Part II

Background and evidence

3 Background

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Introduction

3.1. This chapter begins with a brief history of BT and the development of its current role in the provision of telephony services in the UK. This is followed by an outline of the structure of the BT group, in particular those parts of the group concerned with the provision of fixed-to-mobile telephony. The relationship of BT with the MNOs is outlined, together with a description of certain relevant technical features of mobile telephony. The system of regulation is then described, in particular the price control arrangements, interconnection between the networks of licensed PTOs and the regulatory accounting arrangements which apply to BT. An indication is then given of the financial performance of BT and of certain of its relevant businesses and activities. Finally, a description is provided of the four MNOs and their recent financial performance.

Liberalization of telecommunications in the UK

3.2. Until 1981 nearly all telecommunication services were provided by the Post Office, a statutory corporation converted from a government department by the Post Office Act 1969.[1] Under the British Telecommunications Act 1981, telecommunications activities were separated from the Post Office and transferred to British Telecommunications, a new public corporation. On 6 August 1984 the property, rights and liabilities of British Telecommunications were transferred to British Telecommunications plc under section 60 of the 1984 Act. The Government then offered 50.2 per cent of the shares of BT for sale and the shares were admitted to the Official List of the London Stock Exchange and also listed in New York, Tokyo and Toronto (subsequently withdrawn). The remainder of the shares held by the Government were sold to the public in two further tranches in 1991 and 1993. At 31 March 1998 BT had over 2 million shareholders; at 31 October 1998 the equity market capitalization of BT was some £50 billion. At the time of privatization certain special rights, set out in the company's Articles of Association, attached to the special rights redeemable share issued to HM Government. The share, which carried no rights to capital or profits beyond its nominal value, was redeemed at par by HM Government on 10 September 1997.

3.3. A new regulatory framework was established under the 1984 Act which abolished the statutory exclusive right to operate telecommunication systems formerly held by BT and provided, in section 7 of the 1984 Act, for the licensing of the running of telecommunication systems. Section 8 of the 1984 Act sets out special provisions which apply to any licence which include conditions requiring the licence-holder:

(a) to provide such telecommunication services as are specified in the licence;

(b) to connect or permit connection to the licensed system of such other systems or apparatus as are specified in the licence;

(c) to permit the provision, by means of any telecommunication system to which the licence relates, of such services as are specified in the licence;

(d) not to show undue preference to, or exercise undue discrimination against, particular persons or persons of any class or description (including, in particular, persons in rural areas), whether in respect of charges or other terms or conditions; and

(e) to publish, at times specified in the licence, a notice specifying, or specifying the method that is to be adopted for determining, the charges and other terms and conditions applicable to services provided.

3.4. The 1984 Act gave the principal regulatory responsibilities to the Secretary of State (at present the Secretary of State for Trade and Industry) and the DGT. Section 3(1) (see Appendix 3.1) requires them to exercise their functions under Parts II and III of the Act in the manner best calculated to secure that such telecommunication services are provided throughout the UK as satisfy all reasonable demand for them (except where it is not reasonably practicable). This includes the provision of emergency services, public call boxes, directory information services, maritime services and services to rural areas. They must also secure that persons who provide these services are able to finance their provision.

3.5. Section 3(2) requires the Secretary of State and the DGT to exercise their functions in the manner best calculated to achieve a number of objectives including the promotion of:

(a) the interests of consumers, purchasers and other users of telecommunication services and apparatus in the UK in respect of the prices charged and the quality and variety of services provided;

(b) effective competition between those engaged in commercial activities connected with telecommunications; and

[1] Only Kingston-upon-Hull retained a separate telephone company.

(c) efficiency and economy among such persons.

In terms of the distribution of functions the Secretary of State has taken primary responsibility for market opening measures and in particular has the function of licensing new telecommunications operators. Between 1984 and October 1998 38 PTO licences were granted by the Secretary of State. These included 33 fixed link PTO licences and 5 MNO licences. In addition, 177 ISR licences to provide international services over lines leased from licensees authorized to operate international facilities including BT or Cable & Wireless plc (C&W—see paragraph 3.9) and 62 international facilities licences have also been granted.

3.6. By virtue of section 50 of the 1984 Act the DGT also has functions in relation to competition exercisable concurrently with the Director General of Fair Trading:

(a) under the Fair Trading Act 1973, in particular in relation to monopoly situations which exist or may exist in relation to commercial activities connected with telecommunications; and

(b) under the Competition Act 1980 in relation to anti-competitive practices in connection with the production, supply or acquisition of telecommunication apparatus or the supply or securing of telecommunication services.

3.7. Section 12 of the 1984 Act allows for licence modifications by agreement between the DGT and the relevant licensee. The DGT also has the power under section 13 of the 1984 Act to make references to the MMC requiring the MMC to determine whether any matters relating to the provision of telecommunication services or the supply of telecommunication apparatus by a licensee operate, or may be expected to operate, against the public interest and if so whether the adverse effects could be remedied or prevented by modifications of the operator’s licence. Section 14 requires the MMC to specify licence modifications which could remedy any adverse effects. Under section 15 the DGT is then required to make such licence condition modifications as he considers requisite, though he must have regard to the modifications specified in the report. A reference to the MMC under section 13 normally takes place when the licensee and the DGT cannot agree on a licence modification. A brief summary of the main provisions of BT’s PTO licence relevant to this inquiry is at Appendix 3.2.

3.8. Since the early 1980s the Department of Trade and Industry (DTI) has used its licensing powers to promote competitive entry into the telecommunications markets. The timing, pace and nature of the resulting changes have differed from one market to another. For example, in the telephone equipment market competition developed rapidly after liberalization, stimulated by the provision for independent approval of apparatus and the establishment of the British Approvals Board for Telecommunications, whose functions include the inspection and approval of telephone handsets and other equipment—such as answering machines—which users attach to operators’ networks. In 1981 liberalization also took place in value-added services (such as voicemail and electronic data exchange), enabling firms to provide value-added services over lines leased from BT.

3.9. The Government decided in 1983 that only one network operator should be licensed to provide a fixed network to compete with BT (after 1984) for a period of seven years. It was thought that the investment needed was so large and the risk so great that no company would be prepared to enter the market with the prospect of competing with both BT and other new operators. The operator chosen in 1983 was Mercury, a consortium in which C&W had a 40 per cent shareholding and which began operating in 1986. By 1984 Mercury had become a subsidiary of C&W and it subsequently merged in 1996 with a number of cable and television companies to become CWC, with C&W having a controlling shareholding of 53 per cent.

3.10. Mercury initially focused on particular areas of the telecommunications business, including long-distance and international calls and services to large corporate customers, which generated a high volume of call traffic per line. It did not compete directly with BT in providing services to smaller customers, but did offer them services by means of indirect connection through BT’s local network.

3.11. In 1983 licences were granted to two companies to operate mobile cellular services, namely Racal-Vodafone Ltd (subsequently Vodafone) and Cellnet. Cellnet is a wholly-owned subsidiary of Cellnet Group Ltd (CGL), of which BT owns 60 per cent of the issued share capital. The initial licences were replaced by PTO licences under section 7 of the 1984 Act in 1985 when the MNOs commenced operations. In 1991 three further licences were issued to provide mobile services using digital technology operating personal communications networks (PCNs), but a subsequent merger reduced these to two—Mercury Personal Communications Ltd (MPC) and Orange. MPC operates its licence in a partnership called Mercury Personal Communications (trading as One2One) which comprises the company and subsidiaries of Media One International[1] and C&W. Orange was originally a wholly-owned subsidiary of Hutchison Telecom (UK) Ltd (HTUK), but in 1996 a public offering of shares in its parent company—Orange plc—took place and the shares were admitted to the Official List of the London Stock Exchange. At March 1998 there were more than 9 million subscribers to the four mobile networks.

3.12. During the period when only BT and Mercury were licensed as national FNOs (known as the duopoly period) companies were licensed under the Cable and Broadcasting Act 1984 to provide broadband cable television services in specific geographical areas. Some of these cable companies were a potential source of competition to BT and Mercury as they were also capable of providing telephony services on their networks. However, they were only able to provide such services as agent for either BT or Mercury. The cable companies in turn were given some protection, in that licences granted to BT, Mercury (and Kingston Communications (Hull) Ltd (Kingston Communications)) prevented these operators from using their networks to convey broadcast entertainment and information services to the home. However, BT and Mercury were free to own local cable franchises and to provide broadcast and entertainment services to any non-residential premises including businesses, schools, universities and hospitals. In 1990/91 the Government reviewed the duopoly policy and in the White Paper *Competition and Choice: Telecommunications Policy for the 1990s* (Cm 1461, March 1991) outlined proposals to end the duopoly within the UK and sought to ensure the growth of competition in all telecommunications markets with a presumption in favour of additional licences being granted. Applications for licences would be considered from any company wishing to establish fixed telecommunications networks in competition with BT and Mercury. In addition, cable companies were permitted to provide voice telephony services directly. The White Paper indicated that restrictions on the conveyance of broadcast entertainment services would not be removed until 2001, though the position would be reconsidered in 1998 if the DGT advised that removing the restrictions would be likely to promote more effective competition in telecommunications.

3.13. BT told us that customers could obtain telecommunication services from three main types of supplier: network operators, who generally provided direct services to selected customers over their own network access; indirect service providers or resellers, who might not own a network, but leased bulk capacity, via private circuits, to provide indirect call services to customers (over other operators' access networks); and aggregators ('switchless resellers'), who provided indirect services but did not need their own switches nor a licence and offered least-cost routing over the networks of other operators.

3.14. Whilst network access could be provided only by network operators physically connecting the customer's premises to the network, call services could potentially be supplied by all types of suppliers. BT said that some network operators might offer network access to particular customers (for example, business customers, or customers in a particular geographic area), but might also offer call services as resellers to all customers. Resellers might market their services directly to customers, through aggregators, or through agents who might repackage and rebrand the reseller's services.

3.15. BT told us that the spread of the UK's cable television companies was now approaching half of all the country's homes; the companies had a telephony penetration rate (that is, the percentage of customers in homes passed taking cable telephony) of around 30 per cent (February 1998) and the DTI had been able to announce in April 1998 that the restrictions on BT and other PTOs, preventing them from offering broadcast entertainment services over their networks, would be progressively lifted. BT and other PTOs now had the option of providing broadcasting to the 17 per cent of UK homes currently outside cable franchise areas and, from 2001, would be able to compete across the country.

[1]Until 1998, when Media One International was split from US West Inc, the joint parent of One2One was US West.

Structure of the BT group

3.16. BT is a major international telecommunications operator which in the year to 31 March 1998 generated turnover of £15.6 billion and whose shareholders' funds at 31 March 1998 were £10.8 billion. As noted in paragraph 3.11, BT owns 60 per cent of CGL which is the holding company for Cellnet, one of the MNOs.

3.17. Until September 1998 (and therefore for the period leading up to this inquiry) BT was organized for management and accounting purposes into four main operating divisions.[1] Three of these divisions—business division, consumer division and global division—were customer focused; the fourth division—network and systems—operated the network used to provide customers with most of the services they require. The four operating divisions were supported by other divisions such as group finance. For regulatory purposes a different organization applies in which BT is divided into a number of businesses and activities (broadly by type of service) for each of which separate financial statements are prepared and published. None of the regulatory units corresponds with the organizational divisions for management purposes. However, the network and systems division was more closely linked to the regulatory network business than to other regulatory businesses, while the business and consumer divisions were more closely linked to the regulatory retail systems and access businesses than to the network business. The various businesses and activities in the regulatory structure of BT are shown in Table 3.1.

TABLE 3.1 **BT: regulatory businesses and activities**

Business	*Activities within the business*
Access	Business
	Residential
Network	N/A
Retail Systems	Local calls
	National calls
	International calls
	Calls to mobile
	Directory enquiries
	Public payphones
	Private circuits
	Other retail systems businesses
Apparatus supply	N/A
Supplemental services	N/A
Residual businesses	N/A

Source: BT.

3.18. Calls to mobile is one of the activities within the BT Retail Systems business. Revenues from calls to mobile will be generated from both business and residential customers and recorded by those customer-facing divisions. Operating costs of calls to mobile will be recorded in the books of both the customer-facing divisions and the network division. Additionally, calls to mobile costs will be incurred in the support divisions to the extent that those divisions contribute to the provision to customers of the facility to make calls to mobile networks. The results of the overseas activities of BT and of its MNO interests are included within the residual businesses category.

BT's network and interconnection with MNOs

BT's network

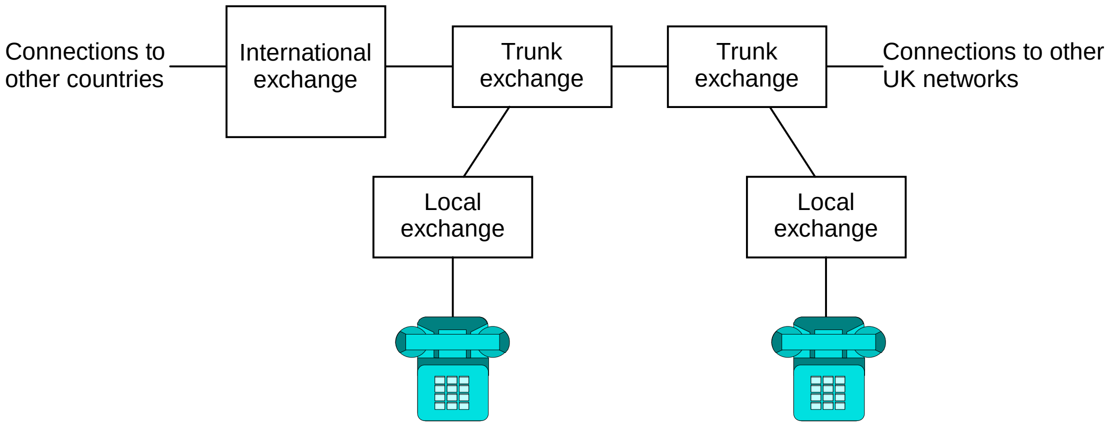
3.19. BT's network is the largest in the UK, comprising over 8,600 local exchanges and concentrator units, 96 trunk exchanges and 6 international exchanges providing in excess of 27 million fixed

[1]Changes to BT's organization structure were announced in August 1998.

lines to customers. It is arranged in a two-tier hierarchy based on a system of local exchanges (LEs) and connections to subscribers' premises at one level and trunk exchanges (TEs) and transmission lines at another, as illustrated in Figure 3.1.

FIGURE 3.1

BT's two-tier hierarchy



Source: MMC.

3.20. Telephones in customers' premises are connected to LEs, either via copper cable or, particularly for business customers with greater traffic volumes, via more expensive links such as optical fibres. The LE provides various aspects of the network's functions, including power to customers' telephones, status tones, billing data and onward routing of calls to other switches. Most local calls are handled at this level. The connection from the customer's premises to the LE is known as the 'local loop'.

3.21. Most long-distance calls and some local calls are routed via TEs, which comprise the second level of the hierarchy. These switches are optimized to convey large volumes of calls and are connected to trunk transmission lines carrying many thousands of individual calls. Most interconnection between other networks and BT's is made at the TE level.

3.22. International calls are routed to other countries via dedicated international exchanges having appropriate billing facilities and equipped to signal to other international switches.

Interconnection

3.23. In the time since the full liberalization of the UK's telecommunications markets, the number of operators offering telecommunications services has rapidly increased. In order for these operators to provide their customers with the ability to make calls to and receive calls from other companies' customers, it is necessary to connect these networks physically either directly or indirectly. This process is known as interconnection.

3.24. Legislation, both in the UK and in the form of the Interconnection Directive (see paragraph 3.53), has imposed interconnection obligations on all telecommunications network operators that provide switched or non-switched bearer services. All operators which are subject to the provisions of the Directive have rights and obligations to negotiate interconnection with other operators. Operators with significant market power (SMP), broadly those with a market share of greater than 25 per cent, have further obligations, including a requirement to allow access to their networks at points other than the network termination points offered to the majority of end-users. BT and Kingston Communications are the only operators deemed by the DGT to have SMP in the national market for interconnection, but Vodafone and Cellnet have been determined as having SMP in the mobile market for interconnection.

3.25. Licensed operators interconnect to BT's network for different reasons. Network operators, including the MNOs, interconnect in order to allow their customers to be able to call BT's customers and vice versa, or to use part of BT's network to transmit calls to the customers of other parties. Indirect operators connect to BT in order to offer competition in subsets of the services that BT provides. Initially this consisted of competition for international calls, but has latterly extended to other services such as national and local calls and calls to mobile phones.

3.26. Many companies have been set up to exploit opportunities in the international market, including ISR operators. ISR operators lease capacity on international routes from existing operators and resell the capacity to their customers by interconnecting with the switched networks at either end of the leased international circuit. These operators take advantage of preferential interconnection tariffs, traffic consolidation opportunities and international payment rate differentials to offer prices that are competitive with conventional operators.

Calls to other phones on BT's network

3.27. National calls to other fixed phones on BT's network are achieved in four stages:

(a) Stage one: seize line to local exchange

The caller lifts the receiver, causing the line to the LE switch and one of the ports on the switch to be reserved for his use for the duration of the call, and a dial tone to be generated. Audio tones generated by the caller's phone handset when dialling the destination number are interpreted by the LE to determine onward routing of the call.

(b) Stage two: call set-up request

A request is sent via BT's national transmission network to the destination LE to ascertain the status of the called customer's phone. The request, and subsequent signalling messages, take the form of packets of data which pass independently through the transmission network along what is called the signalling channel, which is set up at the same time as the speech channel, using the same switches and transmission lines in the BT network.

(c) Stage three: call set-up acknowledgement

The destination LE sends an acknowledgement message back to the originating LE to confirm the availability of the customer (at this point a ringing tone is heard), with a further message when the called customer lifts the handset to answer. The delay from dialling a number to the receipt of the acknowledgement message (and hence ringing tone) is typically between 0.5 and 5 seconds during which time the transmission path through BT's network is reserved and cannot be used for other calls.

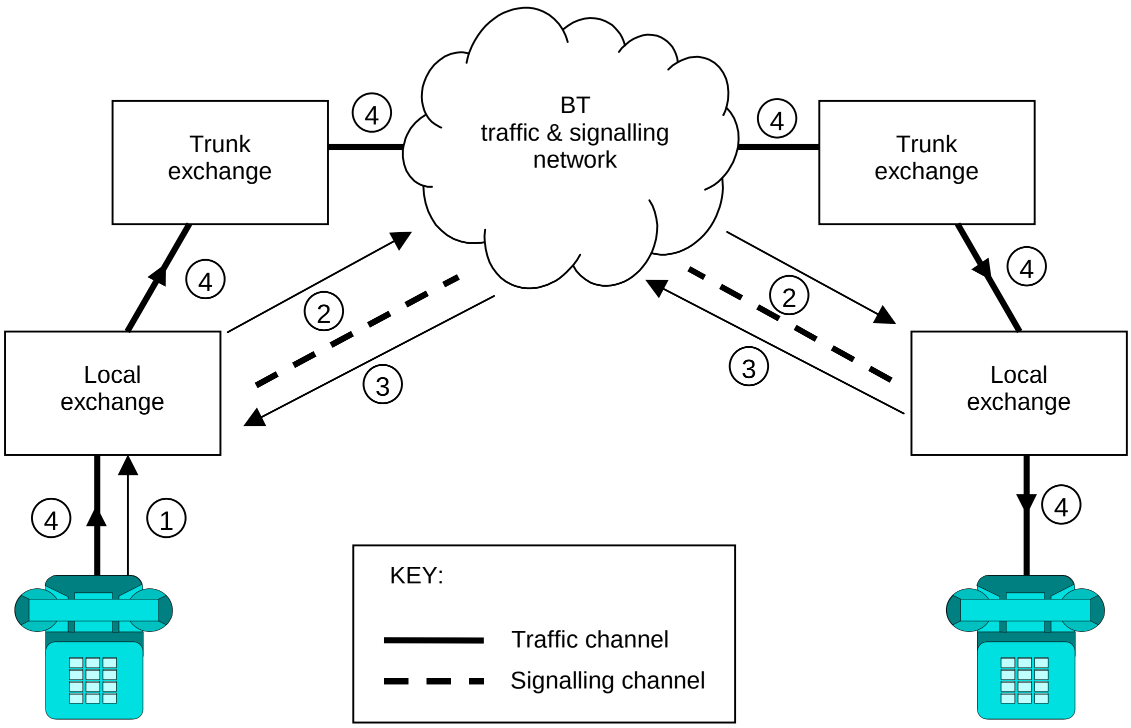
(d) Stage four: open speech channel

Once the originating LE receives confirmation that the destination customer has answered the call, the speech channel is opened through BT's network to carry the voice traffic. The call will generally be connected through at most two TE switches between the LEs.

The process is illustrated in Figure 3.2.

FIGURE 3.2

Set-up process for a call to another phone on BT's network



Source: MMC.

3.28. For local area calls the process is similar, except that most signalling and routing is via one or more LEs typically without involving TEs.

Calls to mobile phones

3.29. Figure 3.3 illustrates the process of connecting a call to a mobile phone network. As for calls to fixed phones, there are four stages:

(a) Stage one: seize line to local exchange

The process begins in the same way as for calls to fixed phones. However, mobile phones are assigned numbers from designated number ranges. At the time of our inquiry, each four-digit prefix was allocated to a specific network—though this was shortly to change as a result of the introduction of mobile phone number portability (see paragraphs 3.31 to 3.35). These prefixes could start with 03, 04, 05, 07, 08 or 09 but, from April 2001, all mobile phone numbers will have a prefix which starts with 07. The LE sends the calls to the TE, which recognizes prefixes and hence that this is a call to a mobile phone (or to a personal number or pager), and also (at the time of our inquiry) which network is being called.

(b) Stage two: call set-up request

A request is sent via BT's national transmission network to the destination mobile network to inform it of the request to connect a call. The message is passed to the mobile network at the nearest point of interconnection (POI). This is known as near-end handover.

(c) Stage three: call set-up acknowledgement

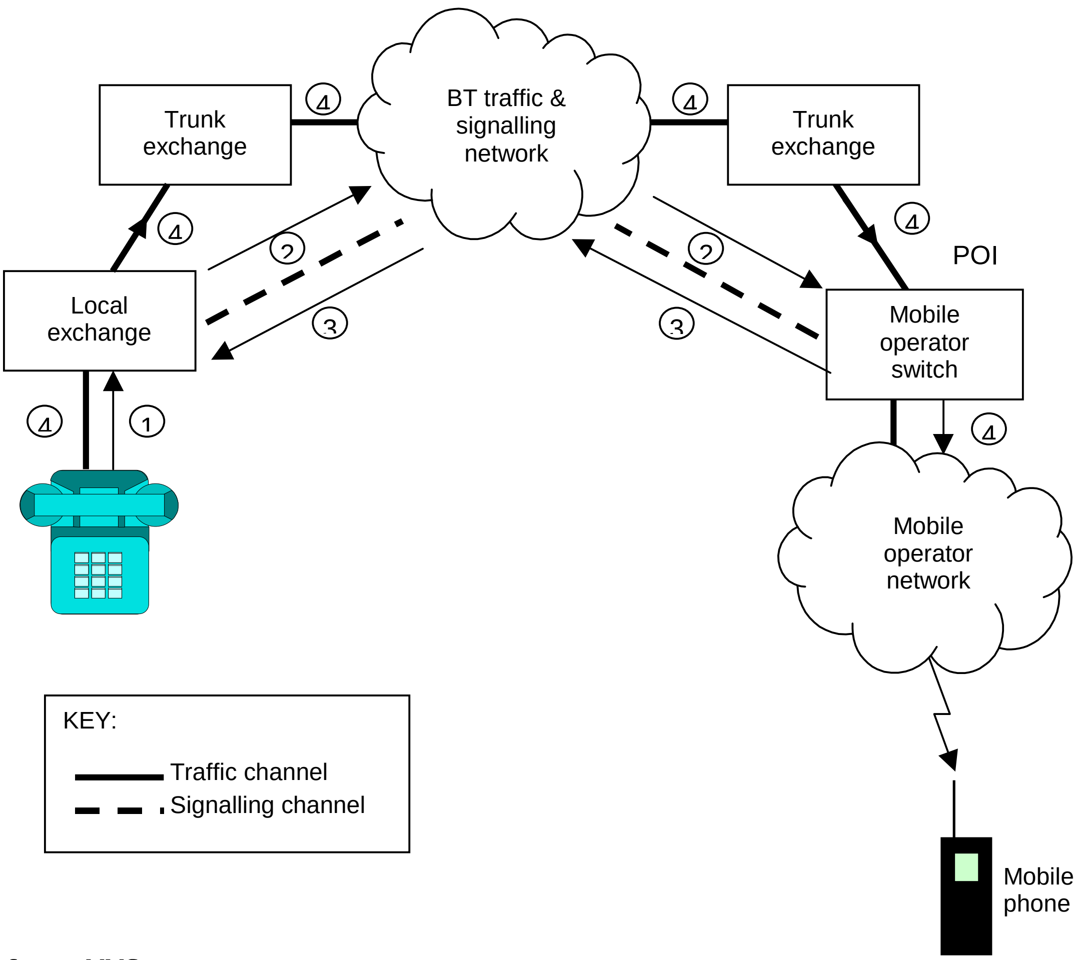
The MNO's network locates the called mobile phone to confirm that it is logged on to the network and prepared to receive calls. If it is not, a recorded message from the mobile network, announcing the status of the mobile phone, is relayed back to the originating LE. At the time of our inquiry, for both Vodafone and Cellnet (but not Orange and One2One) this was accompanied by a charging signal to BT. If it is available, acknowledgement and call answered messages are relayed back to the originating LE. The delay to the receipt of the acknowledgement message (and hence ringing tone) is typically between 3 and 20 seconds, during which time the transmission path through BT's network to the POI with the mobile network is reserved and cannot be used for other calls.

(d) Stage four: open speech channel

Once the originating LE receives a call-answered message, a speech channel is opened via the established POI to carry the voice traffic. The answer may be in the form of the subscriber answering the call, a voicemail system, or a diversion to another phone. For both Cellnet and Vodafone, a charging signal is sent back to BT at this stage (for Orange and One2One, the charging signal for a diverted call is only sent when the new target phone answers).

FIGURE 3.3

Call set-up mechanism for a call from a fixed to a mobile phone



Source: MMC.

3.30. Signalling messages and voice traffic will generally be routed to the nearest POI for that mobile network. Cellnet has of the order of 10 POIs with BT and Vodafone of the order of 60 (the numbers change constantly), so the exact distance to the POI may vary. However, all POIs are accessed via trunk switches and, therefore, all calls from fixed to mobile phones must be routed through at least one TE.

Mobile phone number portability and its implications for BT

3.31. The fact that subscribers historically had to change their number if they wished to transfer from one network operator to another was considered by the DGT to be a major obstacle to competition. Accordingly, he sought to introduce telephone number portability, whereby subscribers could retain their number if they changed networks. Number portability was introduced into fixed networks in June 1996. In January 1997, OFTEL commissioned consultants to carry out a study into the costs and benefits of introducing number portability into mobile networks, the results of which are summarized in Appendix 3.3. As a consequence, the MNOs' licences have been amended, requiring the introduction of mobile number portability (MNP) by 1 January 1999.

3.32. A proprietary technical means of implementing MNP has been developed for use in the UK, which results in calls to numbers which have moved to other networks being routed via both the donor and recipient operators' networks. A detailed description is given in Appendix 3.3.

3.33. A consequence of the introduction of MNP is that the link between the four-digit prefix to the phone number and the network (and therefore to tariffs) is lost. The DGT told us that he believed customers should, in principle, be able to deduce the tariff for all calls to mobile phones. Given that, in future, prefixes will not be specific to network operators, this could be achieved in three ways:

(a) Calls from fixed phones to mobile phones on all four networks could be charged at the same tariff (harmonization). This was the option preferred by the DGT. The solution has the attraction of simplicity, but the MNOs argued that it removed any prospect of using the price of incoming calls as an area of competition. Moreover, unless the charge was uniform throughout the day and the week, the actual average revenue per minute of the MNOs would depend on their traffic profile and might differ between them.

(b) Calls could be charged according to the tariff appropriate to the network operator to which the number was originally allocated. This requires no changes to be made to the billing systems of the FNOs, who would pass on to the MNO the termination charge relating to the original network. However, the MNOs might have different termination charges, in which case there would be an excess or shortfall in the termination rate received by the MNO for calls to mobile phones that had moved networks. In addition, if increasing numbers of subscribers were to change networks, an increasing number of calls would be charged at a rate not set by the subscriber's MNO. This might reduce the incentive for the operators to lower rates in a similar way to the way a harmonized rate would.

(c) Technical means could be developed for determining the ultimate destination of the call, and billing systems and procedures altered accordingly. Possible requirements include the establishment of a central database of ported numbers and the exchange of information in real-time, either at call set-up or during the call. One potential solution based on intelligent network (IN) technology is described in more detail below. Any such solution would have to be supported by all FNOs.

3.34. INs represent a new generation of telephony switching technology, building on the introduction of digital switches in the 1980s. INs allow switches in large networks to be controlled from one (or more) central points using data and processing power that is available at that point. This has the advantages of, *inter alia*, allowing efficient management of the network, removing the need to upgrade software on all switches when new services are to be introduced and improved performance and resilience, as well as offering a range of new services that can be hosted on a central computer system. A variety of potential means exist for the implementation of number portability based on IN technology, most of which involve the interrogation of central databases containing details of ported customers and subsequent rerouting of calls to ported numbers under the control of a central point. However, an IN solution would tackle only the routing part of the problem. It would not address the changes needed in billing systems to enable calls to customers who had changed networks to be charged at the appropriate rate, or the issue of informing customers that the price of a call may be different from that which would be expected on the basis of the prefix.

3.35. BT told us that it was currently exploring the opportunities to be gained from IN-based technology. Indeed, it was already using this technology for some applications (such as non-geographic numbers). However, the cost of IN technology is high and it would seem that its introduction solely for the implementation of number portability would not be justified. The DGT said that it seemed that the roll-out of a number portability solution based on IN technology within the next five years was unlikely.

Competition in calls to mobile phones

3.36. BT faces competition in the market for calls from fixed to mobile phones from four main sources:

(a) tromboning;

(b) other local loop network operators providing access directly to customers;

(c) indirect access operators; and

(d) for larger business customers, direct interconnection with a mobile network via leased lines.

Tromboning of calls to mobiles phones and arbitrage opportunities

3.37. From a technical point of view calls from overseas to mobile phones in the UK are treated no differently from other calls from overseas. Incoming international traffic is usually routed initially to BT's network. BT told us that international delivery payments (known as settlement rates) were agreed between international operators on a country-by-country basis, but in most countries the details of the UK dialling plan were not programmed into the international switches. Hence a standard settlement rate was payable to BT on all calls into the UK (whether to fixed or mobile phones). In the case of calls to mobile phones, however, BT was still liable to pay the termination rate to the recipient mobile network. A further description of tromboning arrangements is given in paragraphs 4.55 to 4.62.

3.38. We were told that several international resellers had set up arbitrage schemes to exploit this imbalance. These organizations offered callers to mobile phones the opportunity of reduced rates by tromboning calls via other countries. That is, calls were routed out of the UK and immediately back in to BT's network and thence to the mobile network, but at the international settlement rate rather than the higher termination rate that a directly connected call would incur.

3.39. BT said that it was attempting to combat this situation by monitoring the volume of traffic inbound and outbound to international operators which had not agreed a different settlement rate for calls to mobile phones, and capping the capacity available should the ratio become unreasonably imbalanced, which might imply the presence of an arbitrage operation.

Other local loop network operators

3.40. A variety of operators offer alternative local loop access to the PSTN from which calls may be made to mobile phones, in addition to calls from mobile phones themselves:

(a) Most large urban areas are served by cable television networks (CATV) that are also able to use the cabling through which this service is broadcast to offer alternative local loop access to the PSTN.
(b) High-volume business users may, in certain parts of the country, gain direct access to long-distance networks by leasing high-capacity links.

(c) In some parts of the UK, alternative local loop access can be established by using wireless in the local loop technology which allows customers to connect to the operator's infrastructure using a radio system mounted outside the customer's premises.

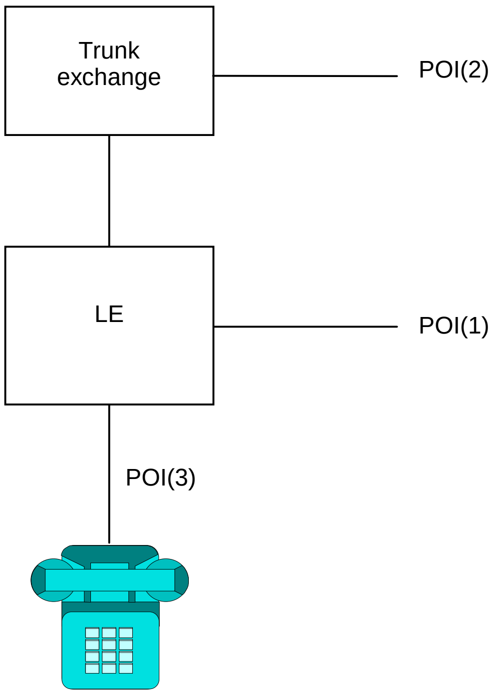
Indirect access and carrier pre-selection

3.41. Indirect access (or carrier selection) has been a feature of competition since liberalization in the telecommunications market in the UK began. In essence, it means that BT's customers are able to access the long-distance networks (equivalent to BT's trunk networks) of alternative operators, using BT's local loop network. With the award of an operating licence to Mercury in 1983, BT was obliged to allow Mercury to interconnect switches to BT's switches and offer its customers the opportunity of accessing Mercury's network by dialling a network access code before making each call, thereby offering competition for long-distance and international calls.

3.42. Figure 3.4 shows the points in BT's network at which other operators are able to interconnect, thereby offering alternative long-distance and international services without the need to invest in a costly local access network. Interconnection can be achieved at either LE (POI(1)) or TE (POI(2)) level. These alternative lines are generally accessed by entering a three- or four-digit code, which is recognized by BT's switches and allows the call to be rerouted. At the time of our inquiry, access at the local loop level (POI(3)) was not generally available.

FIGURE 3.4

Indirect access to BT's network



Source: MMC.

3.43. Interconnection in this way is now standard. Technical, commercial and operational arrangements are well established for interconnection between different network operators.

3.44. Carrier pre-selection is an extension of indirect access, allowing customers to opt to direct all calls of a particular type via the alternative network of an operator other than BT, without the need to dial an access code for each call. Technically and operationally, however, carrier pre-selection is more demanding to implement than carrier selection, requiring operators to implement changes to software in LEs and operational support systems and also to exchange information with other operators when the service is first set up or subsequently altered. The introduction of carrier pre-selection by operators with SMP (BT and Kingston Communications in the UK) has been mandated by 1 January 2000 by the European Commission. Member states can apply for deferment if implementation is not technically feasible within this timescale. BT told us that the UK was applying for deferment because of the time required to implement carrier pre-selection in its network.

Leased lines

3.45. All four MNOs offer companies that are high-volume users of mobile phones the facility of directly connecting their private exchanges to the mobile network, thereby avoiding transiting the traffic through an FNO and allowing considerable savings on the cost of fixed-to-mobile calls.

Regulation

3.46. BT is regulated under its licence in a number of ways. These affect, *inter alia*, its relationships with its customers and with other telecommunications operators. In addition, the licence provides the basis on which BT accounts and reports to the DGT for regulatory purposes.

Customers

3.47. BT's licence includes a range of controls, including specific restrictions on BT's retail prices, which are intended to protect the interests of consumers and to prevent anti-competitive behaviour on the part of BT. In 1984 an overall retail price cap of RPI–3 per cent was set, covering a basket of products and services which included exchange line rentals, local calls and national calls. The control factor (generally referred to as X) was subsequently increased when the price cap was reviewed in 1989, 1991 and again in 1993. Over time other products and services have been included in the basket and there have been separate sub-caps on individual services within the control. The most recent review by the DGT took place in 1997 and the resulting price cap of RPI–4.5 per cent applies for the four years from 1 August 1997, expiring on 31 July 2001. The price controls in the current price cap are now focused on the spending patterns of the bottom eight deciles of residential customers by bill size and cover a smaller proportion of BT's activities than previously. In announcing his proposals for the control period from 1997, the then DGT said that the X of 4.5 per cent corresponded to an X of 7.0 to 8.5 per cent under the previous price control (the X which applied from 1993 to 1997 was 7.5 per cent). The X for a residential focused price cap is smaller because the residential customers covered make fewer international and national calls than businesses. Thus a higher proportion of the basket is now accounted for by residential rental and local calls, which together are less profitable. This has reduced the level of X thought appropriate by the DGT. The DGT told us that the X of 4.5 per cent for the customers concerned was equivalent to the 2.7 per cent which they effectively received over the previous six years. The services covered by the current retail price cap include residential exchange line rentals, connection charges for residential lines, directly-dialled calls and operator-assisted calls. Calls to customers of an operator which is not a fixed-line operator (ie calls to mobile phones) are excluded from the retail price control. The retail price control does, however, spill over to the business market as BT must make the main basket prices available to small business customers as a safeguard measure. BT has agreed to a cap of RPI + 0 per cent on the small business exchange line rental.

3.48. BT has an obligation to provide basic telecommunication services to every person who requests them in any place in the UK (other than Kingston-upon-Hull),[1] except to the extent that the DGT is satisfied that any reasonable demand can be met by other means. This is the basis of what is referred to as the universal service obligation, which is generally taken to mean the requirement to provide customers with direct access to a switched telephone network, and with the ability to make and receive calls, at a reasonable price. BT also has licence obligations to provide 999 services, call boxes and limited service schemes for residential customers concerned about call bills.

[1]Kingston Communications carries similar obligations in the Kingston-upon-Hull area.

3.49. Condition 17 of BT's licence prohibits 'undue preference' and 'undue discrimination'. This constrains BT's ability to charge different customers different prices, for instance in different parts of the UK. Condition 16 of the licence requires BT to publish terms and conditions, including charges, for those services which BT provides in accordance with an obligation placed on it by its licence and to adhere to those terms and conditions. These obligations apply equally to fixed-to-mobile calls. In 1996 an additional licence condition (Condition 18a) was introduced providing for fair trading obligations on BT comparable with those applying under Articles 85 and 86 of the Treaty of Rome prohibiting the abuse of a dominant position or the making of anti-competitive agreements.

Interconnection

3.50. BT has the largest and most comprehensive telecommunications network in the UK. A large number of telephone calls make some use of BT's facilities and considerable regulatory attention has been paid to the terms and conditions for interconnection between BT and other operators.

3.51. Condition 13 of its licence requires BT to enter into agreements (or to amend existing agreements) with certain OLOs to interconnect their systems with the BT network. This obligation applies not only to operators authorized to construct their own networks, such as the cable companies, but also to operators who are licensed to resell the facilities of network providers such as BT and do not construct their own network. The condition originally provided that where BT and the other operators could not agree on the terms and conditions of interconnection, the DGT might determine them, including the charges payable. The condition also provided that interconnection charges should enable BT to recover its costs, including the FAC attributable to the services to be provided, taking into account relevant overheads and a reasonable rate of return on attributable assets. With the licensing of a large number of operators, all of which required interconnection with BT, it became apparent that the former practice of individual negotiations, followed by a determination from the DGT where the parties could not agree, could be improved. In March 1995, BT and the DGT agreed a number of modifications to BT's licence providing a different interconnection regime, coupled with accounting separation. These modifications were far reaching and included requirements for BT:

(a) to establish and publish standard interconnection prices;

(b) to offer interconnection prices on a non-discriminatory basis to all operators;

(c) not to discriminate unduly with respect to the quality of interconnection services;

(d) to apply the same network charges to BT Retail Systems business as apply to other operators;

(e) not to cross-subsidize unfairly any of the regulatory businesses or any part or parts of them; and

(f) to prepare and publish separate audited financial statements, in accordance with a set of methodologies to be approved by the DGT, for specified businesses and activities.

3.52. BT's main interconnection obligations are now to offer to enter into an agreement with any licensed operator, or to amend an existing agreement, to interconnect its system with that of the OLO. BT must also provide other telecommunications services to enable the OLO efficiently to provide its own services. BT has to ensure that the terms of interconnection agreements are 'reasonable' and is required to offer the same charges and associated terms to all operators and must charge itself the same as it charges OLOs for standard services. From 1 October 1997 charges for standard interconnection services have to be reasonably derived from data based on forward-looking LRIC. For a defined set of standard services (subdivided into three baskets) a network charge price control of RPI–8 per cent will apply until 30 September 2001. Other interconnection services are either subject to a price control of RPI + 0 per cent or are deemed to be competitive, with BT setting its own prices within normal fair trading parameters. BT has to publish all interconnection agreements, or amendments to existing agreements, within 28 days of their signature.

3.53. Interconnection is also regulated by the EC Interconnection Directive,[1] which has been implemented in the UK by the Telecommunications (Interconnection) Regulations 1997.[2] The main provisions relevant to this inquiry are as follows:

(a) Article 1 sets out the scope and aim of the Directive, namely the establishment of a regulatory framework for securing the interconnection of telecommunications networks. It states that the Directive concerns the harmonization of conditions for open and efficient interconnection and access to public telecommunications networks and publicly available telecommunication services.

(b) Article 3 requires member states to remove restrictions preventing telecommunications network operators and service providers from negotiating interconnection agreements. Technical and commercial arrangements are to be a matter for agreement between the parties, subject to the Directive and the competition rules of the Treaty.

(c) Article 6 imposes requirements of non-discrimination and transparency for organizations notified by national regulatory authorities (NRAs) as having SMP. Cellnet and Vodafone have been so notified.

(d) Article 7 sets out provisions on interconnection charges to be applied to FNOs which have been notified by NRAs as having SMP. Article 7.2 requires that charges for interconnection follow principles of transparency and cost-orientation. MNOs which have been notified by NRAs as having SMP on the national market for interconnection are also subject to this requirement. Cellnet and Vodafone have not been notified as such, but have been determined as having SMP in the mobile market for interconnection.

(e) Article 9 sets out the general responsibilities of NRAs. Article 9.1 provides that NRAs are to encourage and secure interconnection, exercising their responsibilities in a way which provides maximum economic efficiency and gives the maximum benefit to end-users. They must take account of a number of matters including the principles of non-discrimination and proportionality and the need to stimulate a competitive market. Article 9.3 provides that in pursuit of the aims in paragraph 1 NRAs may intervene on their own initiative at any time and shall intervene on request of a party, to specify issues to be covered in an interconnection agreement or lay down specific conditions to be observed by a party to such an agreement. NRAs may, in exceptional cases, require changes to be made to existing interconnection agreements 'where justified to ensure effective competition and/or interoperability of services for users'.

Accounting arrangements

3.54. Condition 20B of BT's licence provides that BT has to prepare and publish audited financial statements under the accounting separation arrangements for each of the designated regulatory businesses and activities. The financial statements now have to be prepared on both an HCA and a CCA basis. Further details of the regulatory accounting arrangements are set out in Appendix 3.4.

Financial results

BT

[1]97/33/EC.
[2]SI 1997/2931.

3.55. The financial results of BT, together with the accounting separation results of the main businesses concerned with the provision of fixed-to-mobile calls—BT Access, BT Network and BT Retail Systems business—are considered below. The results of the call activities within the BT Retail Systems business are considered further in paragraphs 5.9 to 5.11.

3.56. Table 3.2 shows the summarized consolidated financial results of BT for the five years to 31 March 1998.

TABLE 3.2 **BT: summarized consolidated financial results of BT**

£ million

	1993/94	*1994/95*	*1995/96*	*1996/97*	*1997/98*
Profit and loss account					
Turnover	13,675	13,893	14,446	14,935	15,640
Other operating income	53	129	103	106	372
Operating profit	2,982	2,663	3,100	3,245	3,657
Results of associated undertakings	18	92	82	139	(252)
Sale of group undertakings	(14)	241	7	8	63
Net interest payable	(230)	(259)	(170)	(129)	(249)
Bond purchase premium	-	(75)	-	(60)	-
Pre-tax profit	2,756	2,662	3,019	3,203	3,219
Corporate tax etc	(951)	(926)	(1,027)	(1,102)	(978)
Windfall tax	-	-	-	-	(510)
Post-tax profit	1,805	1,736	1,992	2,101	1,731
Minority interests	(38)	(5)	(6)	(24)	(25)
Profit for the year	1,767	1,731	1,986	2,077	1,706
Dividends	(1,039)	(1,108)	(1,184)	(3,510)	(1,220)
Retained profit	728	623	802	(1,433)	486
Balance sheet					
Tangible fixed assets	15,584	16,012	16,496	16,802	17,252
Fixed asset investments	1,312	1,082	1,057	1,273	1,708
Net current assets/(liabilities)	125	(725)	(106)	(2,667)	(2,636)
Total assets less current liabilities	17,021	16,369	17,447	15,408	16,323
Loans and borrowings due after one year	(3,199)	(3,361)	(3,322)	(2,693)	(3,889)
Provisions	(701)	(879)	(1,267)	(1,391)	(1,426)
Minority interests	(95)	(132)	(180)	(208)	(223)
Shareholders' funds	13,026	11,997	12,678	11,116	10,785
Net debt	1,226	2,153	948	176	3,977
Provisions	701	879	1,267	1,391	1,426
Minority interests	95	132	180	208	223
Net assets	15,048	15,161	15,073	12,891	16,411
Operating profit return:					
On turnover	21.8	19.2	21.5	21.7	23.4
On average net assets	19.7	17.6	20.5	23.2	25.0
Gearing (debt:debt + equity)	8.6	15.2	7.0	1.6	26.9

Source: BT.

3.57. The shareholders' funds were reduced in 1996/97 by a special dividend of £2,244 million and in 1997/98 by the charge for the windfall tax of £510 million. BT's investment in MCI Communications Corporation was included in fixed asset investments at 31 March 1998 at £813 million, goodwill of £2,214 million having been written off to reserves in prior years in respect of the investment. In November 1997 BT agreed to sell the shareholding to WorldCom International Limited; the potential consideration was equivalent to £4,137 million at the exchange rate ruling at 31 March 1998. The transaction was completed after the year end.

BT's regulatory businesses

3.58. The main businesses under the regulatory accounting arrangements concerned with fixed-to-mobile calls are the Access, Network and Retail Systems businesses. Summarized financial results for these businesses for the four years to 1997/98 (after regulatory decisions and restatement) are shown in

Table 3.3. The results of the local, national, international and calls to mobile call activities within the retail business are considered further in Chapter 5 which deals with the cost of fixed-to-mobile calls.

TABLE 3.3 **BT: financial results of selected regulatory businesses**

				£ million
	1994/95	*1995/96*	*1996/97*	*1997/98*
*BT Access**				
Turnover	2,738	2,882	3,026	3,183
Return	(415)	(235)	(99)	(37)
Mean capital employed	7,443	7,144	6,935	6,481
				per cent
Return on:				
Turnover	(15)	(8)	(3)	(1)
Mean capital employed	(6)	(3)	(1)	(1)
				£ million
BT Network				
Turnover	4,854	4,670	4,696	4,696
Return	909	836	737	819
Mean capital employed	6,061	5,645	6,059	6,407
				per cent
Return on:				
Turnover	19	18	16	16
Mean capital employed	15	15	12	13
				£ million
*BT Retail Systems business**				
Turnover	8,427	8,582	8,601	8,539
Return	2,281	2,347	2,671	2,397
Mean capital employed	1,433	2,312	2,481	1,686
				per cent
Return on:				
Turnover	27	27	31	28
Mean capital employed	159	102	108	142

Source: BT.

*Until 7 February 1996, BT Retail Systems business paid ADCs to BT Access. Such payments made in 1994/95 and 1995/96 (£1,390 million and £1,000 million) by BT Retail Systems business have been excluded from the financial results in this table.

The turnover of the BT Retail Systems business reflects substantial transfer charges from BT Network and as a result the combined turnover of the three businesses above exceeds the turnover of the BT group (see paragraph 3.56), in which such intra-group turnover has been eliminated on consolidation.

Mobile network operators

3.59. The four MNOs (see paragraph 3.11) are Vodafone, Cellnet, Orange and One2One.[1] Vodafone and Cellnet were licensed in 1983 and commenced operating in 1985 with an analogue service. Subsequently both Vodafone and Cellnet were awarded digital licences and their networks are now a combination of digital and analogue capacity. Orange and One2One operate digital networks, though using a slightly different technology with 1800 rather than 900 MHz radio links. One2One began operating in September 1993 and Orange in April 1994. A summary of the group structure of each operator and its recent financial results is given below.

Vodafone

3.60. Vodafone Limited, the company which holds the UK mobile licence and operates the network, is a wholly-owned subsidiary of Vodafone Group plc. In addition to Vodafone Limited, the Vodafone group includes companies dealing with value-added services, mobile phone retailing, mobile

[1]A further mobile licence was awarded to Dolphin Telecommunications Ltd on 12 December 1997.

service provision and paging as well as overseas companies providing mobile telephony networks. In the financial year 1997/98 the turnover of the Vodafone group was £2,471 million, of which 72 per cent arose in the UK (mainly from the Vodafone network), 20 per cent in Continental Europe and 8 per cent in the Pacific Rim. Vodafone was originally a wholly-owned subsidiary of Racal Electronics plc (Racal), but in 1988 a Stock Exchange listing was obtained for a minority of the shares in Vodafone Group plc and in 1991 the remaining shares were distributed to shareholders in Racal, so that Vodafone Group plc became independent of Racal. At 31 October 1998 the market capitalization of Vodafone Group plc was £24.8 billion.

3.61. The consolidated financial results of Vodafone Group plc and of Vodafone Limited for the five years to 31 March 1998 are summarized in Table 3.4.

TABLE 3.4 **Vodafone: summary financial details of Vodafone Group plc and Vodafone Limited**

£ million

	1993/94	*1994/95*	*1995/96*	*1996/97*	*1997/98*
Vodafone Group plc					
Turnover	851	1,153	1,402	1,749	2,471
Operating profit*	338	353	466	530	686
Pre-tax profit	363	371	475	539	650
Post-tax profit	245	238	310	367	447
Dividends	84	102	123	147	170
Fixed assets†	720	1,102	1,432	1,927	1,912
Shareholders' funds	698	817	1,022	770	283
Net debt	(111)	160	207	681	1,117
Vodafone Limited					
Turnover	695	930	1,090	1,186	1,342
Operating profit	335	407	474	500	580
Pre-tax profit	345	416	490	518	597
Post-tax profit	237	284	334	353	418
Dividends	160	208	250	300	360
Tangible fixed assets	463	510	580	660	806
Shareholders' funds	574	650	734	788	846
Net external debt	11	6	3	(1)	5

Source: Vodafone.

*In 1997/98 interest paid by associated companies was shown separately in the accounts of Vodafone Group plc, instead of being included within the results of associated companies as part of operating profit. If the new basis had been applied in 1996/97 the operating profit for that year would have been £539 million; the pre-tax profit was unaffected by the change.

†Includes intangible assets.

Cellnet

3.62. Telecom Securior Cellular Radio Limited (Cellnet), the company which holds the licence and operates the network, is a wholly-owned subsidiary (via an intermediate holding company (Cellnet Networks Ltd)) of CGL. CGL is in turn owned as to 60 per cent by BT and 40 per cent by Securicor Group plc. Cellnet holds investments in a number of companies involved with mobile telephony including Link Stores Ltd (40 per cent), DX Communications Ltd (26 per cent), Cellular Operations Ltd (40 per cent) and The Mobile Phone Store Ltd (40 per cent). Another subsidiary of CGL—Cellnet Services Ltd—owns Cellnet Solutions Ltd, Cellnet Transactions Ltd and Call Connections Ltd.

3.63. The financial results of CGL and of Telecom Securior Cellular Radio Limited (as the company operating the mobile network) for the five years to 31 March 1998 are summarized in Table 3.5.

TABLE 3.5 **Cellnet: summary financial details of Cellnet Group Ltd and Telecom Securicor Cellular Radio Ltd**

					£ million
	1993/94	*1994/95*	*1995/96*	*1996/97*	*1997/98*
Cellnet Group Ltd					
Turnover	468	685	919	997	
Operating profit	168	200	231	187	
Pre-tax profit	128	155	183	145	
Post-tax profit	93	100	119	97	
Dividends	47	50	36	-	
Fixed assets*	567	744	851	915	
Shareholders' funds	189	239	322	403	
Net debt	407	453	440	426	
Telecom Securicor Cellular Radio Ltd					✂
Turnover	451	657	874	932	
Operating profit	166	206	241	188	
Pre-tax profit	125	160	193	147	
Post-tax profit	91	104	125	98	
Dividends	46	50	36	-	
Fixed assets*†	562	738	845	924	
Shareholders' funds	171	225	315	413	
Net debt	413	472	449	541	

Source: Cellnet.

*Includes intangible assets representing the cost of subscriber leases amortized over lives of up to three years.
†The 1997/98 accounts to be filed at Companies House will include a change in accounting policy to write off the cost of acquisition of subscriber bases immediately.

3.64. The operations of Cellnet form the major part of CGL. All CGL subsidiaries are UK based and there are no overseas operations comparable with those of the Vodafone group. A substantial part of the net debt of Cellnet is provided by BT. The construction of the analogue network was funded by a finance lease from Cellular Radio Ltd (formerly BT Cellular Radio Ltd): borrowing by Cellnet at 31 March 1998 included finance leases of £207 million owing to BT group companies. The majority of the employees of Cellnet are employed by BT, with the employment costs being recharged. In 1996/97 there was an exceptional charge of £65 million in Cellnet in relation to an abortive billing and customer care project.

Orange

3.65. The principal business of Orange plc and its subsidiaries is the operation of the Orange PCN telecommunications network in the UK which is carried on by a subsidiary company, Orange Personal Communications Services Ltd (Orange). In addition to operating the Orange network, Orange plc group provides a range of other mobile telecommunication services in the UK and has mobile telephony interests in France, Germany, Austria, Switzerland and Belgium. Orange was originally a wholly-owned subsidiary of HTUK, which immediately prior to an offer for sale in March 1996 was owned by Hutchison Whampoa (68.4 per cent) and British Aerospace (31.6 per cent). Following flotation, the market capitalization of Orange plc on 31 October 1998 was £6.7 billion. 30 per cent of the share capital is now publicly held, Hutchison Whampoa and British Aerospace holding 49 per cent and 21 per cent respectively.

3.66. A summary of the financial results of Orange plc and of Orange Personal Communications Services Ltd for the five years to 31 December 1997 is shown in Table 3.6.

TABLE 3.6 **Orange: summary financial details of Orange plc and Orange**

£ million

	Years ended 31 December				
	1993	*1994*	*1995*	*1996*	*1997*
Orange plc					
Turnover	124	143	229	619	914
Operating loss	(46)	(92)	(121)	(177)	(51)
Loss for the year	(231)	(119)	(140)*†	(229)	(139)
Fixed assets‡	278	416	579	750	986
Shareholders' deficit	(316)	(435)	(575)	(121)	(261)
Net debt	484	740	969	704	1,078
Orange Personal Communications Services Ltd					
Turnover	-	34	119	375	634
Operating loss	(6)	(78)	(126)	(188)	(52)
Loss for the year	(6)	(77)	(110)*†	(255)	(163)
Fixed assets‡	235	399	549	719	935
Shareholders' deficit	29	(48)	(181)	(435)	(599)
Net debt	182	401	608	1,060	1,421

Source: Orange.

*In 1995 the accounting policies for the amortization of subscriber acquisition costs and capitalization of interest costs associated with the construction of mobile network assets were changed. Had the accounting policies not changed the net loss of Orange Personal Communications Services Ltd would have been decreased by £40 million.

†The loss for the year in 1995 was arrived at after taking account of an exceptional gain on defeasance of finance leases of £64 million.

‡Includes intangible assets.

One2One

3.67. MPC, a company which is ultimately equally owned by Media One International (paragraph 3.11) and C&W, has been granted a licence to provide personal communications services in the UK. Together with USW PCN Inc (a company wholly owned by Media One International) and MPC 92 Ltd (a company wholly owned by C&W), MPC set up a partnership called Mercury Personal Communications (which trades as One2One) for the purpose of operating the licence to build and operate a national PCN network in the UK. One2One is ultimately a 50:50 joint venture between Media One International and C&W.

3.68. A summary of the financial results of the One2One partnership for the five years to 31 March 1998 is shown in Table 3.7.

TABLE 3.7 **One2One: summary financial details of the One2One partnership**

£ million

	1993/94	*1994/95*	*1995/96*	*1996/97*	*1997/98*
Turnover	28	95	164	262	548
Operating loss	(63)	(115)	(106)	(217)	(125)
Loss of the year	(66)	(123)	(133)	(276)	(229)
Fixed assets*	203	320	436	686	938
Partners' capital/(deficit)	138	172	49	(227)	(456)

Source: MPC.

*In 1996/97 deferred customer acquisition costs and deferred revenue expenditure totalling £96.4 million was re-classified in the balance sheet from current assets to intangible fixed assets.