2 Conclusions

Contents

Page

The reference

2.1. On 27 April 1995 the DGT made a reference to us under section 13 of the Act on the subject of telephone number portability (usually referred to in this report as portability or NP). Portability is defined in the reference (see Appendix 1.1), in summary, as a facility provided by one telephone operator to another which enables customers to retain their telephone numbers when switching their business between those operators.

2.2. The DGT had previously put to BT a proposed modification to the condition of BT's licence which deals with portability. BT did not accept these proposals. In such circumstances the DGT has to make a reference to the MMC if he wishes to proceed with the licence modification. If the MMC conclude that the matter specified in the reference operates or may be expected to operate against the public interest, and that the effects adverse to the public interest could be remedied or prevented by modifications of licence conditions, the DGT may proceed to modify the conditions. In doing so he must take account of the modifications recommended by the MMC but is not obliged to adopt them.

2.3. The matter specified in the present reference, in summary, is that:

(a) following directions from the DGT to BT to provide portability to Videotron (a cable company), BT has not been able to reach agreement with Videotron as to the basis on which the costs are to be allocated;

(b) BT's licence does not provide for the DGT to resolve such a dispute; and

(c) the unresolved dispute is impeding the conclusion of negotiations between BT and other operators

with the result that no portability has been or is being provided by BT.

General background

2.4. BT was privatized in 1984, when just over 50 per cent of its shares were floated (the rest of the Government's holding was sold in the early 1990s). A new framework of regulation was established under the Act which abolished BT's statutory monopoly and provided for the licensing of the running of telecommunication systems. Licensed operators may be required by their licences to connect, or permit the connection of, their systems to those of other operators.

2.5. The chief regulatory functions are shared between the Secretary of State and the DGT. The former has prime responsibility for market-opening measures, in particular by licensing new operators. The DGT's powers include enforcing operators' compliance with licence conditions and proposing licence modifications. Both he and the Secretary of State are under a duty to exercise their respective functions in the manner best calculated to secure the provision of telecommunication services throughout the UK and the ability of operators to finance the provision of those services. They also have duties to promote various matters, including notably the interests of users and effective competition.

2.6. In 1983, under what became known as the duopoly policy, the Government decided that for a period of seven years (1984 to 1991) it would license only one new operator, Mercury Communications Ltd (Mercury), to provide a fixed network. Mercury focused principally on the more profitable areas of business, viz long-distance and international calls and services to large corporate customers. It did not compete directly with BT in providing services to smaller customers but offered services by means of indirect access through BT's local network.

2.7. During the duopoly period companies were licensed under separate legislation to provide broadband cable television (TV) services in specific geographical areas. Some of these companies were a potential source of competition to BT as they were also capable of providing telephony services on their networks, but they were not permitted to do so except as agents for BT or Mercury; very few such opportunities were taken up. BT and Mercury were in turn prevented from using their networks to convey broadcast entertainment services to the home.

2.8. In 1991, following a review, the Government decided to end the duopoly (except in relation to international services) and said that it would consider applications from any company wishing to establish a fixed network in competition with BT and Mercury. Cable companies were permitted to provide voice telephony services but the Government decided to retain the prohibition on BT and Mercury conveying broadcast entertainment services to the home until 2001, subject to possible review in 1998.

Regulation of BT

2.9. The regulation of BT has several facets. The following paragraphs consider two of these, namely BT's relations with its customers and with other operators. Regulation to encourage competition is dealt with in paragraphs 2.27 to 2.29.

2.10. BT's licence includes a range of conditions designed to protect the interests of consumers. First, there is an overall price cap covering exchange line rentals and connections; local, national and international calls; directory enquiries and operator services; and `freephone' and `local rate' charges. Prices for this basket of services taken as a whole, which generate about 60 per cent of BT's total revenue, are currently not allowed to rise by more than the retail price index (RPI) -7.5 per cent a year and no single price (except exchange line rentals) can increase by more than the RPI. The price cap is due for review in July 1997; the DGT told us that he would be putting proposals to BT early in 1996 for the price control arrangements to cover the subsequent period.

2.11. BT is prohibited from exercising undue preference or undue discrimination. This constrains its ability to charge different customers different prices. The DGT may issue guidelines specifying the degrees of differential pricing which are permitted. BT has to adhere to the published terms and conditions on which it offers services. It is obliged to provide services to all persons in the UK who reasonably request them: this is referred to as the Universal Service Obligation (USO).

2.12. Turning to BT's relations with other operators, in practice the latter have only been able to offer voice telephony in the UK market by interconnecting their networks directly or indirectly with that of BT, which is required to enter into agreements with the other operators for this purpose. Substantial growth in interconnection began in 1991 with the ending of the duopoly.

2.13. Condition 13 of BT's licence provides that where BT and another operator are unable to agree any terms and conditions of interconnection, including the charges payable, the DGT may-on request by either operator-determine them. The condition also provides, however, that BT should be able to recover its costs, including the fully allocated costs attributable to the services concerned, the relevant overheads and a reasonable rate of return on capital.

2.14. In March 1994 the DGT issued a consultation document seeking views on how the interconnection regime could best be adapted to meet the needs of the developing multi-operator environment. As a result five new conditions were added to BT's licence on 31 March 1995 aimed at easing the negotiation of interconnection agreements. These provide, *inter alia*, for the drawing up by the DGT of a list of standard interconnection services and the prices for them (known as the `ready reckoner'). BT is also required to publish separate financial statements for its network and retail businesses (BT Network and BT Retail respectively). BT Retail and other licensed operators (OLOs) purchase network services from BT Network, paying the same component prices. (See Appendix 6.3 for a summary of the regulatory accounting arrangements affecting BT.)

Competition

2.15. Following the 1991 liberalization a substantial number of companies are now licensed to provide fixed-line telephony. These include both cable franchisees and other operators with national licences. Most of the leading cable operators are owned or part-owned by large, often overseas-based, companies (see Appendix 4.1).

2.16. Since 1991 the growth of cable networks has greatly increased. By July 1995 the cables had passed some 5 million homes, nearly a quarter of the UK total of 22 million homes. Penetration of cable telephony has also grown rapidly with around 19 per cent of homes passed taking the service: in absolute terms around 1 million homes. (Telephony is not yet available to all homes where cable TV is on offer: the number of homes taking cable telephony as a proportion of homes to which the service is available is about 24 per cent.) Most cable companies now obtain about half of their revenue from telephony and half from TV services. With penetration on a rising trend and cable networks spreading rapidly-around 14 million homes are forecast to be passed by the year 2000-cable's share of the telephone access market can be expected to increase considerably.

2.17. In addition to the cable companies a number of other operators have been licensed to provide telephony. Prominent among these are:

- Energis Communications Limited (Energis), a subsidiary of the National Grid, which is building a network using the Grid's ducts and pylons;

- MFS Communications Limited (MFS) and City of London Telecommunications Limited (COLT), which have begun providing services to high-volume customers in the City of London and are now extending to other urban centres;

- AT&T (UK) Limited (AT&T), whose parent company is by far the largest carrier of long-distance and international calls in the USA, which is expected to launch a UK service shortly aimed at large multinational companies; and

- Ionica L3 Limited (Ionica), a new company which is building a network using radio technology, starting in East Anglia and with the intention of moving on to other regions.

Ionica will offer direct access to homes and smaller business premises. The other new licensees and Mercury provide direct access mainly to business premises with a high volume of traffic but offer indirect access to lower-volume users over BT's lines. Energis, MFS and COLT are already serving customers while AT&T and Ionica are expected to launch services shortly.

2.18. As at March 1995 BT had 95 per cent of all direct fixed connections in the UK, down from 99 per cent in 1992, with little difference in share between residential and business customers. Its share of calls (measured by retail revenues) was 87 per cent in 1993/94, but with a higher share of residential than business calls (94 per cent and 79 per cent respectively).

2.19. BT's market shares can be expected to fall as competitors step up their activities. Indeed there are some areas of the market, targeted by competitors, where its share has already declined substantially. Apart from the rate of penetration achieved by cable companies (see paragraph 2.16), BT drew our attention to the fact that in the City of London its competitors had gained 43 per cent of business voice revenue and, within that, 61 per cent of business international calls.

2.20. The market is growing in size so this need not imply a reduction in BT's volume of business. The company reported, however, that in the year to September 1995 the number of its residential connections fell by 0.2 per cent-the first year-on-year decline-although business

connections and call volumes continued to increase. BT has also recently experienced declining real revenue from calls (see paragraph 4.14), reflecting the impact of the price cap partially offset by volume increases.

Obstacles to competition

2.21. Notwithstanding the emergence of a number of competitors, it seems clear that overall BT retains a strong position in the market. In part this reflects the characteristics of the telecommunication industry.

2.22. First, wire-based networks require substantial investments which cannot be salvaged if the operator leaves the industry (unless another party is willing to pay to take them over). As a result entry may be deterred: established suppliers, which have already incurred these sunk costs, are likely to respond to entry by cutting prices. This barrier is particularly important where excess capacity exists or would result from entry. Excess capacity is not a major feature of the main national links but it is an inevitable characteristic of access connections, especially the `local loop' serving residential and small business customers. An entrant has to duplicate the network of the established supplier and the available revenue is then split between them. This barrier can, however, be substantially reduced by taking advantage of the economies of scope available from combining the supply of telephony and TV services.

2.23. Apart from Mercury, most of the entry which has occurred in the UK market (or can be predicted with some confidence) takes the following forms:

(a) access to business sites with many lines and a high ratio of revenue earned to connection costs (Energis, MFS, COLT);

(b) use of radio technology where sunk costs are much lower and the problem of excess capacity does not arise (Ionica); and

(c) cable, where companies are granted sole franchises within defined areas and the exclusive right to combine telephony and TV services.

2.24. Secondly, the fact that BT has 95 per cent of all connections means that entrants require interconnection with BT's network. In the absence of regulation the potential would exist for BT to frustrate or impede entry by refusing or delaying interconnection, offering it on unfavourable terms, or providing a poor quality of service. BT also controls other services essential to entrants, eg the production of telephone directories, and in practice sets many of the technical standards operating in the industry.

2.25. Thirdly, there are deterrents to customers switching suppliers. Besides the need to change telephone number if portability is not available, these include the lack of knowledge about suppliers other than BT (which benefits from its universal recognition and presence in all parts of the market); the nuisance and potential damage from having new installations; and the time needed to deal with administrative aspects.

2.26. BT for its part faces certain disadvantages *vis-à-vis* other operators. Its network is, in part, older than that of other operators, all of which entered the market within the last ten years, and hence BT may incur extra costs in upgrading its network to offer new services. Certain features of the regulatory regime-besides those designed to protect entrants-place burdens or restrictions on BT, for example the USO and the capping of BT's line rental charges, which had been held down under public ownership for social reasons. BT argues that the latter constraint, which the DGT has

announced he intends to lift, effectively obliges BT to charge more for calls than it otherwise would, making it vulnerable to competitors undercutting its call rates.

Regulation to encourage competition

2.27. The Government and successive DGTs have sought to encourage competition as the best way of promoting economic efficiency and the interests of consumers. They have done so both by giving specific assistance to BT's competitors and by preventing anti-competitive behaviour by BT.

2.28. The principal examples of specific entry assistance have been the exclusive rights granted to Mercury in the duopoly period (see paragraph 2.6); the exclusive rights given to cable companies to combine telephony and TV (see paragraphs 2.7 and 2.16); and the DGT's waiver of payments (known as `Access Deficit Contributions') which OLOs were required to make to BT to contribute towards the losses which it incurred on line rentals.

2.29. Conditions in BT's licence include the following requirements which may be regarded as designed to prevent anti-competitive behaviour:

- BT must trade from national, published price lists (with limited freedom to give volume discounts);

- discounted prices on BT's main network services must be at or above fully allocated costs unless the DGT specifically agrees otherwise;

- BT must provide interconnection on a basis that does not discriminate between itself and OLOs;

- interconnection includes other services such as access to 999 operators;

- BT must also co-operate with OLOs in the provision of directory information;

- BT must produce separate accounts for each of its businesses and must not unfairly cross-subsidize any business;

- BT must provide private circuits to other operators; and

- BT must provide NP subject to the provisions of the relevant licence condition.

Portability

2.30. The main elements in the UK's telecommunication networks are:

(a) access links which connect customers to a switch or exchange;

(b) the exchanges themselves which route calls;

(c) transmission links between exchanges; and

(d) computer support systems which manage the network and its maintenance and provide customer support.

BT's network has two tiers of exchanges: local exchanges, of which there are nearly 7,600; and trunk exchanges, 63 in number. Other operators' networks are much smaller and generally have a single tier of exchanges.

2.31. Telephone numbers are used as the means of routeing calls through these networks. So, for example, if a customer dials the number 01273 345678 from another part of the country, the caller's local exchange would recognize from the first five digits that the call was for another exchange and send the call on to its parent trunk exchange. That exchange would `look up' a table which identifies those five digits as being in a certain area and route the call on to the trunk exchange for that area. That exchange would additionally examine the next two digits to identify the destination local exchange and route the call accordingly. Finally the local exchange would additionally examine the last four digits, identify the called party and complete the call. Figure 5.1 illustrates how a typical trunk call on the BT network would be routed, while Figure 5.2 illustrates a typical call from a BT customer to a cable company customer.

2.32. At privatization BT was left in control of the allocation of telephone numbers. With the arrival of other operators the DGT, through the introduction of a new condition to BT's licence (see paragraph 2.36), formally assumed responsibility in 1991 for determining the UK numbering scheme and for the allocation of blocks of numbers to each operator for the use of its customers.

2.33. Interconnect calls such as that illustrated in Figure 5.2 necessitate a payment between operators. Typically the operator supplying the service to the calling customer collects the revenue for the call and passes a portion on to the interconnecting operator (or operators) who complete the call. The level of these charges will be settled by negotiation between the operators or, in the absence of agreement, following a determination by the DGT. The basic principle is that any operator which incurs a cost in completing a call should be fully reimbursed for that cost, plus overheads, and make a reasonable rate of return on its capital. The point at which interconnection is made-a factor which influences the incidence of costs-is chosen by the originating operator in line with the network principles agreed between the originating and interconnecting operators. BT has chosen to interconnect at the level of the trunk exchanges, rather than the local exchanges, on grounds of cost.

2.34. NP is a facility which enables customers to retain their numbers when changing operators and thus permits callers to continue making calls to those customers using the same numbers. Several types of portability need to be recognized:

(a) *Portability of geographic numbers*. Geographic numbers (so called because they identify a particular geographical area) are ordinary telephone numbers of subscribers located in a specific area of an operator's network. Portability of geographic numbers, in its basic form, refers to the ability of a customer to retain his or her number when changing operator while remaining at the same address. Changes of address, whether at the same time as porting or subsequently, are referred to in this report as simultaneous and subsequent mobility respectively. A subscriber who has ported his number may port again if he changes operator a second or third time. This is referred to as subsequent porting. Geographic numbers include blocks of numbers allocated to a single, normally business, customer at one or more premises in a particular exchange area. The industry is exploring methods by which such blocks of numbers could be ported if the customer changes operator.

(b) *Portability of non-geographic numbers*. These are numbers not related to a particular geographic area. Examples are freephone numbers in the 0500 and 0800 ranges, premium rate numbers such as 0891, local rate numbers such as 0345 which provide national calls at the rates normally charged for local calls, numbers for mobile telephones, and personal numbers allocated to an individual rather than a fixed telephone instrument.

2.35. Our terms of reference cover the portability of geographic numbers, including number blocks which have been allocated to a particular customer, and of certain categories of non-geographic numbers. They do not cover the porting of numbers for mobile telephones because these fall outside the definition of `Directly Provided Telecommunication Service' in the terms of reference (see Appendix 1.1, paragraph 1(5)).

Background to the reference

2.36. Following the duopoly review (see paragraph 2.8) a new condition (Condition 34B) dealing with numbering in general and NP in particular was added to BT's licence in September 1991 (see Appendix 3.3 for relevant extract). The condition gives the DGT power to direct BT to provide portability of geographic numbers to another operator within a specified geographical area if three pre-conditions are satisfied:

(a) that it is technically feasible for portability to be provided by BT throughout the specified area;

(b) that the DGT has carried out a cost-benefit analysis indicating that in the geographical areas where portability is expected to be provided the benefits outweigh the likely costs (when carrying out this analysis the DGT must have consulted BT and other relevant operators and he must make the results available to them); and

(c) that any operator to whom BT is directed to provide portability is willing to enter into an agreement with BT to provide reciprocal portability, and does so.

2.37. In December 1992 the DGT commissioned National Economic Research Associates (NERA) to carry out a cost-benefit analysis. Notwithstanding the references in Condition 34B to `geographical areas', the study covered the UK as a whole and the subsequent debate proceeded on that footing. We in our inquiry have also examined the issues on a UK-wide basis.

2.38. NERA investigated the costs and benefits of several different technical methods of providing portability. It identified three categories of benefits:

(a) *Type 1 benefits*, which accrue to the customers who port their numbers. These include savings from not having to change number; from switching to lower cost operators; and from the convenience of dealing with only one operator (at present some customers who do not wish to change number use BT lines for incoming calls and another operator for outgoing calls).

(b) *Type 2 benefits*, which accrue to all UK telecommunication customers. These arise from efficiency improvements and associated price reductions which result from increased competition in the telephony market due to the availability of NP.

(c) *Type 3 benefits*, by which NERA meant other savings which accrue generally-but mainly to calling subscribers-as a result of there being fewer number changes. These include fewer misdialled calls and fewer calls to directory enquiries.

2.39. NERA estimated that over the period 1995/96 to 2004/05 Type 1 benefits could be valued at around £550 million, Type 2 benefits at £1,280 million and Type 3 at around £20 million (1993 prices). For every technical solution examined but one, the total value of these benefits substantially exceeded the expected costs of providing NP.

2.40. In August 1993 the DGT issued a note entitled *Sharing the costs of number portability* drawing on NERA's emerging findings. Although Condition 34B.15 allowed BT to recover the reasonable costs associated with allocating numbers and routeing calls to the other operator, the DGT's note stated that an efficient allocation of resources might be achieved by making each operator responsible for its own set-up costs, while extra transmission costs could either be borne by the operator incurring them or be split on a market share basis (see paragraph 6.2).

2.41. In a press release in January 1994 accompanying publication of NERA's report the DGT said that, in the light of the findings, he intended to use his powers under BT's licence to bring about the early introduction of NP. An industry committee, the Network Interoperability Consultative Committee (NICC), was charged with drawing up a technical standard for an interface which would enable operators to transfer numbers to each other. Its report was published in August 1994.

2.42. Negotiations took place between BT and Videotron, one of the cable companies, for the reciprocal provision of portability in Videotron's franchise areas. The two companies were unable to reach agreement on the financial terms on which portability would be provided and on 22 August 1994 the DGT formally directed BT to provide NP to Videotron from 7 October 1994. By that date the network arrangements were in place for this to be done but the parties had still not agreed on the financial terms.

2.43. On 25 November 1994 the DGT wrote to BT expressing concern about this situation and proposing a modification to Condition 34B of BT's licence which would enable him to determine the commercial terms of an agreement to provide NP if the parties could not agree. Following further exchanges the DGT issued a draft modification to BT's licence for formal consultation on 22 February 1995. The key elements of this draft, which is set out at Appendix 3.4, were as follows:

(a) BT should bear the costs incurred in modifying its networks and systems in order to be able to provide the facility of NP (system set-up costs);

(b) BT should be able to recover from the other operator the costs of adjusting its switches and administrative records in order to enable a particular customer to port his or her number when transferring to that operator (per line set-up costs);

(c) the additional costs involved in BT's network in routeing a call to a ported number should be shared between operators `as appropriate' (conveyance costs);

(d) the DGT would be able to determine both the charges to be made between operators, and the costs on which they were based, on the request of either party to negotiations for the provision of NP; and

(e) the scope of the licence condition would be widened to cover certain categories of non-geographic numbers.

2.44. Despite further consultations BT found the DGT's proposals unacceptable, although in a letter of 6 April 1995 it offered to base its charges for additional conveyance costs on long-run incremental rather than fully allocated costs, with the generality of fixed and common costs being spread across BT's other services.

2.45. As a result of his inability to reach agreement with BT on a licence modification, the DGT made the reference to us initiating the present inquiry.

Technical solutions

2.46. If a number has been ported, the dialled digits no longer contain all the necessary information for call routeing and additional information must therefore be supplied at some point during the call set-up process. In principle this can be done at the originating local exchange, at one of the trunk exchanges used for long-distance calls, or at the destination local exchange. Each of these cases gives rise to different technical challenges and introduces different cost elements: in particular the balance may vary between fixed costs; costs which arise when a subscriber ports a number and thus vary with the extent of porting; and costs which are incurred by calls to all numbers, whether ported or not. A further key issue arising in the introduction of NP is the migration path between technical solutions.

2.47. The DGT had asked the NICC (see paragraph 2.41) to identify both a short-term solution which could be introduced as soon as possible and a long-term solution. The NICC's August 1994 report was concerned only with the former. Its recommendation, for a solution called `data decode', was accepted by the DGT and was the basis of the trials which have subsequently been conducted by BT and certain cable companies.

2.48. The data decode solution establishes a procedure by which information is added to permit calls to be made to ported numbers. The information takes the form of a six-digit prefix, beginning with the digit 5, which an exchange within the donor operator's network must insert before the dialled number. The initial digit 5 indicates that the subsequent dialled number has been ported and the remaining five digits of the prefix identify the particular exchange to which it has been ported. The recipient operator then decodes the remaining information in order to complete the call.

2.49. The solution recommended by the NICC does not prescribe the point in the call set-up process at which an operator should insert the prefix. As far as BT is concerned, however, to avoid a fundamental change in its network routeing procedures the prefix has to be added at the destination local exchange, which is where information about the called party is housed. This can be done in either of two ways, set out below. Besides these two variants on data decode there is also the longer-term possibility of the information on ported numbers being held in databases located outside the switch infrastructure, a so-called `intelligent network' (IN) approach. Paragraphs 2.51 to 2.55 describe these three solutions.

2.50. It is necessary to note first, however, that a more primitive option is available in the form of the existing `call forwarding' service which BT offers to subscribers wishing to have incoming calls forwarded to another BT number. The negotiations between BT and Videotron in 1994 were based on this solution. It has a number of limitations, however, and since data decode is now expected to be available for implementation early in 1996, the call forwarding solution is no longer being seriously considered.

Tromboning

2.51. In this solution the physical call path is established as far as the destination local exchange, ie the exchange to which the called party was connected before porting his or her number. This exchange recognizes that the number has been ported and inserts the six-digit prefix (see paragraph 2.48). Because BT interconnects with OLOs at trunk exchange level (see paragraph 2.33), the call then has to be routed from the local exchange to its trunk exchange for hand-over to the recipient operator. For calls which have been routed in from the trunk exchange in the first place there is thus a doubling-back or `tromboning', creating an additional loop in the call path which continues for the duration of the call (see Figure 5.3).

2.52. For calls originating on the same local exchange, however, NP will not require tromboning, only routeing to the trunk exchange and thence to the point of interconnection. This is the same routeing as would be necessary if the called party had transferred to a new operator and been given a new number. There is a third category of call, namely those originating in a local exchange adjacent to that to which the called party was originally connected. NP does require additional routeing in this case although it does not take the form of tromboning. Figure 5.4 illustrates the consequences of NP for these three categories of call. BT told us that a typical split between the three categories was 48 per cent trunk calls and 26 per cent for each type of local exchange call.

2.53. The tromboning phenomenon is less likely in the short term to affect OLOs providing portability because they either interconnect at their local exchanges or have a single-tier network, with no distinction between trunk and local exchanges. In the longer term this situation may change if these operators introduce two tiers of exchanges.

Call drop-back

2.54. Call drop-back is an improved form of data decode which eliminates the need for the tromboning of trunk calls. As with tromboning, the recognition of ported numbers and insertion of the 5xxxxx prefix is carried out at the donor operator's destination local exchange. However, during the call set-up phase the signalling system passes this information back to the trunk exchange so that the call path to the recipient operator can be established directly from the trunk exchange. The donor operator's terminating local exchange then takes no further part in the call. This is illustrated in Figure 5.5. Call drop-back does not affect calls originating on the same or adjacent local exchanges (see paragraph 2.52).

IN solutions

2.55. Under a future IN solution the database, held outside the switches, would be consulted at some point during call set-up and supply the switches with the information necessary to complete the call. Unless a form of drop-back signalling were introduced the database would have to be looked up for all calls, not just calls to ported numbers. IN solutions therefore differ from tromboning and call drop-back in introducing additional costs for calls to numbers which have not been ported. The extent of these costs depends on where the database reference is made-at the terminating local exchange, terminating trunk exchange or originating local exchange-but, as described in paragraph 5.28, there are disadvantages to each of these possibilities. The advantage of INs is that they would be capable of supporting a wide range of other services as well as NP. The consensus view is that IN structures cannot be commercially justified solely as the means of providing NP for geographic numbers but will in due course be the preferred means of providing such portability alongside other services.

Migration path between solutions

2.56. The transition between different solutions depends both on the time-scales on which new technology can be introduced and on the volume of ported numbers. On the basis of submissions made to the MMC, a possible timetable might be as follows:

- tromboning from early 1996;

- call drop-back replacing tromboning before the end of 1997;

- IN solutions with database reference at appropriate points in the network, potentially being introduced by 1998/99; and

- IN solutions with database reference at the originating exchange available some time after 2000.

This timetable might vary from operator to operator.

Implementing different types of portability

2.57. The data decode solution has been designed specifically for the portability of single geographic numbers at a fixed location. Nonetheless, both data decode and IN solutions-or some combination of the two-could also be applied to other forms of portability. The relative merits of the technical options may, however, be different in these circumstances. In particular it has been argued that:

- data decode will only be justified for number block portability once call drop-back is available (the porting of number blocks may generate a high volume of demand and hence a high level of the additional conveyance required by the tromboning solution);

- portability of complete blocks of 10,000 numbers may, however, be achievable without the use of local exchange data decode (in this case the changes in routeing procedures could be made at the trunk exchange by reassigning the full 10,000 number block); and

- IN solutions could provide the best approach to portability for certain non-geographic services such as freephone (these services already employ a form of IN technology, so it may make sense to use this same IN platform for the provision of portability).

Costs of different solutions

2.58. The extent of the costs which would arise from the introduction of NP has been a matter of dispute among the parties giving evidence to us. The information in this section concerns BT's costs and is based on BT's evidence, while the views of the DGT and certain cable companies are summarized later in the chapter (see paragraphs 2.81 to 2.83, 2.104 and 2.105).

Costs of the tromboning solution

2.59. BT estimated its *system set-up* costs for implementing the tromboning solution at £35 million (see Table 6.2 for breakdown). The figure is relatively firm as much of the expenditure has already been incurred. There has been no controversy about this element because all operators expect to bear their own system set-up costs.

2.60. BT's estimates of its *per line set-up* costs have varied considerably:

(a) In February 1995 BT gave the Office of Telecommunications (OFTEL) a first estimate of £3.

(b) In May 1995, after the reference to us was made, BT quoted a figure of £36.61 to the cable companies with which it was negotiating.

(c) In June 1995 the estimate was reduced to £24.60 in BT's main submission to us.

(d) In August 1995 BT told us that it had revised its estimate down further to an average of £18 and saw scope for an additional reduction to an average of £12.

(e) In September 1995 BT told us that it was prepared to make a firm commitment to introduce the average rate of £12 from April 1996. This average was made up of £8 for digital exchanges and £32 for BT's remaining analogue (TXE4) exchanges which require more work. If the DGT agreed, BT was willing to `de-average' the cost so that from April 1996 most charges would be at the £8 rate. BT said that it intended to phase out the TXE4 exchanges by the end of September 1997 but this was not a firm commitment.

2.61. In explanation of these changes BT told us that the initial £3 was a very early estimate which reflected the future position with all systems development in place and the phasing out of TXE4 exchanges completed, and excluded overheads and a profit mark-up. It added that it had probably been mistaken to quote such an estimate. The £36.61 was an estimate of BT's direct pay costs for the various set-up tasks-based on an average of one hour's work-plus an allowance for overheads and profit consistent with the rates which it had already submitted to OFTEL for data amendments, an existing service. The subsequent fall to £24.60 reflected the application of reduced overhead rates and a lower profit mark-up consequent on a recent determination by the DGT of other, comparable charges. (See paragraphs 6.10 and 6.11 for more detail on this estimate.)

2.62. At a hearing with us in July 1995 BT told us that it expected that its costs would fall fairly quickly as NP was implemented but there was as yet no field experience on which to base estimates, nor had procedures yet been agreed with OLOs. The August 1995 estimate of £18 reflected a reduction from one hour to 45 minutes in the labour time required, based on what had been learnt in the trials with cable companies then taking place; while the further envisaged reduction to £12 reflected a labour time of 30 minutes as a result of some automation being introduced (an automatic link between the customer service system and the operational management centre). BT also mentioned that it was examining the feasibility of another element of automation, real-time routeing, which if implemented would reduce the cost further.

2.63. The calculation of *additional conveyance* costs is a more complex matter. The extent of the additional conveyance depends on both the type of call (see paragraph 2.52) and on the nature of the comparison. BT based its calculations on a comparison between calls to a customer who has changed to a new operator and been given a new number, and calls to a customer who has changed operator but ported his or her number. The other possibility is to compare calls to a customer who is still on the BT network with calls to a customer who has both changed operator and ported his or her number. BT said that it considered the former basis to be appropriate as it isolated the effects of NP itself from other factors. NYNEX CableComms Limited (NYNEX), on behalf of a group of cable companies, argued that the latter basis was necessary to give the full picture. The DGT took the same view but added that in principle the choice of basis depended on whether the customer concerned would, or would not, have switched operator even if portability was not available. Figure 5.4 illustrates the differences between the two approaches. See also paragraphs 6.19 to 6.23, 6.37, 6.38 and 6.43 and Appendices 6.1 and 6.2.

2.64. In September 1994, during its negotiations with Videotron (see paragraph 2.42), BT quoted 1.23p a minute as its estimated charge for additional conveyance. This rate was subsequently used in the trials of the tromboning solution conducted between BT and certain cable companies during 1995 and is incorporated in the standard contract which BT has prepared for the full commercial introduction of NP early in 1996, with the proviso that the rate will be adjusted retrospectively in line with the arrangements which result from our inquiry. BT told us that the 1.23p a minute was based on the ready reckoner rate, for use in interconnection, for a `single tandem segment', a standard combination of network components which BT felt equated most

closely to the use of the network involved in tromboning and was therefore a reasonable initial basis for estimating costs. The ready reckoner rate was based on actual information for 1991/92.

2.65. In June 1995 BT told us that the average cost of additional conveyance in 1995/96, based on broadly the same method of calculation, was 0.7p a minute and that the cost was falling by 10 per cent a year. In August 1995, having reviewed its assumptions and taken account of more recent interconnection information which had become available, BT revised its estimate down to 0.54p a minute and the rate of reduction in costs was revised to 7 per cent a year (see paragraphs 6.26 to 6.29 and Appendix 6.1 for further details).

2.66. BT said that it expected to recover from OLOs the full cost of additional conveyance on its network. It envisaged this being done by collecting information on the actual number of minutes of ported calls and the time of day/week and then applying the standard interconnection rates for the network components used, ie to treat NP conveyance costs as simply a form of interconnection. In accordance with normal practice, charges would be based initially on estimates and reviewed when actual data were available.

Costs of call drop-back

2.67. BT told us that the additional *system set-up* costs of a move to call drop-back should be around £2 million, while per line set-up costs would be the same as for the tromboning solution. It assessed the additional conveyance costs for ported calls under call drop-back at 0.2p a minute for 1995/96, falling at 7 per cent a year and thus down to 0.18p a minute by 1997/98 when call drop-back is due to be introduced. That is less than 40 per cent of the equivalent cost of 0.46p a minute in that year under the tromboning solution (0.54p rolled forward for two years with cost reduction at 7 per cent a year). Table 2 of Appendix 6.1 shows the details of BT's calculations.

Total costs of introducing NP

2.68. In order to estimate the total costs to BT of introducing NP it is necessary to make assumptions about the number of lines ported and (for conveyance costs) the number of call minutes arising on those lines. BT provided us with a range of such assumptions and Chapter 6 sets out some resulting cost estimates (see paragraphs 6.15, 6.32 and Table 6.6). Those estimates, however, assume that porting begins on a substantial scale in 1995/96, which is now unrealistic. Table 2.1, which is based on an updated estimate from BT which assumes that porting begins in April 1996, gives an illustration of BT's total costs from the introduction of NP if 3.9 million lines are ported over the four years 1996/97 to 1999/2000 and some 67 billion call minutes arise. It is assumed that call drop-back is implemented in November 1997.

TABLE 2.1 **Possible costs for BT of introducing portability, 1996/97 to 1999/2000**

	£m
System set-up	
- tromboning	35
- call drop-back	2
	37
Per line set-up	
- 3.9 million at £8 each	31
Additional conveyance	152
Total	220

Source: MMC, based on information from BT.

Per line set-up costs would be higher than this to the extent that average costs were above £8 in the early part of the period but this factor would probably be outweighed by lower costs later in the period (see paragraphs 2.60 to 2.62). The calculation of conveyance costs is sensitive to the number of call minutes arising during the period of the tromboning solution, when BT estimates that its costs will be much higher than under call drop-back. On the illustration given above, annual costs-comprising per line set-up and additional conveyance-would quickly rise to a peak of some £60 million in 1997/98 and fall to around £40 million in the following two years. Given the many uncertainties, the figures quoted in this paragraph should be regarded as indicating no more than broad orders of magnitude.

Costs of IN

2.69. At this stage it is uncertain what services would be supported on an IN so the costs attributable to any particular application, such as portability, are also unclear. BT indicated a range of set-up costs lying between £500 million and £1 billion for a complete IN, though much of this was general network investment which could also be used to provide other advanced services. BT assumed that per line set-up costs would be as for the data decode solutions but made no forecast of additional conveyance.

Costs of other types of portability

2.70. BT told us that it was studying the implications of portability for number blocks. Initial indications were that for large and medium-sized blocks per line set-up costs would need to be calculated project by project. For small blocks per line set-up costs would be on the same basis as for single numbers, though possibly with some reduction for economies of scale. There would be no conveyance costs if whole blocks of 10,000 numbers were ported because control of the block would pass to another operator. For smaller sizes of block BT said that it would expect to recover conveyance costs in the same way as for single numbers.

2.71. Discussions in the industry about the portability of non-geographic numbers are at a relatively early stage and we received no indication from either BT or other parties as to what costs this type of portability would entail.

Summary of views expressed

2.72. In the course of our inquiry we had extensive submissions from BT and the DGT (see Chapters 8 and 9) and held two hearings with each of them; we also received much evidence from third parties, notably other providers of telecommunication services and representatives of users. The essence of the matter referred to us by the DGT was that portability was not being provided by BT (see paragraph 2.3). Much of the material put to us, however, centred on the question how the costs caused by the implementation of portability should be borne. This issue was evidently at the heart of the disagreement between BT and Videotron and we therefore need to examine it in some detail. We first summarize the views put to us by the main protagonists in our inquiry and by other parties which made submissions to us.

Views of the DGT

2.73. The DGT said that the implementation of NP was a matter of the first importance: its absence was a major constraint on the development of competition and an obstacle to the realization of the benefits to the public interest that increased competition would generate. Competitive disciplines on BT in the local loop were extremely weak, though there was empirical evidence that in the last two years the emergence of competition in that part of the market (due to the growing pressure of the cable operators) had produced benefits for all residential consumers. The need to change number when changing supplier was a powerful disincentive to users switching their custom from BT, whether they were businesses or residential subscribers. The importance of portability to the growth of competition was borne out by various studies, including NERA's cost-benefit study and a Consumers' Association (CA) survey (see Table 7.1). The DGT submitted that the implementation of portability would bring benefits in the three categories identified by NERA (see paragraph 2.38).

2.74. The DGT recalled that BT had publicly committed itself to the need for portability but commented that BT's commercial interests were not necessarily the same as the public interest. BT could be expected to have a profit incentive to resist or delay the introduction of portability and, failing that, an interest in requiring rival operators to pay high charges for the provision of portability. This would not only raise its rivals' costs but also generate revenue for BT. While the DGT had the power to direct BT to provide portability to other operators, and a limited power to determine what BT's costs were, he considered he was not able, under Condition 34B, to resolve a dispute over who should bear the costs. Experience had shown that the scope for deadlock in negotiations between BT and other operators on the cost issue was such as to jeopardize the introduction of portability generally. Condition 34B was therefore not adequate in present circumstances to bring about the introduction of portability.

2.75. The DGT said that, following his direction to BT in August 1994 to provide portability to Videotron, BT had sought to require Videotron to bear all BT's costs of establishing and maintaining portability including the costs of pre-contractual negotiations with Videotron. In the DGT's view the fact that BT made a proposal on these lines showed the dichotomy between the public interest and BT's interest: BT's offer was not calculated to form the basis of a deal, and if Videotron had accepted it, many of the benefits which could be expected from portability would have been reduced or eliminated. BT had subsequently indicated that it would be prepared to make portability agreements with other operators on less onerous terms: in particular it would be prepared to meet its own system set-up costs. But it did not accept that it should bear the ongoing costs of additional conveyance. (The DGT himself had proposed, in the licence amendment put out for consultation in February 1995, that BT should be able to recover its per line set-up costs although his position on this aspect subsequently changed in the light of the cost estimates which BT produced: see paragraph 2.80.)

2.76. The DGT considered that BT ought to bear a substantial proportion of these conveyance costs for four reasons in particular:

(a) BT had the means to reduce and ultimately eliminate the additional conveyance costs;

(b) its incentive to do so would be weakened if it could pass its costs on;

(c) BT's customers stood to gain most of the benefits of the enhanced competition which the introduction of portability would stimulate; and

(d) BT's ability to recover all its additional conveyance costs might emasculate that enhanced competition, to the detriment of users.

2.77. It was clear, the DGT continued, that there was substantial scope for disagreement between BT and other operators, especially in relation to who should bear additional conveyance costs. As new technical solutions were developed, further scope for disagreement could be expected to emerge.

2.78. The DGT considered it necessary for him to have a residual power to allocate the costs of portability so as to resolve deadlocks in negotiations between BT and other operators. The absence of such power could be perceived to be an indictment of the regulatory regime. BT's competitors were investing heavily in the UK but-not surprisingly given the huge initial investments required to construct a network from scratch-were not at present profitable. To sustain their position and encourage future investments it was important for them to win customers and hence generate cash flow. Continued investment was being made on the basis of expectations about the way in which the regulatory regime would operate to promote competition and address the anti-competitive effect of BT's dominance.

2.79. The DGT submitted that if the MMC answered the two questions in the reference affirmatively (see paragraph 2.170), the appropriate remedy would be to modify Condition 34B of BT's licence so as to give him the power to determine not only the costs of providing portability but also how those costs were to be borne. The modification which he had put to BT before the reference (Appendix 3.4) had proposed that:

- BT would bear its own system set-up costs;

- the DGT would have a power to determine the allocation of conveyance costs in the event of an unresolved dispute between BT and another operator; and

- BT would recover its per line set-up costs.

2.80. Since then, however, BT had proposed a much higher charge for per line set-up than it had previously estimated (£36[1] as opposed to £3). This would fundamentally alter the balance of overall cost allocation in favour of BT and might indicate that BT was responding to the DGT's proposals by reducing system set-up costs (which it would bear) at the expense of higher costs from inefficient manual processes in per line set-up (which it would hope to recover). In these circumstances the DGT believed he should have a power to determine the allocation of per line set-up costs as well as conveyance costs.

2.81. Commenting on the cost implications of different technical solutions, the DGT noted that BT's estimate of its *system set-up* costs for tromboning was a much smaller proportion of the company's turnover than was the case for other operators.

2.82. *Per line set-up* costs, the DGT noted, were a matter of dispute between operators. BT had claimed that several manual processes were involved in its then estimate of £36, whereas other operators had said that the process could be done virtually automatically, with costs of between £3 and £8 for porting a line from an OLO to BT.

2.83. As regards *additional conveyance*, the DGT considered that, because tromboning was an interim solution which would soon be replaced by call drop-back, it was appropriate to calculate costs on a short-run incremental basis. The provision of capacity was the main influence on the cost of both switching and transmission. The DGT recognized that, compared with a call to a competitor's customer who had not ported his or her number, a call to a ported number required additional use of BT's network components. But when compared with the use of BT's network-for both incoming and outgoing calls-before the loss of the porting customer, it was unlikely that BT

[1]Later reduced in BT's evidence to us-see paragraph 2.60.

would be required to install significant extra capacity in the short term. This was because the increased network usage on incoming calls to ported numbers was compensated by the reduced usage for outgoing calls as a result of the loss of the customer. Even if there were some increase in network usage it did not follow that BT's capacity would have to be increased; and even if increases in capacity were needed in some areas, the effect was likely to be only a slight acceleration of BT's investment programme. The position could not be determined until NP was in operation-a further reason for the DGT to be given discretion in relation to cost allocation (see paragraphs 6.37, 6.38, 8.35 and 8.36 for the DGT's approach to calculating BT's additional conveyance costs).

2.84. The DGT said that any extra conveyance would be reflected in the costs of BT's Network business. Incremental costs resulting from the implementation of NP would not be separately identifiable because the level of costs in the absence of portability would not be known. In calculating the standard costs for the use of BT Network components for interconnection purposes, the total component cost would be divided in the normal way by the number of minutes for which the component was used but excluding the number of minutes required to provide additional conveyance for NP. The effect would be to spread the incremental cost of NP conveyance over all calls on BT Network, and hence to distribute it broadly by market share between operators. The impact on the bills of residential customers would be tiny (see paragraph 8.39).

2.85. The DGT told us that if we recommended a licence amendment he would issue his proposals for consultation. He would have to work initially on estimated costs but would expose the basis of BT's calculations to the industry at large so as to establish the appropriate methodology and quantification. Charges would then be recalculated in the light of actual experience in the usual way. He had not so far used his powers to investigate BT's estimates and would only expect to do so in the context of an actual determination. It was possible to obtain detailed information from BT, but it could be difficult for the DGT to assess its accuracy. As the DGT was continually forced to make clear in public, BT's systems did not always allow him to make proper investigations if he felt the need to do so.

2.86. The DGT commended to us six principles which, he argued, should guide decisions on cost allocation:

(a) *cost causation:* it was relevant to identify whose actions caused the costs to be incurred at the margin;

(b) *cost minimization:* those who could affect the size of the costs should face strong incentives to minimize costs;

(c) *distribution of benefits:* cost recovery mechanisms should recognize that those who ported numbers were not the only beneficiaries of NP (the DGT told us, however, that he did not rely on the particular estimates of benefits which NERA had made: the NERA work had been done to comply with the requirement in Condition 34B for a cost-benefit study, and had not been concerned with the allocation of costs);

(d) *effective competition:* cost recovery mechanisms should not weaken the pressure for competition that NP would bring;

(e) *reciprocity and symmetry:* since NP would be reciprocal, cost recovery mechanisms should be symmetrical for each direction in which customers switched operators; and

(f) *practicability:* cost recovery mechanisms should be easy to implement.

The DGT added that the licence modification should not, however, bind him to a rigid cost-allocation framework since that would prevent him from responding to rapidly changing technology and market developments.

Views of BT

2.87. BT maintained that it now faced highly effective and fast-growing competition from a large number of other operators, many of which were subsidiaries of rich and powerful overseas parents. BT had the advantages of its past position in the market and its scale and experience. But BT's competitors in turn had advantages currently denied to BT, such as the ability to target particular customers without wider service obligations; the freedom to exploit BT's price structure; the ability to use low-cost radio technologies or to combine broadcasting and telephony services; and waivers of access deficit contributions. The UK telephony market was one of the most open in the world. BT had few comparable opportunities to compete outside the UK. The likely incremental competitive spur from the introduction of portability was minimal given the effectiveness of existing competition.

2.88. BT also said that there was no doubt that portability would add to the already considerable attraction of the cable companies, whose market shares would increase as a result. But these companies enjoyed healthy gross margins and would experience significant revenue increases even if they paid BT's reasonable costs of providing portability.

2.89. BT agreed that it was in the public interest that portability should be provided and firmly denied that it had resisted or delayed the process. On the contrary, the UK was leading the world in the introduction of NP. Major telecommunication networks like BT's were not designed to provide portability, which necessitated a re-engineering of the network and the alteration of many complex computer systems.

2.90. BT said that it had collaborated with Videotron during the summer of 1994 in developing the necessary technical and operational specifications to permit numbers to be ported in both directions using the call-forwarding method (see paragraph 2.50). It had first offered this solution to Videotron at the standard retail price for the product, and subsequently made an alternative proposal based on the charging principles laid down in its licence condition for interconnection (Condition 13). Videotron had refused to negotiate because the DGT, in his August 1993 press release concerning the NERA study, had suggested a justification for other operators paying less than BT's reasonable costs, which Condition 34B allowed BT to recover.

2.91. Subsequently BT had entered into trials with a number of cable companies to test the tromboning solution. These had been successful and on 2 October 1995 BT had invited other operators to make formal requests to enter into agreement with it for portability to be provided in particular areas. Subject to the carrying out of feasibility studies, other operators could have the facility virtually immediately. BT was confident that on the terms now in prospect OLOs would be eager to take up portability.

2.92. BT also emphasized that it had commissioned from its suppliers the software development needed for it to implement call drop-back as soon as it reasonably could. The earliest time at which the new software could be brought into operation, without disrupting BT's planned schedule of upgrades, was autumn 1997.

2.93. In BT's submission there was no reason for any departure, in relation to portability, from the normal principle of cost recovery. It rejected the DGT's analysis on the following grounds:

(a) The principal beneficiaries of portability were those who ported their numbers and their new telephony suppliers. The NERA study which purported to show that the bulk of the benefits accrued to all UK telecommunication users, most of whom were BT customers, had been discredited and could not form the basis for any decision on charging. (BT's detailed views on the NERA study are set out in Chapters 7 and 9.) BT's price cap already exerted pressure to squeeze out any remaining inefficiencies within BT.

(b) If portability were under-priced, demand would be artificially stimulated, creating unnecessary costs on BT's network. This would cause a misallocation of resources.

(c) The cable companies could afford to pay BT's reasonable costs. They had the commercial options of offering portability free to potential customers and absorbing the costs; charging for it specifically; or increasing the general level of their charges so as to spread the cost among all their customers. If portability was as important as the cable companies claimed, they and/or their customers should be prepared to pay the reasonable costs of providing it. Indeed BT was confident that, if the DGT had not held out the prospect of OLOs getting portability virtually free, the cable companies would have readily accepted it on the terms being offered by BT.

2.94. In response to the argument that if BT could pass on its costs it would have no incentive to reduce them, the company said that it was prepared to make two commitments:

(a) to cut the charge for conveyance from November 1997 in line with the reduction in additional conveyance costs which was forecast to result from the introduction of call drop-back, even if drop-back were not actually implemented by then; and

(b) to cut per line set-up charges to an average of £12 from April 1996, again in line with currently forecast cost reductions but irrespective of whether they were achieved by that date in practice (it would also be willing to de-average the costs as between different types of exchanges, if the DGT agreed, so that the cost for most customers would be only £8).

2.95. BT said that the additional power sought by the DGT was unnecessary. He already had the power to determine BT's reasonable costs. Data for identifying some of these were available in BT's regulatory accounts, while the portability trials in which BT was engaged (see paragraph 2.91) would provide evidence on other cost elements. In any event the usual process would apply whereby charges were initially based on estimates but were reviewed when data on actuals were available, with any necessary adjustments being made retrospectively.

2.96. BT added that the power which the DGT sought was also undesirable. When BT's licence was changed in 1991 the Secretary of State had assured BT, in an agreement to which the DGT was privy, that the new condition would not entitle the then DGT to determine how portability costs were to be borne. The process of regulation was weakened if agreements, which often involved trade-offs between conflicting interests, were selectively ignored later on.

2.97. Moreover BT was concerned at the way the regulatory framework was evolving. As competition had grown, so had the demand for greater regulation and greater discretion for the DGT. The balance between explicit, predictable rules and regulatory discretion had shifted in favour of the latter. If the DGT were given the discretion which he sought, BT would never again have the possibility of recourse to the MMC to resolve a disagreement with the regulator over a proposed licence change affecting portability because the DGT would have an unfettered power.

Views of cable companies

2.98. Four of the leading cable companies-Bell Cablemedia (South East) Limited (Bell Cablemedia), NYNEX, TeleWest Communications PLC (TeleWest) and Videotron-gave joint evidence. They told us that since 1991 the number of homes taking telephony from cable companies had grown rapidly. The introduction of competition in this period had resulted in efficiency improvements by BT. But only competition from cable operators would put pressure on BT to reduce local call rates and rental charges. The fact that BT's latest price reductions were targeted on local calls reflected at least in part cable competition.

2.99. The four companies added, however, that BT still dominated the UK market for telephony services, accounting for nearly 98 per cent of all domestic telephone lines and 95 per cent of the total duration of local calls (both business and domestic). The absence of NP was the most significant impediment to competition in the UK telephone market. Market research by CA showed that 70 per cent of consumers would consider changing operators if they could retain their number. BT actively used the lack of portability to deter its customers from switching.

2.100. The four companies agreed with NERA's categorization of the benefits from portability. Their experience suggested, however, that for some customer types the costs of changing telephone number (and correspondingly the Type 1 benefits from portability) were much higher than NERA's estimates. Without portability there was a significant sub-group of customers for whom there would never be a competitive telecommunication market. But Type 2 benefits were the most important. The increased competition which would result from the removal of barriers to customer migration would stimulate efficiency among all operators, not just BT. There were also significant benefits not identified by NERA, in particular consumer welfare benefits resulting from lower prices and from the greater number of customers moving to the more efficient cable networks.

2.101. The four companies said that BT had not given any detailed information about the cost assumptions on which its price proposals to the DGT and the cable operators had been calculated. In their view BT's proposed prices, which they believed were based on fully allocated historical costs, bore little relationship to the true economic costs to BT of implementing portability. Incremental costing was the appropriate basis for calculating these costs.

2.102. In the four companies' submission, the decision on allocation of costs should aim to minimize costs and maximize benefits. There were trade-offs between the amounts spent on system set-up and per line set-up such that BT would have the incentive to invest optimally only if it bore both categories of cost. Further, if BT were able to pass on conveyance costs it would have both the opportunity and incentive to overstate and actually increase those costs. Thus the broad principle should be that each operator should bear the costs that arose in its own network.

2.103. The four companies argued that if BT's proposals on costs and their allocation prevailed, universal portability would not happen in the residential market in the foreseeable future. The cable companies would not be able to afford to proceed with it. Portability would be introduced only for customers whose traffic volumes made the implementation costs worthwhile, to the detriment of consumer choice. It was essential that the DGT had the power to correct market distortions caused by BT's dominance, such as BT's refusal to offer reasonable terms for the deployment of portability.

2.104. Commenting on cost levels, the four companies put their own *system set-up* costs at between £1 million and £2 million each. The magnitude of *per line set-up* costs depended on the processes used, which in turn reflected the level of investment in system set-up. In particular the use of a real-time routeing device, which enabled the recipient operator remotely to activate the porting operation on the donor operator's switch, was a key factor in reducing costs (see paragraph 2.62). If BT did not use such a device, other operators' costs-particularly in importing numbers from BT-could be very substantially higher because of the potential need for a second visit to the customer's premises.

2.105. These companies estimated the *additional conveyance* costs of tromboning calls across their switches, when called customers had ported their numbers to BT, in the range 0.08p to 0.15p a minute on a long-run incremental cost basis. They agreed with the DGT, however, that the correct basis of calculation was short-run incremental costs, and on this basis they believed the costs would be zero or very small taken overall. Indeed network usage could actually be reduced by the introduction of NP because of the capacity freed by the migration of customers to other operators' networks.

2.106. The four companies stated that they wished to introduce NP at the earliest opportunity if the results of the inquiry made this commercially feasible. They had therefore responded to BT's invitation of 2 October 1995 (see paragraph 2.91) by requesting feasibility studies. BT's processes required a period of four to five months from receipt of such requests to commercial roll-out, which these companies regarded as excessive. They would not, however, be proceeding with the commercial introduction of portability until they had been able to assess the implications of our findings: they regarded the risk of being held to the charges proposed by BT as unacceptably high.

Views of other parties

2.107. The views of other parties who gave evidence are summarized in Chapter 10.

2.108. The other operators generally adopted a similar position to that of the four cable companies whose views are summarized above. It is worth noting the following particular comments, however:

(a) Mercury estimated that the absence of NP had cost it at least £194 million in lost revenue over the last three years. This estimate was based on the assumption that, given portability, Mercury would have carried the incoming calls to its large business customers, as well as their outgoing calls. Mercury said that, just as the DGT's power to determine interconnection charges was necessary for Mercury to compete effectively with BT, so it was essential for him to be able to resolve the issue of portability where BT was in a similarly dominant position.

(b) AT&T commented that portability would give customers access to a range of competitive services offered by new operators. These operators could not continue to invest in creating such services unless they were able to provide them on an equivalent basis to BT. For example, other operators would hesitate to promote freephone services, which were used far less in the UK than the USA, until 0800 numbers were portable.

(c) Energis argued that customers had a right to own their telephone numbers, which should therefore be easily portable, subject to a set-up charge but no per call charges. Its own priorities were different from the cable companies' in that its primary requirements were for portability of number blocks (10,000, 1,000 and 100 sequential numbers) and individual non-geographic numbers (freephone and premium rate).

(d) Ionica saw a risk that without NP a relatively stable duopoly, involving BT and the relevant cable company, could emerge in the residential market in which the aggressive pricing strategies used by the cable companies to gain market share would later be discarded. The introduction of a competitor such as itself, with a different basis for competitive advantage, was necessary to provide a more dynamic and durable form of competition. But for NP to be introduced on a footing in which operators could recover costs from each other would encourage inefficiency and stifle innovation.

(e) MFS said that NP had been technically and economically feasible for some time but BT had resisted its introduction for as long as it could and now sought to place an undue burden of cost on new operators.

2.109. Among representatives of users, the Business Advisory Committee on Telecommunications, which advises the DGT on the interests of small businesses, told us that the cost and inconvenience to users of changing their numbers could be considerable and there was a risk that business would be lost because of incorrect information already in circulation. As long as a switch of operator entailed a change of number this cost and risk had to be set against the potential benefit of switching, with the result that switching was inhibited.

2.110. CA described to us the results of a survey which it had carried out to find out why domestic users had or had not switched from BT to another operator (see paragraphs 10.93 to 10.95). It concluded from the results that the lack of NP was a significant deterrent to switching supplier and was the main barrier to competition in the telecommunication industry. BT had been able in consequence to sustain an overwhelming market share while offering uncompetitive prices and standards of service. CA was therefore sceptical about BT's claim to support NP: BT's interests for the foreseeable future appeared to lie with preventing its introduction.

2.111. CA added that in a competitive market consumers should be able to swap supplier with ease and at minimum cost. BT's position that it should recover its costs from other operators was untenable, and CA supported the DGT's view that the costs of NP should be distributed in proportion to market share. If BT's competitors had to pay for the tromboning of calls, BT would have no incentive to implement technology which would reroute calls more efficiently and BT's inefficiency would be subsidized by its competitors. The DGT should have powers to require a settlement if operators could not agree. The alternative was to allow one company to block developments which were in consumers' interests, which was not acceptable.

2.112. CCTA, the Government Centre for Information Systems, told us that the growing competition between operators was illustrated by the range of tariff structures and differing types of service offered but the absence of portability was preventing the public sector from taking advantage of this. CCTA considered that if the DGT was not given the powers to allow him to settle the portability issue quickly the momentum generated by opening up the telecommunication market might be lost. The commercial interests of operators militated against the industry itself deciding the terms of the agreement, whereas the DGT was independent and far better placed to ensure that portability was introduced in a way that encouraged competition.

2.113. The Telecommunications Managers Association urged that any further delay in introducing NP should be avoided. It wanted to see NP available as a service from all operators, not just BT: when that was achieved, each operator should bear its own costs. Meanwhile it could not see a common approach to the issue of cost allocation emerging from the complexities of the market. The only solution was to allow the regulator to make a determination case by case in bilateral disputes. The impetus which the early introduction of NP would give to competition outweighed any disadvantage which might accrue to those customers who could not make use of the facility yet would have to bear the costs.

2.114. The Telecommunications Users' Association (TUA) said that it believed NP was essential for fair and independent treatment of all operators and that the costs must not inhibit the process. There was a high demand for NP among the TUA's members but the Association thought consumers would generally be unwilling to pay a one-off charge to port their numbers, though they might be more likely to do so if it was part of the overall package offered by a new operator. If BT incurred increased conveyance costs it should be allowed to charge them to recipient operators. The TUA wanted full transparency of costs and charges but if this were not possible the DGT had to be able to satisfy himself about the charging mechanism.

Interpretation of BT's licence

2.115. Before analysing the issues raised in the evidence of the DGT, BT and others it is necessary to consider the scope of the DGT's existing powers under BT's licence and why he considered it necessary to make the reference to us. The relevant text is set out in Appendix 3.3.

2.116. Condition 34B.13 of BT's licence begins: `A direction or determination under this licence will not determine how the costs of Portability are to be borne and a direction under paragraph 34B.11 [ie that BT shall provide Portability] will not be made in respect of a geographical area unless: ….' As described in paragraph 2.36, there follow three requirements: that it is technically feasible for portability to be provided; that a cost-benefit analysis carried out by the DGT shall have shown that the gains from introducing portability outweigh the likely costs; and that OLOs are willing to provide reciprocal portability to BT.

2.117. The extract quoted in the preceding paragraph is ambiguous, since it is not clear whether the opening statement (that a direction or determination will not determine how the costs of portability are to be borne) is absolute or contingent on the three requirements which follow. On the latter interpretation the DGT could already have the power to determine how the costs of portability are to be borne provided the other conditions for introducing it are met. Legal advisers to the cable companies said that this was indeed their view of the matter.

2.118. The DGT told us that he considered the condition could not bear this interpretation. This was partly because of statements elsewhere in the condition, in particular the statement in paragraph 34B.15 that `nothing in this Condition shall preclude the Licensee from recovering from the operator of a Relevant System the reasonable costs associated with allocating Numbers to and routeing calls to that System'. But the DGT's interpretation also depended partly on his knowledge of the outcome of the 1991 duopoly review as set out in a letter from the Secretary of State to BT's Chairman which stated, *inter alia*, that `The [new] condition [ie what became Condition 34B] will not empower the Director General to determine how the costs of portability are to be borne' (see paragraphs 3.35 and 8.10).

2.119. This letter is not in the public domain. It is clearly undesirable that the interpretation of a provision in BT's licence should depend partly on an unpublished document the contents of which were not known to other participants in the industry. Nevertheless we accept that it was reasonable for the DGT to proceed on the basis that he did not have the power to allocate portability costs.

2.120. A more fundamental argument was put to us by Mr Ian Ellison, a telecommunication consultant and non-executive director of a cable company. Mr Ellison, who as a DTI official had been responsible for work on the Act and on drafting the initial licence subsequently granted to BT, argued that portability involved no more than the supply of a type or description of telecommunication services. BT had been obliged under Condition 1 of its licence to provide these services on request at all times since it became practicable to provide them, but had simply refused to do so. This was an abuse of BT's dominant position. Because the refusal to supply was a contravention of the conditions of BT's licence, the DGT had statutory duties under section 16 of the Act to make compliance orders. Instead he had included in Condition 34B additional provisions which were redundant, over-complex and ineffective. BT should be required to provide portability and should recover the costs from the generality of its customers through their ordinary bills.

2.121. The DGT said that Mr Ellison's argument was incorrect. The fallacy arose because portability did not involve only, or even primarily, the provision of a service to the originator of a call. It was the recipient of the calls whose request led to the provision of portability: the originators of calls merely lived with the consequences and were indirect beneficiaries of a service provided to another. Even if portability was a service which BT was required to provide under

Condition 1, which the DGT denied, that would still leave unanswered the question who should bear the costs. Although, said the DGT, Mr Ellison argued that custom and practice should lead BT to recover its costs from all its customers, there was nothing in BT's licence to demand this. The position remained therefore that the DGT had no power to resolve the issue of who should meet the costs.

2.122. If Mr Ellison were right it would evidently be possible to achieve a speedy resolution to the problem. What matters, however, is that the DGT does not believe he has the relevant powers. In the absence of any clear reasons for thinking that the DGT's view is mistaken, we have proceeded on the footing that he cannot be expected to take the action proposed by Mr Ellison. (It is relevant that BT too disputed Mr Ellison's view of the licence.)

2.123. Although Condition 34B does not enable the DGT to allocate costs, it does specifically give him the power to determine BT's reasonable costs-which the condition allows BT to recover-in the event of any dispute on the subject: see paragraph 15 of the condition. A further question arises, therefore, as to the scope of paragraph 15 and in particular the meaning of `reasonable costs'. BT stated that under licence Condition 13 which dealt with interconnection, `reasonable costs' were treated as fully allocated costs plus an allowance for return on capital, and that it expected the DGT to adopt the same definition for portability. As to the interpretation of `reasonable', BT said that if, for example, the DGT thought it was unreasonable for BT to spend an hour's work on per line set-up for portability, he could determine that its costs should be based on whatever shorter period of time he considered reasonable. He would not, however, be able to disallow the extra costs to which portability would give rise in BT's remaining TXE4 exchanges, even though more efficient digital exchanges were in operation throughout most of BT's network. The DGT said that in the context of interconnection he could disallow the costs of inefficient routeing of a call.

2.124. This aspect of the interpretation of `reasonable costs' is clearly not straightforward, as indeed the DGT told us. We infer that he could not, for example, determine that BT's portability conveyance costs should immediately be based on call drop-back. Although that method is known to be feasible, he would have to show that it was unreasonable of BT not to have introduced it.

2.125. As to the accounting basis on which the `reasonable costs' should be calculated, the DGT has announced his intention of moving to incremental costs plus a share of common costs as the basis of interconnection charges. The DGT suggested in his policy statement that normally his decisions would be based on some form of long-run incremental costs, sometimes on short-run incremental costs and rarely on fully allocated costs. As far as portability is concerned, he might decide to adopt short-run incremental costs as the basis for charges in the period of tromboning, although we believe there would be practical difficulties in the way of doing so (see paragraphs 2.166 and 2.205). Moreover in BT's view a move to either long-run or short-run incremental costs as the basis for `reasonable costs' would require a licence amendment and hence BT's agreement (or, failing that, a reference to the MMC).

Analysis

2.126. We have found it useful to analyse the issues by reference to the six principles which the DGT suggested should guide decision-making on the allocation of the costs caused by implementing portability (see paragraph 2.86). In this way we have, as required, had regard to the duties which the Act imposes on the Secretary of State and the DGT, including the promotion of the interests of consumers, the maintenance and promotion of effective competition and the promotion of efficiency and economy (see paragraphs 2.171 and 2.172). We also address in this section BT's concern about the prospect of the DGT having a broad discretion to allocate costs.

Cost causation

2.127. The cost causation principle posits that those who contemplate purchasing some good or service, and thus causing costs to be incurred, should face prices which reflect those costs. This ensures that resources will only be allocated to the production of the good or service if the purchaser obtains sufficient value to justify that allocation.

2.128. In 1984 BT inherited a network which had been established to serve a supplier with a statutory monopoly and for which the issue of NP did not arise. Although BT invested heavily in the years which followed in modernizing the network, in doing so it did not anticipate a future need for portability: a provision dealing with portability was not added to its licence until 1991. The change of circumstance after 1991 to a position in which there is broadly-based competition in the provision of telephone access (the local loop) therefore introduced a requirement for portability which imposes on BT additional costs, both capital and current.

2.129. In examining the causes of those costs it is necessary to distinguish between the three activities involved in establishing portability, viz system set-up, per line set-up and the conveyance of calls.

2.130. *System set-up* is a single operation (for any given technical method of providing portability) whose costs are not caused by the provision of portability to any particular customer. Two views of the causation of those costs are possible:

(a) that they are caused by those customers who are, in some sense, `demanding' portability; or

(b) that they are part of the investment which any operator needs to make to enable it to provide telecommunication services in today's circumstances.

2.131. All the operators which gave evidence to us, including BT, accepted the proposal in the DGT's draft amendment to BT's licence (see Appendix 3.4), namely that each operator should bear its own system set-up costs. This suggests that the view at *(b)* above is widely held. On this view it was the Government's decision to initiate a competitive market in the local loop, which in turn requires NP if that market is to work efficiently, which is the cause of operators' system set-up costs. The view is supported by the fact that, following the duopoly review, the DGT took over from BT the function of allocating numbers. Operators do not `own' the numbers which are allocated to them and must have the ability to transfer them to another operator. The implication is that the costs should be borne by telecommunication customers generally.

2.132. If BT bears its own system set-up costs, BT Network will recover them through charges to operators, including BT Retail, for the use of the network (see paragraph 2.14). To that extent customers generally will pay towards the costs of portability. BT's estimated system set-up costs may represent of the order of 15 per cent of its total costs in providing portability over the first five years (see Table 2.1) and a rather higher proportion in discounted terms.

2.133. *Per line set-up* costs, by contrast, are caused directly by the provision of portability to a particular customer. If the allocation of costs were determined solely by reference to the principle of cost causation, there is no question but that the porting customer should pay. This could be achieved either by the new telephony supplier making an initial charge to cover both operators' costs; or by the exporting supplier-which we assume for the purposes of this chapter will be BT-making a `disconnection charge' which the customer would have to pay before his number were ported.

2.134. The position as regards *additional conveyance* costs is more complex. Again two views are possible:

(a) that the proximate cause is the making of calls to people who have ported their numbers-the normal principle of telephony charging is that the caller pays the full cost of the call, and there is insufficient reason to justify any departure from that principle; or

(b) that the real, underlying cause of the extra costs is the decision to port-the caller may well not know that the number has been ported and ought not to be required to pay a higher charge than expected, nor should the cost fall on the caller's operator.

2.135. BT supported *(b)* and in that context argued that the conveyance element of portability was a form of interconnection and that the normal principles of interconnection charging should apply. Thus the OLOs should pay BT for the use made of its network to meet their subscribers' requirements and vice versa (see paragraph 2.66).

2.136. We do not find BT's stance wholly convincing. With interconnection the originating operator (BT for this purpose) collects all the revenue from the caller and pays over part of it to the other operator to complete the call to its subscriber. BT's proposal for dealing with portability conveyance costs is that it should retain a greater proportion of the revenue from a call to a ported number by, in effect, deducting an amount from the termination payment which it would otherwise make to the other operator. This is a reverse of the normal flow of interconnection charges.

2.137. To explore the comparison further we observe that, when BT makes an interconnection payment to another operator to complete a call, its loss of revenue is greater than its saving in costs from no longer having to deliver the call. The position is essentially the same with a call to a ported number, although such a call is likely to be even less profitable than one to another operator's subscriber who has changed number because it normally gives rise to extra costs as well as a loss of revenue. In both cases the normal principles of telephony charging would lead BT either to charge its own subscribers a higher rate for such calls or, more likely, to average the extra costs and loss of revenue over all its outgoing calls.

2.138. We therefore think that the parallel between portability and normal interconnection is not close. Whatever other justifications there may be for view *(b)*, we are not convinced by BT's argument that the existence of the interconnection charging regime should lead one to adopt that view.

2.139. Clearly the two alternative views in paragraph 2.134 have different implications for cost allocation. We return to this issue in the context of our recommendations.

Cost minimization

2.140. The principle here is that those who can affect the size of costs should face incentives to minimize them. This entails both the enhancement of operational efficiency and the rapid adoption of cost-saving technologies. The argument evidently runs counter to mechanisms which simply allow one operator to pass on its costs to others. Such mechanisms eliminate the incentive to reduce costs and may reverse it if-as under the financing regime for BT to provide interconnection-the costs are defined to include a return on capital.

2.141. BT argued that there was in place a well-tried system for calculating and vetting its costs for the purpose of determining charges to OLOs. The DGT, however, was much less sanguine about this (see paragraph 2.85). Other operators complained that BT would not give them sufficient information to judge whether BT's proposed charges were justified by its costs.

2.142. BT argued more specifically that portability conveyance charges would be based on the same network component costings as those used for interconnection. Since these costings were used for charges from BT Network to BT Retail (as well as to other operators), and since BT's retail prices were capped, there was every incentive for it to minimize those costs.

2.143. This argument is valid to the extent that conveyance costs are charged on the same basis as interconnection. There are, however, two major aspects of portability costs to which the argument does not fully apply: per line set-up and the transition to call drop-back. As recorded in paragraph 2.94, BT offered to make commitments in respect of both these elements. We doubt that these offers could be enforced under the existing terms of BT's licence and believe it would be open to BT, for example, to defer the introduction of the lower-cost methods on the grounds that unforeseen circumstances required it. It is clearly preferable for cost minimization-and hence for the promotion of efficiency and economy among suppliers (see paragraph 2.126)-that BT should face its own incentives to get costs down, particularly by adopting improved technology, rather than the DGT seeking to vet and control those costs in the absence of such incentives.

2.144. A rather different argument, strongly emphasized by BT, which is relevant to cost minimization is that the porting customer should be required to pay the costs of per line set-up and additional conveyance on the grounds that to do otherwise would create excessive demand for portability, and thus result in an inefficient use of resources. BT's survey suggests that, if there were no charge for portability, [*] per cent of residential customers changing supplier would port their number, but if a charge were made the percentage would fall significantly. In the absence of such charges many customers would therefore choose to port their numbers even though the benefits to them were less than the costs involved (see paragraph 7.40). (BT's survey suggests that business subscribers are much less likely to be deterred by a charge.)

2.145. It would in principle be possible for the DGT to require operators to pass on to porting customers a charge reflecting the per line set-up costs and possibly conveyance costs too. The DGT, BT and the cable companies with which the possibility was discussed were all opposed to this idea, which was seen as an undesirable intrusion into commercial decision-making. It would in any case be fruitless for the DGT to seek to require OLOs to make specified charges to their subscribers when the rest of their prices are not regulated. The cable companies told us that they had not decided whether to make any charge to new subscribers for porting their numbers: they might opt for a modest initial charge but thought it unlikely that they would contemplate any ongoing charge.

2.146. Even if importing operators made no charge to their porting customers, any charges they themselves paid to BT (and any extra costs they incurred on their own networks) would affect the profitability to them of additional porting customers and thus would be likely to affect the strength of their marketing effort to attract new customers. Moreover, tariffs to larger business customers of operators other than BT may be subject to an element of negotiation and an operator's negotiating position would obviously be affected by the charges it paid for porting numbers. Larger business customers are increasingly being targeted by cable companies and are the main market for the non-cable competitors to BT.

Distribution of benefits

2.147. There is general agreement that the benefits to be achieved from the introduction of NP exceed the costs but major disagreements on the size and distribution of the benefits. In essence BT's view is that most of the benefits accrue to customers who port-though BT argued that NERA had overstated those benefits-while the view of the DGT and most OLOs is that the bulk of the

*Figure omitted. See note on page iv.

benefits accrue to telecommunication users in general. (See paragraph 2.38 for NERA's categorization of benefits, which was adopted in most of the evidence we received.)

2.148. The debate concerning NERA's estimate of Type 1 benefits is summarized in paragraphs 7.14 to 7.24. Quantification of these benefits is problematic and divergent views were expressed. For customers switching supplier as a result of NP being available the net economic benefit is the difference in marginal cost (between BT and the other operator) of supplying the customer, less the customer's cost of switching operator and the marginal cost to BT of porting calls. NERA assumed that the difference in the marginal cost of supplying customers was reflected in the difference between operators' prices. BT argued that this was not the case in so far as the lower prices charged by OLOs reflected `cream skimming'-ie the targeting of only BT's more profitable customers-and that NERA had made insufficient allowance for cream skimming. For this and other reasons BT submitted that Type 1 benefits were less than NERA had estimated. The view expressed by some other parties that customers would not be prepared to pay to port their numbers on the face of it argues against the existence of substantial Type 1 benefits.

2.149. To the extent that BT is allowed to recover its reasonable costs the precise quantification of direct (Type 1) benefits is not relevant to our deliberations. The issue here is how far the existence of indirect benefits (Types 2 and 3) may justify, or contribute to the justification of, moving away from full cost recovery by BT.

2.150. Most of the debate has concerned Type 2 benefits, on which several substantial submissions were made to us (see Chapter 7). NERA's quantification of Type 2 benefits relied on an empirical estimate of the relation between reductions in market share and productivity improvements. This analysis was based on the hypothesis that increased competition squeezes market share and forces companies to achieve higher levels of productivity than would otherwise be the case (see paragraphs 7.30 to 7.35).

2.151. Some objections made to this approach appear to us to be unconvincing. For example, we do not believe all scope for further efficiency gains/cost reductions has disappeared as a result of regulation in general or the RPI-X formula in particular. Competition may generate efficiency gains which the DGT is unable to secure because of lack of full information, and it may lead to a much wider range of such gains than price regulation is likely to produce (see also paragraph 2.159). Nor are we convinced that the estimated efficiency gains will be offset by loss of economies of scale, though such effects cannot be ruled out entirely.

2.152. Despite this, having considered NERA's cost-benefit analysis in some detail, and the numerous economic submissions to which it gave rise, we do not think the attempts to quantify the wider benefits accruing to users of telecommunication services from NP have been successful. We note that the study on which NERA primarily relied derives a statistical relationship between productivity and market share across 12 industries, with no strong reason to believe this relationship necessarily applies to BT, at any rate to the same extent. We appreciate that NERA considered other studies concerned specifically with the impact of telecommunication liberalization in the USA or Japan (see paragraph 7.32) but we do not think we can rely on these, as the impact of NP may be different from that of initial liberalization. More generally we consider that there are many ways in which competition may generate efficiency gains (for example, through faster technical progress[1]), and that estimates of the impact of competition on productivity which are linked to movements in market shares may therefore mislead. Further distortion could arise if, as firms raise productivity in response to competitive pressures, they thereby mitigate or even eliminate the loss of market share which would otherwise have occurred.

[1]Technical progress is allowed for in the studies submitted to us, but is assumed to occur independent of the extent of competition.

2.153. We nonetheless recognize the potential for NP to increase competitive pressures and, as a result, bring about productivity improvements which will benefit telecommunication users generally. Indeed, like most of those who contributed to this debate, our judgment is that such effects are very likely to emerge and to be significant. But we do not feel that any of the empirical results presented to us can be relied on to provide adequate quantification of the likely size of Type 2 benefits. We return to this subject in paragraphs 2.156 to 2.159.

2.154. NERA's estimate of Type 3 benefits was very low in relation to Types 1 and 2 (see paragraph 2.39) and none of the economic studies submitted to us commented on this aspect. As indicated in paragraph 7.37*(a)*, however, we consider that there are grounds for believing NERA underestimated the size of Type 3 benefits. Most of the benefits arising under Type 3 are unlikely to be taken into account when the customer decides whether to port.

2.155. Having reviewed the full range of evidence submitted, our judgment is that, while precise quantification is not possible, indirect benefits (Types 2 and 3) are significant in relation to the direct benefits (Type 1). The principle of distribution of benefits does therefore provide some ground for BT not recovering all its reasonable costs.

Effective competition

2.156. The arguments which started with NERA's estimate of Type 2 benefits evolved in such a way that they need to be addressed also in the context of effective competition. In NERA's analysis Type 2 benefits essentially took the form of a reduction in BT's costs. Later submissions, notably those of London Economics on behalf of the cable companies (see paragraph 7.26), took the debate into the area of switching costs and their effect on competition and prices.

2.157. In this context the absence of NP is seen as an obstacle to competition because it creates switching costs, ie costs incurred by customers in changing from one operator to another, which many customers (particularly businesses) perceive as high. The introduction of portability, by lowering these switching costs, will therefore strengthen competition and enable the market to function more effectively. This can be expected to lead to increased efficiency and lower costs among operators, including BT, the benefits of which will be passed on to consumers. Lower prices will then stimulate demand and increase consumer benefits.

2.158. Any attempt to quantify these benefits is hampered by the fact that the effects of competition are widely diffused and bear not only on costs and prices-where measurement may in principle be possible-but also upon factors such as quality and range of services provided. In addition there is the point that BT's prices are regulated, ie a mechanism already exists which is meant to substitute for the current weaknesses in competition in bearing down on BT's costs. This mechanism indirectly affects all other operators, who are unlikely to be able to set prices above BT's.

2.159. As indicated in paragraph 2.151, there is a fundamental difference, however, between the pressure which a regulatory price cap puts on a company and the pressure which results from competition. Competition can be expected to stimulate all-round benefits for BT's customers, including in particular quality and range of service as well as prices, whereas price regulation will tend to lead mainly to cost-cutting, even if this would be at the expense of quality. This remains true even though certain aspects of BT's quality of service are also subject to regulation. (BT's introduction of per second charging for calls is an example of an improvement in service which is likely to have been stimulated by competition rather than regulation.) The implication is that portability will promote the interests of consumers generally (one of the duties mentioned in paragraph 2.126).

2.160. Also relevant is the DGT's argument that the mechanism for cost recovery should not weaken the pressures for effective competition by allowing one operator (BT) to raise unduly the costs of its competitors. Moreover if BT were able to retain significant revenues even after losing customers, its incentives to compete might be diminished.

2.161. The first of these points turns on the DGT's ability to prevent BT from passing on inflated costs, either by misstating the figures or by using inefficient practices. As discussed in the context of cost minimization (see paragraph 2.141), the DGT made it clear to us that he could not be confident of preventing this, particularly in so far as new types of activity were concerned.

2.162. The second argument is theoretically right but BT would lose the revenues from outgoing calls and its relationship with those customers. The ability to recover NP costs would be no substitute unless (again) those costs were inflated. It is characteristic of network industries such as telecommunications that the marginal costs of supplying additional customers are small once the necessary infrastructure is in place. BT can therefore be expected to fight hard to avoid a major loss of market share.

2.163. It could also be argued that the allocation of NP costs should be used as a vehicle for giving further `entry assistance' to BT's competitors. BT argued that its competitors already benefited from significant assistance-see paragraph 2.87. The cable companies have been successful in raising debt and equity and are apparently making good progress in building their networks and recruiting subscribers. It is now very likely, therefore, that before long BT will face competition from them in most of the areas that have been franchised (around 75 per cent of the UK). Likewise Mercury has already built its network, ie sunk its costs. On the other hand, the cable companies have substantial investments still to make. They are consuming large amounts of cash and it will be several years before most of them can hope to begin generating profits, and even longer before they will become cash-positive. Moreover Mercury has encountered setbacks which have led it to review its competitive strategy.

2.164. We do not consider it necessary, however, to attempt to form a judgment on the financial position and prospects of the various competitors to BT, which are in any event likely to vary significantly. We place emphasis on the fact that the absence of portability is undoubtedly an obstacle to these operators' ability to win customers from BT, at a time when most of them are vulnerable because of the long lead-times before they can expect to become profitable. In this respect the important points are that NP should be implemented quickly as long as the terms on which it is implemented are not such as unduly to discourage its uptake. Both conditions are necessary for the maintenance and promotion of effective competition (see paragraph 2.126).

Reciprocity and symmetry

2.165. The extent to which other operators are required to provide portability to BT and to each other is not strictly a matter for our inquiry. Condition 34B of BT's licence provides that the DGT may only direct BT to provide portability to an OLO if the other operator is willing to reciprocate. There appears to be general agreement in the industry that reciprocity should continue to be an essential element in the introduction of portability. The relevance of this for our inquiry is that the arrangements to be made for allocating portability costs need to take account of the fact that BT will not always be the exporting operator. The DGT submitted that the cost-allocation arrangements should be symmetrical as far as possible as between operators. We agree that is a desirable aim.

Practicability

2.166. In general the issue of practicability must be addressed in the context of our recommendations and we return to the subject below. As regards the accounting basis for calculating costs, however, we would comment at this stage that there might well be practical difficulties in adopting a basis for portability charges different from that in use where there is cross-charging between operators, notably interconnection. Both the DGT and BT told us that the work on a possible move from fully allocated to incremental costs (see paragraph 2.125) involved difficult questions and would take time to complete.

Regulatory discretion

2.167. It was clear from BT's evidence that, in addition to the substantive issues on portability itself, the company regards the issue of regulatory discretion as an important one in the present inquiry (see paragraph 2.97).

2.168. This is a broad subject, and not one which it would be appropriate to address in a general way in a report which deals with one relatively narrow aspect of BT's operations. We agree that predictability of regulation is a desirable aim and that as far as possible the DGT should not be drawn into matters which should be the subject of commercial negotiation between operators. These, however, are matters of degree. We have noted the extent of BT's continuing strength in relation to other operators and the latter's inability to reach acceptable agreements with BT on interconnection charges: the DGT told us that it had been necessary for him to make a determination in nearly all major cases. We share the DGT's own view that he should seek to withdraw from detailed regulation and move towards a less interventionist role wherever industry structure and competitive pressures allow. Meanwhile there is a continuing need for a strong regulatory framework.

2.169. The particular issue that arises in this inquiry, however, is not-at least in BT's eyes-a matter of degree but of principle, namely whether the DGT should have a discretion to allocate costs. The DGT submitted that he needed a broad discretion to cater for changing circumstances (see paragraph 2.86). BT saw this as inimical to fair and predictable regulation. There is merit on both sides of this argument and we have sought to reflect that in our recommendations.

The public interest

2.170. The DGT's questions to us in the reference were whether the matter summarized in paragraph 2.3 operated or might be expected to operate against the public interest; and if so whether the effects adverse to the public interest which the matter had could be remedied or prevented by modifications of the conditions of BT's licence. If the answer to the first question is `yes', we are required by section 14(1)*(b)* of the Act to specify in our report the adverse effects; and if the answer to the second question is `yes' we are required by section 14(1)*(c)* to specify the modifications by which those effects could be remedied or prevented.

2.171. In determining whether a particular matter referred to us in this way operates or may be expected to operate against the public interest, we are required by section 13(8) of the Act to have regard to the matters in respect of which section 3 of the Act (set out in Appendix 3.1) imposes duties on the Secretary of State and the DGT. Section 3 specifies the general duties of the Secretary of State and the DGT in carrying out their functions under Parts II and III of the Act. Section 3(1) prescribes primary duties which in summary are:

(a) to secure that there are provided throughout the UK such telecommunication services as satisfy all reasonable demands for them; and

(b) to secure that any person by whom any such services fall to be provided is able to finance the provision of those services.

Section 3(2) prescribes several other duties which, in the words of the Act, are `subject to' the primary duties.

2.172. In the Schedule to our terms of reference (Appendix 1.1) the DGT specified certain effects adverse to the public interest which in his opinion resulted from the matter specified in paragraph 2. He stated that some 95 per cent of businesses and households in the UK obtained directly provided telecommunication services from BT; that at present a customer had to change his telephone number if he wanted to obtain those services from another operator instead of BT; that such a change was inconvenient and could be costly; and that as a result customers were discouraged from switching to other operators to such a significant degree that competition in the market for directly provided telecommunication services was being inhibited. This was detrimental:

(a) to the interests of customers in respect of prices charged for telecommunication services and the quality and variety of services provided;

(b) to the maintenance and promotion of effective competition between operators; and

(c) to the promotion of efficiency and economy on the part of operators.

These points are matters in respect of which duties are imposed by section 3(2) of the Act-see Appendix 3.1, section 3(2)*(a)* to *(c)*.

2.173. The reference arose because the DGT was frustrated at what he saw as the slow progress towards the introduction of portability. Our terms of reference do not require us to go back beyond the disagreement with Videotron in 1994 but it is relevant that the provisions of Condition 34B created a rigid framework of conditions which were bound to cause delay. The requirement for a cost-benefit study slowed matters, and NICC work on a technical solution then had to be completed. It is now agreed on all sides that portability should be introduced even though BT strongly disputes the findings of the cost-benefit study.

2.174. Turning to the disagreement between BT and Videotron, it may be that the prospects for an agreement were not good from the outset. On the one hand the DGT had indicated his view that BT should not simply be able to pass on its costs (see paragraph 6.2). On the other hand the tromboning solution was not ready for introduction by October 1994, when the DGT's direction required the two operators to provide portability to each other, so that BT was obliged to offer the higher-cost solution based on remote call forwarding. Nonetheless we note that BT's negotiating stance reduced the prospects for agreement by emphasizing the high costs which it would expect Videotron to bear (see paragraph 2.75). BT for its part considered that Videotron had not attempted to engage in genuine negotiations (see paragraph 2.90). Since the failure of BT and Videotron to reach agreement there has been progress in the technical work needed for the implementation of the tromboning solution but the position remains as stated in the reference, namely that BT is not yet providing portability except in the context of proving trials.

2.175. We are not convinced by BT's assertion (see paragraph 2.93) that, if the DGT had not cast doubt on the applicability of Condition 34B in its present form, BT would readily have been able to reach agreements with OLOs to implement portability in accordance with the provisions of that condition.

2.176. BT has consistently quoted to OLOs high estimates of the costs which they would be likely to incur if they wanted portability. This emerges initially from the negotiations with Videotron and subsequently in the estimates which BT has produced for per line set-up and additional conveyance costs. Apart from the £3 estimate quoted to the DGT, which was clearly an error, BT's opening estimate of per line set-up costs was over £36, far higher than OLOs' estimates of their own costs and three times the level which BT told us it now expects to achieve by April 1996. Similarly BT's initial estimate of additional conveyance costs was 1.23p a minute, compared with 0.54p a minute which was the final estimate which it gave to us for its costs in 1995/96 (see paragraphs 2.60 to 2.66). Despite these substantial reductions BT continued to refer to the initial estimates in the documents which it issued to OLOs at the beginning of October 1995 (although it has always added that, if the outcome of our inquiry affected the position, any resulting price adjustments would be retrospectively applied). Three major cable companies told us that they would not proceed with the commercial introduction of NP until they were able to assess the implications of our findings because the risk of being held to BT's intended charges was too high (see paragraph 2.106).

2.177. Looking to the future, although portability will in due course facilitate the movement of subscribers between operators generally, the main effect in the short term will be to accelerate BT's loss of customers, particularly to the cable companies. This is not in BT's commercial interests. As long as BT's licence remains as it is, BT has no incentive to reach agreement with other operators-it has time on its side.

2.178. We have considered BT's argument that a change in its licence concerning portability would be contrary to the agreement reached following the duopoly review (see paragraph 2.96). We do not regard that agreement as preventing any future change. The fact that BT's licence may be modified, either with BT's agreement or following a reference to the MMC, is an integral aspect of the regulatory regime and an element of uncertainty which BT has to accept. Reference to the MMC gives BT a full opportunity to state its views and have them considered.

2.179. As noted in paragraphs 2.21 to 2.25, BT retains a strong position in the market and there are considerable obstacles to the growth of competition. Competition is developing as a result of the various steps taken by the Government and the DGT but it is still at a relatively early stage. We have explained in paragraphs 2.157 to 2.159 the relevance of NP to this process. Besides these arguments of principle there is convincing evidence from several parties-including representatives of users as well as OLOs-that the absence of portability is an important barrier to competition. We consider that the introduction of portability is necessary for the promotion of effective competition between operators. Such competition can be expected both:

(a) to benefit consumers in respect of prices charged for telecommunication services and in the quality and variety of services provided; and

(b) to promote efficiency and economy on the part of operators.

2.180. Although most of the evidence submitted to us concerned portability of single geographic numbers, these arguments apply also to the portability of number blocks and non-geographic numbers (see paragraph 2.34). Thus Mercury emphasized to us the obstacles which it faced in winning large business customers because of their inability to port large blocks of numbers (see paragraph 2.108*(a)*); while AT&T emphasized that the absence of portability for non-geographic numbers was stifling competition in the freephone market (see paragraph 2.108*(b)*).

2.181. There is in fact no disagreement with the proposition that NP should be introduced and that its absence is contrary to the public interest. While there has been strong criticism, particularly by BT, of NERA's cost-benefit study, we received no evidence disputing NERA's conclusion that, for all technical solutions except full IN, the benefits of portability would outweigh the costs.

2.182. We have considered the present situation and prospects in the light of the various matters to which the Act requires us to have regard (see paragraphs 2.171 and 2.172). Against that background we believe NP needs to be introduced in a more rapid and effective manner than is likely if BT's licence remains unchanged. For the reasons discussed in the analysis section (paragraphs 2.126 to 2.169)-notably under the headings of cost minimization, distribution of benefits and effective competition-it is not appropriate for BT to be able to recover from OLOs all the costs which it is claiming under the terms of its current licence. BT repeatedly emphasized to us that recovery of its fully allocated costs remained an overriding aim. Moreover it is unlikely that the offers which BT made to us about the timing of particular cost reductions (see paragraph 2.94) could be enforced under the present terms of Condition 34B.

2.183. For the reasons set out above we do not believe portability will be introduced as rapidly or extensively as is desirable under the present provisions of Condition 34B, which enable BT to recover all its reasonable costs. If the licence were left unchanged it could be expected that:

(a) there would be further protracted argument about the level of these costs; and

(b) any take-up of portability by OLOs would be on a restricted basis, preventing the full realization of the benefits which the widespread introduction of portability would bring.

2.184. We therefore conclude that `the matter' specified in the reference (see Appendix 1.1) does operate, and may be expected to operate, against the public interest with the particular adverse effects that:

(a) competition in the market for directly provided telecommunication services is being, and can be expected to continue to be, inhibited; and

(b) this inhibition of competition is detrimental to the interests of customers in that prices charged for telecommunication services are likely to be higher, quality and variety of service lower and choice diminished compared with what would otherwise be the case.

2.185. We further conclude that the effects adverse to the public interest which we have identified can be remedied or prevented by modifications of the conditions of BT's licence which would facilitate the early introduction of NP.

Modifications

2.186. In view of the conclusions set out above, we are required to specify modifications by which the adverse effects which we have identified could be remedied. Modifications are needed, first, to remove BT's ability to recover all its reasonable costs and, secondly, to allocate the costs between BT and OLOs. It is also necessary to remove the ambiguity as to the DGT's powers to which the wording of paragraph 34B.13 gives rise (see paragraph 2.117).

2.187. In the following paragraphs we set out how we believe the three main categories of cost involved in the provision of portability should be dealt with. In doing so we take full account of the considerations set out in the analysis section above (paragraphs 2.126 to 2.169). The particular modifications which we specify are set out in Appendix 2.1. The modifications are themselves subject to some qualifications but in view of the dangers of over- elaboration to which the DGT drew our attention (see paragraph 2.86) we have not thought it necessary or desirable to include the qualifications in the licence itself-we consider that the proposed power of the DGT to determine whether costs are reasonable will permit the qualifications set out in paragraph 2.192 to be taken into account.

2.188. We understand BT's concern that it would be inappropriate for the DGT to have a very wide discretion as to how portability costs should be allocated. The DGT has a residual power under Condition 13 to determine interconnection terms when operators cannot agree but that power is constrained by the condition itself which lays down the principles on which charges shall be based. The arrangement meets two aims: that operators, including BT, should have a reasonably clear framework for their commercial decision-making, while the DGT has the power to resolve deadlocks over matters of detailed interpretation. We consider that the principal elements of the charging regime which we outline in paragraphs 2.190 to 2.210 should be incorporated in a revised licence condition. The particular recommendations we have made will limit the extent of detailed regulatory intervention which is needed.

2.189. It will be clear that the various arguments adduced do not in themselves lead to one definite conclusion, and that judgment is required. Overall we think there is a case for the costs of NP being shared: on the one hand the introduction of NP does lead to extra costs to BT, while on the other hand there are benefits to existing BT subscribers who do not port their numbers. We do not, however, think it necessary to apply cost sharing to all three cost elements. The balance of considerations varies as between different categories of costs, and there are likely to be advantages in keeping the overall solution as simple as possible.

System set-up costs

2.190. As regards *system set-up costs*, we take the view expressed in paragraph 2.130*(b)*, namely that these are an essential part of the investment which any operator needs to make in providing telecommunication services. BT should therefore bear its own system set-up costs in full, because this would bring about cost minimization, recognize the wide distribution of benefits and promote effective competition. We see no practical difficulties. This proposal is specified in paragraph 3*(a)* of Appendix 2.1.

Per line set-up costs

2.191. In the case of *per line set-up costs* the principle of cost causation applies more strongly than with the other two cost categories. If BT were allowed to pass on its per line set-up costs it is likely that at least some of those costs would in turn be passed on by OLOs to porting customers as an initial charge (see paragraph 2.145). Moreover given that benefits accrue to porting customers (Type 1 benefits), the principle of distribution of benefits indicates that part of the cost of implementing NP should fall on those customers. In view of the fall in BT's estimates of its per line set-up costs, passing on these costs would not put at risk the wider benefits of enhanced competition. Accordingly we recommend that BT should be able to charge its reasonable per line set-up costs to the operators to which it provides portability, with no cost sharing (we assume that importing operators would bear their own per line set-up costs).

2.192. We see a need for two qualifications, however:

(a) The charges should be based from the outset on the techniques which BT told us it envisaged using from April 1996 (see paragraphs 2.60*(e)* and 2.62). This recognizes that it is unlikely in practice that significant numbers of customers will be able to port their numbers before that date. BT expected that these techniques would generate charges for each porting customer of £8 on a digital exchange and £32 on an analogue (TXE4) exchange. We do not recommend that these figures should appear in the licence-the DGT will want to satisfy himself as to the best estimates he can obtain and the charges will in any case be subject to review when actual data are available-but they give a strong indication to OLOs of the likely order of magnitude of the charges they can expect to pay. The £8 and £32 figures yield a

weighted average of £12, about one-third the level quoted in BT's offer of 2 October 1995 to provide portability. Given the extent of averaging of costs in this industry, our inclination would be to go for the averaged charge.

(b) BT told us that its current intention was to replace all remaining TXE4 exchanges with digital ones by the end of September 1997, although this was not a firm commitment. We consider that the higher costs resulting from the continued existence of TXE4 exchanges should be disallowed from that date even if BT has not by then completed the replacement programme.

BT also told us that, by introducing real-time routeing devices, it saw scope for a further significant reduction in per line set-up costs (see paragraph 2.62, last sentence).

2.193. The DGT should be able to determine that charges are based on the implementation of such cost-saving techniques-and the installation of modern digital exchanges-when he judges it reasonable for BT to introduce them, regardless of whether BT has in fact done so (see the third sentence of paragraph 3 of Appendix 2.1). Points *(a)* and *(b)* in paragraph 2.192 are two examples of how we envisage the DGT would use this power.

2.194. These qualifications to BT's ability to recover its per line set-up costs would give the company incentives, which would otherwise be absent, to reduce costs. They also meet the concern that BT might economize on system set-up at the expense of higher per line set-up costs if it were able to recover the latter (see paragraph 2.80). Although some actual costs may be disallowed we would not expect this to give rise to practical difficulty because in general information will be available on the reduced level of costs which would be chargeable. We propose that the accounting basis for calculating charges should be the equivalent of that used for interconnection, namely fully allocated costs plus an element for profit, but changing to an incremental costs basis if that is agreed for interconnection in due course (see the second sentence of paragraph 3 of Appendix 2.1).

2.195. It is evident that the estimated cost to BT of per line set-up is falling fast. The question arises whether a time will come when it will cease to be sensible for the costs to be passed between operators. On the one hand, the extent to which the benefits of portability exceed the costs will become greater as costs fall. On the other hand, if switching becomes commonplace, with movement both to and from BT and between OLOs, BT will no longer be carrying the great majority of the cost burden as an `exporter' of customers. If per line set-up costs continue to be passed on there will be a permanent barrier to switching, albeit a low one. In a normal competitive market it is quite possible that there would be no cross-charging of this kind.

2.196. We have considered whether in such circumstances the DGT should have a discretion to abolish the charging of per line set-up costs. In our view this would have considerable merit but it would not be practicable, at the present time, to define the circumstances with the precision necessary for a licence modification. Instead we suggest that the DGT should review the position in due course if he considers that the charging of per line set-up costs should be ended. Unless technological progress brings down these costs more quickly than was envisaged in the evidence given to us, we would not expect such a move to be justified for three or four years.

2.197. In addition to the set-up costs incurred when a customer decides to port a number from BT to another operator, administrative costs of a broadly similar nature will arise in certain other circumstances:

(a) if the porting customer changes address, whether at the time of porting or subsequently; and

(b) if a customer, having ported a number from BT to another operator, ports that number again to a third or fourth operator.

We recommend that BT should be able to recover these costs from the other operator concerned in the same way as per line set-up costs (see paragraph 4 of Appendix 2.1). The review we suggest in the previous paragraph would also cover these categories of costs.

Additional conveyance costs

2.198. For *conveyance costs* the balance of the arguments flowing from the six principles points to a different conclusion. Looking first to the longer term, we propose that under the call drop-back solution BT should bear these costs-though they would be shared with OLOs to the extent that the latter contribute to the costs of BT Network via interconnection charges-for the reasons set out below.

2.199. First, it is in relation to the additional conveyance costs that Type 3 benefits most directly arise: calling customers derive evident benefit from the fact that they can still use the original number to reach the called party who has changed supplier. More generally we consider that for BT to bear most of the conveyance costs, while passing on per line set-up costs, would reflect a reasonable balance between Type 1 benefits on the one hand and Types 2 and 3 benefits on the other.

2.200. Secondly, we have made clear that we regard the provision of portability as an essential feature of a competitive telecommunication market. It follows that the routeing of calls to ported numbers should be regarded as a normal part of a telecommunication service and not as a facility requiring special charging arrangements, particularly as telephone numbers are now a national resource and no longer `owned' by individual operators. The normal principle of telephony charging is that the caller pays; in practice, however, there is much averaging of costs in the setting of charges. We see the spreading of these costs over all subscribers as another, and not particularly significant, form of averaging. Taking for illustration the estimated additional conveyance costs of £152 million in Table 2.1, we estimate that if BT's share of these was spread equally over the total number of lines in the UK, the effect would be to increase bills by some 30p to 35p a quarter. In practice the increase for most residential customers, and particularly for low users, would be significantly less than this.

2.201. Thirdly, under our proposal BT will have every incentive to minimize the costs. There is time before the expected date of introduction of call drop-back for BT to explore further ways of reducing conveyance costs. It will also have the incentive to examine the viability of IN solutions.

2.202. As regards the remaining principles, cost causation gives conflicting signals and is in any case less useful (see paragraphs 2.134 to 2.139). For BT to bear the costs scores well on practicability grounds in that the actual level of the additional costs would not need to be calculated: to the extent that additional capacity was needed for the transmission and processing of ported calls, the costs would simply be part of the overall capital costs of BT Network. It would, however, be necessary to monitor the number of minutes of ported calls.

2.203. We now turn to the period of tromboning, ie to the end of October 1997. Here we recommend that the estimated additional costs compared with call drop-back should be shared equally between BT and other operators (see paragraph 3*(b)* of Appendix 2.1). This would recognize that tromboning unavoidably imposes much higher costs on BT than call drop-back, and that OLOs should pay a contribution towards the extra costs if they want to derive the benefits of NP on this earlier time-scale. It would also, we believe, be a better reflection of the balance of benefits in relation to costs from the early provision of NP, without removing the incentive on BT to minimize the costs. The implication is that, taking for illustration BT's cost estimates for

1995/96 of 0.54p a minute, BT would pay 0.37p and OLOs 0.17p.[1] We do not believe the passing on of costs at this level to OLOs will be such as to delay unreasonably the take-up of portability, and we note in that context that 0.17p a minute is within reach of the 0.08p to 0.15p range which the group of cable companies estimate as their own additional conveyance costs if their customers moved to BT and ported their numbers (see paragraph 2.105).

2.204. As with per line set-up costs we do not recommend that these or any other figures should appear in the licence itself. The DGT should be able to examine BT's cost estimates and judge what is reasonable. But here again the figures we have set out should give BT's competitors a good indication of the likely level of charges.

2.205. It will be observed that the cost figures in paragraph 2.203 are drawn from BT's calculations and therefore represent fully allocated costs calculated in the same way as interconnection charges. They also isolate the effect of porting from the effect of customers switching to other operators (see paragraphs 2.63 to 2.66). For the reasons set out below, we agree with BT that for the purpose in hand this is the correct method to calculate charges to other operators.

2.206. First, we doubt that it is practicable to attempt calculations by reference to incremental costs unless the whole interconnection regime has moved on to that footing. Certainly it is not worth attempting this solely for the period of tromboning.

2.207. Secondly, the DGT and the cable companies argued that capacity on BT's network would be freed up as a result of subscribers porting to other operators, and suggested that in the short run BT might therefore need to make little if any new investment in order to provide the extra conveyance needed for ported calls. Since tromboning was a short-term requirement, the additional conveyance costs resulting from it would actually be small or even zero.

2.208. We would not accept this as a general proposition. For customers who would have switched operator even in the absence of NP, the effect of its introduction is clearly separate from the effect of switching. For customers who switch only because NP is available the argument has more merit. Even here, however, the general position must be that if capacity becomes spare as a result of switching, that capacity is available for BT's purposes and cannot be regarded as a free resource to provide the additional conveyance needed for calls to ported numbers. Since demand for telephone services is growing strongly it can be assumed that spare capacity will normally be taken up quite quickly, though this assumption loses some force in relation to a period of only 18 months or so, the expected duration of the tromboning solution. Moreover, the position will vary between geographical areas and in some places BT may indeed be able to cope with tromboning without additional investment. It would, however, be impracticable to base conveyance charges on detailed calculations of the precise capacity situation in different areas, and on an assumed split between customers switching to OLOs because NP was available and others who would have switched even in its absence. Furthermore BT would bear the risk of some additional capacity being provided for tromboning and subsequently being stranded for a time as surplus to requirements.

2.209. In the context, therefore, of the recommendations we make for the sharing of conveyance costs in the tromboning period we are firmly of the view that BT's method of calculation should be adopted.

2.210. Under both the tromboning and call drop-back solutions we recommend that, as envisaged by the DGT, the costs borne by BT should then be shared among the generality of operators in proportion to their use of BT Network (see paragraph 2.84). If BT Retail's share of the

[1]The calculation is 0.54p-0.2p (the estimated cost of call drop-back) giving 0.34p. OLOs pay half this difference, ie 0.17p, while BT pays the other half plus the remaining 0.2p, ie 0.37p.

UK domestic telecommunication market falls-which is likely to entail a fall in its proportionate use of BT Network-this factor may become of increasing importance.

Other matters

2.211. In case of disputes arising over the cost category to which any particular item belongs, we recommend that the DGT should have power to determine the relevant category for the purpose of the proposed charging regime (see the fourth sentence of paragraph 3 in Appendix 2.1).

2.212. At present the costs borne by BT would be at the expense of its shareholders because BT is prevented by price control from passing on the costs to its customers. This factor should in principle be taken into account in the forthcoming price review (alongside any efficiency improvements, leading to cost reductions, brought about by the increase in competition which resulted from the introduction of NP). In practice-given that the costs are likely to fall to a low level soon after the start of the next price control period as a result of call drop-back-the effect should be very small in the context of BT's regulated businesses as a whole.

2.213. Table 2.1 was based on illustrative figures provided by BT showing its projected costs based on a particular set of assumptions as to the charges passed on to customers for porting their numbers. Broad estimates based on that illustration suggest that our recommendations would distribute the total of per line set-up and additional conveyance costs between BT and other operators in the ratio of roughly two-thirds and one-third respectively over the four years 1996/97 to 1999/2000. The amount borne by other operators is higher in the first two years and declines sharply thereafter with the transition to call drop-back and the reduction in per line set-up costs. Alternative assumptions given to us by BT as to the level of take-up did not change this broad picture. The amounts in Table 2.1 cover only BT's estimates of its costs and exclude the costs which other operators will incur in providing NP.

2.214. We believe this sharing of costs would be an appropriate reflection of the analysis in this chapter and of our judgments on the various elements involved.

2.215. Our analysis has been carried out in the context of the portability of single geographic numbers (see paragraph 2.34). As far as number blocks are concerned it appears from BT's evidence (paragraph 2.70) that similar issues generally arise, and we consider that our recommendations should apply to the porting of number blocks. The porting of large blocks (but below 10,000 lines) might give rise to substantial additional conveyance costs, but the element of cost sharing which we have recommended for the period of tromboning would ensure that both parties had an incentive to avoid unnecessary costs.

2.216. As regards non-geographic numbers, the stage reached in the industry discussions of this form of portability was not such as to enable us to address it in any detail. Portability of non-geographic numbers is likely to be implemented by a form of IN solution and this may generate somewhat different issues from those presented by the porting of geographic numbers. The modifications which we specify are not intended to apply to the porting of non-geographic numbers but will help the parties in reaching agreement on any further modification of the licence condition which may prove necessary to cater for other forms of portability.

2.217. We also propose that the provision requiring that a cost-benefit analysis be carried out before BT can be directed to provide portability should now be deleted: an analysis has already been carried out covering the UK as a whole and in any case all parties now agree that portability should be introduced (see paragraph 1*(b)* of Appendix 2.1).

2.218. The DGT will have to consider how OLOs' licences should be modified to deal with NP costs. We believe it would be a straightforward matter for him to apply the same regime as we have recommended for BT, *mutatis mutandis*, to OLOs when they are in the position of exporting numbers.