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Intelligent Network (IN); IN Capability Set 1 (CS1) extension; Intelligent Network Application Protocol (INAP); Customised Applications for Mobile network Enhanced Logic (CAMEL); Part 1: Protocol specification

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Contents

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Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Signalling Protocols and Switching (SPS), and is now submitted for the Public Enquiry phase of the ETSI standards Two-step Approval Procedure (TAP).

The present document is part 1 of a multi-part standard covering the IN Capability Set 1 (CS1) extension; Intelligent Network Application Protocol (INAP); Customised Applications for Mobile network Enhanced Logic (CAMEL) as described below:

Part 1: "Protocol specification";

Part 2: "Protocol Implementation Conformance Statement (PICS) proforma specification".

NOTE: Further parts of the present document may be identified later.

Proposed national transposition dates	
Date of latest announcement of this EN (doa):	3 months after ETSI publication
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Date of withdrawal of any conflicting National Standard (dow):	6 months after doa

1 Scope

This fist part of EN 301 152 specifies the additions for Intelligent Network Application Protocol (INAP) to support the Camel Phase 1 Capability. The present document is based on ETS 300 374-1 [19]: "Intelligent Network (IN); Intelligent Network Capability Set 1 (CS1) Core Intelligent Network Application Protocol (INAP)".

ETS 300 374-1 [19] is also taken as an editorial basis for the present document. Only additions and modifications in respect to that ETS are specified in the present document. For Customized Applications for Mobile network Enhanced Logic (CAMEL) only a restricted subset of the protocol aspects of ETS 300 374-1 [19] is necessary. This restriction is not defined in the present document. A profiling of CAMEL, i.e. which protocol aspects are used, is given by EN 301 152-2 [31]. Clauses and subclauses of ETS 300 374-1 [19] for which neither additions nor modifications are made do not appear in the present document. However, to ensure the same clause numbering of the present document as of ETS 300 374-1 [19], deleted clauses and subclauses are numbered implicitly.

As the present document specifies the additions in respect to the SSF it is assumed that the SCF is according to ETS 300 374-1 [19] taking into account the requirements defined in the present document for the SSF.

The protocol specification of the CAMEL Capability to the present document is considered as equivalent to GSM 09.78 [28].

2 References

References may be made to:

a) specific versions of publications (identified by date of publication, edition number, version number, etc.), in which case, subsequent revisions to the referenced document do not apply; or

b) all versions up to and including the identified version (identified by "up to and including" before the version identity); or

c) all versions subsequent to and including the identified version (identified by "onwards" following the version identity); or

d) publications without mention of a specific version, in which case the latest version applies.

A non-specific reference to an ETS shall also be taken to refer to later versions published as an EN with the same number.

2.1 Normative references

The date of the following reference has been modified:

[11] ITU-T Recommendation Q.1218 (1995): "Interface Recommendation for intelligent network CS1".

The following references are in addition to those of ETS 300 374-1 [19].

[19] ETS 300 374-1 (1994): "Intelligent Network (IN); Intelligent Network Capability Set 1 (CS1); Core Intelligent Network Application Protocol (INAP); Part 1: Protocol specification".

[20] ETS 300 974: "Digital cellular telecommunications system (Phase 2+); Mobile Application Part (MAP) specification (GSM 09.02)".

[21] ITU-T Recommendation Q.713 : "Signalling Connection Control Part formats and codes".

[22] ITU-T Recommendation X.680 (1994) | ISO/IEC 8824-1 (1995): "Information technology – Abstract Syntax Notation One (ASN.1): Specification of basic notation

[23] ITU-T Recommendation X.681 (1994) | ISO/IEC 8824-2 (1995): "Information technology – Abstract Syntax Notation One (ASN.1): Information object specification".

[24] ITU-T Recommendation X.682 (1994) | ISO/IEC 8824-3 (1995): "Information technology – Abstract Syntax Notation One (ASN.1): Constraint specification".

[25] ITU-T Recommendation X.683 (1994) | ISO/IEC 8824-4 (1995): "Information technology – Abstract Syntax Notation One (ASN.1): Parameterization of ASN.1 specifications".

[26] ITU-T Recommendation X.690 (1994) | ISO/IEC 8825-1 (1995): "Information technology – ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)".

[27] ITU-T Recommendation X.880 (1994) | ISO/IEC 13712-1 (1995): "Information technology - Remote Operations: Concepts, model and notation".

[28] TS 101 046 (V5.1): "Digital cellular telecommunications system (Phase 2+); Customized Applications for Mobile network Enhanced Logic (CAMEL); CAMEL Application Part (CAP) specification (GSM 09.78 version 5.1.0)".

[29] ETS 300 646-1: "Integrated Services Digital Network (ISDN); Signalling System No.7; Digital cellular telecommunications system (Phase 2); Application of ISDN User Part (ISUP) version 2 for the ISDN-Public Land Mobile Network (PLMN) signalling interface; Part 1: Protocol specification (GSM 09.12)".

[30] ETS 300 940: "Digital cellular telecommunications system (Phase 2+); Mobile radio interface layer 3 specification (GSM 04.08)".

2.2 Informative references

[31] EN 301 152-2 (V1.1): "Intelligent Network (IN); IN Capability Set 1 (CS1) extension; Intelligent Network Application Protocol (INAP); Customised Applications for Mobile network Enhanced Logic (CAMEL); Part 2: Protocol Implementation Conformance Statement (PICS) proforma specification".

[32] TS 101 044 (V5.1) (1997, v5.1.0): "Digital cellular telecommunications system (Phase 2+); Customized Applications for Mobile network Enhanced Logic (CAMEL) - Stage 2 (GSM 03.78)".

3 Abbreviations

For the purposes of the present document, the following abbreviations apply in addition to those of ETS 300 374-1 [19]:

ACM	Address Complete Message
CAMEL	Customized Applications for Mobile network Enhanced Logic
CSI	CAMEL Subscription Information
IAM	Initial Address Message
MO	Mobile Originating
OCSI	Originating CSI
REL	Release
TCSI	Terminating CSI

Within the present document the terms gsmSSF and SSF and the terms gsmSCF and SCF respectively are used synonymously.

4 General

4.1 Definition methodology

For the purpose of the present document, ITU-T Recommendations X.880 [27] and the ITU-T Recommendations for ASN.1 X.680 [22], X.681 [23], X.682 [24], X.683 [25] and X.690 [26] for the basic encoding rules apply.

4.4 INAP addressing

4.4.2 Quality of service parameters

The class (class 0 or class 1) of SCCP is set as required by the application.

NOTE: RESULT_NL should not be used.

However, if segmentation is needed class 1 is set.

NOTE: According to ETS 300 285 [5], TC imposes no limitation on the number of segments. However if the peer TC users are certain that the Network Service used supports segmentation and reassembly of user data, the TC_RESULT_NL (RR_NL) facility is not necessary and should be avoided.

The return option may be used if requested by the application (Network Operator to determine).

6 Additional abstract syntax

This clause specifies the **additional** abstract syntax, using ASN.1 as defined in CCITT Recommendation X.208 [14] and ITU-T Recommendations X.680 [22], X.681 [23], X.682 [24] and X.683 [25].

The encoding rules which are applicable to the defined abstract syntax are the Basic Encoding Rules for ASN.1, defined in CCITT Recommendation X.209 [15] and ITU-T Recommendation X.690 [26] with the restrictions as described in ITU-T Recommendation Q.773 [10], subclause 4.1.1, modified by ETS 300 287 [5]. Additional encodings are cited for parameters used in existing ISUP (ETS 300 356-1 [7]) and DSS1 (ETS 300 403-1 [8]) standards. Existing data types from the CS1 ETSI Core INAP (ETS 300 374-1 [19]) and MAP (ETS 300 974 [20]) standards have been used.

NOTE: If this specification uses only a subtype, this will be indicated in EN 301 152-2 [31].

As for CS-2 in the following subclauses the ASN.1 extension marker "..." is not commented out.

6.1 Operation types

Operation timers

The following value ranges apply for operation specific timers:

short: 1 to 20 seconds.

6.3 Data types

```
--  The EXTENSION MACRO is replaced by the EXTENSION CLASS defined in subclause 6.6 Classes.
--  However, the Criticality type remains.

CriticalityType ::= ENUMERATED {
        ignore(0),
        abort(1)
        }

--  This section contains additional type definitions.

-- The following datatypes are imported.

IMPORTS

    IMSI,
    Ext-BasicServiceCode

FROM MAP-CommonDataTypes { ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-CommonDataTypes(18) version3(3)}

    LocationInformation,
    SubscriberState
```

```
FROM MAP-MS-DataTypes { ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-MS-DataTypes(11) version3(3)}

    CallReferenceNumber,
    SuppressionOfAnnouncement

FROM MAP-CH-DataTypes { ccitt(0) identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network(1) modules(3) map-CH-DataTypes(13) version3(3)};

    ISDN-AddressString,

FROM MAP-CommonDataTypes { ccitt identified-organization(4) etsi(0) mobileDomain(0)
gsm-Network (1) modules (3) map-CommonDataTypes (18) version3 (3)};


-- Argument Data Types


ConnectArg              ::= SEQUENCE {

    genericNumbers              [14] GenericNumbers             OPTIONAL,

--  The following components are included before the extension marker.
    suppressionOfAnnouncement   [55] SuppressionOfAnnouncement  OPTIONAL,
    oCSIApplicable              [56] OCSIApplicable             OPTIONAL,
    ...
    }

InitialDPArg                ::= SEQUENCE {

--  The following components are included in addition before the extension marker.
    iMSI                        [50] IMSI                       OPTIONAL,
    subscriberState             [51] SubscriberState            OPTIONAL,
    locationInformation         [52] LocationInformation        OPTIONAL,
    ext-basicServiceCode        [53] Ext-BasicServiceCode       OPTIONAL,
    callReferenceNumber         [54] CallReferenceNumber        OPTIONAL,
    mscAddress                  [55] ISDN-AddressString         OPTIONAL,
    calledPartyBCDNumber        [56] CalledPartyBCDNumber       OPTIONAL,
    ...
    }

-- Common Data Types

CalledPartyBCDNumber        ::= OCTETT STRING (SIZE (minCalledPartyBCDNumberLength ..
maxCalledPartyBCDNumberLength))

--  Indicates the Called Party Number, including service selection information. Refer to GSM 04.08
--  [30] for encoding. This data type carries only the "type of number", "numbering plan
--  identification" and "number digit" fields defined in [30]; it does not carry the "called party
--  BCD number IEI" or "length of called party BCD number contents".

--  The Extensionfield type is defined as follows:

ExtensionField ::= SEQUENCE {
    type        EXTENSION.&id ({SupportedExtensions}),
            -- shall identify the value of an EXTENSION type
    criticality
            CriticalityType DEFAULT ignore,
    value       [1]EXTENSION.&ExtensionType
                    ({SupportedExtensions}{@type})
    }
--  This parameter indicates an extension of an argument data type. Its content is network operator
--  specific

GenericNumber               ::= OCTET STRING (SIZE(minGenericNumberLength..
                                maxGenericNumberLength))

--  Indicates a generic number. Refer to ETS 300 356-1 [7] Generic number for encoding.

GenericNumbers              ::= SET SIZE(1..numOfGenericNumbers) OF GenericNumber

OCSIApplicable              ::= NULL
--  Indicates that the OCSI, if present, shall be applied
--  on the outgoing call leg created with a Connect operation.


-- Definition of range constants

--  The range constants which are network specific in ETS 300 374-1 [19] are profiled in
--  EN 301 152-2 [31].

--  Additional constants are defined as follows:
```

```
minCalledPartyBCDNumberLength       INTEGER ::= 1
maxCalledPartyBCDNumberLength       INTEGER ::= 41
minGenericNumberLength              INTEGER ::= 3
maxGenericNumberLength              INTEGER ::= 11
numOfGenericNumbers                 INTEGER ::= 5

--  APPLICATION SERVICE ELEMENTS

gsmSCF-Activation-ASE               ::= APPLICATION-SERVICE-ELEMENT
    -- consumer is gsmSSF
    CONSUMER INVOKES {
        initialDP
        }

gsmSSF-call-processing-ASE          ::= APPLICATION-SERVICE-ELEMENT
    -- supplier is gsmSCF
    SUPPLIER INVOKES {
        continue
        }
```

6.5 Application contexts

```
CAP-v1-gsmSSF-to-gsmSCF-AC APPLICATION-CONTEXT
-- dialogue initiated by SSF with InitialDP
INITIATOR CONSUMER OF {
    gsmSCF-activation-ASE,
    Connect-ASE
    Call-handling-ASE,
    BCSM-event-handling-ASE,
    gsmSSF-call-processing-ASE,
    Activity-test-ASE
    }
::= {ccitt(0) identified-organization(4) etsi(0) mobileDomain(0) gsm-Network(1) ac(0)
cap-gsmssf-to-gsmscf(50) version1(0)};
```

6.6 Classes

This subclause defines the following classes.

```
-- The following items are imported.

IMPORTS

    ROS-OBJECT-CLASS, CONTRACT, OPERATION-PACKAGE, Code, OPERATION,
    CONNECTION-PACKAGE
        FROM Remote-Operations-Information-Objects
                {joint-iso-ccitt remote-operations(4) informationObjects(5) version1(0)}


EXTENSION ::= CLASS {
    &ExtensionType,
    &criticality    CriticalityType DEFAULT ignore,
    &id Code
    }
WITH SYNTAX {
    EXTENSION-SYNTAX    &ExtensionType
    CRITICALITY &criticality
    IDENTIFIED BY   &id
    }
-- Example of addition of an extension named 'Some Network Specific Indicator' of type
-- BOOLEAN, with criticality 'ignore' and to be identified with object ID 'ccitt(0)
-- identified-organization(4) organisation(x) gsm(x) capextension':
-- Example of definition using the above information object class:
--
-- SomeNetworkSpecificIndicator  EXTENSION ::= {
--  EXTENSION-SYNTAX    BOOLEAN
--  CRITICALITY         ignore
--  IDENTIFIED BY       global : xxxxxx
--  }

firstExtension EXTENSION ::= {
    EXTENSION-SYNTAX    NULL
    CRITICALITY ignore
    IDENTIFIED BY   global:{xxxxxx}
    }
SupportedExtensions EXTENSION ::= {firstExtension -- full set of network operator extensions}
```

8 Error procedures

8.1 Operation related error procedures

8.1.6 MissingCustomerRecord

8.1.6.2 Operations SSF->SCF

InitialDP

Procedures at invoking entity (SSF)
SSF receives error "MissingCustomerRecord"

The CCF handles the call according to the Default Call Handling parameter of the valid CAMEL Subscription Information (CSI).

8.1.7 MissingParameter

8.1.7.3 Operations SSF -> SCF

Procedures at invoking entity (SSF).

The CCF handles the call according to the Default Call Handling parameter of the valid CSI.

8.2 Entity related error procedures

8.2.1 Expiration of T_{SSF}

8.2.1.2 Procedures SSF->SCF

Procedure at the invoking entity (SSF).

The CCF handles the call according to the Default Call Handling parameter of the valid CSI.

9 Detailed operation procedures

9.11 Connect procedure

9.11.1 General description

This operation is used to request the SSF to perform the call processing actions to route a call to a specific destination or to influence other call set-up information, e.g. the Generic Number.

The Connect operation may be received in the O-BCSM (DP 2) and in the T-BCSM (DP 12).

9.11.1.1 Parameters

The parameter originalCalledPartyID carries the dialled digits only if the call is forwarded by the SCF.

The parameter callingPartyNumber is not used. If received, the Calling Party Number is ignored.

The following parameters are defined in addition to ETS 300 374-1 [19].

- genericNumbers:

  This parameter allows the SCF to set the Generic Number parameter used in the network. It is used for transfer of Additional Calling Party Number.

- suppressionOfAnnouncement:

  This parameter indicates that announcements and tones which are played in the exchange at non-successful call set-up attempts shall be suppressed.

- oCSIApplicable:

  This parameter indicates to the SSP that the OCSI, if present, shall be applied on the outgoing call leg created with the Connect operation.

9.11.3 Responding entity (SSF)

9.11.3.1 Normal procedure

In respect of the SSF postconditions, no statement on the O-BCSM is made. For the SSF precondition: an originating or terminating call attempt has been initiated instead of saying "call origination".

9.17 EventReportBCSM procedure

9.17.2 Invoking entity (SSF)

9.17.2.1 Normal procedure

There are no service features to reuse the same O-BCSM.

9.17.2.2 Error handling

In case the message type is request, on expiration of T_{SSF} before receiving any operation, the SSF aborts the interaction with the SCF and instructs the CCF to handle the call according to the Default Call Handling parameter of the valid CSI.

9.19 InitialDP procedure

9.19.1 General description

9.19.1.1 Parameters

The following parameters are defined in addition to ETS 300 374-1 [19].

- calledPartyNumber:

  This parameter contains the number used to identify the called party in the forward direction, e.g. the Called party number of ISUP (see ETS 300 356-1 [7]). For the Mobile Originating (MO) case, this parameter shall carry as many Least Significant Digits of the calledPartyBCDNumber as are allowed by the protocol length limitations. The "address signal" fields shall be copied octet by octet from the "number digit" fields in the calledPartyBCDNumber, without taking account of the field allocations specified in GSM 04.08 [30]; for example a * character in the calledPartyBCDNumber shall map to character 10 in the calledPartyNumber, and a # character shall map to character 11. The "Type of Number" and "Numbering plan identification" parameters shall map into "Nature of address indicator" and "Numbering plan indicator" parameters respectively. The "INN indicator" shall be set to "Routing to Internal Network number Allowed".

- calledPartyBCDNumber:

  This parameter contains the number used to identify the called party in the forward direction. It may also include service selection information, including * and # character.

- iMSI:

  IMSI of the mobile subscriber for which the service is invoked. For encoding see GSM 09.02 [20].

- subscriberState:

  The state of the mobile subscriber for which the service is invoked. The possible states are busy, idle and not reachable. For encoding see GSM 09.02 [20].

- locationInformation:

  This parameter indicates the whereabouts of the MS, and the age of the information defining the whereabouts. For encoding see GSM 09.02 [20].

- ext-BasicServiceCode:

  Indicates the Basic Service Code. For encoding see GSM 09.02 [20].

- callReferenceNumber:

  This parameter gives the call reference number assigned to the call by the CCF. For encoding see GSM 09.02 [20].

- mscAddress:

  This parameter gives the mscId assigned to the GMSC/MSC. For encoding see GSM 09.02 [20].

9.19.2 Invoking entity (SSF)

9.19.2.2 Error handling

If the destination SCF is not accessible then the SSF instructs the CCF to handle the call according to the Default Call Handling parameter of the valid CSI.

On expiration of T_{SSF} before receiving any operation, the SSF aborts the interaction with the SCF and instructs the CCF to handle the call according to the Default Call Handling parameter of the valid CSI.

9.23 ReleaseCall procedure

9.23.1 General description

This operation is used to tear down by the SCF an existing call at any phase of the call for all parties involved in the call. The operation may only be sent within a control relationship and is not allowed in a monitor relationship.

9.25 RequestReportBCSMEvent procedure

9.25.1 General description

The RequestReportBCSMEvent operation shall not be allowed:

- to be received into the SSF FSM state "Monitoring"; and

- to disarm already armed events in all SSF FSM states.

9.25.1.1 Parameters

The value of collectedInfo is not valid in the eventTypeBCSM parameter.

The "legID" = 2 for the sendingSideID is also used to indicate a party that was created with a Continue operation.

10 Services assumed from TCAP

10.9 Mapping on to TC services

10.9.1 Dialogue control

10.9.1.8 Quality of service

The quality of service of TC request primitives is set by the SACF to the following value:

- sequencing requested if required by the application (see subclause 4.4.2);
- return option as required by the application (see subclause 4.4.2).

Annex A (normative): Mapping between INAP and ISUP

This annex defines the mapping between the INAP parameters and the call parameters sent/received in the ISUP.

A.1 InitialDP operation

Table A.1

ISUP message IAM (note 1)	CAP operation InitialDP
Called party number	calledPartyNumber
Calling party number	callingPartyNumber
Calling party's category	callingPartysCategory
Location number	locationNumber
Original called number	originalCalledPartyID
User teleservice information (1st priority) High layer compatibility IE contained in access transport (2nd priority) (note 2)	highLayerCompatibility
Generic number 'additional calling party number'	additionalCallingPartyNumber
User service information prime (1st priority) User service information (2nd priority)	bearerCapability
Redirecting number	redirectingPartyID
Redirection information	redirectionInformation
NOTE 1: Optional parameters may be absent, i.e. they are only mapped if these parameters are available at the DP. NOTE 2: If two High layer compatibility information elements are contained in the access transport parameter, then the second information element, carrying the preferred HLC, is mapped to the CAP highLayerCompatibility parameter.	

A.2 Connect operation

On receipt of a Connect operation from the SCF the called party number used for routeing is derived from the destinationRoutingAddress (see table A.2). If the triggering of the CAMEL service was made for a mobile terminating or forwarded call, an Address Complete message (ACM) message shall be sent to the preceding exchange. The encoding of the backward call indicators in the ACM is specified in GSM 09.12 [29].

Table A.2 illustrates the mapping of parameters received in the Connect operation to parameters sent in the Initial Address Message (IAM) message to the succeeding exchange. Parameters which were received in the IAM and are not replaced by parameters of the Connect operation are treated according to the normal procedures.

On sending of the IAM the awaiting address complete timer is started. If the timer expires the call is released in both directions and an appropriate indication is returned to the calling subscriber.

Table A.2

CAP operation Connect (note 1)	ISUP message IAM
destinationRoutingAddress	Called party number
callingPartyNumber	see subclause A.2.1
originalCalledPartyID	Original called number
callingPartysCategory	Calling party's category
redirectingPartyID	Redirecting number
redirectionInformation	Redirection information
genericNumbers	Generic number (note 2)
NOTE 1: Optional parameters may be absent, i.e. they are only mapped if received. NOTE 2: The set of generic numbers received in the genericNumbers parameter is mapped to the appropriate number of Generic Number parameters in the ISUP IAM. This shall be performed irrespective of the value of the screening indicator in the ISUP calling party number.	

A.2.1 Connect operation

The Calling Party Number received in the Connect operation is ignored. In outgoing ISUP message IAM the Calling Party Number received in incoming ISUP message IAM is used.

A.3 ReleaseCall operation

Upon receipt of the ReleaseCall operation, the CCF/SSF sends Release (REL) messages in both directions. The cause indicators parameter contains the releaseCallArg parameter of the ReleaseCall operation.

History

Document history				
V1.1.1	January 1998	Public Enquiry	PE 9822:	1998-01-30 to 1998-05-29