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Implementation Guideline

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Mobile Computing Promotion Consortium (MCPC)

ShibaKoen Sanada Bldg.

5-12 Shiba-Koen 3-chome, Minato-ku, Tokyo, 105-0011 Japan

TEL: +81-(0)3-5401-1935

F A X : +81-(0)3-5401-1937

E M A I L : office@mcpc-jp.org

WEB SITE: <http://www.mcpc-jp.org>

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Contributors

Nobuki Asai	ALPINE ELECTRONICS, INC.
Masanobu Ujiie	ALPS ELECTRIC CO., LTD.
Seiichi Suzuki	Clarion Co., Ltd.
Shuji Terakado	ELECOM CO., LTD.
Riko Yagi	Mitsubishi Electric Corporation
Toshiyuki Suzuki	NTT DoCoMo, Inc.
Masatoshi Hino	Sharp Corporation
Shio Kubo	SOFTBANK MOBILE Corp.
Satoshi Miyazaki	SOFTBANK MOBILE Corp.
Hiroyuki Hayashi	SOFTBANK MOBILE Corp.
Yasuho Egawa	Sony Corporation
Yoshihisa Takahashi	Sony Corporation
Mitsuyoshi Yasuda	Sony Ericsson Mobile Communications Japan,
Hiroshi Kato	TAIYO YUDEN CO., LTD.
Hiroshi Matsuya	TOSHIBA CORPORATION
Masashi Miura	TOYOTA MOTOR CORPORATION
	Representative for JAMA

Bluetooth Phonebook Access Profile Implementation Guideline

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1 Phonebook Access Profile Use Cases Description

1.1 Summary of the use cases

1.1.1 Introduction

The Car-Communication-Appliation-Promotion group (CCAP) is concerned that Car-WG profiles may not provide sufficient definition to assure interoperability of Bluetooth devices supporting these profiles. CCAP believes that this application guide for the Bluetooth PhoneBook Access applications will improve interoperability between handheld devices and the car, and help implementers understand the Phonebook Access Profile for user convenience. This guideline provides:

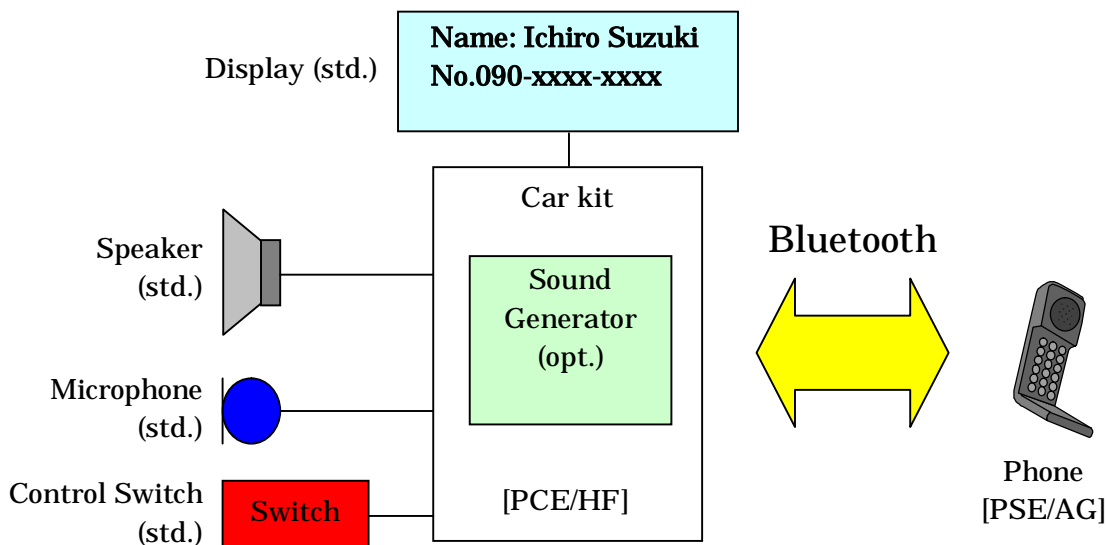
- Recommended values of parameters
- Recommended sequence charts
- Typical use cases
- Implementation issues

The intent is that this guideline be applied to the application layer above the Phonebook Access Profile (PBAP). CCAP may also provide additional guidelines in the future such as the Message Access Profile (MAP) etc. and future versions of these profiles.

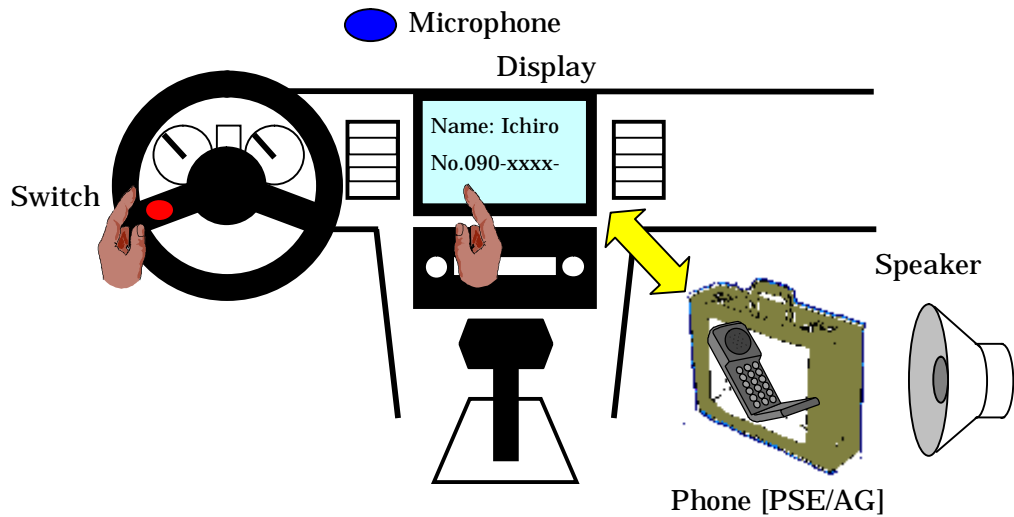
1.1.2 Target system

The figure below shows a system diagram that this guideline specifies. PBAP and HFP (HandsFree Profile) may be operated together in some use cases. In this case the minimum functionality of the PhoneBook Client Equipment (PCE) or Handsfree Unit (HF) is a speaker, microphone, control switch and display. The Sound Generator is optional.

There might be a case of only PCE operation, without HF role such as PC. It should be also covered in this guideline.



1.1.3 Example of the system



1.1.4 Table of the Use Cases

Category	Use Case	Description	PBAP Sect.
1.2 Standalone use cases			
1.2.1 Phonebook download	1.2.1.1 Download of the main phonebook	Download the entire content of the main phone book object in "pb"	4.2
	1.2.1.2 Download of call history information	Download the entire content of the call history object in "ich", "och", and "mch"	4.2
	1.2.1.3 Usage of "cch" repository	Download the entire content of the call history object in "cc"	4.2
1.2.2 Phonebook browsing	1.2.2.1 Download of selected entries	Browse the content of each folder, select and download entry/entries	4.3
	1.2.2.2 Caller name lookup upon incoming call	Search the caller name from "pb" with CLI of an incoming call via HFP	4.3
	1.2.2.3 Dial	Browse the content of each folder and dial a number via HFP	4.3
1.3 Multi-profile use cases			
	1.3.1 Caller name lookup upon incoming call	Search the caller name from "pb" with CLI of an incoming call via HFP	4.3
	1.3.2 Consultation of the Phonebook during a conversation	Browse the content of each folder during a conversation via HFP	4.3
	1.3.3 Consultation of the Phonebook during a DUN session	Browse the content of each folder during data transfer via DUN	4.3

1.2 Standalone use cases

1.2.1 Phonebook download

1.2.1.1 Download of the main phonebook

The PCE can download the PSE's main phone book object.

- Main phone book object: pb

Figure 1 shows the example of the use case.

(PCE,HF)

Car navigation system, Hands-Free device with display equipment, etc.

(PSE,AG)

Mobile Phone

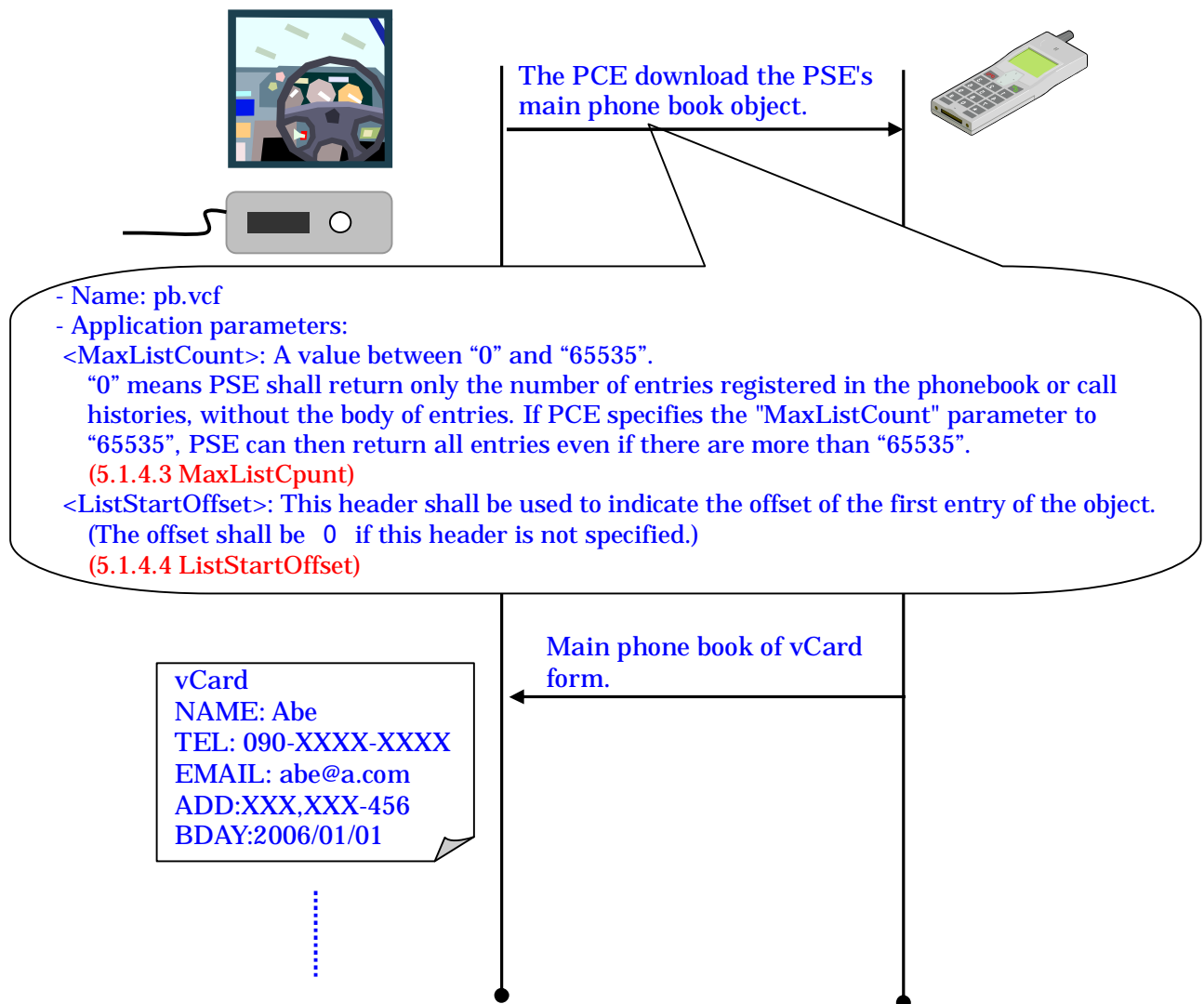


Figure 1: Download of the main phonebook

~~<Owner card>~~

~~The special handle 0.vcf in the pb folder is reserved for the owner card. It shall always be present and contain at least the mobile number of the PSE, whenever the PSE has the knowledge of this number. When the owner card is not known, handle 0.vcf can be an empty vCard, or a vCard that contains the mobile number of the PSE, if the PSE has a mobile number and does know it. The 0.vcf shall always be present in the pb.vcf file.~~

1.2.1.2 Download of call history information

The PCE can download the PSE's history information object.

- Incoming Calls History object: ich
- Outgoing Calls History object: och
- Missed Calls History object: mch
- Combined Calls History object: cch

Figure 2 shows the example of the use case.

(PCE,HF)
 Car navigation system, Hands-Free device with display equipment, etc.

(PSE,AG)
 Mobile Phone

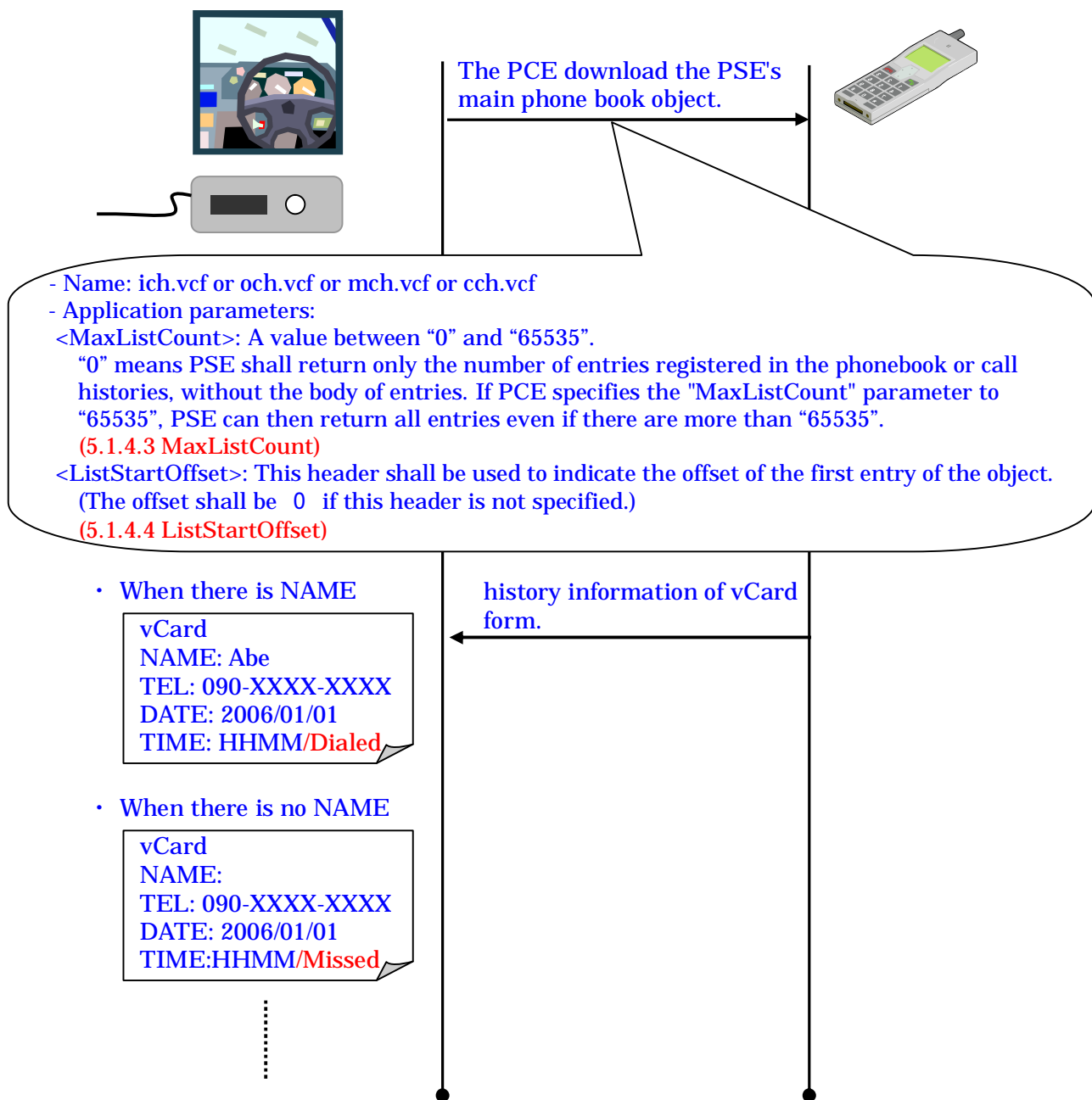


Figure 2: Download of call history information

1.2.1.3 Usage of “cch” repository

The integrated list of incoming call history, outgoing call history, and missed call history is stored in the combined call history (cch) repository. It depends on the implementation of PSE, how it integrates and how it indexes the entries. For example, PCE can display the entries in “cch” as the following order.

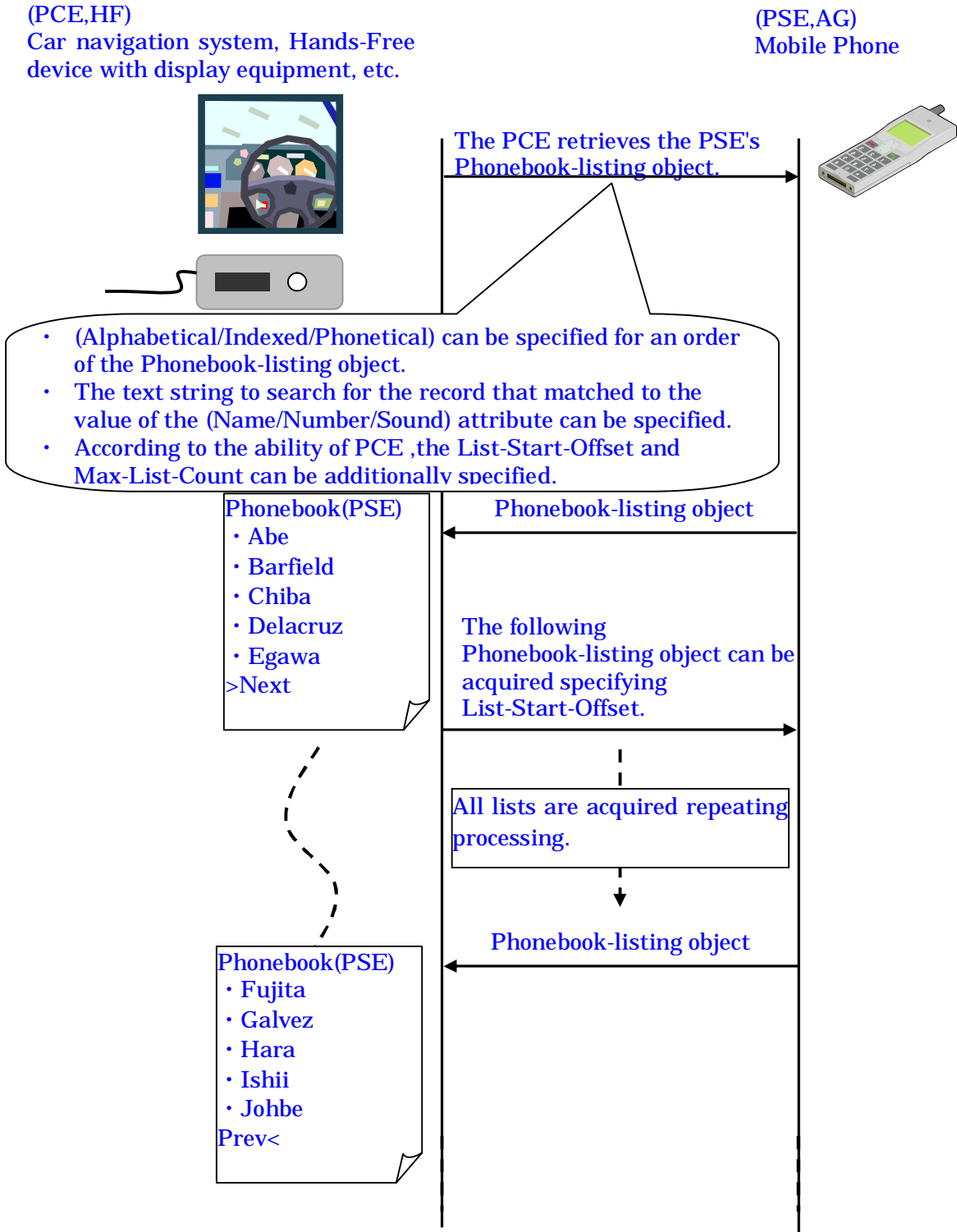
- By time stamp, call history is able to be arranged in call sequence.
- To be arranged with the frequency of call.

1.2.2 Phonebook browsing

1.2.2.1 Retrieve selected entries

The PCE can retrieve the PSE's Phonebook-listing object and retrieve selected entries.

Figure 1 shows the example of the use case.



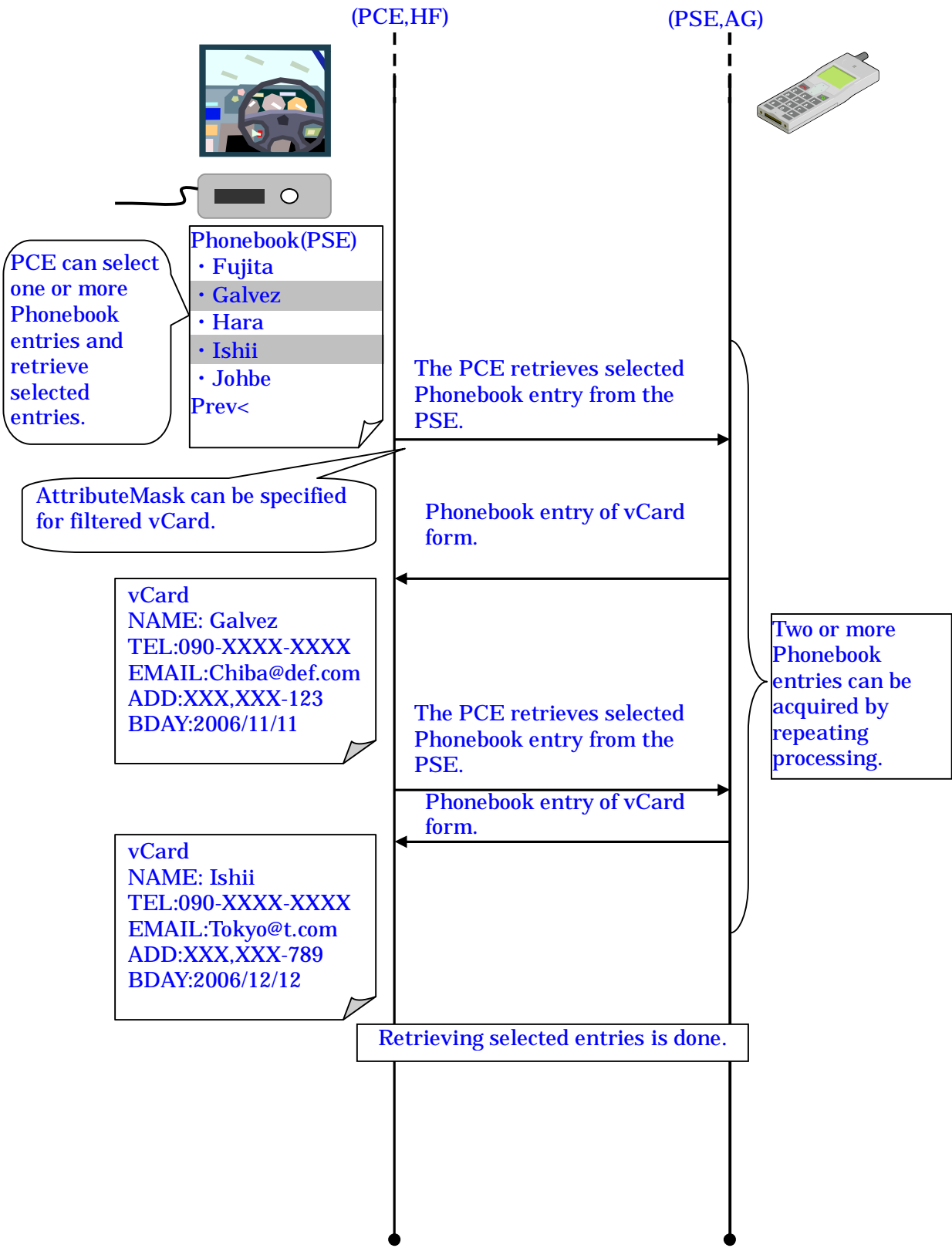


Figure 1: Retrieve Selected entries

1.2.2.2 Caller name lookup upon incoming call

The PCE searches the phonebook entry from the PSE, and can retrieve it. Figure 2 shows the example of the use case.

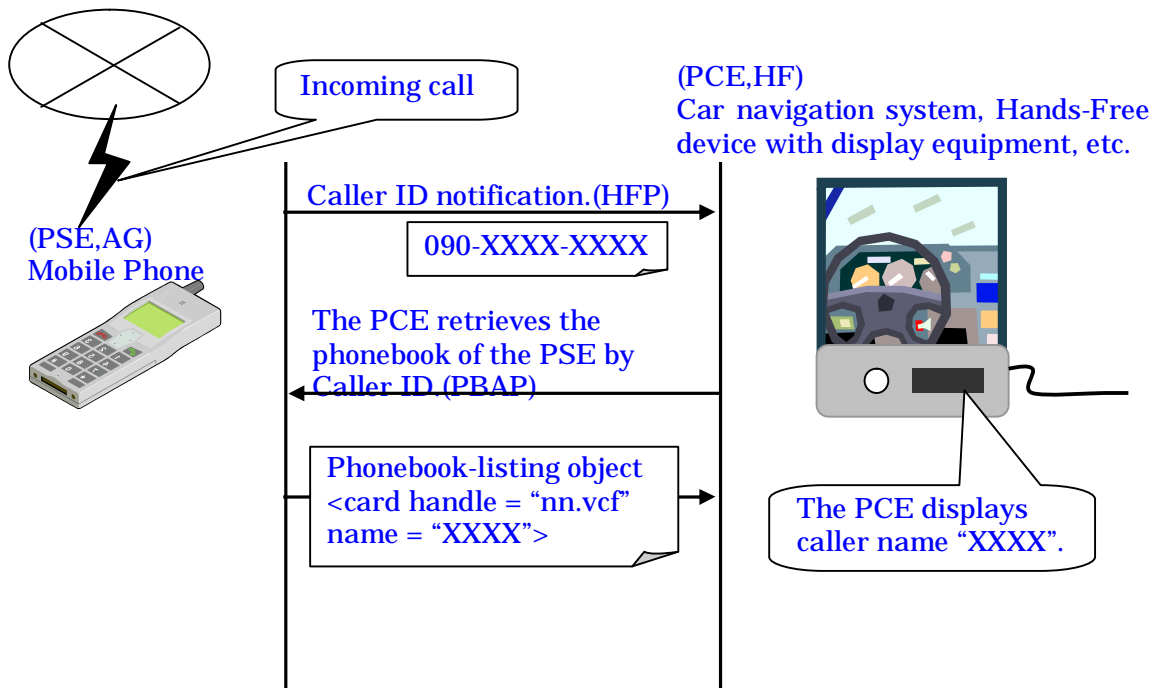


Figure 2: Caller name lookup upon incoming call

1.2.2.3 Dial

The PCE can dial it from the telephone book with HFP.
 The PCE can store Phonebook entries in PCE's Phonebook.
 Figure 3 shows the example of the use case.

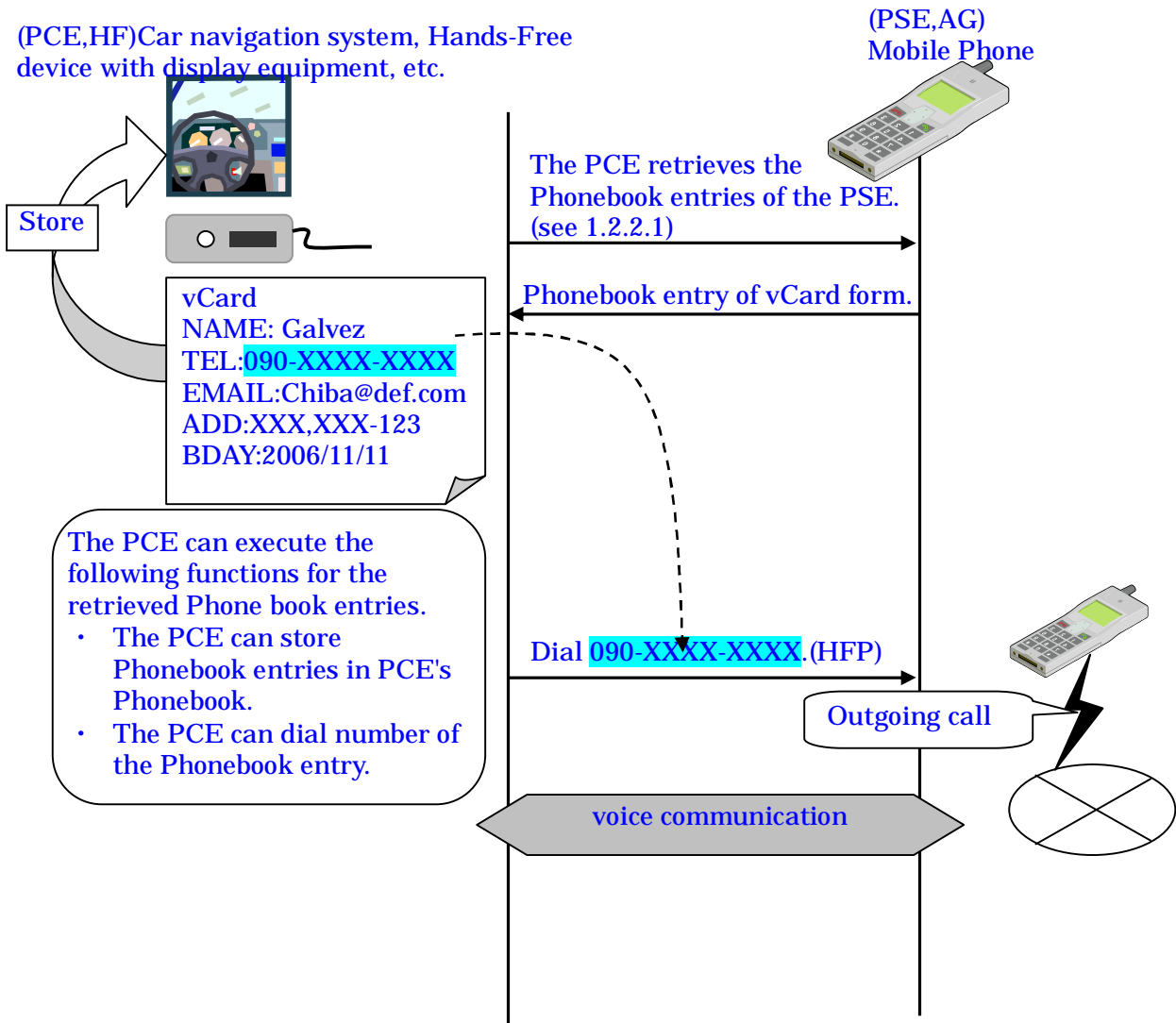


Figure 3: Dial

1.3 Multi-profile use cases

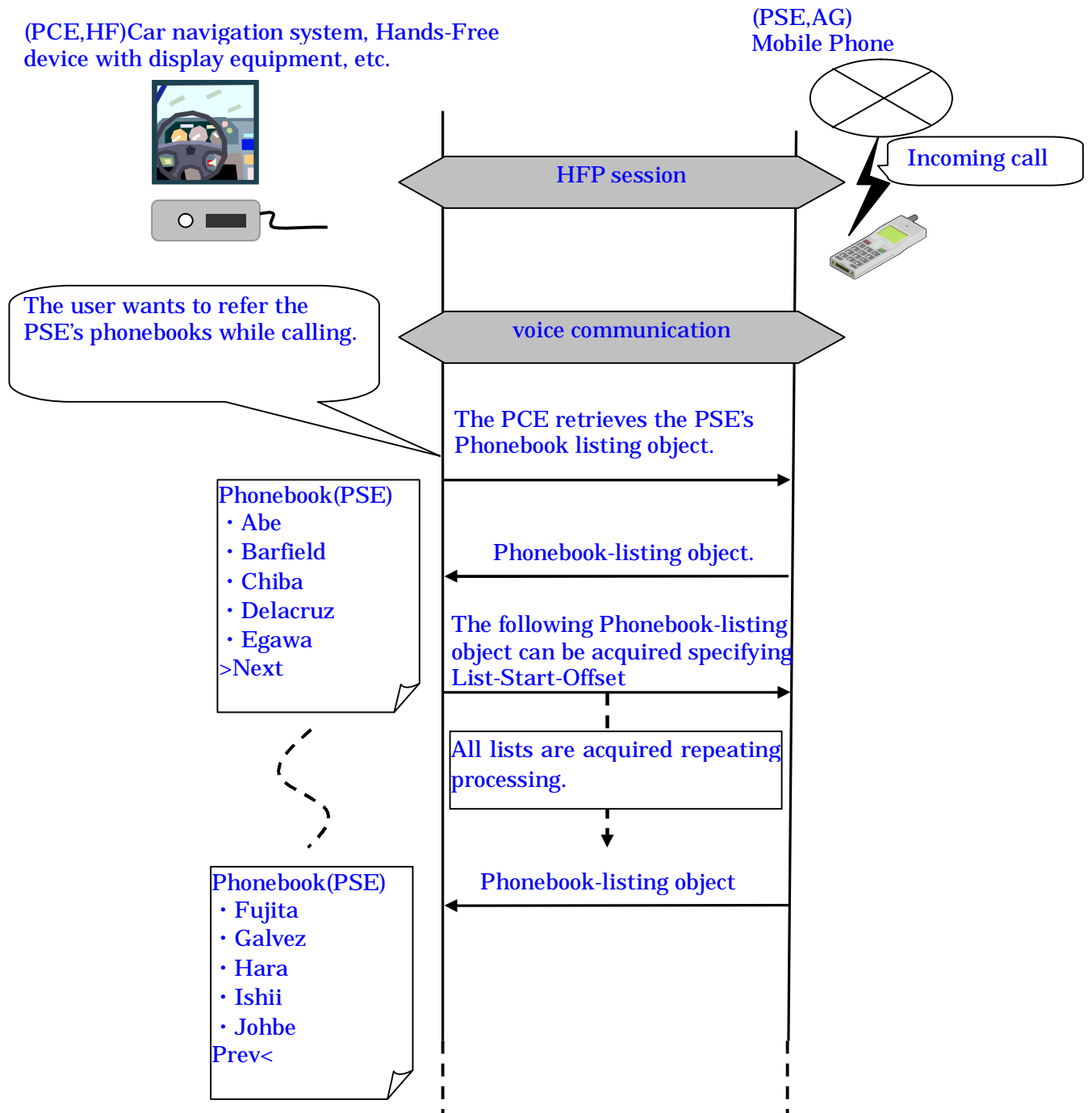
1.3.1 Caller name lookup upon incoming call

Refer to 1.2.2.2.

1.3.2 Consultation of the Phonebook during a conversation

The PCE can consult the Phonebook during a conversation with HFP if the PSE supports the multi-profile.

Figure 4 shows the example of the use case.



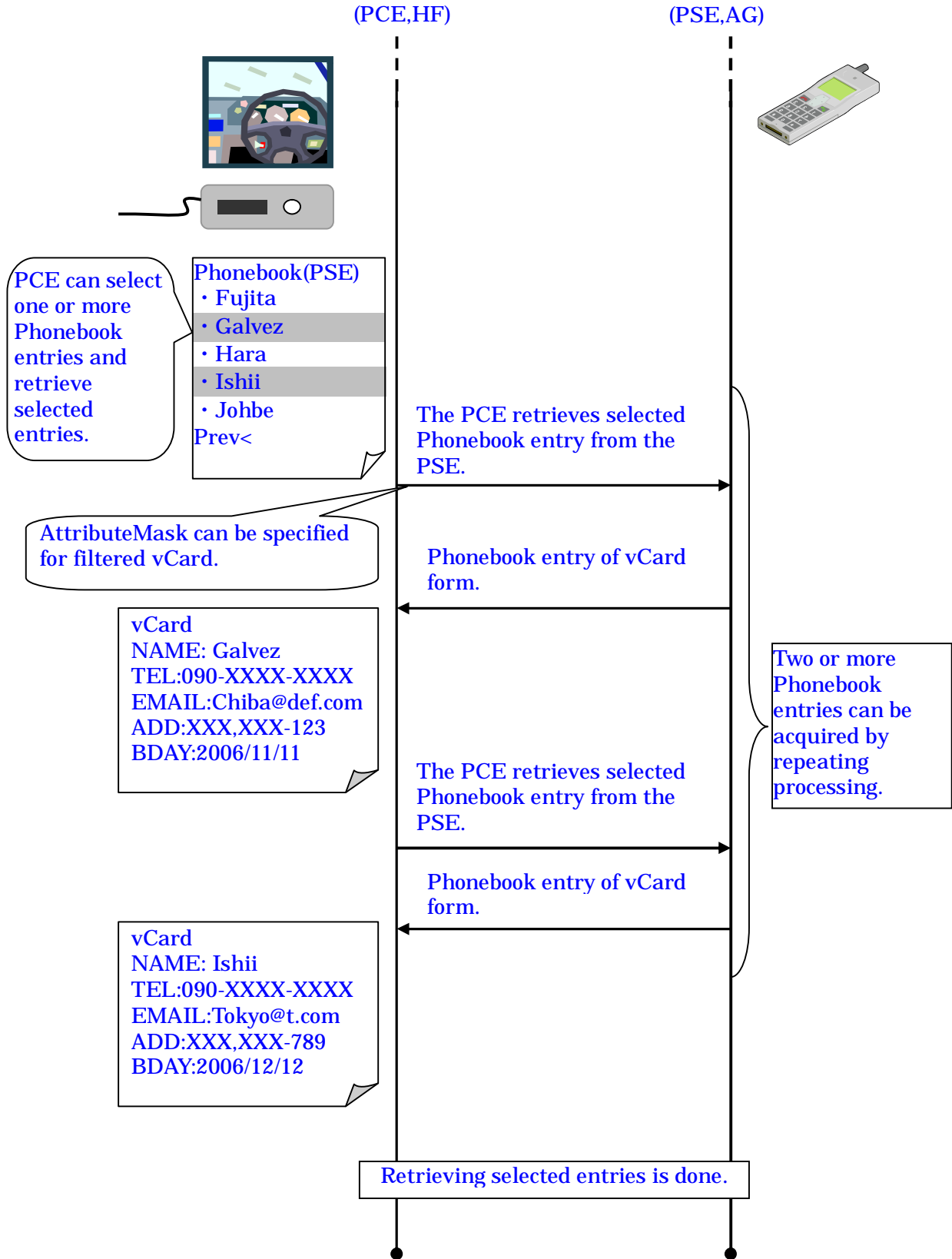


Figure 4: Consultation of the Phonebook during a conversation

1.3.3 Consultation of the Phonebook during a DUN session

The PCE can retrieve the PSE's Phonebook-listing object and retrieve selected entries during a DUN session.

Figure 5 shows the example of the use case.

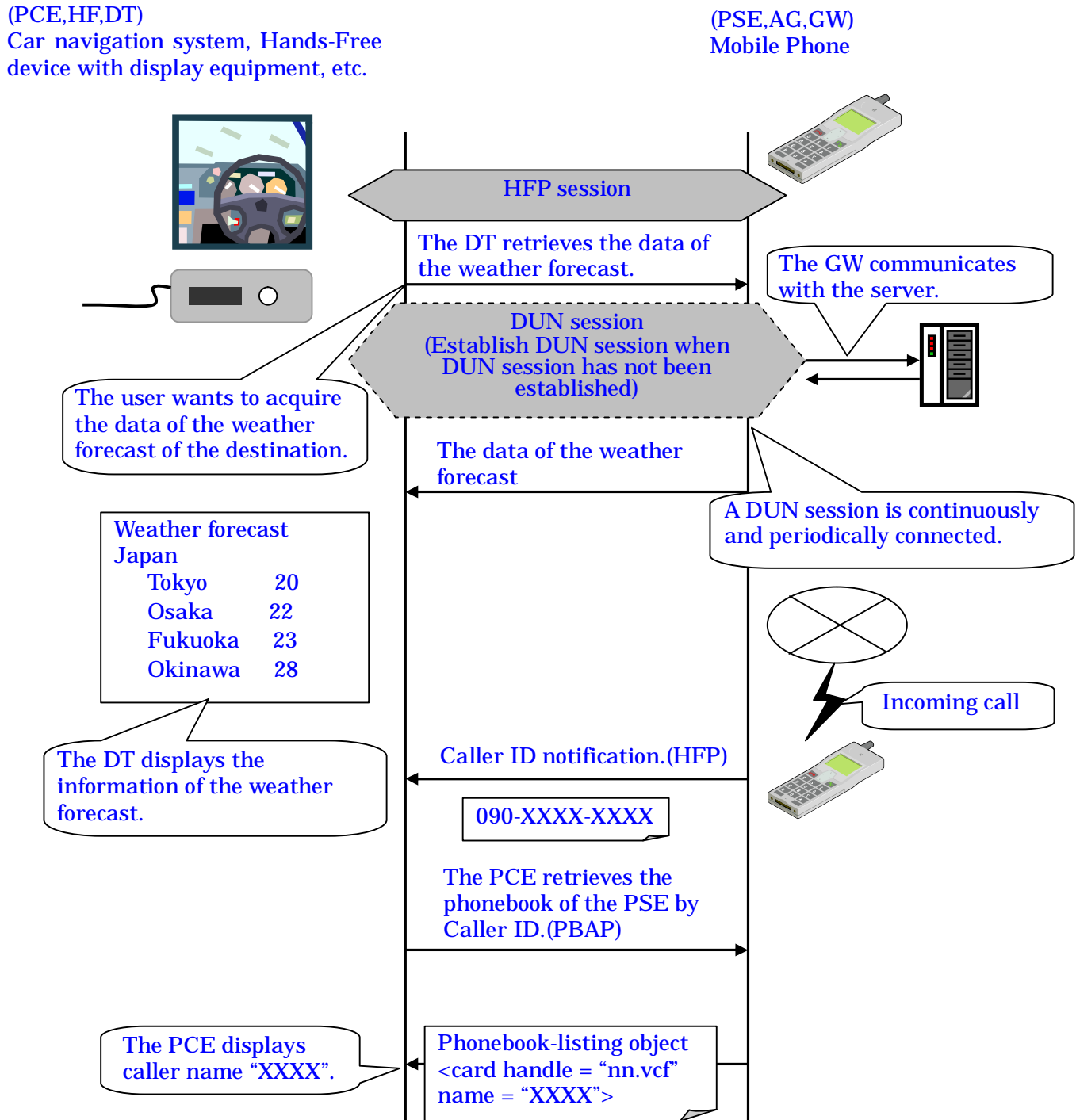


Figure 5: Consultation of the Phonebook during a DUN session

2 General Implementation Issues

2.1 Link establishment

The PSE and the PCE shall create a sure connection specified in section 2.5 “Bluetooth Security” of PBAP. This Procedure may include entering a Passkey and will include creation of link keys. A fixed Passkey may also be used during the GAP authentication procedure. The PBAP mandates the use of several Bluetooth security features:
(2.5 Bluetooth Security)

Security features	Recommendation
Security mode	2 or 3 shall be used.
Encryption	Mandatory
Passkey	A zero-length passkey shall be prohibited.
Link keys	Combination keys shall be used.
Encryption key length	At least 64 bits. Maximum length is recommended.
User confirmation	The PSE user shall have to confirm at least the first PBAP connection from each new PCE.

Either the PSE or the PCE may initiate bonding. As a minimum the PSE shall support Inquiry in order to initiate bonding. Both the PSE and the PCE shall support Inquiry Scan Mode in order to accept bonding. (2.4 Profile fundamental)

The SDP record for the PCE can be ignored for current Bluetooth V2.0, however, it will be effective if QoS is applied in the future. The PSE will be able to prepare for connecting PBAP from the PCE in anytime.

2.2 vCard format

The format of the phonebook should be followed ver.2.1 of vCard. However, especially considering in Japanese situation, the PCE has to handle some of the ver.3.0 of vCard because the property of “Sort_String” is used for information of “Furi-gana” in vCard 3.0. The following requirements or attentions should be considered for implementation.

2.2.1 Properties

Properties of vCard for a standard cellular phone, which shall be careful to be implemented, are listed below. Multiple phone numbers for a name entry of vCard can be stated. However, this guideline does not specify the number of phone numbers.

The PSE shall support VERSION, TEL and N as mandatory. In case of vCard 3.0, FN shall be also mandatory. SOUND or Sort_String is recommended to be Mandatory in Japanese implementation. (*1)

Bit	Property	Name	Support	Note
0	VERSION	Version	M	vCard 2.1 or vCard 3.0
1	FN	Formatted name	M	Mandatory for vCard 3.0
2	N	Name	M	
3	PHOTO	Associated Image or Photo	O	
4	BDAY	Birthday	O	
5	ADR	Address	O	
6	LABEL	Delivery	O	
7	TEL	Phone number	M	Allow multiple entries
8	EMAIL	Electronic Mail address	O	Allow multiple entries
9	Mailer	Electronic Mail	O	Type of email software
10	TZ	Time Zone	O	Offset from UTC
11	GEO	Geographic Position	O	Longitude and latitude
12	TITLE	Job	O	Job title
13	Role	Role within the Organization	O	
14	LOGO	Organization Logo	O	Image or graphic
15	AGENT	vCard of Person Representing		
16	ORG	Name of Organization	O	Company name
17	NOTE	Comments	O	
18	REV	Revision	O	Date and time of the last Update to the vCard
19	Sound	Pronunciation of name	M ^{*1}	Furi-gana (for vCard 2.1)
20	URL	Uniform Resource Locator	O	
21	UID	Unique ID	O	
22	KEY	Public Encryption Key	O	
23	NICKNAME	Nickname	O	
24	CATEGORIES	Categories	O	
25	PROID	Product ID	O	
26	CLASS	Class Information	O	
27	Sort_String	String used for sorting operations	M ^{*1}	Furi-gana (for vCard 3.0)
28	X-IRMC-CALL-DATETIME	Time stamp	O	
29-38		Reserved for future use		
39	Proprietary Filter	Indicates the usage of a proprietary filter	O	
40-63		Reserved for proprietary filter usage		

(5.4.4.1 Filter {AttributedMask(64-bit value)} Table 5.2 Attributed Mask)

(1) Character code settings: CHARSET, ENCODING

- CHARSET: UTF8

- ENCODING: none (3.1.4 Phone Book Entries Format)

PBAP mandates UTF8 as default and does not allow to use other character sets. However, an errata allowing any character set is proposed. The method negotiating character set will not be defined in PBAP. It will be referred from other profiles or specifications such as AVRCP, GSM07.07 etc. If the errata is accepted, Shift-JIS can be used after the PSE device and the PCE device agree to use.

(2) Version information: VERSION

- vCard 2.1 / vCard 3.0 (3.1.4 Phone Book Entries Format)

(3) Formatted name: FN

- This property specifies the formatted name string associated with the vCard object. This is the way that the name is to be displayed. It can contain desired honorific prefixes, suffixes, titles, etc. For example, "Mr. John Q. Public, Jr.", Dr. Ann Tyler, or Hon. Judge Blackwell. This property is based on the semantics of the X.520 Common Name attribute.

The following is an example of the Formatted Name property:

FN:Mr. John Q. Public, Esq.

(4) Name: N

- When the delimiter between the first name and the last name is needed, ';' shall be used. The first Name shall be set in Field-2 and the last name in Field-1.

When the delimiter is not needed, the first name and the last name shall be set in Field-1.

If the PSE uses no structure of name representation, the PSE should provide everything as a LastName field of the N attribute. Other more advanced internal representations should be able to map correctly the name information into a structured N vCard attribute. (3.1.6.1 Name attribute format)

(5) Address: ADR

- Each field of ADR is shown below:

Field-1	Postal address (Not popular in Japan.)
Field-2	Extension address (Room No. of apartment, dormitory etc.)
Field-3	Street (House No., Block No. etc.)
Field-4	Minor district (Town, City etc.)
Field-5	Major district (State, Prefecture etc.)
Field-6	Postal code
Field-7	Country

- If the address cannot be classified, it shall be described in Field-2.

(6) Telephone number: TEL

- Multiple TEL shall be able to be included in a vCard.

- Type of TEL shall be supported at least 5, general, cellular, home, work and FAX.

- Multiple TEL shall be able to be set for a type of TEL.

- Example of type of TEL and the parameter:

General	-> VOICE [default]
Cellular	-> CELL
Home	-> HOME;VOICE
Work	-> WORK;VOICE

FAX -> FAX

(7) E-mail address: EMAIL

- Multiple EMAIL shall be able to be included in a vCard.
- Multiple EMAIL shall be able to be set for the same address type of e-mail.
- The parameter shall be supported at least INTERNET [default].

(8) Company name: ORG

- Company name shall be set in Field-1.
- Section name shall be set in Field-2

(9) Furi-gana: SOUND or Sort_String

- The extended parameter shall be used to indicate which property of "Furi-gana" is.
- Default parameter shall be X-IRMC-N.
Extended parameter name of property adding X-IRMC-"Furi-gana"
Field etc. Same field shall exist as described after X-IRMC-[Property].
CHARSET, ENCODING CHARSET: Shift-JIS/UTF8, ENCODING: none
- Using the extended parameter X-IRMC-N, this shall be "Furi-gana" of N and have five fields as same as N.

(10) Time stamp: X-IRMC-CALL-DATETIME

- The time of each call found in och, ich, mch and cch folder, can be shown using the IrMC defined X-IRMC-CALL-DATETIME property that extends the vCard specification. This attribute can be used in combination with three newly created property parameters:

MISSED

RECEIVED

DIALED

These are used to indicate the nature of the call that is time-stamped with X-IRMC-CALL-DATETIME.

For instance, a call that was missed on March 20th, 2005 at 10 am would be stamped:

X-IRMC-CALL-DATETIME:MISSED:20050320T100000

It is strongly recommended to use this property parameter whenever possible. They are especially useful in vCards that are retrieved from the cch folder.

Note that it is legal to use this property with no data ie.

X-IRMC-CALL-DATETIME:MISSED:

This scenario may occur if the device did not have the time/date set when the call was received. The phone number would be recorded but no date/time could be attached to it. It will still need to be added to the vCard as the cch log needs it to indicate the type of call that the record identifies. (3.1.4.1 Call History extension)

Time stamp should be used UTC or local time in combination with TZ, Time Zone so that call histories can be sorted in time order.

2.2.2 Owner's vCard

The special handle 0.vcf in the pb folder shall be reserved for the owner's card. It shall always be present. When the owner card is not known, index 0 can be an empty vCard, or a vCard that contains the mobile number of the PSE, if the PSE has a mobile number and does know it. The 0.vcf shall be present in the pb.vcf file.

(3.1.5.2 Local Phone Books: PB and SIM1)

2.2.3 Call history

For call history items, only the phone number used for the call shall be included in

the TEL vCard field, rather than every number. (3.1.5.3 Call Histories)

The X-IRMC time stamp attribute shall be always present even if no time information is available for a given history item, since it conveys the nature of the missed, outgoing and incoming call history.

Regarding the vCard format for call histories which does not have phone number information because of an errata is proposed. This will be defined as X-IRMC extensions, CLI_BARRED, CLI_UNAVAILABLE and CLI_PUBLICPHONE.

2.3 Handles

All the vCards of the PSE are identified by their handle (<handle.vcf>). The handles are 32 bit values, represented as up to 8 hexadecimal digits. The length of the handles can be variable.

PBAP has been developed on the assumption that the handles are not modified during the lifespan of a given PBAP session i.e. that the internal index and the actual content of each vCard does not change. If for some reason the implementation allows for handle modifications (including possibly deletion operations) during an active PBAP session, it shall support either of the following 2 behaviours:

Error reporting: If any of the handles are modified/deleted during an active PBAP session, then the PSE shall return Error "Precondition failed" to all read requests until the PCE has updated the vCard-listing.

Change tracking: The PSE keeps track of all the changes that are brought to the handles during the active PBAP session.

(3.1.5.1 Handles)

2.4 Folder Structure

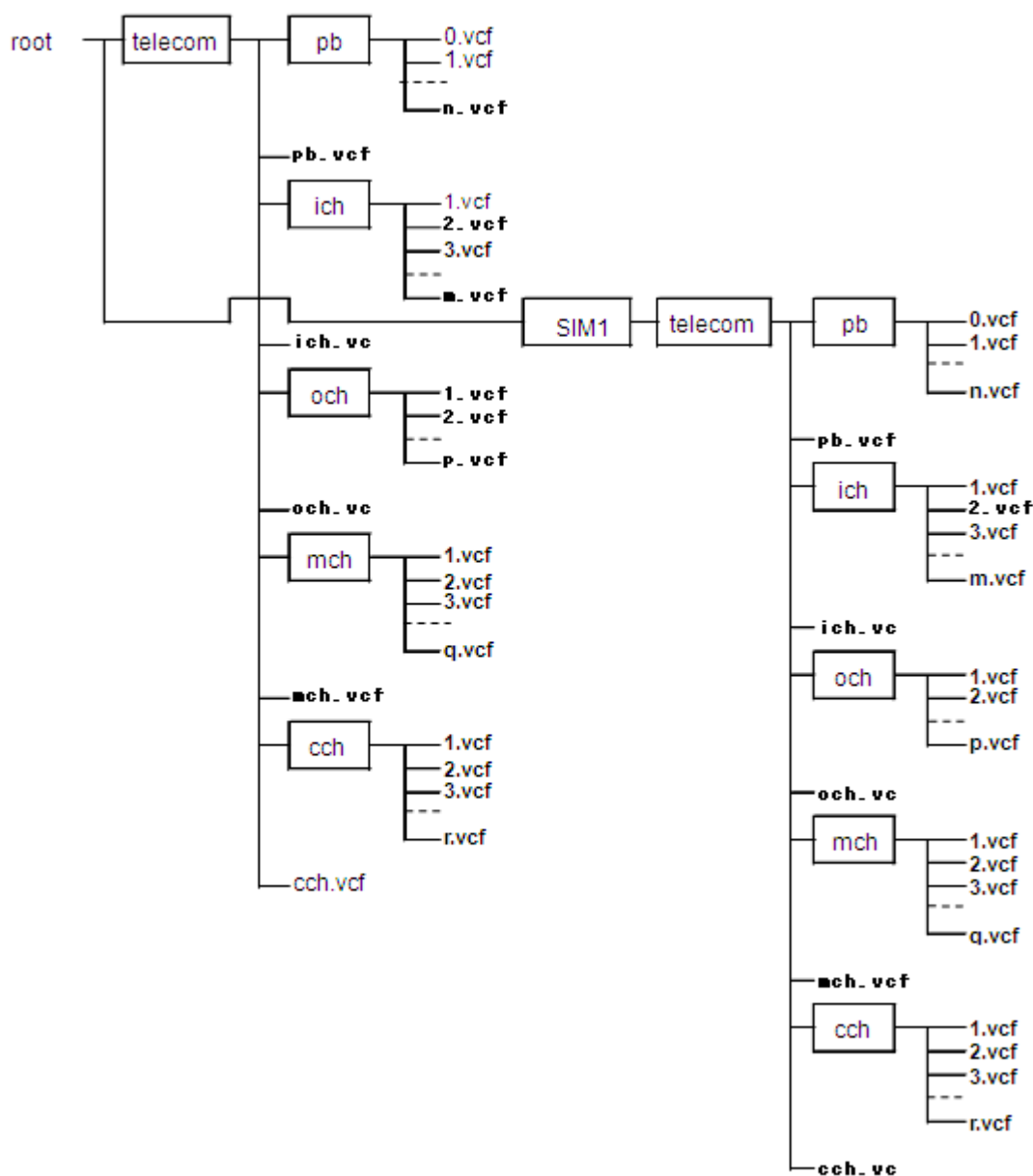


Figure 6: PBAP virtual folders architecture

(3.1.5 PBAP virtual folders structure)

OBEX SetPath Command (the basis for the SetPhoneBook function) allows only for setting the current folder to the root, parent or a child folder. For example in order to set the current phone book folder to "pb", from the root, it is necessary to apply SetPath twice: the first is necessary to change into "telecom" and the second is necessary to change into "pb". (5.2 SetPhoneBook Function)

2.5 Attributes filtering

With the exception of the mandatory attributes, the attributes that are requested by the PCE can be ignored by the PSE in case the PSE does not support them. However, all the attributes that are supported by the PSE shall be returned, provided that their value is not null for the current phone book entry. For instance, if the PSE supports EMAIL, and TITLE (in addition to VERSION, N and TEL) and the PCE requests the EMAIL and BDAY attributes, the PSE shall include EMAIL in the vCard objects that are returned to the PCE for which the value of EMAIL is not null (in addition to the mandatory VERSION, N and TEL fields).

The basic rules are:

- If the filter header is not specified all the attributes shall be returned.
- Filter = 0x00000000 means that all the attributes shall be returned.
- It is mandatory for the PSE to support and be capable of returning N and TEL in the case of vCard2.1, FN and TEL in the case of vCard3.0 if requested in the filter header. Also SOUND or Sort_String shall be supported in Japanese implementation.
- Besides N, FN and TEL, the PSE can ignore the attributes that it does not support.
- All the attributes that are supported by the PSE and are requested by the PCE shall be returned to the PCE.

(5.1.4.1 Filter {AttributeMask (64-bit value)})

2.6 Example of the usage for MaxListCount and ListStartOffset

<Case 1>

offset	vCard in "pb"
0	0.vcf
1	1.vcf
2	2.vcf
3	3.vcf
:	3.vcf
n
	n.vcf

<Case 2>

offset	vCard in "pb"
0	7.vcf
1	2.vcf
2	5.vcf
3	0.vcf
:
m	xx.vcf

Case 1:

- PullPhoneBook/PullvCardListing result with MaxListCount=0
The PSE shall return a value 'n', the number of vCard.
- PullPhoneBook/PullvCardListing result with MaxListCount=3, ListStartOffset=0
The PSE shall return 0.vcf, 1.vcf and 2.vcf.
- PullPhoneBook/PullvCardListing result with MaxListCount=3, ListStartOffset=1
The PSE shall return 1.vcf, 2.vcf and 3.vcf.

Case 2:

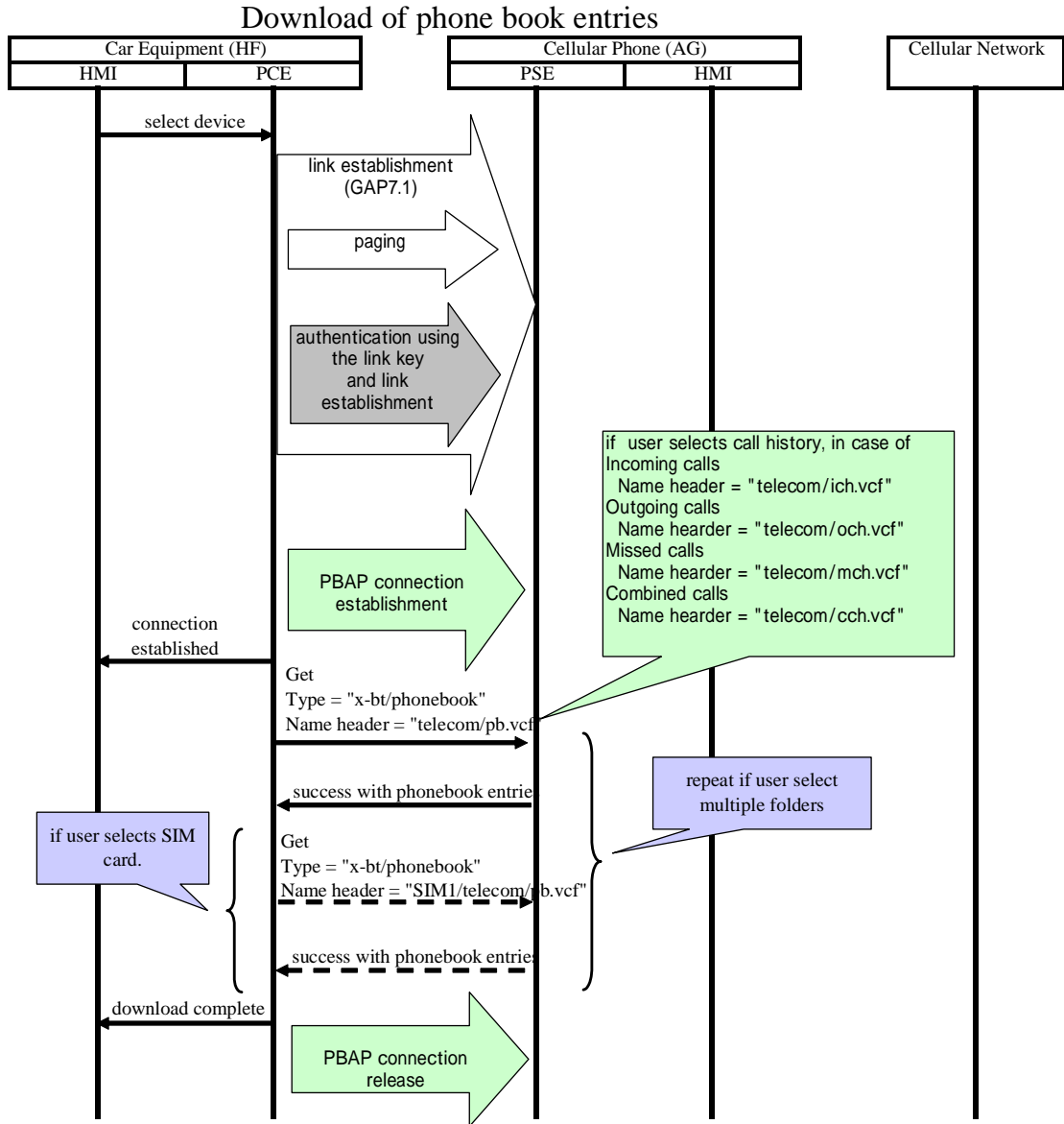
- PullPhoneBook/PullvCardListing result with MaxListCount=0

The PSE shall return a value 'm', the number of vCard.

- PullPhoneBook/PullvCardListing result with MaxListCount=3, ListStartOffset=0
The PSE shall return 7.vcf, 2.vcf and 5.vcf.
- PullPhoneBook/PullvCardListing result with MaxListCount=3, ListStartOffset=1
The PSE shall return 2.vcf, 5.vcf and 0.vcf.

3 Phonebook Download Implementation Issues

3.1 Download of the main phonebook



If PCE specifies the "MaxListCount" parameter to 0, PSE shall return only the number of entry registered in the phonebook or call history without the body of entries.

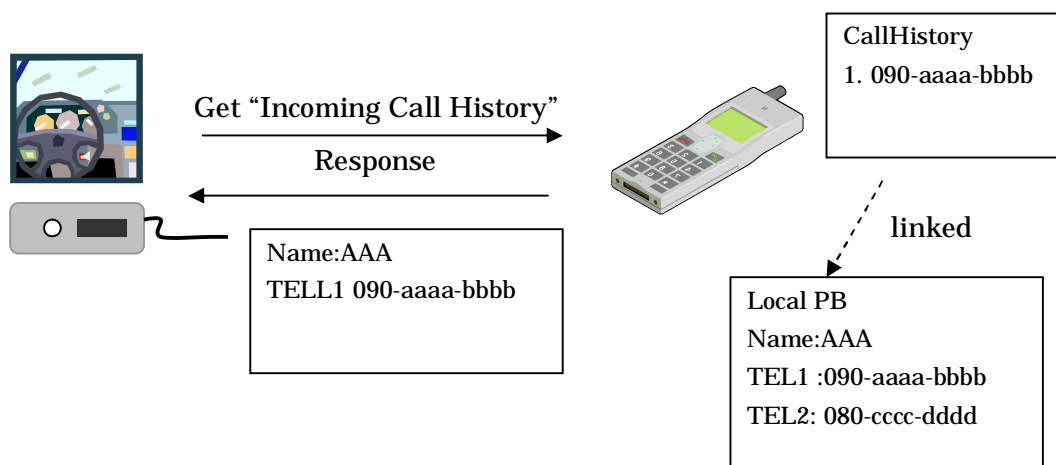
65535 is the maximum possible size for "MaxListCount". However, if PCE specifies the "MaxListCount" parameter to 65535, PSE can then return all entries even if there are more than 65535.

3.2 Download of call history information

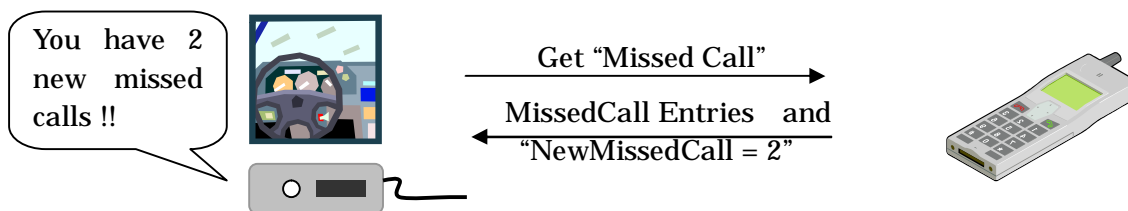
If the number of a call history (ich, mch, och and cch) is linked to the local phonebook, the PSE shall return the telephone number that was used for the call. The PSE should provide available contact information as well.

If the number is not linked to the local phonebook then the call history object shall contain empty Name header, Version, empty FN header (for vCard 3.0) and TEL if requested.

When requesting for the call history, PSE returns a set of entries with each entry containing a telephone number from the call history list together with the name of the owner of this number based on the phonebook. This is instead of sending the original phonebook entry which may contain several other phone numbers.



When PCE requests for the "Missed Call" history, PSE shall return the entries together with the number of recent missed call using the "NewMissedCalls" parameter.



In the event when PSE cannot confirm the exact number of recent missed calls but it is definite that there is at least 1 missed call; it would set the variable "NewMissedCalls" to 65535.

The integrated list of incoming call history, outgoing call history, and missed call history is stored in the combined call history (cch) repository. It depends on the implementation of PSE, how it integrates and how it indexes the entries.

4 Phonebook Browsing Implementation Issues

4.1 Generic issues

4.1.1 SetPhoneBook Function

Usages of the SetPhoneBook Function are allowed only three types: (1) Go back to root, (2) Go down 1 level, and (3) Go up 1 level. **The Name header doesn't use absolute path name for this function.** The usage of the flags and Name header is as follows: (5.2 SetPhoneBook Function)

	(1) Go back to root	(2) Go down 1 level	(3) Go up 1 level
Flags bit 0	0	0	1
Flags bit 1	1	1	1
Flags bit 2-7	0	0	0
Name header	EMPTY	name of the child folder	optional

Example: Going to "SIM1/telecom/ich" from "SIM1/telecom/pb"

Case1

	type	current folder
1	Go up 1 level	"SIM1/telecom"
2	Go down 1 level	"SIM1/telecom/pb"

Case2

	type	current folder
1	Go back to root	"" (root)
2	Go down 1 level	"SIM1"
3	Go down 1 level	"SIM1/telecom"
4	Go down 1 level	"SIM1/telecom/pb"

In both cases, PCE can set the current folder, but in the Case1, PCE has to know a path name of the current folder without asking PSE. There is no command to retrieve the path name from PSE.

4.1.2

Search Function

The header of "Search Attribute" shall be used to indicate to the PSE, which vCard attribute the search operation shall be carried out on. If this header is not specified, the search shall be performed on the "Name" attribute. (5.3.4.2 SearchAttribute)

This header of "Search Value" shall be used to indicate to the PSE, which vCards shall be contained in the object. All the vCards shall be returned if this header is not specified. The UTF-8 character set shall be used for <text_string> in this header. (5.3.4.3 SearchValue)

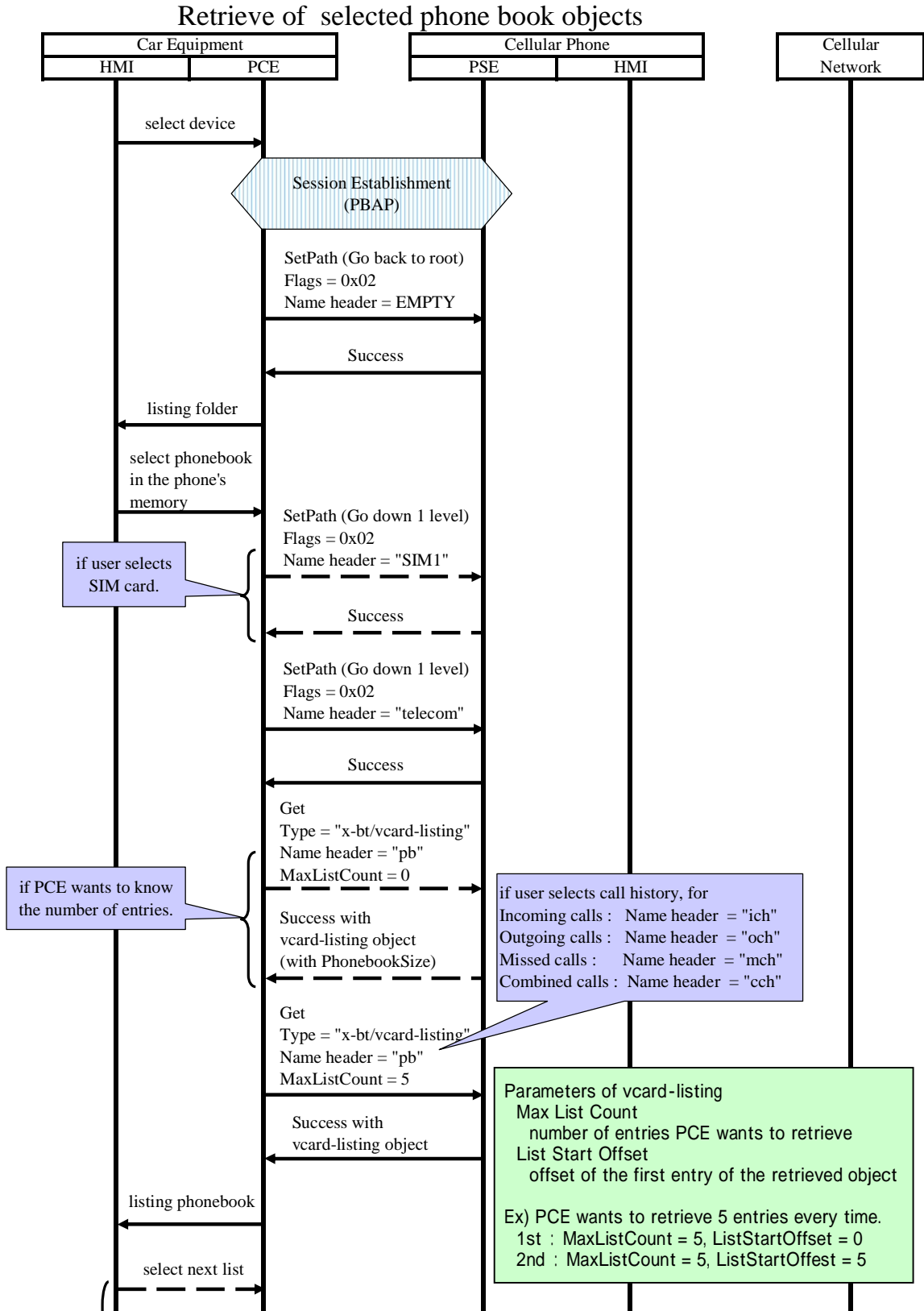
4.1.3 Sorting Function

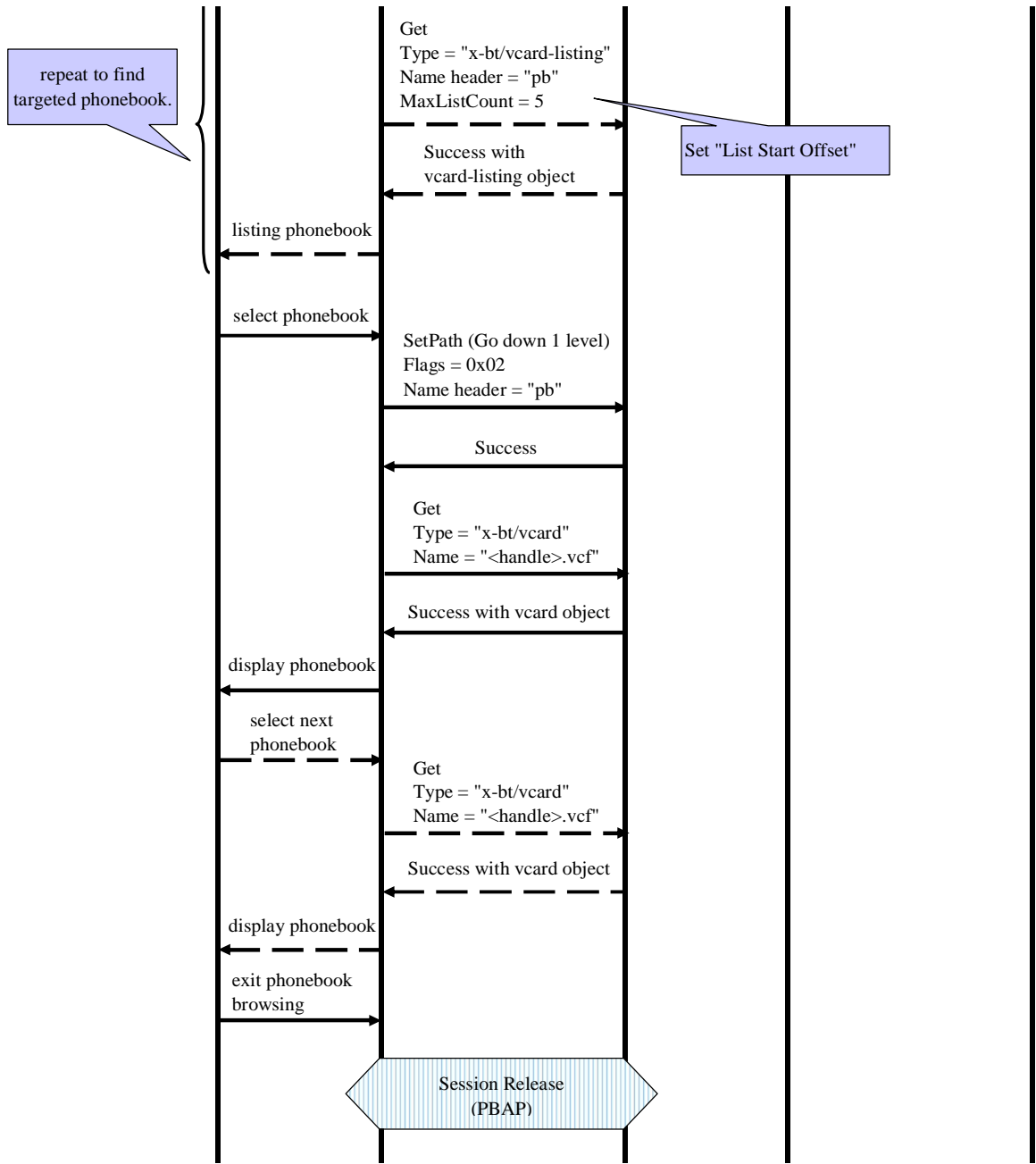
The sorting algorithm is implementation dependent. UTF-8 conversion should be performed before the sorting.

The sorting algorithm should be based on UTF-8 representation of the Sound attribute. Note that sorting on the Sound attribute makes sense only when the Sound attribute values of the phonebook objects on the PSE are in textual form. (5.3.4.1 Order)

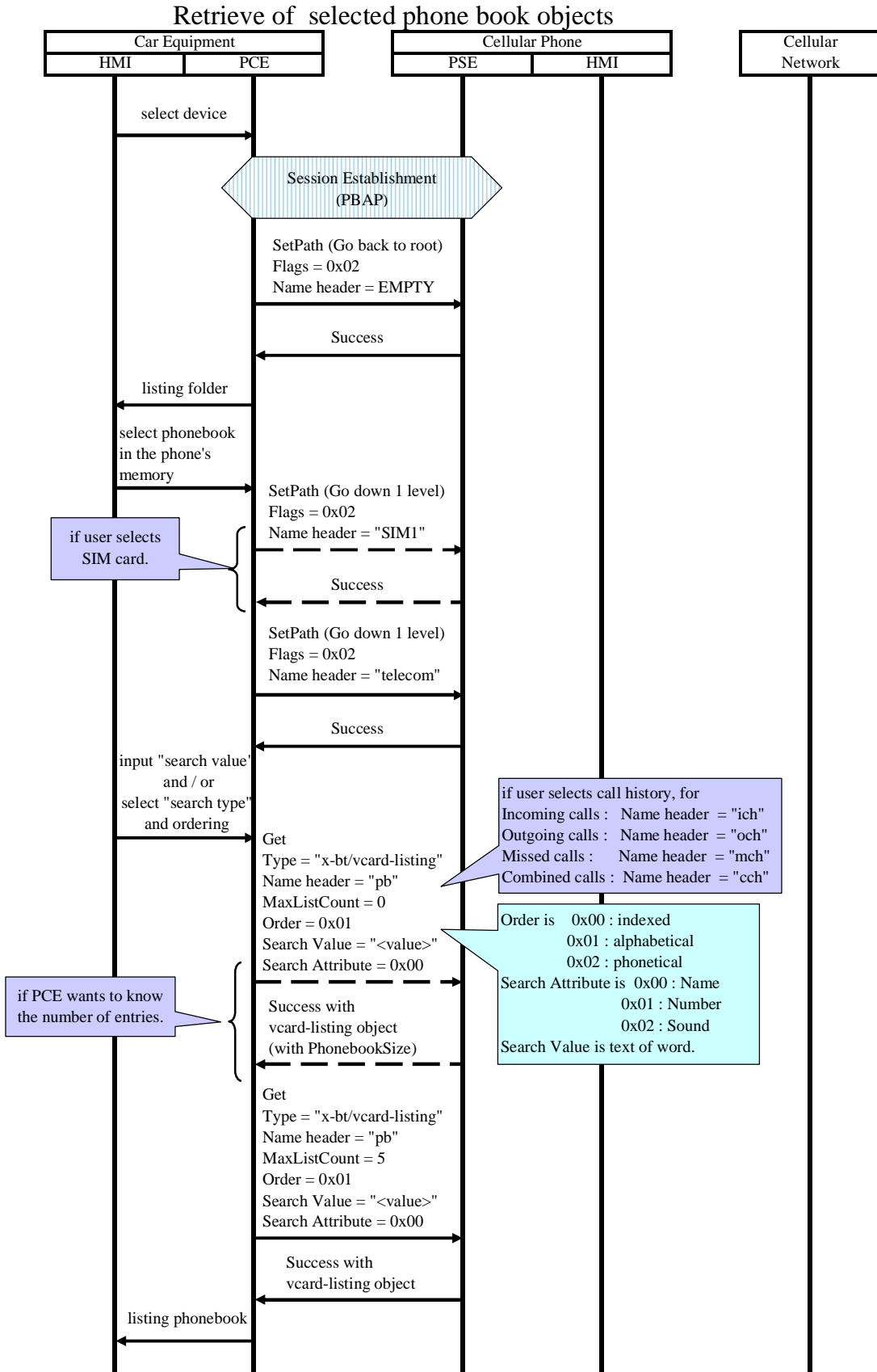
4.2 Retrieve selected entries

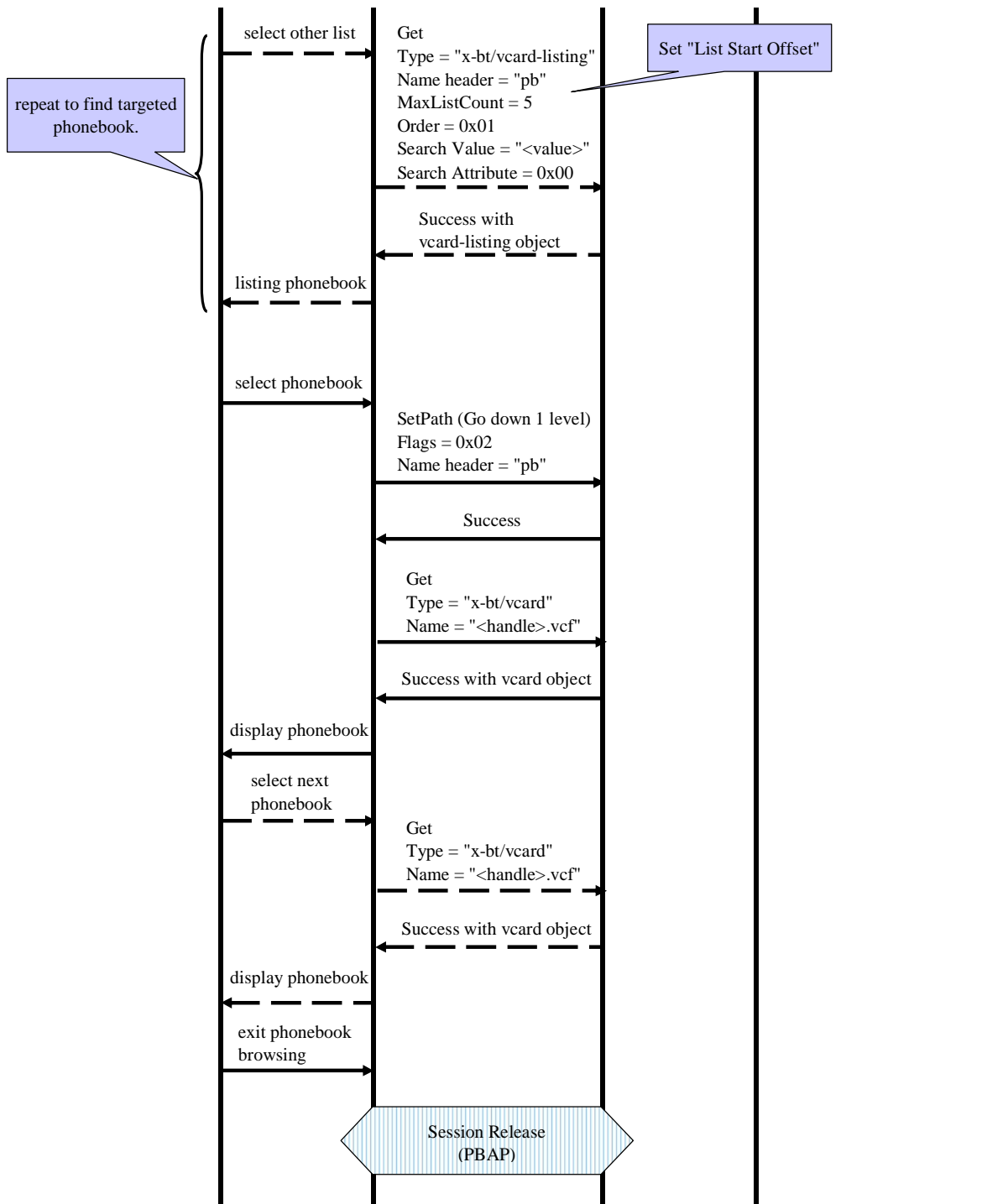
4.2.1 Retrieve selected entries w/o search parameter





4.2.2 Retrieve selected entries with search parameter



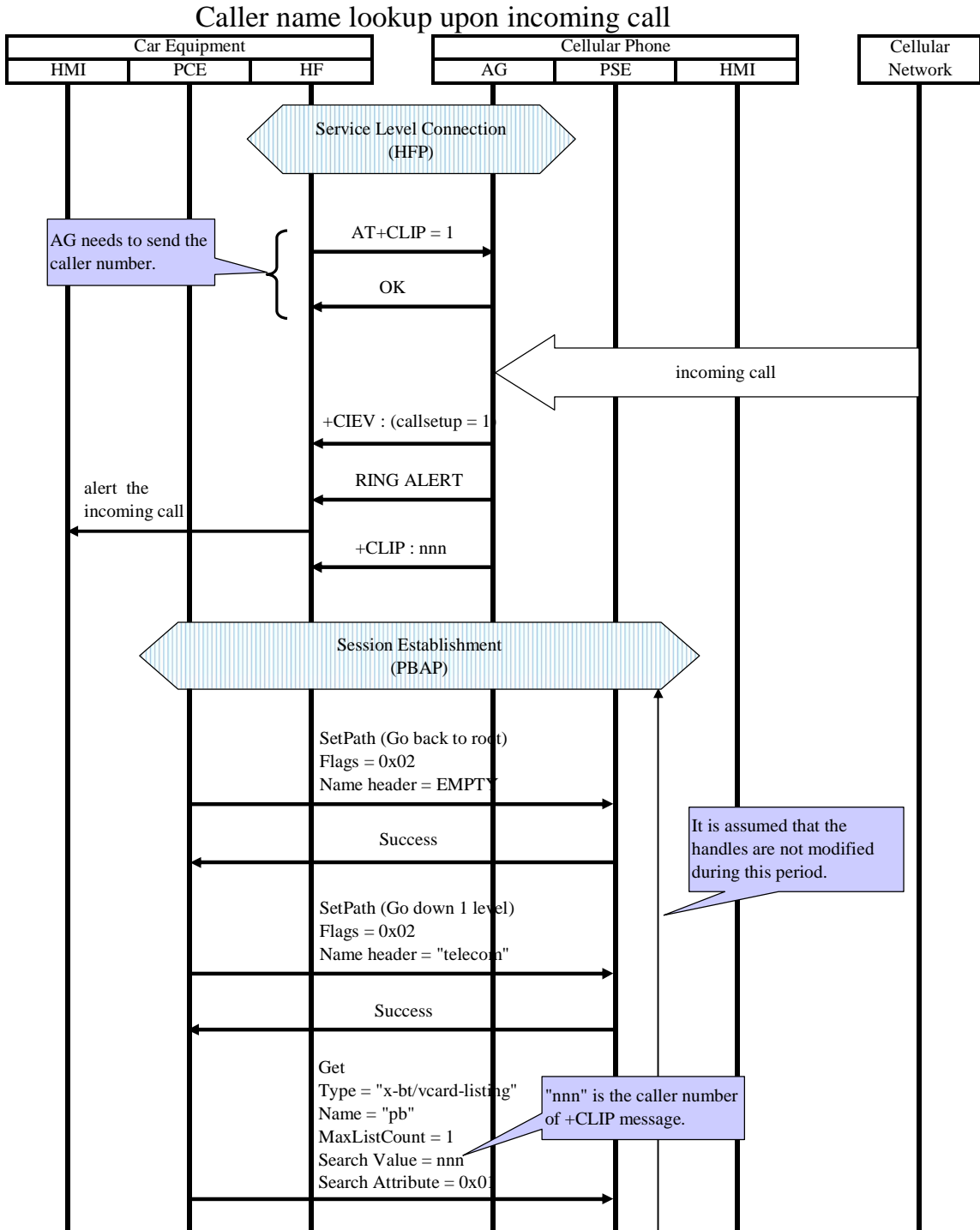


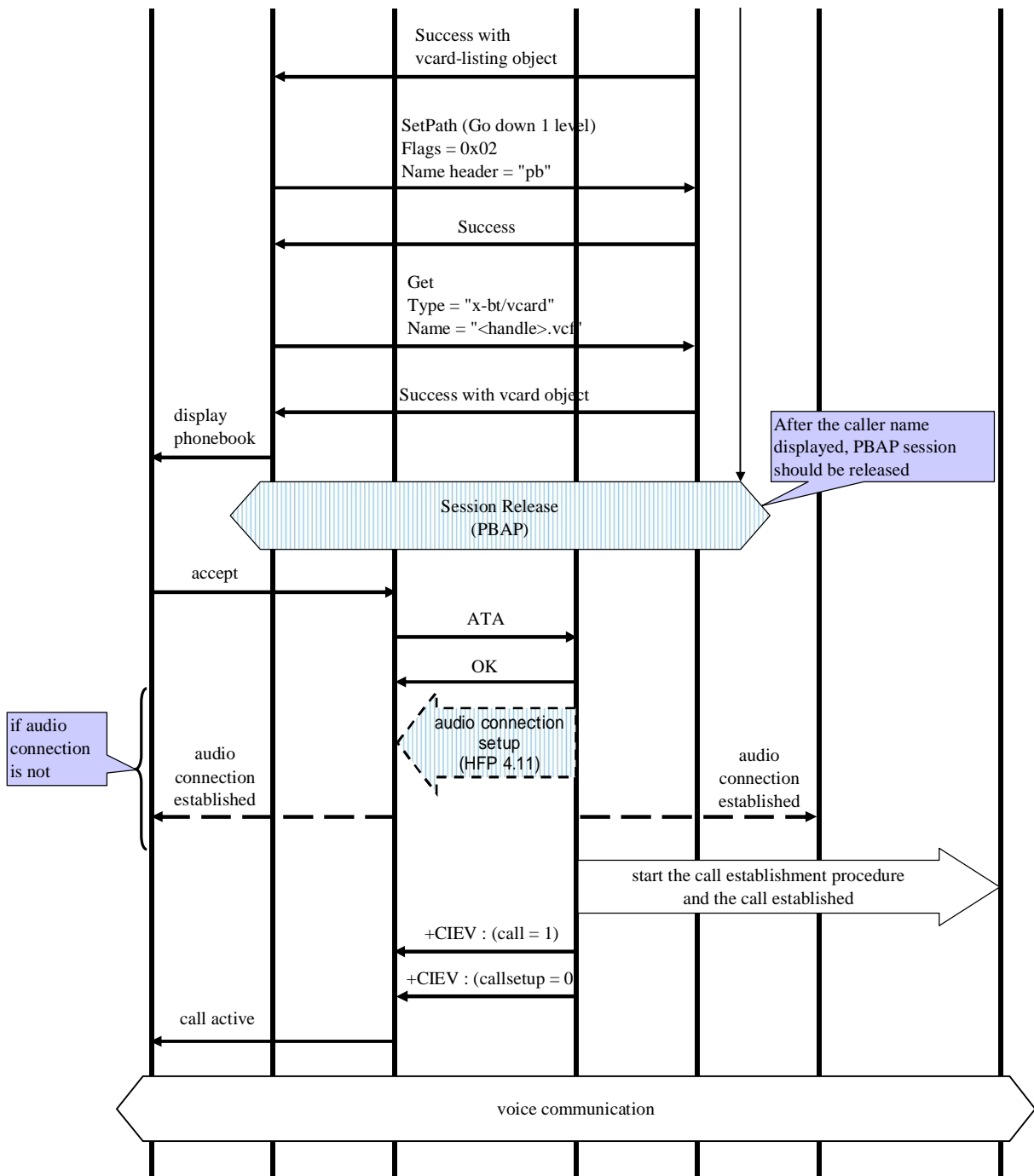
4.3 Caller name lookup upon incoming call

4.3.1 Caller name lookup upon incoming call (“telecom/pb”)

PCE retrieves caller name from incoming call number, so AG (PSE) has to send HF (PCE) caller number.

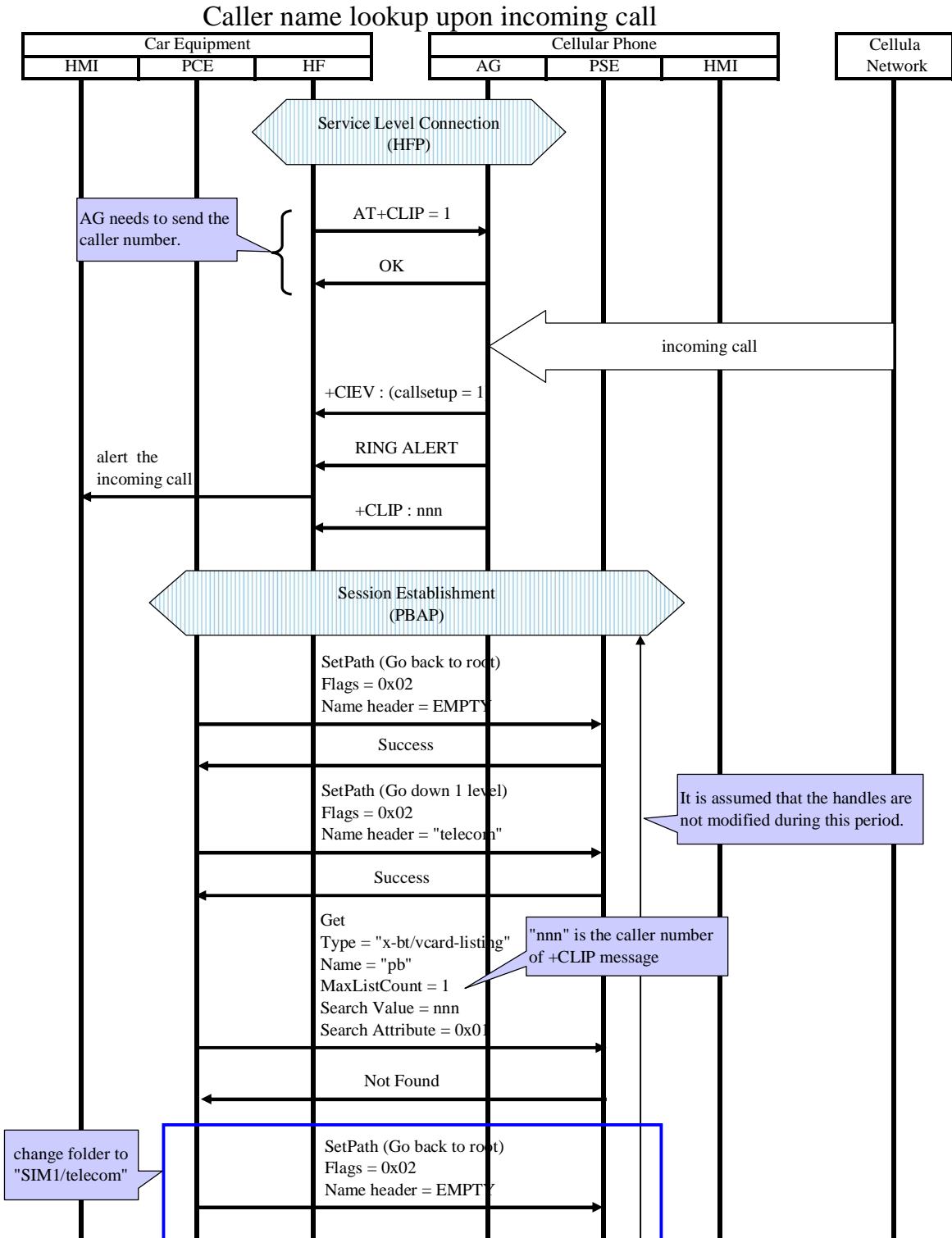
At the following MSC, PBAP session is established after the +CLIP message. If PBAP session is established before incoming call, the displayed caller name may be incorrect. The phonebook entry may be modified at the incoming call.

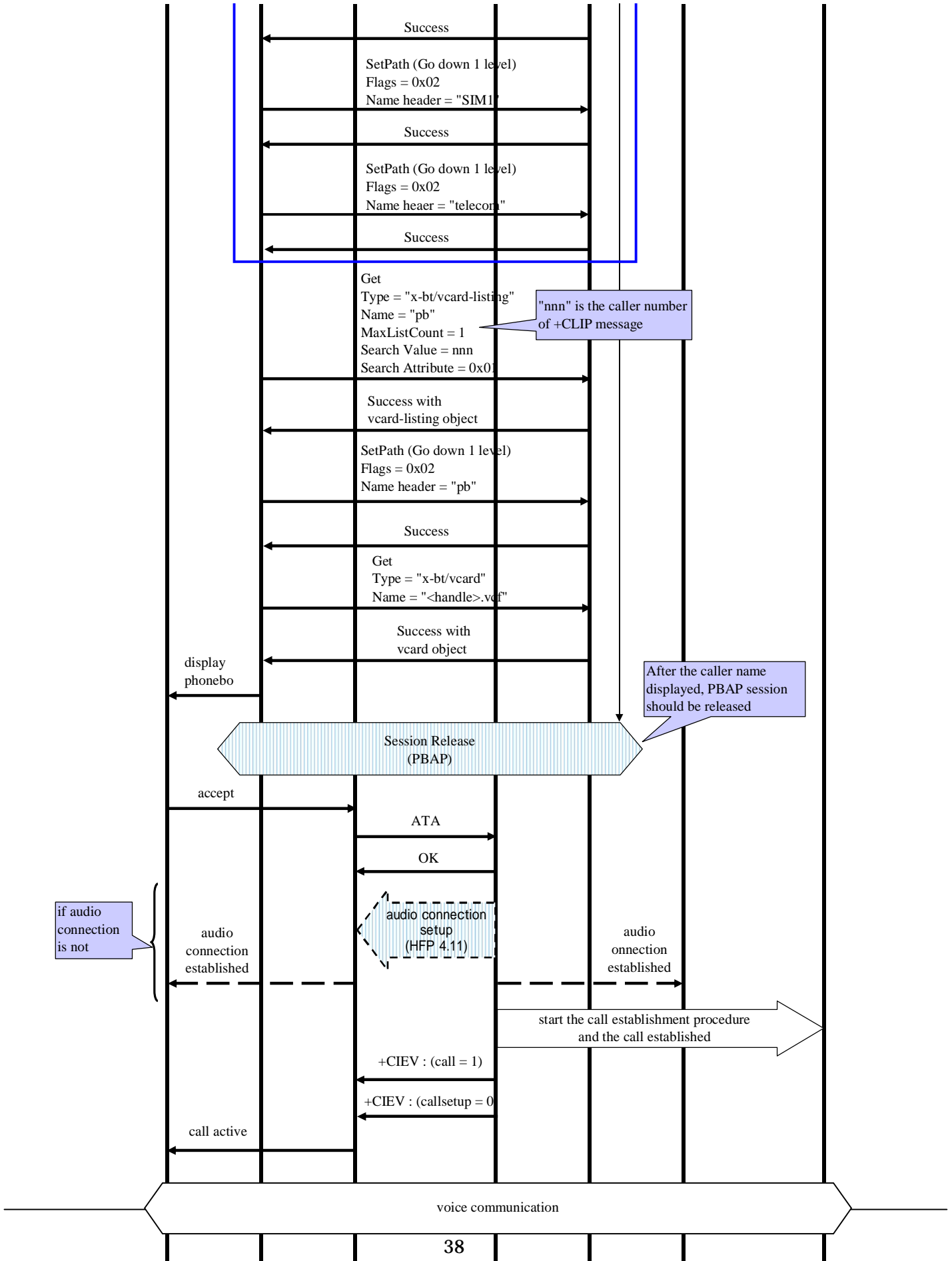




4.3.2 Caller name lookup upon incoming call (“SIM1/telecom/pb”)

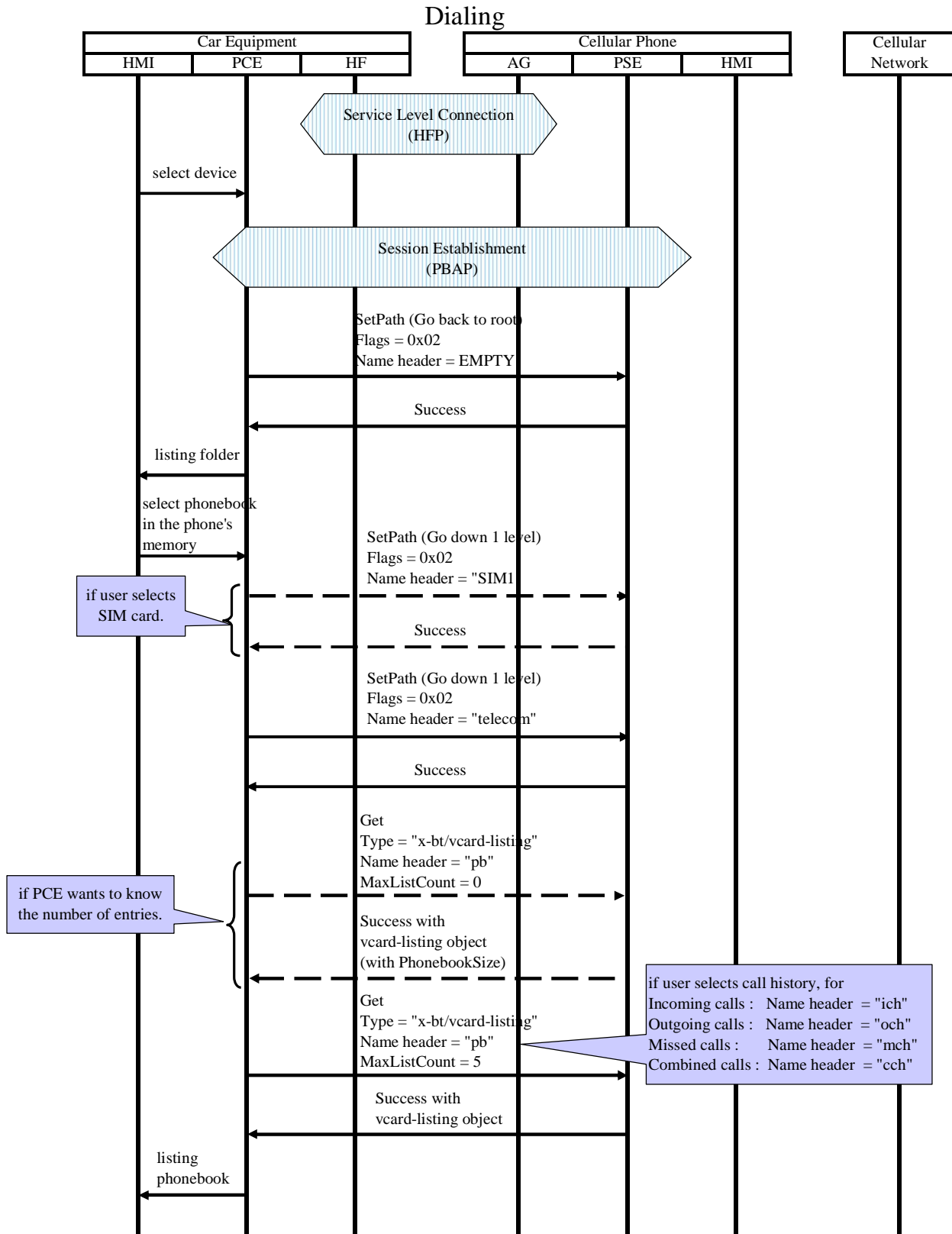
In this chart, PSE can't find the caller name in the folder “telecom/pb”. PSE tries to look up another folder “SIM1/telecom/pb”, and find the caller name in this folder. At the following MSC, PBAP session is established after the +CLIP message. If PBAP session is established before incoming call, the displayed caller name may be incorrect. The phonebook entry may be modified at the incoming call.

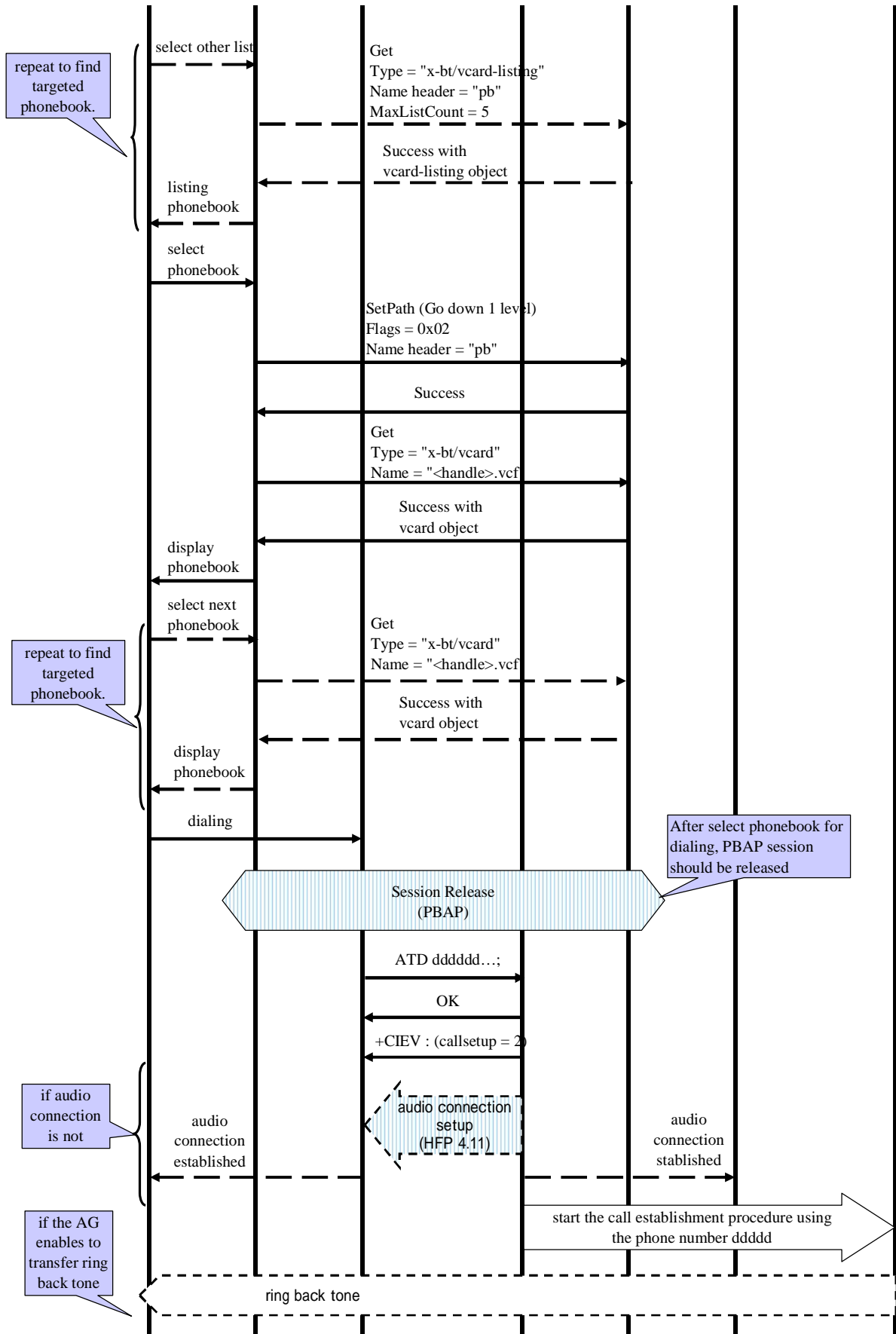


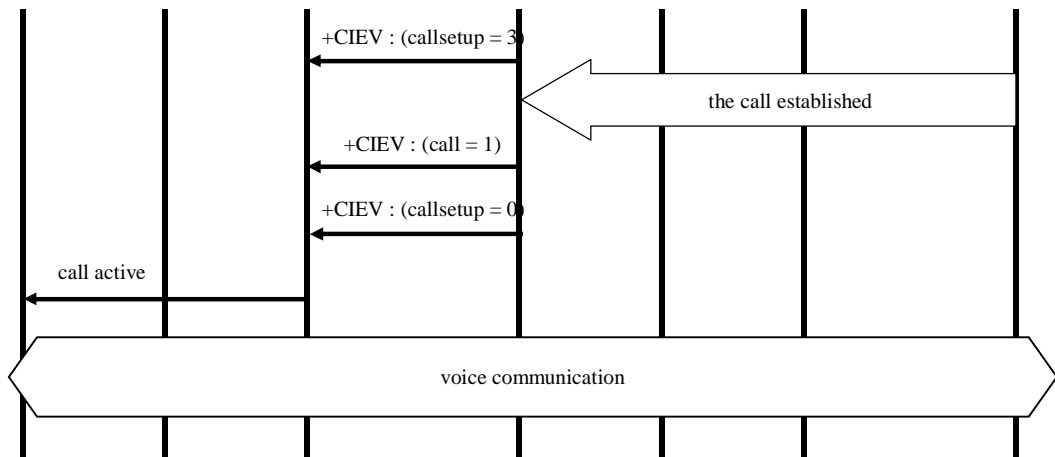


4.4 Dial

4.4.1 Dialing from retrieved phonebook entry







4.4.2 Dialing from incoming call history (PSEs entries are modified during an active PBAP session)

If any of the PSEs entries are modified/deleted during an active PBAP session, then the PSE shall return Error "Precondition failed" to all read requests until the client has updated the vCard-listing. When the PCE receive Error "Precondition failed", PCE shall go back to root folder and retry to retrieve Phonebook entries.

If PSE has "Change tracking" function, PSE does not return Error. In this case, the MSC is similar to section 4.4.1.

