



ATIS-0300067

**INTERIM NORTH AMERICAN NUMBERING PLAN
(NANP) EXPANSION REPORT**

December 10, 1999

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EXECUTIVE SUMMARY

This INC Interim NANP Expansion Report documents the status, as of year end 1999, of the North American industry's efforts to establish a NANP expansion plan.

Information describing the overall INC NANP expansion project, details of the expansion option selection process, and a complete listing of the assumptions and constraints as agreed to by the INC is provided.

In this report the INC has identified five options for further analysis and evaluation. These five options are described in detail in this report. The INC's objective is to select a single option for recommendation to NANP area national regulatory authorities for final approval.

INC has considered and eliminated other expansion alternatives from active consideration. These are listed in Appendix A. The committee continues to encourage the submission of new options and concepts and will subject all new expansion proposals to the established evaluation process.

The major activities required to implement NANP expansion have been identified and are estimated to require five to ten years.

The INC has identified certain specific dependencies and prerequisites which are either required to enable the implementation of the five expansion plans, or which conversely would preclude their implementation. INC has made the following assumptions pertaining to these dependencies.

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

It must be noted that 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 will have a significant impact on the ability to transition to certain options and would eliminate other options.

The INC recognizes that the above assumptions and any NANP expansion plan will result in the need for major expenditures for, and modifications to, the North American telecommunications network and impact all its users. The INC is also fully aware that the policy directives required to ensure the timely implementation of NANP expansion

are the sole responsibility of the national regulatory authorities in the NANP participating countries.

Therefore, the INC is soliciting from these authorities confirmation of the validity of the assumptions listed above, and ultimately will seek their approval of INC's selected NANP expansion plan.

The date of NANP exhaust is currently uncertain, but may be in the relatively near term. Expansion implementation is estimated to take five to ten years. Therefore, confirmation of the above assumptions is urgently requested to enable the INC to proceed effectively with its task of selecting in a timely manner the appropriate NANP expansion plan.

Please provide any comments to:

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INC INTERIM NANP EXPANSION REPORT

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INC INTERIM NANP EXPANSION REPORT

1.0 OVERVIEW OF PROJECT

The last major expansion of the North American Numbering Plan (NANP)¹ occurred in 1995 with the introduction of interchangeable NPA codes. Since that time, there has been no agreed upon plan for increasing the future capacity of the NANP.

In 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 for expansion proposals and continues to actively encourage such input.

The INC NANP Expansion Plan, currently under development through the industry consensus process, 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 will document the expansion options and process requirements when expansion beyond the current ten-digit limit is required. The plan will define the numerical/format expansion requirements and identify the transition strategies, trigger points and dependencies required to ensure the smooth and timely evolution of the NANP.

The 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 (i.e., year-end 1999) the INC has considered twenty-seven NANP expansion options. Five options remain under consideration and new proposals continue to be evaluated when received.² Those that have been eliminated from current consideration are listed in Appendix A of this report.

Further details of these eliminated options and the rationale for their rejection is documented in the INC NANP Expansion Report (refer to ATIS Web site- <http://www.atis.org/atis/clc/inc/inchom.htm>). For your convenience, the INC Uniform Dialing Plan is attached to this report.

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 As recently as November 1999, a new NANP expansion proposal from US West was received for consideration.

This INC Interim NANP Expansion Report provides details of the five options that are under active review. The report contains high-level option descriptions, transition plans, significant advantages and disadvantages and identifies prerequisites and dependencies associated with each plan.

2.0 SELECTION PROCESS

The NANP Expansion Workshop has conducted a number of meetings that were dedicated to evaluating the then-current list of viable options. The objective of these meetings was to reduce the number of NANP expansion options by comparing their relative ability to meet the assessment criteria (as defined in the NANP Expansion Report, Sect. 4). This process was conducted in two phases, using a matrix approach.

Initially, each option was evaluated against the assumptions and constraints detailed in Section 3 of this report. 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. This rationale is contained in either Annex C or D of the NANP Expansion Report.

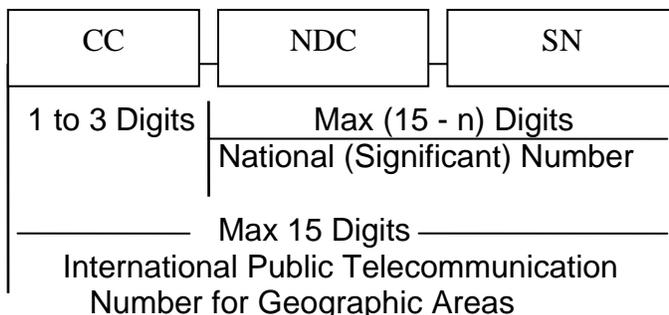
Subsequently, a similar process was conducted on a qualitative basis where advantages and disadvantages of the remaining options were identified. This process resulted in the selection of the five options documented in this report.

3.0 ASSUMPTIONS AND CONSTRAINTS

The following lists the assumptions and constraints that the INC is using to evaluate NANP expansion options. All of these assumptions and constraints have been agreed to by industry consensus and all viable options must meet all assumptions and constraints.

- a. The digits of the NANP will be of the decimal system (i.e., 0-9).
- 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 be consistent with ITU Recommendation E.164 (Public Telecommunications Numbering Plan).

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.
- i. The expanded NANP must increase the quantity of NPAs in order to ensure the availability of additional NPAs when the current supply is exhausted
- j. The expanded NANP must mitigate the need for future NPA relief.
- k. The expanded NANP shall support the Public Switched Telephone Network. Private numbering plans are not accommodated by these NANP resources. Existing and future services' interfaces and network capabilities should be supported by the expanded numbering resource.
- l. 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.
- m. 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.
- n. 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.
- o. 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).
- p. The expanded NANP must support service provider number portability in both geographic and non-geographic applications. The following assumptions apply to the portability of geographic numbers:
 - i) NPAs 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 in general will not be permitted across numbering plan area boundaries (Note: Where local calling areas cross state boundaries and/or include multiple NPAs, portability may be supported.);
 - iv) portability will apply to all geographic numbers used in a wireline/wireless environment;
 - v) location portability will 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.

- q. The expansion plan will consist of two functional components. One to expand NPA capacity and one to mitigate NPA exhaust.
- r. Both expansion plan components, as described above, will be implemented simultaneously (i.e., no two-phased expansion approach).
- s. The N restriction (i.e., 2 through 9) will be removed from the C.O. code field (i.e., D digit) coincident with the implementation of the NANP expansion plan.
- t. The conditions defined in the INC Uniform Dialing Plan will be implemented before the NANP expansion plan is implemented. Specifically, the use of the prefix 1 will be eliminated, and all intra-NANP calls will be dialed on a ten-digit only basis.

4.0 OPTION 1-A 4 DIGIT NPA WITH NEW D DIGIT

4.1 Description of Option

This Option adds a fourth digit to the end of the area code field. Option 1-A also releases the first digit of the Central Office Code in the current NANP structure to allow the use of the digits '0' or 1 in addition to the currently available digits 2 through 9. An eleven-digit number is created with this option. The number format for this option is as follows:

NXX(X) + XXX + XXXX

where N represents digits 2 through 9, X represents digits 0 through 9, and:

NXX(X)	a four-digit NPA with (X) the additional digit
XXX	a three-digit Central Office Code with a released D digit
XXXX	a four-digit line number

The existing NANP format (NXX + NXX + XXXX) mathematically provides 6.4 billion numbers (800 x 800 x 10,000). Option 1-A increases the number of available area codes from 800 to 8000 and the number of available Central Office Codes from 800 to 1000. The mathematical quantity of numbers available with this option is therefore:

$NXX(X) + XXX + XXXX = (8000 \times 1000 \times 10000) = 80 \text{ billion}$

Option 1-A therefore provides approximately a twelve-fold increase in capacity relative to the existing NANP structure. Importantly, within each NPA the quantity of numbers is increased by two million.

Option 1-A 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 a transition period [to be defined] only the digits 0 and 1 can be used 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.

Examples of expanded NANP numbers below show the digit 0 being assigned to Canada and the digit 1 assigned to the remainder of the NANP during transition for geographic numbers.

For example: 972 NXX XXXX becomes 9721 XXX XXXX
 202 NXX XXXX becomes 2021 XXX XXXX
 613 NXX XXXX becomes 6130 XXX XXXX
 514 NXX XXXX becomes 5140 XXX XXXX

Non-Geographic NPAs would be changed as follows:

800 XXX XXXX becomes 8000 XXX XXXX

900 XXX XXXX becomes 9000 XXX XXXX

Special Use Codes would be dialed as follows:

N11 codes would stay N11

950 XXXX would stay 950 XXXX

202 555 1212 would change to 2021 555 1212

555 XXXX would stay 555 XXXX

4.2 Transition Plan

Adding the specific new digits (i.e., 0 or 1) in the fourth position of the NPA code creates a means to transition to the expanded format. Since the fourth digit in the existing ten-digit NANP can never have a 0 or 1 in that position, introducing these values in the D digit position will provide the necessary indication for all switching equipment and operational systems to ensure identification of an expanded NANP number. Thus, transitioning will be accomplished through this unique assignment of 1 or 0 in the D digit location.

Because of this unique assignment, it will be possible to allow for a permissive dialing period during which the network will be able to determine whether the caller was dialing a ten-digit or an eleven-digit number by checking the value of the D digit. It is recommended that a six-month permissive dialing period be allowed to effect a smooth transition to the new four digit area codes.

During the transition period only four-digit NPAs with 0 or 1 in the D digit position would be introduced. At the end of the transition period, four-digit NPA codes that do not have a 1 or 0 in the fourth digit can then be assigned.

4.3 Significant Advantages and Disadvantages

4.3.1 Advantages

Easy to understand, as it adds a digit at the end of the NPA with a single, uniform rule.

Requires no prefix to accomplish the transition because a 0 or a 1 in the new D digit of the four-digit NPA is used as a transition indicator.

Retains the existing NPA code as the first three digits of the expanded area code, which maintains “an ERC-like”³ format for various services (e.g., 800 becomes 8000, 888 becomes 8880, etc.).

Does not require implementation of the INC Uniform Dialing Plan prior to implementation because there is no need for a prefix to implement this option.

Enables all calls to be consistently dialed with eleven digits.

Releases the 80 N9X formatted NPAs for immediate assignment, as they are not required for this or future expansion.

Enables switches to determine within the first four digits dialed whether the caller is dialing a ten- or eleven-digit number during transition period.

4.3.2 Disadvantages

Prohibits the opening of the D digit to either 0 or 1 prior to the implementation of this option and during the transition period.

Does not guarantee the Canadian industry and regulatory authorities increased flexibility and autonomy in the use of NANP numbering resources.

4.4 Dependencies & Prerequisites

This option cannot be implemented in the above manner if the D digit is released prior to NANP expansion.

³ Easily Recognizable Code.

5.0 OPTION 1-B 4 DIGIT NPA WITH NEW D DIGIT AND 4 DIGIT C.O. CODES

5.1 Description of Option

This Option adds a fourth digit to end of the area code field and an additional digit to the beginning of the Central Office code field. Option 1-B also releases the first digit of the Central Office code in the NANP structure to allow the use of the digits 0 or 1. A twelve-digit number is created with this option. The format for this option is as follows:

NXX(X) + (X)XXX + XXXX

where N represents digits 2 through 9, X represents digits 0 through 9 and:

NXX(X)	a four digit NPA with (X) the additional digit
(X)XXX	a four digit Central Office Code with (X) the additional digit
XXXX	a four digit line number

The existing NANP format (i.e., NXX NXX XXXX) mathematically provides 6.4 billion numbers (800 x 800 x 10,000). Option 1-B increases the number of NPAs from 800 to 8,000 and the number of Central Office codes from 800 to 10,000. The mathematical quantity of numbers available with this option is therefore:

$$NXX(X) + (X)XXX + XXXX = (8000 \times 10,000 \times 10,000) = 800 \text{ billion}$$

Option 1-B therefore provides approximately a 125-fold increase in the quantity of available numbers relative to the existing NANP structure. Within each NPA the addition of 9200 Central Office Codes increases the quantity of numbers in the NPA by 92 million.

Option 1-B 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 a transition period [to be defined] only the digits 0 and 1 can be used 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.

Examples of expanded NANP numbers below show the digit 0 being assigned to Canada and the digit 1 assigned to the remainder of the NANP during transition for geographic numbers.

For example: 972 NXX XXXX becomes 9721 XXXX XXXX
 202 NXX XXXX becomes 2021 XXXX XXXX
 613 NXX XXXX becomes 6130 XXXX XXXX
 514 NXX XXXX becomes 5140 XXXX XXXX

Non-Geographic NPAs would be changed as follows:

800 XXX XXXX becomes 8000 XXXX XXXX

900 XXX XXXX becomes 9000 XXXX XXXX

Special Use Codes would be dialed as follows:

N11 codes would stay N11

950 XXXX would stay 950 XXXX

202 555 1212 would change to 2021 5555 1212

555 XXXX would change to 5555 XXXX

5.2 Transition Plan

Transition to the expanded NANP is facilitated by adding the digits 00 or 11 in the fourth and fifth positions after the existing three-digit NPA, except for Special Use Codes. As the fourth digit in the existing ten-digit NANP cannot be a 0 or 1, using one of those values in the D digit position will provide the necessary indication for all switching equipment and operational systems to ensure identification of an expanded twelve-digit NANP number.

By checking the value of the D and E digits, it will be possible to allow for a permissive dialing period during which time the network switches will be able to determine whether the caller was dialing a ten-digit or twelve-digit number.

It is recommended that a six-month permissive dialing period be used to effect a transition to the 1-B format.

At the end of the transition period, four-digit NPA codes and four-digit CO codes that do not have a 1 or 0 in the fourth and fifth positions can then be assigned.

5.3 Significant Advantages and Disadvantages

5.3.1 Advantages

Easy to understand, as it adds a digit at the end of the NPA and a digit on the front of the CO code with a single uniform rule.

Requires no prefix to accomplish the transition because a 0 or a 1 in the new D digit of the four-digit NPA can be used as a transition indicator.

Retains the existing NPA code as the first three digits of the expanded area code, which maintains "an ERC-like" format for various services (e.g., 800 becomes 8000, 888 becomes 8880, etc.).

Does not require implementation of the INC Uniform Dialing Plan prior to implementation because there is no need for a prefix to implement this option.

Enables all calls to be consistently dialed with twelve digits.

Releases the 80 N9X formatted NPAs for immediate assignment as they are not required for this or future expansion.

Enables switches to determine within the first four digits dialed whether the caller is dialing a ten- or twelve-digit number during transition period.

5.3.2 Disadvantages

Prohibits the opening of the D digit to either 0 or 1 prior to the implementation of this option and during the transition period.

Requires twelve-digit dialing on all calls.

Creates 10,000 C.O. codes in every NPA, this significantly increases the quantity of "stranded" resources.

Creates 800 billion NANP numbers, which far exceeds projected requirements.

Does not guarantee the Canadian industry and regulatory authorities increased flexibility and autonomy in the use of NANP numbering resources.

5.4 Dependencies & Prerequisites

This option cannot be implemented if the D digit at the beginning of the existing CO code (NXX) is allowed to be 0 or 1 prior to NANP expansion.

6.0 OPTION 2-A 4 DIGIT NPA WITH NEW A DIGIT

6.1 Description of Option

Option 2-A adds a new digit to the beginning of the area code field. This option also releases the first digit of the Central Office Code in the current NANP structure to allow the use of the digits '0' or 1 in addition to the currently available digits 2 through 9. An eleven-digit number is created with this option. The number format for this option is as follows:

(N)XXX + XXX + XXXX

where:

(N)XXX A four-digit Numbering Plan Area Code (a four-digit field where N = 2 through 9 and X= 0 through 9) Note: The B digit is released to X values.
 XXX Central Office Code (a three-digit field in the format XXX where X= 0 through 9)
 XXXX Line Number (a four-digit field in the format XXXX where X= 0 through 9)

The existing NANP format (NXX NXX XXXX) mathematically provides 6.4 billion numbers (i.e., 800 x 800 x 10,000 = 6.4 billion). Option 2-A increases the number of NPA codes from 800 to 8,000 and the number of C.O. codes from 800 to 1,000. The new quantity of numbers available is therefore:

$(N)XXX + XXX + XXXX = (8000 \times 1000 \times 10,000) = 80 \text{ billion}$

Option 2-A therefore provides approximately a twelve-fold increase in capacity relative to the existing NANP. Importantly, within each NPA the quantity of numbers is increased by two million.

Initially, that is during the transition period (to be determined), only the digit 2 will be used as the new A digit to create four-digit NPA codes.

For example: 972 NXX XXXX becomes 2972 XXX XXXX
 202 NXX XXXX becomes 2202 XXX XXXX
 613 NXX XXXX becomes 2613 XXX XXXX
 514 NXX XXXX becomes 2514 XXX XXXX

Non-Geographic NPA's would be changed as follows:

800 NXX XXXX becomes 2800 XXX XXXX
 900 NXX XXXX becomes 2900 XXX XXXX

Special Use Codes would be dialed as follows:

N11 codes would remain as N11

950 XXXX would stay 950 XXXX

202 555 1212 would change to 2202 555 1212

555 XXXX would stay 555 XXXX

6.2 Transition Plan

Option 2-A will require dialing a prefix during the permissive dialing period of transition. Since NPAs do not use 0 or 1 in the A digit, the use of a prefix in the 0 or 1 format will enable the network to determine whether a subscriber is dialing the existing or expanded format during transition.

During the permissive dialing period, calls to expanded NANP numbers will require dialing the prefix 1. Also during the permissive dialing period, the existing ten-digit NANP numbers could be dialed and completed using ten digits (i.e., 1 2972-444-1234 could be dialed and completed using 972-444-1234).

During the transition period, the new A digit is fixed (i.e., can only have a single value of 2), therefore, all existing NPAs will be in the 2 + NPA format. After transition, the A digit will be released to the other values of N (i.e., 3-9).

The use of the prefix 1 for dialing the expanded NANP numbers could be eliminated after the permissive dialing period.

It is recommended that a six-month permissive dialing period be used to effect a transition to the 2-A format.

6.3 Significant Advantages & Disadvantages

6.3.1 Advantages

Maintains the uniqueness of NPAs in their association with a single geographic area.

Preserves the ERC concept, since the A digit is the only change in the number format.

Easy to understand and use by the general public because it adds a single digit in front of the existing ten-digit number. The ten-digit, pre-expansion NANP number is maintained embedded in the expanded number.

Permits the D digit to be released prior to NANP expansion, which would increase the quantity of CO Codes in existing NPAs by 25% and delay exhaust of all existing NPAs.

6.3.2 Disadvantages

Confuses the relationship to the existing NPAs by adding a digit to the existing NPA (i.e., 972 becomes 2972, and 800 becomes 2800).

Imposes mandatory change to pre-expansion, ten-digit NANP numbering resource format NXX-XXX-XXXX (i.e., three-digit NPAs become four-digit NPAs).

Requires all calls to be dialed with eleven digits (twelve during transition).

Requires the use of a prefix, such as 1 or 11, in order to differentiate between the old and new formats during the permissive dialing period.

The use of the prefix 1 would require the prior implementation of the INC Uniform Dialing Plan (i.e., elimination of the use of prefix 1) throughout the NANP area.

Removal of the need to dial the prefix after the permissive dialing period is another change to the dialing plan and therefore will be confusing to the public.

6.4 Dependencies & Prerequisites

This Option would require the implementation of the INC Uniform Dialing Plan (i.e., ten-digit local and toll dialing and elimination of the prefix 1) prior to NANP expansion in order to make the prefix 1 available for transition to Option 2-A.

7.0 OPTION 3-A NATIONAL DESTINATION CODE (NDC)

7.1 Description of Option

This Option adds a new single digit National Destination Code (NDC) field to the NANP number format between the Country Code and the current NANP ten-digit address. The new NANP number format would be as follows:

NDC + NPA + XXX+ XXXX

where:

NDC	National Destination Code (a new single digit field in the format N, where N = 2 through 9)
NPA	Numbering Plan Area (a three digit field in the format NXX, where N = 2 through 9 and X= 0 through 9)
XXX	Central Office Code (a three digit field in the format XXX, where X= 0 through 9)
XXXX	Line Number (a four digit field in the format XXXX, where X= 0 through 9)

The existing NANP format (NXX NXX XXXX) mathematically provides 6.4 billion numbers (i.e., $800 \times 800 \times 1,000 = 6.4$ billion). Option 3-A increases the number of NPA codes from 800 to 6400 and the number of C.O. codes in each NPA from 800 to 1000. The new quantity of numbers available is therefore:

$$N + NXX + XXX + XXXX = (8 \times 800 \times 1000 \times 10000) = 64 \text{ billion}$$

Option 3-A therefore provides a tenfold increase in capacity relative to the existing NANP. Importantly, within each NPA the quantity of numbers is increased by two million.

The NDC field will provide a means of dividing the NANP serving area into unique sectors. Calls placed within an individual NDC would be dialed using ten digits (i.e., NPA-XXX-XXXX). Calls placed between NDCs would be dialed using a prefix plus eleven digits (e.g., 1-NDC-NPA-XXX-XXXX). Calls placed from outside the NANP area would be dialed using the international dialing prefix plus the full NANP address (e.g., 00-CC-NDC-NPA-XXX-XXXX).

Under this Option, the NANP area could be divided into up to eight NDCs. It is currently assumed by INC that the NDCs would be allocated as follows:

NDC	Allocation
0	protected/unassignable
1	protected/ unassignable
2	Canada (geographic NPAs only)
3	USA (geographic NPAs only)*
4	USA (geographic NPAs only)*
5	USA (geographic NPAs only)*
6	USA (geographic NPAs only)*
7	SAC/ERC (all non-geographic NPAs)
8	spare/growth
9	spare/growth

* NDCs 3-6 may be allocated to specific USA geographic sectors, overlaid sectors, or both. The Caribbean countries would be included in one of these USA sectors.

For example: 972 NXX XXXX becomes 3 972 XXX XXXX
 202 NXX XXXX becomes 4 202 XXX XXXX
 613 NXX XXXX becomes 2 613 XXX XXXX
 514 NXX XXXX becomes 2 514 XXX XXXX

Non-Geographic NPAs would be changed as follows:

800 NXX XXXX becomes 7 800 XXX XXXX
 900 NXX XXXX becomes 7 900 XXX XXXX

Special Use Codes would be dialed as follows:

N11 codes would stay N11
 950 XXXX would stay 950 XXXX
 202 555 1212 would change to 3 202 555 1212
 555 XXXX would stay 555 XXXX

7.2 Transition Plan

In this option, intra-NDC calls (i.e., calls remaining in the NDC area of the calling party, Home-NDC calls) are dialed with no change to the pre-expansion dialing procedures (i.e., NPA XXX XXXX). Inter-NDC calls (i.e., calls going to a different NDC area than the calling party's, Foreign-NDC calls) are dialed with a prefix (assume 1), followed by the F-NDC digit (i.e., PFX + F-NDC + NPA XXX XXXX or 1 + 2 + 202 023 4567).

During both the permissive dialing period and permanently thereafter, the switching equipment in each NDC area would maintain a listing of the NPAs which are working in the H-NDC area. Calls to H-NDC NPAs would be routed on a ten-digit basis. Calls to F-NDC NPAs (i.e., those NPAs not on the H-NDC NPA list) would require the prefix plus the F-NDC. During the permissive dialing/transition period, there would be no duplication of NPA assignment within the NDCs and positive translation techniques would be used to either route calls or provide informative announcements to users.

It is recommended that a six-month permissive dialing period be used to effect a transition to the 3-A format.

7.3 Significant Advantages and Disadvantages

7.3.1 Advantages

Requires no changes to the subscribers' pre-expansion ten-digit NANP numbers (i.e., NPA + NXX + XXXX).

Preserves pre-expansion dialing procedures for Intra-NDC calls (i.e., ten-digit dialing).

Provides the Canadian industry and regulatory authorities with increased flexibility and autonomy in the use of numbering resources allocated to Canada, thus insulating Canadian networks and numbering resources from external factors (e.g., non-Canadian growth, regulatory and industry forum decisions, etc.).

Facilitates the routing of international inbound calls destined for a specific NDC directly to that NDC (i.e., Canada).

Releases the 80 N9X formatted NPAs set aside for future expansion for immediate assignment and mitigation of existing NPA exhaust, as those N9X NPAs are not required for this or future expansion.

Permits the D digit to be released prior to NANP expansion, which would increase the quantity of CO Codes in existing NPAs by 25% and delay exhaust of all existing NPAs.

7.3.2 Disadvantages

Requires the use of a prefix, such as 1 or 11, in order to implement inter-NDC dialing while permitting ten-digit intra-NDC dialing. The reuse of prefix 1 would require the prior implementation of the INC Uniform Dialing Plan (i.e., ten-digit local and toll dialing and elimination of the prefix 1) throughout the NANP area.

Prohibits consistent dialing within the USA.

Complicates the transition plan and customer education process because there is no uniform rule to derive post-expansion numbers from pre-expansion numbers (i.e.,

different areas would be located in different NDCs). Callers must be educated during the transition period regarding how existing numbers would be modified via the addition of NDCs for different geographic areas.

Using both ten-digit dialing for intra-NDC calls and prefix dialing for inter-NDC calls would increase the potential for and quantity of misdialed calls and calls completed to wrong numbers due to ambiguities between NDCs and the first digit of geographic area codes.

7.4 Dependencies & Prerequisites

This Option would require the implementation of the INC Uniform Dialing Plan (i.e., ten-digit local and toll dialing and elimination of the prefix 1) prior to NANP expansion in order to make the prefix 1 available for inter-NDC calls.

8.0 OPTION 4-A - 4 DIGIT NPA WITH NEW "B" DIGIT

8.1 Description of Option

This Option adds an additional digit in the second position of the area code field. Option 4-A also releases the first digit of the Central Office Code in the current NANP structure to allow the use of the digits 0 or 1 in addition to the currently available digits 2 through 9. An eleven-digit number is created with this option. The number format for this option is as follows:

$N(X)XX + XXX + XXXX$

where N represents digits 2 through 9, X represents digits 0 through 9, and:

$N(X)XX$	a four-digit NPA with (X) the additional digit
XXX	a three-digit Central Office Code with a released D digit
$XXXX$	a four-digit line number

The existing NANP format ($NXX + NXX + XXXX$) mathematically provides 6.4 billion numbers ($800 \times 800 \times 10,000$). Option 4-A increases the number of available area codes from 800 to 8000 and the number of available Central Office codes from 800 to 1000 per NPA. The mathematical quantity of numbers available with this option is therefore:

$N(X)XX + XXX + XXXX = (8000 \times 1000 \times 10,000) = 80 \text{ billion}$

Option 4-A therefore provides approximately a twelve-fold increase in capacity relative to the existing NANP structure. Importantly, within each NPA the quantity of numbers is increased by two million.

In order to distinguish between old and new formatted NPA codes and take advantage of the current restricted assignment of N9X formatted NPAs, initially all NPAs (existing and new) would be allocated the digit '9' in the "B" position.

For example:

- 972 NXX XXXX becomes 9972 XXX XXXX
- 202 NXX XXXX becomes 2902 XXX XXXX
- 613 NXX XXXX becomes 6913 XXX XXXX
- 514 NXX XXXX becomes 5914 XXX XXXX

Non-Geographic NPAs would be changed as follows:

- 800 NXX XXXX becomes 8900 XXX XXXX
- 900 NXX XXXX becomes 9900 XXX XXXX

Special Use Codes would be dialed as follows:

N11 codes would stay N11

950 XXXX would stay 950 XXXX

202 555 1212 would change to 2902 555 1212

555 XXXX would stay 555 XXXX

8.2 Transition Plan

Adding the new fourth digit 9 in the second position of the NPA code facilitates transition to the expanded Option 4-A format. Since NPA codes in the format of N9X are reserved for NANP expansion, there are no existing NPAs with a 9 in the second digit position. Transition would be accomplished by changing all existing three-digit NPA codes to four-digit NPA codes by adding the digit 9 as the new second digit. Use of the digit 9 in the second position of the expanded NPAs will enable switches to determine whether the caller is dialing a ten-digit or eleven-digit number.

At the end of the transition period, four-digit NPA codes using the "X" format in the second digit position will be assigned.

It is recommended that a six-month permissive dialing period be used to effect a transition to the 4-A format.

8.3 Significant Advantages and Disadvantages

8.3.1 Advantages

Use of the prefix 1 as a toll indicator can continue because no prefix is needed to support transitioning to this option.

Enables release of the D digit prior to expanding the NANP to eleven digits, as this option does require the use of the D digit to facilitate transition.

Facilitates transition by adding the digit 9 as the new second digit to all NPAs.

8.3.2 Disadvantages

Expanding the NANP by inserting the digit 9 between the first and second digits of all existing NPA s may be difficult to explain, may be hard to understand by the general public, and is user-unfriendly.

Does not allow release of the 80 N9X formatted NPAs for immediate assignment, as they are required for this expansion.

Does not provide the Canadian industry and regulatory authorities with increased flexibility and autonomy in the use of NANP numbering resources.

8.4 Dependencies & Prerequisites

This option can be implemented if the D digit is released prior to NANP expansion and does not require the elimination of the prefix 1.

9.0 TIMING, TRIGGERS AND EVOLUTION

The determination of the date of NANP resource exhaust and the related date of the implementation of the NANP Expansion Plan is not within the purview of the Industry Numbering Committee. Further, the INC has not determined whether NANP expansion should be triggered exclusively by an NPA exhaust scenario or by a regulatory directive to modify the NANP to better meet evolving societal or business needs.

INC's NANP Expansion Plan will include a mechanism for monitoring NANP resource utilization and define an algorithm that will trigger the implementation of the expansion plan. One example of such an algorithm is a formula, calculated annually by the NANPA, which projects the exhaust of NANP NPA resources.

The INC believes that the industry will require five to ten years to expand the NANP. An expansion date needs to be set by regulatory directive with the necessary lead time to accommodate industry expansion activity prior to the expansion date.

In order to realize this five to ten-year implementation plan, it will be necessary to evolve North American telecommunications network(s) to a state wherein there are no encumbrances to implementing the NANP expansion plan when it is required.

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

Two of the expansion options (i.e., 2-A and 3-A) require the implementation of the INC Uniform Dialing Plan in order to use the prefix 1 to allow the network to distinguish between "old" and "new" NANP numbers. Due to dialing/human factors considerations and the dearth of available NANP prefixes, the INC has concluded that the prefix 1 is the only practicable alternative for transition to Options 2-A and 3-A.

The prefix 1 is currently in use in the network today as either a toll or a ten-digit indicator. Therefore, if it is to be available for NANP expansion, its current uses must be eliminated, as is called for in the INC Uniform Dialing Plan. Further, the INC believes that a multi-year (e.g., five) "cooling-off" period should occur before it is reintroduced to support NANP expansion dialing plans.

All five described NANP expansion options call for 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 C.O. 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 deal with numbers dialed in expanded NANP format (e.g., NPA XXX

XXXX) accurately and ubiquitously 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.

An evolution scenario is depicted below. The Years X and Y are independent of each other and are not necessarily intended to take place sequentially and may or may not take place in parallel.

<u>PHASE</u>	<u>ACTIVITY/MILESTONE</u>	<u>DATE/TIMING</u>
1	Commence Implementation of INC Uniform Dialing Plan	Year X (TBD)
2	INC Uniform Dialing Plan in place	Year X + 5
3	Prefix 1 "cooling-off" period	Year X + 10
4	NANP expansion trigger*	Year Y (TBD)
5	Commence Clearing of D digit**	Year Y
6	Recommend NANP Cut-over Relief Date	Year Y
7	Regulatory approval of NANP cut-over date & commence expansion implementation	In Year Y
8	Notify industry, media and public	In Year Y
9	D digit cleared	Year Y + 5
10	Commence expansion deployment	Year Y + 6
11	Cut-over – commence permissive dialing	Year Y + 9.5
12	Terminate permissive dialing	Year Y + 10
13	Commence assigning new expanded resources	Year Y + 10+

* Projection of NANP exhaust at a date certain within the predetermined expansion window (e.g., 10 years).

**D digit clearing may commence at any time.

10.0 SUMMARY AND CONCLUSIONS

Expanding the NANP has broad and significant ramifications within and beyond the telecommunications industry. The INC recognizes that it must not only consider technical issues but also capacity and human factors in the process of selecting a NANP expansion plan. INC, in multiple evaluation steps, has currently identified five options that best meet its established criteria.⁴ Each of these five options has its unique set of advantages and disadvantages.

Although the issue of cost is not within the purview of the INC, the INC believes the costs of NANP expansion will be significant for any of the options that may be implemented. It must also be recognized that end user terminal equipment will need to be upgraded, reprogrammed or replaced at significant expense, which has not been quantified. In addition, wireless subscribers may need to transport their equipment for reprogramming. The INC has no definitive cost information to differentiate among these five options.

The INC has determined that the human factor considerations involving the use of and transitioning to any of these expansion options are very important in selecting an option. The need for the public to understand the nature of the expansion and the transition plan was a major factor in the selection of the five current options. The INC recognizes that using human factors in any selection process without formal data collection is subjective in nature and open to debate. Therefore, it has been difficult to achieve consensus as to whether there is a clear advantage to any of the expansion options as relating to human factors.

In order to implement any NANP expansion option, it must be possible to transition to that particular plan. In considering the transition process, the INC has identified the following two assumptions that would enable transition to any option to occur:

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

It must be noted that 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 will have a significant impact on the ability to transition to certain options and would eliminate other options. Specifically:

⁴ The new US West proposal has yet to be described fully and evaluated against the established INC criteria.

- a) If the INC Uniform Dialing Plan were not implemented throughout the NANP area (e.g., to eliminate the prefix 1 prior to NANP expansion), then transitioning to Options 2-A and 3-A is impracticable because no viable prefix is available. Options 2-A and 3-A would therefore be eliminated.
- b) Releasing the D digit before the implementation of NANP expansion would preclude the ability to transition to Options 1-A and 1-B. Options 1-A and 1-B as currently defined would therefore be eliminated.
- c) If the D digit is released prior to NANP expansion and the INC Uniform Dialing Plan is not implemented, then Option 4-A becomes the only viable option.

The above dependencies are illustrated in the following matrix.

NANP EXPANSION MATRIX

Dependency Option	D DIGIT RELEASE ⁵	UNIFORM DIALING PLAN
1-A NXX(X)-XXX-XXXX	AT NANP EXPANSION <u>ONLY</u> , REQUIRED FOR TRANSITION	IMPLEMENTATION <u>NOT</u> REQUIRED FOR EXPANSION
1-B NXX(X)-(X)XXX-XXXX	AT NANP EXPANSION <u>ONLY</u> , REQUIRED FOR TRANSITION	IMPLEMENTATION <u>NOT</u> REQUIRED FOR EXPANSION
2-A (N)XXX-XXX-XXXX	MAY BE RELEASED BEFORE EXPANSION	IMPLEMENTATION <u>REQUIRED</u> , PREFIX 1 REINTRODUCED
3-A (NDC)-NXX-XXX-XXXX	MAY BE RELEASED BEFORE EXPANSION	IMPLEMENTATION <u>REQUIRED</u> , PREFIX 1 REINTRODUCED
4-A N(X)XX-XXX-XXXX	MAY BE RELEASED BEFORE EXPANSION	<u>IMPLEMENTATION NOT</u> REQUIRED FOR EXPANSION

⁵ Release of the "D" digit, precludes seven-digit local dialing.

The INC is forwarding this NANP Expansion Interim Report to the regulatory authorities of the NANP member countries and requesting that they confirm the INC's assumptions relative to D digit release and the implementation of the INC Uniform Dialing Plan.

Based on the projected NANP expansion implementation timeframe of five to ten years and a possible near-term date for NANP exhaust, the INC requests regulatory responses in a timely manner which address any conflict with the above assumptions.

This will allow the INC to proceed to recommend a NANP expansion plan. Absent any regulatory response, INC will proceed with its work toward developing its recommendation, using the assumptions that the D digit is NOT released prior to NANP expansion and that the recommended INC Uniform Dialing Plan is in place.

APPENDIX A**LIST OF ELIMINATED NANP EXPANSION OPTIONS**

- | | | | | | |
|------|---|--|-------------------|-------------------|------|
| 1.0 | D DIGIT RELEASE TO N ¹ | I.E., | NXX | N ¹ XX | XXXX |
| 2.0 | D DIGIT RELEASE TO X | I.E., | NXX | XXX | XXXX |
| 3.0 | "A" DIGIT RELEASE TO N ¹ | I.E., | N ¹ XX | NXX | XXXX |
| 4.0 | "A" DIGIT RELEASE TO X | I.E., | XXX | NXX | XXXX |
| 5.0 | COMBINATION 1.0 & 3.0 | I.E., | N ¹ XX | N ¹ XX | XXXX |
| 6.0 | COMBINATION 1.0 & 4.0 | I.E., | XXX | N ¹ XX | XXXX |
| 7.0 | COMBINATION 2.0 & 3.0 | I.E., | N ¹ XX | XXX | XXXX |
| 8.0 | COMBINATION 2.0 & 4.0 | I.E., | XXX | XXX | XXXX |
| 9.0 | NDC ASSIGNED AS PER CIC APPLICATION | I.E., NXXX NPA NXX XXXX | | | |
| 10.0 | COUNTRY CODE SEGREGATION | I.E., 3 DIGIT C.C.'S ASSIGNED TO EACH NANP COUNTRY | | | |
| 11.0 | 5 DIGIT NPA CODES | I.E., NXX(XX) NXX XXXX | | | |
| 12.0 | NETWORK IDENTIFICATION CODE BEHIND NPA CODE | I.E., NXX XX NXX XXXX | | | |
| 13.0 | 5 DIGIT NXX (C.O.) CODES | I.E., NPA NXX(XX) XXXX | | | |
| 14.0 | 6 DIGIT SUBSCRIBER NUMBERS | I.E., NPA NXX XXXX(XX) | | | |
| 15.0 | 5 DIGIT SUBSCRIBER NUMBERS | I.E., NPA NXX XXXX(X) | | | |
| 16.0 | POSTALIZED STRUCTURE | I.E., ZIP CODES | | | |

LIST OF ELIMINATED NANP EXPANSION OPTIONS (continued)

17.0 K-DIGIT (11TH DIGIT) SERVICE IDENTIFIER
I.E., NPA NXX XXXXK

18.0 NON-DISRUPTIVE PLAN FOR NANP EXPANSION
I.E., NPAXX XXX XXXX

KEY TO SYMBOLS

X = DIGITS 0 THROUGH 9
N = DIGITS 2 THROUGH 9
N¹ = DIGITS 1 THROUGH 9
K = SERVICE IDENTIFIER