

IPWorks SCF INAP Interface

INTERWORK DESCRIPTION

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1 Introduction

This document describes the Intelligent Network Application Protocol (INAP) between IPWorks and Service Control Function (SCF) node for Number Portability (NP) information retrieval.

Scope

- Interface Overview
- Interface Role
- Services
- Procedures
- Information Model
- Related Standards

Target Groups

This document is intended for personnel needing to understand the logical entity, including interfaces and protocols, of the IPWorks.

1.1 Prerequisites

We assumed that the reader has knowledge or experience in the following areas: SS7

1.2 Related Information

The trademark information, typographic conventions, definition and explanation of acronyms and terminology can be found in the following documents:

- *Trademark Information*, Reference [1]
- *Glossary of Terms and Acronyms*, Reference [2]
- *Typographic Conventions*, Reference [3]





2 Interface Overview

The following figure illustrate the interface entities, the underlying protocol layer, and the scope of this IWD.

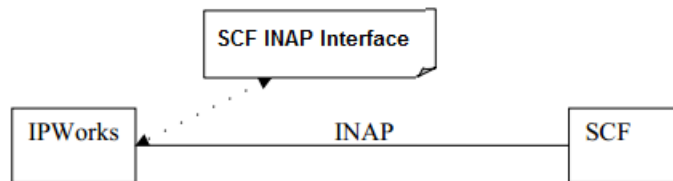


Figure 1 Interface entities, underlying protocol layers and the scope of this IWD

The INAP protocol is used between IPWorks and SCF node for NP information retrieval.

- IPWorks uses the `InitialDP` operation in Intelligent Network Capability Set 1 (CS1) to interrogate the SCF to retrieve number portability information for a subscriber number.
- SCF sends responses to IPWorks. The response is one of the INAP messages: Connect, Continue, Release or some `InitialDP` negative message.

2.1 Interface Role

SCF provides the status retrieval services `Subscriber Number Portability`. This document describes how IPWorks uses this service via INAP. IPWorks simulates the role of Service Switching Function (SSF) node in this context.

2.2 Services

The user services used by the INAP are shown in Table 1

*Table 1 Used Services*

| Used Service | Description |
|-------------------------------------|---|
| IN-Based Number Portability service | <p>The replies sent by SCP is one of the following INAP messages: Connect, Continue, Release Call or other negative InitialDP response.</p> <p>IPWorks triggers the service request when receiving ENUM queries that fall into some pre-configured number series, and the number portability information reply is used by IPWorks to compose the ENUM response.</p> |

2.3 Encapsulation and Addressing

The INAP CS1 InitialDP, Connect, Continue, Release and various InitialDP negative response operations are transported over TCAP. For more information about how INAP operations make use of TCAP and lower layers of SS7, see ETS 300 374-1: Intelligent Network (IN); Intelligent Network Capability Set 1 (CS1); Core Intelligent Network Application Protocol (INAP); Part 1: Protocol Specification, Reference [5].

For SCCP layer routing, both the Signaling Point Code (SPC) + Subsystem Number (SSN) and Global Title Translation (GTT) routing mechanisms are supported. If GTT routing is chosen, the TT default value is 0, but configurable.

IPWorks supports both SIGTRAN and E1 as the transport vehicle.



3 Procedures

This section describes the procedures used in connection with the used interfaces of IPWorks.

3.1 Overview



Figure 2 InitialDP NP request and Response

Based on the InitialDP operation request sent by IPWorks, the response sent by SCF is one of the following messages: Connect, Continue, Release Call or other negative InitialDP response. In some cases, IPWorks may not be able to get any response and a preset timer fires.

3.2 Lower Level Procedures

N/A

3.3 IN-Based Number Portability Service

IPWorks uses the IN-Based Number Portability service in SCF to retrieve the number portability status of a subscriber number. The detailed IPWorks procedure is shown in the following figure.

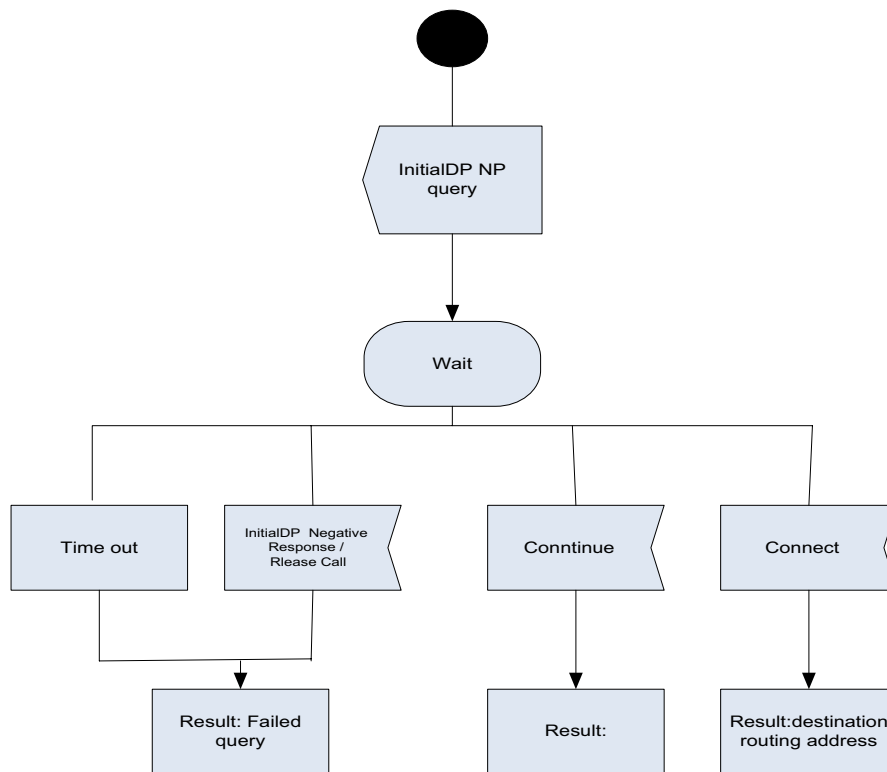


Figure 3 IPWorks InitialDP NP query handling procedure

3.3.1 InitialDP NP query

IPWorks triggers the InitialDP NP query operation towards external SCF node when receiving ENUM queries that fall into some pre-configured number series.

3.3.2 Wait

The default wait timer value is three seconds, which is configurable. Operator could adjust it according to the real network condition.

3.3.3 Connect

The destination routing address parameter is included in the INAP Connect reply,; otherwise IPWorks treats it as an InitialDP negative response.

3.3.4 Result: Destination Routing Address

Destination routing address contains the following information depending on the subscriber type:

**Prefix + directory number**

The prefix indicates the network where the call is routed. IPWorks maps properly this parameters to the ENUM reply.

Only directory number

IPWorks treats the number queried as not ported.

3.3.5 Continue

No parameter is supported by IPWorks in this message.

3.3.6 Result: number not ported

Upon receiving the INAP continue operation, IPWorks treats the subscriber number as not ported.

3.3.7 InitialDP Negative Response/Release Call

IPWorks treats any response (other than the Connect and Continue response) in the same way: the SCF does not have the information it wants and the number portability query has failed.

3.3.8 Time Out

After waiting for the designated period (that is a configured time length), if IPWorks does not receives response from SCF node, the waiting time will fire.

3.3.9 Result: Failed query

IPWorks also take this information as input to proceed with other function processing. No further INAP InitialDP operation is tried for the specific subscriber number.





4 Information Model

This section describes the information model including the mandatory and optional parameters of each service operation.

4.1 General

Each Information Element (IE) is marked as M, C, S, E, or -.

Table 2 Information Element

| | | |
|---|---------------------|---|
| M | Mandatory | An “M” IE is always included. |
| C | Conditional | A “C” IE is included if the sending entity has the necessary information to populate the IE. |
| S | Specific conditions | For the conditions of the inclusion of an “S” IE, see the Description column of the definition table (check the following tables). |
| E | Mutually Exclusive | When a set of “E” IEs is shown in the definition of an Information Flow or compound IE, only one of those IEs may be included. |
| - | Not applicable | A “-” IE is always omitted. |

The following principles apply for the handling of the IEs by IPWorks:

- IPWorks discards any IE that is not functionally supported by IPworks.

4.2 InitialDP Operation Request

This message is specified in Reference [5]. The information elements contained in INAP InitialDP for number portability are described in the following table.

Table 3 InitialDP operation request

| Information element name | Required | Description |
|--------------------------|----------|---|
| Service Key | M | Identifies the requested IN service (MNP query) |
| Called Party Number | M | The possibly ported MSISDN |

4.3 Connect operation

This message is specified in Reference [5]. Upon receiving the INAP Connect operation request, IPWorks expects that the `destinationRoutingAddress` parameter is available. All other parameters in Connect operation request are optional.

Table 4 Connect operation

| Information element name | Status | Description |
|-----------------------------|--------|--|
| Destination Routing Address | M | This parameter contains the called party number towards which the call is to be routed. The encoding of the parameter is defined in ETS 300 356-1 |

4.4 Continue

This message is specified in Reference [5]. This message does not contain any IE.

4.5 InitialDP Negative Response / Release Call

The Release Call message contains one mandatory parameter as specified in Reference [5].

Table 5 InitialDP Negative Response / Release Call

| Information element name | Required | Description |
|--------------------------|----------|---|
| Cause | M | Indicates the reason for releasing the call |

IPWorks treats the Release Call and all other InitialDP Negative Response as that the query has failed.



5 Formal Syntax or Schema

For the interface used by INAP CS1 operations, refer to Reference [5].





6 Related Standards

This interface is based on Reference [5] and Reference [4].

TIP: This interface does not fully comply with the whole specification:

- IPWorks only simulates parts of SSF node function to interact with SCF node for number portability service.
- Major operation messages used in ETS 300 374-1 are InitialDP/Connect/Continue/Release Call.
- Annex A Chapter A 4.2 in 3GPP TS23.066 Release 6 is supported.





Reference List

IPWorks Library Documents

- [1] *Trademark Information*
- [2] *Glossary of Terms and Acronyms*
- [3] *Typographic Conventions*

Standards

- [4] [3GPP TS 23.066 3rd Generation Partnership Project; Technical Specification Group Core Network; Support of Mobile Number Portability \(MNP\); Technical realization; Stage 2 \(Release 6\)](#)
- [5] [ETS 300 374-1: Intelligent Network \(IN\); Intelligent Network Capability Set 1 \(CS1\); Core Intelligent Network Application Protocol \(INAP\); Part 1: Protocol Specification](#)
- [6] [ETS 300 356-1: Integrated Services Digital Network \(ISDN\); CCITT Signalling System No.7; ISDN User Part \(ISUP\) version 2 for the international interface; Part 1: Basic services](#)