NICC ND 1428 V1.1.3 (2010-11)

NICC Document

NGN; PSTN/ISDN Service Interconnect; Guidance to CPs on PSTN Destination Group usage

Note : This standard was originally intended to allow fulfilment of changes to General Condition 18 which were announced by Ofcom via the November 2007 Statement entitled “Telephone number portability for consumers switching suppliers - Concluding Statement”. This change was subsequently set aside by the Competition Appeal Tribunal (Case 1094/3/3/08), and in the April 2010 Statement entitled “Routing calls to ported telephone numbers”, Ofcom concluded that no changes were justified.

However, Ofcom recognised the benefits that a common numbering database approach could bring both to number portability arrangements and to the conservation of geographic numbers, and further concluded that :

> *We consider that a direct routing solution for interconnected fixed networks using such an approach could become viable if and when next generation core network technology is adopted widely by network operators. While the timescale of such adoption is currently uncertain, we would encourage network operators to consider the benefits of incorporating direct routing capability into their next generation network designs.*

Accordingly, whilst NICC Standards cannot warrant what the precise model of usage of a common numbering database for future NGNs will be, this document provides an indication of what was considered appropriate when the issue was considered by NICC, and hence should be borne in mind by network operators when meeting Ofcom’s request to consider direct routeing when designing their NGNs.

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Contents

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Foreword

This NICC Document (ND) has been produced by NICC This NICC Document (ND) has been produced by NICC Naming Numbering and Addressing Working Group

Introduction

This document should be read in conjunction with ND1631 [2], which sets out the architecture for usage of a Common Numbering Database. Within [2], the concept of Destination Groups (DGs) is introduced, and it is specified that Communication Providers (CPs) will be assigned one or more ranges of DGs to identify destinations in their network. This document provides guidance to CPs of how DGs assigned to them are best structured. It is produced in advance of detailed pan industry discussion on routeing and interconnect schemes using DGs, and therefore may be subject to change in the light of those discussions.

1 Scope

This document provides guidance to CPs of how PSTN DGs assigned to them should be structured.

This document is informative only.

2 References

For the particular version of a document applicable to this release see ND1610 [1].

2.1 Informative references

[1] NICC, ND1610, Multi-Service Interconnect of UK Next Generation Networks

[2] NICC ND1631: "NGN; PSTN/ISDN Service Interconnect; Architecture for usage of Common Numbering Database"

[3] NICC ND1208 "Mobile Number Portability"

3 Definitions and abbreviations

3.1 Definitions

For the purposes of the present document, the following terms and definitions apply:

Destination Group : A Destination Group represents a set of numbers (which may or may not be contiguous) served by a communications provider for which another provider would make the same routeing decisions for all numbers within it

E-F Digit boundary : the boundary between the seventh and eighth digits in a UK telephone number including the leading zero.

Far End Handover : Interconnect routeing practice where the call is handed over to the next network at the interconnect location as near as practicable to the termination.

Near End Handover : Interconnect routeing practice where the call is handed over to the next network at the interconnect location as near as practicable to the origination.

3.2 Abbreviations

For the purposes of the present document, the following abbreviations apply:

CP	Communications Provider
DG	Destination Group
IRN	Intermediate Routeing Number, defined in ND 1208 [3]
MAP	Mobile Application Part (of C7 signalling)
MRC	Mobile Rerouteing Code
SRF	Signalling Relay Function

4 Background to Destination Groups

The concept of Destination Groups (DGs) was introduced in ND1631 [2], which sets out the architecture to be adopted for usage of a common numbering database. When the database is queried with a number, it returns the same number, prefixed with a Destination Group. This Destination Group is then used to route calls to the terminating network (or correct node within that terminating network).

A DG represents a set of numbers served by a Communications Provider (CP) for which another CP would make the same routeing decisions for all numbers within it. As such, from a given origin there should be a common routeing plan for all numbers within a given DG, although (depending upon the commercial policy of the routeing CP concerned) multiple DGs may use the same routeing plan. For example:

- An originating CP which does not have an interconnect directly to the terminating CP identified by a set of DGs could route all of those DGs to a common transit network.
- Similarly, if the routeing CP does not connect to every node on the terminating network, they may route a set of DGs to a common tandem interconnect point.

The set of numbers that comprise a DG may or may not be contiguous; for example a DG could represent the set of number ranges served by a terminating node, minus any exported numbers plus any imported numbers.

PSTN DGs are of the form 7<CP-identity><internal destination>, where

- <CP-identity>, which identifies either an individual or group of CPs, is a four-digit number between 2000 and 9999 inclusive, allocated centrally; and
- <internal-destination>, which identifies either a location within a CP, or a CP within a group of CPs, is a three-digit number retaining leading zeroes, i.e. in the range 000 to 999.

5 Requirements of Destination Groups

Originating networks will receive numbers prefixed by DGs when querying the common numbering database. As such, it is important that they are reasonably able to both route using the DG and apply any accounting arrangements based upon the DG, potentially in combination with significant digits of the subsequent number. This clause sets out the requirements that other CPs can reasonably expect the terminating CP to apply when devising a DG structure. It is recognised that, in devising the structure of a DG scheme, CPs will need to balance the often conflicting requirements set out below.

5.1 Uniqueness

A DG should only be used for numbers that are to be routed in the same way. A DG must not be re-used, for example, to represent two terminating locations which would have quite different routeing plans in originating and transit networks.

This does not, of course, preclude a CP having a single DG that represents the entirety of their network, so long as originating networks are not able to yield cost savings by routeing numbers within a given DG differentially.

5.2 Aggregation

Where possible, DGs should be structured to allow routeing aggregation by CPs that do not wish to route each DG individually. Transposing this into a firm guideline is problematic as no two network architectures are alike. However, NICC has considered this aspect and concluded that it is preferable that, for DGs requiring Far End Handover, the leading digits of the <internal-destination> field should identify the physical handover and where possible the particular call control function controlling the media path. Further, where it is possible to encode the approximate geography of a physical handover into the leading digits, this should be considered.

Note : It is recognised that the geography element is problematic and it is impossible for the terminating CP to devise a scheme that will suit all originating/transit CPs because the interconnect locations served by two CPs' nodes in a given location will never be the same. At best, it could be possible to highlight the broad geography of an interconnect handover if it does not introduce too high a degree of inefficiency to the scheme.

5.3 Efficiency

A <CP-identity> provides a terminating CP with one thousand potential DG values. In the vast majority of cases this should be sufficient and only in exceptional circumstances will additional <CP-identity> values be assigned. As such, it is incumbent on terminating CPs to be efficient in their assignment of DGs, and not to devise a scheme that is inherently wasteful of resources.

In particular, where two sets of numbers need not be distinguished for either routeing or tariffing purposes, they should be in the same DG. Where only the terminating CP needs to distinguish, splitting such sets into multiple DGs should be carried out in such a way as to not prevent other CPs' ability to aggregate.

5.4 Minimisation of DG and routeing changes

Where, for example, there is a need to re-arrange networks, depending upon the DG scheme adopted it could be necessary to either change the DG that is applied to numbers in the common numbering database, or to change the node to which a given DG is routed by network elements. Both options drive costs for other networks, for the former by increasing the overall cost of providing the database (more changes = more cost), or for the latter by driving direct costs in reconfiguring other networks. CPs are encouraged to consider this aspect in devising their DG scheme, to minimise the overall cost to industry.

5.5 Interconnect Charging

For some numbers, it should be possible to agree commercial arrangements for interconnect traffic solely upon the combination of DG and interconnect point used. An example of this is geographic numbers.

For other numbers, it will be possible to agree arrangements based solely on the DG itself. An example of this is mobile numbers.

For some number types, however, it will be necessary for commercial arrangements to look at both the DG and the significant digits of the subsequent number. For example, the 08 and 09 ranges contain numbers with a plethora of retail price points hence interconnect charges, but a given network's 08 and 09 ranges will follow only very few routeing plans (indeed it could be a single one). In order to have interconnect commercial arrangements which depend solely upon the DG, it would be necessary to have a DG for each of these price points, which would be very inefficient. As such, in this case a single DG for each set of numbers with a common routeing plan is considered most appropriate.

The demarcation between whether a set of numbers should have a single DG (hence require analysis of the leading digits of the subsequent numbers to apply interconnect accounting) or have a set of DGs representing each interconnect accounting price point lies at the E-F digit level. If the commercial arrangement can be determined by examining no further than the E digit of the subsequent number, then a common DG should be used. If it cannot, then multiple DG values should be used.

Note : This implies that for geographic numbers, if there is a differential termination rate according to the line type, each line type should have a separate DG value.

Where possible, DGs should be separated between those where it is necessary to examine the subsequent digits to determine commercial interconnect arrangements, and those where it is not. For example, a single DG should not contain some numbers where subsequent analysis is required, and others for which it is not. Further, where possible this distinction should be drawn at the leading digits of the <internal-destination>.

5.6 Near versus Far End Handover

Where possible those DGs requiring Near End Handover should not be interspersed with those where Far End Handover is rewarded.

6 Example Destination Group structures

This Clause provides some typical examples of good practise in devising Destination Group structures. Any similarity to real CPs, living or deceased, is unintentional.

6.1 Mobile CPs

As a result of digit limitations in MAP, Mobile CPs as a whole have been assigned the <CP-identity> value of 2007. Inherent within this assignment is that the <internal-destination> identity can only be a given Mobile CP's value of Mobile Rerouteing Code (MRC) as used in Intermediate Routeing Numbers (IRNs).

Therefore, a CP with there an MRC assigned by Ofcom of 7456 will automatically have a DG value of 72007456. As such, is no need to devise a further internal structure.

This does not preclude that CP getting a subsequent <CP-identity> of their own, but, if they were to do so, the interworking to IRNs for incorporation in MAP would not be possible.

6.2 Small CP

As an example, consider a CP that has five physical handover points (two of which are in London), has a single/paired call control function, and serves both geographic (requiring Far End Handover) and non-geographic (requiring Near End Handover) numbers. For the latter, the CP has numbers with a series of price points, that utilise a common service platform. If their <CP-identity> is, for example, 4567, their DG scheme could be:

7 4567 000 - Near End Handover where it is necessary to examine the subsequent number to determine accounting

7 4567 1xx - Handover #1 (Scotland)

7 4567 2xx - Handover #2 (North England)

7 4567 3xx - Handover #3 (Midlands)

7 4567 4xx - Handover #4 (London)

7 4567 5xx - Handover #5 (London)

7 4567 6-9xx - Spare

Depending upon the CP's internal requirements, the xx could be set to a common value such as 00, or could vary to represent a set of terminations served by the given handover (e.g. 00 = customer access gateway group A, 01= access gateway group B, etc). If, however, the CP did adopt this latter approach, they must be cognisant of the impact if they were to move numbers between their gateways.

6.3 Medium CP

As an example, consider a CP that has twenty physical handover points, three of which are in London. The interconnect architecture is such that there is only one call control function relevant to each handover. The CP serves both geographic (requiring Far End Handover) and non-geographic (requiring Near End Handover) numbers. For the latter, the CP has numbers with a series of price points, that utilise a common service platform. If their <CP-identity> is, for example, 5678, their DG scheme could be;

7 5678 000 - Near End Handover where it is necessary to examine the subsequent number to determine accounting

7 5678 10x - Handover #1 (Scotland)

7 5678 15x - Handover #2 (Scotland)

7 5678 20x - Handover #3 (North England)

7 5678 25x - Handover #4 (North England)

7 5678 30x - Handover #5 (Wales)

7 5678 40x - Handover #6 (Midlands)

7 5678 45x - Handover #7 (Midlands)

…

7 5678 90x - Handover #18 (London)

7 5678 93x - Handover #19 (London)

7 5678 96x - Handover #20 (London)

Depending upon the CP’s internal requirements, the x could be set to a common value such as 0, or could vary to represent a set of terminations served by the given handover (e.g. 0 = customer access gateway group A, 1= access gateway group B, etc). If, however, the CP did adopt this latter approach, they must be cognisant of the impact if they were to move numbers between their gateways.

The values of DG such as 7 5678 11x would be kept spare, for either (a) expansion of existing handovers (for example if Handover#1 served more than ten groups of customer access gateways) or (b) introduction of new handovers (for example if a new interconnect point was introduced in Scotland).

6.4 Large CP

As an example, consider a CP that has twenty five physical handover points spread across the country, has as many as seven call control functions controlling each handover and serves both geographic (requiring Far End Handover) and non-geographic (requiring Near End Handover) numbers. For the latter, the CP has numbers with a series of price points, that utilise a common service platform.

The CP also breaks charging down further, discriminating according to the one of two types of line on which the call terminates.

6.4.1 Schema #1

For this Schema, the CP has been assigned two <CP-Identity> values 3000 and 3001.

Their DG scheme could be;

7 3000 000 - Near End Handover where it is necessary to examine the subsequent number to determine accounting

7 3000 100. … 7 3000 119 – Far End Handover to Handover #1 (Scotland)

7 3000 120 … 7 3000 139 – Far End Handover to Handover #2 (Scotland)

7 3000 200. … 7 3000 219 – Far End Handover to Handover #3 (NE England)

7 3000 300 … 7 3000 319 – Far End Handover to Handover #4 (Yorkshire)

7 3000 320. … 7 3000 339 – Far End Handover to Handover #5 (Yorkshire)

7 3000 400 … 7 3000 419 – Far End Handover to Handover #6 (NW England)

…

7 3001 100 … 7 3001 119z – Far End Handover to Handover #10 (London)

7 3001 120. … 7 3001 139 – Far End Handover to Handover #11 (London)

7 3001 140 … 7 3000 159 – Far End Handover to Handover #12 (London)

7 3001 160. … 7 3000 179 – Far End Handover to Handover #13 (London)

…

7 3001 500 … 7 3000 519 – Far End Handover to Handover #25 (SW England)

Given each handover would have 20 DG values, these could readily accommodate 7 call control functions x 2 line types.

The advantage of this structure is that for other CPs;

- CPs that do not have direct interconnect to the large CP could route either on the basis of the 73000/73001, or if they wished to use a modicum of regionalisation, 73000x/73001x.
- For CPs with wider connectivity to the large CP, only call control functions “local” to a given handover need to know the full detail of the plan. For example, an originating CP with a node in London could build 73000 1xx to generically point to their Scottish call control function, and only break out the detail of the specific meanings of the “xx” at that call control function.
- If CPs have wide connectivity to the large CP but are content to select the correct handover and have no desire to e.g. select the correct call control function at that handover, then even the “local” node need only know that 7300010 and 7300011 represent that handover, and not bother analysing the final digit.

6.4.2 Large CP – schema #2

An alternative to the schema outlined in Section 6.4.1 is that the same large CP has been assigned three <CP-Identity> values 3000, 3001 and 3002.

In this case, their DG scheme could be;

7 3000 000 - Near End Handover where it is necessary to examine the subsequent number to determine accounting

7 3000 1nz. – Far End Handover to Handover #1 (Scotland)

7 3000 2nz – Far End Handover to Handover #2 (Scotland)

7 3000 3nz – Far End Handover to Handover #3 (NE England)

7 3000 4nz – Far End Handover to Handover #4 (Yorkshire)

7 3000 5nz – Far End Handover to Handover #5 (Yorkshire)

7 3000 6nz – Far End Handover to Handover #6 (NW England)

…

7 3001 0nz– Far End Handover to Handover #10 (London)

7 3001 1nz.– Far End Handover to Handover #11 (London)

7 3001 2nz – Far End Handover to Handover #12 (London)

7 3001 3nz – Far End Handover to Handover #13 (London)

…

7 3002 5nz – Far End Handover to Handover #25 (SW England)

The value of n would determine the terminating call control function, for example, DG 73000 10z could be controlled by one call control function, DG 73000 11z by another etc. The value of z would determine the line type, as it applied to charging.

The advantage of this structure is that for other CPs;

- CPs that do not have direct interconnect to the large CP could route either on the basis of the 73000/73001/730002, or if they wished to use a modicum of regionalisation, 73000x/73001x/73002x.
- For CPs with wider connectivity to the large CP, only call control functions “local” to a given handover need to know the full detail of the plan. For example, an originating CP with a node in London could build 730001xx to generically point to their Scottish call control function, and only break out the detail of the specific meanings of the “xx” at that call control function.
- If CPs have wide connectivity to the large CP but are content to select the correct handover and have no desire to e.g. select the correct call control function at that handover, then even the “local” node need only know that 730001xx represents that handover, and not bother analysing the final digits.
- Even for a CP selecting both the handover and call control function, the analysis of the value of z would be something which would be relevant only to billing, not to networks.

History

Document history		
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1.1.1	August 2008	First publication
1.1.2	October 2008	Warning about status of regulation added to cover-sheet
1.1.3	November 2010	Warning regards regulatory status updated

End of Document