



ATIS STANDARD

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**RECOMMENDED PLAN FOR EXPANDING THE
CAPACITY OF THE NORTH AMERICAN
NUMBERING PLAN (NANP)**

December 13, 2001

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Executive Summary

This report completes the INC's evaluation of the North American Numbering Plan (NANP) expansion and provides the INC's final recommendation to add a fourth digit to the end of the NPA field and an additional digit to the beginning of the Central Office code field, resulting in a twelve-digit numbering plan. The expanded format would then be as follows:

NXX(X) + (X)NXX + XXXX

The INC has investigated three different transition methodologies and recommends that the transition to the new plan be a two-digit simultaneous expansion. The existing ten-digit NANP number would be expanded to twelve digits during a single transition.

This report also defines the associated timelines and dependencies required to ensure timely evolution of the numbering plan to an expanded format. Critical to NANP expansion is the recognition of the major activities essential for implementation. The INC has identified these activities, and estimates that a ten-year lead-time is necessary. In addition, the expansion plan requires that the historic D digit not be released prior to NANP expansion. This is necessary so that during the transition both the existing and expanded NANP numbers can be dialed.

Finally, the INC acknowledges that any NANP expansion plan entails major expenditures for, and modifications to, the North American telecommunications network. Any expansion plan will also have a significant impact on all users. For these reasons, it is anticipated by the INC that the national regulatory authorities in the NANP participating countries have a vested interest in creating policy directives required to ensure the timely implementation of NANP expansion for the benefit of all telecommunication users. The INC intends that this report will enable adequate planning, execution, and seamless transition to NANP expansion when it occurs.

The INC's work on NANP expansion includes two other reports. The first report, the Interim NANP Expansion Report, was issued in December 1999 and chronicled five options culled from twelve that were under consideration by the INC at that time. The second report, the NANP Expansion Reference Document, provides reference information on selection procedures and criteria. This latter document includes the rationale for excluding the options not deemed feasible, and the detailed criteria and procedures used for evaluating all options.

**RECOMMENDED PLAN FOR EXPANDING
THE CAPACITY OF THE NORTH AMERICAN NUMBERING PLAN**

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RECOMMENDED PLAN FOR EXPANDING THE CAPACITY OF THE NORTH AMERICAN NUMBERING PLAN

1.0 Background

The Mission of the INC NANP¹ Expansion Workshop is “to develop an industry agreed recommendation for expanding the capacity of the North American Numbering Plan to meet the long term needs of the telecommunications industry and the user community in the geographic area served by the NANP.”

In fulfilling this mission, this report summarizes the results of an issue opened on December 10, 1993, that includes the evaluation and assessment of alternative expansion plans and recommends a selected expansion plan.

The work leading to this report has identified alternatives for modifying/expanding the NANP format. During this time frame, INC has evaluated and assessed the implications of various alternatives. This report also contains descriptions of three transition alternatives for the recommended expansion plan that include timelines and transition considerations.

1.1 Estimates of NANP Exhaust

NANP exhaust is typically associated with the timeframe and the event when the last assignable area code has been allocated. The INC has made no claims as to the date of exhaust, and has relied on the periodic projections released by the NANP Administrator based on NANP Numbering Resource Utilization / Forecast (NRUF) data. This exhaust calculation historically was made using data collected from the Central Office Code Utilization Survey, or COCUS, conducted annually. In 2001, the NANPA used the data from the semi-annual Number Resource Utilization/Forecast (NRUF) Form 502 to calculate NANP exhaust.

The current (2001) NANPA projection of exhaust is the year 2025 with a timeframe range between 2024 and 2038 depending on the applicable assumptions. In 1999, NANPA projected that NPAs (Number Plan Areas, typically referred to as area codes) would be completely depleted between 2007 and 2012. These figures were revised slightly in the 2000 COCUS study ranging from 2012 to 2018. Even with number optimization measures being adopted,² demand for numbers may unexpectedly accelerate their exhaust, due to nascent

¹ The NANP is the basic numbering plan for the public switched telecommunications networks in the following 19 countries in Country Code 1: Anguilla, Antigua & Barbuda, Bahamas, Barbados, Bermuda, British Virgin Islands, Canada, Cayman Islands, Dominica, Dominican Republic, Grenada, Jamaica, Montserrat, St. Kitts & Nevis, St. Lucia, St. Vincent & the Grenadines, Trinidad & Tobago, Turks & Caicos Islands, and the United States (including Puerto Rico, the U.S. Virgin Islands, Guam and the Commonwealth of the Northern Mariana Islands).

² These measures include number portability, number pooling, rate center consolidation, utilization requirements, etc.

competition and new technologies. For this reason, proactive examination of the expansion alternatives has been thorough and ongoing.

1.2 NANP Expansion Documents

INC's work on NANP expansion options includes two other reports. The first report, the Interim NANP Expansion Report was issued in December 1999 and chronicled five options culled from twelve that were under consideration by the INC at that time. The second INC document, the NANP Expansion Reference Document³ provides reference information on selection procedures and criteria. This latter document includes the rationale for excluding the options not deemed feasible, and the detailed criteria and procedures used for evaluating all options.

This present report completes the INC evaluation of NANP expansion and provides the INC's final recommendation on NANP expansion. Should any major assumptions change, this recommendation will be revisited.

This report defines the changes in NANP format and numeric structure as well as optional transition plans, and their associated timelines and dependencies required to ensure timely evolution of the number resource to the expanded format.

Critical to NANP expansion is recognition of the major activities essential for implementation. The INC has identified these activities, and estimates that a ten-year lead-time is necessary.

The INC acknowledges that any NANP expansion plan entails major expenditures for, and modifications to, the North American telecommunications network. In addition, any NANP expansion plan will require adjustment, and impact all its users. For these reasons, it is anticipated by the INC that the national regulatory authorities in the NANP participating countries have a vested interest in creating the policy directives required to ensure the timely implementation of NANP expansion for the benefit of all telecommunication users. The INC intends that this report will enable adequate planning, execution, and seamless transition of NANP expansion when it occurs.

³ This document has been developed since the initiation of the project. This document is available at www.atis.org.

2.0 Overview of Project

2.1 History

In January of 1992 the NANPA (then Bellcore) released a document called the Long Range Numbering Plan (LRNP) addressing their future projections and assumptions for the allocation and use of the NANP numbering resources. Later in November 1992, a Long Range Number Planning (LRNP) forum was established and subsequent to that, the Future Numbering Forum (FNF) had its first meetings. As a result of these initial industry efforts to address critical numbering issues, the topic of NANP expansion found its way to the INC. Other key developments that have stemmed from this effort, led to the formation of the NANC as well as the introduction of the overlay technique for NPA relief.

The last major expansion of the North American Numbering Plan (NANP) occurred in 1995 with the introduction of interchangeable NPA codes. This effort added a potential of 640 more NPAs to the NANP. In general, this expansion effort occurred in a controlled cost and operational environment on December 31, 1995. The industry, regulators, and the public were informed of this expansion ten years in advance which reduced its cost and gave everyone adequate notice of the event. There have been minimal negative impacts within the area served by the NANP as a result of the introduction of interchangeable codes. Since that time, there have been no agreed upon plans that have been implemented to expand the NANP.

In December 1993, the Industry Numbering Committee (INC) accepted Issue #022 – "NANP Format Expansion" and commenced work on determining a strategy for expanding the NANP.

The INC requested and carefully considered input from all segments of the industry, consumer groups, regulatory authorities, and general interest groups/individuals for expansion proposals and continues to actively encourage such input.

This report, derived through industry consensus, is intended to provide the detailed procedures required to meet the long-term needs of the telecommunication industry and the user community in the geographic area served by the NANP.

The plan documents the resulting expansion process requirements when expansion beyond the current ten-digit limit is required. The plan defines the numerical/format expansion requirements and identifies the transition strategies, trigger points and dependencies required to ensure the smooth and timely evolution of the NANP.

This NANP Expansion Plan is intended to be a living document that will be maintained by the industry through regularly scheduled updates or action trigger mechanisms, which are to be identified and maintained in the document.

To date, the INC has considered 28 NANP expansion options. Although one plan has been selected, new proposals continue to be evaluated when received. Those that have been eliminated from current consideration are listed in the NANP Expansion Reference Document (“Reference Document”).

Further details of these eliminated options and the rationale for their rejection are documented in the INC Reference Document (refer to ATIS Web site- <http://www.atis.org>).

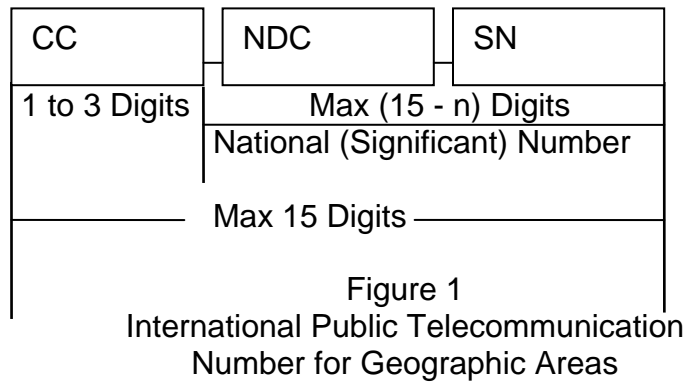
This INC NANP Expansion Report provides details of the final recommendation. The report contains high-level option descriptions, transition plans, significant advantages and disadvantages, and identifies prerequisites and dependencies associated with the recommended expansion approach.

2.2 Major Assumptions and Constraints

This section lists the assumptions and constraints that the INC has been using to evaluate NANP expansion options. All of these assumptions and constraints have been agreed to by industry consensus, and all viable NANP expansion options must meet all these assumptions and constraints. Certain assumptions have been modified as the work has progressed corresponding to new industry and or regulatory developments.

- a). The digits of the NANP will be of the decimal system (i.e., “0” through “9”).
- b). The control characters, star (*) and number sign (#), will continue to be used only as control characters to indicate a special dialing/addressing function.
- c). The dial/keyboard/keypad on basic terminals will remain functionally unchanged.
- d). The basic function of manual “dialing” must be maintained (i.e., automatic input will not become universal).
- e). The expanded NANP will remain consistent with International Telecommunications Union (ITU) Recommendation E.164 (Public Telecommunications Numbering Plan). See Figure 1.

The structure of the ITU Recommendation E.164 number is made up of the following fields:



Where:

CC = Country Code

NDC = National Destination Code

SN = Subscriber Number

n = the number of digits in the Country Code

- f) The length of the National (Significant) Number in the expanded NANP will be limited to twelve digits. This is to ensure compliance with ITU Recommendation E.164, which allows for a maximum length of three digits for the country code within the maximum length of fifteen digits for the international number.
- g) The expanded NANP resources will continue to be assigned to and used exclusively by service providers and users who reside in the countries that form the NANP community.
- h) The expanded NANP must provide for adequate numbering resources for a competitive environment within any of the countries served by the NANP. The plan should not disadvantage one industry segment or NANP country over another.
- i) The expanded NANP must contain a functional component to increase the quantity of Numbering Plan Areas (NPAs) in order to ensure the availability of additional NPAs when the current supply is exhausted.
- j) The expanded NANP must contain a functional component to mitigate the need for future NPA relief.

- k) Both expansion plan components, as described above, should be addressed by the expansion proposal. This may be accomplished in one phase (i.e. simultaneously) or through two phases.
- l) The expanded NANP shall support the Public Switched Telephone Network (PSTN). These NANP resources do not accommodate private numbering plans. Existing and future services' interfaces and network capabilities should be supported by the expanded numbering resource.
- m) The expanded NANP should be implementable with sufficient time to permit both an orderly transition to the expanded format and provide sufficient numbering resources to meet industry requirements.
- n) The expanded NANP must meet applicable national regulatory or governmental requirements (e.g., number portability) in effect at the time the expanded NANP is implemented.
- o) The NANP expansion plan must apply throughout the NANP serving area subject to the appropriate regulatory or governmental procedures and constraints. In order to remain part of the NANP each country must implement the accepted NANP expansion plan.
- p) The expanded NANP should not be constrained by the current practice of assigning line numbers in blocks of ten thousand to switching entities or points of interconnection (POI).
- q) The expanded NANP must support service provider number portability in both geographic and non-geographic applications. At the time of the release of this report, the following assumptions apply to the portability of geographic numbers:
 - i) NPA's will retain geographic significance (i.e., defined geographic coverage areas);
 - ii) portability with pooling will at a minimum cover the top one hundred MSAs in the U.S.;
 - iii) portability and pooling are restricted to a rate center;
 - iv) portability will apply to all geographic numbers used in a wireline/wireless environment;
 - v) location portability may eventually need to be supported throughout any given portability pooling area and will not be restricted to rate centers; and
 - vi) While service provider portability refers to the ability of end users to retain the same telephone number as they change from one service provider to another, service portability refers to the ability of users of telecommunications services to retain existing telecommunications numbers without impairment of quality,

reliability, or convenience when switching from one telecommunications service to another service (i.e. POTS to ISDN) provided by the same telecommunications carrier.

- r) The N restriction (i.e., 2 through 9) will be removed from the existing D digit in the Central Office (CO) code field coincident with the implementation of the NANP expansion plan.
- s) The conditions defined in the INC Uniform Dialing Plan⁴ will be implemented before the NANP expansion plan is implemented.

⁴ See INC Uniform Dialing Plan, INC 97-0131-017, www.atis.org/atis/clc/inc/incdocs.htm

3.0 Selection Process/Considerations

The NANP Expansion Workshop dedicated a number of meetings to evaluating options for NANP expansion. The objective of the meetings was to identify the best candidates by comparing their relative ability to meet specific assessment criteria with the expectation of recommending a specific expansion plan to the industry. This resulted in fewer viable options at each stage in the selection process. Details and the rationale regarding the elimination of plans are documented in the NANP Expansion Reference Document.

Initially, each option was evaluated against the assumptions and constraints (see Annex B and C). The next phase was an evaluation using the assessment criteria described below. When a given option failed to meet this evaluation, the rationale for elimination was documented. For example, if a proposed alternative used symbols and digits rather than just the digits 0-9, the plan did not meet the basic assumptions and constraints and was subsequently rejected. In addition, each option was evaluated against assessment criteria relating to such items as: increased usable capacity in numbers; basic human factors; consistency with international standards, etc. When a given option failed to meet this evaluation, the rationale for elimination was documented. For example, plans that added capacity to an irrelevant portion of the number (i.e. in the station/line number field) were rejected.

As indicated in row one of Table 1 below, some of the options were eliminated based on the fact that they conflicted with the Assumptions and Constraints that INC had established. The results of the evaluations are captured in meeting notes and correspondence and recorded in either Annex B or C of the Reference Document.

Row two of the table shows that other options satisfied the Assumptions and Constraints, but failed to meet critical Assessment Criteria. The justification for these decisions is documented in Annex B and C of the Reference Document.

Row three indicates options that were eliminated using a matrix approach. During this evaluation, INC ranked each option under each category of Assessment Criteria on a comparative basis that resulted in the elimination of a number of options. The rationale for the elimination of these is documented in Annex F of the Reference Document.

Row four indicates options that were subjected to a second phase of numerical matrix evaluation that were eliminated based on their relative inability to satisfy the Assessment Criteria, and they are documented in Annex C of the Reference Document.

Row five references the Pro/Con analysis that led INC to five potential options documented in the Interim NANP Expansion Report dated December 10, 1999.

After the issuance of the Interim NANP Expansion Report the remaining five options were evaluated (see row six of the table), which were later reduced to two potential alternatives. This phase of the evaluation was based on a more detailed analysis of transition issues, most notably “zero plus” dialing conflicts. The details of this evaluation are documented in Annex B of the Reference Document.

At this point, INC had two plans left to consider. One of the plans added one digit to the NPA code (called plan 1A) and the other added two digits to the existing NANP (one digit to the NPA and the other digit to the CO code, referred to as 1B). At the same time INC received a suggestion from the FCC regarding the concept of only adding one additional digit to the central office code. INC then decided to accommodate all these options into one recommendation that supported the addition of one or two additional digits to the NPA or CO code fields. This resulted in the present plan being recommended.

Table 1: High Level View of the Selection Process

Type	Documentation Source	Evaluation Basis:	Additional Documentation
1. Reject upon Summary Evaluation	Annex B and C in Reference Document	Conflict with Assumptions and Constraints	Meeting Notes and Correspondence
2. Further Evaluate and then Reject	Annex B and C in Reference Document	Passed Assumptions and Constraints but Failed Assessment Criteria	
3. Phase I	Annex F in Reference Document	Passed Assessment Criteria and Matrix Phase I	Captured in Matrix
4. Phase II	Annex C in Reference Document	Passed Matrix Phase II and Pros & Cons	
5. Short List	Interim Report and Annex B	Pros & Cons	Captured in Meeting Notes
6. Further Review	Reference Document	More detailed description on how the plans would transition	Annex C

3.1 Assessment Criteria

The following criteria were used to assess all NANP expansion options. The assessment process focused on the relative merits of one plan versus another. Also, since most expansion options included the potential for a phased approach, assessment incorporated the merits of each phase as well as the total expansion package. The following key criteria are further described in the Reference Document:

- Human Factors Needs
 - Degree of Stability
 - Easy to Understand
 - Service Identification
- Impact on Call Processing and Network Operations
 - Digit Analysis and Translations
 - Digit Analysis on Inbound International Calls
- Signaling
 - SS7 Standards Impact
 - SS7 Applications Impact
 - Recording and Rating
 - Operations Support Systems (OSS)
 - Operator Service Systems
 - Emergency Systems
- Life Expectancy of Expanded NANP
- Numbering Resource Utilization/Efficiency
- Accommodating Future Network Requirements
- Requirements Between Countries Served by the NANP
- Consistency with Public Policy
- Uniform Availability of Numbers
- Additional Digits
- Evolution/Transition
- Administration

3.2 Selection Process

In total, the INC has considered twenty-eight NANP expansion options to date. In 1999, this was narrowed down to five feasible options. These five were further reduced to two and, upon closer examination, one viable plan was selected based on the following specific criteria.

1. Human Factors Needs - User impacts, public perspective.
2. Degree of Stability – Minimal change required for implementation.
3. Easy to Understand – Ability to be accepted by the general public.
4. Easy to Use - Ease of use based on similarity to the existing NANP format.

5. Service Identification - Ability of new plan to maintain service recognition, e.g., toll free, 911.
6. Impact on Call Processing and Network Operations – Support of translation functions.
7. Digit Analysis and Translations - Call routing, including presubscription and toll issues.

In addition, certain specific dependencies and prerequisites which are either required to enable the implementation of the expansion plans, or which conversely would preclude their implementation, have been identified in the major alternatives for NANP expansion. INC, in its study of the alternatives, has made the following assumptions pertaining to these dependencies.

- a) Prior to NANP expansion, the INC Uniform Dialing Plan must be approved and implemented throughout the NANP (i.e., ten-digit dialing and the elimination of any current uses of the prefix 1).
- b) The release of the D digit will not occur prior to NANP expansion.

These two proposed network changes are not independent of one another. Specifically, when the D digit is released and Central Office codes commencing with the digits 0 and 1 are introduced, the network will no longer support seven-digit dialing. This in turn supports the INC's recommendation to move to all ten-digit dialing per the INC Uniform Dialing Plan.

If one or both of these assumptions are violated in any portion of the NANP, it would prevent the ability to ensure a uniform transition to certain options and would eliminate other options.

4.0 Recommended Expansion Plan

The INC recommends expanding the format of the NANP by adding two additional digits, one digit to the NPA field and one digit to the Central Office code field. The current ten-digit NANP can be expanded to twelve digits by three different transition methods. This allows for the greatest flexibility in selecting the method of expansion and provides the industry a long-term direction on how to plan for NANP expansion.

Since it is possible to implement the two-digit format changes in separate phases, policy-makers may choose to implement only one digit of the expansion until necessity requires more. In any case, the transition options offer policy-makers flexibility in addressing the many considerations associated with such a significant change.

4.1 Recommended NANP Expansion Plan Format

The INC Recommended NANP Expansion Plan adds a fourth digit to the end of the NPA field and an additional digit to the beginning of the Central Office code field, resulting in a twelve-digit numbering plan. The expanded format will be as follows:

NXX(X) + (X)NXX + XXXX

where

NXX (X) a four digit NPA with **(X)** the additional digit

(X)NXX a four digit Central Office Code with **(X)** the additional digit

XXXX a four digit line number

Here, the values,
N represents digits 2 through 9, and
X represents digits 0 through 9,

Note: The new F Digit (sixth digit of the expanded plan) takes on the values of 2 through 9 to allow a future expansion effort if and when needed.

4.1.1 Plan Capacity

The existing NANP format (NXX NXX XXXX) provides 6.4 billion numbers (800 x 800 x 10,000). The expansion plan increases the number of NPAs from 800 to 8,000 and the number of Central Office codes from 800 to 8,000. The quantity of numbers available with this option is therefore:

$NXX(X) + (X) NXX + XXXX = (8,000 \times 8,000 \times 10,000) = 640 \text{ billion.}$

The expansion plan contains approximately a 100-fold increase in the quantity of available numbers relative to the existing NANP's total of 6.4 billion. Within each

NPA, the addition of 7200 Central Office codes increases the quantity of numbers in the NPA by 72 million.

4.1.2 Dependencies & Prerequisites

The INC recommended NANP expansion plan requires that ten-digit dialing be implemented within all parts of the NANP prior to expansion. This is necessary so that additional digits can be added to the end of the NPA and the beginning of the CO code (NXX) thereby creating a four-digit NPA Code and a four-digit CO Code. The current uses of the prefixes 0 and 1 will still be available.

The expansion plan also requires that the present (historic) D digit not be released prior to NANP expansion. This is necessary so that during the transition both the existing and expanded NANP can be dialed and the network can determine whether the caller has dialed a ten-digit TN, an eleven-digit TN, or a twelve-digit TN by the analysis of the historic D digit.⁵

The following sections present a detailed discussion on three alternative transition methodologies:

4.2 Transition Method 1 (Both Digits Implemented Simultaneously)

Transition Method 1 adds two digits to the NANP at the same time. The ten-digit NANP number would be expanded to twelve digits during a single transition. The final expansion format would be:

NXX(X) + (X) NXX + XXXX

To achieve that transition, we start from the existing NANP:
NXX + NXX + XXXX

Examples of the current ten-digit NANP format transitioning to the twelve-digit expanded NANP format numbers are shown below.

Geographic numbers would be changed as follows:

972-NXX-XXXX becomes 9720-0NXX-XXXX

202-NXX-XXXX becomes 2020-0NXX-XXXX

613-NXX-XXXX becomes 6130-0NXX-XXXX

⁵ A rejected approach was to implement a timing period after the completion of dialing to determine if the dialing of the number is complete. This approach was unacceptable due to post dial delays on all telephone calls dialed with the old format.

514-NXX-XXXX becomes 5140-0NXX-XXXX

Non-Geographic numbers would be changed as follows:

800-NXX-XXXX becomes 8000-0NXX-XXXX

900-NXX-XXXX becomes 9000-0NXX-XXXX

Special Use Codes would be affected as follows:

N11 codes would remain N11 ⁶

950-XXXX would remain 950-XXXX

202-555-1212 would change to 2020-0555-1212

4.2.2 Transition to Expanded NANP Using Method 1

During the transition period (one year) both the new and old plans need to be supported. The values of the fourth digit in the existing ten-digit NANP (historic D digit) cannot be a 0 or 1. Using the 0 or 1 value in the D digit position will provide the necessary indication for all switching equipment and operational support systems to ensure identification of an expanded twelve-digit NANP number. Method 1 could potentially be implemented with the new fourth digit of the NPA being either 0 or 1 allocated for Canada's exclusive and permanent use. During the transition period, only the value 0 or 1 can be used in the fourth position to differentiate the new from the old plan throughout the NANP. All non-geographic NPAs will be assigned a new fourth digit, either 0 or 1, across the entire NANP area. The allocation of the specific digits is unresolved. After transition, the values 2-9 will be assigned for growth.

Expansion is facilitated by adding the digits (00, 01, 10, 11) in the fourth and fifth positions of a ten-digit NANP number, immediately after the existing three-digit NPA, except for special use codes. Once the switching system has determined that the end user dialed an existing ten-digit number, the switch can be instructed to insert the appropriate combination in the fourth and fifth digit positions and forward this number on to subsequent switching systems. Signaling and billing systems can be arranged to transition to the twelve-digit NANP number long before the customers need to dial the twelve-digit number.

⁶ However, should the subscriber dial N110 or N111, the results will be the same as if N11 was dialed.

During the permissive dialing period, network switches will be able to determine whether the caller was dialing a ten-digit or twelve-digit number by checking the value of the D digit.

It is recommended that a one-year permissive dialing period be used to effect a transition. After the transition period is over, four-digit NPA codes and four-digit CO codes can then be assigned using other digit values (2-9) in the fourth and fifth digits.

4.3 Transition Method 2 (Phased Approach with NPA Implemented First)

Transition Method 2 first adds a fourth digit to the end of the NPA code and then at a later date adds an additional digit to the beginning of the CO Code field. The ten-digit NANP number would be expanded to eleven digits during the first transition phase. The eleven-digit number would be subsequently expanded to twelve digits during a second transition phase at some later date.

To achieve this transition, we start from the existing NANP:
NXX + NXX + XXXX

We then go through an intermediate eleven-digit phase:
NXX (X) + NXX + XXXX

Before reaching the final expansion format
NXX(X) + (X)NXX + XXXX

Examples of the current ten-digit NANP format transitioning to the twelve-digit Method 2 expanded NANP format numbers are shown below.

Geographic numbers would be changed as follows:

972-NXX-XXXX becomes 9720-NXX-XXXX after the first transition phase, then 9720-NXX-XXXX becomes 9720-0NXX-XXXX after the second transition phase.

202-NXX-XXXX becomes 2020-NXX-XXXX after the first transition phase, then 2020-NXX-XXXX becomes 2020-0NXX-XXXX after the second transition phase.

Non-Geographic numbers would be changed as follows:

800-NXX-XXXX becomes 8000-NXX-XXXX after first transition phase, then 8000-NXX-XXXX becomes 8000-0NXX-XXXX after the second transition phase

888-NXX-XXXX becomes 8880-NXX-XXXX after first transition phase, then 8880-NXX-XXXX becomes 8880-0NXX-XXXX after the second transition phase

Special Use Codes would be affected as follows:

N11 codes would remain N11⁷

950-XXXX would remain 950-XXXX

202-555-1212 would change to 2020-555-1212 then change to 2020-0555-1212

4.3.1 Transition to Expanded NANP Using Method 2

The fourth digit in the existing ten-digit NANP cannot be a 0 or 1. Using the 0 or 1 digit in the D digit position will provide the necessary indication for all switching equipment and operational support systems to ensure identification of an expanded eleven-digit NANP number during the first transition period. Also before the first transition phase occurs, all numbers must be dialed on a ten-digit basis. During the first transition phase both ten and eleven digit numbers must be supported.

Step one transitioning is enabled by adding the digit 0 or 1 as the fourth digit of the NPA code, except for special use codes. Once the switching system has determined that the end user dialed an existing ten-digit number, the switch can be instructed to insert a 0 or 1 in the fourth digit position and forward this number on to subsequent switching systems. It is recommended that the initial transitioning phase be one year.

Method 2 could potentially be implemented with the new fourth digit of the NPA being either 0 or 1 allocated for Canada's exclusive and permanent use. During the transition period, only the value 0 or 1 can be used in the fourth position to differentiate the new from the old plan throughout the NANP. All non-geographic NPAs will be assigned a new fourth digit, either 0 or 1, across the entire NANP area. The allocation of the specific digits is unresolved. After transition, the values 2-9 will be assigned for growth.

After this first transition, although it will be possible to have a 0 in the fourth digit, there will be an E digit restriction that blocks the fifth digit from taking on the values of 0 or 1 in the new eleven-digit number.

⁷ However, should the subscriber dial N110 or N111, the results will be the same as if N11 was dialed.

Phase two transitioning is enabled by adding the 0 or 1 as the first digit of the new four-digit CO Code. Since the restriction barring the use of the digits 0 and 1 in the first digit remains, using the 0 digit as the new first digit of the expanded CO code field will enable switching systems to determine if an eleven or twelve digit number has been dialed.

Signaling and billing systems can be arranged to transition to the eleven-digit and then a twelve-digit NANP number long before the customers need to dial the eleven-digit number and then the twelve-digit number.

During the permissive dialing periods, network switches will be able to determine whether the caller was dialing an expanded format or non-expanded number by checking the value of the D and E digits.

It is recommended that the transition period for phase two also be one year. At the end of the transition period, digits other than 0 or 1 can be assigned in the expanded digit fields.

It is also recommended that there be an interval of not less than several decades between the end of the step one transition period and the beginning of the step-two transition period.

4.4 Transition Method 3 (Phased Approach with CO Code Implemented First)

Transition Method 3 first adds a digit to the beginning of the CO code field and then at a later date adds a digit to the end of the NPA. The ten-digit NANP number would first be expanded to eleven digits during the first transition phase by adding a 0 to the beginning of the CO code. The eleven-digit NANP number would then be expanded to twelve digits during a second transition phase by adding a 1 to end of the NPA.

To achieve this transition, we start from the existing NANP:
NXX + NXX + XXXX

We then go through an intermediate eleven-digit phase:
NXX + (Y)NXX + XXXX where Y = 0,2-9

And then transition to the final expansion format with the following configuration
NXX(X) + (X)NXX + XXXX

Examples of the current ten-digit NANP format transitioning to the twelve-digit Method 3 expanded NANP format numbers are shown below.

Geographic numbers would be changed as follows:

972-NXX-XXXX becomes 972-0NXX-XXXX after the first transition phase, then 972-0NXX-XXXX becomes 9721-0NXX-XXXX after the second transition phase

202-NXX-XXXX becomes 202-0NXX-XXXX after the first transition phase, then 202-0NXX-XXXX becomes 2021-0NXX-XXXX after the second transition phase

Non-Geographic NPAs would be changed as follows:

800-NXX-XXXX becomes 800-0NXX-XXXX after the first transition phase, then 800-0NXX-XXXX becomes 8001-0NXX-XXXX after the second transition phase

888-NXX-XXXX becomes 888-0NXX-XXXX after the first transition phase, then 888-0NXX-XXXX becomes 8881-0NXX-XXXX after the second transition phase

Special Use Codes would be affected as follows:

N11 codes would remain N11⁸

950-XXXX would remain 950-XXXX

202-555-1212 becomes 202-0555-1212 after the first transition phase, then 2021-0555-1212 after the second transition phase

4.4.2 Transition to Expanded NANP Using Method 3

The fourth digit in the existing ten-digit NANP cannot be a 0 or 1. Using the 0 digit in the D digit position will provide the necessary indication for all switching equipment and operational support systems to ensure identification of an expanded eleven-digit NANP number during the first transition phase.

Phase one transitioning is enabled by adding the digit 0 as the new first digit of the CO code field. Limiting the value of the new digit to 0 is necessary to provide uniqueness to the new number and to allow for the second phase transition. Subsequent to transitioning into phase one, the new digit can take on all values other than the value 1. Once the switching system has determined that the end user dialed an existing ten-digit number, the switch can be instructed to insert a 0 in the fourth digit position (i.e. first position of the CO code field) and forward this number on to subsequent switching systems.

⁸ However, should the subscriber dial N110 or N111, the results will be the same as if N11 was dialed.

Phase two transitioning is enabled by adding the digit 1 as fourth digit of the NPA code. Since the restriction barring the use of the digit 1 in the first digit of the CO code field remains, using the value 1 for the new fourth digit of the expanded NPA field will enable switching systems to determine whether an eleven-digit or twelve-digit number has been dialed.

This Method 3 transitioning does not support the adoption of a unique digit for Canada's exclusive and permanent use.

Signaling and billing systems can be arranged to transition to the eleven-digit and then a twelve-digit NANP number long before customers need to dial the eleven-digit number and then the twelve-digit number.

During the permissive dialing periods, network switches will be able to determine whether the caller was dialing an expanded format or non-expanded number by checking the value of the D and E digits.

It is recommended that one year permissive dialing periods be used to effect a transition. At the end of the transition phases, digits other than 0 and 1 can be assigned in the expanded digit fields.

It is also recommended that there be an interval of not less than several decades between the end of the step one transition period and the beginning of the step-two transition period.

4.5 Comparison of Transition Methods

The INC supports an eventual expansion of the NANP by two digits, going from ten to twelve digits. In converging on that ultimate goal, INC recognizes that expansion by a single digit will provide relief from exhaust for a considerable, though indeterminate, length of time. Policy-makers may opt to implement only a first phase initially and postpone implementation of a second phase until necessity peeks over the horizon. Clearly, expanding either the NPA field or the CO code field will generate sufficient resources to accommodate the numbering needs in the near term. However, the telecommunications industry's orderly evolution requires long term planning, which the INC's two-digit plan provides by pointing the way to a further expansion. If decision-makers elect a phased approach, the industry will be able to plan for the long term whether policy-makers choose to start with the NPA or the CO code fields. If policy-makers choose to implement both changes at once, they should gain sufficient resources to meet the industry's and the public's needs for the imaginable future.

Policy-makers must evaluate and resolve the issue regarding the complexity to the public at large of a one-time change involving two digits versus two separate changes, each involving a single digit. If it is determined that two separate

changes are easier for the public to deal with, the next question is whether the perceived human factor advantage in a phased transition is sufficient to overcome the additional cost for a two-phase implementation.

The various methods of transitioning to the expanded NANP must be considered in many contexts. However, there are no significant technical obstacles identified with any of the methods. Two important considerations are costs and human factors, neither of which INC has examined in a definitive manner since both lie outside its mandate.

From a relative cost perspective, INC believes there is no significant cost difference between Methods 2 and 3. Since both are implemented in two phases, the costs to inform and prepare the public, as well as to design, engineer, and deploy telecom networks, equipment, and systems must be borne twice. However, Method 1 enjoys the benefit of incurring such expenses only once and therefore is the clear winner with respect to cost minimization. Moreover, with Method 1 the full benefit of the expanded NANP will be made available to the public and the telecommunications industry immediately after the single-phase transition.

Considering implementing only the first phase of Method 2 or 3 in the near term presents a different set of trade-offs. The first phase of Method 2 will not directly affect the need for NPA relief; it will simply provide more NPAs to relieve those nearing exhaust. Expanding the CO code field by adding a digit in front of it will achieve an eleven-digit NANP, but will require mandatory and universal eleven-digit dialing. However, the latter approach will provide sufficient CO codes (7000 per NPA instead of today's 800) to reduce and, in most cases, possibly eliminate the need for NPA relief.

While a major benefit of Method 3 in comparison to Method 2 is the elimination of future NPA splits/overlays in the first phase of NANP expansion, its implementation will only effectively work if a significant number of unassigned NPAs are still available in the industry pool. In order to ensure that adequate NPAs will be available for future industry needs, Method 3 will have to be started in a timeframe that is much earlier than that needed for Methods 1 or 2. The earlier starting timeframe required for Method 3 runs counter to one of the primary goals of the industry: to delay any NANP Expansion plan as long as possible in order to avoid the cost and service impacts associated with this major undertaking. The cost impacts associated with the necessary network changes and the impacts on the entire NANP end user community associated with this Method 3 will be no less than the impacts associated with any other NANP expansion plan. To proceed with Method 3, policy-makers, the industry, and the public must prepare for expansion well in advance of the point at which all available NPAs had been assigned.

Method 1 combines the benefits of adding resources to each NPA, deferring the need for NPA relief, adding additional NPAs, as well as allowing NANP expansion to be deferred as long as possible. Method 1 also minimizes the number of expansion conversions the public and industry would have to endure.

4.5.1 Comparison Summary

The following table provides a comparison of the three NANP Expansion methods.

**Table 2: Comparison Table of Transition Methods
NPA(X) – (X)NXX – XXXX**

Features	Method 1 (Both NPA & CO digits at once)	Method 2 (NPA digit first then CO digit)	Method 3 (CO digit first then NPA digit)
Opening of D digit prior to NANP expansion	No	No	No
Ten-Digit Dialing prior to NANP expansion	Required	Required	Required
80 N9X NPAs ⁹	Can be assigned	Can be assigned	Can be assigned
Implementation	One phase	Two phases	Two phases
When to Implement	Near NANP exhaust (i.e., no NPAs left)	Near NANP exhaust (i.e., no NPAs left)	Earlier than NANP exhaust, to ensure enough NPAs left to delay transition to Phase 2
Human Factor Considerations	One implementation phase by adding 2 digits at same time	Two implementation phases adding one digit at a time	Two implementation phases adding one digit at a time
Canadian Identity Digit Requirement	Can support	Can support	Cannot support
Dialing Plan	12 digits at start	11 digits during Phase 1 & 12 digits during Phase 2	11 digits during Phase 1 & 12 digits during Phase 2
Initial Increased Capacity	Adds digits to NPA & CO fields at start	Phase 1 only adds digit to NPA field	Phase 1 only adds digit to CO field
Reduces Future NPA Relief	Yes	No	Yes
Relative Cost	Lower	Greater	Greater
Time to Complete (See reference in Section 5.3)	Completed in one phase	Two phases separated by several decades	Two phases separated by several decades

⁹ These NPAs are currently reserved for use in transition to an expanded NANP through an option other than that recommended in this Report. Releasing these codes will defer NANP exhaust beyond the current NANPA projections.

5.0 Timing and Triggers for NANP Expansion

5.1 Timing

The INC believes that the industry will require up to ten years to transition to the expanded NANP. A date certain for expansion needs to be set by regulatory directive with the necessary lead-time to accommodate industry expansion activity and public notification and training prior to the actual expansion date. The exact determination of the date of NANP exhaust and the related date of the implementation of the NANP Expansion Plan are not within the purview of the Industry Numbering Committee, but rather the NANPA and the appropriate regulatory authorities. In order to realize a ten year implementation plan, it will be necessary to evolve North American telecommunications network(s) to eliminate any encumbrances to implementing the NANP expansion plan.

The INC had previously identified in its assumptions two significant activities integral to NANP expansion: (1) implementation of the INC's Uniform Dialing Plan, and (2) D digit clearing (migration of the current uses of the 0 and 1 in the D digit position).

Regarding the implementation of the INC's Uniform Dialing Plan, the three transition methods identified in this report do not require implementation of the full Uniform Dialing Plan, but do require the implementation of ten-digit dialing.

All three expansion methods do require the elimination of the current D digit restriction as an integral part of the expansion plan. Specifically, this means that, at expansion, the first digit of the CO code field will be allowed to take the format 0-9, and numbers in this format will be assigned to subscribers; this is referred to as releasing the D digit.

Releasing the D digit will require clearing all uses of the 0 and 1 in the D digit position (e.g., to support internal routing, identification and billing functions, etc.). The network must be able to accurately and ubiquitously deal with numbers dialed when the central office code begins with a 0 or 1 NANP format (e.g., NPA XXX XXXX) before any of these numbers are assigned to subscribers. It is recognized that the current use is extensive and therefore steps must be taken to eliminate it prior to the rollout of NANP expansion to ensure successful and on-time implementation of NANP expansion. The FCC stated in its Second Report and Order: "We therefore direct carriers to begin identifying and eliminating specialized uses of zero or one as the D Digit in anticipation of the eventual expansion of the D Digit."¹⁰

An evolution scenario for expansion is depicted below in Table 3.

¹⁰FCC 00-429, Paragraph 106.

5.1.1 Timeline

Table 3 provides a timeline for NANP expansion. This timeline, which will be applicable to phase one of any of the three transition methods described in this report, is based on a starting point identified as Year X. Section 5.2, which describes how the trigger is determined for each expansion method, will set the Year X starting point. If a multi-phase transition is chosen, then the second phase would start over at step one.

The overall timeframe for NANP expansion starting from starting from Year X will be ten years with various milestones defined throughout this ten-year period.

Table 3: NANP Expansion Plan Timeline

<u>STEP</u>	<u>ACTIVITY/MILESTONE</u>	<u>DATE/TIMING</u>
1	NANP expansion trigger reached	Year X
2	Recommend NANP cut-over relief date	Year X
3	Regulatory approval of NANP cut-over date	Year X
4	Notify industry, media, and public	Year X
5	Commence expansion implementation - Commence clearing of D-digit - Commence implementation of ten-digit dialing	Year X
6	D-digit cleared	Year X + 5
7	Ten-digit dialing in place	Year X + 5
8	Commence expansion deployment in network	Year X + 6
9	NANP cut-over - Commence permissive dialing	Year X + 9
10	Commence assigning expanded format numbers	Year X + 9
11	Terminate permissive dialing	Year X + 10
12	Additional NANP resources available for assignment	Year X + 10

5.1.2 Transition Interval

INC recommends an implementation interval for expansion of one year. This transition interval is effectively the permissive dialing period during which callers would be able to complete calls by dialing either the current NANP format or the expanded NANP format. This period would provide sufficient time for worldwide notice that the dialing plan for the NANP would be changing and also permit a concentrated and focused public education program to capture the public's attention for such a major change in telecommunications. This interval would provide time for a concerted effort to identify and resolve the inevitable problems associated within the introduction of new design. A longer transition period would run the risk of weakening public awareness and preparedness. In addition, the ability of switching equipment around the world to enable two dialing protocols for NANP numbers for a term much longer than a year is likely to be problematic.

INC supports the same transition interval of one year for all expansion methods.

Nevertheless, the transition interval may also be impacted by human factors that INC has not studied. Consequently, the length of this interval constitutes another policy issue that NANP nation decision makers should address.

5.2 Triggers

NANP Transition Methods 1 and 2 initially expand the NPA field, whereas NANP Transition Method 3 initially expands the NANP by increasing the CO code field. Based on the different approaches utilized by each method, different triggers will need to be defined that will determine the unique starting timeframe for each method.

In addition, Methods 2 and 3 describe approaches increasing the NANP in two phases. After the first phase is implemented there will need to be another decision point or trigger that will indicate the need to start on the second phase. Each of the phased approaches will need to have unique trigger points for phase one of each plan and unique trigger points for phase two of each plan.

5.2.1 Transition Method 1

Method 1 adds a digit to the NPA field and a second digit to the CO/NXX field in one implementation phase. This method will therefore require a single trigger to direct the industry as to when to put this plan into effect. Several factors will need to be considered in setting this trigger point:

1. length of the time (in years) needed by the industry and end user community to prepare (i.e. – 10 years)
2. average annual assignment rate of NPAs (NANPA should re-calculate this number after each NRUF reporting period)

3. number of NPAs available for assignment (NANPA should re-calculate this number after each NRUF reporting period)

With this information in hand, the trigger which will initiate the start of NANP Transition Method 1 can be established by multiplying (1) by (2). This will determine the quantity of NPAs that will need to be set aside for the period of industry and end user community preparation. Then, subtracting this total from (3), the present day total number of NPAs available for assignment, will identify the number of NPAs that can continue to be assigned before NANP expansion must be initiated. The trigger to start NANP expansion using Method 1 will be when the number of NPAs available for assignment reaches zero (see Example of Method 1 Trigger Calculation below). By dividing the number of NPAs available for assignment by the annual assignment rate, the number of years before the start of NANP expansion (Year X in Table 3) can be determined.

5.2.1.1 Example of Method 1 Trigger Calculation

As an example using the following totally arbitrary values, the trigger calculation for Method 1 would be as follows:

1. length of the time (in years) needed by the industry and end user community to prepare = 10 years
2. average annual assignment rate of NPAs = 8 NPAs per year
3. number of NPAs available for assignment = 215 NPAs

The total amount of NPAs that will need to set aside for the period of industry and end user community preparation equals:

$$10 \text{ years} \times 8 \text{ NPAs per year} = 80 \text{ NPAs}$$

The number of NPAs that can continue to be assigned before NANP expansion must be initiated is determined as follows:

$$215 \text{ NPAs} \text{ minus } 80 \text{ NPAs} = 135 \text{ NPAs}$$

Thus, based on the latest NRUF calculation 135 NPAs can be assigned over the next 16 to 17 years (assuming the current annual assignment remains at 8 NPAs per year) before NANP Expansion Method 1 must start to be implemented. After each NRUF reporting period this number will be recalculated. At the time when it reaches zero NANP expansion must begin.

5.2.2 Transition Method 2

Method 2 adds a digit to the NPA field in its first phase and a second digit to the CO code field during its second phase. Each phase will require a unique trigger that will indicate the need to start the particular phase of NANP expansion.

5.2.2.1 Method 2/Phase 1

The trigger for the first phase of implementation should be identical to the trigger described in Method 1.

Several factors will need to be considered in setting this trigger point:

1. length of the time (in years) needed by the industry and end user community to prepare (e.g. – 10 years)
2. average annual assignment rate of NPAs (NANPA should re-calculate this number after each NRUF reporting period)
3. number of NPAs available for assignment (NANPA should re-calculate this number after each NRUF reporting period)

With this information in hand, the trigger which will initiate the start of NANP Transition Method 2/Phase 1 can be established by multiplying (1) by (2). This will determine the amount of NPAs that will need to be set aside for the period of industry and end user community preparation. Then, subtracting this total from (3), the present day total number of NPAs available for assignment, will identify the number of NPAs that can continue to be assigned before NANP expansion must be initiated. The trigger to start NANP expansion using Method 2/Phase 1 will be when the number of NPAs available for assignment reaches zero. (See example of Method 1 Trigger Calculation above). By dividing the number of NPAs available for assignment by the annual assignment rate, the number of years before the start of NANP expansion (Year X in Table 3) can be determined.

5.2.2.2 Method 2/Phase 2

The trigger for this second phase of implementation should be based on the need for additional numbering resources over those resources made available in the first expansion phase.

To determine the trigger for Method 2/Phase 2 we need to apply some of the same factors utilized in Method 1. However, because this expansion phase does not provide any additional NPAs, a quantity of NPAs must be set aside for future industry needs.

The factors that will need to be considered in setting this trigger point include:

1. length of the time (in years) needed by the industry and end user community to prepare (e.g. – 10 years)
2. average annual assignment rate of NPAs (NANPA should re-calculate this number after each NRUF reporting period)
3. number of NPAs available for assignment (NANPA should re-calculate this number after each NRUF reporting period)
4. number of NPAs to be set side for future needs (e.g. – additional countries/territories entering the NANP, new services, unanticipated future service providers needs) The exact number of NPAs to be set aside for these

future needs should be determined by the appropriate regulatory authorities with industry input.

With this information in hand, the trigger which will initiate the start of NANP Transition Method 2/Phase 2 can be established by multiplying (1) by (2). This will determine the quantity of NPAs that will need to be set aside for the period of industry and end user community preparation. In addition, the number of NPAs to be set aside for future industry needs must be added to the previous total. This new total represents the total NPAs that will need to be set aside. Then, subtracting this total from (3), the present day total number of NPAs available for assignment, will identify the number of NPAs that can continue to be assigned before NANP expansion must be initiated. The trigger to start NANP transition using Method 2/Phase 2 will be when the number of NPAs available for assignment reaches zero (see Example of Method 2/Phase 2 Trigger Calculation below). By dividing the number of NPAs available for assignment by the annual assignment rate, the number of years before the start of NANP expansion (Year X in Table 3) can be determined.

5.2.2.3 Example of Method 2/Phase2 Trigger Calculation

As an example using the following totally arbitrary values, the trigger calculation for Method 2/Phase 2 would be as follows:

1. length of the time (in years) needed by the industry and end user community to prepare = 10 years
2. average annual assignment rate of NPAs = 8 NPAs per year
3. number of NPAs available for assignment = 215 NPAs
4. number of NPAs set aside for future needs = 100 NPAs

The total amount of NPAs that will need to set aside for the period of industry and end user community preparation equals:

$$10 \text{ years} \times 8 \text{ NPAs per year} = 80 \text{ NPAs}$$

In addition, the total amount of NPAs that will need to be side aside for future industry needs (100 NPAs) needs to be added to NPAs set aside for industry and end user community preparation (80 NPAs).

$$100 \text{ NPAs} + 80 \text{ NPAs} = 180 \text{ NPAs}$$

This new total (180 NPAs) represents the total NPAs that will need to be set aside.

The number of NPAs that can continue to be assigned before NANP expansion must be initiated is determined as follows:

$$215 \text{ NPAs} \text{ minus } 180 \text{ NPAs} = 35 \text{ NPAs}$$

Thus, based on the latest NRUF calculation 35 NPAs can be assigned over the next 4 to 5 years (assuming the current annual assignment remains at 8 NPAs

per year) before NANP Transition Method 3/Phase 1 must start to be implemented. After each NRUF reporting period this number will be recalculated. At the time when it reaches zero NANP expansion must begin.

5.2.3 Transition Method 3

Method 3 adds a digit to the CO code field during its first phase and a second digit to the NPA field during its second phase. Each phase will require a unique trigger that will indicate the need to start the particular phase of NANP expansion.

5.2.3.1 Method 3/Phase 1

To determine this trigger we need to apply some of the same factors utilized in Methods 1 & 2, however, because this method does not provide any additional NPAs during its first phase an additional quantity of NPAs must be set aside for future industry needs or until the second phase of this plan can be implemented.

The factors that will need to be considered in setting this trigger point include:

1. length of the time (in years) needed by the industry and end user community to prepare (i.e. – 10 years)
2. average annual assignment rate of NPAs (NANPA should re-calculate this number after each NRUF reporting period)
3. number of NPAs available for assignment (NANPA should re-calculate this number after each NRUF reporting period)
4. number of NPAs to be set side for future needs (e.g. – additional countries/territories entering the NANP, new services, unanticipated future service providers needs) The exact number of NPAs to be set aside for these future needs should be determined by the appropriate regulatory authorities with industry input.

With this information in hand, the trigger which will initiate the start of NANP Transition Method 3/Phase 1 can be established by multiplying (1) by (2). This will determine the amount of NPAs that will need to set aside for the period of industry and end user community preparation. In addition, the number of NPAs to be set aside for future industry needs must be added to the previous total. This new total represents the total NPAs that will need to be set aside. Then, subtracting this total from (3), the present day total number of NPAs available for assignment, will identify the number of NPAs that can continue to be assigned before NANP expansion must be initiated. The trigger to start NANP transition using Method 3/Phase 1 will be when the number of NPAs available for assignment reaches zero (see Example of Method 2/Phase 2 Trigger Calculation above). By dividing the number of NPAs available for assignment by the annual assignment rate, the number of years before the start of NANP expansion (Year X in Table 3) can be determined.

Based on the additional quantity of NPAs needed by this method, the amount of time before reaching the trigger threshold will be significantly less than with the other two methods. This would cause NANP expansion to be started at a much earlier time.

5.2.3.2 Method 3/Phase 2

The trigger for this second phase of implementation should be based on the need for additional numbering resources over those resources made available in the first expansion phase.

The trigger for the second phase of implementation will be very similar to the trigger described in Method 1.

Several factors will need to be considered in setting this trigger point:

1. length of the time (in years) needed by the industry and end user community to prepare (i.e. - 10 years)
2. average annual assignment rate of NPAs (NANPA should re-calculate this number after each NRUF reporting period)
3. number of NPAs available for assignment (NANPA should re-calculate this number after each NRUF reporting period)

With this information in hand, the trigger which will initiate the start of NANP Transition Method 3/Phase 2 can be established by multiplying (1) by (2). This will determine the amount of NPAs that will need to be set aside for the period of industry and end user community preparation. Then, subtracting this total from (3), the present day total number of NPAs available for assignment will identify the number of NPAs that can continue to be assigned before NANP expansion must be initiated. The trigger to start NANP transition using Method 3/Phase 2 will be when the number of NPAs available for assignment reaches zero. (See example of Method 1 Trigger Calculation above). By dividing the number of NPAs available for assignment by the annual assignment rate, the number of years before the start of NANP expansion (Year X in Table 3) can be determined.

5.3 Phase Intervals

Expansion of the NANP, by whichever plan is chosen, will be a major undertaking. The expansion affects not only service provider infrastructure and subscriber equipment, but also society at large. Examples of some of the impacts include: requiring changes in any systems that store and make use of telephone numbers; and requiring changes to stationery, advertising, and established procedures and habits. Given the magnitude and pervasiveness of these changes it is desirable to limit the number of times the NANP must be expanded. A phased method may be desirable, and is justifiable, only under the presumption that a single digit expansion is all that is likely to be required in the foreseeable future, but that it is nonetheless prudent to retain the capability for

further expansion if and when necessitated by circumstances unforeseen at the present time. From this perspective, if an interval of less than several decades is contemplated between phases, it would be preferable to expand from ten to twelve digits all in one phase.

6.0 Maintenance/Update of the NANP Expansion Plan

This document is the final report from the INC's NANP Expansion Workshop on a recommendation for expanding the capacity of the NANP. Significant changes in the regulatory or technological environments would cause the INC to revalidate the applicability of its present recommendation.

The NANP Administrator is expected to conduct a continuing review of the projected exhaust date and an updated projection provided to the INC on a regular basis. In addition, technological change as well as demographic changes in the geographic areas of the NANP may further impose a need over time to reexamine the recommended method. The assessment criteria used to validate the proposed options may require review and updating in line with such changes. The INC will determine from an initial review the need to open an issue for a more complete review of the plan and a need to update and if necessary reissue the plan or revisions thereto. The INC will continue to periodically review the NANP exhaust situation and may supplement this report as needed.

7.0 Liaison with Other Fora

Once the current nineteen NANP regulatory authorities have agreed upon the format for expansion of the NANP, a number of other standards and procedures must be developed. INC recognizes that other industry fora would need to initiate actions in their respective areas of expertise. Some of the groups affected are noted below, but do not represent an all-inclusive list:

Table 4: Standards Development & Implementation

STANDARDS TYPE	GROUP AFFECTED	WORK DESCRIPTION	COMMENTS
Customer and Access Billing records	ATIS/OBF	Development of new or modification of old billing structures gathered by switching systems	This work includes the development of specifications needed by switch manufacturers to change the existing AMA recordings.
Access Ordering	ATIS/OBF	Modifications needed in Access ordering forms and procedures.	
Technical Specification for NANP Expansion	ATIS/T1	Development of technical documents for equipment suppliers to modify existing switching conventions.	Includes rate center definitions, translation requirements and signaling requirements.
NANP Expansion Test Plans	ATIS/NIIF	Development of an industry test plan to verify that network capabilities are in place to expand the NANP	Includes the expansion of published test plan numbers and uses.
NANP Expansion Testing	ATIS/IITC/NTC	Arrangements for industry laboratory interoperability testing prior to testing in the actual working NANP.	
The Telcordia™ Business Integrated Routing and Rating Data Base System (BIRRDS)	ATIS/NIIF/ NRRIC	Determination of the input and output requirements for industry OSSs to define and publish the necessary information to properly route calls using the expanded NANP.	Call Completion
Modifications to input and output of the BIRRDS	Telcordia™ Routing Administration/ CIGRR	Expansion of existing OSS.	Based upon NRRIC requirements.
Modify, Develop and publish numbering guidelines	ATIS/INC	Assignment and reporting guidelines for expanded numbering plan	COCAG, TBPAG, NRUF, etc.
Country Code “1” Numbering Plan Expansion Notification	ITU-T Technical Standardization Bureau – (TSB)	World Notification of Numbering Plan Expansion	Based on information from the NANPA
Expanded format Toll Free Number Guidelines	ATIS/OBF SNAC	Expansion of SMS-800 System	

8.0 Summary and Conclusions

This report has identified and analyzed several methodologies to expand the NANP by adding a digit to both the NPA field and/or the CO code field either simultaneously or sequentially. The INC recognizes that the final decision regarding expanding the NANP is likely to be dominated by economic and ergonomic considerations. However, the INC did assess issues of comprehensibility and complexity, user friendliness, and relative costs of three transition options. Based on this assessment, it is the INC's recommendation that Transition Method 1, which involves a two-digit simultaneous expansion, is the preferred expansion approach.

The INC also recognizes that there is no current means of making this expansion transparent to all telecommunications users who communicate within the NANP and worldwide. Implementing NANP expansion will therefore prove to be a major public relations challenge, and this task doubtlessly will constitute a major portion of the total cost of expansion. Any further work of determining the exact cost and human factors impacts must be addressed by parties other than the INC. Policy-makers in NANP nations will also have important roles to play in the orderly implementation of expansion.

The INC will continue to periodically review NANP exhaust projections and may supplement this report as needed.