

4 Competitive pressures on charges for calls to mobile phones

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Introduction

4.1. This chapter begins by looking at the growth in the use of mobile phones. It then examines charges for fixed-to-mobile calls and their components. Next it considers the FNOs by looking at their shares of fixed-to-mobile calls and at the competitive pressures on their charges. Finally the chapter examines the mobile networks by looking at the MNOs' shares and churn, and by analysing the competitive pressures on termination rates.

The growth in the use of mobile phones

4.2. The use of mobile phones has grown substantially over the last few years. Table 4.1 shows the proportion of call minutes from fixed lines (in total and from BT) by call type in 1992/93 and 1997/98 and the growth in call minutes between these two years. In volume terms the two main categories of calls are: local and national. In 1997/98 local and national calls accounted for 60.2 and 28.1 per cent respectively of call minutes from fixed lines. The proportions held by these two categories have fallen between 1992/93 and 1997/98 as the growth in call minutes in local and national calls (45 and 52 per cent respectively) has been lower than the growth in other call types. The proportion of call minutes for international calls rose from 3 per cent in 1992/93 to 3.5 per cent in 1997/98 as the growth in these call minutes (88 per cent) was higher than the growth in total call minutes (57 per cent). Fixed-to-mobile calls accounted for 0.9 per cent of all call minutes in 1992/93 and for 2.4 per cent in 1997/98, the volume of these call minutes growing by 321 per cent between these two years.

TABLE 4.1 Proportion and growth of call minutes from fixed lines by types of call, 1992/93 and 1997/98

<i>Types of calls</i>	<i>Proportion of call minutes in</i>		<i>Growth in call minutes 1992/93 to 1997/98</i>	<i>Proportion of call minutes in</i>		<i>Growth in call minutes 1992/93 to 1997/98</i>
	<i>1992/93</i>	<i>1997/98</i>		<i>1992/93</i>	<i>1997/98</i>	
	<i>All FNOs</i>			<i>BT only</i>		
Local	65.3	60.2	45.0	67.2	63.8	27.0
National	29.2	28.1	52.0	27.9	26.4	27.0
International	3.0	3.5	88.0	2.5	2.2	20.0
Mobile	0.9	2.4	321.0	0.9	2.3	257.0
Other	1.6	5.7	476.0	1.6	5.2	330.0
Total	100.0	100.0	57.0	100.0	100.0	33.0
Total volume (billion)	98.3	154.8	56.5	91.4	122.0	30.6

Source: MMC calculations based on published OFTEL data.*

*Local, national and international comprise only simple voice calls (including integrated services digital network (ISDN)). 'Other' calls include number translation services, premium rate, DQ, operator calls, the speaking clock and public payphones. Calls from BT private payphone lines are not included up to 1995/96 but are included in the relevant section from 1996/97. International call minutes and fixed-to-mobile calls are overstated up to 1995/96 due to the inclusion of interconnect minutes in the BT data. There may be some double counting of minutes, particularly for international calls, due to calls supplied by an operator to a reseller being counted by both the operator and the reseller.

Note: Totals may not sum due to rounding.

4.3. Table 4.2 shows the substantial growth in the number of subscribers and the number of call minutes on the mobile networks over the last five years.

TABLE 4.2 The growth in the use of mobile phones

	<i>Number of subscribers m*</i>	<i>Incoming minutes bn†</i>	<i>Outgoing minutes bn</i>	<i>Total minutes bn‡</i>
1992/93	1.51	0.97	1.61	2.58
1993/94	2.27	1.21	2.05	3.26
1994/95	3.94	1.76	3.36	5.12
1995/96	5.74	2.46	5.06	7.51
1996/97	7.11	3.49	6.81	10.30
1997/98	9.02	5.03	9.57	14.60

Source: MMC calculations on published OFTEL data.

*As at March of that year.

†Includes all incoming minutes, not just those from fixed lines.

‡Totals may not sum due to rounding.

4.4. Between 1992/93 and 1997/98 the annual average growth was 43 per cent for the number of subscribers, 39 per cent for the number of incoming minutes, 43 per cent for the number of outgoing minutes and 41 per cent for the total number of minutes.

Charges for fixed-to-mobile calls and their components

4.5. In order to make fixed-to-mobile calls users pay retail charges to their FNO. These retail charges consist of charges (known as termination charges) from the MNO to the FNO for terminating calls on the mobile network and the FNO's own costs including a profit margin.

4.6. Hence, in the case of BT, retail charges to customers for fixed-to-mobile calls comprise termination charges (paid by BT to the MNO) and BT's retention (which includes BT's own costs and a profit margin). We deal first with BT's retail prices, secondly with the MNOs' termination charges and finally with BT's retention rate.

BT's retail prices

4.7. Table 4.3 shows BT's headline fixed-to-mobile tariffs (before discounts) between 1993/94 and August 1998, the date of the last change in rates (see paragraphs 4.35 and 4.36 and Table 4.9 for a comparison of BT's retail tariffs for fixed-to-mobile calls and those of other operators). BT told us that it offered discounts on its headline prices ranging from 5 to 15 per cent, for example residential customers could nominate, free of charge, one mobile number as a Friends and Family number getting a discount of 10 per cent. It said that currently 13 million customers had signed up to Friends and Family, with 4 million of those having nominated a mobile number. BT stated that the average discount across all of its fixed-to-mobile calls was 4.9 per cent as at March 1998 (or 4.2 per cent after deducting an allowance for fees).

TABLE 4.3 BT's headline retail charges (excluding VAT) for fixed-to-mobile calls

ppm

	1993/94	1994/95	1995/96*	Apr 96	Jul 96	Oct 96	Feb 97	Aug 97	Oct 97	Aug 98
<i>Peak/standard/day†</i>										
Vodafone	33.60	33.60	34.93	34.93	34.93	31.91	31.91	31.06	27.23	25.53
One2One	16.80	16.80	14.22	14.22	14.22	14.22	25.53	25.53	25.53	25.53
<i>Cheap/evening‡</i>										
Vodafone	25.20	25.20	24.10	24.10	24.10	21.27	21.27	18.72	18.72	17.02
One2One	8.40	8.40	8.38	8.38	8.38	8.38	17.02	17.02	17.02	17.02
<i>Cheap/weekend§</i>										
Vodafone	25.20	25.20	24.10	24.10	10.63	10.63	10.63	8.93	8.93	8.51
One2One	8.40	8.40	8.38	8.38	8.38	8.38	8.51	8.51	8.51	8.51

Source: BT.

*Tariffs introduced in June 1995. Prior to June 1995, retail prices were based on a unit structure with a given time allowance per unit. Prices quoted are for a 1-minute call. After June 1995, charges were on a per-second basis and hence are not directly comparable.

†Peak charges applied on weekdays, 9 am to 1 pm, standard charges applied on weekdays 8 am to 9 am and 1 pm to 6 pm and day charges applied on weekdays, 8 am to 6 pm.

‡Cheap charges applied on weekdays 6 pm to 8 am and on weekends and evening charges applied on weekdays, 6 pm to 8 am.

§Cheap charges applied on weekdays 6 pm to 8 am and on weekends and weekend charges applied on weekends.

Note: BT's tariffs for calls to Cellnet (Orange) are the same as those for calls to Vodafone (One2One). One2One launched its service in September 1993.

4.8. As from August 1998, BT offered the same tariff for calls to all mobile networks. Before August 1998 BT charged lower rates for calls to Orange and One2One than it did for calls to Vodafone and Cellnet: between half and two-thirds lower in 1994/95.

4.9. BT's retail rates for calls to the Vodafone and Cellnet networks were broadly constant until October 1996 (July 1996 for weekend calls) when daytime rates fell in real terms by about 10 per cent and evening rates by 13 per cent. In July 1996 BT's weekend rates for calls to Vodafone and Cellnet fell by 56 per cent in real terms. Between October 1996 and August 1998 BT's rates for calling the Vodafone and Cellnet networks fell (in real terms) by about one-quarter.

4.10. There was little change in BT's rates for calls made to the Orange and One2One networks until February 1997 when, following increases in termination charges, BT increased its rates in real terms by 78 per cent (daytime), over 100 per cent (evening) and by less than 1 per cent (weekend). Orange and One2One told us that after the increases in the retail rates for calling their networks these rates were still 20 per cent below those for calling the Vodafone and Cellnet networks. Orange also stated that charges for calling the Vodafone and Cellnet networks had subsequently been reduced. BT's weekend rates for calling the Orange and One2One networks have remained broadly constant between 1993/94 and August 1998 (a fall of about 10 per cent in real terms). BT has not changed its rates for calling the Orange and One2One networks since February 1997. One2One told us that BT had issued a review notice in 1998 of One2One's inbound termination rates pursuant to its interconnection agreement with One2One. One2One said that this review was currently on hold given the uncertainty surrounding our investigations.

Termination rates

4.11. Table 4.4 shows the MNOs' termination charges to BT between 1993/94 and August 1998 (the last date when rates were changed). In comparing these rates it should be noted that different times were used to define peak periods and standard periods by three of the MNOs that used these definitions. The time periods for all four MNOs have been the same from April 1996.

TABLE 4.4 Termination charges to BT

	ppm									
	1993/94	1994/95	1995/96	Apr 96	Jul 96	Oct 96	Feb 97	Aug 97	Oct 97	Aug 98
<i>Peak/day</i>										
Vodafone*	29.75	30.20	29.60	24.67	24.67	23.32	23.32	22.81	19.00	17.50
Cellnet†	30.10	30.83	30.73	24.67	24.67	23.32	23.32	22.81	19.20	17.55
Orange‡	-	8.27¶	7.11¤	7.37	7.37	7.37	17.20	17.20	17.20	17.20
One2One§	7.33	7.33	7.33	7.33	7.33	7.33	17.50	17.50	17.50	17.50
<i>Standard/day</i>										
Vodafone*	31.12	32.11	31.48	24.67	24.67	23.32	23.32	22.81	19.00	17.50
Cellnet†	30.80	31.36	32.63	24.67	24.67	23.32	23.32	22.81	19.20	17.55
Orange‡	-	6.32¶	7.11¤	7.37	7.37	7.37	17.20	17.20	17.20	17.20
One2One§	7.33	7.33	7.33	7.33	7.33	7.33	17.50	17.50	17.50	17.50
<i>Cheap/evening</i>										
Vodafone*	21.43	21.28	21.71	18.00	18.00	15.49	15.49	13.50	13.50	12.20
Cellnet†	21.30	22.33	21.65	18.00	18.00	15.49	15.49	13.51	13.51	12.26
Orange‡	-	4.87	4.87	5.04	5.04	5.04	12.10	12.10	12.10	12.10
One2One§	5.04	5.04	5.04	5.04	5.04	5.04	12.20	12.20	12.20	12.20
<i>Cheap/weekend</i>										
Vodafone*	21.43	21.28	21.71	18.00	7.14	7.14	7.14	5.60	5.60	5.30
Cellnet†	21.30	22.33	21.65	18.00	7.14	7.14	7.14	5.60	5.60	5.34
Orange‡	-	4.87	4.87	5.04	5.04	5.04	5.10	5.10	5.10	5.10
One2One§	5.04	5.04	5.04	5.04	5.04	5.04	5.30	5.30	5.30	5.30

Source: MNOs.

*Peak charges applied on weekdays 11 am to 2 pm; standard charges applied on weekdays 8 am to 11 am and 2 pm to 6 pm; cheap charges applied on weekdays 6 pm to 8 am and weekends. Day charges apply on weekdays 8 am to 6 pm; evening charges apply on weekdays 6 pm to 8 am; and weekend charges apply all weekend. Moved to day, evening and weekend charging in April 1996.

†Peak charges applied on weekdays 9 am to 1 pm; standard charges applied on weekdays 8 am to 9 am and 1 pm to 6 pm; cheap charges applied on weekdays 6 pm to 8 am and weekends. Day charges apply on weekdays 8 am to 6 pm; evening charges apply on weekdays 6 pm to 8 am; and weekend charges apply all weekend. Moved to day, evening and weekend charging in April 1996.

‡Peak charges applied on weekdays 8 am to 1 pm; standard charges applied on weekdays 1 pm to 6 pm; cheap charges applied on weekdays 6 pm to 8 am and weekends. Day charges apply on weekdays 8 am to 6 pm; evening charges apply on weekdays 6 pm to 8 am; and weekend charges apply all weekend. Moved to day, evening and weekend charging in April 1995.

§No peak, standard and cheap charges. Day charges apply on weekdays 8 am to 6 pm; evening charges apply on weekdays 6 pm to 8 am; and weekend charges apply all weekend.

¶To December 1994.

¤From January 1995.

4.12. Orange and One2One began their services with termination rates over 70 per cent lower than those of Vodafone and Cellnet. This difference fell to about 20 per cent following large increases in the rates charged by Orange and One2One for their day and evening services in February 1997. There have been no changes in their rates since February 1997. Prior to 1 August 1998, Orange and One2One's termination charges were around 10 per cent lower than those of Vodafone and Cellnet.¹ In August 1998 the termination charges of Vodafone and One2One were the same; these were a little lower than Cellnet's termination rates and a little higher than those of Orange.

4.13. Vodafone's and Cellnet's rates were broadly constant until April 1996 when they fell in real terms by about 18 to 21 per cent (peak/day), 23 to 26 per cent (standard/day) and about 18 per cent (cheap/evening and cheap/weekend). Between April 1996 and August 1998 the termination rates of Vodafone and Cellnet fell (in real terms) by about one-third (nearly three-quarters for cheap/weekend rates).

4.14. Orange told us that when it signed its Revised Interconnect Agreement with BT in January 1995 there was a requirement for its rates to move to a day, evening and weekend format. This meant that Orange's new day rate applied to the same time period (weekdays 0800 to 1800) as its previous peak (weekdays 0800 to 1300) and standard (weekdays 1300 to 1800) time periods. These changes in time periods and Orange's associated changes in termination rates meant that from 1 January 1995 Orange's termination rates for 0800 to 1300 (weekdays) fell from 8.27 ppm to 7.11 ppm (a fall of 14 per cent) and its termination rates for 1300 to 1800 (weekdays) increased from 6.32 ppm to

¹There are slight differences between the rates of Vodafone and Cellnet, and between Orange and One2One.

7.11 ppm (an increase of 12.5 per cent). Its termination rates for all other periods remained at 4.87 ppm. Orange told us that these changes were designed to be revenue-neutral.

4.15. Between 1993/94 and February 1997 One2One's rates fell (in real terms) by about 9 per cent. In nominal terms its rates were unchanged.

4.16. We used each MNO's average inbound revenue as a proxy for their average termination charges. This was calculated from published OFTEL data on interconnect revenue and on incoming minutes for each year from 1992/93 to 1997/98. These data will be influenced by differences in demand patterns between the MNOs and by changes in demand patterns over time but they provide a broad estimate of how each MNO's termination charge has changed during the last five years. Between 1992/93 and 1997/98 Vodafone's and Cellnet's average inbound revenue fell in real terms by 47.8 and 41.5 per cent respectively. These reductions broadly occurred in two stages. Between 1992/93 and 1995/96 the reductions in real terms were 12.5 per cent for Vodafone and 6.9 per cent for Cellnet, compared with 40.3 per cent (Vodafone) and 37.2 per cent (Cellnet) between 1995/96 and 1997/98. Between 1996/97 and 1997/98 One2One's and Orange's average inbound revenue increased in real terms by 78.4 per cent and 83.1 per cent respectively.

BT's retention

4.17. Tables 4.5 and 4.6 show BT's retention for calls to Vodafone and Orange respectively. Its retention for calls to Cellnet (which in August 1998 was very similar to that for calls to Vodafone) and its retention for calls to One2One (which in August 1998 was between 0.1 to 0.3 ppm lower than that for calls to Orange) are shown in Appendices 4.1 and 4.2 respectively. The retention figures in Tables 4.5 and 4.6, and Appendices 4.1 and 4.2, are overestimates as they do not take account of BT's discounts. BT's average discount (before reductions for fees) for fixed-to-mobile calls was 4.9 per cent as at March 1998.

TABLE 4.5 BT's headline retention rate for calls to Vodafone's network*

	1993/94	1994/95	1995/96	Apr 96	Jul 96	Oct 96	Aug 97	Oct 97	Aug 98
<i>ppm</i>									
<i>Peak/day</i>									
BT's headline tariffs to Vodafone	33.60	33.60	34.93	34.93	34.93	31.91	31.06	27.23	25.53
BT's POLO to Vodafone	29.75	30.20	29.60	24.67	24.67	23.32	22.81	19.00	17.50
BT's retention rate	3.85	3.40	5.33	10.26	10.26	8.59	8.25	8.23	8.03
BT's retention rate (Aug 98 prices)	4.44	3.82	5.80	10.97	10.99	9.12	8.49	8.42	8.03
<i>Standard/day</i>									
BT's headline tariffs to Vodafone	33.60	33.60	34.93	34.93	34.93	31.91	31.06	27.23	25.53
BT's POLO to Vodafone	31.12	32.11	31.48	24.67	24.67	23.32	22.81	19.00	17.50
BT's retention rate	2.48	1.49	3.45	10.26	10.26	8.59	8.25	8.23	8.03
BT's retention rate (Aug 98 prices)	2.86	1.67	3.75	10.97	10.99	9.12	8.49	8.42	8.03
<i>Cheap/evening</i>									
BT's headline tariffs to Vodafone	25.20	25.20	24.10	24.10	24.10	21.27	18.72	18.72	17.02
BT's POLO to Vodafone	21.43	21.28	21.71	18.00	18.00	15.49	13.50	13.50	12.20
BT's retention rate	3.77	3.92	2.39	6.10	6.10	5.78	5.22	5.22	4.82
BT's retention rate (Aug 98 prices)	4.35	4.40	2.60	6.52	6.53	6.13	5.37	5.34	4.82
<i>Cheap/weekend</i>									
BT's headline tariffs to Vodafone	25.20	25.20	24.10	24.10	10.63	10.63	8.93	8.93	8.51
BT's POLO to Vodafone	21.43	21.28	21.71	18.00	7.14	7.14	5.60	5.60	5.30
BT's retention rate	3.77	3.92	2.39	6.10	3.49	3.49	3.33	3.33	3.21
BT's retention rate (Aug 98 prices)	4.35	4.40	2.60	6.52	3.74	3.70	3.43	3.41	3.21

Source: MMC calculations based on data provided by BT.

*As indicated in the footnotes to Table 4.3, retail prices and hence retentions prior to June 1995 are not directly comparable.

TABLE 4.6 BT's headline retention rate for calls to Orange's network*

ppm

	<i>Apr 94†</i>	<i>Sep 94†</i>	<i>Apr 95</i>	<i>Jun 95</i>	<i>Apr 96</i>	<i>Feb 97</i>	<i>Mar 98</i>	<i>Aug 98</i>
<i>Peak/day</i>								
BT's headline tariffs to Orange	16.8	16.80	16.80	14.22	14.22	25.53	25.53	25.53
BT's POLO to Orange	8.56	8.56	7.11	7.11	7.37	17.20	17.20	17.20
BT's retention rate	8.24	8.24	9.69	7.11	6.85	8.33	8.33	8.33
BT's retention rate (Aug 98 prices)	9.33	9.27	10.61	7.75	7.33	8.77	8.45	8.33
<i>Standard/day</i>								
BT's headline tariffs to Orange	12.6	16.80	16.80	14.22	14.22	25.53	25.53	25.53
BT's POLO to Orange	6.55	6.55	7.11	7.11	7.37	17.20	17.20	17.20
BT's retention rate	6.05	10.25	9.69	7.11	6.85	8.33	8.33	8.33
BT's retention rate (Aug 98 prices)	6.85	11.54	10.61	7.75	7.33	8.77	8.45	8.33
<i>Cheap/evening</i>								
BT's headline tariffs to Orange	8.40	8.40	8.40	8.38	8.38	17.02	17.02	17.02
BT's POLO to Orange	5.04	5.04	4.87	4.87	5.04	12.10	12.10	12.10
BT's retention rate	3.36	3.36	3.53	3.51	3.34	4.92	4.92	4.92
BT's retention rate (Aug 98 prices)	3.80	3.78	3.87	3.82	3.57	5.18	4.99	4.92
<i>Cheap/weekend</i>								
BT's headline tariffs to Orange	8.40	8.40	8.40	8.38	8.38	8.51	8.51	8.51
BT's POLO to Orange	5.04	5.04	4.87	4.87	5.04	5.10	5.10	5.10
BT's retention rate	3.36	3.36	3.53	3.51	3.34	3.41	3.41	3.41
BT's retention rate (Aug 98 prices)	3.80	3.78	3.87	3.82	3.57	3.59	3.46	3.41

Source: MMC calculations based on data provided by BT.

*As indicated in the footnotes to Table 4.3, retail prices and hence retentions prior to June 1995 are not directly comparable.

†Due to the different definitions of time periods between BT and Orange, BT's estimates of its POLO differ slightly from Orange's estimates for April and September in 1994 (1994/95 in Table 4.4).

4.18. BT's retention for calls to Vodafone's network on the whole increased in real terms to mid-1996 and then fell to August 1998. For peak/day, standard/day and cheap/evening its retention (in real terms) was higher at the end of the period than at the beginning. For cheap/weekend the reverse is true. BT told us that this was because of the highly unsatisfactory nature of the pre-1996 contract it had with Cellnet and Vodafone which, after customer discounts, resulted in its losing money on these calls. BT stated that at the end of the contract period, it sought to correct for this, leading to a one-off adjustment in the retention which had fallen steadily since April 1996. For calls to Orange's network, BT's retention fluctuated over the period. However, BT's retention for 1-minute calls to Orange's network was higher in real terms at the end of the period than it was at the start of the period for standard/day and cheap/evening calls but lower for peak/day and cheap/weekend. BT told us that because of the unit charging structure it used prior to June 1995 there were some difficulties in interpreting these trends. In August 1998, BT's retention for calls to Orange's network was slightly higher than its retention for calls to Vodafone's network (the difference ranging from 0.1 to 0.3 ppm).

Fixed network operators

4.19. We see fixed-to-mobile calls as being a segment of growing importance within the fixed-line telephony market. The purpose of our analysis is to assess whether there is sufficient competitive pressure, either direct or indirect, to constrain BT's retail prices and its retention for calls to Vodafone's or Cellnet's networks. With this in mind we look at the shares of fixed-to-mobile calls and then at the competitive pressures on FNOs for these types of calls.

Shares of fixed-to-mobile calls

4.20. We first examine FNOs' shares of traffic and how these shares have moved over time.

4.21. Table 4.7 shows FNOs' volume and share of fixed-to-mobile calls since 1992/93.¹

TABLE 4.7 FNOs' volume and shares of fixed-to-mobile call minutes

	<i>million</i>					
	<i>All operators</i>	<i>BT</i>	<i>Kingston</i>	<i>CWC</i>	<i>Cable</i>	<i>Other</i>
<i>Volume</i>						
1992/93	896	799		94	3	
1993/94	1,124	965		145	14	
1994/95	1,607	1,357		215	35	
1995/96	2,388	1,991		286	99	12
1996/97	2,819	2,198	10	314	191	106
1997/98*	3,774	2,849	16	368	312	229
<i>per cent</i>						
Growth 1992/93 to 1997/98	321	257	N/A	291	10,300	N/A
<i>Shares</i>						
1992/93	100.0	89.17		10.49	0.33	
1993/94	100.0	85.85		12.90	1.25	
1994/95	100.0	84.44		13.38	2.18	
1995/96	100.0	83.38		11.98	4.15	0.50
1996/97	100.0	77.97	0.35	11.14	6.78	3.76
1997/98*	100.0	75.49	0.42	9.75	8.27	6.07

Source: MMC calculations based on published OFTEL data.*

*The data for CWC and the cable operators in 1997/98 are not those published by OFTEL but are a revised series so that data in 1997/98 are on the same basis as the earlier years. OFTEL's published data for 1997/98 are not comparable with those for the earlier years due to Mercury's acquisition of three cable companies leading to the creation of CWC.

Note: Totals may not sum due to rounding.

4.22. BT's share of fixed-to-mobile call minutes has fallen from 89.2 per cent in 1992/93 to 75.5 per cent in 1997/98. Over the same period BT's call minutes to mobile phones increased by 257 per cent. CWC's share grew from 1992/93 (10.5 per cent) to 1994/95 (13.4 per cent) and then fell to 9.8 per cent by 1997/98. The share of the cable operators has grown over the last few years reaching 8.3 per cent in 1997/98. BT provided us with data that showed that the penetration of telephony services by cable operators was 29 per cent in February 1998 compared with less than 20 per cent in April 1994.² Other resellers and aggregators have seen their share reach 6.1 per cent in 1997/98, rising from zero in 1994/95.

4.23. From 1996/97 OFTEL collected and published data that split fixed-to-mobile call minutes (and revenue) by business and residential customers. In 1997/98 BT accounted for 68.7 per cent of such call minutes for business customers (down from 72 per cent in 1996/97) and for 84.8 per cent of such calls by residential customers (down from 87.4 per cent in 1996/97).

4.24. BT provided its own estimates of shares held by operators for various call types. Appendix 4.3 shows BT's estimates in detail and Table 4.8 shows its percentage estimates for different types of users.

¹Shares calculated on the basis of revenue show similar results.

²The percentage of customers in homes passed taking cable telephony. BT said that cable companies had already passed approaching 50 per cent of all homes.

TABLE 4.8 BT's share of call minutes by call type, 1992/93 to 1997/98

per cent

Call type from fixed lines

	<i>Local</i>	<i>National</i>	<i>Mobile</i>	<i>International</i>
<i>Business</i>				
1992/93	92.2	82.2	82.9	66.8
1993/94	89.9	78.9	79.6	63.4
1994/95	88.7	74.6	77.6	57.3
1995/96	86.6	72.1	74.7	52.6
1996/97	84.7	68.5	71.3	43.3
1997/98*	80.8	62.8	66.4	33.3
<i>Residential</i>				
1992/93	99.7	97.3	97.3	94.8
1993/94	98.8	94.8	94.7	90.9
1994/95	96.5	91.0	93.8	83.1
1995/96	93.5	89.0	89.5	79.7
1996/97	89.9	87.8	85.9	75.8
1997/98	83.9	85.4	82.9	69.0
<i>Total</i>				
1992/93	97.1	89.9	87.5	79.0
1993/94	95.8	87.4	84.8	75.9
1994/95	94.1	83.7	84.1	69.5
1995/96	91.4	81.4	81.0	65.6
1996/97	88.3	79.1	77.7	58.6
1997/98*	83.1	75.5	74.1	50.1

Source: MMC calculations on data provided by BT.

*Data for business customers are based on 11 months.

4.25. Table 4.8 shows that BT's share of business call minutes for fixed-to-mobile calls fell from 82.9 per cent in 1992/93 to 66.4 per cent in 1997/98, a fall of 16.5 percentage points. Over the same period BT's estimates show that its share of international business call minutes fell from 66.8 to 33.3 per cent, a fall of 33.5 percentage points. BT's share of national call minutes by business users fell by 19.4 percentage points between 1992/93 (82.2 per cent) and 1997/98 (62.8 per cent). BT's share of local call minutes fell by 11.4 per cent over the same period. It should be noted that fixed-to-mobile calls is a relatively new service that is growing rapidly (see Table 4.7).

4.26. Between 1992/93 and 1997/98 BT experienced a larger fall in its share of international call minutes used by residential customers (25.8 percentage points) than it did for other call types. Its share for these other call types fell between 1992/93 and 1997/98 by similar amounts (15.8 percentage points for local calls, 11.9 percentage points for national calls and 14.4 percentage points for fixed-to-mobile calls). A similar pattern exists for a combination of business and residential call minutes. Between 1992/93 and 1997/98 BT's share of all international call minutes fell by 28.9 percentage points and its share of other call types fell by between 13.4 and 14.4 percentage points.

4.27. BT told us that its data and those of OFTEL overestimated the shares of the FNOs as they did not include fixed-to-mobile calls through private wire which previously would have used a fixed line. BT estimated that, taking account of private wire traffic, its share of fixed-to-mobile calls for business customers in March 1998 would have been 61 per cent rather than 64.5 per cent. BT told us that with over 9 million mobile phone users, mobile-to-mobile calls were a real alternative to fixed-to-mobile calls, in particular given the low charges for mobile-to-mobile calls on the same network. It said that when considering all calls to MNOs, whether from fixed lines or from other mobile networks, BT's share of call minutes was only 57 per cent.

Competitive pressure on fixed network operators

4.28. In this section we look at the possible competitive pressures on BT and other FNOs. We begin by discussing the nature and the extent of competition. We then look at the number of operators, ease of entry, the range of retail tariffs for fixed-to-mobile calls and the characteristics of users making fixed-to-mobile calls and international calls. Finally we examine technical alternatives to using the FNOs to contact mobile networks and consider the role of tromboning.

Nature and extent of competition

4.29. BT told us that the nature of competition differed for the two broad types of customers. First, for business and higher-spending residential customers competitors could direct their efforts to particular items of a bill, for example international calls and increasingly fixed-to-mobile calls. Small retail savings in such charges alone could generate large savings in bills for such large users. BT told us that these customers were price sensitive as witnessed by their switching away from BT for international calls. BT provided us with the names of companies that it said had changed their patterns of business with BT due to the differences in charges for fixed-to-mobile calls. However, in each case we found that these changes were part of a package of reductions, making the precise savings on fixed-to-mobile calls offered by the new operator difficult to establish. Secondly, BT said that competition for the less intensive users tended to focus on reductions in the overall bill and not on particular aspects of the bill although as each aspect contributed to the overall level of the bill, there were competitive pressures on all prices.

4.30. With regard to the influence of competition, BT made two main points. First, BT said that the consumers who had not been included in the calculations used to set BT's retail price cap¹ represented those users who were actively targeted by competitors, who were sensitive to price and who shopped around for better deals. These users accounted for 86 per cent of fixed-to-mobile calls which, in BT's view, implied that the great majority of fixed-to-mobile calls were subject to competitive pressures. This point was disputed by the DGT who said that customers who were not used in the calculations to set BT's retail price cap were not necessarily part of a competitive market. The DGT stated that at most it was only multiple line businesses which could be said to be completely outside the price controls and protected by competition alone and these users accounted for 48 per cent of the revenue from fixed-to-mobile calls in 1997/98.² BT told us that this proportion was higher than for any other call type which in its view provided further evidence that fixed-to-mobile calls were competitive.³

4.31. Secondly, BT said that the provisions in its licence prohibiting undue discrimination meant that any price reduction it offered to one group of customers had to be shared with all other customers in a way that was not unduly discriminatory. It suggested that its lack of flexibility in this area was demonstrated by the fact that the DGT asked BT to withdraw its Corporate Advance discount scheme which was designed to offer its large customers an additional discount of between 1 and 4 per cent. On 27 October 1998, the DGT announced that it appeared reasonable for BT to give additional discounts to business customers on outgoing calls and incoming local rate and freephone calls based on their total spend (BT's Dual Discount) and that he was still in discussion with BT regarding its Corporate Advance scheme.

Number of operators, ease of entry and the range of retail prices

4.32. BT told us that the total number of operators was growing rapidly: on average there were three new operators each week. It said that there were now 282⁴ licensed operators, a rise of 79 since the start of the reference. BT stated that of the many and growing number of licensed operators which began by offering international calls, particularly for business customers, all could and most did offer fixed-to-mobile calls and these operators were now offering services to a wider group of customers. It said that these operators had started to advertise their services for fixed-to-mobile calls more widely. We were provided with copies of a number of advertisements that showed BT's rivals offering fixed-to-mobile calls alongside international calls.

4.33. BT told us that it was very easy for new operators, particularly indirect operators, to enter the market and that barriers to entry were very low. It stated that the costs of telecommunications switches had been falling dramatically, reducing the cost of setting up as a reseller. It said that in addition there had been a steady decrease in the charges for network services required by resellers. BT told us that developments in technology had created considerable excess capacity on the networks by

¹Business customers and the top 20 per cent of residential customers.

²49 per cent in 1995/96 and 1996/97.

³The corresponding proportions for other call types in 1997/98 were: 30 per cent for local calls, 42 per cent for national calls and 37 per cent for international calls. These proportions had been broadly stable over the last three years although the proportion for international calls increased from 34 per cent in 1995/96 to 38 per cent in 1996/97.

⁴Taken from OFTEL data, November 1998.

increasing the effective capacity of the physical networks. It stated that extra capacity could therefore be made available without having to put in additional cable. BT claimed that there were therefore few, if any, impediments to resellers entering the market or broadening the range of services offered. It said that where there was a profitable opportunity to offer particular types of calls to particular customers, resellers could easily and quickly exploit that opportunity. BT told us that only the marginal costs of offering fixed-to-mobile calls would be incurred by new operators. It said that for existing operators which did not currently offer fixed-to-mobile services, the fungibility of switches ensured no technical barriers to rapid introduction of new services, additional marketing costs to introduce such services would be small and termination costs could be reduced by arbitrage opportunities including tromboning (see paragraphs 4.55 to 4.62) or by using private wire (see paragraphs 4.42 to 4.51).

4.34. BT said that some operators offered charges for fixed-to-mobile calls which were substantially below those offered by BT. BT provided us with a comparison of its charges as at April 1998 for fixed-to-mobile calls with those of a selection of other FNOs (see Table 4.9). It told us that this comparison was not comprehensive and could change from day to day. BT said that international resellers were beginning to focus specifically on fixed-to-mobile calls, advertising these calls at attractive prices. The most attractive of the prices offered by international resellers were assumed to be based on termination rates which were in turn based on the calls being tromboned.

TABLE 4.9 Prices for fixed-to-mobile calls in April 1998

	<i>ppm (excluding VAT)</i>					
	<i>Cellnet and Vodafone</i>			<i>Orange and One2One</i>		
	<i>Day</i>	<i>Evening</i>	<i>Weekend</i>	<i>Day</i>	<i>Evening</i>	<i>Weekend</i>
<i>Residential</i>						
BT Base	27.23	18.72	8.93	25.53	17.02	8.51
BT Premierline & F&F	23.15	15.91	7.60	21.70	14.47	7.23
AT&T OneRate	30.64	20.43	9.36	24.09	15.74	7.83
CWC LocalCall	27.00	18.72	8.93	24.25	16.17	8.08
CWC UKCall	26.00	14.30	7.66	23.15	12.94	6.38
CWC SmartCall	26.00	14.30	7.66	23.15	12.94	6.38
First Telecom	20.85	15.32	15.32	19.15	12.77	12.77
Primus	25.53	20.43	20.43	25.53	20.43	20.43
Telewest	25.69	17.59	8.39	24.00	16.00	8.00
Uni-Call	10.00	10.00	10.00	10.00	10.00	10.00
Smartcall	10.00	10.00	10.00	10.00	10.00	10.00
The Flying Calling Card	11.00	11.00	11.00	11.00	11.00	11.00
Lo-Cost International	18.00	11.00	11.00	18.00	11.00	11.00
AXS Telecom	15.00	15.00	15.00	15.00	15.00	15.00
Phonewise	16.00	16.00	16.00	16.00	16.00	16.00
Global	16.00	16.00	16.00	16.00	16.00	16.00
Apollo*	18.00	18.00	18.00	18.00	18.00	18.00
OC Communications	24.50	18.00	18.00	22.50	15.00	15.00
Callmate	21.00	21.00	21.00	21.00	21.00	21.00
Call Box	25.00	25.00	25.00	25.00	25.00	25.00
1677moretalk	32.00	32.00	32.00	25.00	25.00	25.00
Intelphone UK	40.00	40.00	40.00	22.00	22.00	22.00
Online Services	38.00	38.00	38.00	36.00	36.00	36.00
Communications 2000	50.00	50.00	50.00	50.00	50.00	50.00
WorldCom	55.00	55.00	55.00	55.00	55.00	55.00
<i>Business</i>						
BT Base	27.23	18.72	8.93	25.53	17.02	8.51
BT Business Best	25.87	17.79	8.49	24.26	16.17	8.09
ACC Value Business	23.37	16.01	7.63	22.75	15.15	6.45
ACC Value Plus	23.37	16.01	7.63	22.49	14.55	6.38
ACC Connect	20.00	15.34	6.96	21.00	14.00	6.76
AT&T Business CallPlan	30.00	21.70	10.00	24.00	16.00	8.50
CWC VentureCall	24.00	17.50	17.50	21.90	13.80	13.80
CWC UKLink	21.50	15.20	15.20	21.50	15.20	15.20
CWC Global Link	24.00	16.50	16.50	24.00	16.50	16.50
CWC MetroLink	24.00	16.50	16.50	24.00	16.50	16.50
Energis Direct	26.10	20.56	20.56	23.20	16.00	16.00
Energis Indirect	29.20	22.09	22.09	26.50	18.00	18.00
Telewest	29.10	21.90	21.90	26.50	17.50	17.50

Source: BT.

*18 ppm applied to its £20 card. The charge for its £5 and £10 cards is 20 ppm.

Note: Many of the prices offered by other operators are constrained in some way. Examples include: the prices quoted are only available on highest denomination prepaid cards; prices are subject to minimum charges per call; there are restrictions on the call times during which the rates are available.

4.35. Table 4.9 shows that, for both residential and business customers, BT's day and evening charges are higher than many tariffs offered by other operators. However, BT's weekend charges are among the lowest. These findings have to be viewed with caution as the data are not comprehensive and companies other than BT are not obliged to publish or adhere to a price list.

4.36. We put it to BT that these operators could not profitably be offering significant price reductions unless they had a lower termination charge. BT agreed. This implies that these price reductions are based on termination rates which are in turn based on the calls being tromboned. BT suggested that the operators offering prices only marginally lower than its own were unlikely to be tromboning calls. It said that they were more likely to have interconnection arrangements to transit calls across another operator's network (for example, CWC) and would therefore rely only on lower retail costs or a smaller profit margin to enable them to offer lower prices. BT stated that its main competitor, CWC, did not, as far as BT was aware, make use of tromboning and yet the majority of its prices were lower than BT's.

4.37. BT told us that users faced low switching costs. It said that the price differences, the low switching costs and the operators' relationships already established with their existing customers (for example, in relation to international calls) overcame any customer inertia, encouraging customers to use other FNOs. BT submitted that the rapid growth in the volume of fixed-to-mobile calls made such calls increasingly attractive to other operators.

Comparison of those making fixed-to-mobile calls and international calls

4.38. BT told us that it saw its share of fixed-to-mobile calls as likely to follow the trend of its share in international calls (see Table 4.8). It saw similar characteristics in the users making fixed-to-mobile calls and those making international calls. BT supported its view by referring to the activities of those customers which the DGT did not include when calculating BT's retail price cap. BT told us that these customers accounted for 89 per cent of international calls and 86 per cent of fixed-to-mobile calls but for 75 per cent of national calls and 62 per cent of local calls.¹ It should be noted, however, that the DGT considered it relevant that a proportion of these users were protected by the retail price cap.

4.39. Another way to compare the characteristics of different types of users is to look at their expenditure patterns on calls. BT provided us with data showing the expenditure on international calls, fixed-to-mobile calls and other types of call by decile (see Table 4.10).

TABLE 4.10 **Expenditure by BT's residential customers on calls by type of call by decile in 1997/98 (excluding line rental)**

	Decile 1	Decile 2	Decile 3	Decile 4	Decile 5	Decile 6	Decile 7	Decile 8	Decile 9	Decile 10
<i>£ million</i>										
<i>Amounts spent</i>	<i>Figures omitted. See note on page iv.</i>									
Local										
National										
International										
Mobiles										
Other										
Total	<i>per cent</i>									
<i>Proportions</i>	<i>Figures omitted. See note on page iv.</i>									
Local										
National										
International										
Mobiles										
Other										
Total										

Source: BT.

Notes:

1. The proportions could be seen as an overestimate of the importance of fixed-to-mobile calls (and other call types) as they show expenditure on call revenue only (ie they exclude revenue from line rental).

¹Based on call minutes.

2. Totals may not sum due to rounding.

4.40. Table 4.10 shows that the spending patterns for international calls and fixed-to-mobile calls differ for different deciles. Fixed-to-mobile calls accounted for [§§] per cent of the call expenditure of the highest decile (the largest proportion of call expenditure by fixed-to-mobile calls of any decile). The comparable figure for international calls was [§§] per cent. Also the difference between the lower decile and the highest decile is much less for fixed-to-mobile calls than it is for international calls.

Technical alternatives to using fixed network operators to contact a mobile network

4.41. In this section we look at the possible competitive pressures on BT and other FNOs which could result from users using alternatives to the standard fixed line. We examine leased lines and mobile-to-mobile calls. We also examine the pressures arising from the competitive offerings made available to users by operators which choose to exploit arbitrage opportunities such as tromboning.

Leased lines ('private wires')

4.42. All the MNOs offer connections using leased lines. We refer to those offered by Cellnet as an example of those offered by the other MNOs. BT said that the availability of leased lines was an additional source of competitive pressure which served to constrain its prices in the same way as any other competitors' offerings. In addition, although primarily an option for end-users, BT said that leased lines provided an arbitrage opportunity for its competitors, thus providing further pressure on BT's prices.

4.43. Cellnet said that it offered two services which involved the use of a leased line by the customer: Cellnet Access and Mobile Extension. Cellnet Access enabled the corporate customer's employees to make calls between numbers on the company's private branch exchange (PBX) and its Cellnet mobile phones. The service used a fixed link (leased from an FNO by the corporate customer) to connect the corporate PBX to the mobile network. From a technical perspective, Mobile Extension is very similar to Cellnet Access in that it uses a fixed link and an integrated services digital exchange.

4.44. Table 4.11 shows the call charges for calls made from the customer's PBX via Cellnet Access to the customer's mobile phone in the UK and comparable BT charges. Cellnet Access charges are between 1.9 and 11.7 ppm lower than BT's charges. However, as well as the call charges for Cellnet Access, the fixed-line link to the mobile network costs between £2,000 and £15,000 a year to lease, depending on the length of link required.

TABLE 4.11 **Call charges from PBX to Cellnet Access mobile phones**

<i>Period</i>	<i>ppm excluding VAT</i>		
	<i>BT standard rates</i>	<i>Cellnet Access*</i>	<i>Corporate retail saving†</i>
Weekday	27.2	18	9.2
Evening	18.7	7	11.7
Weekend	8.9	7	1.9

Source: Cellnet.

*Recommended retail prices.

†Saving shown likely to be reduced in practice since corporate customer will probably benefit from discount on the standard BT tariffs shown.

4.45. Table 4.12 shows the Mobile Extension PBX-to-mobile call charges and comparable BT charges.

TABLE 4.12 **Mobile Extension call charges for PBX to mobile phones**

Period	ppm excluding VAT		
	BT standard rates	Mobile Extension*	Corporate retail saving†
Weekday	27.2	9	18.2
Evening	18.7	5	13.7
Weekend	8.9	5	3.9

Source: Cellnet.

*Recommended retail prices.

†Saving shown likely to be reduced in practice since corporate customer will probably benefit from discount on the standard BT tariffs shown.

4.46. Table 4.12 shows that Mobile Extension charges are between 3.9 and 18.2 ppm lower than BT's charges. As well as the call charges for Mobile Extension, the fixed-line link to the mobile network costs between £2,000 and £15,000 a year to lease, depending on the length of link required. There is an annual subscription of £10,000 (with over 1,000 mobile phones), £12,000 (with 501 to 1,000 mobile phones) or £15,000 (with 500 or fewer mobile phones). There is also a connection charge of £30 for each digital phone and £50 for each analogue phone, and a monthly subscription of £27.50.

4.47. Cellnet provided us with data which showed that its Cellnet Access and Mobile Extension together accounted for 4.7 per cent of total inbound call minutes from fixed lines to its network and 3.3 per cent of its inbound revenue.

4.48. Vodafone told us that it had [] customers connected by private wire. It said that these customers accounted for [] per cent of its customer base, for 4.1 per cent of its airtime revenue and for between 3 and 4 per cent of its incoming call minutes. It stated that its basic private wire tariff for fixed-to-mobile calls was 18 ppm (peak) and 7.5 ppm (off-peak) and that these charges were above the general termination rates it introduced in August 1998. Vodafone told us that the attractiveness of these private wire arrangements was diminishing with the fall in mobile interconnection charges. It said that since January 1998 it had lost [] private wire contracts, [] to other operators.

4.49. Orange told us about its leased line service, Orange Link. It said that calls via Orange Link were priced at 12 ppm (excluding VAT) in the peak period and 4.25 ppm (excluding VAT) in the off-peak period (the off-peak rate was reduced from 6 ppm on 1 November 1998). It currently had only one customer for this service.

4.50. Orange estimated the volumes that a corporate business customer would have to achieve in order to offset the service set-up and maintenance costs of Orange Link against the call savings. It assumed that the customer paid an annual leased line rental of about £10,000 with set-up costs of about £4,000. In this case the corporate business would reach the breakeven point if it generated approximately 216,000 minutes of calls from the office to the handsets and approximately 180,000 minutes of calls from the handsets to the office. Assuming that the corporate business had 150 Orange handsets, these volumes would give an average of 120 minutes of call traffic per user each month (office to handset) and 100 minutes of call traffic per handset per month (handset to office). It was assumed that the breakeven point would not change significantly with the change in the off-peak rate from 6 to 4.25 ppm as corporate users mainly used the peak period. Furthermore, the cost/savings breakeven point would vary depending on private network set-up/maintenance costs, service usage, the customer's call mix, traffic mix, other costs and the customer's usage policy.

4.51. Orange told us that in general terms the economics of private wire only started to work if an organization had more than 100 phones, at which stage the costs of installing and leasing the service were outweighed by the reduced call prices. It said that in general terms the economics of Orange Link started to work only if an organization had a minimum of 100 to 150 phones, at which stage the costs of installing the leased line, setting up the user's private network and maintaining the user's service were outweighed by the savings. One2One told us that this service was a package offering

inbound and outbound calls and that the technical configuration with a private wire was different to that of a full network interconnection.

Mobile-to-mobile calls

4.52. Mobile-to-mobile calls can also provide cost savings to users compared with the standard BT route. Apparatus is available for attachment to a PBX which has the effect of turning a call from a fixed extension on the PBX to a mobile phone into a mobile-to-mobile call. Vodafone told us that this option permitted savings compared with the standard BT rates of between 50 and 78 per cent on fixed-to-mobile call charges. It should be noted that these savings reflect, in part, the fact that the mobile networks' charges for mobile-to-mobile calls within the same network can be lower than termination charges for fixed-to-mobile calls.

4.53. Orange is the only MNO which offers this service. Orange's mobile-to-mobile service operates via a Nokia PremiCell which costs £649.99 (including VAT) for the equipment and installation. Savings to customers depend on the volume of traffic and the time of day of the calls.

4.54. As in the case of the leased line option, for mobile-to-mobile calls to be a financially viable alternative to using the standard BT route, the user has to be able to offset the set-up costs against the savings in call charges, which requires a substantial number of fixed-to-mobile calls.

The role of tromboning

4.55. The importance of tromboning as an alternative to using the standard fixed-line route is that tromboning does not involve any large additional costs and it currently provides an opportunity for operators to exploit lower termination charges paid to the MNOs for incoming international calls. As termination charges account for about three-quarters of BT's retail charge, BT's competitors have the ability to use an international route to offer substantial savings in fixed-to-mobile call charges.

4.56. International tromboning involves taking a call, which has originated in the UK and is destined for a UK mobile phone, outside the UK and then returning it to the UK as if it were an incoming international call. Typically, a large UK company will send calls destined for mobile phones to a UK FNO over a private circuit; or a UK operator will consolidate calls received from a number of smaller customers. The FNO will then send these calls to an overseas operator who by prior agreement will return the calls to the UK. The UK FNO and the overseas operator may be the same company.

4.57. This arrangement exploits an arbitrage opportunity because international accounting rates, the agreed payments between any two international operators, are generally averaged across all call types. Thus, for a caller in France, there is only one international rate to the UK regardless of whether the call is to be terminated on a fixed or a mobile phone. Vodafone told us that this option could lead to savings of about 25 per cent compared with BT's tariffs.

4.58. Reflecting the international accounting arrangements, MNOs have agreed for the time being to charge much less for terminating incoming international calls than for terminating other calls. Cellnet stated that before 1 April 1996 it agreed with BT to accept a payment of 1.6 ppm for international calls. From 1 April 1996 Cellnet agreed to accept a payment of 5 ppm for international calls, independent of time of day, rather than the normal interconnect rate, although this was substantially below any estimate of their cost. Cellnet said that the other alternative would have been to bar access to its mobile numbers from overseas which would not have been in the interests of customers.

4.59. BT told us that international accounting rates were dropping rapidly, such that the rates on the US routes and on a number of European routes were close to or even below 5 ppm. This means

that BT would be receiving less from the overseas operator than it would be paying out as the POLO to an MNO.

4.60. BT said that it could not distinguish between genuine internationally-originating calls and tromboned calls. It did not, therefore, have a clear view of the extent of tromboning. However, it said that analysis of incoming traffic levels had revealed abnormally high levels of fixed-to-mobile calls traffic on some international routes. For example, certain US routes had during the course of this inquiry shown a fixed-to-mobile calls level of around 60 per cent, compared with the normal figure of some 2 to 5 per cent; some Scandinavian routes had shown levels of around 30 per cent, compared with a normal level of between 3 and 16 per cent on those routes. BT said that these levels would suggest that tromboning was taking place over these routes, but the precise extent could not be established.

4.61. The MNOs told us that there was no difference in their costs for handling traffic from within the UK as opposed to that from overseas. This being the case, both they and BT felt that over the next few years pressure would be exerted for fixed-to-mobile calls from outside the UK to be charged at the same termination rate as those from within the UK. Vodafone told us that BT had to take the initiative if these changes were to take place. BT told us that it expected the MNOs to insist that the rate be reviewed once the outcome of this inquiry was known.

4.62. BT said that negotiation of alternative arrangements with all overseas operators and their administrations might not be straightforward and might take some time. However, in the course of our inquiry, it announced that, in the absence of a positive response to proposals to US operators that calls to UK mobile phones above historical levels should be subject to a higher accounting rate, it had decided to refuse to interconnect such calls. BT told us that there would still be scope for savings from tromboning even if its currently proposed changes to the accounting rates were implemented as the increases were the minimum required to cover BT's losses and did not affect the payment to the MNOs.

Mobile networks

4.63. We see fixed-to-mobile calls as being a segment of the mobile telephony market. The purpose of our analysis is to assess whether there is sufficient competitive pressure, either direct or indirect, to constrain termination charges for calls to Vodafone's or Cellnet's networks.

4.64. It is not necessary, within our terms of reference, to conduct a full investigation of all aspects of competition between the MNOs. However, it is important that we should look at certain indicators of competition for subscribers as, according to the evidence of Cellnet, Vodafone and others, it is competition between networks for subscribers that is the source of much of the competitive pressure that is constraining termination charges. With this in mind we look at the MNOs' shares of mobile telephony business and the extent of churn and then we look at the competitive pressures on termination charges.

Mobile operators' shares

4.65. There are a number of ways of measuring the MNOs' shares of mobile telephony business: shares of subscribers, of net connections, of outgoing call minutes, of revenue for outgoing calls, of incoming call minutes and of revenue for incoming calls. The relevant statistics are shown in Tables 4.13 to 4.18.

4.66. Each of the tables also shows the Herfindhal Hirschman Index (HHI) which is a widely-used measure of market concentration. An HHI of 10,000 means the existence of one company in the market, and the lower the number the lower the concentration. The minimum number for the HHI with four operators is 2,500. Cellnet told us that the HHI was a poor guide to competitiveness in dynamic markets and took no account of volatile competition. It said that the trend in the HHI for MNOs was clearly downwards and that the closer an industry moved to its minimum HHI the smaller

the possible reduction in the index.¹ BT told us that the HHI was typically used to measure the change in concentration resulting from a merger. One2One made a similar point with regard to the use of the HHI. It said also that whilst an unconcentrated market (if properly defined) was highly likely to be competitive, it did not follow that a concentrated market was necessarily or even usually uncompetitive. BT stated that in the mobile market, the most striking feature was the rapid and consistent fall in the HHI over time, with the fall each year being greater than the level of change viewed as significant by the US Department of Justice in merger cases. We regard the HHI as a useful way of providing a single index of the degree of concentration in a market but we do not regard it as the only indicator of the extent of the competitive pressure between the four MNOs. We now look at each of these measures in turn.

Subscribers

4.67. Table 4.13 shows the number of subscribers and the shares of the MNOs.

TABLE 4.13 **MNOs' shares of subscribers**

	<i>All networks</i> <i>'000</i>	<i>Vodafone</i> <i>%</i>	<i>Cellnet</i> <i>%</i>	<i>One2One</i> <i>%</i>	<i>Orange</i> <i>%</i>	<i>HHI</i>
March 1992	1,260	56.51	43.49	0.00	0.00	5,084.71
March 1993	1,507	56.40	43.60	0.00	0.00	5,082.01
March 1994	2,267	52.40	44.91	2.69	0.00	4,769.90
March 1995	3,940	45.99	44.01	6.52	3.48	4,106.60
March 1996	5,736	42.61	41.68	7.18	8.53	3,677.28
March 1997	7,109	40.33	38.37	8.72	12.58	3,333.20
March 1998	9,024	38.01	34.10	13.28	14.62	2,997.30
July 1998*	9,849	37.87	32.43	14.61	15.09	2,927.13

Source: MMC calculations based on published OFTEL data.

*MMC estimate based on data provided by Vodafone and Cellnet.

Note: Totals may not sum due to rounding.

4.68. Table 4.13 shows that Vodafone and Cellnet have lost share but together they still account for 70.3 per cent of all mobile subscribers. This is reflected in the HHI and explains why it remains above the minimum level for four firms.

Net new connections

4.69. The MNOs told us that the competitive situation in terms of operators' shares was changing. One way to analyse these changes is to use data on net new connections (see Table 4.14). We were told that the more recent periods were the most relevant as they took into account the growing importance of One2One and Orange.

¹Cellnet gave the following example. The first 1 per cent taken from a monopolist reduces the HHI by 198 to 9,802; the last 1 per cent to move to four players reduces the HHI by 2 to 2,500.

TABLE 4.14 MNOs' shares of net new connections

	All networks '000	Vodafone %	Cellnet %	One2One %	Orange %	HHI
<i>Annual</i>						
1992/93	247	55.87	44.13	0.00	0.00	5,068.92
1993/94	760	44.47	47.50	8.03	0.00	4,298.58
1994/95	1,673	37.30	42.80	11.72	8.19	3,427.09
1995/96	1,796	35.19	36.58	8.63	19.60	3,035.09
1996/97	1,373	30.81	24.54	15.15	29.50	2,651.21
1997/98	1,914	29.41	18.23	30.15	22.20	2,599.57
<i>Period</i>						
1994/98	6,757	33.18	30.47	16.83	19.52	2,693.69
1995/98	5,084	31.83	26.42	18.51	23.25	2,593.79
1996/98	3,288	29.99	20.86	23.91	25.24	2,543.25

Source: MMC calculations based on published OFTEL data.

Note: Totals may not sum due to rounding.

4.70. For 1997/98 One2One accounted for the largest share of net connections (30.2 per cent), closely followed by Vodafone (29.4 per cent). Orange was the third largest operator (22.2 per cent) and Cellnet accounted for the smallest proportion of net connections (18.2 per cent). Vodafone told us that the annual data understated the degree of competitive rivalry that arose month to month as pricing decisions were taken at much shorter intervals than a year. It said that during the year to January 1998, Vodafone's share ranged from a low of 11 per cent to a high of 42 per cent.

4.71. Cellnet provided monthly figures for net connections (see Appendix 4.4). It said the data showed that the lead in the share of net connections had changed hands several times during recent months. Cellnet told us that these data showed the intensity of competition between the MNOs. It said that these data suggested that failure to address these implied trends would result in swift exit from the market. The data show fluctuations in net connections by month but broad trends are identifiable: Vodafone's share has slightly fallen, Cellnet's share has fallen more than that of Vodafone and the shares of Orange and One2One have increased. Over the period January to July 1998 the shares of the MNOs, whilst continuing to fluctuate in certain months, have been as follows: 35 per cent for Vodafone, 15 per cent for Cellnet, 30 per cent for One2One and 20 per cent for Orange.

Outgoing minutes

4.72. Table 4.15 shows shares of outgoing minutes of calls from mobile phones.

TABLE 4.15 MNOs' shares of outgoing call minutes

	All networks m	Vodafone %	Cellnet %	One2One %	Orange %	HHI
1992/93	1,609	59.98	40.02	0.00	0.00	5,199.01
1993/94	2,047	57.35	38.79	3.86	0.00	4,808.72
1994/95	3,358	46.46	32.37	19.51	1.67	3,589.28
1995/96	5,059	35.40	27.42	31.09	6.09	3,008.83
1996/97	6,806	32.99	24.83	31.24	10.95	2,800.21
1997/98	9,572	32.98	24.03	30.48	12.51	2,750.85

Source: MMC calculations based on published OFTEL data.

Note: Totals may not sum due to rounding.

4.73. Table 4.15 shows that Vodafone and Cellnet lost share between 1992/93 and 1996/97. They suffered larger falls in share in 1994/95 and 1995/96 with the growth of One2One and Orange. Between 1996/97 and 1997/98 Vodafone's share was broadly constant and Cellnet's share fell by less than one percentage point. Since 1995/96 One2One has had more outgoing call minutes than Cellnet (see paragraph 4.75) but its share fell slightly in 1997/98. Orange has increased its share in every year of its operation.

Outgoing revenue

4.74. Table 4.16 shows the MNOs' shares of revenue from outgoing calls, rentals and connections (outgoing revenue).

TABLE 4.16 MNOs' shares* of outgoing revenue†

	All networks £m	Vodafone %	Cellnet %	One2One %	Orange %	HHI
1993/94	1,194	56.62	42.80	0.59	0.00	5,037.37
1994/95	1,638	52.50	42.37	3.48	1.65	4,566.51
1995/96	2,265	48.39	40.40	5.56	5.65	4,036.28
1996/97	2,747	46.20	37.20	6.30	10.30	3,664.01
1997/98	3,204	44.19	33.46	9.80	12.55	3,326.09

Source: MMC calculations based on published OFTEL data.

*For Orange and One2One the figures represent the retail revenue received direct from their retail customers. For Vodafone and Cellnet the figures are OFTEL estimates that are based on data provided by service providers. The table will underestimate the shares of Vodafone and Cellnet as OFTEL does not have complete coverage of service providers.

†Includes revenue for outgoing calls, rental and connections.

Note: Totals may not sum due to rounding.

4.75. Table 4.16 shows that total outgoing revenue more than doubled between 1993/94 and 1997/98. Vodafone and Cellnet have lost share. Together they still account for about 77.7 per cent of outgoing revenue. It is noticeable from Table 4.16 that One2One's share of revenue is much lower (9.8 per cent) than its share of outgoing minutes (30.5 per cent—see Table 4.15).

Incoming call minutes

4.76. Table 4.17 shows MNOs' shares of minutes of calls to mobile phones (incoming call minutes) for 1992/93 to 1997/98.

TABLE 4.17 MNOs' shares of incoming call minutes

	All networks m	Vodafone %	Cellnet %	One2One %	Orange %	HHI
1992/93	970	63.61	36.39	0.00	0.00	5,370.37
1993/94	1,209	61.12	38.88	0.00	0.00	5,247.53
1994/95	1,764	53.34	36.51	7.65	2.49	4,243.27
1995/96	2,455	42.85	34.46	12.06	10.63	3,282.15
1996/97	3,492	38.52	29.07	15.12	17.30	2,856.18
1997/98	5,027	36.42	27.83	17.55	18.20	2,740.29

Source: MMC calculations on published OFTEL data.

Note: Totals may not sum due to rounding.

4.77. Table 4.17 shows that Vodafone is the largest operator (36.4 per cent). It and Cellnet have lost share. Vodafone's share fell from 63.6 per cent in 1992/93 to 36.4 per cent in 1997/98 with most of its fall in share occurring between 1993/94 and 1995/96. Cellnet's share fell by 8.6 percentage points between 1992/93 (36.4 per cent) and 1997/98 (27.8 per cent). The two new entrants (Orange and One2One) together accounted for 35.8 per cent of incoming call minutes in 1997/98.

Incoming call revenue

4.78. Table 4.18 shows MNOs' shares of revenue from termination charges (incoming call revenue).

TABLE 4.18 MNOs' shares of incoming call revenue

	<i>All networks</i> £m	<i>Vodafone</i> %	<i>Cellnet</i> %	<i>One2One</i> %	<i>Orange</i> %	<i>HHI</i>
1992/93	255	64.31	35.69	0.00	0.00	5,409.77
1993/94	312	60.90	38.78	0.32	0.00	5,212.65
1994/95	415	56.63	40.72	1.93	0.72	4,869.15
1995/96	517	51.06	42.36	3.29	3.29	4,423.49
1996/97	532	46.99	37.97	6.58	8.46	3,764.84
1997/98	762	37.80	31.36	14.04	16.80	2,891.58

Source: MMC calculations based on published OFTEL data.

4.79. Table 4.18 shows that Vodafone's and Cellnet's shares have fallen over the period but that in 1997/98, taken together, they still accounted for 69.2 per cent of total incoming call revenue.

Summary of operators' shares

4.80. The various measures of MNOs' shares show that Vodafone and Cellnet have lost share since the entry of Orange and One2One. However, in 1997/98 Vodafone and Cellnet still retain sizeable shares (see Table 4.19).

TABLE 4.19 Shares of Vodafone and Cellnet in 1997/98

	<i>per cent</i>		
	<i>Vodafone</i>	<i>Cellnet</i>	<i>Total</i>
Number of subscribers*	38.0	34.1	72.1
Number of subscribers†	37.9	32.4	70.3
Net connections	29.4	18.2	47.6
Outgoing minutes	33.0	24.0	57.0
Outgoing revenue	44.2	33.5	77.7
Incoming minutes	36.4	27.8	64.3
Incoming revenue	37.8	31.4	69.2

Source: MMC calculations on published OFTEL data.

*March 1998.

†July 1998 (based on data provided by Vodafone and Cellnet).

Note: Totals may not sum due to rounding.

Churn

4.81. The MNOs told us that the rate of churn demonstrated the extent of competitive pressures they faced. They said that there was no industry standard for calculating churn and that each operator estimated its own figure based on its own convention. However, broadly speaking, churn is calculated as the number of disconnections for a period as a proportion of the customer base. Measures of churn do not record those users who upgrade their handset but who do not disconnect from the networks.

4.82. The overall churn for digital networks is about 20 per cent a year. It is higher for digital and analogue networks taken together at about 30 per cent. Churn on analogue networks can be as high as 50 per cent.

4.83. Table 4.20 shows Vodafone's and Cellnet's churn rates between 1993/94 and 1997/98.

TABLE 4.20 Vodafone's and Cellnet's network churn, 1993/94 to 1997/98

	<i>per cent</i>				
	1993/94	1994/95	1995/96	1996/97	1997/98
<i>Vodafone</i>					
Analogue	22.0	29.8	26.6	33.5	51.7
Digital	44.2	37.1	20.3	16.7	20.3
Total	22.2	30.2	25.6	27.4	29.0
<i>Cellnet</i>					
Total	29.5	24.8	28.2	31.6	31.2

Source: Vodafone.

4.84. Following an increase in 1994/95, Vodafone's overall rate of churn remained broadly constant between 1994/95 and 1997/98. Its rate of churn for its digital services fell between 1993/94 and 1995/96 but has been broadly constant since then. Cellnet's overall rate of churn was also broadly constant between 1993/94 and 1997/98 although it did fall in 1994/95.

4.85. Vodafone said that nearly a million Vodafone subscribers now churn each year. Vodafone's churn rates combine both disconnect churn (when a customer disconnects from the network and either reconnects to another network or ceases to use a mobile phone at all) and upgrade churn (when a customer disconnects from the network and then reconnects soon after with a new number). Vodafone said that market research suggested that about three-quarters of all churn was disconnect (within which those abandoning cellular altogether outnumbered those switching to other networks by two to one (50 per cent compared with 25 per cent)) and one-quarter was upgrade.¹ Vodafone told us that the evidence on churn was reinforced by the enormous number of customers who changed handsets, tariff or service provider without disconnecting. It said that in the 12 months to May 1998, 58 per cent of the average Vodafone network subscriber base (ie over 1.5 million) migrated (staying with the same operator but moving from one mobile package to another) and that each of these customers had the opportunity to switch to another network. It told us that they were retained by the competitiveness of Vodafone's offering. Vodafone stated that adding the proportion of customers who churned to those who migrated suggested that no less than 75 per cent of Vodafone's customers (over 2 million) changed some aspects of their mobile phone service each year.

4.86. Applying the network switching proportion of 25 per cent to Vodafone's churn implies that about 5 per cent of its digital customers and 7 per cent of all its customers are moving to other MNOs.

4.87. Vodafone told us that users who disconnected but remained on its network were able to benefit from competition between service providers and as such these users should be included in any estimate of the potential for switching. From an analysis of customers who disconnected Vodafone estimated this potential at about 18 per cent. Its estimate included 8 per cent of its disconnecting users who switched to another network, 6 per cent of its users who stayed with its network but who went to a new service provider and 4 per cent who stayed with its network and who stayed with their old service provider but who changed their contract in some way. Disregarding the latter group Vodafone's method when applied to its digital churn gives an estimate of network switching of between 6 and 10 per cent.

4.88. Vodafone's second residential survey (see paragraphs 4.137 to 4.139) showed that 56 per cent of respondents who disconnected from a mobile were in fact changing from an analogue to a digital service on the same network. 49 per cent were changing to a different tariff on the same network.

4.89. In its first residential survey Vodafone found that 21 per cent of users reported that they were likely (to varying degrees) to switch networks at the end of their current contract, while its first

¹This finding is based on a series of studies carried out by Campden Consulting on a sample of subscribers who left the Vodafone network between 1994 and 1997.

business survey showed that 17 per cent of respondents said that they were likely to switch networks within the next 12 months.

4.90. Over the last five years, Cellnet's churn rates have been between 25 and 32 per cent (see Table 4.20). Cellnet stated that it categorized churn into three groups. First, those customers who opted for a new mobile phone package. Cellnet said that in 1997/98, 51 per cent of customers disconnecting from Cellnet's network did so in order to reconnect, either to Cellnet (29 per cent) or an alternative network (22 per cent). It told us that this demonstrated that customers were price sensitive: they were prepared to switch between packages in order to benefit from better deals. Secondly, there were those customers who decided they no longer required a mobile phone. This applied to 28 per cent of Cellnet's customers in 1997/98. Thirdly, some customers were disconnected because of bad debts. This applied to 21 per cent of Cellnet's customers in 1997/98.

4.91. Applying the network switching proportion (22 per cent) to Cellnet's churn implies that about 7 per cent of all its customers are moving to other MNOs. This proportion is the same as that for Vodafone.

4.92. Cellnet told us that it did not regard network switching as an adequate reflection of the degree of competition between networks. It considered that both churn (disconnections) and migrations showed the degree of competition between MNOs. It said that in 1997/98 nearly half of its customers made a decision about their mobile phone package. Over 800,000 disconnected (nearly one in three overall and just over one in five for digital customers) and over 600,000 migrated. The migrations included those switching from analogue to digital as well as digital upgrades.

4.93. Our consumer survey (see paragraphs 4.134 and 4.135) found that 16 per cent of those users who had had their mobile phones for over one year had changed networks in the last 12 months. This will include both digital and analogue churn, but is nonetheless a higher figure than the 5 to 7 per cent of network switching which we estimated above. However, the 16 per cent may not be directly comparable with the 5 to 7 per cent as it might include some users who after leaving one network stopped using mobile phones before they joined another network. These users could have abandoned mobile phones for a time or could have been disconnected due to bad debts and as such they would not be recorded as switching to another network in the company figures. Vodafone said that our switching figure of 16 per cent was based on users who had had a mobile phone for more than a year and had changed networks in the last 12 months. It stated that 35 per cent of the mobile phone users in our survey had had their mobile phones for one year or less and that this group was not asked about changing networks. Vodafone told us that it would expect a proportion of this group also to switch, albeit perhaps not to the extent of the 16 per cent. It said that assuming that some three percentage points of the 35 per cent would also switch within a year, 19 per cent of users would change networks in a year. Vodafone said that subsequent analysis it had carried out showed that 40 per cent of GSM disconnections took place within the first year and given that about 29 per cent of disconnections were to rival networks, its original estimate was perhaps low and around 20 per cent of users would switch in a year. In Vodafone's second residential survey 54 per cent of respondents said that their present mobile phone was their first; 46 per cent stated that this was not the case and of this 46 per cent (ie those who had previously had a mobile phone), 32 per cent said that they had been connected to a different network. The findings of this survey therefore suggest that some 15 per cent of those questioned (32 per cent of 46 per cent) had switched networks.

4.94. Vodafone pointed out that some business customers used more than one mobile network. Its second business survey showed that 45 per cent of respondents with more than one mobile phone were connected to more than one network. Of these, 29 per cent reported a change in the proportions of phones connected to each network. The most popular network other than Vodafone was Cellnet.¹ For those respondents with mobile phones on more than one network, on average 11.4 mobile phones were connected to Vodafone, 4.1 to Cellnet, 0.5 to Orange and 0.2 to One2One and 69 per cent of the respondents concerned said that these proportions had not altered significantly over time.

¹The survey was based on Vodafone's customers.

Competitive pressures on termination charges

4.95. We turn now to consider more specifically the extent of competitive pressure on termination charges. We begin our analysis by examining the recent falls in termination charges. We then look at the possible competitive pressures from various sources: substitutes, new entry, technical options, FNOs and users.

Recent falls in termination charges

4.96. The DGT and the MNOs disagreed on the reasons for the fall in the termination charges of Vodafone and Cellnet. The DGT told us that the falls were due more to the threat of regulatory action than to competitive pressure.¹ The MNOs on the other hand told us that the falls were due more to competitive pressure.

4.97. To help us form our own view on this question we examined the relationship between the changes in the termination rates² and changes in market shares (using the HHI for MNOs and the changes in BT's share of fixed-to-mobile calls). We used Vodafone's and One2One's termination rates. The changes in Vodafone's rates are very similar to those of Cellnet and the changes in One2One's rates are very similar to those of Orange. If changes in competition are an important factor in changes in termination rates and if market shares have some bearing on the intensity of competition we might expect to see some relationship between reductions in the HHI and in BT's share and falling prices. One2One told us that our analysis was flawed as it was unreasonable to rely on the HHI as a means of assessing competition in a market.

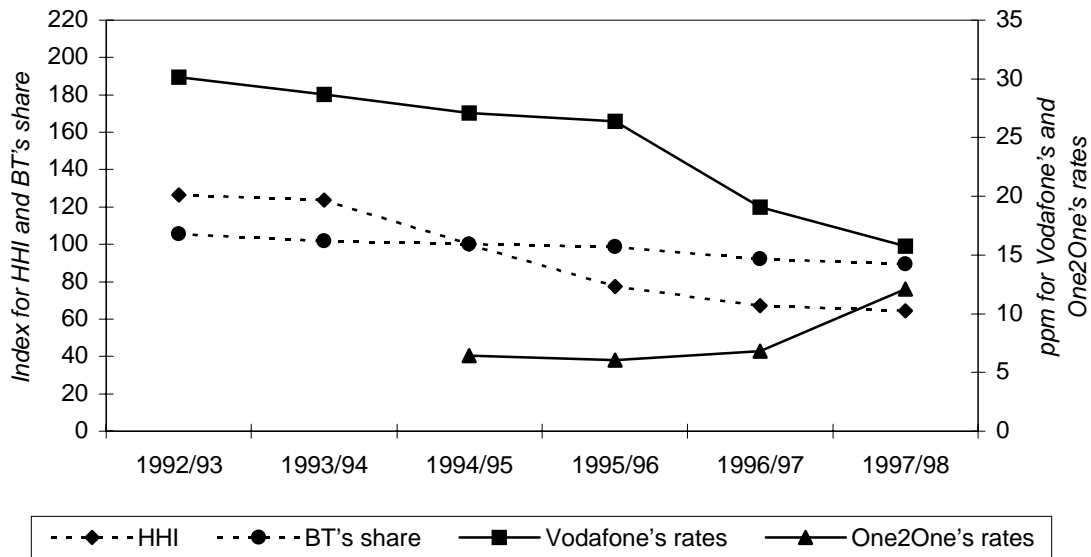
4.98. Figure 4.1 shows no clear relationship between changes in termination rates and changes in concentration. The HHI falls over the period as do Vodafone's termination charges. The largest fall in the HHI was between 1993/94 and 1995/96 as Orange and One2One entered the market and began to increase their market shares. During this time termination charges did not fall in nominal terms. The larger fall in charges (for Vodafone) was in 1996/97 and towards the end of this period (February 1997) Orange and One2One substantially increased their rates. During this period there was a smaller reduction in the HHI as it approached the minimum level of 2,500 with four companies. BT said that both the HHI and BT's market share had fallen throughout the period and of the ten year-on-year price changes, eight had been falls. It told us that broadly speaking this would suggest some positive correlation between the fall in the HHI and price reductions.

¹In his Consultative Document, *Prices of calls to mobile phones* (March 1997), the DGT said that he identified concerns about the prices of calling mobile phones in his June 1996 Statement on *Pricing of Telecommunications Services from 1997*. However, in his March 1996 Consultative Document (*Pricing of Telecommunications Services from 1997*) the DGT said that he remained concerned about the high cost of calls to mobile phones.

²We used published OFTEL data as these showed similar trends in termination rates to the data provided by the mobile operators (see paragraph 4.16).

FIGURE 4.1

The trends in termination charges, the HHI for incoming minutes and BT's share of fixed-to-mobile call minutes



Source: MMC calculations based on published OFTEL data.

Notes:

1. Concentration is measured by the changes in the HHI for incoming calls to mobiles and by the changes in BT's share of calls to mobiles (1994/95 is the base of 100 in both cases).
2. The changes in rates (termination charges) are expressed in real terms using 1997/98 (Q1, Q2) prices.
3. The changes in Cellnet's termination charges are very similar to those of Vodafone.
4. The changes in Orange's termination charges are very similar to those of One2One.

4.99. Cellnet and Vodafone also criticized our analysis in this area on the grounds that it did not allow for the fact that Orange's and One2One's rise in rates reflected their increased coverage (a point also made by One2One) and that they increased their rates in expectation of the level at which rates would be harmonized for the introduction of MNP. They also submitted that the HHI did not measure competitive intensity and that there was the possibility that time-lags existed and that increased competition might lead to increased quality rather than a decrease in price.

4.100. We investigated whether there was a relationship between One2One's increased termination rates and the improvement in its quality. We chose One2One as it provided the necessary data. We used coverage as a proxy for quality. The information from One2One showed:

- *September 1993*: One2One launched its service within the M25.
- *April 1994*: coverage was extended outside the M25 to towns like Milton Keynes, High Wycombe, Reading, Basingstoke, Guildford, Crawley, Sevenoaks, Rochester, Chelmsford and Stevenage.
- *August 1994*: coverage was extended north, up the M40 and M1 to Birmingham, and south, to Southampton.
- *September 1995*: coverage reached 55 per cent of the Great Britain population and was extended in the South (Bournemouth, Brighton and Andover) and the North-West (Liverpool, Bolton and Stoke-on-Trent).

- *December 1996*: coverage reached 80 per cent of the Great Britain population, including parts of the North-East (Newcastle, Kingston upon Hull and Durham), Scotland (Glasgow, Edinburgh and Dumfries), Wales (Cardiff and Swansea) and Norfolk.
- *August 1997*: coverage reached 90 per cent of the Great Britain population.
- *March 1998*: coverage reached 95 per cent of the Great Britain population.

4.101. The above shows network extensions at April 1994, August 1994, September 1995, December 1996, August 1997 and March 1998 which compares with one change in One2One's termination rates (February 1997). One2One told us that its initial termination charges were set artificially low in order to assist market entry. It said that the February 1997 increase reflected the fact that by then its coverage extended to approximately 80 per cent of Great Britain's population. It should be noted that One2One and Orange did not, however, substantially increase their outbound charges at this time. This point was disputed by Cellnet and One2One (see paragraph 4.207). Also Orange told us that it increased its termination charges because its substantially lower charges would not lead to increased call volumes nor would this incentivize most customer groups to select Orange over other operators.

4.102. With regard to the HHI, we accept that it is not a direct measure of competition. It is, however, a widely-used measure of market structure which might be expected to have some influence on the extent of competition. Between 1993/94 and 1995/96 the HHI for incoming calls fell from 5,248 to 3,282, a 38 per cent fall. This is not surprising as during this period Orange and One2One entered the market and began to increase their market shares. The corresponding fall in Vodafone's average termination rates was 8 per cent in real terms. Between 1995/96 (about the time of the DGT's publicly stated concerns on charges for fixed-to-mobile calls) and 1997/98 the HHI fell from 3,282 to 2,740, a fall of 17 per cent compared with a fall in Vodafone's average termination charges of 40 per cent in real terms. During this latter period the average termination charge of One2One increased by 78 per cent in real terms. These findings are therefore rather ambiguous. There was not a clear matching between the change in the HHI and the change in the termination rates but the figures do not rule out that the change in the HHI was a contributory factor in the change in the termination rates.

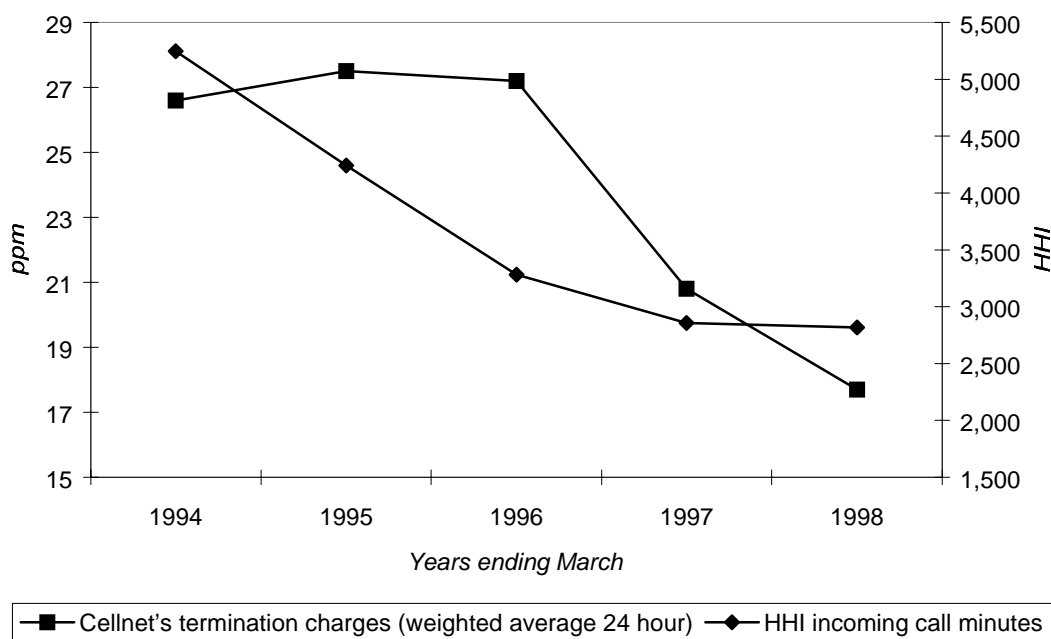
4.103. With regard to the time-lag of one or two years, we accept that some sort of lag might be consistent with some users having a contract period. However, this might be offset to some degree by the operators wishing to attract first-time users and those users coming to the end of their contracts. Vodafone's view that competition in mobile phones started with the price of handsets, then included monthly charges, then outgoing call charges and now includes incoming call charges is also consistent with the existence of a lag.

4.104. Cellnet provided us with the results of work carried out by an economic consultancy company (CASE) in which it used the HHI as part of an analysis of the degree of competition facing MNOs. We discuss that part of its work that is related to fixed-to-mobile calls.

4.105. CASE plotted Cellnet's weighted average termination rates and the HHI for incoming minutes for the period 1993/94 to 1997/98 (see Figure 4.2). The analysis behind Figure 4.2 is similar to that behind Figure 4.1 which is based on work carried out by the MMC. However, we used a longer time period and Vodafone's rates as opposed to Cellnet's. We also used additional data, namely BT's share of fixed-to-mobile call minutes and One2One's rates. We concluded that there was no clear relationship between changes in concentration and changes in termination rates (see paragraph 4.102). CASE, on the other hand, concluded that Cellnet's termination charges were correlated with the fall in the HHI.

FIGURE 4.2

Evolution of the HHI and of Cellnet's termination charges



Source: CASE calculations on OFTEL and Cellnet data.

4.106. It is clear from Figure 4.2 that both Cellnet's termination charges and the HHI show a downward trend. However, inspection of Figure 4.2 reveals two distinct periods. First, between 1993/94 and 1995/96 there was little change in Cellnet's termination rates but there was a fall in the HHI. Secondly, between 1995/96 and 1997/98 termination rates fell sharply but the reduction in the HHI was much less pronounced. The results are again therefore rather ambiguous. Cellnet told us that with four firms the possible minimum level that the HHI could reach was 2,500 (four firms with equal market share). It said that the HHI was already around the 3,000 level as of 1995/96 and therefore it should be expected that the fall in the HHI would necessarily slow down as it approached the 2,500 limit. Cellnet also told us that there was a closer relationship between the HHI and its termination rates when the analysis was carried out using calendar years and not financial years. However, this analysis, on closer inspection, seems to reveal three distinct periods. First, between 1994 and 1995 there was no change in Cellnet's termination rates but there was a fall in the HHI. Secondly, between 1995 and 1996 termination rates and the HHI seem to fall broadly in line with each other. Thirdly, between 1996 and 1998 termination charges continued to fall at about the same rate as in the previous period but the reduction in the HHI was much less pronounced.

4.107. Cellnet told us that as the shape of the analysis changed significantly by moving from financial year to calendar year, a movement of only three months, no more could be read into this analysis other than generally that the HHI and termination charges were moving downwards at about the same rate. It said that this reinforced Cellnet's reservations about any analysis involving the HHI.

4.108. The DGT pointed out that correlation does not imply causation. He said that the HHI for incoming minutes was not driven by price competition on inbound calls but largely by the HHI for subscribers which was itself driven by a degree of competition in the market for mobile customers, where the prices of handsets, subscriptions and outgoing calls were likely to be key determinants. He told us that the fact that the threat of regulatory action had led to the MNOs reducing their termination charges over the same period that competitive activity had reduced the HHI for outbound calls was largely coincidental. The DGT said that it was totally fallacious to infer from the data that competitive pressures, as represented by the decline in the HHI for incoming call minutes, were associated with or even responsible for the fall in termination charges.

Competitive pressure from substitutes for mobile phones

4.109. Table 4.21 (which is based on our consumer survey) shows the respondents' views on alternatives to using mobile phones. It shows that 55 per cent of respondents thought that people calling them had alternatives to calling their mobile phones, these being: to wait and use a fixed phone, pagers and other receiving devices, face-to-face meeting and leaving a message with a colleague, family member or a friend. Given these alternatives, it is necessary to examine to what extent mobile phone users would switch to using other forms of communication following a hypothetical small price increase in mobile phones. We deal with this issue in paragraphs 4.220 to 4.225.

TABLE 4.21 Respondents' views on alternatives to using mobile phones

Based on the question: *Do the people who call your mobile have any other ways they could reasonably contact you?*

	%
Yes	55
No	44
Don't know	<u>1</u>
Total	<u>100</u>
Sample size	164

Base: Mobile phone bill-payers who accept incoming calls.

Based on the question: *What are these options?*

	<i>With options</i> %	<i>All</i> %
Pager/voicemail/answerphone/fax	34	19
Secretary/colleague	11	6
Other family member/friend	14	8
Wait and use fixed phone	74	41
Face-to-face (meeting)	28	15
Other	6	3
Don't know	3	2
Sample size	90	164

Base: Mobile phone bill-payers who accept incoming calls and who are contactable in other ways.

Source: MMC consumer survey.

4.110. In Vodafone's second residential survey respondents were asked when they acquired their present mobile phone did they seriously consider, as an alternative, any of a given set of alternatives which included a pager, an additional fixed line and an e-mail account. 83 per cent of respondents said that they did not seriously consider any of the given options.

4.111. Vodafone said that its belief was that those who contemplated the purchase of a mobile phone did not see an obvious substitute for it. There had been 'halfway' attempts at mobile telephony, but none successful on the scale of the two-way mobile system using a fully portable handset. The 'Rabbit' system, which enabled customers to make calls away from their fixed locations (but not to receive calls), had to be closed in the early 1990s after no more than five years of operation, not least because its price was high relative to full two-way mobile communications. Pagers had likewise had only niche success. No other system currently available provided real-time two-way communication over virtually the whole of the UK and (with roaming) across a large number of other countries.

4.112. Notwithstanding the range of alternatives to fixed-to-mobile calls, including pagers, our consumer survey found that 67 per cent of fixed-line users called a mobile phone only when there was no other option (see Table 4.26).

Pagers

4.113. Customers could use pagers as another form of communication. Pagers differ from mobile phones in a number of ways. First, only one-way communication is currently available in the UK (although this can be used to initiate a return call). Secondly, Cellnet and Orange told us that the cost of calling pagers for a typical message was higher than the cost of a fixed-to-mobile call. Cellnet said that an industry average of 55p peak/16p off-peak per message for calls to pagers compared with 32 ppm peak/10.5 ppm off-peak for BT calls to Cellnet. Thirdly, entry costs are lower: Cellnet told us that these were approximately £90 for the pager with no subscriptions compared typically with at least £130 first year recommended retail price subscriptions for a mobile phone. These figures suggest that pagers are cheaper than mobile phones for the subscribers (£90 compared with £130) but more expensive for the incoming caller (55/16p per message compared with 32/10.5 ppm). Since Cellnet provided us with this information, subscriptions for some mobile phones have fallen below £130. Other things being equal, the gap between subscriptions for pagers and mobile phones may therefore have narrowed.

4.114. Cellnet provided us with data which showed that between 1993 and 1997 the number of pagers in the UK increased by 95 per cent (758,000 subscribers to pagers in 1993 compared with 1,475,000 in 1997). Cellnet said that the rapid rise in the use of pagers since 1995 had been widely recognized as being the result of the introduction of calling-party-pays in September 1994. In the same period the number of mobile phone subscribers increased by 291 per cent (2.3 million in 1993/94 compared with 9 million in 1997/98).

4.115. Vodafone told us that, in its view, pagers were not an effective substitute for mobile phones. It said that the technical limitations of pagers relative to mobile phones seemed likely to ensure that this remained so for the foreseeable future. In its second business survey Vodafone found that 95 per cent of all respondents said that they did not consider pagers as an alternative when reviewing their mobile phone contracts.

4.116. BT told us that on the basis of Pager Acquisition Research in March 1997, 68 per cent of pager users also had a mobile phone, which suggested that pagers were often used to supplement the use of a mobile phone rather than as an alternative. It said that despite the potential for pagers to substitute for fixed-to-mobile calls, it was unlikely that ownership of a pager alone would currently be regarded as a suitable substitute for a mobile phone for the majority of mobile phone owners. It stated that in a recent survey¹ respondents who had said that they had the intention of giving up their mobile phone in the next year were asked what they would replace it with. Of this sample, 69 per cent said another mobile phone, 16 per cent said nothing, 3 per cent said that they would replace it with a pager and 2 per cent said they would replace it with a fixed line at home.

4.117. Orange provided us with a copy of a report on pagers commissioned by the RA which suggested that technological change (two-way pagers) will lead to rapid growth in pagers, particularly alphanumeric pagers. It noted, however, that the introduction of two-way paging was an important factor for the predicted growth in the pager; and one MNO told us that this facility was unlikely to be commercially available in the UK for a number of years.

Other possible substitutes

4.118. Cellnet told us that competitive pressure was applied to termination charges by alternative forms of communication other than pagers, including faxes, e-mail, calls to fixed lines, answerphones and voicemail. It said that typically, these options would not be as attractive as fixed-to-mobile calls because they might add uncertainty or delay in contacting the person with the mobile phone, particularly if his or her location was unknown. So the customer would trade off the higher price of calling a mobile phone against its higher value.

Competitive pressure from alternative networks

¹Cessations Research—Paging, July/August 1996.

4.119. Orange told us that MNOs faced competition from a number of different sources, particularly when convergence of fixed and mobile services, one of the future key developments for mobile services, was taken into account. Additional spectrum could be made available for limited wide-area services using cordless technologies such as DECT (digitally enhanced cordless technology) or Ionica's FRA (Fixed Radio Access) technology. Further spectrum might also be made available for PAMR services and for paging services (using the ERMES and/or FLEX technologies).

4.120. Orange said that it was unclear what the Government's policy was on allocating additional spectrum for DECT/FRA services and therefore the prospects of new entry were uncertain. It told us that existing FNOs did not need to be allocated spectrum in order to offer cordless services using the DECT technology. DECT spectrum had previously been made 'licence-exempt', ie made available to anyone wishing to use the spectrum. Operators offering cordless services would be competing directly with the MNOs in the converged fixed/mobile market, particularly at the pico and micro levels (for example, in offices or within limited sites).

4.121. We were also told by Orange that there had been a recent consolidation in this market, with the merger of the two previous PAMR operators into one single operator, now trading as Dolphin. Orange said that the Government had stated that it might be willing to set aside additional spectrum for PAMR services if there was demand. It stated that PAMR services overlapped and therefore competed with those provided by more 'traditional' MNOs, particularly in closed user group mobile applications, such as providing communications solutions for transport firms. It told us that this consolidation and the migration to a digital technology (TETRA) would allow Dolphin to address more effectively some of the mobile markets, particularly where users had heavy data requirements.

4.122. One2One told us about the three operators of low earth orbit satellite digital services (Iridium, Globalstar and ICO Global Communications) which it said were scheduled to launch their services in November 1998, early 1999 and summer 2000 respectively. One2One stated that these services would operate with hand-held mobile phones and were expected initially to target business customers. It said that initial retail charges for outbound calls were expected to be in the range of 50 to 100 ppm (ICO), 74 to 89 ppm (Globalstar) and 178 to 299 ppm (Iridium).

4.123. One2One provided us with an article from *The Times*, dated 21 August 1998, which quoted a spokesman for Motorola, one of the main stakeholders in the Iridium network and one of the companies making the mobile phones for this service, as saying that the handsets were likely to cost £1,800 initially but that the price was expected to fall over time. The article also quoted the Managing Director of The Carphone Warehouse as saying that he expected the cost of the telephones to be over £2,000. One2One told us that satellite operators might choose to subsidize the sale of handsets as the MNOs had done.

Competitive pressure from new entry

4.124. One indicator of the degree of competitive pressure is the threat of entry and the existence or otherwise of entry barriers. However, it appears that there might be no new MNOs until 2002 or 2003 when UMTS is expected to be operating.

Competitive pressure from technical alternatives

4.125. We have discussed the technical alternatives (leased lines, mobile-to-mobile calls and tromboning) to using the standard BT option or the other FNOs when calling mobile phones (see paragraphs 4.41 to 4.62). Here we look at the possible pressure exerted on termination charges by these technical options.

4.126. The operators told us that the prices of these technical options could and did exert downward pressure on their termination charges. Cellnet, for example, has peak retail rates for its

leased lines and Mobile Extension of 18 ppm and 9 ppm respectively (see Tables 4.11 and 4.12) which compare with its termination charges for fixed-to-mobile calls pre-August 1998 of 19.2 ppm and post-August 1998 of 17.55 ppm (see Table 4.4). These termination charges compare with a rate via trom-boning of 5 ppm. The operators said that because users, particularly business users, were price sensitive, in order to retain these business customers MNOs were forced to reduce their termination charges to levels which competed with those rates offered for leased lines, mobile-to-mobile and trom-boning. Vodafone also told us that when its private wire charges were lower than its general termination charges FNOs cited private wire charges in support of their requests for lower termination rates.

4.127. This argument was not accepted by the DGT. He told us that the existence of leased lines and mobile-to-mobile might serve to segment the market, ie offer a fixed fee plus lower call charges which would be attractive to large-scale users but not be commonly attractive for smaller-scale users. This could result in the charges for such services having little if any influence on overall charges. He stated that it would be in the commercial interests of the MNOs to segment the market in this way thereby increasing their revenue.

4.128. Vodafone said that its non-discrimination clause might be relevant in this area. In its view this clause meant effectively that the benefits to one group of users had to be passed on to another similar set of users. Orange told us that it was not appropriate to compare leased line charges with termination charges.

Competitive pressure from fixed-line operators

4.129. Cellnet said that FNOs placed considerable downward pressure on its termination charges. It said that FNOs were anxious to be able to offer their subscribing customers lower fixed-to-mobile call charges in order to deliver value for money and to encourage additional call traffic. They had commercial leverage over Cellnet as from time to time it had to negotiate with these operators for terms on new services. It was put to us, however, that any such commercial leverage could be weakened by the financial relationships which existed between some of the FNOs and some of the MNOs, for example BT owning 60 per cent of Cellnet and CWC owning 50 per cent of One2One. One2One stated that it was jointly owned by C&W, not CWC, and MediaOne International. It said that C&W was a holding company and not an FNO. BT told us that at the first opportunity to renegotiate the termination charge with both Cellnet and Vodafone (1996), the negotiations were commercial and robust. It said that it sought and obtained cost information supported by audit reports to provide assurance that the termination rates were cost reflective. We put it to BT that it could have sought to improve its termination rates by seeking determination or arbitration by the DGT. BT told us that the reason it did not seek a determination between 1991, when the original determination was made for CWC, and 1996 was that its contracts with Vodafone and Cellnet during this period prevented the resolution of disputes in this way. They provided for arbitration but, in view of Vodafone's and Cellnet's insistence that the charges determined for CWC were below their costs, BT considered arbitration to be a lengthy and uncertain process. Although the renegotiation of BT's contracts with Cellnet and Vodafone in 1996 led to the removal of the restriction on its ability to seek a determination, BT considered that it had by then been encouraged by the DGT to seek a negotiated settlement with the MNOs.

4.130. Termination rates paid by BT were considerably higher than those paid by CWC until very recently. In 1993/94 BT paid a peak termination rate to Cellnet and Vodafone of about 30 ppm compared with around 18 ppm paid by CWC as determined by the DGT. BT and CWC currently pay the same termination rates to Cellnet and Vodafone but this results from CWC having agreed to increase the amount it pays from the level determined by the DGT.

4.131. Cellnet told us that it had little discussion before 1998 with CWC on the subject of termination charges because those charges had been determined by the DGT in 1991 and subsequently indexed annually. It said that in 1998 it was under pressure from the DGT to agree termination charges which did not discriminate between BT and CWC. It stated that as a result of the requirement under the EC Interconnection Directive to ensure non-discrimination, Cellnet and CWC agreed that Cellnet would place extra business with CWC in return for CWC paying a higher termination charge (15 ppm) than had been determined by the DGT (12.3 ppm). The new termination charge agreed

between the parties took effect on 1 April 1998 and has been set at the same day/evening/weekend rate that Cellnet agreed with BT and which came into effect on 1 August 1998.

4.132. Cellnet said that while CWC wanted the termination rate charged by Cellnet to be as low as possible, it was keen to have a full commercial relationship with Cellnet. Therefore, CWC and Cellnet came to contractual agreement on a number of services including international outgoing calls and private circuits as well as termination charges for both UK and overseas originated calls.

Competitive pressure from users

4.133. Two forms of pressure in this category have been suggested, the first through closed user groups, and the second through call-back. In this and some of the remaining sections we draw heavily on the findings of various consumer surveys. As a result before examining closed user groups and call-back we summarize the main characteristics of the samples used in the various surveys. We then look at calling patterns which are important for assessing the importance of closed user groups. We then look at closed user groups and call-back.

Characteristics of the consumer surveys

4.134. The MMC consumer survey was carried out by telephone by Research Survey of Great Britain (RSGB) in May 1998. The survey covered fixed-line and mobile phone users with a total weighted sample size of 1,236. Nine hundred and twenty-eight respondents were only fixed-line users and 309 were mobile users. The mobile phone sample consisted of 218 respondents who owned the phone and 91 who did not own but had access to the phone. One hundred and ninety-five mobile phone users in the sample paid for all or some of their mobile phone bill. The MMC survey covered primarily residential customers. Of fixed-line respondents, 91 per cent said that their fixed line was used mainly for domestic calls, 1 per cent said that it was used mainly for business calls and 8 per cent said that it was used broadly equally for both. 53 per cent of the mobile respondents said that their mobile phone was used mainly for domestic calls, 21 per cent said that it was used mainly for business calls and 24 per cent said that it was used broadly equally for both.

4.135. Cellnet criticized our consumer survey. It said that some of the questions in our survey were misleading and some important questions, particularly on price sensitivity of potential users, were not asked. We recognize the limits of consumer surveys, both ours and the others we have seen, but we feel that, taken with other evidence, they provide a useful source of information.

4.136. The Cellnet survey was carried out by ROMTEC. It was carried out by telephone in May 1998. Cellnet's survey had a total sample size of 513, 356 being residential customers and 157 being business customers. 40 per cent of the residential users (142) had mobile phones. Of these, 73 per cent said that they paid for the phone personally, 24 per cent said that their company paid, and 3 per cent said that someone else paid. Of the business users, 69 per cent (108) had mobile phones.

4.137. Vodafone provided results from four surveys, two covering residential users and two covering small to medium-sized business users. Its first two surveys were in effect a small number of questions added on to other surveys for other purposes which Vodafone had already commissioned. The two surveys were carried out by telephone in June 1998. They covered residential and small to medium-sized business users and we refer to them as Vodafone's first residential survey and its first business survey. Vodafone's first residential survey was carried out by NOP and covered a sample of 505, all being mobile users. Its first business survey was carried out by Harris Research (Harris) and had a sample size of 455, again all being mobile users.

4.138. Vodafone's second residential survey was carried out by NOP on behalf of Vodafone for this inquiry and included 1,000 residential consumers with a mobile phone on Vodafone's network. It was carried out by telephone in July and August 1998. Vodafone's survey may not produce results applicable across all fixed-line users as all of the respondents had a mobile phone and may therefore be more aware of mobile phones and associated charges than those fixed-line users who do not own a mobile.

4.139. Vodafone's second business survey was undertaken for this inquiry. It was carried out by NOP and included small to medium-sized companies. All respondents were customers of Vodafone. Three hundred telephone interviews were conducted in July 1998.

4.140. Orange provided us with details from a survey carried out by Harris Research in 1997. Orange told us that it asked Harris Research to conduct the survey to establish what features were important to people using mobile phones. Harris took a sample of 1,380 mobile phone users across all networks, including users who had only recently acquired mobile phones. The respondents were asked their views on 20 different network attributes covering service, network features and pricing aspects.

Calling patterns

4.141. Table 4.22, which is based on findings from Cellnet's residential survey, shows the proportion of types of fixed-to-mobile calls from fixed-line users with and without mobile phones.

TABLE 4.22 Proportion of calls to a mobile phone by particular groups*

	<i>percentage of calls</i>			
	<i>Friends and family</i>	<i>Tradesman</i>	<i>Business</i>	<i>Emergency services</i>
<i>Those with mobile phones</i>				
Nil	13	73	33	92
1 to 40%	30	21	21	7
41 to 99%	31	4	33	0
All	<u>25</u>	<u>2</u>	<u>12</u>	<u>1</u>
Total	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
Mean	51.8	6.9	40.0	1.3
Sample size	127	126	126	126
<i>Those without mobile phones</i>				
Nil	31	61	63	92
1 to 40%	13	18	9	3
41 to 99%	20	10	16	1
All	<u>36</u>	<u>11</u>	<u>12</u>	<u>3</u>
Total	<u>100</u>	<u>100</u>	<u>100</u>	<u>100</u>
Mean	50.5	18.3	24.6	4.8
Sample size	146	145	145	145

Source: Cellnet.

*Taking friends and family as an example, this table should be read as follows: While 13 per cent of respondents made no fixed-to-mobile calls to friends and family, 30 per cent made between 1 and 40 per cent of their calls to mobile phones in this category, 31 per cent made 41 to 99 per cent of their calls in this category and 25 per cent of respondents said that all of their fixed-to-mobile calls came into the friends and family category. The mean, ie average, over all who had mobile phones in the sample was 51.8 per cent in the friends and family category.

Note: Totals may not sum due to rounding.

4.142. Table 4.22 shows that on average calls to family and friends are the most popular types of fixed-to-mobile calls (the highest mean of 51.8 per cent for respondents with mobile phones and 50.5 per cent for those respondents without a mobile phone). Calls to business account for the second largest proportion of fixed-to-mobile calls (40.0 per cent for respondents with mobile phones and 24.6 per cent for respondents without mobile phones). There is considerable variation around these averages. For example, for non-mobile owners, whilst 50.5 per cent of fixed-to-mobile calls are made to friends and family, 31 per cent of respondents did not make any calls to a mobile owned by their family or friends. For the same group of respondents, whilst 24.6 per cent of fixed-to-mobile calls are made to business, 63 per cent of respondents did not make any business calls to a mobile phone. There seems to be a difference in call patterns to mobile phones depending on whether the caller has a mobile phone. For respondents with mobile phones, business calls and calls to tradesmen account for 40.0 and 6.9 per cent respectively of all fixed-to-mobile calls. The proportions for those without mobile phones are 24.6 and 18.3 per cent respectively.

4.143. Table 4.23, which is based on results from the MMC consumer survey, shows fixed-to-mobile calls and calls received on mobile phones by particular groups. Consumers who made calls-to-

mobiles from their fixed phones, but who did not themselves pay for a mobile phone, were asked about the type of calls they made to mobile phones. Mobile phone bill-payers who said that they accepted incoming calls on their mobile phone were asked about the type of calls they received.

TABLE 4.23 **Calls to and from mobile phones by particular groups**

Q25. *What sort of calls do you make from your fixed phone to a mobile phone?*
 Q102. *What sort of calls do you receive on your mobile phone?*

	per cent	
	Fixed-to- mobile	Receive on mobile
Personal to/from friends/family in own household	36	68
Personal to/from friends/family in other household	55	51
Business calls to/from own business	5	36
Calls to/from other businesses/personal services	23	37
Other	2	2
Sample size	401	164

Base: Fixed—Those with access to a fixed phone who pay some or all of the bill who ever make fixed-to-mobile calls but do not pay for a mobile.

Mobile—Mobile phone bill-payers who accept incoming calls.

Source: MMC consumer survey.

4.144. Table 4.23 shows that calls to friends and family in other households are the most popular type of fixed-to-mobile calls for fixed-line users calling mobile phones who were not themselves mobile phone bill-payers, whereas for mobile phone users the most popular type of incoming call is from friends or family in the same household.

4.145. In its second residential survey Vodafone asked fixed-line users which of a series of categories of recipients best described those to whom the majority of their fixed-to-mobile calls were made. Table 4.24 shows the results.

TABLE 4.24 **The proportion of residential fixed-to-mobile calls to particular groups**

	%
Calls to a family member	29
Calls to a friend	11
Calls to a business of which you are a customer	4
Other business calls	21
A mixture—no one type dominates	34
Don't know	2
Total	100
Sample size	842

Source: Vodafone.

Note: Total does not sum due to rounding.

4.146. Table 4.24 shows that for 29 per cent of respondents' calls to family members accounted for the majority of fixed-to-mobile calls and for a further 11 per cent calls to friends accounted for the majority. For 21 per cent of respondents, the majority of fixed-to-mobile calls were made to businesses other than those of which they were a customer.

4.147. In its second residential survey Vodafone asked mobile phone owners where most of their incoming calls came from. We allocated the answers that were equally split between certain groups¹ and found that 35 per cent of respondents said that most calls to their mobile phones came from family, 15 per cent said from friends, 30 per cent said from business contacts, 17 per cent said there was no set pattern and 4 per cent said they did not know.

4.148. Measures of the extent to which fixed-to-mobile calls are made by different groups of consumers were provided in the results of Cellnet's survey of consumers. Both consumers with mobile

¹Where answers referred to two groups we divided those responses by two and allocated to the groups and where responses referred to three groups we divided by three.

phones and those without were asked how many calls a week they personally made from a fixed phone to a mobile phone. 34 per cent of mobile phone users said that they made five fixed-to-mobile calls or more, while the corresponding figure for non-users was 12 per cent. At the other end of the scale, 11 per cent of mobile phone users and 31 per cent of non-users said that they did not call mobile phones at all from a fixed phone. The overall implied average number of fixed-to-mobile calls by non-mobile users was about three a week, compared with about six for mobile phone users. Assuming that 15 per cent of the adult population use mobile phones, these figures imply an overall average of about 3.9 fixed-to-mobile calls per fixed-line subscriber per week. A further inference from these figures is that non-mobile users make an estimated 79 per cent of all fixed-to-mobile calls, and mobile phone owners make the remaining 21 per cent.

4.149. Cellnet's survey also asked respondents what proportion of their fixed phone bills was accounted for by fixed-to-mobile calls. For mobile users the implied average was about 5.6 per cent, and for non-mobile users about 3.7 per cent. Vodafone said that the figure of 5.6 per cent was an average and masked the fact that for some mobile users fixed-to-mobile calls would represent a much higher proportion of their total bills and it was those users whose conduct was likely to constrain termination charges.

Closed user groups

4.150. When buying goods and services consumers are interested in the prices they have to pay. In the case of mobile phones, subscribers have to pay a connection fee, a subscription and charges for outgoing calls.¹ If subscribers do not have to pay for incoming calls it may be argued that they have no interest in such charges. However, subscribers in closed user groups do have an interest in the price of incoming as well as the price of outgoing calls because they also pay the phone bill in part or in full for calls from a fixed line to the mobile phone. They may therefore have an interest in lower incoming as well as outgoing charges.

4.151. There are two types of users which form closed user groups. First, residential users where a substantial number of calls are made between members of the same household: for this group of user we need to distinguish between those subscribers who pay some or all of the fixed-line bill and those subscribers who have an interest in some fixed-line users' bills but who are not responsible for paying some or all of the bill. The second group is business users where many calls are made between employees of the same company.

4.152. There is a third group of users who are interested in the price of incoming calls but are not part of a closed user group. These are companies which rely on incoming calls to generate business (for example, small traders).

4.153. The DGT said that he did not accept the importance of closed user groups. He told us that overall tariffs would be unaffected by pressures within such groups. In his view, even if incoming call charges were of sufficient concern to mobile phone users within closed user groups to influence their choice of network, the MNOs were unlikely to respond by reducing the general level of termination charges. The DGT told us that it was more likely that, in order to maintain revenues from fixed-line subscribers calling mobile phones, the MNOs would deal with any concerns about incoming call charges by compensating the subscribers concerned with special offers on other aspects of their mobile phone package. For the third category (small traders) the DGT saw these pressures as leading to the greater use of 0800 (freephone numbers) or 0345 (local rate numbers) with overall tariffs being unaffected. Freephone and local rate numbers have recently been introduced by one MNO. The DGT said that freephone and local rate numbers could be used to segment the market.

4.154. We now look at the results from the various surveys which provide information on the importance or otherwise of closed user groups. The relevance of the findings for closed user groups depends on whoever pays the bill for the mobile phone being responsible for some or all of the cost of incoming calls. For business users this is clearly their employer. For residential users the main economic group is probably the household rather than the family or friends.

¹Prepay customers buy a mobile phone package and then buy vouchers which entitle them to make and receive calls.

4.155. Table 4.25 is taken from Cellnet's residential and business surveys and shows the proportion of incoming calls for mobile owners from a fixed phone to a mobile which are paid for by particular groups.

TABLE 4.25 Proportion of incoming calls from a fixed phone to a mobile paid by particular groups

Q4.3. What percentage of incoming calls from a fixed phone to your mobile are paid by:

	Residential users				Business users		
	Personally*	Your company	Immediate family	Your customers/clients	Your company	Customers/clients/suppliers	Your employee's immediate family
Nil	65	61	47	72	22	41	53
1-40	11	13	18	9	19	23	39
41-99	7	16	14	13	29	22	1
All	14	9	20	6	24	8	1
Don't know	1	1	1	1	7	7	6
Total	98	100	100	101	101	101	100
Mean (%)	21.0	22.3	33.2	17.3	52.9	28.3	6.9
Sample size	142	142	142	141	109	109	109

Source: Cellnet.

*Taking the second column of this table as an example the table should be read as follows: 65 per cent of respondents did not personally pay for any of the cost of the calls from fixed phones which they received on the mobile phone, 11 per cent of respondents paid for between 1 and 40 per cent of such calls, 7 per cent paid for between 41 and 99 per cent of such calls and 14 per cent of respondents paid for all of those calls. On average 21 per cent of residential respondents' incoming calls from fixed phones to their mobile were paid for by themselves.

4.156. These results suggest that 21 per cent of residential respondents' incoming calls from a fixed phone to their mobile were paid for personally (ie by the recipient); 22.3 per cent were paid by their company; 33.2 per cent were paid for by their immediate family; and 17.3 per cent by their customers and/or clients. It should be noted that the 22.3 per cent paid for by the respondents' company is influenced by the inclusion of the group of 61 per cent of consumers who said that they received no calls from their company's fixed phone system. For those who said that they did receive such calls the implied average proportion of calls from their company was 52 per cent. Cellnet told us that its survey found that 14 per cent of residential respondents paid for all their incoming calls from a fixed phone themselves. 65 per cent said that they did not personally pay for any of the cost of the calls from fixed phones which they received on their mobile phones. Cellnet said that 20 per cent of residential respondents had all their incoming calls from a fixed phone paid by their immediate family. 47 per cent of respondents said that they did not have any of these calls paid for by their immediate family.

4.157. Table 4.25 also shows that using the mean, Cellnet's survey of business users found that 52.9 per cent of incoming calls from a fixed phone to a mobile for business users were paid for by their company, a further 28.3 per cent were paid for by the company's customers and suppliers and 6.9 per cent were paid for by the employee's immediate family.

4.158. Table 4.25 on its own does not enable us to determine the size of closed user groups. To do so we need to assess the importance of those incoming calls paid for by the recipient and the level of awareness of and sensitivity to the incoming call charges. There will be considerable uncertainty attached to any such assessments. However, we can begin by using Cellnet's findings that, on average, 21 per cent of fixed-to-mobile calls are paid for by subscribers personally and that 73 per cent of these users pay for their own mobile phone (note that this is not the same as buying the mobile). For residential customers receiving business calls paid for by their company the relevant proportions are 22 and 24 per cent. This suggests that closed user groups for residential customers might be of the order of 21 per cent. The equivalent figure for business users is 53 per cent. To get an estimate of the likely significance of such groups we then have to apply a proportion that takes account of price awareness (for residential customers we assume 6 to 60 per cent and for business customers 40 to 90 per cent (these ranges are based on the findings from the surveys carried out for the MMC, Vodafone and Cellnet)). Our broad estimates of the impact of the closed user groups for residential customers are therefore between 1 and 15 per cent $((21\% \times 73\% \times 6\%) + (22\% \times 24\% \times 40\%))$ or

$((21\% \times 73\% \times 60\%) + (22\% \times 24\% \times 90\%))$. The same method gives broad estimates of closed user groups for business users of 20 to 50 per cent ($(53\% \times 100\% \times 40)$ or $(53\% \times 100\% \times 90)$). Vodafone told us that it rejected our broad range of estimates. It stated that the correct figures for residential and business users were likely to be higher than the upper end of our estimates. It based its view on greater price sensitivity within closed user groups. For example, Vodafone said that in its own business survey some 69 per cent of respondents said that they would switch networks if calls on one network were 10 per cent cheaper than on other networks. It told us that the proportion of users who would switch was likely to be higher in the closed user groups. It said that in its residential survey some 62 per cent of Vodafone users regarded the cost of inbound calls as a relevant factor to consider when changing their mobile phone. Cellnet disagreed with our estimates. It told us that our estimates should not take account of those users who did not pay and that we should not adjust for price awareness.

4.159. 54 per cent of respondents to Vodafone's second residential survey who paid a mobile phone bill said that they made calls from a fixed phone to a mobile for which they also paid the bill. Of the 54 per cent, 19 per cent said that these calls accounted for most of the calls received on that mobile, 21 per cent said that these calls accounted for about half of the calls received on that mobile and 59 per cent said that these calls accounted for a small part of the calls received on that mobile. These results suggest that about 78 per cent of Vodafone's customers made little or no contribution to the payment of incoming calls. A further 11 per cent paid for around half and the remaining 11 per cent paid for most or all incoming calls. This appears to be broadly consistent with our estimate of the size of the closed user group in paragraph 4.158.

4.160. In the same survey 81 per cent of residential users said that they did not pay the bills of those who called them and 19 per cent said that they paid the phone bill of some of the people who called them on their mobile. Of the 19 per cent, 21 per cent said that these calls accounted for most of the calls made to the mobile, 18 per cent said about half and 60 per cent said a small part.

4.161. In Vodafone's second business survey 67 per cent of respondents thought the cost of incoming calls was important to their business. Of those, 67 per cent thought the costs were important because they paid a lot of those costs themselves; and 61 per cent thought them important because they did not want customers to be deterred from calling their mobile phones.

4.162. In the same survey 11 per cent of respondents said that they took steps to restrict the use that their employees made of calls from fixed lines to mobile phones, and 87 per cent said that they did not take such steps. 18 per cent said that they encouraged office-based employees to call mobile phones from other mobile phones available in the office, and 81 per cent did not. 6 per cent said that they had substituted mobile phones for fixed phones in the office, and 94 per cent had not.

4.163. It is possible that as Vodafone's surveys include only fixed-line users with mobile phones (see paragraphs 4.137 to 4.139), these fixed-line users will be more knowledgeable of mobile phones than fixed-line users who do not have mobile phones. Vodafone said that as it had shown that a significant proportion of users were sensitive to the cost of inbound calls and that it could not distinguish (or discriminate) between this group and others, then the fact that its surveys included only fixed-line users with mobile phones was irrelevant. It said it accepted that only a proportion of users were in closed user groups and that only a proportion took into account the costs of inbound calls. Nevertheless, it considered that none of the evidence collected by the MMC, or Vodafone, or other parties, suggested that these proportions were trivial. It told us that all MNOs must take this group of users into account, ie a group that was both aware of prices and sensitive to them in making network choice decisions. It said that the MNOs were not capable of discriminating between those who were in this sense empowered and those who were not. Thus, it stated that one group served to empower all consumers. Vodafone told us that the evidence it had produced was that a significant group of users existed that was increasingly constraining behaviour on inbound calls. It said that the constraining process had been attenuated by the requirement for harmonization with MNP.

4.164. However, on a number of issues, results from Vodafone's second surveys were at variance with the results of other consumer surveys. This may reflect their particular coverage, or their emphasis on topics relating to consumer awareness, past, present and prospective, of aspects of incoming call charges. We have nonetheless considered the results of all the surveys on an even footing.

Call-back

4.165. Call-back takes place when a caller and a call recipient decide not to complete their conversation but instead arrange for the recipient to call back the original caller in order to complete the conversation. It might arise for a number of reasons considered below. The operators see call-back as being important because of its scope to exert pressure on the charges for calls (incoming and outgoing), keeping the charges for inbound and outbound calls broadly in line with each other. Cellnet told us that it was important to remember that call-back might bypass the mobile network completely if the conversation was completed by a call to a fixed line.

4.166. There are no industry-agreed estimates of the extent of call-back. Table 4.26, which is taken from our consumer survey, shows the circumstances in which fixed-to-mobile calls were made. Respondents mentioned more than one factor. The most popular reason for calling mobile phones was that such calls were made only where there was no option (67 per cent). 9 per cent of respondents said that they asked the mobile phone owner to call them back.

TABLE 4.26 The reasons for making fixed-to-mobile calls

Q26. Which of these describe your view of the calls you make from your fixed phone to mobile phones?

	%
Give me freedom to talk to people when I want to	18
Only call when there is no option	67
Never really think about whether the phone I am calling is a mobile or not	18
Ask the mobile owner to call me back	9
Don't know	2
Sample size	401

Base: Those with access to fixed phone who pay some or all of the bill who ever make fixed-to-mobile calls but do not pay for a mobile.

Source: MMC consumer survey.

4.167. Table 4.27 shows the response to the question of whether mobile phone owners ever call back. 43 per cent of these respondents told us that they had done so. We do not, however, have evidence on the extent to which they return the calls they receive. 55 per cent of respondents told us that they never engage in call-back. The MMC survey question (as reported in Table 4.27) specifically related to the original called person being on a mobile phone, and deciding to call back a caller. It thus covered call-back situations irrespective of who suggested a call-back, whereas the Cellnet survey question on call-back (see paragraph 4.170) and the findings from the MMC survey reported in Table 4.26 only covered situations where a caller requests call-back.

TABLE 4.27 The extent of call-back from mobile phones

Q100. Do you ever call people back to save them from calling your mobile?

	%
Yes	43
No	55
Don't know	2
Total	<u>100</u>
Sample size	164

Base: Mobile phone bill-payers who accept incoming calls.

Source: MMC consumer survey.

4.168. Table 4.28 shows the respondents' reasons for call-back.

TABLE 4.28 Reasons for engaging in call-back

%

To save them the cost of the call	52
Overall it is cheaper	18
It is courteous/polite	19
To fit in at a time which suits me better	12
Other	18
Sample size	71

Source: MMC consumer survey.

4.169. Table 4.28 shows that 18 per cent of respondents engaging in call-back (8 per cent of all respondents) said that they engaged in call-back because it was cheaper overall, ie reflecting a view of the differential between inbound and outbound calling costs. The main reason given for calling people back was to save the caller the cost of the call. It may be that in these cases those engaged in call-back are concerned to save the caller the cost of the call in the belief that the incoming call is too expensive relative to the cost of the outgoing call. But they may also reflect a wish to save the caller money based on more general views on the purpose of the call, the relative incomes of the parties and the relationships between the parties. To this extent the 43 per cent of mobile users who have at some time engaged in call-back will not necessarily act as a restraining influence on price behaviour. One2One rejected this point. Non-financial reasons were also given: 19 per cent of those who carried out call-back said that they did this because it was courteous and polite whilst 12 per cent said that they called people back at a more convenient time. 18 per cent gave other reasons.

4.170. Compared with the 43 per cent of mobile phone bill-payers in the MMC survey who have engaged in call-back at some point, 17 per cent of mobile phone users in Cellnet's consumer survey said that they often or sometimes called someone on their mobile phone and asked them to call back in order to save money on the call. 82 per cent said that they did not ask for call-back. Cellnet's question on this topic did not stipulate whether the original call was from a mobile phone or from a fixed phone; at the same time the question related to the caller asking for a call-back from a mobile phone.

4.171. Vodafone's first residential survey found that 50 per cent of mobile respondents never/almost never engaged in call-back, 32 per cent sometimes called people back and 18 per cent did so more often than not. Its first business survey found that 60 per cent of respondents never engaged in call-back, 15 per cent almost never engaged in call-back, 21 per cent did so sometimes and 5 per cent all the time.

Conditions required for closed user groups and call-back to be effective

4.172. In order for closed user groups to exert pressure on the charges of incoming calls for mobile phones, fixed-line users should be aware of the charges for such incoming calls and they must be sensitive to them. Their sensitivity to these charges will be likely to depend on a number of factors (price levels, incomes, importance of call and the proportion of fixed-line bills accounted for by fixed-to-mobile calls).

4.173. In order for call-back to exert pressure on the charges of fixed-to-mobile calls a number of conditions should be in place. First, fixed-line users must be aware of when they are calling a mobile phone and the charges for doing so, and they must be price sensitive. As in the case of closed user groups, their sensitivity to these charges will be likely to depend on a number of factors (price levels, incomes, importance of call and the proportion of fixed-line bills accounted for by fixed-to-mobile calls). Secondly, users must be able to compare the prices of inbound and outbound calls. Thirdly, switching between inbound calls and outbound calls must be significant enough to cause the MNOs to alter their charges. With regard to closed user groups and call-back, Vodafone told us that users did not need to know exactly what the charges were. It said that it was sufficient that they should believe that fixed-to-mobile calls were more expensive than calls to fixed lines.

4.174. As some of the conditions which seem to be required for call-back to be effective are also required for closed user groups to be effective, we first look at these common conditions: price awareness, the role of prices and the proportion of fixed-line bills accounted for by fixed-to-mobile calls. We then look at those conditions which might be required for call-back to be effective in restraining charges: the ability to compare inbound and outbound charges and awareness of when calling a mobile. Vodafone said that we had adopted a static approach, ie that we had looked at the extent of closed user groups and call-back at the present time. It said that we should attach weight to the evidence that there was a growing awareness among consumers of the different offers available in the market. Vodafone told us that this suggested that, over time, phenomena such as call-back might be expected to grow if there was a prospect of cost savings through generating traffic in one direction rather than another. More generally, Vodafone stated that we should have recognized more the changing nature of the market.

Price awareness

4.175. We examine price awareness under the following headings: awareness of the relative charges of calls-to-mobiles and calls to fixed lines; usefulness of fixed-line bills; awareness of the costs of fixed-to-mobile calls; and awareness of the costs of using mobile phones.

Awareness of the relative charges of calls-to-mobiles and calls to fixed lines

4.176. 84 per cent of respondents in the MMC survey¹ said that it cost them more to call a mobile phone than a fixed phone. The Cellnet consumer survey showed that there was general awareness among non-mobile users that fixed-to-mobile calls tended to cost more than calls to another fixed phone. Thus 88 per cent of those who did not plan to get a mobile phone said that fixed-to-mobile calls cost more than calls to another fixed phone, and all 12 of those in the survey who planned to get a mobile phone (6 per cent of the 214 respondents in the survey who did not have a mobile phone) also agreed that fixed-to-mobile costs were higher. Vodafone's second residential survey showed that 56 per cent of respondents said that a fixed-to-mobile call was a lot more expensive than a fixed-to-fixed call, 32 per cent said that it was a bit more expensive, 3 per cent said that the charges were about the same, 1 per cent said fixed-to-mobile calls were cheaper than fixed-to-fixed calls and 8 per cent did not know. Vodafone's second business survey showed that 76 per cent of respondents thought that the cost of a fixed-to-mobile call was higher than that for a fixed-to-fixed call.

4.177. Asked about the scale of price differences, half of all respondents in the Cellnet survey who were aware of any differences said that the fixed-to-mobile cost was between three and five times as much or more (25 per cent said three times, 14 per cent said four times, and 11 per cent said five times as much or more), while 33 per cent said twice as much, 6 per cent said less than twice as much, and 10 per cent said that they did not know. On the basis that fixed-to-mobile calls are more than three times more expensive than fixed-to-fixed calls, Cellnet's findings suggest that 74 per cent of those questioned either did not know how much more it cost to call a mobile phone (10 per cent) or underestimated the extra relative cost by some margin (64 per cent).

Usefulness of the fixed-line bills

4.178. Fixed-to-mobile calls are identified by their prefix on a BT bill. BT told us that where it had been advised by MNOs of active number ranges, the name of the MNO would also be shown on the bill. The costs of fixed-to-mobile calls are shown on a BT bill under the category of premium-rated services. As well as fixed-to-mobile calls, these services include personal numbering, information and paging services. A recent BT booklet which sets out its UK call prices contained eight pages of specialized numbers.

¹Those with fixed-line access who pay some or all of the bill.

4.179. Two-thirds of respondents¹ said that the cost of calling a mobile phone was shown separately on their fixed-phone bill. Vodafone's second business survey found that 72 per cent of all respondents did not know from their fixed-line bills how much they spent on calling mobile phones.

Awareness of costs of fixed-to-mobile calls

4.180. 47 per cent of respondents¹ in the MMC consumer survey said that they did not know how much it cost them in terms of ppm to make a fixed-to-mobile call. Of those who thought they knew, nearly 40 per cent overestimated the cost. The accuracy of the estimates of the remaining respondents depends on the time of day when they made their calls.

4.181. BT provided us with data which showed that fixed phone users greatly overestimated charges of various calls. In the case of fixed-to-mobile calls these charges were on average overestimated by between 55 and 205 per cent. For fixed-to-fixed calls charges were overestimated by between 16 and 170 per cent.

4.182. Respondents to Cellnet's consumer survey were asked which of the mobile networks they believed to be the cheapest to call from a fixed line. BT's headline retail rates for calling Vodafone and Cellnet were higher at this time than its rates for calling Orange and One2One (see Table 4.3). Of respondents to Cellnet's survey 4 per cent said that Orange and One2One were the cheapest network to call, 9 per cent said One2One, 19 per cent said Orange, 13 per cent said some combination of Vodafone and/or Cellnet, 16 per cent said that they were all the same and 40 per cent did not know.

4.183. Vodafone's first residential survey found that 43 per cent of respondents were fully aware of the cost of calling a mobile phone from a fixed line when they acquired their current mobile phone. 44 per cent had some idea and 13 per cent had no idea. Of those who were not initially aware, after buying their mobile phone 31 per cent said that they were fully aware, 57 per cent had some idea and 11 per cent had no idea.

4.184. In its first business survey Vodafone found that 46 per cent of respondents were fully aware of the cost of incoming call charges when they acquired their mobile phone. 37 per cent had some idea of the cost and 16 per cent had no idea. After they had bought their mobile phone their awareness of incoming call charges increased, with 60 per cent then being fully aware, 30 per cent having some idea and 10 per cent having no idea.

4.185. Cellnet's consumer survey (which was carried out in May 1998) showed differing views among mobile users on whether or not the cost of calling a mobile phone had come down in the previous year, with 48 per cent saying that it had, 29 per cent that it had not, and 23 per cent saying that they did not know. Among non-users 42 per cent said that they did not know, 38 per cent thought it had come down, and 20 per cent that it had not. 56 per cent of business users thought that the cost of calling a mobile had decreased within the last year. 17 per cent thought that the cost had not fallen and 27 per cent did not know.

4.186. The MMC consumer survey also showed differing views among mobile users on whether or not the cost of calling a mobile phone from a fixed-line phone had changed over the last year, with 29 per cent saying that it had fallen, 14.5 per cent that it had risen, 34.9 per cent saying it had stayed about the same, and 21.6 per cent saying that they did not know. Among non-users 16 per cent said that they thought it had fallen, 8 per cent thought it had risen, 24 per cent thought it had stayed about the same and 52 per cent did not know.

4.187. Orange told us that it accepted that the price awareness of fixed-line customers to the price of fixed-to-mobile calls was generally very low. It said that this was one of the findings that persuaded Orange to end its attempt to derive competitive advantage through the continuation of lower termination rates and to increase its termination rates in February 1997 (see Table 4.4). Orange stated that the lack of customer awareness of the price of fixed-to-mobile calls was largely an FNO problem.

¹Those with access to fixed phones who pay some or all of the bill and who make calls-to-mobiles but do not pay for a mobile.

It told us that given that fixed-to-mobile calls made up such a low proportion of the fixed customer's bills, the low awareness of prices, especially when in its view these prices were set at a reasonable level, was not a surprising finding.

Awareness of the costs of using mobile phones

4.188. Mobile phone users also seem to have a mixed knowledge of the costs to them of using their mobile phones to make outgoing calls. 21 per cent of mobile bill-payers in our survey did not know their annual mobile phone bill. Table 4.29 shows further results from our consumer survey.

TABLE 4.29 Knowledge of the costs to them of using mobile phones

Q84. How much do you pay for your mobile phone line rental each month?
 Q85. How many minutes of calls can you make for that line rental?
 Q86. How much does it cost for outgoing calls in terms of ppm?
 Q87. How much does it cost for outgoing calls once you have used up all the time covered by your line rental?

	<i>Line rental</i>	<i>Number of minutes</i>	<i>Cost of outgoing calls</i>	<i>Cost of additional outgoing calls</i>
Don't know (%)	26	51	60	36
Sample size	195	145	50	77

Base: Line rental—Mobile phone bill-payers.
 Number of minutes—Mobile phone bill-payers who estimated their monthly line rental costs.
 Costs of outgoing calls—Mobile phone bill-payers who did not estimate their monthly line rental costs.
 Costs of additional outgoing calls—Mobile phone bill-payers who gave a number of minutes of calls they could make for their line rental.

Source: MMC consumer survey.

4.189. In addition to the price awareness questions covered in Table 4.29 we asked those mobile bill-payers who had estimated their call costs in terms of ppm whether these costs varied or whether they were a flat rate. 64 per cent said that the costs varied and 35 per cent said that they were a flat rate.

The role of prices

4.190. We analyse the role of prices in two ways: first, by looking at observed changes in demand; secondly, by looking at the responses from the various surveys and by looking at the evidence given to us by main and third parties.

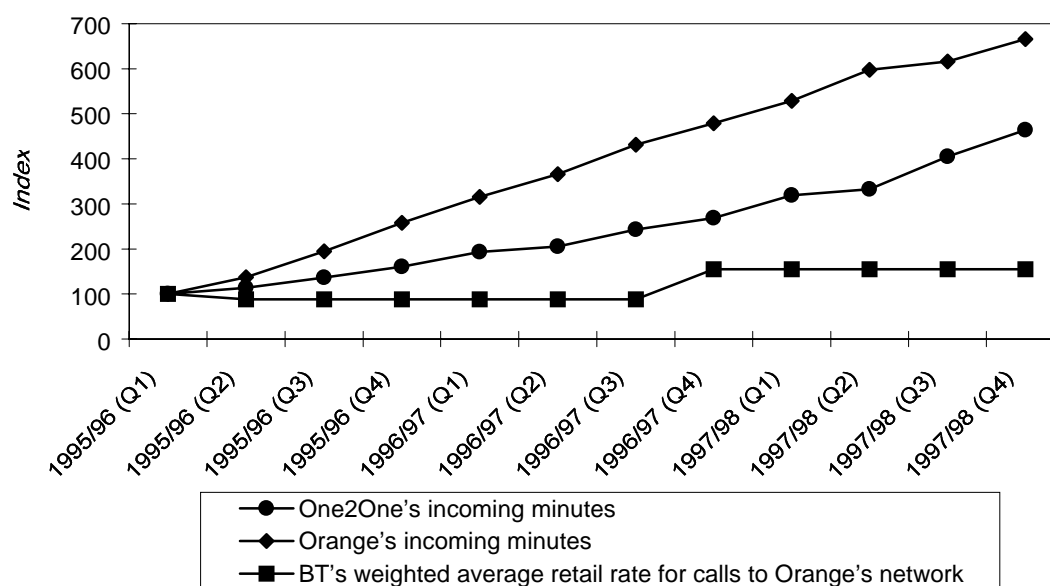
4.191. Before examining the role of prices on users' behaviour we look at Vodafone's view that users' experience of mobile phones is an important factor that influences their behaviour. Vodafone said that its two residential surveys showed that many users were experienced; over 40 per cent had owned a mobile phone prior to their current phone, some 21 per cent had had two previous contracts and 18 per cent had had three. Around a third of those who had had a previous contract were now connected to a different network. In the business sector Vodafone said that network dual-sourcing, an experience factor, was very common. Vodafone's first business survey found 56 per cent of businesses on more than one network, whilst its second survey showed just under half in this group. According to Vodafone's second survey of businesses, 29 per cent had changed the proportions of handsets connected to each network. Vodafone suggested that the two sets of surveys illustrated consistency in the extent to which users could be said to be experienced. Its second business survey found that 40 per cent of businesses reviewed their mobile contracts on a set pattern, and that this involved a detailed review of competitive offerings.

Observed changes in demand

4.192. We analysed the changes in incoming call minutes to Orange and One2One and the changes in BT's weighted average headline tariffs. We chose BT's rates to Orange and One2One because BT's retail rates for calling Orange and One2One increased substantially in February 1997 and the existence of price sensitivity should be more apparent with larger price increases. The large increase in BT's rates did not seem to affect the volume of incoming call minutes (see Figure 4.3). Orange told us that there were no noticeable effects on call volumes immediately after it increased its rates, although there was some reduction over time. One2One said that inbound call volumes were affected by many factors other than just price, for example as mobile phone batteries now lasted far longer, people tended to leave them switched on and hence they received more inbound calls. It said that the development of voicemail had also stimulated inbound call volumes. One2One also stated that many customers did not know how much it cost to call mobile phones (because of BT's complicated tariff structure) and so were unable to respond to changes in price.

FIGURE 4.3

The trends in BT's retail price for calls to Orange's network and the incoming call minutes on Orange's and One2One's networks



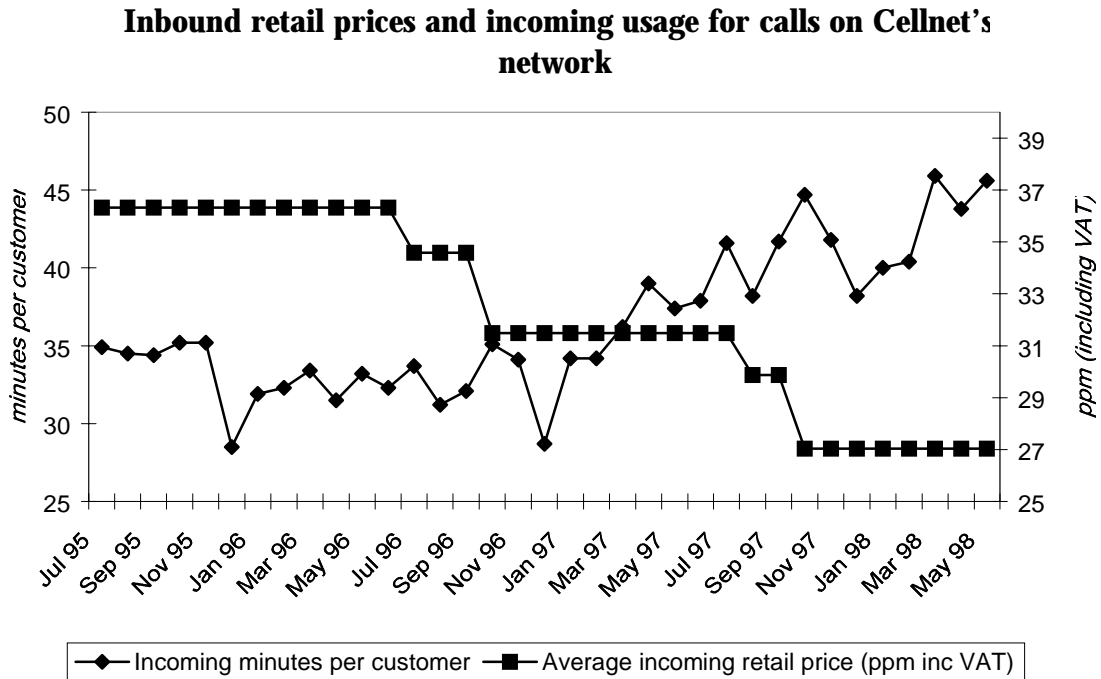
Source: MMC calculations on data provided by BT, Orange, One2One and OFTEL.

Note: The trend in BT's weighted average retail rate for calls to One2One is very similar to that for calls to Orange.

4.193. The MNOs argued that the volume trend effect would mask any sensitivity to price changes. We accept that there will be a trend effect but given the size of the increase in BT's rates for calls to Orange and One2One it seems reasonable to expect some effect on the incoming traffic to these two operators.

4.194. In its work for Cellnet, CASE took account of the volume effect by using incoming minutes per subscriber. CASE then used monthly data for most of the last three years to compare average inbound call minutes per subscriber with the average inbound retail price (see Figure 4.4).

FIGURE 4.4



Source: Cellnet.

4.195. CASE stated that the inverse relationship (see Figure 4.4) provided some evidence that callers to mobile phones were price sensitive.¹ It said that two distinct periods could be identified from Figure 4.4. The first was up to July 1996 when it said that inbound retail prices remained constant and incoming usage per subscriber showed a slight decline. The second was after July 1996 when CASE said that inbound retail prices significantly declined in several stages causing inbound callers to increase their consumption of incoming minutes.

4.196. CASE examined the data (including that from before July 1996) using regression analysis to estimate a price elasticity for inbound calls. It estimated the demand elasticity at -0.92^2 which CASE said was high for a market which the DGT claimed to be price insensitive.

4.197. The DGT offered two comments on CASE's analysis and on its interpretation. First, he said that the regression analysis included data going back only to 1995. The DGT told us that he might have expected an income variable to be significant in a calculation of this kind. He stated that the use of two and a half years' data failed to bring out the significance of the income variable (one of the variables in CASE's regression analysis). Secondly, the DGT told us that the finding of a high elasticity of demand implied nothing about whether a market was competitive or monopolistic. He said that it was a well-known proposition that in the examination of monopoly pricing a monopolist usually had a demand curve that included elastic (greater than 1) and inelastic parts (less than 1). The DGT stated that where marginal costs were positive the standard finding of micro economic theory was that a monopolist would price on that part of the demand curve where the elasticity was greater than 1.

¹CASE stated that this relationship might differ for other operators. It said that whereas Cellnet's and Vodafone's network coverage was already at almost 95 per cent at the end of 1995, this was not the case for Orange and One2One, and consequently if this analysis was carried out for Orange and One2One quality of service variables would be crucial.

²An elasticity of -0.92 in this case means that a 10 per cent decrease in incoming retail charges would lead to a 9.2 per cent increase in incoming minutes per subscriber.

4.198. With regard to the DGT's second point, Cellnet said that the DGT's argument was inconsistent with views he had expressed at other times.

4.199. The DGT commissioned work on CASE's regression analysis from Dr John Hunter at Brunel University. Dr Hunter raised a number of technical matters which in his view cast serious doubt on the validity of CASE's work. Dr Hunter said that the use of regression analysis with time series data could produce misleading results due to influence of past values of the variables in the model.¹ He said that the demand for the service in question (for example, incoming call minutes) should have been modelled jointly with the phone purchase, for example. Dr Hunter questioned the type of model used by CASE.² He pointed out that the sample size was too small.

4.200. CASE told us that it rejected Dr Hunter's core criticisms of its work that the regression results were spurious and that the estimating equations were highly primitive and mis-specified. CASE used some statistical tools to test for the influence of past values of the variables in the model. It concluded that the evidence was mixed but that, if anything, the view of no past influence could not be rejected at a widely recognized statistical level.³ CASE said that by using usage per subscriber it had taken account of Dr Hunter's point with regard to demand being jointly modelled. With regard to the criticisms of type of model it had used, CASE stated that its model was fairly standard in empirical work and it referred to work on mobile phone services carried out by Professor J A Hausmann of MIT.⁴

4.201. We examined the trend in minutes per subscriber for two reasons; first to assess whether there was a possible relationship between this volume measure for incoming calls and the price of incoming call minutes. As in Figure 4.3 we concentrate on this volume measure for calls to One2One's and Orange's networks to examine whether there was a demand response following the substantial increase in prices for calls to these networks in February 1997. The second reason was to assess whether there was a possible relationship between the volume of inbound and outbound call minutes that might imply that this variable would have some influence on CASE's findings from its regression analysis. CASE did not include a variable for outbound volume in its analysis.

4.202. Figure 4.5 shows the trend in incoming call minutes per subscriber for each of the four networks for each year from 1994/95 to 1997/98.

4.203. Figure 4.5 shows that there was a fall in incoming call minutes per subscriber on One2One's network in 1997/98 but not on Orange's network, although the growth in this volume measure on Orange's network was smaller in 1997/98 than in the previous year. This could indicate a possible price-volume relationship.

¹Technically known as spurious degrees of correlation reflecting trend effects within non-stationary time series.

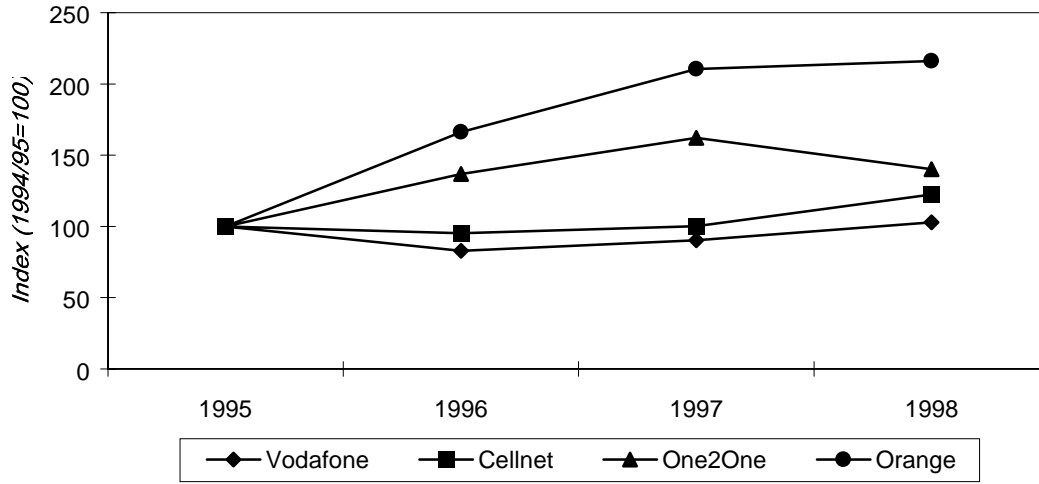
²Logarithmic demand equation.

³In the tests carried out by CASE the hypothesis of no autocorrelation was not rejected at the 5 per cent but was rejected at the 1 per cent level.

⁴J A Hausmann, Valuing the effect of regulation on new services in telecommunications, Brookings paper on economic activity, Microeconomics 1997, pages 1 to 38.

FIGURE 4.5

Incoming call minutes per subscriber, 1994/95 to 1997/98

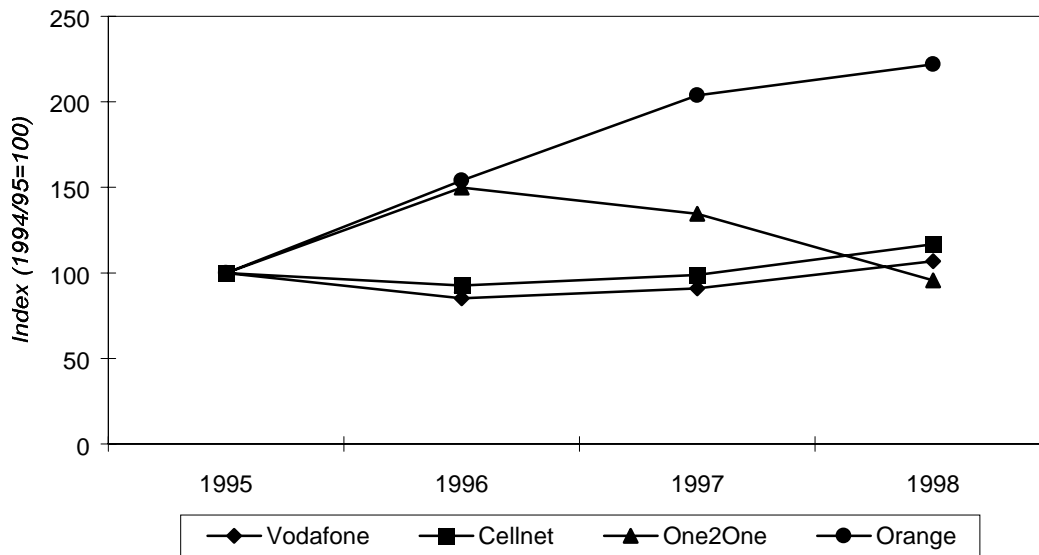


Source: MMC calculations based on published OFTEL data.

4.204. In order to investigate this possible relationship further we examined the trend in outgoing call minutes per subscriber (see Figure 4.6).

FIGURE 4.6

Outgoing call minutes per subscriber, 1994/95 to 1997/98



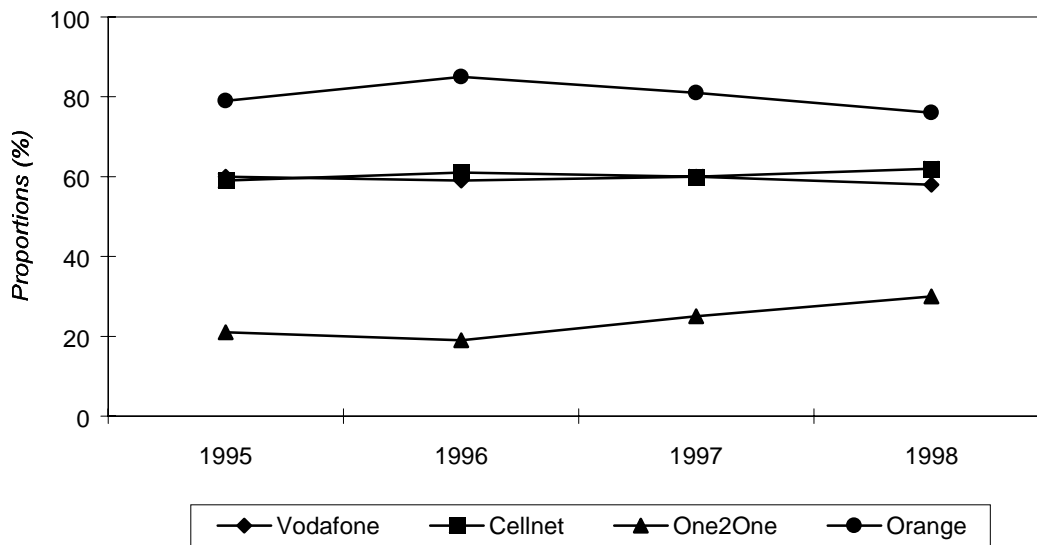
Source: MMC calculations based on published OFTEL data.

4.205. Figure 4.6 shows a very similar trend to Figure 4.5. The one exception is for outgoing call minutes per subscriber from One2One's network which began to fall a year earlier (1996/97) than the fall in its incoming call minutes per subscriber.

4.206. We then examined the possible relationship between incoming minutes per subscriber and outgoing minutes per subscriber (which is the same as the relationship between incoming minutes and outgoing minutes). Figure 4.7 shows the relationship for each of the four networks. If there was a possible price-volume relationship we would expect to see a fall in the ratio of incoming minutes to outgoing minutes in 1997/98 because outgoing call minutes became cheaper relative to incoming call minutes for One2One's and Orange's networks following the February 1997 increase in termination charges.

FIGURE 4.7

The ratio of incoming minutes per subscriber as a proportion of outgoing minutes per subscriber, 1994/95 to 1997/98



Source: MMC calculations based on published OFTEL data.

4.207. Figure 4.7 shows that incoming call minutes as a proportion of outgoing call minutes decreased slightly on Orange's network in 1997/98 (by 6 per cent). However, on One2One's network incoming call minutes increased as a proportion of outgoing call minutes in 1996/97 and in 1997/98, in the latter year by 20 per cent. This finding for One2One's network appears to be inconsistent with a possible relationship between incoming call prices and incoming usage (as measured by incoming call minutes per subscriber). Figure 4.7 also seems to suggest a possible relationship between inbound and outbound call minutes which might be relevant to CASE's regression analysis. Cellnet said that our analysis was flawed because it ignored changes in outbound tariffs over the same period. Cellnet told us that One2One increased its outbound tariffs in mid-1997 which it said would have the effect of reducing the volume of outgoing calls and offsetting the dampening effect on inbound traffic. Cellnet stated that the increase in One2One's tariffs could be seen by calculating its minimum monthly bills. It said that One2One's Bronze tariff package set minimum monthly bills before the price increase and that this package was replaced by One2One's Weekend package. Cellnet told us that the two packages had identical connection charges and line rentals but that the national call charges were different. It stated that the Weekend package had a peak rate of 30 ppm and an off-peak rate of 10 ppm¹ compared with 29 ppm and 6 ppm for the Bronze package. Cellnet said that the significant increase was for the off-peak rate as most of One2One's subscribers were non-business and were therefore more likely to make most of their calls in the off-peak period. One2One did increase its tariff in these two packages.

¹One2One's tariffs (excluding VAT) for these and other packages are shown in Table 4.45. For 1998, Table 4.45 shows an off-peak rate of 4.3 ppm and not the 10 ppm (8.5 ppm excluding VAT) quoted by Cellnet as One2One reduced its off-peak rates.

However, based on the usage patterns behind Tables 4.41 and 4.42, One2One's Weekend package did not on its own set minimum monthly bills. Together with One2One's One 2 30 tariff package¹ it did set the minimum monthly bill for subscribers who did not make outgoing calls (ie zero minutes in Tables 4.41 and 4.42) as both of these packages had a monthly line rental of £14.89 (excluding VAT). These two packages had the same connection fees, line rentals and national call charges but the One 2 30 package had 30 inclusive minutes compared with no inclusive minutes with the Weekend package. There was therefore scope for customers to avoid any increase in minimum monthly bills, and with one minor exception, none rose in 1997 and 1998 (see Tables 4.41 and 4.42). Cellnet also referred as did One2One to the increase in One2One's average outbound revenue as shown in Tables 4.39 and 4.47, an increase of over 30 per cent between 1996/97 and 1997/98. However, One2One told us that these rates were influenced by changes in customer mix and in part by its network expansion. One2One also said that it ceased offering its PersonalCall tariff which gave customers free evening and weekend calls. We note that Tables 4.39 and 4.47 show the average outbound revenue for Orange falling by about 10 per cent between 1996/97 and 1997/98.

4.208. CASE also carried out a regression analysis to estimate the determinants of Cellnet's subscribers. Again the analysis used monthly observations over a time period of nearly three years. It found that a 10 per cent increase in outgoing retail prices of mobile services (connection charges, monthly subscriptions and outgoing call charges) decreased Cellnet's subscriber base by 2.6 per cent with a further reduction of 2.1 per cent six months later when CASE stated that on average most of the contracts had terminated or were about to terminate. The analysis also found that a 10 per cent increase in the cost of handsets decreased Cellnet's subscriber base by 1.4 per cent and a 10 per cent increase in the retail price of incoming call minutes decreased Cellnet's subscriber base by 2.7 per cent, slightly higher than the effect of outgoing retail prices. The finding that subscribers appear to be relatively more price sensitive to the cost of inbound calls than to the cost of outbound calls is inconsistent with the findings of our consumer survey and those of Cellnet and Vodafone (see Tables 4.35, 4.36 and 4.37) and with the marketing strategies of the MNOs.

4.209. CASE's regression analysis also found that a 10 per cent increase in the retail price of incoming call minutes would have decreased Cellnet's subscriber base by a further 0.9 per cent six months later.

4.210. Cellnet also provided us with an estimate of elasticity based on the findings of our consumer survey. Cellnet estimated the responsiveness of potential subscribers to mobile networks to changes in incoming call costs. It told us that it had calculated that if charges for fixed-to-mobile calls fell by an average of 7.5 per cent, there could be an increase of some 9 per cent in the subscriber base of the mobile networks (an elasticity of 1.2). Cellnet acknowledged that a 9 per cent increase in subscribers seemed high. Cellnet also calculated this elasticity for what it called the effective price fall. This price fall was calculated by applying the proportion of Cellnet's total net revenue accounted for by its revenue from inbound calls (27 per cent) to the average price fall of 7.5 per cent. This gave an effective price fall of 2 per cent (27 per cent \times 7.5 per cent). Cellnet then related the effective price fall (2 per cent) to the 9 per cent increase in potential subscribers giving an effective elasticity of 4.5 (9 per cent divided by 2 per cent).

4.211. We have a number of reservations about Cellnet's calculations:

- (a) The calculations are based on a very small number of respondents. On a weighted basis, there are only four in the case of the 5 per cent price change and 16 (of whom 11 were in the age range 16 to 24) in the case of the 10 per cent price change. The margins of error around these calculations are large.
- (b) We believe the effective price elasticities are potentially misleading. They assume that consumers react to a 10 per cent price fall when in effect such a price fall (because it accounts for only a proportion of the overall cost) is much smaller. We note that this gives an elasticity many times greater than other estimates we have seen.

¹Replaced by its One 2 45 package.

- (c) Cellnet used the full non-owning mobile phone population as its base when we believe it should have excluded certain age groups, for example those aged less than 14 years.

4.212. Cellnet did not agree with most of our criticisms of its method. It said that even if all our criticisms were valid the elasticity estimate would be -0.4 rather than -4.5 . Cellnet told us that even what it regarded as a minimum elasticity (-0.4) clearly gave networks strong incentives to continue to reduce termination rates. It stated that in its view the elasticity of -0.4 was a very conservative estimate, that our own calculations showed an estimate between -0.8 to -1.6 and that changing some of our assumptions would suggest an even higher figure. Again, it should be noted that this is an estimate of the effective price elasticity. The corresponding ordinary price elasticity would be around one-quarter of these figures.

4.213. We did not produce a revised estimate of the elasticity as we believe there is too much uncertainty surrounding the assumptions. Cellnet said that it agreed with our position that in view of the wide range, the calculations were not reliable. However, it stated that the estimates were only not reliable for deriving an accurate estimate of the elasticity, and that the exercise was not worthless. It said that it sought to factor out the uncertainty by producing a worst case scenario and that therefore its analysis was useful. Cellnet told us that although the analysis did not conclusively suggest one particular elasticity, it did indicate strongly that lower incoming prices affected the numbers of subscribing customers by a non-trivial amount. Cellnet said that it placed more weight on the elasticity estimates derived from the regression analysis (see paragraph 4.196).

4.214. An alternative way to test the price sensitivity to the price increase for calls to Orange's and One2One's network is to look at the change in the shares of the two MNOs for incoming minutes at the time of the price change. Table 4.17 shows that these two MNOs increased their shares of incoming minutes in 1997/98. The share of One2One increased from 15.1 per cent in 1996/97 to 17.6 per cent in 1997/98. Orange's share increased from 17.3 to 18.2 per cent for the same period. It is the case that these increases in their shares were lower than increases they experienced in earlier years. Orange told us that as its share of incoming and outgoing minutes had continued to grow ever since it entered the market, the relevant trend was that the rate of its growth in share had slowed which in its view indicated that there was some price sensitivity over a period. The increase in share in 1997/98 might have been influenced by the fact that BT's retail rates for calls to Orange's and One2One's networks were still 20 per cent less than its rates for calls to Vodafone's and Cellnet's networks even after the rise in its rates in February 1997 (see Table 4.6 and Appendix 4.2). Also during this time Orange and One2One were increasing the coverage of their networks. This increased coverage did not, however, lead to a substantial rise in their outbound charges (see paragraph 4.207). Vodafone told us that competitive pressure would not have allowed increases in outbound rates. Cellnet said that changes in MNOs' shares of (incoming) call minutes were likely to be influenced mainly by the different patterns of the growth in the number of subscribers for the different MNOs.

4.215. Before turning to the results on the role of prices, it is useful to note Orange's view on price sensitivity. In its response to our questionnaire Orange stated that, at the time of assessing whether or not to increase its termination charges, it had become increasingly clear through analysis of call volumes and market research that customers calling mobile phones were not particularly price sensitive to changes in the termination rate, and that significantly undercutting the prices of other mobile networks' termination charges would not lead to increased incoming call volumes nor would this incentivize most customer groups to select Orange over other operators. It went on to say that if little competitive advantage could be gained, it was important that Orange was able adequately to recover its costs of termination. Subsequently Orange told us that this price insensitivity might no longer be so widespread and might not apply to different user groups, for example to potential private wire customers.

The findings on the role of prices from the consumer surveys

4.216. We look first at the role of prices in influencing the use of phones and secondly at the role of prices in influencing the choice of the network.

The role of prices in influencing the use of phones

4.217. Table 4.30 shows the importance of price for various types of phone call. 35 per cent of fixed-line users used the phone more at particular times because it was the cheapest time to call. The corresponding proportions for mobile phone users and for those making fixed-to-mobile calls were 20 per cent and 14 per cent respectively.

TABLE 4.30 **Reasons for using the telephone at particular times**

Q11/Q28/Q61. *Why do you tend to use the phone more at particular times?*

	<i>per cent</i>		
	<i>Fixed</i>	<i>Fixed-to- mobile</i>	<i>Mobile</i>
Times when I am at home	41	21	10
Times when others are available	35	59	19
Times when others are not available (they have to call me back)	1	3	1
Cheapest time to phone	35	14	20
Only time I get access to the phone	2	2	2
Times when away from home	-	-	29
Times when away from work	-	-	10
Times when travelling	-	-	23
Other	5	10	13
Don't know	3	1	*
Sample size	826	325	139

Base: Those who pay some or all of their bill who use their phone more at particular times.

Source: MMC consumer survey.

*Less than 0.5 per cent.

4.218. Those respondents who said that they used their phones at particular times because it was the cheapest time to call will have based their decisions on the relative prices of making calls at particular times of the day or week. Table 4.31 shows these prices for fixed-to-mobile and fixed-to-fixed calls charged by BT at the time of our survey.¹

TABLE 4.31 **BT's prices for national calls for fixed-to-mobile and fixed-to-fixed calls by time of day**

	<i>Daytime</i>	<i>Evening</i>	<i>Weekend</i>
<i>Fixed-to-fixed</i>			
Prices (ppm inc VAT)	7.9	4.2	3.0
Index (based on weekend)	263.3	140.0	100.0
Index (based on evening)	188.1	100.0	
<i>Fixed-to-mobile</i>			
Vodafone and Cellnet:			
Prices (ppm inc VAT)	32.0	22.0	10.5
Index (based on weekend)	304.8	209.5	100.0
Index (based on evening)	145.5	100.0	
Orange and One2One:			
Prices (ppm inc VAT)	30.0	20.0	10.0
Index (based on weekend)	300.0	200.0	100.0
Index (based on evening)	150.0	100.0	

Source: MMC calculations based on data provided by BT and the MNOs.

4.219. Table 4.31 shows that the differential, both absolutely and proportionately, between BT's weekend prices on the one hand and its daytime and evening prices on the other is less for fixed-to-

¹BT's prices (including VAT) for calls to Vodafone and Cellnet were reduced to 30 ppm (day), 20 ppm (evening) and 10 ppm (weekend) from 1 August 1998.

fixed calls than for fixed-to-mobile calls. Other things being equal we would expect these relationships to lead to a higher percentage of fixed-line users making calls in the cheaper periods for fixed-to-mobile calls than for fixed-to-fixed calls rather than the opposite as shown in Table 4.30 (35 per cent for fixed-to-fixed calls and 14 per cent for fixed-to-mobile calls). Comparing daytime and evening charges the absolute difference is larger for fixed-to-mobile calls but proportionately the differential is less. This finding could provide some explanation for the percentages shown in Table 4.30.

4.220. The price sensitivity of mobile phone users and of fixed-line users calling mobile phones is shown in Table 4.32.¹

TABLE 4.32 Price sensitivity of calls to and from mobile phones

Q49/Q98. Suppose that over the next 12 months the cost of calls to (from) mobile phones were to fall (increase). How much would the cost have to fall (increase) in order to affect the number or length of calls you make to mobile phones?

	per cent	
	Fixed-to-mobile	From mobile
5 per cent	3	20
10 per cent	6	24
20 per cent	24	15
Would not be affected	53	33
Don't know	14	7
Total	<u>100</u>	<u>99</u>
Sample size	881	195

Base: Fixed—those with fixed-line access who pay some or all of the bill who do not pay for a mobile.
Mobile—Mobile phone bill-payers.

Source: MMC consumer survey.

4.221. A widely-used way of testing price sensitivity is to look at implied changes in demand following price changes of 5 per cent and in some cases 10 per cent. Our consumer survey did not identify actual demand responses to price changes. It only identified the proportion of respondents who said that they would change their demand in response to price changes. As a result the findings in Table 4.32 can be used to infer price sensitivity only in an indirect way. Table 4.32 shows that 3 per cent of fixed users said that they would change their behaviour to some extent following a 5 per cent price change and that a further 6 per cent would change following a 10 per cent price change. Vodafone told us that it acknowledged that 5 and 10 per cent tests were some sort of economic standard, but it said that they might not be wholly relevant in this case. It stated that a 5 or 10 per cent test was not enough to provoke behavioural changes in a market where larger percentage price changes were the norm. It is quite common to use a 5 per cent change for this kind of test and many of the changes in retail prices for fixed-to-mobile calls have been in the range of 2 to 10 per cent. BT told us that it acknowledged that market elasticity (whether people would make more or longer calls if prices were lower) was relatively low but it said that this was not relevant to an assessment of the competitiveness in the fixed market. BT stated that it believed customers did switch between operators in response to price differences (firm elasticity) as evidenced by their willingness to switch their international call business away from BT.

4.222. Table 4.33 shows data relating to whether fixed-line users would change the number or length of calls they make to mobile phones in response to the mobile phone user receiving the call paying for all or most of the call. 34 per cent of fixed-to-mobile users would change the number or length of the calls they made to mobile phones and 55 per cent said that they would not.

¹As noted in past MMC reports (*The Littlewoods Organisation plc and Freemans plc (a subsidiary of Sears plc): a report on the proposed merger*, The Stationery Office, Cm 3761, November 1997; and *Foreign package holidays: a report on the supply in the UK of tour operators' services and travel agents' services in relation to foreign package holidays*, The Stationery Office, Cm 3813, December 1997) consumers may have a tendency to overstate their price sensitivity because a lack of sensitivity may be thought as indicating irrationality, poor or weak commercial acumen.

TABLE 4.33 Relative price sensitivity of fixed-to-mobile calls

Q52. In some countries, the person receiving a call to their mobile pays for all or most of the call. Would this make a difference to the number or length of calls you make to mobile phones?

	%
Yes	34
No	55
Don't know	<u>11</u>
Total	<u>100</u>
Sample size	881

Base: Those with fixed-line access who pay some or all of the bill who do not pay for a mobile.

Source: MMC consumer survey.

4.223. Cellnet's survey asked respondents whether they agreed or disagreed with a number of statements. One of the statements asked respondents whether they agreed or disagreed that if the cost of calling a mobile phone was reduced they would make more calls. 57 per cent of respondents strongly disagreed with this statement, 14 per cent neither agreed nor disagreed, 25 per cent agreed and 3 per cent strongly agreed.

4.224. Cellnet's consumer survey included a question on price sensitivity. The results showed that 84 out of 142 mobile phone users (60 per cent) agreed (49 per cent) or agreed strongly (11 per cent) with the statement that 'I never call a mobile if I can help it—it is too expensive'. By contrast only 25 per cent of non-mobile phone users agreed and 5 per cent agreed strongly with the same statement.

4.225. In Vodafone's second residential survey respondents were asked which of a given set of statements best described how they felt about calling mobile phones. 59 per cent chose the option 'I wouldn't hesitate to call a mobile whatever the reason', 33 per cent opted for 'I would only call a mobile if it was fairly urgent' and 7 per cent chose 'I would only call a mobile if the call were extremely urgent or an emergency'.

The role of prices in influencing the choice of network

4.226. In Vodafone's second business survey 58.7 per cent of all respondents said that they would consider switching networks if the cost of calling from mobile phones became (say) 5 per cent cheaper on other networks. A further 14.7 per cent said that they would switch if the cost became 10 per cent cheaper.

4.227. In the same survey 55.7 per cent of all respondents said that they would consider switching networks if the cost of calling to mobile phones became (say) 5 per cent cheaper than for other networks. 13.7 per cent said that they would switch if the cost became 10 per cent cheaper.

4.228. In Vodafone's first residential survey 37 per cent of those respondents who said that they were likely to switch networks gave lower tariffs and cheaper overall costs as their reason (the most popular answer). Lower call charges were given as a reason by 5 per cent of respondents. The same users (those saying that they were likely to change networks) were asked which of a range of factors would definitely make them consider staying with their present network. 80 per cent of those asked mentioned special offers or discounts on their bill; 56 per cent mentioned the ability to upgrade the handset; 43 per cent mentioned collecting points to convert into products or services; and 25 per cent mentioned collecting air miles. Cheaper call costs were mentioned by 3 per cent.

4.229. Vodafone's second business survey found that 63 per cent of respondents did seek lower bills when they last reviewed their mobile contract while 35 per cent did not.

4.230. Tables 4.34 and 4.35 show the importance of incoming call charges and the factors taken into account when consumers were deciding which mobile package to buy.

TABLE 4.34 Importance of charges for incoming calls when buying a mobile phone package

Q77. When you bought your package were you aware of the cost of incoming calls?
 Q76. When you bought your package did you discuss the price of incoming calls with a sales agent?
 Q75. Did you consider the cost of incoming calls when you were deciding which mobile package to buy?

	per cent		
	Aware	Discuss	Consider
Yes	40	16	10
No	56	79	87
Don't know	<u>4</u>	<u>5</u>	<u>4</u>
Total	<u>100</u>	<u>100</u>	<u>101</u>
Sample size	165	165	154

Base: Consider—Mobile phone bill-payers who chose their phone/package and did not spontaneously mention incoming call costs.
 Discuss/Aware—Mobile phone bill-payers who chose their phone/package.

Source: MMC consumer survey.

TABLE 4.35 Factors taken into account when deciding which mobile phone package to buy

Q73. What factors did you take into account when deciding which mobile phone package to buy?

	%
Handset size/weight	11
Battery duration	6
Battery recharging time	3
Service support	5
Geographical coverage/reception	16
Handset cost	9
Connection charges	12
Line rental charges	24
Outgoing call costs	17
Incoming calls costs	6
Call costs unspecified	14
Other	30
Didn't buy/choose the phone/package	16
Don't know	7
Sample size	195

Base: Mobile phone bill-payers.

Source: MMC consumer survey.

4.231. The questions covered by Tables 4.34 and 4.35 could be thought of as reflecting the different stages in the process of buying a mobile phone: how aware was the buyer, what was discussed, what was considered and what was taken into account. The responses suggest that at each of these stages the role of incoming call charges diminished. 40 per cent of respondents were aware of the cost of incoming calls, 16 per cent discussed them, 10 per cent considered them and 6 per cent of respondents took them into account when deciding which mobile phone to buy.

4.232. The findings of Tables 4.34 and 4.35 are broadly consistent with the views given to us by a leading retailer of mobile phones. It told us that customers buying mobile phones practically never asked about the cost of incoming calls. One2One told us that contrary to the evidence that we had been provided with, it had been informed by a leading independent retailer that customers purchasing mobile phones often asked about the cost of incoming calls. One2One said that this might be a reason why The Carphone Warehouse included the standard BT retail inbound rates in its mobile pricing brochure.

4.233. In Cellnet's consumer survey 61 per cent of those with a mobile phone said that, when choosing their mobile network, they were not at all concerned about the cost to others of calling their mobile phone. 4 per cent said that they were very concerned about such costs. In its business survey

5 per cent of those questioned said that when choosing their mobile phone network they were very concerned at the cost of calling their employees' mobile phones from a fixed line while 39 per cent were not at all concerned.

4.234. Cellnet's consumer survey asked about factors likely to be important when choosing between networks (see Table 4.36).

TABLE 4.36 Factors which were taken into account when choosing between networks

	<i>per cent</i>				
	<i>The cost of the handset</i>	<i>Outgoing charge</i>	<i>Incoming charge</i>	<i>Subscription</i>	<i>Areas make/ receive calls</i>
<i>Residential users</i>					
1—Most important	13	25	0	20	41
2	11	31	11	32	15
3	22	21	20	28	7
4	15	19	33	15	16
5—Least important	38	4	35	4	19
Don't know	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>	<u>1</u>
Total	<u>100</u>	<u>101</u>	<u>100</u>	<u>100</u>	<u>99</u>
Sample size	84	84	84	84	84
Mean	3.5	2.5	3.9	2.5	2.6
<i>Business users</i>					
1—Most important	4	26	2	19	49
2	19	34	9	26	13
3	21	9	23	30	17
4	23	15	34	17	11
5—Least important	32	17	32	9	11
Don't know	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>	<u>0</u>
Total	<u>99</u>	<u>101</u>	<u>100</u>	<u>101</u>	<u>101</u>
Sample size	47	47	47	47	47
Mean	3.6	2.6	3.9	2.7	2.2

Source: Cellnet.

4.235. Table 4.36 shows that of five such factors, the cost of calling a mobile (the question did not distinguish between when the caller was calling from a mobile or a fixed phone) on average was scored as least important (the highest mean of 3.9) by the 84 respondents who already had a mobile and had been involved in the choice of network. None of the 84 said that it was the most important factor while 35 per cent said that it was the least important factor. The results suggest that more importance was attached to factors such as cost of monthly subscriptions, the cost of calling from a mobile, the cost of a handset, and the extent of network area coverage.

4.236. Incoming call charges were also seen as the least important factor for business users (the highest mean of 3.9). 2 per cent (one respondent) said that such charges were the most important but 32 per cent said that they were the least important.

4.237. In Vodafone's second residential survey respondents were asked about the relevance of factors when considering acquiring/changing their mobile phone. Table 4.37 shows the responses to this question.

TABLE 4.37 The relevance of factors when considering acquiring/changing mobile phone

	<i>per cent</i>			
	<i>Highly relevant</i>	<i>Somewhat relevant</i>	<i>Not at all relevant</i>	<i>Don't know</i>
<i>When considering acquiring present mobile phone</i>				
The price of the handset	30	34	35	1
Upfront connection fee	31	32	36	2
The monthly rental charge	54	32	14	*
Costs of making calls from the mobile	48	31	21	1
Costs of making calls to the mobile	10	20	69	1
Network brand name	16	21	62	1
Advice or opinion of others	15	28	57	*
The total connection cost	36	34	29	2
The total annual cost	38	32	29	1
Convenience to purchase the phone	44	34	21	1
<i>When next considering changing mobile phone</i>				
A better handset	44	34	21	1
A lower monthly rental	68	23	9	*
Lower charges for making calls from the mobile	66	26	8	*
Lower charges for making calls to the mobile	30	32	37	1
Better call sound quality	55	28	16	1
Network brand name	16	27	56	1
Retailer's brand name	8	21	70	1
Having no contract	23	31	43	3
Just fancy a change	9	22	68	1

Source: Vodafone.

*Less than 0.5 per cent.

Notes:

1. The sample size for these questions was 1,000.
2. Totals may not sum due to rounding.

4.238. Vodafone told us that the importance of incoming call charges increased with greater knowledge of mobile phones. These costs were thought to be highly relevant by 10 per cent of respondents when acquiring their mobile phones but by 30 per cent when considering changing their present mobile phone. There was also an increase in those who thought that incoming call charges were somewhat relevant: 20 per cent when acquiring their mobile phone compared with 32 per cent when considering changing their mobile phone. There was a fall in the proportion of mobile phone users who thought that these charges were not at all relevant: from 69 per cent when considering acquiring a mobile phone to 37 per cent when considering changing their mobile phones.

4.239. Table 4.37 also shows that of all the factors which were presented to the respondents, the least important when considering acquiring a mobile phone was the cost to others of incoming calls. When considering changing their mobile phone, incoming call charges were the fifth most important factor, above brand names, having no contract and 'just fancy a change'. They remained the least important price-related answer and in this question respondents were not presented with the option of the price of the handset and the total annual cost.

4.240. In Vodafone's second business survey, respondents were asked for the relevance of factors when last and next deciding on a mobile phone contract. Table 4.38 shows the responses to this question.

TABLE 4.38 The relevance of aspects when deciding on a mobile phone contract

	<i>per cent</i>			
	<i>Highly relevant</i>	<i>Somewhat relevant</i>	<i>Not at all relevant</i>	<i>Don't know</i>
<i>(a) When last deciding on a mobile phone contract</i>				
The price of the handset	24	38	36	2
Upfront connection fee	32	34	32	2
The tariff for making calls from the mobile	69	20	10	1
The tariff for making calls to the mobile	34	34	30	3
Volume-related discounts	31	31	33	4
Those who said that their judgment would change when they next decided on a mobile phone contract (17 per cent) were then asked the same questions (see (b))				
<i>(b) When next deciding on a mobile phone contract</i>				
The price of the handset	48	30	22	
Upfront connection fee	54	32	14	
The tariff for making calls from the mobile	76	20	4	
The tariff for making calls to the mobile	62	26	12	
Volume-related discounts	54	32	14	
Aggregating the two samples produces the results in (c)				
<i>(c) When last and next deciding on a mobile phone contract</i>				
The price of the handset	28	37	34	1
Upfront connection fee	35	34	29	2
The tariff for making calls from the mobile	70	20	9	1
The tariff for making calls to the mobile	38	33	27	3
Volume-related discounts	35	31	31	3

Source: Vodafone.

Note: The sample size was 300 for (a), 50 for (b) and 350 for (c).

4.241. 34 per cent of respondents said that when they last decided on their mobile phone contract, incoming call charges were highly relevant and 34 per cent said that they were somewhat relevant. 76 per cent of all respondents said that when they next decided on a mobile phone contract their judgment would not change and 17 per cent said that their view would be different. Of those whose view would be different (17 per cent), 62 per cent said that incoming call charges would be highly relevant and 26 per cent said that they would be somewhat relevant. Taking these two sets of responses together suggests that 38 per cent of all respondents regarded incoming call charges as highly relevant, 33 per cent regarded them as somewhat relevant and 27 per cent regarded them as not at all relevant.

4.242. In Vodafone's first business survey, 74 per cent said that they took no account of incoming call charges when, in a personal capacity, they acquired their mobile phone. 19 per cent took some account of such charges and 7 per cent took them into account all the time.

4.243. In Vodafone's first residential survey, 62 per cent said that when they bought their mobile phone they did not take into account the costs that others would incur when making calls to their mobile phone. 28 per cent took account of incoming calls to some extent and 9 per cent did so to a considerable extent.

4.244. Respondents in Vodafone's second residential survey were asked, if each of the four mobile networks offered them an equally attractive package in terms of handset, connection fee, fixed monthly charge and call charges, which one from a given set of items would then be most important to them in making their decision. By far the most frequently mentioned factor, referred to by 58 per cent of respondents, was a greater geographical coverage of the network. Other factors mentioned by broadly equal proportions of respondents were 16 per cent for a lower cost of calling a mobile, 12 per cent for customer service and stores and 11 per cent for the ability to make and receive calls abroad.

4.245. In Cellnet's two surveys (residential and business users) respondents were asked if they thought they missed or would miss business or social opportunities because people were concerned about the cost of calling a mobile phone. 76 per cent of residential users with mobile phones and 93 per cent of business users said that they did not think they or their company missed or would miss

social or business opportunities because people were concerned about the cost of calling a mobile phone.

4.246. In the MMC survey, 30 per cent of mobile phone bill-payers who accepted incoming calls said that someone had told them in the previous 12 months that they did not make calls to their mobile phone because call charges were too high. 68 per cent stated that no one had said this to them.

4.247. In its second residential survey Vodafone asked mobile owners which of a given number of statements best described how they reached their decision when they acquired their present mobile phone. 34 per cent said that they shopped around a little, 18 per cent said that they shopped around a lot, 15 per cent said that they took advice from friends, 11 per cent said that the mobile was free, 9 per cent bought it on impulse and 7 per cent used a specialist magazine to help them decide.

4.248. A survey commissioned by Orange in 1997 asked existing subscribers which features of their mobile phone package would give most benefit if improved to the customer's ideal. Among Orange subscribers, incoming call charges were sixteenth in order of importance, out of 20 features identified. The top five concerns of the respondents all related to network quality and coverage. Orange told us that this research showed that there would be little improvement in overall customer satisfaction if incoming call prices were changed.

4.249. In the MMC consumer survey we asked those who had switched mobile networks what prompted them to move. The answers to this question are subject to a large margin of error as only a small number of respondents included in the survey fell into this category (weighted sample of 20 users). Three of the 20 respondents said that cheaper incoming call charges prompted them to switch networks. On this basis incoming call charges were the fourth most popular response. Other reasons were as follows: 2 respondents gave changing handset/hardware as their reason, 2 gave better support services (for example, call recording), 5 gave better coverage/reception, 5 gave cheaper line rental, 7 gave cheaper outgoing call charges and 7 gave other reasons.

Proportion of fixed-line bills accounted for fixed-to-mobile calls

4.250. Table 4.10 shows the amount of money spent on BT calls by type of call by decile in 1997/98. It shows that the expenditure on fixed-to-mobile calls of the lowest six deciles accounted for between [§<] and [§<] per cent of their fixed-line call expenditure. The proportions for the seventh, eighth and ninth deciles were [§<], [§<] and [§<] per cent respectively. For the tenth decile the proportion was [§<] per cent. These proportions overestimate, and for the lower deciles substantially so, the importance of such calls in total fixed-line customer expenditure because they do not take into account customer expenditure on line rental. Taking account of expenditure on line rentals, expenditure on fixed-to-mobile calls of the lowest six deciles accounted for between [§<] and [§<] per cent of their fixed-line call expenditure. In the tenth decile the proportion was [§<] per cent.

4.251. Cellnet's survey also asked what proportion of respondents' fixed-line phone bills was accounted for by fixed-to-mobile calls. For mobile users the implied overall average was about 5.6 per cent, and for non-mobile users about 3.7 per cent. In assessing these figures it should be noted that our consumer survey found that 47 per cent of fixed-line users never called mobile phones.

Inbound and outbound charges

4.252. It is extremely difficult to compare inbound and outbound rates. The problems are twofold. First, there are many different outbound packages and these packages have changed over time. Vodafone told us that the number of basic outbound tariffs not including optional variants of each tariff doubled between 1993 and 1996 and then almost doubled again between 1996 and 1998. In December 1998 there were over 30 basic tariffs. Secondly, outbound packages contain different tariff structures, including time-of-day variations, and these structures have changed over time. One important change has been the introduction of bundled minutes, ie minutes provided free or as part of a fixed monthly charge, or as part of a prepay service.

4.253. Our analysis in this area is in four parts. First, we summarize the position for inbound rates. Secondly, we examine the trend for outbound rates. Thirdly, we look at the variations in the current outbound rates depending on the assumptions made to estimate them. Fourthly, we examine the comparative position of inbound and outbound rates.

Inbound rates

4.254. In comparing inbound and outbound rates identifying inbound rates is relatively straightforward. Whilst accepting that there are number of operators who offer inbound calls, we concentrate on BT's rates as it accounts for 75.5 per cent of fixed-to-mobile call minutes (see Table 4.7). The structure of BT's inbound rates, certainly compared with the structure of outbound rates, is relatively uncomplicated although there are a number of different discount packages which apply. The rates differ primarily by time period, ie day, evening and weekend. Table 4.3 shows that BT's headline retail charges are currently the same for calls to each of the MNOs' networks.

Trends in outbound rates

4.255. We start by looking at what has happened to average revenue per outgoing minute from charges to subscribers based on OFTEL's published data (see Table 4.39).

TABLE 4.39 MNOs' average revenue per outgoing minute from charges to subscribers

	<i>ppm*</i>				
	<i>All networks</i>	<i>Vodafone</i>	<i>Cellnet</i>	<i>One2One</i>	<i>Orange</i>
1993/94	58.33	57.58	64.36	8.86	-
1994/95	48.78	55.13	63.85	8.70	48.21
1995/96	44.77	61.19	65.97	8.01	41.56
1996/97	40.36	56.53	60.47	8.14	37.99
1997/98	33.47	44.85	46.61	10.76	33.58

Source: MMC calculations based on published OFTEL data.

*Includes revenue for outgoing calls, rental and connection.

4.256. Vodafone's average rate rose from 57.6 ppm in 1993/94 to 61.2 ppm in 1995/96 (an increase of 6.3 per cent) and then fell to 44.9 ppm in 1997/98 (a fall of 26.7 per cent since 1995/96 and of 22.1 per cent since 1993/94). Cellnet's average rate has followed a similar pattern to Vodafone's average charge. One2One's average rate fell from 1993/94 to 1995/96 and then increased to 1997/98. Orange's average rate has fallen in every year since 1994/95.

4.257. One2One told us that changes in customer mix might tend to increase average ppm figures and offset to some extent the actual price falls caused by competition. It said that this was due to the rapid growth in the number of non-business users for whom average usage and revenue per customer were lower. With regard to the increase in its own average revenue (as shown in Table 4.39) One2One stated that the slight upward trend in its outbound charges reflected in part its network expansion from its initial coverage within the M25 only, to coverage of approximately 96 per cent of the population in Great Britain.

4.258. Vodafone criticized the use of these average rates in Table 4.39. It said that OFTEL acknowledged that the revenue figures, which are used to derive the average charges, are subject to a high degree of uncertainty. Vodafone told us that it believed we should use wholesale and not retail prices as Vodafone Limited, the subject of the MMC investigation, was a wholesale company. Vodafone also argued that connection and rental charges should not be treated wholly as part of outbound charges. It said that customers acquired mobile phones partly (and sometimes wholly) in order to receive calls, not just to make them, and as a result fixed charges should logically be ascribed to inbound as well as outbound calls. Vodafone provided us with three calculations of the trend in its prices (see Table 4.40).

TABLE 4.40 The fall in Vodafone's outbound charges, 1993/94 to 1997/98

Average charges based on:

	<i>Outgoing calls, rental and connection ppm</i>	<i>Outgoing calls ppm</i>	<i>Monthly subscription £/subscriber</i>
1993/94	42.33	30.12	16.4
1994/95	43.46	31.61	13.69
1995/96	44.89	30.24	12.18
1996/97	40.54	21.03	12.94
1997/98	34.03	13.72	12.24
Percentage change 1993/94 to 1997/98	-19.60	-54.40	-25.40

Source: Vodafone.

4.259. Table 4.40 shows that on the basis of Vodafone's estimates, its rates have fallen in nominal terms by between 19.6 and 54.4 per cent. The reductions in the charges shown in Table 4.40 have not occurred evenly over the period. The outgoing, rental and connection charge rose between 1993/94 and 1995/96 with all of the fall in this rate taking place in 1996/97 and 1997/98. The outgoing call rate was broadly constant in the first three years with all of its fall taking place in 1996/97 and 1997/98. The change in the subscription rate occurred in the first two years of the period with little change in the final three years.

4.260. Another way to look at the trend in outbound rates is to estimate the minimum monthly bill for various illustrative calling patterns (see Tables 4.41 and 4.42).

TABLE 4.41 Minimum monthly bills (excluding VAT) for outgoing calls on mobile networks (including line rental and call charges), with a peak/off-peak ratio of 80:20

	<i>Minutes</i>					<i>£ per month</i>	
	<i>0</i>	<i>50</i>	<i>100</i>	<i>150</i>	<i>200</i>	<i>250</i>	<i>300</i>
<i>Vodafone 80:20</i>							
1994	20.00	31.00	42.00	53.00	64.00	75.00	86.00
1995	15.00	30.50	42.00	53.00	64.00	75.00	86.00
1996	15.00	22.50	35.50	46.50	55.50	64.50	73.50
1997	14.89	21.28	34.04	43.04	52.04	61.04	70.04
1998	14.89	21.27	30.32	38.57	46.12	53.67	59.57
<i>Cellnet 80:20</i>							
1995	20.00	36.03	47.03	53.04	64.05	75.06	86.08
1996	15.00	28.03	41.05	52.02	61.02	70.03	79.03
1997	14.89	21.45	34.38	47.32	60.26	73.19	82.64
1998	14.89	21.28	32.69	42.01	50.34	58.67	67.00
<i>One2One 80:20</i>							
1996	14.89	25.59	36.29	44.18	50.68	57.18	63.68
1997	14.89	19.99	25.09	30.19	35.29	40.39	45.49
1998	14.89	15.95	24.68	31.91	34.04	39.67	45.30

Source: MMC calculations on data provided by the companies.

TABLE 4.42 Minimum monthly bills (excluding VAT) for outgoing calls on mobile networks (including line rental and call charges), with a peak/off-peak ratio of 50:50

	Minutes						£ per month
	0	50	100	150	200	250	300
<i>Vodafone 50:50</i>							
1994	20.00	28.75	37.50	46.25	55.00	63.75	72.50
1995	15.00	27.50	37.50	46.25	55.00	63.75	72.50
1996	15.00	22.50	32.50	42.50	52.50	60.00	67.50
1997	14.89	21.28	31.28	41.28	49.04	56.54	64.04
1998	14.89	19.99	27.57	35.45	42.88	48.41	53.93
<i>Cellnet 50:50</i>							
1995	20.00	33.79	42.55	51.32	55.06	63.83	72.60
1996	15.00	25.03	35.05	45.07	55.05	62.56	70.07
1997	14.89	21.28	28.51	38.51	48.51	58.51	68.51
1998	14.89	20.64	26.81	35.96	44.22	51.02	57.82
<i>One2One 50:50</i>							
1996	14.89	22.52	30.14	37.77	44.68	49.68	54.68
1997	14.89	19.99	25.09	30.19	35.29	40.39	45.49
1998	14.89	15.64	23.09	30.01	34.04	38.37	42.69

Source: MMC calculations on data provided by the companies.

4.261. This analysis of falling minimum monthly bills does not take into account analogue tariffs or the recent introduction of prepay packages which can result in lower bills for lower users. We have excluded analogue tariffs in order to produce like-for-like comparisons. Analogue services are not available from Orange and One2One. They are the older operating systems of Vodafone and Cellnet which are due to be phased out over the next few years.

4.262. An example of a prepay package is Orange's Just Talk. This package currently has an initial payment of £79.99 (which includes the handset and, currently, an initial 30-minute voucher), no monthly rental but top-up vouchers ranging in price from £5 to £50. The vouchers dictate the call charges and time between the required payments. For example, with the £50 voucher, call charges cost 25 ppm (including VAT) and a minimum payment is required every three months.

4.263. Tables 4.41 and 4.42 show that the minimum monthly bills have fallen over the last few years. There have been greater falls in the minimum monthly bill for larger users on Vodafone's and Cellnet's networks. There has been no change in the minimum monthly bill for the lowest users over the last two years and little change since 1995 for Vodafone and since 1996 for Cellnet. In Cellnet's calculations (see paragraph 4.266) it shows a fall for the lowest user of 30 per cent over the last two years. This, however, is due to its introducing a new analogue service in September 1997 that is known as Social Life. One2One said that our analysis showed that minimum monthly bills for the lowest users had not fallen because we had excluded prepay packages. Some of the savings shown in Tables 4.41 and 4.42 would arise only for customers changing tariffs. Cellnet told us that its Cellnet First mobile package, which was introduced on 1 July 1998, automatically selected the cheapest tariff given the users' actual pattern of demand.

4.264. The MNOs criticized the assumptions we used in our calculations. We have used peak/off-peak ratios of 80:20 and 50:50. Vodafone said that our peak/off-peak splits were unrepresentative and potentially misleading. It told us that we should have used actual demand patterns for particular tariffs which in its case would lead to peak/off-peak splits ranging from 58/42 to 81/19 per cent. In its calculations Cellnet used a peak/off-peak split of 30/70 per cent. Cellnet said that we should have taken account of per-second billing that was introduced in 1996. This would have reduced the bills after 1996 thereby increasing the percentage reduction. Orange told us that, given the dynamism of the mobile market, any comparisons of monthly bills would very rapidly become out of date and should probably be avoided. It said that such comparisons were also misleading because they failed to take into account the difference in quality between the networks and they failed to include other prices (for example, price for insurance services which were free with some MNOs and not others, the price of voicemail, of mobile-to-mobile calls and of international calls).

4.265. Vodafone provided its own estimate of the changes in its minimum monthly bills between 1992 and 1998, and between 1995 and 1998. Vodafone's estimates showed that there was very little change in the minimum monthly bills between 1992 and 1995. Between 1995 and 1998 minimum monthly bills fell in nominal terms by between 26 and 39 per cent, the larger reductions being for those packages aimed at the heavier users.

4.266. Cellnet provided us with estimates prepared by CASE of Cellnet's minimum monthly bills. Its estimates showed reductions, in nominal terms, of between 30 and 55 per cent for the period 1994 to 1998. Its larger reductions were for the heavier users although there was little difference for those using 100 and 150 minutes between 1997 and 1998. Cellnet also estimated what it called the minimum cost of owning a mobile phone which included the components in the minimum monthly bill plus an estimate for the minimum handset price. Cellnet's estimates of the minimum cost of owning a mobile phone showed a fall, in real terms, of between 60 and 65 per cent for the period 1994 to 1998. These reductions are greater than those based on CASE's estimate of the minimum monthly bill due to the inclusion of a handset price which CASE estimated as falling from £246 in 1993 to £7 in 1998 and the use of prices in real terms.

4.267. Another way to look at the trend in outbound rates is to examine the trend in individual elements of the published tariffs (see Tables 4.43 to 4.45).

TABLE 4.43 Comparison of Vodafone's outgoing digital tariffs (excluding VAT)

	VF20	VF60	VF120	VF300		
1998						
Connect fee (£)	29.79	29.79	29.79	29.79		
Line rental (£)	14.89	21.27	34.04	59.57		
Inclusive minutes	20	60	120	300		
Peak charge (ppm)	29.7	27.2	17.8	16.1		
Off-peak charge (ppm)	4.3	4.3	4.3	4.3		
1997						
	<i>Old Pers World</i>	<i>Pers World</i>	<i>Pers World 15</i>	<i>Metroworld</i>	<i>Pers World 50</i>	
Connect fee (£)	25.00	30.00	30.00	50.00	30.00	
Line rental (£)	15.00	15.00	14.89	20.00	21.28	
Inclusive minutes	0.00	0.00	15.00	0.00	50.00	
Peak charge (ppm)	35.00	30.00	34.00	30.00	30.00	
Off-peak charge (ppm)	15.00	10.00	10.00	15.00	10.00	
1996						
	<i>Old Pers World</i>	<i>Pers World</i>		<i>Metroworld</i>	<i>Pers World Extra</i>	
Connect fee (£)	25.00	30.00		50.00	30.00	
Line rental (£)	15.00	15.00		20.00	22.50	
Inclusive minutes	0.00	0.00		0.00	50.00	
Peak charge (ppm)	35.00	30.00		25.00	30.00	
Off-peak charge (ppm)	15.00	10.00		15.00	10.00	
1995						
	<i>Old Pers World</i>			<i>Metroworld</i>		
Connect fee (£)	25.00			50.00		
Line rental (£)	15.00			20.00		
Inclusive minutes	0.00			0.00		
Peak charge (ppm)	35.00			25.00		
Off-peak charge (ppm)	15.00			15.00		
1994						
				<i>Metroworld</i>	<i>Eurodigital</i>	
Connect fee (£)				50.00	50.00	
Line rental (£)				20.00	25.00	
Inclusive minutes				0.00	0.00	
Peak charge (ppm)				25.00	25.00	
Off-peak charge (ppm)				10.00	10.00	

Source: Vodafone.

4.268. Table 4.43 shows that there was a reduction in Vodafone's peak and off-peak tariffs between 1997 and 1998. Peak rates fell by 15 to 46 per cent and off-peak rates fell by between 57 and

71 per cent. There were no changes in the following Vodafone tariffs: Old Pers World tariff between 1995 and 1997 and Pers World tariff between 1996 and 1997. In the case of Metroworld, off-peak tariffs increased (from 10 to 15 ppm) in 1995 and peak tariffs increased (from 25 to 30 ppm) in 1997. Between 1995 and 1998 there was little change in the line rental. This will have been offset to some degree by the introduction of inclusive minutes. They were introduced with Pers World Extra in 1996 and Pers World 15 in 1997 and were widely adopted by Vodafone in 1998.

TABLE 4.44 Comparison of Cellnet's outgoing digital tariffs (excluding VAT)

	<i>Occ Call+</i>	<i>Reg Call+</i>	<i>Freq Call+</i>			
<i>1998</i>						
Connect fee (£)	29.79	29.79	29.79			
Line rental (£)	14.89	21.28	34.04			
Inclusive values (£)	4.26	12.77	17.02			
Peak charge (ppm)	31.5	28.1	18.7			
Off-peak charge (ppm)	8.5	8.5	8.5			
<i>1997</i>						
Connect fee (£)	29.79	29.79	30.00			
Line rental (£)	14.89	21.28	27.49			
Inclusive values (£)	4.26	12.77	0.00			
Peak charge (ppm)	34.04	29.79	20.43			
Off-peak charge (ppm)	10.21	10.21	10.21			
<i>1996</i>						
		<i>Reg Call+</i>	<i>Freq Call+</i>	<i>Citytime +</i>		
Connect fee (£)		30.00	30.00	50.00		
Line rental (£)		15.00	25.00	20.00		
Inclusive values (£)		0.00	0.00	0.00		
Peak charge (ppm)		30.04	20.00	50.04		
Off-peak charge (ppm)		10.04	10.04	10.04		
<i>1995</i>						
				<i>Citytime+</i>	<i>Primetime+</i>	<i>Primetime+ (Budget)</i>
Connect fee (£)				50.00	50.00	50.00
Line rental (£)				20.00	25.02	45.02
Inclusive values (£)				0.00	0.00	100/200*
Peak charge (ppm)				50.04	25.02	25.02
Off-peak charge (ppm)				10.04	10.04	10.04

Source: Cellnet.

*100 peak minutes or 200 off-peak minutes.

4.269. Table 4.44 shows the tariffs for Cellnet. In 1998, Cellnet reduced its charges for its digital services: off-peak charges fell by 16.7 per cent and peak charges by between 5.6 and 8.5 per cent. In 1997 Cellnet increased its line rental and charges for its Frequent Caller Plus tariff. In 1998 line rental was increased further (from £27.49 to £34.04) but the newer tariff included £17.02 of inclusive minutes. Cellnet offered inclusive minutes for its larger customers in 1995 in its Primetime Plus (Budget) tariffs. It introduced inclusive minutes with its Occasional Caller Plus and Regular Caller Plus tariffs in 1997.

TABLE 4.45 Comparison of One2One's outgoing tariffs (excluding VAT)

	One 2 W/e	One 2 30*	One 2 100	One 2 200
<i>1998</i>				
Connect fee (£)	29.79	29.79	29.79	29.79
Line rental (£)	14.89	14.89	24.68	34.04
Inclusive minutes	0	30	100	200
Peak charge (ppm)	25.5	25.5	17	13
Off-peak charge (ppm)	4.3	4.3	4.3	4.3
	<i>Bronze</i>	<i>Diamond</i>	<i>Silver</i>	<i>Gold</i>
<i>1997</i>				
Connect fee (£)	29.79	29.79	29.79	29.79
Line rental (£)	14.89	14.89	24.68	30.64
Inclusive minutes	0	0	0	0
Peak charge (ppm)	24.7	10.2	15.3	15.3
Off-peak charge (ppm)	5.1	10.2	5.1	5.1
	<i>Bronze</i>	<i>Diamond</i>	<i>Silver</i>	<i>Gold</i>
<i>1996</i>				
Connect fee (£)	29.79	29.79	29.79	29.79
Line rental (£)	14.89	14.89	24.68	35
Inclusive minutes	0	0	0	0
Peak charge (ppm)	25.5	10.2	15	15
Off-peak charge (ppm)	5	10.2	5	5

Source: One2One (1998 and 1997) and Vodafone (1996).

*Replaced by One 2 45 which includes 45 inclusive minutes.

4.270. On the whole One2One increased its peak call charges in 1998 (the exception was the reduction for users who switched from One2One's Gold tariff to its One 2 200 tariff line) and reduced all its off-peak charges. There was little change in One2One's call charges between 1996 and 1997. The main change was the fall in the peak charge for its Bronze tariff. Between 1996 and 1998 there was little change in One2One's line rentals. The exception was a fall in the line rental for its Gold package in 1997 and an increase for users who switched from One2One's Gold tariff to its One 2 200 tariff. Inclusive minutes were introduced in 1998.

Current outbound rates

4.271. Vodafone provided us with five estimates of its average outbound rates, each calculated using different assumptions. There were substantial differences between these estimates. Its first estimate was based on all outgoing revenue and all outgoing minutes which produced a figure of 33.7 ppm. Its second estimate was based on outgoing revenue less revenue from connections and a reduction in subscription revenue in the proportion of incoming to outgoing minutes which produced a figure of 27.9 ppm. Its third estimate was similar to its second estimate but it excluded all subscription revenue giving an average revenue of 18.4 ppm. The fourth estimate was based on all outbound contract revenue (all outbound call revenue less Pay As You Talk¹ and excluding any notional revenue from bundled minutes), plus minutes used outside the bundles and minutes outside Pay As You Talk to produce a figure of 13.7 ppm. Finally, the 13.7 ppm was adjusted to eliminate the effect of discounts to service providers giving a figure of 16.3 ppm.

4.272. Vodafone told us that there was no right or wrong method of estimating these average charges. Vodafone preferred the method which produced the estimate of 27.9 ppm for 1997/98 (see paragraphs 4.277 and 4.279 for other MNOs' estimates of current outbound rates).

Relationship between inbound and outbound rates

4.273. Cellnet provided us with estimates of the movements in BT's average incoming call charges to its network and its average outgoing call charges over a four-year period where the final year was

¹Vodafone's prepay tariff package.

an estimate for 1998/99. Its estimates were weighted averages. Cellnet provided two estimates of its average outbound call charges. In the first, Cellnet weighted its average prices for each of its tariff packages by the number of their subscribers. We refer to this estimate as the subscriber-based estimate. In its second estimate the same average prices per tariff package were weighted by the number of their outbound minutes. We refer to this estimate as the minute-based estimate. Its estimates of BT's average inbound call charges to its network were based on BT's tariffs which were weighted by the proportions of tariff in different time periods (63 per cent for the daytime, 26 per cent for the evening and 11 per cent for the weekend). Table 4.46 shows the results of Cellnet's calculations.

TABLE 4.46 **Incoming and outgoing call rates**

	1995/96	1996/97	1997/98	1998/99
				<i>ppm</i>
Incoming rates to Cellnet (BT retail)	31.2	28.5	24.7	22.0
Outgoing (Cellnet retail) based on subscribers	34.8	32.5	28.0	22.0
Outgoing (Cellnet retail) based on outbound minutes	31.2	27.5	23.1	19.7
<i>Annual percentage change</i>				
Incoming rates to Cellnet (BT retail)		-8.7	-13.3	-10.9
Outgoing (Cellnet retail) based on subscribers		-6.6	-13.9	-21.4
Outgoing (Cellnet retail) based on outbound minutes		-11.9	-16.0	-14.7
	<i>1995/96–1998/99</i>			
<i>Percentage change over the period</i>				
Incoming rates to Cellnet (BT retail)	-29.5			
Outgoing (Cellnet retail) based on subscribers	-36.8			
Outgoing (Cellnet retail) based on outbound minutes	-36.9			

Source: Cellnet and MMC calculations based on data provided by Cellnet.

4.274. Cellnet's two estimates of average outbound rates show the same reduction over the whole period. However, their falls in particular years differ. In 1996/97 the subscriber-based estimate falls by 6.6 per cent compared with a reduction of 11.9 per cent for the minute-based estimate. The reverse is true in 1998/99, where the subscriber-based estimate is expected to fall by 21.4 per cent compared with 14.7 per cent for the minute-based estimate. Whilst Cellnet's calculations show a falling trend for average outgoing and average incoming call charges, their rates differ. For the four-year period Cellnet expects average incoming rates to fall by 29.5 per cent and average outbound rates (both estimates) to decline by about 37 per cent.

4.275. Between 1995/96 and 1997/98 the difference between Cellnet's average incoming and its subscriber-based estimate of average outgoing charges is broadly constant, the difference being between 3.3 and 4 ppm. Cellnet expects no difference between these average charges in 1998/99, because its estimated subscriber-based average outgoing charge falls by more than its estimated average incoming charge (21.4 per cent compared with 10.9 per cent). Work carried out for Cellnet estimated a correlation between these two average estimates of 0.972 for the four-year period.

4.276. Cellnet's minute-based estimate of average outbound call charges follows the same trend as its estimate of average inbound call charges. However, in this case the difference in outbound and inbound average rates increases, but only slightly (from no difference in 1995/96 to 2.3 ppm in 1998/99).

4.277. Vodafone's preferred estimate, which is an average wholesale rate (27.9 ppm for 1997/98), is the same as Cellnet's subscriber-based retail estimate for the same year but is 4.8 ppm higher than Cellnet's minute-based retail estimate. As Vodafone's estimate is a wholesale rate and Cellnet's estimates are retail rates, the difference between their estimates on a like-by-like basis, using BT's average 1997/98 retention rate of 5.8 ppm, is between 5.8 and 10.6 ppm.

4.278. With regard to the estimated correlation of 0.972 between Cellnet's estimate of average inbound rates and its subscriber-based estimate of outbound rates (see paragraph 4.275), the DGT made a number of comments. First, he said that the correlation appeared to have been estimated on four observations for each variable, which he thought was a modest number of observations on which to draw firm conclusions. Secondly, the DGT told us that the fact that these two variables were

correlated did not mean there was some kind of causal link between them. He stated that there was an alternative, and he believed convincing, explanation as to why the correlation was high, which was consistent with the products not being in the same market, or there being any causal link between the levels of or movements in the two prices. This explanation was, he told us, that the introduction and growth of competition in the outbound sector coincided with OFTEL's interest in the level of inbound charges. With regard to the DGT's first point, CASE told us that the period it had used was the only period for which data relating to the present market structure with four MNOs was available. It said that to extend the data-set back further would mean dealing with an entirely different market situation (duopoly) not relevant to assessing more recent competitive issues. With regard to the DGT's second point, CASE stated that the DGT had not established that it was the threat of regulatory action that was responsible for the fall in termination charges.

4.279. Cellnet's estimates of the similarity between inbound and outbound rates are not shown by other MNOs' estimates. Orange's estimates are 18.4 to 30.7 ppm for mobile outbound and 20 to 21 ppm for fixed inbound. One2One also provided estimates. One2One compared its promotional outbound rate of 40 ppm (usual price of 50 ppm), which it said was the lowest flat rate in the industry for low to medium users, for its prepay service with an inbound charge from BT of 22 ppm, a difference of 18 ppm.

4.280. Cellnet told us that termination rates were reasonable because the proportion of revenue raised by them (27 per cent of total net revenue) was less than could be justified (in terms of use of the network) in relation to the proportion of incoming call minutes (incoming call minutes accounted for 41 per cent of all call minutes), the difference therefore being 14 percentage points. Cellnet also estimated that incoming call revenue accounted for 38 per cent of total call charge revenue. This gives a difference of three percentage points. However, the calculations used to derive the 38 per cent figure compared the net revenue from incoming calls with the gross revenue from outgoing calls (ie before deducting discounts and the amounts invoiced for termination on the fixed-line network). A more appropriate comparison might be one involving net incoming revenue and net outgoing revenue. Assuming that wholesale discounts and outgoing interconnection apply evenly over the revenue items other than roaming and incoming calls, we estimated that net incoming call revenue accounted for 47 per cent of total net call revenue, some six percentage points above the volume proportion (41 per cent). We showed our estimates to Cellnet. It told us that incoming calls were more intensive in their use of assets than outgoing calls. It said that it was not unreasonable therefore that the percentage of net incoming revenue should be greater than the proportion of net incoming call volume.

4.281. We also used data published by OFTEL to estimate inbound and outbound rates (see Table 4.47). The data in Table 4.47 are similar to those shown in Table 4.39.

TABLE 4.47 **Inbound and outbound average revenue**

	<i>ppm</i>				
	1994	1995	1996	1997	1998
BT—calls to mobile phones (inbound)	30.78	27.41	24.46	24.02	23.06
Mobiles—calls from mobile phones (outbound):*					
Vodafone	56.13	53.27	60.36	55.37	44.03
Cellnet	62.59	62.10	65.03	58.82	45.39
Orange	N/A	41.07	37.99	36.24	32.58
One2One	7.59	7.63	7.44	7.81	10.49

Source: MMC calculations on published OFTEL data.

*Based on all calls and rental.

4.282. The purpose of Table 4.47 is not to compare price levels, which will be affected by the different demand patterns, but to compare the trends in inbound and outbound prices. Table 4.47 shows that over the whole period BT's average charge has fallen by more than that of Vodafone but less than those of Cellnet and Orange. However, between 1994 and 1996 BT's charges for fixed-to-mobile calls fell by 20.5 per cent while Vodafone's and Cellnet's charges for outbound rose; but for the last three years BT's rates have fallen by 5.7 per cent while Vodafone's rate fell by 27.1 per cent, Cellnet's by 30.2 per cent and Orange's by 14.2 per cent. One2One's average rates have fluctuated

over the period. BT's average charges during this period include the increase in its charges for calls to the Orange and One2One networks following the increase in their termination rates.

4.283. The MNOs criticized the assumptions we used to estimate these inbound and outbound rates. Vodafone said that BT's average charges did not include any element of its monthly rental whereas this would be included for outbound calls. These may be relevant in explaining the difference in the levels of inbound and outbound charges but are less likely to affect comparisons of trends in these rates. In addition the perceived cost to a mobile subscriber of making calls may well include the cost of acquiring the handset and any associated monthly charge. However, the perceived cost to a fixed-line subscriber of making calls to a mobile phone will rarely, if ever, include the cost of the fixed handset and the monthly charge.

4.284. It is unlikely that mobile phone users will decide on the relative charges of using mobile phones as opposed to fixed-link phones on the basis of average charges. It is more likely that any comparisons will be based on marginal costs, in this case actual tariffs. Table 4.48 shows a selection of inbound and outbound tariffs over the last few years.

TABLE 4.48 Inbound and outbound tariffs (excluding VAT) of BT* and Vodafone and Cellnet, 1996 to 1998

1998	Peak charges		Off-peak charges		
	Vodafone	BT†	Vodafone	BT evening†	BT weekend†
Vodafone's tariffs					
VF20	0–29.7	25.53–27.23	0–4.3	17.02–18.72	8.51–8.93
VF60	0–27.2		0–4.3		
VF120	0–17.8		0–4.3		
VF300	0–16.1		0–4.3		
Cellnet's tariffs	Cellnet		Cellnet		
Occ Call+	0–34.04	25.53–27.23	0–10.21	17.02–18.72	8.51–8.93
Reg Call+	0–29.79		0–10.21		
Freq Call+	0–20.43		0–10.21		
1997	Vodafone		Vodafone		
Vodafone's tariffs					
Old Pers World	35	27.23–31.91	15	18.72–21.27	8.93–10.63
Pers World	30		10		
Pers World 15	0–34		0–10		
Metroworld	30		15		
Pers World 50	0–30		0–10		
Cellnet's tariffs	Cellnet		Cellnet		
Occ Call+	0–34.04	27.23–31.91	0–10.21	18.72–21.27	8.93–10.63
Reg Call+	0–29.79		0–10.21		
Freq Call+	20.43		10.21		
1996	Vodafone		Vodafone		
Vodafone's tariffs					
Old Pers World	35	31.91–34.93	15	21.27–24.1	10.63–24.1
Pers World	30		10		
Metroworld	25		15		
Pers World 50	0–30		0–10		
Cellnet's tariffs	Cellnet		Cellnet		
Reg Call+	30.04	31.91–34.93	10.04	21.27–24.1	10.63–24.1
Freq Call+	20		10.04		
Citytime+	50.04		10.04		

Source: Vodafone, Cellnet and BT.

*Headline tariffs.

†The range represents BT's headline prices during the year.

4.285. The marginal cost to the customer of the inclusive minutes is zero and for these minutes, subject to the existence of unused minutes at the end of the month, users have an incentive to use their mobile phones for outbound calls. One MNO provided us with data that suggested that on average about [§] per cent of inclusive minutes were not used for its newer mobile phone packages. For its older packages, the unused proportions were much higher ([§] to [§] per cent). This MNO told us that these average figures could be misleading.

4.286. Table 4.48 indicates that in some cases the costs of inbound and outbound calls are similar (in 1998 the peak rates for VF20 and VF60 were similar to BT's peak rates). In other cases, even ignoring the inclusive minutes, there are large differences between inbound and outbound rates (in 1998 the peak rate for VF300 was much lower than BT's peak rate; and in the same year, Vodafone's off-peak rate was much lower than BT's evening rates).

Awareness of calling a mobile phone

4.287. Table 4.49 shows how many respondents in our consumer survey said that they knew when they were calling a mobile phone. It shows that two-thirds of the respondents thought they had this knowledge even leaving aside their usual calls-to-mobiles.

TABLE 4.49 Knowledge of when calling a mobile phone

Q21. Leaving aside your usual calls to mobile phones, do you usually know whether the number you are calling is a mobile phone or not?

	%
Yes	67
No	29
Don't know	<u>4</u>
Total	<u>100</u>
Sample size	1,053

Base: Those with fixed-line access who pay some or all of their bill.

Source: MMC consumer survey.

4.288. The respondents' knowledge of when they were calling mobile phones was explored further by asking them if they recognized particular phone numbers, not all of which were mobile phone numbers. Table 4.50 shows the results. It shows that over two-thirds of respondents did not recognize the mobile numbers but that there was a higher level of recognition for the 0345 and 0800 numbers. BT told us that most fixed-to-mobile calls were made by a small number of regular callers who would be aware of the nature of the number they were calling. It said that the ability to recognize, out of context, a random dialling code as a mobile prefix was difficult and in its view not relevant. BT stated that what mattered was whether, when calling a particular number, customers were aware that it was a mobile phone. BT pointed out, for example, that it was very rare (approximately 2 per cent) for *Yellow Pages* advertisements which included a mobile number not to state it as such.

TABLE 4.50 Lack of recognition of certain telephone numbers

Q22. Which type of phone respondent thinks could be reached by the following number

Phone number	0345	0498	0589	0800	0956	0973
Don't know (%)	51	69	71	14	69	67
Sample size	1,053	1,053	1,053	1,053	1,053	1,053

Base: Those with fixed line access who pay some or all of their bill.

Source: MMC consumer survey.

4.289. Cellnet told us that we had not used its most popular prefixes and as a result it felt that our findings could be misleading. Also Cellnet said that as most users phoned only three mobile numbers

on a regular basis most users would know when they were phoning a mobile phone even if they did not recognize particular prefixes.

4.290. In Cellnet's consumer survey 51 per cent said that when they dialled a number to make a call they knew if they were calling a mobile number every time, a further 36 per cent said that they knew some of the time and 12 per cent said none of the time. In Cellnet's survey there was less awareness about which network was being called. 4 per cent said that they knew the network every time, 26 per cent said that they knew some of the time and 68 per cent said none of the time.

4.291. Vodafone's second residential survey found that 85 per cent of respondents who paid a fixed-line bill were aware when they were calling a mobile from a fixed line. Of these respondents, 95 per cent said that they recognized the mobile number by the prefix; 79 per cent said that they did not rely on the mobile user to tell them that they were calling a mobile; and 54 per cent said that they did not rely on a business card or something similar to tell them that they were calling a mobile. It should be noted that these findings related to a sample of mobile users, and thus excluded non-users who, it is estimated, account for the majority of all fixed-to-mobile calls.

4.292. In Vodafone's second business survey 55 per cent of respondents said that they identified their phone number as a mobile number on their business cards. Of those that included their mobile number in other forms of publicity, 48 per cent said that they identified the number as a mobile number.