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Bellcore Letter

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To
Recipients of North American Numbering Plan (NANP) Information

Entitled Competitor
Unrestricted

From
W. M. Blalock, Assistant Vice President - Operations Applications

Abstract

This IL *distributes* the North American Numbering Plan Administrator's Proposal On The Future Of Numbering In World Zone 1 to the telecommunications sector for review and comment by April 30, 1992.

(Includes safety liability disclaimer (if applicable), ordering information, originator's signature information)

Bellcore, as the North American Numbering Plan administrator (NANPA), in the performance of its responsibilities as same, has felt the need for a numbering plan for the future that facilitates the evolution of telecommunications within World Zone 1 (WZ1).

The need for a near-term strategy on the appropriate allocation of the 640 new "interchangeable" NPA codes available in 1995 and a long-term plan for the evolution of numbering within 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 NANPA proposal is in response to this need.

It is the NANPA goal to achieve consensus on such a plan and therefore offers the attached proposal for telecommunications sector review and comment by April 30, 1992. The complete consensus process for this proposal is contained within the last section of the plan.

Any questions pertaining to this document and its content should be directed to Fred Gaechter on 201-740-4596.

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for W. M. Blalock
Assistant Vice President - Operations Applications

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

January 2, 1992

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

The review period continues through April 30, 1992. Procedures for commenting on this document will be found on page 28.

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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" NPA 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 NANPA proposal on the future of numbering in WZ1 is in response to this need.

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 have adequate resources to last well into the 21st century?

3. Can the NANP meet the needs of the users and providers of North American telecommunications?

The proposal detailed below leads to an affirmative response to each of these questions and constitutes 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 interchangeable NPA (Numbering Plan Area) codes. Accordingly, between now and 1995 is the critical time period during which a plan must be formulated on how the additional 640 NPA codes, gained by the implementation of interchangeable codes, should be allocated. 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 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 C, Section 3.3, and Section 3.4, respectively.

The numbering plan proposed here consists of two major parts, the short-term plan for the allocation of NANP resources after the implementation of interchangeable NPA codes (Section 4) and the long-term goals and predictions for the telecommunications industry and the NANP (Section 5).

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

- The reservation of 300 of the 640 new interchangeable NPA codes for assignment as geographic NPA codes.
- The reservation of 80 of the 640 NPA codes for non-geographic applications.
- The reservation of 80 of the 640 NPA codes for the ultimate expansion of the NANP beyond 10-digits.
- The reservation of 10 of the 640 NPA codes for additional Service Access Codes (SACs).
- The reservation of 170 of the 640 NPA codes for unidentified applications/purposes and/or growth.
- The development of administrative guidelines for the assignment and conditional recovery of codes within the set of 640 NPA codes.
- A perspective on the use of 7-digit national numbers.

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 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 goals of the long-term plan.

The proposal also includes a recommendation to form an NANP Advisory Council (Section 9) to advise the NANPA on issues relative to the administration and design of the NANP.

This document, *The NANPA's Proposal on the Future of Numbering in WZ1*, is being widely distributed within the telecommunications sector (industry entities, associations,

affiliated agencies, regulatory bodies/committees, forums throughout WZ1) for review and comment. The 120-day comment cycle is from January 2, 1992 to April 30, 1992.

At the end of the comment cycle, the NANPA will use 60 days to review and consolidate the industry comments and incorporate those deemed appropriate into a revised proposal. Should the NANPA receive extensive contradictory comments, it will consider an industry forum for the purpose of achieving consensus on those items having contradictory opinions. If at the end of the third quarter of 1992, the industry has not achieved consensus on the major issues of contention, the NANPA will determine if there is the potential for consensus in the near-term. If so, the industry forum will continue to meet as long as there is progress toward consensus. At any point that the NANPA determines that the industry is at an impasse regarding the remaining items not having consensus, the NANP proposal, with a full report on the forum process and its result, will be issued as the view of the NANPA and forwarded to the FCC (Federal Communications Commission) and the appropriate Canadian government agency(ies).

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.

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[1]. 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.

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

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.

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 Section 2.1.1) which consists of Canada, the Caribbean administrations (those within NPA code 809) listed in Appendix A, and the United States. The Federal Communications Commission (FCC) has plenary jurisdiction over the administration of the NANP within the United States. In Canada, when numbering-related public policy requires clarification, the government (Department of Communications [DOC]) is consulted. The Canadian Radio-television and Telecommunications Commission (CRTC) has jurisdiction over the use of numbering resources by Canadian telecommunications carriers under its jurisdiction. Within the Caribbean basin, no central authority exists with jurisdiction over the NANP. 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.

The NANPA's responsibilities include the following:

- Administer the NANP resources[2] 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[3] on NANP administrative procedures and design changes.

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[2] CO codes within geographic NPA codes are administered by the dominant LEC within the NPA, not the NANPA (with the exception of the 809 NPA code for the Caribbean).

[3] 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.

- 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 applications.
- Adapt the NANP to the changing requirements of the telecommunications industry users and service providers.
- Represent the NANP interests to national and global standards and telecommunications bodies.

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 against them.These attributes were developed by the NANPA.They are listed and explained in Appendix C.

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 D.

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"[4] 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 on the future of numbering in WZ1 is in response to this need.

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 have adequate resources to last well into the 21st century?

3. Can the NANP meet the emerging needs of the 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, such 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**. 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.

[4] 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."

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 interchangeable NPA 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, 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 are 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 DOC, 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.

The feasibility of a common market-like agreement between Canada, the United States, and Mexico is under study by the governments of these countries. 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 potential for a 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 numbering plan impartially considers and reflects the combined interests of the public user community and the entire telecommunications sector[5] within WZ1.

No segment of the industry or public should be intentionally 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.

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. 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

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[5] 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.

most recent CCITT Recommendation E.164 (approved 23 August 1991) confirms international agreement on the use of decimal numbering.

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.

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 requirement for, and assignment of, non-geographic numbers does not preclude the continuing need for geographic numbers. Despite the projected proliferation of services requiring non-geographic numbers, there will be many fixed destination terminals that should remain appropriately addressable by a geographic number, e.g., the local tax office, or the local service station.

3.3.9 NANP resources will continue to be administered for the overall good 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 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. Although it is perceived that the level of regulation will remain stable for the near-term, the long-term projection is that it will change significantly over time.

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.

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 complete digit analysis or translation in order to determine and route to the appropriate geographic destination, e.g., current 800 Service and other future database applications such as personal communications.

3.4.2 No portion of the 10-digits of the NANP number will be assigned for the primary purpose of identifying telecommunications entities or carrier networks.

Carrier and entity identification will continue to be by methods such as presubscription and prefixes, e.g., CICs.

3.4.3 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. See Section 8 for further comment on sub-address usage.

3.4.4 The assignment of NANP numbers will be in accordance with federal, provincial, state, and local regulations where appropriate.

Carriers and entities qualified under federal, provincial, and state regulations to perform the telecommunications functions inherent in and requiring NANP numbers will qualify for the assignment of such resources at a level equal to other carriers and entities qualified to perform the same functions.

3.4.5 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. Forecasts suggest an expectation of 79% NPA code usage by 2025. 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 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.

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

The 1995 implementation of interchangeable NPA 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 NPA codes** for the purposes detailed below. These proposed reservations are based on projected requirements for the period covered by this numbering plan proposal (1995 - ~2025). Specific code assignments will occur after a determination of need has been established. The proposed reservations are flexible. If the predictions are not substantiated over time, the reservations for specific applications will be revised to reflect actual needs.

The reservation of 470 of the 640 interchangeable NPA codes for specific applications/purposes results in 170 codes reserved for continued growth, beyond 2025, in any of the applications detailed below. Appendix E presents the code reservation in two charts depicting the allocation projections and the allotment of the 640 codes by application/purpose.

4.1 Reservation of NPA codes for geographic assignment

The function of numbers within geographic NPA codes is to address terminal devices (e.g., PSTN/ISDN, cellular, pager, and centrex/DID). Based on the continuation of this functionality, it is proposed that **300 of the new 640 NPA codes be reserved for assignment as geographic NPA codes.** The reservation of 300 geographic codes will ensure the availability of two growth codes per existing NPA between 1995 and 2025. The current prediction is that there will be 144 geographic NPA codes working in 1995. The two growth codes per NPA is an average; there will be NPAs that will require upwards of four codes in that time period and those that will require no additional code assignments. The NANPA attempted, with the assistance of Bellcore statisticians, to predict accurately the number of codes required during the 30 year period. However, due to the recent and anticipated future explosion of new service applications, the historical data available was insufficient to render a statistically acceptable prediction.

The reservation of codes need not be sequential with respect to numerical value. A NANPA study is currently underway to determine the most effective method of assigning and reserving geographic NPA codes. Although there is no plan to recover currently assigned geographic NPA codes with low central office code fill, new NPA codes will continue to be assigned only after code exhaust is adequately substantiated to the NANPA.

4.2 Reservation of NPA codes for non-geographic assignment

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. 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 **reservation of 90 NPA codes for non-geographic applications** - 80 for personal communications applications and 10 for growth as Service Access Codes (SACs). There is no accurate way to predict the future

need for non-geographic codes since the services requiring them are not yet defined. The 80 code reservation is based on preliminary industry estimates of potential personal communications subscribers as well as the potential advantages of reserving a block of codes having a common middle (or "B") digit for ease of user recognition. These non-geographic applications are projected to be in three 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 F.

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[6] on the dialed digits to determine the appropriate service provider. 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

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[6] 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).

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.

3. Service Access Codes (SACs) assigned for unique services and functions.

SACs have been assigned for services with a variety of non-uniform functions, i.e., (1) fully shareable database with a unique billing arrangement - 800 database service; (2) service provider identification with the potential for the same terminating "line number" working in multiple locations - 900 service for polling/survey events; (3) NPA code assigned to interexchange carriers for each to use the full complement of 8 million numbers for the implementation of network-based services - 700 code. Presuming a need for uniquely functional non-geographic codes in the future, **10 new NPA codes will be reserved** for that purpose. The 10 code reservation is based solely on the availability of easily recognizable (e.g., 211, 311, 234, 345, etc.) codes, not on a SAC market projection. Spare N11 formatted codes (211, 311, etc) may be appropriate for this application, as NPA codes with full 10-digit dialing. The potential for assignment of the remaining, and potentially recoverable, N11 codes for an appropriate nationwide abbreviated 3-digit dialing application, is remote.

The 80 reserved codes proposed for personal communications 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 Reservation of NPA codes for the ultimate expansion of the NANP to beyond 10-digits

The NANP will eventually (after 2025) exhaust its 10-digit format, thereby requiring a format expansion. The expansion plan recommended in Appendix G requires the **reservation of 80 NPA codes** for transition and a "grace period" where both the new and the old formats would be usable.

4.4 Reservation of NPA codes for unanticipated/unidentified future needs and/or the perpetuation of the 10-digit format beyond 2025

The proposed total reservation of 470 NPA codes as detailed above in Sections 4.1-4.3 does not address the potential for unanticipated events, unidentified number resource applications, unanticipated growth, 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 the potential for local exchange competition that could require the assignment of CO codes to multiple local exchange carriers.

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 reservation of 300 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 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 **170 NPA codes be reserved for potential and unanticipated events, applications, and growth requirements as well as the longevity of the NANP 10-digit format.**

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. 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 NPA codes will be assigned for industry use. The NANPA will develop a set of draft guidelines during the first half of 1992. The draft will be widely distributed throughout the telecommunications industry for review and comment - the first step of the process to adopt a set of guidelines by industry consensus.

4.6 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 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.** 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. A trend toward 10-digit only dialing is in evidence. Clearly the two concepts are in conflict; the 10-digit view is technically realistic and fair to all users, and thus is supported by the NANPA.

5. Long-term Goals 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 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 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 are contained in Appendix H.

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

5.1 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[7] 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 Idenification 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 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,

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[7] 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. This paper attempts to circumvent this issue by reliance on the context within which the terms are used.

but will be seamless only in a qualified (or "virtual") sense since the user will be aware of the existence of such networks and may 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 American National Standards Institute - accredited Committee T1 - Telecommunications (Committee T1).

5.2 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.

5.3 Eventual exhaust of the 640 interchangeable NPA codes

Section 4 of this proposal recommends that 470 of the 640 interchangeable NPA codes be reserved for the specific applications/purposes detailed. It further states that the remaining 170 codes be reserved for unidentified future applications 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. 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 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 and justified in Appendix F. This method would entail the reservation 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.

5.4 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. Some countries outside WZ1 would already find this useful.

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 request to the CCITT to expand the analysis capability to 7 digits.

5.5 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 dialing plan, separate from the numbering plan, that utilizes prefixes or code sets to perform functions not currently performed within the NANP 10-digit format, e.g., CICs to select the interexchange carrier of choice, vertical services codes (*XX[X]) to access/change the components of a premium service such as call forwarding, "011" for international DDD (IDDD), "1" to indicate a 10-digit call is being dialed, "0" or "00" for operator assistance. The existence of multiple worldwide numbering plans and a 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 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.

5.6 The use of overlay NPA codes

Until recently, when an NPA code exhausted its supply of CO codes, the usual recourse was to split the exhausting geographic NPA 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 assign a new NPA code to the remaining area. This method has served the public and the industry well until recently. Two factors lead to the recommendation that overlay NPA codes be considered as the response to an exhausting NPA code in all cases, but particularly in densely populated areas:

1. The ever decreasing size of NPAs and the consequential lack of natural NPA boundaries, resulting in user confusion regarding dialing requirements.

2. The necessity for wholesale number changes when effecting a code split. This is not only an expense (e.g, business cards, letterheads, advertising, notification of associates/customers/friends) to users, but to the industry as well. The rapid deployment of operations support systems driven by the customer's line number, results in extensive and expensive support system changes with every code split. Several LECs have recognized this problem and are conducting studies to quantify the impact.

An overlay, where the new NPA code is superimposed on an existing NPA, eliminates these two concerns. There are, however, other issues relative to overlay NPA codes that need to be studied. The industry should study the ramifications of overlay NPA codes and observe the results of the first application - the 917 NPA code in New York City, scheduled for January 1, 1992.

5.7 Universal 10-digit dialing within the NANP

It is recommended that the North American telecommunications industry 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.

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.

6. 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.

6.1 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.

6.2 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.

6.3 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.

6.4 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.

6.5 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.

6.6 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.

6.7 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.

6.8 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.

7. 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:

7.1 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.

7.2 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.

8. Capacity Perspectives

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 practive. 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 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.

9. Formation of an NANP Advisory Council

It is recommended that an NANP Advisory Council be formed to advise the NANPA on issues relative to the administration and design of the NANP. The council would advise the NANPA on WZ1 numbering issues identified by the NANPA, industry entities, users, vendors, or regulatory agencies.

Significant numbering issues (e.g., non-LEC ISDN numbering) have remained unresolved for a long period of time 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 willing to discuss all aspects of a numbering issue, i.e., technical, standards, regulatory, etc. Issues have been discussed with the FCC, 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 DOC 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 administration and design resolved by the industry in a consensus process sponsored by, or with the participation of, the NANPA. The formation of a standing council situated between the industry as a whole and these agencies will fill a void that could serve to resolve industry issues without undue and potentially conflicting escalation to the regulatory bodies of the countries participating in the NANP.

In a competitive environment, many issues remain unresolved for the lack of a home for resolution. It is therefore recommended that a standing advisory council of industry representatives be formed and chaired by the NANPA to resolve such issues. The charter, representation, authority, and meeting schedule of such a council is for further study. If its formation is acceptable to the industry, the NANPA will draft a proposal recommending the details of such a council and submit the proposal for industry review and comment. A chart showing the relative placement of the proposed council to existing fora and agencies is contained in Appendix I.

One of the first issues recommended for the consideration of such a council should be the method of funding the ongoing administration of the NANP.

10. Action Plan

This document, *The NANPA's Proposal on the Future of Numbering in WZI*, is being widely distributed within the telecommunications sector for review and comment. The 120-day comment cycle is from January 2, 1992 to April 30, 1992. All comments should be forwarded to Fred Gaechter at the following address:

Fred Gaechter
NANP Administration
Bellcore - Room 1B234
290 West Mt. Pleasant Avenue
Livingston, New Jersey 07039

During the comment cycle, representatives of the NANPA will present the proposal to appropriate forums, organizations, and committees for the purpose of explaining and clarifying its content.

At the end of the comment cycle, the NANPA will have 60 days to review and consolidate the industry comments and incorporate those deemed appropriate into a revised proposal. Should the NANPA receive extensive contradictory comments, the NANPA will convene, given a reasonable prospect for progress, an industry forum for the purpose of achieving consensus on those items having contradictory opinions. If at the end of the third quarter of 1992, the industry has not achieved consensus on the major issues of contention, the NANPA will determine if there is the potential for consensus in the near-term. If so, the industry forum will continue to meet until a consensus forms or it becomes obvious that consensus is not achievable. At any point that the NANPA determines that the industry is at an impasse regarding the remaining items not having consensus, the NANP proposal, with a full report on the forum process and its result, will be issued as the view of the NANPA and forwarded to the FCC and the appropriate Canadian government agency(ies).

If consensus is achieved on all major issues, the NANPA will develop a schedule and propose a process for studying the method of evolving to the long-term goals.

All questions pertaining to this document and its content should be directed to Fred Gaechter on 201-740-4596.

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

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 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.

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 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 consist of decimal digit patterns.

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

Appendix D

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 D (Continued)

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.

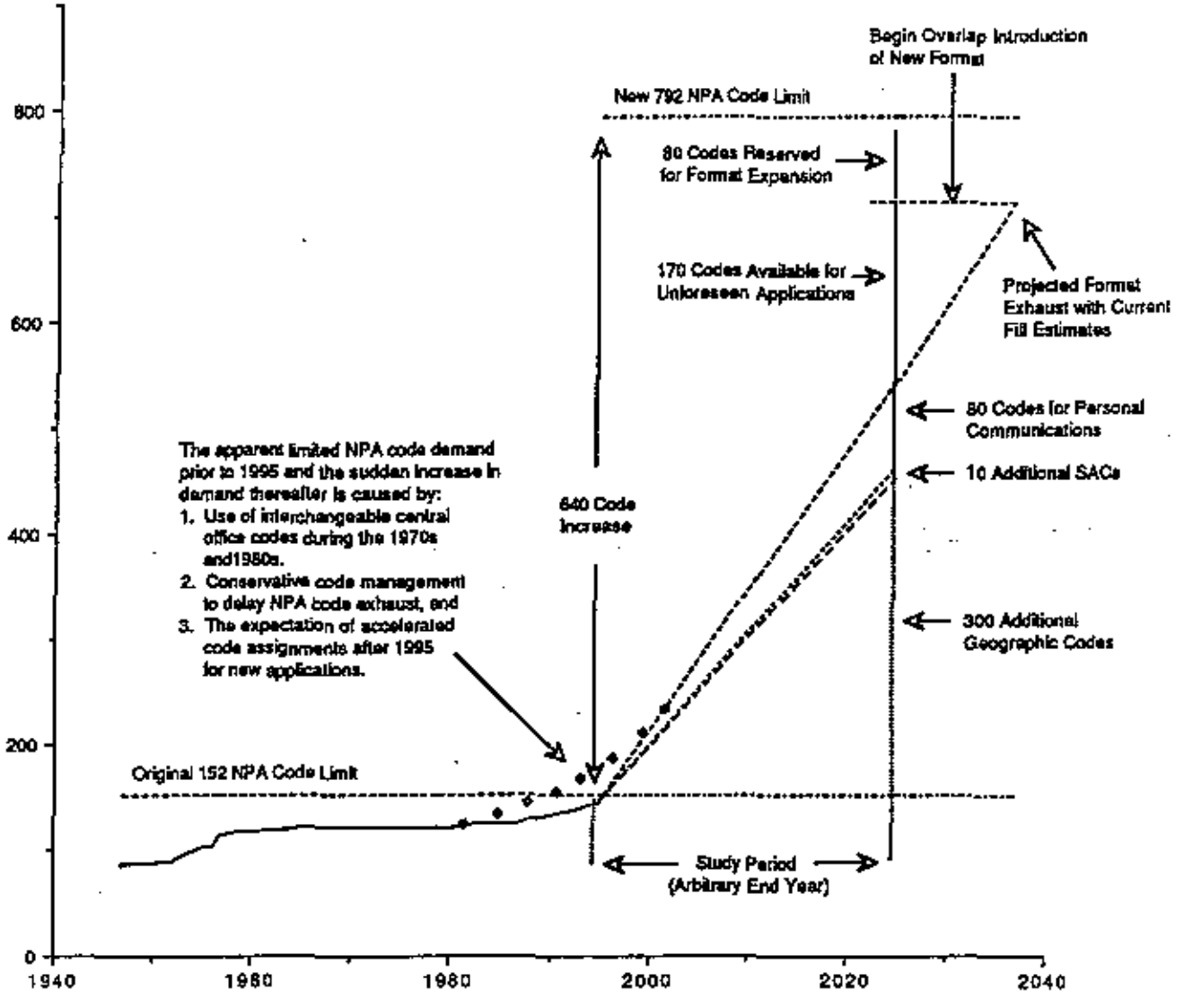
Numbers applied to communications networks have typically been key factors in routing and charging. Both fixed and mobile stations are commonly served by numbers that participate in these traditional roles. Personal numbering appears likely to change the linkage, but routing and charging must still be 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.

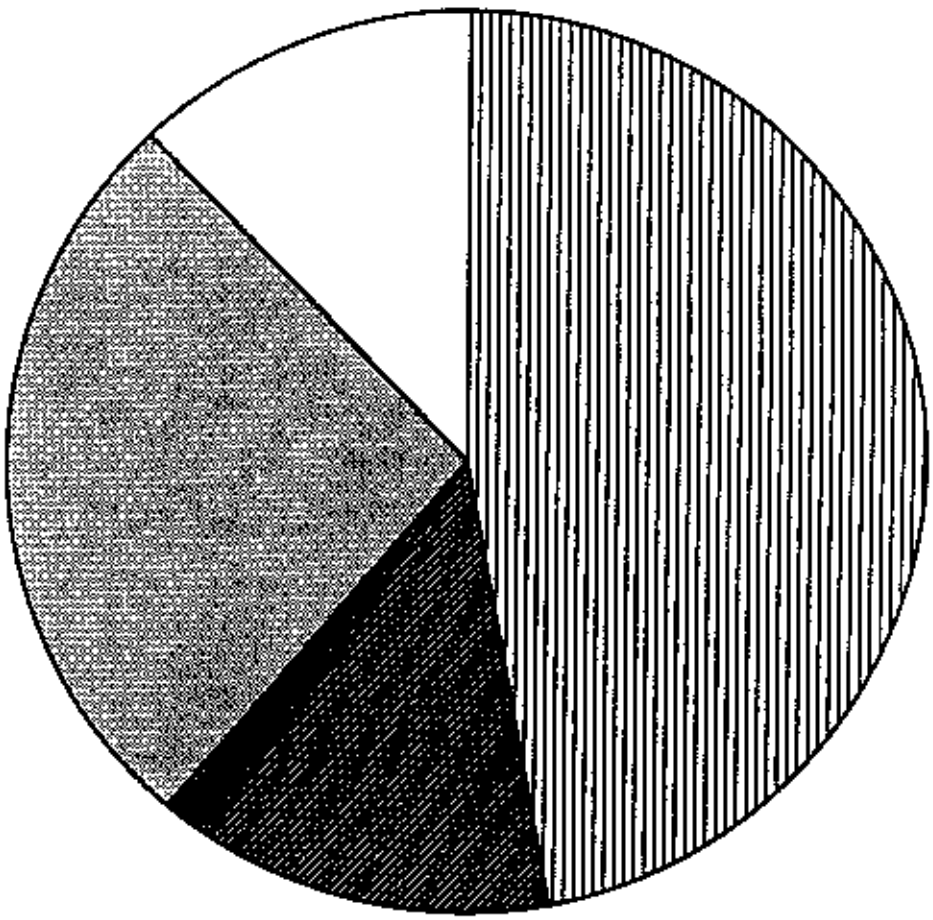
Appendix E

NANP Capacity Allocation Projection



Appendix E (Continued)

Allotment of 640 New NPA Codes



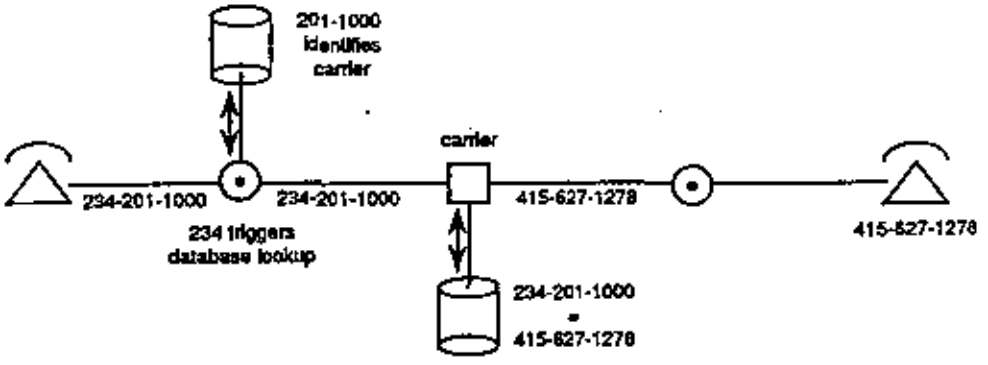
- Geographic
- Personal Communications
- SACs
- Unforseen Applications
- Reserved for Format Expansion

Appendix F

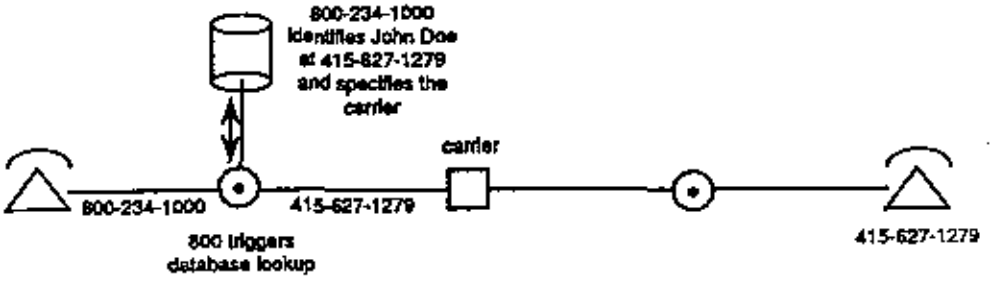
Diagrams for Indirect Addressing

- NANP-wide / nationwide database

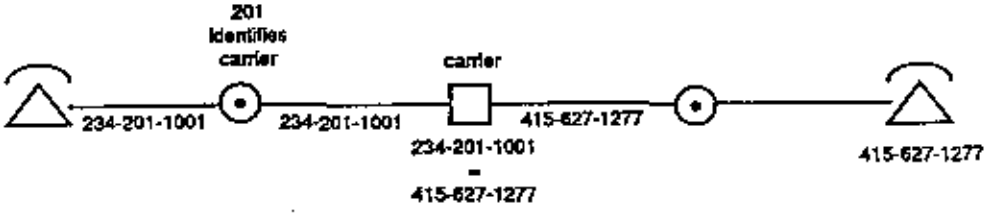
  - Personal communication services (with NANP-wide / nationwide and service provider databases



  - 800 database



- NNX plan



Appendix G

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 H

Long-Term Numbering Plan (LTNP) Interview Process

During the second half of 1990 the NANPA conducted telecommunications sector interviews of experts and futurists in the field of telecommunications. It was intended, and every effort was made, to obtain interviews representative of the broad and diverse segments of the telecommunications sector. In some cases, interviews were denied on either the basis of availability or the perception that the information sought by the NANPA was proprietary. In an effort to address the latter, the NANPA committed to keeping proprietary the specific comments of those interviewed. Attachment A contains a list of entities and futurists/experts that participated in the interview process.

In most cases, the interviews took approximately 2 hours. The discussion, in all cases, was frank, cooperative, and very informative. In order to assist discussion, a list of questions was sent to each person to be interviewed in advance of the interview. The questions were not provided for answer during the interview, but only to assist the person to be interviewed in preparing for the areas to be discussed during the interview.

The NANPA expresses sincere appreciation for those agreeing to be interviewed. This project would not have been nearly as successful without their thoughtful input.

At the end of the interview process, the NANPA consolidated the views expressed by those interviewed into a list of perceptions and issues derived from the interviews. Where there were conflicting views expressed by those interviewed, it is evident. Otherwise, those interviewed were generally in agreement with the perceptions and issues. Attachment B contains select concerns and general conclusions derived from the interview process. For those interested, a more detailed analysis is available from the NANP Administrator by calling Jean Mobley on 201-740-4661.

Appendix H (Attachment A)

LTNP Interviews - by Industry Sector

World Zone 1:

Interexchange Carrier:	AT&T:	Bob Lucky
	MCI:	Henry Sinnreich
Local Exchange Carrier:	Ameritech:	Joel Engel
	BellSouth:	Don Jones
	GTE:	Leland Schmidt
	Pacific Bell:	Mike Bandler, Marty Kaplan
	USTA:	Paul Hart
Canadian Carrier:	Bell Canada:	Hugh Burrows
	Telecom Canada:	Bob White & staff
Research/Association:	AT&T:	Bob Lucky
	Bellcore:	Irwin Dorros, Gary Handler, Bob Whitefleet, Gary Herman, Steven Minzer, Bob Keevers, Phil Porter, Ming Lai
	BNR:	John Luetchford
	SRI:	Edward Means, Tom Mandel, Linda Bruns
Government Agency:	FCC:	Peyton Wynns, Ken Stanley, Jerry Vaughn
	NTIA:	Bill Maher
	State Department:	Earl Barbely
	Canadian Department of Communications:	Dorothy Phillips, Thomas Whalen, Andrew Patrick
Vendor:	AT&T:	Bob Lucky
	IBM:	John Felton, Terry Smetanka, Norman Cowder
RCC:	CTIA:	John Stupka
	SWB Mobile Services:	John Stupka
	Telocator:	Tom Stroup
	McCaw Cellular:	Nicolas Kauser

International:

Carrier:	Australia Telecom:	Cliff Mathieson
	British Telecom:	David Halliday, David Leakey
	Nippon T&T:	Yoshimasa Tokui
Research/Association:	CCITT:	John Tar
	Ovum (Great Britain):	Claire Milne
Government Agency:	Oftel (Great Britain):	Geoff Knight

Appendix H (Attachment B)

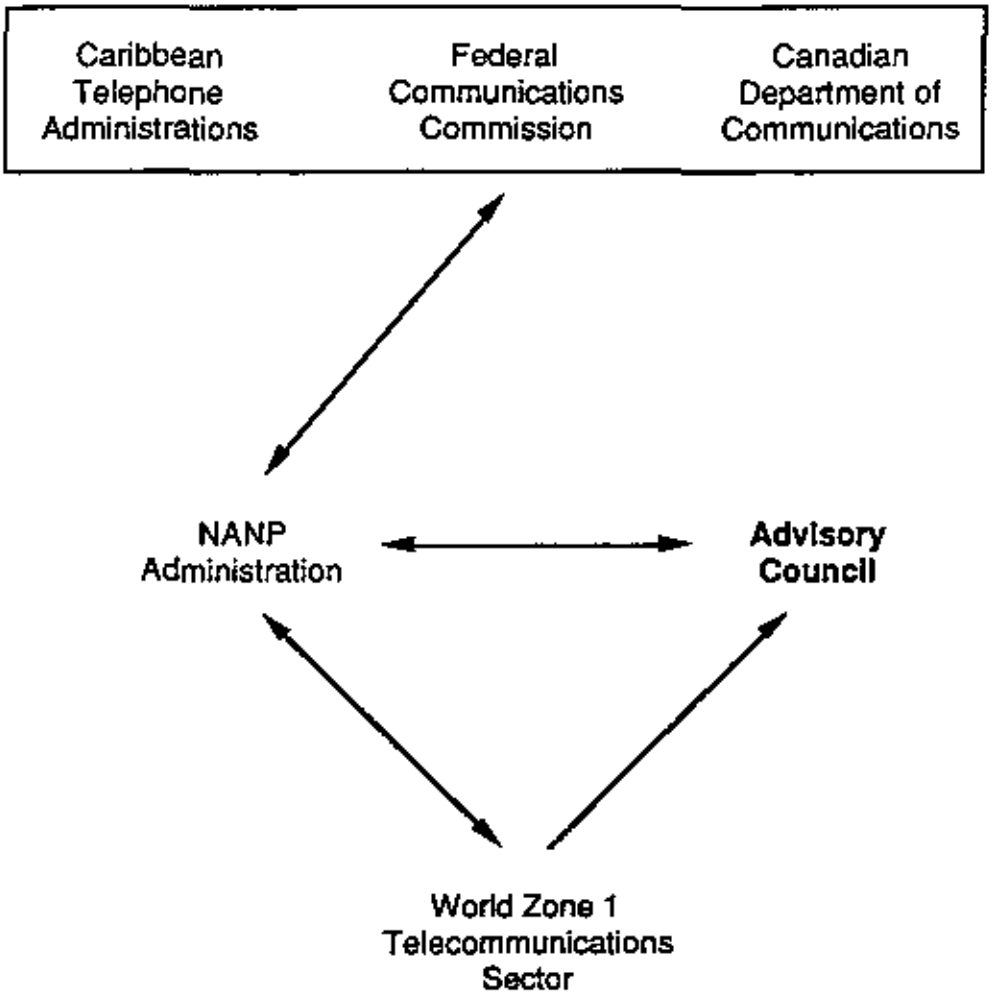
Perceptions and Issues Derived from LTNP Interviews

OVERVIEW

- General Concerns Regarding The Development of a LTNP:
  - Can not presume to offer a stable prediction for 30 years hence.
    - Current knowledge insufficient.
    - LTNP must be a flexible and "living" document.
    - Must identify and recognize alternatives.
  - Ensure adequate representation of industry sectors in the data gathering process.
  - Identify the process most likely to gain industry and regulatory support for the proposed LTNP.
  - Topic of most interest to those interviewed: Personal Communications.
  - Let moderation prevail, not grandiose predictions.
- Select General Conclusions From Interviews:
  - All aspects of society will become increasingly decentralized.
  - Equally sophisticated capabilities will be required for home, office, and mobile telecommunications.
  - Personal communications will be both a wireline and wireless service, with wireless as as adjunct to, not a replacement for, wireline.
  - Intelligent Network is the platform for the future.
  - A seamless/virtual seamless network is required to ensure ease of user access and interworking in a multi-vendor environment.
  - The level of cooperation between industry entities will ultimately determine the business success of the North American industry.
  - Competition is here to stay, the degree of regulation is less predictable.
  - The future requires flexible charging with integrated billing.
  - Fixed and mobile addresses will coexist for the foreseeable future.
  - By 2020, a user interface, not the user, will likely perform network connectivity and addressing functions.
  - Numbering must be an enabler, not an impediment.

Appendix I

Advisory Council Interworking



This diagram depicts the flow of issues and information into and out of the Advisory Council.

Appendix J

Glossary of Acronyms

B-ISDN	Broadband Integrated Services Digital Network
BNR	Bell Northern Research
CAC	Carrier Access Code
CC	Common Control or
CC	Country Code
CCITT	International Telegraph and Telephone Consultative Committee (translated from the original French: Comite Consultatif International Telegraphique et Telephonique)
CIC	Carrier Identification Code
CLC	Carrier Liaison Committee
CO (code)	Central Office (code)
CRTC	Canadian Radio-television and Telecommunications Commission
CTIA	Cellular Telecommunications Industry Association
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
FCC	Federal Communications Commission
FGB	Feature Group B
HNPA	Home Numbering Plan Area
ICCF	Industry Carrier Compatibility Forum
IDDD	International Direct Distance Dialing
INF	ISDN Numbering Forum
INPA	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
NPA	Numbering Plan Area
NTIA	National Telecommunications and Information Agency
PBX	Private Branch Exchange
POTS	Plan Old Telephone Service
PSDS	Public Switched Digital Service
PSTN	Public Switched Telephone Network
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
USTA	United States Telephone Association
VPN	Virtual Private Network
WZ1	World Zone 1