

TELEPHONE NUMBERING

New equipment and services, more companies offering telephony, and increased consumer demand are starting to overload the UK's telephone numbering scheme. To remedy this, the Office of Telecommunications (OFTEL) has proposed that all telephone numbers should be increased by one digit from Easter 1994. There is however disagreement on the costs and implications of such a move and whether more efficient management could release the numbers required with less cost and disruption.

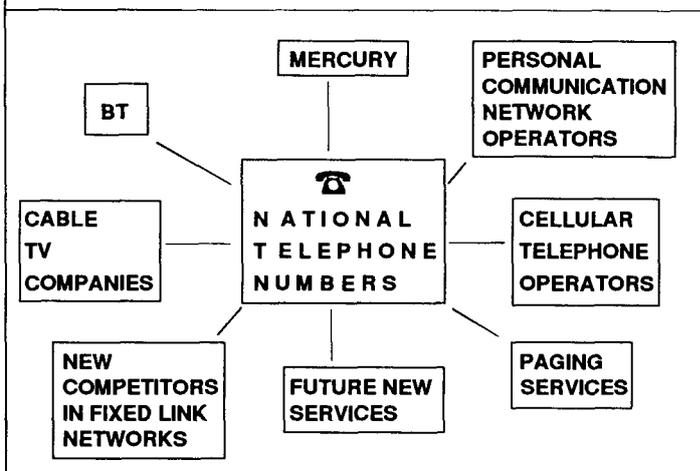
This Briefing Note examines the technical requirements of a national telephone numbering scheme and related issues.

THE PRESENT SYSTEM

Currently, 30 million telephone numbers are in use in the UK mostly through the fixed-link networks operated by BT and Mercury Communications. Growth in demand has been rapid (over 1 million new lines each year between 1987 and 1991) as a result of increased services such as facsimile transmission, automatic financial transfer at supermarket tills, electronic burglar alarms, cheque verification, electronic mail, and so on. In addition, Government policies to encourage competition in telecommunications have increased the demand for numbers (see Figure 1). In planning ahead, telephone users and regulators are keen to provide for growth in both services and competition, and foresee increasing difficulty in meeting these demands with the present system.

Most telephone numbers in the UK consist of a leading zero followed by nine digits making ten digits in all, and are assigned according to the broad principles described in the **Box** (next page). In theory, the nine digits after the '0' could be arranged to give almost 1000 million numbers, but the actual number in use is much less - around 30 million, or 3% of the theoretical maximum. The main reasons for the low utilisation rate are:

Figure 1 THE COMPETITORS FOR TELEPHONE NUMBERS



- The first four digits are the STD codes based on National Numbering Groups (NNGs) which, for largely historical reasons, are mostly assigned to regions of similar geographical area. Although each NNG could support up to a million users, many have been allocated to areas with limited population. Some codes, such as BT's 'Phonebase' directory enquiry service (0910), have had to be reserved for specific services.
- There has been a growth in non-geographical services requiring their own prefix - e.g. 0800 (no charge), 0345 (local rate only), 0898 (a 'premium-charge' code for services ranging from share advice to various 'entertainments') and mobile telephones. Like STD codes, these codes often have many fewer than one million numbers attached to them.
- New Public Telecommunications Operators (PTOs) use different codes and numbers for the same area or service (e.g. Mercury has its own codes which correspond to BT's 0800/0345 codes (0500 and 0645 respectively)). New companies also seek large blocks of numbers to give them scope for future growth - for instance, the new Personal Communications Network (PCN) operators are each requesting blocks of ten million numbers in sequence.
- Some 9- and 8-digit numbers are still in use which 'waste' available numbers.
- Certain combinations of digits (e.g. 999), or codes (e.g. the old London '01' code), are barred permanently or temporarily because it could lead to customer confusion.

WHAT DO TRUNK TELEPHONE NUMBERS MEAN?

Originally, telephone numbers used to consist of a named exchange and a number (e.g. Whitehall 1212). The move to all digit numbers was made in the 1960s with the introduction of Subscriber Trunk Dialling (STD) codes, based on geographical locations. The coverage of the entire UK by STD codes was completed in 1979.

STD telephone numbers in the UK consist of ten digits; most are arranged as a four-digit code, followed by a six-digit number, (e.g. 0223 456789). The digits conform to the following formula:

0223456789	This has become synonymous with making a trunkcall. (Technically, the 0 means that the following nine digits are an internationally recognised sequence for UK telephones.)
0 223456789	This tells the network where the call is going, how to route it, and how much it will cost. This group of digits is known as a National Numbering Group (NNG). Many NNGs are three digits long but 4- and 5-digit NNGs are also used.
0223 456789	The subscriber's telephone number.

The arrangement for large conurbations is to have a city prefix, a local area code and then a final destination number, e.g. 071 219 3000. Writing this number another way, 0712 193000, it appears the same as the example above and call routing and tariffs are determined in the same way.

PROPOSALS FOR CHANGE

Issues of telephone numbering and allocation are decided by OFTEL, who receive advice from the Telephone Numbering and Addressing Board (TNAB)¹. OFTEL have concluded that the existing system lacks the capacity to accommodate increased demand for telecommunication services, and forecast that numbers will start to run out by 1994. In September 1991, OFTEL announced their preferred solution was the addition of an extra digit to every geographical STD telephone code in the UK, with effect from Easter 1994.

One of OFTEL's objectives is to allocate future numbers in such a way as to facilitate competition. This places certain demands on any numbering system, since clients of new service providers will expect their telephone numbers to have the same 'quality' that they receive from BT (e.g. in the number of digits that have to be dialled). There are also arguments that a new system should have an understandable rationale to help users to identify which service they are accessing, its associated tariff, and so on. OFTEL see an expansion in the numbers of digits as offering more potential to meet these needs than 'tinkering' with the existing system, and see the renumbering as an important step to creating a fully competitive telecommunications environment in the UK, in line with Government policy expressed in the 1991 White Paper.

Adding an Extra Digit

Under the proposed scheme, all UK telephone NNGs would contain an extra '1' (technically known as an 'S-digit') after the initial zero. This would enable a new series of codes of the form '01xxx' to be allocated. No decision has been taken on non-geographic codes such as pagers, cellular telephones and 0800 numbers.

Adding an extra '1' will initially allow STD codes starting with 1 to be used (e.g. 01123) which offers 100

million extra numbers. In the longer term, other S-digits could be used, each of which would open up almost 1,000 million extra numbers to the system. No decisions have been made on how these might be allocated, but there are a number of possibilities. For instance, numbers beginning 01 might be reserved for the fixed network; another for mobile communications, etc. Other numbers could be used to identify geographical location, tariff, type of service, etc.

Adding an extra digit to all codes would affect existing equipment. Some private payphones cannot accommodate an extra digit and would be unusable in the new scheme (such equipment is still endorsed by the PTOs as being compatible with the present STD system and no indication is being given that it is expected to become obsolescent in 1994). Other equipment will require modification. For example, some businesses have installed electronic 'boxes' that automatically divert outgoing trunk calls via the Mercury network. These boxes cannot read an extra digit in the STD code and will have to be replaced or upgraded - otherwise, the call will default to the BT network. Similar problems will affect telephonic burglar alarms - an extra digit in the code will require all 750,000 alarms in the UK to be reprogrammed, and software will have to be rewritten and verified at the 45 base stations. Modifications will also have to be made to the electronic tills in large shops.

The Telecommunications Managers Association (TMA) and others believe that these penalties are sufficient to justify delaying the 'extra digit' plan. They argue that an interim solution called 'code recovery' could be started which would provide a breathing space during which the issues surrounding national renumbering could be debated and analysed more fully.

1. The TNAB is a limited company formed four years ago. Its full consultative committee (FCC) includes the PTOs, and trade and user associations. A separate committee, consisting only of the PTOs have discussed renumbering issues before reporting to the FCC.

Code Recovery

Code recovery would seek to make more efficient use of the current UK numbering system than is achieved at present. Some countries already have much higher utilisation rates than the UK's 3%; for example France, with a comparable population, has a code utilisation between 12 and 16%. The USA has a utilisation rate of 16% and has only recently had to introduce new area codes in certain congested areas such as parts of New York. Japan has a numbering scheme very like the UK's, but serves twice the number of people - a 6% efficiency of use.

A code recovery programme would identify the areas with the most underused NNGs and recode them where possible to the code of a neighbouring area. For instance, an island could lose its own code and use instead the STD code of the nearest mainland port; small villages would adopt the code of the nearest large town. The least used NNGs would each release close to a million numbers for reuse elsewhere in the country, and up to 200 are considered to be potential candidates for 'recovery' in this way, which could offer 5-6 times the utilisation rate achieved so far.

In favour of the scheme is that initial costs would be low (perhaps a few million pounds), and disruption limited to the NNG areas being recoded. Since these would be selected as the most underused in the network, the number of users affected would also be low. A code recovery scheme would not require most equipment to be replaced or upgraded except for some private payphones. Code recovery could become more expensive if pursued into areas where there are many business users, and this would increase costs if the full potential of code recovery had to be realised. However, experts believe that there are sufficient NNGs where this is not the case to allow future demand to be met into the next century, without incurring large costs.

The main disadvantage of code recovery is that the codes recovered would be randomly numbered, and would not, for example, satisfy a PCN operator's need for consecutive code blocks. Nor may it always be possible to recode underused NNGs to neighbouring ones, which could lead to some customer confusion. Also, since some form of national renumbering is ultimately inevitable in the UK, some see code recovery as an unnecessary additional expense.

ISSUES

Weighing the Costs and Benefits

A number of extreme estimates have appeared in the press concerning the costs of adding an extra digit.

OFTEL's estimate for the cost of modifying users' equipment is £200M, in addition to the cost incurred by the PTOs of renumbering the entire system (estimated at £100M or more). It is over the indirect costs to business that most dispute arises. Additional costs arise from reprinting stationery, signs, advertising, informing customers etc., which could be substantial for large businesses, particularly those with major overseas links. If these are included, some estimates place the potential cost to users as high as a few billion pounds. Some argue that the lack of authoritative estimates of costs is sufficient reason alone for delaying the introduction of an extra digit into all STD codes. Other point out that any delay in executing the proposed renumbering plan will negate the investments, running into millions of pounds, that have already been made by the PTOs, particularly BT, in anticipation of renumbering.

The costs incurred may depend on secondary factors, such as the speed of changeover and the period of notice provided. For example, a long period of notice would allow replacement of headed notepaper, repainting of commercial vehicles etc. to be integrated into the normal routines of reordering or maintenance. A generous changeover period would, for example, allow the necessary modifications to a burglar alarm to be incorporated into the half-yearly recommended routine maintenance, making the costs a few tens of pounds instead of over £100. There would also be problems in providing enough resources for a rapid change: in the recent London renumbering, engineers were brought in from all over the country, which would not be possible if the whole country was changing. Currently, OFTEL are understood to be considering an extension in the transition period for burglar alarms from the original 3 months to six months or longer.

The costs of code recovery would be relatively low, and codes used to be recovered as part of BT's network updating. However, the pace of BT's code recovery programme has slowed in recent years.

One 'cost' is through disruption, and some have examined whether the 'extra digit' plan is likely to create more or less disruption than the 'code recovery' scheme. Taking a number from a telephone directory and keying it into the instrument itself, or writing down a number communicated verbally, requires good short-term memory. Psychological tests have shown that numbers greater than six or seven digits long are difficult to reproduce without error, and the problem worsens as the number of digits increases. The addition of an extra digit would therefore increase the error rates in dialling. Errors have costs associated with them - 'busy' lines, user frustration and so on, though these are not quantifiable.

If the code recovery scheme were implemented, then disruption is expected in the recoded area and among the new code users. However, since the recovered code would belong to an underused NNG, with a small population and probably little business activity, the disruption caused at the changeover is not expected to be large or lasting. Moreover, since the number of digits will remain the same, there should be no change to the error rate in dialling.

Both code recovery and renumbering would deal with number congestion into the next century, but supporters of renumbering point to the longer term benefits which could accrue from the ability to 'redesign' the UK telephone system to meet a number of different objectives. Some potential advantages are not in contention. For instance, it would be possible to make numbers more informative on aspects such as area, charge rate, and type of service. It would also be possible to allocate blocks of numbers for new large users in an expanded system.

However on other aspects there is disagreement among experts on the relative advantages of the two approaches. OFTEL see renumbering as an essential prerequisite to a fully competitive telecommunications environment. But some experts see the issue as one of network management, and believe that either system could be managed to ensure neutrality in competition - i.e. irrespective of the PTO used, customers would use the same length of number and preferably would be able to change between BT, Mercury or a competitor without having to change their number.

Timing of Change

The potential benefits of renumbering are accepted even by those supporting code recovery, and the key question is over the timing of any major renumbering scheme. Some such as the TMA argue that it is premature to launch a major restructuring of the UK telephone numbering system, with its attendant costs, until future needs have been more completely defined. They point to the fact that uses for the 'S' digit have so far only been the subject of tentative discussion and speculation rather than firm proposals, and believe that the specifications for a future national numbering scheme should be formulated before rather than after any change. Recently, Mercury have also called for further discussion of renumbering issues.

But OFTEL say their decision was taken only after extensive consultation, and the idea of an extra digit originally received widespread support from operators, equipment manufacturers and users. Moreover, they point out that technology, services and user requirements are developing so rapidly that early decisions on the exact allocations in a renumbered system

might restrict future flexibility. BT continue to support the renumbering scheme; the Telecommunications Users Association (TUA) also support a rapid implementation of the 'extra digit' plan, provided the changeover could be followed by a period of stability, preferably for 50 years or so.

Should users and manufacturers be involved more closely in consultations? Some believe that the advisory body TNAB should be restructured to allow the Full Consultative Committee to be the main forum for discussion of telephone numbering questions, rather than its subcommittee, which involves only the PTOs at present. The capacity potentially available via code recovery is seen as offering ample time for such consultations to be concluded.

OFTEL are still examining comments on their earlier proposals.

European Harmonisation

The European Commission (EC) is studying telephone numbering throughout the Community and examining what scope there is for harmonisation. This raises the question of whether any national renumbering could soon be followed by another change stipulated by the EC, involving extra cost and inconvenience. The EC does not intend to impose numbering schemes within national boundaries. Making all telephone numbers conform to the same type throughout Europe, (e.g. in the number of digits for the area code and subscriber number), is considered a very long-term proposition.

Some harmonisation however, is likely to occur. Firstly, the emergency code throughout the Community will become 112 (running in parallel to the 999 code in the UK for some years), and the international access code will become 00 (not 010 as is used now). Some Member States may introduce these changes during 1992, but full implementation is not required by the EC until 1998. The EC may also agree to standardise on 08xx prefix for special, non-geographic services (e.g. the 0800 toll-free code), and is examining ways of setting inter-community telephone tariffs for such services.

FURTHER READING

Additional details and background information are available from POST, 2 Little Smith St., London SW1P 3DL, tel: (071)-222-2688.

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