

Telephone growth has caused many changes in telephone numbers over the years. A new numbering system to take care of future growth is needed because some Numbering Plan Areas are running out of numbers. Here are some reasons why All-Number Calling was selected.

why all numbers?

Norman D. Blair, *Traffic Facilities Administrator*, and
Merlin P. Cosgrove, *Public Relations Manager*, A. T. & T. Co.

■ WASHINGTON, D. C., is the nation's leader of policies and programs; but at the same time it reflects the nation's programs and activities. It is as a representative city that Washington illustrates the nation's phenomenal growth of telephones and the changes this growth has brought to telephone numbers the customers use. Washington has followed the national pattern.

When the White House was known as the Executive Mansion, protocol dictated telephone numbers. The Executive Mansion had "No. 1"; "No. 2" was for "Capitol, U. S., Senate Corridor, near Secretary's Office." This was in 1878 when The National Telephonic Exchange in Washington published its first directory and proclaimed "direct and private communication between any two subscribers whenever desired." This one-sheet directory listed 187 subscribers alphabetically; in front of each name was the telephone number. The lower half of the sheet had a

"classified list" that showed no numbers at all.

Numbers weren't used—they weren't necessary. If an enterprising *Evening Star* reporter had a hot story at the Capitol just before press time, he "borrowed" the phone in the Capitol and asked the operator for "*The Star*"; he probably didn't even know it had number 27.

Newspapers were quick to subscribe to this new telephonic service which had developed scarcely two years after the telephone was invented. So were livery stables, grocers, coal and ice dealers, attorneys and "private residences."

By 1883, when The C. & P. Telephone Company was formed, Washington had 900 phones. The women who'd replaced boys as operators still connected calls by names of customers: they associated the names with the numbers on the switchboard. Of course, the numbers on the board had to be changed to accommodate the growing number of telephones. *The*

Star's number was changed to 410 in 1886.

By 1892 *The Evening Star* had need for two listings in the directory: 1204-2 for business office and 1204-3 for editorial. The "2" meant "ring two" and "3" meant "ring three." Within three years (1895), the newspaper needed more lines—more people had telephones—and a type of switchboard was installed. *The Star* got another new number—1724.

But operators were getting too many names to remember, and by 1900 the use of telephone numbers was a necessity. The nation's capital had 4,000 telephones—a 100 per cent increase in two years! The central office had to be split and a new office, East, was formed. The original office was called Main... and *The Star's* number became Main 1724.

This was but the beginning. Year after year more people wanted telephone service. The number of telephones in Washington doubled and redoubled again and again. New offices were added to take care of this growth. *The Evening Star* added more extensions, more lines. When dial service was introduced, telephone numbers needed two letters and four numbers; with Direct Distance Dialing, seven turns of the dial were necessary because telephone numbers in many cities already required seven turns. This is when the name-numeral plan requiring the dialing of two letters and five numbers was introduced.

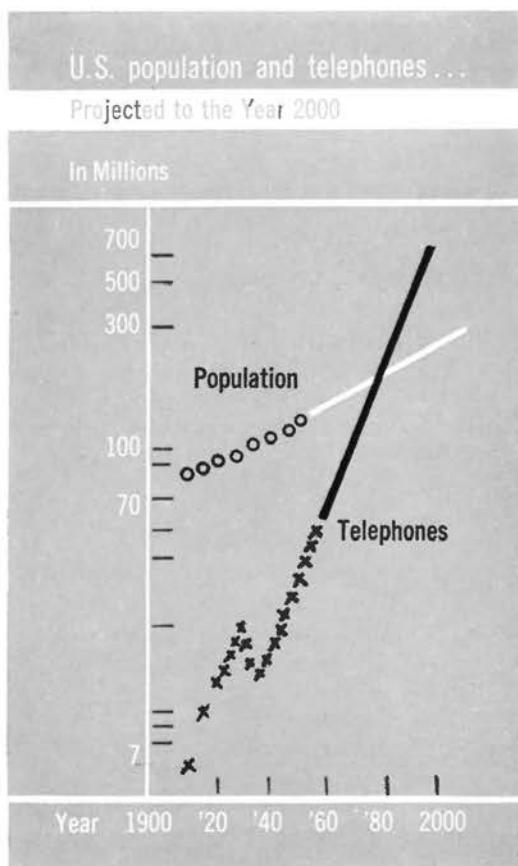
These changes have meant more numbers to remember, more digits to be dialed. *The Star's* first number, 27, grew to 410 to 1204 to 1724 and then to Main 1724; which grew to Main 2440 and then to Main 5000; became National 5000 which, with dial service, became NA 5000; changed to ST 5000 and then, another pull of the dial, to ST 3-5000. Since 1959, when *The Star* moved to its modern plant in southeast Washington, its number has been LI 3-5000. The key to all these changes has been telephone growth.

Although Washington hit its population peak in 1941, telephones continued to increase there as in the rest of the country. The capital had 465,000 phones in 1949;

487,000 the next year; 537,000 in 1952, and by 1960 there were 642,000 phones. Today there are 670,000 phones. With all the new phones and the need for more numbers, Washington has begun to use all number central office codes. These consist of three digits rather than two letters and one digit.

The Star, and Washington, reflect the national pattern of telephone growth.

Under the name-numeral plan, there's a threatened shortage of telephone numbers in some of the Numbering Plan Areas. The reason, of course, is that telephones are increasing at a fantastic rate. In the nation today there are 78 million phones for 180 million people. Forecasts for 1985 to 1990 predict an equal number of people and phones—280 million; and by the year 2000, approximately 340 million people



why all numbers?

may require 600 million phones!

And to compound the problem, there are new services that will require telephone numbers: Bellboy signaling, air-ground service, mobile telephone service and Centrex installations (direct dialing to and from extensions) for all kinds of industry and government.

Guaranteeing a distinctive telephone number for each phone is essential if Direct Distance Dialing is to work. Planning is essential. And basic to this planning is the industry-imposed obligation to "fix" numbers so they won't have to be changed with each spurt in telephone growth. All-Number Calling will help.

Numbering Plans Studied

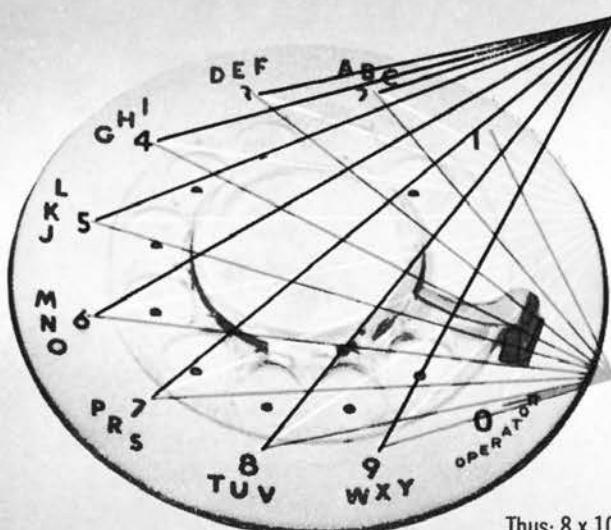
Confronted with this tremendous problem of the future shortage of numbers, the Bell System established a study group.

Its job was to study every aspect of telephone numbers. The customer was omnipresent as the group met. Any change in numbers must meet present—and future—needs, but with the least amount of *real* change and at the least inconvenience to the customers.

The U. S. and Canada had been divided into Numbering Plan Areas, identified by a three-digit code, and 126 of these codes are being used today. It's obvious, of course, that no two telephones in the same area can have the same telephone number. But under the 2-5 "name-numeral" plan, only 540 central office codes are available for use in each area.

Members of the study group quickly ruled out the obvious way to get more central office codes, thus more numbers—cutting areas in half, or at least, into smaller entities. This would limit the customer's "home" area and would require him to dial three more digits (the area code) to make many of the calls he now dials with only seven turns of the dial. This inconvenience to the customer has another

Numbers Make More Central Office Codes



First Number:

8 possibilities ("1" and "0" reserved for special prefixes)

Second Number:

10 possibilities

Third Number:

10 possibilities

Thus: $8 \times 10 \times 10$ combinations = 800 potential codes

Minus those reserved for service codes ending in "11" — 8

Central Office Codes 792

peril: it's a mathematical certainty that the more turns of the dial, the more errors—and the more errors, the more unhappy and dissatisfied the customer. Besides, area codes would have to be changed more frequently for large groups of customers—a gross inconvenience to those customers as well as to the persons who call them. It was agreed that creation of new areas should be kept to a minimum.

After some years of intensive investigation, the group decided on a plan that offers definite advantages over the name-numeral plan. It does not require the customer to add another anything—no more turns of the dial, no wholesale change of telephone numbers to remember. No peculiar, unpronounceable names. Yet this plan—called All-Number Calling—would add more central office codes. This means more telephone numbers in each Numbering Plan Area. The suggestions have been studied again and again and now, Bell System companies are going ahead with ANC to take care of future growth. The non-Bell telephone companies are follow-

ing the same procedures. In fact, today there are more than 20 million telephone numbers composed of all numbers.

Why ANC Adds Numbers

Simply stated, ANC adds up to more telephone numbers because it uses more dial holes to form central office codes.

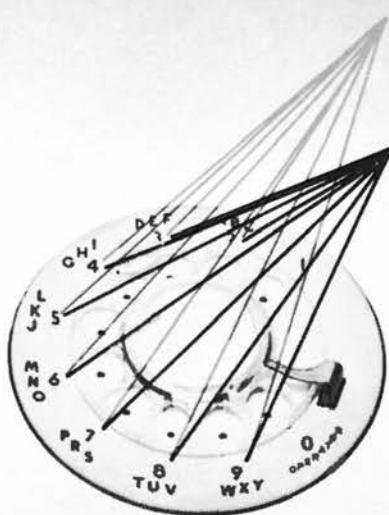
The telephone dial has ten holes, numbered "1" through "0." However, two of these—the "1" and the "0" are used for DDD and to reach the operator so there are eight possibilities for the beginning number of a central office code. For the second turn of the dial all ten numbers are available; and ten for the third turn. That's $8 \times 10 \times 10$ or 800 combinations. However, the eight codes ending in "11" are reserved for service codes (such as "411," "611," etc.) so these eight are subtracted from the 800. Thus a total of 792 central office codes are made available by ANC.

Contrast this with the 540 codes usable under the 2-5 name-numeral plan. Because neither the "1" nor the zero has a letter

2 Letter — 5 Number System Restricts Number of Codes

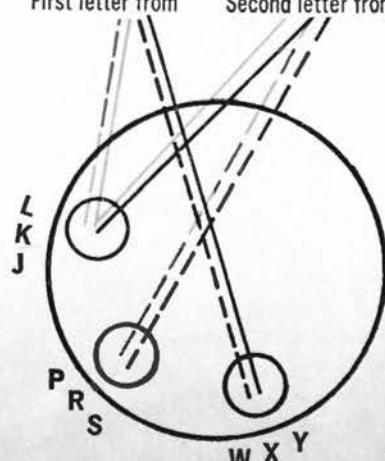
First Letter: 8 possible dial turns

Second Letter: 8 possible dial turns



Possible combinations of letters 60
Number possibilities \times 9
Central office codes 540

64 potential letter combinations
- 4 combinations that do not form usable names (below)
60 First letter from Second letter from





why all numbers?

associated with it, only eight holes can be used for the first letter of the central office code. And for the same reason, the second letter of the code is limited to eight turns of the dial. Thus there are 64 (8 x 8) potential combinations of letters available for these codes. But four of these combinations do not produce names appropriate for telephone use. Oh, some names *can* be produced, but they're not the simple words that are satisfactory for central office names in telephone numbers. So this leaves only 60 usable combinations of letters available. The third pull of the dial has nine possibilities because zero is usually omitted to avoid the confusion between the zero and the letter "O." The usable letter combinations—60, times the nine digits, gives 540 available central office codes.

Were letters used in an arbitrary manner rather than to make central office names, the four combinations ruled out in the present 2-5 system could be used. This would restore to 64 the combinations available for the first two letters. Multiplied by the nine digits available for the third pull (again eliminating the confusion between zero and the letter "O"), this system would make 576 codes available—not much improvement over the 540 codes of the 2-5 plan.

Many other plans were investigated—and turned down:

- *Add an extra letter or digit for local numbers:* customers would have one more turn of the dial for every call and, in most cases, numbers would change completely; much additional equipment would be needed.
- *Add "Q" to the "1" space and "Z" to the zero space:* customers would use two letters (no name implied in most cases) and a digit—they would find arbitrary letters much easier to misunderstand than

numbers ("D" sounds like "B" and "P," etc.); every dial plate would have to be replaced before new codes could be used. Besides, "Q" would be out of alphabetical order on the dial.

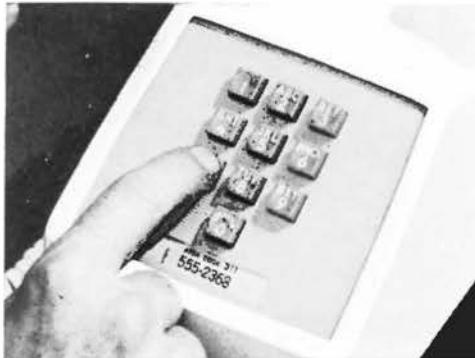
- *Rearrangement of letters on the dial* so that only one letter and one number would appear in a space: customers would have wholesale and drastic number changes; again, the dial plates on every telephone in the U.S. would have to be changed prior to using the new codes.

Other Advantages

Of all the proposals advanced, ANC provides the most central office codes with the least change and inconvenience to the customer. More customers can reach more telephones by dialing the minimum number of digits. And for almost the first time, telephone growth does not require the customer to add to the number of dial turns he must make. Eventually when telephone numbers no longer have letters, a single large number may appear for each large opening on the dial. And it's certainly easier to find one number in a space than to hunt for one letter in a grouping of three letters and one number all in the same space on the dial.

There are also other advantages. ANC eliminates the confusion between the letter "O" and zero, and between the figure "1" and the letter "I" and the resulting errors that have plagued many dial service customers since dialing first started. Other common errors caused by misspelling and mispronouncing the central office names will be relegated to history. In Washington, for instance, an "Ordway" number frequently sounded like "Audrey," and because of this, the name was changed. So was the Georgia office—did you dial GA or GE?

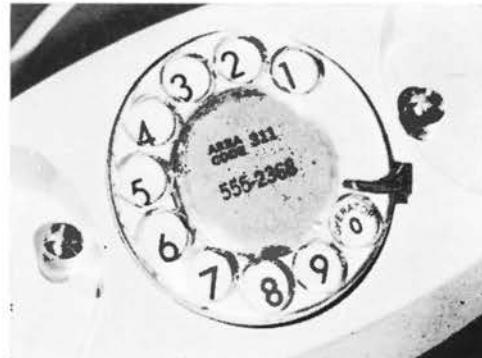
There's still another advantage to ANC and one that will facilitate world wide dialing in the future: alphabets and letter arrangements on dials vary widely, but numbers form an international common language. Even today, 43 million dial



Customers participating in trial of "Touch-Tone" telephone (above) approve its speed. All-number phone numbers also save time.

phones in more than 100 foreign countries use all-number telephone numbers.

For those persons who feel ANC is some sort of an impersonal dehumanizing movement, it should be noted that the only change is in the form of the number. Customers are still listed by name and address in all directories. The fact of the matter is that telephone service is highly personal—its very purpose, communicating with others, is symbolic of this. And to underscore this very personal service, new



This model Princess phone designed for ANC shows but one number to a dial hole, this will cut down time needed to hunt letters.

equipment is available, and more will come, that automatically dials your telephone numbers—even your long distance numbers with ten digits.

Furthermore, as electronic central offices come into service, and as new developments occur, customers will probably be able to dial two- and three-number codes to get telephone numbers they call frequently. And the service will be faster and certainly better than when the Washington *Evening Star* had number 27.



Norman D. Blair

The authors bring to this article a rare blend of technical experience and sensitivity to the customer's point of view. Norman D. Blair has been directly concerned with the technical aspects of All-Number Calling since coming to A. T. & T. as Traffic facilities administrator two years ago. Before that he had broad experience in both the technical and service aspects of Traffic with Southwestern Bell. He started work with that company in Traffic engineering in 1946 and, except for five years, was in that company's Traffic Department until he came to A. T. & T. He was general Traffic manager for the state of Arkansas at that time.



Merlin P. Cosgrove

In his own field of public relations, Merlin P. Cosgrove has been involved with All-Number Calling ever since the plan was adopted. As public relations manager he is concerned with service from the customer's viewpoint—and in obtaining public understanding of the need and the advantages of such important facets of service as ANC. Mr. Cosgrove's broad experience in the analysis of customer attitudes began while he was with the New York Telephone Company before joining the A. T. & T. Public Relations Department in 1953. He came to A. T. & T. as a statistician working with studies of public relations activities.