

# Cellular Networking Perspectives

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## In This Issue ...

The September issue of *Cellular Network Perspectives* started a discussion of the North American Numbering Plan (NANP) and the Bellcore proposal to eliminate its current shortcomings and guide it into the next century. In this issue we conclude our discussion of the NANP by analyzing how the controversy surrounding their proposal affects cellular carriers.

This issue also continues a discussion of the TIA cellular networking sub-committee, TR45.2, by focussing on the activities of Working Group I, which is responsible for protocols and message encoding.

## The Future of the North American Numbering Plan

The Bellcore vision of the future of the NANP either ignores the existence of wireless carriers or is directly opposed to their needs:

- It contains a very narrow definition of non-geographic numbering, so narrow that it excludes cellular.
- It does not discuss possible NANP conservation by the Local Exchange Carriers (LEC's).
- It does not provide alternate solutions to the NANP numbering crisis.
- It assumes continued control of the NANP by Bellcore and the LEC's.
- It sees the future of tele-communications as more like the past than the present.

### Cellular Terminals Not Mobile. Bellcore Bias?

The Bellcore proposal classifies cellular addresses (MIN's) as Geographic numbers. While this is the way that cellular is currently integrated into the NANP, it is not by choice, rather it is by lack of choice. A closer examination of non-geographic numbering shows that not only is Bellcore wrong to classify Cellular as a Geographic service, there will in the future be several levels of non-geographic numbering:

- Basic Non-Geographic (e.g. 1-800)  
Basic non-geographic services allow a phone to be located independently of the phone number used to reach it. The phone number does not contain complete routing information, routing must be extracted from a database.

- Mobile (e.g. Cellular)

Although cellular phones currently are assigned a MIN from the area code of their home system, more efficient routing could be provided by non-geographic numbers, particularly for frequent roamers. A call from Los Angeles to a New York mobile currently roaming in Chicago is today routed first to New York based on the roamer's MIN and then forwarded by the New York system to Chicago. It is currently technically possible (although not commonly implemented) to use IS-41 protocols to set up a single, much cheaper, long distance call from Los Angeles to Chicago in this case.

- Portable Numbers (e.g. Future 1-800)

1-800 numbers are currently assigned to a single carrier. For example, AT&T controls all 1-800-USA-XXXX numbers. This forces a user desiring one of these numbers to subscribe to AT&T. The FCC will almost certainly mandate that, to encourage greater competition, 1-800 numbers become portable between carriers.

- Portable, Mobile (Cellular, PCS)

The ultimate phone number would be able to follow a person from place to place and from service provider to service provider. While the technology to do this for all numbers does not currently exist, it is certainly possible for some numbers as an extra cost service.

One of the difficulties associated with non-geographic numbering is billing of calls in a predictable and fair way to both the calling and called parties. The available options appear to be:

- The called party pays all charges, as in 1-800 service.
- The calling party pays a flat rate charge, as in 1-900 service.
- The calling party pays a variable rate, but is somehow informed about it.
- The calling party pays to the home system (based on the dialed number), the roamer to their current location and the carrier pockets the difference.

The choice of a billing method will be based on business and regulatory considerations, and probably several different methods and combinations of methods will be offered to consumers.

### Control of the NANP

The NANP is currently controlled by the NANP Administration (NANPA), a group within Bellcore, an organization itself controlled by the Regulated Bell Operating Companies (RBOCs), the biggest and most powerful Local Exchange Carriers. This control was inherited from the time when AT&T had a virtual monopoly on US phone service. Now this power over the NANP has become an anti-competitive anachronism. The RBOCs are in control of a resource critical to their competitors, particularly cellular and inter-exchange carriers.

### Bellcore's NANPA is Biased

The NANPA may not intend to be biased but by viewing every use of numbering resources through LEC eyes the NANPA cannot avoid bias, intentional or not. There are many examples of this. Both Inter-Exchange carriers (IXC's) and wireless carriers, for example, are held to a higher standard of need to obtain NANP resources than the LEC's. An examples of this disparity is the denial of requests by IXC's and cellular carriers to allocate an entire area code while LECs retain area codes that have only a tiny fraction of numbers used. NPAs are routinely split in cities with large cellular populations while under-utilized NPA's are never combined. The NANPA decries the use of CO codes for continent-wide 7 digit dialing, while ignoring nationwide LEC use of codes such as 555 and 411. Small cellular carriers are routinely denied allocation of entire CO codes (10,000 numbers), while small LEC's are always allocated entire CO codes. In the words of Los Angeles County representative William Irving "The RBOCs have on several occasions *abused* their ability to control the NANP, and this capability can be applied by the RBOCs in the future as a strategic marketing weapon". The RBOCs must eventually allow fairer administration of the NANP if telecommunications is to stay on the road towards greater competition.

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## Is Impartial NANP Coordination Possible?

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It would be unfair to the NANP administrators within Bellcore to suggest that an impartial NANPA would be simple to achieve. It would have to provide for input from different business segments: LEC, IXC, Cellular, Paging etc., from state regulators and from consumers. Not only that, while Americans often forget about their neighbours to the North, and which way up their flag flies, Canada and several Caribbean nations share the NANP resource. The sheer number of parties involved, and the differences between US and Canadian tele-communications policy would make NANP administration a daunting challenge. But a challenge that has to be undertaken.

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## How Much is that Number in the Window?

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A paradox of the NANP is that while its resources are controlled, they are not really owned. While this is the current view of the FCC, DOC and the NANPA, it may eventually be necessary for users wanting numbers to pay market value for them to establish fairly whether a case exists for each allocation. The value of the NANP is immense, for if a single number is valued at only \$10, the total NANP resource would be valued at \$100 Trillion, an Area Code at \$100 Billion and a CO code at \$100 Million. A free market would transfer the responsibility to justify allocation of NANP resources to the business plans of the companies requesting them and replace NANPA central planning by mere bookkeeping.

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## Alternate Solutions to the Numbering Crisis

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While Bellcore proposed one solution to the numbering crisis; allocating more NPA codes by eliminating restrictions on the second NPA digit but also eliminating 7 digit local dialing. Alternate solutions from the bizarre to the reasonable were suggested in response:

- (*bizarre*) Use of the hexadecimal numbering system to enlarge the 10 digit dialing system. This has the minor drawback of requiring the addition of new buttons to every phone, and new capabilities to every telephone exchange, wireline, cellular or other.
- (*interesting*) Moving to an 11 digit NANP address is a possible, although it would require changes to every telephone exchange in North America. Given time to adapt, it would multiply 10-fold the address space of the NANP, while allowing local dialing, albeit with 8 digits instead of 7. An interesting question is whether the extra digit should be added to the area code, CO code or line number. The opinion of this newsletter is that line numbers should be increased from 4 to 5 digits as that better reflects the growth of the North American telephone system, where the number of

cities has not increased, the number of telephone exchanges within each city has not increased, but the number of subscribers served by each telephone exchange, wireline or not, has increased dramatically.

- (*reasonable*) Allocating 200 more CO codes in each NPA by extending the first CO digit from N (2-9) to X (0-9). This would result in fewer new numbers than extending the second NPA digit from Y (0-1) to X, but would have the important advantages of allowing localized switch changes and of reducing the need for disruptive NPA splits and overlays. Although the NANPA proposal discusses this change, they suggest, without justification, that it occur only after all new area codes are exhausted, around 2025.

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## Conclusions

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There are both technical and political problems to be solved to put the North American Numbering Plan back on track. Potential solutions have to be examined by a group representing all industry and government interests, a group that will attempt to find the best remedy for consumers of tele-communications services. A major technical adjustment may be required soon to protect consumers from unending splits and overlays of area codes, while providing enough numbers for future technologies that may, in some eyes, be wasteful of numbering resources.

## TR45.2 Working Group I

Working Group I of the TR45.2 sub-committee is responsible for message encoding and protocol selection for the cellular inter-system standard, IS-41. It integrates the output of other working groups prior to balloting. It then responds to all ballot comments before recommending publication.

The current priority of WG I is to publish IS-41 Revision C in the second quarter of 1993. This is a major revision of the standard, intended to include support for terminal authentication, voice encryption, new subscriber features, CDMA inter-system operations and resolution of the major Border Cell problems. There are also many corrections and clarifications to be made to IS-41 based on field experience. It will be a challenge to achieve this goal, a challenge that will require a great deal of focussed work.

Working Group I is chaired by Charles Ishman of Motorola. With more than 25 years of experience in telecommunications, particularly in the design of switching software for North American and international markets, he has the depth of experience required for the challenges of his position.

## Glossary

**Area Code**•A 3 digit code assigned to an NPA. Currently restricted to the digits NYX, resulting in 160 possible area codes, of which 16 are lost to service codes (e.g. 911 and 800). The area code is the first 3 digits of every NANP address.

**Bellcore**•The research organization owned by the Local Exchange Carriers that arose from the divestiture of AT&T (RBOC's). This organization inherited responsibility for the NANP from AT&T.

**CO Code**•A Central Office Code. Somewhat of a misnomer, the CO code is the 4th through 6th digits of an NANP address.

**DOC**•Department of Communications. Has authority over numbering issues in Canada.

**FCC**•Federal Communications Commission. Has authority for numbering issues in the USA.

**Geographical Number**•A telephone number from which the location of the serving local exchange can be derived.

**LEC**•Local Exchange Carrier. A company with a monopoly on local wired telephone service in a specified area. See **RBOC**.

**N**•A digit in an address that must be in the range 2 through 9.

**NANP**•North American Numbering Plan; the dialing system in use in WZ1.

**NANPA**•NANP administrator, a department within Bellcore.

**Non-Geographic Number**•A telephone number from which the location of the terminal can only be determined by consulting a database.

**NPA**•Numbering Plan Area; a major subdivision of the NANP. See **Area Code**.

**RBOC**•Regional Bell Operating Company. One of the LEC's that became an independent company following the divestiture of AT&T.

**WZ1**•World Zone 1; USA, Canada and the Caribbean.

**X**•An address digit that may be any value from 0 through 9.

**Y**•An address digit that must be 0 or 1.

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