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Non Geographic Number Portability

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PNO-ISC SERVICE DESCRIPTION NUMBER 007

NON GEOGRAPHIC NUMBER PORTABILITY

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0.2 Normative information

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0.4 History

Revision	Date of Issue	Updated By	Description
Issue 1	May 2000	Simon Sporton	Editorial changes to conform with BSI format

0.5 Issue control

PAGE	ISSUE	DATE
All	Issue 1	May 2000

0.6 References

- [1] "Options for the Introduction and Development of Non-Geographic Number Portability", OFTEL, 10 January 1996.
- [2] "NICC DOC NO. 96/031 Question Re Non-Geographic Number Portability", OFTEL, April 1996.
- [3] "Non-Geographic Number Portability NICC Task Group Terms of Reference", PNO-IG NGNP Task Group, 3 May 1996.

0.7 Glossary of terms

0.7.1 Definitions

Call Originating Function	A function whereby a call originates from the Originating Network.
Call Trap Function	A function whereby the operator identifies whether he is the Recipient of the dialled number.
Donor	<p>In phase 1 and 2, a Donor is a Number Range Holder, who donates a non-geographic number, and may be a Prefix Adder at the same time. However, in phase 3, Donor ceases to exist because non-geographic numbers will have then become public commodity.</p> <p>In the context of NGNP, 'Donor' has a slightly different meaning to the term as commonly understood in Geographic Number Portability. This term, however, is not used in this document and will be referred to as Number Range Holder in phase 1 and 2.</p>
Function Provider	Operators who have the necessary network capability to perform certain functions specified in section 3.2 and are willing to provide other operators with such capability for NGNP on a commercial basis.
Number Range Holder	<p>This is the holder of the number prior to it being ported. Number Range Holder only exists in phase 1 and 2. In phase 3, non-geographic numbers will become public commodity and will no longer be owned by any one operator.</p> <p>For the purpose of this document, the Number Range Holder is associated with the number administration and management. In phase 1 and 2, a Number Range Holder is an entity who is responsible for administration and allocation of non-geographic numbers within a particular range.</p>
Originating Network (Originator)	The network from which the call is originated.
Prefix Addition Function (Prefix Adder)	The function where a Prefix Adder identifies the Recipient and adds the appropriate prefix to indicate the correct Recipient Network.

Range Analysis Function (Range Analyst)	The function where a Range Analyst analyses a number range for onward routing.
Recipient Network (Recipient)	The network where the Service Logic Function is performed for the ported number.
Service Logic Function	A sequence of processes / functions performed by the Recipient Network to provide a specific service, based upon ITU-T Q.1290 - Glossary of terms used in the definition of Intelligent Network.
Transit Network (Transit Function)	A Transit Network can either be: - a network which conveys a ported call between a network which has added the prefix and the Recipient Network. It recognises a prefixed call and forwards it to the correct Recipient without modifying or removing the prefix.; or - a network which conveys a dialled number between the Originator and the Number Range Holder.

0.7.2 Abbreviations

ACI	Additional Call Information
ACM	Address Complete Message
ASUI	Additional Set Up Information
CB	Cross Border
CCBS	Completion of Call to Busy Subscriber
CI	Charge Indicator
CLI	Calling Line Identity
CPG	Call Progress Message
EDI	Enhanced Diversion Indicator
ETSI	European Telecommunications Standards Institute
ETR	European Telecommunications Recommendations
GVNS	Global Virtual Network Service
HLSD	High Level Service Description
ICSTIS	Independent Committee for the Supervision of Standards of Telecommunications Information Services.
IAM	Initial Address Message
IFAM	Initial and Final Address Message
ISUP	Integrated Services User Part
ITU	International Telecommunications Union
IUP	Interconnect User Part
NGNP	Non-Geographic Number Portability
NICC	Network Interoperability Consultative Committee
NTAI	Network Translated Address Indicator
OFTEL	Office of Telecommunications
PNO-IG	Public Network Operators Interest Group
PNO-ISC	Public Network Operators Interconnect Signalling Committee
POC	Point of Connection
PRS	Premium Rate Service

SASUI Send Additional Set Up Information
ToA Type of Answer

0.8 Scope

This document is intended to serve as a Service Description for the deployment of Non-Geographic Number Portability (NGNP) among different operators in the UK, according to the requirements stated in the question to NICC (Network Interoperability Consultative Committee) under NICC DOC NO. 96/031 and the subsequent Task Group Terms of Reference. It gives guidance as to the practicability of introducing an early implementation of NGNP in the UK and proposes a specific solution. Interim guidance on the preferred long term solution and its recommended technical implementation are also given.

This document presents the industry consensus as to how NGNP should be achieved in the UK. It is not a Functional Specification which will need to be developed by OFTEL in consultation with the industry. While this document is stable for phase 1 and 2, it should be treated as an on-going working document and will be reviewed during the course of the development of NGNP.

The report focuses on the interoperability of NGNP and is not intended as a definition or deployment guide, as these are areas in which each operator may choose their own implementation that conforms to all the requirements of this Service Description. Alternatively, the operators may consider the possible implementation alternatives as recommended in this report.

A guiding principle of the Task Group was that, for call control data exchange, management information and implementation alternatives, the evolution of NGNP should be compatible with the early solution and should be capable of phased introduction by operators working either independently or collaboratively. This introduction should be as fast as possible given technical and commercial constraints.

The Group noted that phase 3 of NGNP should, as far as possible, be compatible with the support systems and processes of all networks developed for phase 1 and 2 (e.g. order processing, billing, fault reporting, and maintenance).

This document presents the Task Group's proposals for the technical solutions for achieving NGNP, in terms of call functionality and network interoperability.

Another major issue which needs to be dealt with is the need of a centralised number administration. This is not necessarily a pre-requisite for the introduction of NGNP although there are benefits for this to be available on day 1. For the long-term solution, however, a number administration function needs to be well-established. The proposals given in this report are independent of the centralised number administration and management.

Any numbering issues raised during the preparation of this document that are outside its scope are reported in the Supplementary Document for further consideration in commercial, regulatory and implementation forums. The Supplementary Document will also discuss issues related to operation, administrative and maintenance procedures that will be necessary to support all phases of NGNP as well as regulatory and commercial issues identified during the technical and practical study.

For the purpose of this study, NGNP is defined as "the ability of a customer to change operator and retain the non-geographic number allocated to them for that particular service [type] within the UK Specified Numbering Scheme." The product defined is NUMBER and not Service or Feature Portability.

"Non-geographic number" or "Location independent number", as defined in ETSI revised version of the draft ETR on Number Portability, is "a number without any geographic information". The Solution for NGNP as addressed in this document is restricted to non-geographic numbers that are available to retail customers. Mobile, paging and personal numbers are not considered in this report because separate issues are involved in introducing portability for these services. OFTEL issued a separate Consultative Document NICC DOC NO. 96/023 for Mobile Number Portability on 28 March 1996 and this will deal with portability for mobile numbers.

In phase 1 and 2, when a customer ceases service on a Recipient Network, the ported number reverts back to the Number Range Holder. If the customer terminates service on one Recipient Network and wishes to port their number to another Recipient Network, then agreement must be reached by the Number Range Holder and the new Recipient. NGNP will only involve the Number Range Holder and one Recipient with no chaining of porting. In phase 3, however, the centralised number administration will enable the ceased non-geographic number to revert back to the 'number pool' and be re-allocated to another customer on a non-discriminatory basis for use with any operator.

1 SOLUTION

1.1 Introduction

The Task Group proposes two phases for the "Early" Solution (phase 1 and 2) and a "Long-Term" Solution (phase 3). All three phases are based on call re-routing using 5xxxxx prefixes and are compatible with one another. The differences lie in the economic efficiency and ability of routing and conveyance as well as access to the number ownership information.

The means by which the routing prefix plus the dialled number is forwarded across the Point of Connection (POC) is left to the individual operators. However, it is anticipated that this will be accomplished by a database query.

Operators who do not have translation capability can employ a Prefix Adder who provides prefix addition function. The Task Group believes that this is a secondary issue as far as the introduction of NGNP is concerned and that individual operators are free to make this implementation decision. The precise responsibilities are therefore excluded from the discussion hereafter.

In the scenarios illustrated in section 4 - Call Progress Summary, Transit Network may be involved and will reside between the Originating and Recipient Networks, depending on the interconnect arrangements among the operators concerned. For simplicity, Transit Networks are not described in the call progress.

1.2 Functional Model

A functional model comprising six functions is used to define the functionality of all exchanges in the setting up of a call to a ported number. These six functions are:

- Call Originating Function
- Call Trap Function
- Range Analysis Function
- Prefix Addition Function
- Service Logic Function
- Transit Function

There are also four entities identified for NGNP:

- Originating Network
- Number Range Holder
- Transit Network
- Recipient Network

In addition to these four entities, there is a role, commonly known as the 'Donor' (see section 0.7.1 - Definitions).

A single entity may perform more than one function e.g. the Originating Network is likely to be the Range Analyst unless it has special arrangement to direct non-geographic numbers via a specific operator. Operators may change role or cease to exist, depending on either the commercial arrangements or the phase at which they are operating (see definition of 'Donor'). In addition, some functions e.g. Transit Function may not exist in a call set-up (see section 1.5 for details of phase evolution.)

Operators, who wish to participate in NGNP but do not have the capability to perform Call Trap Function, Range Analysis Function or Prefix Addition Function, may contract a Function Provider to carry out the required functions on their behalf.

1.3 Phase 1 and 2

Phase 1 is the solution where all calls available for NGNP are routed as they are today, i.e. to the network which performs Prefix Addition Function for that number range. It is then the responsibility of that network to perform Service Logic Function if the number is hosted by them, or to apply the correct prefix and route the call to the Recipient in an efficient manner otherwise.

The distinction between phase 1 and phase 2 is that in phase 2 the Originator has to filter out dialled numbers

which have been ported to itself, i.e. the Originator is the Recipient. This is referred to as the Call Trap Function, the purpose of which is to reduce the degree of tromboning and therefore improves routing efficiency. Alternatively, Call Trap Function can be performed by any other physical network prior to the call being prefixed, on behalf of the Originator. Calls which do not belong to the Originator will be forwarded in the same way as described in phase 1. Implementation of phase 2 featuring the Call Trap Function is at the operator's discretion.

Phase 1 and 2 assume that only the Number Range Holder and the Recipient have information of the number status i.e. whether it is ported and to whom it has been ported.

1.4 Phase 3

In phase 3, the Number Range Holder is abandoned in preference to the centralised number administration. The network performing Prefix Addition Function identifies the correct Recipient of the dialled number. This is achieved by referring to a centralised database which will hold all non-geographic numbers to which portability may be applied.

Initially, this may be accomplished by means of a paper based record or a simple electronic data interface mechanism. As the demand of NGNP and the numbers available for portability grow, this can be migrated to an automated database to which all operators providing non-geographic number services will connect via some protocol (to be agreed). The Task Group feels that a well managed non real-time database will be the most efficient and cost-effective means to hold and provide the information. A copy of the database with the essential information as agreed by the industry can be downloaded to each operator and will be updated periodically or on request. All operators will send information about changes of number status to the centralised number administration.

For the purpose of this study, it has been assumed that the centralised number administration will be managed by an independent party.

Even when the number recipient information is available to all operators, some operators may retain phase 1 or phase 2 operation for part or all of their calls due to various reasons. In this case, they have to contract to a phase 3 operator who will perform the centralised database look-up. In phase 3, from a PROCESS viewpoint, the industry must have a cross-industry phase 3 inter-operator process even if it is in a mixed phase OPERATION environment due to differences in operators' network capabilities.

Operators who do not have the capability to apply prefix will forward the call via a Prefix Adder.

1.5 Evolution of Phase 1, 2 and 3 (For further study)

A guiding principle of the Task Group was that, for call control data exchange, management information and implementation alternatives, the evolution of NGNP should be compatible in terms of interoperability and should be capable of phased introduction by operators working either independently or collaboratively. This introduction should be as fast as possible given technical and commercial constraints.

Initially, operators can choose to provide NGNP by means of phase 1 or phase 2 implementation. The ability to migrate to phase 3 is enabled by the introduction of the centralised number administration. This will require an in-depth investigation of ownership, allocation and management of numbers, management and design of the database, management and ownership of the organisation, processes, operation, costs etc. Given our tasks and limited amount of time for our technical study, the Task Group feel that it will be most appropriate if another industry group be set up to study the requirements of the centralised number administration and implementation of phase 3, and that it will be best carried out once the industry have had some experience with NGNP under phase 1 and 2.

1.6 Structure of Prefixes

The routing prefixes used will not be a dialable number, such as 3 digit short code, but will be a code which uniquely identifies the type of number portability, in this case it is NGNP, and the POC at the Recipient Network. The structure of the prefixes and their allocations are subject to control by OFTEL.

To remain consistent with the prefix principles of Geographic Number Portability, calls to ported non-geographic numbers will be routed using six digit fixed length 5xxxxx prefixes of the form 504xxx, where '5' indicates 'Number Portability', '04' indicates that the type of portability is for 'non-geographic numbers' and 'xxx' identifies the Recipient.

It was generally accepted that most operators need only one prefix each and should not require more than two prefixes. To optimise the availability of prefixes, the Task Group suggests that a detailed proposal is to be drawn up by an industry operational and process group for submission to OFTEL for consideration and

adoption.

Among the 130 Public Telecommunications Operator (PTO) Licensees in the UK, just over 40 of them have been allocated Freephone, Local Rate, National Rate or PRS numbers to date. Although both the number of PTO Licensees and Number Translation Service Providers will increase, it is unlikely that the nine hundred prefixes (excluding the 5049xx range as described below) in the 504xxx range will run out.

It was also suggested that a range within 504xxx is reserved for common operator internal use (e.g. 5049xx). This will introduce the ability in phase 2 to efficiently route calls to non-ported numbers thus eliminating the potential of circular routing of a call between an operator's IN (or translation switch) and its core network.

Consider the EXAMPLE where a call to OPERATOR1's 0800 number (where OPERATOR1 is the Number Range Holder) originates in OPERATOR2. Under phase 2, the 0800 call will be passed from the Originator's core network to the IN to determine if the call has been ported. If it has been ported to OPERATOR2, who is therefore both the Originator and the Recipient, then OPERATOR2 will 'trap' the call and perform Service Logic Function.

However, if the call has not been ported, OPERATOR2's IN will prefix the 0800 number with 5049xx, where the 5049xx identifies where the call should be handed over to OPERATOR1. The 5049xx prefix will be removed before the call is handed over the interconnect. Without this measure, however, the non-prefixed call would be routed from the IN to the core network which would recognise it as a new 0800 call and therefore attempt to route it back to the IN, thus causing circular routing.

Since 5049xx prefixes are used within a network, different operators can use the same range and there are enough prefixes within the 5049xx range for all Number Range Holders. Further, with the introduction of phase 3, the concept of the Number Range Holder would cease and the 5049xx range can be relinquished. The Task Group feel that this is a wise precaution against routing inefficiency and faults.

1.7 Requirements on Networks

All Operators wishing to avail themselves of the number portability function must be able to fulfil all the requirements of both the Number Range Holder Network and the Recipient Network. If an operator has part or whole of the number range that is deemed to be portable, those numbers will have to be available for portability.

All calls transferred between operators will be accounted for the purposes of interconnect settlement.

Calls with a prefix added will be routed to the Recipient Network directly or via a Transit Network who has the capability to determine subsequent routing based on prefix analysis. Any prefixed call received by a Transit Network will be routed without modifying or removing the prefix.

If the number has not been ported, the Number Range Holder will perform the Service Logic Function.

The Recipient Network will connect calls to the ported number when correctly received over a POC. If either the dialled number or the prefix is incorrect, the number will be made unobtainable. The prefix cannot be modified or removed. The Recipient will investigate the fault as part of the fault management procedures.

Calls will be passed between networks according to the agreed arrangement between the operators concerned. Operators should ensure that such routing arrangements optimises the efficiency of the delivery of these calls.

2 CALL PROGRESS SUMMARY (FOR PORTED NUMBERS ONLY)

The scenarios shown in this section are examples of possible mappings of functions and physical entities as described in section 1.2. For simplicity, the following call progress scenarios assume that :

- the number is ported from OPERATOR 1 to OPERATOR 2;
- all operators have Range Analysis and Prefix Addition Functions;
- Transit Networks are excluded from the discussions in this section.

2.1 Phase 1

Phase 1 Case 1 - Call Originates at OPERATOR 3

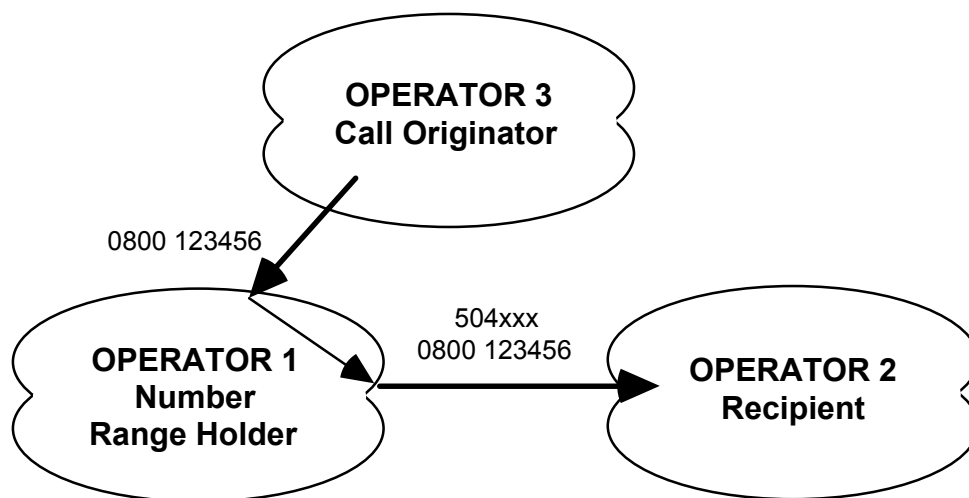


Figure 1 - Phase 1 Case 1 - Call originates at OPERATOR 3

OPERATOR 3	OPERATOR 1 Number Range Holder	OPERATOR 2 Recipient
1. Call <u>originates</u> . 2. <u>Range Analyst</u> - Analyse number range and route on dialled digits as it did before portability, i.e. to the known Number Range Holder.	3. <u>Range Analyst</u> - Analyse number to determine if the number is owned by itself. 4. <u>Prefix Adder</u> - Identify the number is now ported to OPERATOR 2. Add prefix identifying Recipient. 5. Route on prefixed number to Recipient.	6. Perform <u>Service Logic Function</u> .

2.1.1 Phase 1 Case 2 - Call originates at the Number Range Holder

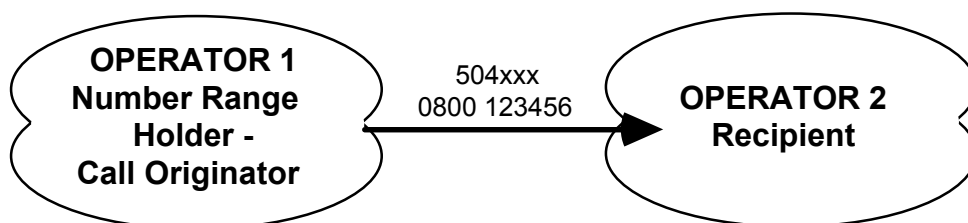


Figure 2 – Phase 1 Case 2 - Call originates at the Number Range Holder

OPERATOR 3	OPERATOR 1 Number Range Holder	OPERATOR 2 Recipient
	1. Call <u>originates</u> . 2. <u>Range Analyst</u> - Analyse number to determine if the number is owned by itself. 3. <u>Prefix Adder</u> - Identify the number is now ported to OPERATOR 2. Add prefix identifying Recipient. 4. Route on prefixed number to Recipient.	5. Perform <u>Service Logic Function</u> .

2.1.2 Phase 1 Case 3 - Call Originates at the Recipient

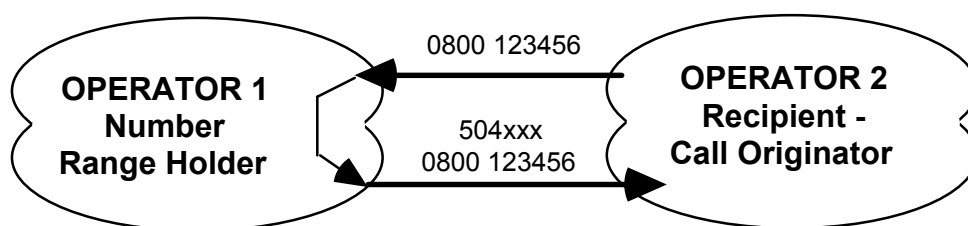


Figure 3 – Phase 1 Case 3 - Call originates at the Recipient

OPERATOR 3	OPERATOR 1 Number Range Holder	OPERATOR 2 Recipient
	3. <u>Range Analyst</u> - Analyse number to determine if the number is owned by itself. 4. <u>Prefix Adder</u> - Identify the number is now ported to OPERATOR 2. Add prefix identifying Recipient. 5. Route on prefixed number to Recipient.	1. Call <u>originates</u> . 2. <u>Range Analyst</u> - Analyse number range and route on dialled digits as it did before portability, i.e. to the known Number Range Holder. 6. Perform <u>Service Logic Function</u> .

2.2 Phase 2

2.2.1 Phase 2 Case 1 - Call Originates at OPERATOR 3

Same as Phase 1 Case 1 (see Figure 1).

2.2.2 Phase 2 Case 2 - Call Originates at the Number Range Holder

Same as Phase 1 Case 2 (see Figure 2).

2.2.3 Phase 2 Case 3 - Call Originates at the Recipient

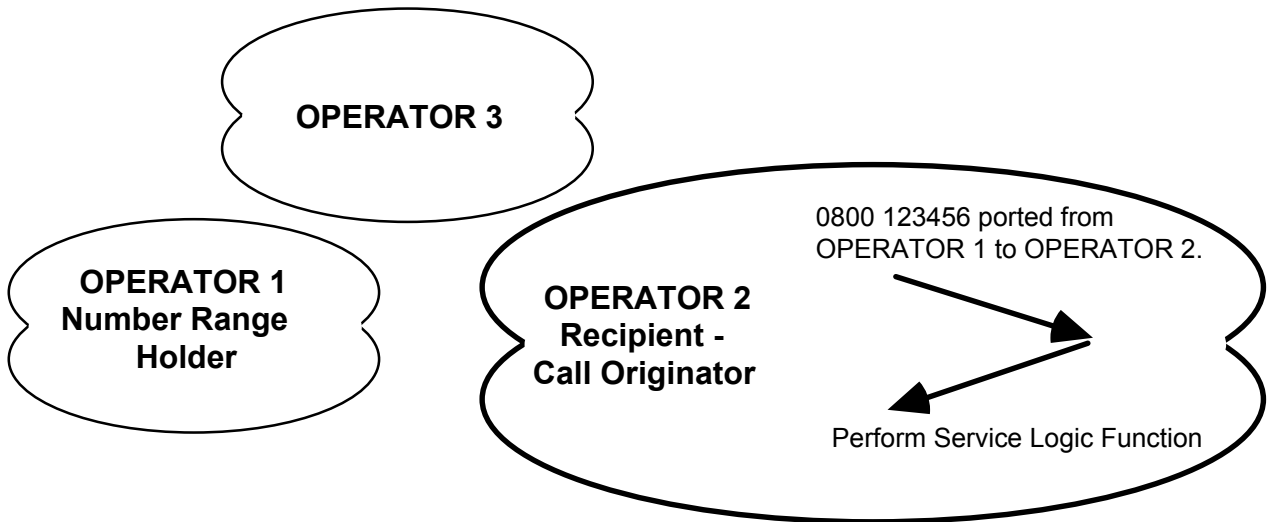


Figure 4 – Phase 2 Case 3 - Call originates at the Recipient

OPERATOR 3	OPERATOR 1 Number Range Holder	OPERATOR 2 Recipient
		1. Call <u>originates</u> . 2. <u>Range Analyst</u> - Analyse number to determine that the number is ported to itself. OPERATOR may choose to prefix the number at this stage. 3. Perform <u>Service Logic Function</u> .

2.3 Phase 3

2.3.1 Phase 3 Case 1 - Call Originates Outside the Recipient Network

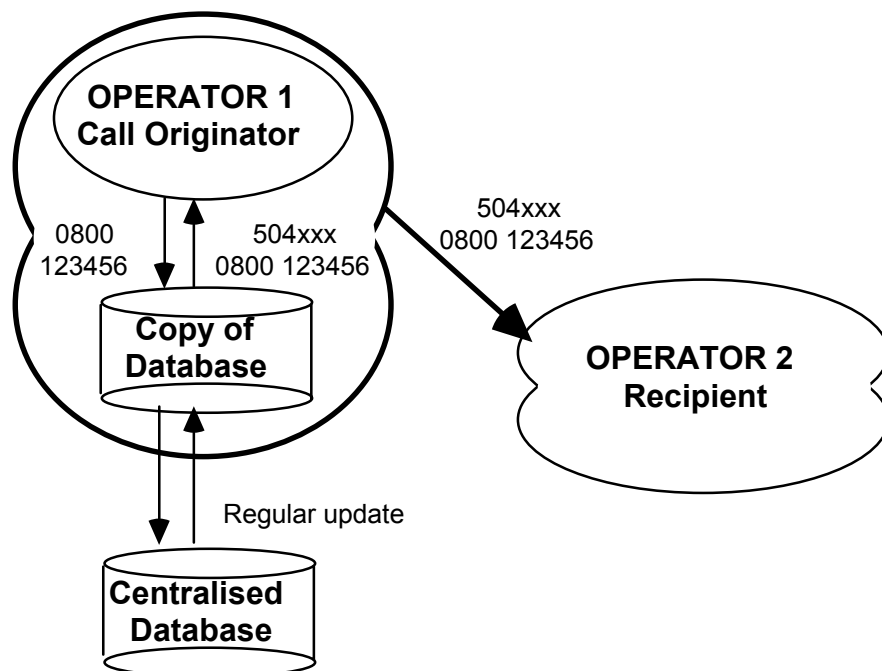


Figure 5 – Phase 3 Case 1 - Call originates outside the Recipient Network

OPERATOR 1	OPERATOR 2 Recipient
1. Call <u>originates</u> . 2. <u>Range Analyst</u> - Analyse number to identify that the number is ported to OPERATOR 2. 3. <u>Prefix Adder</u> - Add prefix identifying Recipient. 4. Route on prefixed number to Recipient.	5. Perform <u>Service Logic Function</u> .

2.3.2 Phase 3 Case 2 - Call Originates in the Recipient Network

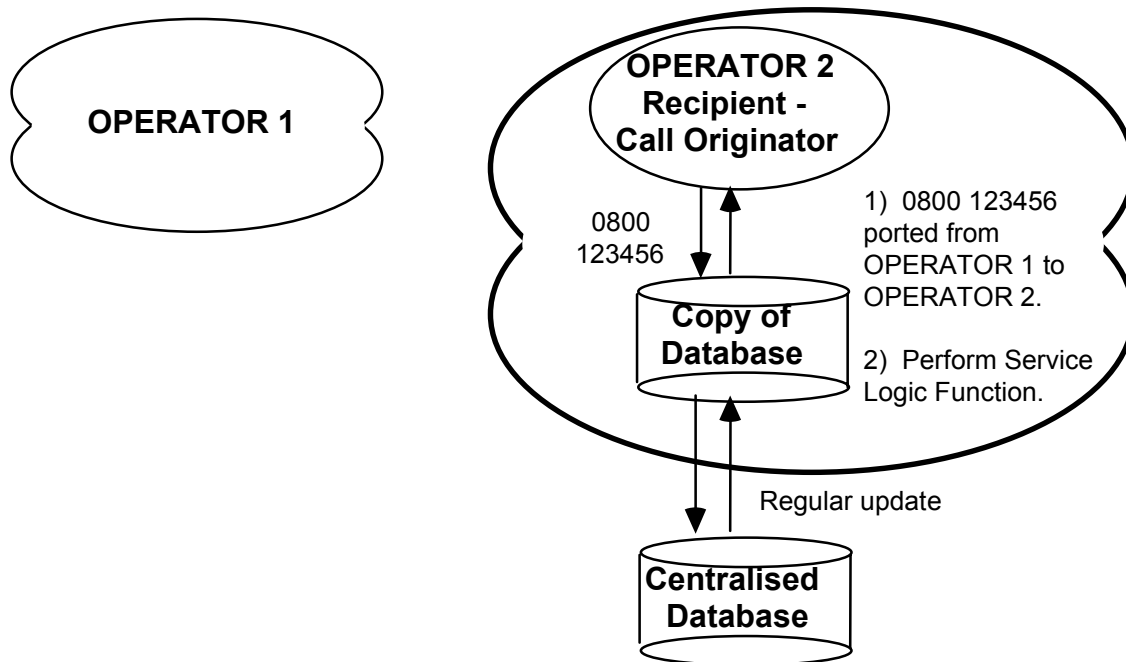


Figure 6 – Phase 3 Case 2 - Call originates in the Recipient Network

OPERATOR 1	OPERATOR 2 Recipient
	1. Call <u>originates</u> . 2. <u>Range Analyst</u> - Analyse number to identify that the number is ported to itself. 3. Perform <u>Service Logic Function</u> .

3 SIGNALLING

3.1 Introduction

The UK interconnect signalling systems which are impacted by the presence of NGNP are IUP (Interconnect User Part) and ISUP (ISDN User Part).

A design aim of the NGNP solution described in this document has been that no changes to the existing C7 IUP message structure are required. The PNO-ISC/IUP Working Party is to be requested to confirm this, and provide any IUP signalling specification necessary to support NGNP on IUP.

The PNO-ISC/ISUP Working Party is to be requested to provide any signalling specification necessary to support NGNP on UK ISUP.

The rules for IUP and ISUP signalling given in sections 3.2.2 and 3.2.3 below are for guidance only and may be removed when the PNO-ISC specifications are available.

3.2 Transparency Requirements

3.2.1 Transparency Rules, General

The general principle relevant to the transparency of C7 user part signalling is that the network applying the prefix should transit all signalling messages as would a Transit Network, except for the addition of the prefix in the routing digits of the I(F)AM.

3.2.2 IUP Signalling

The network applying the prefix should do so by adding the prefix to the beginning of the Called Address field of the I(F)AM.

The network applying the prefix should onward route using either IFAM (Initial and Final Address Message) or IAM (Initial Address Message), with IFAM being the preferred option, to minimise post dial delay.

Other than the Called Address field, all parameters in the I(F)AM should have the values they would have been given had the call been transited without a number portability prefix having been applied.

In particular the following parameters should not be modified as a result of adding a number portability prefix:

- Enhanced Diversion Indicator (EDI);
- Cross Border (CB) - used to indicate CLI (Calling Line Identity) unavailable;
- Network Translated Address Indicator (NTAI).

The network applying the prefix should not modify the ACM (Address Complete Message) or its parameters. In particular the CI (Charge Indicator) parameter should not be modified.

It is outside the scope of work on NGNP to specify the value of the ACM CI parameter generated by the terminating network, and its interpretation by the originating network or charge point. However, it is expected that the terminating network will set the CI to '1' (charge), and that the charge point will ignore this parameter.

The network applying the prefix should not modify the Answer message or its parameters. In particular the ToA (Type of Answer) parameter should not be modified.

It is outside the scope of work on NGNP to specify the value of the Answer ToA parameter generated by the terminating network, and its interpretation by the originating network or charge point. However, it is expected that the terminating network will set the ToA to '1' (Answer - chargeable) if calls to the terminating line or service are usually charged, and to '0' (Answer - non chargeable) if calls to the terminating line or service are usually not charged. The network performing the Service Logic Function may modify the ToA parameter to a value dependent on the service. The charge point is expected to use the value of the Answer ToA parameter as a recommendation only.

For all messages not covered above, the network applying the prefix should transit the message as would a Transit Network.

It is noted that some implementations of the Prefix Addition Function may automatically generate an ACI (Additional Call Information) message requesting CLI, and await the response before proceeding. This ACI generation is acceptable. Subsequent ACI messages should transit the Prefix Addition network.

It is noted that some implementations of the Prefix Addition Function may cause an ACM message to be

generated. It is strongly recommended that such an ACM is not generated, but if it is generated then all subsequent signalling functions must function correctly. Subsequent signalling includes the ACM originated by the terminating network, and the reception of SASUI/ASUI messages.

It is noted that some proposed implementations of the Prefix Addition Function may cause an Answer message to be generated. Such Answer generation is not acceptable.

3.2.3 ISUP Signalling

The network applying the prefix should do so by adding the prefix digits to the appropriate parameter of the IAM.

Other than this parameter, all parameters in the IAM should have the values they would have been given had the call been routed without a number portability prefix having been applied.

In particular the following parameters should not be modified as a result of adding a number portability prefix:

- Redirecting number;
- Redirecting information;
- Original called number;
- Generic number.

The network applying the prefix should not modify the parameters of ACM, Answer, CPG (Call Progress Message) and Connect messages as a result of applying the number portability prefix. In particular, the CI of the Backward Call Indicators should not be so modified.

Specification of the use of the CI in these messages is outside the scope of work on NGNP.

For all messages not covered above, the network applying the prefix should transit the message as would a Transit Network.

3.3 Interaction with ISUP Supplementary Services

The only ISUP Supplementary Service for which NGNP interworking problems have been identified is CCBS (Completion of Call to Busy Subscriber). However, the interworking problems of CCBS are not confined to NGNP, and affect several other services, including Geographic Number Portability, IN services generally and GVNS (Global Virtual Network Service). These CCBS interworking problems are being considered within the UK by PNO-ISC Working Parties and internationally by ITU-T Study Group 11/4.

It is recommended that any CCBS interworking mechanism identified as a standard will allow CCBS to interwork with NGNP.

End of PNO-ISC/SER/007