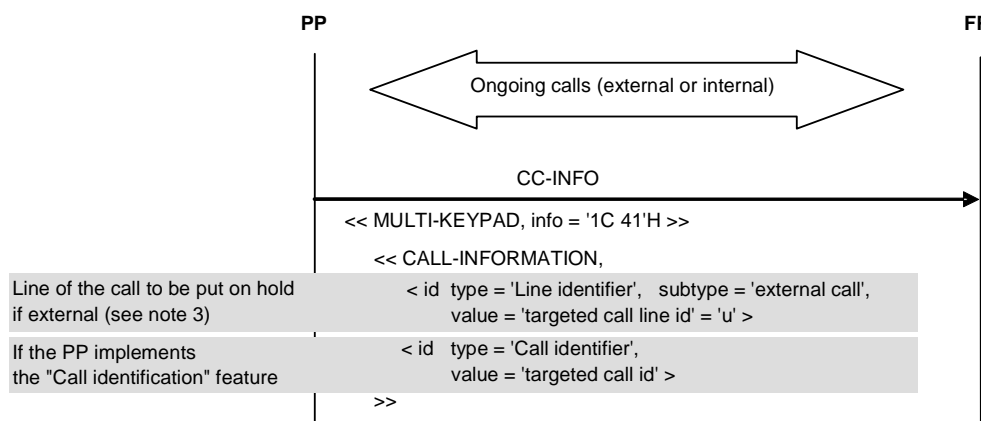
Figure 11: Putting a call on hold

7.4.3.5.9 Resuming a call put on-hold

This procedure applies to the FP and a PP already involved in a call on a DECT system implementing the feature entitled "Common parallel call procedures (external or internal)".

> NOTE 1: Implementation of the "Multiple call" feature or of the "Multiple line" feature implies implementation of the "Common parallel call procedures (external or internal)" feature.

In order to resume a call that was put on-hold, the PP shall send the control code 1CH as keypad information in a {CC-INFO} message, followed by 42H. Furthermore,

- If the PP implements the "Call identification" feature, it shall send the identifier of the call to be resumed in a <<CALL-INFORMATION>> information element included in the same {CC-INFO} message.

NOTE 2: A PP implementing the "Call identification" feature sends the call identifier of the call to be resumed, even if there is only one call on-hold.

- If the PP implements the "Line identification" feature, and the call to be resumed is external, it shall send the line identifier of the call to be resumed, in the same <<CALL-INFORMATION>> information element, even if it is attached to a single line.

NOTE 3: If the call identifier is absent, the line identifier may help determine the targeted call; if the call identifier is present, the line identifier is only added as a result of the <<CALL INFORMATION>> completeness principle (see clause 3.1).

The FP may indicate the result of the present procedure by sending an appropriate <<"DISPLAY">> information element in a {CC-INFO} message to the PP.
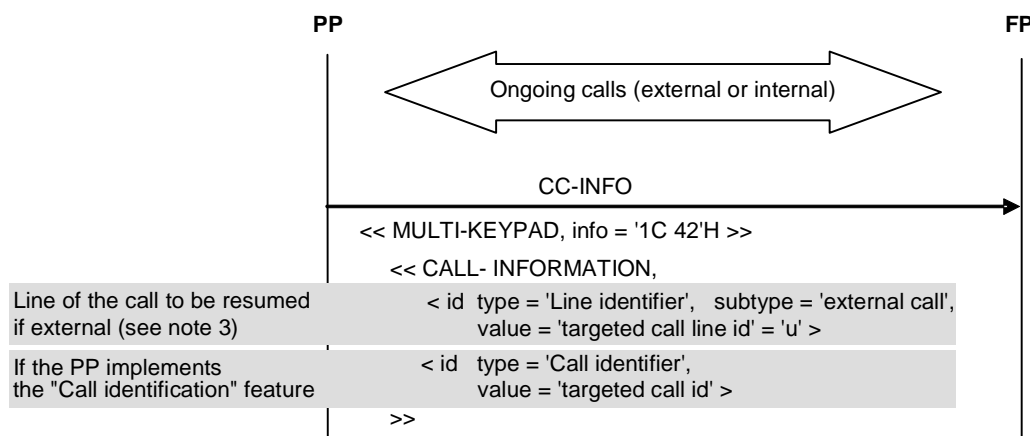
Figure 12: Resuming a call put on hold

7.4.3.5.10   CLIP on call waiting

This procedure applies to the FP and a PP already involved in a call on a DECT system implementing the feature entitled "Common parallel call procedures (external or internal)". If the "Multiple call" feature is implemented on a line, the line may be configured in "single call" mode, or in "multiple call" mode.

CLIP on call waiting shall be indicated by the FP to the PP.

This indication shall be done by sending in a {CC-INFO} message the information element <<Calling Party Number>>.

If the waiting call is an internal call, the information element <<Calling Party Number>> shall indicate a private numbering plan.
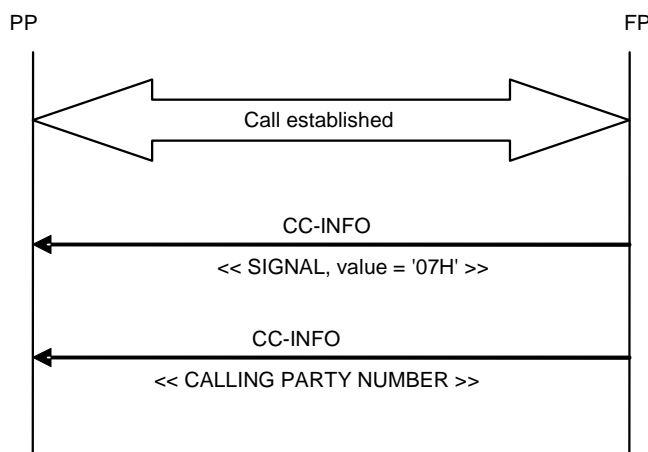
Figure 13: CLIP on call waiting

7.4.3.5.11   CNIP on call waiting indication

This procedure applies to the FP and a PP already involved in a call on a DECT system implementing the feature entitled "Common parallel call procedures (external or internal)". If the "Multiple call" feature is implemented on a line, the line may be configured in "single call" mode, or in "multiple call" mode.

CNIP on call waiting shall be indicated by the FP to the PP.

This indication shall be done by sending in a {CC-INFO} message the information element <<Calling Party Name>>.
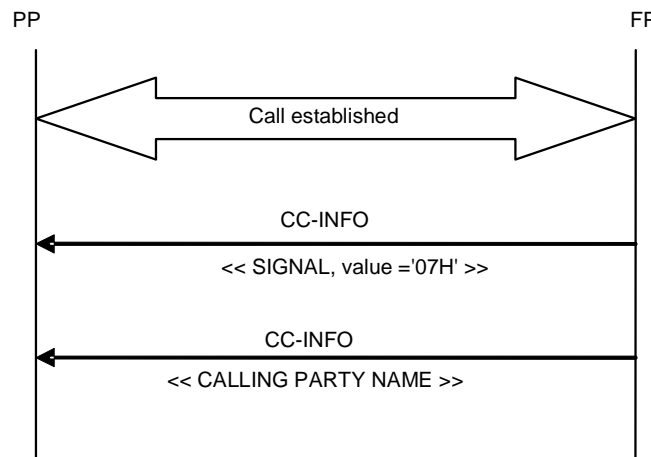
Figure 14: CNIP on call waiting

> NOTE: In case both CLIP and CNIP are sent to the PP, it is sufficient to display one of them. It is optional to display both.

7.4.3.6   Call transfer

Call transfer is used by the user of a PP involved in two parallel calls to connect the remote parties together before ending the existing calls. If one of the remote parties is a handset registered to the same FP, the transfer can be handled at FP level; otherwise, the success of the transfer is network-dependent.

Implementation of the "Common parallel calls procedures" feature is a pre-requisite on PP and FP sides for implementation of the "Call transfer" feature.

The call transfer may be announced or unannounced, depending on when the call transfer control message is sent by the PP.

In order to transfer a call, the PP shall first establish a parallel call with the call transfer target, and then send the control code 1CH as keypad information in a {CC-INFO} message, followed by 34H. Furthermore,

- If the PP implements the "Call identification" feature, it shall send the identifier of the call to be transferred in a <<CALL-INFORMATION>> information element included in the **same** {CC-INFO} message.

- If the PP implements the "Line identification" feature, and the call to be transferred is external, it shall send the line identifier of the targeted call in a <<CALL-INFORMATION>> information element (the same one if the call identifier is also sent), even if it is attached to a single line.

The FP shall understand a call tranfer request as a request for transferring the previously active call to the currently active call. It shall issue a call identifier update for the PP target of the call transfer, as shown in figures 13 and 14, indicating the call identifier of the transferred call as updated call identifier.

If the previously active call has been released in the mean time, the call transfer shall fail but the currently active call shall still be released.

When implementing the "Call transfer" feature, the FP shall set bit a_{30} of the "Extended higher layer capabilities (part 2)" (see EN 300 175-5 [5], clause F.3). Consistently with the above description, bit a_{31} must also be set.

7.4.3.6.1   Announced call transfer procedure

For the "Announced call transfer" procedure, all requirements of clause 7.4.3.6 apply. Additionally, if the control code is sent after the {CC-CONNECT}, allowing for a transient call with the targeted PP, the transfer is defined as announced.
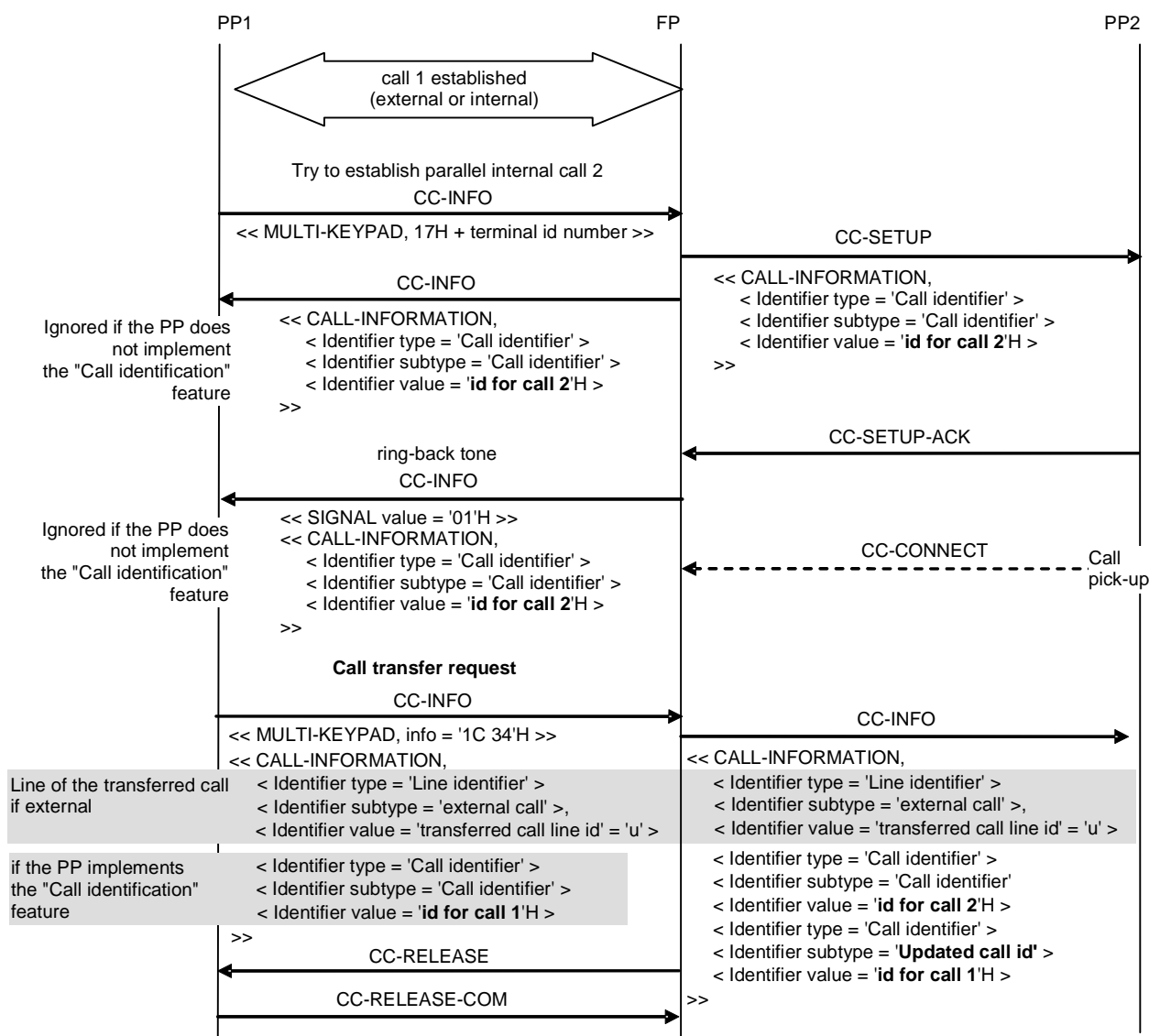
Figure 15: Announced call transfer (example with internal target PP2):
"call transfer request" *after* {CC-CONNECT}

NOTE 1: The Call Control message sequence in figure 15 should be understood as an example. The real sequences may also contain different Call Control messages or Call Control messages in another order or Call Control messages with other contents.

NOTE 2: On a "single call" mode line, PP2 is always idle. On a "multiple call" mode line, PP2 may be idle or busy. If busy, PP2 would receive a call waiting indication instead of a CC-SETUP, and would send a 'Call waiting acceptation" instead of a CC-CONNECT.

NOTE 3: A multiple call line may not support the additional internal call. In that case, PP1 will receive back a busy tone signal, which will terminate the procedure.

NOTE 4: In figure 15, the second call is established using the "Outgoing parallel call initiation" procedure of clause 7.4.3.5.1; however, any procedure leading to two parallel calls may precede the call transfer procedure.

7.4.3.6.2   Unannounced call transfer procedure

For the "Unannounced call transfer" procedure, all requirements of clause 7.4.3.6 apply. Additionally, if the control code is sent after reception of the ring back tone but before the {CC-CONNECT} (pick up time), the transfer is defined as unannounced.
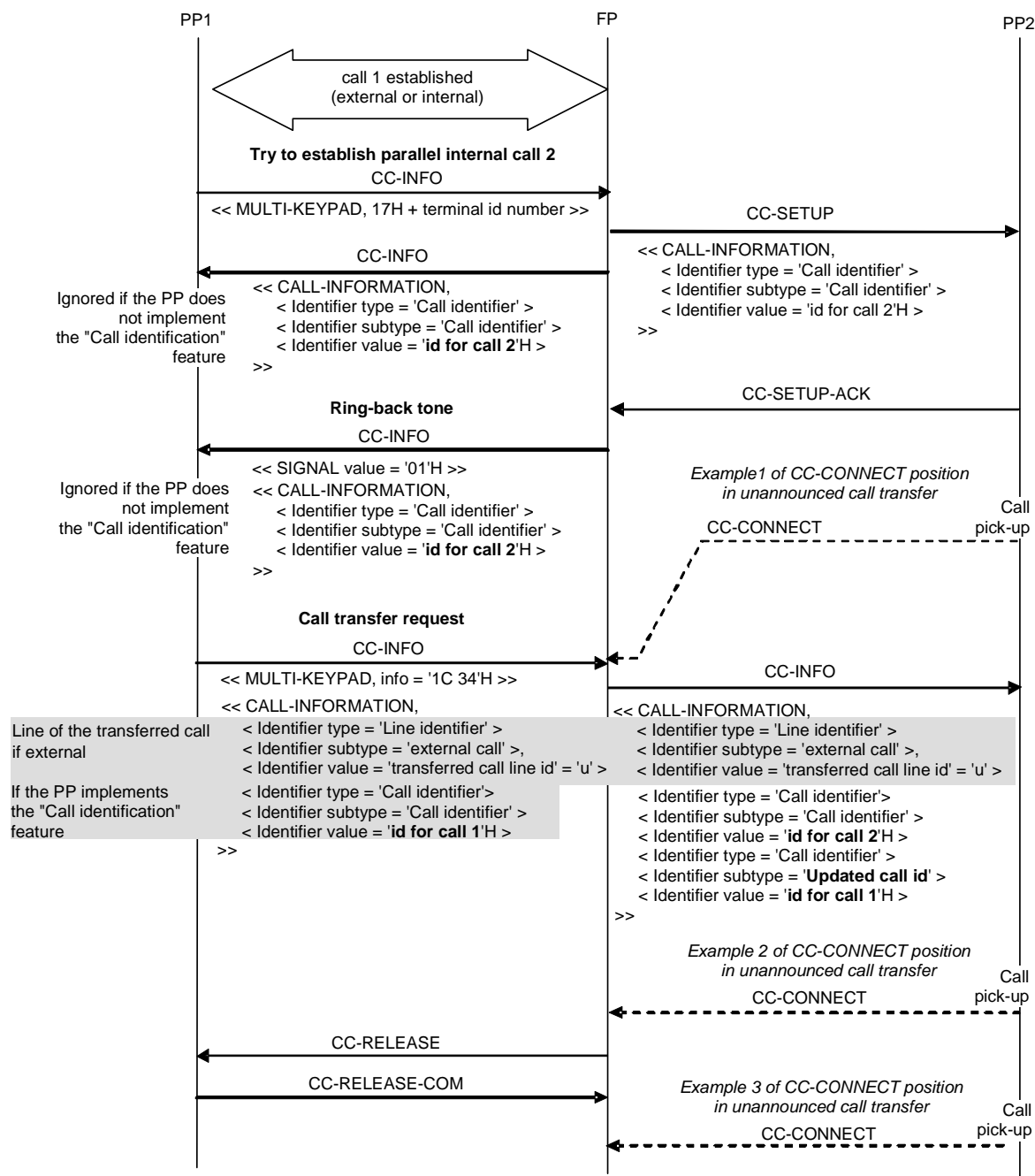
**Figure 16: Unannounced call transfer (example with internal target PP2):
"call transfer request" *before* {CC-CONNECT}**

NOTE 1:   The Call Control message sequence in figure 16 should be understood as an example. The real sequences may also contain different Call Control messages or Call Control messages in another order or Call Control messages with other contents.

NOTE 2:   On a "single call" mode line, PP2 is always idle. On a "multiple call" mode line, PP2 may be idle or busy. If busy, PP2 would receive a call waiting indication instead of a CC-SETUP, and would send a "Call waiting acceptance" instead of a CC-CONNECT.

NOTE 3: A multiple call line may not support the additional internal call. In that case, PP1 will receive back a busy tone signal, which will terminate the procedure.

NOTE 4: In figure 16, the second call is being established using the "Outgoing parallel call initiation" procedure of clause 7.4.3.5.1; however, any procedure leading to two parallel calls may precede the call transfer procedure. For example, unannounced call transfer could also be used instead of call waiting acceptation after the "Call waiting indication" procedure.

7.4.3.6.3   Call re-injection to the line (external or internal)

The purpose of the "Call re-injection to the line (external or internal)" procedure is to transfer a call (external or internal) unannounced to all PPs attached to the line.
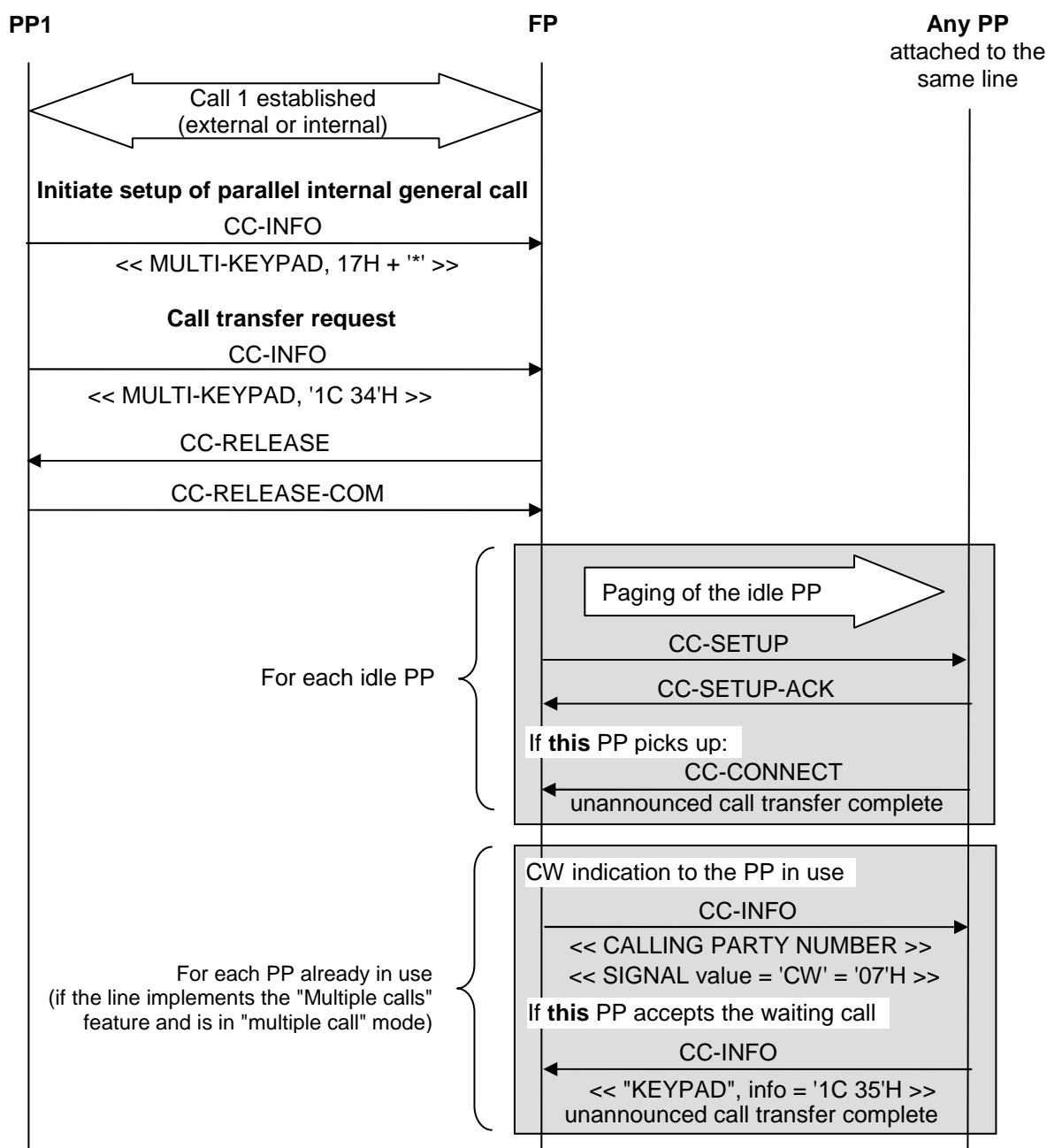
Figure 17: Use of 'unannounced call transfer' as a way to re-inject a call into the line

NOTE: The Call Control message sequence in figure 17 should be understood as an example. The real sequences may also contain different Call Control messages or Call Control messages in another order or Call Control messages with other contents.

7.4.3.6.4 Remote party CLIP on call transfer

"Remote party CLIP on call transfer" shall be used when a call transfer occurs between the remote parties of a double call. It is defined as follows:

- A first call between a first party (A, transferring party) and a second party (B, "remote" party) is supposed to have been completely established. This first call may be external or internal.

- A second internal call between A and a third party (C, the PP target of the call transfer) is either already established (announced call transfer) or being established (unannounced call transfer). "Remote party CLIP on call transfer" shall be used on announced or unannounced call transfer.

"Remote party CLIP on call transfer" occurs in the FP after reception of the "call transfer request" from the transferring party. The remote party CLIP (of B) shall be indicated by sending the <<Calling Party Number>> information element in a {CC-INFO} message.

NOTE 1: "Remote party CLIP on call transfer" is applicable when the third party C is internal (that is, registered to the same PP as the transferring party A).

NOTE 2: C successively receives the usual CLIP (of A) and the "Remote party CLIP on call transfer" (of B).

7.4.3.6.5 Remote party CNIP on call transfer

The "Remote party CLIP on call transfer" procedure applies unchanged, except that CLIP is replaced everywhere with "CNIP".

NOTE 1: In case both CLIP and CNIP are sent to the PP, it is sufficient to display one of them. It is optional to display both.
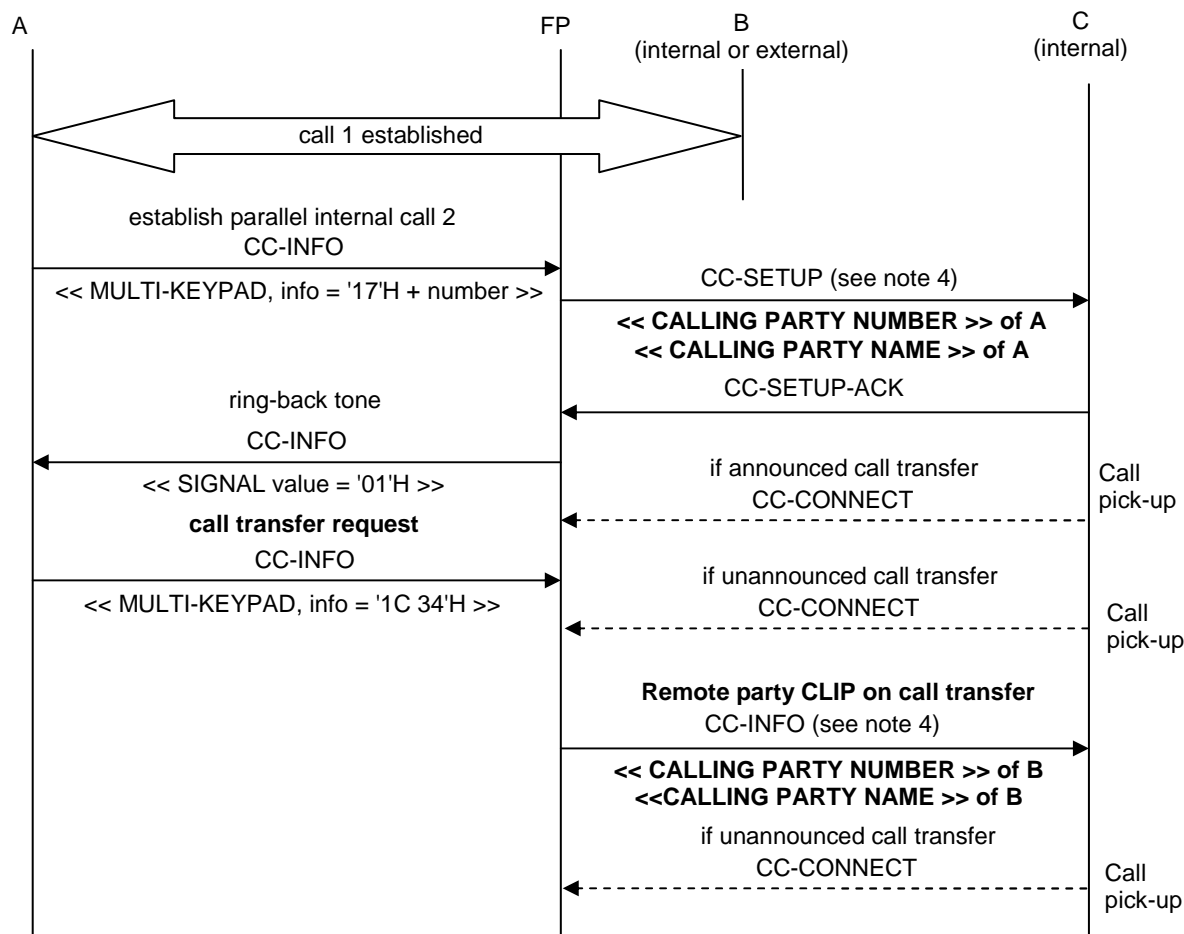
Figure 18: Remote party CLIP and CNIP on call transfer

NOTE 2: The Call Control message sequence in figure 18 should be understood as an example. The real sequences may also contain different Call Control messages or Call Control messages in another order or Call Control messages with other contents.

NOTE 3: On figure 18, three possible positions for the CC-CONNECT message are shown.

NOTE 4: CNIP for internal handsets is handled according to the provisions of GAP "Internal Call CNIP" procedure (GAP clause 8.44).

NOTE 5: CNIP and CLIP might not fit in a single message; in that case one or more additional {CC-INFO} message(s) are used.

7.4.3.7   3-party conference with established external and/or internal calls

The 3-party conference takes place either between 3 PPs on the same FP (based on 2 internal calls), or between 2 PPs and one remote party (based on one internal + one external calls), or between 1 PP and 2 remote parties (based on 2 external calls).

If the "Multiple lines" feature is implemented, the calls may be on two different lines.

In case two parallel calls are established or a waiting call was indicated, in order to establish a conference, the PP shall send the control code 1CH as keypad information in a {CC-INFO} message, followed by 32H. Furthermore,

- If the PP implements the "Call identification" feature, it shall send the call identifier of the current active call in a <<CALL-INFORMATION>> information element included in the same {CC-INFO} message.

- The FP shall use this active call id (even if the PP did not send it) as the call id for the conference call. If additional non-initiating PPs are involved in the conference call, the FP shall issue a call identifier update for each of them, as shown in figure 19.

NOTE 1: In a 3-party conference call, all PPs involved in the conference share the same call identifier for the 3-party call.

The FP may change the codec using the service change procedure (see clause 7.4.3.3, "Codec change for parallel calls").

When implementing the "Call transfer" feature, the FP shall set bit a_{30} of the "Extended higher layer capabilities (part 2)" (see EN 300 175-5 [5], clause F.3). Consistently with the above description, bit a_{31} must also be set.
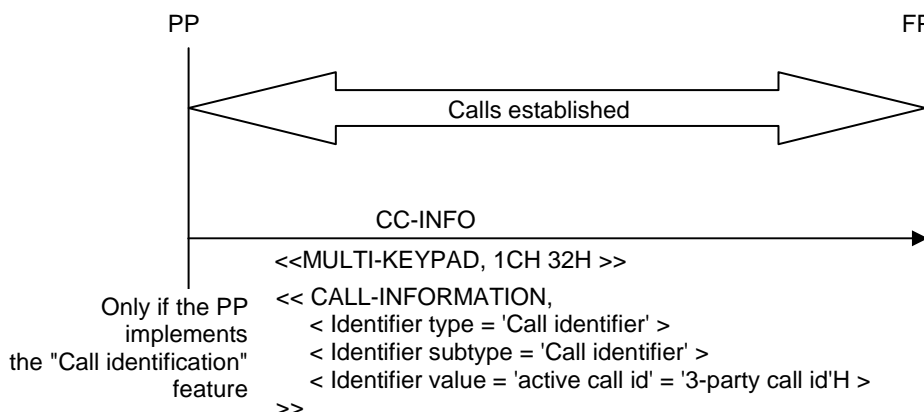
Figure 19: 3-party conference call establishment request

If the PP is involved in more than 2 calls, the FP shall warn the user by sending the << SIGNAL >> information element with the value 09H indicating negative acknowledgement tone.

The release by the PP of one of the parallel calls shall not be possible in a conference. However, the FP could send a call release according to procedure "Call release and call release rejection" of clause 7.4.3.5.4 (or clause 7.4.3.5.5 if the PP does not implement the "Call identification" feature) if one of the remote parties hangs up.
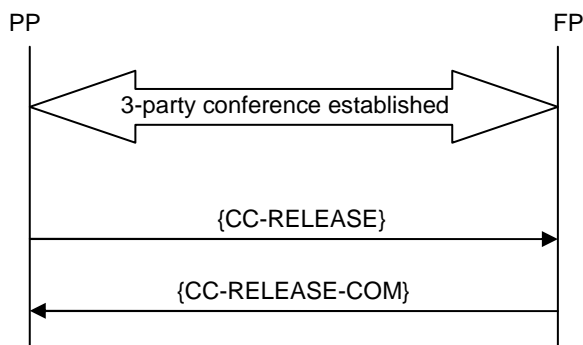
Figure 20: 3-party conference release

NOTE 2: For the initiating PP, sending a {CC-RELEASE} message releases the conference. For a non-initiating PP, sending a {CC-RELEASE} message withdraws that non-initiating PP from the conference.
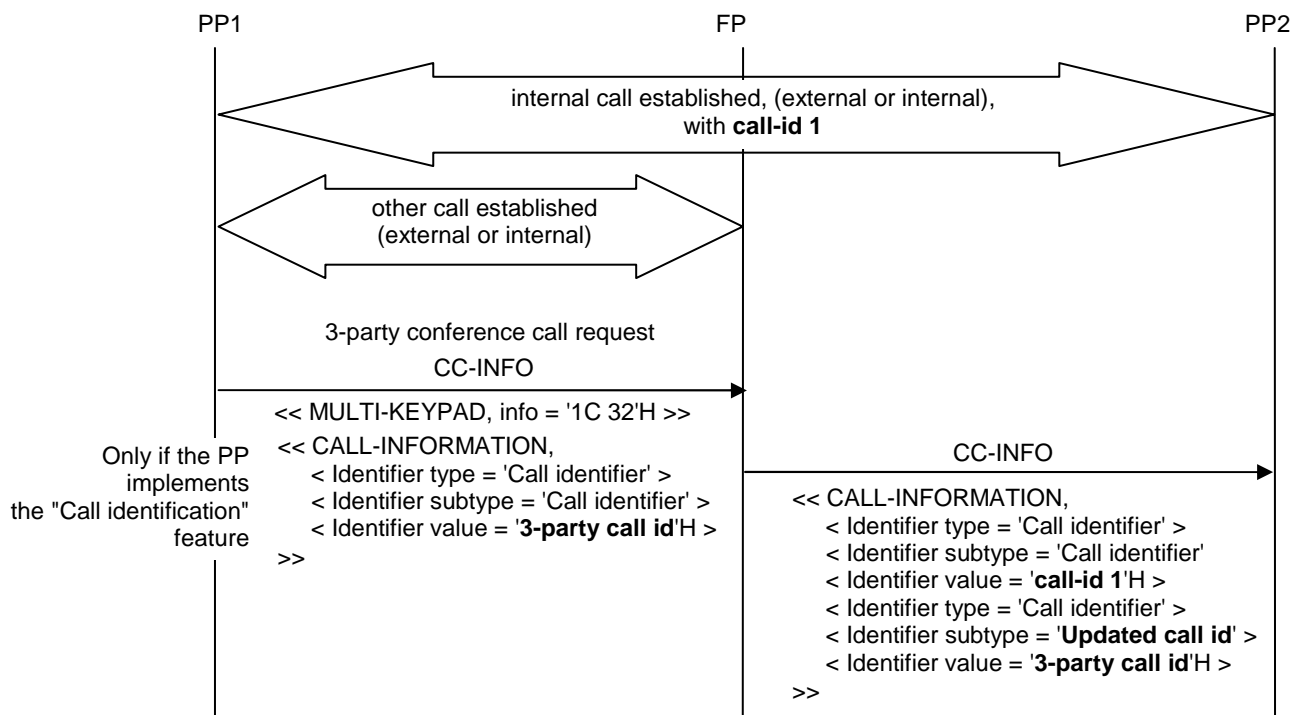
Figure 21: Call id update for the non-initiating PP

7.4.3.8   Call intrusion (from PP to FP)

Call intrusion is a simple way to set up a 3-party conference call, with an existing external active call on another PP. This service mimics the usual behavior of two PSTN wired phones connected to the same physical analogue line.

> NOTE: Call intrusion is also known as "barging-in".

This feature makes optional use of the "Line identification" feature on PP side.

7.4.3.8.1   Implicit call intrusion into a line in "single call" mode

This procedure applies to the FP and an idle PP on a line either not implementing the "Multiple calls" feature, or implementing this feature but configured in "single call" mode.

> NOTE 0:   "Implicit call intrusion" if implemented should be a configurable feature of the single call mode line.

If PP1 is involved in an active external call and PP2 wishes to participate in a 3-party conference with PP1 and the remote party:

- PP2 shall attempt to get the external line with a {CC-SETUP}. The call identifier assigned by the FP for this call shall be the call identifier for the intruded call. This message shall then be directly acknowledged by the FP with a {CC-CONNECT} message.

- The FP shall notify PP1 with a {CC-INFO} message containing the information element <<SIGNAL>> with the value 02H indicating 'Intercept tone on'.

The FP shall generate automatically a conference call audio stream between the three parties.

| PP2
attached to line u | PP1
attached to line u | FP | Network |

External Call established with **call id 1**

CC-SETUP

The PP sets up the call and
selects the line to be used:

<< CALL-INFORMATION,
    < Identifier type = 'Line identifier' >
    < Identifier subtype = 'Line identifier for external calls' >
    < Identifier value = u >
>>

CC-INFO

<< CALL-INFORMATION,
    < Id type = 'Line identifier', subtype = 'external', value = 'u' >
    < Id type/subtype = 'Call identifier', value = '**call id 1**' >
>>

CC-CONNECT

CC-INFO

<< SIGNAL, value = '02'H >>

PP2 <<CALLING-PARTY-NUMBER>>

<< CALL-INFORMATION,
    < Identifier type = 'Line identifier' >
   < Identifier subtype = 'Line identifier for external calls' >
    < Identifier value = 'u' >
    < Identifier type = 'Call identifier' >
    < Identifier subtype = 'Call identifier' >
    < Identifier value = '**call id 1**' >
>>

Ignored if the PP does not implement
the "Call identification" feature

3-party call establishment

Figure 22: Implicit call intrusion

NOTE 1: The Call Control message sequence in figure 22 should be understood as an example. The real sequences
         may also contain different Call Control messages or Call Control messages in another order or Call
         Control messages with other contents.

NOTE 2: In addition to the "Intercept tone on" signal, Call waiting with the same call id warns PP1 of a call
         intrusion attempt.

NOTE 3: If the selected line is not a "single-call" mode line, the DECT system will try to make an outgoing call.

7.4.3.8.2   Explicit call intrusion

This procedure applies to the FP and an idle PP on a line implementing the "Multiple calls" feature and configured in
"multiple call" mode or in "single call" mode. In this case, the PP intrudes a call by using a specific control code for
"call intrusion" while initiating the setup of an external call.

PP2
intruding PP,
attached to line u

PP1 in a call
intruded PP,
attached to line u

FP

Network

Ongoing external call with **call id 1**

CC-SETUP

The PP sets up the call
and selects the line to be
used (line of the call to
be intruded):

<< CALL-INFORMATION,
    < Identifier type = 'Line identifier' >
    < Identifier subtype = 'Line identifier for external calls' >
    < Identifier value = 'u' >
>>

CC-INFO

<< CALL-INFORMATION,
    < Id type = 'Line identifier', subtype = 'external', value = 'u' >
    < Id type/subtype = 'Call identifier', value = '**call id 2**' >
>>

CC-INFO

<< MULTI-KEYPAD, | < Keypad info = '1C 40'H > >>

Targeted handset (optional) | CC-INFO'

<< MULTI-KEYPAD,
    < Keypad info = 'targeted terninal id number' > >>

CC-INFO

<< CALL-INFORMATION,
    < Id type = 'Line identifier', subtype = 'external', value = 'u' >
    < Id type/subtype = 'Call identifier', value = '**call id 2**' >
    < Identifier type = 'Call identifier' >
    < Identifier subtype = '**Updated call id**' >
    < Identifier value = '**call id 1**' >
>>

CC-CONNECT

CC-INFO

<< SIGNAL, value = '02'H >>

PP2 <<CALLING-PARTY-NUMBER>>

<< CALL-INFORMATION,
    < Identifier type = 'Line identifier' >
    < Identifier subtype = 'Line identifier for external calls' >
    < Identifier value = 'u' >

Ignored if the PP does not implement
the "Call identification" feature.
See also note 2.

    < Identifier type = 'Call identifier' >
    < Identifier subtype = 'Call identifier' >
    < Identifier value = '**call id 1**' >
>>

3-party call establishment

Figure 23: Successful explicit call intrusion

NOTE 1: The Call Control message sequence in figure 23 should be understood as an example. The real sequences
may also contain different Call Control messages or Call Control messages in another order or Call
Control messages with other contents.

If PP1 is involved in an active external call and PP2 wishes to participate in a 3-party conference with PP1 and the remote party:

- PP2 shall attempt to get the external line with a {CC-SETUP}. The FP assigns a call identifier for this new setup call.

NOTE 2: At this stage, the FP does not know that there will be a call intrusion attempt and assigns a call identifier to this new call independently of the intruded call. This is in contrast to the "Implicit call intrusion" procedure.

- PP2 then sends a *call intrusion request*, consisting in the control code 1CH as keypad information in a {CC-INFO} message, followed by 40H, and optionally followed by the terminal id number of the handset owning the targeted call. As a result of this request:

  - If a terminal id number is specified, and there is a call active on this terminal, this call shall be intruded.

  - If no terminal id number is specified, but there is only one active call on the line, this only call shall be intruded.

  - In all other cases, a CC-INFO message shall be returned back to the requesting PP with a <<SIGNAL>> information element with <Signal value> field equal to 09H (for negative acknowledgement).

- The FP shall notify PP1 with a {CC-INFO} message containing the information element <<SIGNAL>> with the value 02H indicating 'Intercept tone on'.

The FP shall generate automatically a conference call audio stream between the three parties.

NOTE 3: In addition to the "Intercept tone on", Call waiting with the same call id warns PP1 of a call intrusion attempt.

NOTE 4: In "multiple call" mode, simply initiating a call setup would lead to the setup of an additional call if the line can accept an additional call, or to a failure (busy tone signal received back).

7.4.3.9   Internal call codec priority

7.4.3.9.1   Description

When performing an internal call between two wideband enabled PPs, the FP shall arrange that the call is finally established in a wideband codec rather than in a narrow band codec. Respectively in a super wideband codec rather than in a wideband or narrowband codec.

As a consequence, in the particular case where both PPs present G.722 with highest priority, the internal call shall finally be established in ITU-T Recommendation G.722 [17].

Exception cases to this procedure are listed in clause 7.4.3.9.2.

This procedure has been added to guarantee that the internal call will be established in the highest audio quality supported by both handsets involved in the internal call, at least when no other call is established at the same time in the DECT system.

Two examples of support of this procedure are given hereafter:

EXAMPLE 1:   When the <<Codec List>> information element is only specified at subscription registration and location registration phases.

EXAMPLE 2:   When the <<Codec List>> information element is specified at call setup phase.

Figure 24 shows an example (example 1) with an internal call sequence where no codec list is specified at call setup and both PP-s support wideband (same codec list re-used as at location registration phase).
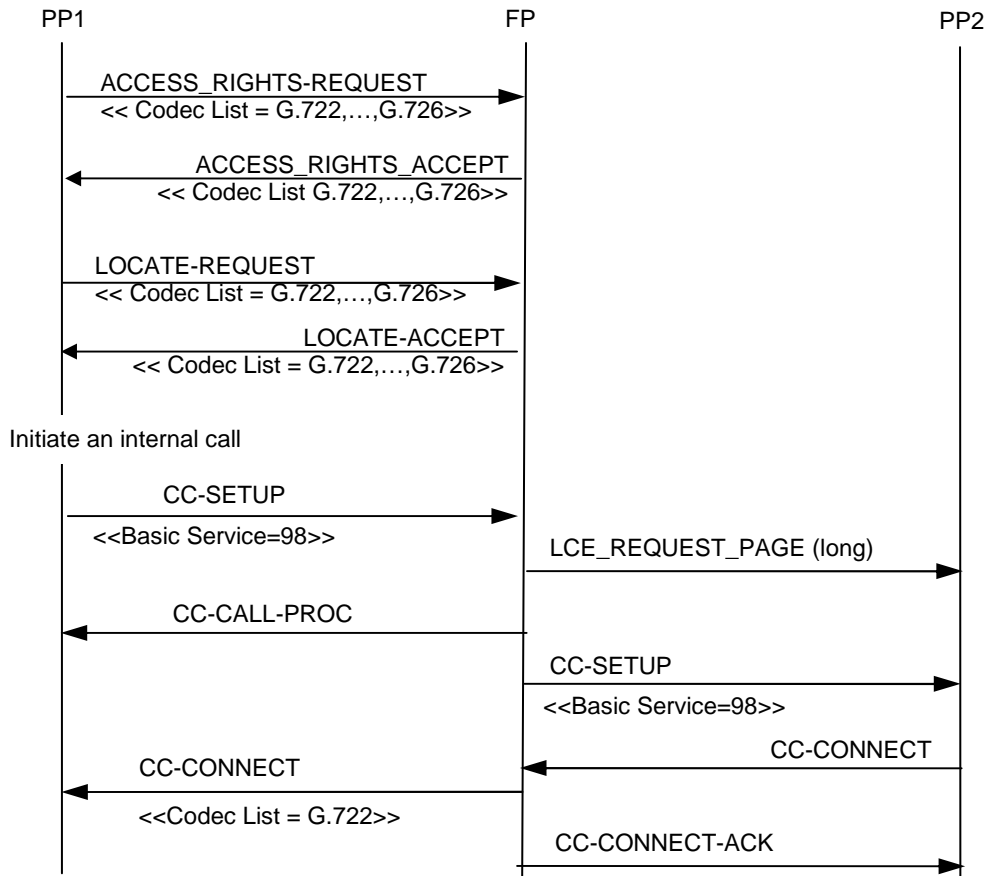
Figure 24: Internal call with no codec list at call setup

Figure 25 shows example 2 with an internal call sequence where the codec list is specified at call setup and both PPs support wideband.
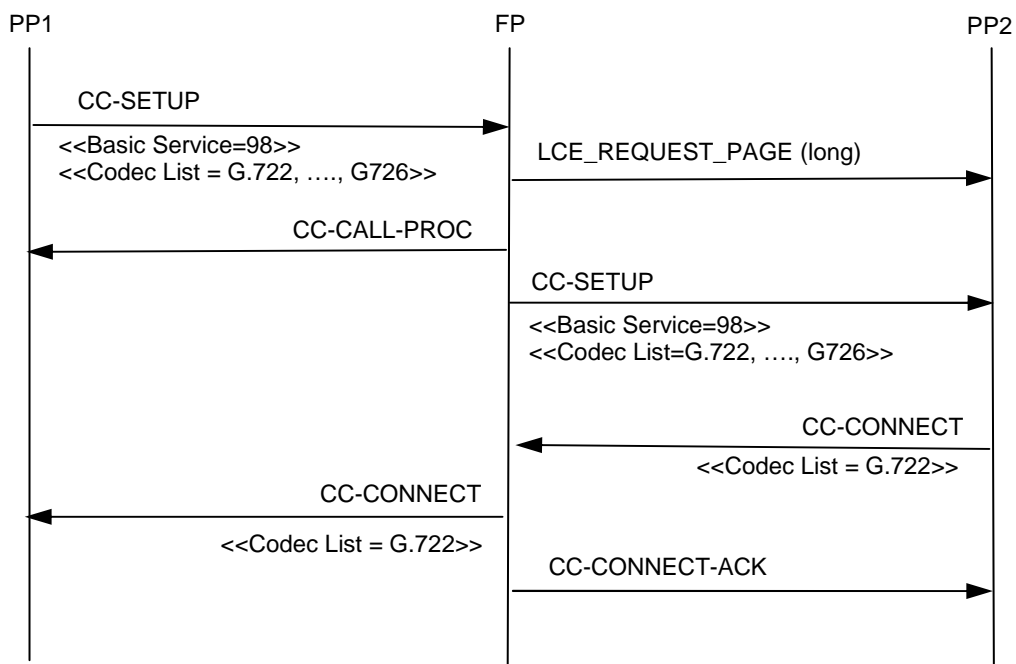
Figure 25: Internal call with codec list at call setup

ETSI

NOTE: The Call Control message sequences in figures 24 and 25 should be understood as examples. The real sequences may also contain different Call Control messages or Call Control messages in another order or Call Control messages with other contents.

7.4.3.9.2   Exception cases

Exception to the clause 7.4.3.9. No requirement applies in the following cases:

1)   Case of internal call transfer. In this case, the PP requesting the transfer may specify any order for the codecs in the <<Codec List>> information element. For example, the codec used in the initial ongoing external call to be transferred may be given the highest priority in the <<Codec List>> information element sent by the PP for the parallel call. This could avoid two codec switching: one for each PP involved in the transfer.

2)   Cases of multiple calls handled by the FP at the same time, if critical for FP hardware resources.

3)   Specific implementations of PPs that have to support narrow band headsets.

4)   Specific implementations of PPs where battery autonomy is very critical.

7.4.4   Handling of single call services

7.4.4.1   Control messages

The following control codes shall be transmitted as keypad information in {CC-INFO} messages and shall trigger the corresponding actions in the FP.

7.4.4.1.1   Call deflection control messages

Table 18: Control messages for control of single call services

Procedure	Control message	Direction	PP Status
Call deflection (internal)	1CH 38H 17H + number	PP to FP	M
Call deflection (external)	1CH 38H 15H + number	PP to FP	M

Call deflection procedure for internal and external calls is detailed in clause 7.4.4.2.

7.4.4.2   Call deflection

The call deflection service enables the user to respond to an incoming call by requesting redirection of this call to another number specified in the response. The call deflection service can only be requested before the connection is established by the user, i.e. in response to the incoming call during the period that the user is being alerted of the call (see TS 122 072 [22]).

In order to deflect a call in the "CALL RECEIVED" CC state, the PP shall send the control code 1CH as keypad information in a {CC-INFO} message, followed by 38H and by the deflected-to telephone number. Deflected-to telephone number may be internal or external.

NOTE 0: Deflection to an internal telephone number only makes sense if ringing groups have been defined and if the deflected-to terminal belongs to a different ringing group, for example in a multi-line context.

It is recommended that the deflected-to telephone number is pre-configured (in the handset) before using this service. The PP related procedures to pre-program and display the deflected-to number is out of the scope of this procedure.

If a user requests the call deflection service, and the deflected-to telephone number is external, the FP shall relay the service request to the network:

•   If the service can be provided, the FP shall notify the PP by releasing the incoming call.

•   If the service cannot be provided, the FP shall not release the incoming call and should proceed further with it.

On the FP side, only the first call deflection request shall be taken into account. Possible further requests concerning this call and coming from the same or other PPs shall be ignored.

```
   PP1                              FP                              Network

    |<───────────── CC-SETUP ──────────────|                          |
    |                                       |                          |
    |────────────── CC-SETUP-ACK ─────────>|                          |
    |                                       |                          |
    |         call deflection request       |                          |
    |────────────── CC-INFO ──────────────>|                          |
    |<< "KEYPAD", '1C 38 15'H + number >>   |      <═══ CD activation ═══>
    |                                       |                          |
  ┌─────────────────────────────────────────────────────────────────────┐
  │ if request accepted:    CC-RELEASE                                   │
  │    |<────────────────────────────────────|                          │
  │    |            CC-RELEASE-COM            |                          │
  │    |────────────────────────────────────>|                          │
  └─────────────────────────────────────────────────────────────────────┘
  ┌─────────────────────────────────────────────────────────────────────┐
  │ if request rejected (example):                                      │
  │pick-up|- - - - - - CC-CONNECT - - - - - ->|                          │
  └─────────────────────────────────────────────────────────────────────┘
```
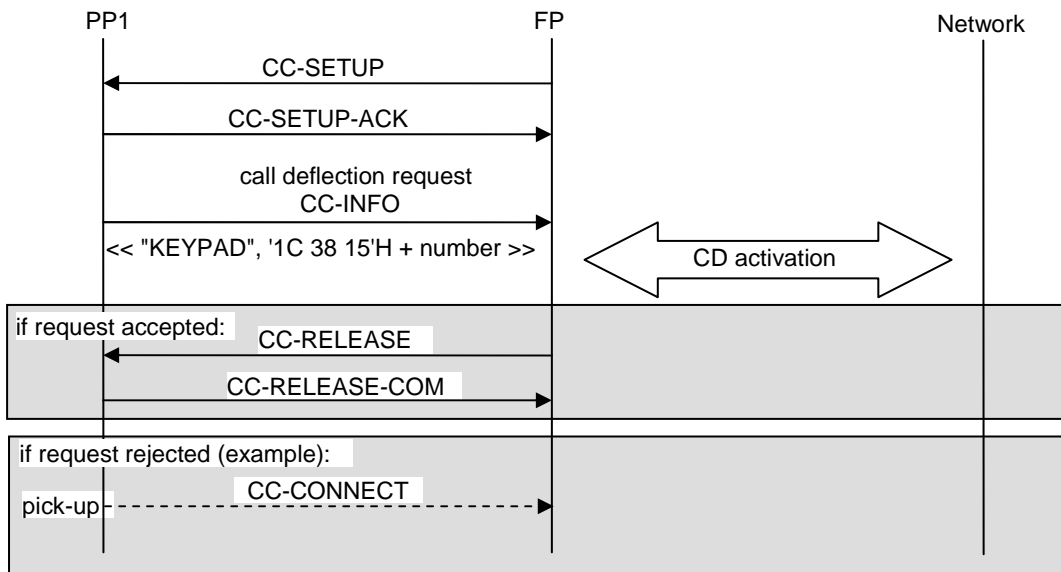
Figure 26: Call deflection invocation when the deflected-to party is external

```
   PP1                              FP                              PP2

    |<───────────── CC-SETUP ──────────────|                          |
    |                                       |                          |
    |────────────── CC-SETUP-ACK ─────────>|                          |
    |                                       |                          |
    |         call deflection request       |                          |
    |────────────── CC-INFO ──────────────>|                          |
    |<< "KEYPAD", '1C 38 17'H + number >>   |                          |
  ┌─────────────────────────────────────────────────────────────────────┐
  │ if request accepted:                    |        CC-SETUP           │
  │                                         |─────────────────────────>|│
  │                                         |<< CALLING PARTY NUMBER>> (see note) │
  │                    CC-RELEASE           |        CC-SETUP-ACK       │
  │    |<────────────────────────────────────|<─────────────────────────│
  │    |            CC-RELEASE-COM            |                          │
  │    |────────────────────────────────────>|                          │
  └─────────────────────────────────────────────────────────────────────┘
  ┌─────────────────────────────────────────────────────────────────────┐
  │ if request rejected (example):                                      │
  │pick-up|- - - - - - CC-CONNECT - - - - - ->|                          │
  └─────────────────────────────────────────────────────────────────────┘
```
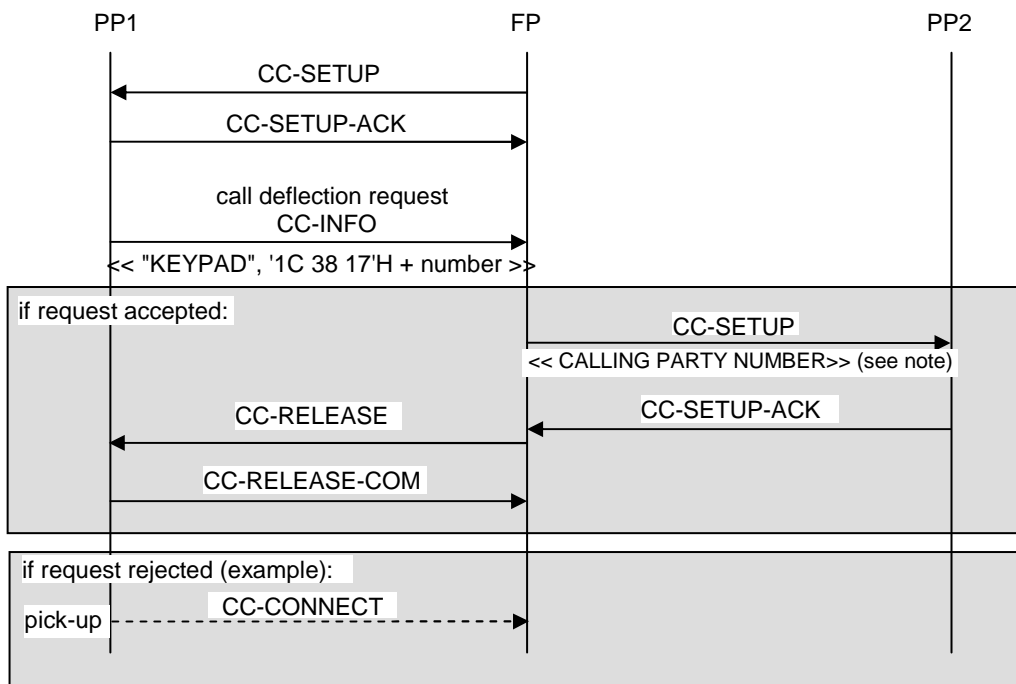
Figure 27: Call deflection invocation when the deflected-to party is internal

NOTE 1: The Call Control message sequences in figures 26 and 27 should be understood as examples. The real sequences may also contain different Call Control messages or Call Control messages in another order or Call Control messages with other contents.

NOTE 2: <<CALLING PARTY NUMBER>> is the deflected (remote) party calling party number. It could also be sent in a CC-INFO message.

ETSI

7.4.5   Line identification

7.4.5.1   Line identification general requirements

Line identifiers are used to identify the line on which an external call (incoming or outgoing) is made.

When the "Multiple line" feature is also implemented, line identifiers allow to enhance the handling of parallel calls in the "Common parallel call procedures" feature. However, when the "Line identification" feature is implemented, line identifiers shall be sent even if there is only one line in the system. Furthermore, if there are several lines in the system (meaning that the "Multiple line" feature is also implemented), the line identifiers shall be used also for PPs attached to only one line.

A party (PP or FP) shall send the line identifier in case it implements the "Line identification" feature, regardless of whether the other party implements the feature or not. If the other party does not implement the feature, it shall ignore the received line identifier. However, a PP implementing the feature may not send any line identifier if it uses the "FP managed line selection" procedure.

Typically, a FP would use line identifiers in the 0..n interval, where 'n+1' represents the number of lines it handles.

Several procedures outside of the "Line identification" feature itself also use line identifiers conditionally to the implementation of the "Line identification" feature. This includes procedures defined for the feature entitled "Common parallel calls procedures".

A DECT system shall use the **CALL-INFORMATION completeness principle** (see clause 3.1).

7.4.5.2   Line identification for external outgoing calls

7.4.5.2.1   General line identification requirements for external outgoing calls

For outgoing calls, the "Line identification" feature enables a PP to select the line on which the call has to be placed. If the PP does not send any line identifier, the "Line identification" feature enables the FP to notify back the PP of the line identifier for the selected line.

This procedure applies to all external outgoing calls (first or parallel). In the case of a parallel call, it only applies if the feature entitled "Common multiple call procedures" is also implemented. In that case, relevant procedures are described there.

The line identifier information shall be sent with one of the following methods:

- Included in a << CALL INFORMATION >> information element sent in the CC-SETUP message.

- Included in a << MULTI-KEYPAD >> information element sent either in the CC-SETUP message, or in a CC-INFO message. This method shall only be used if the line identifier is in the interval 0..9. If this method is used, the line identifier information shall consist in the pound key ("#") character ('23'H) followed by the line identifier digit, IA5-coded on a single octet.

7.4.5.2.2   Line identification for a *first* external outgoing call using <<CALL INFORMATION>>

This procedures applies to the FP and a PP effectively sending a line identifier for a first external outgoing call, using a <<CALL-INFORMATION>> information element.

When using the present procedure, a << CALL INFORMATION >> information element shall be used for conveying the line identifier information, this information element shall be included in the {CC-SETUP} message, as an addition to procedure "Outgoing call request" of GAP [12], clause 8.2.

**Table 19: Values used within the {CC-SETUP} message
when the << CALL-INFORMATION >> method is used for conveying the line identifier information**

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
<<Call-information>>	<Identifier type>	0	Code for 'Line identifier' identifier type
	<Identifier subtype>	0	Code for 'Line identifier for external calls' subtype
	<Identifier value>	All	The line identifier value itself

```
PP                                          FP                    Network
attached to line u

        CC-SETUP
  ──────────────────────────────────────▶
  << CALL-INFORMATION,
      < Identifier type = 'Line identifier' >
      < Identifier subtype = 'Line identifier for external calls' >
      < Identifier value = u >
  >>
        CC-INFO
  ──────────────────────────────────────▶        Use of line u
  << MULTI-KEYPAD,  < Keypad info = 'called number' > >>    for calling
                                                           'called number'
```

**Figure 28: Line identification for a first external outgoing call,
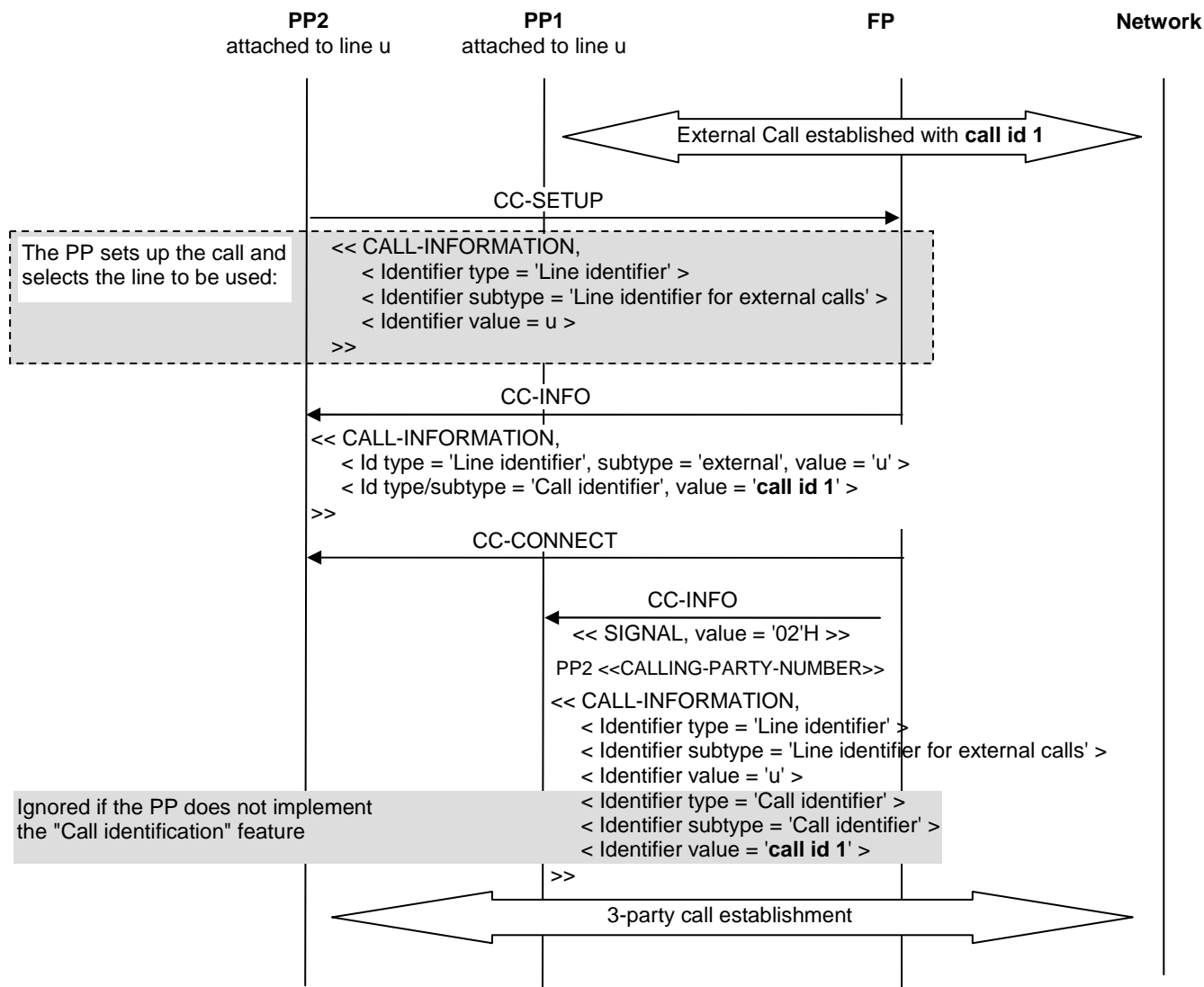using the << CALL-INFORMATION >> method**

NOTE: The Call Control message sequence in figure 28 should be understood as an example. The real sequences may also contain different Call Control messages or Call Control messages in another order or Call Control messages with other contents.

7.4.5.2.3   Line identification for a *first* external outgoing call using << MULTI-KEYPAD >>

This procedures applies to the FP and a PP effectively sending a line identifier for a first external outgoing call, using a <<MULTI-KEYPAD>> information element.

When using the present procedure, a << MULTI-KEYPAD >> information element shall be used for conveying the line identifier information. This information element shall be included either:

- in the {CC-SETUP} message, as an addition to procedure "Outgoing call request" of GAP [12], clause 8.2; or

- in a {CC-INFO} message, as described in procedure "Sending keypad information" of GAP [12], clause 8.10.

In both cases, the following table shall be considered.

NOTE: In the latter case, the <<MULTI-KEYPAD>> information element used may contain (partial or complete) called party number information.

**Table 20: Values used within the {CC-SETUP} or a {CC-INFO} message
when the <<MULTI-KEYPAD>> method is used for conveying the line identifier information**

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
<<Multi-keypad>>	<Keypad info>	23H	Code for the pound key ('#') used for introducing the line identifier
		30H - 39H	The line identifier itself
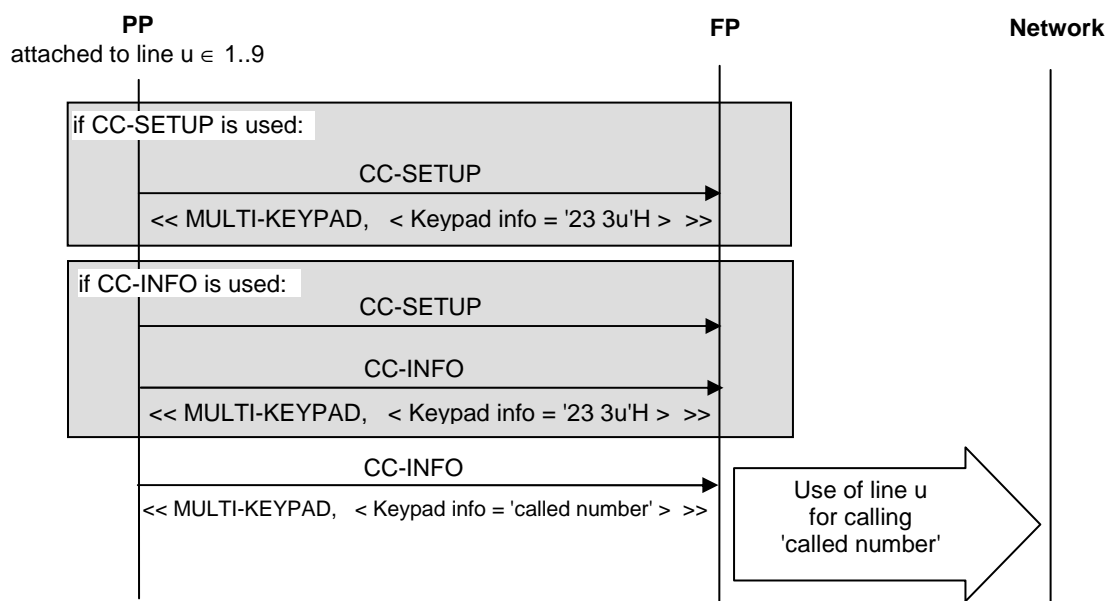
**Figure 29: Line identification for a first external outgoing call,
using the << MULTI-KEYPAD >> method**

7.4.5.2.4   FP managed line selection for a *first* external outgoing call

This procedures applies to the FP and a PP making a first external outgoing call. It allows the PP not to send any line identifier for this new call.

For a given call, it shall always be possible for a PP implementing the current procedure not to send any line identifier. In that case, the line selection is said to be "FP-managed".

A FP implementing this procedure shall therefore always be prepared to possibly select a line on behalf of the PP.

  NOTE 1: The PP can therefore allow its user not to select any line (either on a call-by-call basis, or permanently by configuration).

  NOTE 2: If the PP is attached to only one line (e.g. registered to a FP with only one line), it should not use the present procedure and send the line identifier in all cases, because FP management is not needed in that case (although it may send it without requesting the user to explicitly having to select the line).

  NOTE 3: A PP not implementing the "Line identification" feature (PPs compliant with NG-DECT Part 1 (TS 102 527-1 [21]), GAP (EN 300 444 [12]) and PPs compliant with the present document not implementing the feature) also implicitly uses FP-managed line selection, but is out of scope of the present procedure.

If the PP does not send any line identifier for a given outgoing call, the FP shall always notify back the PP of the used line identifier, even if there is only one line in the DECT system. This applies for the following types of PPs:

  •   a PP implementing the present procedure;

  •   an NG DECT PP not implementing the current procedure (a Part 1 PP, or possibly a Part 3 PP).

A GAP PP however shall not receive any line identifier.

The notified line identifier information shall be sent included in a << CALL INFORMATION >> information element sent in a CC-INFO message.
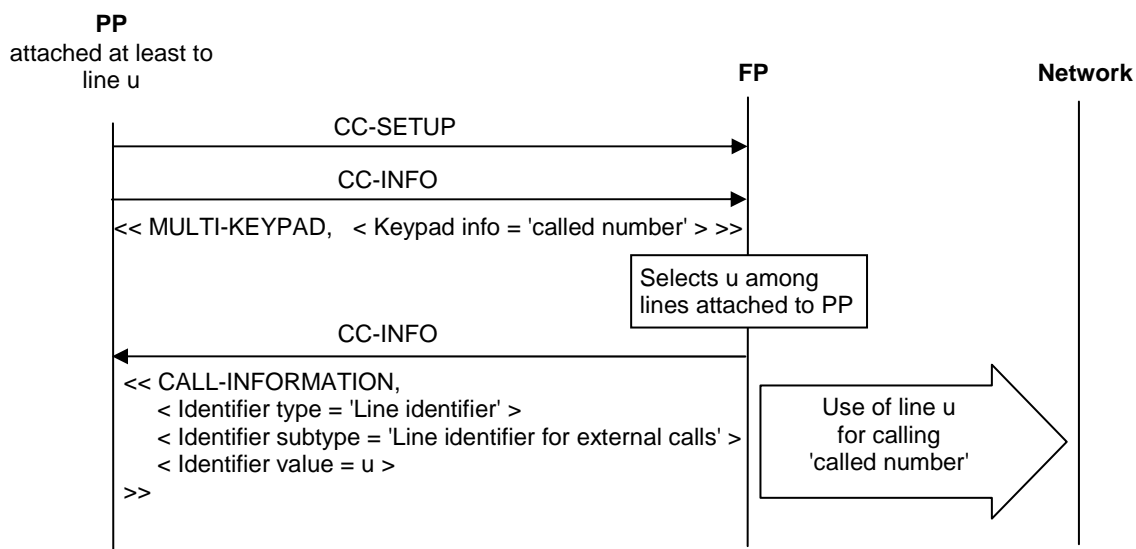
**Figure 30: Line identification for a first external outgoing call,
using the << CALL-INFORMATION >> method**

7.4.5.3   Line identification for external incoming call

7.4.5.3.1   General line identification requirements for external incoming calls

For incoming calls, the "Line identification" feature enables the FP to notify the PP of the line on which the incoming call was received.

> NOTE 1: The current general procedure applies to all external incoming calls (first incoming call or waiting call). In the case of a waiting call, it applies conditionally to the implentation of the feature entitled "Common multiple call procedures".

For incoming calls, the line identifier information shall always be sent included in a << CALL INFORMATION >> information element, as follows:

- For a first incoming call, it shall be sent in the CC-SETUP message, as decribed in clause 7.4.5.3.2.

- For a waiting call, it shall be sent in every CC-INFO message used for notifying the waiting call, as decribed in clause 7.4.3.5.2.

7.4.5.3.2   Line identification for a *first* external incoming call

For incoming calls, the "Line identification" feature enables the FP to notify the PP of the line identifier of the line on which the incoming call arrived.

A line identifier for an incoming call shall be sent from FP to PP in a <<CALL INFORMATION>> information element in the {CC-SETUP}message, as an addition to GAP [12], clause 8.12, "Incoming call request".

The FP shall notify the line identifier used even if there is only one line in the system, and even if the PP is attached to only one line.

PP
attached at least to
line u   **FP**   **Network**

CC-SETUP

Incoming call to line u
from 'calling number'

<< CALL-INFORMATION,
   < Identifier type = 'Line identifier' >
   < Identifier subtype = 'Line identifier for external calls' >
   < Identifier value = u >
>>
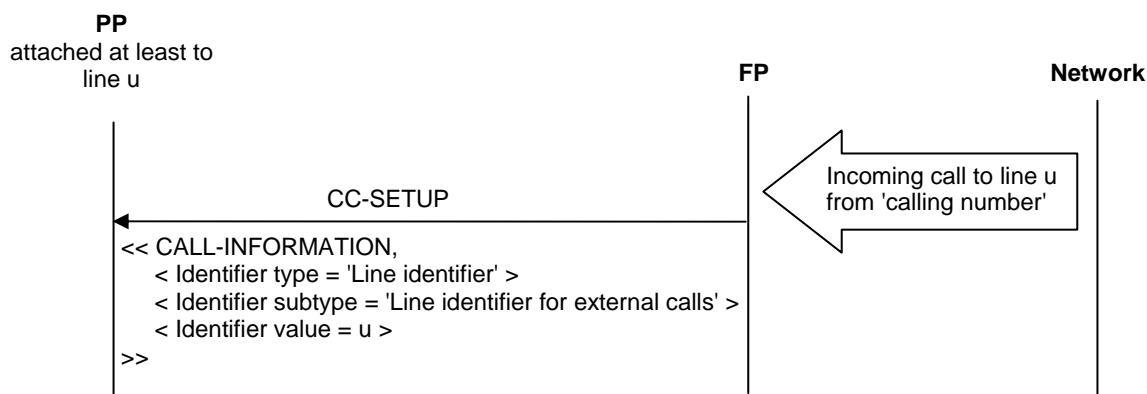
Figure 31: Line identification for a first external incoming call

7.4.5.4   Line specification in events notification

This procedure applies to the FP and a PP implementing the "Generic events notification" procedure of clause 7.4.1 (and including clause B.1).

As an addition to the "Generic events notification" procedure of clause 7.4.1, a FP using the present procedure shall send a set a line identifiers along with the events notification.

This set of line identifiers shall be sent in a <<CALL-INFORMATION>> information element, along with the <<EVENTS-NOTIFICATION>> information element in the same FACILITY message. For each of these line identifiers, the <Identifier type> field shall be "Line identifier" and the <Identifier subtype> field shall be "relating-to".

NOTE 1: The <<CALL-INFORMATION>> information element allows to send several identifiers of the same type and subtype.

Such a set of line identifiers shall only be sent if at least one of the following conditions is fulfilled:

1)   The notification is broadcasted to all PPs, and **every** line in the set is concerned with **all** of the event types notified.

NOTE 2: A simple way to achieve it is either to have the <<EVENTS-NOTIFICATION>> information element only contain a notification for a single type of event, or to have the set of lines reduced to a single line.

NOTE 3: This condition allows a PP to ignore a notification that does not mention a line it is not attached to. Conversely, if a line is mentioned, all event types notified are relevant for this line. A PP can therefore always alert the user for an event type before querying the corresponding event list on the FP.

2)   The notification is only sent to PPs attached to all lines in the set (not excluding attachments to lines outside this set), and **every** line in the set is concerned with **at least one** of the events notified.

NOTE 4: This condition ensures that a PP will never query an event list on the FP for nothing. It should however query the concerned event list before alerting the user for an event type, to be able to also notify the line(s) on which events of this type occurred.

```
         PP                                                    FP
    attached to any line(s)


              <------------  Ongoing call (internal or external)  ------------>


                          FACILITY
         <------------------------------------------------------
         << EVENTS-NOTIFICATION >>

         << CALL-INFORMATION,
             < Identifier type = 'Line identifier' >
             < Identifier subtype = 'Relating-to line identifier' >
             < Identifier value = u >
             < Identifier type = 'Line identifier' >
             < Identifier subtype = 'Relating-to line identifier' >
             < Identifier value = v >
         >>
```
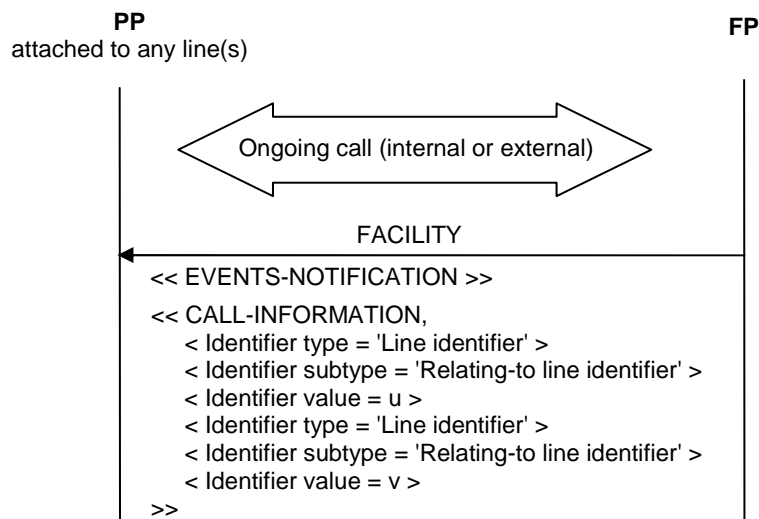
Figure 32: Events notification concerning lines u and v (example during a call)

If a <<CALL-INFORMATION>> information element is used for conveying the set of lines concerned with the notified events as an addition to the "Generic events notification" procedure of clause 7.4.1, consider table 21.

Table 21: Values used within the {FACILITY} message

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
<<Call-information>>			A line identifier is sent for each of the lines in the set
	<Identifier type>	0	Code for 'Line identifier' identifier type
	<Identifier subtype>	3	Code for 'Relating-to line identifier' subtype
	<Identifier value>	All	The line identifier value itself

7.4.6   Call identification

7.4.6.1   Call identifier general requirements

Call identifiers are used to identify all ongoing calls in a DECT system, internal or external. They allow to enhance the "Parallel call" and "Multiple call" features. More specifically:

- Call identifiers allow to properly handle PPs with more than 2 call instances, especially for all double call related procedures (see clause 7.4.3.5, "Common parallel call procedures (external or internal)").

- Even for PPs with only 2 call instances, call identifiers allow to properly handle asynchronous messages (for example a call toggle from the PP crossing a call release from the FP).

Call identifiers are assigned by the FP and are uniquely defined DECT system-wide. In other words, call identifiers shall NOT be PP specific (i.e. there shall never be two equal call identifiers, even for 2 different PPs), nor line specific.
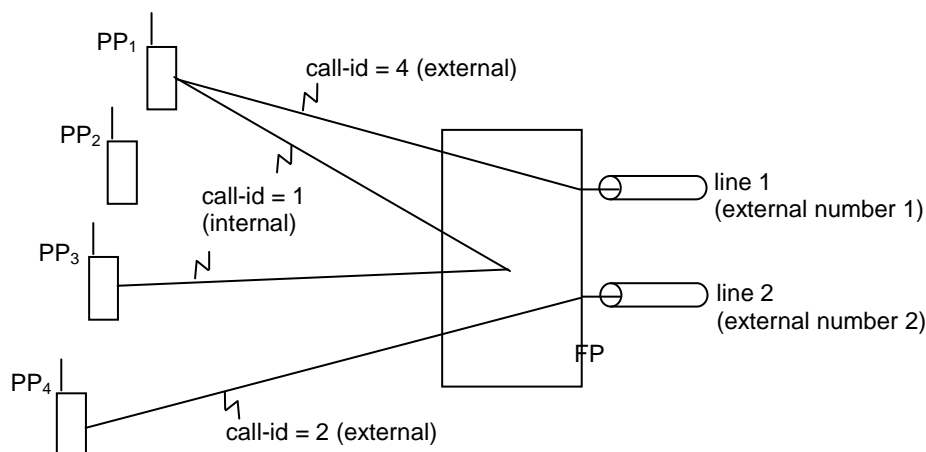
Figure 33: Calls identifiers are assigned by the FP and unique for the DECT System

A call identifier is assigned each time a call is setup. In order to be usable for parallel/multiple calls, a call identifier shall be assigned also for the first call of a PP.

The call identifier is freed at call release (i.e. available for a further new call).

Typically, a FP will assign call identifiers by taking them in the 0..n interval, where 'n+1' represents the maximum number of simultaneous calls the FP can handle. To assign a call identifier to a new call, it will use the smallest free number in this interval, free numbers being defined as not yet assigned numbers, or numbers that were assigned but for which the call has been terminated.

Call identifiers shall be sent within the <<CALL-INFORMATION>> information element with <Identifier type> and <Identifier subtype> fields both equal to 'Call identifier'. It shall be sent in case the sending party (PP or FP) implements the "Call identification" feature.

   NOTE: The "Call transfer", "3-party conference with established internal and/or external calls" and "Call intrusion" features also make use of call identifiers with a different <Identifier subtype> = 'Updated call identifier', for the purpose of updating the identifier of an existing call. This subtype is not used within the "Call identification" feature itself.

Several procedures outside of the "Call identification" feature itself also use call identifiers conditionally to implementation of this feature. This includes some procedures of the "Common parallel calls procedures" feature.

When implementing the feature, the PP shall set the corresponding terminal capability bit.

7.4.6.2   Call identifier assignment on outgoing call (FP to PP)

The purpose of this procedure is to have the FP assign a unique call identifier for the call, external or internal, and notify it back to the calling PP.

In case of internal call, the FP shall assign a single call identifier for both PPs.

The assigned call identifier shall be notified back to the PP, by including a <<CALL-INFORMATION>> information element in a {CC-INFO} message with <Call identifier> field value equal to the assigned call identifier.
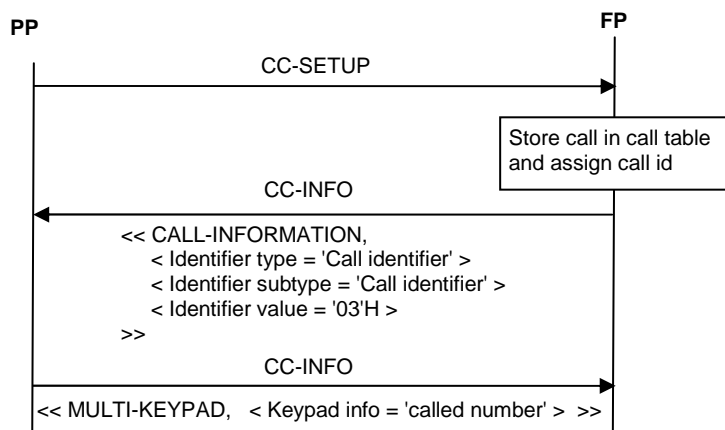
Figure 34: Example of call identifier assignment on outgoing call, with call-id=3

A service call (call with <Call class> equal to BH) shall also be assigned a call identifier. However, this call-id is intended for the first outgoing voice call placed within this service call, if any (e.g. a service call may be setup for accessing the contact list on the FP, which may be followed by an outgoing call setup within the same service call).

7.4.6.3   Call identifier assignment on incoming call (FP to PP)

The purpose of this procedure is to have the FP, upon incoming call, external or internal, assign a unique call identifier and send it to the PP.

> NOTE 1: The "Handset locator" feature uses a kind of incoming call to which the FP also assigns a call identifier.

In case of internal call, the FP shall assign a single call identifier for both PPs.

A Call identifier for an incoming call shall be sent from FP to PP in a <<CALL INFORMATION>> information element in the {CC-SETUP}message.

> NOTE 2: The call identifier should not be displayed to the user.

For this procedure using the {CC-SETUP} message, see table 22 of GAP [12], clause 8.12, "Incoming call request", with the additions described in table 22.

Table 22: Values used within {CC-SETUP}

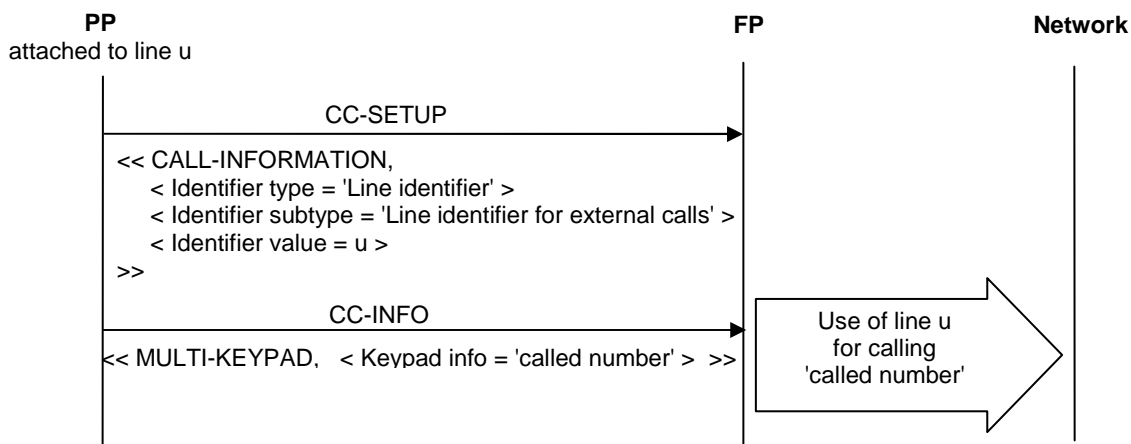| Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
<<Call-information>>	<Identifier type>	1	Code for 'Call identifier' identifier type
	<Identifier subtype>	0	Code for 'Call identifier' subtype
	<Identifier value>	All	The call identifier value itself
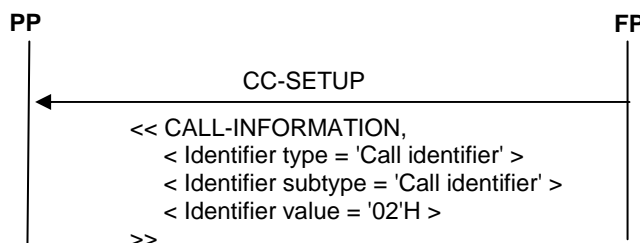
Figure 35: Example of Call identifier assignment on incoming call, with call-id = 2

7.4.7   Multiple lines handling

7.4.7.1   Multiple lines common requirements

The "Multiple lines" feature describes the behaviour of DECT systems connected to more than one network lines. A PP registered in such a DECT system may be attached to one or several of these lines.

The "Multiple line" feature is only useful if the DECT system is connected to at least two different lines.
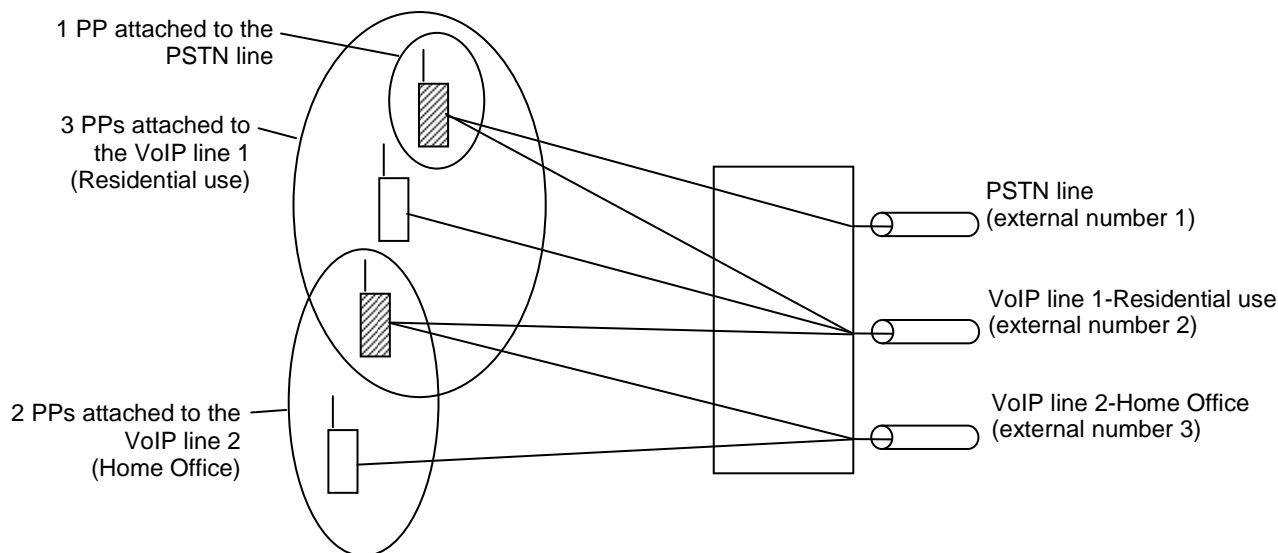
Figure 36: Example of a multiple line configuration with 3 lines (with attachments)
PPs attached to several lines are hatched

When implementing the "Multiple lines" feature, the PP shall set the corresponding terminal capability bit. The FP shall set bit a_{38} of the "Extended higher layer capabilities (part 2)" (see EN 300 175-5 [5], clause F.3).

7.4.7.1.1   Pre-requisites

The following pre-requisites for implementation of the "Multiple lines" feature shall be taken into account:

- A FP implementing the "Multiple lines" feature shall implement the "Line identification" feature as a pre-requisite.

- A PP implementing the "Multiple lines" feature should implement the "Line identification" feature as well.

- A PP or FP implementing the "Multiple lines" feature shall implement the feature entitled "Common parallel call procedures" of clause 7.4.3.5 as a pre-requisite, so that a new call on a different line can be placed or received on an already in use handset.

7.4.7.1.2   Minimum requirements

An implementation of the "Multiple lines" feature on a DECT system shall comply with the following minimum requirements:

- The "Maximum number of simultaneous calls" supported by a FP implementing the "Multiple lines" feature shall be at least equal to 2. This includes support of as many simultaneous call contexts.

7.4.7.2   Terminal attachment and line settings

All registered PPs shall be attached to at least one line. A PP may be attached to one or more lines. For example, a given PP can be attached to a PSTN line and a VoIP line at the same time.

7.4.7.2.1 Initial attachment

The FP shall provide at least one of the following two possible attachment modes:

FP-managed attachment: After subscription registration the PP is attached by the FP to one or several lines with no specific user intervention.

In case of FP-managed attachment, and in order to know the set of lines it is attached to, the PP may read the "Attached handsets" setting of all "Line settings" entries via the "List access service" feature (NG1.N.16).

PP-managed attachment: Attachment is initiated by the PP during or just after subscription registration.

An initial PP-managed attachment shall be implemented as an update of the "Attached handsets" setting for every entry in the "Line settings" list corresponding to a targeted line, and performed via the "List access service" feature (NG1.N.16).

7.4.7.2.2 Attachment modification

The PP should be able to change the initial attachment (add or remove lines) during or after location registration. If supported, the PP shall initiate the procedure.

An attachment modification shall be implemented as an update of the "Attached handsets" setting for every entry in the "Line settings" list corresponding to a targeted line, and performed via the "List access service" feature (NG1.N.16).

7.4.7.2.3 Line settings

The FP shall support the "List access service" feature (NG1.N.16) and the "Line settings" list.

Apart from the "Attached handsets" setting itself, a PP shall only be able to update the settings of the lines it is attached to.

7.4.7.3 Incoming and outgoing external calls on a multiple line system

This procedure applies to the FP and a PP attached to one or more line(s). If the PP is idle, or in communication on the same line, no specific requirement is needed. Conversely, if the PP is already in communication on another line, specific requirements are needed. The following table details the procedures to be used.

Table 23: Incoming and outgoing external calls on a multiple line system

	Incoming call on line A	Outgoing call on line A
All idle PPs	Usual "mono-line" requirements apply (see notes 1 and 2)	Usual "mono-line" requirements apply (see notes 1 and 2)
All PPs attached to line A in communication on line A		
All PPs attached to line A and B in communication on line B but not A (parallel incoming or outgoing call on another line A; see note 3)	"Call waiting indication (external or internal)" (clause 7.4.3.5.2), shall be used (see note 1)	"Outgoing parallel call initiation" (clause 7.4.3.5.1) shall be used (see note 1)
NOTE 1: In any case, "Line identification" must be used on FP side, and should be used on PP side. NOTE 2: The new call on line A may be a first call or a parallel call. If the line A is a multiple call line, please refer to clause 7.4.8.2, "Incoming and outgoing external calls on a multiple call line"; otherwise, usual procedures defined in the present DECT standard apply. NOTE 3: In this case, the PP is necessarily attached to several lines (at least A and B). The PP is busy with line B but not A, which means that with regards to line A it is not involved in any call. However, as it is not idle, parallel call procedures apply (feature "Common parallel call procedures" of clause 7.4.3.5).		

7.4.7.4 Internal calls in multiple line context

This procedure applies to the FP and a PP attached to one or more line(s).

Internal calls in multiple line context shall be possible between any two PPs, even if there is no line to which both PPs are attached.

It should be possible to forbid internal calls between PPs that do not share a common line by configuration of the DECT system.

7.4.7.5   Compatibility with non multiple line PP or FP

This procedure applies to a non multiple line DECT equipement (PP or FP) in front of a DECT-NG PART3 PP or FP implementing the "Multiple lines" feature.

Non multiple line DECT equipment include:

- NG DECT Part 3 PP or FP, not implementing the "Multiple lines" feature.

- NG DECT Part 1 PP or FP.

- GAP PP or FP.

    NOTE: For a PP, not implementing the "Multiple lines" feature does not necessarily mean that the PP is attached to only one line; is only means that the PP is not aware of possible multiple attachments.

7.4.7.5.1   Non multiple line PP in front of a multiple line FP

Attachment: A *non* multiple line PP shall use FP-managed attachment and is not aware of the lines it is attached to (only the user is).

    NOTE: A FP should not attach a PP to more than one line if the PP does not implement the "Multiple line" feature but however implements the "List access service" feature (NG1.N16) and the "Line settings" list.

Outgoing calls: A *non* multiple line PP may:

- Either use FP-managed line selection; in that case, if the PP is a non GAP PP and implements the "Line identification" feature, it should use the line identifier notification received to notify the user of the line used.

- Or use the '#' key based line selection mechanism of clause 7.4.5.2.3 ("Line identification for a first external outgoing call using <<MULTI-KEYPAD>>"). In that case, the user must manually enter the line identifier after the '#' key.

Incoming calls: A *non* multiple line PP shall receive all incoming calls arriving on one of the lines it is attached to; if the PP is a non GAP PP and implements the "Line identification" feature, it should however use the line identifier received to notify the user of the line used.

7.4.7.5.2   Non multiple line FP in front of a multiple line PP

In front of a "non multiple line" FP (hence connected to at most one line), a PP implementing the "Multiple lines" feature is however attached to a single line.

- In front of a non-GAP FP, it should send the corresponding line id for each call, as specified in clause 7.4.5.2.2 (or alternatively clause 7.4.5.2.3), and not use "FP-managed line selection" (following the recommendation included in clause 7.4.5.2.4 that FP-managed line selection is not meant for PPs attached to a single line).

- In front of a GAP FP, it shall not send any line identifier.

7.4.8   Multiple call line handling

7.4.8.1   Multiple calls general requirements

The "Multiple calls" feature represents the ability for a FP and PP to support several fully parallel calls (outgoing or incoming) to and from a single line supporting the "Multiple call" mode.
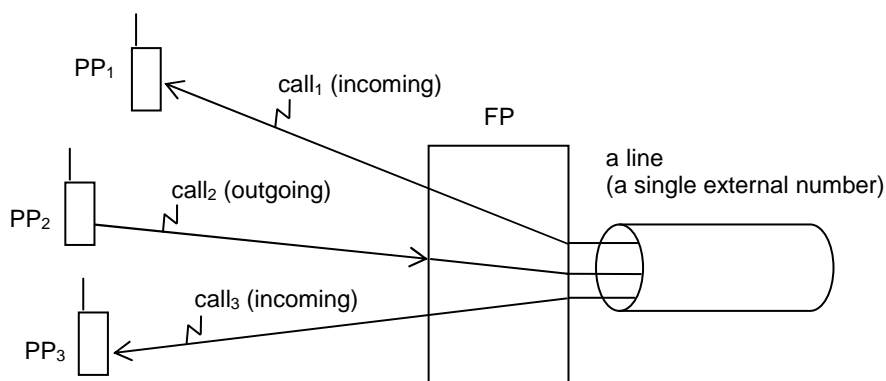
Figure 37: A multiple-call line with three simultaneous calls

This feature is especially useful when several calls are placed or received on *different* handsets at the same time. However, a multiple call enabled DECT system is compatible and can be connected to a non multiple call line like a PSTN line.

From the DECT system point of view, a multiple call line may be configured in "single call" mode. To configure a multiple call line in "single call" mode, or the other way round, the "Multiple call mode" setting of the "DECT system settings list" (see clause 7.4.11.4.8) shall be used through the "List access service" feature (NG1.N.16).

NOTE 1:   PSTN double calls are also a kind of multiple calls on a single line, but always with a single handset for both calls, and only one call context active at a time.

NOTE 2:   "Multiple calls" is most notably a feature brought by VoIP protocols, allowing several call contexts to be opened simultaneously on network side.

When implementing the "Multiple calls" feature, the FP shall set bit a_{39} of the "Extended higher layer capabilities (part 2)" (see EN 300 175-5 [5], clause F.3).

7.4.8.1.1   Pre-requisites

The following pre-requisites for implementation of the "Multiple calls" feature shall be taken into account:

- A FP implementing the "Multiple calls" feature shall implement the "Call identification" feature as a pre-requisite.

- A PP implementing the "Multiple calls" feature should implement the "Call identification" feature as well.

- A PP or FP implementing the "Multiple calls" feature shall implement the feature entitled "Common parallel call procedures" of clause 7.4.3.5 as a pre-requisite, so that a new call can be placed or received on an already in communication PP.

NOTE: On FP side, implementation of the feature entitled "Common parallel call procedures" also implies implementation of the "Line identification" feature.

7.4.8.1.2   Minimum requirements

An implementation of the "Multiple calls" feature on a DECT system shall comply with the following minimum requirements:

- The "maximum number of simultaneous calls" supported by a FP implementing the "Multiple calls" feature shall be at least equal to 2. This includes support of as many simultaneous call contexts.

- The FP shall be able to support this maximum number of incoming or outgoing calls for idle PPs as defined in clause 7.4.6.2. This includes simultaneous ringing of all idle PPs on incoming calls and availability of all idle handsets for placing a new call when there is already a call going on on the line.

7.4.8.2 Incoming and outgoing external calls on a multiple call line

This procedure applies to the FP and the PP at external call (incoming or outgoing) setup on a multiple call line. This line might be set in "multiple call" or "single call" mode.

7.4.8.2.1 Line set in "single call" mode

On a multiple call line configured in "single call" mode, only one call can be active at a time on the line. Other calls (second, or further) are on-hold and can only become active by replacing the existing one on the same PP.

To handle a line in "single call" mode, the DECT system shall use the usual procedures defined in the present DECT standard. In particular, the feature entitled "Common parallel call procedures" shall be used to handle the second or further call on the same PP.

If the DECT system is busy, but implicit call intrusion is enabled by configuration, clause 7.4.3.8.1 shall be used instead of the "Busy system or line notification" procedure (clause 7.4.6.3).

7.4.8.2.2 Line set in "multiple call" mode

On a multiple call line configured in "multiple call" mode, several calls may be active simultaneously; second and further calls are presented to all PPs (idle or busy). The following table details the procedures to be used.

Table 24: Line set in "multiple call" mode

	Incoming call setup	Outgoing call setup
On all idle PPs attached to the line	GAP 8.12 "Incoming call request" shall be used (see note 1)	GAP 8.2 "Outgoing call request" shall be used (see note 2)
On all busy PPs attached to the line	"Call waiting indication" (see clause 7.4.3.5.2), shall be used (see notes 3, 4 and 5)	"Outgoing parallel call initiation" (clause 7.4.3.5.1) shall be used (see notes 2 and 3)
NOTE 1: Unless the DECT system is busy (see clause 7.4.6.3), although the line was not, in which case the call is not presented.		
NOTE 2: If the DECT system is busy, the "Busy system or line notification" procedure (see clause 7.4.6.3) must be used back.		
NOTE 3: All "Common parallel calls procedures", then, apply for handling the parallel calls. The fully parallel calls are in this case only alternatively active as for PSTN double calls.		
NOTE 4: On a multiple call line with VoIP interfacea call waiting procedure for already in use handsets may be used in the following two cases: a second VoIP call is received, or an in-band call waiting tone from a PSTN to VoIP gateway is received. However, the used procedures are the same.		
NOTE 5: If the call is meanwhile accepted by another PP, or if the remote party hangs up before the call is accepted by any PP, the call must be then released by the FP towards the current PP (see clauses 7.4.3.5.4 and 7.4.3.5.5).		

7.4.8.3 Busy system or line notification

This procedure applies to the FP and a PP that initiated an outgoing call (external or internal) at a point in time where the FP and/or the line cannot support the additional call. The new outgoing call may be a first call, or a parallel call.

NOTE 1: The current procedure applies within an outgoing call setup attempt. For idle PPs, a <<DISPLAY>> notification can also be used outside of any call for preventing call setup attempts, especially on a line in single-call mode.

NOTE 2: In single call mode, the line is considered busy for idle PPs, as soon as one call is going on on it.

Busy line: A busy line is a line for which no new incoming or outgoing call can be performed, because all of the available bandwidth is used. This concept is especially relevant for multiple call lines.

Busy system: A DECT system is busy if the FP is not able to support any additional call, because the maximum number of call contexts it can handle has been reached. The system may be busy without the line being busy.

NOTE 3: A call context could be used by an internal call. A system should allow as many calls (external *or internal*) as there are call contexts potentially available on the system.

On call setup attempt (first or parallel), if the system is busy or the line is busy, the FP shall send back a "busy system or line notification" back to the PP, in the form of a <<SIGNAL>> information element with <Signal value> field equal to 04H ('busy tone') included in a CC-INFO message.

If the PP does not hook on after a time-out has elapsed, the FP shall send a call release request to the PP to terminate the call attempt. This call release request shall take the form of a CC-RELEASE message for a first call, or of a CC-INFO message according to procedure "Call release and call release rejection" (clause 7.4.3.5.4), for a parallel call.
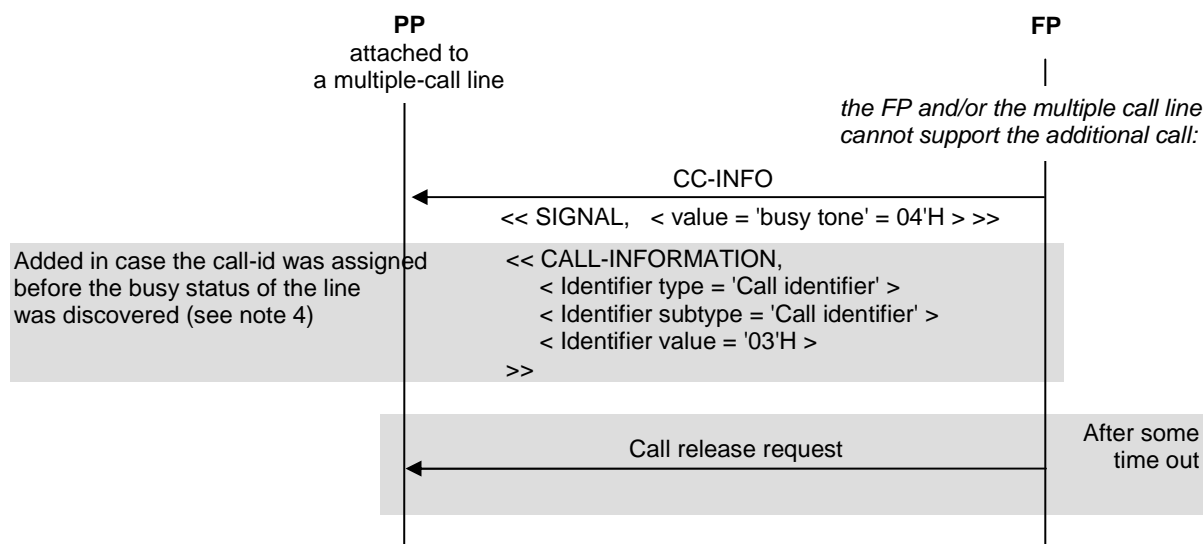
Figure 38: Busy system or line notification for call with defined call-id=3

NOTE 4:   The call identifier may be sent here even if the PP did not receive it before. Ignored on PP side, if the PP does not implement the "Call identification" feature.

7.4.9   PP and FP capabilities indication and broadcast

7.4.9.1   Terminal capability indication

NOTE 0:   This procedure description replaces clause 8.17 of EN 300 444 (GAP) [12].

The PP shall be able to send the <<Terminal capability>> information element and the FP shall be able to receive it at least in {ACCESS-RIGHTS-REQUEST} and when location registration is supported in the {LOCATE-REQUEST}. The following text together with the associated clauses define the mandatory requirements with regard to the present document.

Table 25: Values used within the <<TERMINAL CAPABILITY>> information element

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
<<Terminal capability>>	<Tone capability>	All	
	<Display capability>	All	If PT supports feature (GAP.N.24) it shall indicate in this field value which is equal to or higher than 2
	Echo parameters	[1, 2, 3]	See note 1
	Slot type capability	All	Full and long 640 slots mandatory; double and long 672 optional. See also note 2
	Ambient noise Rejection (N-REJ)	[1, 2]	See note 2
	Adaptive volume control (A-VOL)	[1, 2, 3]	See note 2
	<Profile indicator_1>	"xxxxx1x"B	GAP and/or PAP supported

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
	<Profile indicator_6>	"1xxxxxx"B, "0xxxxx"B	Support (or not support) of "no-emision" mode (optional feature)
	<Profile indicator_7>	"xxxx11x"B	New Generation DECT Wideband speech supported, and Part 3 supported.
		"xxx1xxx"B or "xxx0xxx"B	Support of the "Call identification" feature [NG1.N.13]
		"xx1xxxx"B or "xx0xxxx"B	Support of the "Common parallel call procedures" feature [NG1.N.7]
		"x1xxxxx" or "x0xxxxx"B	Support of the "Multiple lines" feature [NG1.N.14]
	<Control codes>	All	If PT supports feature (GAP.N.25) it shall indicate in this field value which is equal to or higher than 2

NOTE 1: Echo parameters values "01" and "10" may only be set by type 2a PPs. See clause 6.8, table 7, note 2 for restrictions on PPs type 2a. GAP compliant or NG-DECT part 1compliant PPs may also set these values.

NOTE 2: This capability is assumed as the default value (see table 26) if the <<TERMINAL-CAPABILITY>> information element is omitted.

The capabilities in table 26 shall be assumed as default if the following fields in the <<TERMINAL CAPABILITY>> information element are not present.

Table 26: Values assumed as terminal capabilities

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
<<Terminal capability>>	<Echo parameters>	1	Minimum Telephone Coupling Loss (TCL) (> 34 dB)
	<N-REJ>	1	No noise rejection
	<A-VOL>	1	No PP adaptive volume control
	<Slot type capability>	"xxx1x1x"B	Full slot and Long slot (j=640) supported

No echoing of characters is allowed in the FT and therefore the PT would be responsible for displaying dialled digits. All display information from the FT would be assumed to be additional information that the PT shall display in addition. The PT shall logically separate display information originating at the FT and PT. This could be achieved, for example, by one physical display and two logical displays or two physical displays and two logical displays. The key point is that display characters from the PT and FT shall not be simultaneously interleaved/mixed on the same physical display.

7.4.9.2   Higher layer information FP broadcast

The FP and PT shall support the broadcast of Higher Layer capabilities as part of Q_T MAC broadcast messages (see clauses 7.6.3, 7.6.4 and 7.6.5).

The broadcast attributes are a small set of NWK layer and DLC layer capabilities (jointly known as "higher layer capabilities") that shall be broadcast regularly as part of the MAC layer broadcast service. See EN 300 175-5 [5], annex F.

RFPs belonging to the same LA shall broadcast the same values of higher layer attributes (see EN 300 175-5 [5], annex F) at any given time.

The PP shall be capable to read and interpret at least the following broadcast attributes codings during locking procedure. In the locked state the PP may assume them as static.

FP and PT shall support the following values of "Higher Layer capabilities" information attributes.

7.4.9.2.1   Higher layer information in standard FP broadcast (Qh= 3)

The requirements of clause 7.3.9.1 of TS 102 527-1 [21] shall apply.

7.4.9.2.2   Extended Higher Layer capabilities part 2

The Extended Higher Layer capabilities, part 2, Fixed Part Information field shall be used indicating the supported set of Wideband speech Services.

Table 27: Extended Higher Layer Capabilities part 2 interpretation by the PP

BIT Number	Attribute	Value	Note
< a_{24} >	NG-DECT Wideband voice supported	1	See TS 102 527-1 [21]
< a_{29} >	NG-DECT extended voice supported	1	
< a_{30} >	NG-DECT extended voice supported sets of services: Call transfer (external or internal)	[0, 1]	Related procedures: clause 7.4.3.6
< a_{31} >	NG-DECT extended voice supported sets of services: Common parallel call procedures (internal or external)	[0, 1]	Related procedures: clause 7.4.3.5
< a_{32} >	NG-DECT extended voice supported sets of services: Third party conference call (internal or external)	[0, 1]	Related procedures: clause 7.4.3.7
< a_{33} >	NG-DECT extended voice supported sets of services: Intrusion call	[0, 1]	Related procedures: clause 7.4.3.8
< a_{34} >	NG-DECT extended voice supported sets of services: Call deflection	[0, 1]	Related procedures: clauses 7.4.4.1.1 and 7.4.4.2
< a_{35} >	"no emission" mode support	[0, 1]	Related procedures: see NG1.M.5 in clause 6.12
< a_{36} >	List access service feature support	[0, 1]	Related procedures: clause 7.4.10
< a_{37} >	Easy pairing feature support	[0, 1]	Related procedures: clauses 7.10.1.2.1, 7.10.1.3.1, 7.10.1.2.2, 7.10.1.2.3, 7.10.1.3.2 and 7.10.1.3.3. If supported, for security reasons, it shall be set to "1" and unset at the same time as a44
< a_{38} >	Multiple lines		Related procedures: clause 7.4.7
< a_{39} >	Multiple calls		Related procedures: clause 7.4.8
< a_{40} >	Permanent CLIR		Related procedures: clause 7.4.12

7.4.10   List access service

7.4.10.1   General considerations

Equipment supporting New Generation DECT Part 3 shall support the "List access service" feature as described in the present clause. The lists managed by this feature are structured as represented in figure 39.
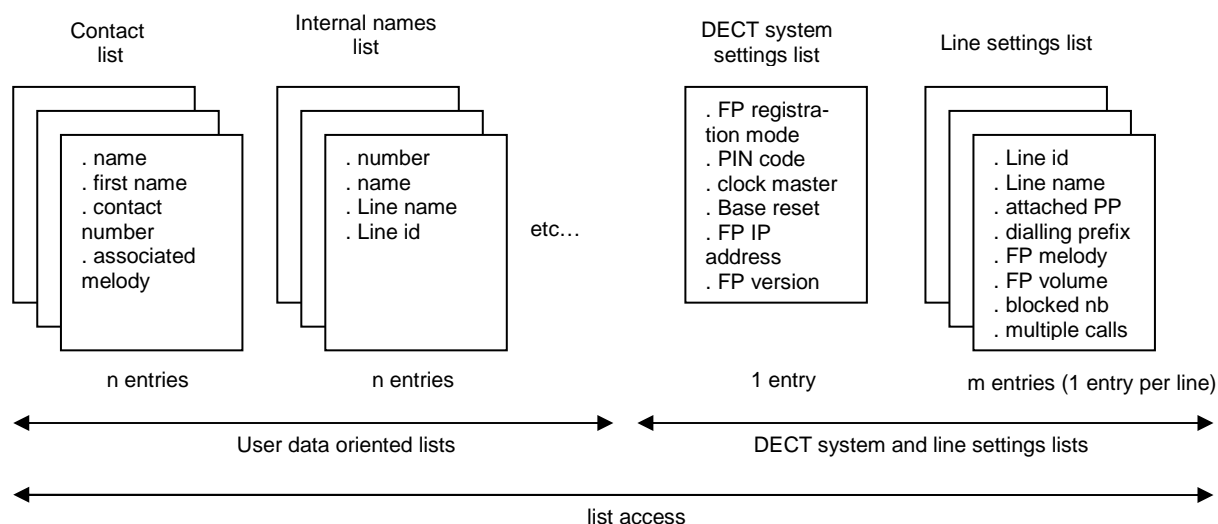
Figure 39: Structure of the lists managed by the "List access service" feature

The list access feature defines a generic way to access lists located in the FP from the PP. This access includes 'read', 'edit' and 'delete' functionalities.

When implementing the feature, the FP shall set the capability bit indicating "List access service" feature support (see EN 300 175-5, [5], clause F.3, bit a36).

The procedure is based on IWU-Info messages, which contain the information element <<IWU to IWU>>, using the dedicated protocol discriminator '03'H.

Table 28: Values used within the <<IWU to IWU>> information element

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	L	Length of content
	<S/R bit>	1	Transmission of message
	<Protocol Discriminator>	03H	List access
	<Command >	1…127	List access command
	<Command specific byte 0>		
	…		
	<Command specific byte L-2>		

Basic service :

The procedure can be started by a PP either in idle mode or in an already existing call. The procedure can be used independently of the basic service <Call class> field value of the call (i.e. all lists may be accessed with any <call class> value).

At call setup, it is recommended to use the following value for the <Call class> field of the <<Basic service>> IE:

- 'Internal call setup' for access to the list of internal names.

- 'Normal call setup' for access to the missed calls list, outgoing calls list, all calls list, incoming call accepted list, and contact list.

- 'Service call setup' for access to the system settings list and the line settings list.

If a call is already setup (internal or external call), the system shall continue to use the same connection for the list access session.

NOTE 1: Before starting the list access session, the PP may put the existing call on-hold (see clause 7.4.3.5.8) to indicate to the FP that the speech path is suspended during the list access session.

Interactions with incoming or outgoing voice call:

When initiating a list access session when a voice call (internal or external) is already ongoing. The PP:

- May put the existing call on hold (see clause 7.4.3.5.8) prior to list access.

- However, if the list access session is intended to establish an other voice call, the PP shall either:

  - Put the first voice call on hold prior to the list access session (see clause 7.4.3.5.8).

  - Use the outgoing parallel call initiation procedure (see clause 7.4.3.5.1) and access the list within this new call.

When initiating a voice call during a list access session:

- If the <Call class> is 'Internal call setup', and the call is a first call, dialled digits shall be used for placing an internal call. If the call is a parallel call, the NG1.N.7 "Common parallel calls procedures" feature shall be used instead.

- If the <Call class> is 'Normal call setup', and the call is a first call, dialled digits shall be used for placing an external call. If the call is a parallel call, the NG1.N.7 "Common parallel calls procedures" feature shall be used instead.

- If the <Call class> is 'Service call setup', dialled digits are for external call; unless the 17H 'Internal call' control code is send before the dialled digits. There will be an implicit change of the call class: the system will act as if the call class had changed from 'Service call setup' to 'Normal call setup' or to 'Internal call setup' as appropriate for the voice call being initiated.

When receiving an incoming voice call during a list access session, the FP may either:

- Close the list access session, release the list access call, and then present the incoming call as a first call using a new connection.

- Close the list access session, and manage the incoming call as a parallel incoming call (or "waiting call"; see NG1.N.6 "Parallel Calls" and related NG1.N.7 "Common parallel calls procedures" features).

- Leave the list access session open in the current state, and manage the incoming call as a parallel incoming call.

  NOTE 2:   When a connection has been setup for a list access session, a waiting call may be the first voice call occurring during the connection (i.e. it is not a truly parallel call although the "Waiting call indication" procedure is used).

When an open list access session and a voice call(s) are ongoing in parallel, the FP shall not release the link before the session and the call are ended.

Interactions with the "Call identification" feature NG1.N13:

Assuming that the "Call identification" feature NG1.N13 is implemented on FP side, call identification is intended for voice calls only. More specifically:

- At list access call setup, whatever the call class, the FP shall assign a call id just after the SETUP message. This call-id is intended for the outgoing voice call expected to be placed following the list access session.

- If list access re-uses an already established connection, no call identification shall be assigned by the FP at list access session setup.

- When the PP initiates a *first* voice call during a list access session, the voice call shall use the already assigned call identifier.

- When the PP initiates a *parallel* voice call during a list access session (the list access session was started while a first call was going on), the FP shall assign a new call id to this parallel call.

- When a waiting call is presented during a list access session, the FP shall always assign a new call-id to this incoming call. In other words, even if this waiting call is the first voice call occuring within the connection, it shall never use the already assigned call id.

Moreover the use of the C_F channel is recommended in case both parties support it (indicated in FP capabilities, bit a26). If there was an existing call when the list access session is started, the PP shall first put the existing call on-hold (see clause 7.4.3.5.8) before using the C_F channel.

Access to a list is encapsulated in a session. Each session is linked to exactly one list access and is used:

- by the FP to grant access to a list;

- to handle accesses to multiple lists from one PP.

Typical sequences of commands between start and end of a session are the following:

- "Read entries" or "search entries", for just reading entries;

- "Read entries" or "Search entries" followed by "Edit entry" and "Save entry" for updating an existing entry, if an "Edit entry" has been issued but the list entry is left unchanged, a "Save entry" command shall still be used to unlock the entry;

- "Save entry" with entry id equal to 0, for creating a new entry in the list.

Entry identifier: Each entry in a list is unambiguously identified within the FP for a dedicated list by an entry id. This entry id has to be referenced in case of writing access and is used by the FP to reject multiple write accesses from several PPs.

Field identifier: Each entry of a list may contain several fields. Each field has a unique identifier which is list dependent (see clause 7.4.10.5). This means the same field may be included in several list but with a different field id. This shall be taken into consideration when using field id in a command.

List index: The list index determines the position of an entry in a sorted list and is used for navigation within a list. The list index may change after modification of the list.

In order to indicate list changes to the PPs, a notification procedure is defined. This enables the PP to read list contents in advance before using them (caching), enabling the PP both to hold local copies of lists and to anticipate operations around the current entry, in order to save time and so increase interactivity (faster MMIs on PP side).

List entry fields with characters shall in the FP be stored in UTF-8 format. PP shall be able to support at least IA5.

Guarantee of service:

When the FP supports a list, it shall manage and process all mandatory commands. Negative answers are allowed only for real faulty cases and shall not be used systematically. Especially, the FP shall not declare it supports a list and respond with negative answers to all commands.

When the FP supports a list, it shall support as many fields as possible.

When the FP supports a field of an entry, it shall support as many values as possible for the field and process this field correctly. For example: if the FP uses a name entry field it shall fill it correctly and not always leave it empty.

When the DECT-NG PART3 system supports a list, it shall also implement the corresponding service related to this list, entry or field. The PP shall display as many fields as possible. For example: if a FP declares a contact list, the FP shall fill it correctly and support all mandatory requests from all PPs. The PP shall provide access to this contact to the user and not re-create a local copy of the list.

Of course the FP shall update automatically missed calls, outgoing call, all call list by adding locally corresponding entries in the lists.

Initial values:

- First possible session identifier assigned by FP shall be "1". Value "0" is a reserved return value used by the FP when a problem occurs.

- First possible "list identifier" shall be "0" (see clause 7.4.10.3 for list identifier coding).

- First possible "entry identifier" assigned by FP shall be "1".

- First possible "field identifier" shall be "1".

- First possible "Start index" parameter value in read/read confirm/search entries/search entries confirm commands shall be "1". Value "0" points to the last entry.

- First possible "position index" parameter value in save/save confirm commands shall be "1" (first entry). Value "0" points to the last entry.

Sessions:

The FP shall be able to handle 2 started sessions initiated from a single PP at the same time.

All sessions between a PP and FP are ended at the latest at call release.

The number of entries allowed within a list is defined by the FP (manufacturer dependent). A dedicated error code shall be used if PP tries to save new entry in a full list.

7.4.10.2   List change notification

When a list change notification is implemented by the FP:

- The notification shall be sent upon change of the contents of a list (i.e. change of an entry or addition of an entry).

- If the list contains a line identifier, the notification shall be sent to all PPs attached to line id of the modified entry, and only to them.

- If the list does not contain any line identifier, the notification shall be sent to all registered PPs.

- Notifications shall be sent by the FP by use of the "generic event notification" procedure. For indication of list change and values used in <<Events notification>> information element, consider table 29.

Table 29: Values used within {FACILITY} message for list change indication

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<Events notification>>	<Event type>	3	List change indication
	<Event sub type>	X	List identifier as indicated in clause 7.4.10.3
	<Event multiplicity >	0..127	Total number of entries in the list (see note)
NOTE: 'Event multiplicity' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).			

In order to allow the display of information in idle mode on PP side, notifications shall be sent by the FP for:

- Line settings list.

- Internal names list. However, a change in this list shall only be notified when a PP modifies the name of another PP (if the FP allows it), and the list change notification shall only be sent to that other PP concerned by the change.

For all other lists, sending of notifications is left free to the implementor. However, the possibly important extra processing on FP and PP sides necessary for sending and handling notifications (e.g. if sent for each call) shall be carefully taken into account.

NOTE: If the corresponding feature is implemented, the notification includes the CALL INFORMATION IE with line identifier. This might be useful when notifying a change in the line settings list.

7.4.10.3   List identifier codings

The following list identifier codings are defined:

Bits	8 7 6 5 4 3 2 1	Meaning
	0 0 0 0 0 0 0 0	List of supported lists
	0 0 0 0 0 0 0 1	Missed calls list
	0 0 0 0 0 0 1 0	Outgoing calls list
	0 0 0 0 0 0 1 1	Incoming accepted calls list
	0 0 0 0 0 1 0 0	All calls list
	0 0 0 0 0 1 0 1	Contact list
	0 0 0 0 0 1 1 0	Internal names list
	0 0 0 0 0 1 1 1	DECT system settings list
	0 0 0 0 1 0 0 0	Line settings list
	1 x x x x x x x	Reserved for proprietary lists
	all other values reserved	

The lists shall be sorted on the FP, using default criteria for each of them. The default sorting criteria are the following:

- The "Missed calls", "Outgoing calls", "Incoming accepted call" lists, and more generally all call-related lists shall be sorted by default using the "Date and time" field.

- The "Contact" list shall be sorted by default using the "Name" field (first criterion). In case the names are equal the list should be sorted using the "First name" field (criterion 2).

- The "Internal names" list shall be sorted by default using the "Number" field (terminal id number).

- The "Line settings" list shall be sorted by default using the "Line id" field.

Please refer to the "Start session" command for a definition of the sorting order used for a given field type (this definition applies independently of the position of the field in the sorting process: i.e. whether used as "first criterion", "criterion 2", etc.).

7.4.10.4   List Access Commands

The following list access commands are defined:

Bits	8 7 6 5 4 3 2 1	Meaning	PP -> FP	FP -> PP
	0 0 0 0 0 0 0 0	start session	yes	-
	0 0 0 0 0 0 0 1	start session confirm	-	yes
	0 0 0 0 0 0 1 0	end session	yes	yes
	0 0 0 0 0 0 1 1	end session confirm	yes	yes
	0 0 0 0 0 1 0 0	query supported entry fields	yes	-
	0 0 0 0 0 1 0 1	query supported entry fields confirm	-	yes
	0 0 0 0 0 1 1 0	read entries	yes	-
	0 0 0 0 0 1 1 1	read entries confirm	-	yes
	0 0 0 0 1 0 0 0	edit entry	yes	-
	0 0 0 0 1 0 0 1	edit entry confirm	-	yes
	0 0 0 0 1 0 1 0	save entry	yes	-
	0 0 0 0 1 0 1 1	save entry confirm	-	yes
	0 0 0 0 1 1 0 0	delete entry	yes	-
	0 0 0 0 1 1 0 1	delete entry confirm	-	yes
	0 0 0 0 1 1 1 0	delete list	yes	-
	0 0 0 0 1 1 1 1	delete list confirm	-	yes
	0 0 0 1 0 0 0 0	search entries	yes	-
	0 0 0 1 0 0 0 1	search entries confirm	-	yes
	0 0 0 1 0 0 1 0	negative acknowledgement	-	yes
	0 0 0 1 0 0 1 1	data packet	yes	yes
	0 0 0 1 0 1 0 0	data packet last	yes	yes
	1 x x x x x x x	reserved for proprietary list access commands		
	all other values reserved			

Proprietary list access commands shall have list access command codings with most significant bit set to '1'.

The "read entries", "read entries confirm" and "search entries confirm" commands use a start index as these command may apply to a range of entries within a list.

The "save entry" and "save entry confirm" commands use a position index as these commands apply to one entry.

Possible error codes are specified for each command from PP to FP. They use negative acknowledgement command, with exception of negative start session confirm.

7.4.10.4.1   Start and end session

7.4.10.4.1.1   "Start session" command

This command from PP requests to start a session to access the specified list in the FP.

Table 30: Values used within {IWU to IWU} information element
to request the starting of a list change session

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command =start session>	0	List access command
	<List identifier>	0..FFH	List identifier
	<Sorting fields>		List of suggested fields for sorting the list towards this PP
	<Number of sorting fields>	0..255	If 0, the default sorting of the list shall be used by the FP (see note)
	<Sorting field identifier 1>	0..255	Suggested field element type used for sorting the list (first criterion)
	…		
	<Sorting field identifier n>	0..255	Suggested field element type used for sorting the list, to be used when field 1, … , field n-1 of both compared entries are equal (criterion n)
NOTE: It is recommended to limit the number of requested sorting fields to two (n=2).			

The submitted sorting field identifiers suggest entry fields which should be used by the FP to sort the requested list towards this PP in the given session. This suggests to sort the list by "sorting field 1" as first criterion, and then by "sorting field 2" as second criterion, when field 1 of both compared entries are equal, and so on.

For each field type, a sorting order is defined, which applies independently of the position of the field in the sorting process: i.e. whether used as "first criterion", "criterion 2", etc. The defined sortings are as follows:

- For fields of type "Number" (including terminal id numbers), "Name", "Line name", "First name", or "Contact number", the alphanumerical order shall be used.

  NOTE: The alphanumerical order can only be defined on a subset of the UTF-8 encoded characters. This subset and the associated order depend on the locale used.

- For fields of type "Date and time", the ante-chronological order shall be used (highest index for the oldest call, lowest index for the newest call).

- For fields of type "Line id", the ascending numerical order shall be used.

If the <Number of sorting fields> is equal to 0, the FP shall use the default sorting of the list. No sorting field identifier is sent in this case.

7.4.10.4.1.2   "Start session confirm" command

This command from FP to PP confirms or rejects the start of the session.

**Table 31: Values used within {IWU to IWU} information element to confirm or
reject the starting of a list change session**

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command =start session confirm>	1H	List access command
	<List identifier>	0..FFH	List identifier
	<Session identifier>	0..127	Session identifier (see note 1)
	<Total number of available entries>	0..127	Number of available entries in list requested by the PP (see note 1)
	<Discriminator type>	00H, 01H	Undefined, EMC (see note 2)
	<Discriminator>	00H..FFH	EMC value high byte
	<Discriminator>	00H..FFH	EMC value low byte
	<Start session reject reason>	0..FFH	Reject reason in case of reject
	<Sorting fields>		List of fields used for the actual sorting the list towards this PP
	<Number of sorting fields>	0..255	
	<Sorting field identifier 1>	0..255	Field element type used for the actual sorting the list (first criterion)
	…		
	<Sorting field identifier n>	0..255	Field element type used for the actual sorting of the list (criterion n).
NOTE 1: 'Total number of available entries' and 'session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).			
NOTE 2: Discriminator type set to '1' (= EMC) indicates the support of proprietary list access commands, of proprietary lists and of proprietary list fields. For distinguising proprietary elements from different manufacturers, the EMC is given in the following two octets. In case Discriminator type is set to '0', the following two octets are don't care. The PP shall not use proprietary list elements in case either the Discriminator type is '0' (= Undefined) or the EMC is different from the own one.			

The session identifier shall be unique between FP and one PP. It identifies the access for one list to the PP, which has started the session. The FP shall at least support two session at a time to one PP.

Proprietary elements shall have identifiers with the most significant bit set to '1'.

The submitted list entry field identifiers are used to indicate the entry field which is used by the FP to sort the requested list towards this PP in the given session. The FP may choose other entry fields than the ones suggested by the PP in the 'start session' command (e.g. 'name' instead of 'first name' in contact list). The sorting capabilities of the FP depend on the implementation of the FP.

For list entry field identifiers see clause 7.4.10.5.1.

If start session is confirmed the reject reason shall not be evaluated.

Even if the default sorting is required by the PP in the "Start session" command (using '0' as value for <Number of sorting fields>), the FP shall confirm the sorting fields which were actually used for sorting the list (and which shall be the ones defined as "default" sorting fields in clause 7.4.10.4.1.1).

Possible error cases:

If start session is rejected, the session identifier shall be set to 0, and the field reject reason shall indicate the appropriate reason.

If a sorting field identifier is not valid, the submitted sorting field identifier shall be ignored by the FP. Nevertheless the FP indicates the chosen sorting field identifiers in the start session confirm.

Start session reject reason:

Bits	8 7 6 5 4 3 2 1	Meaning
	0 0 0 0 0 0 0 0	not enough resources
	0 0 0 0 0 0 0 1	list already in use by another session
	0 0 0 0 0 0 1 0	list not supported
	all other values reserved	

7.4.10.4.1.3 "End session" command

This command from PP or FP ends the specified session.

**Table 32: Values used within {IWU to IWU} information element
to request the end of a list change session**

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command =end session>	2H	List access command
	<Session identifier>	1..127	Session identifier (see note)
NOTE: 'Session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).			

This command may be sent by PP and FP to request end of session.

The session(s) between a PP and FP shall at latest be terminated with call release.

Remaining locked entries (see edit procedure) shall be unlocked with the end session command.

Possible error cases:

If session identifier is wrong the command should be ignored by the receiver.

7.4.10.4.1.4 "End session confirm" command

This command from PP or FP confirms the ending of the specified session.

**Table 33: Values used within {IWU to IWU} information element
to confirm the end of a list change session**

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command =end session confirm>	3H	List access command
	<Session identifier>	1..127	Session identifier (see note)
NOTE: 'Session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).			

Reject of end session request shall not be possible.

7.4.10.4.2 Query supported entry fields

7.4.10.4.2.1 "Query supported entry fields" command

This command from PP queries the fields which are supported or not in the entries of a given list in the FP.

**Table 34: Values used within {IWU to IWU} information element
for the "Query supported entry fields" command**

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command = query supported entry fields>	4H	List access command
	<Session identifier>	1..127	Session identifier (see note)
NOTE:	'Session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

Possible error cases:

If session identifier is wrong, the FP shall answer with negative acknowledgement reject reason 'invalid session number'.

7.4.10.4.2.2   "Query supported entry fields confirm" command

This command from FP confirms the query of supported fields which are supported or not in the entries of a given list in the FP.

The FP submits the supported entry field identifier and shall group them in editable and non-editable fields.

**Table 35: Values used within {IWU to IWU} information element
for the "Query supported entry fields confirm" command**

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command = query supported entry fields confirm>	5H	List access command
	<Session identifier>	1..127	Session identifier (see note)
	<number of editable entry fields>	0..255	Number of editable entry fields
	<List entry field identifier 1>	0..255	Supported field element type
	…		
	<List entry field identifier n>	0..255	Supported field element type
	<number of non-editable entry fields>	0..255	Number of non-editable entry fields
	<List entry field identifier 1>	0..255	Supported field element type
	…		
	<List entry field identifier n>	0..255	Supported field element type
NOTE:	'Session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

For list entry field identifiers see clause 7.4.10.5.1.

7.4.10.4.3   Read entries

7.4.10.4.3.1   "Read entries" command

This command from PP requests to read a range of consecutive entries in the list, or only a subset of the fields of these entries. The list here shall be understood as the list resulting from the initial sorting of the list as specified by the FP in the "Start session confirm" command.

NOTE 1: Range can be limited to one entry.

Table 36: Values used within {IWU to IWU} information element for "Read entries" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command =read entries>	6H	List access command
	<Session identifier>	1..127	Session identifier (see note 1)
	<Start index>	0..127	Start index (see note 1)
	<Counter>	1..255	Number of requested entries
	<List entry field identifier 1>	0..255	Requested field element type
	…		
	<List entry field identifier n>	0..255	Requested field element type
NOTE 1: 'Session identifier' and 'start index' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).			
NOTE 2: 'List entry field identifier' values are defined for each list separately.			

Start index:

The start index is the first index of the range of requested entries.

Bits	7 6 5 4 3 2 1	Meaning
	0 0 0 0 0 0 0	last entry
	other values	list entry

Counter (octet):

Bits	8 7 6 5 4 3 2 1	Meaning
	0 x x x x x x x	forward (in ascending list index order)
	1 x x x x x x x	backward (in descending list index order)

The response contains data packets with list entries in order of ascending list index, regardless of whether counter indicated forward or backwards and always includes the entry with list index=start index.

EXAMPLE: In case 2 entries are requested 'backwards' with start index 5, the data packets shall include the entries with indices 4 and 5, with entry 4 transmitted first.

Possible error cases:

If session identifier is wrong the FP shall answer with negative acknowledgement reject reason 'invalid session number'.

In case the 'start index' is invalid, the FP shall answer with negative acknowledgement, reject reason 'invalid start index'. This includes the case where the list is empty.

In case the index range given with 'counter' is invalid, the FP shall return the existing elements in the range.

In case an unknown list entry field identifier is requested, the FP shall ignore this field and continue with the next requested field.

7.4.10.4.3.2   "Read entries confirm" command

This command from FP confirms the read command with the corresponding entry/entries with one or several specified fields. Corresponding entry/entries are sent along in data packets.

Table 37: Values used within {IWU to IWU} information element for "Read entries confirm" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command =read entries confirm>	7H	List access command
	<Start index>	1..127	Start index (see note)
	<Session identifier>	1..127	Session identifier (see note)
	<Counter>	0..255	Number of delivered entries
NOTE:	'Start index' and 'Session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

'Counter' returns the number of returned list entries.

'Start index' shall always indicate the smallest index value of the list response.

Content of list entry is transmitted in data packets.

7.4.10.4.4 Edit entry

7.4.10.4.4.1 "Edit entry" command

This command from PP requests to read and lock only one entry.

Table 38: Values used within {IWU to IWU} information element for "Edit entry" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command =edit entry>	8H	List access command
	<Session identifier>	1..127	Session identifier (see note)
	<Entry identifier>	1..127	Entry identifier (see note)
	<List entry field identifier 1>	0..255	Requested field element type
	…		
	<List entry field identifier n>	0..255	Requested field element type
NOTE:	'Session identifier' and 'entry identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

Whether a field element is editable or not is indicated in the response message.

In contrast to 'read entries', the list access command 'edit entry' offers the reference to a single list entry via 'entry identifier'.

FP shall prevent other PPs from changing the requested list entry (negative acknowledgement with reject reason 'temporarily not possible') until PP has sent the save entry command or the session is terminated.

'List entry field identifier' values are defined for each list separately.

Possible error cases:

If session identifier is wrong the FP shall answer with negative acknowledgement reject reason 'invalid session number'.

In case an unknown entry identifier is requested, the FP shall answer with negative acknowledgement, reject reason 'entry not available'.

In case an unknown list entry field identifier is requested, the FP shall ignore this field and continue with the next requested field.

7.4.10.4.4.2 "Edit entry confirm" command

This command from FP confirms the edit command with the corresponding entry with one or several specified fields, and locks this entry against access from other PPs. Corresponding entry is sent along in data packets.

Table 39: Values used within {IWU to IWU} information element for "edit entry confirm" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command =edit entry confirm>	9H	List access command
	<Session identifier>	1..127	Session identifier (see note)
NOTE:	'Session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

Content of list entry is transmitted in data packets.

7.4.10.4.5 Save entry

7.4.10.4.5.1 "Save entry" command

This command from PP requests to save the entry in the list identified by the specified entry identifier, or to add a new entry to the list. Corresponding entry is sent along in data packets.

The list entries which are saved shall have been requested via 'edit' before in the same session, except for creation of a new entry.

The 'save' transaction shall contain all fields or a subset of the fields which were submitted in the 'edit' transaction.

If a new entry is created, the PP shall indicate this by using the entry identifier 00H. In this case FP shall assign a new entry identifier for the entry, and submit it in the following 'save entry confirm'.

Table 40: Values used within {IWU to IWU} information element for "Save entry" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command = save entry>	AH	List access command
	<Session identifier>	1..127	Session identifier (see note)
	<Entry identifier>	0..127	Entry identifier (see note)
NOTE:	'Session identifier' and 'entry identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

Content of list entry is transmitted in data packets.

Entry identifier:

Bits	7 6 5 4 3 2 1	Meaning
	0 0 0 0 0 0 0	not yet assigned entry identifier (new entry proposed by the PP)
	other values	assigned entry identifier (this entry identifier shall already exist in the list)

If a new entry has to be created, the PP shall indicate this by using the entry identifier 00H. In this case FP shall assign a new entry identifier for the entry and submit it in the following 'save entry confirm'.

The new or modified entry shall be inserted in the list by the FP taking into account the sorting criteria for this list.

Content of list entry is transmitted in data packets.

If the previously started edit procedure has to be terminated without changing the list entry, PP shall perform the 'save entry' procedure with only one empty 'last data packet' following after 'save entry'.

In case several fields of the same type in one entry were received during 'edit', PP shall send with 'save' all received fields of this type.

Fields which shall be deleted shall be sent back to FP with length 0.

Possible error cases:

If session identifier is wrong the FP shall answer with negative acknowledgement reject reason 'invalid session number'.

If an unknown entry identifier of the list is requested (except 0), the FP shall answer with negative acknowledgement, reject reason 'entry not available'.

If a PP attempts to save an entry with a field content which cannot be accepted, (e.g. for a field whose contents are only allowed once in the list like line-id in the "Line settings" list), the FP shall reject the command with a negative acknowledgement, with reject reason "content not accepted".

If a PP attempts to add a new entry in a list which cannot accept an additional entry, the FP shall reject the command with a negative acknowledgement, with reject reason "list full".

7.4.10.4.5.2   "Save entry confirm" command

This command from FP confirms the save of one entry in a list and returns the position index where the entry was saved.

Table 41: Values used within {IWU to IWU} information element for "Save entry confirm" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command = save entry confirm>	BH	List access command
	<Session identifier>	1..127	Session identifier (see note)
	<Entry identifier>	1..127	Entry identifier (see note)
	<Position index>	1..127	Position index (see note)
NOTE: 'Session identifier', 'position index' and 'entry identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).			

The position index indicates the (possibly new) index of the entry in the list.

Entry fields which were not indicated as editable shall not be sent back with changes within the data packet messages belonging to the save entry procedure.

In case changes in non-editable fields or a change of a not previously requested (edit) entry, the FP should send negative acknowledge with reject reason 'procedure not allowed'.

7.4.10.4.6   Delete entry

7.4.10.4.6.1   "Delete entry" command

This command from PP requests to delete one entry in a list.

Table 42: Values used within {IWU to IWU} information element for "Delete entry" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command =delete entry>	CH	List access command
	<Session identifier>	1..127	Session identifier (see note)
	<Entry identifier>	1..127	Entry identifier (see note)
NOTE:	'Session identifier' and 'entry identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

Delete entry is not allowed for 'List of supported lists', nor for 'DECT system settings list'.

Possible error cases:

If session identifier is wrong the FP shall answer with negative acknowledgement reject reason 'invalid session number'.

If an unknown entry identifier of the list is requested (except 0), the FP shall answer with negative acknowledgement, reject reason 'entry not available'.

If the PP requests delete entry for 'List of supported lists' or 'DECT system settings list', the FP shall answer with negative achnowledgement reject reason, 'procedure not allowed'.

7.4.10.6.1.2   "Delete entry confirm" command

This command from FP confirms the deletion of an entry in a list.

Table 43: Values used within {IWU to IWU} information element for "Delete entry confirm" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command = delete entry confirm>	DH	List access command
	<Session identifier>	1..127	Session identifier (see note)
	<Total number of available entries>	0..127	Number of available entries in list after deletion (see note)
NOTE:	'Total number of available entries' and 'session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

7.4.10.4.7   Delete list

7.4.10.4.7.1   "Delete list" command

This command from PP requests the deletion of a complete list.

Table 44: Values used within {IWU to IWU} information element for "Delete list" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command =delete list>	EH	List access command
	<Session identifier>	1..127	Session identifier (see note)
NOTE:	'Session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

Delete list means deletion of all entries. The list itself is still available.

Delete list is not allowed for 'List of supported lists', 'Line settings list'; nor for 'DECT system settings list'.

Possible error cases:

If session identifier is wrong the FP shall answer with negative acknowledgement reject reason 'invalid session number'.

If an unknown list identifier is requested (including list of supported list), the FP shall answer with negative acknowledgement, reject reason 'procedure not allowed'.

In case the FP rejects the delete list command, it shall answer with negative acknowledgement, reject reason=procedure not allowed.

If the PP requests delete list for 'List of supported lists'or 'DECT system settings list', the FP shall answer with negative achnowledgement reject reason, 'procedure not allowed'.

7.4.10.4.7.2   "Delete list confirm" command

This command from FP confirms the deletion of a complete list.

Table 45: Values used within {IWU to IWU} information element for "Delete list confirm" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command =delete list confirm>	FH	List access command
	<Session identifier>	1..127	Session identifier (see note)
NOTE: 'Session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).			

7.4.10.4.8   Search entries

7.4.10.4.8.1   "Search entries" command

This command from PP requests to read a range of consecutive entries in the list, beginning with an entry matching a search criterion. The list here shall be understood as the list resulting from the initial sorting of the list as specified by the FP in the "Start session confirm" command.

Table 46: Values used within {IWU to IWU} information element for "Search entries" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command = search entries>	10H	List access command
	<Session identifier>	1..127	Session identifier (see note)
	<Matching option>	00H to 07H	First part of the search criterion
	<Searched value >		Second part of the search criterion; Always coded as a string
	<String length>	1..255	
	<String content 0>	…	UTF-8 coded characters
	…	…	
	<String content n>	…	UTF-8 coded characters
	<Counter>	1..255	Number of requested entries
	<List entry field identifier 1>	0..255	Requested field element type
	…	…	
	<List entry field identifier n>	0..255	Requested field element type
NOTE:	'Session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

In the list access command 'search entries', the submitted searched value contents together with the matching option define the search criterion.

FP answers with list entries beginning with the first matching entry, but it does not generate a new list for the result. A matching entry shall be understood with the matching option taken into account.

The "Search entries" command shall be considered successful if at least one entry is found that matches the search criterion, and even if there are less than <counter>-1 entries after the matching entry in the list. See "Search entries confirm" command/particular cases for the case the search does not succeed (no entry found at all).

The command 'search entries' is in principle similar to 'read entries' with the exception, that instead of 'start index' the 'searched value' is used.

Matching option:

Bits	8 7 6 5 4 3 2 1	Meaning
	0 0 0 0 0 0 0 0	exact match with whole target field required
	0 0 0 0 0 0 0 1	exact match as with 00H option tried, current start index returned if exact match fails
	0 0 0 0 0 0 1 0	exact match as with 00H option tried, previous start index returned if exact match fails
	0 0 0 0 0 1 x x	case sensitive search required
	all other values reserved	

If '00'H matching option is used, the FP shall only succeed if it finds an entry in the list with first sorting field value *equal* to the searched value, and shall return an error otherwise (see possible error cases).

> NOTE 1: This option is especially useful for the PP to retrieve a specific entry with no human intervention.

If '01'H matching option is used, the FP shall only succeed if either the exact match succeeds (as with option 00H), or if the end of the list was not reached when the exact match failed. The current entry index shall be returned as start index of the returned range. If the end of the list was reached when the exact match failed (there is no current entry anymore), the FP shall return an error (see possible error cases).

If '02'H matching option is used, the FP shall only succeed if either the exact match succeeds (as with option 00H), or if the current entry when the exact match failed was not the first entry of the list. The "previous index" = "current entry index -1" shall be returned as start index of the returned range. If the current entry when the exact match failed was the first entry of the list, the FP shall return an error (see possible error cases).

NOTE 2: Options '01'H and '02'H are especially useful for searching the contact list. For example, if "Smi" is the searched value, with matching option '01'H, and there is no entry with "Name" field equal to "Smi" in the list, exact match will fail on the first entry ranked after "Smi" in the list when using the alphanumerical order. This entry is the so-called "current entry" and may have e.g. "Smith" as "Name" field value, or any other value.

Searched value:

The FP shall use the 'searched value' as search criterion in the entry field which was used as first criterion by the FP for sorting the list; this sorting field is indicated to the PP in the 'Start session confirm' command.

In case a numerical value is searched, the string content fields shall contain the IA5-coded decimal representation of the value (e.g. in case of searching for Line id =12, the string content is '31H 32H').

NOTE 3: This particular coding of numerical values does not imply anything about the underlying sorting order of the list, which depends on the sorting fields defined for the session and on their types (see "Start session" command).

Counter (octet):

See the "Read entries" command (clause 7.4.10.4.3), as the same definition applies here.

Possible error cases:

If session identifier is wrong the FP shall answer with negative acknowledgement reject reason 'invalid session number'.

In case an unknown list entry field identifier is requested, the FP shall ignore this field and continue with the next requested field.

7.4.10.4.8.2   "Search entries confirm" command

This command from the FP specifies the start index of the range of entries found as a result of the "Search entries" command, and the number of returned entries. Corresponding entry/entries are sent along in data packets.

**Table 47: Values used within {IWU to IWU} information element
for "Search entries confirm" command**

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command = search entries confirm>	11H	List access command
	<Session identifier>	1..127	Session identifier (see note)
	<Start index>	1..127	Start index of the range of returned entries (see note)
	<Counter>	0..255	Number of returned entries
NOTE: 'Session identifier' and 'start index' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).			

Start index and counter return the index of the first returned list entry and the number of returned list entries.

Content of list entry/entries is transmitted in data packets.

Particular cases:

If no entry is found that matches the search criterion, the <counter> field value shall be set to zero. No data packet shall be sent.

7.4.10.4.9   Negative Acknowledgement

This command from FP rejects the previous command with a reject reason.

Table 48: Values used within {IWU to IWU} information element for "Reject" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command=negative acknowledgement >	12H	List access command
	<Session identifier>	1..127	Session identifier (see note)
	<Reject reason>	0..255	Reject Reason
NOTE:	'Session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

Reject reason:

Bits	8 7 6 5 4 3 2 1	Meaning
	0 0 0 0 0 0 0 0	invalid range
	0 0 0 0 0 0 0 1	entry not available
	0 0 0 0 0 0 1 0	invalid session number
	0 0 0 0 0 0 1 1	temporarily not possible
	0 0 0 0 0 1 0 0	entry format incorrect
	0 0 0 0 0 1 0 1	invalid start index
	0 0 0 0 0 1 1 0	procedure not supported
	0 0 0 0 0 1 1 1	procedure not allowed
	0 0 0 0 1 0 0 0	content not accepted
	0 0 0 0 1 0 0 1	list full
	all other values reserved	

In case of 'invalid session number', the invalid session identifier of the acknowledged command is used in the negative acknowledgement.

7.4.10.4.10 Data packet / Data packet last

These packets allow to send data content along with a command.

Table 49: Values used within {IWU to IWU} information element for "Data packet" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Length of content>	LH	Length of content
	<Protocol Discriminator>	03H	List access
	<Command =data packet / data packet last>	13H/14H	List access command
	<Session identifier>	1..127	Session identifier (see note)
	<Data content byte 0>	0.. 255	Content first byte
	…		
	<Data content byte n >	0.. 255	Content last byte
NOTE:	'Session identifier' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

'Data packet last' is used if no more data will be sent for this response.

Data content is structured as follows:

Table 50: Data content structure in the "Data packet" command

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<IWU to IWU>>	<Entry identifier for 1st entry>	1..127	Identifier of the entry (see note)
	<Entry length>	0..127	Length (see note)
	<Entry field identifier 1 >	0.. 255	
	<Entry field length>	0..127	Length (see note)
	<Entry field content 0>		
	…		
	<Entry field content i>		
	<Entry field identifier 2 >	0.. 255	
	…		
	<Entry field identifier n >	0..255	
	<Entry field length>	0..127	Length (see note)
	<Entry field content 0>		
	…		
	<Entry field content j>		
	<Entry identifier for 2nd entry>	1..127	Identifier of the entry (see note)
	<Entry length>	0..127	Length (see note)
	…		
	Continues with further entries		
NOTE:	'Entry identifier', 'entry length', and 'entry field length' can be extended using the most significant bit up to 16383. In case more than one byte is used for the value, the highbyte shall be send before the lowbyte (e.g. '1' is coded as 0x81, '128' is coded as 0x01 0x80).		

NOTE: The data content is distributed over several 'data packet' messages. One entry field might be distributed over more than one data packet.

For entry field contents see clause 7.4.10.5.1.

7.4.10.5   Lists and entry fields

In the following, the entry field identifiers for various lists are defined.

Proprietary list fields shall have entry field identifiers with the most significant bit set to '1'.

7.4.10.5.1   Fields description

7.4.10.5.1.1   Field 'List identifiers'

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = List identifiers								1
	0/1	Length (L)							2
	0/1	X	x	x	X	x	x	x	3
	1st supported list identifier								4
	2nd supported list identifier								5
	…								

For octet 3 'x' indicates, the value is reserved for future use.

The list identifiers shall be ordered in ascending numerical order.

The list identifiers are defined in clause 7.4.10.3.

7.4.10.5.1.2   Field 'Number'

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = Number								1
	0/1	Length (L)							2
	0/1	editable	internal	own	x	x	x	x	3
	1st digit								4
	2nd digit								
	…								

Each digit shall be out of 30H…39H, 23H, 2AH, 05H, 15H.

For octet 3, each bit indicates whether a property of the field is given (1) or not (0). In case of 'x', the value is reserved for future use.

7.4.10.5.1.2.1   Field 'number' for terminal identity numbers

This field is also used for terminal identity numbers, if needed. In that case, the digits shall correspond to the decimal representation of the terminal identity numbers coded in IA5. For example:

- For terminal 1, terminal identity number is 0000 0001B, coded value is 31H.

- For terminal 14, terminal identity number is 0000 1110B, coded value is 31H 34H.

7.4.10.5.1.3   Field 'Name'

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = Name								1
	0/1	Length (L)							2
	0/1	editable	x	x	x	x	x	x	3
	1st character byte								4
	2nd character byte								
	…								

Characters shall be coded as defined for UTF-8.

NOTE: If FP supports contact list, it is recommended to use the name from the contact list if available.

For octet 3, each bit indicates whether a property of the field is given (1) or not (0). In case of 'x', the value is reserved for future use.

7.4.10.5.1.4   Field 'Date and time'

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = Date and time								1
	0/1	Length (L)							2
	0/1	editable	x	x	x	x	x	x	3
	Content as specified for IE <<Time-DATE>> octet 3								4
	Content as specified for IE <<Time-DATE>> octet 4								5
	…								

For octet 3, each bit indicates whether a property of the field is given (1) or not (0). In case of 'x', the value is reserved for future use.

Octets 4 and following are coded as specified for octets 3 and following in IE <<Time-Date>> (EN 300 175-5 [5]). Only 'interpretation' 000000 (=current time/date) is allowed. Any 'coding' is allowed (time or date or time&date).

In case of multiple calls it is recommended that date and time indicate the last call.

7.4.10.5.1.5   Field 'New'

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = New								1
	0/1	Length (L)							2
	0/1	editable	new	x	x	x	x	x	3

For octet 3, each bit indicates whether a property of the field is given (1) or not (0). In case of 'x', the value is reserved for future use.

When a new entry is created, the bit 'new' shall be set by the FP. The FP shall reset the bit upon reading of the entry from any PP.

7.4.10.5.1.6   Field 'Line name'

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = Line name								1
	0/1	Length (L)							2
	0/1	editable	x	x	x	x	x	x	3
	1st character byte								4
	2nd character byte								5
	…								

For octet 3, each bit indicates whether a property of the field is given (1) or not (0). In case of 'x', the value is reserved for future use.

Characters shall be coded as defined for UTF-8.

7.4.10.5.1.7   Field 'Line id'

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = Line id								1
	0/1	Length (L)							2
	0/1	editable	x	x	x	x	x	x	3
	Identifier subtype								
	0/1	Identifier value							
	…	…							
	0/1	Identifier value							

For octet 3, each bit indicates whether a property of the field is given (1) or not (0). In case of 'x', the value is reserved for future use.

The structure of the Line id field aligns to the structure of IE <<CALL-INFORMATION>> line identifier type (see EN 300 175-5 [5], clause 7.7.56).

For all call-related lists, if the entry where the field is included corresponds to an internal call, the line id field shall be present but empty (length set to '0').

Identifier subtype values:

- For all call-related lists, the subtype shall be set to "Line identifier for external call" (call is external).

- For the "Contact list", subtype shall be set to "Relating to" or "All lines", depending on the contact.

- For the "Line settings" list, and for any other list, the subtype shall be set to "Relating to".

7.4.10.5.1.8   Field 'Number of calls'

Bits	8	7	6	5	4	3	2	1	Octet
	— Field identifier = Number of calls								1
	0/1	Length (L)							2
	0/1	editable	x	x	x	x	x	x	3
	value								4

For octet 3, each bit indicates whether a property of the field is given (1) or not (0). In case of 'x', the value is reserved for future use.

7.4.10.5.1.9   Field 'Call type'

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = Call type								1
	0/1	Length (L)							2
	0/1	editable	Missed call	Accepted call	Outgoing call	x	x	x	3

For octet 3, each bit indicates whether a property of the field is given (1) or not (0). In case of 'x', the value is reserved for future use.

7.4.10.5.1.10   Field 'First name'

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = First name								1
	0/1	Length (L)							2
	0/1	editable	x	x	X	x	x	x	3
	1st character byte								4
	2nd character byte								
	…								

For octet 3, each bit indicates whether a property of the field is given (1) or not (0). In case of 'x', the value is reserved for future use.

Characters shall be coded as defined for UTF-8.

7.4.10.5.1.11   Field 'Contact number'

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = Contact number								1
	0/1	Length (L)							2
	0/1	editable	default	own	Fixed	mobile	work	x	3
	1st digit								4
	2nd digit								
	…								

For octet 3, each bit indicates whether a property of the field is given (1) or not (0). In case of 'x', the value is reserved for future use.

Field 'contact number' can be contained several times in one entry.

A digit is out of 30H…39H, 23H, 2AH, 05H, 15H.

7.4.10.5.1.12   Field 'Associated melody'

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = Associated melody								1
	0/1	Length (L)							2
	0/1	editable	X	X	X	X	X	X	3
	Value								4

For octet 3, each bit indicates whether a property of the field is given (1) or not (0). In case of 'x', the value is reserved for future use.

7.4.10.5.2   "List of supported lists" entry fields

This list contains the identifiers of the lists which are supported by the FP (as some lists are optional on FP side)

Table 51: "List of supported lists" entry fields

Field identifier	Field	Normative action/comment	Clause
0x01	List identifiers	Single variable-length field with identifiers of all supported lists	7.4.10.5.1.1

The list identifiers are defined in clause 7.4.10.3.

The 'List of supported lists' refers to a list with only one entry.

   NOTE: The list identifiers are ordered in ascending numerical order (see clause 7.4.10.5.1.1).

7.4.10.5.3   "Missed call list" entry fields

This list contains all the missed calls occurring on any line of the DECT system.

Table 52: "Missed call list" entry fields

Field identifier	Field	Normative action/comment	Clause
0x01	Number	Number of the calling party	7.4.10.5.1.2 (see note)
0x02	Name	Name of the calling party	7.4.10.5.1.3
0x03	Date and Time	Date and Time of the missed call	7.4.10.5.1.4
0x04	New	Indicates whether entry is shown first time	7.4.10.5.1.5
0x05	Line name	Name of line on which the call was received	7.4.10.5.1.6
0x06	Line id	Id of line on which the call was received	7.4.10.5.1.7
0x07	Number of calls	Indicates amount of missed calls from this calling party	7.4.10.5.1.8
NOTE:	The "Missed call list" may include internal calls (e.g. if allowed by configuration). Clause 7.4.10.5.1.2.1 describes the coding of terminal identity numbers.		

7.4.10.5.4   "Outgoing call list" entry fields

This list contains all outgoing calls occurring on any line of the DECT system.

Table 53: "Outgoing call list" entry fields

Field identifier	Field	Normative action/comment	Clause
0x01	Number	Number of the called party	7.4.10.5.1.2 (see note)
0x02	Name	Name of called party	7.4.10.5.1.3
0x03	Date and Time	Date and Time of the call	7.4.10.5.1.4
0x04	Line name	Indicates name of line used for the call	7.4.10.5.1.6
0x05	Line id	Id of line line used for the call	7.4.10.5.1.7
NOTE:	The "Outgoing call list" may include internal calls (e.g. if allowed by configuration). Clause 7.4.10.5.1.2.1 describes the coding of terminal identity numbers.		

7.4.10.5.5   "Incoming accepted call list" entry fields

This list contains all the accepted incoming calls occurring on any line of the DECT system.

Table 54: "Incoming accepted call list" entry fields

Field identifier	Field	Normative action/comment	Clause
0x01	Number	Number of the calling party	7.4.10.5.1.2 (see note)
0x02	Name	Name of calling party	7.4.10.5.1.3
0x03	Date and Time	Date and Time of the call	7.4.10.5.1.4
0x04	Line name	Name of line on which the call was received	7.4.10.5.1.6
0x05	Line id	Id of line line used for the call	7.4.10.5.1.7
NOTE:	The "Incoming accepted call list" may include internal calls (e.g. if allowed by configuration). Clause 7.4.10.5.1.2.1 describes the coding of terminal identity numbers.		

7.4.10.5.6   "All call list" entry fields

This list contains all calls (missed, outgoing, incoming accepted) occurring on any line of the DECT system.

Table 55: "All call list" entry fields

Field identifier	Field	Normative action/comment	Clause
0x01	Call type	Coding of the list: missed / accepted / outgoing	7.4.10.5.1.9
0x02	Number	Number of the calling/called party	7.4.10.5.1.2 (see note)
0x03	Name	Name of calling/called party	7.4.10.5.1.3
0x04	Date and Time	Date and Time of the missed call	7.4.10.5.1.4
0x05	Line name	Name of line on which the call was received/passed	7.4.10.5.1.6
0x06	Line id	Id of line line used for the call	7.4.10.5.1.7
NOTE:	The "All call list" may include internal calls (e.g. if allowed by configuration). Clause 7.4.10.5.1.2.1 describes the coding of terminal identity numbers.		

7.4.10.5.7 "Contact list" entry fields

This list contains the contact list (or phone book) for the complete DECT system.

Table 56: "Contact list" entry fields

Field identifier	Field	Normative action/comment	Clause
0x01	Name	Name of the contact (last name)	7.4.10.5.1.3
0x02	First name	First name of the contact	7.4.10.5.1.10
0x03	Contact number	Number of the contact	7.4.10.5.1.11
0x04	Associated melody	Ringing melody used for the contact	7.4.10.5.1.12
0x05	Line id	Id of line used for the call	7.4.10.5.1.7

If the entry is related to all lines in the system, the field 'Line id/subtype' shall be set to "All lines".

7.4.10.5.8 "Internal names list" entry fields

This list contains the names of registered PPs of the complete DECT system.

Table 57: "Internal names list" entry fields

Field identifier	Field	Normative action/comment	Clause
0x01	Number	Terminal identity number	7.4.10.5.1.2 (see note)
0x02	Name	Name of the internal party	7.4.10.5.1.3
NOTE: Clause 7.4.10.5.1.2.1 speficies the coding of terminal identity numbers.			

One and only one entry per terminal identity number shall exist in the "Internal names" list. If a PP attempts to save an entry with an already existing "Number" field, the FP shall reject it with negative acknowledgement with reject reason "content not accepted".

When a PP registers to the FP, the FP shall automatically add a corresponding entry in the internal names list (see clause 7.4.10.5.10).

7.4.10.5.9 "DECT system settings list" entry fields

See clause 7.4.11.3.

7.4.10.5.10 "Line settings list" entry fields

See clause 7.4.11.4.

7.4.10.6 Generic sequence charts for list access

See clause C.1.1 for examples of sequence charts for list access.

7.4.10.7 Use case examples for list access

See clause C.1.2 for examples of use cases for list access.

7.4.11 DECT system and line settings

7.4.11.1 DECT system and line settings considerations

DECT system and line settings shall use the "List access service" procedures with the following additional requirements.

DECT system settings consist of a set of settings that are valid for the complete DECT system, i.e. valid for all registered PPs independently of line / multiple line concepts. They are stored in the FP as a unique list with only one entry in the list. Each setting is a field of this entry.

Line settings consist of a set of settings that are valid for one line of the DECT system, i.e. valid for all registered PPs attached to this line. They are stored in the FP as a unique list with one entry per line in the list. Each setting is a field of this entry. Even if the DECT system does not implement multiple line features, the FP and PP shall support line settings with only one entry: the settings for the only line supported by the system.

Sorting of the lists:

No sorting is defined for the "DECT system settings" list, as it contains only one entry.

The "Line settings" list is sorted by ascending line id number.

Commands:

All the "List access service" feature commands shall be supported for the "DECT system and line settings" feature, except for:

- The "delete entry" command is not allowed for the "DECT system settings" list.

The "delete list" command is not allowed for the "DECT system settings" list, nor for the "Line settings" list.

These commands shall not be invoked by any PP and shall be answered with negative acknowledgement from the FP with reject reason "procedure not allowed" (see clause 7.4.10.4.9).

Saving a new line setting entry or deleting a line setting entry is allowed (when creating or removing a line for the DECT system). Please refer to clause 7.4.11.2 "Interactions between registration, attachment of handsets and lists" for impacts.

Only one entry per line identifier shall exist in the "Line settings" list. In other words, two distinct entries shall never have the same line id (see clause 7.4.11.3 for details).

Settings:

Some DECT system or line settings are mandatory and shall be supported both by the FP and the PP. Please refer to table 1 for status of each setting. When a setting is mandatory in the table, all related fields are mandatory.

The PP may use the "Query supported entry fields" procedure (see clause 7.4.10.4.2) to know which settings are supported by the FP. The FP shall answer with mandatory and optional settings implemented in the FP. This way, the PP will be able to give proper indication to the user (when accessing to the settings menus for example).

All settings shall have default value set when product is manufactured. All these settings may be reset to default value with the "Base reset" setting.

For variable-length settings, if the value is not defined by the user, the length of the field shall be set to zero.

    EXAMPLE: If no dialling prefix is set, length of this field shall be zero.

The PP may modify 1 to n setting(s) by using an "Edit entry" command with following parameters: (session identifier, entry identifier=1, 1 to n field identifiers).

PIN code:

For security reasons, the PIN code shall never be sent over the air on a non ciphered link. Moreover, the FP shall prevent a non-allowed PP to save a new PIN code:

At least when accessing the 'PIN code' setting of the "DECT system settings" list, with any command, the connection shall be ciphered and conditioned to correct PIN keyboarding; i.e. for "Read entries confirm", "Search entries confirm" , "Edit entry confirm", "Save entry" and "Save entry confirm" commands that includes the PIN code field in data packets:

- The DECT link shall be ciphered prior to the command. If this not the case, the FP shall answer with a negative acknowledgement, reject reason = "procedure not allowed" (see clause 7.4.10.4.9).

- Before saving a new PIN code, the PP shall perform "Edit entry" on the PIN code, and check that the return value matches the PIN code just entered by user.

- Only after edit, the PP may save the new PIN code value.

Access to the "DECT system settings" menu on the PP may be conditioned to prior PIN code keyboarding and may be completely in ciphered mode. This is left free to the implementer.

Initial value:

The "DECT system settings" list unique entry is at position index 1 in the DECT system list.

First "Line settings" list entry is at position index 1 in the line settings list.

7.4.11.2   Interactions between registration, attachments of handsets and lists

"Internal names" list fully reflects the registered PPs. At registration of a handset, the FP shall add a new entry in the "Internal names" list with a default name. (For example "DECT n" where n stands for the terminal identity number in decimal representation). "Attached handsets" setting in the corresponding line setting(s) shall also automatically be updated by the FP with corresponding bit. Attachment may be initiated by the PP or done on FP side (default attachment or e.g. through a web to FP interface).

Except during temporary period (modifications/creations/delete of lines), a registered handset shall always be attached to at least one line: the PP shall appear at least in one "attached handset" field of one line setting. It may appear in several line settings if it is attached to several lines. Deleting an entry in the "Internal names" list shall result in de-registration of the corresponding handset. "Attached handsets" field in the line setting(s) list shall also be automatically updated by the FP. Deleting one entry (one line) of the line settings list shall result in the de-attachment of the corresponding handsets from the line.

If, as a consequence of a "delete entry" command on the line settings list, a handset is no longer attached to any line anymore, it shall however remain registered and available in the "Internal names" list. This handset is no longer reachable from external lines. This temporary state may arise especially when removing and creating new lines.

   NOTE 1:   This mechanism makes it possible to register/unregister any handset to/from the DECT system, and to attach/detach it to/from a line in two separate steps.

   NOTE 2:   As specified in the "Multiple lines" feature NG1.N.14, attachment may be PP-managed (for example, the user chooses the line at registration) or FP-managed (for example, the handset is attached by default to a line).

If the "Base reset" influences the "Internal names" list or the "Line settings" list attached handsets, the corresponding handsets de-attachments and un-registrations shall be correctly handled.

7.4.11.3   DECT system settings list

The following entry fields are defined for the (singular) DECT system list entry.

Table 58: Entry fields for the (singular) DECT system list entry

Field identifier	Field	Default value	Base reset impacted	Normative action/comment	Clause
0x01	PIN code	YES/MD	MD	Allows modification of the PIN code	7.4.11.3.1
0x02	Clock master	MD	MD	Defines the entity which sets date an time for the DECT system (PP or FP)	7.4.11.3.2
0x03	Base reset	YES	YES	Sets settings back to default factory values	7.4.11.3.3
0x04	FP IP address / type	MD	MD	DHCP or static	7.4.11.3.4
0x05	FP IP address / value	MD	MD	Editable only for static IP address	7.4.11.3.5
0x06	FP IP address / subnet mask	MD	MD	Editable only for static IP address	7.4.11.3.6
0x07	FP IP address / gateway	MD	MD	Only for static IP address	7.4.11.3.7
0x08	FP IP address / DNS server	MD	MD	Only for static IP address	7.4.11.3.8
0x09	FP version / Firmware version	YES/MD	NO	Software version of the FP	7.4.11.3.9
0x0A	FP version / Eeprom version	YES/MD	NO	Eeprom version of the FP	7.4.11.3.10
0x0B	FP version / Hardware version	YES/MD	NO	Hardware version of the FP	7.4.11.3.11

Default value: it is the value of the setting when product is manufactured:

- "YES" means that a default value is standardized. See corresponding setting clause definition.

- "MD" means that a default value shall be provided by the manufacturer (could also be empty or a zero length setting).

- "YES/MD" means that a default value shall be provided by the manufacturer, which shall not be empty.

"Base reset" impacted: describes the impact of the "Base reset" setting on this particular setting:

- "YES" means setting is reset to default value when "Base reset" setting is activated.

- "NO" means setting is not impacted by "Base reset" setting.

- "MD" means manufacturer defines if the setting is impacted or not by the "Base reset" setting.

7.4.11.3.1   Field 'PIN code'

The 'PIN code' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = PIN code								1
	0/1	Length (L)							2
	0/1	Editable	x	x	X	x	X	X	3
	1st digit								4
	2nd digit								
	…								
	8th digit								

Each digit shall be out of 2AH and interval 30H..39H.

The 'PIN code' field shall respect the following rules:

- Each decimal digit entered by the user, is translated into one octet (ASCII coded). The PT shall be capable to accept any PIN between 0 and 8 decimal digits (limits included).

- The PIN shall always have a length of 8 digits, the resulting string of octets is padded with a number of leading "*" octets to achieve a total of 8 octets (for example if the PIN code is only 4 digits). For example, a value of "1091" (4 decimal digits entered via keypad) is translated into a pin code of the following value: "****1091", and coded as shown in figure 40.

| 2AH | 2AH | 2AH | 2AH | 31H | 30H | 39H | 31H |

Figure 40: Example of PIN code coding

7.4.11.3.2   Field 'Clock master'

The 'Clock master' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = clock master								1
	0/1	Length (L)							2
	0/1	Editable	x	x	X	x	x	X	3
	Value								4

Value shall be 30H or 31H. 30H stands for FP, 31H stands for PP.

The behaviour of the PP and FP according to 'Clock master' field setting shall be consistent with the "Date and Time synchronization" feature described in clause 7.4.2.

7.4.11.3.3   Field 'Base reset'

The 'Base reset' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = base reset								1
	0/1	Length (L)							2
	0/1	Editable	x	X	x	x	x	X	3
	Value								4

Value shall be 30Hor 31H. 30H stands for 'No', 31H stands for 'Yes'.

The 'Base reset' field shall respect the following rules:

- If at least one DECT system setting, or line setting, has been set to a non default value, the 'Base reset' field shall be equal to 'No' when a PP performs a read command.

- If a registered PP sets the value to 'Yes', all DECT system and line settings shall be reset to their default value. The setting remains set to 'Yes' until any DECT system or line setting is changed.

- Any attempt from a PP to set this parameter to 'No' shall result in a negative acknowledgement, with reject reason "procedure not allowed" from the FP (see clause 7.4.10.4.9).

Default value: 31H ('Yes').

7.4.11.3.4   Field 'FP IP address / type'

The 'IP address type' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = IP address type								1
	0/1	Length (L)							2
	Editable	DHCP	Static	X	x	x	x	x	3

The IP address of the FP may be assigned dynamically using DHCP or manually using a static address entered by the user.

The length of the field shall be set to zero when the value of the field is not defined by the user.

7.4.11.3.5   Field 'FP IP address / value'

The 'IP address value' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = FP IP address / value								1
	0/1	Length (L)							2
	0/1	Editable	IPv4/6	X	x	x	X	X	3
	1st byte								4
	2nd byte								
	3rd byte								
	…								

IPv4/6: if set to 0, the format is IPv4 (4 bytes long); if set to 1, the format is IPv6 (16 bytes long).

An IPv4 address shall always have a length of 4 bytes.

EXAMPLE 1:   A value of 192.168.213.1 is translated into an 'IP address / value' field with the following bytes: 'C0A8D501'H.

An IPv6 address shall always have a length of 16 bytes.

EXAMPLE 2:   A value of fd11:2233:4455:1:a:b:c:d is translated into an 'IP address / value' field with the following bytes: 'FD11223344550001000A000B000C000D'H.

The length of the field shall be set to zero when the value of the field is not defined by the user.

7.4.11.3.6   Field 'FP IP address / subnet mask'

The 'IP address value' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	\multicolumn{8}{c}{Field identifier = FP IP address / subnet mask}	1
	0/1	\multicolumn{7}{c}{Length (L)}	2
	0/1	Editable	IPv4/6	X	x	x	X	X	3
	\multicolumn{8}{c}{1st byte}	4
	2nd byte	
	3rd byte	
	…	

IPv4/6: if set to 0, the format is IPv4 (4 bytes long), if set to 1, the format is IPv6 (16 bytes long).

A subnet mask for IPv4 shall always have a length of 4 bytes.

EXAMPLE 1:   A value of 255.255.255.0 is translated into an 'IP address / subnet mask' field with the following bytes: 'FFFFFF0'H.

A subnet mask for IPv6 shall always have a length of 16 bytes.

EXAMPLE 2:   A subnet mask corresponding to a 59-bit prefix is translated into an 'IP address / subnet mask' field with the following bytes: 'FFFF FFFF FFFF FFE0 0000 0000 0000 0000'H.

The length of the field shall be set to zero when the value of the field is not specified by the user.

7.4.11.3.7   Field 'FP IP address / gateway'

The 'FP IP address / gateway' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	\multicolumn{8}{c}{Field identifier = FP IP address / gateway'}	1
	0/1	\multicolumn{7}{c}{Length (L)}	2
	0/1	Editable	IPv4/6	X	x	x	X	X	3
	\multicolumn{8}{c}{1st byte}	4
	2nd byte	
	3rd byte	
	…	

IPv4/6: if set to 0, the format is IPv4 (4 bytes long), if set to 1, the format is IPv6 (16 bytes long).

The 'FP IP address / gateway' field shall always have a length of 4 bytes (IPv4) or 16 bytes (IPv6). See the 'IP address / value' field for more information.

The length of the field shall be set to zero when the value of the field is not specified by the user.

7.4.11.3.8 Field 'FP IP address / DNS server'

The 'DNS server' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = FP IP address/ DNS server								1
	0/1	Length (L)							2
	0/1	Editable	IPV4/6	X	x	x	X	X	3
	1st byte								4
	2nd byte								
	3rd byte								
	…								

IPv4/6: if set to 0, the format is IPv4 (4 bytes long), if set to 1, the format is IPv6 (16 bytes long).

The 'FP IP address / DNS server' field shall always have a length of 4 bytes (IPv4) or 16 bytes (IPv6). See the 'IP address / value' field for more information.

The length of the field shall be set to zero when the value of the field is not specified by the user.

The 'FP IP address / DNS server' field may be included several times in the entry: main server and alternate server.

7.4.11.3.9 Field 'FP version / Firmware version'

The 'firmware version' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = FP version / Firmware version								1
	0/1	Length (L)							2
	0/1	X	x	x	x	X	x	x	3
	1st character byte								4
	2nd character byte								5
	…								

Characters shall be coded as defined for UTF-8.

7.4.11.3.10 Field 'FP version / Eeprom version'

The 'Eeprom version' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = FP version / Eeprom version								1
	0/1	Length (L)							2
	0/1	X	X	x	x	X	X	x	3
	1st character byte								4
	2nd character byte								5
	…								

7.4.11.3.11 Field 'FP version / Hardware version' field

The 'Hardware version' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = FP version / Hardware version								1
	0/1	Length (L)							2
	0/1	X	X	x	x	X	X	x	3
	1st character byte								4
	2nd character byte								5
	…								

Characters shall be coded as defined for UTF-8.

7.4.11.4   Line settings list

The following 'entry field identifier' for line settings list are defined.

Table 59: Entry fields for a line settings list entry

Field identifier	Field	Default value	Base reset impacted	Normative action/comment	Clause
0x01	Line name	MD	MD	Name of the line	7.4.11.4.1
0x02	Line id	MD	NO	Line identifier	7.4.11.4.2
0x03	Attached handsets	MD	MD	List of registered handsets which are attached to the line.	7.4.11.4.3
0x04	Dialling prefix	MD	MD	If defined, adds a prefix to called party numbers for calls placed on the line.	7.4.11.4.4
0x05	FP melody	YES/MD	MD	Melody of the FP linked to this line.	7.4.11.4.5
0x06	FP volume	YES/MD	MD	Melody volume of the FP linked to this line.	7.4.11.4.6
0x07	Blocked telephone number	MD	MD	Forbidden called party numbers on the line	7.4.11.4.7
0x08	Multiple calls mode (single/multiple)	MD	MD	Current mode of the line: single call or multiple call	7.4.11.4.8
0x09	Intrusion call	MD	MD	Intrusion call YES / NO	7.4.11.4.9
0x0A	Permanent CLIR	YES	MD	Restrict number for all outgoing calls on this line	7.4.11.4.10
0x0B	Call forwarding	YES	MD	Stores the type and number of the call forwading.	7.4.11.4.11

Default value: it is the value of the setting when product is manufactured.

- "MD" means that a default value, if any, shall be provided by the manufacturer (could also be empty or zero length setting).

- "YES/MD" means that a default value shall be provided by the manufacturer (shall not be empty).

- "YES" means that a default value is standardized. See corresponding setting clause definition.

Base reset impacted: describes the impact of the "Base reset" setting on the given setting.

- "YES" means that the setting is reset to default value when "Base reset" setting is activated.

- "NO" means that thesetting is not impacted by "Base reset" setting.

- "MD" means "manufacturer defined", whether or not the setting is impacted by the "Base reset" setting.

The list shall be sorted by ascending numerical order of the 'Line id' field values.

Only one entry per line identifier shall exist in the line settings list. In other words, two distinct entries shall never have the same line id. If a PP attempts to add or modify an entry with an already existing line id in one entry of the list, the FP shall reject it with negative acknowledgement (clause 7.4.10.4.9) / reject reason = 'content not accepted'.

When the line name of a specific line is modified, the FP should automatically update the other lists where line name is stored (especially call lists).

7.4.11.4.1   Field 'Line name'

See 'Line name' field in "List access service" feature, clause 7.4.10.5.1.6.

7.4.11.4.2   Field 'Line id'

See 'Line id' field in "List access service" feature, clause 7.4.10.5.1.7.

7.4.11.4.3   Field 'Attached handsets'

The 'Attached handsets' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	0	Field identifier = Attached handsets							1
	Length (L)								2
	0/1	Editable	x	X	x	x	X	X	3
	0/1	Number of registered handsets attached to the line							4
	0/1	Handset bitmap							5
	0/1	..							
	0/1	Handset bitmap (continued)							5n

Number of registered handsets attached to the line (octet 4):

The number of handsets relates to the number of handsets attached to the line. The value shall be coded with the natural binary value, with the least significant bit in bit position "1". Allowable values are "1" to "255".

Handset bitmap (octet group 5):

This is a bitmap octet group, with the handset number 1 in bit position "1". A "1" indicates handset is attached to the line, and a "0" indicates it is not.

Handset bitmap (octet 5n):

Bits	7 6 5 4 3 2 1	Meaning
	x x x x x x 1	Handset number 1 is attached
	x x x x x 1 x	Handset number 2 is attached
	x x x x 1 x x	Handset number 3 is attached
	x x x 1 x x x	Handset number 4 is attached
	x x 1 x x x x	Handset number 5 is attached
	x 1 x x x x x	Handset number 6 is attached
	1 x x x x x x	Handset number 7 is attached

NOTE 1: If the extension bit is "0" in the first octet (indicating presence of an additional octet), the least significant bit of second octet stands for handset number 8.

NOTE 2: The format of the current field is a bit mask, it is different from the format of the number field of the internal names list (terminal id number) but represents the same handset numbers.

7.4.11.4.4   Field 'Dialling Prefix'

See'Number' field in "List access service" feature, clause 7.4.10.5.1.2.

The prefix shall be added by the FP to the called party number to any external outgoing call placed on the line.

The length of the field shall be set to zero when the value of the field is not defined.

7.4.11.4.5   Field 'FP melody'

See 'Associated melody' field in "List access service" feature, clause 7.4.10.5.1.12.

This field defines the melody to be used to ring in the FP on an incoming call on a dedicated line.

7.4.11.4.6   Field 'FP volume'

The 'FP volume' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = volume								1
	0/1	Length (L)							2
	0/1	editable	X	x	x	x	x	X	3
	Value								4

ETSI

Value shall be out of interval 30H..39H.

7.4.11.4.7   Field 'Blocked number'

See 'Number' field in "List access service" feature, clause 7.4.10.5.1.2, except that the possible value shall be out of interval 30H..39H, and 2AH value.

The 'blocked number' field may be composed of:

- either a single phone number value,

- or a range of phone number values. In this case, the 'Number' field shall be equal to a sequence of one or more digit(s) followed by '*'. For example: "02*" represents all numbers starting with "02" digit sequence.

When a PP attached to the line tries to place an external outgoing call on a number which is blocked, this call shall not be established by the FP. The FP shall release the call.

This field may be contained several times in line settings entry. This allows to block several numbers or ranges of numbers. The number of times the field is included shall be defined at line setting entry creation. See clause 7.4.10.4.5 list access 'Save entry' command procedure for details how to handle several fields of the same type in the same entry.

The length of the field shall be set to zero when the value of the field is not defined.

7.4.11.4.8   Field 'Multiple calls mode' can be contained several times in one entry

The 'Multiple calls mode' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = Multiple calls mode								1
	0/1	Length (L)							2
	0/1	Editable	x	X	x	x	x	X	3
	Value								4

Value shall be 30H or 31H. 30H stands for "Single call mode", 31H for "Multiple call mode".

This field is related to the "Multiple calls" feature (see clause 7.4.8) and allows to configure a multiple call line in single call mode. For non-multiple call lines, the value "Single call mode" shall always be used.

7.4.11.4.9   Field 'Intrusion call'

The 'intrusion call' field shall be coded as follows:

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier = Multiple calls mode								1
	0/1	Length (L)							2
	0/1	Editable	x	X	x	x	x	X	3
	Value								4

Value shall be 30H or 31H. 30H stands for intrusion call not allowed, 31H for intrusion call allowed.

This field is related to the "intrusion call" feature (see clause 7.4.3.8). For "Implicit call intrusion" (see clause 7.4.3.8.1), the value also indicates the behavior of the system when a call setup is attempted on the line (real call setup, vs call intrusion).

7.4.11.4.10   Field 'Permanent CLIR'

The 'Permanent CLIR' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier =Permanent CLIR								1
	0/1	Length (L)							2
	0/1	Editable	x	X	x	x	x	X	3
	Value								4
	CLIR code 1st digit								5
	CLIR code 2nd digit								

Value shall be 30H or 31H. 30H stands for CLIR de-activated for all calls, 31H for CLIR activated for all calls.

Each digit shall be out of interval 30H..39H, and values 23H, 2AH, 05H and 15H.

If a PP sets or resets the value, the FP shall activate or deactivate the CLIR service in the network using the CLIR code for all outgoing calls placed on the specified line. This setting shall be consistent with the CLIR feature (NG1.N.17).

If the CLIR code is not relevant (depending on the Network type), the FP may set the length of the field so that the field only includes the value octet.

Default value: 30H: 'de-activated'. Default CLIR code is "manufacturer defined".

7.4.11.4.11   Field 'Call forwarding'

The 'Call forwarding' field shall be coded as follows.

Bits	8	7	6	5	4	3	2	1	Octet
	Field identifier =Call forwarding								1
	0/1	Length (L)							2
	0/1	Editable	x	X	x	x	x	X	3
	CF type								4
	1st digit								
	2nd digit								

CF type shall be 30H, 31H or 32H. 30H stands for CFU (Call forwarding unconditional), 31H for CFB (Call forwarding busy), and 32H for CFNR (Call forwarding on non response).

The digits represent the call forwarding target number.

The length of the field shall be set to zero when the value of the field is not defined by the user.

If a PP sets or resets the field, the FP shall activate or deactivate the corresponding Call forwarding in the network for specified type of calls received and on the specified line.

This field may be contained several times in the line settings entry. This allows to define several call forwarding types for the line. The number of times the field is included shall be defined at line setting entry creation. See clauses 7.4.10.4.5 list access 'Save entry' command procedure for details on how to handle several identical fields in the same entry.

Default value: length = 0 (no call forwarding defined).

7.4.11.5   Virtual contact list and call list per line

The default behaviour of the "List access service" feature is to share all lists between all registered PPs, independently of the line attachments of the PPs.

The current procedure allows to share virtually contact or call lists (missed calls, outgoing calls, incoming accepted calls, all calls lists) only between handsets attached to the same line. For a system implementing this procedure, it shall be possible to switch back dynamically to the default behavior.

After reading or searching entries, the PP shall filter the entries that are related to a given line thanks to the line identifier field. This way, the PP has a possibility to show to the user only the calls and contacts that are related to one line (including the contacts that are attached to all lines).

7.4.12 Calling line identity restriction (CLIR)

7.4.12.1 Considerations

The "Calling line identity restriction" feature defines procedures for CLIR as defined by 3GPP Technical specifications for Line identification supplementary services (see TS 122 081 [24]).

This procedure allows a user to enable or to disable the presentation of its calling line identification when originating a call. When it is enabled, the originating network notifies the destination network that the calling party number is not allowed to be presented to the called party. If the called party subscribes to calling identification and the calling party has calling line identification restriction enabled, the called party shall receive the presentation indicator set to "presentation restricted" in the <<CALLING-PARTY-NUMBER>> IE of the CC-SETUP. In this case, the calling party's number will not be presented to the called party.

The CLIR service may be provisioned in a permanent (for all outgoing calls) or a temporary mode (call by call basis).

7.4.12.2 Permanent CLIR mode (all calls)

This procedure allows a user to enable or to disable the presentation of its calling line identification for all following outgoing calls for a specified line.

To enable (respectively disable) the permanent CLIR mode, the user shall set (respectively reset) the 'Permanent CLIR' field of the specified line in the "Line settings" list (see the "List access service" feature NG1.N.16). When this mode is enabled (respectively disabled), the FP shall invoke the permanent mode by sending the permanent CLIR activation (respectively deactivation) request to the network for the specified line.

NOTE 1: The current procedure does not state anything about the availability or not of the service on Network side.
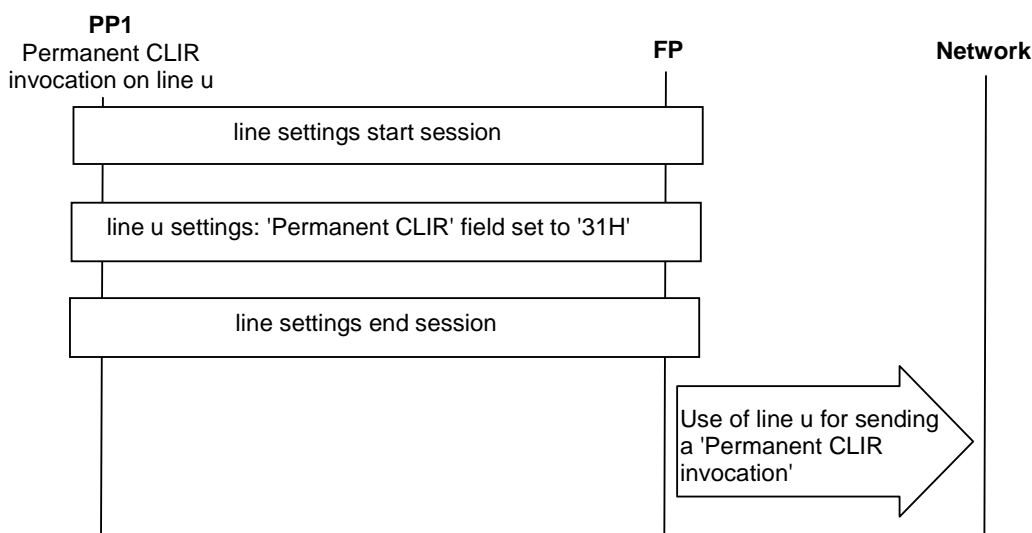
Figure 41: Permanent CLIR mode invocation

When the permanent mode is deactivated, it shall be always possible to use the temporary mode.

NOTE 2: It should be noted that the permanent mode can also be provisioned by using the temporary mode for each call.

When implementing the "Permanent CLIR mode (all calls)" procedure, the FP shall set bit a_{40} of the "Extended higher layer capabilities (part 2)" (see EN 300 175-5 [5], clause F.3).

7.4.12.3 Temporary CLIR mode (call by call)

This procedure allows a user to disable the presentation of its calling line identification at the time of the call request.

If the user requests a temporary CLIR mode when originating a call, the PP shall insert before the telephone number in the <<MULTI-KEYPAD>> IE the CLIR invocation temporary digits sequence.
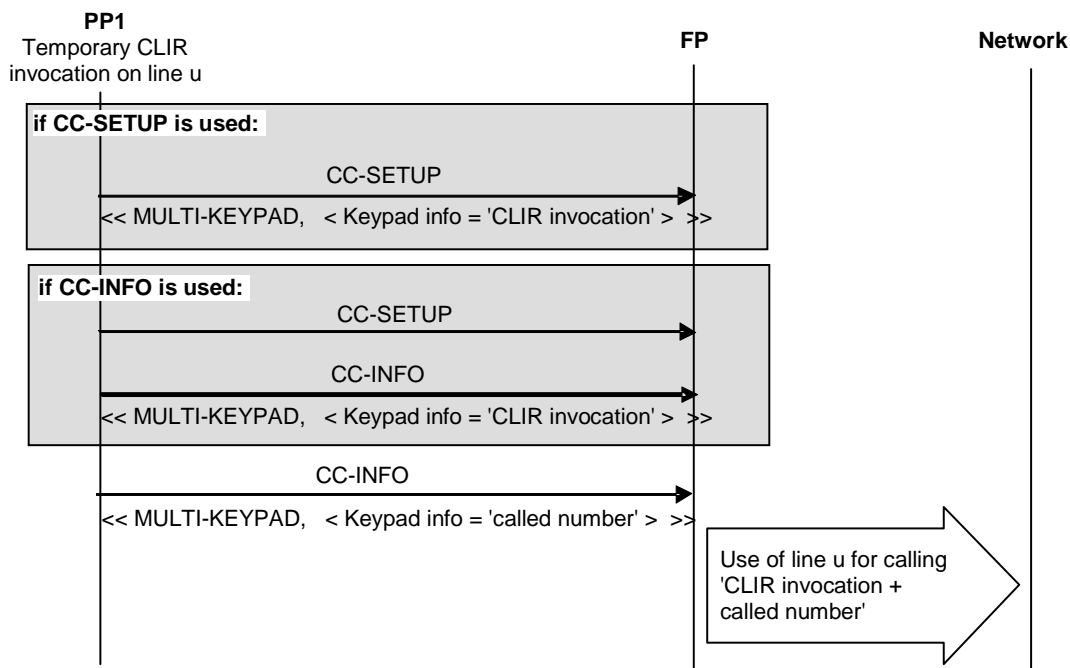
Figure 42: Temporary CLIR mode invocation

A temporary CLIR request shall override a permanent deactivated CLIR mode.

NOTE 1: It should be noted that the temporary mode can also be provisioned directly by the user by dialling the CLIR temporary digits sequence.

NOTE 2: As the network temporary CLIR invocation digits sequence is network dependent, the sequence should be configurable on PP side.

7.5 Data Link Control (DLC) layer procedures

This clause specifies the additional DLC layer procedures, messages and information elements required in New Generation DECT Extended Wideband Speech Services not described in TS 102 527-1 [21] or in EN 300 444 [12] (GAP), or incorporating modifications to the description given in these specifications.

7.5.1 DLC services

The requirements of TS 102 527-1 [21], clause 7.5.1 shall apply.

7.6 Medium Access Control (MAC) layer procedures

This clause specifies the additional MAC layer procedures, messages and information elements required in New Generation DECT Extended Wideband Speech Services not described in TS 102 527-1 [21] or in EN 300 444 [12] (GAP), or incorporating modifications to the description given in these specifications.

7.6.1 MAC services

The requirements of TS 102 527-1 [21], clause 7.6.1 shall apply.

7.6.2 Frame formats and multiplexers

The requirements of TS 102 527-1 [21], clause 7.6.2 shall apply.

7.6.3 Downlink broadcast

7.6.3.1 N_T message

The requirements of TS 102 527-1 [21], clause 7.6.3.1 shall apply.

7.6.3.2 Q_T - static system information

The requirements of TS 102 527-1 [21], clause 7.6.3.2 shall apply.

7.6.3.3 Q_T - Fixed Part capabilities

The requirements of TS 102 527-1 [21], clause 7.6.3.3 shall apply.

Higher layer information: The management entity in the FP supplies the MAC layer with a 16-bit SDU via the Management Entity (ME) SAP. The content of that SDU is placed in bits <a32> to <a47> of the Q_T message. At the PT the MAC layer passes the 16 bits out through the ME SAP to the management entity.

For the setting of the higher layer information bits see clause 7.3.9.1 of TS 102 527-1 [21].

7.6.3.4 Q_T - Extended Fixed Part capabilities

The requirements of TS 102 527-1 [21], clause 7.6.3.4 shall apply.

Higher layer information: The management entity in the FP supplies the MAC layer with a 23-bit SDU via the Management Entity (ME) SAP. The content of that SDU is placed in bits <a25> to <a47> of the Q_T message. At the PT the MAC layer passes the 24 bits out through the ME SAP to the management entity.

No higher layer information for New Generation DECT; parts 1 or 3 is broadcasted in Q_T - Extended Fixed part capabilities.

7.6.3.5 Q_T - Extended Fixed Part capabilities part 2

The FT shall be capable of sending and the PT shall be capable of receiving and processing the Q_T message as defined in EN 300 175-3 [3], clause 7.2.3.11 with the following values.

Table 60: Values used within Extended FP capabilities part 2

MAC message	Field within the message	Standard values within the MAC message	Normative action/comment
<<FP capabilities>>	<Qh>	C	
	<a12>	1	Long slot j=640
	<a13>	0,1	Long slot j=672 (if supported)
	<a23>	0,1	"no emission" mode: preferred carrier number mode (CN)

Setting of bit a_{23} : "no emission mode"

$a_{23} = 1$:   variable preferred CN /every CN possible.

$a_{23} = 0$:   fixed preferred CN.

The preferred carrier number is selected and broadcasted by the FT (PT broadcast info).

FT:

- if ($a_{23} = 1$), then DummyPointer-wakeups on all carriers should be done after reset;

- if ($a_{23} = 0$), then DummyPointer-wakeup only on the known preferred carrier should be done after reset.

PT:

- check capability "no emission" mode: preferred carrier number mode;

- if ($a_{23} = 1$), then DummyRequest-wakeups on all carriers should be done after reset or asynchronous mode;

- if ($a_{23} = 0$), then DummyRequest-wakeup only on the known preferred carrier should be done after reset or asynchronous mode.

Higher layer information: The management entity in the FP supplies the MAC layer with a 24-bit SDU via the Management Entity (ME) SAP. The content of that SDU is placed in bits <a24> to <a47> of the Q_T message. At the PT the MAC layer passes the 24 bits out through the ME SAP to the management entity.

For the setting of the higher layer information bits see clause 7.4.9.2.2.

7.6.3.6 Q_T - SARI list contents

The requirements of TS 102 527-1 [21], clause 7.6.3.6 shall apply.

7.6.4   Paging broadcast

The requirements of TS 102 527-1 [21], clause 7.6.4 shall apply.

7.6.5   "no-emision" mode

The requirements of EN 300 175-3 [3], clauses 7.1.2, 7.2.3.11, 7.2.4.3, 7.3.5.3, 9.4 and 11.11 shall apply.

7.7   Physical layer (PHL) requirements

7.7.1   Modulation

The FT and PT shall support 2 level Gaussian Frequency Shift Keying (GFSK) modulation as defined by EN 300 175-2 [2], clause 5.

7.7.2   Slot type (Physical packets)

The requirements of TS 102 527-1 [21], clause 7.7.2 shall apply.

7.8   Requirements regarding the speech transmission

7.8.1   General

The requirements of TS 102 527-1 [21], clause 7.8.1 shall apply.

7.8.2   Speech codecs

The requirements of TS 102 527-1 [21], clause 7.8.2 shall apply.

7.8.3   Audio performance requirements

The requirements of TS 102 527-1 [21], clause 7.8.3 shall apply. The status of each feature shall be as defined by tables 8 (clause 6.8) and 2 (clause 6.3) of the present document.

7.9   Management procedures

All procedures described in GAP (EN 300 444 [12], clause 13) shall be supported. Higher layer capability FP broadcast shall be set as described in clause 7.4.9.2 of the present document.

7.10   Application procedures

This clause specifies the additional application layer procedures, messages and information elements required in New Generation DECT Extended Wideband Speech Services not described in TS 102 527-1 [21] or in EN 300 444 [12] (GAP), or incorporating modifications to the description given in these specifications.

7.10.1   Easy PIN code and easy pairing registration

The "Easy PIN code registration" and "Easy pairing registration" features use common procedures (see clause 7.10.1.3) and specific procedures (see clauses 7.10.1.1 and 7.10.1.2 respectively).

7.10.1.1   Easy PIN code registration

7.10.1.1.1   Searching mode and PIN code requests

The access rights procedure triggered by the user on the PP causes it to actively search for a FP broadcasting 'Access Rights supported attributes' capability (i.e. Extended Fixed part capability bit a44 = 1, see EN 300 444 [12], annex A (informative): PP locking procedure for on-air subscription procedure). The searching mode shall be limited by the timer P<AP.02>.

When a FP is found in subscription mode, the PP shall prompt the user to enter the PIN code. After PIN entering, the PP shall start the access rights procedure using the PIN code value for the authentication code.

NOTE1:   When performing easy PIN code registration, it is assumed that the PP is in close proximity to the FP, and therefore the PP will receive a stronger signal from that FP. The PP can use RSSI readings to speed-up the search for the desired FP. For example:

   1 - Measure the RSSI level on each channel.

   2 - Synchronize on the FP with the highest RSSI value.

   3 - Wait for the a44 bit to check if it is set.

   4a - If a44 is set, start the access rights procedure.

   4b - If a44 is not set, put the RFPI on a barred list and go to step 2 (or 1) to find other FP.

NOTE 2:   It is recommended to request the PIN code entering *after* locking to a FP in subscription mode, because this procedure may be common with easy pairing search mode request procedure (see clause 7.10.4). Nevertheless it can be done before.

NOTE 3:   For security purposes, it is recommended to use a PIN value different from default '0000' value. In this case it could be convenient to indicate the device PIN value with a sticker on the FP. It could also be recommended to change the PIN value in the user manual.
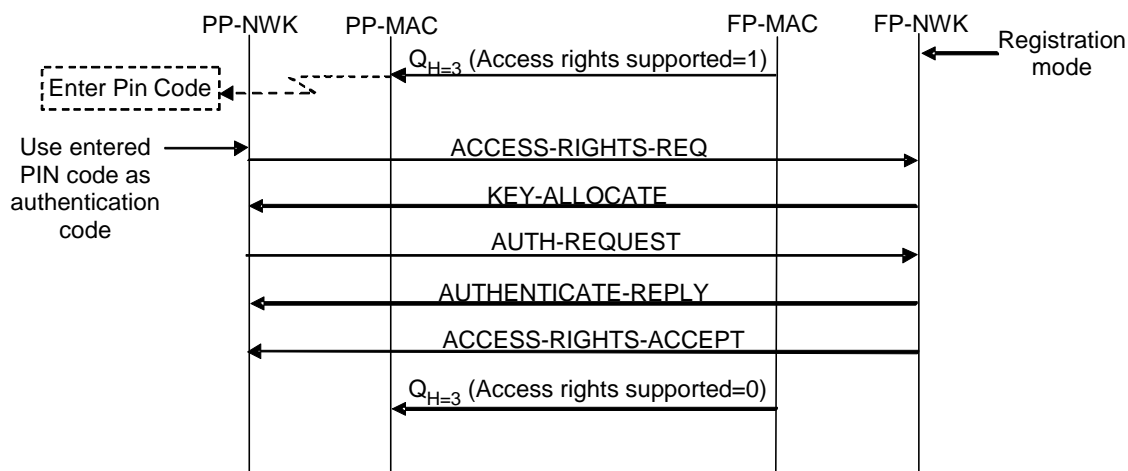
Figure 43: Easy PIN-code registration mode

7.10.1.2   Easy pairing registration

7.10.1.2.1   Easy pairing registration description

Easy pairing feature simplifies the registration process by not requesting any PIN code to the user when the PIN code is set to default "0000" value.

When feature is implemented, related procedures shall be valid at first power ON of a non registered handset and at any additional further registrations.

The PP will systematically try to register with the default "0000" PIN-code. In case of failure, the PP will automatically switch back to the easy PIN code registration feature process and corresponding procedures.

From security point of view, successful easy pairing is equivalent to default 0000 PIN-code registration which is less secure than any non 0000 PIN code registration. As a consequence, for easy pairing registration, the user should be instructed to monitor the registration user feedback (see clause 7.10.6).

As additional security and for user convenience it is recommended to use the "Base station name selection" (clause 7.10.7). This allows checking that registration of a PP is ongoing on the correct FP.

The 'Easy pairing feature support' capability bit shall be correctly managed by the FP. This allows to make the difference between an easy pairing capable FP and other FPs.

7.10.1.2.2   Base station limited registration mode

The FP shall have a physical or a logical button to trigger the access rights procedure.

When the button is pressed on the FP, the FP shall set its broadcasting 'Access Rights supported attributes' capability bit to enable the on air subscription (see clause 7.4.9.1 "Higher layer information in FP broadcast" and EN 300 444 [12] clause 13.6 "Broadcast attributes management"). At the same time, the FP shall set the 'Easy pairing registration supported' capability bit (see clause 7.6.3.5 "Q_T - Extended Fixed Part capabilities part 2").

These bits shall be set during timer F<AP.01>. When the access rights procedure is successfully completed, these bits shall be cleared.

For security reasons, the FP shall perform no more than one successful access rights procedure during the subscription mode.

7.10.1.2.3   Searching mode request

The access rights procedure triggering by the user on the PP causes it to actively search for a FP broadcasting 'Access Rights supported attributes' capability (i.e. Extended Fixed part capability bit a44 = 1, see EN 300 444 [12], annex A (informative): PP locking procedure for on-air subscription procedure). The searching mode shall be limited by the timer P<AP.02>.

When a FP is found in subscription mode, the PP shall start the access rights procedure using the '0000' value for the authentication code. If the FP rejects the access rights, the PP shall prompt the user to enter the PIN code. The PP shall then initiate a new access rights request with the same FP using the PIN entered value for the authentication code.

NOTE: When performing easy pairing registration, it is assumed that the PP is in close proximity to the FP, and therefore the PP will receive a stronger signal from that FP. The PP can use RSSI readings to speed-up the search for the desired FP. For example:

1 - Measure the RSSI level on each channel.

2 - Synchronize on the FP with the highest RSSI value.

3 - Wait for the a44 bit to check if it is set.

4a - If a44 is set, start the access rights procedure.

4b - If a44 is not set, put the RFPI on a barred list and go to step 2 (or 1) to find other FP.
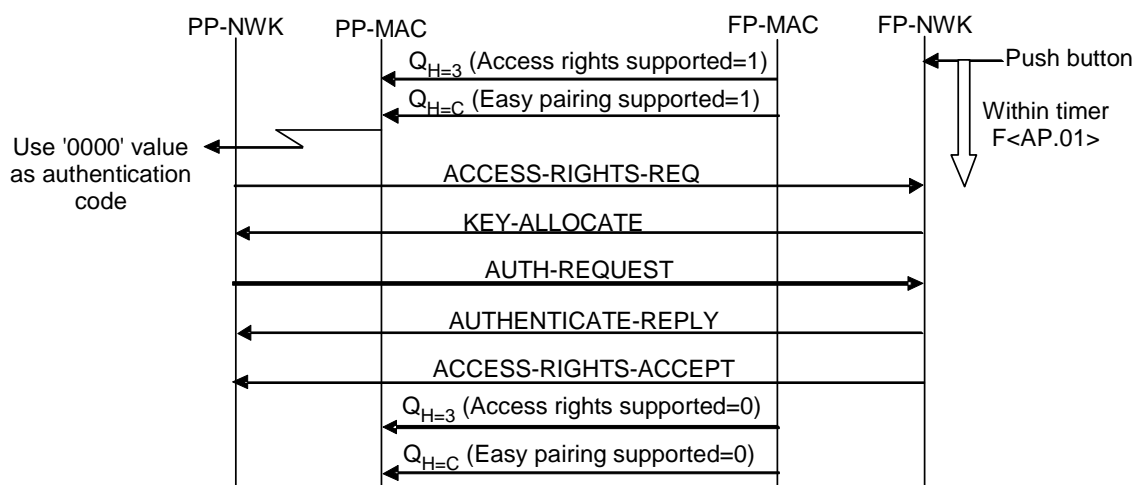
Figure 44: Easy pairing when PIN is set to default '0000' value
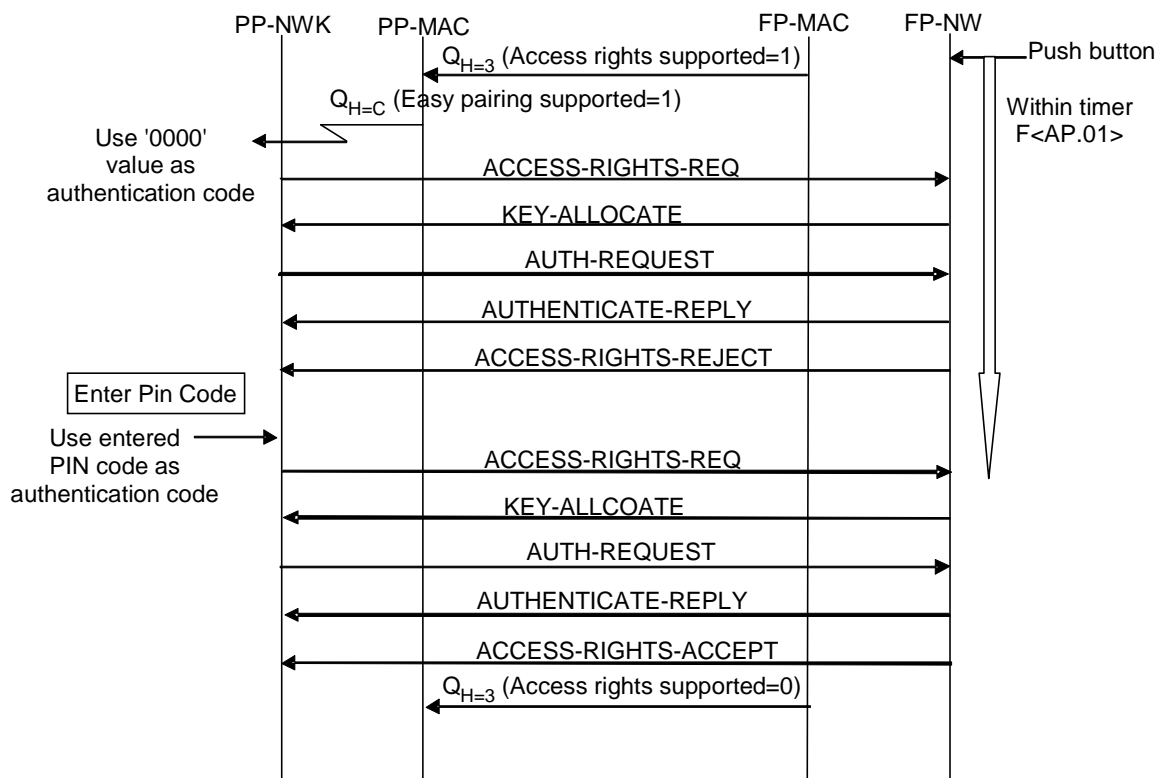
Figure 45: Easy pairing when PIN is not set to default '0000' value: switching back to PIN entry

Backward compatibility management : when a PP is in front of a FP without easy pairing capability, here are three possible behaviours of the PP (among several others and left free to implementer):

1) The PP uses the easy pairing feature, in case of failure, requests the PIN code, exactly as in front of a FP with easy pairing. The PP does not take into account the capability bit. This means easy pairing feature is always used on the PP independently of the FP type.

2) The PP uses the easy pairing feature but in case of easy pairing failure, the PP uses the capability bit to warn the user that re-triggering of the FP registration button might be necessary before using the easy PIN code registration feature. This deals with the case where the FP might not remain in registration mode in case the PP easy pairing attempt fails (could occur on some GAP FP for example).

3) The PP detects the absence of 'easy pairing registration supported' capability bit from the beginning and decides not to use the easy pairing feature but to use easy PIN code registration feature instead. This behaviour has the drawback not to use easy pairing. So it should be implemented only if behaviour 1 and 2 can not be implemented.

7.10.1.3 Common procedures to easy PIN code and easy pairing

7.10.1.3.1 Registration mode automatic access

When a PP that it is not registered to any FP is powered on, the PP shall start in a mode where the user is directly invited to trigger the access rights procedure. Upon user acknowledge, the access right procedure shall start.

It shall be possible for the user to leave this mode to switch back to idle mode.

For any further registrations on the PP (additional registration to the initial one), the registration mode should also be easily accessible from the user point of view.

7.10.1.3.2   Base station name selection

This clause applies only to PP with a display capability.

The FP shall broadcast its name during the subscription mode. The name shall be composed of up to 17 characters to fit in a {CLMS-FIXED} message. The name could be set to the manufacturer and model of the phone by default (see note 1) and could be changed by the user to a friendly name.

As soon as a FP with a44 set to 1 is found within the FP searching process based on the RSSI, the name shall be displayed by the PP.

> EXAMPLE 1:   The PP may display a list of FP names in subscription mode for selection by the user.

> EXAMPLE 2:   The PP may display only the selected FP (taking into account the best RSSI indication for example).

The PP will then start the access rights procedure with the selected FP (see clauses 7.10.2 or 7.10.5). The name shall be displayed by the PP with the result of the complete registration procedure.

The FP shall transmit its name information frequently during the subscription mode (i.e. during timer F<AP.01>). At least, the first segment of the FP name shall be transmitted within one period of F<AP.03> after the FP capabilities information transmission in order to receive it very quickly on PP side.

> NOTE 1:   When there are several FP of same type in range in subscription mode, this can be confusing. Therefore, it is recommended to set a unique name by default. For a DECT phone, the name could be composed of the phone model reference with the two last bytes of RFPI and indicated with a sticker on the FP. For a DECT FP integrated within a gateway/PBX, the name could be composed of the gateway/PBX model reference with additional unique identifier.

> NOTE 2:   The PP should take into account the FPs not supporting the base name broadcasting (e.g. GAP or NG-DECT part 1 base stations). In that case, the PP may display a message like "Unknown" or the RFPI.

> NOTE 3:   With this procedure, the overall process to select a base in registration mode is a little bit longer but it really improves the security.

FP name broadcasting is initiated by including the <<NETWORK-Parameter>> information element in the {CLMS-FIXED} message. The procedure to construct a multi-section {CLMS-FIXED} message shall be performed as defined in EN 300 175-5 [5], clause 8.3.
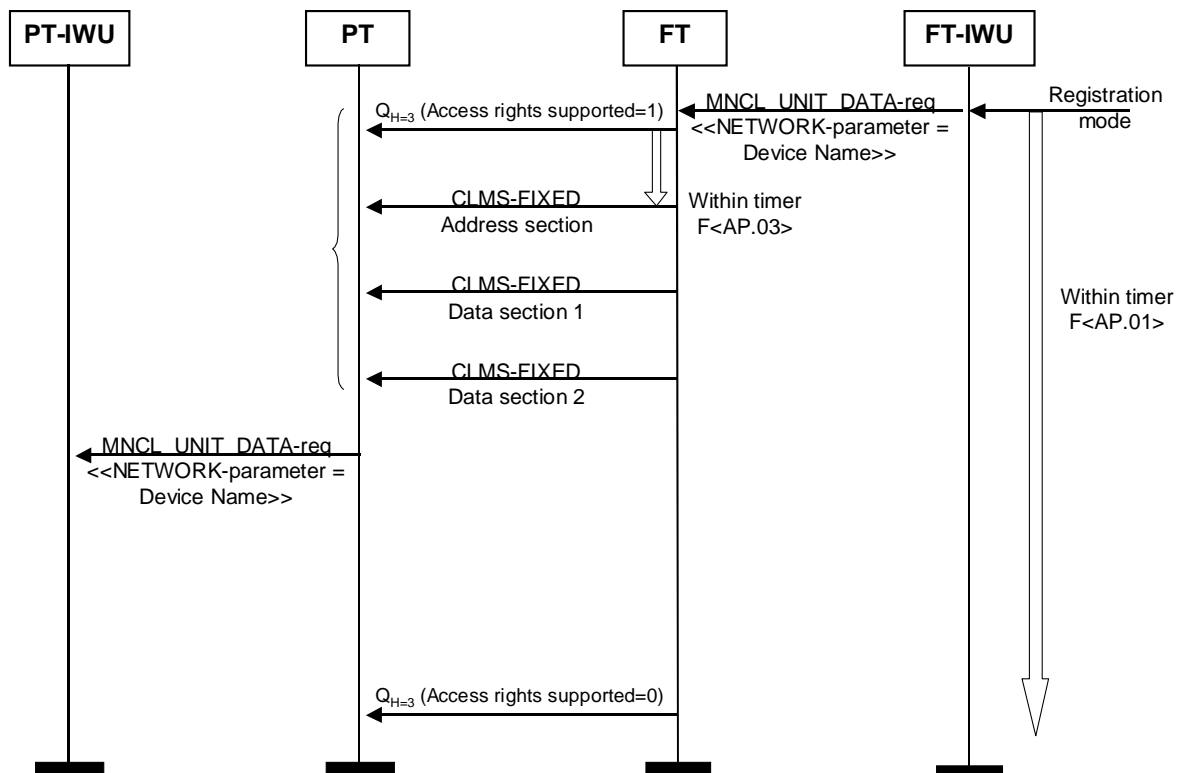
Figure 46: Base station name broadcasting

Table 61: Values used within the {CLMS-FIXED} message 1st segment

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<A>>		1	Address section
<<CLMS header>>		010	Multiple sections/Standard
<<Address>>		CFFFH	Connectionless Group TPUI
<<Protocol Discriminator>>	<Second Discriminator>	000001	DECT Information elements coding
<<Length Identifier>>		Any	Indicates implicitly the number of data sections to follow

Table 62: Values used within the {CLMS-FIXED} message 2nd segment

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<A>>		0	Data section
<<CLMS header>>		000	Data section number - 0 (1st)
<<DATA/Fill>>		41H	NETWORK parameter (octet 1)
		Any < 20	Length (octet 2)
		00010000	Discriminator: Device name (octet 3)
		Name	First character of name (octet 4)

Table 63: Values used within the {CLMS-FIXED} message k segment

Information element	Field within the information element	Standard values within the field/IE	Normative action/comment
<<A>>		0	Data section
<<CLMS header>>		K	Data segment (k+1)
<<DATA/Fill>>		Name	
		Name/Fill	
		Name/Fill	
		Name/Fill	

7.10.1.3.3   Registration user feedback

This clause applies only to FP with user signalling capability (for example a display, a LED or a buzzer). To improve the security, it is strongly recommended to support this feature both on the FP and the PP.

The FP and the PP shall give a feedback to the user of the registration process through a user interface.

The feedback given on the user interface of the PP and the FP shall be as a minimum the following status of the registration process with the following states:

- Registration in progress state:

    - Condition of entrance: the PP is looking for or is locked on a FP in subscription mode and the protocol is exchanging messages.

    - Recommended user action: wait for protocol to finish.

- Registration error state:

    - Condition of entrance: some error occurred, such as failed to find a peer device, or to complete the access rights procedure (e.g. authentication failed).

    - Recommended user action: wait then try again.

- Registration success state:

    - Condition of entrance: protocol procedure is complete and successful.

    - Recommended user action: try to make an outgoing call request.

The proposed user feedback with corresponding user interface allows user to check that registration on the correct FP was successful. This is an additional security especially in the case of the easy pairing procedure which is less secure than the PIN-code registration procedure.

The user should be aware that during the registration mode unwanted PP could join the FP. The user should be instructed to monitor the user interface, especially to check the success indication on both sides for security considerations. This verification will prevent the PP from joining a FP that was not selected or to prevent an other PP from joining the selected FP.

Type of user interface is left free to implementers. For example, the user interface could be a display on the PP side and a LED on the FP side. It could also be an audio tone indication or any other richer user interface (displays on both sides for example).

7.10.2   Handset locator

On FP side, a software or hardware button shall trigger this procedure.

The FP shall present an incoming external call to all PPs registered to the FP. Incoming call used at NWK level is the GAP NWK feature N8 "Incoming call". The FP shall send the information element <<Calling Party Name>> with the <Presentation indicator> field set to 'Handset locator' value.

On PP side, the call shall be presented as an incoming call. If PP has ringing capabilities enabled, the PP shall ring.

NOTE 1: It is recommended that the FP sends a CNIP with a name related to the current procedure, for example "Handset locator".

NOTE 2: The 'Handset locator' value of <Presentation indicator> field in CNIP might be used by the PP to trigger the ringing even if it is disabled, or to increase the ringer volume in that particular case.

**Table 64: Values used within the {CC-SETUP} or {CC-INFO} message
for handset locator internal call CNIP**

Information element	Field within the information element	Standard values within the field/information element	Normative action/comment
<<Calling party name>>			
	<Presentation indicator>	11	Handset locator
	<Used Alphabet>	All	
	<Screening indicator>	All	
	<Calling party name>	All	'Handset locator' for example

The procedure is stopped when incoming call is accepted by one of the PPs. In this case, the FP shall immediately release the call on this particular PP and stops incoming call presentation to other PPs.

NOTE 3: Other possible stops of the procedure are out of the scope of the current specification. For example the procedure could also be stopped:

- by pressing the button again on the FP side;
- by using a timer mechanism on FP side.

NOTE 4: The way the call is accepted on the PP is out of the scope of the present document. For example only the call key could accept the incoming call.
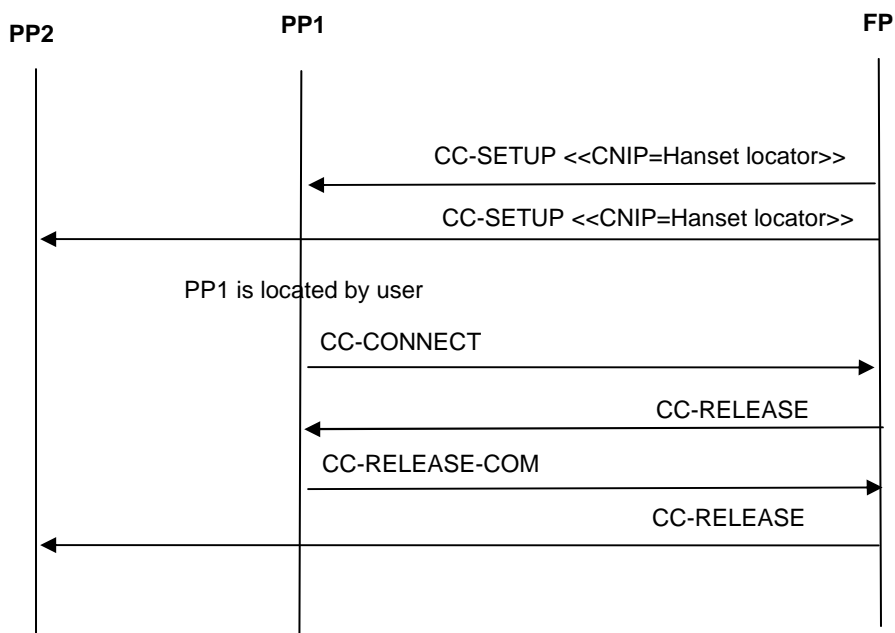
Figure 47: Handset locator example where PP1 is located

NOTE 5: The Call Control message sequence in figure 47 should be understood as an example. The real sequences may also contain different Call Control messages or Call Control messages in another order or Call Control messages with other contents.

Annex A (normative):
System parameters

A.1   Application timers

<AP.01>   **Subscription mode timer.**

FT value: 120 seconds.

PT value: Not used.

Start: Subscription mode has been requested by the user: set a44 "access rights supported" bit and "Easy pairing registration supported" a37 bit.

Stop: As soon as on-air subscription procedure is successful, clear a44 "access rights supported" bit and "Easy pairing registration supported" a37 bit.

<AP.02>   **Searching mode timer.**

FT value: Not used.

PT value: 120 seconds.

Start: Searching mode has been requested by the user: listen and wait for a44 "access rights supported" bit.

Stop: As soon a as on-air subscription procedure is successful.

<AP.03>   **Base station name broadcasting timer.**

FT value: 160 ms.

PT value: Not used.

Start: Base station name broadcasting occurrence (Higher layer capabilities FP broadcast sent).

Stop: The first segment of the FP name is sent.

Annex B (normative):
Procedure diagrams

The following diagrams depict basic sequences that illustrate the text of present document.

The Call Control message sequences in the following diagrams shall be understood as examples. The sequences may also contain different Call Control messages or Call Control messages in another order or Call Control messages with other contents.

EXAMPLE: CC-ALERTING and CC-CALL PROCEEDING are sometimes not mentioned although they are allowed in the sequences.

B.1 Events notification diagrams

The following flowcharts are very basic sequences. See also annex C (especially clauses C.2.4 and C.2.5) for more complete examples of notifications.

For clarity of the following flowcharts, <<Call information>> IE including call identifiers and line identifiers does not appear in some of the CC messages that must convey it. Please note that they should not be omitted when implementing equivalent cases.

B.1.1 Event notification when there is no existing connection

Use case: FP wants to send an event notification and there is no existing connection : use the CLSS procedure (page the PP and setup the bearer).
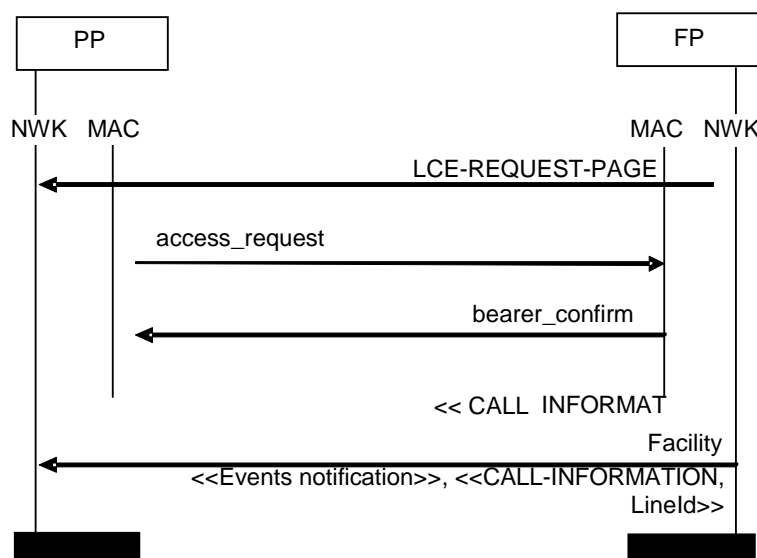
Figure B.1: Event notification when there is no existing connection

NOTE: Line identifier may be equal to 'all lines' value.

B.1.2   Event notification during existing connection

Use case: FP wants to send an event notification when the PP is on communication : use the existing connection.
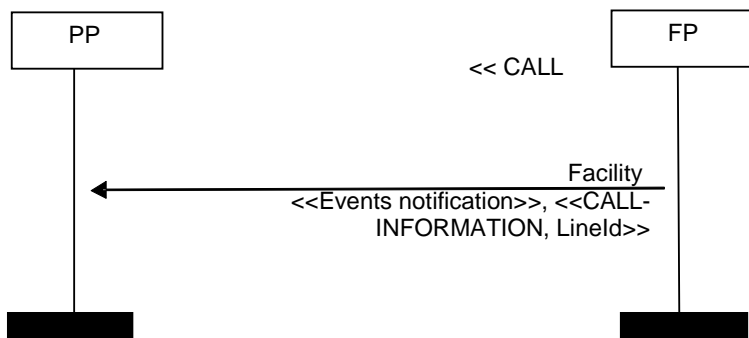
Figure B.2: Event notification during existing connection

NOTE: Line identifier may be equal to 'all lines' value.

B.1.3   Event notification when the PP is switched on

Use case: FP has wanted to send an event notification when PP was switched off, PP is switched on : use the location registration connection.
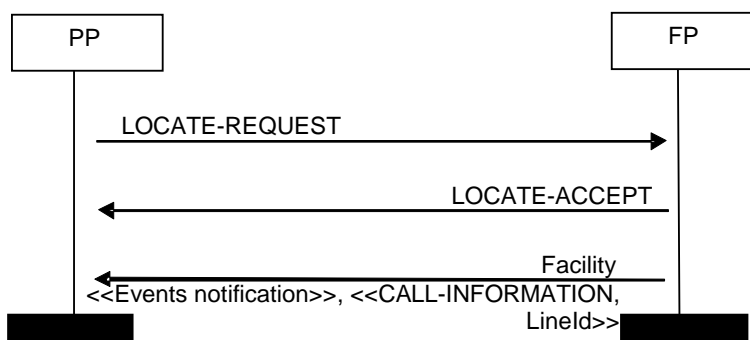
Figure B.3: Event notification when the PP is switched on

NOTE: Line identifier may be equal to 'all lines' value.

B.1.4 Event notification using call connection

Use case: FP has wanted to send an event notification when PP was not in range, PP sends a CC-SETUP : use the call connection.
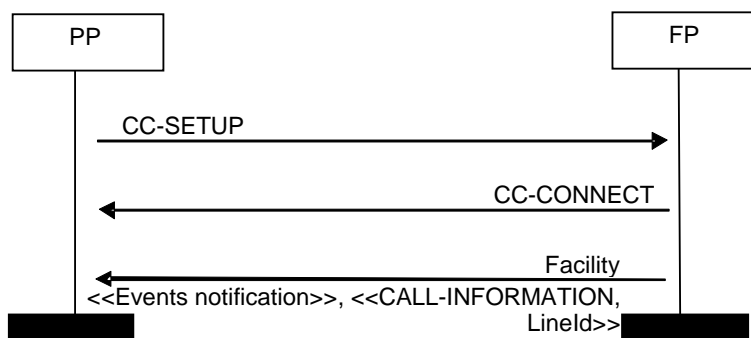
Figure B.4: Event notification using call connection

NOTE: Line identifier may be equal to 'all lines' value.

B.1.5 Event notification for "Missed call notification"

Use case: Missed call notification message sequence.
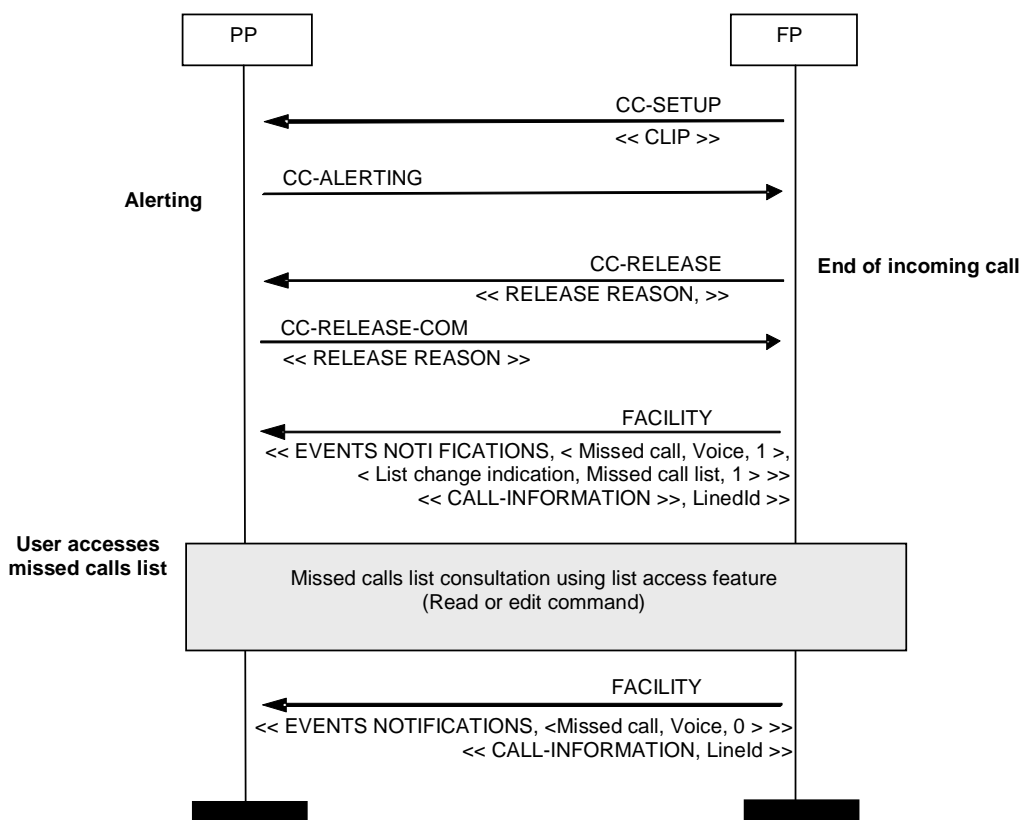
Figure B.5: Missed call notification

NOTE: See also clause C.2.4 for more detailed flowcharts including line identifiers and call identifiers.

B.2   Date-time synchronization diagrams

These flowcharts depicts the date and time synchronization feature, but only in the cases where the FP sets the date and time of the PP. If the DECT system implements this feature, the FP behaviour shall follow one of the possible use cases listed hereafter. Please note some flexibility is allowed concerning the the CC messages.

For clarity of the following flowcharts the <<Call information>> IE including call identifier does not appear in the CC messages that must convey it. Please note that it should not be omitted when implementing equivalent cases.

EXAMPLE: The call identifier must be assigned by the FP after CC-SETUP message.

B.2.1   Date-time synchronization when there is no existing connection

Use case: FP wants to send a time and date synchronization and there is no existing connection: use the CLSS procedure (page the PP and setup the bearer).
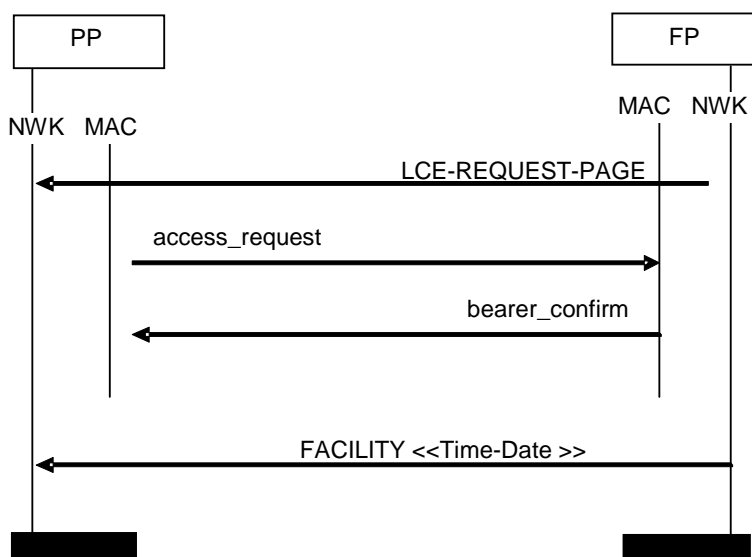
Figure B.6: Date-time synchronization when there is no existing connection

B.2.2   Date-time synchronization during existing connection

Use case: FP wants to send a time and date synchronization when the PP is on communication : use the existing connection.
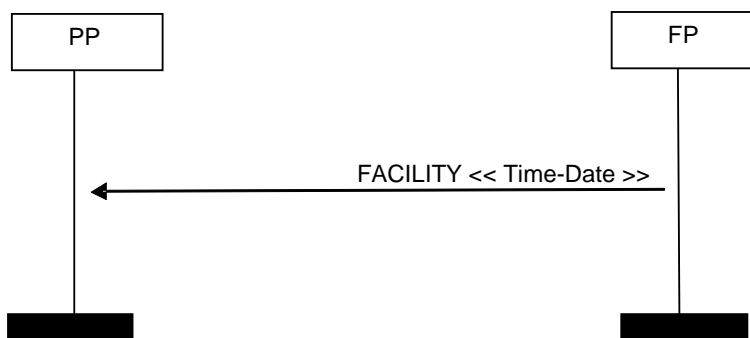
Figure B.7: Date-time synchronization during existing connection

B.2.3 Date-time synchronization when the PP is switched on

Use case: FP has wanted to send a time and date synchronization when PP was switched off, PP is switched on : use the location registration connection.
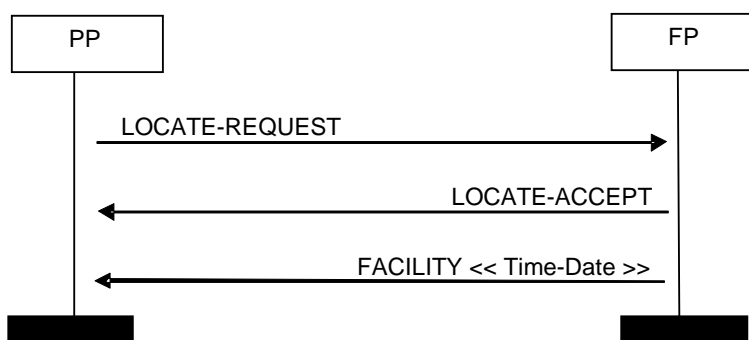
Figure B.8: Date-time synchronization when the PP is switched on

B.2.4 Date-time synchronization using call connection

Use case: FP has wanted to send a time and date synchronization when PP was not in range, PP sends a CC-SETUP : use the call connection.
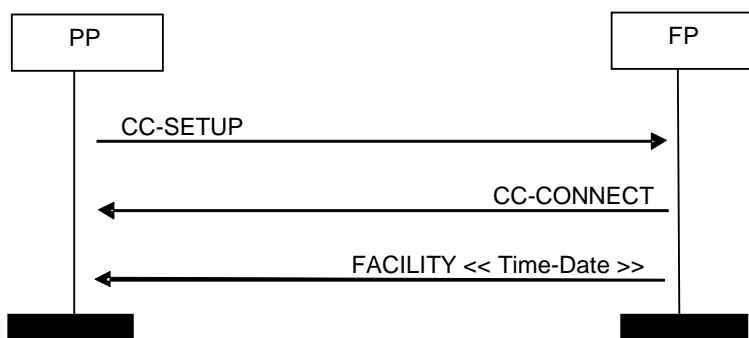
Figure B.9: Date-time synchronization using call connection

NOTE: The line identifier is not represented here. Note that it is anyway only relevant if the synchronization is done in the context of an external call.

B.3 List access service basic sequence diagrams

For clarity of the following flowcharts, <<Call information>> IE including call identifiers and line identifiers does not appear in some of the CC messages that must convey it. Please note that they should not be omitted when implementing equivalent cases.

B.3.1 Start/end session when PP is in idle mode
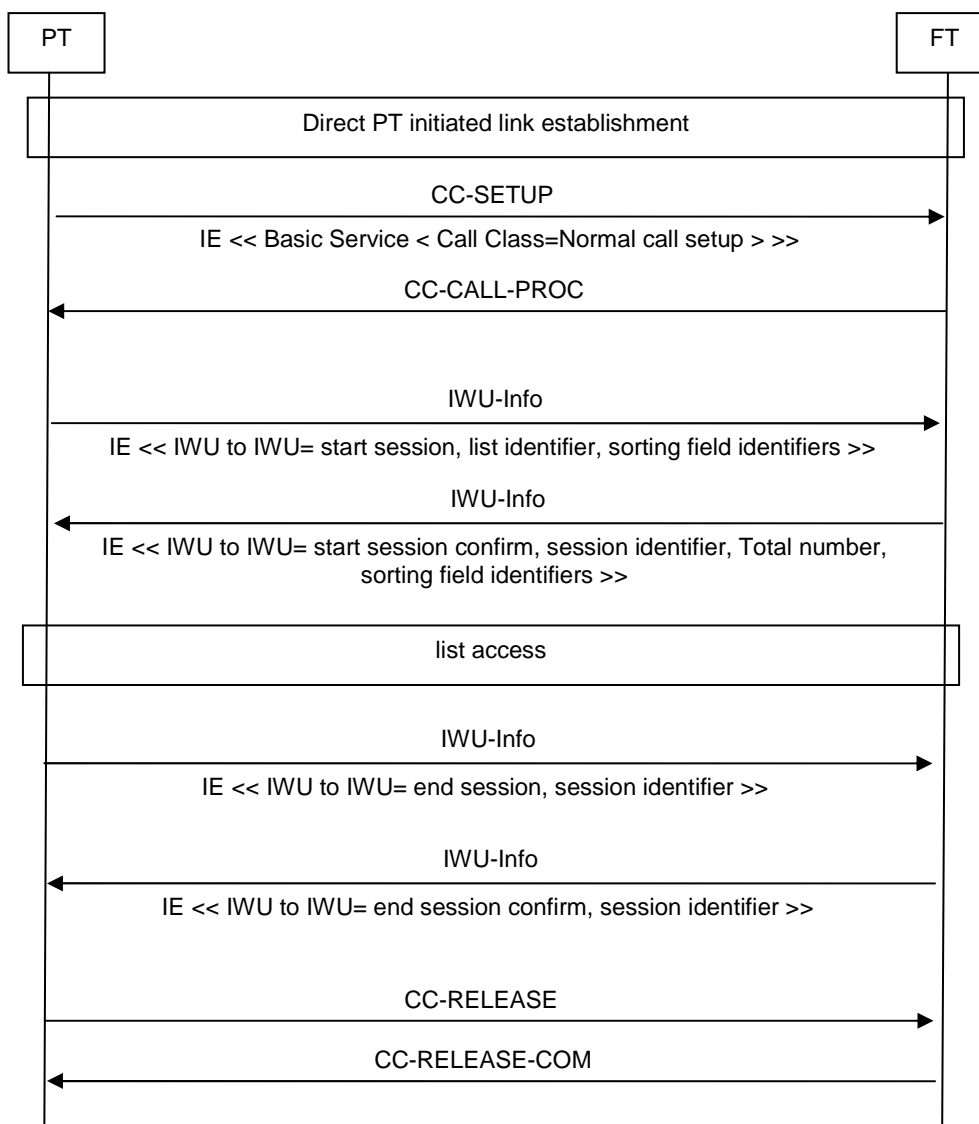
Figure B.10: List access: start/end session when PP is in idle mode

B.3.2   Start/end session when a call is already established to PP
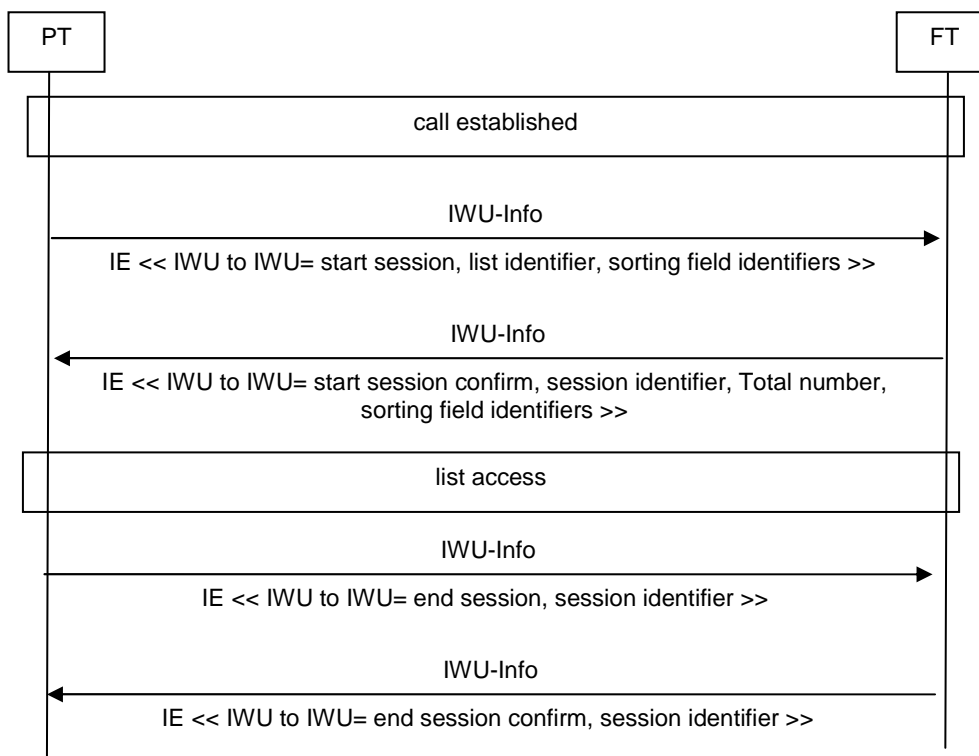
Figure B.11: List access: start/end session when a call is already established to PP

NOTE: See also diagrams in clause C.6 for examples on list access and voice calls flowcharts.

B.3.3   Query supported entry fields
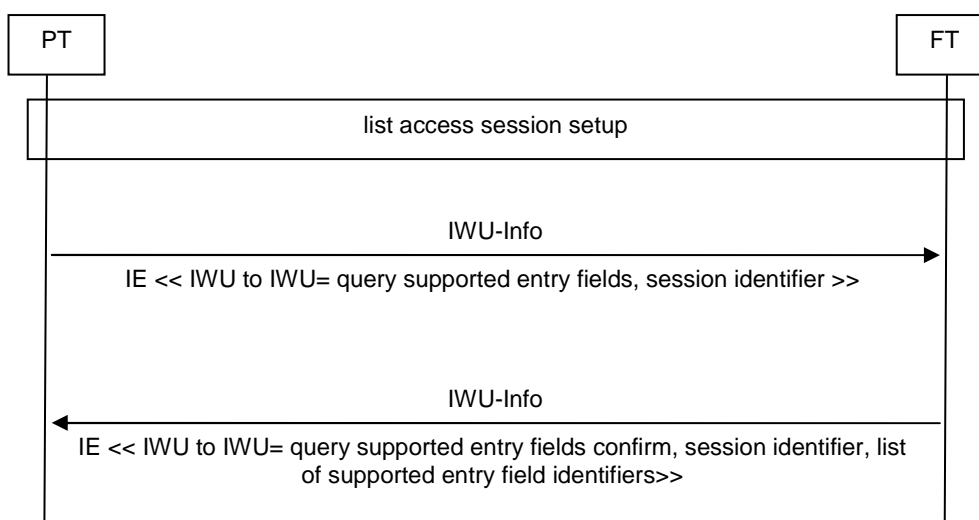
Figure B.12: List access: query supported entry fields

B.3.4   Read entries
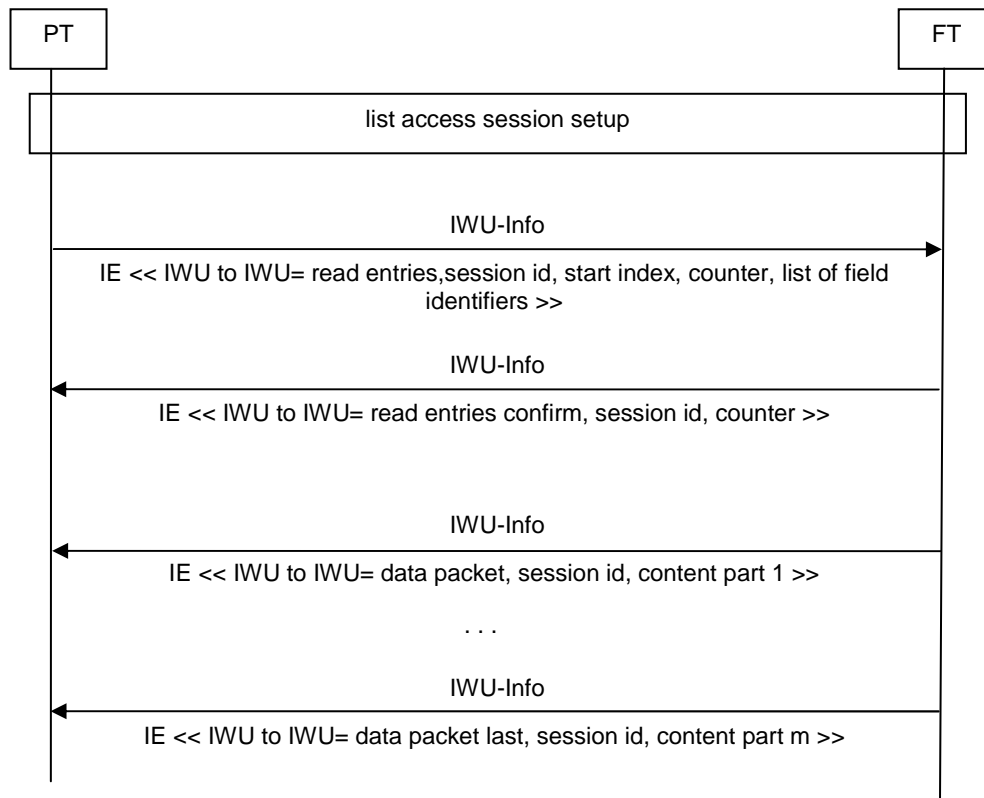
Figure B.13: List access: read entries

B.3.5   Edit entry
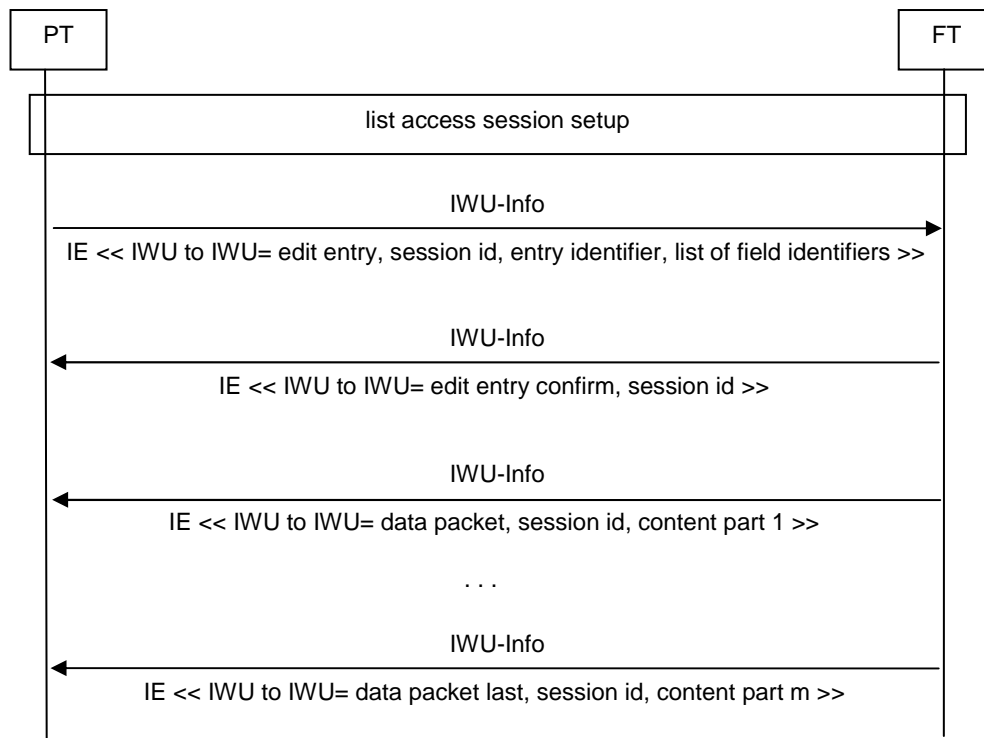
Figure B.14: List access: edit entry

B.3.6   Save entry
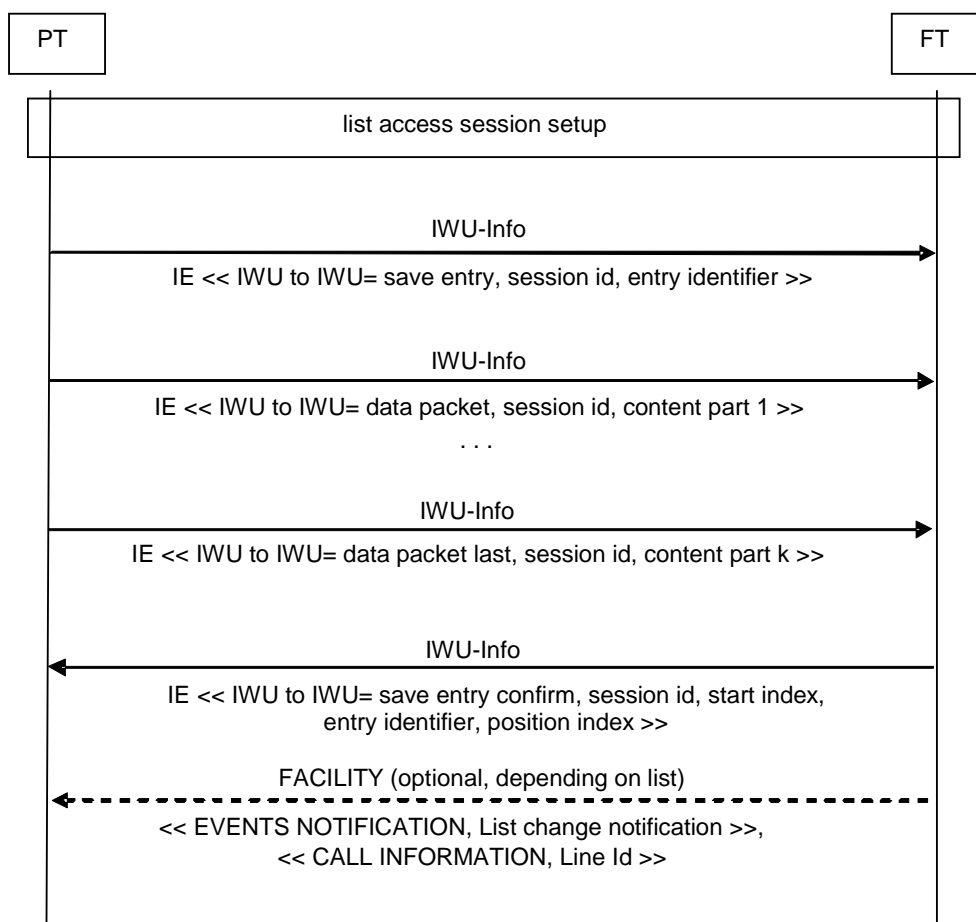
Figure B.15: List access: save entry

NOTE: Alternatively the FACILITY message might be sent after terminating the list access session.

B.3.7   Delete entry
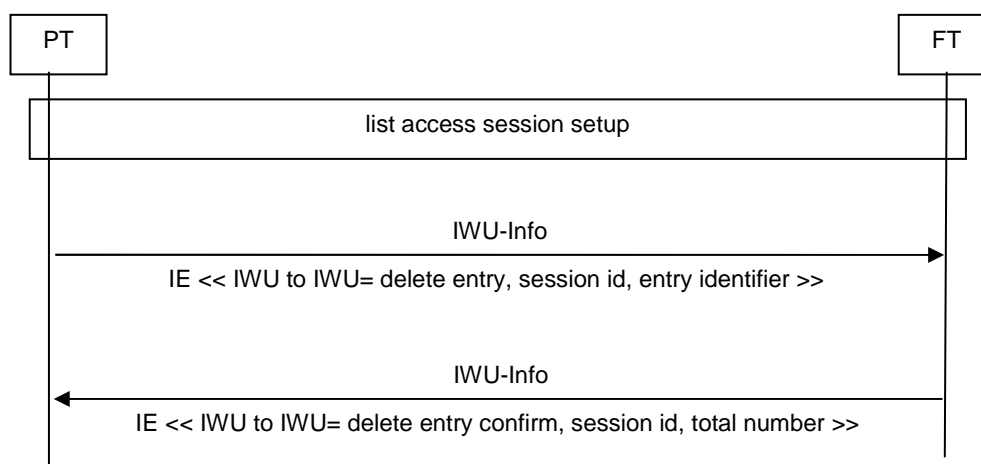
Figure B.16: List access: delete entry

NOTE: The list has changed once this procedure has been performed. PP should read list again starting from index of the first entry which was deleted.

B.3.8 Delete list
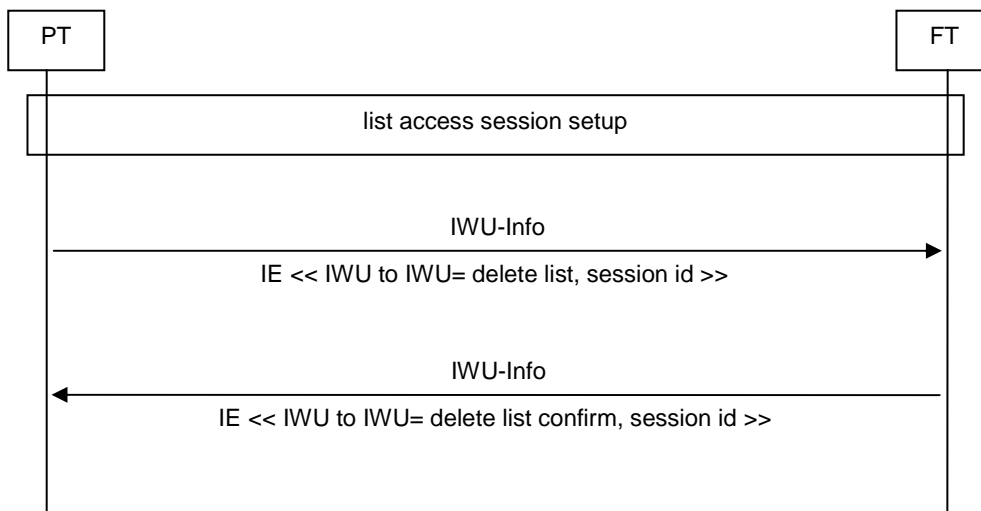
Figure B.17: List access: delete list

B.3.9 Search entries
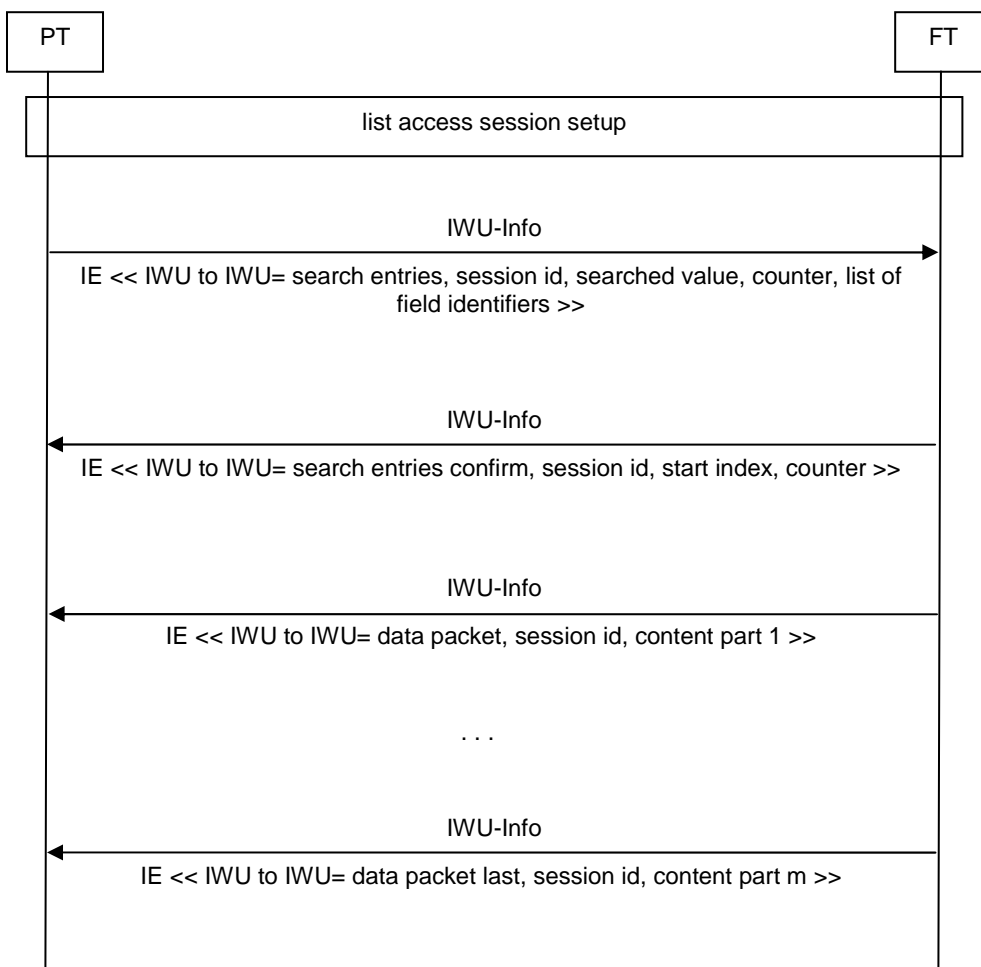
Figure B.18: List access: search entries

Annex C (informative):
Recommended implementation of procedures

C.1   General

In the following clauses, several examples for generic sequence charts are depicted.

It has to be noted that the sequences are only examples, it cannot be mandatory that the message flows shall always be exactly in the described way. However it is recommended to follow the examples where possible in order to ensure interoperability.

C.2   Multiple lines diagrams

The diagrams of this clause document the "Multiple lines" feature. This feature can be used when at least the FP implements it. For the PP, implementing this feature means that it is aware of multiple attachments, and proposes an adapted MMI.

However a PP may be attached to several lines without being aware of it, i.e. not implementing the "Multiple lines" feature. Such a PP would use e.g. "FP-managed line selection" for outgoing calls, and would receive calls from these lines at the price for the user of not knowing from which line an incoming call arrives (unless asking the calling user).

The "Line identification" feature is an independent feature on PP side, but a pre-requisite on FP side. Implementing it on PP side (recommended) however allows the user to place a call on line k by keyboarding '#k' before the called number, or by introducing the 'k' value through a dedicated MMI. It also allows the user to know in advance on which line a call is received through display. However, such a PP still cannot propose a menu with the set of attached lines presented and to choose from.

If the PP now implements the "List access" feature, in addition to the "Line identification" feature, it has got virtually anything it needs to implement the "Multiple lines" feature, and implenting it at this stage is only a matter of MMI implementation.

C.2.1   Attaching a new PP to one or several lines

Use case: the user hast just registered a new PP, then the user is invited to select the line(s) to which the new PP is attached to (PP managed attachment). This use case can also be used later to change the handsets attachment to the lines.

We assume that the new registered PP is the terminal number 'm'.

PP   **FP**

ACCESS-RIGHTS-REQUEST

ACCESS-RIGHTS-ACCEPT

LOCATE-REQUEST

LOCATE-ACCEPT

TEMPORARY-IDENDITY-ASSIGN-ACK < TPUI IdN=m >

Line settings start session. 'Total number of entries' = N (lines)

Update 'Attached handsets' field of each line for the new registered PP:

IWU-INFO

IE << IWU to IWU= **read entries**, session id, start index=n, counte r=forward/1,
list of field identifiers = Line Id id, Line name id, Attached handsets id >>

IWU-INFO

IE << IWU to IWU= **read entries confirm**, session id, counter=1 >>

IWU-INFO

IE << IWU to IWU= **data packet**, session id, content part = nth entry content >>

IWU-INFO

IE << IWU to IWU= **edit entry**, session id, entry identifier = entry id n,
list of field identifiers= Line Id id, Line name id, Attached handsets id >>

IWU-INFO

IE << IWU to IWU= **edit entry confirm**, session id, start index = n >>

IWU-INFO

IE << IWU to IWU= **data packet last**, session id, content part= nth entry content >>

user may update the 'Attached handsets' field for nth line in line settings list
to attach the new registered PP to the nth line

IWU-INFO

IE << IWU to IWU= **save entry**, session id, entry identifier= entry id n >>

IWU-INFO

IE << IWU to IWU= **data packet last**, session id, content part= nth entry updated >>

IWU-INFO

IE << IWU to IWU= **save e ntry confirm**, session id, entry identifier = entry id n,
start index >>

for (n ∈ 1.. N)

FP notifie s list change notification to all PPs attached to the line n

line settings end session

Figure C.1: Attaching a new PP to one or several lines

NOTE 1: The above diagram assumes that only one "data packet" command is necessary for reading one entry
content, i.e. the 'data packet last' command is received directly.

NOTE 2: As an alternative, all entries in the "Line settings" list could be read all at once with one read entries
command.

C.2.2   Outgoing first call on a line

For each use case, two sub use cases at least are handled: Line identification by PP, or FP managed line selection.

C.2.2.1   PP attached to 1 line

C.2.2.1.1   Line identification by "mono-line" PP

See below, clauses C.2.2.2.1, C.2.2.2.2 and C.2.2.2.3, as there is no difference from the case when a PP is attached to several lines (the only line-id still must be sent at call setup by a PP attached to only one line).

C.2.2.1.2   No line identification by "mono-line" PP: not relevant

"FP-managed line selection" is not recommended for a PP attached to only one line, which must systematically send the line-id.

C.2.2.2 PP attached to several lines

Clauses C.2.2.2.1, C.2.2.2.2 and C.2.2.2.3 implement variants of the same use case: the PP implements the "Line identification" feature and sends the line-id when setting up the call. Clause C.2.2.2.3 in addition presents the case where the PP sends the called number before the call-id is received (pre-dialling and similar use cases).

Clause C.2.2.2.4 documents *call by call* FP-managed line selection and clause C.2.2.2.5 *permanent* FP managed line selection, useful for example for the case a PP, although attached to several lines, always uses the same line for outgoing calls.

C.2.2.2.1   Line identification by PP using <<CALL-INFORMATION>>

Use case 1: the PP selects a line on a call-by-call basis using <<CALL-INFORMATION>> IE.
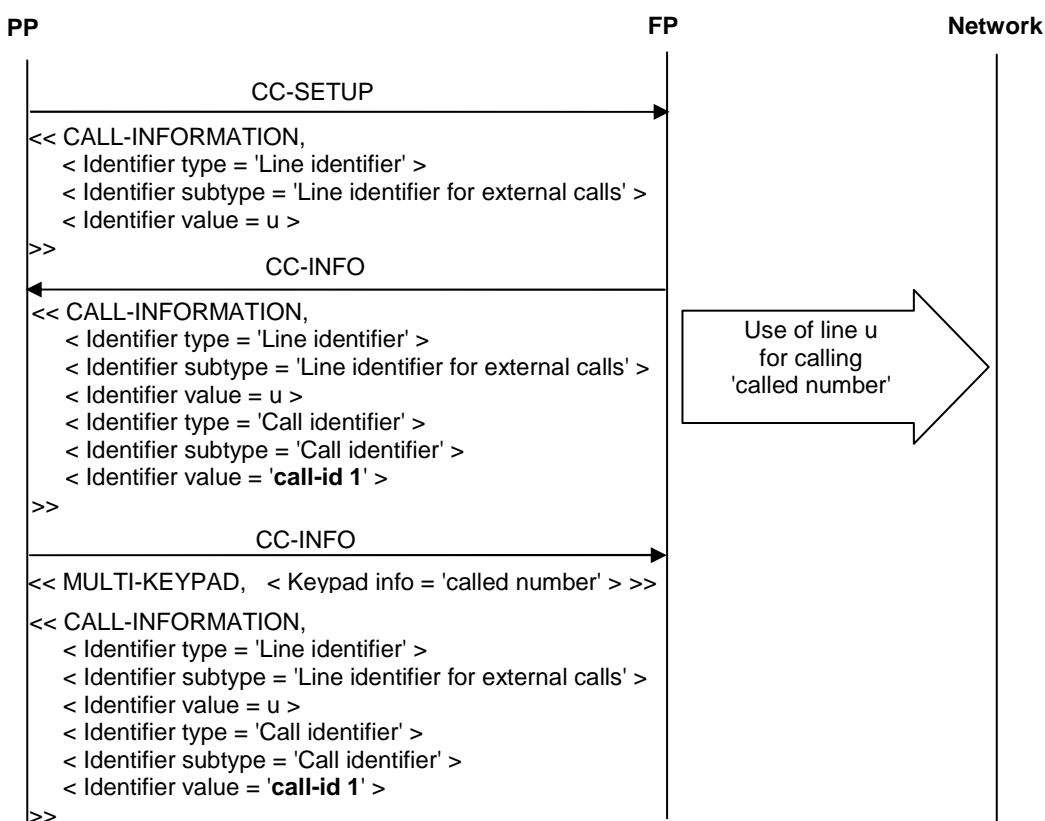
Figure C.2: Line identification by PP using <<CALL-INFORMATION>>

NOTE 1: The PP in this diagram is also supposed to implement "Line identification" (see CC-SETUP and CC-INFO for called number) and "Call identification" (see CC-INFO for called number).

NOTE 2: As "Call identification" is mandatory for NG PART3 FPs, the call identifier notification is represented, although it is somehow independent of the "Multiple lines" feature. The line identifier is repeated in the <<CALL-INFORMATION>> IE used for that notification as a result of the "**call information completeness principle"**.

C.2.2.2.2   Line identification by PP using the <<MULTI-KEYPAD>>

Use case: the PP selects a line on a call-by-call basis using << MULTI-KEYPAD >> IE (e.g. the user used the keyboard to select the line instead of the dedicated MMI).
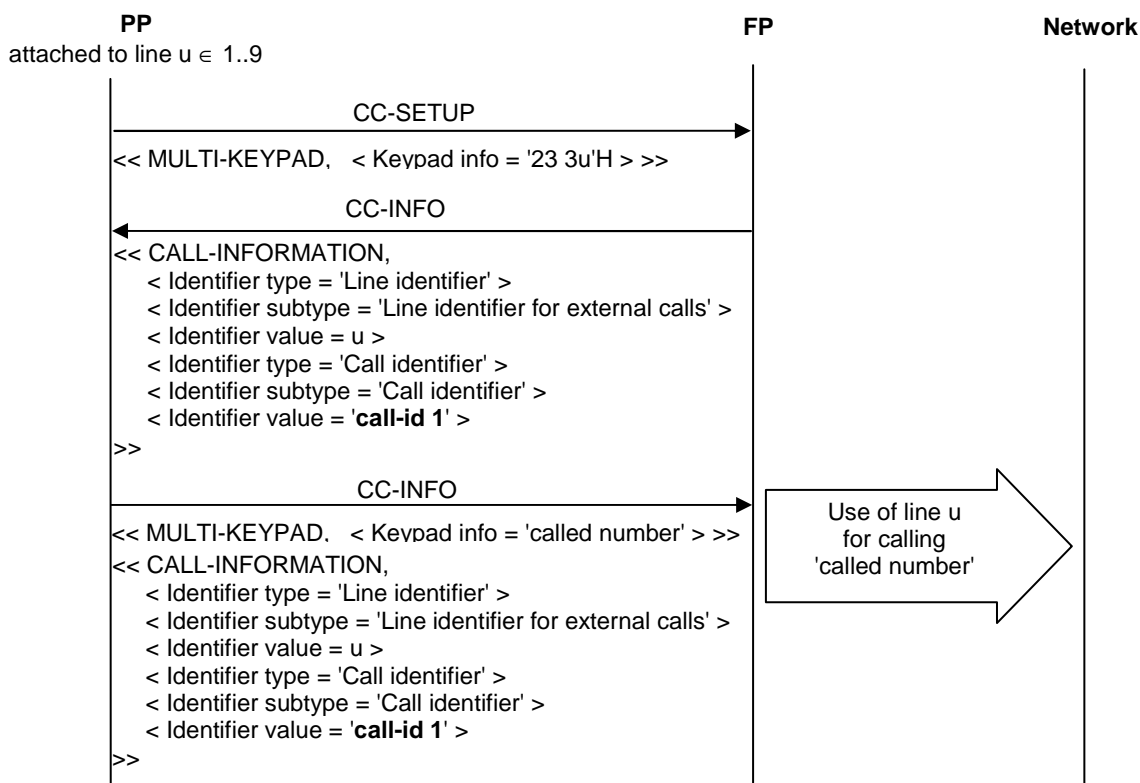
Figure C.3: Line identification by PP using <<MULTI-KEYPAD>>

NOTE 1: Restriction to [0..9] interval for the line id value is in place here because <<MULTI-KEYPAD>> is used for sending the line id.

NOTE 2: As "Call identification" is mandatory for Part 3 FPs, the call identifier notification is represented, although it is somehow independent of the "Multiple lines" feature. The line identifier is repeated in the <<CALL-INFORMATION>> IE used for that notification as a result of the **call information completeness principle"**.

C.2.2.2.3   Line identification by PP immediately followed by call number (e.g. pre-dialling)

Use case: the PP selects a line on a call-by-call basis (using here << CALL-INFORMATION>> IE), and immediately sends the called number, without waiting for the call id. This use case applies when pre-dialling is used, when re-dialling is used, or when the call is placed after phone book look-up.

NOTE: Use of the <<CALLED PARTY NUMBER>> in the CC-SETUP is not considered, as it is not used in GAP and part 3 relies on GAP.

```
PP                                          FP              Network

|                    CC-SETUP                 |               |
|-------------------------------------------->|               |
| << CALL-INFORMATION,                        |               |
|    < Identifier type = 'Line identifier' >  |               |
|    < Identifier subtype = 'Line identifier for external calls' > |
|    < Identifier value = u >                 |               |
| >>                                          |               |
|                    CC-INFO                   |               |
|-------------------------------------------->|               |
| << MULTI-KEYPAD,   < Keypad info = 'called number' > >>     |
|                                             |  Use of line u |
|                                             |   for calling  |
|                                             |  'called number'|
|                    CC-INFO                   |               |
|<--------------------------------------------|               |
| << CALL-INFORMATION,                        |               |
|    < Identifier type = 'Line identifier' >  |               |
|    < Identifier subtype = ' Line identifier for external calls' > |
|    < Identifier value = u >                 |               |
|    < Identifier type = 'Call identifier' >  |               |
|    < Identifier subtype = 'Call identifier' > |             |
|    < Identifier value = 'call-id 1' >       |               |
| >>                                          |               |
```

Figure C.4: Line identification by PP immediately followed by call number

C.2.2.2.4   No line identification by PP: FP managed line selection

Use case: a line is selected by the FP using the 'Attached handsets' parameter of lines settings. For example, a line is selected by configuration for all outgoing calls, or lines are prioritized by configuration and the first free line is used, etc.

```
PP                                          FP              Network

|                    CC-SETUP                 |               |
|-------------------------------------------->|               |
|                    CC-INFO                   |               |
|<--------------------------------------------|               |
|  << CALL-INFORMATION,                        |               |
|     < Identifier type = 'Call identifier' >  |              |
|     < Identifier subtype = 'Call identifier > |             |
|     < Identifier value = 'call-id 1' >       |             |
|  >>                                          |               |
|                    CC-INFO                   |               |
|-------------------------------------------->|               |
| << MULTI-KEYPAD,   < Keypad info = 'called number' > >>     |
|                                             | Selects u among|
|                                             | lines attached to PP |
|                    CC-INFO                   |               |
|<--------------------------------------------|  Use of line u |
|  << CALL-INFORMATION,                        |   for calling  |
|     < Identifier type = 'Line identifier' >  | 'called number'|
|     < Identifier subtype = 'Line identifier for external calls' > |
|     < Identifier value = u >                 |               |
|     < Identifier type = 'Call identifier' >  |               |
|     < Identifier subtype = 'Call identifier' > |             |
|     < Identifier value = 'call-id 1' >       |             |
|  >>                                          |               |
```

Figure C.5: No line identification by PP: FP managed line selection

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NOTE: The sequence of messages above is also used for NG DECT PPs that do not implement the "Multiple lines" feature (Part 1 PPs or Part 3 PPs not implementing the feature). However, such PPs could ignore the line-id received.

C.2.2.2.5   No line identification by PP and permanent FP-managed line selection

Use case: the PP always uses the same line for outgoing call (e.g. the line is selected by configuration). In this case, the FP may send the line-id as soon as possible, i.e. together with the call-id.

PP   **FP**

Outgoing parallel call initiation

CC-SETUP →

CC-INFO ←

Line selected for the call if external

```
<< CALL-INFORMATION,
    < Identifier type = 'Line identifier' >
    < Identifier subtype = 'Line identifier for external calls' >
    < Identifier value = u >
    < Identifier type = 'Call identifier' >
    < Identifier subtype = 'Call identifier' >
    < Identifier value = 'call-id 1' >
>>
```

CC-INFO →

```
<< MULTI-KEYPAD,   < Keypad info = 'called number' > >>
<< CALL-INFORMATION,
    < Identifier type = 'Line identifier' >
    < Identifier subtype = 'Line identifier for external calls' >
    < Identifier value = u >
    < Identifier type = 'Call identifier' >
    < Identifier subtype = 'Call identifier' >
    < Identifier value = 'call-id 1' >
>>
```

Figure C.6: No line identification by PP and permanent FP-managed line selection

NOTE: This use case does not apply to a PPs attached to a single line: as a rule, a PP implementing "Line identification" should always perform line selection unless it uses "FP-managed line selection" in the purpose of simplifying the user experience. If attached to a single line, it can send the line-id without user intervention so that the user experience cannot be simplified further.

C.2.2.3 GAP PP

C.2.2.3.1 Line identification by GAP PP with backward compatible mechanism

Use case: the PP selects a line using << MULTI-KEYPAD >> IE. A GAP handset will not receive any <<CALL-INFORMATION>> element.
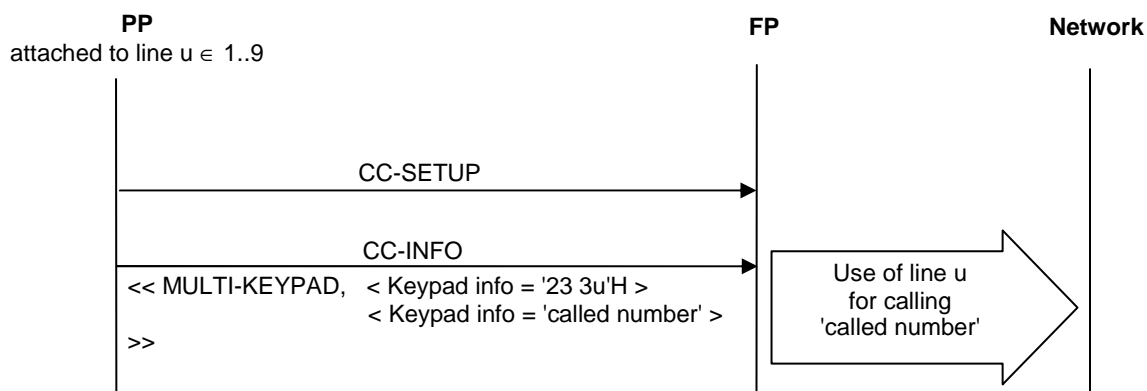
Figure C.7: Line identification by GAP PP with backward compatible mechanism

C.2.2.3.2 No line identification by GAP PP: FP managed line selection

Use case: the line is selected by the FP using the 'Attached handsets' parameter of lines settings. A GAP handset will not receive any <<CALL-INFORMATION>> element.
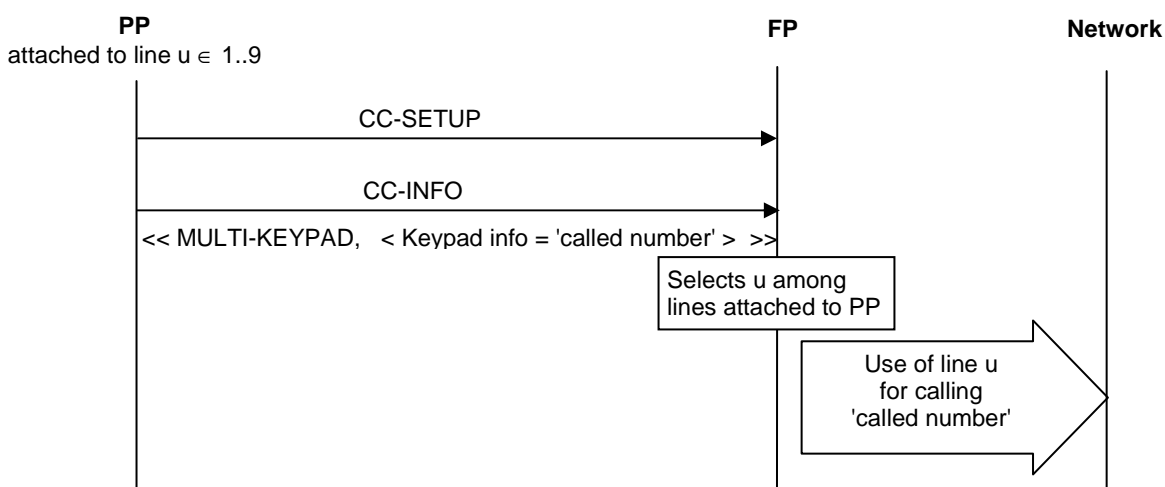
Figure C.8: No line identification by GAP PP: FP managed line selection

C.2.2.4 NG-DECT Part 1 PPs

C.2.2.4.1 Line identification by Part 1 PP with backward compatible mechanism

"Part 1 PP" means a PP compliant with TS 102 527-1 [21].

Use case: the Part 1 PP selects a line using << MULTI-KEYPAD >> IE, but however receives the <<CALL-INFORMATION>> element from the FP (and ignores it).

PP	FP	Network

PP
attached to line u ∈ 1..9

CC-SETUP

<< MULTI-KEYPAD,   < Keypad info = '23 3u'H > >>

CC-INFO

<< CALL-INFORMATION,
    < Identifier type = 'Line identifier' >
    < Identifier subtype = 'Line identifier for external calls' >
    < Identifier value = u >
    < Identifier type = 'Call identifier' >
    < Identifier subtype = 'Call identifier' >
    < Identifier value = '**call-id 1**' >
>>

CC-INFO

<< MULTI-KEYPAD,   < Keypad info = 'called number' > >>

Use of line u
for calling
'called number'

Figure C.9: Line identification by Part 1 PP with backward compatible mechanism

NOTE: Figure C.9 is also valid for a Part 3 non-multiple line PP (i.e. not implementing the "Multiple lines"
feature). If such a PP however implements the "Line identification" feature, it could use a
<<CALL-INFORMATION>> instead of sending the keypad information '#u'. See the introduction of
clause C.2 for information about what distinguishes such a Part 3 PP from a real "Multiple lines" PP.

C.2.2.4.2   No line identification by Part 1 PP: FP managed line selection

See clause C.2.2.2.4, "No line identification by PP: FP managed line selection", which also applies here.

C.2.3   First incoming call on a line

C.2.3.1 PP attached to 1 line

See below, clause C.2.3.2, PP attached to several lines, as there is no difference with the case when a PP is attached to
several lines.

C.2.3.2 PP attached to several lines

Use case: the PP is attached to several lines. An incoming call on line u is presented.

PP
attached at least to
line u

	FP	Network

CC-SETUP

Incoming call to line u
from 'calling number'

<< CALL-INFORMATION,
    < Identifier type = 'Line identifier' >
   < Identifier subtype = 'Line identifier for external calls' >
    < Identifier value = u >
    < Identifier type = 'Call identifier' >
    < Identifier subtype = 'Call identifier' >
    < Identifier value = = '**call-id 1**' >
>>
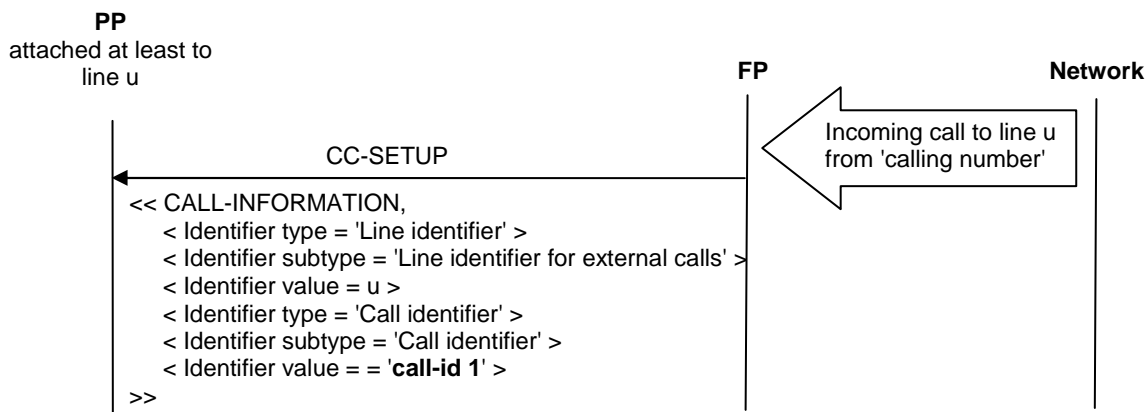
Figure C.10: First incoming call, PP attached to several lines

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C.2.4   Missed call on a specific line

Use case: the PP is attached to several lines. Missed call list is implemented. An incoming call on line u is not answered. Missed call and missed call list update notifications are sent just after the incoming call release.
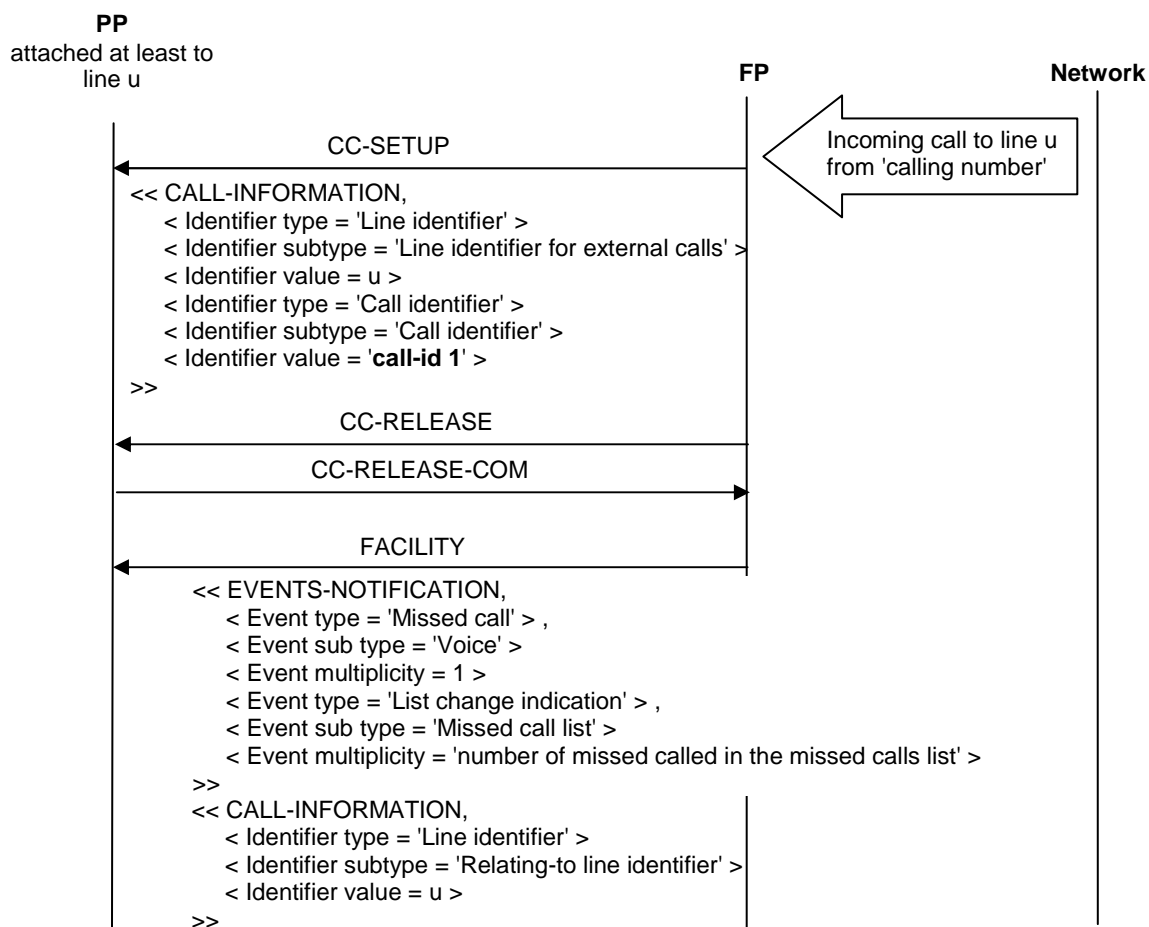
Figure C.11: Missed call on a specific line

NOTE: The list change indication for the Missed call list is optional.

C.2.5   Voice message waiting indication on a specific line

Use case: a voice message has been left in the voice mailbox of line u, a voice message waiting indication is sent to each PP attached to this line.
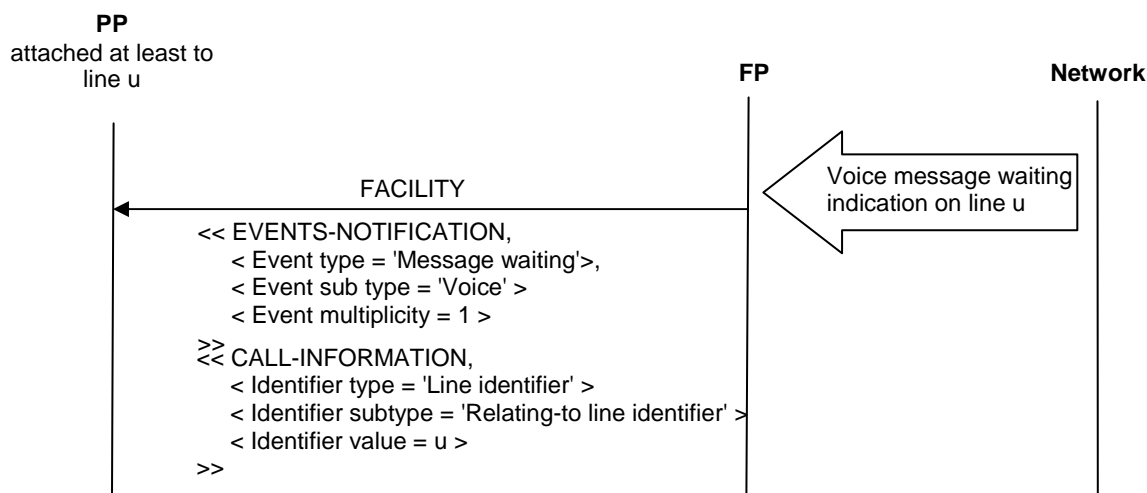
Figure C.12: Voice message waiting indication on a specific line

C.3   Multiple calls diagrams

C.3.1   First incoming call on the line or system

Use case: the PP is attached to a multi-call line. An incoming call is presented to the line.
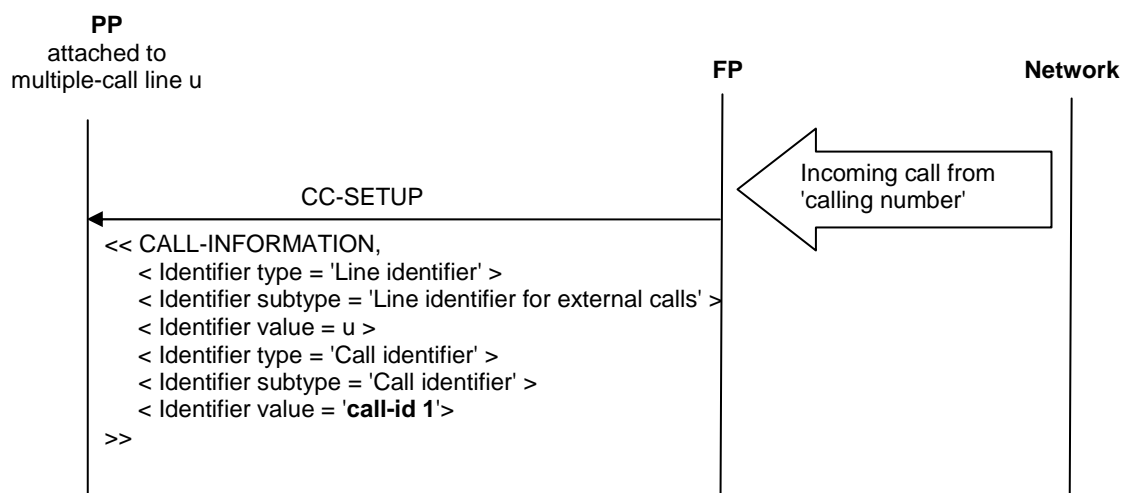
Figure C.13: First incoming call on the line or system

NOTE: Although somehow independent of the "Call identification" feature, the line identifier notification is also represented, as "Line identification" is mandatory for Part 3 FPs.

C.3.2   Second incoming call on the line or system

Use case: the PPs are attached to a multi-call line. A call is on going from PP1 which implements the "Call identification" feature. An incoming call is presented to the line. For conciseness of the diagram, line identification is not represented (which corresponds to the case of an internal waiting call).
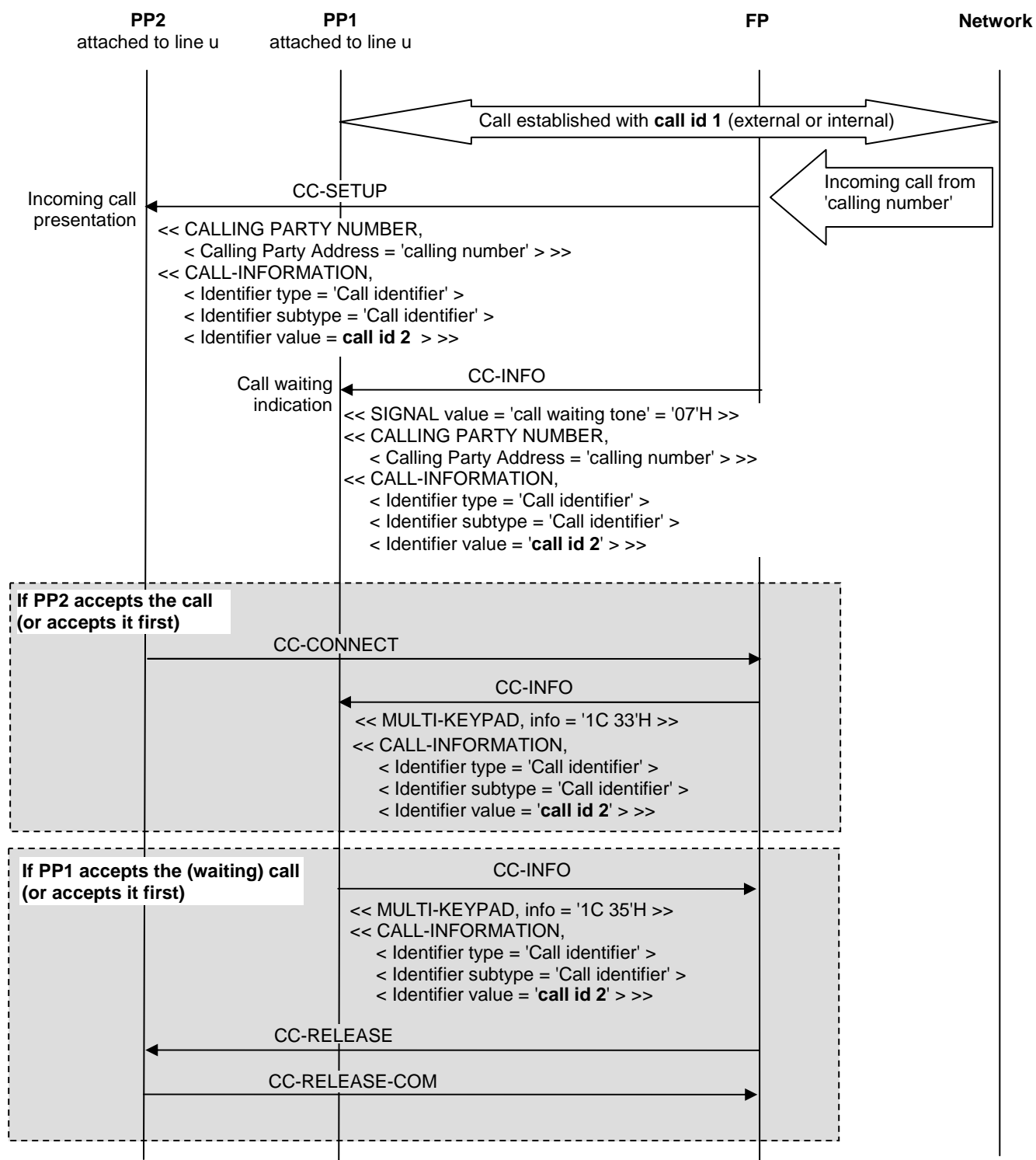
Figure C.14: Second incoming call on the line or system

NOTE: When PP1 does not implement "Call identification", the procedure used by the FP to release the call
         towards PP1 when PP2 answers depends on the context: if PP1 also tried to answer the call (and sent
         1C35H) but answered second, the FP uses the "call release and call release rejection" procedure
         (i.e. sends 1C 33H, as here); if PP1 did not answer at all, the FP uses the "On-hold call release" procedure
         instead (i.e. sends 1C 37H). In both cases, a such PP1 ignores the call id sent along with the message
         (call id 2) and only relies on the message itself.

C.3.3 First outgoing call on the line or system

Use case: the PP is attached to a multi-call line. An outgoing call is initiated.
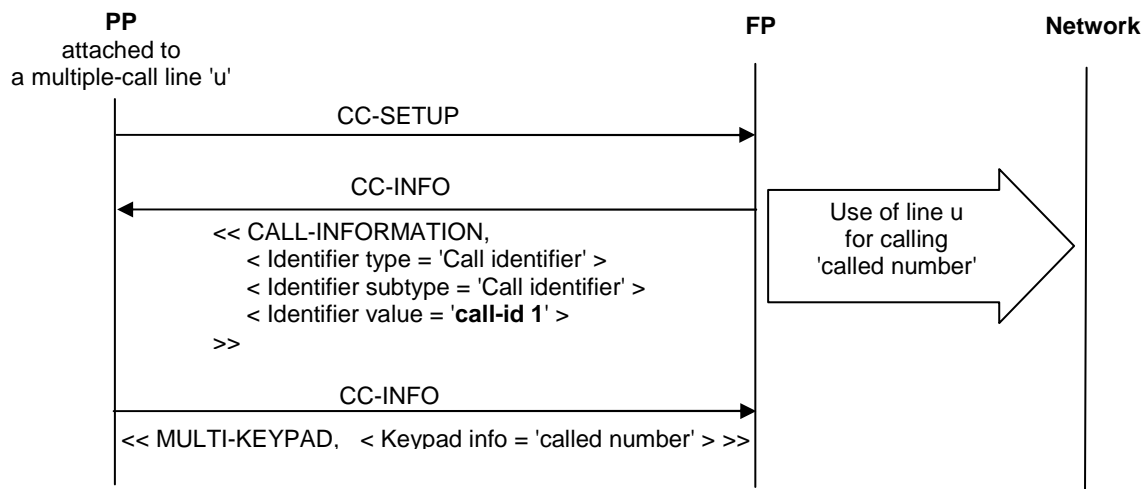
Figure C.15: First outgoing call on the line or system

NOTE: Figure C.15 does not show the exchange of line identifiers. For a complete diagram, see for example clause C.2.2.2.1.

C.3.4   Second outgoing call on the line or system

Use case: the PPs are attached to a multi-call line. A call is going on on PP1. A second external call is initiated. For conciseness of the diagram, line identification is not represented (which corresponds to the case of an internal outgoing call).
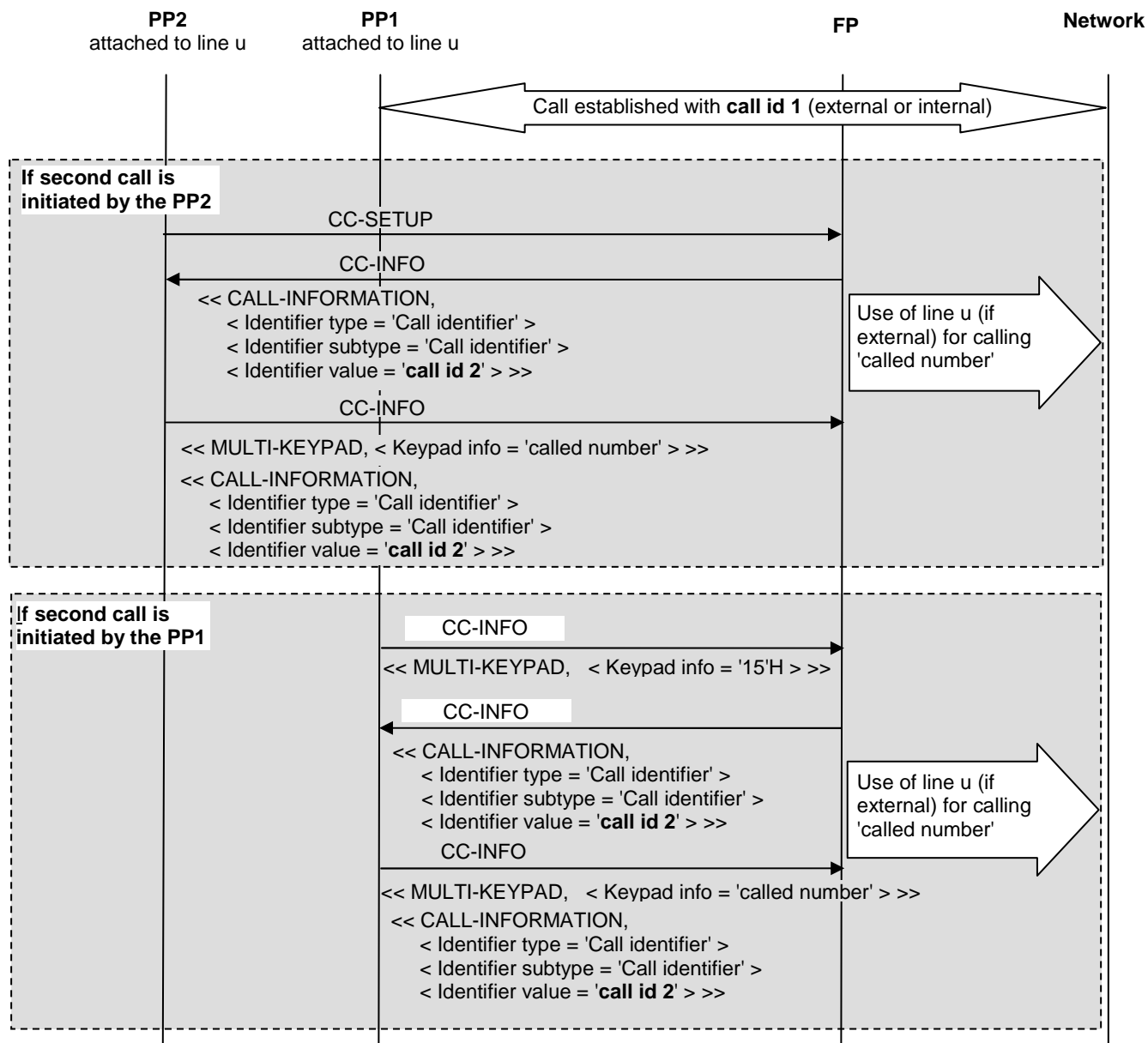
Figure C.16: Second outgoing call on the line or system

C.4 Parallel calls complex or alternative diagrams

This annex illustrates use cases of the "Common parallel call procedures" feature (NG1.N.7) that are not described in the main part of the standard (see figures of clause 7.4.3.5) but require clarification, and gives guidelines for implementation. More specifically, it includes:

- Alternative use cases.

- Limit or complex use cases that may not happen so often but illustrate the philosophy of the standardized procedures.

NOTE: Clauses C.2 and C.3 deal with "Multiple lines" and "Multiple calls" specific use cases (e.g. not applicable in the PSTN double call case).

C.4.1 Call identification for outgoing parallel calls

This clause shows variants of the "Outgoing parallel call initiation" diagrams presented in the procedure itself (see clause 7.4.3.5.1), that correspond to variant use cases. In all the diagrams presented, the call-id is sent by the FP as soon as possible, (and even if the line-id is not known at this stage) so that it can be used by the PP in all subsequent messages concerning that call (for messages that use the call id when available).

C.4.1.1 All in one PP message - line identification by PP

Use case: The PP sends all parallel call initiation information in a single CC-INFO message (e.g. the user used the phone book before placing a parallel call). A single message sent by the PP with 15/17H + line-id + called-number;
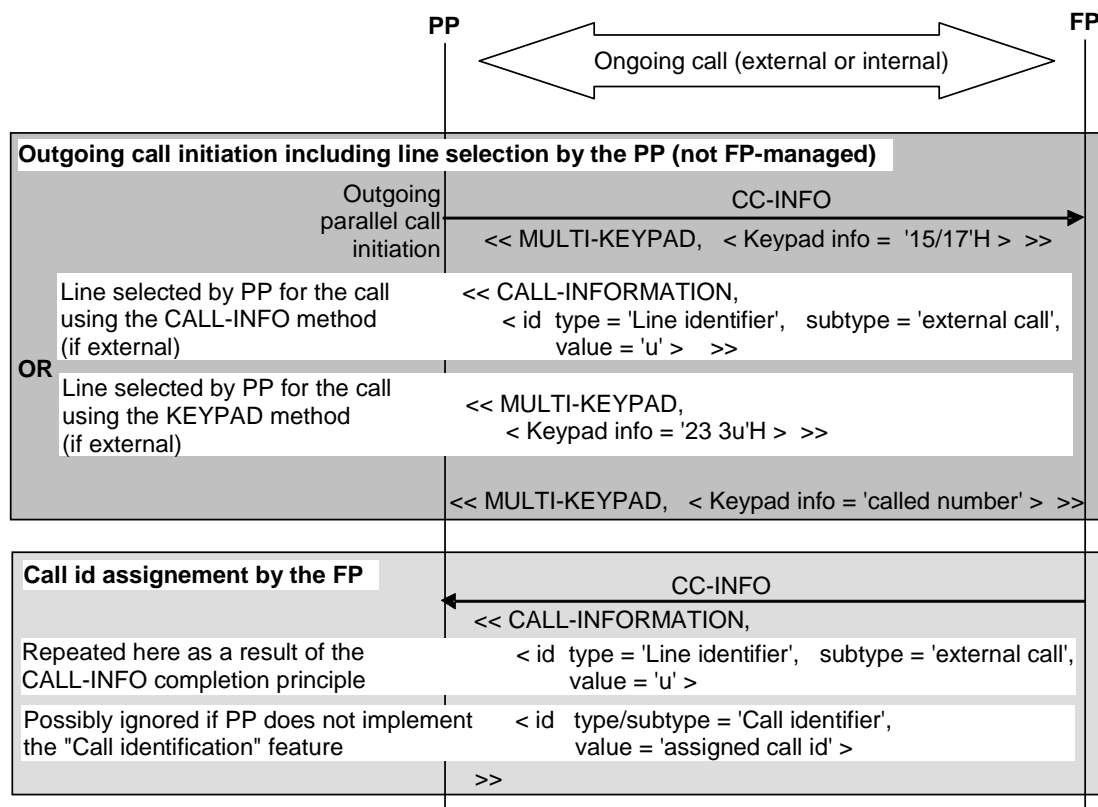
Figure C.17: Outgoing parallel calls: all in one PP message, line identification by PP

C.4.1.2   All in one PP message - FP-managed line selection

Use case: The PP sends all parallel call initiation information in a single CC-INFO message (e.g. the user used the phone book before placing a parallel call). However, "FP-managed line selection" is used. A single message sent by the PP with 15/17H + called-number, but without line-id.

PP   **FP**

Ongoing call (external or internal)

Outgoing call initiation with FP-managed line selection

Outgoing parallel call initiation

CC-INFO

<< MULTI-KEYPAD,   < Keypad info = '15/17'H > >>
                   < Keypad info = 'called number' > >>

Call id assignement and line selection by the FP

CC-INFO

<< CALL-INFORMATION,

Line selection performed by the FP

< id type = 'Line identifier',   subtype = 'external call', value = 'u' >

possibly ignored if PP does not implement the "Call identification" feature

< id type/subtype = 'Call identifier', value = 'assigned call id' >

>>

Figure C.18: Outgoing parallel calls: all in one PP message, FP managed line selection

C.4.1.3   Line pre-selection by PP - Manual dialling of called number

Use case: The PP sends initiates a parallel call with 15/17H + line-id in a single CC-INFO message (e.g. the user pre-selected or pre-dialled ('#k') the line to use-unless the PP is attached to only one line, in which case the user does not have to do so, but the present use case still applies-before manually dialling the called number). The FP replies with the call-id as soon as it received the first message, and before dialling of the called number.
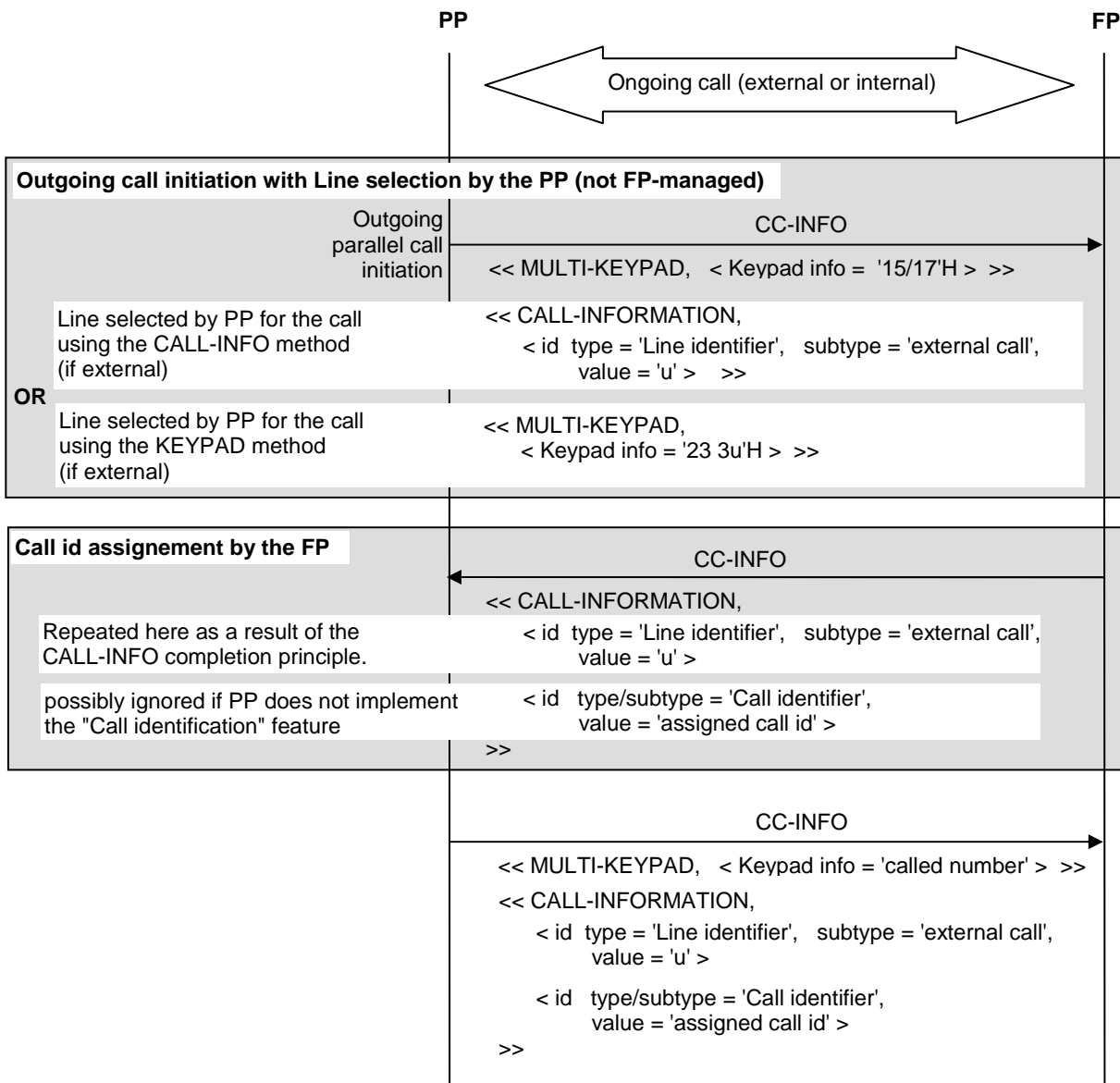
Figure C.19: Outgoing parallel calls: line pre-selection by PP, Manual dialling of called number

C.4.1.4   FP-managed line selection - Manual dialling of called number

Use case: The PP initiates a parallel call with 15/17H (e.g. the user pressed the R/INT key before manually dialling the called number). The FP replies with the call-id as soon as it received the first message, and before dialling of the called number. When sending the call-id, the FP cannot send the line-id together with it (because FP does not know at this stage if PP will use FP-managed line selection).

NOTE: This use case is listed here as a reminder, as it is already presented as a mainstream use case in the "Outgoing parallel call initiation" procedure (see clause 7.4.3.5.1, figure 5).

C.4.1.5   Unsupported new outgoing parallel call

Use case: The PP initiated an outgoing parallel call (external or internal) at a point in time where the FP and/or the line cannot support the additional call. A "busy system or line notification" (see clause 7.4.8.3) is sent to the PP. If a call id was assigned to the new call (a call context was created on FP side and the call id was notified to the PP), a "call release" must be also sent.

PP   FP

Ongoing call (external or internal)

Outgoing call initiation including line selection by the PP (not FP-managed)

| Outgoing parallel call initiation | CC-INFO |
| | << MULTI-KEYPAD, < Keypad info = '15/17'H > >> |

Line selected by PP for the call using the CALL-INFO method (if external)

<< CALL-INFORMATION,
    < id type = 'Line identifier', subtype = 'external call',
        value = 'u' > >>

OR

Line selected by PP for the call using the KEYPAD method (if external)

<< MULTI-KEYPAD,
    < Keypad info = '23 3u'H > >>

<< MULTI-KEYPAD, < Keypad info = 'called number' > >>

Busy system or line notification after call id assignment: call release needed

Call id assignment
CC-INFO

<< CALL-INFORMATION,

Repeated here as a result of the CALL-INFO completion principle

    < id type = 'Line identifier', subtype = 'external call',
        value = 'u' >

possibly ignored if PP does not implement the "Call identification" feature

    < id type/subtype = 'Call identifier',
        value = 'assigned call id' >
>>

Busy system or line notification
CC-INFO

<< SIGNAL value = 'busy tone' = '04'H >>

<< CALL-INFORMATION … same values as above. >>

Call release
CC-INFO

<< MULTI-KEYPAD, info = '1C 33'H >>

<< CALL-INFORMATION … same values as above. >>

Busy system or line notification before call id assignment (i.e. before call context was created

Busy system or line notification
CC-INFO

<< SIGNAL value = 'busy tone' = '04'H >>

<< CALL-INFORMATION,

Selected line-id shall be present
Call-id is absent since it was not assigned

    < id type = 'Line identifier', subtype = 'external call',
        value = 'u' >
>>

Figure C.20: Outgoing parallel calls: unsupported new outgoing parallel call

C.4.2   Incoming parallel calls

C.4.2.1   Two simultaneous incoming calls on two different lines

Use case: the PP is attached to several lines. An incoming call is received on two different lines. This use case shows that from the PP point of view, this use case does not fundamentally differ from the use case where two simultaneous calls occur on a single line.
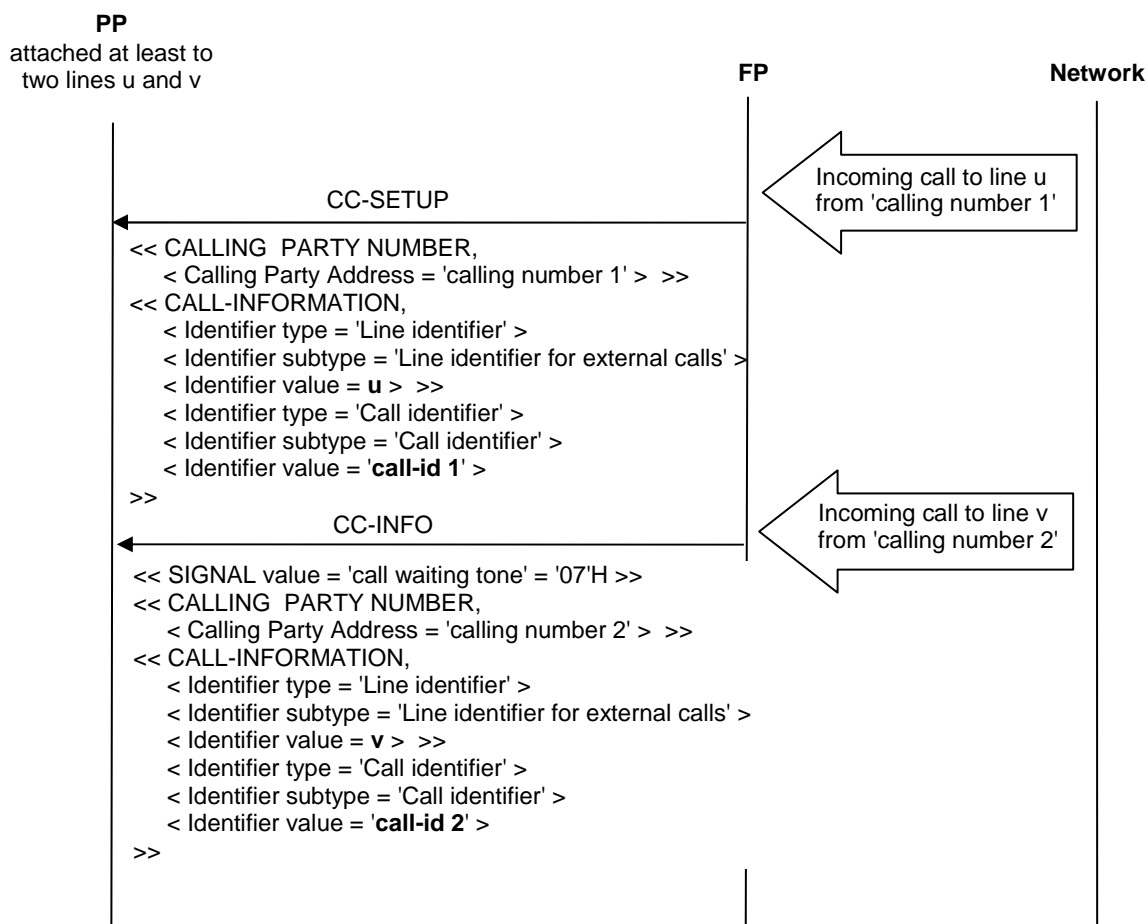
Figure C.21: Incoming parallel calls: two simultaneous incoming calls on two different lines

C.4.2.2   FP release of waiting call when remote party hangs up

Use case: use of call release from the FP when the remote partie hangs up. This may occur even before the PP answered the call.
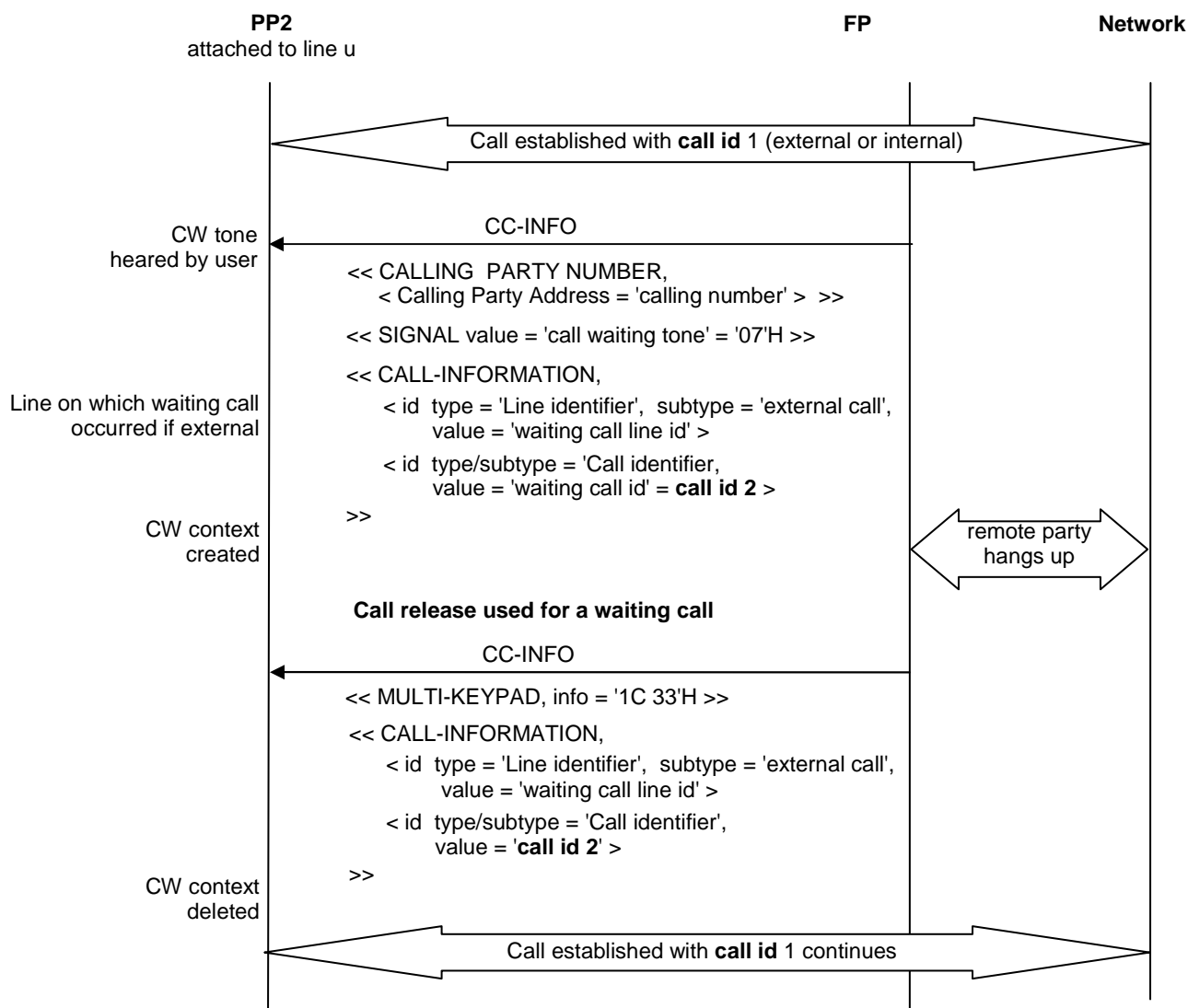
Figure C.22: Incoming parallel calls: FP release of waiting call when remote party hangs up

C.4.2.3   Two incoming calls before user answers

Use case: Two calls are arriving before the user anwsers any of them. Both calls are presented to the user on the MMI and the user selects one of them. Use of CC-CONNECT (with no identified call) automatically means that the first call (presented with CC-SETUP) is picked up. If the user selects the second call, the PP must send a call waiting acceptation *before* the CC-CONNECT is sent to the FP.
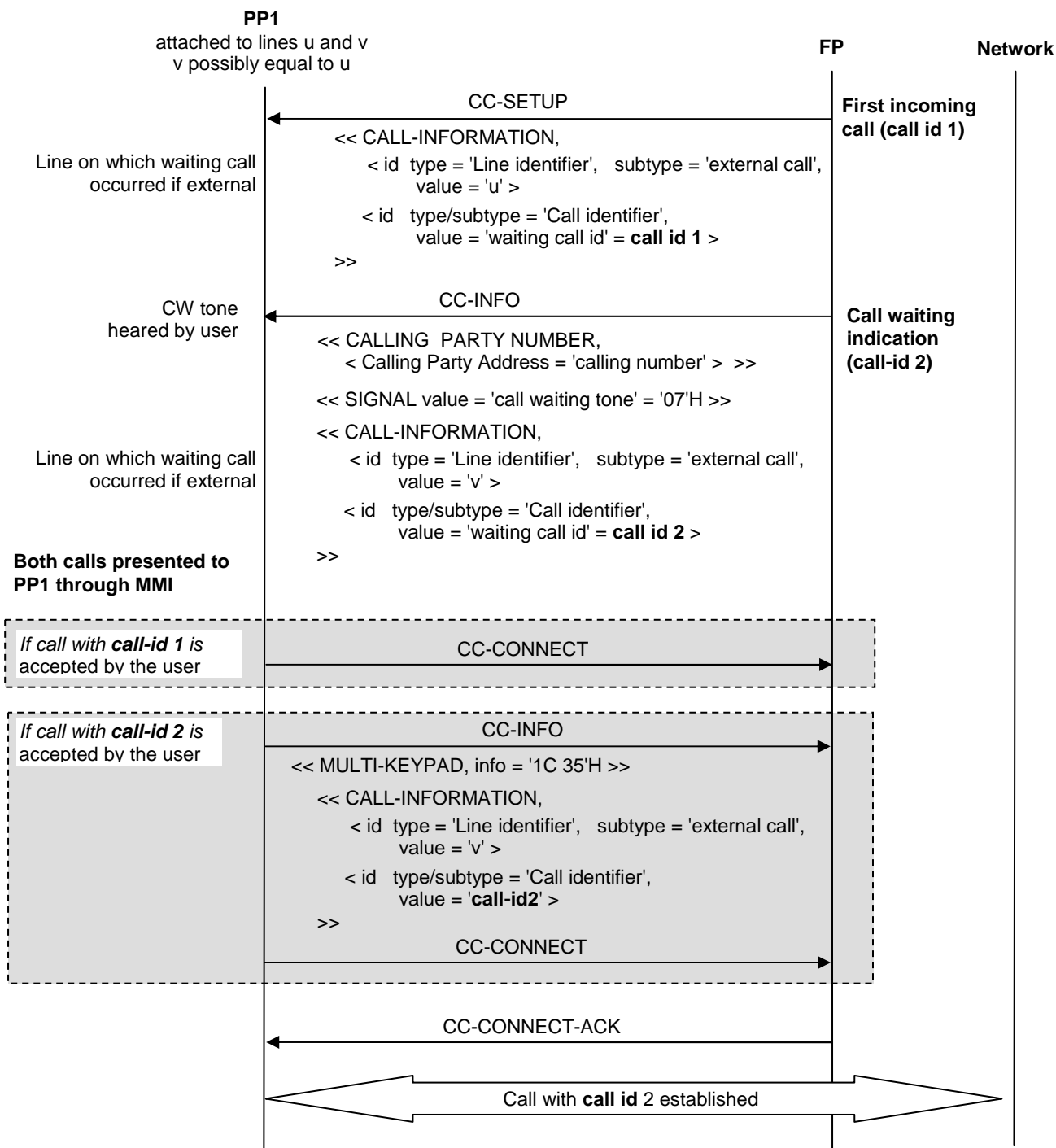
Figure C.23: Incoming parallel calls: Two incoming calls before user answers

C.4.3   Call waiting represented as first call when user hangs up

Use case: the PP is attached to a multi-call line. A call is on going from PP1. A second incoming call is presented to the line. The PP hangs up and the call is represented as a first incoming call.
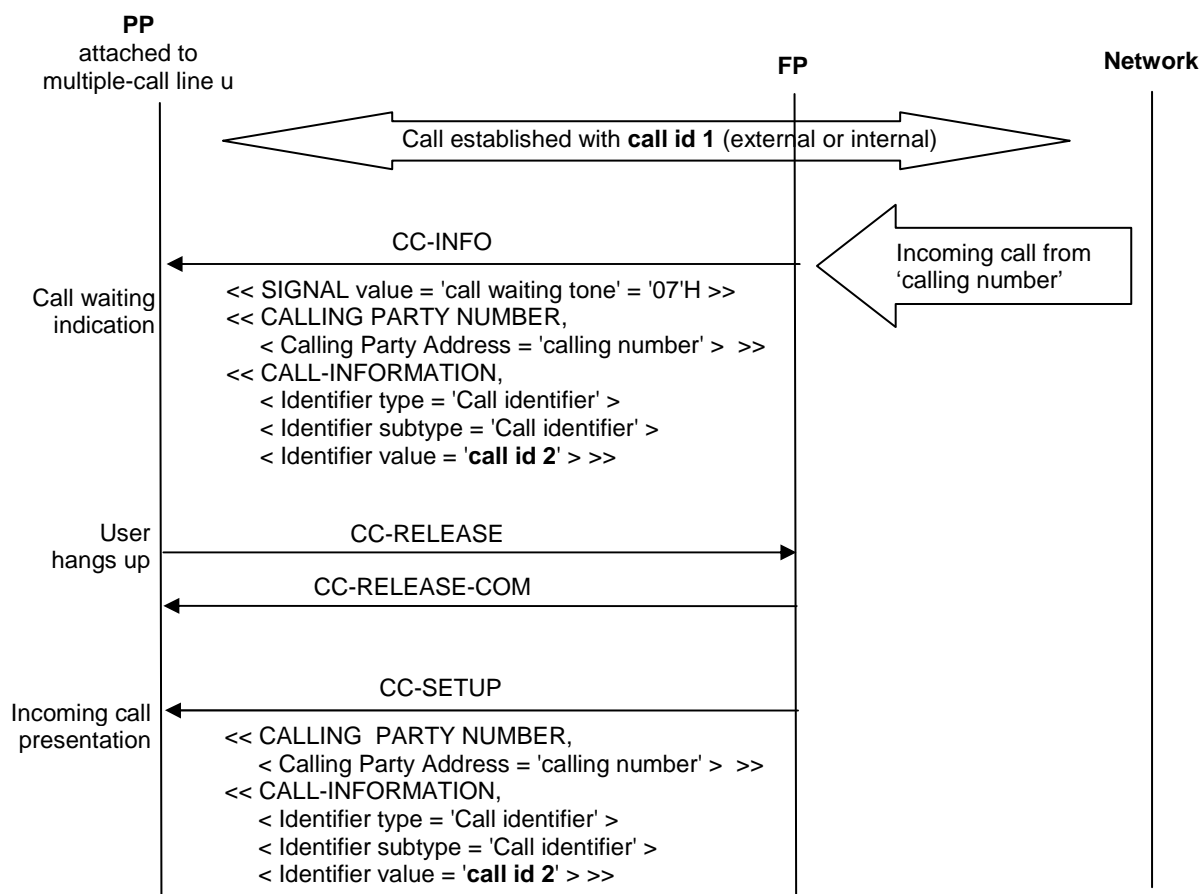
NOTE: The <<CALL-INFORMATION>> information element is not sent in a CC-RELEASE or CC-RELEASE-COM message.

Figure C.24: Call waiting represented as first call when user hangs up

C.5   List access service use case examples

C.5.1   General

In the following clauses, several use case examples for list access are depicted.

It has to be noted that the sequences are only examples, it cannot be mandatory that the message flows shall always be exactly in the described way. However it is recommended to follow the examples where possible in order to ensure interoperability.

For clarity of the following flowcharts, <<Call information>> IE including call identifiers and line identifiers does not appear in some of the CC messages that must convey it. Please note that they should not be omitted when implementing equivalent cases.

C.5.2   Use case: transfer number from missed call list to contact list
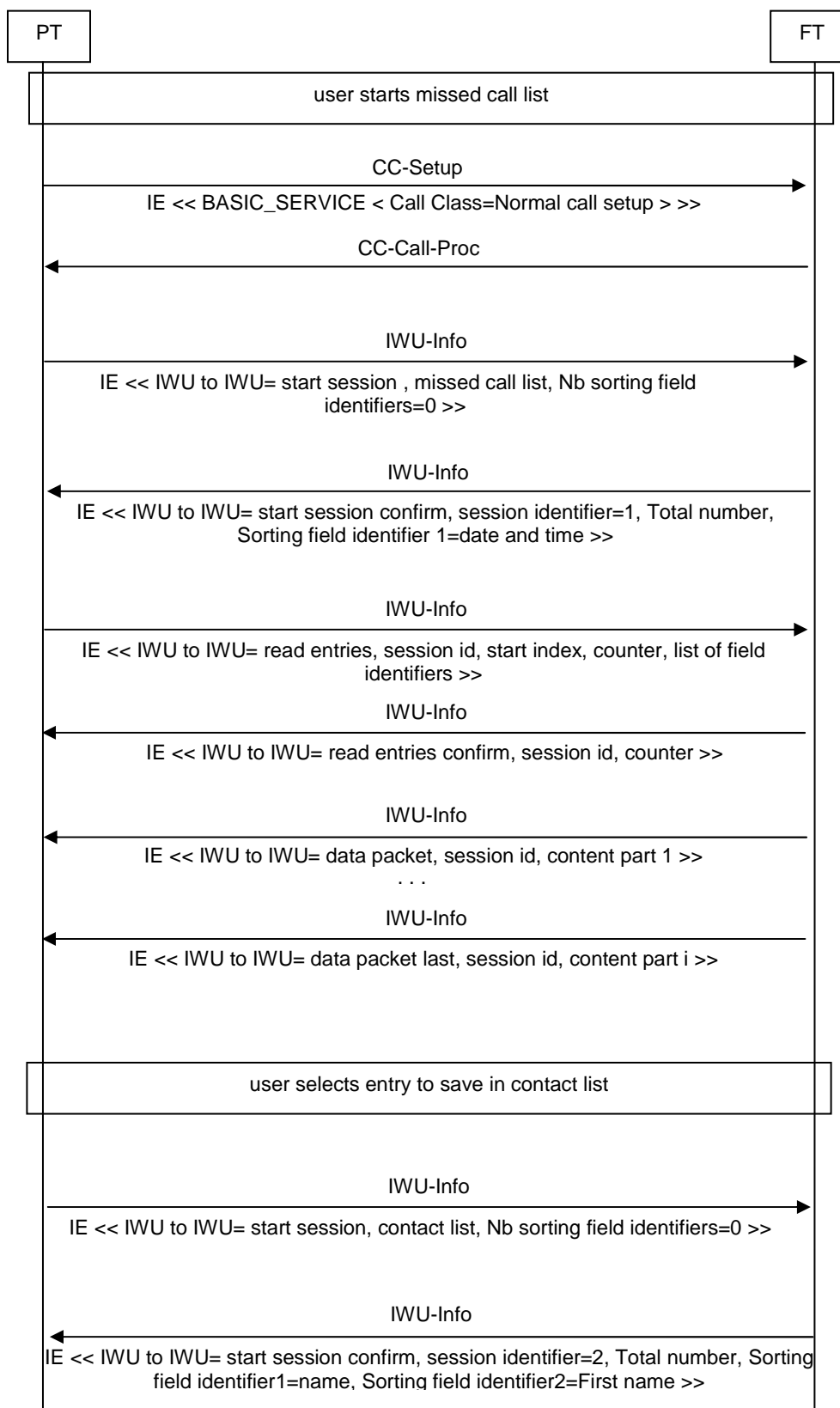
Figure C.25: List access use case: transfer number from missed call list to contact list (1/2)

```
  ┌──────┐                                              ┌──────┐
  │  PT  │                                              │  FT  │
  └──────┘                                              └──────┘
     │                    IWU-Info                          │
     │─────────────────────────────────────────────────────▶│
     │  IE << IWU to IWU= save entry, session id=2, entry identifier=00H >>
     │                                                       │
     │                    IWU-Info                          │
     │─────────────────────────────────────────────────────▶│
     │  IE << IWU to IWU= data packet, session id=2, content part 1 >>
     │                                                       │
     │                      . . .                           │
     │                                                       │
     │                    IWU-Info                          │
     │─────────────────────────────────────────────────────▶│
     │  IE << IWU to IWU= data packet last, session id=2, content part j >>
     │                                                       │
     │                    IWU-Info                          │
     │◀─────────────────────────────────────────────────────│
     │  IE << IWU to IWU= save entry confirm, session id=2, position index, entry
     │                   identifier =xxH >>
     │                                                       │
     │                    IWU-Info                          │
     │─────────────────────────────────────────────────────▶│
     │  IE << IWU to IWU= end session, session identifier=1 >>
     │                    IWU-Info                          │
     │◀─────────────────────────────────────────────────────│
     │  IE << IWU to IWU= end session confirm, session identifier=1 >>
     │                                                       │
     │                    IWU-Info                          │
     │─────────────────────────────────────────────────────▶│
     │  IE << IWU to IWU= end session, session identifier=2 >>
     │                    IWU-Info                          │
     │◀─────────────────────────────────────────────────────│
     │  IE << IWU to IWU= end session confirm, session identifier=2 >>
     │                                                       │
     │                   CC-RELEASE                         │
     │─────────────────────────────────────────────────────▶│
     │                 CC-RELEASE-COM                       │
     │◀─────────────────────────────────────────────────────│
     │                                                       │
```

Figure C.26: List access use case: transfer number from missed call list to contact list (2/2)

The second session might also be established after release of the first session. FP shall be capable to handle at least two sessions independently.

C.5.3 Use case: select and call internal party

```
┌────┐                                                              ┌────┐
│ PT │                                                              │ FT │
└────┘                                                              └────┘
  │   ┌────────────────────────────────────────────────────────┐    │
  │   │         Direct PT initiated link establishment          │    │
  │   └────────────────────────────────────────────────────────┘    │
  │                          CC-Setup                                │
  │─────────────────────────────────────────────────────────────────>│
  │      IE << BASIC_SERVICE <Call Class=Internal call setup> >>      │
  │                                                                  │
  │                        CC-Call-Proc                              │
  │<─────────────────────────────────────────────────────────────────│
  │                                                                  │
  │                          IWU-Info                                │
  │─────────────────────────────────────────────────────────────────>│
  │   IE << IWU to IWU= start session, internal names list, Sorting  │
  │                    field identifier1=number >>                   │
  │                          IWU-Info                                │
  │<─────────────────────────────────────────────────────────────────│
  │ IE << IWU to IWU= start session confirm, session identifier,     │
  │   Total number, Sorting field identifier1=number >>              │
  │                          IWU-Info                                │
  │─────────────────────────────────────────────────────────────────>│
  │  IE << IWU to IWU= read entries, session id, start index,        │
  │          counter, list of field identifiers >>                   │
  │                          IWU-Info                                │
  │<─────────────────────────────────────────────────────────────────│
  │  IE << IWU to IWU= read entries confirm, session id, counter >>  │
  │                                                                  │
  │                          IWU-Info                                │
  │<─────────────────────────────────────────────────────────────────│
  │  IE << IWU to IWU= data packet, session id, content part 1 >>    │
  │                            . . .                                 │
  │                          IWU-Info                                │
  │<─────────────────────────────────────────────────────────────────│
  │ IE << IWU to IWU= data packet last, session id, content part m >>│
  │                          IWU-Info                                │
  │─────────────────────────────────────────────────────────────────>│
  │    IE << IWU to IWU= end session, session identifier >>          │
  │                          IWU-Info                                │
  │<─────────────────────────────────────────────────────────────────│
  │ IE << IWU to IWU= end session confirm, session identifier >>     │
  │                          CC-Info                                 │
  │─────────────────────────────────────────────────────────────────>│
  │    IE << MULTI-KEYPAD, int-key + number digits >>               │
```

Figure C.27: List access use case: select and call internal party

The int-key is necessary at least in case basic service is not internal call.

C.5.4   Use case: select and call number from contact list

```
   ┌─────┐                                                          ┌─────┐
   │ PTs │                                                          │ FT  │
   └─────┘                                                          └─────┘
      │                                                                │
      │┌──────────────────────────────────────────────────────────┐  │
      ││        Direct PT initiated link establishment             │  │
      │└──────────────────────────────────────────────────────────┘  │
      │                         CC-Setup                              │
      │──────────────────────────────────────────────────────────────▶│
      │      IE << BASIC_SERVICE < Call Class=Normal call setup > >>   │
      │                                                                │
      │                        CC-Call-Proc                           │
      │◀──────────────────────────────────────────────────────────────│
      │                                                                │
      │                         IWU-Info                              │
      │──────────────────────────────────────────────────────────────▶│
      │  IE << IWU to IWU= start session, contact list, Nb sorting field identifier=0 >>
      │                                                                │
      │                         IWU-Info                              │
      │◀──────────────────────────────────────────────────────────────│
      │ IE << IWU to IWU= start session confirm, session identifier, Total number, Sorting
      │       field identifier1=name Sorting field identifier2= first name >>
      │                                                                │
      │                         IWU-Info                              │
      │──────────────────────────────────────────────────────────────▶│
      │  IE << IWU to IWU= read entries, session id, start index, counter, list of field
      │                       identifiers >>
      │                                                                │
      │                         IWU-Info                              │
      │◀──────────────────────────────────────────────────────────────│
      │    IE << IWU to IWU= read entries confirm, session id, counter >>
      │                                                                │
      │                         IWU-Info                              │
      │◀──────────────────────────────────────────────────────────────│
      │     IE << IWU to IWU= data packet, session id, content part 1 >>
      │                             . . .                              │
      │                         IWU-Info                              │
      │◀──────────────────────────────────────────────────────────────│
      │   IE << IWU to IWU= data packet last, session id, content part m >>
      │                         IWU-Info                              │
      │──────────────────────────────────────────────────────────────▶│
      │      IE << IWU to IWU= end session, session identifier >>       │
      │                                                                │
      │                         IWU-Info                              │
      │◀──────────────────────────────────────────────────────────────│
      │   IE << IWU to IWU= end session confirm, session identifier >>  │
      │                                                                │
      │                          CC-Info                              │
      │──────────────────────────────────────────────────────────────▶│
      │         IE << MULTI-KEYPAD, number digits >>                   │
      │                                                                │
```

Figure C.28: List access use case: select and call number from contact list

C.5.5   Use case: save entry with invalid format
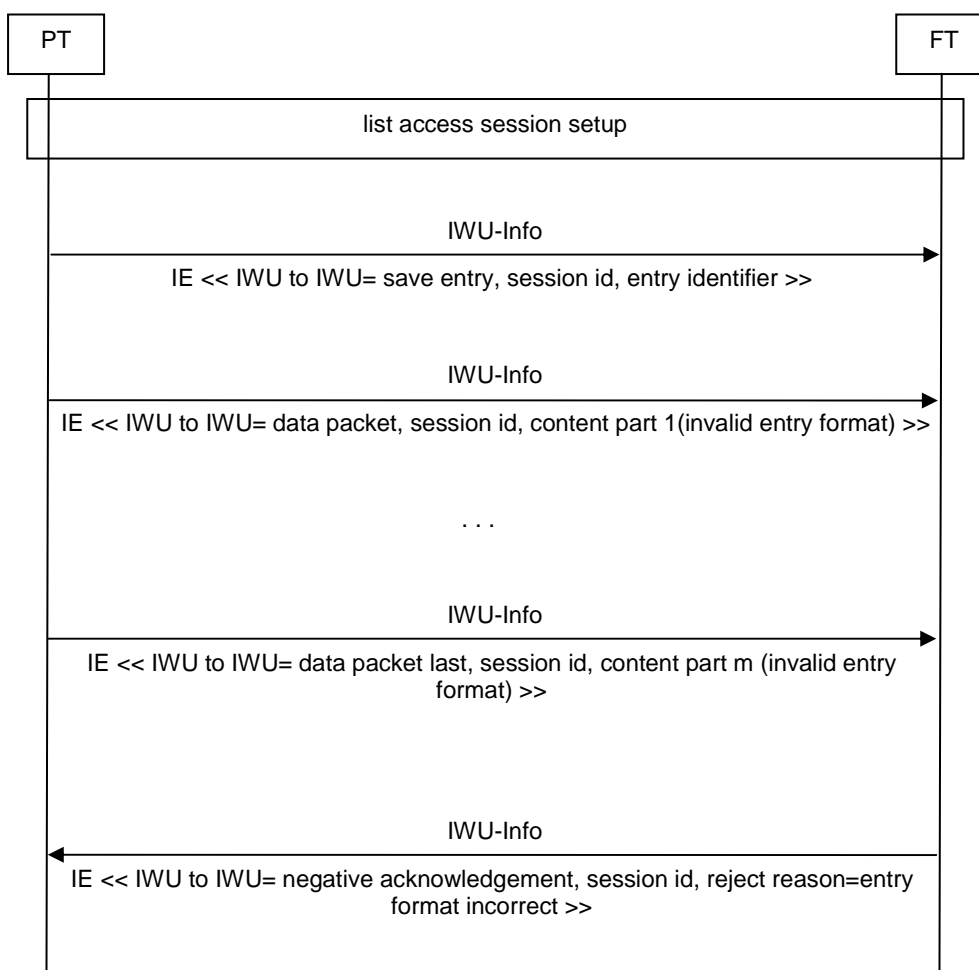
Figure C.29: List access use case: save entry with invalid format

C.5.6   Use case: read invalid start index
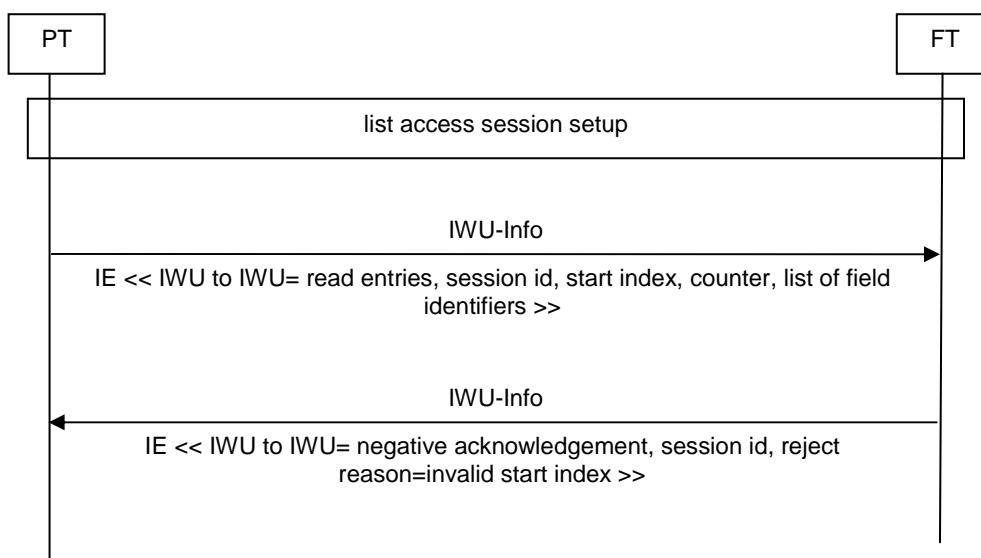
Figure C.30: List access use case: read invalid start index

C.5.7   Use case: modify a PP internal name

The user edits the internal name of the PP number '3' in the DECT system. This use case can be used just after subscription registration or later.

PP   FP

Internal names list access start session

IWU-INFO

IE << IWU to IWU=**search entries**, session id, matching option=00H,
searched value = 33H, counter=1, list of field identi fiers= Number id, Name id >>

IWU-INFO

IE << IWU to IWU=**search entries confirm**, session id, start index, counter=1 >>

IWU-INFO

IE << IWU to IWU=**data packet last**, session id, content part=(entry
identifier, number, name) for 3rd entry >>

IWU-INFO

IE << IWU to IWU=**edit entry**, session id, entry identifier, list of field
identifiers= number id, name id >>

IWU-INFO

IE << IWU to IWU=**edit entry confirm**, session id, start index >>

IWU-INFO

IE << WU to IWU=**data packet last**, session id, content part= ontent part=
(entry identifier, number, name) for 3rd entry >>

user updates the 'name' field for 3rd entry in internal name list

IWU-INFO

IE << IWU to IWU=**save entry**, session id, entry identifier >>

IWU-INFO

IE << IWU to IWU=**data packet last**, session id, content part = 3rd
entry content updated >>

IWU-INFO

IE << IWU to IWU=**save entry confirm**, session id, entry identifier, start index >>

Internal names list access end session

FP notifies PP 3 of the changing of its name using clause 7.4.10.2

Figure C.31: List access use case: modify a PP internal name

C.6 List access service with voice calls (additional use cases and procedure diagrams)

C.6.1 General

In the following clauses, several procedure diagrams for list access service combined with voice calls are depicted.

It has to be noted that the sequences are only examples, it cannot be mandatory that the message flows shall always be exactly in the described way. However it is recommended to follow the examples where possible in order to ensure interoperability.

C.6.2 List access when a voice call is already ongoing

Please note that for clarity of the flowcharts, the line identifier is not mentioned. However it has to be implemented and managed correctly as defined by the present document.

C.6.2.1 Use case: Consult a list during a voice call

Use case: Look for the number of a contact while you are in voice call and then come back to the voice call.
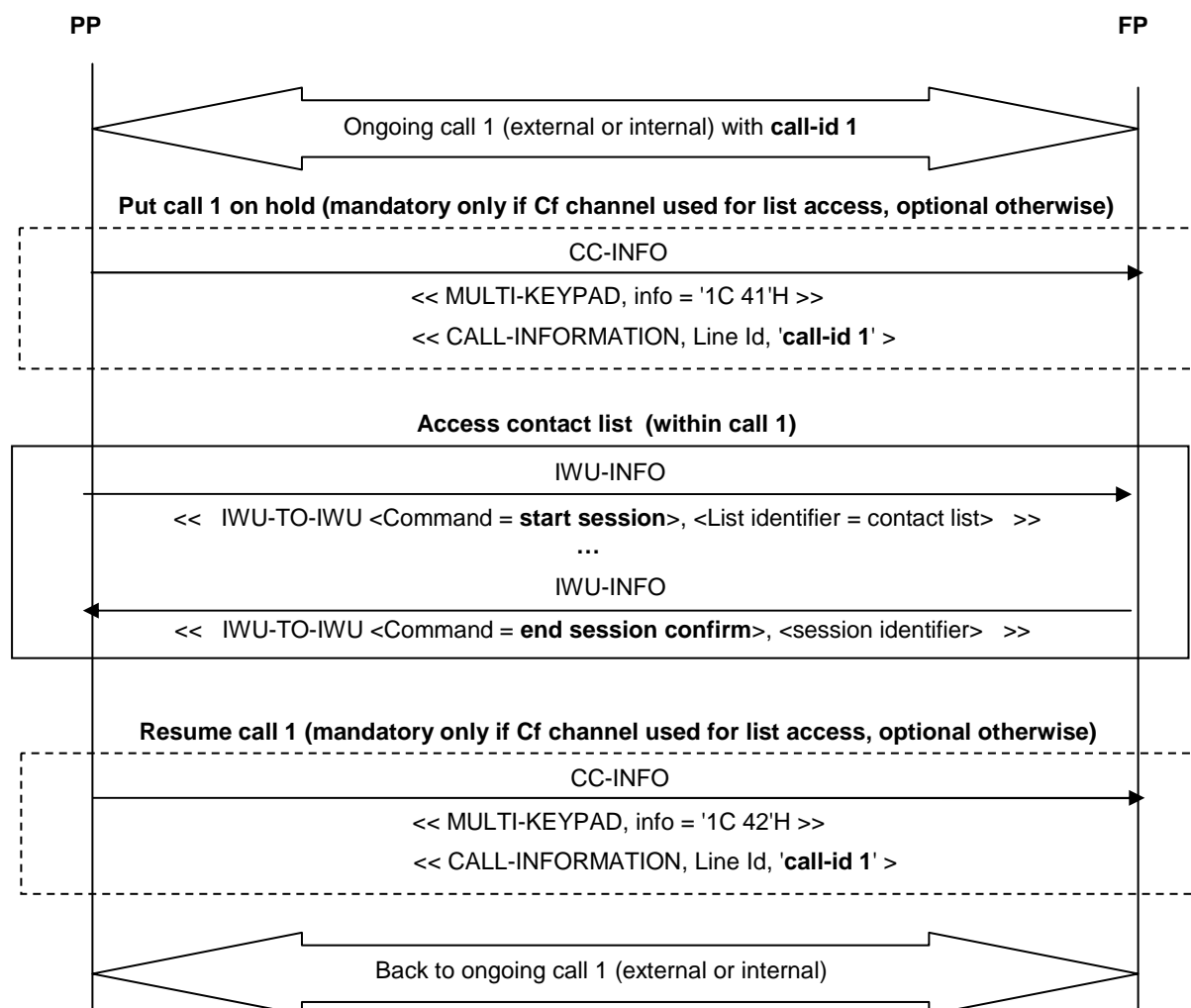
Figure C.32: List access use case: consult a list during a voice call

C.6.2.2   Use case: call transfer using internal names list (first call explicitly put on hold)

Use case: Ongoing call is put on hold before establishing a parallel internal call using the internal names list. The first call is then transferred. It shows in particular that a call can optional be put on hold before an outgoing second call is made. In this case, it is proposed that an additional call id is attached to the list access.

NOTE: The list access re-uses call id1.

PP   **FP**

Ongoing call 1 (external or internal) with **call-id 1**

Put call 1 on hold

CC-INFO

<< MULTI-KEYPAD, info = '1C 41'H >>

<< CALL-INFORMATION, Line Id, '**call-id 1**' >

Access internal names list to find call transfer target (within call 1)

IWU-INFO

<<   IWU-TO-IWU <Command = **start session**>, <List identifier = internal names list>   >>

...

IWU-INFO

<<   IWU-TO-IWU <Command = **end session confirm**>, <session identifier>   >>

Establish parallel internal call 2

CC-INFO

<< MULTI-KEYPAD, 17H + terminal id number >>

CC-INFO   Call id assignment by the

<< CALL-INFORMATION, < id   type/subtype = 'Call identifier', value = '**call id 2**' > >>

Call transfer request

CC-INFO

<< MULTI-KEYPAD, info = '1C 34'H >>

Only if the PP implements the "Call identification" feature

<< CALL-INFORMATION,
    < Identifier type = 'Call identifier' >
    < Identifier subtype = 'Call identifier' >
    < Identifier value = '**call-id 1**' >
>>

**Figure C.33: List access use case: call transfer using internal names list
(first call explicitly put on hold)**

C.6.2.3   Use case: call transfer using internal names list (first call implicitly put on hold by internal call)

Use case: Ongoing call is implicitly put on hold before establishing a parallel internal call using the internal names list. The first call is then transferred. It shows in particular that the 17H implicitly puts the ongoing call on hold.

NOTE: The list access re-uses call id2.

PP   FP

Ongoing call (external or internal) with **call-id 1**

Request internal call, call 1 implicitly put on hold

CC-INFO

<< MULTI-KEYPAD, 17H >>

<< CALL-INFORMATION, Line Id, '**call-id 1**' >

CC-INFO   Call id assignement by the

<< CALL-INFORMATION, < id   type/subtype = 'Call identifier', value = **call id2** > >>

Access internal names list to find call transfer target (within call id 2)

IWU-INFO

<< IWU-TO-IWU <Command = **start session**>, <List identifier = internal names list> >>

...

IWU-INFO

<< IWU-TO-IWU <Command = **end session confirm**>, <session identifier> >>

Establish parallel internal call 2

CC-INFO

<< MULTI-KEYPAD, Called nb = terminal id number >>

CC-INFO

<< CALL-INFORMATION, < id   type/subtype = 'Call identifier', value = **call id2** > >>

Call transfer request

CC-INFO

<< MULTI-KEYPAD, info = '1C 34'H >>

Only if the PP   << CALL-INFORMATION,
implements   < Identifier type = 'Call identifier' >
the "Call   < Identifier subtype = 'Call identifier' >
identification" feature   < Identifier value = '**call-id 1**' >
                  >>

**Figure C.34: List access use case: call transfer using internal names list
(first call explicitly put on hold)**

ETSI

C.6.2.4 Use case: establishing a parallel call using contact list

Use case: During an ongoing call, the user establishes a parallel external call using the contact list. In this case, there is no need for an additional call id for the list access: it is done within existing call.
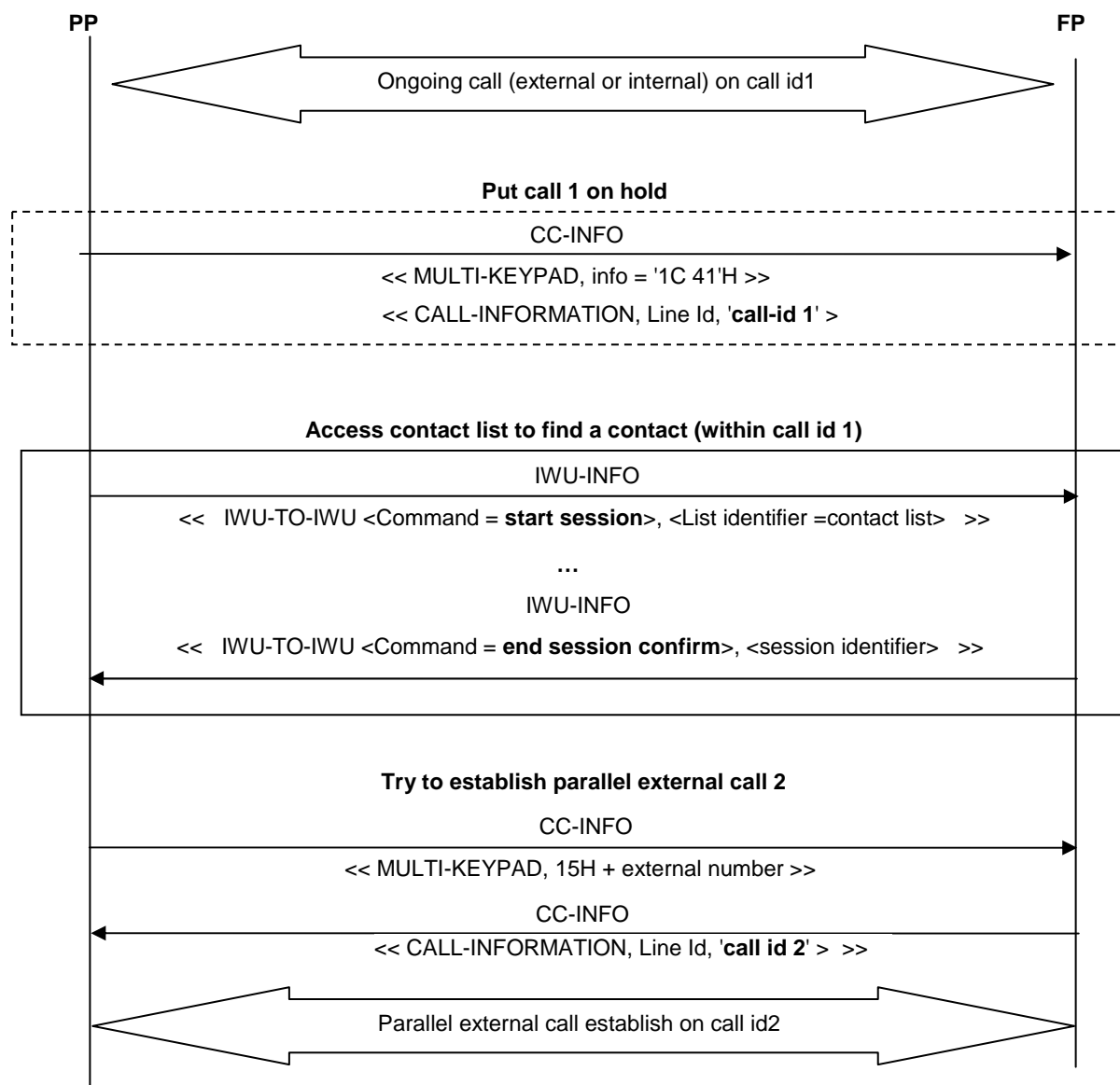
Figure C.35: List access use case: establishing a parallel call using contact list

C.6.3 Incoming voice call during list access session

Please note that for clarity of the flowcharts, the line identifier is not mentioned. However it has to be implemented and managed correctly as defined by the current standard.

C.6.3.1 Use case: incoming voice call during list access, previous connection released

Use case: A list access call is on going from a PP. An incoming call is presented to the line. The FP hangs up the list access call before presenting the incoming call.
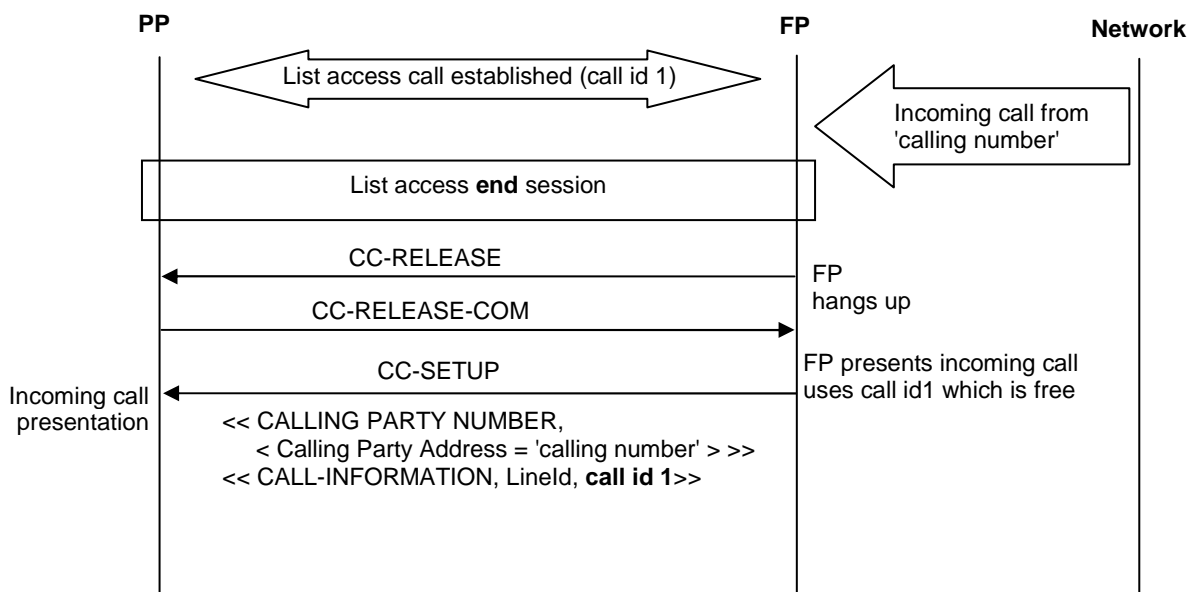
**Figure C.36: List access use case: incoming voice call during list access,
previous connection released**

NOTE: The first list access may have or not a call id assigned by the FP. Depending mainly on the service type
          used to setup the list access call.

C.6.3.2   Use case: incoming call during list access, managed as a parallel call, previous session ended

Use case: A list access call is on going from a PP. An incoming call is presented to the line. The FP closes the list access session before presenting the incoming call.
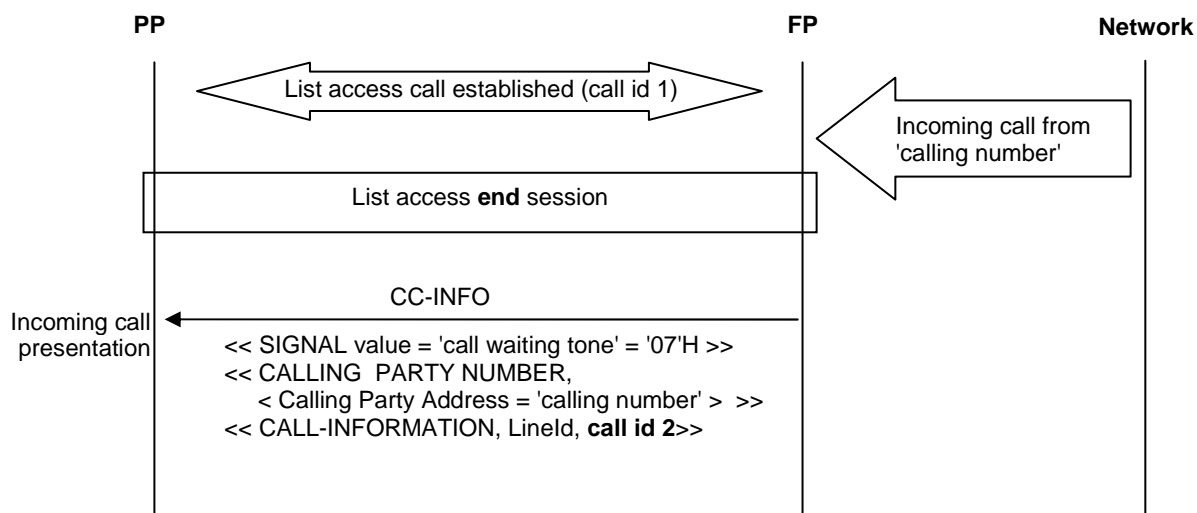
**Figure C.37: List access use case: incoming voice call during list access,
previous connection released**

NOTE: The first list access may have or not a call id assigned by the FP. Depending mainly on the service type
          used to setup the list access call.

C.6.3.3 Use case: incoming voice call during list access, managed as parallel call, previous session not ended

Use case: A list access call is on going from a PP. An incoming call is presented to the line. The FP manages it as a parallel call.

NOTE: The first list access may have or not a call id assigned by the FP. Depending mainly on the service type used to setup the list access call.
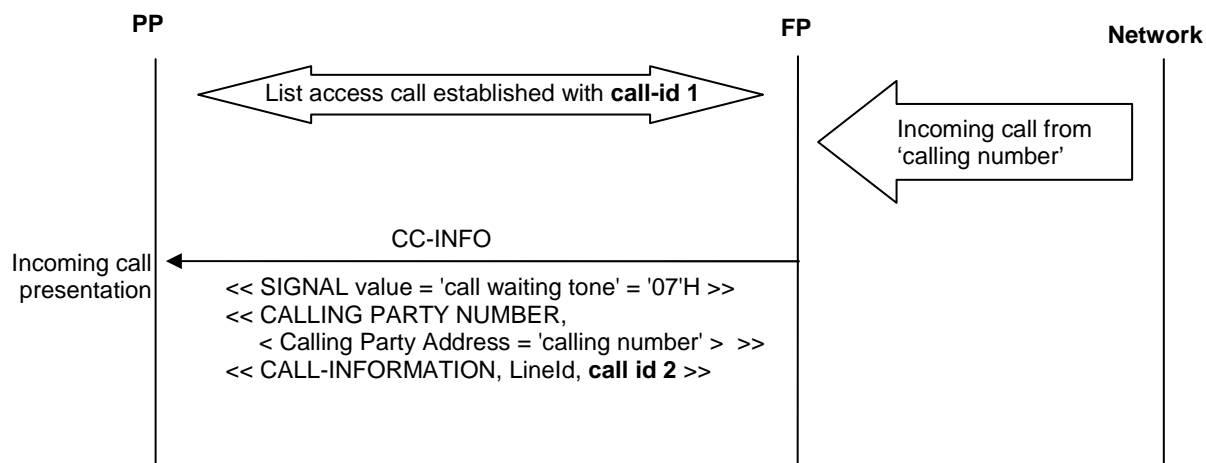
Figure C.38: List access use case: incoming voice call during list access, managed as parallel call, previous session not ended

C.7 DECT system settings diagrams

C.7.1 General

In the following flowcharts, we assume that:

- N lines are defined, i.e. 'Total number of entries' = N in line settings list before starting lines settings session.

- The total number of registered PPs is M, i.e. 'Total number of entries' = M in internal names list before starting internal names session.

- Only one data packet command is necessary to read one entry content, i.e. 'data packet last' command is received directly.

NOTE: In the following flowcharts, the read entries or search entries might be done prior to the sequence (in a previous session for example). But this is not the most usual behaviour as the PP may probably show the current value of the setting before enabling the user to modify it.

For clarity of the following flowcharts the <<Call information>> IE including call identifier does not appear in the CC messages that must convey it. Please note that it should not be omitted when implementing equivalent cases. For example the call identifier must be assigned by the FP after CC-SETUP message.

C.7.2 Modifying the PIN code

Use case: FP without keyboard, the user modifies the system PIN code from the PP.

PP **FP**

Enter old PIN code

CC-SETUP

<< BASIC SERVICE <Call Class=Service call setup> >>

CC-CALL-PROC

IWU-INFO

IE <<IWU to IWU= **start session**, DECT system settings list, Number of sorting fields =0>>

CIPHER-REQUEST

Encrypted

IWU-INFO

IE <<IWU to IWU= **start session confirm**, session identifier, Total number=1 >>

Read old PIN code: IWU-INFO

IE <<IWU to IWU= **read entries**, session id, start index =1, counter=01H,
list of field identifiers= FP registration mode, PIN code, …, FP version >>

IWU-INFO

IE <<IWU to IWU= **read entries confirm**, session id, start index, counter=1 >>

IWU-INFO

IE <<IWU to IWU= **data packet**, session id, content part >>

IWU-INFO

IE <<IWU to IWU= **data packet last**, session id, content part >>

If entered PIN code matches FP return PIN

IWU-INFO

IE <<IWU to IWU= **edit entry**, session id, entry identifier,
list of field identifiers= PIN code >>

IWU-INFO

IE <<IWU to IWU= **edit entry confirm**, session id, start index >>

IWU-INFO

IE <<IWU to IWU= **data packet last**, session id, content part= (entry identifier,
PIN code) >

New PIN code is entered twice. If equal, PP saves the new PIN code value

IWU-INFO

IE <<IWU to IWU= **save entry**, session id, entry identifier>>

IWU-INFO

IE <<IWU to IWU= **data packet last**, session id, content part = updated PIN code>>

IWU-INFO

IE <<IWU to IWU= **save entry confirm**, session id, entry identifier, start index>>

DECT system settings end session

Figure C.39: Modifying the PIN code

ETSI

C.7.3   Resetting the base

Use case: Reset all DECT system and line settings to their default value.

PP   **FP**

DECT system settings start session

Read DECT system settings:

IWU-INFO

IE <<IWU to IWU= **read entries**, session id, start index =1, counter=01H,
list of field identifiers= FP registration mode, PIN code, …, FP version >>

IWU-INFO

IE <<IWU to IWU= **read entries confirm**, session id, start index, counter=1>>

IWU-INFO

IE <<IWU to IWU= **data packet**, session id, content part >>

IWU-INFO

IE <<IWU to IWU= **data packet last**, session id, content part >>

IWU-INFO

IE <<IWU to IWU= **edit entry**, session id, entry identifier,
list of field identifiers= Base reset >>

IWU-INFO

IE <<IWU to IWU= **edit entry confirm**, session id, start index >>

IWU-INFO

IE <<IWU to IWU= **data packet last**, session id, content part= (entry identifier,
Base reset) >

User confirms system and line settings reset

IWU-INFO

IE <<IWU to IWU= **save entry**, session id, entry identifier>>

IWU-INFO

IE <<IWU to IWU= **data packet last**, session id, content part = (Base reset, YES) >>

IWU-INFO

IE <<IWU to IWU= **save entry confirm**, session id, entry identifier, start index>>

DECT system settings end session

Figure C.40: Reseting the base

C.8 Line settings diagrams

C.8.1 General

In the following flowcharts, we assume that:

- N lines are defined, i.e. 'Total number of entries' = N in the line settings list before starting lines settings session.

- Only one data packet command is necessary to read one entry content, i.e. 'data packet last' command received directly.

In the following flowcharts, the read entries or search entries might be done prior to the sequence (in a previous session for example). But this is not the most usual behaviour as the PP may probably show the current value of the setting before enabling the user to modify it.

For clarity of the following flowcharts the <<Call information>> IE including call identifier does not appear in the CC messages that must convey it. Please note that it should not be omitted when implementing equivalent cases. For example the call identifier must be assigned by the FP after CC-SETUP message.

C.8.2 Changing the settings of a line

Use case 1: The user edit the line settings of the line number 'i'. Read only the selected entry.

PP   FP

CC-SETUP
<< BASIC_SERVICE <Call Class=Service call setup> >>
CC-CALL-PROC

IWU-INFO
IE <<IWU to IWU= **start session**, lines settings, Number of sorting fields =0 >>
IWU-INFO
IE <<IWU to IWU= **start session confirm**, session identifier, total number=N >>

Line i selected by the user (i ∈ 1.. N):
IWU-INFO
IE <<IWU to IWU= **read entries**, session id, start index =i, counter=01H,
list of field identifiers= Line id id, Line name id, …, Multiple calls mode id >>
IWU-INFO
IE <<IWU to IWU= **read entries confirm**, session id, start index, counter=1>>
IWU-INFO
IE <<IWU to IWU= **data packet last**, session id, content part for ith entry>>

IWU-INFO
IE <<IWU to IWU= **edit entry**, session id, entry identifier,
list of field identifiers= Line id id, Line name id, …, Multiple calls mode id>>
IWU-INFO
IE <<IWU to IWU= **edit entry confirm**, session id, start index >>
IWU-INFO
IE <<IWU to IWU= **data packet last**, session id, content part= content part for ith entry>>

user updates the settings for ith line in line settings list

IWU-INFO
IE <<IWU to IWU= **save entry**, session id, entry identifier >>
IWU-INFO
IE <<IWU to IWU= **data packet last**, session id, content part= ith entry
IWU-INFO
IE <<IWU to IWU= **save entry confirm**, session id, entry identifier, start index>>
IWU-Info
IE <<IWU to IWU= **end session**, session identifier>>
IWU-Info
IE <<IWU to IWU= **end session confirm**, session identifier >>
FACILITY

FP notifies all PP
attached to the line

<<EVENTS NOTIFICATIONS, <List change indication, Line settings,
N> > << CALL-INFORMATION, LineId >>
CC-RELEASE
CC-RELEASE-COM

Figure C.41: Changing the settings of a line (use case 1)

Use case 2: The user edit the line settings of the line number 'i'. Read all N entries before editing the selected entry.

PP   **FP**

CC-SETUP

<< BASIC_SERVICE <Call Class=Service call setup> >>

CC-CALL-PROC

IWU-INFO

IE <<IWU to IWU= **start session**, lines settings, Number of sorting fields =0 >>

IWU-INFO

IE <<IWU to IWU= **start session confirm**, session identifier, total number=N >>

IWU-INFO

IE <<IWU to IWU= **read entries**, session id, start index =i, counter=N,
list of field identifiers= Line id id, Line name id, …, Multiple calls mode id >>

IWU-INFO

IE <<IWU to IWU= **read entries confirm**, session id, start index, counter=N>>

IWU-INFO

IE <<IWU to IWU= **data packet**, session id, content part >>

IWU-INFO

IE <<IWU to IWU= **data packet last**, session id, content part >>

Line i selected by the user (i $\in$ 1.. N):   IWU-INFO

IE <<IWU to IWU= **edit entry**, session id, entry identifier,
list of field identifiers= Line id id, Line name id, …, Multiple calls mode id>>

IWU-INFO

IE <<IWU to IWU= **edit entry confirm**, session id, start index >>

IWU-INFO

IE <<IWU to IWU= **data packet last**, session id, content part= content part for ith entry>>

user updates the settings for ith line in line settings list

IWU-INFO

IE <<IWU to IWU= **save entry**, session id, entry identifier >>

IWU-INFO

IE <<IWU to IWU= **data packet last**, session id, content part= ith entry

IWU-INFO

IE <<IWU to IWU= **save entry confirm**, session id, entry identifier, start index>>

IWU-Info

IE <<IWU to IWU= **end session**, session identifier>>

IWU-Info

IE <<IWU to IWU= **end session confirm**, session identifier >>

FACILITY

<<EVENTS NOTIFICATIONS, <List change indication, Line settings, N> >>
<< CALL-INFORMATION, LineId >>

CC-RELEASE

CC-RELEASE-COM

FP notifies all PP
attached to the line

Figure C.42: Changing the settings of a line (use case 2)

ETSI

C.8.3   Changing the name of a line

Use case: The user edit directly the line name of the line number '3'.

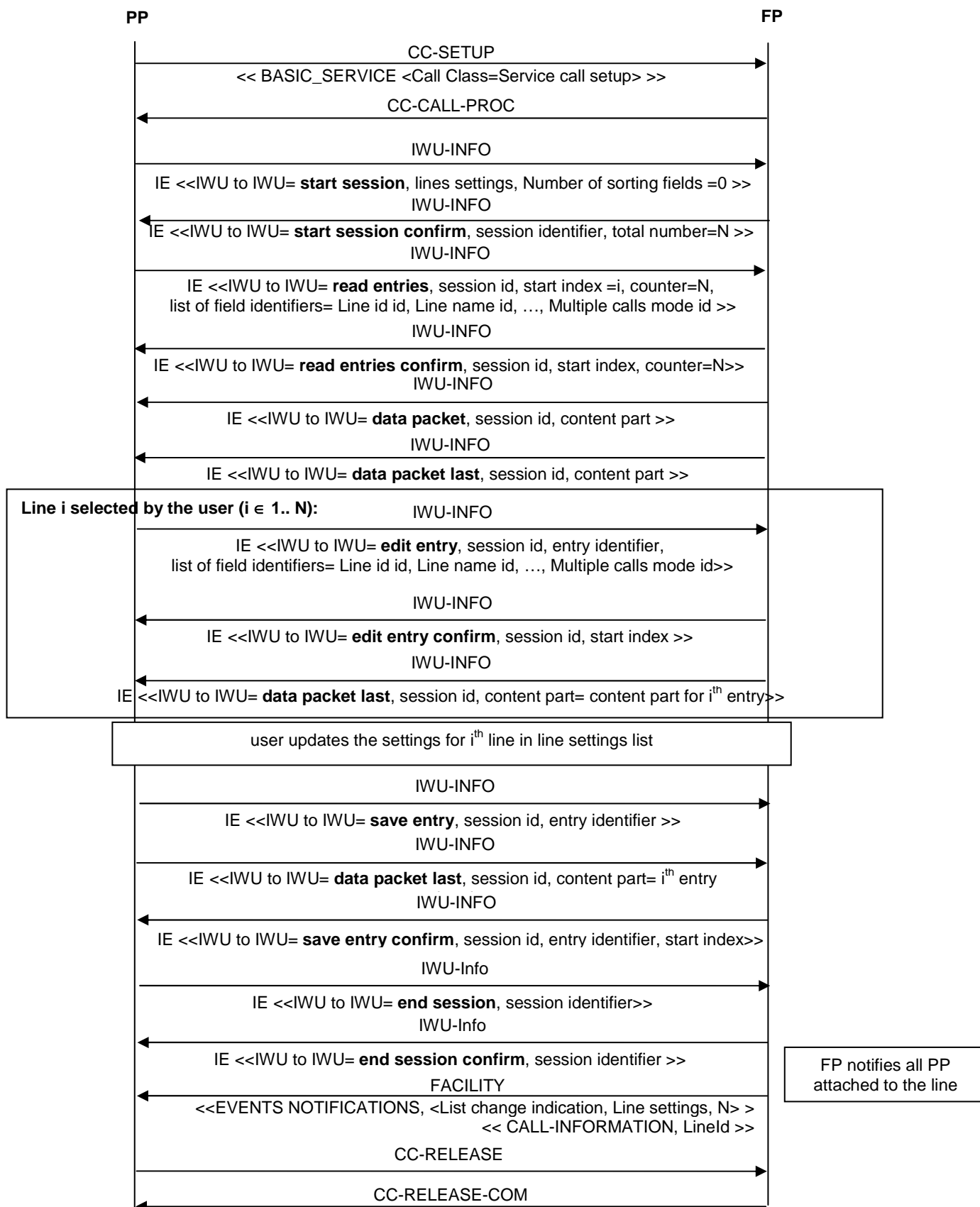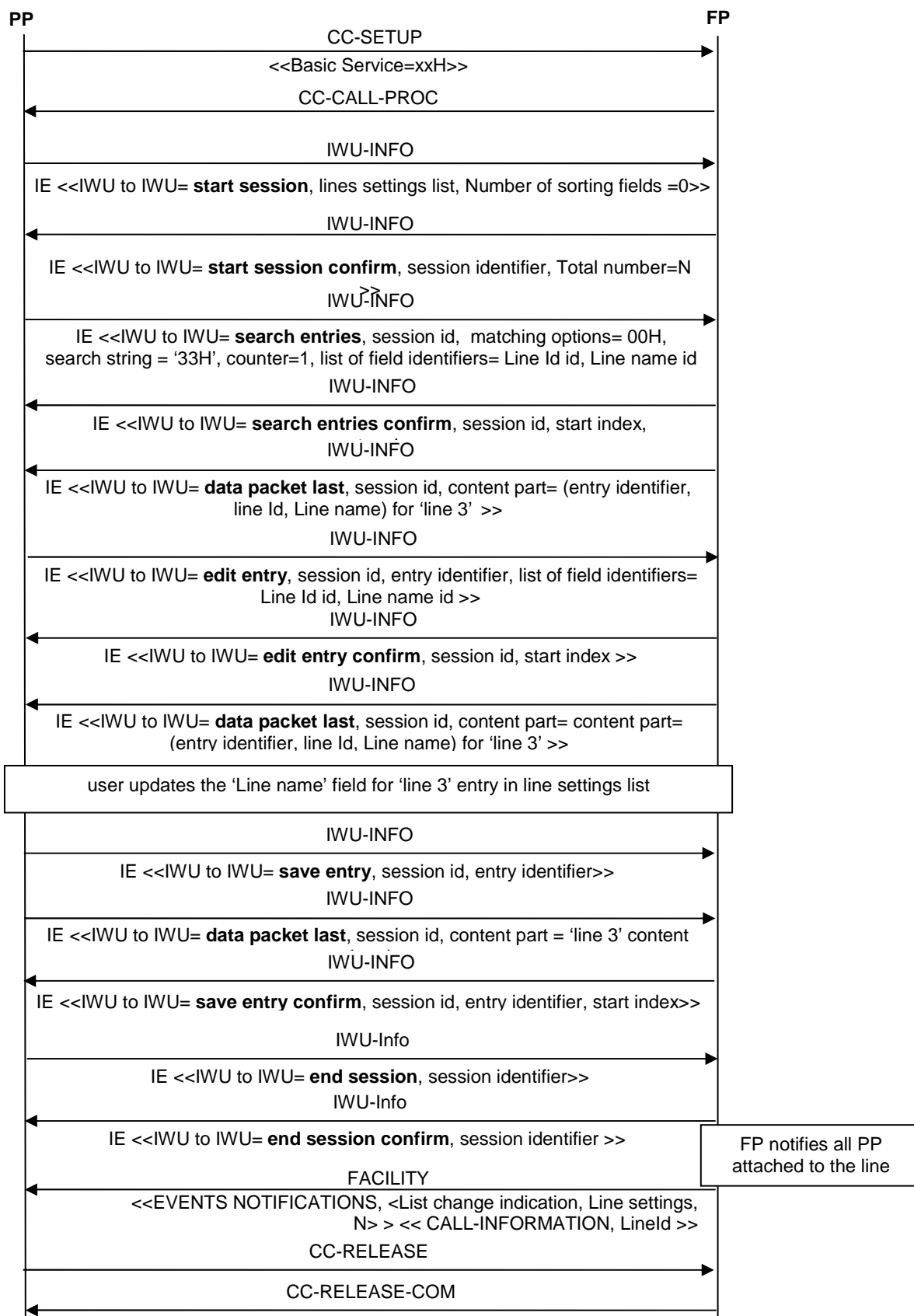PP   FP

CC-SETUP

<<Basic Service=xxH>>

CC-CALL-PROC

IWU-INFO

IE <<IWU to IWU= **start session**, lines settings list, Number of sorting fields =0>>

IWU-INFO

IE <<IWU to IWU= **start session confirm**, session identifier, Total number=N

IWU-INFO
>>

IE <<IWU to IWU= **search entries**, session id, matching options= 00H,
search string = '33H', counter=1, list of field identifiers= Line Id id, Line name id

IWU-INFO

IE <<IWU to IWU= **search entries confirm**, session id, start index,

IWU-INFO

IE <<IWU to IWU= **data packet last**, session id, content part= (entry identifier,
line Id, Line name) for 'line 3' >>

IWU-INFO

IE <<IWU to IWU= **edit entry**, session id, entry identifier, list of field identifiers=
Line Id id, Line name id >>

IWU-INFO

IE <<IWU to IWU= **edit entry confirm**, session id, start index >>

IWU-INFO

IE <<IWU to IWU= **data packet last**, session id, content part= content part=
(entry identifier, line Id, Line name) for 'line 3' >>

user updates the 'Line name' field for 'line 3' entry in line settings list

IWU-INFO

IE <<IWU to IWU= **save entry**, session id, entry identifier>>

IWU-INFO

IE <<IWU to IWU= **data packet last**, session id, content part = 'line 3' content

IWU-INFO

IE <<IWU to IWU= **save entry confirm**, session id, entry identifier, start index>>

IWU-Info

IE <<IWU to IWU= **end session**, session identifier>>

IWU-Info

IE <<IWU to IWU= **end session confirm**, session identifier >>

FP notifies all PP
attached to the line

FACILITY

<<EVENTS NOTIFICATIONS, <List change indication, Line settings,
N> > << CALL-INFORMATION, LineId >>

CC-RELEASE

CC-RELEASE-COM

Figure C.43: Changing the name of a line

ETSI

Annex D (informative):
Services and features defined in other specifications

D.1 Services and features defined in TS 102 527-1 (New Generation DECT; part 1)

The following informative annex shows the features and MAC/DLC services defined in TS 102 527-1 [21] (New Generation DECT; part 1), many of them are reused in the present document. This list is informative, and shows the status in TS 102 527-1 [21] (V1.2.1). In case of changes or divergences the original definitions at TS 102 527-1 [21] shall rule.

D.1.1 New Generation DECT; part 1, Speech Services (clause 5.1 of TS 102 527-1)

Narrow band ADPCM G.726 voice service [NG1.1]: ITU-T Recommendation G.726 [15] narrow band codec **[NG1.SC.1]** over 32 kbit/s unprotected transmission channel.

Narrow band PCM G.711 voice service [NG1.2]: ITU-T Recommendation G.711 [16] narrow band codec **[NG1.SC.2]** over 64 kbit/s protected or unprotected transmission channels.

Wideband 7 kHz G.722 voice service [NG1.3]: ITU-T Recommendation G.722 [17] wideband codec **[NG1.SC.3]** over 64 kbit/s protected or unprotected transmission channels.

Wideband 7 kHz low rate G.729.1 voice service [NG1.4]: ITU-T Recommendation G.729.1 [18] wideband codec **[NG1.SC.4]** over 32 kbit/s unprotected transmission channels.

Super wideband 14 kHz MPEG-4 ER AAC-LD voice service [NG1.5]: MPEG-4 ER AAC-LD super wideband codec **[NG1.SC.5]** over 64 kbit/s protected or unprotected transmission channels.

Wideband 11 kHz low rate MPEG-4 ER AAC-LD voice service [NG1.6]: MPEG-4 ER AAC-LD super wideband codec **[NG1.SC.6]** over 32 kbit/s unprotected transmission channels.

D.1.2 New Generation DECT; part 1, Network (NWK) features (clause 5.2 of TS 102 527-1)

Codec Negotiation [NG1.N.1]: capability to negotiate the speech codec to be used in a communication, based on the supported capabilities in both peers and the previsions included in the present document. This feature may require slot type change.

Codec Switching [NG1.N.2]: capability to switch between different speech codecs during a call. This feature may require slot type change.

D.1.3 New Generation DECT; part 1, Data Link Control (DLC) services (clause 5.3 of TS 102 527-1)

LU1 Transparent UnProtected service (TRUP) Class 0/minimum_delay [NG1.D.1]: transparent unprotected service introducing minimum delay , transmission Class 0/min_delay as defined by EN 300 175-4 [4], clause 11.2.

LU1 Transparent UnProtected service (TRUP) Class 0 [NG1.D.2]: transparent unprotected service introducing minimum delay , transmission Class 0 as defined by EN 300 175-4 [4], clause 11.2.

LU7 64 kbit/s protected bearer service [NG1.D.3]: protected service providing reliable 64 kbit/s transmission over packet type P80 incorporating FEC and ARQ protection mechanisms. Defined by EN 300 175-4 [4], clause 11.9.

LU12 UNProtected Framed service (UNF) Class 0 [NG1.D4]: unprotected service introducing normal delay , transmission Class 0 as defined by EN 300 175-4 [4], clause 11.14.

FU1 DLC frame [NG1.D.5]: bidirectional frame used in LU1 service. Defined in EN 300 175-4 [4], clause 12.2. Frame length depends on slot type and is defined in table 12.2.1.1 of EN 300 175-4 [4], clause 12.2.1.

FU7 DLC frame [NG1.D.6]: bidirectional frame used in LU7 service. Defined in EN 300 175-4 [4], clause 11.9.

FU12 DLC frame with adaptation for codec G.729.1 [NG1.D.7]: bidirectional frame used in LU12 service, as defined in EN 300 175-4 [4], clause 12.12, frame size specified for full slot, 2-level modulation and with the adaptation for codec G.729.1 defined in EN 300 175-4 [4], clause E.1.

D.1.4   New Generation DECT; part 1, Medium Access Control (MAC) services (clause 5.4 of TS 102 527-1)

I_N_minimum delay symmetric MAC service type [NG1.M.1]: I_N_minimum delay symmetric connection as defined in EN 300 175-3 [3], clause 5.6.2.1.

I_N_normal delay symmetric MAC service type [NG1.M.2]: I_N_normal delay symmetric connection as defined in EN 300 175-3 [3], clause 5.6.2.1.

I_{PQ}_error_detection symmetric MAC service type [NG1.M.3]: I_{PQ}_ error_detection symmetric connection as defined in EN 300 175-3 [3], clause 5.6.2.1. (type 3: I_P_ error_detection with single-subfield protected B-field as defined in EN 300 175-3 [3], clause 6.2.1.3.4).

Advanced Connections [NG1.M.4]: MAC Connection Oriented service providing connection between FT and PT. Advanced connections are able to support multiple bearers, bearers different of the full slot, and any MAC service. The service includes the means for setting-up and releasing the required bearer(s).

D.1.5   New Generation DECT; part 1, Physical Layer (PHL) services (clause 5.5 of TS 102 527-1)

2 level GFSK modulation [NG1.P.1]: 2 level Gaussian frequency Shift Key (GFSK) modulation as defined by EN 300 175-2 [2], clause 5.

Physical Packet P32 [NG1.P.2]: physical packet P32 (full slot) as defined by EN 300 175-2 [2], clause 4.4.2.

Physical Packet P64 [NG1.P.3]: variable capacity Physical packet P00j as defined by EN 300 175-2 [2], clause 4.4.3, with j = 640.

Physical Packet P67 [NG1.P.4]: variable capacity Physical packet P00j as defined by EN 300 175-2 [2], clause 4.4.3, with j = 672.

Physical Packet P80 [NG1.P.5]: physical packet P80 (double slot) as defined by EN 300 175-2 [2], clause 4.4.4.

D.1.6   New Generation DECT; part 1, Speech coding and audio features (clause 5.6 of TS 102 527-1)

G.726 32 kbit/s ADPCM [NG1.SC.1]: ITU-T Recommendation G.726 [15] narrow band codec as defined by EN 300 175-8 [8], clause 5.1. ITU-T Recommendation G.726 [15] codec is mandatory for New Generation DECT in order to ensure interoperability with existing DECT systems.

G.711 64 kbit/s log-PCM [NG1.SC.2]: ITU-T Recommendation G.711 narrow band codec [16] as defined by EN 300 175-8 [8], clause 5.2. ITU-T Recommendation G.711 [16] codec is optional for New Generation DECT in order to improve the quality of narrow band communications, and fax/modem transmissions. ITU-T Recommendation G.711 [16] provides a slightly higher intrinsic voice quality and no transcoding for PSTN calls. Both, A-Law and μ-Law are supported.

G.722 64 kbit/s wideband [NG1.SC.3]: ITU-T Recommendation G.722 wideband SB-ADPCM 7 kHz codec [17] as defined by EN 300 175-8 [8], clause 5.3. ITU-T Recommendation G.722 [17] is chosen as mandatory wideband codec for New Generation DECT in order to greatly increase the voice quality by extending the bandwidth from narrow band to wideband. ITU-T Recommendation G.722 [17] provides a high wideband quality at a bit rate of 64 kbit/s with low complexity and very low delay.

G.729.1 32 kbit/s wideband [NG1.SC.4]: ITU-T Recommendation G.729.1 wideband codec [18] as defined by EN 300 175-8 [8], clause 5.4. ITU-T Recommendation G.729.1 [18] codec is optional for New Generation DECT in order to provide even higher wideband quality and better robustness to packets/frames losses than ITU-T Recommendation G.722 [17] at half the bit rate of ITU-T Recommendation G.722 [17]. This allows a better transport efficiency on the network side and over the DECT air interface (one full slot). In addition, it is seamless interoperable with largely deployed ITU-T Recommendation G.729 [i.6] based VoIP networks and terminals. ITU-T Recommendation G.729.1 [18] encodes signals in frames of 20 ms. It is a scalable codec operating at bitrates of 8 kbit/s and from 12 kbit/s to 32 kbit/s per steps of 2 kbit/s, in narrow band or in wideband from 14 kbit/s. ITU-T Recommendation G.729.1 [18] already incorporates a high efficiency packet loss concealment mechanism.

MPEG-4 ER AAC-LD 64 kbit/s super wideband [NG1.SC.5]: MPEG-4 ER AAC-LD codec [19], [20] as defined by EN 300 175-8 [8] clause 5.5.1. MPEG-4 ER AAC-LD is optional for New Generation DECT in order to provide higher quality than G.722 by further extending the bandwidth to superwideband (50 Hz to 14 kHz) (and even further, up to full audio bandwidth (20 Hz to 20 kHz)). MPEG-4 ER AAC-LD is designed for high quality communication applications including all kind of audio signals e.g. speech and music and provides a high quality for music streaming or other multimedia applications mixing speech and music. It provides an audio bandwidth of 14 kHz or more at a bitrate of 64 kbit/s. MPEG 4 ER AAC-LD (Error resilient, Low Delay AAC profile) is standardized as an audio profile [19] of MPEG-4 (ISO/IEC 14496-3 [20]). The frame size is 10 ms and the algorithmic delay 20 ms.

MPEG-4 ER AAC-LD 32 kbit/s wideband [NG1.SC.6]: as [NG1.SC5], but using the 32 kbit/s mode, as defined by EN 300 175-8 [8], clause 5.5.2. It provides a bandwidth of 11,5 kHz or more. The frame size is 20 ms and the algorithmic delay 40 ms.

PLC (Packet Loss Concealment) G.722 Appendix III & IV [NG1.SC.7]: to better cope with transmission errors, a Packet Loss Concealment algorithm (PLC) as defined by EN 300 175-8 [8], clause 5.3.2 may be optionally implemented for ITU-T Recommendation G.722 [17]. Appendices III and IV describe packet loss concealment solutions extending the ITU-T Recommendation G.722 [17] decoder. These PLC algorithms may be optionally implemented to improve voice quality in degraded transmission conditions where packets/frames may be lost (in IP network or on DECT air interface).

NOTE 1: Both appendices meet the same quality requirements but address two different quality/complexity trade offs:

1) Appendix III aims at maximizing the robustness at a price of additional complexity.

2) Appendix IV proposes an optimized complexity/quality trade off with almost no additional complexity compared with ITU-T Recommendation G.722 [17] normal decoding (0,07 WMOPS).

Since ITU-T Recommendation G.722 [17] does not incorporate any mechanism to cope with lost frames/packets, the use of a PLC algorithm is strongly recommended to avoid annoying effects in case of packet/frame losses.

NOTE 2: ITU-T Recommendation G.729.1 [18] already incorporates a packet loss concealment mechanism.

Detection of Modem/fax tone [NG1.SC.8]: detection of the 1 100 Hz, 1 300 Hz and 2 100 Hz standard tones indicating a fax/modem transmission and answering, as defined by EN 300 175-8 [8] clause 5.2.2. The main utility of this function is the switching of codecs to transparent PCM (ITU-T Recommendation G.711 [16]) in order to facilitate modem/fax transmission. The tone detection can also be used to de-activate echo suppression if present.

Codec selection and switching [NG1.SC.9]: to handle several codecs (at least ITU-T Recommendation G.726 [15] and ITU-T Recommendation G.722 [17]), New Generation DECT will support a codec selection and switching mechanism. This may consequently allow the use of other codecs that could be specified in next releases as additional optional codecs according to future application or interoperability needs.

PP Audio type 1a ("classic GAP" handset) [NG1.SC.10]: Audio specification for a general purpose 3,1 kHz telephony handset as defined by EN 300 175-8 [8], clause 7.2.3.

PP audio type 1b ("improved GAP" handset) [NG1.SC.11]: Audio specification for a general purpose 3,1 kHz telephony handset with improved TCLw, as defined by EN 300 175-8 [8], clause 7.2.4. It is compatible with VoIP and long delay networks.

PP audio type 1c (HATS tested, 3,1 kHz handset) [NG1.SC.12]: Audio specification for a general purpose 3,1 kHz telephony handset based on the new HATS methodology, as defined by EN 300 175-8 [8], clause 7.2.5. It includes strong echo suppression (TCLw) requirements and is compatible with VoIP and long delay networks.

PP audio type 1d (HATS tested, 3,1 kHz "improved" handset) [NG1.SC.13]: Audio specification for a general purpose 3,1 kHz telephony handset based on the new HATS methodology with improved quality, as defined by EN 300 175-8 [8], clause 7.2.6. It includes strong echo suppression (TCLw) requirements and is compatible with VoIP and long delay networks. This type has a more demanding acoustic specification, providing superior subjective quality. In practice, this means better electro-acoustic components (speaker, microphone), electronics and signal processing.

PP Audio type 2a (ITU-T P.311 7 kHz handset) [NG1.SC.14]: Audio specification for a wideband, 7 kHz service, handset based on the ITU-T Recommendation P.311 [i.5], as defined by EN 300 175-8 [8], clause 7.2.9.

PP Audio type 2b (HATS 7 kHz handset) [NG1.SC.15]: Handset for 7 kHz service (wideband), based on HATS methodology, as defined by EN 300 175-8 [8], clause 7.2.10. It includes strong echo suppression (TCLw) requirements and is compatible with VoIP and long delay networks.

PP Audio type 2c (HATS 7 kHz "improved" handset) [NG1.SC.16]: Handset for 7 kHz service (wideband), based on HATS methodology, with improved quality, as defined by EN 300 175-8 [8], clause 7.2.11. It includes strong echo suppression (TCLw) requirements and is compatible with VoIP and long delay networks. This type has a more demanding acoustic specification, providing superior subjective quality. In practice, this means better electro-acoustic components (speaker, microphone), electronics and signal processing.

PP audio type 3a (HATS tested, 3,1 kHz handsfree) [NG1.SC.17]: Audio specification for a Narrowband (3,1 kHz) handsfree device as defined by EN 300 175-8 [8], clause 7.2.7. This type applies to handsfree devices operating with an open loudspeaker and microphone. The type applies to either:

1) specific PPs designed to operate in handsfree mode;

2) standard handset implementing types 1a, 1b, 1c or 1d, but with the option to operate in handsfree mode; and

3) handsfree accessory devices connected to a handset by any wired or wireless technology.

It provides (300 Hz - 3,4 kHz) frequency range, and it is defined based on HATS methodology.

PP audio type 3b (HATS tested, 3,1 kHz "improved" handsfree) [NG1.SC.18]: Audio specification for a Narrowband (3,1 kHz) handsfree device, improved quality version, as defined by EN 300 175-8 [8], clause 7.2.8. This type applies to handsfree devices operating with an open loudspeaker and microphone. The type applies to either:

1) specific PPs designed to operate in handsfree mode;

2) standard handset implementing types 1a, 1b, 1c or 1d, but with the option to operate in handsfree mode; and

3) handsfree accessory devices connected to a handset by any wired or wireless technology.

It provides (300 Hz - 3,4 kHz) frequency range, and it is defined based on HATS methodology. This type has a more demanding acoustic specification, providing superior subjective quality. In practice, this means better electro-acoustic components (speaker, microphone), electronics and signal processing.

PP Audio type 4a (HATS 7 kHz handsfree) [NG1.SC.19]: Wideband (7 kHz) handsfree device, as defined by EN 300 175-8 [8], clause 7.2.12. This type applies to handsfree devices operating with an open loudspeaker and microphone. The profile applies to either:

1) specific PPs designed to operate in handsfree mode;

2) standard wideband handset implementing profiles 2a, 2b or 2c, but with the option to operate in handsfree mode; and

3) handsfree accessory devices connected to a handset by any wired or wireless technology.

It provides (150 Hz - 7 kHz) frequency range, and it is defined based on HATS methodology.

PP Audio type 4b (HATS 7 kHz "improved" handsfree) [NG1.SC.20]: Wideband (7 kHz) handsfree device, improved quality version, as defined by EN 300 175-8 [8], clause 7.2.13. This type applies to handsfree devices operating with an open loudspeaker and microphone. The profile applies to either:

1)   specific PPs designed to operate in handsfree mode;

2)   standard wideband handset implementing profiles 2a, 2b or 2c, but with the option to operate in handsfree mode; and

3)   handsfree accessory devices connected to a handset by any wired or wireless technology.

It provides (150 Hz - 7 kHz) frequency range, and it is defined based on HATS methodology. This type has a more demanding acoustic specification, providing superior subjective quality. In practice, this means better electro-acoustic components (speaker, microphone), electronics and signal processing.

PP Audio type 5a (Super wideband 14 kHz) [NG1.SC.21]: Handset for 14 kHz service (super wideband), as defined by EN 300 175-8 [8], clause 7.2.14.

PP Audio type 5b (Super wideband 14 kHz, handsfree) [NG1.SC.22]: Handsfree device for 14 kHz service (super wideband), as defined by EN 300 175-8 [8], clause 7.2.15.

FP audio type 1b ("new ISDN" 3,1 kHz) [NG1.SC.23]: Audio specification for a DECT FP supporting narrowband service and providing a digital 64 kbit/s G.711 interface, typically (but not necessarily) an ISDN connection, new specification, as defined by EN 300 175-8 [8], clause 7.3.3.

   NOTE 3:   FP Audio type 1a ("classic ISDN", 3,1 kHz FP, see EN 300 175-8 [8]) is not to be used in in New Generation DECT equipment. Instead of it, FP type 1b should be used in NG-DECT FPs with ISDN or digital circuit-switch interfaces.

PP echo canceller for FP, narrowband (3,1 kHz) service [NG1.SC.24]: Auxiliary feature for FPs consisting on echo canceller for handling the echo generated by PPs type 1a. As defined by EN 300 175-8 [8], clause 7.4.2. Only narrowband echo cancellation capability is required for this feature.

PP echo supressor for FP, narrowband (3,1 kHz) service [NG1.SC.25]: Auxiliary feature for FPs consisting on echo supressor for handling the echo generated by PPs type 1a. As defined by EN 300 175-8 [8], clause 7.4.3. Only narrowband capability is required for this feature.

FP audio type 2 (analog PSTN 3,1 kHz) [NG1.SC.26]: Audio specification for a DECT FP supporting narrowband service and providing an analog 2-wire PSTN interface. As defined by EN 300 175-8 [8], clause 7.3.4.

FP audio type 3 (VoIP 3,1 kHz) [NG1.SC.27]: Audio specification for a DECT FP supporting narrowband service and providing a VoIP interface, with codecs G.711 (typically) or G.726 on top of it. As defined by EN 300 175-8 [8], clause 7.3.5.

FP Audio type 4 (ISDN, wideband) [NG1.SC.28]: Audio specification for a DECT FP supporting wideband service and providing a digital 64 kbit/s interface, typically (but not necessarily) an ISDN connection, with a wideband codec such as G.722, MPEG, etc. As defined by EN 300 175-8 [8], clause 7.3.6.

FP Audio type 5 (VoIP wideband) [NG1.SC.29]: Audio specification for a DECT FP supporting wideband service and providing a VoIP interface, with a wideband codec on top such as G.722, MPEG, etc. As defined by EN 300 175-8 [8], clause 7.3.8.

PP echo canceller for FP, wideband (7 kHz) service [NG1.SC.30]: Auxiliary feature for FPs consisting on echo canceller for handling the echo generated by PPs type 2a. As defined by EN 300 175-8 [8], clause 7.4.2. Only wideband echo cancellation capability is required for this feature.

PP echo supressor for FP, wideband (7 kHz) service [NG1.SC.31]: Auxiliary feature for FPs consisting on echo supressor for handling the echo generated by PPs type 2a. As defined by EN 300 175-8 [8], clause 7.4.3. Only wideband echo cancelation capability is required for this feature.

FP audio type 6a (internal call) [NG1.SC.32]: This type of audio specification applies to the case of internal call inside a DECT FP or a DECT system without any external interface. This type applies to any service. As defined by EN 300 175-8 [8], clause 7.3.8.

FP audio type 6b (internal conference) [NG1.SC.33]: This type of audio specification applies to the case of 3-party or multi-party conference inside a DECT FP or a DECT system with or without an external interface. Applies to any service. As defined by EN 300 175-8 [8], clause 7.3.9.

Adaptive volume control for FP [NG1.SC.34]: Accessory feature for FPs consisting on an adaptive volume control depending on the level of environmental noise at the PP. The gain variation shall be symmetrical. As described in EN 300 175-8 [8], clause 7.6 and informative annex D.

D.2   Services and features defined in EN 300 444 (GAP)

The following informative annex shows the features and MAC/DLC services defined in EN 300 444 [12] (GAP), many of them are reused in the present document. This list is informative, and shows the status in EN 300 444 (V1.5.1). In case of changes or divergences the original definitions at EN 300 444 [12] (GAP) shall rule.

D.2.1   GAP Network (NWK) features (clause 4.1 of EN 300 444)

outgoing call [N.1]: call initiated at a DECT PP.

off-hook [N.2]: ability to indicate the action of going off-hook, e.g. to start call setup or accept a call.

on-hook (FULL Release) [N.3]: ability to indicate the action of going on-hook (e.g. to terminate a call) and fully release the radio resource.

dialled digits (basic) [N.4]: capability to dial digits 0 to 9, *, #.

register recall [N.5]: ability of the PP to request the invocation of the supplementary service "register recall" over the DECT interface and the ability of the FP to transmit the request to the local network.
Register recall means to seize a register (with dial tone) to permit input of further digits or other action.

go to DTMF signalling (defined tone length) [N.6]: go to DTMF signalling with defined tone length.

pause (dialling pause) [N.7]: ability to generate or indicate a dialling pause, e.g. to await further dial tone.

incoming call [N.8]: call received at a DECT PP.

authentication of PP [N.9]: process by which the identity of a DECT PP is checked by the FP.

authentication of user [N.10]: process by which the identity of a user of a DECT PP is checked by the FP. The User Personal Identification (UPI), a personal identification of 0 to 8 digits, manually entered by the user, is used for user authentication.

location registration [N.11]: facility whereby a PP can be registered with a FP or a cluster of FPs such that incoming calls, radio pages or messages may be routed to it.

on-air key allocation [N.12]: capability to transform Authentication Code (AC) into User Authentication Key (UAK) using the key allocation procedure.

identification of PP [N.13]: ability for the FP to request and PP to provide specific identification parameters.

service class indication/assignment [N.14]: assignment by the FP to PP of the service class and indication to the FP by the PP of the contents of its service class.

alerting [N.15]: activates or deactivates alerting at the PP using any appropriate indication.

ZAP [N.16]: ability first to assign and then to re-program the account data held in the PP so that access rights may be suspended subject to the conditions set by the service provider being met, coupled with the ability to re-program the account data again to reinstate access rights once these conditions have been met.
One ZAP field shall be provided per account field. The PP has the right to authenticate the FP prior to the execution of ZAP suspend.

encryption activation FT initiated [N.17]: activation of the encryption process requested by FT.

subscription registration procedure on-air [N.18]: standardized procedure for loading subscription registration data into a PP in real time over the air-interface.

link control [N.19]: ability to request, accept, maintain and release a data link for the purposes of a NWK layer procedure.

terminate access rights FT initiated [N.20]: ability of the FP to delete a subscription in the PP.

partial release [N.21]: ability to release an established or in progress Call Control (CC) call whilst retaining the radio resource for the purpose of accessing further services.

go to DTMF (infinite tone length) [N.22]: go to DTMF signalling, indicating infinite DTMF tone duration.

go to pulse [N.23]: go to pulse (decadic) signalling.

signalling of display characters [N.24]: transmission to the PP of characters to be displayed on the user's PP display (if provided).

display control characters [N.25]: characters sent to the PP to control the user's display in the PP (if provided) Such characters include cursor control, clear screen, home, flash, inverse video, etc.

authentication of FT [N.26]: process by which the identity of a FP is checked by the PP.

encryption activation PT initiated [N.27]: activation of the encryption process suggested by PT.
The real time start of ciphering is done in the MAC layer and is always initiated by the PT.

encryption deactivation FT initiated [N.28]: deactivation of the encryption process requested by FT.
The real time stop of ciphering is done in the MAC layer and is always initiated by the PT.

encryption deactivation PT initiated [N.29]: deactivation of the encryption process suggested by PT.
The real time stop of ciphering is done in the MAC layer and is always initiated by the PT.

Calling Line Identification Presentation (CLIP) [N.30]: ability to provide the calling party number to the called party before accepting the call.

internal call [N.31]: call between 2 users that does not make use of the local network resources.
This is typically useful in residential environments.

service call [N.32]: call initiated by a DECT PT for entering of FT related service and adjustment procedures in a transparent way.
After having sent the service call indication, the PT behaves according to the rules of a normal call.

Enhanced U- plane connection [N.33]: ability of the FT to initiate connection of the U- plane during call establishment or release e.g. to facilitate the provision of in band tones or announcements.

Calling Name Identification Presentation (CNIP) [N.34]: ability to provide the calling party name to the called party before accepting the call.

D.2.2 GAP Speech coding and audio features (clause 4.2 of EN 300 444)

For the purposes of the present document the following definitions shall apply:

G.726 32 kbit/s ADPCM [SC.1]: ITU-T Recommendation G.726 [15] narrow band codec as defined by EN 300 175-8 [8] clause 5.1.

PP audio type 1a ("classic GAP" handset) [SC.2]: Audio specification for a general purpose 3,1 kHz telephony handset as defined by EN 300 175-8 [8], clause 7.2.3.

PP audio type 1b ("improved GAP" handset) [SC.3]: Audio specification for a general purpose 3,1 kHz telephony handset with improved TCLw, as defined by EN 300 175-8 [8], clause 7.2.4. It is compatible with VoIP and long delay networks.

PP audio type 1c (HATS tested, 3,1 kHz handset) [SC.4]: Audio specification for a general purpose 3,1 kHz telephony handset based on the new HATS methodology, as defined by EN 300 175-8 [8], clause 7.2.5. It includes strong echo suppression (TCLw) requirements and is compatible with VoIP and long delay networks.

PP audio type 1d (HATS tested, 3,1 kHz "improved" handset) [SC.5]: Audio specification for a general purpose 3,1 kHz telephony handset based on the new HATS methodology with improved quality, as defined by EN 300 175-8 [8], clause 7.2.6. It includes strong echo suppression (TCLw) requirements and is compatible with VoIP and long delay networks. This type has a more demanding acoustic specification, providing superior subjective quality. In practice, this means better electro-acoustic components (speaker, microphone), electronics and signal processing.

PP audio type 3a (HATS tested, 3,1 kHz handsfree) [SC.6]: Audio specification for a Narrowband (3,1 kHz) handsfree device as defined by EN 300 175-8 [8], clause 7.2.7. This type applies to handsfree devices operating with an open loudspeaker and microphone. The type applies to either:

1) specific PPs designed to operate in handsfree mode;

2) standard handset implementing types 1a, 1b, 1c or 1d, but with the option to operate in handsfree mode; and

3) handsfree accessory devices connected to a handset by any wired or wireless technology.

It provides (300 Hz - 3,4 kHz) frequency range, and it is defined based on HATS methodology.

PP audio type 3b (HATS tested, 3,1 kHz "improved" handsfree) [SC.7]: Audio specification for a Narrowband (3,1 kHz) handsfree device, improved quality version, as defined by EN 300 175-8 [8], clause 7.2.8. This type applies to handsfree devices operating with an open loudspeaker and microphone. The type applies to either:

1) specific PPs designed to operate in handsfree mode;

2) standard handset implementing types 1a, 1b, 1c or 1d, but with the option to operate in handsfree mode; and

3) handsfree accessory devices connected to a handset by any wired or wireless technology.

It provides (300 Hz - 3,4 kHz) frequency range, and it is defined based on HATS methodology. This type has a more demanding acoustic specification, providing superior subjective quality. In practice, this means better electro-acoustic components (speaker, microphone), electronics and signal processing.

FP audio type 1a ("classic ISDN" 3,1 kHz) [SC.8]: Audio specification for a DECT FP supporting narrowband service and providing a digital 64 kbit/s G.711 interface, typically (but not necessarily) an ISDN connection, classic specification, as defined by EN 300 175-8 [8], clause 7.3.2. It is recommended to use FP type 1b instead of type 1a.

FP audio type 1b ("new ISDN" 3,1 kHz) [SC.9]: Audio specification for a DECT FP supporting narrowband service and providing a digital 64 kbit/s G.711 interface, typically (but not necessarily) an ISDN connection, new specification, as defined by EN 300 175-8 [8], clause 7.3.3. It is recommended to use FP type 1b instead of type 1a.

PP echo canceller for FP [SC.10]: Auxiliary feature for FPs consisting on echo canceller for handling the echo generated by PPs type 1a. As defined by EN 300 175-8 [8], clause 7.4.2. Only narrowband echo cancellation capability is required.

PP echo supressor for FP [SC.11]: Auxiliary feature for FPs consisting on echo supressor for handling the echo generated by PPs type 1a. As defined by EN 300 175-8 [8], clause 7.4.3. Only narrowband capability is required.

FP audio type 2 (analog PSTN 3,1 kHz) [SC.12]: Audio specification for a DECT FP supporting narrowband service and providing an analog 2-wire PSTN interface. As defined by EN 300 175-8 [8], clause 7.3.4.

FP audio type 3 (VoIP 3,1 kHz) [SC.13]: Audio specification for a DECT FP supporting narrowband service and providing a VoIP interface, with codecs G.711 (typically) or G.726 on top of it. As defined by EN 300 175-8 [8], clause 7.3.5.

FP audio type 5a (internal call) [SC.14]: This type of audio specification applies to the case of internal call inside a DECT FP or a DECT system without any external interface. This type applies to any service. As defined by EN 300 175-8 [8], clause 7.3.8.

FP audio type 5b (internal conference) [SC.15]: This type of audio specification applies to the case of 3-party or multi-party conference inside a DECT FP or a DECT system with or without an external interface. Applies to any service. As defined by EN 300 175-8 [8], clause 7.3.9.

Adaptive volume control for FP [SC.16]: Accesory feature for FPs consisting on an adaptive volume control depending on the level of environmental noise at the PP. The gain variation shall be symmetrical. As described in EN 300 175-8 [8], (detailed descriptions for each type of FP in clause 7.6, and examples of settings in annex D).

D.2.3   GAP Application features (clause 4.3 of EN 300 444)

AC to bitstring mapping [A.1]: Mapping of the AC into a bitstring.

multiple subscription registration [A.2]: Ability of PP to store more than one subscription.

manual entry of the Portable Access Rights Key (PARK) [A.3]: Ability of the PP to accept a manual entry of the PARK for ensuring attachment to the right FP in a physical area covered by many providers.

terminal identity number assignment in mono-cell system [A.4]: Ability to assign to each PT a terminal identity number.

D.2.4   DLC service definitions (clause 5.1 of EN 300 444)

LAPC class A service and Lc [D.1]: single frame acknowledged C-plane data link service providing a single data link between one FT and one PT.
The higher layer information is segmented (if necessary) and transmitted in numbered frames. The Lc provides frame delimiting, transparency and frame synchronization.

C_S channel fragmentation and recombination [D.2]: Lc service providing channel dependant fragmentation (by means of dividing a LAPC data unit into more than one service data units for delivery to the MAC layer C_S logical channel) and recombination (by means of joining several service units received from the MAC layer C_S logical channel into a LAPC data unit)

broadcast Lb service [D.3]: simplex point-to-multipoint transmission using simple fixed length DLC frames providing a restricted broadcast service in direction FP to PP(s).

intra-cell voluntary connection handover [D.4]: internal handover process provided and initiated by the DLC layer (e.g. as a result of continued poor quality of service from the MAC layer), whereby one set of DLC entities (C-plane and U-plane) can re-route data from one MAC connection to a second new MAC connection in the domain of the same cell, while maintaining the service provided to the NWK layer.

intercell voluntary connection handover [D.5]: internal handover process provided and initiated by the DLC layer (e.g. as a result of continued poor quality of service from the MAC layer), whereby one set of DLC entities (C-plane and U-plane) can re-route data from one MAC connection to a second new MAC connection not in the domain of the same cell, while maintaining the service provided to the NWK layer.

encryption activation [D.6]: transporting the NWK layer encryption request and the cipher key to the MAC layer, thereby enabling the encryption process in the MAC layer.

LU1 TRansparent UnProtected service (TRUP) class 0/min_delay [D.7]: transparent unprotected service introducing minimum delay between the higher layers and the MAC layer.
May be used for speech and non-speech applications. Speech transmission shall only use the class 0/min_delay operation over a single bearer MAC connection. Data integrity is not guaranteed. No error protection is applied, and octets may be lost, erroneous or duplicated. The continuous higher layer data is fragmented for delivery to the I_N logical channel in the transmission direction, and recombined from the I_N logical channel in the receiving direction.

FU1 [D.8]: offers a defined fixed length frame structure and buffering functions for transmission of U-plane data to the MAC layer (at the transmit side) or accept of data from the MAC layer (at the receiving side) on demand and with minimum delay. Used for speech but may be used for more general data purposes.

encryption deactivation [D.9]: transporting the NWK layer encryption deactivation request to the MAC layer, thereby disabling the encryption process in the MAC layer.

D.2.5   GAP MAC service definitions (clause 5.2 of EN 300 444)

general [M.1]: set of basic requirements regarding data formats, multiplexing, CRC usage, scanning and locking, which are prerequisites to communication between peer MAC entities.

continuous broadcast [M.2]: simplex service from FT to PT whereby the FT maintains at least one bearer with continuous transmissions.
The PT can use the information carried in this bearer to lock to the FT and to obtain knowledge about the FT.

paging broadcast [M.3]: service whereby the identities of specific PTs can be broadcast by the FT. This service is normally used by the FT to request a specific PT to set up a link to the FT.

basic connection [M.4]: service providing connection between FT and PT consisting of one full slot duplex bearer supporting the In_minimum_delay data service (i.e. speech).
Only one basic connection may exist between a FT and particular PT (except during connection handover). The service includes the means for setting-up and releasing the required bearer(s).

C$_S$ higher layer signalling [M.5]: low rate connection oriented data service with ARQ using the C$_S$ channel to transfer higher layer signalling data.

quality control [M.6]: provides means for monitoring and controlling the radio link quality.

encryption activation [M.7]: service providing means for enabling the encryption whereby on demand all higher layer data (including speech) is transferred across the AI in an encrypted form.
Always initiated by the PT.

extended frequency allocation [M.8]: service which allows a FT to support frequencies in addition to the standard DECT frequencies.

bearer handover - intra-cell [M.9]: internal MAC process whereby data transfer (C channel and I channel) is switched from one duplex bearer to another in the domain of the same cell while maintaining the service to the DLC layer.

bearer handover - inter-cell [M.10]: internal MAC process whereby data transfer (C channel and I channel) is switched from one duplex bearer to another not in the domain of the same cell while maintaining the service to the DLC layer.

connection handover - intra-cell [M.11]: in the MAC layer, it is the process enabling setting up a new basic connection in the domain of the same cell to support connection handover at the DLC layer.

connection handover - inter-cell [M.12]: in the MAC layer, it is the process enabling setting up a new basic connection not in the domain of the same cell to support connection handover at the DLC layer.

Secondary Access Rights Identity (SARI) support [M.13]: ability to support, in addition to the primary Access Rights Identity (ARI), secondary ARIs that the FT broadcasts less frequently than PARIs.
These may be used to reflect an inter-operators agreement allowing a portable to access more than one operator or services through FT.

encryption deactivation [M.14]: service providing means for disabling the encryption whereby on demand the process of transmitting higher layer data (including speech) across the AI in encrypted form is to be cancelled (a connection release automatically disables ciphering).

D.3   GAP Feature/service to procedure mapping tables

The following informative annex shows the features/service to procedure mapping tables as defined in EN 300 444 [12] (GAP), that are reused in the present document (unless other specification is given). This list is informative, and shows the status in EN 300 444 [12]. In case of changes or divergences the original tables at EN 300 444 [12] (GAP) shall rule.

D.3.1 GAP NWK feature to procedure mapping table (clause 6.8.1 of EN 300 444)

Table D.1: NWK feature to procedure mapping (table 5 of EN 300 444)

Feature/Procedure mapping					
				Status	
Feature	Procedure	Reference	PT	FT	
				R/B	P
N.1 Outgoing call		4.1	M	M	M
	Outgoing call request	8.2	M	M	M
	Overlap sending	8.3	M	O	O
	Outgoing call proceeding	8.4	M	O	O
	Outgoing call confirmation	8.5	M	O	O
	Outgoing call connection	8.6	M	M	M
	Sending keypad information	8.10	M	M	M
N.2 Off Hook		4.1	M	M	M
	Outgoing call request	8.2	M	M	M
	Incoming call connection	8.15	M	M	M
N.3 On Hook (full release)		4.1	M	M	M
	Normal call release	8.7	M	M	M
	Abnormal call release	8.8	M	M	M
N.4 Dialled digits (basic)		4.1	PT	M	M
	Sending keypad information	8.10	M	M	M
N.5 Register recall		4.1	M	O	O
	Sending keypad information	8.10	M	M	M
N.6 Go to DTMF signalling (defined tone length)		4.1	M	O	M
	Sending keypad information	8.10	M	M	M
N.7 Pause (dialling pause)		4.1	M	O	O
	Sending keypad information	8.10	M	M	M
N.8 Incoming call		4.1	M	M	M
	Incoming call request	8.12	M	M	M
	Incoming call confirmation	8.13	M	M	M
	PT alerting	8.14	M	M	M
	Incoming call connection	8.15	M	M	M
N.9 Authentication of the PP		4.1	M	O	M
	Authentication of PT	8.24	M	M	M
N10 Authentication of the user		4.1	M	O	O
	Authentication of user	8.25	M	M	M
N.11 Location registration		4.1	M	O	M
	Location registration	8.28	M	M	M
	Location update	8.29	M	O	O
	Terminal Capability indication	8.17	O	O	O
N.12 On air key allocation		4.1	M	O	O
	Key allocation	8.32	M	M	M
N.13 Identification of PP		4.1	M	O	O
	Identification of PT	8.22	M	M	M
N.14 Service class indication/assignment		4.1	M	O	M
	Obtaining access rights	8.30	M	M	M
	Terminal Capability indication	8.17	O	O	O
	Authentication of PT	8.24	M	M	M
N.15 Alerting		4.1	M	M	M
	PT alerting	8.14	M	M	M
N.16 ZAP		4.1	M	O	O
	Obtaining access rights	8.30	M	M	M
	Terminal Capability indication	8.17	O	O	O
	Incrementing the ZAP value	8.26	M	M	M
	Authentication of FT	8.23	O	M	M
N.17 Encryption activation FT initiated		4.1	M	O	M
	Cipher-switching initiated by FT	8.33	M	M	M
	Storing the Derived Cipher Key (DCK)	8.27	M	M	M

Feature/Procedure mapping					
				Status	
Feature	Procedure	Reference	PT	FT	
				R/B	P
N.18 Subscription registration user procedure on-air		4.1	M	M	M
	Obtaining access rights	8.30	M	M	M
	Terminal Capability indication	8.17	O	O	O
N.19 Link control		4.1	M	M	M
	Indirect FT initiated link establishment	8.35	M	M	M
	Direct PT initiated link establishment	8.36	M	M	M
	Link release "normal"	8.37	M	M	M
	Link release "abnormal"	8.38	M	M	M
	Link release "maintain"	8.39	M	M	M
N.20 Terminate access rights FT initiated		4.1	M	O	O
	FT terminating access rights	8.31	M	M	M
	Authentication of FT	8.23	O	M	M
N.21 Partial release		4.1	O	O	O
	Partial release	8.9	M	M	M
N.22 Go to DTMF (infinite tone length)		4.1	O	O	O
	Sending keypad information	8.10	M	M	M
N.23 Go to Pulse		4.1	O	O	O
	Sending keypad information	8.10	M	M	M
N.24 Signalling of display characters		4.1	O	O	O
	Display	8.16	M	M	M
	Terminal capability indication	8.17	M	M	M
N.25 Display control characters		4.1	O	O	O
	Display	8.16	M	M	M
	Terminal capability indication	8.17	M	M	M
N.26 Authentication of FT		4.1	O	O	O
	Authentication of FT	8.23	M	M	M
N.27 Encryption activation PT initiated		4.1	O	O	O
	Cipher-switching initiated by PT	8.34	M	M	M
	Storing the DCK	8.27	M	M	M
N.28 Encryption deactivation FT initiated		4.1	O	O	O
	Cipher-switching initiated by FT	8.33	M	M	M
N.29 Encryption deactivation PT initiated		4.1	O	O	O
	Cipher-switching initiated by PT	8.34	M	M	M
N.30 Calling Line Identification Presentation (CLIP)		4.1	O	O	O
	Incoming call request	8.12	M	M	M
	Calling Line Identification Presentation	8.41	M	M	M
N.31 Internal call		4.1	O	O	O
	Internal call setup	8.18	M	M	M
	Internal call keypad	8.19	M	O	O
	Internal call CLIP	8.43	O	O	O
	Internal call CNIP	8.44	O	O	O
N.32 Service call		4.1	O	O	O
	Service call setup	8.20	M	M	M
	Service call keypad	8.21	M	O	O
N.33 Enhanced U- plane connection		4.1	O	O	O
	Enhanced FT initiated U- plane connection	8.40	M	M	M
N.34 Calling Name Identification Presentation (CNIP)		4.1	O	O	O
	Calling Name Identification Presentation (CNIP) Indication	8.42	M	M	M

D.3.2 GAP DLC service to procedure mapping table (clause 6.8.2 of EN 300 444)

Table D.2: DLC service to procedure mapping (table 6 of EN 300 444)

Service/Procedure mapping					
				Status	
Service	Procedure	Reference	PT	FT	
				R/B	P
D.1 LAPC class A service and Lc		5.1	M	M	M
	Class A link establishment	9.1	M	M	M
	Class A acknowledged information transfer	9.2	M	M	M
	Class A link release	9.3	M	M	M
	Class A link re-establishment	9.4	M	M	M
D.2 C_S channel fragmentation and recombination		5.1	M	M	M
	C_S channel fragmentation and recombination	9.5	M	M	M
D.3 Broadcast Lb service		5.1	M	M	M
	Normal broadcast	9.6	M	M	M
D.4 Intra-cell voluntary connection handover		5.1	M	C601	C601
	Class A basic connection handover	9.7	M	M	M
D.5 Inter-cell voluntary connection handover		5.1	M	O	O
	Class A basic connection handover	9.7	M	M	M
D.6 Encryption activation		5.1	M	C603	M
	Encryption switching	9.8	M	M	M
D.7 LU1 TRUP Class 0/min_delay		5.1	M	M	M
	U-plane Class 0/min delay	9.9	M	M	M
D.8 FU1		5.1	M	M	M
	FU1 frame operation	9.10	M	M	M
D.9 Encryption deactivation		5.1	C602	C602	C602
	Encryption switching	9.8	M	M	M
C601: IF service M.9 THEN O ELSE M.					
C602: IF feature N.29 OR N.28 THEN M ELSE I.					
C603: IF feature N.17 OR N.27 THEN M ELSE I.					

D.3.3 GAP MAC service to procedure mapping table (clause 6.8.3 of EN 300 444)

Table D.3: MAC service to procedure mapping (table 7 of EN 300 444)

Service/Procedure mapping					
				Status	
Service	Procedure	Reference	PT	FT	
				R/B	P
M.1 General		5.2	M	M	M
	General	10.1	M	M	M
M.2 Continuous broadcast		5.2	M	M	M
	Downlink broadcast	10.2	M	M	M
	Higher layer information FP broadcast	13.6	M	M	M
M.3 Paging broadcast		5.2	M	M	M
	Paging broadcast	10.3	M	M	M
	Higher layer information FP broadcast	13.6	M	M	M
M.4 Basic connections		5.2	M	M	M
	Setup of basic connection, basic bearer setup (A-field)	10.4	M	M	M
	Connection/bearer release	10.5	M	M	M
M.5 C_S higher layer signalling		5.2	M	M	M
	C_S channel data	10.8	M	M	M
	Q2 bit setting	10.9	M	M	M
M.6 Quality control		5.2	M	M	M
	RFPI handshake	10.10	M	M	M
	Antenna diversity	10.11	M	O	O
	Sliding collision detection	10.12	O	M	M
M.7 Encryption activation		5.2	M	C704	M
	Encryption process - initialization and synchronization	10.13	M	M	M
	Encryption mode control	10.14	M	M	M
	Handover encryption process	10.15	M	M	M
M.8 Extended frequency allocation		5.2	M	O	O
	Extended frequency allocation	10.16	M	M	M
M.9 Bearer handover, intra-cell		5.2	M	C701	C701
	Bearer handover request	10.6	M	M	M
M.10 Bearer handover, inter-cell		5.2	M	O	O
	Bearer handover request	10.6	M	M	M
M.11 Connection handover, intra-cell		5.2	M	C702	C702
	Connection handover request	10.7	M	M	M
M.12 Connection handover, inter-cell		5.2	M	O	O
	Connection handover request	10.7	M	M	M
M.13 SARI support		5.2	M	O	O
	Downlink broadcast	10.2	M	M	M
	Higher layer information FP broadcast	13.6	M	M	M
M.14 Encryption deactivation		5.2	C703	C703	C703
	Encryption mode control	10.14	M	M	M
C701: IF service M.11 THEN O ELSE M.					
C702: IF service M.9 THEN O ELSE M.					
C703: IF feature N.29 OR N.28 THEN M ELSE I.					
C704: IF feature N.17 OR N.27 THEN M ELSE I.					

D.3.4   GAP Application feature to procedure mapping table (clause 6.8.4 of EN 300 444)

Table D.4: Application feature to procedure mapping table (table 8 of EN 300 444)

Feature/Procedure mapping					
				Status	
Feature	**Procedure**	**Reference**	**PT**	**FT**	
				R/B	**P**
A.1 AC to bitstring mapping		4.3	M	C801	M
	AC to bitstring mapping	14.2	M	M	M
A.2 Multiple subscription registration		4.3	M	N/A	N/A
	Subscription control	14.1	M	N/A	N/A
A.3 Manual entry of the PARK		4.3	O	N/A	N/A
	Manual entry of the PARK	14.3	M	N/A	N/A
A.4 Terminal identity number assignment in mono cell system		4.3	O	O	N/A
	Terminal identity number assignment	14.4	O	O	N/A
C801: IF feature N.9 OR N.10 OR N.12 OR N.26 THEN M ELSE N/A.					

Annex E (informative):
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- IETF RFC 3261: "SIP: Session Initiation Protocol".

History

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