



# SLOVENSKI STANDARD

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Intelligent Network (IN); Intelligent Network Application Protocol (INAP); Capability Set 2 (CS2); Part 5: Distributed Functional Plane (DFP) [ITU-T Recommendation Q.1224 (1997), modified]

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# ETSI EN 301 140-5 V1.1.3 (1999-11)

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*European Standard (Telecommunications series)*

**Intelligent Network (IN);  
Intelligent Network Application Protocol (INAP);  
Capability Set 2 (CS2);  
Part 5: Distributed Functional Plane (DFP)**

[ITU-T Recommendation Q.1224 (1997), modified]

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**Postal address**

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F-06921 Sophia Antipolis Cedex - FRANCE

---

**Office address**

---

650 Route des Lucioles - Sophia Antipolis  
Valbonne - FRANCE

Tel.: +33 4 92 94 42 00 Fax: +33 4 93 65 47 16

Siret N° 348 623 562 00017 - NAF 742 C

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## Foreword

This European Standard (Telecommunications series) has been produced by ETSI Technical Committee Signalling Protocols and Switching (SPS).

The present document is based on ITU-T Recommendation Q.1224 [6]. It provides major modifications and further requirements to this base document.

The present document is part 5 of a multi-part standard covering Intelligent Network (IN); Intelligent Network Application Protocol (INAP); Capability Set 2 (CS2) as described below:

- Part 1: "Protocol specification";
- Part 2: "Protocol Implementation Conformance Statement (PICS) proforma specification";
- Part 3: "Test Suite Structure and Test Purposes (TSS&TP) specification for Service Switching Function (SSF)";
- Part 4: "Abstract Test Suite (ATS) specification and Partial Protocol Implementation eXtra Information for Testing (PIXIT) proforma for Service Switching Function (SSF)";
- Part 5: "Distributed Functional Plane (DFP) [ITU-T Recommendation Q.1224 (1997), modified]"**.

### National transposition dates

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# 1 Scope

The present document is based on ITU-T Recommendation Q.1224 [6]. It provides major modifications and further requirements to this base document.

The scope of the IN Distributed Functional Plane (DFP) architecture for IN capability set 2 (CS2) is driven by the service requirements of desired IN CS2 services, and constrained by the capabilities of the embedded base of evolvable network technology. The scope of functionality required to support desired IN CS2 services includes functionality to provide:

- end user access to call / service processing;
- service invocation and control;
- end user interaction with service control;
- service management;
- Call Party Handling;
- internetworking;
- security;
- Out-Channel Call Related User Interaction;
- Out-Channel Call Unrelated User Interaction;
- wireless Access; and
- Feature Interactions.

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The scope of each of these aspects is addressed in clause 2 of ITU-T Recommendation Q.1224 [6] and is endorsed by the present document.

The present document follows the same document structure as ITU-T Recommendation Q.1224 [6] for clause 4 onwards and refers to text in ITU-T Recommendation Q.1224 [6] when there is no difference in the present document compared to ITU-T Recommendation Q.1224 [6]. If there are changes the related text is included in the relevant clause.

Clause 1 (General), clause 2 (Scope of IN distributed functional plane for capability set 2) and clause 3 (Distributed functional model for IN CS2) in ITU-T Recommendation Q.1224 [6] are endorsed by the present document.

The following capabilities supported in ITU-T Recommendation Q.1224 [6] are excluded from the present document:

- The Hybrid Approach for the Connection View State;
- Trigger Detection Point - Notification for the SSF/CCF-SCF interface;
- DP specific INAP operations  
Only DP generic INAP operations are supported by ETSI Core INAP CS2 which means that following DP specific operations supported in ITU-T IN CS2 are not part of ETSI IN CS2: AnalysedInformation, AnalyseInformation, AuthorizeTermination, CollectedInformation, FacilitySelectedAndAvailable, OAbandon, OAnswer, OCalledPartyBusy, ODisconnect, OMidCall, ONoAnswer, OriginationAttempt, OriginationAttemptAuthorized, OSuspended, RouteSelectFailure, SelectFacility, SelectRoute, TAnswer, TBusy, TDisconnect, TMidCall, TNoAnswer, TerminationAttempt, TermAttemptAuthorized and Tsuspended.

Supported information flows are in subclause 4.1.5 of EN 301 140-1 [10].



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## 2 References

The following documents contain provisions which, through reference in this text, constitute provisions of the present document.

- References are either specific (identified by date of publication, edition number, version number, etc.) or non-specific.
- For a specific reference, subsequent revisions do not apply.
- For a non-specific reference, 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.

- [1] EN 300 374-1: "Intelligent Network (IN); Intelligent Network Capability Set 1 (CS1); Core Intelligent Network Application Protocol (INAP); Part 1: Protocol specification".
- [2] EN 300 403-1: "Integrated Services Digital Network (ISDN); Digital Subscriber Signalling System No. one (DSS1) protocol; Signalling network layer for circuit-mode basic call control; Part 1: Protocol specification [ITU-T Recommendation Q.931 (1993), modified]".
- [3] ITU-T Recommendation Q.762: "Signalling System No.7; ISDN user part general functions of messages and signals".
- [4] ITU-T Recommendation Q.763: "Signalling System No. 7; ISDN user part formats and codes".
- [5] ITU-T Recommendation Q.932: "Digital Subscriber Signalling System No. 1 (DSS 1); Generic procedures for the control of ISDN supplementary services".
- [6] ITU-T Recommendation Q.1224: "Distributed functional plane for Intelligent Network Capability Set 2".
- [7] ITU-T Recommendation Q.1228: "Interface ITU-T Recommendation for intelligent network CS2".
- [8] ITU-T Recommendation Q.1290: "Glossary of terms used in the definition of intelligent networks".
- [9] ITU-T Recommendation Q.1218: "Interface Recommendation for intelligent network CS-1".
- [10] EN 301 140-1: "Intelligent Network (IN); Intelligent Network Application Protocol (INAP); Capability Set 2 (CS2); Part 1: Protocol specification".
- [11] ITU-T Recommendation Q.1204: "Intelligent network distributed functional plane architecture".
- [12] ITU-T Recommendation Q.1214: "Distributed functional plane for intelligent network CS1".
- [13] ITU-T Recommendation E.164: "The international public telecommunication numbering plan".
- [14] ES 201 296: "Integrated Services Digital Network (ISDN); Signalling System No.7; ISDN User Part (ISUP); Signalling aspects of charging".

## 3 Abbreviations

For the purposes of the present document, the abbreviations given in EN 301 140-1 [10] and the following apply:

BRI	Basic Rate Interface (2 x 64 kbit/s + 1 x 16 kbit/s)
CP	Connection Point
CPG	Call Progress message
DFP	Distributed Functional Plane
DP	Detection Point
IF	Information Flow
PIC	Point in Call
SIB	Service Independent Building Box
SPID	Service Profile Identifier

## 4 SSF/CCF model

### 4.1 General

Text in subclause 4.1 in ITU-T Recommendation Q.1224 [6] shall be followed.

### 4.2 Basic call manager (BCM)

Text in subclause 4.2 in ITU-T Recommendation Q.1224 [6] shall be followed.

#### 4.2.1 BCSM

Text in subclause 4.2.1 in ITU-T Recommendation Q.1224 [6] shall be followed.

#### 4.2.2 CS2 BCSM description

The BCSM for IN CS2 described in this subclause is based on the overall BCSM in annex A of ITU-T Recommendation Q.1204 [11] and ITU-T Recommendation Q.1214 [12], refined as applicable to IN CS2.

It reflects the functional separation between the originating and terminating portions of calls as illustrated in figures 4.1 and 4.2. These figures show an originating half BCSM and a terminating half BCSM, each of which is managed by a functionally separate BCM in the SSF/CCF. The description is a starting point to identify the aspects of the BCSM that are visible to IN service logic instances, and the nature of the information flows between the SSF/CCF and SCF (see clause 12).

In the following descriptions, the PICs are related at a high level to EN 300 403-1 [2] ISDN call states. This is not intended to be a detailed formal definition of the relation between the PICs and EN 300 403-1 [2] ISDN call states, but is intended as a point of reference to use in understanding the PICs. In particular, there are a number of possible ways in which the EN 300 403-1 [2] call states may be traversed in certain situations which are not considered below. To enable independence between services offered during one call session when the PICs may be traversed several times, it is necessary - at each PIC - to maintain available a specific set of data until the calling (controlling) user releases and to ensure that software resources are returned to a coherent status when call processing passes through the PICs.

For each PIC, an initial list of BCSM information that shall be maintained, if available, is given. Information that is available at all PICs is given at the beginning of the O- and T-BCSM descriptions.

The information that is sent to the SCF at a given trigger detection point is a subset of the information described here. Other information may be available at a given PIC that is not used by processing at the PIC or is only used by underlying call processing.

In order to maintain uniqueness of DP names between the originating and terminating half BCSMs, "O" and "T" is prefixed to certain originating and terminating DP names, respectively.

For ease of reference, the DPs associated with the BCSM transition implied by each entry and exit event for each PIC are listed along with the PIC descriptions.

The semantics for Abandon and Disconnect DP needs further clarification. Some misalignments inside Part 1 and between Part 1 and Part 5 have been detected. It is also allowed to report Disconnect DP during the WfEoU(WFI), and WfEoTC(WFI) user interactions states.

### 4.2.2.1 Originating BCSM for IN CS2

The originating half of the BCSM corresponds to that portion of the BCSM associated with the originating party (see figure 4.1).

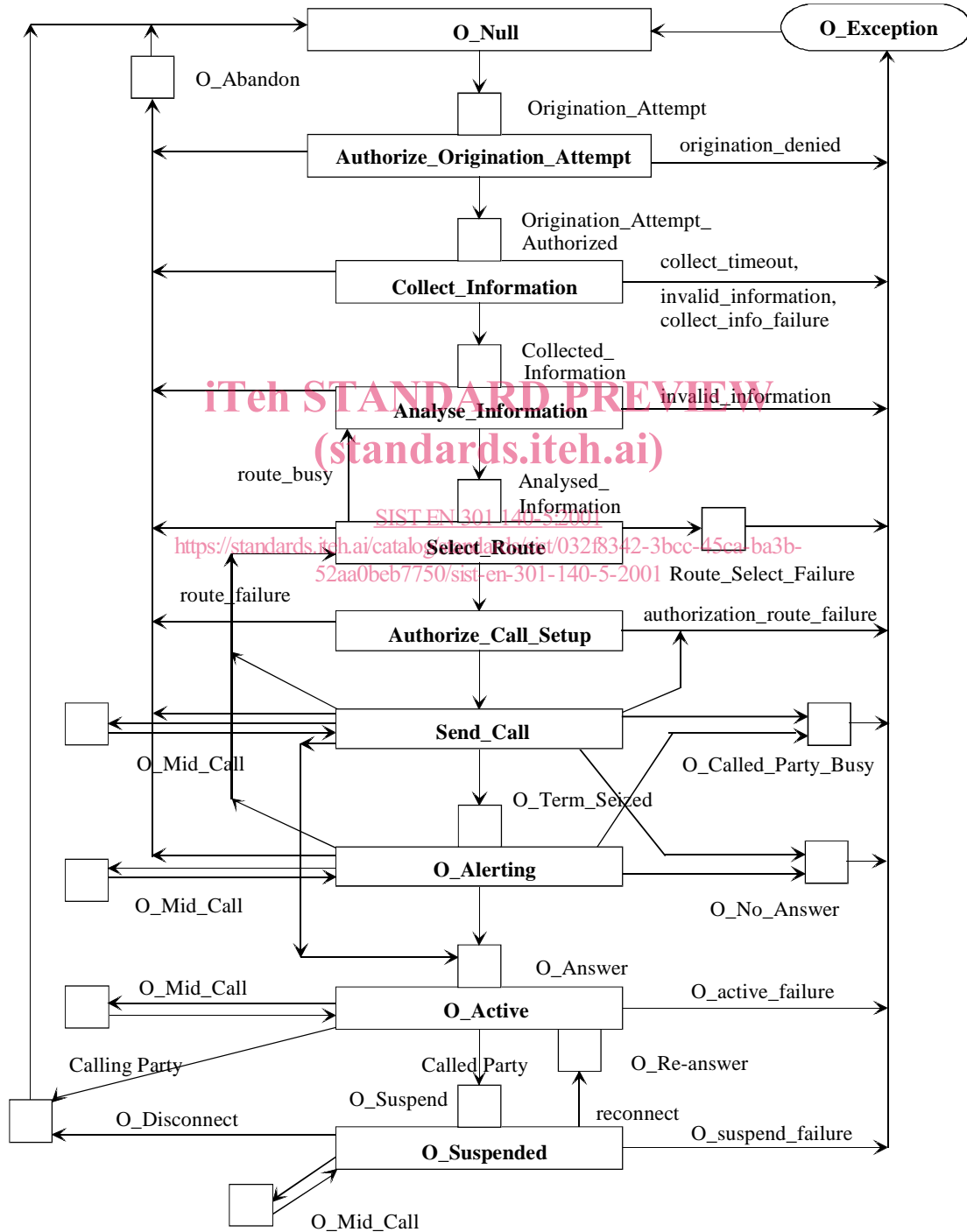


Figure 4.1: Originating BCSM for CS2

The following information is available at all PICs in the O-BCSM:

- Calling Party Category - see ITU-T Recommendation Q.762 [3] Calling Party's Category signalling information.
- SRF/SSF capabilities - see ITU-T Recommendation Q.1290 [8]. Used to decide if an assist of hand-off procedure is to be used.
- Call Gapping Encountered - see ITU-T Recommendation Q.1290 [8].
- Terminal Type - see ITU-T Recommendation Q.1290 [8]. The SCF uses this to determine the most appropriate form of user-interaction to use (e.g. in-band announcements). This information is only available at originating or terminating local exchanges.
- Location Number - see ITU-T Recommendation Q.762 [3] Location Number signalling information. Used if the calling party is a mobile subscriber.
- ISDN Access Related Information: - See ITU-T Recommendation Q.762 [3] Access Transport Parameter.
- Original Called Party ID - see ITU-T Recommendation Q.762 [3] Original Called Party Number element. This ID refers to the case where the call is diverted.
- Redirecting Party ID - see ITU-T Recommendation Q.762 [3] Redirecting Party ID element. This ID refers to the case where the call is diverted.
- Redirection Information - see ITU-T Recommendation Q.762 [3] Redirection Information element. This information refers to the case where the call is diverted.
- Additional Calling Party Number - see ITU-T Recommendation Q.762 [3] Generic Number element.
- Forward GVNS - see ITU-T Recommendation Q.762 [3] Forward GVNS element.
- The description for each of the PICs in the originating half of the BCSM are described below:

NOTE: See BCSM Indications of subclause 4.2.4 for more information concerning PICs.

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#### 4.2.2.1.1 O\_Null

*Entry event:* Disconnect and clearing of a previous call (DPs: O\_Disconnect and O\_Abandon), or default handling of exceptions by SSF/CCF completed.

*Functions:* Interface (line / trunk) is idled (no call exists, no call reference exists, etc.). Supervision is being provided.

*Information available:* After detecting the Origination Attempt event, it is assumed that the SSF/CCF has the following information available associated with the originating call portion, with restrictions as noted. If the SSF/CCF determines that the origination is denied, the cause of the failed authorization is also known.

- Bearer Capability - see ITU-T Recommendation Q.762 [3] User Service Information and EN 300 403-1 [2] Bearer Capability information element.
- Calling Party Number - see ITU-T Recommendation Q.762 [3] Calling Party Number signalling information. This information is available at the SSF/CCF for a non-ISDN line and may be available for SS7 trunks, but is not available from trunks supported by conventional signalling or private-facility trunks. For a DSS 1 interface, this is determined by the information provided in the SETUP message or by the default number assigned to the caller (see ISDN SETUP information below).
- SRF Available - see ITU-T Recommendation Q.1290 [8].
- Service Profile Identifier (SPID) - see ITU-T Recommendation Q.932 [5], annex A. This information may be available at the SSF/CCF if the calling party is served by a BRI interface on this SSF/CCF.
- Called Party Number - see ITU-T Recommendation Q.762 [3] Called party number signalling information. Used to identify the called party in the forward direction. Available only for trunks or ISDN lines.
- Transit network selection - see ITU-T Recommendation Q.763 [4] Transit network selection parameter. This parameter, if present, identifies the Carrier Identification Code and the Circuit Code.

- Class of Service - see ITU-T Recommendation Q.1290 [8].
- Calling Party Business Group ID (BGID) - see ITU-T Recommendation Q.1290 [8] Business Group ID. This information is available for a non-ISDN line, ISDN interface, private-facility trunk group, or possibly an SS7 trunk when the caller is a member of a Business Group.
- Calling Facility Group - see ITU-T Recommendation Q.1290 [8]. Available on conventional or SS7 trunks.
- Calling Facility Group Member - see ITU-T Recommendation Q.1290 [8]. Available on conventional or SS7 trunks.
- Travelling Class Mark - see ITU-T Recommendation Q.1290 [8].
- Feature Code - see ITU-T Recommendation Q.762 [3] Feature Code Signalling Information where this parameter is defined for national use only. Available, if used, for a party served by an ISDN interface using en bloc sending or for an SS7 trunk.
- Access Code - see ITU-T Recommendation Q.1290 [8]. Available, if used, for a party served by an ISDN interface using en bloc sending.
- Operator Services Information - see ITU-T Recommendation Q.1290 [8]. This information element is not included in a SETUP message containing the keypad information element.
- ISDN SETUP feature-related information - see EN 300 403-1 [2]. The SSF/CCF receives a SETUP message from a DSS 1 interface and this SETUP message can also contain the following information:
  - Progress Indicator - see EN 300 403-1 [2] Progress indicator information element.
  - Keypad Facility - see EN 300 403-1 [2] Keypad facility information element. This information element is not expected in a SETUP message also containing the Called party number, Called party number subaddress, Transit network selection, or Operator services information elements.
  - Feature activation - see ITU-T Recommendation Q.932 [5] Feature activation information element.
  - Calling party number/see EN 300 403-1 [2] Calling party number information element.  
 The Called party number information element is sent when en bloc sending is used and the Keypad information element is not present. When the type of number and numbering plan identification field within the Called party number information element is set to "unknown," the SSF/CCF treats the string as if it has been received within a Keypad information element. In this case, it is not expected to be sent with the transit network selection or Operator services information elements.
  - Facility Information - see EN 300 403-1 [2] Facility information element. This information element may identify USI Information or Facility Information.
  - Other information, as defined by ITU-T Recommendation Q.932 [5], Generic Procedures for the Control of ISDN Supplementary Services, can be included. Some of this information may be of interest to the SCF.
- ISDN User Part IAM feature related information. The IAM can also contain the following information (see ITU-T Recommendations Q.762 [3] and/or Q.763 [4]):
  - Nature of connection indicators - see ITU-T Recommendation Q.763 [4] Nature of Connection Indicators parameter.
  - Forward call indicators - see ITU-T Recommendation Q.763 [4] Forward Call Indicators parameter. The caller's access is identified as ISDN or non-ISDN, and an indication is given of whether an end-to-end SS7 supported connection is required.
  - User service information - see ITU-T Recommendation Q.762 [3]. User Service Information parameter. For the purposes of IN CS2, this parameter identifies the call as circuit-mode / speech, circuit-mode / 3,1 kHz audio, circuit-mode / unrestricted digital information (64 kbps), or circuit-mode / restricted digital information.
  - Generic Number - see ITU-T Recommendation Q.762 [3] Generic number parameter. More than one generic number parameter may be present within a given IAM.

- Generic name - see ITU-T Recommendation Q.1290 [8].
- Carrier selection - see ITU-T Recommendation Q.1290 [8].
- Generic digits - see ITU-T Recommendation Q.762 [3]. May contain a travelling class mark (network operator specific).
- Other parameters may be included in the IAM. These parameters may be included because of features provided by other switches in the connection (e.g. information relating to the call being forwarded).
- Any information relating to switch-based features that have already been invoked for the call will also be available.

*Exit event:*

- Indication of desire to place outgoing call (e.g. off-hook, EN 300 403-1 [2] SETUP message, ISDN-UP IAM message) (DP: Origination\_Attempt).
- The following exception exit events are applicable to the O\_Null PIC. For this PIC, if the call encounters one of these exceptions during O\_Null PIC processing, the exception event is not visible because there is no corresponding DP.
  - The O\_Abandon occurs when the calling party disconnects. For example, this event can result from one of the following:
    - the SSF/CCF receives an on-hook indication from a caller served by a non-ISDN line, following switchhook flash timing;
    - the SSF/CCF receives a call clearing message from a caller served by an ISDN interface;
    - the SSF/CCF receives a disconnect indication from a conventional trunk or private facility trunk;
    - SSF receives a Release Message from an SS7 trunk.

Corresponding EN 300 403-1 [2] call state: O\_Null

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#### 4.2.2.1.2 Authorize\_Origination\_Attempt

*Entry event:* An indication is available that the originating terminal needs to be authorized. (DP: Origination\_Attempt).

*Functions:*

- The originating terminal rights should be checked using the calling party's identity and service profile. The authority / ability of the party to place the call with given properties (e.g. bearer capability, line restrictions) is verified. The types of authorization to be performed may vary for different types of originating resources (e.g. for lines vs. trunks).
- Other features which might be required during this PIC are not described in the IN CS2 BSCM.

*Information available:* After detecting the Origination\_Attempt\_Authorized event, it is assumed that the SSP has the same information available associated with the originating call portion as it did after detecting the Origination\_Attempt event in the O\_Null PIC.

If the SSP determines that the origination is denied, the cause of the failed authorization is also known.

*Exit event:*

- An indication is received that the authorization is successful. The O\_BCSM moves to the Collect\_Information PIC (DP: Origination\_Attempt\_Authorized).
- A disconnection indication is received from the originating party (DP: O\_Abandon).
- An indication is received that the call origination is denied. The O\_BCSM moves to the O\_Exception PIC.

#### 4.2.2.1.3 Collect\_Information

*Entry event:* Authority / ability to place outgoing call verified. (DP: Origination\_Attempt\_Authorized).

*Functions:*

- Initial information package / dialling string (e.g. service codes, prefixes, dialled address digits) being collected from originating party. Information being examined according to dialling plan to determine end of collection. No further action may be required if an en bloc signalling method is in use (e.g. an ISDN user using en bloc signalling, an incoming SS7 trunk).
- The SSF/CCF shall be able to support subsequent digit collection according to trigger criteria assigned before sending the query. For example if a feature code (e.g. \*64) is entered, the SSF/CCF may:
  - collect digits according to the normal dialling plan; or
  - collect a variable number of digits.

*Information available:* After the SSF/CCF determines that information collection is complete, it is assumed that the SSF/CCF has the following information available associated with the originating call portion:

- Calling Party Number, Calling Party BGID, Class of Service, Bearer Capability, Calling Facility Group, Calling Facility Group Member, Service Profile Identifier, other feature-related information, Facility Information. This information is available for each access type under the conditions defined in the O\_Null PIC.
- Collected Information - As described below.

From a non-ISDN line or DSS 1 interface, the collected information consists of one or more of the following:

- Access Codes within a Customized Dialling Plan (CDP) - see ITU-T Recommendation Q.1290 [8].

The Customized Dialling Plan (CDP) in force may specify that after a given access code is dialled, more digits are to be collected according to the "normal dialling plan," i.e. the dialling plan in force. In this case, Access Code and Collected Address Information are known. If the CDP in force specifies that after a given access code is dialled, a variable number of digits are to be collected, then Access Code and Collected Digits are known.

- Feature Code - see ITU-T Recommendation Q.762 [3] Feature Code Signalling Information where this parameter is defined for national use only.

If the numbering plan in force specifies that after a given feature code is dialled, more digits are to be collected according to the "normal dialling plan", then Feature Code and Collected Address Information are known. If the dialling plan in force specifies that after a given feature code is dialled, a variable number of digits are to be collected, then Feature Code and Collected Digits are known. The service associated with the feature code is dependent upon the users service profile.

- Facility Code - see ITU-T Recommendation Q.1290 [8]. This information may be provided if and when facility selective service signalling is supported.
- Feature Activation - see ITU-T Recommendation Q.932 [5] Feature Activation information element. If the CDP in force specifies that after a given feature activator is received, more digits are to be collected according to the numbering plan, then Feature Activation Indicator and Collected Address Information are known. If the CDP in force specifies that after a given feature activator is received, a variable number of digits are to be collected, then Feature Activation Indicator and Collected Digits are known.
- Prefix - see ITU-T Recommendation Q.1290 [8].
- Carrier Access Code / Carrier Identification Code - see ITU-T Recommendation Q.1290 [8]. The caller may dial a Carrier Access Code (CAC) (e.g. a 10XXX or 101XXXX for use on this call). When the caller is served by an ISDN interface, a Carrier Identification Code, i.e. XXX or XXXX, may be received by the SSF/CCF within the transit network selection information element of the ISDN SETUP message.
- Collected Address Information - see ITU-T Recommendation Q.1290 [8]. Available as per the numbering plan.
- Numbering Plan Indicator - see ITU-T Recommendation Q.762 [3] Numbering Plan Indicator signalling information.