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To:
Recipients of North American Numbering Plan (NANP) Information

Entitled Companies
Unrestricted

From:
R. R. Conners - Director, North American Numbering Plan Administration

Abstract:
This IL distributes the second edition of the *North American Numbering Plan Administrator's Proposal on the Future of Numbering In World Zone 1* to the telecommunications sector.

Letter Information (includes safety liability disclaimer (if applicable), ordering information, originator's signature information)

This IL distributes the second edition of the *North American Numbering Plan Administrator's Proposal on the Future of Numbering In World Zone 1* to the telecommunications sector. This second edition of the proposal integrates comments received by the North American Numbering Plan Administrator (NANPA) on the first edition of the proposal.

The NANPA will sponsor an open industry forum, the goal of which will be to achieve consensus on a WZ1 long-term numbering plan through the review and modification of the NANPA proposal. The first meeting of the forum will be March 16-18, 1993 in the Washington, DC area. Detailed instructions on how to participate in the process are in section 10 of the attached proposal.

R. R. Conners
Director, NANPA

NORTH AMERICAN NUMBERING PLAN ADMINISTRATOR'S PROPOSAL ON THE FUTURE OF NUMBERING IN WORLD ZONE 1

Second Edition

January 4, 1993

This document has been prepared by North American Numbering Plan Administration for industry review. It may be copied and distributed freely.

The action plan regarding this document will be found in Section 10, page 45.

Changes in the text from the first edition are in *italics* in this second edition document.

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Appendices

1. Executive Summary

In its formative years, the North American Numbering Plan (NANP) required little more than ad hoc administration. Initially, the assignment of NANP resources was based on a single service (POTS [Plain Old Telephone Service]) and the addressing of geographic destinations. Consequently, there was only marginal need for a detailed numbering plan for the future - a reference document predicting the direction in which the telecommunications industry would move and proposing a complementary numbering plan that will be efficient and productive. The environment in which the telecommunications industry exists today is in dramatic contrast to the preceding decades. A numbering plan for the future that facilitates the evolution of telecommunications is now urgently required. One of the near-term events that must be addressed in this plan is the 1995 availability of 640 new "interchangeable" Numbering Plan Area *(INPA)* codes. The need for a near-term strategy on the appropriate allocation of this new inventory of 640 codes and a long-term plan for the evolution of numbering within World Zone 1 (WZ1), persuaded the North American Numbering Plan Administrator (NANPA) that the future of numbering in WZ1 should be organized and planned more deliberately to reflect the emergence of new telecommunications trends. The following *second edition* of the NANPA proposal on the future of numbering in WZ1 *continues to be an effort to address this need and has been revised in response to the comments on the first edition received from 37 entities/individuals within the telecommunications sector.*

The proposal for the future of the NANP detailed in this document must answer at least three primary questions:

1. Is the NANP adaptable to emerging new services, architectures, and technologies?

2. Will the 10-digit format of the NANP, *if not expanded for reasons other than exhaust,* have adequate resources to last well into the 21st century?

3. Can the NANP meet the needs of the users and providers of *World Zone 1* (North American) telecommunications?

The proposal detailed below leads to an affirmative response to each of these questions. This *second edition* proposal, *revised in response to sector comments, is now a telecommunications sector document under development as well as* the future numbering plan recommendation of the North American Numbering Plan Administrator (NANPA).

The proposal has a natural starting point - 1995, the implementation year for INPA codes. Accordingly, the critical time period is between now and 1995 during which a plan must be formulated on how the additional 640 *INPA* codes, gained by the implementation of interchangeable codes, should be allocated[1]. The year 2025 is an arbitrary choice for "end of study." It is not so far in the future as to undermine the credibility of predictions but far enough removed from today to disassociate commitments to current technology, policy, and services from the development of futuristic concepts on the customers' needs from the telecommunications industry and its numbering plan. Consequently, the approximate timeframe of this proposal is 1995-2025 and beyond. The selection of the year 2025, or

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[1] *The Industry Carriers Compatibility Forum (ICCF) has formed a workshop, in response to a NANPA-introduced issue, to develop allocation and assignment guidelines for the INPA codes. However, the NANPA still felt obligated to propose a new allocation scheme, reflecting sector comments on the first scheme, in this second edition proposal as a recommended starting point for the workshop.*

any other long-range planning date, is not to be construed as a prediction for the eventual exhaust of the 10-digit format of the NANP. As explained later in this document, the resources of the 10-digit format are expected to meet service needs well beyond 2025.

In order to determine the credibility of a proposed plan, there should be:

1) a set of attributes against which the plan can be compared both during its development and upon completion;

2) a list of global assumptions to establish the environment for the development of the plan proposal; and then

3) a set of guiding principles for the assignment and use of NANP resources under the plan.

The attributes, assumptions, and principles were all developed and are in Appendix E, Section 3.3, and Section 3.4, respectively.

The numbering plan proposed here *contains four* major parts, the short-term plan for the allocation of NANP resources after the implementation of interchangeable NPA codes (Section 4), *intermediate-term numbering issues (Sections 5 & 6)*, the long-term goals and predictions for the telecommunications industry and the NANP (Section 7), *and the proposal for a World Zone 1 and United States steering committee structure (Section 9).*

The most significant aspects of the short-term plan are:

- The *allocation* of *160* of the 640 *INPA* codes for assignment as geographic NPA codes.
- The *allocation* of *160* of the 640 *INPA* codes for non-geographic applications.
- The *allocation* of *320* of the 640 *INPA* codes for *growth in both the geographic and non-geographic allocations and the ultimate expansion of the NANP 10-digit format.*
- A perspective on *dialing considerations, including abbreviated dialing.*
- *A perspective on number portability.*

The most significant intermediate-term issues discussed are:

- *A perspective on Number Portability.*
- *A discussion of Dialing Considerations.*

The most significant long-term NANP goals are:

- The Public Switched Telephone Network (PSTN) of the future will be a "virtual seamless network."
- The use of overlay NPA codes will provide relief for geographic NPAs facing office code exhaust.
- The use of universal 10-digit dialing within the NANP.
- Public networks will interconnect, and private networks may interwork with public networks.
- The "dialing" process by which an end user accesses the public network will commonly be performed by a "smart" user-network interface.
- The telecommunications sector's agreement on an ultimate expansion plan for the NANP will apply after the exhaust of the current 10-digit format.

- The potential for numbering and dialing plan integration will be pursued after human factors and technical considerations permit.

The short-term plan is intended to evolve to include *those issues of the intermediate-term* and the goals of the long-term plan deemed appropriate by the telecommunications industry. The NANPA will sponsor the cooperative industry effort needed to implement the short-term plan and its evolution to *the issues of the intermediate-term* and the goals of the long-term plan.

The proposal also includes a recommendation to form *both a world Zone 1 and a United states Numbering Steering Committee* (Section *9*).

This *second edition* document, "The NANPA's Proposal on the Future of Numbering in WZ1", is being widely distributed for review throughout the WZ1 telecommunications sector (industry entities, associations, affiliated agencies, regulatory bodies/committees, *and* forums). *The NANPA will sponsor the first meeting of the Future Of Numbering Forum (FNF) - an open forum - in the Washington, DC area on March 16-18, 1993. The NANPA intends to use ANSI procedures, i.e., a contribution-driven consensus process, for this forum. The NANPA will continue to sponsor the forum meetings as long as the industry deems it appropriate and progress is being made. The goal is to achieve consensus on an overall WZ1 numbering plan as well as its individual components. Absent consensus on the plan and/or its components, the documentation accumulated will be referred to the appropriate regulatory agencies.*

2. Introduction

It is incumbent on planners of telecommunications services to check and recheck the infrastructure on which such services rely. One dominant feature of this infrastructure is numbering. Accordingly, this proposal addresses the present and future role of "numbering" within the North American Numbering Plan (NANP) area, with emphasis on effectiveness and adaptability. Since 1947, when area code assignments in the original NANP were first officially published, the very definition of numbering has changed. It continues to change with the evolution of the telecommunications industry itself. The following sections will define numbering as it was in the past and as it is today, and then, building on that base, offer a numbering plan proposal that looks ahead to 2025.

The proposal view begins with 1995. Over the 30-year span to be examined, the issues anticipated in or near 1995 will have a clearer focus. The early resolution of these issues has priority. A 30-year time span involves forecasts not nearly as clear. But elements such as numbering capacity can be estimated and tentative judgments recorded.

Numbering is described above as one dominant feature in the provision of most telecommunications services. Numbering does not stand alone, however, nor should it be assumed that numbering sufficiency can assure overall service viability if numbering is not embedded in a complete telecommunications service plan that optimizes the service package and its reliance on an effective and adaptable numbering plan.

The NANP and the proposals for it, contained herein, must be compatible with international telecommunications agreements. The NANP is part of the "Numbering Plan for the ISDN Era," known as CCITT's (International Telegraph and Telephone Consultative Committee) international numbering Recommendation E.164. The NANP and, consequently, any proposals recommending its future, must conform to E.164 or its successor if international services with worldwide applications are to be accommodated. Services confined to North America must not conflict with global international services.

The first edition of the NANPA proposal was distributed to the telecommunications sector for review and comment. Thirty-seven entities/individuals submitted comments to NANPA. Appendix K lists those entities/individuals which submitted comments. The NANPA thoroughly reviewed the comments and revised the Proposal based on the comments as well as the knowledge gained from participation in the ongoing numbering discussions in several sector forums and agencies. This second edition, is NANPA's effort to produce a proposal that reflects, not incorporates, the comments in order to offer to the telecommunications sector a draft plan for its consideration, revision, and ultimate consensus.

2.1 The past and present of the NANP

The NANP was designed for the public switched network already in place and growing dynamically to meet conditions prevailing at the end of World War II. Operators had been completing long distance calls long before the introduction of standardized NANP destination codes. Beginning November 10, 1951, when Englewood, N.J. initiated Direct Distance Dialing (DDD), customers and operators were introduced to the 10-digit NANP format represented symbolically as N0/1X-NNX-XXXX[2]. Customers still maintained

several supporting dialing options of which "Dial 0" was a familiar backup for any non-dialable calls. The 10-digit DDD format, however, shortened to seven digits for use within the home NPA, was the dominant new element. Although the 10-digit NANP format has been remarkably stable, prefix usage has varied. Early use of 11X+ service code access eventually gave way to 1+ access. Some cities adopted common control switching, avoiding prefix usage. Other locales employed mixed arrangements of common control and step-by-step. In 1960, prefix 0+ offered a dialable means to link DDD with operator assistance. The progression of format change is shown in Appendix A.

Progressively, the routing of long distance calls no longer followed step-by-step tradition. Provisions to analyze clusters of digits (normally the leading three but often the leading six) were added to all key network switches. In and after 1970, the prefixes 011 and 01+ ushered in the era of international dial service. The NANP became one of the "national" components of CCITT Recommendation E.163 (now Recommendation E.164). Throughout the evolution of the NANP, capacity and adaptability were, and should continue to be, subject to ongoing scrutiny.

The title "North American Numbering Plan" is somewhat of a misnomer, since the area it serves is not geographically what is considered to be North America. For example, Mexico, part of North America, is not currently part of the NANP. Conversely, Hawaii, not technically a part of North America, is a part of the NANP. The area served by the NANP includes those jurisdictions (listed in Appendix B) described in CCITT Recommendation E.164 as World Zone 1 (WZ1). The area served by the NANP consequently equals WZ1. *Although this proposal is for the future of numbering within WZ1, the WZ1 numbering plan, whatever it evolves to be, must not adversely impact users outside of WZ1 and must, in fact, attempt to make it as easy to communicate with WZ1 users as possible. The NANPA perspective is that while the WZ1 telecommunications sector is redesigning the WZ1 numbering plan it must consider the impact that proposed changes might have on the rest of the international telecommunications community and the international carriers that transport calls into and out of WZ1.*

2.2 The North American Numbering Plan Administrator (NANPA)

Bellcore was assigned the function of administering the North American Numbering Plan (NANP) in an amendment to the Plan of Reorganization that implemented divestiture, which Plan was entered and approved by the Modified Final Judgement (MFJ) court. Bellcore has performed the function of NANP Administrator (NANPA) since divestiture (January 1, 1984). The NANP is the numbering plan for World Zone 1 (see Appendix B) which consists of Canada, the Caribbean administrations listed in Appendix *B* (those within NPA code 809), and the United States. The Federal Communications Commission (FCC) has *asserted* plenary jurisdiction over the administration of the NANP within the United States. In Canada, *the Ministry of Communications is responsible for overseeing Canadian numbering resources*. Within the Caribbean basin, no central authority exists with jurisdiction over the *Caribbean* NANP *resources*. The governments of each of the Caribbean administrations within the NANP participate in the discussion of numbering issues involving their respective countries on an "as needed basis" and voluntarily acknowledge the NANPA as "ombudsman" for their numbering needs.

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2 N=digits 2-9; X=digits 0-9; 0/1= digits 0 or 1.

The NANPA's responsibilities include the following:

- Administer the NANP resources[3] [4] fairly and impartially to the mutual benefit of users and service providers in the entire NANP region - WZ1.
- Work cooperatively with standards bodies, industry forums, national and international organizations, and appropriate government agencies to seek and implement consensus[5] on NANP administrative procedures and design changes.
- Ensure that code conservation techniques are employed in the assignment and utilization of NANP resources.
- Seek to ensure the availability of NANP resources for legitimate[6] applications.
- Adapt the NANP, *by industry consensus and/or with industry fora assistance,* to the changing requirements of the telecommunications industry users and service providers.
- Represent the NANP interests to national and global standards and telecommunications bodies.

In the performance of these responsibilities, the NANPA is subject to the plenary jurisdiction and oversight of the appropriate regulatory agencies within the 18 countries served by the NANP. The regulatory agencies within these countries have joint NANP oversight of general policy, planning, procedural issues and individual NANP oversight of specific numbering issues uniquely impacting their respective territory. No single regulatory agency has full jurisdiction or oversight over the entire NANP. The NANPA currently maintains contacts with the appropriate staff personnel of these agencies regarding NANP issues and NANPA decisions.

It is with these responsibilities in mind that the NANPA developed this proposal for the future of numbering in WZ1.

2.3 Attributes of an effective numbering plan

In order to develop a credible numbering plan proposal, a set of attributes was applied that details the functions of an effective and efficient numbering plan. These attributes were considered throughout the plan development process and the final proposal was tested

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[3] *A list of NANP resources currently administered by the NANPA is contained in Appendix C.*

[4] CO codes within geographic NPA codes *historically have been* administered by the dominant LEC within the NPA, not the NANPA (with the exception of the 809 NPA code *for Bermuda and* the Caribbean). *Stating the current procedures for CO code administration does not presuppose the future.*

[5] *The consensus process referred to is that used by the NANPA whereby the telecommunications sector is requested to review and comment on NANP issues, proposals, recommendations, and decisions with the intent of building sector consensus (see Appendix D for further consensus process details).*

[6] *"Legitimate applications" are generally determined by the text of industry-approved assignment guidelines, federal and/or state/provincial regulations, and/or the appropriate regulatory agencies.*

against them. These attributes were developed by the NANPA *and are offered as part of the proposal for industry discussion, revision, and ultimate agreement.* The *proposed attributes* are listed and explained in Appendix E *and are analytically compared with the proposal in Appendix M.*

2.4 Functions of numbers within the NANP

Important to the development of this numbering plan proposal is an understanding of the functions intended for the numbers within the numbering plan. An analysis of the functions of numbers within the NANP is contained in Appendix F *and is offered as part of the proposal for industry discussion, revision, and ultimate agreement.*

3. The Development of the NANPA Proposal for Future Numbering in WZ1

3.1 Purpose and scope of the proposal

In its formative years, the NANP required little more than ad hoc administration. There was only marginal need for a detailed numbering evolution plan for the future, That is, there was little need for a reference document predicting the direction in which the telecommunications industry would move and proposing a complementary numbering plan that will be efficient and productive. The environment in which the telecommunications industry exists today is in dramatic contrast to the preceding decades. A numbering plan for the future that facilitates the evolution of telecommunications is now urgently required. One of the near-term events that must be addressed in this plan is the 1995 availability of 640 new "interchangeable"[7] NPA codes (INPA). The need for a near-term strategy on the appropriate allocation of this new inventory of 640 codes and a long-term plan for the evolution of numbering in WZ1, persuaded the NANPA that the future of numbering in WZ1 should be organized and planned more deliberately to reflect the emergence of new telecommunications trends. The following NANPA proposal[8] on the future of numbering in WZ1 *continues to be* in response to this need *and has been revised in response to the comments on the first edition received from 37 entities/individuals within the telecommunications sector.*

The proposal for the future of the NANP detailed in this document must answer at least three primary questions:

1. Is the NANP adaptable to new technologies, architectures, and services?

2. Will the 10-digit format of the NANP, *if not expanded for reasons other than exhaust,* have adequate resources to last well into the 21st century?

3. Can the NANP meet the emerging needs of the *World Zone 1* (North American) telecommunications industry and its users?

The plan detailed below enables an affirmative response to each of these questions.

The scope of the proposal on the future of numbering in WZ1 focuses primarily on the 10-digit numbering plan applicable to the PSTN in the ISDN era. There are other numbering/dialing resources centrally administered by the NANPA *(see Appendix C),* such

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[7] The term "interchangeable" codes refers to those codes in the format NXX, where N=digits 2-9 and X=digit 0-9. Prior to the implementation of interchangeable NPA codes the NPA code format was N0/1X. The expansion of the second ("B") digit from only a 0 or a 1 to 0-9 provides 640 additional NPA codes for use in the NANP. Previously central office (CO) codes were similarly expanded from the NNX format to the NXX format. NPA codes and CO codes, after the new formats are fully implemented, have the same format (NXX), hence the term "interchangeable."

[8] *This proposal is no longer only a NANPA proposal, but a proposal originally developed by the NANPA and revised in response to comments from the telecommunications sector. However, since the revision was done unilaterally by NANPA, even though reflecting sector input, the NANPA recommends its existing and new content. Therefore, for ease of reference, this document still refers to the proposal as the "NANPA proposal."*

as CICs (Carrier Identification Codes), SS7 (Signaling System 7) network codes, and vertical services codes. The 10-digit format identifiable with the PSTN/ISDN, however is the hallmark and foundation of the **numbering plan** for North America. Other resources administered by the NANPA can arguably be classified as part of the **dialing and/or service plan** *(see Section 6.1)*. Some prefixes and service access codes may be utilized in a uniform manner throughout North America. Others, such as CICs, apply in only a portion of North America. All are important, but the 10-digit customer-dialable format is dominant.

This proposal does not, and should not, contain specific assignment guidelines for the numbering resources administered by the NANPA. As detailed in Appendix C, assignment guidelines already exist or are under consensus-based development by the appropriate industry forum. The NANPA proposes, however, that ***the telecommunications sector should undertake to integrate these numerous guidelines*** *into one cohesive NANP assignment document and should set a January 1, 1995 target for completion of such an integration.*

This proposal is intended to be a living document. Whatever form it takes after industry review and discussion, it is intended that the "NANPA Proposal For The Future Of Numbering In World Zone 1" will be periodically reviewed and updated with industry participation and consensus.

3.2 Proposal timeframe

The proposal has a natural starting point - 1995, the implementation year for INPA codes, which makes available for assignment 640 additional NPA codes. The industry has been persuaded by clear evidence that pre-1995 area code allocations need detailed and convincing justification. It is not as clear what degree of management should accompany the 640-code breakthrough. Some might believe that codes should be assignable for numerous applications previously not deemed appropriate for NANP resources. Accordingly, now until 1995 is the critical time period during which agreement should be reached on how the 640 new NPA codes should be allocated. As is indicated below, *the philosophy of* NPA code conservation should not be relaxed.

The year 2025 is an arbitrary choice for "end of study." It is not so far in the future as to undermine the credibility of predictions but far enough removed from today to disassociate commitments to current technology, policy, and services from the development of futuristic concepts for the telecommunications industry and its numbering plan. Consequently, the approximate timeframe of this proposal is 1995-2025 and beyond. The selection of 2025, or any other long-range planning date, is not to be construed as a prediction for the eventual exhaust of the 10-digit format of the NANP. As explained later in this document, the resources of the 10-digit format *can be* expected to meet service needs well beyond 2025.

3.3 Global assumptions relevant to the NANP

Underlying this proposal on the future of numbering is a list of global assumptions, relevant throughout the entire timeframe of the proposal (1995-2025), and developed as the foundation on which the principles of the NANP and the allocation of its resources were constructed.

3.3.1 The countries within WZ1 will continue to participate in an integrated numbering plan.

A recent Canadian study, funded by the *Canadian Department Of Communications*, concluded that Canada should continue as an equal partner in the NANP. Although there have been no published studies by the Caribbean participants in the NANP, there has been no indication from any of the administrations in the 809 NPA code that they intend to withdraw from the NANP. *Additionally, there has been no expressed interest on the part of those Caribbean nations not in the NANP to become NANP participants* [9].

A common market-like agreement *has been reached* between Canada, the United States, and Mexico. Coincidentally, Telefonos de Mexico is also developing a long-term numbering plan. Although the Telefonos de Mexico plan is not expected to propose Mexico's inclusion in the NANP, the North American common market-like agreement has not been overlooked. As a result, the Mexican plan includes the consideration of, but not the expectation of, participation in the NANP as a potential alternative.

3.3.2 The *design and implementation of the* numbering plan must impartially consider and *meet* the combined interests of the public user community and the entire telecommunications sector[10] within WZ1.

No segment of the industry should be advantaged or disadvantaged by the design or administration of the NANP. The user public is interested in ease of access to the telecommunications network and its services. The numbering proposal should not unduly burden the public with difficult, complex, and lengthy numbering schemes. The human factors impact of any change should be carefully assessed. *The current NANPA's perception is that the public/user attitudes regarding numbering and dialing issues, e.g., uniform dialing plan, 10-digit dialing, abbreviated dialing, are not truly known despite the continuing statements of industry entities and segments that their numbering/dialing needs are in the best interest of the user. It is NANPA's perception that such statements are more often driven by an interest in market presence. NANPA, therefore,* ***recommends that the telecommunications sector consider conducting a developmentally and statistically sound user survey regarding key numbering and dialing issues*** *prior to making irreversible decisions in response to market driven statements of need.*

Since the advent of competition in the WZ1 telecommunications sector, there has been frequent and heated debate regarding entitlement to NANP numbering resources, i.e., NPA codes, CO codes, and line numbers, and the alleged adverse affect on the interests of certain segments of the industry that the lack of such entitlement causes. This debate has been heard in every forum that has undertaken to discuss/resolve any numbering issue. The issue of entitlement has virtually no topical bounds; its scope has technical, regulatory, business, operations, administrative, interconnection, and billing implications. Despite the ardor with which the opposing views of this issue are expressed, no singular forum or

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9 Incorporation into the NANP can only occur by the expressed interest of the nation/territory not currently a part of the NANP and with the concurrence of the appropriate government agencies and/or the agreement of the current NANP community. Such is the case with the pending US State Department's sponsorship of the inclusion of Guam, the Northern Mariana Islands, and American Samoa (all US territories) into the NANP.

10 Throughout this document "telecommunications sector" is an inclusive phrase for telecommunications entities, the telecommunications user public, government agencies involved with telecommunications public policy, and telecommunications industry forums and associations, within WZ1.

agency has been requested, nor unilaterally undertaken, to resolve the broad issue of NANP resource entitlement. Instead, the telecommunications sector has decided, for whatever reason, to attack the issue one small piece at a time in various and diverse fora. The most recent and, from the NANPA's perspective, the most significant discussions on this issue are underway in two ICCF workshops - the CO Code Assignment Guidelines and the INPA Assignment Guidelines workshops. It is the NANPA's position that the consensus-based development of these assignment guidelines will, in conjunction with the development of the long-range numbering plan, resolve the broad issue of NANP resource entitlement.

3.3.3 The NANP should be in conformance with, and an active formulator of, the most recent edition of the appropriate international and domestic numbering standards; e.g., CCITT Recommendation E.164.

Conformance with international and domestic numbering standards promotes compatibility among telecommunications users within WZ1 and offers transit and connecting services for points outside WZ1.

3.3.4 The NANP is, and will remain for the foreseeable future, a 10-digit numbering plan.

The NANP is now, and through 2025 is expected to remain, a 10-digit numbering plan[11]. There are exceptions, the most prominent of which are "0", "N11", and 7-digit dialing. Of these variants, only 7-digit dialing has a corresponding 10-digit equivalent, the short format serving intra-area code calls. To qualify for 7-digit calling, the calling party must have knowledge that calling and called area codes match. If they do, then 7-digit dialing is sufficient to establish the intended intra-NPA destination. However, seven digits may or may not be sufficient to complete a given call in some telephone company jurisdictions. The distinction relates to charging. Some intra-NPA calls may qualify as "toll," while others are "local." If a dialing distinction is to reveal the "toll/local" status, it has been traditional (due to step-by-step switching) to associate 7-digit dialing with "local." In contrast the format 1+Home NPA-NXX-XXXX is available for home area toll calls. Failure to place a call in the appropriate format is now seen as a cause for call rejection in areas electing to use toll alerting. Consequently, it follows that 7-digit dialing will be encountered both with and without toll alerting. Numbering planners have long considered it good practice for switches to accept and attempt to complete any call originated with a valid 10-digit address, including home area calls for which 7-digit dialing could suffice. It follows that a 10-digit attempt to reach an intra-NPA destination could qualify for acceptance if switching technology so allowed. Step-by-step switching technology forced rejection of home area calls not conforming to recommended dialing practices. Such blanket treatment need not be continued with common control.

3.3.5 The digits of the NANP will continue to be those of the decimal system (0-9).

There has been no expressed interest in international or national standards bodies to deviate from the decimal system as the basis of the worldwide numbering plan. Section 4.4 of the most recent CCITT Recommendation E.164 (approved 23 August 1991) confirms international agreement on the use of decimal numbering.

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11 The expansion of the NANP will occur either because of the eventual exhaust of its current 10-digit format or the agreement within the telecommunications sector that the needs and interests of the sector would be best served by expanding the format.

Subject-matter-experts affiliated with the development of future digital services, currently to be provided on other than the PSTN, have expressed an interest in an alternative numbering scheme based on the hexadecimal system. More development, implementation, and interworking information is required for the telecommunications sector to understand and study the potential of a hexadecimal numbering scheme.

3.3.6 Ubiquitous international and WZ1 connectivity between public telecommunications users will continue to be accommodated by the WZ1 PSTN and its numbering plan (the NANP), and by interworking arrangements with other public networks.

The significance of this assumption is that the worldwide PSTN must continue to provide full connectivity to those users subscribing to and familiar with only the "minimal" level of telecommunications service. Full connectivity between like terminals at service levels above "minimal" need not be initially ubiquitous, but should be part of an evolving implementation plan with scheduled milestones.

One issue, caused by the evolving competitive environment within WZ1, is the method by which user and network connectivity is to be achieved. The debate to date includes two primary methods, physical connectivity between WZ1 carriers' networks or connectivity via the allocation of NANP numbering resources. All parties to the debate have characterized this issue as being business and regulatory in nature and hence have not found an appropriate forum for its resolution.

Another, and related, evolution issue is the extent of interconnection/interworking between networks and services historically viewed as "private" and the "public" network and services that utilize E.164, and in WZ1 NANP, numbering resources. Several network services and architectures currently in the early stages of implementation or under development, e.g., broadband ISDN, SMDS, IN, cause the heretofore easily identifiable separation point between "private" and "public" to be less apparent. The industry and its users would be best served by a full telecommunications sector effort to redefine the terms "public" and "private" in the context and reality of evolving services and technology.

3.3.7 The WZ1 telecommunications industry will continue to include multiple networks, network providers, and service providers.

Competition in the WZ1 telecommunications industry is here to stay. An effective and easy to use numbering plan requires the cooperation of the various providers and the interoperability of the multiple networks in a competitive environment.

3.3.8 Geographic and non-geographic numbers will coexist.

The existence and growth of both geographic and non-geographic telecommunications services indicates a continuing need for unique and separate quantities of numbers for both applications. The users of telecommunications services will be the determinant as to the relative proliferation of each.

It is the NANPA's perspective that, absent a new technology-based addressing scheme, fixed destination terminals will remain addressable by a geographic number. Conversely, many users' situations and services will involve mobile destination terminals, in place of or in addition to fixed destination terminals, more appropriately served by non-geographic numbers.

At a minimum, geographic and non-geographic numbers must coexist within the same public switched network, and, dependent on available technologies and requirements, e.g., database deployment, number portability, there may need to be, at least for the near-term, a direct relationship between some geographic and non-geographic numbers.

3.3.9 NANP resources will continue to be administered for the overall good *and use* of the user public and the telecommunications sector and, as such, will not be "owned" by the entities or users to which they are assigned. NANP resources will continue to be centrally administered[12].

The assignment of an NANP resource does not imply ownership. If the good of the user public and the telecommunications industry requires the recovery of an assigned resource, the resource must be returned to the NANP inventory. Such a policy is only one of the reasons for continued central administration of NANP resources.

3.3.10 An unspecified level of government regulation of the telecommunications industry will exist for the foreseeable future.

Regulators' (federal, provincial, state, or local) concerns for the availability of basic service at a reasonable cost and the belief that the continuity of telecommunications networks in WZ1 is in the public interest, with associated national security impacts, will result in continued regulation of the telecommunications industry at some unspecified and evolving level. *The level of regulation, and the related level of competition, vary country-by-country within WZ1. Historically, once a competitive environment is created and stabilized, the level of regulation decreases as the level of competition increases. One consequence of such a trend will be the future assignment and use of NANP resources for unregulated services and the apparent and consequent lack of the regulatory bodies' oversight inherent in the increase of unregulated services and their need for NANP numbering resources.*

The challenge for the telecommunications sector of WZ1 is to design the NANP - the integrated numbering plan for the 18 countries it serves - and its administrative procedures in a manner that ensures the flexibility necessary for it to function in a fair and equitable manner for all the users and providers of its diverse regulatory environments.

3.4 Principles for the assignment and use of NANP resources

The industry and its users require a set of overall principles that must be met in order to assign and use NANP resources. The following principles form the basis for this proposal. *The principles are not listed in any deliberate order or priority.*

3.4.1 The primary function of NANP numbers will continue to be destination addressing. Destination addresses are of two varieties.

1. **End-user geographic destination addresses** - network addresses used to route to and address user terminals normally associated with a fixed, geographic location, e.g., PSTN/ISDN numbers in geographic NPA codes.

2. **End-user indirect, non-geographic destination addresses** - network addresses requiring digit analysis or translation *(partial, e.g., non-database, or*

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[12] This "assumption" is also appropriate as an Assignment Principle and is, therefore, repeated as paragraph 3.4.5.

complete, e.g., database) in order to determine and route to the appropriate destination, e.g., *database, translation point, network, service provider.*

3.4.2 The preferred method for the addressing of secondary terminals on the user side of the user-network interface, in contrast to terminals considered main stations or equivalent, will be through the use of sub-addresses or signaling (protocol).

In this way there is no impact on the ten digits of the NANP number. While specific architectures or services may suggest the use of NANP numbers to address secondary terminals beyond a single network interface, e.g., ISDN, alternatives are preferable and conserve NANP resources. The traditional applications of DID (Direct Inward Dialing) to PBXs will remain as an alternative for both ISDN and PSTN terminals. DID typically involves tariffed treatment of "station" number blocks and directly affects numbering capacity.

CCITT Recommendation E.164 defines sub-addressing as a "network address extension" that exists "outside the ISDN numbering plan." CCITT Recommendation I.334 details the format for ISDN sub-addressing within the ISDN protocol.

For the near-term, sub-addressing and/or signalling technologies may not be available for secondary terminal sub-addressing. For the near-term, therefore, NANP numbering resources remain the appropriate means for addressing secondary terminals.

3.4.3 The assignment of NANP numbers will be in accordance with federal, provincial, state, and local regulations, *and industry-approved assignment guidelines,* where appropriate.

Carriers, *service providers and other telecommunications* entities qualified under federal, provincial, and state regulations to perform the telecommunications functions inherent in and requiring NANP numbers *and conforming to the industry-approved assignment guidelines for the resource requested,* will qualify for the assignment of such resources. *The resources assigned will be the same in format i.e., NPA, central office (CO) code, line number, as* other carriers, *service providers and* entities qualified to *offer* the same *services or capabilities. The quantity of numbering resources assigned to each carrier, service provider, or entity will be based on the requirements, e.g., service projections, code fill data, contained within the assignment guidelines for the specific numbering resources requested.*

3.4.4 Code conservation is a necessary principle in the administration of the finite resources of the NANP.

With the increased NPA code resources available after 1995, there is an ambivalence within the industry as to the continuing need for conventional code conservation. The NANPA sees this resource as finite with a point of exhaust as demonstrated below. Although there has been no study to determine the cost of expanding the 10-digit format, it is widely accepted to be a figure large enough to cause the telecommunications sector to defer code expansion until absolutely necessary/*required* and/or until the technology deployed in the network is such that code expansion is less costly than it would be with the currently deployed technology.

In section 3.1 of this document, the NANPA proposes an industry effort to consolidate all existing and developing assignment guidelines into one document. Additionally, the NANPA recommends that the consolidated document should contain a section dedicated to the principles of code/number conservation.

3.4.5 NANP resources will continue to be administered for the overall good and use of the user public and the telecommunications sector and, as such, will not be "owned" by the entities or users to which they are assigned. NANP resources will continue to be centrally administered.

The assignment of a NANP resource does not imply ownership. If the good of the user public and the telecommunications industry requires the recovery of an assigned resource, the resource must be returned to the NANP inventory. Such a policy is only one of the reasons for continued central administration of NANP resources.

3.4.6 Any potential telecommunications service provider can request NANP resources.

Any provider, or potential provider, of telecommunications services can request NANP numbering resources by following the procedures established for the specific resources requested. The appropriate NANP numbering resources will be assigned to those applicants meeting the criteria set forth in the industry-developed and approved assignment guidelines for the specific resources requested. The numbering plan must address and equally meet the legitimate needs of all telecommunications service providers.

3.4.7 NANP resources must be available for new and legitimate applications, services, and service providers.

New technology, expanded market demand, heightened user expectations, or increased service provider capabilities must not be inhibited by the lack of NANP resources or overly restrictive numbering assignment guidelines. The opportunity to allow the telecommunications sector to grow within existing services and create/offer new services can not be deterred by a limiting or inflexible numbering plan. The terms "traditional" or "non-traditional" are inappropriate relative to determining what entities receive NANP resources. As stated in paragraph 3.4.6, all entities can apply and those entities conforming to the appropriate industry-approved assignment guidelines will be assigned resources despite past perceptions and characterizations.

3.4.8 The assignment of NANP resources must consider and encourage efficient operation of the PSTN.

One of the primary functions of NPA and CO codes within the NANP is to enable the public switched network to efficiently and effectively handle calls based on the dialed digits. When code-level resources are assigned, consideration must be given to avoid creating inefficient and/or ineffective call routing and/or handling as well as the inefficient and uneconomical use of telecommunications facilities. In a database environment, this principle applies to the entire 10-digit number.

3.4.9 The NANP should be designed and administered in a manner that minimizes user confusion.

The public is the ultimate user of the NANP. The success of the NANP, as well as the telecommunications industry, depends on the ease with which the user, i.e., consumer, can access the network and its services and reach the intended destination. The more difficult the numbering plan and telecommunication services are to use, the less successful and efficient they will be.

4. Allocation of NANP Resources After the Implementation of Interchangeable NPA Codes.

The 1995 implementation of interchangeable NPA *(INPA)* codes will add 640 NPA codes to the NANP inventory. This addition increases the number of codes from the current 152 to 792 and has been the basis for speculation regarding the future assignment and use of this expanded resource. **This numbering plan proposal recommends a method for the allocation of the 640 *INPA* codes** for the purposes detailed below. *The NANPA supports at least a minimal allocation of initial sets of codes in order to ensure the availability of numbering resources in appropriate quantities and format for geographic and non-geographic services.* These proposed *allocations* are based on projected requirements for the period covered by this numbering plan proposal (1995 - ~2025). Specific *INPA* code assignments will occur after a determination of need has been established *based on the tenets of the INPA Assignment Guidelines (when completed) currently under development within the Industry Carriers Compatibility Forum (ICCF).* The *proposed allocations must be* flexible. If, over time, *actual code assignments indicate a needed adjustment in the* predictions, the *allocations should* be revised to reflect actual needs.

The *NANPA proposes the allocation* of *320* of the 640 interchangeable NPA codes for *geographic and non-geographic services and the remaining 320* codes for the *additional growth of new and existing services in both categories and for the eventual expansion of the NANP 10-digit format. The proposed allocation, further detailed below, is as follows:*

Application	*Code Allocation format*	*Code Allocation quantity*
Geographic INPA codes:	*N2X-N3X*	*160 codes*
Growth/expansion:	*N4X-N7X*	*320 codes*
Non-geographic INPA codes:	*N8X-N9X*	*160 codes*

The proposed allocation is based on the "B" digit of the INPA. The "B" digit allocation is particularly important for non-geographic applications in that it provides upfront user and network recognition, by the digits "8" or "9", that the specific call being dialed has the unique attributes of a non-geographic call, e.g., unknown destination and potentially different billing arrangements from geographic calls. Such a capability has been a requirement of the developers of non-geographic services such as personal communications services.

If/when the 160 codes allocated to either geographic or non-geographic applications are exhausted, additional codes will be allocated from the numerically closest set of 80 codes, e.g., the next set of geographic codes would be the 80 codes in the N4X format and the next set of non-geographic codes would be the 80 codes in the N7X format.

If the industry determines that 80 codes are temporarily required for the "grace period" associated with expanding the 10-digit NANP format, (see Section 4.3) it will be

determined at that time which 80 codes, either those in the N5X or N6X format, will be allocated for that purpose.

It should be noted and understood that it is the NANPA's position that telecommunications entities are not relegated to the use of only geographic or non-geographic numbering resources. Geographic and non-geographic codes are assigned respectively to geographic and non-geographic services regardless of the service providing entity. For example, a wireline carrier or a cellular carrier historically assigned geographic numbering resources will qualify for non-geographic numbering resources for the provisioning of non-geographic services. The assignment processes for the geographic and non-geographic INPAs will be determined by the telecommunications sector through the development of the INPA assignment guidelines within ICCF.

Appendix G contains a description of another allocation method, based on the "C" digit, considered by the NANPA. Although it has attractive attributes, it is not favored because it does not provide ubiquitous upfront user/network non-geographic recognition since all numbers (0-9) already exist in the "C" digit position within the 144 currently assigned geographic NPA codes.

Appendix H presents the *proposed* code *allocation* in two charts depicting the allocation projections and the allocation of the 640 codes by application/purpose.

4.1 *Allocation* of NPA codes for geographic assignment.

The function of numbers within geographic NPA codes is to address *geographically-based fixed or mobile* terminal devices. Based on the continuation of this functionality, it is proposed that ***160* of the new 640 NPA codes be *allocated* for assignment as geographic NPA codes.** The *allocation* of *160* geographic codes should, based on one measure (COCUS), ensure the availability of *adequate codes to meet the needs of geographic services for the period* 1995 to 2025. *This projected need is based on the 1992 Central Office Code Utilization Survey (COCUS) - a NANPA run database of NPA code administrator-provided actual and projected data on all CO codes assigned within each geographic NPA code. The 1992 COCUS predicts the exhaust of 63 currently assigned NPA codes during 1995-2025. The prediction of 63 code exhausts is minimal in that it does not include anticipated multiple exhausts of codes serving densely populated areas nor does it take into account any potential changes in the growth rate of geographic services requiring numbering resources. Additionally, the accuracy of the COCUS data for long-term projections is suspect ; its primary purpose is to predict near-term NPA code exhausts.*

The reservation of codes need not be sequential with respect to numerical value *within the allocated code sets.* A NANPA study is currently underway to determine the most effective method of assigning and reserving geographic NPA codes. *NANPA documents as far back as 1974 proposed that the first INPA codes to be assigned would be those ending in the digits "0-2". That long-standing intention has caused many LECs to defer until last the assignment of NXX codes ending in the digits "0-2" in order to avoid dialing conflicts with a future INPA assignment in local and adjacent NPAs. Such deferments are ignored, and these codes are assigned, once the remainder of the codes within a given NPA code are exhausted.*

4.2 *Allocation* of NPA codes for non-geographic assignment.

The function of numbers within non-geographic NPA codes is, from a calling party perspective, to address a fixed or mobile called party at a non-geographically-based fixed or

mobile terminal and, from a network perspective, to route the call to a translation point for end-user location. For example, there are services such as personal communications under development that propose architectures utilizing a database(s) or other method of digit analysis to determine the relevant location of the terminating user or terminal device, i.e., user or terminal mobility/portability. *Although the network is aware of the need for a digit analysis function, the dialing user is only aware that the dialed non-geographic number identifies the called mobile person, not that there is any implicit network functionality within the dialed digits.* The use of indirect addressing and associated signaling referrals inherent in the developing service descriptions for these services and the projected user interest in the services, support the ***allocation of 160* NPA codes for non-geographic applications**. There is no accurate way to predict the future need for non-geographic codes since the services requiring them are not yet defined. The *160* code *allocation* is based on preliminary industry estimates of potential personal communications subscribers, *the intent for equitable code allocations for geographic and non-geographic services,* as well as the potential advantages of reserving a block of codes having a common middle (or "B") digit for ease of user/*network* recognition. These non-geographic applications are projected to be in *two* varieties.

1. Area code assignments for NANP-wide and/or nationwide database applications with fully shareable use of a database by multiple providers.

The database transaction offers either trunk routing advice or a secondary referral. The assignment of dedicated NPA codes to these applications is appropriate for caller recognition that the destination user/terminal is mobile. The dedicated code also informs the network that the call must be routed based on the content of the NANP-wide and/or nationwide database (first indirect address). The function of the NANP-wide and/or nationwide database will be either to (1) identify and refer the call to the service provider's database (second indirect address) where the current location (direct address) of the end-user resides, or (2) to initiate trunk routing to the appropriate end user (direct address) via the indicated transport carrier. The first instance is that of a personal communications application with both (1) an NANP-wide or nationwide database and (2) service provider databases. The second instance is that of the 800 database or a personal communications application with only an NANP-wide or nationwide database. In either instance, line numbers (full 7-digits), within the non-geographic NPA codes, will be assigned to the end user whose profile will identify the service provider of choice. For diagrams see Appendix I.

2. Central office code assignments (within non-geographic area codes) for non-geographic applications not using a fully shareable database, but requiring separately and centrally administered blocks of numbers to support referrals to service providers.

In order to offer personal communications-like services in an environment without an NANP-wide or nationwide database, CO codes within dedicated non-geographic area codes will be assigned to service providers. The appropriate network node will perform a 6-digit translation[13] on the dialed digits to determine the appropriate service provider.

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[13] The 6-digits translated are the first six of the numbering scheme (excluding prefixes). NANP-wide, the 6-digits include the area code and the CO code (NPA+NXX). Internationally, digit analysis is only required for up to 4-digits prior to Time T (December 31, 1996), including the country code (i.e., country code and area code [1+NPA] for calls destined for North America). After Time T, international digit analysis is expanded to up to 6-digits (i.e., country code, area code, and 2-digits of the CO code [1+NPA+NX] for calls destined for North America).

Given a suitable signaling arrangement, the service provider will receive and translate the dialed digits to determine the current location of the terminating end-user. Numbering to facilitate access to information in a database represents new functionality. The database 'service provider' may or may not have independent status as a network provider/carrier. The role of numbering is to facilitate the referral process for data retrieval, without regard to the ultimate network provider(s)/carrier(s). The calling party's carrier preference is honored as before, but may be considered tentative until charging issues are clarified. Thus 'network identification' is clearly differentiated from 'database provider' identification. The latter may rely on signaling access alone and is nodal in character. The similarity to '800-NXX' usage extends only to digit analysis. There need be no "presence" other than signaling arrangements capable of reaching the database provider. Guidelines should seek to establish eligibility for service provider status that is consistent in terms of availability and fault recovery, since the referral function is critical with respect to all subsequent call processing by other service providers.

The potential for an evolution of this architecture to a fully shareable database application will require central administration of the CO codes, while the end-user line numbers will be administered by the service provider.

The *160 allocated* codes proposed for personal communications-like applications will be apportioned between applications 1 and 2 in a manner that reflects the speed of database development, evolution, and deployment. As large nationwide or NANP-wide databases are deployed, more codes will be required for application 1 and less for application 2. There is no information to date by which to project the eventual apportionment.

4.3 *Allocation* of NPA codes for the *eventual* expansion of the NANP to beyond 10-digits.

At some point in time, the NANP will require a *format expansion*[14], *either due to the eventual exhaust of its current 10-digit format or due to an agreement within the telecommunications sector that the needs and interests of the sector would be best served by expanding the format.* The expansion plan *detailed* in Appendix J requires the ***allocation*** **of 80 NPA codes,** *within the 320 codes allocated for growth/expansion,* for transition and a "grace period" where both the new and the old formats would be usable. *The telecommunications sector should begin a work effort to plan for the eventual expansion of the 10-digit format of the NANP. The actual allocation of a specific set of 80 codes for this purpose will occur only if the telecommunications sector agrees on an expansion plan requiring such an allocation for a "grace period". If a plan not requiring such an allocation is agreed to by the telecommunications sector, the 80 codes would remain as part of the 320 codes allocated for growth.*

4.4 *Allocation* of NPA codes for *growth*, unanticipated/unidentified future needs and/or the perpetuation of the 10-digit format beyond 2025.

The proposed *allocation* of *320* NPA codes as detailed above in Sections 4.1-4.3 does not address the potential for unanticipated events, unidentified number resource applications,

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[14] *Today's technology seems to limit the available format exhaust options to format expansion. However, by the time actual exhaust occurs (presuming that format expansion will not have occurred for other reasons), there may be new a technology that would offer an easier, less expensive alternative.*

unanticipated growth *in geographic and non-geographic services,* and/or the desired maximal longevity of the 10-digit NANP format.

1. Unanticipated events - changes in national, state, provincial, or local public policy decisions that may require the allocation of additional numbering resources. An example is local exchange competition that *would* require the assignment of *unique* CO codes to multiple local exchange carriers[15].

2. Unidentified number resource applications - the deployment of services, technologies, or architectures that may require unique number resources outside the defined geographic and non-geographic applications.The NANPA conducted an analysis of prospective future services, technologies, and architectures. The intent was to identify and allocate appropriate numbering resources to each. This analysis resulted in the conclusion that specific allocations of numbers to future services, technologies, and architectures are either not necessary, or not appropriate/quantifiable at this time. It was determined, as a part of this analysis, that the numbering resources required in the future will be mainly from the existing geographic or non-geographic categories, that is, not requiring a new set of dedicated numbers. It is also perceived that services and numbers will be increasingly independent through the use of functional signaling capabilities (ISDN and B-ISDN). However, if in the long-term these conclusions should prove to be faulty, there may be a need to allocate unique code sets to currently unidentified services, technologies, and architectures. An example of such a potential allocation may be for Enhanced Service Providers (ESPs).

3. Unanticipated growth - the growth in number resource requirements for geographic and non-geographic applications may exceed the *allocation* of *320* codes prior to 2025.

4. 10-digit NANP format longevity - the cost of expanding the NANP format beyond the current 10-digits is believed to be high for current network technology. Therefore, a key objective of this plan is to maintain the 10-digit format for as long as possible. There is no inference in this plan that the telecommunications sector should presume or plan that the 10-digit format will exhaust in 2025. The opposite is in fact true. It is the NANPA's position that code conservation policies *(see paragraph 3.4.4)* should be continued in order to defer NANP exhaust as long as possible. While NANP resources should be an enabler to the offering of telecommunications services and not a deterrent, there is nothing in the proposal and its assignment predictions that would warrant a discontinuance of a major NANP principle - code conservation. The proposed reservations detailed above, as well as the uncertainties in the projections for the future of the telecommunications sector, lead to the conclusion that the 640 NPA codes will be sufficient well into the middle of the 21st century, given reasonable care in code management.

   It is therefore recommended that ***240-320*** **NPA codes** (depending on the need for 80 codes for 10-digit format expansion) **be *allocated* for potential and unanticipated events, applications, and growth requirements as well as the longevity of the NANP 10-digit format.**

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[15] Local exchange competition is an evolving regulatory requirement, established on a state-by-state basis. There are varying opinions on the ultimate extent of local exchange competition.

4.5 The development of administrative (assignment and recovery) guidelines, adopted by industry consensus, for interchangeable NPA codes.

The above sections propose the principles by which NANP resources should be assigned and an allocation plan for the 640 interchangeable NPA codes[16]. There is also a need for assignment guidelines, similar in nature to those already in existence for assignment of CO codes within the 800 and 900 SACs, to delineate the specific criteria by which these 640 INPA codes will be assigned and recovered for industry use[17]. *Additionally, if the telecommunications sector ultimately agrees on a code allocation scheme, similar to the one detailed above, these guidelines should provide a periodic, e.g., every 5 years, code allocation review process, with the goal of allocation modification, if/when appropriate.*

Although there is no plan to recover currently assigned NPA codes with low central office code fill, new NPA codes, geographic and non-geographic, will continue to be assigned only after code exhaust is adequately substantiated to the NANPA[18].

4.6 Implications for the recovery of assigned NPA Codes with low code fill.

The recommendation to consider the recovery of existing geographic NPA codes with low code fill appeared in several comments on the first edition of this document and has been offered for consideration by several entities since the topic of the implementation of INPA codes first occurred. The code recovery proposals generally recommend one of two scenarios: 1. consolidate two or more states/provinces with low code fill NPAs, thereby enabling the recovery of one or more underutilized NPA codes, or 2. expand the boundary of a low code fill NPA across a state/province boundary as part of a code exhaust plan for an adjacent state/province, thereby eliminating the need for a new NPA code assignment. The NANPA has been reluctant to pursue these recommendations for two primary reasons:

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16 Related to the development of assignment guidelines is the announcement made by NANPA at the November ICCF27 meeting that it intends to assign an INPA for the purpose of international carrier network identification on international calls inbound to World Zone 1. The ICCF26 meeting had already accepted an issue to develop assignment guidelines for the NNX codes within an INPA code (originally an N00, revised to INPA at ICCF27) for this purpose, but tabled the issue pending the NANPA decision on an assignment of an INPA resource. The NANPA's ICCF27 announcement reactivated the issue and a workshop was formed to develop the NNX assignment guidelines. It has always been, and continues to be, the NANPA position that in the absence of assignment guidelines for a specific NANP resource, the NANPA will assign resources if an applicant substantiates an "urgent need" that cannot await the industry approval process for assignment guidelines. Such is the case with this particular assignment of a single INPA.

17 Consequently, the NANPA originated a new issue at the November meeting of the Industry Carriers Compatibility Forum (ICCF) suggesting that the ICCF establish a workshop to develop assignment guidelines for INPA codes. ICCF accepted the issue (#251) and NANPA agreed to prepare draft assignment guidelines by January 31, 1993.

18 Currently, when the code administrator projects the exhaust of a geographic NPA code, the NANPA receives a copy of the exhaust plan including CO code fill data. The NANPA reviews the data, audits assignment records, and, where appropriate, recommends actions necessary, e.g., utilization of protected or reserved codes, prior to the assignment of a new geographic NPA code. Frequently, these NANPA procedures have delayed, in some cases substantially, the need for a new NPA code assignment.

1. NANPA records as far back as 1974 report that state regulatory agencies oppose the loss of state/provincial geographic identity inherent in either recovery scenario, and 2. such code transfers would necessitate massive customer number changes, something to be avoided for other than reasons of absolute necessity. Additionally, although not explicitly studied, NANPA believes there to be extensive billing/tariff implications inherent in such code transfers/expansions. One version of NPA code recovery that can be effected however, is the expansion of an NPA boundary within a state/province to incorporate part of the area within the exhausting NPA code into an adjacent NPA code with low code fill, thereby eliminating the need for a new code assignment. It is NANPA's understanding that code administrators routinely study this option when developing a code exhaust plan.

5.0 Number Portability

There appear to be three types of number portability that should be understood to ensure that we in the telecommunications sector are talking about the same type of portability while discussing this issue.

5.1 Number portability types

5.1.1 Location portability

Location portability would enable a user to take their existing number with them when they move. The difficulty with which such a capability is possible grows with the distance involved. Location portability is relatively easy and is usually afforded the user when moving within the same wire center area. When moving outside the wire center area, e.g., anywhere within the NANP or even worldwide, location portability becomes increasingly more difficult and expensive to provide and probably of less general public interest due to the lack of relative frequency with which such a move might occur in comparison to a local move. Historically, such number portability has been available by purchasing premium services such as foreign exchange service or call forwarding. The later, in the case of a permanent move, may have a time limit to its availability.

5.1.2 Service provider portability

Service provider portability would enable the user to take their existing number with them when they change service providers and is only applicable when there is competition within a specific market area. Service provider portability is an issue when moving among wireline service providers as well as among wireless service providers. From discussions within the telecommunications sector, this form of portability is the one most frequently discussed among regulators. Providing service provider portability without a database serving the area within which portability will be available will require the assignment of unique central office codes to each service provider. Implementing a database shared (central or distributed) by all service providers within the serving area allows for code sharing on a line-by-line basis but involves the making of decisions regarding implementation and operations costs and strategies.

5.1.3 Service portability

Service portability would enable the user to take their existing number, which is unique to their existing specific service, with them when they change to a different service with its own unique set of numbers. The NANPA offers two hypothetical cases of service portability: 1. a wireline service subscriber also subscribes to a wireless service and anticipating that most of their calls will be of the wireless nature might therefore request that their existing number, assigned to a wireline service and carrier, be moved to the wireless service and carrier, and 2. new PCS/UPT subscribers may want to take their existing uniquely wireline or wireless number with them when they subscribe to PCS/UPT so that their most publicized existing number becomes their uniquely PCS/UPT number by which they are reached at whatever terminal they are near at the time of the call. In each case, the inverse scenario could also be true.

5.2 Evolution of number portability

It is NANPA's perception that all three variations of number portability have varying degrees of advantages and implementation complexities. It is apparent to NANPA that service provider portability will, at some point in time, be a regulatory requirement in those areas where competition exists in the same market area. However, any such requirement must recognize the cost of such a capability, e.g., database development, deployment, operation, and administration, and insure that the costs are fairly apportioned within the telecommunications sector. It therefore behoves the entire telecommunications sector, i.e., industry, users, and regulators, to ***actively study the methods by which service provider portability can be implemented in order to determine the one method that is the most efficient and effective.***

It is also the NANPA's perception that location portability and service portability currently have comparatively limited regulator interest and therefore should be discussed within the context of user and service provider interest.

Number portability, potentially in all three varieties, is a very visible capability requiring sector attention. One of the important attributes of number portability, in all three variations, is the more efficient use, i.e., code fill, of NANP resources. As such, the NANPA strongly recommends that ***number portability must be a prime consideration when developing the numbering plan for the future of WZ1.***

6.0 Dialing Considerations

Although this document contains a numbering plan proposal and is not intended to delve into the complexities of dialing plans and addressing, it is difficult not to, at least, provide the NANPA perspective on the differentiation between the three disciplines "numbering", "dialing", and "addressing". This perspective is provided for the sole purpose of stimulating industry discussion with the goal of reaching agreement/understanding/consensus on what is meant by each of the three terms. The remaining paragraphs of this section will then discuss several dialing issues.

6.1 Three Disciplines: Numbering, Dialing, Addressing

6.1.1 Numbering

Numbering includes that portion of the dialed digits that conforms to CCITT Recommendation E.164 and can be transmitted across "national", i.e., numbering plan boundaries (WZ1). The basic international format is the country code (CC) plus the national number. For domestic calls, i.e., within the same numbering plan, the country code is not dialed.

For calls originating and terminating within WZ1 (domestic), the number is the 10-digits of the NANP, in both its 10-digit and 7-digit format.

NPA	-	NXX	-	XXXX
201	-	740	-	4596

For calls originating in WZ1 and terminating outside WZ1 (international outbound), the number is the destination country code (1-3 digits in length) followed by the appropriate digits of the destination numbering plan, totalling no more than 12 digits prior to 12/31/96 (Time T) and 15 digits after 12/31/96.

CC	+	National Number
44	+	22 730 5887

For calls originating outside WZ1 and terminating within WZ1 (international inbound), the number is the WZ1 country code "1" plus the appropriate 10-digits of the NANP, totalling 11-digits.

CC	+	NXX	-	NXX	-	XXXX
1	+	201	-	740	-	4596

6.1.2 Dialling

Dialing is the use of specific digits and/or special characters either as a prefix/appendix to a number or dialed alone. Unlike numbers, dialing digits cannot be transmitted across

national numbering plan boundaries. Basically, any digits or characters dialed that are other than the number, as defined above, are dialing. Some examples of dialing are:

0	=	*"0" indicates operator assistance required*
1 + number	=	*"1" indicates 10-digits follows*
0 + number	=	*0" indicates operator assistance required or credit card call*
10XXX[19] + number	=	*10XXX indicates carrier selection*
**XX*	=	**XX accessing a vertical service*
N11[20]	=	*indicates a service code, e.g., 911 emergency*

6.1.3 Addressing

Addressing is the total string of digits/characters dialed by the calling party and required by the public switched network to translate, transport, terminate, and bill the call. As such, addressing includes both numbering and dialing. A hypothetical example of an addressing string of digits is:

10XXX	*+ 1 +*	*201-740-4596*	*+ #*	*+ 2345*	*+*	*#*
CIC	*prefix*	*number*	*indicator*	*sub-address*		*EOD*

6.2 Uniformity of dialing

The dialing plan throughout WZ1 is not uniform. The primary areas of diversity are in the application of the Prefix "1" and the implementation of 7-digit versus 10-digit dialing patterns. The reasons for the diversity are often due to local regulatory considerations. When discussing the potential for a uniform WZ1 dialing plan, numbering experts within the telecommunications sector are supportive of uniformity as a goal, but will readily admit that it probably is not feasible within their network.

*The lack of uniformity causes inefficiencies in the operation and administration of the network and confusion on the part of the user public. **The NANPA proposes that the telecommunications sector study the feasibility of implementing a uniform WZ1 dialing plan** by investigating the advantages and deterrents to uniform dialing and determining whether the deterrents are insurmountable in comparison to the advantages. This study relates to the proposal for a WZ1 user survey contained in paragraph 3.3.2.*

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[19] This CAC/CIC format will be expanded to 101XXXX in the near future.

[20] The industry has historically had difficulty characterizing the N11 codes as either numbering or dialing. The NANPA decided on dialing as a pragmatic and definitional resolution. The debate will, undoubtedly continue.

6.3 Perspective on 7-digit national numbers.

DDD established the role of 10-digit NANP numbers and included an option for 7-digit abbreviations. Thus a 7-digit number implied a corresponding 10-digit number. The rule is simple and well known. If calling and called party stations are both in the same (home) NPA, that home NPA value need not be dialed. This view remains viable unless "10-digit only" dialing is adopted in a particular NPA. No loss of numbering capacity is attributable to this usage.

Before equal access was introduced in the US, a form of "unequal" access made an impromptu appearance. An arrangement later known as Feature Group B (FGB) was linked to the dialable format 950-WXXX, where W=0 or 1, in combination with 1,000 non-conflicting assignments carried as XXX. For the first time a national application of 7-digit dialing was made available, but not initially as a means to reach destination numbers without supplementary dialing. Many considered the use interim. It was not readily growable.

With nearly 120 geographic area codes active in the U.S., this use of "950" diverted a code otherwise eligible to identify nearly 1.2 million subscribers to a function serving up to only 10,000. With the additional 640 interchangeable NPA codes, a total of approximately 7 million subscribers could be identified by this diverted code.

Short (7-digit) numbers have long been considered attractive for purposes not *heretofore* consistent with DDD planning. One 7-digit number to serve throughout the United States (or WZ1) would have clear commercial advantages. However, justification and means for providing such numbers in an even-handed manner to all applicants, particularly given the limitation of only 10,000 possible subscribers nationwide, have yet to be found. Additionally, touchtone, repeating dialers, speed dialing, and potential future technologies make 10-digit dialing decreasingly onerous. There must be compelling reasons to assign a 7-digit number to serve one nationally oriented subscriber when the same resource could label 120 typical subscribers. As custodians of a shared resource, the NANPA must not confer advantages on a few while burdening the many. Thus **7-digit national or WZ1 numbers are not endorsed *by NANPA*.** This view is to a large extent self-enforcing since codes to support "national" 7-digit numbers are not easily available. The "950" FGB usage cited remains an exception and pre-dates the current administrator. It is not viewed as a WZ1 precedent *for expanding the inventory of "national" 7-digit numbers.*

*There is, however, significant interest within the telecommunications sector to pursue, for commercial reasons, the feasibility of expanding, beyond the current "950" capacity, service providers' access to additional "national" 7-digit numbers. In light of this interest, **the NANPA proposes that the WZ1 industry undertake a study** to understand and quantify the advantages of "national" 7-digit numbers to the telecommunications sector including the users and service providers, weigh those advantages against the apparent inefficiency of using NANP resources in this manner, identify any additional codes that would be available to expand the inventory of "national" 7-digit numbers*[21]*, and ultimately, if this process results in consensus within the telecommunications sector that "national" 7-*

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21 ICCF has established a new workshop, based on a NANPA sponsored issue (#254), to investigate the feasibility and desirability of assigning 555-XXXX line numbers as a new 7-digit numbering resources for use by the entire telecommunications industry.

digit number applications should be encouraged and expanded, develop guidelines for their equitable and efficient use and assignment.

6.4 Abbreviated dialling

The topic of abbreviated dialing has been discussed in various fora for the last several years. Based on this discussion, the NANPA's perception of what is meant by abbreviated dialing is: the ability of a user to reach a specific service/service provider by dialing less than 7 digits.

One particular issue has rocketed this topic to the top of the list of numbering issues: the appropriate local and WZ1-wide assignment and use of N11 codes. This specific topic is currently before at least two regulatory agencies to which interested entities, including the NANPA, have publicly commented. Consequently, this specific abbreviated dialing issue will not be discussed in this document.

The NANPA perspective on the general topic of abbreviated dialing relates to the proposal in paragraph 3.3.2 that a user survey should be conducted to determine the user interest in such capabilities as abbreviated dialing. The NANPA has seen no data to substantiate the claims of user interest in abbreviated dialing particularly in contrast to other potential industry goals that may be foreclosed by abbreviated dialing, e.g, fair and equitable access to very limited resources, uniform dialing. It is therefore the NANPA's perspective, absent any comprehensive survey data, that the primary advantage of abbreviated dialing is the perceived market advantage to service providers. The NANPA is not opposed to such a use of numbers, even for the sole purpose of market advantage, as long as the telecommunications sector can substantiate the public interest, achieve consensus within the WZ1 telecommunications sector, and is willing to investigate and accept any potential detriments inherent in local and/or WZ1-wide abbreviated dialing.

The NANPA is a participant in the task groups under the Information Industry Liaison Committee (IILC) on abbreviated dialing and supports this forums primary interest in the topic. The NANPA proposes an active cross-sector participation in these task groups to ensure that their conclusion will represent the entire telecommunications sector.

7. Long-term Goals, *Trends* and Predictions for the Telecommunications Industry and the NANP

The beginning of the process that resulted in the above proposed method for the allocation of interchangeable NPA codes (Section 4) and the following long-term goals and predictions for the telecommunications sector was a comprehensive NANPA study to assemble and assess the collective opinion of the telecommunications industry on its long-term direction. The *initial* conclusions and recommendations of the NANPA stemmed from numerous interviews with telecommunications experts and futurists. The input obtained from these interviews was compiled and analyzed. The result of the analysis, along with the expertise resident in the NANPA organization, was the *first* NANPA proposal for the future of numbering in WZ1 and its numerous recommendations and predictions. A description of the interview process, a list of interview participants and their organizations, and a brief list of select general conclusions *were included in the first edition of this Proposal - Bellcore IL-92/01-013, January 6, 1992 - which is available to those not already in receipt of a copy by calling Jean Mobley on 201-740-4661.*

Following are the most pertinent and salient long-term goals, predictions, and recommendations as developed by NANPA from this interview and analysis process.

7.1 The PSTN of the future will be a "virtual seamless network."

Today's WZ1 network is comprised of the separate networks of multiple network providers, each having a defined and limited function, e.g., intra-LATA (Local Access and Transport Area) network , inter-LATA network, cellular network, pager network, satellite network, and niche networks providing unique services. In addition, there are a multitude of "private" networks[22] providing service(s) to closed sets of users, e.g., data networks, packet networks, private voice networks. The inefficiency of the inherent redundancy of network components for such an architecture as well as the inconvenience to the user public in having to select, sometimes on a call-by-call, service-by-service, or time-of-day basis, the network of choice, will only be further complicated by the potential for future services "requiring" more separate networks.

Data, packet, and private networks not having PSTN/ISDN functionality or connectivity are not assigned NANP numbering resources. This policy is in conformance with CCITT Recommendation E.164. Public data/packet networks utilize X.121 numbering and Data Network Identification Codes (DNICs). CCITT Recommendation X.122 specifies the interworking methodology between public data/packet networks and the PSTN/ISDN. Consequently numbering for these, and any non-PSTN/ISDN applications, are not addressed in this document.

The "intelligent" North American network of the future will continue to have multiple network providers. However, the future user will have the ability merely to place a demand on the North American network and have it select the appropriate separate network(s) necessary to successfully complete the desired communication, with the assistance of

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[22] Throughout this report the terms "private network" and "public network" are used. The telecommunications industry has found it difficult to define these two terms as well as their attributes, separate functions and potential interworking *(see paragraph 3.3.6)*. This paper attempts to circumvent this issue by reliance on the context within which the terms are used.

capabilities such as "smart" user interfaces, sophisticated signaling protocols, and terminal protocol conversion capabilities. The North American network will thereby be seamless in that the user will be unaware of the network(s) used to handle a particular communication, but will be seamless only in a qualified (or "virtual") sense since the user will be aware of the existence of such networks and *will* require advance arrangements with the multiple providers of choice to handle complex communications needs in an integrated manner. There are related goals or predictions necessary to enable a "virtual seamless network":

1. **Public networks will interconnect.** There are many public networks in North America that do not now directly interconnect (i.e., users directly served by network A do not communicate with users directly served by network B via a direct connection between networks A and B) but rather interwork (i.e., users directly served by network A communicate, knowingly or unknowingly, with users directly served by network B via an interworking or transit arrangement with a third party, e.g., network C).

2. **Private networks may interwork with public networks.** The industry is already moving towards the philosophy that "no network is an island." Those users with a need to communicate only with each other, in whatever medium(ia), may still participate in a private network. However, in many instances the need for such a user to go off-net to access the public network is often inconvenient, e.g., to add-on an off-net public network subscriber to an existing on-net private network call. Customer needs and convenience will drive the development of voluntary standards for private-public network interworking.

3. **Private networks may exist primarily to provide only high technology-based services beyond the capability of some public network.** This goal implies several changes in the telecommunications industry: 1. network architecture (e.g., Virtual Private Network [VPN]) and services (e.g., Switched Multi-megabit Data Service [SMDS]) developments seem to predict the dissolution of the absolute separation of private and public networks; 2. the economic advantages of private networks for specific applications will diminish; 3. there will be more willingness by industry to set standards for private networks (voluntary, but essential for compatibility) and their interworking with public networks. Such efforts are already underway in *the* American National Standards Institute-accredited Committee T1 - Telecommunications.

It is the expressed perception of some within the telecommunications sector that a seamless network, apparently even when modified as a "virtual" seamless network, and the concept of network interconnection are both "anti-competitive". The NANPA perception is that the market place, the advent of new technologies, the evolution of competition (such as the acquisition/merger/affiliation of diverse service providers within the telecommunications sector, e.g., between an interexchange carrier and a cellular carrier), and the demands of the users/regulators will result in a natural evolution toward a virtual seamless network as well as network interconnection. It is not the NANPA perception that either a seamless or interconnecting network will appear overnight, but will occur as the result of the sector's evolution into the future. The NANPA feels that the telecommunications sector should be aware of such evolutions, monitor their progress, and ensure that the developing numbering plan does not inhibit such trends, if indeed they are occurring.

7.2 The "dialing" process by which an end user accesses the telecommunications network will commonly be performed by a "smart" user-network interface.

At some time within the 2025 range of this proposal, user-to-network interfaces - either terminal-based or network-based - will be commonly deployed with the capability of performing the "dialing" function for the originating user. The user will provide the identity of the called party (either by voice, touch, or keyboard) to a directory function within the user interface. The user interface will match the called party's identity to a network destination address and perform the dialing function and service attribute negotiation for the user. The numbering implication is that once this capability evolves from "common" to "ubiquitous", the number or pattern of digits used as a destination address are a diminished human factors issue since the "dialing" of them will be performed by signalling protocols within the user interface.

7.3 Eventual exhaust of the 640 interchangeable NPA codes.

Section 4 of this proposal recommends that *320* of the 640 interchangeable NPA codes be reserved for the specific applications/purposes detailed. It further states that the remaining *320* codes be reserved for unidentified future applications, *format expansion*, and growth. At some time, the finite inventory of 640 new NPA codes will exhaust. Although the time can not be accurately predicted, it is expected that this exhaust will not occur until well into the middle of the 21st century. This prediction presumes that there will be no new services or applications for which additional large quantities of numbers will need to be allocated, a tenuous presumption based on recent history. This proposal would therefore be incomplete if it did not at least propose, for consideration, the next changes to be taken in response to the exhaust of NPA codes.

The first step recommended is to unblock the D digit - the first digit of the office code - from its current restriction to the digits 2-9 to include all digits 0-9. Thereafter, the 10-digit format of the NANP would be NXX-XXX-XXXX. This change will add 200 office codes for assignment in every NPA in the NANP, thereby forestalling the exhaust of those NPA codes approaching exhaust. The amount of time gained by this step until the 10-digit format is exhausted is dependent on the number of office codes required within each of the codes predicted for imminent exhaust. All the ramifications of such a proposal have not yet been investigated fully *and at least one regulatory agency opines that the unblocking of the D digit should be implemented by the telecommunications sector now, not when the exhaust of the 640 INPAs is imminent.* The telecommunications industry should start discussion on this recommendation and on any other proposed alternatives well in advance of the exhaust of the 640 interchangeable NPA codes.

The second step, *if not already implemented in response to other needs within the telecommunications sector,* will be to expand the length of the 10-digit format. The expanded length is undetermined and for further study. One format expansion method is detailed in Appendix *J*. This method would entail the *allocation* of 80 of the 640 interchangeable NPA codes as stated in section 4.3. Whatever expanded number length is recommended, it must conform to CCITT Recommendation E.164 *and not exceed 12 digits prior to December 31, 1996 and 15 digits thereafter, including the WZ1 country code "1".*

7.4 The expanded capabilities of CCITT Recommendation E.164.

Rec. E.164 expands the capabilities of the numbering plan for the ISDN era. CCITT Recommendation E.165 establishes the time (time "T") after which these capabilities can be used, as December 31, 1996. The two significant expanded capabilities are:

1. An expansion of the maximum length of an international number from 12 to 15 digits.

2. An expansion of the maximum number of digits to be analyzed in switching an originating international call, to determine the proper international routing and charging, from 4-5 digits, depending on the length of the country code, to 6 digits for all country codes.

There is no proposal for the use of the additional three digits allowable in the length of an international number within the NANP until, as mentioned above, the exhaust of the 10-digit format of the NANP. It is recommended that all public switches within WZ1 be prepared, by time "T", to register and process 15 digits on originating international calls in the eventuality that one or more non-WZ1 countries may elect to expand their national numbering plan beyond the current 12 digits. *It is NANPA's understanding that at least one country has already expanded its numbering format to 13 digits and that additional countries outside WZ1 will also be expanding their digit format to exceed the currently allowable 12 digits* [23].

It is also recommended that all WZ1 international and interexchange carriers be prepared, by time "T", to analyze up to 6 digits to determine the proper international routing of calls originating in WZ1. Local exchange carriers need not be concerned regarding this expanded digit analysis since it is currently the responsibility of the interexchange and international carriers to perform the digit analysis required to determine the proper international routing of calls.

The expanded digit analysis capability from 4-5 digits to 6 digits is of questionable value to WZ1 which has its 10-digit format segmented into groups of 3, 3, and 4 digits (i.e., NXX-NXX-XXXX). The analysis of 6-digits on international calls inbound to WZ1 includes the country code ("1"), the NPA code (NXX), and only two digits of the CO code (NX). An expanded analysis to include the full three digits of the CO code could be of value to WZ1. If so, there should be WZ1 discussion regarding the potential for a *contribution* to the CCITT *proposing* to expand the analysis capability to 7 digits. *The NANPA delegate to CCITT Q5/II is prepared to present such a contribution to CCITT, if the collective WZ1 telecommunications sector is in agreement.*

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[23] *At least one WZ1 carrier has expressed a concern regarding the need for switch modifications at Time T without a commitment from other countries outside WZ1 that there will be format expansions at or near Time T. The same carrier's preliminary switch analysis indicates that current switch technology can handle up to 14 digits and, therefore modification would only be necessary if any country intends to expand their numbering format to the full 15-digit capability. The NANPA's delegate to CCITT Q5/II will pursue the question of other countries' intentions regarding digit expansion. The collective WZ1 industry must discuss and resolve the switch modifications issue and NANPA recommends that that effort should start immediately.*

7.5 Numbering and dialing plan integration.

The worldwide numbering scheme is composed of multiple numbering plans for separate telecommunications services, architectures or media (e.g. E.164 - the numbering plan for the ISDN era, X.121 - the numbering plan for public data networks). Additionally, within WZ1 there is a *widely varying* dialing plan. The existence of multiple worldwide numbering plans and a *varying* WZ1 dialing plan containing numerous prefixes and code sets adds to the complexity of the network and the confusion of the user public. A great deal of experts' time has been spent over the last several years integrating Recommendations E.166 and X.122, Numbering Plan Interworking. The WZ1 dialing variations make it difficult for users to access the network in a consistent manner.

In this context, it is recommended that the telecommunications industry study the feasibility of integrating the multiple numbering plans in existence today into one worldwide numbering plan (e.g., E.164) and the dialing plan of WZ1, with its prefixes and code sets, into the 10-digit or expanded format of the NANP. This is a goal that may not be feasible, *in its entirety or even partially*, until well beyond 2025. The degree of integration attainable depends on the willingness of the organization controlling the plans to integrate, as well as the technical ability to integrate. It is a goal that must be studied one plan or prefix at a time and is not intended to imply that universal integration of all numbering and dialing plans is feasible, but merely that they be studied individually, *e.g., the feasibility of an alternative method of operator assistance access than "0".*

7.6 The use of overlay NPA codes

Until recently, in an area where an NPA code has exhausted its supply of CO codes and interchangeable CO codes have already been implemented as a relief measure, two alternatives for code relief have traditionally been considered: an NPA boundary realignment, or an NPA split. The NANPA is recommending that a third alternative, NPA overlay, be considered as the preferred response to an exhausting NPA code in the future, especially in densely populated areas.

7.6.1 NPA boundary realignment

In an NPA boundary realignment, the NPA requiring relief is adjacent to an NPA,within the same State or Province, which has extra CO code capacity. A boundary shift occurs so that excess codes in the adjacent NPA can be used in a portion of the NPA requiring relief. In essence, the geographic area of the exhausting NPA shrinks, and the geographic area of the NPA with excess capacity expands. Only the customers in the geographic area between the old and new boundary are directly affected by this change.

7.6.2 NPA split

The more traditionally chosen solution to CO code exhaust in a geographic NPA has been to implement an NPA split. Essentially, the exhausting geographic NPA is split in two, leaving the existing NPA code to serve the area with the highest density of business customers (in order to minimize number changes) and assigning a new NPA code to the remaining area. This method works best in areas where natural or physical boundaries (counties, boroughs, cities) between the old and new NPAs can be identified and easily recognized by the public. Enough NPA splits have occurred that implementation procedures are well-established, most technical concerns are addressed, and historic precedent as well as public familiarity facilitate the task of public education and acceptance.

7.6.3 NPA overlay

An NPA overlay occurs when two or more geographic NPA codes serve the same geographic area. In an NPA overlay, code relief is provided by opening up a new NPA code within the same geographic area as the NPA requiring relief. Numbers from this new NPA are assigned to new growth. Existing customer number changes are minimized or, ideally, eliminated.

Four potential implementation strategies have been identified for an NPA overlay: distributed overlay, concentrated growth, boundary extension, and multiple overlay.

The first potential implementation strategy is a distributed overlay. This strategy is most appropriate when growth in telephone numbers is expected to be more or less evenly distributed throughout the existing NPA requiring relief. The new NPA is added to the NPA requiring relief and shares the exact same geographic boundaries. When new phone numbers are required, they are assigned from the new NPA.

A second potential implementation strategy is a concentrated growth overlay. This could occur in an NPA where the majority of the new demand for telephone numbers is concentrated in one section of the existing NPA. For example, a fast growing metropolitan area and a sparsely populated rural area could exist within the same NPA. The overlay NPA would be assigned initially to the section of the NPA experiencing the fastest growth, and new phone numbers in that section would be assigned from the new NPA. As more relief is required the section served by two NPAs would expand. This implementation could eventually become a distributed overlay as demand requires.

A third potential implementation strategy is a boundary extension overlay. In this implementation, the NPA requiring relief is adjacent to an NPA with spare capacity. The boundary between these two NPAs is essentially eliminated, and spare CO codes from the adjacent NPA are assigned within the original NPA boundary where relief was required. An appropriate use of boundary extension might be in a state or province consisting of two NPAs, where one NPA has excess capacity. This solution has the advantage of not requiring a new NPA code, but it also shares some of the limitations of boundary realignment, in that it provides less long term relief.

The fourth potential implementation strategy is a multiple overlay. This strategy is most applicable in a metropolitan area with two or more NPAs. The new NPA would be assigned to overlay the multiple existing NPAs serving the entire metropolitan area. Another usage could be for a state or province with two NPAs. The third NPA would be assigned to new growth within the entire state or province.

The NANPA has identified several advantages to an NPA overlay:

- *Existing customer number changes are minimized or, ideally, eliminated.*
- *If the NPA overlay does not require a change in dialing requirements, customer programmed phone numbers in automatic dialers, security systems, screening lists, speed calling lists, etc. could be left alone, eliminating the potential for service disruptions caused by customer inaction and their potentially serious consequences.*

- *Paging and cellular customers would not have to return their units to a service point for chip changes or reprogramming.*
- *Assuming no changes in dialing requirements, permissive dialing periods could be eliminated.*
- *The costs of updating operations support systems each time an NPA split occurs to reflect the change in NPA for existing customer numbers would be eliminated.*
- *If planned well enough in advance, some flexibility could be achieved in assigning numbers.*
- *Boundary decisions become simpler.*

The NANPA has also identified four major issues and concerns with an NPA overlay:

- *The impacts on the numerous switching, operations, maintenance, and billing support systems have not been identified.*
- *Ten-digit dialing is necessary, either in both the overlay and overlayed NPAs, or at least for calls to the customer's foreign NPA (FNPA).*
- *Overlay NPAs are still new and untried*[24].
- *Longer planning periods may be required to implement an overlay NPA effectively.*

Code relief planning is a local process, coordinated by the predominant local exchange carrier with the participation of appropriate regulatory authorities and all local telecommunications providers serving the affected area. NANPA's role is to act as a consultant in code relief planning efforts and to help ensure that guidelines for code relief meet the standards for efficient and effective use of NPA numbering resources. It is NANPA's recommendation that NPA overlay be explicitly considered as a viable code relief planning alternative in all situations in World Zone 1. The advantages and disadvantages of NPA overlay versus NPA splits should be determined locally and outlined, in consultation with other telecommunications entities doing business in the area, prior to making a final recommendation of the best approach for the local area. NANPA believes that while there may be some areas for which an NPA split could still be the best approach, NPA overlay has the potential as a preferred solution for much more graceful number relief than an NPA split, not only in metropolitan areas, but also in any localities where well-defined boundaries can not be determined and/or the desire to avoid changing phone numbers outweighs the requirement for ten digit dialing.

In order to facilitate these code relief planning processes, NANPA ***proposes that an in-depth study of NPA overlay be conducted.*** *The purpose of this study would be to identify technical issues relative to the implementation of NPA overlay which require*

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[24] *From a technical point of view, the first application of an NPA overlay - the 917 NPA code in New York City - occurred in 1992. It should be noted that while the 917 NPA overlay implementation resembles the multiple overlay scenario discussed earlier, there were some implementation approaches unique to the particular code relief situation in New York City at the time, including a boundary realignment, which complicated the overlay. However, the results of the 917 NPA overlay, especially the technical issues found, can be observed and understood for what may be applicable to other areas in the future.*

resolution, to understand the impact of NPA overlay on each industry sector, and to perform a comparison of NPA splits and NPA overlay code relief alternatives.

7.7 Universal 10-digit dialing within the NANP

It is recommended that the North American telecommunications *sector* resolve to evolve to 10-digit dialing for station-to-station (network based) calls, including local. The evolution will start with those areas implementing overlay NPA codes. The long-term goal, however, should be universal 10-digit dialing within the NANP. It has long been recognized that the user public and the telecommunications network would benefit from a uniform dialing plan for all calls. A full 10-digit dialing plan would eliminate the network's analysis of the initial digits to determine the length of the digit stream. The user confusion inherent in any non-standard plan will be eliminated and many failed calls due to misdialing will also be eliminated. The traveling public is particularly subject to confusion by the differing dialing plans used throughout North America.

Services such as touchtone, repeating dialers, speed dialing, and potential future technologies make 10-digit dialing decreasingly onerous.

A universal 10-digit dialing plan would also eliminate the need for the "1" prefix as a 10-digit call indicator to the network. The use of the "1" prefix as a toll indicator is another issue. When used as a toll indicator, the prefix requires a user to know in advance that a particular destination code requires the "1" prefix. The "1" as a toll indicator is at best a concession to a concern better met by the advance knowledge of the approximate cost per minute of a call. It is recommended that the industry study alternatives for providing call charge information outside the dialing and numbering plans. *Concerns regarding local regulatory requirements that the prefix "1" be retained as a toll indicator, although valid, should not deter the telecommunications sector from studying the potential for both a better toll indicator method and, concurrently, the elimination of the prefix "1". Until such a study is conducted and the aggregate WZ1 telecommunications sector reaches agreement on this issue, the use or discontinuance of the prefix "1" must continue to be a local decision.*

It is also recommended that format-based call rejection associated with toll alerting be limited to 7-digit toll calls. Other implementations of toll alerting, e.g., tone warning, need not involve call rejection, thereby leaving the decision to the caller. In other jurisdictions, the concept of toll alerting may be inconsistent with local experience and consequently of no interest.

8. The Evolution of Numbering in WZ1

Section 4 contains the recommended method of allocating the 640 interchangeable NPA codes and is viewed as the short-term proposal for the NANP. Section 5 contains goals and predictions for the future (~2025) of the telecommunications industry and is viewed as the long-term proposal for the NANP. Along this time scale, extending from 1995 to 2025 and beyond, is the period of evolution and transition - the period where the NANP resources and design of 1995 gradually, and in a controlled and planned manner, develop into the resources and design of the future. There is no recommended time by which each of the long-term goals will, or should, be implemented. It is recommended rather that there be an effort first to achieve industry and public consensus that these goals are indeed those which the industry will evolve to and then jointly develop the method by which this evolution will take place. Some specific examples of the evolution anticipated for the recommended goals and the method of study are:

8.1 Universal 10-digit dialing

The plan for evolving the current multiplicity of dialing schemes to full 10-digit dialing would start with the implementation of overlay NPA codes in metropolitan areas. The evolution would continue through the willing participation of carriers and users within other NPAs, generally coincident with another dialing/numbering change (e.g., NPA code exhaust) within the NPA, not as a unilateral action. The growth of non-geographic NPA codes will also stimulate the evolution toward 10-digit dialing. The NANPA would coordinate the evolution and provide the motivation by reinforcing the advantages of 10-digit dialing. It is strongly recommended, as a short-term goal, that the dialing of 10-digits, when only 7-digits are required, not result in a call failure.

The implementation of a full 10-digit dialing plan requires user awareness that a 10-digit number is always acceptable and does not necessarily connote a toll charge.

8.2 Numbering/dialing plan integration

Although a lofty and complex goal, its evolution should start with industry concurrence that new numbering/dialing plans (including prefixes) will be implemented only when the needs of the industry and its users can not be met within the current plans and formats, not merely for convenience. Current numbering/dialing plans will continue basically as they are for the near-term. Specific instances should be investigated as study warrants (e.g., elimination of the "1" prefix with full 10-digit dialing and the use of another method, e.g., tones or announcements or out-of-band signaling) to indicate a toll call and/or its approximate cost. Likewise, efforts should be made to bring into uniformity existing numbering/dialing plans, e.g., the current effort to use vertical services codes (*XX[X]) uniformly across wireline and wireless networks. The more expansive integration of numbering/dialing plans, particularly within E.164 and the NANP, can only occur concurrently with the expansion of the plans.

9. Formation of NANP *Steering Committees*

Significant numbering issues (e.g., non-LEC ISDN numbering) have remained unresolved for a long period of time, *take an inordinate amount of time to resolve*, or have been resolved through other than industry consensus even though the industry consensus process was used. To a substantial degree, the lack of resolution of such issues is due to the lack of a forum(s) responsible for, or *willingness* to discuss, all aspects of a numbering issue, i.e., technical, standards, regulatory, etc. Issues have been discussed with the FCC or the DOC, in Committee T1, in the Industry Carrier Compatibility Forum (ICCF), in the Carrier Liaison Committee (CLC), and even in ad hoc committees such as the ISDN Numbering Forum (INF) sponsored by the NANPA at the request of Committee T1. In each case, discussion of issues is rightfully limited to the scope of the organization's charter. In most cases, numbering issues cover the entire spectrum of telecommunications concerns and therefore can not be completely resolved in any one particular forum.

The FCC has asserted jurisdictional purview over the administration of the NANP in the United States. The *Ministry of Communications* in Canada has a similar purview as do specific governmental agencies within the countries of the Caribbean. In all cases, it has been evident that these regulatory agencies prefer to see issues of *NANP* administration and design resolved by the industry in a consensus process sponsored by, or with the participation of, the NANPA.

The NANPA therefore proposes the formation of two steering committees to resolve such issues. The two proposed steering committees are the World Zone 1 Numbering Steering Committee (WNSC) and the United States Numbering Steering Committee (USNSC).

9.1 World Zone 1 Numbering Steering Committee (WNSC)

The proposed function of the WNSC would be to resolve numbering issues and conflicts arising from the NANP's structure as an integrated numbering plan serving the 18 North American countries of World Zone 1. It would therefore resolve numbering issues/conflicts involving divergent/opposing needs/views of the WZ1 countries regarding the use, assignment, and planning of NANP resources. It would also coordinate the development of a WZ1 position on international numbering issues when appropriate, e.g., determine the need for a CCITT contribution requesting 7-digit analysis on international calls. It would not discuss/resolve the national numbering issues of WZ1 countries. Issues would be brought to the attention of the WNSC by any interested party within WZ1. Potentially, the WNSC could also attempt to resolve issues/concerns regarding the functions and design of the NANP and it resources as presented by interested telecommunications representatives from outside WZ1.

Additionally, the WNSC should undertake the ongoing oversight of numbering issues requiring WZ1-wide routine management, e.g., the WZ1-wide funding arrangement for the North American Numbering Plan administrator's (NANPA) organization.

The WNSC would resolve issues through a consensus process defined within its charter. The charter will be developed and approved at the WNSC's first meeting. The NANPA would be directed by the consensus-approved documents developed by the WNSC. Absent consensus, the NANPA will continue to have the authority, under extenuating or urgent situations, to make decisions regarding the use and administration of NANP resources. The NANPA will function and serve as the staff organization and secretary for the WNSC.

The WNSC should meet on an "as needed" basis, i.e., at the request of the chairperson or a predetermined set of its members. The considerations for calling a meeting would be the volume and urgency of issues offered for resolution. Additionally, the WNSC should hold a scheduled annual meeting to conduct the business of its WZ1-wide management function(s).

The WNSC meetings would be open to all interested parties. However, WNSC membership would include representatives of telecommunications sector interest groups. It is proposed that the number of representatives be equal from Canada, the Caribbean, and the United States. The following list of proposed WNSC members is offered for review and discussion:

CANADA

CSCN chairperson or delegate
Ministry of Communications (DOC and/or CRTC?)
Representatives (1 each) of industry interest groups: e.g., IXCs, LECs, RCCs, ESPs, Vendors, Users

CARIBBEAN

Caribbean Association of National Telecommunications Organizations (CANTO) - an industry association - chairperson or delegate
Caribbean Telecommunications Union (CTU) - a regulatory association - chairperson or delegate
Representatives (1 each) of industry interest groups: (same as listed for Canada)

UNITED STATES[25]

USNSC chairperson or delegate
Federal Communications Commission
National Associate of Regulatory Commissioners
Representatives (1 each) of industry interest groups: (same as listed for Canada)

The NANPA would serve as, and perform the duties of, WNSC secretary. Additionally the NANPA should function as a consultative organization to the WNSC. Appendix I contains a WNSC interworking chart showing the relationship between the WNSC and other organization/bodies/agencies/fora.

9.2 United States Numbering Steering Committee (USNSC)

It is proposed that the USNSC function as the lead US telecommunications sector forum/body for the numbering discipline and would therefore perform the duties of numbering project management and issue/complaint resolution. As such, the USNSC would accept US numbering issues referred by interested parties, identify the components of the issues requiring study and resolution, liaise the component parts to the appropriate forum/agency/body/association for resolution, and coordinate the overall issue resolution in order to meet the needs of the issue originator and the US telecommunications sector in a timely manner. It is not intended that the USNSC take on the numbering functions ongoing, intended, or currently within the purview of any other

[25] *The proposed US membership causes, due to the US regulatory structure, the US to have one more member than Canada or the Caribbean, a matter that will have to be resolved when this issue is discussed.*

forum/agency/body/association. If the whole issue or any of its component parts do not conform to the charter of an existing forum/agency/body/association, the USNSC will undertake to resolve the issue, through the consensus process as detailed in its charter, which will be developed at its first meeting. Issues would be brought to the USNSC by any interested party within the US or from parties outside the US with a direct interest in US numbering discussions/decisions. The NANPA, in the administration of US numbering resources within the NANP, would be directed by the consensus-approved documents developed by the USNSC. Absent consensus, the NANPA will continue to have the authority, under extenuating or urgent situations, to make decisions regarding the use and administration of NANP resources. The NANPA will function and serve as the secretary (if the USNSC is a new independent committee) and staff organization for the USNSC. A similar relationship exists between the Canadian Steering Committee on Numbering (CSCN) and the designated Canadian NANPA - Stentor.

The USNSC will be an open committee both in its membership and in the conduct of its meetings. It is, however, imperative that the means be found by which both the FCC and the NARUC will be active participants in the USNSC, not passive observers. It may even be appropriate that the FCC sanction the functions of the USNSC as the Ministry of Communications sanctioned the functions of the Canadian Steering Committee on Numbering (CSCN), a model for many aspects of the development of the USNSC.

The USNSC, at the discretion of the US telecommunications sector, could be organized as a new and independent committee or it could be designated as a new function of an existing forum/agency/body/association. It is understood that the USNSC does not supersede the jurisdiction of the FCC in numbering matters. Appendix I contains a USNSC interworking chart showing the relationship between the USNSC and other organization/bodies/agencies/fora.

There were many diverse opinions regarding the formation of any, let alone two, new committees or councils on numbering. The opinions ranged from open disdain to ardent support and, regarding the authority level of any such function, from only advisory to directorial in nature. Consequently, there are many unidentified and unresolved issues regarding the formation of both the WNSC and the USNSC. These issues should be identified and resolved by consensus within the WZ1 and US telecommunications sector. The NANPA has only provided the foundation of a organizational structure intended to make the resolution of WZ1 numbering issues a more efficient and effective process.

10. Action Plan

This *second edition* document, *The NANPA's Proposal on the Future of Numbering in WZ1*, is being widely distributed within the telecommunications sector for review. *The NANPA will sponsor the first meeting of the Future Of Numbering Forum (FNF) in the Washington, DC area on March 16-18, 1993. The NANPA will use ANSI procedures, i.e., the contribution-driven consensus process, at this meeting and therefore solicits contributions on this proposal. Although contributions can cover any topic relating to the proposal, it is requested that contributions be specific in that they provide specific text recommendations for changes, additions or deletions to the document. This does not preclude contributions relative to the overall future numbering plan process or project. Contributions will be sequentially numbered. Document numbers can be obtained from the contact provided below. The consensus process is helped by participants having contributions in advance of meetings for review. The NANPA will forward a copy of each contribution received by March 8, 1993 to each registered meeting participant. Contributions will be accepted at any time through the closing of the first day of the meeting. Contributors will be expected to bring to the meeting a copy for each participant of any delayed contribution (those not forwarded to the NANPA by March 8). All advance contributions* should be forwarded to the following:

Fred Gaechter
NANP Administration
Bellcore - Room *1B225*
290 West Mt. Pleasant Avenue
Livingston, New Jersey 07039
Tel. #: 201-740-4596 *Fax #: 201-740-6860*

The first two numbered contributions to this forum will be: 1. this Proposal (FNF/91-001) and 2. the NANPA's proposed agenda for the first forum meeting (FNF/93-002), which will be distributed to the industry for advance comment during January 1993 along with meeting logistics details. It has been NANPA's experience that contributions directed toward specific sections of the document and with specific text recommendations are the most helpful to progressing work within a forum.

It is NANPA's intention to divide the proposal into short-term and long-term issues and to establish work groups for those identified issues that the telecommunications sector agrees require work. The short-term issues should have more immediate resolution dates, e.g., December 31, 1993, while the long-term issues will have longer-term resolution dates and, in some cases, may be categorized as "ongoing" work. The NANPA will commit to sponsoring forum meetings, as long as the industry supports the forum work, up until the resolution dates set by the forum participants. At the resolution dates, the NANPA will evaluate the potential for resolution, if not already achieved, and determine, on an issue-by-issue basis, whether the forum should continue based on the potential for consensus. Those issues having consensus will be referred to the appropriate regulatory agencies and distributed to the telecommunications sector, as issues resolved by consensus. Those issues where the discussion appears to be at an impasse, will be referred to the appropriate regulatory agencies with all related documentation and a NANPA recommendation. The regulatory agencies will receive a periodic status report on those issues on which work is continuing. If at any point in this entire process it is determined that an issue(s) is within the charter of another forum/agency/body, the NANPA will liaise that issue, on behalf of the FNF, in the appropriate manner to the specific forum.

Appendix A

NANP Format Chronology for DDD

1947: NPA assignments (86 codes) published in map form.

1951: Start of DDD, in Englewood, N.J.

	Destination of Call		
	Local	**Other Home NPA**	**Foreign NPA**
1951:			
CC	NNX-XXXX	NNX-XXXX	N0/1X-NNX-XXXX
1952-71:			
CC	NNX-XXXX	NNX-XXXX	N0/1X-NNX-XXXX
CC/SXS	NNX-XXXX	1+NNX-XXXX	1+N0/1X-NNX-XXXX
1972-94: (#)			
No Toll Alert	NXX-XXXX	NXX-XXXX	1+N0/1X-NXX-XXXX
Toll Alert	NXX-XXXX	1+HNPA-NXX-XXXX	1+N0/1X-NXX-XXXX
1995-: (*)			
No Toll Alert	NXX-XXXX	NXX-XXXX	1+NXX-NXX-XXXX
Toll Alert	NXX-XXXX	1+HNPA-NXX-XXXX	1+NXX-NXX-XXXX

Interchangeable Office Codes Introduced
* Interchangeable Area Codes Introduced
CC = Common Control
HNPA = Home Numbering Plan Area
SXS=Step by Step

Appendix B

World Numbering Zone 1 Countries
(From CCITT Rec. E.164)

Anguilla
Antigua and Barbuda
Bahamas (Commonwealth of the)
Barbados
Bermuda
British Virgin Islands
Cayman Islands
Canada
Dominican Republic
Grenada
Jamaica
Montserrat
Saint Kitts and Nevis
Saint Lucia
Saint Vincent and the Grenadines
Turks and Caicos (Islands)
Trinidad and Tobago
United States of America, including Puerto Rico and the Virgin Islands

Appendix C

Resources Currently Administered By The NANPA

- NPA codes (e.g., 908-NXX-XXXX)
- 800 and 900 NXX codes (e.g., 800-379-XXXX, 900-431-XXXX)*
- Carrier Identification Codes (e.g., 10345)*
- N00 (e.g., 500-NXX-XXXX) and nationwide N11 codes (e.g., 911)
- SS7 network codes (maintenance agent agreement with Committee T1)*
- Vertical Services Codes (e.g., *73 for "Call Forwarding activation)*
- CO codes within the Caribbean 809 NPA code
- ANI II digits (in response to ICCF assignment agreements)*

* Industry guidelines are either approved or under development.The NANPA utilizes these guidelines in the administration of these resources.

Appendix D

NANPA Consensus Process

The preponderance of the resources administered by the North American Numbering Plan administrator (NANPA) are assigned in accordance with industry-approved assignment guidelines or procedures[26]. Revisions to these assignment guidelines are effected by the consensus processes of the industry forum having jurisdiction over the specific guidelines to be revised, e.g.., ICCF or Committee T1. It is understood by the telecommunications sector that resource applicants denied numbering resources under these assignment guidelines can appeal the denial to either or both the forum with jurisdiction over the specific guidelines or the appropriate regulatory agency. It is also understood that any applicants' sensitive/proprietary information that might be required by the NANPA to determine the legitimacy of an application will be maintained as proprietary by the NANPA, i.e., not shared with other than NANPA personnel.

When new assignment guidelines, numbering issue resolution, or design changes to the NANP are required, the need for same is referred, usually by NANPA and based on forum charters, to the appropriate *regulatory agency* or ANSI-accredited or *other recognized* industry forum (e.g., Committee T1, ICCF NOF, OBF, FCC, CSCN, DOC, IILC, NARUC, TR-45) for guidelines or design change development under their respective processes.

Numbering issues not under the purview of a specific or single forum, or not resolved by the identified forum, are resolved by the NANPA by seeking subject-matter-expert initial input, publishing NANPA recommendations, seeking telecommunications sector written comments, striving for consensus through the sponsoring of an open industry forum, and publishing the ultimate decision. If this process fails to result in sector consensus, the issue will be referred to the appropriate regulatory body for resolution, usually with a NANPA position/recommendation and all appropriate documentation.

If during this often lengthy process, the issue involves an "urgent need" for the assignment of numbering resources to an applicant(s), the NANPA will make a determination on the basis of the information provided and inform the appropriate regulatory body of that decision.

These consensus processes are a mix of ANSI and other forum processes. NANPA believes that there is no single consensus process that achieves success in all instances. For example, the ANSI process was unable to achieve consensus on the ISDN numbering issue and other processes are often so lengthy as to deny industry entities the needed resources in a timely manner. Additionally, it is the NANPA position that in some instances the consensus process has been deliberately delayed, or even terminated, by parties whose interests where best served by non-consensus. Consensus processes require a full dedication to timely resolution and eventual acceptance by the minority position that the majority view must, at the appropriate time, be accepted and implemented if the

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26 *Existing guidelines include: 800 Assignment Guidelines, 900 Assignment Guidelines, CIC Assignment Guidelines, CO Code Assignment Guidelines (currently under development by ICCF), SS7 Network Code Assignment Procedures (Committee T1), INPA Assignment Guidelines (currently under development by ICCF, International Inbound INPA Assignment guidelines (currently under development by ICCF).*

Appendix D, concluded

telecommunications industry is to be successful in a rapidly changing industry. In too many instances, within the competitive environment of North American, this process has failed.

When the consensus process fails or is not effecting a timely response, the appropriate organization(s) must be empowered to make a responsible decision, at least in the interim while the consensus process continues. It is the current NANPA's position that the NANPA, wherever that function resides, must be so empowered, with the additional oversight, advice, and/or consent of the appropriate regulatory body(ies).

Appendix E

Attributes of an Effective Numbering Plan

A numbering plan has both direct and supporting roles. The following tabulation of attributes, particularly the first two listed, summarize key characteristics of an effective numbering plan:

1. Must provide adequate capacity to address the destination/entities *(terminals and persons)* within the area served by the numbering plan.

2. Must provide a flexible means to expand the aforesaid capacity to satisfy growth requirements.

3. Should be reasonably easy to understand and use, in comparison with feasible alternatives.

4. Should be structured to facilitate digit analysis and distributed administration of individual number assignments.

5. Should exhibit stability, allowing intervals of at least ten years between significant changes to a given locality, *telecommunications segment and/or service.*

6. Should be capable of linkage to supplemental associated dialing or other appropriate protocol to permit more comprehensive service requests.

7. Should seek uniformity of application.

8. Should limit the number of digits required to as few as possible consistent with service needs. International agreements on limits should be honored.

9. Should allow, *in an increasingly competitive environment,* redefinition (expansion) of the destinations/entities being numbered, provided that the impact on capacity can be accommodated.

10. Should be compatible with billing/charging philosophy.

11. Should be compatible with routing philosophy.

12. Should be compatible with international numbering recommendations, e.g., E.164.

13. Should consist of decimal digit patterns.

14. Should reserve appropriate format space to provide for prefix usage when service needs dictate.

Appendix F

Functions of Numbers within the NANP

Fundamentally there are two types of callers that generate traffic on the North American PSTN (Public Switched Telephone Network) - public network users and official network operators. Official network operators, including maintenance personnel, have reserved code sets such as "1N1" (e.g., 121 for inward operator) and "10X" (e.g., 101 for testboard access) not available to, or appropriate for, public network users. The 10-digit numbers appearing in the format N0/1X-NXX-XXXX (and their 7-digit short form) are available to both official and public users.

The numbers referred to are typically destination indicators, given a flexible definition of "destination" to include the places where specified service variants are accessed. In some cases, the codes reserved for official use govern routing constraints, e.g., no-test access for the purpose of verifying the status of apparently busy lines. Operators must also dial other operators to meet special needs encountered with marine, conference, and mobile calling.

Customer dialable numbers were initially defined to identify main telephone stations and equivalent main stations (e.g., direct inward dialing PBX extensions). Special cases arose to provide for long distance Directory Assistance (555) and simple announcements (e.g., time, weather). Three-digit service codes have traditionally been used for local Directory Assistance (411), repair service (611), and business office transactions (811). While the general purpose "0" for assistance remains, calls placed with the emergency code "911" are commonly directed to public safety facilities. The presubscribed interexchange carrier (IXC) operator can be reached by dialing "00". Announcement traffic more varied than time and weather may appear on designated lines, but is more typically aggregated under codes such as 976 and 900. It is of significance that some traffic items, e.g., variants of data calling such as facsimile connections between machines rather than persons, do not fully conform to engineered service arrangements. For example, the dialing of a number for a facsimile terminal that results in intercept treatment may well leave the reason for the ineffective attempt unresolved. With ISDN, the number is supported by a bearer capability choice, offering a basis for more informed responses to irregularities.

Approximately seventy 0XX codes are available to local exchange carriers for applications that resemble office code usage in the sense that an NPA code governs the usage, permitting the same 0XX code to have a definitive application in every NPA. Thus trunk access to operator services or test facilities at a given access tandem can be provided by giving the tandem its own 0XX nodal identification within an NPA.

The use of 0XX and 1XX codes in local networks is limited to interswitch trunking applications since the initial digits "1" and "0" from originating lines are interpreted as prefix digits for public user dialing. Once the prefix function is accounted for, signaling on subsequent network links is free to redefine 0/1XX digit sequences to convey new network oriented information. With respect to interfaces between local exchange carriers and interexchange carriers, agreements must exist on 0/1XX code interpretation. Codes 138 and 158, for example, have standard applications to international outbound calls.

Appendix F, concluded

Numbers tend to have wide-ranging functions. They are a key element in billing. They can relate to credit card usage. They appear in television presentations if the story line so dictates, often as 555-2368 to avoid nuisance calls to "real" numbers serving public users. The relatively new "800" toll free usage has spawned an extraordinary interest in spellable numbers, primarily to gain mnemonic marketing advantages.

The called number, of course, is only one of two numbers in a typical call. The calling number has functions of its own. Nuisance calling has long been a problem largely unsolved until calling numbers could be carried along signaling paths. Now services influenced by both calling and called numbers are commonplace. Call forwarding, for example, can be made selective, the decision to forward depending on the calling party's number. The issue of privacy has been prominent in debates on possible use of the calling party number. In some cases two calling numbers may apply to the same subscriber, one for billing, the other for DDD call-back. A WATS line has no return-call number in the ordinary sense.

Numbers applied to communications networks have typically been key factors in routing and charging. Both fixed and mobile stations are commonly served by numbers that participate in these traditional roles. Personal numbering appears likely to change the linkage, but routing and charging must still be accounted for, indirectly if not directly. The advent of ISDN resolved a different aspect of the routing problem. With ISDN connections involving a choice of transmission facility type, a statement of the caller's preference is needed. In general, a mandatory new input called the bearer capability meets this need without the usual recourse to numbers. A special button or the terminal itself could supply this input. An alternative with conventional dialing requires the three leading touch-tone signals (#56) followed by North American standard formats to establish a request for 56kbps Public Switched Data Service (PSDS). An application of numbers to dialing is also a basic part of equal access. The format 10XXX (to be expanded to 101XXXX) permits the selection of a particular interexchange carrier when the default choice is to be overridden.

It would be presumptuous to try to assemble a complete listing of numbers and their uses. What must be accommodated realistically is a basic set of dialable input choices to cover services offered from fairly simple terminals. As services grow in complexity, protocol structures will expand to allow feature requests by specialized keys. Discussions comparing stimulus and functional signaling have already shaped part of the future in ISDN. What must command attention is not so much the varieties of service, but the risk of large, unexpected multipliers. The numbering plan can expand, if advance warning is sufficient, but change on a continental scale takes both time and careful planning.

For new services based on new protocols in which the destination number and supporting information are always sent en bloc, one traditional problem should disappear. The end of dialing will always coincide with receipt of the en bloc address. Operator dialing offered KP and ST as multifrequency control characters. DTMF has the #, mandatory with equal access cut-through based on 10XXX#, but until the last rotary dial (DP) is retired, basic services otherwise accessible from a device with a rotary dial (DP) will remind us that the old yields to the new, but not easily nor quickly nor completely.

Appendix G

An Alternative INPA Allocation Plan

NANPA considered another INPA allocation plan with code sets based on common "C" digits, i.e., the third digit of the INPA. This plan allocates three "C" digits each to geographic and non-geographic applications, i.e., NN0-NN2 for geographic applications and NN7-NN9 for non-geographic applications. These code sets result in 192 codes for each application until the codes allocated for expansion are subtracted from the codes sets resulting in a net code allocation of 168 codes per application.

As in the allocation plan preferred by the NANPA (Section 4) the middle code sets - NN3-NN6 - are allocated for growth. The geographic and non-geographic allocated code sets would expand into these middle code sets, one set at a time (64 codes), as needed.

Since the plan is based on common "C" digits, it is inappropriate to allocate a "B" digit of 80 codes for format expansion. Consequently, 80 codes for expansion must be proportionately allocated from each of the other three code sets, i.e., geographic, non-geographic, and growth. At the bottom of the following chart, is a list of codes that would be allocated for format expansion, 220-229,.....990-999. Also provided is an example of the format of the expanded 4-digit NPA codes associated with this expansion proposal, i.e., 220X-229X,.....990X-999X. While these 80 expanded codes would be used for all new codes assignment during the "grace period", the remaining assigned/working NPA codes would continue to work as 3-digit NPA codes until gradually converted to the 4-digit format, e.g., 231X, 201X, when appropriate.

Application	Codes	Number of codes allocated
Geographic INPAs	NN0-NN2	192 codes - 24 expansion codes = 168 codes
Growth INPAs	NN3-NN6	256 codes - 32 expansion codes = 224 codes
Non-geographic INPAs	NN7-NN9	192 codes - 24 expansion codes = 168 codes

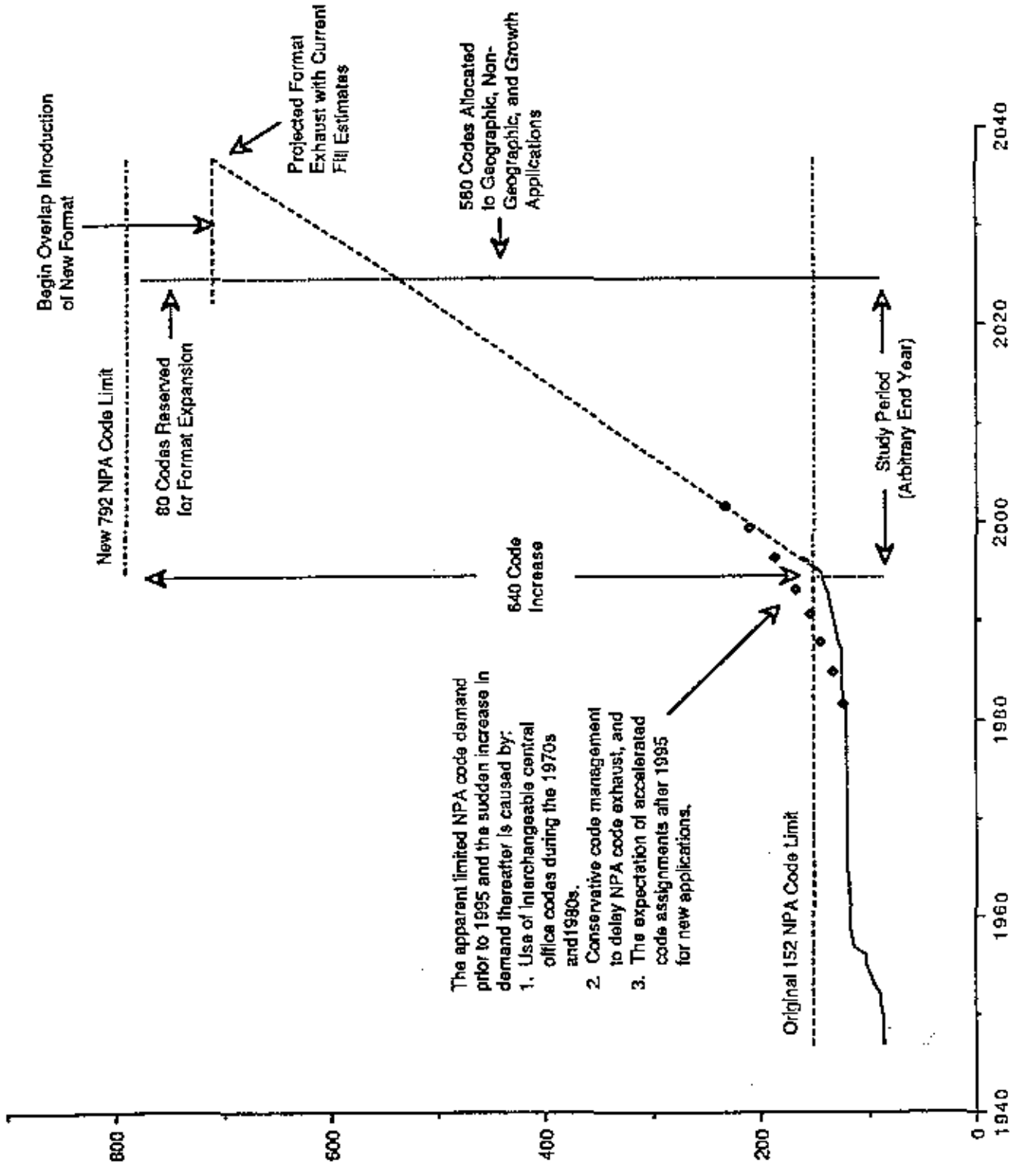
Reserved for expansion:

From geographic codes	From Growth codes	From non-geographic codes
220-222	223-226	227-229
330-332	333-336	337-339
440-442	443-446	447-449
550-555	553-556	557-559
660-662	663-666	667-669
770-772	773-776	777-779
880-882	883-886	887-889
990-992	993-996	997-999

Expanded Codes

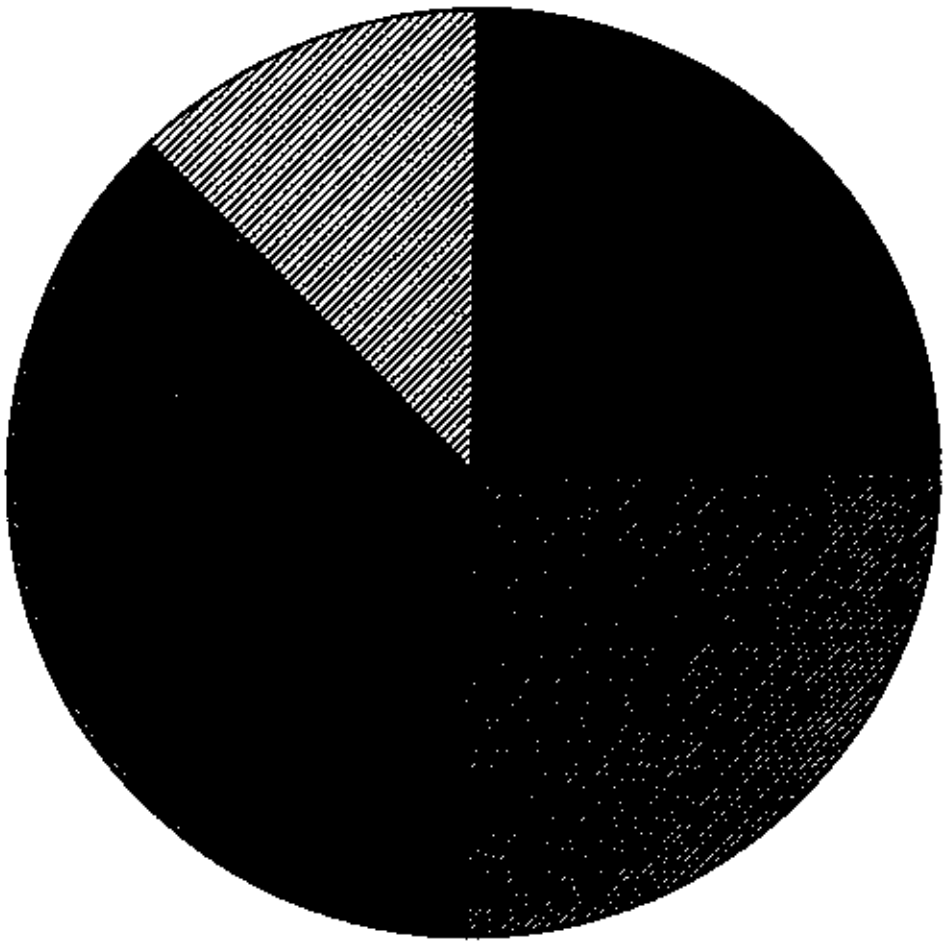
220X-229X	550X-559X	880X-889X
330X-339X	660X-669X	990X-999X
440X-449X	770X-779X	

Appendix H


NANP CAPACITY ALLOCATION PROJECTION
Begin Overlap Introduction of New Format
Projected Format Exhaust with Current Fill Estimates
580 Codes Allocated to Geographic, Non-Geographic, and Growth Applications
New 792 NPA Code Limit
80 Codas Reserved for Format Expansion
640 Code Increase
Study Period (Arbitrary End Year)
The apparent limited NPA code demand prior to 1995 and the sudden increase in demand thereafter is caused by:
1. Use of interchangeable central office codas during the 1970s and1980s.
2. Conservative code management to delay NPA code exhaust, and
3. The expectation of accelerated code assignments after 1995 for new applications.
Original 152 NPA Code Limit
800
600
400
200
0
1940
1960
1980
2000
2020
2040

Appendix H, continued

Allocation of 640 New NPA Codes



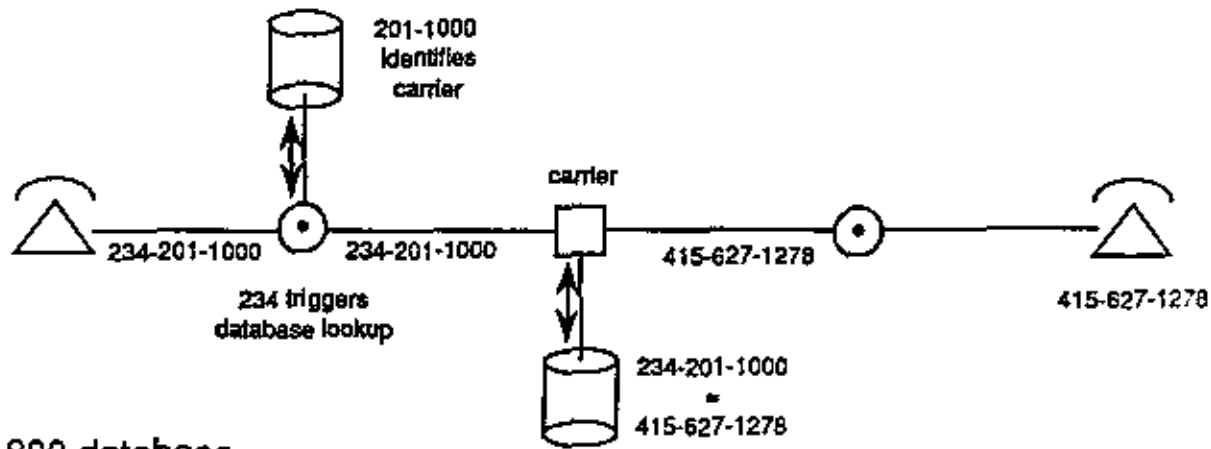
- Geographic
- Non-geographic
- Growth
- Reserved for Format Expansion

Appendix I

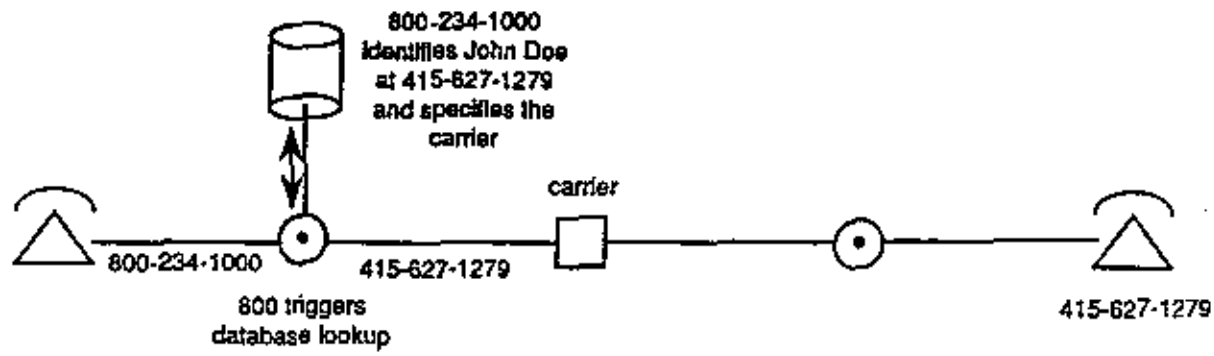
Diagrams for Indirect Addressing

- NANP-wide / nationwide database

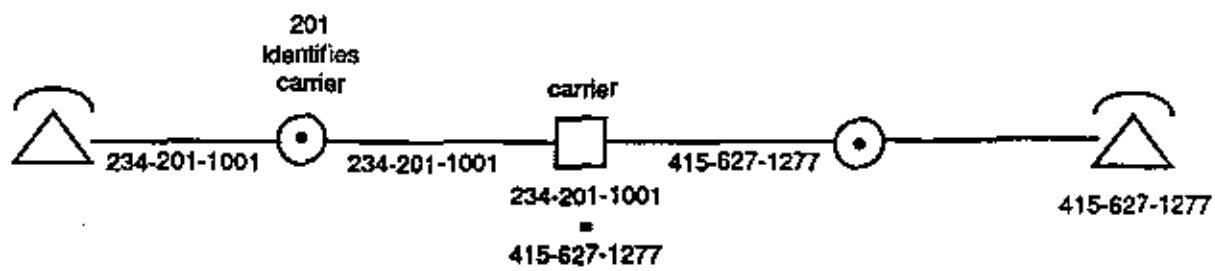
- Personal communication services (with NANP-wide / nationwide and service provider databases)



- 800 database



- NNX plan



Appendix J

Proposed Plan For Eventual Digit Expansion

It is anticipated that the availability of NNX codes will provide numbering capacity to meet service needs in the NANP well beyond the study period covered in this report, that is 1995-2025. Nevertheless, it is expected that eventual expansion of the basic 10-digit number length by one to four digits will be found necessary. It is, accordingly, incumbent on planners to provide capacity for a conversion plan, even though details may not be provided until a later date. Specifically, a means to effect a phased conversion is essential.

A general contingency plan must begin by retaining the then current plan (at the future time of need), while providing for the gradual introduction of an expanded plan. This does not preclude other possibilities, including, for example, a mixed 11-digit, 13-digit plan. Unless future address input procedures leave no doubt as to when dialing of a number is complete, the early input digits must continue to provide a flag. Some new services may well contain protocol provisions defining number length without analysis of leading digits, but a mechanism for determination that dialing is complete, without recourse to timing, must be available until it is assured that no residual need remains.

Two format options suggest themselves. On the one hand, the D-digit of the current 10-digit format is not allowed to take on values 0 or 1. Either or both of these digits could serve as the required indicator that 1+NXX-NXX-XXXX was not intended whenever the valid alternative 1+NXX0-NXX-XXXX had been chosen instead. On the other hand, today's area codes never admit an N digit as the middle digit. If one such N-value, say 6, were reserved (calling for eighty N6X codes to be set aside), then a 1-9608-758-XXXX dialing sequence could be set equal to 1+908-758-XXXX.

The latter approach need not rely on a single N-digit value, but could distribute the same quantity of reserved codes (80) in eight groups of ten such as with: 220 to 229, 330 to 339, ..., 990 to 999. The correspondences would match 220 with 220X, 221 with 221X, and 990 with 990X, etc., thereby establishing the increased digit length. Inspection of 220X could allow length variations by code.

Whether a 1-digit or a multi-digit expansion is justified probably can not be determined at this time, and need not be. What is required is a reservation of code space. The first plan may appear more straightforward, but sacrifices office code space within the 10-digit format, accessible perhaps by the year 2000, for areas using 10-digit-only SACs or densely populated metropolitan areas with 10-digit-only overlays. Selective application of "NXX-XXX-XXXX" format compliance could be introduced with modest development effort. The ABC digits would dictate which D-digit continuations were allowed to have values 0 or 1, as well as other decimal values. An immediate decision is not required; telecommunications sector analysis and study is required, but a reservation of 80 codes in blocks as illustrated is recommended.

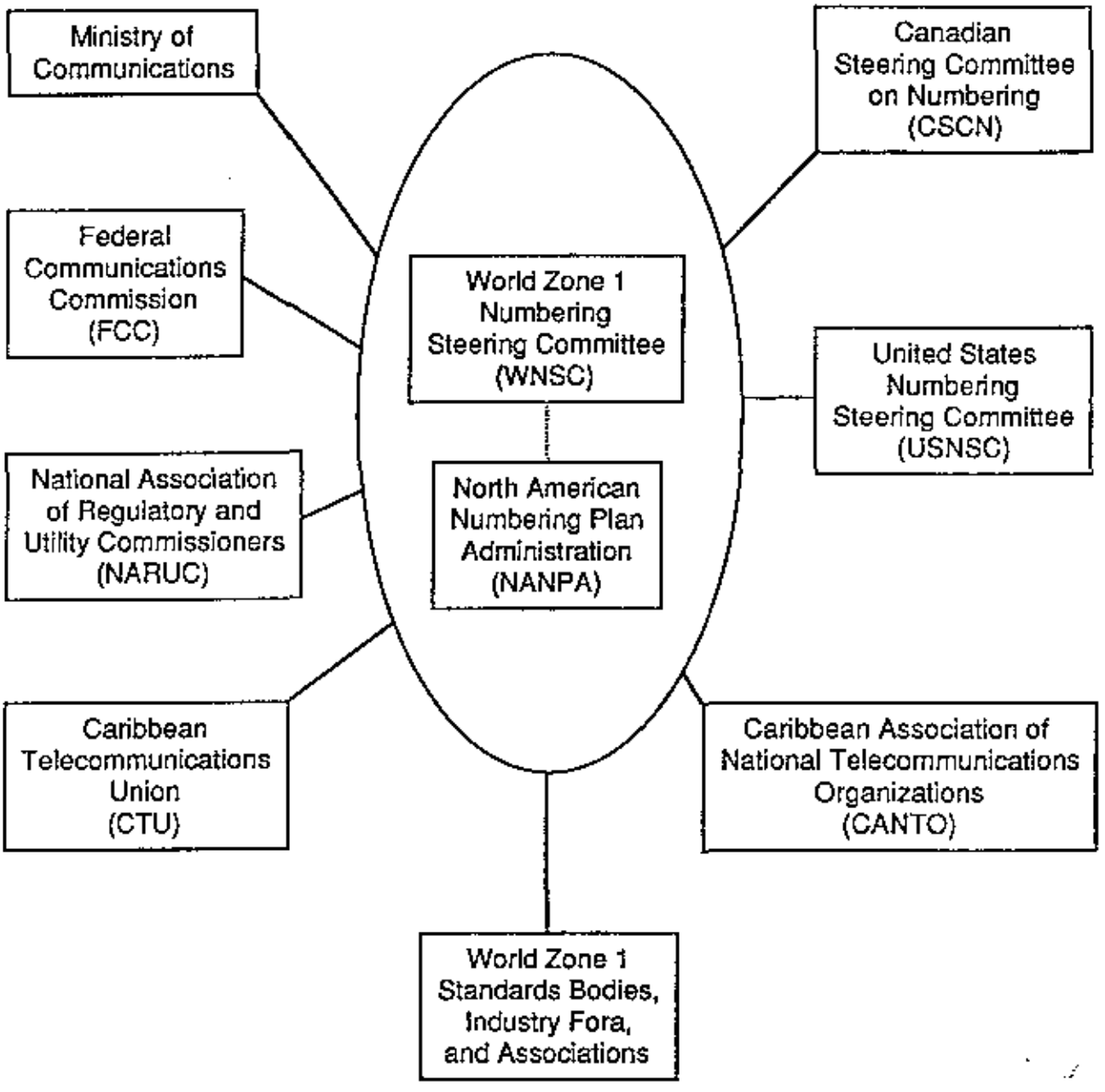
Appendix K

Sources Of Comment On The First Iteration Of The "North American Numbering Plan Administrator's Proposal On The Future Of Numbering In World Zone 1"

1. Ameritech Region Commissions
2. Ameritech Services
3. AMSC Subsidiary Corporation
4. AMR Information Services
5. AT&T
6. Bell Atlantic
7. Bell Canada
8. Bellcore
9. BellSouth Telecommunications
10. Braverman, Philip L.
11. Canadian Steering Committee on Numbering
12. Cantel
13. Cellular Telecommunications Industry Association
14. Cox Enterprises
15. Digital Equipment Corporation
16. Elkhart Telephone Company
17. Felice, David D.
18. GTE Mobile Communications
19. GTE Telephone Operations
20. Los Angeles County
21. McCaw Cellular Communications
22. MCI Telecommunications Corporation
23. New York Department of Public Service
24. Oakes, H. P.
25. Pacific Bell
26. Prodigy Services Company
27. Siemens Stromberg-Carlson
28. Southwestern Bell Corporation
29. Telecommunications Services of Trinidad & Tobago Limited
30. Teleglobe Canada
31. Telesector Resources Group
32. Telocator
33. United States Telephone Association
34. US Sprint Communications Company
35. US WEST Communications
36. Whidbey Telephone Company
37. Wiltel Advanced Technology Group

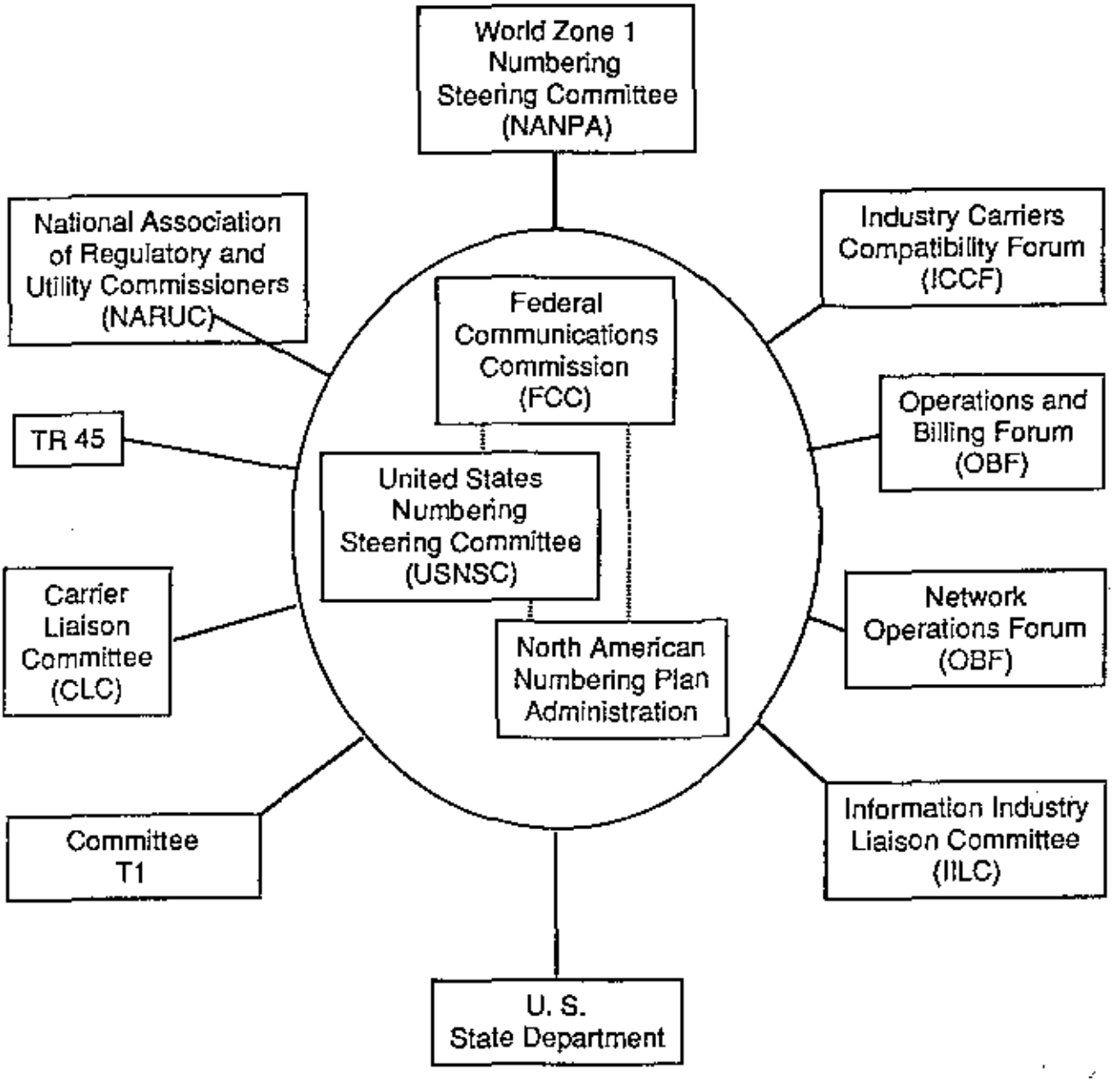
Appendix L

WNSC Interworking



Appendix L, concluded

USNSC Interworking



Appendix M

Effectiveness of the Numbering Plan Proposal

Section 2.3 of this document, "Attributes of an Effective Numbering Plan", states that in order to determine if a proposed numbering plan is effective, it should be compared with a predetermined set of attributes. That set of attributes is in Appendix C. A comparison of the attributes and the plan follows, with related attributes compared in a single combined paragraph. The conclusion drawn from the comparison is that the proposed plan conforms to all the attributes of an effective numbering plan.

1. Capacity

The numbering plan must have the physical capacity to meet the needs of the telecommunications industry and its users for a reasonable period of time, usually defined as a minimum of 10 years, before another change has to occur. The change that starts the clock in this instance is the 1995 implementation of interchangeable NPA codes. The prediction is that this plan will provide the capacity required by the industry well into the middle of the 21st century, without the need for the industry and the ratepayers to bear the cost of an expansion of the current 10-digit format.

Capacity is the dominant concern of numbering. A measure of capacity in turn calls for a definition of the entity being numbered. In North America, the "main station" or equivalent is currently the controlling item. Codes for operators and test lines are also important, but they are not dominant. Other exceptions are 555, 976, and 950. The main station, however, is the portal to and from a customer. There is one directory number in the typical case despite the common use of extension telephones. Nomenclature notwithstanding, a telephone number has nothing to do with a manufacturer's serial number on physical station equipment. If the above traditional understanding is altered, the concept of capacity would require redefinition. Potential changes are considered in the following text.

Estimates of "capacity used" and "capacity remaining" are critical to planning. In 1947, the issues were simpler. The key estimates could relate to population forecasts and market penetration. Since then the dominance of main station forecasting has been challenged. The advent of "800 Service" in 1967 is a case in point. In this case, an "area code", now called a Service Access Code or SAC, was allocated to mark a call as toll free to the caller. The ultimate destination was subordinate to the 800 label. Double numbering was invoked. Capacity was expended for a reason unforeseen in 1947. Capacity expended under SAC 900 was another departure from normal practice. Now two additional applications are bidding for capacity. One is the personal number, wherein the call destination relates to a person, rather than a fixed station. If every person in North America has need of a personal number, major inroads on capacity are unavoidable. A second new form of number consumption is that of the home appliance or other remotely controllable device. Any network application with the potential to multiply significantly the full range of working numbers is a cause for concern. Personal numbers are expected to have substantial impact, but provisions to accommodate them are consistent with projections of available capacity as will as the principles of the NANP. Home appliances and similar remotely controllable devices,however, are candidates for ISDN sub-addressing. When applicable, the sub-address offers the enormous capacity of up to 40 decimal digits. The sub-address itself is a separate part of the signaling protocol and has both calling and called elements. Leading octets allow for sub-address classification, among which "user-specific" assignments allow

Appendix M, continued

flexibility for multiple secondary identities behind a known interface. User-specific sub-addresses with personal numbers will need to be carefully controlled since the relationship to an interface may not be portable. Sub-addresses are not subject to analysis at network switching nodes.

2. Flexibility for growth

The numbering plan must include a method to expand its capacity to meet growth requirements while causing minimal inconvenience to the users. This plan first provides another step (expansion of the "D" digit to allow the use of digits 0-9 instead of the current 2-9) for growth within the 10-digit format and then the means, through the reservation of 80 NPA codes, for the ultimate expansion of the 10-digit format without unduly inconveniencing or confusing the users. This graceful expansion defers the cost to the industry inherent in a format expansion (modifications required in every switch and many operations support systems in WZ1) as well as the cost and inconvenience to the user public which would have to pay for and adjust to the changing of every telephone number in the NANP - a requirement in some of the plans offered as alternatives to interchangeable NPA codes.

3. Ease of use

The numbering plan must be easy to understand. This continues the use of the same numbering format already familiar to the users. It recommends that future expansive services be integrated into the NANP format and provides the NPA-level resources for just such an integration. The user will not therefore be required to be familiar with varying numbering/dialing plans for each unique service offered by the North American industry or to change dialing patterns with each new service or technology. The plan recommends further, that the dialing plan become uniform, i.e., 10-digits, and that the integration of the existing numbering and dialing plans be studied - all to make the services to be offered by the telecommunications industry easy to use.

4. Digit analysis

The numbering plan must enable progressive digit analysis for the functions of numbers within the NANP. The NANP is widely respected for the simplicity of its 3-3-4 segmentation that allows staged digit analysis for routing, addressing and billing. This plan maintains that structure, with the same number of segments and digits within the segments, while allowing for the inevitability of full 10-digit database analysis for additional number functionality, e.g., database addressing, service provider identification, and mobile user location.

5. Least number of digits

One of the tenets of worldwide numbering standards has always been to use as few digits as possible consistent with capacity needs. Fewer digits result in greater efficiency, i.e., switch and network efficiency due to decreased handling and processing time and user efficiency based on fewer digits to dial and remember. Proposals offering prefix plans and expanded digit formats are contrary to this basic philosophy and must, therefore, be in response to a compelling need.

Appendix M, continued

6. Adaptability to new services

This numbering plan proposal redefines and expands the destinations and entities to which numbering resources should be assigned in order to meet the growing needs of the industry and its users. Specifically it encourages the assignment of codes to database applications and service providers, in specific circumstances. Additionally, in that it has not reserved all the 640 interchangeable NPA codes, it has, therefore, left resources for applications currently unanticipated. The development of assignment guidelines, through an industry consensus process, enables the industry to provide direct input to the criteria to be used in the allocation of its numbering resources.

7. Compatibility

The numbering plan must be compatible with current international and national standards and agreements as well as the performance of functions peripheral to the addressing function, i.e., routing and billing/charging. The short-term plan conforms to existing standards, agreements and requirements. Many of the goals of the long-term plan will require study and, potentially, modifications to some standards and procedures.

8. Dialing/protocol linkage

The numbering plan must work with and enable current and future dialing procedures (e.g., prefixes) and service protocols. The numbering plan proposal continues the current NANP structure, which is compatible with all existing prefixes and service protocols. The proposed plan also enables the expansion of existing prefixes (e.g., Carrier Access Codes [CACs]), the addition of new prefixes, and compatibility with future service protocols.

Appendix N

Glossary of Acronyms

ANI II	Automatic Number Identification, II connotes a 2-digit code format
ANSI	American National Standards Institute
B-ISDN	Broadband Integrated Services Digital Network
BNR	Bell Northern Research
CAC	Carrier Access Code
CANTO	Caribbean Association of National Telecommunications Organizations
CC	Common Control or
CC	Country Code
CCITT	Consultative Committee International Telegraph and Telephone (translated from the original French: Comite Consultatif International Telegraphique et Telephonique)
CIC	Carrier Identification Code
CLC	Carrier Liaison Committee
COCUS	Central Office Code Utilization Survey
CO (code)	Central Office (code)
CRTC	Canadian Radio-television and Telecommunications Commission
CSCN	Canadian Steering Committee on Numbering
CTIA	Cellular Telecommunications Industry Association
CTU	Caribbean Telecommunications Union
DDD	Direct Distance Dialing
DID	Direct Inward Dialing
DNIC	Data Network Identification Code
DOC	Department of Communications (Canadian)
DP	Dial Pulse or Dial Pulsing
DTMF	Dual-Tone Multifrequency
EOD	End of dialing
ESP	Enhanced Service Provider
FCC	Federal Communications Commission
FGB	Feature Group B
FNF	Future of Numbering Forum
HNPA	Home Numbering Plan Area
ICCF	Industry Carrier Compatibility Forum
IDDD	International Direct Distance Dialing
IILC	Information Industry Liaison Committee
IN	Intelligent Network
INF	ISDN Numbering Forum
INPA (codes)	Interchangeable Numbering Plan Area (codes)
ISDN	Integrated Services Digital Network
IXC	Interexchange Carrier
KBPS	Kilobits Per Second
KP	Keypulse signal
LATA	Local Access and Transport Area
LEC	Local Exchange Carrier
LTNP	Long-Term Numbering Plan
MFJ	Modified Final Judgement
NANP	North American Numbering Plan
NANPA	North American Numbering Plan Administrator
NARUC	National Association of Regulatory Utility Commissioners (US)
NOF	Network Operations Forum
NPA	Numbering Plan Area
NTIA	National Telecommunications and Information Agency
OBF	Operations Billing Forum

Appendix N, concluded

PBX	Private Branch Exchange
PCS	Personal Communications Service
POTS	Plan Old Telephone Service
PSDS	Public Switched Digital Service
PSTN	Public Switched Telephone Network
RCC	Radio Common Carrier
SAC	Service Access Code
SRI	Stanford Research Institute
SMDS	Switched Multi-megabit Data Service
SS7	Signaling System 7
ST	Start signal
SXS	Step-by-step
UPT	Universal Personal Telecommunications
US	United States
USNSC	United States Numbering Steering Committee
USTA	United States Telephone Association
VPN	Virtual Private Network
WNSC	World Zone 1 Numbering Steering Committee
WZ1	World Zone 1