Alcatel Cable SA and STC Limited

A report on the proposed acquisition by Alcatel Cable SA of STC Limited

MONOPOLIES AND MERGERS COMMISSION

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Presented to Parliament by the Secretary of State for Trade and Industry by Command of Her Majesty February 1994

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Professor G Whittington[1]

Mr A J Nicduszynski *(Secretary)*

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[1]These members formed the group which was responsible for this report under the chairmanship of Mr G C S Mather. (Professor Pickering commenced this inquiry but was replaced by Professor Whittington on 1 December 1993.)

Note by the Department of Trade and Industry

In accordance with section 83(3) and (3A) of the Fair Trading Act 1973, the Secretary of State has excluded from the copies of the report, as laid before Parliament and as published, certain matters, publication of which appears to the Secretary of State to be against the public interest, or which he considers would not be in the public interest to disclose and which, in his opinion, would seriously and prejudicially affect certain interests. The omissions are indicated by a note in the text.

Contents

1 Summary

1.1. On 27 October 1993 we were asked to investigate and report on the proposed acquisition of STC Limited (STC) by Alcatel Cable SA (Alcatel Cable) (see Appendix 1.1). Both companies supply submarine cable systems. STC is ultimately owned by Northern Telecom Limited (NT), a large multinational company registered in Canada. The ultimate parent of Alcatel Cable is Alcatel Alsthom SA (Alcatel), another large multinational company registered in France.

1.2. Reflecting the bulk of the evidence we received, we conclude that submarine cable and satellite systems are separate markets. Although both Alcatel and STC took the view that the balance of advantage between cable and satellite might change, as it had in the past, it is doubtful whether competition from satellites is now effectively constraining the prices charged by suppliers of submarine cable systems.

1.3. The systems may be divided into long-haul (repeatered) and short-haul (unrepeatered). The suppliers generally operate on a global basis, particularly for repeatered systems. Supply should therefore be considered on a global basis although indigenous suppliers may be favoured within a country or region.

1.4. Long-haul submarine cable systems require the installation of repeaters underwater at regular intervals in order to maintain the quality of transmission. This increases substantially the cost of an underwater system because of the high degree of reliability necessary for a planned life of 20 to 25 years without underwater maintenance. There are few significant suppliers in this sector of the market. STC and Alcatel both had a 19 per cent share over the period 1990 to 1993, giving the combined entity a share of 38 per cent of a sector worth about US$6,788 million over that period. AT&T had 36 per cent and Japanese firms 24 per cent between them. Pirelli accounted for the remaining 2 per cent, but did not itself manufacture the repeaters for the contracts concerned.

1.5. The short-haul sector is at present only about one-tenth of the size of the total market for submarine cable systems, but its share is expected to increase to around one-fifth over the next four years. The suppliers of repeatered systems also supply over 60 per cent of the unrepeatered systems but there are five other suppliers. STC and Alcatel both had 22 per cent of the short-haul sector of the market over the period 1990 to 1993, giving the combined entity a share of some 44 per cent of a sector worth $779 million over that period. American Telephone and Telegraph Company (AT&T) had 12 per cent, Japanese firms 7 per cent, Pirelli Cavi SpA (Pirelli) 16 per cent and NKT Elektronik (NKT) 7 per cent. Other suppliers shared the remaining 14 per cent.

1.6. The Office of Telecommunications (OFTEL) believes that price control arrangements affecting British Telecommunications plc (BT) until at least 1997 are sufficient to ensure that telephone users are protected from any abuse in the form of higher prices that might result from the acquisition.

1.7. We noted some concern that STC's future as an important UK business might be jeopardized by the proposed merger if, for example, some of STC's research and

development (R&D) and manufacturing were transferred to Alcatel establishments in France, with effects on employment and on STC's UK suppliers. Alcatel pointed to its policy of developing its foreign acquisitions, and we have no reason to believe that it would not implement this policy following the acquisition of STC. Alcatel told us that it had no plans to make any redundancies in either its own or STC's business, and we found that this is consistent with its plans for STC. We received no representations from trade unions representing STC's workforce.

1.8. NT said that STC did not fit within its core strategy. It had discussed the possible sale of the business with prospective purchasers but only Alcatel had made a firm offer. If the proposed sale did not go forward, STC would face strong competition for funding, and might not be able to secure funds at an appropriate level, given the heavy demands of NT's core business. STC's senior management told us that they had given some consideration to a management buy-out but had decided that it would be impracticable.

1.9. The proposed merger will increase an already high level of concentration amongst suppliers in the long-haul sector of the market. This may, however, be inevitable, as BT and Cable & Wireless plc (C&W) suggested, given the increasing sophistication of the product and the consequent increasing demands for R&D and capital investment. Barriers to entry are high in an industry subject to rapid technological change. The short-haul sector is also highly concentrated, and is taking an increasing share of the total market. But the technological demands are not so great, making the sector attractive to the smaller competitors; there is a larger number of suppliers; and in any event market entry is relatively easy.

1.10. STC has clearly been a lively independent competitor, and we recognize the dangers inherent in the further concentration of supply in the long-haul sector of the market. However, we are satisfied that STC will need the long-term wholehearted support of a strong parent company if it is to continue to thrive. We accept that Alcatel intends to provide that support and to continue both to manufacture submarine cable systems and to carry out concomitant R&D in the UK. The proposed merger is therefore likely to be a means of preserving STC's presence in the UK as a significant exporter and employer at the leading edge of telecommunications technology. We believe that any tendency which the merged group might have to abuse its market position will be kept in check by competition between suppliers and the strong countervailing power of the purchasers of submarine cable systems. We therefore conclude that the creation of the merger situation that we have identified may not be expected to operate against the public interest.

2 Submarine cable technology

2.1. Telecommunications systems operate through one of four principal types of links (or a combination of two or more of them):

(a) land cables;

(b) submarine cable systems;

(c) microwave and radio links; and

(d) satellite systems.

2.2. A submarine telecommunications system connects two or more remote land terminals by an underwater cable. The terminals then connect to the terrestrial telecommunications network.

2.3. Submarine cable systems compete with each of the other three types of links in a range of applications. The main uses of these various technologies and the competition between them are discussed in Chapter 4. This chapter concentrates on the technology involved in submarine cables.

History

2.4. Submarine cables were first laid in the 1850s and the first transatlantic cable, built at what is now the STC factory in Greenwich, was laid in 1867. These were telegraph cables and did not transmit speech. It was not until 1956 that technology had developed sufficiently to enable a successful transatlantic telephone cable (TAT-1) to be laid. TAT-1 was followed by a series of similar type coaxial systems (see Table 2.1), which were unarmoured except at the coast where trawlers and ships' anchors could be a menace, of ever larger capacity up to TAT-7 which went operational in 1983. This has 661 repeaters and a voice capacity of 4,246 circuits. It is due for retirement in 2008. All subsequent transoceanic systems have used fibre optic cables (see paragraphs 2.11 to 2.13).

TABLE 2.1 **Transatlantic cables in the TAT series**

Name	*Year*	*Number of repeaters*	*Basic voice circuits*	*Retired/ (projected retirement date)*	*System type*
TAT-1	1956	118	36	1978	Coaxial
-2	1959	130	48	1982	Coaxial
-3	1963	182	138	1986	Coaxial
-4	1965	182	138	1986	Coaxial
-5	1970	361	845	(1995)	Coaxial
-6	1976	694	4,000	(2001)	Coaxial
-7	1983	661	4,246	(2008)	Coaxial
-8	1988	109	3,840*	(2013)	Optical regenerator
-9	1991	81	7,680*	(2016)	Optical regenerator
-10	1993	58	7,680*	(2018)	Optical regenerator
-11	1993	50	7,680*	(2018)	Optical regenerator
-12	(1995)	133	61,120*	(2020)	Optical amplifier
-13	(1996)	130	61,120*	(2021)	Optical amplifier

Source: STC.

*Per fibre pair.

2.5. The human voice, using the vocal chords, generates frequencies (vibrations per second or Hertz (Hz)) in the range 50 to 15,000 Hz and these vibrations are picked up by the ear as sound. However, speech can be distinguished using a much smaller range of frequencies from about 300 vibrations per second (300 Hz) to 3,100 Hz (3.1 kHz), a 'bandwidth' of 2.8 kHz, and by international agreement this is the bandwidth used for transmission. During transmission over a network the signal will lose power (attenuation) and can also be distorted by the characteristics of the network. The signal has to be amplified (analogue) or regenerated (digital) by repeaters placed at intervals along the cable. Repeaters, at first used only on land, are units containing amplifiers to boost signal strength and equalizers to correct distortion, placed at intervals along the cable, allowing longer distances to be covered. However, the first repeaters used thermionic valves (later replaced by transistors) and it was not until the 1950s that valve technology had advanced to the point where repeaters could be expected to work for years underwater without maintenance.

2.6. Technology has enabled the distances between repeaters to be increased, and for the distortion introduced by the line and by the repeater to be reduced. Nevertheless, in most cases as the distance between the origin and the source increases, more distortion will occur and more noise will be apparent on the line.

2.7. In the early days of telephony open-wire circuits were used almost exclusively. Later twisted-pair cables were introduced and finally coaxial cables (in which the outer, return conductor provides an almost perfect screen for the inner-core conductor, thus minimizing cross-talk between adjacent coaxial pairs). Coaxial cable technology permitted the deployment of TAT-1 and subsequent long-haul analogue submarine cables. Before the use of coaxial cable the only way that people on either side of the Atlantic could speak to each other was by means of a radio link. TAT-1, which was a 15.7 mm diameter armoured polythene coaxial cable with 118 repeaters, could carry 36 simultaneous voice circuits and was expected to be sufficient for many years.

2.8. Progress on coaxial cable depended on technology advances in both electronics and cable design. As both improved, higher frequencies could be used as a carrier and this allowed an increase in the number of speech channels which could be carried on the cable using a method called multiplexing. However, a progressive reduction in repeater spans was necessary to overcome the resultant distortion and noise effects, leading to increased costs for submarine cable systems.

Satellite

2.9. Following the advent of satellite communications in the mid-1960s the per circuit costs of satellite transmission were reduced, making submarine cable circuits less competitive. It was thought that satellites would rapidly replace submarine cable as the principal transoceanic telecommunications system. Submarine cable suppliers had to develop technology to reduce per circuit costs in order to compete. This was achieved primarily by providing greater capacity for only marginally increased capital investment by the operators. This increased capacity on submarine systems was achieved mainly through a series of technological developments.

Analogue and digital systems

2.10. Until the advent of fast switching transistors and later integrated circuits the transmission of information on a carrier was in analogue form in which the modulation attempts to replicate directly the variation in input signal level. Although the concept of sampling a waveform to produce a digital representation of the wave had been invented in the late 1930s, it was not until high-speed switching in silicon circuits became available in the 1960s that digital transmission, in which data is transmitted as a stream of bits (binary digits, 0s and 1s) became possible. Since digital pulses can be transmitted much faster than a person can speak, bursts of digits are fed into different time-slots in the data stream and separated out at the receiving end. Using this method more than 35,000 simultaneous conversations can take place per pair of fibres, with a single cable currently containing between 6 and 24 separate fibres.

Fibre-optic cable

2.11. In the early 1960s STC laboratories did world pioneering work on optic-fibre transmission which resulted in a proposal in 1966 to use light as the transmission medium rather than electrons. By the 1980s fibre-optic cables had been developed to the point of commercial exploitation. There were a number of advantages to fibre-optic cables—the raw material was cheap, electrical interference was eliminated, it could not easily be 'tapped', transmission was fast and more accurate and each fibre pair had enormous traffic capacity.

2.12. Fibre-optic cables are made of glass fibres (with diameters less than that of a human hair), through which light will travel at about 200,000 kilometres per second (km/sec). The fibre is transparent to infra-red light which is widely used. The transmitting glass core is surrounded by a cladding glass with a refractive index which ensures that the light is guided by internal reflection along the core. The quality of transmission depends greatly on the specific wavelength chosen for transmitting data. There are three windows in the wavelength/attenuation curve. Early fibres used the first window (850 nm[1]), most landline and early submarine systems operated in the second window (1,300 nm) and the latest submarine systems use the third window (1,500 nm). At these specific wavelengths losses are reduced and repeaters can be spaced further apart. The light pulses are transmitted into the optical fibre by means of solid-state lasers which can effectively be switched on and off to provide high-speed pulses of light.

2.13. Provided the wavelength of the laser is optimized to the fibre window, transmission with low loss and distortion is possible at high data rates. Repeaters are needed, however, to retime, reshape and amplify the signals for onward transmission. The repeaters have to be closer together as the data rate increases because the pulses are closer to each other and the risk of distortion rises. To date all repeaters in fibre-optic submarine cable systems have used electrical regeneration in the repeater, requiring the light signal to be converted to electrical energy, processed and then retransmitted by a laser.

Optical amplifiers

2.14. Further development is now taking place following the invention of optical amplifiers. The optical amplifier replaces the electrical regenerator in the repeater and as a result the signal remains optical throughout the length of a system. In simplified terms, the weak signal is joined by a second continuous light signal at a slightly shorter wavelength provided by a pump laser in the amplifier. The two signals pass into a fibre section doped with erbium (a rare earth element), the erbium electrons being excited by the pump laser light into emitting photons which amplify the incoming signal. Optical amplifiers can also be used at terminals to boost outgoing and incoming signals and have already enabled longer unrepeatered spans (up to 350 km) to be achieved. Repeatered systems using optical amplifiers have required major redesign but the first repeatered optically amplified systems are expected to be installed in 1994.

2.15. The technology of the fibres themselves is continually improving. At present most of the fibres for long-distance propagation are silica but other materials are being tested. New materials such as fluoride glasses have been proposed; these may reduce losses significantly so that much longer stretches of cable can be installed without repeaters or amplifiers.

Terminal and power feed equipment

2.16. Terminal equipment comprises a number of elements. Multiplexing equipment (see paragraph 2.8) takes the incoming signals from the land network and electrically combines them into a higher-speed signal for transmission through the cable. The equipment also adds information to identify the data it is carrying so that the data can be recognized for onward routeing by the receiving terminal. Each multiplexer normally provides both the outbound assembly and inbound disassembly.

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[1]See Glossary.

Where the cable is fibre-optic the signal is passed through a further electronic stage before conversion to light and onward transmission. Extra modification to the data stream is applied to allow communication with the underwater repeaters and provide supervisory monitoring and control facilities.

2.17. For most systems delivered to date the multiplexing and repeater supervisory systems are contained within a single terminal unit, which also includes the laser transmitters and receivers for delivery and receipt of the optical signals transmitted through the cable. Power-feed equipment supplies the power which drives the repeaters. (Less power is needed for optically-amplified systems than for electrical repeaters, and power feed is not necessary for unrepeatered systems.)

Systems installation

2.18. It is usual for the supplier to have responsibility for installing the system. The terminal equipment is land-based but in order to install the cable and repeaters it is necessary to have a specially equipped cable-laying vessel. Neither Alcatel nor STC have their own cable-laying vessels and have to hire cable-laying services on a subcontracted basis from (*inter alia*) AT&T, C&W (Marine), and BT (Marine), which have their own vessels. The vessel chosen will depend very much on timely availability and the positioning of the vessel in the required part of the world, as unproductive waiting and sailing time to cable pick-up point can be very expensive. Figure 2.1 shows a repeater on a cable in the process of installation.

2.19. Reliability is a key objective of any submarine system. It is installed on the sea bed, designed for a life of 25 years with not more than three faults during that time. If a fault occurs in a repeater (or indeed in the cable) it is necessary to charter a cable-repair vessel. The vessel has to find the cable, normally by the use of grapples and detrenching tools (if the cable has been buried). When the cable is buried (usually to the depth of about 1 metre) in sea depths of up to 1,000 metres this may take up to two or three days. On finding the cable it is lifted up, cut and tested until the fault is isolated. It costs about £50,000 per day to charter a cable ship, so given repair time and transit time a repair is unlikely to cost less than £500,000.

Unrepeatered v repeatered systems

2.20. As a result of the improvements in optical fibre and cable technology, together with the introduction of optical amplifiers in terminal equipment, systems have been developed which span distances of up to 350 km without the need for submarine repeaters. Many submarine systems linking different countries within Europe are below this threshold. Longer distances may be covered by linking separate unrepeatered links along a coastline in a festoon system or in island-to-island links. Such unrepeatered systems can use lower-cost cable, do not require power-feed equipment and are generally cheaper to install. They can usually be installed faster than land lines or radio links and are less vulnerable to damage or disruption (eg by weather, earthquakes or human error).

2.21. Unrepeatered systems are most commonly used:

(a) for mainland to island lines where the island is on the continental shelf of the mainland—such systems are common in Northern Europe and the Mediterranean;

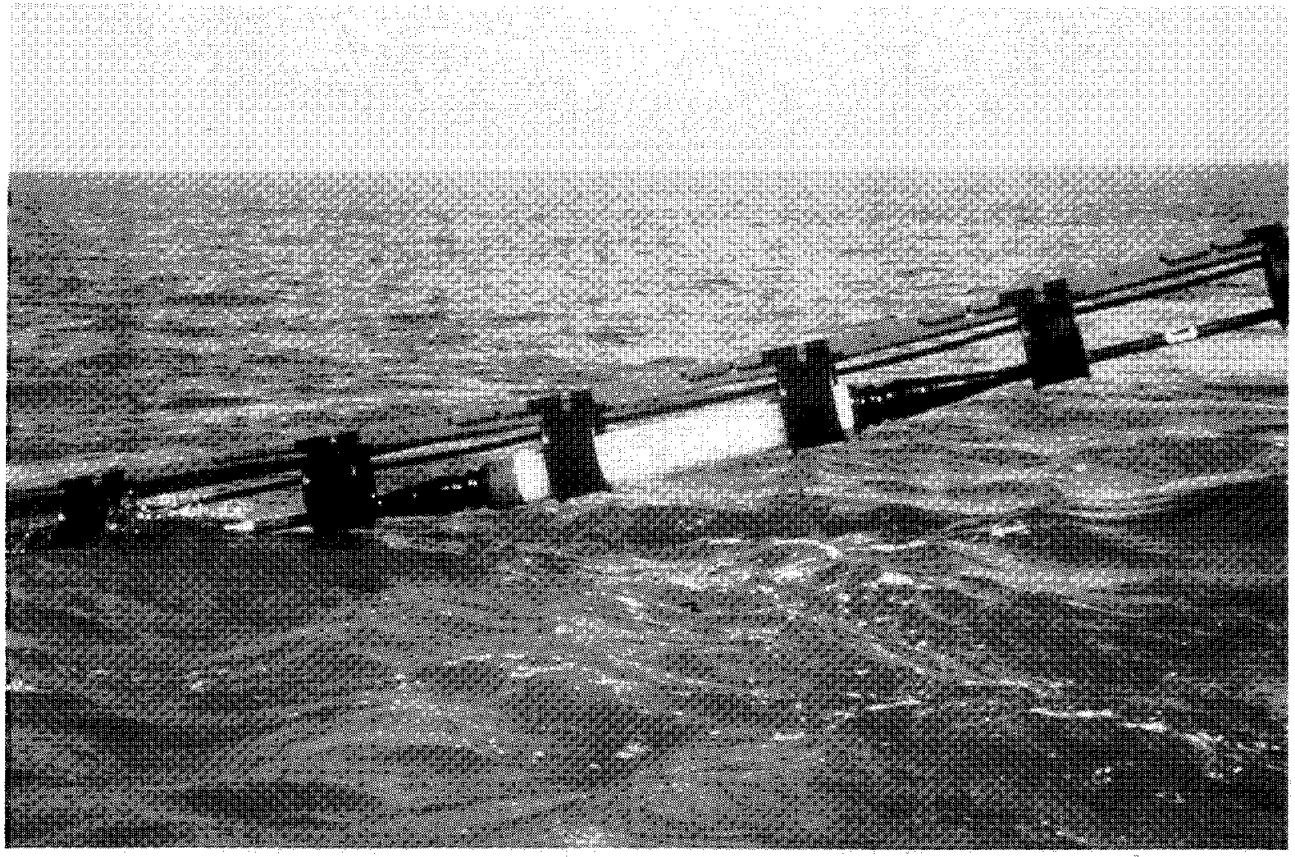
(b) lines between islands that may be situated on the shallower continental shelf or sub-sea mountain ranges containing deeper depressions—these systems are typically found in the Pacific, the Caribbean and the Far East;

(c) coastal festoon-systems that link a series of points along a coast, typically where the terrain is, or weather conditions are, too difficult to use a land line or microwave link; and

(d) short point-to-point lines across a bay or river.

FIGURE 2.1

Submarine repeater being installed



Source: STC.

2.22. Unrepeatered systems presently account for an estimated 10 per cent by turnover value of the total world-wide submarine cable systems market and this is projected to increase to 18 per cent by the year 2000. With the increased distance that unrepeatered systems are capable of covering, links which in previous years could only be spanned using repeaters can now be served by an unrepeatered system.

Developments in submarine cable systems technology

2.23. The principal factors which have affected the rate of improvement in submarine systems technology have been:

(a) the operators' requirements that suppliers should provide high-capacity systems at low per circuit costs;

(b) continuing R&D by suppliers;

(c) innovations in telecommunications technology and other areas such as developments in transmission equipment, optical fibres and lasers, which have applications in submarine systems; and

(d) the continuing threat of developments in satellite technology.

2.24. Major technological advances and increased capacity have coincided with the awarding of contracts for new TAT systems, where the purchasing operators have required systems with significantly increased capacity:

(a) 280 Megabits per second (Mbits/s) per fibre pair in 1986 (TAT-8);

(b) 560 Mbits/s in 1989 (TAT-9); and

(c) 5 Gigabits per second (Gbits/s) in 1993 (TAT-12 and -13).

2.25. Historically, technology developed for each new generation of TAT system has been utilized on other systems around the world until it is overtaken by newer technology. However, with the shift in focus of demand to the Asia-Pacific region this pattern may change in the future.

2.26. Until the advent of competition from satellites and the development of fibre-optic submarine cables the technology utilized in submarine systems tended to lag behind that utilized in land lines. The main reason for this was the desire on the part of purchasers to have proven technology in their systems so as to avoid any unnecessary risks due to the high cost of repairs to submarine cables. However, the benefits arising from some more recent developments of high- capacity low-cost circuits for the operators has meant that the technology has been introduced into commercial operation in submarine cables in advance of land lines. For example, the advent of optical amplifiers gives such substantial advantages to the operators (increased length of unrepeatered links, higher bit rates at lower cost than achievable with repeatered systems) that these will be deployed in marine applications ahead of their widespread use in terrestrial networks.

2.27. Once the basic optical amplifier technology has been installed, three types of further advances are on the horizon:

(a) In theory there is scope for a fibre to carry addition capacity by a change to terminal equipment to produce a higher bit rate, or by wavelength division multiplexing (WDM) (see paragraph 2.28).

(b) The distances between optical amplifiers may be increased by refinements, such as new pump lasers, and forward error correction techniques at a given bit rate and system length, thus reducing costs.

(c) It should be possible to design systems operating at up to 40 Gbits/s per fibre using a combination of WDM and soliton transmission (see paragraphs 2.28 and 2.29).

WDM

2.28. Optically-amplified systems can be upgraded to carry higher capacity by use of WDM technology. This involves simultaneous transmission of data on two or more closely spaced wavelengths through the same optical fibre. Some adjustments to system design are needed to accommodate the extra channels. Extra terminal components are required and repeater spans are reduced. A 1,000 km system could carry at least four, and possibly six, wavelengths, but a 9,000 km system currently carries only a single wavelength.

Soliton technology

2.29. A soliton is the term used to describe the propagation of a pulse of energy through a medium without dispersion, that is the pulse arrives unbroadened. Pulses of high-intensity laser light can be transmitted through fibre as solitons, provided the input power level of the pulse exceeds a certain level, the pulse has an optimum shape and the transmission fibre has closely defined characteristics. Experimental work has shown that solitons may be used to transmit data over longer distances than are possible with the existing generation amplifier systems because of the cumulative effects of noise and dispersion. Such a system depends on the development of soliton transmitters, a careful choice of transmission fibre, and possibly some form of intermediate optical regenerator.

Future developments

2.30. There are a variety of possible areas where further technological developments may be made. In common with other high technology areas one of the main difficulties facing submarine systems suppliers is to assess where their R&D effort should be directed to ensure that they are not left behind by technological developments made by a competitor.

3 The companies involved in the acquisition

Alcatel Alsthom SA

3.1. Alcatel Alsthom SA (Alcatel) is a large multinational group of companies which produces technologically advanced infrastructure equipment for the communications, energy and transport sectors. A chart showing its corporate structure is at Figure 3.1. Alcatel is a publicly quoted company listed on the Paris, Frankfurt, Amsterdam and Tokyo Stock Exchanges. It also trades on Stock Exchange Automatic Quotation (SEAQ) in London and in American Deposit Receipts (ADR) form on the New York Stock Exchange. We were told that no part of Alcatel is owned or controlled by the French Government. The production of communications systems is carried out by companies within Alcatel which design, produce, sell and service communications equipment world-wide. Alcatel Cable, the company which proposes to acquire the submarine systems business in STC, is a 78.6 per cent owned subsidiary of Alcatel and its shares are quoted on the Paris Stock Exchange. The balance of Alcatel Cable's shares is publicly owned.

3.2. During 1992 Alcatel employed 203,000 people world-wide and had industrial facilities located in 30 countries. Its relevant businesses are as follows:

(a) *Cable production:* Alcatel manufactures an extensive range of cable products for both land-based and submarine systems used for telecommunications and in transmitting and distributing power.

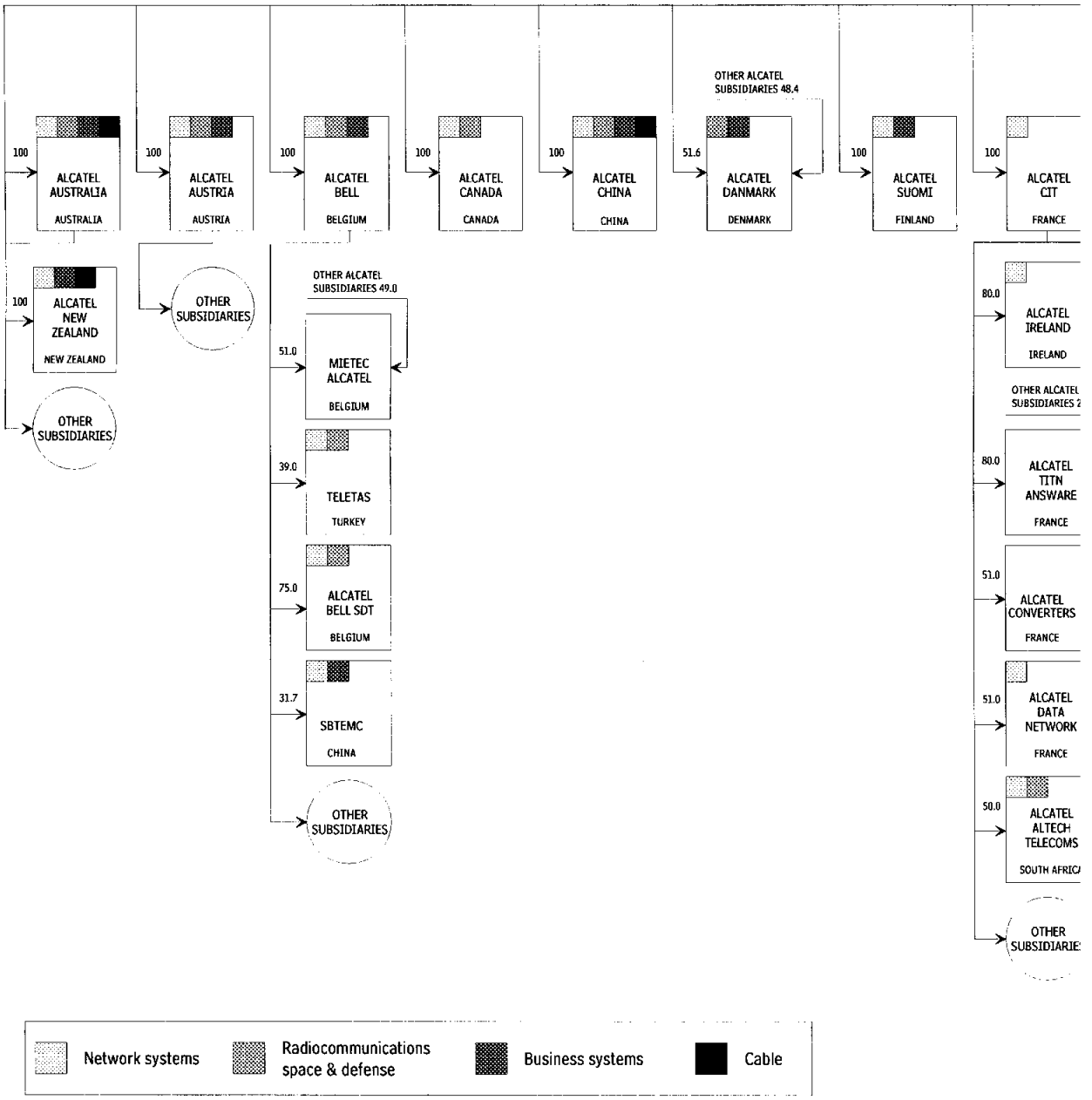
(b) *Network systems:* Alcatel's communications systems sector covers the entire range of switching and transmission technologies, line transmission over both copper and optical-fibre cables, inland and submarine. It produces a range of public network switching systems products.

(c) *Business systems:* Alcatel offers private users a range of communications equipment for voice, data and image.

(d) *Radio communications:* space and defence: Alcatel produces microwave and other radio communications products, including mobile cellular radiotelephony, satellite sub-systems and related ground-based equipment, and defence communications equipment.

3.3. Alcatel's submarine cable systems business is carried out through a number of subsidiary companies. Since 1992 these have operated through an Economic Interest Grouping (EIG) established under French law and known as 'Alcatel Submarcom'. Alcatel Submarcom comprises the following companies: Alcatel Cable, which has a 30 per cent interest, Alcatel CIT, 30 per cent, Tasman Cable Company Pty Limited, 25 per cent, Alcatel Kabel Norge, 10 per cent, and Alcatel Cable Hellas, 5 per cent. These companies are obliged to contribute to the running expenses of Alcatel Submarcom in line with their respective holdings.

3.4. Alcatel Submarcom co-ordinates Alcatel's submarine activities. In particular it brings together expertise in the network-systems sector and the cable sector of Alcatel. Through Alcatel Submarcom, Alcatel designs, supplies and installs cable, repeaters (regenerators or optical amplifiers), terminal equipment and software communications systems. It provides submarine telecommunications systems on a turnkey basis, although it always subcontracts marine installation services. Alcatel Submarcom pools the skills of its constituent companies, as set out below.

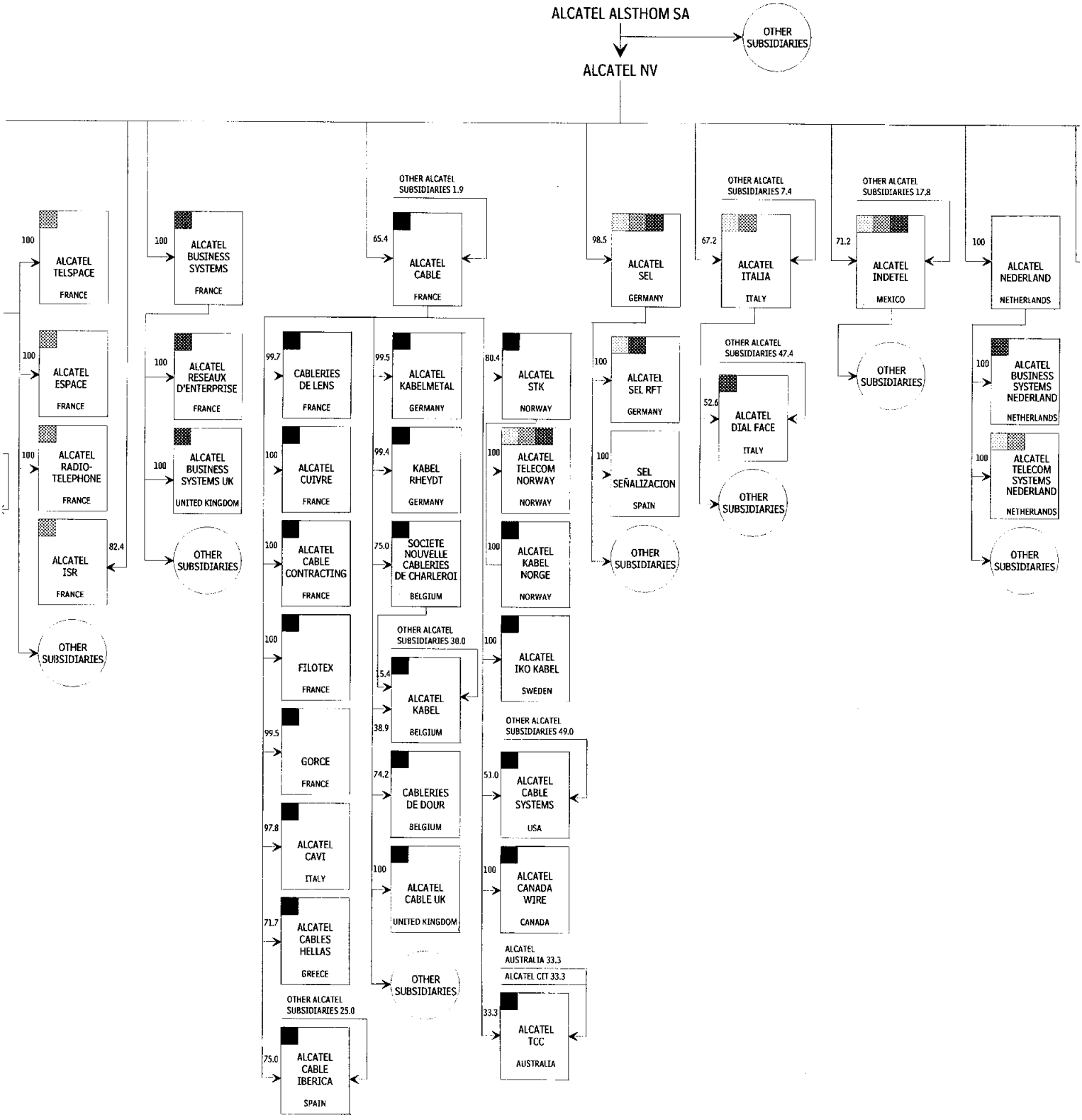


Source: Alcatel.

Note: Percentage of capital owned indicated on connecting lines. These percentages refer only to shareholdings by Alca

FIGURE 3.1

Alcatel corporate structure



el NV and its French subsidiaries (Alcatel Alsthom SA owns 78.6 per cent of Alcatel Cable in total).

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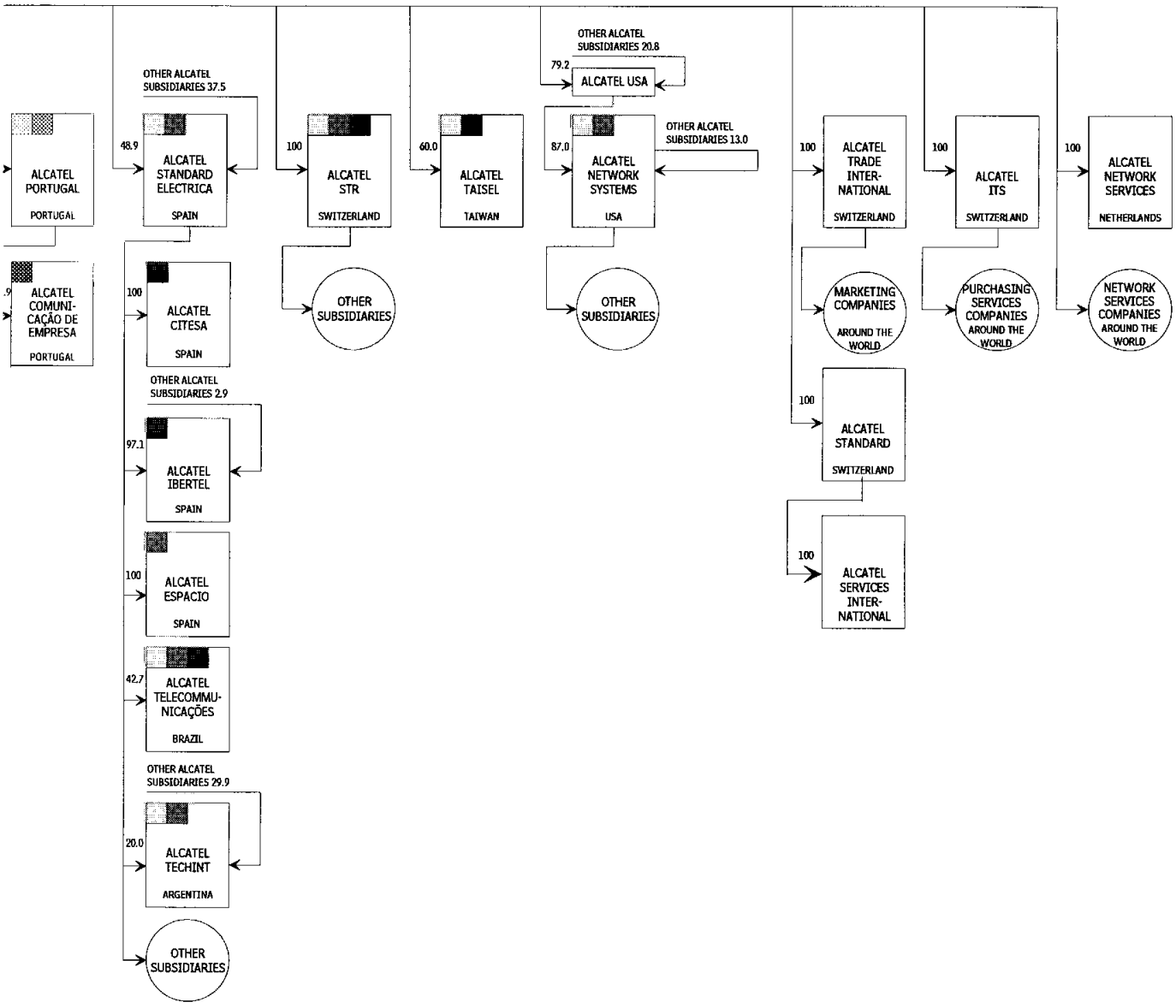
ALCATEL PORTUGAL
PORTUGAL
ALCATEL COMUNI-CAÇÃO DE EMPRESA
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OTHER ALCATEL SUBSIDIARIES 37.5
48.9
ALCATEL STANDARD ELECTRICA
SPAIN
100
ALCATEL CITESA
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OTHER ALCATEL SUBSIDIARIES 2.9
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ALCATEL ESPACIO
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ALCATEL TELECOMMU-NICAÇÕES
BRAZIL
OTHER ALCATEL SUBSIDIARIES 29.9
20.0
ALCATEL TECHINT
ARGENTINA
OTHER SUBSIDIARIES
100
ALCATEL STR
SWITZERLAND
OTHER SUBSIDIARIES
60.0
ALCATEL TAISEL
TAIWAN
OTHER ALCATEL SUBSIDIARIES 20.8
79.2
ALCATEL USA
87.0
ALCATEL NETWORK SYSTEMS
USA
OTHER ALCATEL SUBSIDIARIES 13.0
OTHER SUBSIDIARIES
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ALCATEL TRADE INTER-NATIONAL
SWITZERLAND
MARKETING COMPANIES
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ALCATEL SERVICES INTER-NATIONAL
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ALCATEL ITS
SWITZERLAND
PURCHASING SERVICES COMPANIES
AROUND THE WORLD
100
ALCATEL NETWORK SERVICES
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NETWORK SERVICES COMPANIES
AROUND THE WORLD

3.5. The activities of Alcatel Cable and its subsidiaries cover the whole range of cabling operations. It is divided into six geographical sectors and each of these sectors is organized into the following product divisions:

(a) *Telecommunications:* Alcatel manufactures cables for both overland and submarine telecommunications and produces both fibre-optic and copper conductor cables.

(b) *Power cables:* it supplies all equipment needed to set up high-, medium- and low-voltage power transmission and distribution systems on land and undersea. In addition to cables it produces bare conductors, connectors and related accessories.

(c) *Turnkey projects:* Alcatel Cable Contracting's activities cover power-cable projects and terrestrial-communications networks.

(d) *Special cables:* this covers high value-added systems largely manufactured in limited series and delivered on short notice: for example, 'green' halogen-free, fire-resistant and non-toxic smoke-emission cables providing maximum security in case of fire, and precision wires and cables used in high-technology projects such as space.

(e) *Installation cables:* Alcatel produces standardized cables for use by intermediary suppliers in building and manufacturing.

(f) *Metallurgy:* Alcatel's business includes the production of copper conductors and enamelled wires.

3.6. Alcatel's submarine cable systems business operates from nine sites:

Clichy, France (23)	— headquarters, mechanical, metallic and electrical constructions, manufacture of wires and cables;
Calais, France (468)	— cable manufacture (submarine and terrestrial), technical services supervision of marine operations;
Bezons, France (125)	— optical fibre manufacture;
Marcoussis, France (33)	— R&D into opto-electronic components, optical fibres, sub-assemblies and systems studies;
Liverpool, Australia (63)	— assembly of submarine repeaters, and repeater and systems engineering;
Port Botany, Australia (212)	— submarine cable manufacture and power feed;
Upper Hutt, New Zealand(17)	— terminal and power feed equipment assembly;
La Ville-du-Bois, France (100) Lannion, France (50) Orléans, France (170)	— R&D and manufacture of repeaters, terminal equipment, and related software as well as provision of installation, maintenance and after-sales services.

There were some 1,260 employees in the business in the last quarter of 1993: the number at each site is shown in brackets. Alcatel subcontracts marine installation services.

Financial information

3.7. The consolidated statements of income of Alcatel Cable for the four years from 1989 to 1992 are summarized in Table 3.1.

TABLE 3.1 **Alcatel Cable summarized operating results, 1989 to 1992**

*£ million**

	Year ended 31 December			
	1989	*1990*	*1991*	*1992*
Sales and revenues	2,736.3	2,856.5	3,159.2	4,038.7
Operating profit (profit before interest and tax)	222.8	245.2	293.5	333.4
(Interest)	(42.3)	(40.7)	(47.9)	(52.6)
Other income and (expenses)†	(16.1)	7.1	(22.0)	(33.9)
Profit before tax	164.4	211.6	223.7	246.9
				per cent
Operating profit as a percentage of sales and revenues	8.1	8.6	9.3	8.3
Profit before tax as a percentage of sales and revenues	6.0	7.4	7.1	6.1

Source: Alcatel Cable.

*The above figures have been converted from French francs at FF 8.7 to £1.

†Other income (and expenses) consist of:

	1989	*1990*	*1991*	*1992*
Effect on income before tax of change in accounting principles‡	0.0	17.9	0.0	0.0
Employees' profit-sharing plan	(5.1)	(8.8)	(8.5)	(7.3)
Goodwill amortization	(4.0)	(6.1)	(6.4)	(11.3)
Restructuring expense	(3.3)	(7.7)	(7.3)	(12.2)
Net income from discontinued operations	(0.8)	0.0	0.0	0.0
Capital gains on disposal of tangible assets and financial investments	0.0	14.4	0.7	2.7
Other, net	(2.9)	(2.6)	(0.5)	(5.8)
	(16.1)	7.1	(22.0)	(33.9)

Source: Alcatel Cable.

‡The change in accounting principles in 1990 was the recognition by Alcatel Cable of the revenue and margin on long-term contracts on the percentage of completion method instead of the completed contract method. Under the percentage of completion method, credit for sales is taken during the contract, as work is completed, as a percentage of the total contract sales value instead of awaiting the final completion of the contract; profit is recognized by taking a percentage, in proportion to the sales percentage, of total contract price less costs incurred to date plus the estimated cost to complete. If a loss is expected, the whole of the loss is taken into account.

Alcatel Submarcom

3.8. The trading results of the submarine systems business of Alcatel Submarcom (see paragraph 3.3) for the years 1989 to 1992 and the forecast for 1993 are shown in Table 3.2.

TABLE 3.2 **Alcatel Submarcom: summarized operating results, 1989 to 1992, and forecast for 1993**

	Year ended 31 December				£ million*
	1989	*1990*	*1991*	*1992*	*1993 forecast*
Sales	38.5	75.6	208.2	236.7	[
Operating profit/(loss) (profit/(loss) before interest and tax)	(38.3)	(34.3)	12.6	46.4	‡]
					per cent
Operating profit as a percentage of sales†	(99.4)	(45.4)	6.1	19.6	[‡]

Source: Alcatel.

*The above figures have been converted from French francs at FF8.7 to £1.
†R&D expenditure charged in arriving at operating profit above is:

	1989	*1990*	*1991*	*1992*	*1993 forecast*
R&D expenditure (£m)	20.8	21.0	20.4	25.5	[
As a percentage of sales (%)	54.0	27.8	9.8	10.8	‡]

Source: Alcatel.

3.9. Alcatel told us that the losses incurred in 1989 and 1990 arose because of the development of higher-capacity submarine systems, which incurred high R&D costs; and because, during the same period, Alcatel TCC in Australia was set up and made practically no sales during 1989 and 1990 and substantial start-up costs were incurred. These start-up costs were treated as expenses for accounting purposes.

Northern Telecom and STC

3.10. In 1935 the Telegraph Construction and Maintenance Co (TC&M) and Siemens Bros & Co Ltd (Siemens) set up Submarine Cables Limited at Greenwich to manufacture submarine cable systems. In 1956 the cable manufacturing facility was built at Southampton. In 1959 British Insulated Callender's Cables Ltd acquired TC&M, and with Siemens subsequently sold its shares in Submarine Cables Ltd to Associated Electrical Industries Ltd (AEI) which, in turn, sold the company to Standard Telephones and Cables Limited (STCL), a subsidiary of ITT Corporation (ITT), in 1970. STCL became publicly owned in 1982 (STC PLC), but ITT retained a 35 per cent interest. In 1987 NT bought ITT's shares in STC PLC, obtaining a 27 per cent interest. In March 1991 NT bought the remaining shares and the company was later renamed STC Limited (STC).

3.11. NT is a global supplier of fully-digital telecommunications switching systems, selling to more than 80 countries world-wide. Its headquarters are in Canada. It operates 52 manufacturing plants around the world, with plants in Australia, Canada, France, Malaysia, the People's Republic of China, the Republic of Ireland, Mexico, Thailand, the UK and the USA. R&D is carried out by NT at 25 of these facilities and by Bell-Northern Research (an affiliated company of NT) which operates R&D facilities in eight cities in Canada and the USA, and in the UK through BNR Europe (BNRE) (a wholly-owned subsidiary of Northern Telecom Europe Limited (NTEL), based in Harlow.

‡Figures omitted. See note on page iv.

3.12. NT said that its principal activities are:

(a) central office switching equipment, used by telecommunications operators;

(b) business communications systems and terminals, primarily private switching systems;

(c) transmission equipment, for the transportation of voice data, image, and video within a city, across a continent or round the world; and

(d) cable and outside plant products; in addition to the submarine cables business NT had conventional wire and optical-fibre cable manufacturing facilities until December 1993 (when they were sold to Siecor/Corning) and continues to have facilities to manufacture a variety of outside plant products.

3.13. NTEL has the prime market responsibility for the NT group within Europe, and is the company into which all UK companies within the NT group consolidate their accounts. It has the following sites and offices in the UK:

Monkstown, Northern Ireland	— manufacture of transmission equipment;
Cwmcarn, South Wales	— manufacture of telephone sets;
Newport, South Wales	— defence systems;
Paignton, Devon	— manufacture of, and R&D in, opto-electronic components, and radio products;
Harlow, Essex	— European R&D centre together with specialist fibre manufacture; integrated network division;
Maidenhead, Berks	— NTEL European headquarters, R&D; and
New Southgate, London	— European centre for transmission equipment.

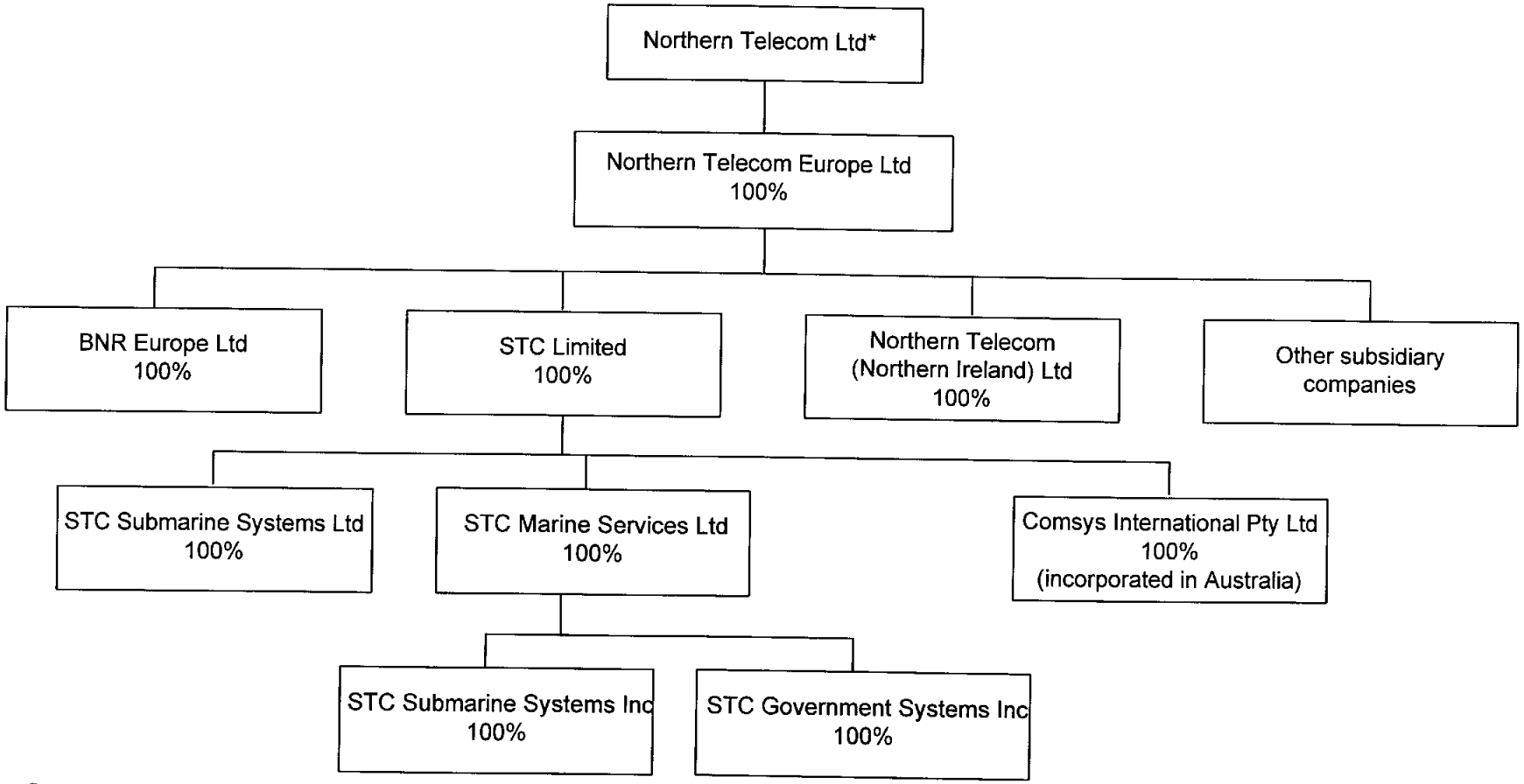
Figure 3.2 shows the structure of NTEL.

Financial information

3.14. The profit and loss accounts of NTEL for the period from 21 January to 31 December 1991 and for the year to 31 December 1992 and forecast for the year to 31 December 1993 are shown in Appendix 3.1 and are summarized in Table 3.3.

FIGURE 3.2

NTEL organization chart



Source: NT.

*Incorporated in Canada, 26 July 1993.

TABLE 3.3 **NTEL (formerly Northern Telecom PLC): summarized operating results for 1991 and 1992 and forecast for 1993**

£ million

	Period from 21.1.91 to 31.12.91**	*Year to 31.12.92*	*Year to 31.12.93 forecast*
Turnover	682.9	662.2	[
Operating profit/(loss) (profit/(loss) before interest and tax)†	117.6	16.5	‡
Profit/(loss) before tax	36.2	(61.9)	]
			per cent
Operating profit/(loss) as a percentage of turnover	17.2	2.5	[
Profit/(loss) before tax as a percentage of turnover	5.3	(9.3)	‡]

Source: NTEL.

*The figures shown above start at 21 January 1991 because:
(a) on 21 January 1991, the company's offer to acquire STC PLC became unconditional; and
(b) prior to 1991, the company was a marketing arm of NT and the accounts are not comparable with those for the years after the acquisition of STC.

†Operating profit/(loss) before interest and tax is arrived at after charges for goodwill, amortization and write-off of: £22.0 million in 1991; £26.6 million in 1992; and £[‡] million in 1993.

Notes:

1. General R&D expenditure (ie other than that relating to specific contracts, charged to provisions and to NTEL shown in note 2 below) charged in arriving at operating profit was:

£ million

	1991	*1992*	*1993*
R&D expenditure (£)	49.9	39.3	[‡]
As a percentage of sales (%)	7.3	5.9	

2. NTEL told us that its R&D expenditure in the UK in the three years 1991, 1992 and 1993 was about £[‡] million, as noted in paragraph 6.13; this expenditure comprised the following:

£ million

General R&D as above (1991: £49.9m; 1992: £39.3m; 1993: £[‡]m)	[
Charged to cost of sales on specific contracts	
Costs incurred on behalf of and charged back to NTL	‡
Charged to acquisition provisions	]

3.15. NTEL's trading results set out in Table 3.3 show:

(a) a 3.0 per cent fall in turnover between 1991 and 1992; and turnover in 1993 [‡];

(b) an 86 per cent reduction in operating profit in 1992 compared with 1991 and a reduction in operating profit as a percentage of turnover from 17.2 per cent in 1991 to 2.5 per cent in 1992; and

(c) [‡] forecast for 1993.

However, NTEL told us that it considered that no meaningful comparisons of turnover, profits or R&D expenditure over the period could be made due to the fundamental changes which have taken place within the various businesses of NTEL. The fundamental changes included, following NTEL's acquisition of STC PLC in 1991, disposal of a number of STC's businesses deemed to be non-core so that the sales and profits of those businesses which were included in the 1991 figures were not included in 1992 or forecast 1993 figures.

‡Details omitted. See note on page iv.

3.16. [

Details omitted. See note on page iv.

]

3.17. NTEL's R&D expenditure, shown in Appendix 3.1, fell from £49.9 million (7.3 per cent of turnover) in 1991 to £39.3 million (5.9 per cent of turnover) in 1992, but is forecast [*Details omitted. See note on page iv.*] in 1993.

3.18. The capital employed of NTEL at 31 December 1991 and 1992 and forecast 1993 is shown in Appendix 3.2. Return on capital employed for these years is summarized in Table 3.4.

TABLE 3.4 **NTEL: capital employed and return on capital employed for 1991 and 1992 and forecast for 1993**

£ million

	At 31 December		
	1991	*1992*	*1993 forecast*
Capital employed	323.1	471.9	[
Profit before interest and tax (Table 3.3)	117.6	16.5	*
Add back goodwill amortization and write-off	22.0	26.6	
	139.6	43.1	]
			per cent
Profit/(loss) before interest, goodwill amortization and write-off and tax as a percentage:			
(a) of year-end capital employed	43.2	9.1	[*
(b) of average capital employed		10.8	]

Source: NTEL.

Note: The above calculation of return on capital employed is based on the tangible assets of NTEL, excluding intangible assets comprising goodwill. If goodwill was included in capital employed, return on capital employed would be:

£ million

	At 31 December		
	1991	*1992*	*1993*
Capital employed (including goodwill)	1,355.6	1,477.8	[
Profit before interest and tax after amortization and write-off of goodwill	117.6	16.5	*]
			per cent
Profit before interest and tax as a percentage:			
(a) of year-end capital employed (including goodwill)	8.7	1.1	[
(b) of average capital employed (including goodwill)		1.2	*]

Return on average capital employed has been calculated on the average of the opening and closing balances.

3.19. Table 3.4 shows that NTEL's return on year-end capital employed fell from 43.2 per cent in 1991 to 9.1 per cent in 1992. This was due to an increase in capital employed, arising mainly from an increase in working capital, and to a reduction in profit, arising mainly from reduction in turnover and increase in cost of sales. [*Details omitted. See note on page iv.*] for 1993 referred to in paragraph 3.16. If goodwill was included in capital employed, return on year-end capital employed would fall from 8.7 per cent in 1991 to 1.1 per cent in 1992 and [*] would be forecast for 1993.

*Details omitted. See note on page iv.

3.20. Cash flow statements for NTEL are shown in Appendix 3.3 for 1991, 1992 and the forecast for 1993. These show a change from net cash inflow in 1991 from operating activities to a net cash outflow in 1992 which showed lower operating profit and increase in working capital. Group loans of £334 million were received by NTEL over 1991 and 1992 and [*] are forecast for 1993.

STC Limited and STC Submarine Systems

3.21. The STC submarine systems businesses formed a division of STC PLC prior to its acquisition by NT in March 1991. From March 1991 until June 1993, these businesses were held in various parts of NT. As a result of a reorganization in June 1993, STC became an intermediate holding company within the group, in order to bring together NT's submarine systems businesses prior to their sale. The subsidiary companies of STC are:

- STC Submarine Systems Limited, UK;
- STC Marine Services Ltd, UK;
- STC Submarine Systems Inc, USA;[1]
- STC Government Systems Inc, USA;[1] and
- Comsys International Pty Ltd, Australia.

All these subsidiaries of STC are referred to in this report as STC. STC also held, until November 1993, a 40 per cent interest in Jasmine Submarine Telecommunications Company Ltd, incorporated in Thailand.

3.22. The principal business of STC is the development, manufacture, supply and installation of submarine telecommunications systems. In contracting with its customers STC will take full turnkey responsibility for the supply and installation of the whole system. A breakdown of the various elements of its business are as follows:

(a) *optical fibre cable* is manufactured in Southampton UK or Portland Oregon, USA, using optical fibre bought in from third parties;

(b) *electronic regenerative repeaters* are manufactured by STC at Greenwich;

(c) *optical amplifiers* are manufactured at Greenwich using some key opto-electronic components bought from NTEL's division at Paignton, Devon, and short lengths of specialist optical fibre supplied by BNRE;

(d) *power feed* and *line interface* are supplied from Greenwich as are *multiplexing equipment* up to 560 Mbits/s (for higher transmission rates STC purchases from NTEL or outside suppliers including NKT of Denmark);

(e) *supervisory software* is developed by STC at Stevenage, Herts and in Australia (Comsys); and

(f) STC does not have its own cable-laying vessel and subcontracts installation to third-party marine installers.

3.23. STC operates from five principal locations (numbers of employees are in brackets):

Greenwich, UK (539)	— headquarters, project management functions, manufacture of repeaters, optical amplifiers, terminal equipment, test of electronic components, R&D on repeaters, terminal and power-feed equipment;

*Details omitted. See note on page iv.

[1]Currently owned by NT Limited (Canada) but to be transferred to STC Limited prior to the sale.

Southampton, UK (340)	— cable R&D and design, manufacture, systems assembly and testing;
Portland, Oregon, USA (214)	— cable manufacturing and engineering, systems assembly and systems testing;
Perth, Australia (32)	— software development for supervisory systems; and
Stevenage, UK (58)	— software development for supervisory systems.

In addition STC has a branch office in Thailand and a sales office in San Diego, USA.

3.24. STC explained to us the procedures it uses to determine credit for sales and credit or debit for profit or loss and to apportion profit. STC told us that profitability indicators are direct margin (sales less direct labour and direct material as a percentage of sales) and gross profit margin and earnings before tax as a percentage of sales.

3.25. The profit and loss accounts of STC for the years 1989 to 1992 and the forecast for 1993 are shown in Appendix 3.4 and are summarized in Table 3.5.

TABLE 3.5 **STC: sales, gross margin, operating earnings and operating earnings as a percentage of turnover, 1989 to 1992 and forecast for 1993**

£ million

	Year ended 31 December				
	1989	*1990*	*1991*	*1992**	*1993 forecast*
Sales	179.3	105.7	170.2	217.8	[§]
Operating earnings (profit before interest, foreign exchange differences and tax)†	34.4	8.3	18.8	36.4	
Profit before tax	34.4	8.1	18.8	34.7	
					per cent‡
Profit before interest and tax as a percentage of sales	19.2	7.9	11.1	16.7	[§]
Profit before tax as a percentage of sales	19.2	7.7	11.1	15.9	

Source: STC.

*1992 figures exclude sales of £7.8 million and profit before interest and tax of £2.3 million of a contract (the 'Kwajalein' contract) which STC said were accounted for statutorily through other divisions of NT but which were sales attributable to the business being divested.

†General R&D expenditure charged in arriving at operating profit (ie other than that relating to specific contracts) was:

	1989	*1990*	*1991*	*1992*	*1993 forecast*
R&D expenditure (£m)	11.2	11.4	12.9	16.1	[§]
As a percentage of sales (%)	6.2	10.8	7.6	7.4	

R&D expenditure relating to specific contracts was £13.2 million in 1992 and is forecast at £[§] million for 1993.

‡Percentages have been calculated on figures rounded to the nearest £'000.

Note: Because of the different ownership of the STC Submarine Systems businesses over recent years, as noted in paragraph 3.20, the figures in Table 3.5 have been taken from the following sources for those parts of the business other than STC Submarine Systems Inc and STC Government Systems Inc:

- 1989 and 1990: STC Submarine Systems division extracted from the statutory accounts of STC PLC, a UK public quoted company.
- 1991: up to the sale of STC PLC to Northern Telecom in March 1991, as above; after that point, as for 1992.
- 1992: made up of STC Submarine Systems Inc in the USA, Comsys Pty in Australia and UK divisions included in NTEL.
- 1993: as for 1992 up to June 1993; from June 1993 as a consolidated group within STC Limited.

For STC Submarine Systems Inc and STC Government Systems Inc, the figures in Table 3.5 have been taken from the statutory accounts of STC PLC for 1989, 1990 and for 1991 up to the end of March; from the statutory accounts of NTEL from April to June 1991; and, after that point (following the sale of the US companies by NTEL to NT), from the accounts of NT.

§Figures omitted. See note on page iv.

3.26. Table 3.5 shows fluctuating sales and profits over the period from 1989 to forecast 1993. Turnover and profit before tax of STC, having fallen in 1990 below the levels of 1989, increased in 1991, but remained below 1989 levels. In 1992 sales and profit were higher than in the previous years and showed increases of £47.6 million (28.0 per cent) in sales and £15.9 million (84.6 per cent) in profit before tax over 1991. Profit before tax in 1993 is forecast [*]. Profit before tax is forecast to [*Details omitted. See note on page iv.*].

3.27. STC prepared a projection of revenues and profits in the period 1994 to 1998 as part of the NT business planning process prior to the agreement of the sale to Alcatel Cable. This business plan projection is shown in Table 3.6. The projections shown in Table 3.6 assumed that STC would continue to be part of NT and be regarded as a core business within the group.

TABLE 3.6 **STC: projected revenue and profit 1994 to 1998**

£ million

	Year ended 31 December				
	1994	*1995*	*1996*	*1997*	*1998*
Customer revenues	[				
Gross margin			*		
Operating profit					]
					per cent
Operating profit as a percentage of customer revenues	[		*		]

Source: STC.

3.28. The gross value of the world-wide assets of STC at 31 December 1992 was £183 million, as set out in Table 3.7.

TABLE 3.7 **Gross value of the world-wide assets of STC at 31 December 1992**

	£ million
Fixed assets at net book value	51.2
Current assets less provisions	74.7
	125.9
Cash held by other parts of the NT group	57.0
	182.9

Source: STC.

3.29. The STC figures in Table 3.7 are a management accounting consolidation of the separate companies forming STC. STC told us that there were no separate statutory accounts for the STC grouping in total at 31 December 1992. We know of no change that would materially reduce the above gross value.

3.30. The capital employed and sources of capital employed of STC Submarine Systems from 1989 to 1992 and forecast for 1993 are shown in Appendix 3.5. Table 3.8 summarizes capital employed and profit before interest, foreign exchange differences and tax as a percentage of average capital employed. Return on average capital employed was 48.3 per cent in 1992 and is forecast at [*] per cent for 1993. However, NTEL and STC told us that they considered that return on average capital employed as defined by the MMC was neither a meaningful nor appropriate measure of profitability. STC said that, in its view, return on capital may be a useful measure when applied to industries which employ significant amounts of fixed capital in manufacturing and selling relatively standard finished goods; but this did not apply to submarine cable systems, where the products are not standard manufactured items and are specifically designed, manufactured and installed to meet individual customer requirements. STC said that it considered it more important to monitor return on sales and cash generated than an absolute return on capital employed.

*Details omitted. See note on page iv.

TABLE 3.8 **STC: capital employed and operating earnings as a percentage of average capital employed, 1989 to 1992 and forecast for 1993**

£ million

	As at 31 December				
	1989	*1990*	*1991*	*1992*	*1993 forecast*
Capital employed	96.3	150.9	79.5	71.2	[*]
Operating earnings (profit before interest, foreign exchange differences and tax)	34.4	8.3	18.8	36.4	
					per cent
Operating earnings as a percentage of average capital employed		6.7	16.3	48.3	[*]

Source: STC.

Note: Return on capital employed has been calculated on the average of opening and closing balances.

3.31. Funds flow statements for STC for 1989 to 1992 and forecast 1993 are shown in Appendix 3.6 and are summarized in Table 3.9. These show that STC had a net cash outflow in 1990, but net cash inflows in 1989, 1991 and 1992. In 1992 STC had a net cash inflow of £82.0 million and transferred cash of £82.4 million to NT. [*Details omitted. See note on page iv.*] are forecast for 1993.

TABLE 3.9 **STC: funds flow statements, 1989 to 1992 and forecast for 1993**

£ million

	1989	*1990*	*1991*	*1992*	*1993 forecast*
Cash generated by operations (earnings before tax, depreciation and movement in provisions)	34.5	(6.0)	30.0	43.3	[
Increase/(reduction) in down-payments	(2.2)	(3.7)	20.9	40.6	
Net (increase)/reduction in working capital (stocks, debtors, and other assets less creditors)	4.1	(53.4)	77.1	14.3	*
(Increase) in fixed assets	(14.8)	(1.4)	(10.1)	(12.6)	
(Increase)/reduction in Thailand equity	0.0	0.0	(1.4)	(3.6)	
Net cash inflow/(outflow)	21.6	(64.5)	116.5	82.0	
Cash transferred to NT	21.6	(64.3)	114.9	82.4	
Net cash movement	0.0	(0.2)	1.6	(0.4)	]

Source: STC.

3.32. Although most of STC's R&D is carried out within STC, assistance is currently obtained from other parts of the NT group as follows:

(a) BNRE, a wholly-owned subsidiary of NTEL which provides research for the NT group's activities in Europe. It is based at Harlow and the principal areas in which it provides research services to STC are:

— design support on high-capacity optical transmission systems;
— development of advanced opto-electronic subsystems and components;
— design of specialized electronic integrated circuits;
— development (and supply) of specialist optical fibre and components;
— test, analysis and research into advanced methods of optical transmission;
— cable design and testing and installation support; and
— repeater mechanics design.

Under the proposed transaction, BNRE will continue to supply research services to STC for another two or three years. However, a team of about 14 BNRE employees, who are engaged in R&D work concerning cable design and repeater testing, will be transferred to STC.

*Details omitted. See note on page iv.

(b) NTEL's Opto-Electronic Components Division in Paignton, which provides services concerned with the development of key opto-electronic components used by STC in repeaters and optical amplifiers. The proposed transaction contemplates that NTEL's Opto-Electronic Components Division will continue to supply these components and related development services to STC.

(c) NTEL's Transmission Division will continue to supply to STC, at least for current orders at the date of divestment, multiplexing equipment to support STC's contractual requirements. This equipment is essentially that which NTEL sells for its land-line transmission business. There is a continuing need to develop the 'interface' between the software elements of the NTEL product and the STC supervisory software. NTEL and STC expect to continue to develop these interfaces following the sale.

The acquisition

3.33. Alcatel said that it had agreed to purchase, subject to regulatory approval and satisfactory due diligence investigations, the entire issued share capital of STC Limited from NTEL. STC Limited is the parent company of the various companies in which NTEL's submarine cable systems business STC is vested (see paragraph 3.21). The consideration for the shares payable by Alcatel was £600 million, of which £400 million was payable in cash at completion and £200 million was payable in cash 120 days after completion. Alcatel would finance the acquisition primarily from its internal reserves and established credit facilities. There would not be any significant effect on Alcatel's gearing. The parties would continue discussions with the intention of completing definitive agreements to effect the transaction subject only to regulatory clearance having been obtained, and completion would take place shortly after such clearance.

3.34. The merger satisfies the assets test of the Fair Trading Act 1973. The proposed transaction was originally notified to the EC Commission under the European Community Merger Regulation (ECMR), but the EC Commission found that the Community-wide turnover threshold was not met by STC and that the transaction did not therefore fall within the scope of the ECMR.

3.35. A pre-merger notification was filed in the USA under the Hart-Scott-Rodino Anti-Trust Improvements Act of 1976 and we were told that the transaction was approved by the Department of Justice at the end of the initial working period without a Second Request for Further Information being issued. Alcatel and NTEL have lodged a voluntary Exon Florio notice with the Committee on Foreign Investments in the USA (CFIUS). The CFIUS must carry out a preliminary review within 30 days of the date of such notice to determine whether an investigation of national security concerns is necessary prior to closing.

3.36. The purchase price of £600 million to be paid by Alcatel is about [*] times STC Submarine Systems' forecast 1993 earnings of £[*] million, based on profit before tax of £[*] million (shown in Table 3.5) and a corporation tax rate of 33 per cent. While this appears an apparently high multiple of earnings, it is historical and Alcatel said that, apart from a small decrease in earnings per share in 1994, it did not expect that the earnings of the group would be diluted as a result of the acquisition of STC Limited. Alcatel has calculated the incremental effect of the acquisition upon its earnings; this calculation, which is set out in Appendix 3.7, shows the acquisition producing a decrease in earnings per share, expressed in sterling, [

Details omitted. See note on page iv.

]. NT told us that a PE ratio of [*] was not unusual for a primary telecommunications business.

3.37. Alcatel told us that it had estimated goodwill on acquisition at £[*] million, being the excess of the purchase price over estimated STC net tangible assets of £[*] million, as shown in the first note to Appendix 3.7. Alcatel told us that the net assets of STC are low in relation to the acquisition price being offered partly because the net assets do not reflect the value of intangible assets arising from R&D.

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*Details omitted. See note on page iv.

3.38. Alcatel Cable shares have been traded on the Paris secondary market for a number of years and obtained a quotation on the Paris Stock Exchange and a Prospectus was issued in this connection in October 1993. This prospectus included a statement by Alcatel Cable regarding its proposed purchase of STC Submarine Systems which said that the acquisition would:

(a) allow a strong European force in submarine cables to be established with annual turnover in the order of FF5.4 billion (£620 million at FF8.7 to £1). From the outset it would be the world leader, ahead of its US and Japanese rivals;

(b) strengthen Alcatel's position in a market with a particularly steady growth which is based on very rapid developments in international communications, where transmissions are increasing at the rate of 15 per cent a year;

(c) enable the group to increase its production capacity, whilst extending its influence in geographical terms. Alcatel Cable's major submarine cable production units are located in France and Australia, whilst STC Submarine Systems is based primarily in the UK and the USA; and

(d) allow the pooling of R&D resources which would help to further developments in cable and transmission technologies, which have seen rapid growth in recent years.

3.39. We were told that under the proposed transaction BNRE would continue to supply research services to STC for another two or three years. However, a team of about 14 BNRE employees who were engaged on R&D on cable design and repeater testing would be transferred to STC. NTEL's Opto-Electronics Division at Paignton would continue to supply key opto-electronic components and related development services to STC. NTEL's Transmission Division would continue to supply STC, at least in respect of current orders at the proposed date of divestment, multiplexing equipment to support STC's contractors' requirements. NTEL and STC had agreed to continue to develop interfaces between the software elements of the NTEL product and STC supervisory software.

4 The market for submarine cable systems

Introduction

4.1. STC's business consists of the manufacture and supply of submarine cable systems, and in this business both it and Alcatel are major world players. In this chapter we consider the market for submarine cable systems. Such systems include electronic and optical components as well as the cable, but it is the supply of the whole systems that is considered here. We look first at submarine cable systems in relation to other telecommunications links (paragraphs 4.2 to 4.13). We then consider the elements that make up a submarine cable systems contract (paragraphs 4.14 and 4.15), and detail the suppliers of systems and their market shares (paragraphs 4.16 to 4.26). Next we consider how submarine cable systems are purchased (paragraphs 4.27 to 4.31) and then we look at trends in demand (paragraphs 4.32 to 4.39). In the next section we examine the links between companies and the extent of vertical integration between suppliers and purchasers of submarine cable systems (paragraphs 4.40 to 4.44). Then we consider R&D (paragraphs 4.45 to 4.47) and we follow this with an assessment of competition, including technological competition in submarine cable systems (paragraphs 4.48 to 4.55). In the final section, we look at the difficulties faced by new suppliers in entering the market for submarine cable systems (paragraphs 4.56 to 4.64).

Submarine cable systems and other telecommunications links

4.2. There are four main types of long-distance telecommunications links:

(a) land cables;

(b) microwave;

(c) submarine cable systems; and

(d) satellite systems.

Such systems link together two or more points at which switched voice and data traffic is received from numerous individual subscribers.

4.3. Satellite systems can operate between any two points in the world but the operation of the other types of link is limited by geography. Microwave links only operate across 'line of sight' distances, which are relatively short, while land cables and submarine cable systems only operate across land and underwater respectively.

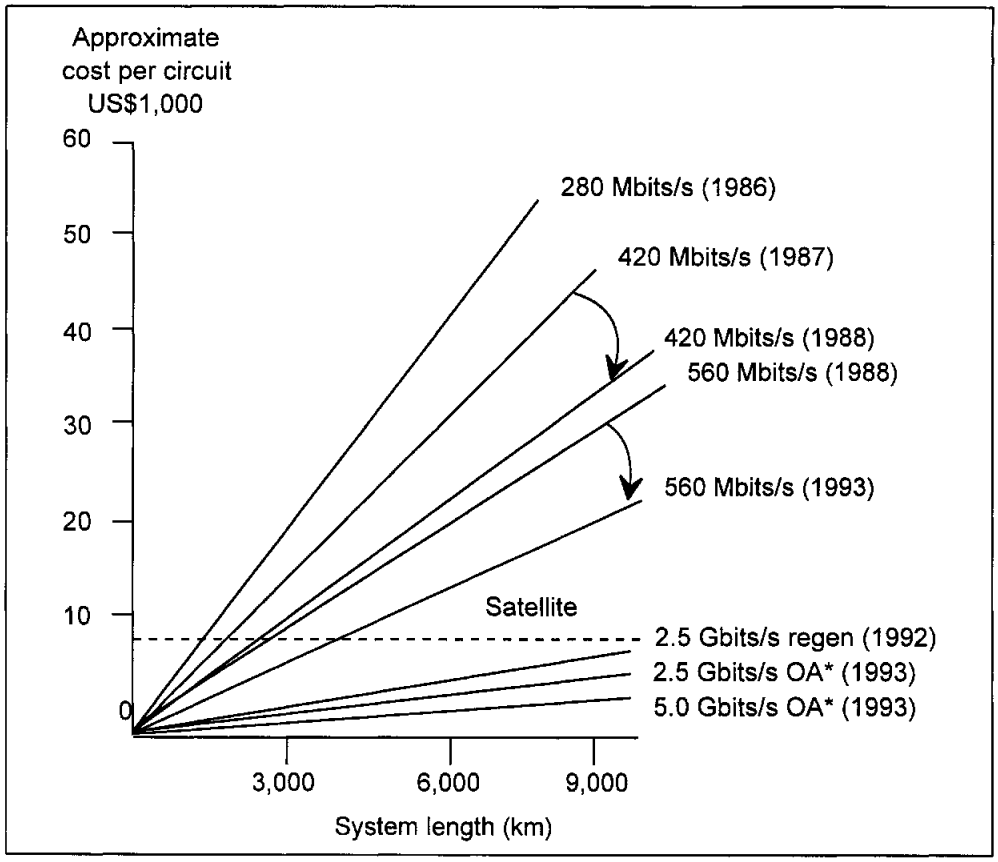
4.4. Nevertheless, submarine cable systems can be an alternative to land cable and/or microwave in some circumstances. For short distances across the sea (eg England to France) microwave links and submarine cable are alternatives and land cable may be a further alternative where there is a bridge or tunnel. For links between coastal locations, land and submarine cables are alternatives. Submarine cables are often linked together into coastal festoons, with landfalls sufficiently frequent to avoid the need for undersea repeaters in the cable. However, the overlap between submarine cable systems and either land cables or microwave is small. The bulk of the submarine cable systems market is accounted for by long-distance links across water which cannot be attained by either land cable or microwave. Similarly, most land cable or microwave links are inland where underwater routes are not feasible.

4.5. Satellites can be a technical alternative to submarine cable systems as a means of linking any two points. It is very difficult to make a precise comparison of submarine cable and satellite costs as costs depend on a large number of factors including some that are specific to particular routes or carriers. For example, the cost of meeting additional demand for telecommunications capacity by investing in submarine cable systems will depend on the cost of strengthening land links between the major centres of telecommunications traffic and the coastal landing point of the cable. The cost of meeting the same demand by purchasing new satellite capacity will depend on the extent of extra investment needed in satellite earth stations which in turn will depend on the nature of the carrier's past investment in earth stations. Figure 4.1 provides an illustration of the costs of carrying telecommunications traffic over different distances by satellite and submarine cable systems. The bulk of the evidence we received suggests that, with the latest 5 Gbits/s technology, a fully-utilized cable is cheaper than satellite for distances up to 10,000 km, which would include transatlantic and transpacific crossings. A disadvantage of satellites is that, as the signal has to travel 36,000 km to the satellite and back again, there is a delay of about 0.25 seconds causing an echo which is a problem for voice and especially data transmission. Even if some reduction in the echo problem is possible, we have been informed that no complete technological solutions are apparent.

FIGURE 4.1

Illustration of submarine cable and satellite costs per circuit

A continuous line shows the cost of each generation of submarine cable system per telephone circuit. The capacity of each generation of cable system is shown in million bits of information per second (Mbits/s) or billion bits of information per second (Gbits/s). The dotted line shows the cost of a satellite telephone circuit at the end of 1992.



Source: STC.

*With optical amplifiers.

Note: This chart is to be interpreted only as an illustration of the complex comparison between submarine cable and satellite system costs (see paragraph 4.5).

4.6. For any particular link across water, the cost comparison between submarine cable and satellite will depend principally on the volume of traffic. Satellites can serve a number of different links and the amount of satellite capacity dedicated to a particular link therefore depends on traffic volume. Moreover, although the individual circuits on the satellite are dedicated to a given link, they can be switched to another link if circumstances change. Submarine cables, however, are committed to a particular link and, once installed, cannot be moved. Where traffic volume is much less than the capacity of the cable, cable costs would be much greater than illustrated in Figure 4.1. For instance, if traffic volume were one-tenth of the cable capacity assumed in Figure 4.1, the unit cost of cable would be approximately ten times that shown. Satellites, therefore, continue to be cheaper than submarine cable where traffic volume is low. However, as cable costs have fallen relative to satellite costs and traffic volumes have increased, the number of links for which a submarine cable system is the economically preferred alternative has increased. This trend continues and many new cable links are expected to be completed over the next five years (see paragraph 4.34).

4.7. Apart from their flexibility and thus suitability for low-volume routes, satellites have a number of advantages over cable. Satellites are more cost-effective for point to multi-point communication, such as broadcasting and the widespread simultaneous dissemination of information. Second, satellite links can be deployed much more quickly than cables, making them more suitable, for example, for news gathering or military applications. Third, satellites are more attractive where a submarine cable system would require land links over long distances or through difficult or inhospitable terrain. For operators in land-locked countries, satellites avoid the need to negotiate for connections to the nearest landfall of a cable system. Fourth, their inherent flexibility make satellites more suitable for mobile communications as mobile stations can link directly to satellites. One view is that the role of satellites, on routes where cable links exist, will be to offer a premium service for mobile communications. Such a service could be attractive for international mobile communications compared with using existing cellular technology which tends to differ between countries. A network of low earth-orbit satellites, which is being promoted by an international consortium, is being planned to fill this role.

4.8. Before the commercial development of submarine optical fibre cable in the mid-1980s, satellite systems were more attractive than cable systems for most long-distance links, even those with high traffic volumes. The balance of advantage then moved in favour of cable, which now has the advantage for high-volume links. The future position is uncertain as it depends on changes in technology. Alcatel told us of a number of developments that might lead to a reduction in satellite costs. These included an increase in the life-span of satellites; deregulation of the satellite industry; and competition to established Western satellite suppliers from suppliers in Russia and China, who Alcatel says have offered to launch satellites at about one-half to one-third of the rates charged in the West. On the other hand, Alcatel and NT's evidence also suggested that costs of submarine cable systems would continue to fall as improved technology could increase cable transmission capacity from 5 to 40 Gbits/s. Both the carriers who gave detailed evidence (BT and C&W) expected cable to continue to have the advantage on high-volume routes for the immediate future.

4.9. The cost structure of satellite systems is different from that of submarine cable systems as illustrated in Figure 4.1. The cost of satellites is the same, whatever the distance covered, while the cost of cable is broadly proportional to distance. For most links, one or other is likely to have a decisive cost advantage. In comparing cable and satellite, users also take into account the significant quality differences: cable has a quality advantage over satellite for data, and to a lesser extent voice, transmission (see paragraph 4.5), but satellite has an advantage over cable for broadcasting and applications requiring more flexibility (see paragraph 4.7). Thus satellite systems are far from a perfect substitute for submarine cable systems. Nevertheless, as both cable and satellite technology changes, the dividing line between cable and satellite applications will move. It is the interaction between developments in relative cost and quality that defines the demand for the two types of system.

4.10. The technology used, and the companies involved, in the supply of satellite systems are different to those involved in the supply of submarine cable systems. Hence potential entry by satellite suppliers into the market for submarine cable systems is not likely to be a constraint on the action of cable suppliers.

4.11. It would therefore seem unlikely, at present, that competition from satellite suppliers could effectively constrain the price charged by suppliers of submarine cable systems. The evidence suggests

that prices of submarine cable systems have not moved in parallel with those of satellite systems, with prices of cable systems having fallen much more steeply than satellite systems over the last ten years. The price of satellite systems may, however, set a ceiling on the price that can be charged for submarine cable systems. It is always possible that future technological advances in satellite technology will improve the competitiveness of satellite systems relative to submarine cable systems, and this process might be hastened were there to be a significant rise in the price of cable systems. The pace of technological change in these areas is such that the market may be radically altered by unforeseen technological developments.

4.12. For the reasons given in paragraphs 4.9 to 4.11, we consider that submarine cable systems constitute a separate market from satellite systems. The remainder of this chapter deals only with submarine cable systems.

4.13. Most submarine cable systems are international in scope as they link points in two or more countries. The suppliers operate throughout the world and are invited to tender on an international basis by international purchasing consortia, which insist on applying common international standards. The supply of submarine cable systems is therefore considered initially on a global basis. Paragraphs 4.22 and 4.26 go on to look at the position within individual regions.

Elements of a submarine cable system contract

4.14. A submarine cable system would normally comprise the following elements (which are described in Chapter 2):

(a) short-haul systems:

- terminal equipment (multiplexing);
- optical fibre cable; and

(b) long-haul systems:

- terminal equipment (multiplexing line interface and power feed);
- optical fibre cable; and
- underwater repeaters (regenerators or optical amplifiers) and supervisory software.

Contracts for the supply of submarine cable systems usually provide for both manufacture and installation of the cable system. Installation is carried out by specially equipped vessels and installation typically accounts for about 10 to 15 per cent of the cost of long-haul systems and about 35 to 40 per cent of the cost of short-haul systems.

4.15. There is an important distinction between short-haul systems without submarine repeaters, and long-haul systems, which require submarine repeaters. Currently, the maximum distance between landfalls for a short-haul system is about 350 km. Above this distance, the light pulse that travels along the optical fibre becomes too distorted to be understood by the receiving equipment. Equipment costs for long-haul systems are more expensive per kilometre, although installation costs per kilometre and as a proportion of the total cost are lower than for short-haul systems. Due to the high cost of lifting cables off the sea-bed for repair purposes repeatered systems have to be extremely reliable. Extensive testing of the repeaters is required before installation and a large commitment to R&D is necessary for suppliers of repeaters. This makes repeatered systems expensive.

Suppliers of submarine cable systems

Long-haul systems

4.16. Submarine cable systems are supplied by AT&T and a number of Japanese firms as well as by Alcatel and STC. Table 4.1 shows which parts of submarine cables are supplied by each of the companies.

TABLE 4.1 **Systems design, manufacturing and installation capabilities of main suppliers of repeatered submarine cables**

	Suppliers					
	AT&T	*STC*	*Alcatel*	*Fujitsu**	*NEC**	*KDD**
System design	YES	YES	YES	YES	YES	YES
Manufacturing						
Terminal equipment:						
Multiplexing	YES	NO†	YES	YES	YES	NO
Line interface	YES	YES	YES	YES	YES	NO
Power feed	YES	YES	YES	YES	YES	NO
Optical fibre cable	NO‡	YES	YES	NO§	NO§	NO§
Repeaters	YES	YES	YES	YES	YES	NO¶
Supervisory software	YES	YES	YES	YES	YES	NO
Installation						
Submarine cable laying	YES	NO	NO	NO	NO	YES
Telecoms carrier	YES	NO	NO	NO	NO	YES

Source: MMC based on information supplied by the companies.

*To be read in conjunction with paragraph 4.19.

†STC purchases multiplexing equipment from elsewhere in NT and from other suppliers, although STC manufactured multiplexing equipment for regenerative systems.

‡Subcontracted to Simplex or other suppliers.

§Subcontracted to OCC or other suppliers.

¶Subcontracted to Mitsubishi, NEC and Fujitsu.

4.17. AT&T is the world's largest manufacturer of both land-based and submarine telecommunications equipment as well as the largest carrier of switched telecommunications traffic, handling a high proportion of long-distance calls within the USA and international calls from the USA. AT&T supplies all parts of the system except the cable itself, which AT&T buys from Simplex of the USA and recently also from Hitachi, the Japanese electronics company. AT&T has its own ships to lay the cable.

4.18. Both Alcatel and STC manufacture all the main parts of the submarine cable system but do not have an installation capability—they have to subcontract cable-laying to firms such as BT (Marine) and C&W (Marine). STC purchases multiplexing equipment and opto-electronic components from elsewhere including the NT group. The main component STC buys in from outside the NT group is optical fibre which is purchased from Corning in the USA or Optical Fibres (Deeside) Ltd, a joint venture between Corning and BICC. Alcatel purchases its optical fibre from within the Alcatel group and also from Sumitomo.

4.19. The structure of the Japanese industry is more complicated than that of other countries, each of which have only one supplier of repeatered submarine cable systems. There are currently three Japanese firms that supply such systems outside Japan. Nippon Denki Kabushiki Kaisha (NEC) and Fujitsu Ltd (Fujitsu) are diversified electronics companies and are established suppliers of submarine cable systems. Both NEC and Fujitsu usually purchase optical fibre cable from Ocean Cable Co Ltd (OCC[1]) but manufacture the other main parts of the system themselves. NEC and Fujitsu, like Alcatel and STC, do not have their own cable-laying vessels. The third firm is Kokushin Denshin Denwa Co Ltd (KDD) which is the largest Japanese overseas carrier. KDD has its own ships for laying the cable but does not manufacture any of the main parts of the system, which it purchases from OCC and other companies including Mitsubishi Cable Industries Ltd (Mitsubishi) (optical amplifiers), Toshiba Corporation (Toshiba) (terminal equipment), NEC and Fujitsu. Until recently, KDD acted as a supplier for some systems with a landfall in Japan (purchasing equipment rather than the whole system from Japanese manufacturers) but did not tender for other systems. The traditional pattern was that, in tendering for overseas contracts, Japanese suppliers formed consortia which were led by NEC or Fujitsu. KDD's traditional role included development of several types of optical cable

[1]OCC is owned by a consortium of Japanese cable manufacturers.

technology, which were licensed to Japanese manufacturers including NEC and Fujitsu. The position has now changed. KDD has established a subsidiary KDD/Submarine Cable Systems Inc (KDD-SCS) to supply submarine cable systems, and KDD now does respond to most requests for tenders outside Japan. In at least one case (Fibre-optic Link Around the Globe (FLAG)—see paragraph 4.37) KDD and another Japanese supplier (Fujitsu) are members of rival consortia. In addition to KDD, Fujitsu and NEC, Nippon Telegraph & Telephone Corp (NTT)—the Japanese domestic operator—supplies systems in Japan, purchasing equipment from OCC, NEC and Fujitsu, but operating its own cable-laying vessels.

4.20. Table 4.2 shows the share of orders obtained by each supplier of long-haul systems, based on STC's information about orders and partially estimated. Frequently, orders are shared between suppliers. No information is available on individual Japanese suppliers and a single figure is therefore shown for all Japanese suppliers. Although Pirelli (see paragraph 4.23) features in Table 4.2 as a minor supplier of long-haul systems, none of those from whom we received evidence saw it as a significant player in the long-haul market because it currently does not have its own repeater technology. Pirelli plans to offer its own repeater technology in 1996.

TABLE 4.2 **Orders for submarine cable systems: long-haul**

		% of value of orders by supplier*				
	Value of orders $m*	*STC*	*Alcatel*	*Japanese companies†*	*AT&T*	*Pirelli‡*
1986	873	51	0	0	43	6
1987	541	0	46	15	29	10
1988	990	37	7	23	30	2
1989	335	23	49	8	4	15
1990	1,310	8	26	29	35	2
1991	2,035	22	28	17	33	0
1992	2,944	20	11	25	41	2
1993	499	30	18	25	16	12
1986–1989	2,739	33	18	12	31	6
1990–1993	6,788	19	19	24	36	2

Source: MMC estimates based on information provided by STC.

*STC indicated that, where it was not among the successful suppliers, it was not aware of the value of orders or the share of each supplier. The figures are based on its best estimates.

†In a number of cases no information was available on the suppliers of Japanese domestic contracts. We have assumed that it was one of the Japanese companies.

‡In most cases, Pirelli had a share of the contracts but that share did not include supply of repeaters. In the other cases, Pirelli had the whole contract and it is assumed that repeater supply was subcontracted.

4.21. Table 4.2 is based on the value, in US$ million, of orders in each year. Because of the small number of very large orders, market shares fluctuate from year to year. In addition there is some uncertainty about the precise year in which some orders were made. It is therefore necessary to look at market shares over a run of years rather than one year in isolation. Table 4.2 shows that between 1990 and 1993 AT&T held the largest share of orders, but that Alcatel and STC, with about 20 per cent of orders each, have a combined share greater than that of AT&T. The merger would result in a high degree of concentration in the supply of long-haul submarine cable systems. During 1990 to 1993 Alcatel, STC and AT&T together accounted for 74 per cent of long-haul orders.

4.22. Table 4.3 shows an analysis of the value of long-haul orders by region (the definition of regions was provided by the companies). The Asia-Pacific region has consistently been the largest and the bulk of orders have been obtained by AT&T and the Japanese. The Atlantic region has been the second most important, with the largest share of orders going to STC and AT&T. The third largest region, by value of orders, has been South-East Asia, which shows the least concentration among suppliers. The other regions (the Mediterranean, the Caribbean and the North Sea) are smaller and show a very high proportion of orders going to one or two local suppliers, with the exception of the Japanese in the North Sea. The strengths of STC and Alcatel tend to be in different regions; hence the impact of the merger on concentration is somewhat less at regional than at global level. The

pattern is of a general but not universal tendency for local suppliers to do specially well in their local region.

TABLE 4.3 **Orders for submarine cable systems: analysis by area, long-haul orders**

	Value of orders $m*	*% of value of orders by supplier**				
		STC	*Alcatel*	*Japanese companies†*	*AT&T*	*Pirelli‡*
Asia Pacific						
1986–89	1,175	19	10	27	40	5
1990–93	2,940	3	11	41	45	0
Total 1986–93	4,115	7	11	37	44	1
Atlantic						
1986–89	994	58	18	0	23	0
1990–93	2,380	43	19	5	32	2
Total 1986–93	3,374	47	19	3	29	1
Caribbean						
1986–89	125	0	0	0	100	0
1990–93	203	0	27	0	73	0
Total 1986–93	328	0	16	0	84	0
Mediterranean						
1986–89	332	5	57	0	5	34
1990–93	244	0	49	0	5	45
Total 1986–93	576	3	54	0	5	39
North Sea						
1986–89	73	62	0	38	0	0
1990–93	88	66	0	34	0	0
Total 1986–93	161	64	0	36	0	0
South-East Asia						
1986–89	39	69	0	0	0	31
1990–93	933	16	38	28	18	0
Total 1986–93	972	18	36	27	17	1
All areas						
1986–89	2,739	33	18	12	31	6
1990–93	6,788	19	19	24	36	2
Total 1986–93	9,526	23	19	20	34	4

Source: MMC estimates based on information provided by STC.

*STC indicated that, where it was not among the successful suppliers, it was not aware of the value of orders or the share of each supplier. The figures are based on its best estimates.

†In a number of cases no information was available on the suppliers of Japanese domestic contracts. We have assumed that it was one of the Japanese companies.

‡In most cases, Pirelli had a share of the contracts but that share did not include supply of repeaters. In other cases, Pirelli had the whole contract and it is assumed that repeater supply was subcontracted.

Short-haul systems

4.23. In addition to the main repeatered system suppliers, the following have supplied short-haul systems:

— Pirelli is a major Italian manufacturer of wires and cables (as well as tyres) and has been supplying short-haul systems for some years.

— NKT of Denmark is a manufacturer of both cable and telecommunications equipment and has also been supplying short-haul systems for some time.

— Siemens, the large German electrical and electronics company, is a long-standing manufacturer of both cable and telecommunications equipment.

— GPT Submarine Communications (GPT) is a long-standing British producer of telecommunications cable; it is ultimately owned by The General Electric Company PLC (GEC) (44.7 per cent), Siemens (29.8 per cent) and The Delta Metal Co Ltd (25.5 per cent). In the supply of submarine cable systems it operates separately from and competes with Siemens.

— Nokia Cables (Nokia) is a Finnish manufacturer of both electronics, including telecommunications, equipment and cables.

— Simplex of the USA manufactures cable for AT&T and has recently started to supply short-haul systems.

4.24. Table 4.4 shows market shares in short-haul systems. Alcatel and STC have consistently held the largest shares of this market. Alcatel and STC have accounted for around 20 per cent each of short-haul orders in recent years. The next largest share of the market has been held by Pirelli (16 per cent) and AT&T (12 per cent). Following the merger, the 1990 to 1993 figures suggest that the combined Alcatel/STC would have almost three times the share of the next largest player (Pirelli), although this is similar to Alcatel's position during 1986 to 1989. Table 4.4 is based on estimates by STC and Alcatel of the successful bids for each individual contract. Since STC and Alcatel are aware of all contracts which they won but not necessarily of all the contracts won by the other suppliers, it is likely that the figures overstate the shares of STC and Alcatel to some small extent.

TABLE 4.4 **Orders for submarine cable systems: short-haul**

		% of value of orders by supplier*						
	Value of orders $m*	*STC*	*Alcatel*	*Japanese companies†*	*AT&T*	*Pirelli*	*NKT*	*Other‡*
1986	106	0	85	0	7	7	0	2
1987	24	4	16	14	0	8	20	37
1988	111	14	14	18	6	32	14	3
1989	90	10	45	20	0	0	25	0
1990	125	11	38	0	34	5	8	4
1991	373	29	19	13	7	17	5	10
1992	141	6	25	5	6	6	11	41
1993	140	30	12	0	13	34	7	4
1986–89	331	8	45	12	4	13	13	4
1990–93	779	22	22	7	12	16	7	14

Source: MMC estimates based on information supplied by Alcatel and STC. STC information has been used except for contracts on which Alcatel information showed that Alcatel was the successful bidder, where Alcatel information has been used.

*Alcatel and STC indicated that, where they were not among the successful suppliers, they were not aware of the value of orders or the share of each supplier. The figures are based on their best estimates.

†In a number of cases no information was available on the suppliers of Japanese domestic contracts. We have assumed that it was one of the Japanese companies.

‡Other suppliers comprises GPT, Nokia, Siemens and Simplex.

4.25. Table 4.5 shows an analysis of the value of short-haul orders by region. To date the largest area, by value, has been the North Sea (which includes all British Isles and Baltic systems as well as those actually in the North Sea). In recent years, the largest share of North Sea orders has been obtained by NKT, although the combined share of Alcatel and STC was larger. For UK domestic systems (and those to the Channel Islands and the Isle of Man but excluding those to North Sea oil rigs) STC had by far the largest share, followed by NKT and GPT. The Mediterranean region was dominated by Alcatel and Pirelli and the Asia-Pacific region by AT&T and the Japanese, the same pattern as for long-haul systems. The results for the other two regions are affected by a single large contract.

TABLE 4.5 **Orders for submarine cable systems: analysis by area short-haul orders**

	Value of orders $m*	*% of value of orders by supplier**						
		STC	*Alcatel*	*Japanese companies†*	*AT&T*	*Pirelli*	*NKT*	*Other‡*
Asia Pacific								
1986–89	60	0	20	68	12	0	0	0
1990–93	179	4	20	31	38	0	0	7
Total 1986–93	240	3	20	40	32	0	0	5
Atlantic and Caribbean								
1986–89	10	0	100	0	0	0	0	0
1990–93	48	0	44	0	35	0	0	21
Total 1986–93	58	0	53	0	29	0	0	17
Mediterranean								
1986–89	67	0	22	0	0	66	12	0
1990–93	222	0	26	0	4	54	0	16
Total 1986–93	290	0	25	0	3	57	3	12
North Sea								
1986–89	172	14	65	0	0	0	15	5
1990–93	188	30	13	0	0	3	29	26
Total 1986–93	361	22	38	0	0	1	22	16
Of which: UK domestic								
1986–89	18	72	0	0	0	0	0	28
1990–93	32	66	0	0	0	0	47	9
Total 1986–93	57	60	0	0	0	0	26	14
South-East Asia, Indian Ocean, Gulf area and other								
1986–89	21	0	0	0	34	0	43	24
1990–93	141	78	22	0	0	0	0	0
Total 1986–93	162	68	19	0	4	0	6	3
All areas								
1986–89	331	8	45	12	4	13	13	4
1990–93	779	22	22	7	12	16	7	14
Total 1986–93	1,110	18	29	9	10	15	9	11

Source: MMC estimates based on information supplied by Alcatel and STC. STC information has been used except for contracts on which Alcatel information showed that Alcatel was the successful bidder, where Alcatel information has been used.

*Alcatel and STC indicated that, where they were not among the successful suppliers, they were not aware of the value of orders or the share of each supplier. The figures are based on their best estimates. In addition there was one contract for which no information was available on the successful suppliers. This has been omitted from the table.

†In a number of cases no information was available on the suppliers of Japanese domestic contracts. We have assumed that it was one of the Japanese companies.

‡Other suppliers comprises GPI, Nokia, Siemens, Simplex and STK.

4.26. The short-haul market has, up to now, been much smaller than the long-haul market. Table 4.6 shows that the value of short-haul orders has been only about 10 per cent, or just over, of the value of long-haul orders over a run of years. The percentage has fluctuated considerably in individual years. Table 4.7 shows the share of orders for all systems (long-haul and short-haul) obtained by each of the main suppliers.

TABLE 4.6 **Orders for submarine cable systems: long-haul compared with short-haul**

	Value of orders $m			*% of value of orders*	
	Long-Haul	*Short-haul*	*Total*	*Long-haul*	*Short-haul*
1986	873	106	979	89	11
1987	541	24	565	96	4
1988	990	111	1,101	90	10
1989	335	90	425	79	21
1990	1,310	125	1,435	91	9
1991	2,035	373	2,408	85	15
1992	2,944	141	3,085	95	5
1993	499	140	639	78	22
1986–89	2,739	331	3,070	89	11
1989–93	6,788	779	7,567	90	10
Total 1986–93	9,526	1,110	10,637	90	10

Source: MMC estimates based on information provided by the companies (mainly STC).

Note: See notes to Tables 4.2 and 4.4.

TABLE 4.7 **Orders for submarine cable systems: long-haul and short-haul**

		% of value of orders by supplier				
	Value of orders $m	*STC*	*Alcatel*	*Japanese companies*	*AT&T*	*Others*
1986	979	45	9	0	39	6
1987	565	0	44	15	28	13
1988	1,101	35	8	23	28	7
1989	425	20	48	11	4	17
1990	1,435	9	27	26	35	4
1991	2,408	23	27	16	29	5
1992	3,085	20	11	25	40	5
1993	639	30	16	19	15	19
1986–90	3,070	30	21	12	28	9
1989–93	7,567	20	20	22	33	6

Source: MMC estimates based on information provided by the companies (mainly STC).

Note: See notes to Tables 4.2 and 4.4.

Appendix 4.1 provides information based on the number (rather than the value) of orders.

Purchasing of submarine cable systems

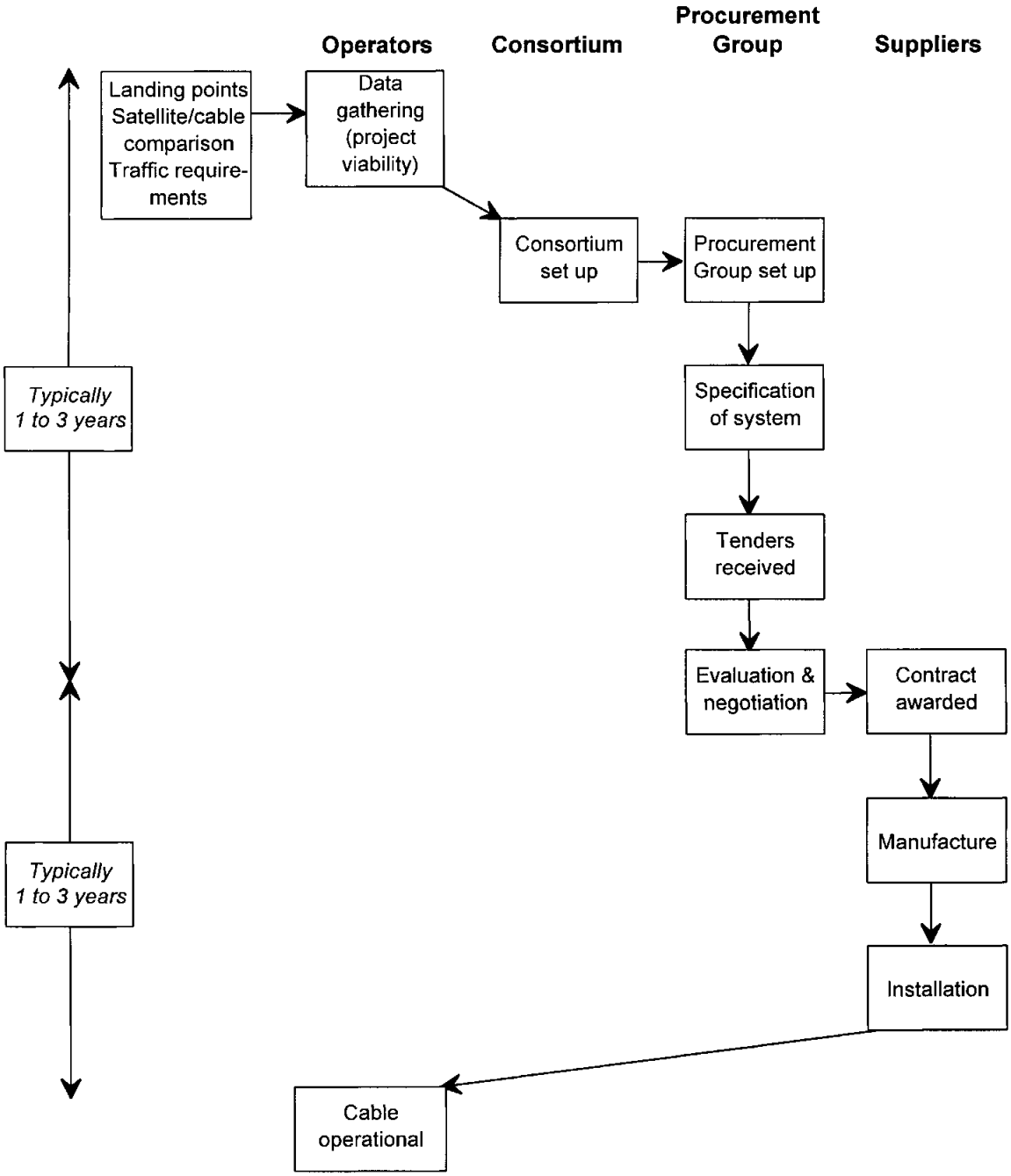
4.27. Submarine cable systems may be purchased by a single telecommunications carrier where the system lies within a single country. Most frequently, submarine cables link two or more countries. The cable system is then owned by a consortium of carriers, which may include not only carriers operating in the countries at either end of the cable but also carriers intending to use the cable for through traffic. The consortium may also include investment-only participants. For example, the FLAG system includes three such investors (see paragraph 4.37).

4.28. The consortium owns the cable system. Each member of the consortium has rights to use the system in proportion to its share in the consortium and it also has the obligation to pay the proportionate share of the capital and maintenance/repair costs of the system. It is usual for a procurement group, consisting of the largest members of the consortium, to do the detailed work of choosing the system and to manage its operation, once built.

4.29. Submarine cable systems are not bought off the shelf. The main stages involved in purchasing a system are shown in Figure 4.2. Typically, there will be a period of discussion involving operators and potential suppliers prior to the formal establishment of the operators' consortium. Once the operators' consortium has been formally established, the procurement group will either issue a general invitation to tender or invite one or more specific suppliers to bid. Following receipt of the bids, there is a further period of negotiation with the supplier or suppliers. The purchasers may invite one or more suppliers to form themselves into a consortium, for example where all the criteria set out at the bidding stage cannot be met by one supplier. Typically it can take up to three years or even longer from the initial proposals to the award of a contract.

FIGURE 4.2

Ordering of a submarine cable system



Source: MMC based on information provided by Alcatel/NT and C&W.

4.30. A distinction is sometimes made between 'common carrier' submarine cable systems, owned by consortia composed of the principal international carriers in each country, and 'independent' or 'private' systems. For example, there are four transatlantic optical fibre common carrier systems (with four further systems having been ordered) owned by consortia in which AT&T and one or more of BT, France Telecom, Deutsche Telekom, Telefonica de Espana (and many others) participate and one independent system (PTAT-1) which is owned by carriers such as Sprint International Inc (Sprint) (USA) and C&W (UK). In their joint submission, the parties told us that the independent systems tended to have fully open procurement whereas purchasing of the major transatlantic and transpacific systems has involved a larger element of negotiation. For example, the PTAT system was awarded in total to STC following a fully open tendering process in which bids were invited from AT&T, Alcatel and NEC as well as STC, whereas the other transatlantic systems,[1] where AT&T has usually been the lead purchaser, tended to involve a larger element of negotiation.

4.31. A number of those providing evidence referred to the leading or predominant role of AT&T as a purchaser of submarine cable systems. Table 4.8 shows that AT&T accounts for a larger share of international public voice telecommunications traffic than any other carrier—about 70 per cent more than Deutsche Telekom, the next largest carrier. Purchasing of long-haul submarine cable systems may be driven more by intercontinental traffic, where our estimates suggest that AT&T's leading position is even more marked (see Table 4.8). A further feature of the international telecommunications scene is that there are more outgoing calls from the USA than incoming calls. Under the conventions that regulate the sharing of revenue for international telecommunications traffic this implies that money flows from AT&T to most other international carriers who could be reluctant to jeopardize this in any way.

TABLE 4.8 **The traffic base of the top 20 international carriers**

		*1992 Outgoing MiTT in million**		*1992 % of world total*		*Cumulative annual growth in outgoing traffic 1988–92*	
Rank	*Carrier*	*Inter-national*	*Inter-continental‡*	*Inter-national†*	*Inter-continental‡*	*International*	*Country*
1	AT&T	6,984	4,312	16.4	23.9	7.9	USA
2	DBP Telekom	4,087	1,640	9.6	9.1	10.6	Germany
3	France Telecom	2,449	869	5.8	4.8	9.3	France
4	BT	2,188	962	5.1	5.3	5.8	UK
5	MCI	2,083	1,300	4.9	7.2	51.4	USA
6	Swiss PTT	1,551	305	3.6	1.7	8.9	Switzerland
7	Stentor§	1,520	-	3.6	-	7.6	Canada
8	Hong Kong Telecom	1,137	387	2.7	2.1	20.9	Hong Kong
9	Netherlands PTT	1,134	287	2.7	1.6	9.9	Netherlands
10	Iritel§	1,116	-	2.6	-	11.0	Italy
11	Sprint	940	448	2.2	2.5	48.3	USA
12	Belgacom	911	129	2.1	0.7	10.2	Belgium
13	KDD	900	459	2.1	2.5	11.2	Japan
14	Telefonica	804	240	1.9	1.3	19.5	Spain
15	Teleglobe	722	704	1.7	3.9	15.1	Canada
16	Austrian PTT	713	162	1.7	0.9	12.2	Austria
17	Telia AB	691	158	1.6	0.9	7.1	Sweden
18	Telmex	684	60	1.6	0.3	26.5	Mexico
19	Mercury	661	304	1.6	1.7	54.5	UK
20	Telstra	659	595	1.6	3.3	9.7	Australia

Source: TeleGeography 1993 (Washington, DC). Copyright ©TeleGeography, Inc 1993.

*MiTT is Minutes of Telecommunications Traffic. Data are for public voice circuits only rounded to the nearest million MiTT. For US carriers and Netherlands PTT, 1992 data are based on billing point of call not point of origin.

†Estimates by MMC, using TeleGeography's estimate that the 1992 global market for switched public telecommunications was about 42,500 MiTT.

‡Approximate estimates by MMC, using TeleGeography data.

§Do not carry intercontinental traffic, which is carried by Teleglobe (Canada) and Italcable.

Notes:

1. Data traffic and traffic on leased lines are excluded.

2. Inconsistent reporting of 'Country Direct' calls (which are billed in a different country from that in which they originated) may lead to some overstatement of figures for US carriers. This is because US figures are reported on the basis of calls paid for whereas figures for most other countries are reported on the basis of calls originated.

[1]Excluding the CANTAT 3 system which was led by Teleglobe Inc of Canada rather than AT&T and was awarded to STC.

Demand for submarine cable systems

4.32. Table 4.6 shows that orders for optical fibre submarine cable systems between 1986 and 1993 totalled over $10 billion. Almost half of these orders were made in 1991 and 1992. However, ordering is inevitably lumpy and orders for 1993 seem to be at a much lower level than in 1991 and 1992. Nevertheless, to date, the trend has been of an increasing volume and value of orders over time. Of the orders made to date, about half have been in Asia or the Pacific and the remainder in the Atlantic, the Caribbean, the North Sea and the Mediterranean. The proportion of orders in Asia or the Pacific has been increasing over time. The major links between Europe and North America (TAT systems) and Japan/Pacific Rim and North America have accounted for a substantial (53) percentage of the value of long-haul orders.[1]

4.33. Alcatel told us that it forecast total orders (long-haul and short-haul) of about $12 billion to $14 billion over the next five years. STC forecast a total market value for all submarine cable systems of up to $15 billion. STC's forecasts show a very high level of ordering in 1994 and 1995, followed by a drop in 1996 and 1997 and a modest recovery in 1998. Both Alcatel and STC therefore forecast the market to continue to increase in value over a five-year planning period (orders over the last five years totalled $7 billion to $8 billion). This view was broadly supported by others providing evidence, with the exception of BT. BT said that it was not expecting to be involved in purchasing any major submarine cable systems (short-haul or long-haul) over the next five to ten years due to a recent downturn in international traffic growth and the very high capacity of systems, such as TAT-12/13, currently on order. BT's non-participation would not rule out a new transatlantic system which might have a landfall elsewhere in Europe.

4.34. The bulk of new long-haul systems is expected to be outside the traditional Europe to North America and Japan to North America routes where new very high-capacity systems are already on order. Possible new systems include new links between Australia and Africa; Africa and South America; South America and Australia; along the Pacific coast of the Americas; and between various points along the coasts of Africa and Australia. Additional systems to increase capacity are likely between Europe and East Asia (via the Mediterranean and Red Sea) and linking the countries along the Pacific coast of Asia.

4.35. Most of those providing evidence expected short-haul (unrepeatered) systems to account for an increased proportion of the total market value in future. Both Alcatel and STC thought a dramatic increase in short-haul orders was likely in 1994 and 1995 due in particular to their predicting a large number of orders for 'festoon' systems that link points along a coastline. Over the next few years, short-haul orders are likely to account for 20 per cent or more of all orders by value, as compared with 10 per cent up to now. Reasons for the rapid growth of short-haul orders may include increases in the maximum length of an unrepeatered cable up to the present maximum of about 350 km. However, this is not the only relevant factor since short-haul systems are often an alternative to land or microwave links and thus the future value of short-haul orders is affected to a much greater extent by the possibilities of replacing land and microwave links as a way of meeting new capacity needs.

4.36. With very high rates of growth in many Asian economies and in their telecommunications infrastructure, the importance of Asia and the Pacific is expected to increase further in future. Alcatel thought that 60 to 65 per cent of the value of new orders would be in the Asian and Pacific areas. There is also a tendency for new systems, especially in the Asian and Pacific regions, to be increasingly complicated networks rather than simple point-to-point links. For example, the TPC5 (Trans Pacific Cable 5) system is a 25,000 km loop which will cross the Pacific twice and link two points on the west coast of the USA with Hawaii, Guam and two points in Japan. The Asia Pacific Cable Network (APCN) is expected to link Japan with Hong Kong, Indonesia, Korea, Malaysia, Philippines, Singapore, Taiwan and Thailand.

4.37. Future orders are also expected to be made increasingly by 'independent' purchasing consortia (see paragraph 4.30) as international telecommunications becomes increasingly competitive and

[1]This represents the share of the value of orders over 1986 to 1993 accounted for by the following cable systems: TAT-9 to 13, PTAT-1, CANTAT-3, Columbus 2, TPC 4 to 5, HAW 4 to 5, GP 2, NPC.

smaller international carriers seek to reduce their dependence on consortia which are dominated by the traditionally important international carriers such as AT&T, KDD and BT. An example of this type of independent consortium is the FLAG system. This is a proposed 28,000 km link between the UK and Japan, with landfalls currently expected to include Gibraltar, Italy, Egypt, Saudi Arabia, UAE, India, Thailand, Malaysia, Indonesia, Hong Kong and Korea. Investors in FLAG are led by NYNEX Corporation (NYNEX) (the holding company for local telephone operating companies in New York and New England) and include Marubeni Corporation (a Japanese general trading company), Gulf Associates Inc (a US trade and project development company) and the Dallah Al Baraka Group (a Saudi Arabian investment company). The investors in FLAG expect to sell capacity to carriers.

4.38. To summarize, some changes are expected in the market over the next few years. The Asian and Pacific areas, where AT&T and KDD are important purchasers, are of growing importance. The traditional market, which has been dominated by purchasing consortia of established carriers, may be giving way to more purchasing by carriers in newly industrialized, former Soviet bloc and by Third World countries and to some extent to purchasing by 'independent' carriers and non-telecommunications investors. There is also a tendency for systems to become more complicated networks rather than simple links between countries. An increase in the proportion of orders accounted for by short-haul systems is also likely.

4.39. However, this is a fast-moving market, characterized by rapid technological change. No one can accurately predict how the submarine cable systems market will evolve over the longer term. With the high capacity of existing cable technology and further increases in prospect, a continued flow of orders over the longer term will depend on continued rapid growth of telecommunications traffic and on submarine cable systems retaining their cost advantage over satellite systems. There are different views about the longer-term prospects for submarine cable systems. Alcatel was optimistic about future trends, pointing to the potential for rapid growth in telecommunications traffic outside the industrialized countries due to the low current level of penetration (with 60 per cent of installed lines in Europe and the USA) and to the potential for growth in new services, in particular picture transmission (which requires a lot of transmission capacity compared with voice or data transmission). On the other hand, Professor William Gosling, a former Technical Director of Plessey who advised the MMC on technical issues during this inquiry, did not think that the volume of telecommunications traffic would be as great as predicted by some in the industry. He thought that, although there would be new services, the impact on traffic would be reduced by technological developments that enabled information to be compressed and thus reduced the amount of transmission capacity needed to transmit a given piece of information, be it in voice, data or picture form. Given this and the likely continued fall in price, Professor Gosling did not see submarine cable systems as an industry likely to undergo a substantial increase in market value.

Links between companies

4.40. AT&T and KDD are both purchasers and suppliers of submarine telecommunications systems. In their role as participants in purchasing consortia choosing between suppliers, these companies are likely to be influenced by their ownership of one of the systems suppliers. In addition, the parties told us in their joint submission that, traditionally, major contracts such as those for the transatlantic and transpacific links had tended to be shared out between the suppliers in proportion to the share held by the relevant national carrier in the purchasing consortium. Thus Alcatel had tended to receive a share of the supply contract in relation to France Telecom's share in the purchasing consortium and similarly for STC and BT. France Telecom had been responsible for negotiations with Alcatel, and BT for negotiations with STC over the price and terms of the contract. The position on the most recent transatlantic orders (TAT-12/13) had been different in that the negotiations took place between all the operators and suppliers. Japanese suppliers have not been invited to bid for the main transatlantic systems (including TAT-12/13) and, similarly, STC and Alcatel have not been invited to bid for the main transpacific systems, which have been divided between AT&T and Japanese suppliers.

4.41. It is unclear whether this pattern of purchasing will continue in future as competition between telecommunications carriers intensifies. Currently, the relationship between suppliers and their national carriers falls into one of three categories. First, there are carriers who are themselves suppliers (AT&T and KDD). Second, there are carriers who continue to be influenced by their

traditional relationship with a particular supplier or suppliers. Third, there are carriers who either have no traditional link with particular suppliers or who have completely opened their tendering to competition. The two international carriers currently operating from the UK, BT and C&W, come into the third competitive category. Thus, STC no longer benefits from a traditional alliance with a national carrier.

4.42. The traditional links between purchasers and their local suppliers contribute to the tendency, shown in Tables 4.3 and 4.5, for local suppliers to have a higher share of orders in their local region than elsewhere.

4.43. AT&T and KDD, as suppliers of submarine cable systems, have signed a technical co-operation agreement covering the development of optical amplifier technology for the new transpacific link. AT&T and KDD are bidding together for the supply of the FLAG system (see paragraph 4.37) and Alcatel and NT expected them to bid together for the APCN (see paragraph 4.36) system. AT&T and KDD have, however, bid in competition with each other on a number of smaller projects.

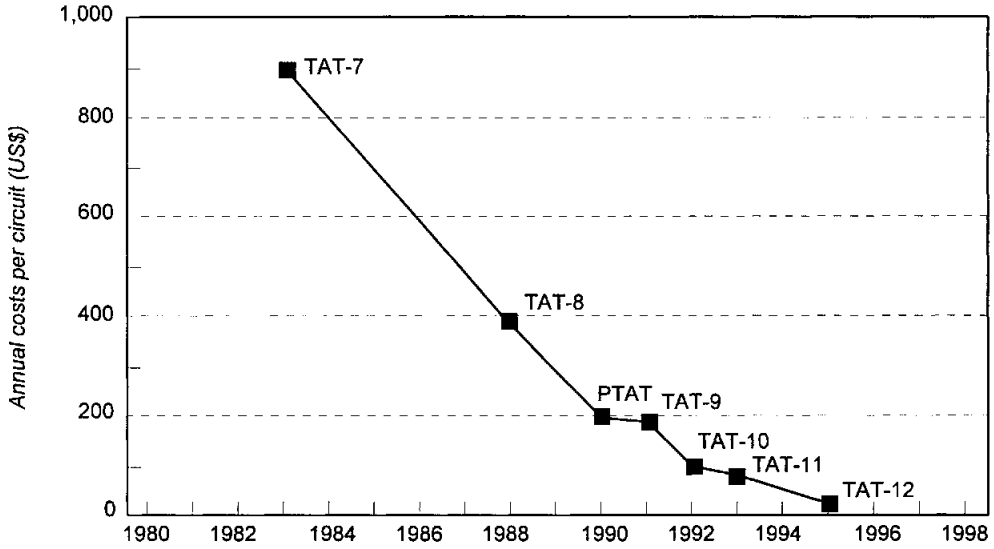
4.44. As a response to the link between AT&T and KDD, Alcatel and STC have already moved closer together. Alcatel, STC and Fujitsu are bidding together for the FLAG system. Alcatel and STC are also bidding together for a system in the Eastern Caribbean. They also intend bidding together on the APCN system. In 1992, before the merger was first proposed, Alcatel and STC discussed much wider co-operation on R&D; manufacturing co-ordination and joint marketing; and bidding within the framework of a European Economic Interest Grouping (EEIG). No agreement was reached on such collaboration primarily because the companies were unable to resolve the issue of who was to control the EEIG.

R&D in submarine cables systems

4.45. Technology has advanced rapidly in the supply of submarine cable systems (see Chapter 2.). The increase in capacity of optical fibre systems since they were first introduced has resulted in the prospective price per circuit for TAT-12/13 (due to be in commercial service in 1995/96) falling to about 6 per cent of its initial level (on TAT-8, in commercial service in 1988), as shown in Figure 4.3. This trend is expected to continue. In their joint submission the parties told us that the capacity of optically-amplified systems was expected to increase from the present 5 Gbit/s to 40 Gbit/s due to innovations which are currently at the research stage—WDM and Soliton technology (see paragraphs 2.28 and 2.29).

FIGURE 4.3

Transatlantic systems (1983 to 1995), annual cost per concentrated circuit (64 Kbit/s)



Source: Alcatel estimates.

4.46. As is to be expected in a high-technology industry, R&D spending is high, about [*] per cent of turnover for STC and Alcatel—and they believed that AT&T and KDD spent relatively more on R&D than they did. The figures for other companies are not available but NEC told us that the R&D expenditure on submarine cable systems was relatively higher than for other products. Carriers, such as BT, C&W and France Telecom, now carry out relatively little R&D into submarine cable systems, which is generally left to the suppliers (the exception is NTT, the Japanese domestic carrier).

4.47. Alcatel and STC suggested that AT&T and KDD (and NTT) spent far more than they did themselves on far-from-the-market R&D. In particular, on Soliton technology AT&T, KDD and NTT had each spent ten times as much to date as Alcatel or STC. Alcatel and STC did not consider that they needed to spend as much as AT&T and KDD to stay competitive. Traditionally, Alcatel and STC had always been much leaner than AT&T and the Japanese on R&D and nevertheless they had been able to stay competitive. However, in the past AT&T and KDD had been more concerned with their role as carriers than as suppliers. Alcatel and STC felt there was a risk attached to their relatively lower spending on R&D.

Competition in the supply of submarine cable systems

4.48. Competition in the supply of submarine cable systems may operate both at the product level and at the technology level. For any existing technology, there is competition between similar products offered by different suppliers. For example, all the suppliers of repeatered submarine systems now offer optically-amplified systems operating at 5 Gbit/s. Competition between similar technology products will be on the basis of price; quality of service and perceived product reliability; delivery dates; and, in some cases, the extent of help with project finance that can be offered by the supplier. Reliability of the cable system is a key factor since it is expensive and time-consuming to lift cables off the sea-bed and carriers may lose revenue if telecommunications traffic cannot get through while the cable is being repaired. The delivery date that a supplier can meet will depend on plant capacity and the weight of other orders.

4.49. The strength of competition on the supply of similar technology products has varied between contracts depending on the tendering method used. But, where only a limited number of suppliers (or even only one) are invited to tender, competition in the tender itself may be supplemented by competition at the initial (pre-tender) negotiating stage and, moreover, post-tender negotiations between purchaser(s) and supplier(s) could to some extent be a substitute for open tendering.

4.50. In practice, suppliers can only compete at the product level if they have access to the latest technology. Competition on technology is potentially very important, therefore. In practice, a distinction may be drawn between main and subsidiary advances in submarine cable technology.

4.51. The parties told us in their joint submission that the main technological advances had tended to be associated with new transatlantic cable systems. The move to optical amplification was associated with the latest transatlantic systems, TAT-12, and TAT-13, and also the transpacific system, TPC 5. All the main suppliers had obtained access to optical amplification technology at about the same time and had thus been able to participate in TAT-12, TAT-13 and/or TPC 5.

4.52. The main technological advances seem to have resulted from the competitive response of suppliers to pressure from operators for improved performance. AT&T appears to have played a special role as both the largest international operator and the largest supplier. The direction of research advances has tended to be disseminated freely through publications, conferences and informal discussions. Such dissemination of research information would help operators to know what advances were possible and to impose requirements for each new generation of technology on suppliers. Suppliers might benefit from a relatively generous price on the first TAT or TPC contract for each generation of technology, which might help to cover development costs (prices have tended to be considerably lower on subsequent contracts within each generation of technology).

4.53. Subsidiary technological advances have involved improving the capacity (bit-rate) of an existing generation of technology. For example, STC developed a 420 Mbits/s system (not offered by

*Figure omitted. See note on page iv.

all other suppliers) which enabled it to win the contracts for the PTAT 1 and NPC independent systems. At the time this was an improvement on the 280 Mbits/s technology used for TAT-8. STC was able to win these contracts because the higher capacity of its system enabled it to offer lower costs per circuit. However, STC's technological advantage was limited as its system was overtaken by the 560 Mbits/s technology for TAT-9 which was offered by all suppliers. Fujitsu then developed an 1,800 Mbits/s technology which enabled it to win the contract for the UK/Germany 5 system. Unlike the main technological advances, these subsidiary advances have enabled one supplier to gain a short-term competitive advantage over the others.

4.54. It is possible that the future pattern of technological advance will differ from that described above. With international telecommunications becoming increasingly competitive and potentially less profitable, AT&T and KDD are placing increased importance on their role as suppliers of submarine cables as well as on their role as operators and purchasers of submarine cables. Alcatel and STC suggested at the joint hearing that, because of this, AT&T and KDD were starting to reduce the extent to which they kept the market aware of developments at their research establishments.

4.55. A further possibility is that AT&T and KDD may seek agreement from other purchasers for a common technology to be used, which would have the effect of virtually eliminating competition at least within one generation of technology. Alcatel and STC told us that AT&T favoured this approach and had sought to persuade BT and France Telecom to agree a common 5 Gbit/s optical amplification technology for TAT-12 and TAT-13. Alcatel and STC were opposed to this approach (as eventually were BT and France Telecom) as they felt the common technology would inevitably have been AT&T's and hence agreement would have led to their becoming dependent on AT&T for their technology. Thus, had the AT&T proposal been accepted, they would not have been in a position to bid for FLAG or other major projects without AT&T's authorization.

Barriers to entry

Short haul

4.56. Submarine cable systems for the short-haul market comprise terminal equipment and optical fibre cable. A potential supplier of short-haul systems could purchase terminal equipment and optical fibre from existing manufacturers of these products. Such a supplier could also arrange for manufacture of its design of cable to be subcontracted to an existing manufacturer of electrical or telecommunications cable. In practice, entry is most likely to be by an existing cable manufacturer with spare capacity. The main cost facing a potential new supplier is in designing, developing and testing the underwater cable, the application of the terminal equipment to the underwater cable and the systems technology. The cost of this was estimated by one supplier at £3 million to £5 million. In their joint submission, the parties thought the cost would be rather higher—£12 million was their estimate. Testing of the cable underwater is essential as the cost of replacing failed underwater cable is high.

4.57. If an entrant into the supply of submarine cable needed to invest in new manufacturing equipment and facilities, the cost of entry would be substantially higher. In their joint submission, the parties estimated the cost at £16 million for the facilities and £13 million for the equipment for both the electronics and the cable. However, it may not be essential for a new supplier to invest in new manufacturing equipment and facilities as terminal equipment can be bought in from outside and cable manufacturing subcontracted to existing suppliers of these products.

4.58. Contracts for the supply of submarine cable systems usually provide for the supplier to carry out both manufacture and installation of the system. Special ships for laying the cable on the sea-bed are available for hire from the main operators such as BT (Marine) and C&W (Marine) in the UK and comparable operators overseas. The need to arrange for cable to be laid on the sea-bed does not therefore represent a material barrier to entry.

4.59. Entrants into the short-haul market over the last ten years (ie since the introduction of optical fibre cable) include Pirelli, NKT, Siemens, GPT, Nokia and Simplex. All of these were existing cable manufacturers. The number of entrants into the short-haul market suggests that entry has not been

too difficult. In particular, it has been possible for entrants to convince purchasers of the reliability of their underwater cable.

Long haul

4.60. Entry into the long-haul sector of the market is more difficult for a number of reasons. First, the potential supplier must have access to underwater repeaters, the associated terminal equipment and, most important, the associated technology which now means optical amplification technology. Second, long-haul (repeatered) cables carry a high-voltage electrical current to operate the repeaters, imposing additional requirements on the cable. Third, long-haul underwater systems now operate at higher capacity (5 Gbits/s) than land cables and short-haul (unrepeatered) underwater systems (see paragraphs 2.24). Because of the difficulty and expense of including extra optical fibres in the underwater repeaters (the practical maximum is currently four fibre pairs), it is more cost-effective to increase the fibre capacity whereas with land and short-haul underwater cables it is more attractive to increase the number of fibres. This means that suppliers of long-haul systems require access to more advanced technology in some respects than do other suppliers.

4.61. As a result of these factors, the R&D and proving costs for long-haul systems are much greater than for short-haul. The parties estimated a new entrant's development and proving costs at £47 million, compared with £12 million for short-haul systems. Existing suppliers also have to spend on R&D to stay competitive, so not all of this may be additional to what an established supplier would have to spend.

4.62. Apart from the R&D costs, a new entrant would have to convince purchasers of the reliability of the system, including the repeaters. The expected lifetime of a submarine cable system is 25 years and purchasers incur significant costs in lifting cable off the sea-bed if any part of the system fails. Unlike underwater cable, repeaters contain active components and, in the absence of extensive measures to ensure reliability, failure is thus more likely than is failure of short-haul unrepeatered systems. From a purchaser's point of view, the risks of contracting with a new entrant are high. Consequently they are likely to prefer to stay with existing suppliers who have many years of experience unless a new entrant can offer some major improvement over systems offered by existing suppliers.

4.63. Pirelli told us that it expected to enter long-haul systems supply with underwater optical amplifiers in 1996. However, the parties thought Pirelli was most likely to compete initially at the shorter end of the long-haul market, where Italian carriers may be significant purchasers. Pirelli would not then be a significant constraint on existing suppliers for longer-distance contracts, which continue to account for the bulk of the long-haul market. The parties also pointed out that NTT, whose own purchasing was limited, was carrying out research into very high capacity links, the implication being that NTT may have some longer-term interest in participating in the long-haul market.

4.64. The need to acquire a reputation for reliability in the supply of repeatered systems represents a significant barrier to the entry of new suppliers. No new supplier has entered the market in recent years. Although Pirelli may start supplying long-haul systems in 1996, it is unclear how far it will be able to compete with existing suppliers. The parties told us that entry could occur with the assistance of major purchasers and BT saw this as a potential constraint on existing suppliers (see paragraph 5.25). The bulk of orders, however, are expected to be in the Asia-Pacific region where the largest purchasers are AT&T and KDD, themselves major suppliers. This would appear to make purchaser-assisted entry less likely over the next few years in relation to major longer-distance systems. For all these reasons, market performance in the supply of longer-distance systems is likely to depend on competition between existing suppliers rather than new entry.

5 Views of other parties

5.1. Letters were sent to a number of telecommunications carriers and suppliers of submarine cable and of components, both in this country and abroad. A large proportion replied in very neutral terms, saying that they had no comments (see Appendix 5.1). The views of those who did comment, including some parties who attended hearings, are set out below.

Government departments and bodies

Department of Trade and Industry

5.2. Two divisions of the Department of Trade and Industry (DTI), Technology Programmes and Services and Telecommunication and Posts Division, gave evidence. We were told that the responsibilities of the DTI included encouraging R&D and promoting the use of technology to improve competitiveness and productivity in UK industry, as well as sponsorship of the telecommunications manufacturing industry. STC had in the past benefited from DTI grants designed to stimulate development of opto-electronics technology. The DTI had also supported STC's efforts to win major tenders abroad.

5.3. The DTI told us that STC owed its market position to excellent technology and aggression in the market-place. STC's presence had helped to drive prices down and to hasten the pace of technological innovation. The DTI considered that the proposed acquisition raised questions about the performance of UK service operators, the business of other UK manufacturers and STC's future as a major UK manufacturer and exporter. The acquisition might reduce competitive pressure with implications for prices, quality of service to the customer and a reduction in R&D. Developments in submarine cable systems had been a major stimulus to innovation in fibre optics and telecommunications in general. Fibre optics and opto-electronics were areas of technology where the UK was still among the world leaders. If the competitive pressure relaxed, the pace of innovation might slow because it would be in Alcatel's interest to rationalize spending on R&D.

5.4. The DTI said that cable was much more economic for use in medium- to high-capacity systems. Satellite, on the other hand, still had an important role in low-traffic routes, very distant destinations and for point to multi-point broadcasting. Although satellites did exercise some constraint on cable prices, they were effectively separate markets. Continuing technological developments made it unlikely that cable would lose market share to satellites.

5.5. The DTI was concerned that the acquisition would lead to further concentration of market power in an already imperfect and concentrated market with very high entry barriers. It would also reduce the number of world players to three and would leave AT&T and Alcatel together with almost 80 per cent of the world market and well over 90 per cent of the European, Mediterranean and Atlantic markets for repeatered systems. Commenting on the barriers to entry into the long-haul market, the DTI thought that for a new company to come into the market producing complete systems was very unlikely as an investment of some £100 million in R&D was probably necessary. New entrants were also faced with the problem that with no track record operators might consider them an unacceptable risk.

5.6. The DTI expected the acquisition to create some opportunities for economies of scale. UK telecommunications operators should benefit from this so long as the merged company faced sufficient

competitive pressure or countervailing purchasing power. There might be an adverse effect on the unrepeatered market through predatory behaviour funded by cross-subsidy.

Office of Telecommunications

5.7. The Office of Telecommunications (OFTEL) said that the Director General of Telecommunications had a duty under the Telecommunications Act 1984 to consider a wide range of matters in exercising his functions under the Act. He had placed particular emphasis on the promotion of the interests of consumers of telecommunications services, as well as the promotion of effective competition in the provision of those services. It was therefore in this context that the likely impact of the proposed acquisition of STC by Alcatel had been assessed.

5.8. In both fixed-link and mobile networks the prospects of competition within the UK were increasing rapidly with the development of cable television companies offering local telephony, the entry of other utilities, particularly electricity companies, into the telephone market and new entrants in the mobile network. However, there was less immediate scope for competition in international services, where costs might be expected to be affected by the merger. BT and Mercury remained, for the time being, the only operators licensed in the UK to provide international facilities. Other operators had been licensed to provide international resale services, but these would depend upon the use of BT's and Mercury's international infrastructure.

5.9. OFTEL told us that the significant question was whether BT (and therefore, indirectly, Mercury) would be constrained by the present price controls on BT from passing on to consumers any input price increases resulting from any exercise of dominance following the proposed merger of Alcatel and STC. The current form of price cap on BT contained incentives for BT to resist such cost rises in order to sustain its desired level of profitability. If higher input prices were likely, BT (and indeed Mercury) would have been expected to point to the dangers of allowing the merger to go ahead. OFTEL understood that neither was objecting to it. The current price controls on BT would expire in 1997, but any adverse effects of the proposed merger on input costs could be taken into account by OFTEL in the review of the price controls at that time.

5.10. In short, OFTEL believed that present price constraints on BT were sufficient to protect consumers against BT (and Mercury) passing on any input price increases resulting from any exercise of dominance on the part of the merged business.

EC Commission

5.11. The EC Commission said (in answer to specific questions) that the world market for submarine systems over the next ten years was generally estimated at slightly over $10 billion, of which two-thirds would be in the Pacific area, and less than 20 per cent would have a landfall in the European Union.

5.12. It was known that KDD had recently decided to enter the submarine systems supply business and to this end had set up a new company (see paragraph 4.19) and promoted the entry of two new equipment suppliers in that business—Toshiba and Mitsubishi. It had also entered into a technical co-operation agreement with AT&T for the definition and development of the next generation of submarine systems. One reason for this was that NEC and Fujitsu, the already well-established Japanese submarine systems suppliers, had very strong traditional links with NTT. Formerly only a national carrier, NTT was now entitled by the new Japanese regulation to become also an international carrier and had thus become a competitor to KDD.

5.13. Submarine technology was very sophisticated and difficult for those companies which did not have strong land-based optical cables (such as Toshiba and Mitsubishi), hence the need to find an experienced partner, and AT&T was both experienced and ideally located on the other side of the Pacific Ocean. If not challenged the AT&T/KDD partnership was likely to impose *de facto* standards in the Pacific and subsequently world-wide.

5.14. The proposed merger between Alcatel and STC would create a credible European response to AT&T/KDD and would save other international operators such as BT and C&W from being totally dependent on their competitors for the procurement of equipment.

5.15. The EC Commission said that, generally speaking, satellite-based networks would remain key competitors to submarine cable networks.

Telecommunications carriers

British Telecommunications plc

5.16. BT could not foresee any changes in technology in the immediate future that would increase competition between satellite and cable systems. Due to economic factors core international transmission between developed countries with heavy demand was now primarily by submarine optical fibre cable. Although perhaps three-quarters of BT's routes still used satellite, three-quarters by volume of traffic was on cable. For example, cable transmission was suited to traffic with France because of its proximity and to North America because of its very large volume of traffic. On the other hand, Chile did not fulfil either of these criteria and satellite was the preferred method of telecommunications between it and the UK. Asked about the scheme for low earth-orbit satellites, BT said that it was designed for mobile communications and was for a different market.

5.17. BT considered the largest suppliers to be AT&T, Fujitsu, NEC, STC and Alcatel. There were also several smaller companies which competed with the five larger suppliers to provide shorter unrepeatered systems which did not require such a high level of technology.

5.18. BT was committed to a procurement process which had no country of origin preference. For the procurement of submarine cables in which BT had a purchasing role, calls for tender were made by publishing a tender notice in the Official Journal of the EC. BT's policy did not discriminate on the basis of country of origin but sought the most economically advantageous bid from sources worldwide. Reliability was a critical factor in the submarine market—suppliers who could not offer a top-quality, world-class product would quickly fall by the wayside. It was a very small market-place.

5.19. Asked to estimate what proportion of purchasing arrangements around the world were open and what were closed or restricted, BT could not give a direct answer. It said that part of the difficulty of making comparisons was that frequently one was not comparing like with like. There were long-haul systems with many participants involved, and long-haul systems where the dominant operators were the principal participants. It was a very mixed market. But there was a growing recognition that competition brought better results from the purchaser's point of view.

5.20. The typical lead-time for a submarine cable project was two years. Decisions on whether new capacity was needed were discussed on a bilateral basis between companies. If more capacity was thought to be needed two or more of the parties would call a meeting with others who might be potential investors, to consider a proposition to construct a cable.

5.21. However, BT did not foresee having any major procurement where it would be an active purchaser in submarine cables in the next few years. Based on traffic demand forecasts BT did not see the global market, certainly in Northern Europe, expanding. But there would be expansion of short-haul unrepeatered systems, for instance in coastal festoons.

5.22. Asked about the recent press reports on planned co-operation between Deutsche Bundespost Telekom and France Telecom, BT said that it looked like a response to developments in telecommunications markets designed to cater for the emerging global business customer market. BT had announced an agreement with MCI targeting a similar market. AT&T was seeking partners to develop its Worldsource and World Partners services.

5.23. Asked about barriers to entry into the long-haul submarine cables market, BT said that there were two expensive and technologically difficult products—the cable and the repeaters. In terms of cable Pirelli and one or two others had suitable products. However, as far as BT knew Pirelli was the only company actively developing a repeater product.

5.24. BT had evaluated the likely impact of a reduction in competition caused by the acquisition. For short-haul systems BT had no concerns; there was an abundance of players there. In the long-haul market it was BT's view that the market was oversupplied and it expected at least one of the main suppliers to be driven out of the market.. There was not sufficient scope in future contracts to support the existing supply base. STC was vulnerable because it did not have the long-term unreserved backing of its parent company.

5.25. BT did not expect the proposed merger of STC and Alcatel to have an adverse effect on the supply base of products suitable for BT's core network. It felt that the merger might even result in stronger competition with AT&T on long-haul oceanic routes. On the medium-haul routes to Iberia, mainland Europe and in the North Sea, BT encouraged competition between the suppliers in Europe, the USA and Japan and the merger was not expected to prevent competitive products from being offered. On the short-haul routes using unrepeatered systems, there was an established supply base for submarine products from several European and Japanese manufacturers, some of which had already supplied BT in addition to STC and Alcatel. If the present long-haul suppliers became too demanding one of the short-haul suppliers could be encouraged to enter the long-haul market.

5.26. BT considered the main players in the repeatered market to be roughly on a par technologically. Clearly the acquisition was of benefit if STC might otherwise disappear completely, but since this did not seem likely BT's commercial and technical response to the take-over was neutral. BT could not think of any great advantages or disadvantages. Both Alcatel and STC together should be well able to compete with AT&T and the Japanese companies, by providing economies of scale and a firmer base for R&D. BT said that from its standpoint a merger of STC with AT&T or a Japanese company might present more problems than the proposed merger with Alcatel where the balance was reasonably neutral. Either of the former might leave Alcatel in a vulnerable position.

5.27. On price, BT thought that STC might help Alcatel to be even more competitive in the future. BT believed Alcatel would continue to employ and manufacture in the UK. In the short term (two or three years) both companies had, in any case, separate contractual commitments. There would still be three other companies in the world since NEC and Fujitsu had separate technologies.

BT (Marine) Ltd

5.28. BT (Marine) Ltd (BT (Marine)), a company with cable ships engaged in laying and maintaining submarine cable, told us of its concern that Alcatel might be more inclined to use France Telecom's cableship fleet for the installation of submarine cable. However, BT (Marine) had been assured by Alcatel that it would be treated on an equal basis to other submarine cable installers and given a fair and equal opportunity to tender for contracts. Provided Alcatel followed this practice, BT (Marine) did not believe it would suffer as a result of the acquisition.

Cable & Wireless plc

5.29. C&W told us that long-distance submarine cables (over 300 km) required undersea electronic devices (repeaters or optical amplifiers) which were complex and had stringent reliability specifications. Four organizations provided such systems: three companies—STC, Alcatel, and AT&T—and a Japanese consortium. The make-up of the Japanese consortium was complex and varied from contract to contract, but the Japanese companies had never been known to compete with each other in the open market. Of the four organizations, AT&T was dominant. This was because AT&T was the world's largest investor in international submarine cables and was thus able to influence the supply decisions.

5.30. AT&T had a close relationship with KDD, the major Japanese international telecommunications carrier. KDD in turn had a very strong influence over the Japanese manufacturers. The relationship between AT&T and KDD was that AT&T was KDD's largest international correspondent, and given that KDD was the dominant international operator in Japan, clearly KDD was very dependent on AT&T. Submarine cables were the main vehicle of that co-operation to date, but the relationship was now moving into international services with a joint venture company called World

Partners formed by AT&T, KDD and Singapore Telecom. This was designed to provide international services to multinational corporations.

5.31. C&W believed consolidation of the submarine cable system industry was inevitable and that STC in particular was unlikely to have a long-term independent future, partly because it was not benefiting from economies of scale and partly because it was without any national structure in which it could work. Because UK procurers now bought without national prejudice, it had to compete in the open market. Liberalization or deregulation of telecommunications operators, except in the UK, was proceeding very slowly. C&W said that STC was known to be the more vulnerable of the main manufacturers.

5.32. C&W said that there was a risk that a combined STC and Alcatel might co-operate rather than compete with AT&T, particularly in the repeatered system market, thus potentially leading towards an unregulated duopoly. On the other hand, the combined company could probably offer the best prospect of challenging AT&T's currently dominant position.

5.33. With improvements in unrepeatered cable system technology it was becoming economic to consider submarine fibre optic cables as an alternative to other media for short-distance national and international traffic. Growth was expected particularly in Asia, the Mediterranean and South America. The unrepeatered market was hard to enter and it was important to have reliable products. The major manufacturers, AT&T, Alcatel and STC, all had established market structures internationally for repeatered systems and thus had an advantage in the unrepeatered market. C&W believed that in a market that might double over the next five years, the proportion of the market not susceptible to national influence by the traditional players would increase from a quarter of the total to about half of a larger market. There was no evidence to suggest that satellites would challenge the increasingly dominant role of cable systems.

5.34. In answer to a question C&W said that the proportion of the cost of international calls accounted for by the capital cost of the submarine circuit varied but was not very high.

5.35. C&W believed on balance that the merger should go ahead but would welcome any incentives which would promote competition between STC/Alcatel and AT&T.

Deutsche Bundespost Telekom

5.36. Deutsche Bundespost Telekom (Deutsche Telekom) said that removing a competitor from the market would result in less competition and, possibly, less innovative ideas. It was difficult to imagine that Alcatel would continue to allow real competition to exist between the two former competitors.

5.37. The high costs of R&D in long-haul systems and the limited demand for the product meant that only a few companies would survive world-wide. Sharing existing patents, rights and expenses for R&D was an attractive method of reducing costs and would help the united company to survive.

France Telecom

5.38. France Telecom told us that the creation of a strong European submarine system supplier would strengthen competition against US and Japanese suppliers.

Telecom Denmark Ltd

5.39. Telecom Denmark Ltd (Telecom Denmark) said that the unrepeatered market was more competitive than that for repeatered systems because more firms were involved. Additionally customers of unrepeatered links were not necessarily dominated by those companies which traditionally had strong ties to their respective suppliers.

5.40. The major interests were represented both as carriers and as potential manufacturers. The high costs of entry would probably deter potential competitors from entering the market. Telecom Denmark did not think that the proposed acquisition would change the situation.

Telefonica de Espana

5.41. Telefonica de Espana said that it had maintained a commercial relationship with both parties involved in the merger for several years and was satisfied with the quality of work provided by the two companies on their installed systems.

KDD Submarine Cable Systems

5.42. In answer to questions KDD-SCS said that in general terms satellite did not provide a full substitute for cables as recently customers had tended to prefer submarine cables to satellite for services which would find the longer propagation delay of satellite unacceptable. Although the cost differentials of cable and satellite varied from case to case, if the volume of traffic was large, or the distance short, the costs per circuit would be less for cable than for satellite.

5.43. In the case of the huge capacity to be carried on TPC 5 and TAT-12/13 there was a built-in self-healing function in the same cable network to provide cable-to-cable restoration. It was likely that in the future submarine cable would be used for major traffic communication and satellite for broadcasting and mobile communications.

5.44. KDD-SCS thought new entry into the submarine repeatered market was difficult since the entry costs were very high, because of the necessary long-term technology development, even for firms with optical technology expertise. The world market was limited. Entry costs to WDM might require less than $10 million for those already manufacturing optical amplifiers.

5.45. KDD-SCS also told us that while the market was not completely closed successful bids by Japanese suppliers were few outside Asia and the Pacific. Customers seemed to prefer experienced suppliers familiar to them and some also considered local content important.

Telkom SA Ltd (South Africa)

5.46. Telkom SA Ltd told us that firms could only remain competitive for repeatered systems if they invested substantially in R&D and were able to demonstrate that they had previously supplied submarine cable systems capable of lasting 20 to 25 years. It was not only the high cost of entry to the market that deterred new companies. A new entrant would have to convince potential customers that it had mastered the technological problems associated with the design life of 25 years and it was unlikely that in the absence of a track record a purchaser would be prepared to take such a risk.

5.47. The market could not be subdivided into regions. For the more expensive repeatered systems, there were examples of world-wide competitive tenders, including successful bids by manufacturers outside their own region. Customers in the UK were likely to be members of large international consortia which would have extensive experience of submarine cable purchasing. As such, they were well placed to determine whether prices were reasonable or not.

5.48. It was possible that one company fewer in the market would have an adverse effect on competition. But a merger between STC and Alcatel would reduce R&D costs, enabling a merged European company to become more competitive in the world market. Such a merger could be preferable to one company disappearing from the market through the ongoing heavy expenditure necessary for R&D.

Others

A large UK supplier

5.49. A large UK supplier said that prior to the advent of repeatered optical fibre technology, the submarine cable systems field was controlled by a small number of dominant suppliers and the market was effectively closed to new entrants. Liberalization and deregulation had increased the range of market opportunities as more customers were able to free themselves from the constraints of a few powerful suppliers. New technologies and innovation reduced the costs of entry and encouraged new suppliers to enter the market with innovative and more efficient designs for particular applications. It felt that these new competitive pressures had contributed substantially to falling prices and improved performance over the last five to ten years.

5.50. It said that many of the coaxial systems which were installed in the 1970s would be coming to the end of their lives by the turn of the century. It saw much of the cable work available in the developed world being in providing replacement systems for them. Some would be replaced by unrepeatered links, others by amplified links. Even where perfectly good modern links existed using radio and satellite systems there were plans to overlay some of these systems using optical fibre links. It thus expected there to be plenty of business for which it might tender. It told us that Alcatel and STC together supplied in excess of 80 per cent of the major submarine cable systems in Western Europe, and a significant number in the rest of the world. However, neither company had taken the lead in developing and applying the new technologies and techniques for unrepeatered and amplified systems, a rapidly growing sector of the submarine cable market. Instead they had concentrated on maintaining their 'early generation' repeatered/amplified system technology, using advancing technology only when forced to do so by competition.

5.51. A merger between Alcatel and STC could only exacerbate this situation. The new group would clearly become the dominant supplier in Europe and parts of the rest of the world. Opportunities for cross-subsidy between different group businesses could result in unfair pricing strategies, making it impossible for smaller companies to compete. Submarine system technology in the UK was seen as one of the world's premier centres of excellence for R&D. The proposed acquisition could cause R&D to be concentrated in France and seriously weaken the prospects for optical technology research in the UK and for the smaller suppliers in general.

5.52. The supplier considered STC to be a highly successful and profitable company which could continue its business into the foreseeable future.

A European supplier

5.53. Another supplier said that the market for unrepeatered systems was highly competitive. High development costs would prohibit any new companies from entering the market for repeatered systems. There were more parties involved in the unrepeatered market. Also new cost-effective cable constructions and laying methods were being developed.

5.54. The supplier said that STC and Alcatel had been strong competitors, but that their strengths had been in different geographical market segments. The proposed acquisition would have an effect on competition because it would reduce the number of suppliers in the market from four to three, only one of which would be in Europe.

Pirelli Cavi SpA

5.55. In answer to questions Pirelli said that the change in repeater technology from electronic to optical opened a window for new entrants into repeatered systems. Nevertheless, the investment required was very large. Pirelli estimated that it would not cost less than $100 million and would not take less than three years to enter the market. There were also technological barriers, including the question of patents, to be overcome.

5.56. Pirelli said that it intended to enter the market for repeatered systems, probably in 1996. It had spent considerable sums on R&D into submarine cable systems in each of the last five years, and expected this expenditure to increase further in the next three years due to Pirelli's proposed entrance into the repeatered market.

NYNEX Corporation

5.57. NYNEX said that it was one of the seven companies established by the divestiture of AT&T in 1984. It covered the north-eastern part of the USA and was about 70 per cent the size of BT in terms of access lines. It was involved in a number of international ventures, including the project management of FLAG (see paragraph 4.37) which, when completed, would be the longest submarine fibre-optic cable in the world, connecting the UK and Japan via the Middle East. When FLAG was completed it would allow long-haul users to optimize and diversify the routeing of their global communications traffic. NYNEX told us that customers of FLAG would be able to avoid the larger up-front costs associated with the traditional method of cable development by groups of international telecommunications carriers who were responsible for the full cost and collectively owned and maintained the cable.

5.58. Several consortia from the main suppliers had made bids for the supply contracts for FLAG and one of them would be awarded the entire contract. Because of the size of the project NYNEX was not surprised that the main companies in the industry had merged their resources and their experience to make bids. NYNEX believed there was sufficient competition for the contract.

NEC Corporation

5.59. In answer to written questions NEC said that KDD was a new system supplier and it was possible, according to how the market developed, that NEC and KDD might at some time be in competition for submarine cable contracts. However, in most cases NEC would be an equipment supplier to KDD where KDD was the main contractor.

5.60. Although unable to identify separately the cost of R&D for submarine cable systems, NEC said that the percentage of R&D costs was relatively higher than that for other products, and with the rapidly changing technology expenditure on R&D in this area would increase rather than decrease.

PDM Neptec Ltd

5.61. PDM Neptec Ltd said that it was a manufacturing contractor to STC, and had no objections to the acquisition provided Alcatel's intention was to continue to manufacture STC's product range in the UK.

Tando Chemicals Ltd

5.62. Tando Chemicals Ltd (Tando) told us that it developed for STC an anti-corrosive coating product for use with armoured sections of submarine telecommunication cable. One outcome of the proposed merger could be the closure of STC's plant in the UK, utilizing only the facilities available at Calais, supplemented by facilities located at Portland, Oregon (currently STC), to supply cable to the Pacific Rim. If the UK plant were to close, Tando feared that it would lose in its entirety this particular business to a French-based company which supplied a product to Alcatel at Calais, which was dissimilar in source (petroleum), function and reported effectiveness but which would remain cheaper than Tando's material could be delivered to Calais.

5.63. On balance, therefore, Tando would be opposed to the acquisition. However, if submarine cable production ceased at Calais instead, Tando would expect to benefit by the additional throughput since it was unlikely that the low cost of the product could sustain the costs of delivery from France.

Four Seasons Roofing Group Ltd

5.64. Four Seasons Roofing Group Ltd said that it had enjoyed a good working relationship with STC for many years and would be more than pleased to carry on this relationship should a new company be formed.

Associated British Ports

5.65. Associated British Ports in Southampton said that it had no particular concerns about the proposed acquisition. It was expected that STC's lease agreement would be assigned to the new company on exactly the same terms and conditions as at present.

Telecommunications Users' Association

5.66. The Telecommunication Users' Association said that it understood there were only four major suppliers of oceanic cabling and that the purchase of STC's operation by Alcatel Cable SA would inevitably present a narrowing of market choice. However, it understood that NT, STC's parent company, had been seen to be downsizing its operation in this specific area and therefore new investment in the company by a third party could be seen to benefit the public interest.

Mr K Fitchew

5.67. Mr Fitchew was a former employee of BT's R&D laboratories and had 15 years' experience working on submarine cable systems. He said that as the market for submarine cables continued to be very healthy, there was no need for rationalization. There were dangers to competition, and also perhaps world-wide security implications, if the number of suppliers in the key area of international communications decreased. The capacity limitations of the various plants meant that not all the companies were necessarily competing simultaneously on a particular system.

5.68. Mr Fitchew felt that it was essential to maintain a diversity of approaches. It was invaluable to have different teams working on similar problems. He believed that allowing the acquisition would probably lead to the loss to this country of a high-quality, leading edge industry and the further erosion of our design and manufacturing capabilities. An example of the UK's technical innovation could be found in the advanced solutions on unrepeatered systems with remotely pumped amplifiers being offered by STC.

6 Views of the main parties

6.1. We received a joint submission from the main parties and written answers given to specific questions addressed to each party separately, supplemented by views expressed at both joint and separate hearings with Alcatel, NT and STC.

Alcatel's reasons for purchase

6.2. Alcatel said that submarine cable systems was a core part of its business and it took a long-term view of the opportunities and risks, which it regarded as essential in this particular area. Alcatel had identified two ongoing developments which presented various risks to, and opportunities for, the future success of the business:

(a) Telecommunications operators' demands for submarine systems were constantly increasing in terms of performance, reliability and costs per circuit. This required continuous R&D, but research into WDM and soliton technology suggested that if these could be developed to work in conjunction, then a 40 Gbit/s system might be feasible.

(b) The growth in demand for very large multi-point branching systems such as the APCN would require sophisticated integration techniques and complex network management software. This would favour the supply of the entire system using a single technology (possibly using other equipment manufacturers on a subcontract basis), instead of a number of independent integrated designs. Alcatel and STC would face increasing difficulties in bidding for such contracts as part of a consortium because it would be increasingly difficult and costly to integrate their different system designs to achieve compatibility.

6.3. Alcatel believed that in the absence of the merger, and the synergies in R&D that it would enable Alcatel to achieve, it would be less able to keep pace with AT&T and KDD given AT&T's extensive R&D facilities, and its recently forged technological alliance with KDD. This perceived weakness, Alcatel said, was accentuated by AT&T's predominant position as an international carrier, and the increasing importance of KDD in this role, particularly in the Asia-Pacific area. The competitive strength of KDD and AT&T in the Asia-Pacific region was partially reflected by the fact that from 1989 to 1993 the Japanese suppliers and AT&T collectively accounted for 86 per cent of orders. This might mean that as participating operators in a consortium, AT&T and KDD would be able to specify their own technological solutions to systems design. In these circumstances the parties said that there would be a material risk that the European suppliers would ultimately become dependent upon AT&T/KDD for their future technological requirements, and therefore that the next transatlantic link and the developing multi-point networks in the Pacific might be of US and Japanese design.

6.4. Alcatel said that in itself the merger would not inevitably maintain the parties' relative technological positions, but they would together be able to explore more diverse areas of research than would be the case for either company alone, in order to develop an effective and substantial independent offering of future generation systems to all operators. For example, in developing optical amplifiers, a choice had to be made between two main potential technical solutions: 'erbium doped' fibre as opposed to semi-conductor technology. Such decisions were often difficult to make and might foreclose future R&D opportunities and a potential significant lead in developing a new product ahead of competitors.

6.5. In response to the suggestion that the purchase price offered was on the high side relative to the net assets acquired and in relation to STC's historical earnings in 1992, Alcatel stated that the matter should be considered in the context of the following of factors.

6.6. First, the net tangible assets acquired by Alcatel Cable were low for three main reasons:

(a) the business was funded significantly by customer prepayments;

(b) there were significant provisions against stocks of spare parts and potential warranty claims; and

(c) capital employed was understated as it did not reflect the value of intangible investments in R&D as none of STC's R&D expenditures were capitalized as intangible assets.

As a result, the purchase price was not assessed by reference to STC's net tangible assets, but by reference to the incremental increase in earnings the acquisition would generate.

6.7. Secondly, Alcatel considered that STC's historical earnings were not an appropriate measure of the incremental increase in earnings that the acquisition would generate, for several reasons. The purchase price reflected STC's recent success in winning some major contracts prior to the merger (which would increase its sales and profits significantly over the next three years), the estimated growth in sales of the merged business as a whole, and the achievement of synergies in R&D (particularly in the longer term). Accordingly, STC's historical earnings in 1992 were less relevant, and the incremental price:earnings ratios for the merged company would be substantially lower on the basis of earnings in 1994 to 1997. Alcatel emphasized that the long-term nature of its contractual commitments placed STC in a very different position from the majority of manufacturing companies which operate on much shorter contract order lead times.

6.8. Thirdly, STC's price:earnings ratios were not high relative to those which applied in similar industries. The FTA Electronics Sector was currently trading at 21.7 times 12 months' earnings (*Financial Times*, 13 October 1993), and many quoted international telecommunications equipment manufacturers had higher price:earnings ratios than the multiple for STC. In addition, a 30 to 50 per cent premium was normally paid in excess of current price:earnings ratios for the acquisition of control.

NT's reasons for the sale

6.9. NT told us that its prime interest in the original acquisition of STC PLC in March 1991 was in the complementary nature of the two businesses in switching systems and transmission equipment, and in the geographical extension that STC offered to NT in these core activities. Whilst a sound business, the submarine systems part of STC did not fit within NT's core business strategy.

6.10. NT had considered disposal of the submarine systems part of STC soon after its acquisition. Reasons for this were given in the minutes of a meeting of the Board of Directors of NT, the parent company of NTEL, held on 20 July 1993. These minutes:

(a) stated that the STC submarine business was considered a non-core business and that, as such, authorization had been received from the Executive Committee in March 1991 (the time of NT's acquisition of STC PLC) to dispose of the business;

(b) referred to 'the financial risks associated with remaining in this slow growth market'; and

(c) stated that NT 'was in receipt of an opinion from Baring Brothers advising that the Alcatel offer constituted a fair price for the assets being sold'.

NT told us that the forecast growth of submarine cable systems was slow compared with the forecast growth of its core business. It said that it had discussed the possible sale of STC with prospective purchasers but only Alcatel had made a firm offer.

6.11. NT told us that if the merger did not proceed:

(a) NT would continue to own and manage the business. It would, however, continue to explore and review all available avenues for its divestment, given its position as a non-core business and the difficult technical and business challenges that NT considered STC might face in the balance of the decade.

(b) STC would increasingly have to compete with NT's core businesses for capital, research and management resources; STC might not be able to justify (in competition with NT's core businesses) the resources that its business would demand to secure its long-term future. A particular concern was the R&D costs required to maintain technological competitiveness by moving the technology to the next stage; and the cost of providing financial support for operators and investors who were looking for project financing from suppliers.

6.12. NT said that, while it was true that STC's profits were good relative to the net assets employed specifically in the business, NT had to consider the additional financial support that was required in terms of bidding for very major contracts. Many emerging operators were looking for project financing in terms of supplier support as were established operators in lesser-developed countries whose markets were now opening up. NT considered that STC needed to be part of an organization which regarded submarine cable systems as one of its core businesses and would therefore be prepared to devote the technical and business resources to it which were necessary to maintain and increase its position in a rapidly changing and developing market.

6.13. Looking at NT's total demands for capital, R&D requirements were growing in all areas, and available resources had to be rationed. In the three years 1991 to 1993 NT spent approximately £[*] million in the UK, of which £[*] million was in capital and about £[*] million in R&D. There was no intention that the funds from the sale would flow back to Canada. NT intended first to reduce indebtedness in the UK and secondly to support future growth of its other businesses in the UK.

STC

6.14. STC said that, for a business of its kind, membership of a large group was essential to enhance the market reputation and credibility of the business amongst its sophisticated customers who sought reassurance about STC's long-term commitment to its business as well as providing more tangible benefits in terms of financial backing. STC also said that its management team would not be confident that the business could operate at the levels shown in its business plan projections in the absence of the support of a large group in which the business was regarded as a core entity.

6.15. As noted in paragraph 6.10, NT did not regard STC as a core business. However, STC told us that, to be a credible contractor to major project customers, in arranging for the financial requirements of large projects, it needed the financial strength of an NT or an Alcatel to support it. STC said that every single deal which STC went into with independent operators or operators in less developed countries required clear financing proposals from the supplier for assisting the project. Sometimes the supplier would be asked to provide full project finance, which meant finding lenders willing to take the risk. In the case of the FLAG project, for example, financing of US$1.2 billion (£805 million at US$1.49 to the £) would be required for the total project, of which STC would need to arrange financing of all this amount with around US$100 million (£67 million) having to be financed against its own balance sheet. STC also said that customers expected products to be in place for 20 to 25 years and support to be provided over that period. It was therefore necessary for STC to be a core part of a group with a market capitalization sufficient to provide credibility compared with the size of project finance required. In reply to a question, STC said that in these circumstances a management buy-out was not feasible.

6.16. STC's senior management also told us that they were initially wary about the proposed merger but had been pleasantly surprised by Alcatel's positive attitude towards the maintenance of STC's independence as a business, subject to co-ordination of R&D and marketing activities. They were confident about the future of Greenwich as a centre of excellence for opto-electronics and submarine systems and of Southampton as one of the most ideal locations for cable supply. They believed Alcatel had a good track record for growing global businesses.

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*Figures omitted. See note on page iv.

Effect of the acquisition

6.17. Alcatel told us that following completion of the proposed transaction it intended to restructure its submarine cables business as shown in Figure 6.1. Alcatel Submarine Systems (ASS) would be the holding company for all of Alcatel's assets and interests relating to the submarine cable systems business. At the level of its Board management ASS would have representatives from Alcatel Cable, Alcatel CIT, Alcatel Submarcom, Alcatel TCC and STC Limited. The role of the Board of Management would be to set the strategic direction of the business as a whole and to co-ordinate future marketing and business development activities. The day-to-day running of the operating companies would continue to be the responsibility of each operating company's existing management.

6.18. Like all Alcatel subsidiaries STC would be required to submit an annual budget for approval by the shareholders, together with a rolling five-year plan covering planned R&D, new product development and likely tendering/market opportunities. Any need to vary the budget would need shareholder approval.

6.19. Alcatel said that it planned to maintain and develop STC as a strong UK-based company, with its own identity, R&D capabilities, and UK production facilities. STC would remain a UK constituted company, with a UK national as its Managing Director, and the majority of its Board of Directors would be UK nationals. In this connection, Alcatel's record, not only with regard to the Anglo-French joint venture, GEC Alsthom NV, but also with respect to its acquisitions of Telettra Spa (Telettra) in Italy, The Network Transmission Systems Division of Rockwell International Corporation in the USA and AEG Kabel AG in Germany, demonstrated effective implementation of the policy that it intended to apply to STC. In the case of each of these acquisitions, Alcatel pooled R&D and the parties' focus and effort (thereby eliminating duplication and furthering specialization), developed exports and improved productivity, and built upon the existing R&D and industrial presence of the acquired company, for example:

- when Alcatel was formed in 1987, there were within the companies being merged two separate network switching systems, both of which had since been maintained and developed while moving towards convergence at the time of introduction of the next generation of switching systems; and

- following the acquisition of Telettra from Fiat in 1990, Alcatel built on Telettra's existing strengths by designating it a 'lead house' for the development of line transmission products. The world-wide headquarters for line transmission products with overall responsibility for the business was now located in Milan.

6.20. In managing these acquisitions, Alcatel had established a policy of designating 'centres of excellence' in different countries, with each designated centre taking a 'lead house' role in relation to specific products or systems.

6.21. Alcatel expected employment to remain relatively constant as no closure (or scaling down) of production or R&D facilities was planned either in the immediate future or in the long term.

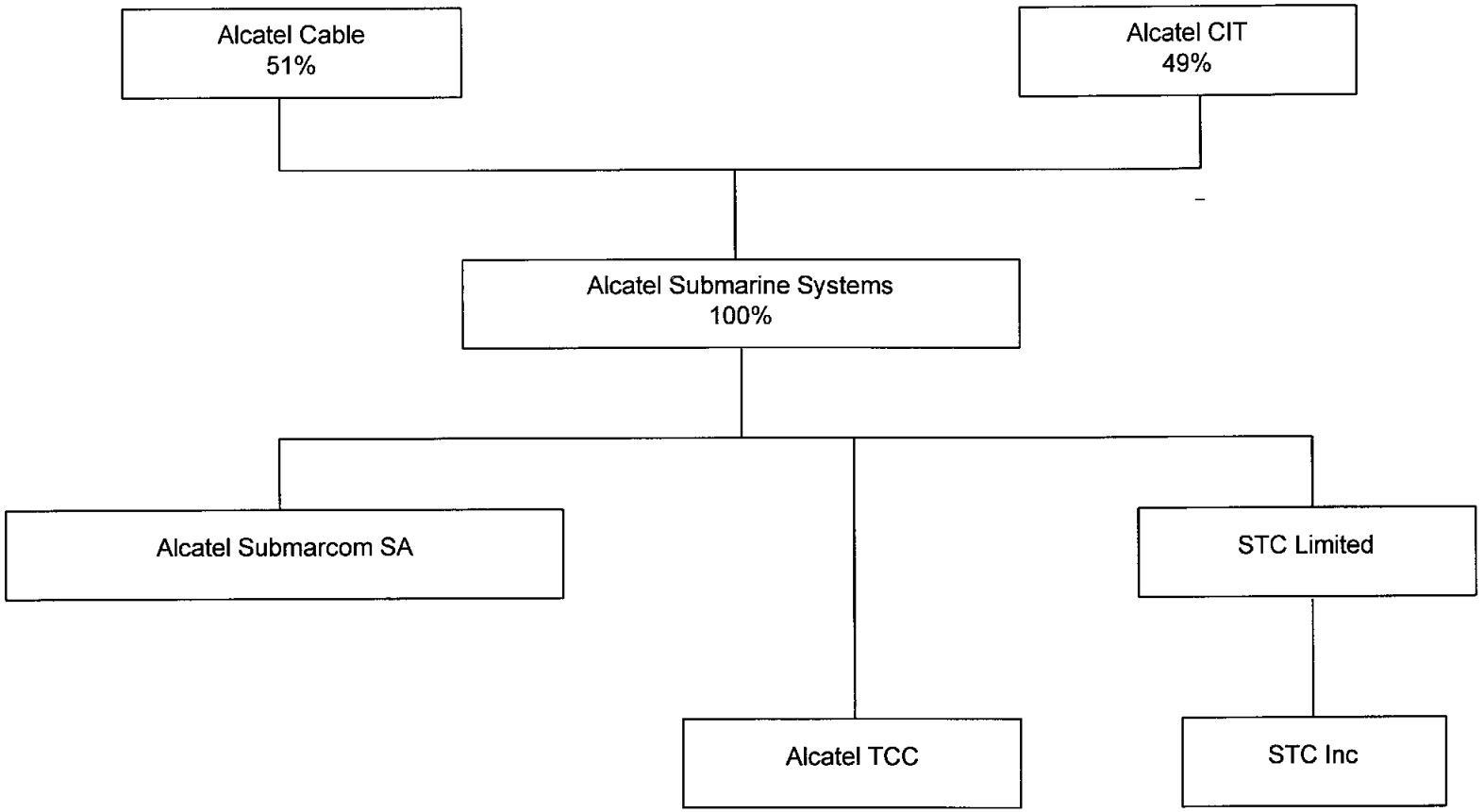
6.22. Given the different ways in which Alcatel and STC had developed their existing generations of optically amplified systems, and given the expected increase in market demand in the foreseeable future, each would continue with its own development and manufacture of its systems. Alcatel said that where orders had been placed for STC systems, Alcatel/STC would be contractually committed to manufacture, deliver, install and maintain systems meeting STC's contract specifications, for at least three years. Thus there could be no immediate scope for rationalization of the parties' existing facilities.

6.23. In the longer run, Alcatel considered it an essential part of its commercial strategy to maintain, and ideally enhance, STC's UK production and R&D facilities for a number of reasons:

(a) The efficiency of R&D expenditure depended upon the skills, abilities and drive of research personnel, and the value of the R&D activities acquired by Alcatel could not be overstated. Accordingly, Alcatel would not wish to move STC's R&D facilities as this would lead to the loss of key staff and of valuable research links with UK universities, which could in turn jeopardize the value of the business acquired.

FIGURE 6.1

Proposed structure of ownership and control after completion of the acquisition



Source: Alcatel.

(b) STC's Southampton plant was in an ideal location with an excellent deep harbour for access by cable-laying ships.

(c) The UK was well served by BT Marine's and C&W Marine's cable-laying ships.

(d) For marketing reasons there were clear advantages in maintaining a strong UK presence, given that there were two major innovative international operators in the UK (BT and C&W).

6.24. Alcatel submitted to us a projected business plan for the combined submarine systems businesses of Alcatel and STC (see Appendix 6.1). Sales and operating profits for the combined business are summarized in Table 6.1.

TABLE 6.1 **Alcatel Submarcom/STC: projected business plan sales and profits, 1994 to 1998**

*£ million**

	Years ended 31 December				
	1994	*1995*	*1996*	*1997*	*1998*
Sales	[				
Operating profit (profit before interest and tax)†	*Figures omitted. See note on page iv.*				]
					per cent
Operating profit as a percentage of sales	[	*Figures omitted. See note on page iv.*			]

Source: Alcatel Cable.

*Converted from French francs at FF8.7 to £1.
†R&D expenditure charged in arriving at operating profit in the business plan is:

	1994	*1995*	*1996*	*1997*	*1998*
R&D expenditure (£m)	[				
As a percentage of sales (%)	*Figures omitted. See note on page iv.*				]
[	*Details omitted. See note on page iv.*				]

6.25. Alcatel told us that its projected business plan is based on the consolidated profit and loss accounts of STC and Alcatel. Table 6.2 shows Alcatel's forecast of the respective contributions to operating profit of STC and of Alcatel.

TABLE 6.2 **Alcatel Submarcon/STC: split of business plan operating profit between Alcatel and STC**

£ million

	1994	*1995*	*1996*	*1997*	*1998*
STC	[				
Alcatel	*Figures omitted. See note on page iv.*				
Total operating profit as in Table 6.1					]

Source: Alcatel.

6.26. Alcatel said that increases in sales were based on growth in sales of systems in volume terms at an average rate of [*] per cent per annum in line with market growth; and on falls in system prices of [*] per cent per annum. Table 6.1 shows profit before tax at between [*] and [*] per cent of sales over the plan period. This compares with STC's actual operating profits as a percentage of sales (see Table 3.5), which varied between [*] per cent in 1989 and [*] per cent in 1990 and which STC has forecast at [*] per cent for 1993; and with STC's projections, which were made prior to the agreement of the sale to Alcatel, shown in Table 3.6, of between [*] per cent in 1994 and [*] per cent in 1997 and 1998.

*Figure omitted. See note on page iv.

Effect of the transaction on competition

6.27. In their joint submission the main parties said that the supply of submarine cable systems took place within a single global market. All the major suppliers tendered internationally and purchasers were usually international consortia of telecommunications operators. Transport costs were less than 3 per cent of contract values and were typically under 1 per cent of contract values. Competition was driven by the strategies of powerful operator purchasers. Operators assessed the need for new capacity, the types of traffic that they expected to carry and the means by which rising demand might be satisfied. They had a choice of alternative technologies providing competing solutions, and such competition was likely to increase in the near future.

6.28. A significant proportion of future growth in demand for international telecommunications capacity would be in situations for which satellite was currently an effective alternative (eg on low-density routes or for multi-point links) or where the inland cost of laying a cable system would be high and from terrestrial links (eg 'festoon' cable systems installed around a country's coast as an alternative to a domestic terrestrial network or in a bridge or through a tunnel) or microwave.

6.29. The parties said that it was important to note that a significant proportion of future orders would be placed by developing countries where traffic flows were low, and inland cable-laying might be costly because difficult terrain would have to be traversed (such as forests and mountains). In addition, much of the future growth in demand for international telecommunications capacity was projected to come from entertainment services (television and video), which at present could be provided more effectively by satellites. In order to develop the market, submarine cable suppliers would have to compete more directly with other transmission media on an increasing basis.

6.30. Whilst submarine systems suppliers' major investments in R&D had led to technological developments giving submarine cable systems an advantage over satellites over long-distance, high-traffic routes, the magnitude of this advantage should not be overstated for several reasons.

6.31. First, even on high-traffic routes, such as the transatlantic routes, Alcatel estimated that on a cost per circuit basis an INTELSAT VI-type system would be of a similar magnitude to the cost of a 5 Gbits/fibre cable system such as used in TAT-13.

6.32. Secondly, there were a number of developments which would enhance the competitiveness of satellite systems:

(a) The deregulation of the satellite industry and improvements in efficiency had substantially lowered the capital cost of satellites. Suppliers in Russia and China now offered to launch satellites at approximately one-half to one-third of the rates charged in the West. In addition, the lifespan of satellites had increased from a historic level of 7–10 years to 15 years and was anticipated to increase to 20 years. This effectively halved the cost of satellite circuits.

(b) At present a disadvantage of geostationary satellite systems which were some 36,000 km above the earth was that this caused a short delay in transmission. However, new echo-suppressing techniques had reduced this problem, and the use of low orbit satellites only some 500 km above the earth would substantially reduce the delay. These developments had enabled satellites to compare more favourably with cable systems.

6.33. In assessing the future prospects of satellite technology, it was important to bear in mind past experience. Technological developments 15 to 20 years ago led to satellite all but eclipsing cable, but new optical fibre technology had enabled cable systems to become highly competitive. This position could change in favour of satellites (and indeed satellite suppliers and operators were striving to achieve this), and this threat would provide strong incentives for cable system suppliers to continue to lower costs per circuit.

6.34. Single unrepeatered systems could now span distances of up to 350 km (and the distance was likely to continue to increase), and greater distances could be covered by festooning unrepeatered links along coastlines or by linking single unrepeatered systems via islands. Such systems could now be used for many intra-European links, and for links in the developing areas of the world (where

substantial growth in traffic was expected). The parties expected unrepeatered systems to account for about 20 per cent of orders up until 2000. Entry into unrepeatered systems could be accomplished at a relatively low cost, and there had been a number of successful new entrants such as Pirelli, NKT, Siemens, Nokia and GPT.

6.35. The parties also said that there had been new entry into the supply of repeatered systems. The entry of KDD, which had initially relied on NEC and Fujitsu for its equipment supply, appears to have caused Fujitsu (at least) to compete independently of KDD and other Japanese suppliers. Fujitsu's competitive position was enhanced by its links with NTT, the Japanese domestic telecommunications operator, which carried out substantial R&D into long-haul systems. KDD had brought Mitsubishi in as a new supplier of optical amplifiers and Toshiba now manufactured terminal equipment. Pirelli was expected to enter the long-haul market with underwater optical amplifiers in 1995/96. The parties believed that Pirelli was likely to be a significant competitor in a substantial part of the long-haul market, because of its existing reputation, its developing facilities and its experience gained in supplying short-haul systems. In addition, Simplex had announced its intention to expand beyond its cable manufacturing role to become a systems supplier. There were many other companies with strong relevant technical capabilities such as Siemens and NKT, which were viable potential entrants into long-haul systems.

6.36. Liberalization in the telecommunications market meant that certain systems suppliers could no longer rely on assured business from their relationships with operators. At the same time contracts were becoming fewer in number and larger in size. For this reason there existed strong incentives for suppliers of submarine cable systems to compete aggressively for contracts, to promote innovation and further reduce per circuit costs in order to make a contribution to their fixed production and development costs.

6.37. The strategy of two leading international operators, AT&T and KDD, would be critical to future developments in the telecommunications market and would have a major effect on the future supply of submarine cable systems. Both ATT and KDD were fully committed to the further development of their well-established, international carrier operations, as well as to the development of their submarine cable systems businesses.

6.38. AT&T was a vigorous and effective competitor for all systems put out to tender. Following its world-wide reorganization in 1990 to create a separate submarine systems business, it had demonstrated a clear intention to compete actively across the market, whereas historically it had tended to be involved only in those contracts in which AT&T was an operator of the system. Likewise, KDD had formed a separate submarine system supply business (KDD-SCS), which had become increasingly influential given its links to its operator parent. All indications in recent tendering procedures showed AT&T and KDD combining to address the large international network projects together. Given the emergence of the Pacific region as a focus for future investment and Japan's importance in that area and in world telecommunications, AT&T and KDD would prosper as they were guaranteed a secure base of profitable systems business by virtue of their operator/supplier relationship. This would enable them to continue to compete vigorously for other system contracts.

6.39. In addition to the secure base of business available to AT&T and KDD because of their operator links, AT&T's involvement as an operator in almost all the large international networks and KDD's significance as an international operator in the important Asia-Pacific region could enable them to dictate both the manner in which contracts were awarded and the technology utilized. At the time the TAT-12/13 orders were about to be placed, STC and Alcatel had faced pressure to manufacture to AT&T's design in relation to current optical amplifier technology which would have enabled AT&T to eliminate competition in system design. This would have left STC and Alcatel in a very vulnerable position as hardware suppliers dependent upon a competitor's technology.

6.40. In the parties' view, there was a substantial risk that, through the development of their technological alliance (supported by AT&T's leading R&D capability), AT&T and KDD would secure a major technological advantage in developing the next generations of systems, which would be able to address the large multi-point networks, involving sophisticated integration techniques and complex network software utilizing a single technology.

6.41. In the longer term, therefore, the merger would support Alcatel/STC's efforts to remain an effective competitor, independent of operators, in the development and supply of submarine cable systems. In itself, the merger would not inevitably maintain the parties' relative technological positions against AT&T and KDD. However, through long-term synergies in R&D, the parties would be able to explore more effectively and efficiently the diverse areas of technological research required in order to development a substantial independent offering of future generations of systems.

The public interest

6.42. The parties said that the public interest at issue was that of the UK public interest; the OFT accepted that it was not a world-wide competition authority. The merger had been cleared by the US Department of Justice after a full investigation without the need for a 'second stage request' under the US legislation, and the EC Commission had recognized that the merger's main impact was on sales outside the EC. In the context of the global markets for telecommunication services and for submarine cable systems, the parties submitted that it would be inconsistent for the UK authorities to reach the view that the merger was likely to operate against the UK public interest.

6.43. The parties had considered how the proposed acquisition could affect the UK public interest and had identified three levels of possible focus:

(a) that of the UK telephone user;

(b) that of the UK telecommunications operators; and

(c) the public interest in the efficient and profitable operation of UK-based R&D facilities and manufacturing operations, particularly in relation to exports which account for over 95 per cent of STC's sales.

The parties said that the proposed merger did not give rise to concerns at any of these levels.

UK telephone users

6.44. UK telephone users had an interest in the prices they paid to operators for their international calls. However, they were not directly affected by the merger. They might, however, be indirectly affected to the extent of the prices paid by UK operators (at present BT and Mercury) for international services. It was principally through the effect on UK operators that the interests of UK customers might be affected.

UK operators

6.45. The parties had been unable to identify any adverse effects of the merger upon the UK operators, BT and Mercury. The focus of demand for new systems was shifting away from Europe and the Atlantic to the Asia-Pacific region, which would account for two-thirds of anticipated orders between now and the end of the century. The parties had been informed by BT that it had no current plans to procure future repeatered submarine systems landing in the UK before the end of the century, and they were unaware of any plans by C&W in this area. There were thought to be plans to order up to three unrepeatered links which could be supplied by a wide class of suppliers. Within this time-scale, there was a single planned repeatered system, which would have a landfall in the UK (the FLAG system). This link was being purchased by an international consortium consisting principally of non-UK buyers, led by an American operator, NYNEX.

6.46. In view of the rapid developments in telecommunications technology generally and of submarine cable systems technology in particular, any assessment of market conditions beyond the end of this century must to some degree be uncertain. However, in considering the interests of UK operators investing in systems into the next century it was essential to bear in mind that:

(a) competitive pressures and customer requirements in the supply of submarine cable systems would ensure that technology would continue to progress, producing further sharp declines in cost per circuit;

(b) within Europe:

— a significant proportion of future links would be unrepeatered and there was a large and growing class of suppliers of this type of system;

— for the UK, with the opening of the Channel Tunnel, some future UK links with the Continent were to be satisfied by the use of terrestrial cable; and

— in the long term the merger would ensure that Alcatel/STC, as an independent systems supplier, would be able to supply the new generations of systems in competition with AT&T and KDD.

UK R&D and manufacturing activities

6.47. The principal commercial purpose of the merger was to create a European company able to compete in the long term with AT&T and KDD in R&D and manufacturing capabilities for future generations of submarine cable systems.

6.48. Alcatel intended to maintain STC's existing capabilities, with employment and investment levels being at least safeguarded and, if future expectations materialize, enhanced.

6.49. The parties concluded that the benefits of the merger would increase as Alcatel and STC developed the next generation of systems. The combined capacities of Alcatel and STC in R&D and in systems development would ensure that the new technologies could be developed and brought to the market more rapidly and more economically for the benefit of telecommunications operators, and ultimately telecommunications consumers, world-wide. The result would be a greater flow of business for the enhanced STC research, development and manufacturing facilities in the UK.

7 Conclusions

7.1. In this inquiry we are concerned with the proposed acquisition by Alcatel Cable SA (Alcatel Cable) of STC Limited (STC), a company incorporated in the UK (see Appendix 1.1 and paragraph 7.8). We are required by the first question in our terms of reference to investigate and report whether arrangements are in progress or in contemplation which, if carried into effect, would result in the creation of a merger situation qualifying for investigation, as defined in section 64(8) of the Fair Trading Act 1973 (the Act), in that enterprises carried on by or under the control of Alcatel Cable would cease to be distinct from enterprises carried on by or under the control of STC. For this purpose the reference refers to the test in section 64(1)*(b)* of the Act (the assets test) and provides that, if we find this test or the alternative test in section 64(1)*(a)* (the market share test) satisfied, we shall exclude the other from our consideration.

7.2. The offer made by Alcatel Cable and accepted by STC, subject to clearance by the regulatory authorities, valued STC at £600 million. The gross value of STC's world-wide assets as at the time of its last balance sheet at 31 December 1992 amounted to £183 million (see paragraph 3.28). We know of no change that would materially reduce that value.

7.3. We conclude that the assets test is satisfied and that, if the arrangements referred to in paragraph 7.1 are implemented, a merger situation qualifying for investigation will be created. As the merger has not been implemented, the second question in our terms of reference relating to the actual creation of a merger situation does not require an answer. We have therefore to consider the third question in the terms of reference, whether the creation of the merger situation may be expected to operate against the public interest.

The companies

7.4. Alcatel Cable is a subsidiary of Alcatel Alsthom SA (Alcatel). Alcatel is the holding company for a large multinational group of companies employing some 200,000 people world-wide. Two-thirds of this workforce is engaged in the design, production, sale and servicing of communications equipment in 30 countries. Alcatel told us that neither it nor any entity within it was owned or controlled by the French Government.

7.5. Alcatel's submarine cables systems business is undertaken by six subsidiaries, including Alcatel Cable, and co-ordinated by Alcatel Submarcom, an Economic Interest Grouping under French law. The business consists of the design, supply and installation of cable, repeaters (regenerators or optical amplifiers), terminal equipment and software communications systems operating from nine sites:

Clichy, France (23)	— headquarters, mechanical, metallic and electrical constructions, manufacture of wires and cables;
Calais, France (468)	— cable manufacture (submarine and terrestrial), technical services supervision of marine operations;
Bezons, France (125)	— optical fibre manufacture;
Marcoussis, France (33)	— research and development (R&D) into opto-electronic components, optical fibres, sub-assemblies and systems studies;

Liverpool, Australia (63)	— assembly of submarine repeaters, and repeater and systems engineering;
Port Botany, Australia (212)	— submarine cable manufacture and power feed;
Upper Hutt, New Zealand (17)	— terminal and power feed equipment assembly;
La Ville-du-Bois, France (100) Lannion, France (50) Orléans, France (170)	— R&D and manufacture of repeaters, terminal equipment, and related software as well as provision of installation, maintenance and after-sales services.

There were some 1,260 employees in the business in the last quarter of 1993: the number at each site is shown in brackets. Alcatel subcontracts marine installation services.

7.6. In 1987 Northern Telecom Limited (NT) bought a 27 per cent interest in STC PLC from ITT Corporation. It acquired the remaining shares in STC PLC in March 1991.

7.7. NT's headquarters are in Canada and it owns a group which operates 52 plants around the world engaged principally in the manufacture of central office switching equipment; business communications systems and terminals; transmission equipment; and cable and outside plant products, including conventional wire and optical fibre cable as well as submarine cables. Northern Telecom Europe Limited (NTEL) has the prime market responsibility for the NT group within Europe.

7.8. NT's submarine systems activities are carried on by STC and its subsidiaries in STC/ Submarine Systems Division. NTEL is the parent company of STC.

7.9. STC operates from five principal locations:

Greenwich, UK (539)	— headquarters, project management functions, manufacture of repeaters, optical amplifiers, terminal equipment, test of electronic components, R&D on repeaters, terminal and power feed equipment;
Southampton, UK (340)	— cable design, manufacture, systems assembly and testing;
Portland, Oregon, USA (214)	— cable manufacturing, systems assembly, and systems testing;
Perth, Australia (32)	— software development for supervisory systems;
Stevenage, UK (58)	— software development for supervisory systems.

STC had 1,183 employees on 1 January 1994: the number at each site is shown in brackets. Like Alcatel it subcontracts marine installation services.

7.10. BNR Europe (BNRE) is a wholly-owned subsidiary of NTEL, based in Harlow. Under the proposed transaction, BNRE will continue to supply research services to STC for another two or three years, but a team of about 14 BNRE employees who are engaged in R&D on cable design and repeater testing will be transferred to STC. The proposed transaction also contemplates that NTEL's Opto-Electronics Division at Paignton will continue to supply key opto-electronic components and related development services to STC. NTEL's Transmission Division at New Southgate will continue to supply to STC, at least in respect of current orders at the proposed date of divestment, multiplexing equipment to support STC's contractors' requirements. NTEL and STC have agreed to continue to develop interfaces between the software elements of the NTEL product and the STC supervisory software.

The proposed merger

7.11. Alcatel Cable has agreed to purchase, subject to regulatory approval, the entire issued share capital of STC from NTEL for £600 million. In addition the name and trade mark 'STC' will be

purchased from either NTEL or NT by a sister company of Alcatel Cable. It is contemplated that ancillary agreements will include the provision to STC by BNRE of R&D in support of existing contracts or outstanding bids submitted by STC up to March 1994 and for the advanced developments for STC's longer-term business. This continuing support is expected to go on for a period of two or three years (see paragraph 7.10).

7.12. NT told us that its prime interest in the acquisition of STC PLC had been the complementary nature of the two businesses in switching systems and transmission equipment, and in the geographical extension that STC PLC offered to NT in these core activities. STC did not fit within this core strategy and NT had contemplated disposing of it from the beginning. There had been a number of discussions with interested parties but only Alcatel Cable had made an offer. Alcatel had been identified as a prospective purchaser at an early stage because of its commitment to the submarine cables business. NT considered that STC needed to be part of an organization which regarded submarine cable systems as a core business and would therefore be prepared to devote to it the technical and business resources necessary to maintain its position in a rapidly changing market.

7.13. We asked NT about the price Alcatel had offered for STC. NT told us that the sum of £600 million did not reflect any significant premium. A PE ratio of [*] was not unusual for a primary telecommunications business. Alcatel confirmed that it regarded its submarine cable business as a core activity. It believed that the proposed merger offered significant benefits in a market where:

(a) Telecommunications operators' demands for submarine systems were constantly increasing in terms of performance, reliability and costs per circuit.

(b) The growth in demand for very large multi-point branching systems such as Asia Pacific Cable Network (APCN) would require sophisticated integration techniques and complex network management software. This would now favour the supply of entire systems using a single technology instead of a number of independent integrated designs.

(c) The recent alliance of American Telephone and Telegraph Company (AT&T) with Kokushin Denshin Denwa Co Ltd (KDD), both telecommunications operators, provided single technology long-haul systems. AT&T was in a predominant position as an international carrier, and KDD had increasing importance in this role, particularly in the Asia-Pacific area.

7.14. The advantages of the proposed merger lay in the complementary nature of Alcatel's and STC's traditional areas of operations, and available synergies in R&D, purchasing and marketing. Although the merger would not in itself inevitably maintain the parties' relative technological positions, they would together be able to explore more diverse areas of research in order to develop an effective and substantial independent offering of future generation systems to all telecommunications operators.

7.15. STC broadly shared Alcatel's views. It believed it needed the financial strength of a parent company such as NT or Alcatel to finance the next generation of long-haul submarine systems. Moreover, given the financial demands likely to be placed on a supplier of these systems, STC also considered that it needed to be part of a group which regarded it as a core business.

The market for telecommunication links

7.16. There is no significant overlap between submarine cables and land cables or microwave (see paragraph 4.4).

7.17. Over the years satellites have to varying degrees competed successfully with submarine cables. Satellites continue to have a clear advantage for point to multi-point communication such as broadcasting, but offer inferior quality for voice and especially data transmission (see paragraph 4.5). They are also more suitable than cable for mobile communications; even on routes where cable links exist they may be able to offer a premium service in this area of demand. A network of low earth-orbit satellites, which is currently being promoted, could be well suited to this role.

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*Figures omitted. See note on page iv.

7.18. More recently cable costs per unit of capacity have been falling rapidly and this trend is likely to continue as cable capacity increases. Cable now has a clear cost advantage over satellite for any route with substantial traffic. The viability threshold for cable continues to fall and many new cable links are expected to be completed over the next five years.

7.19. The bulk of the evidence we have received suggests that direct competition between satellites and submarine cable is currently limited. Although both Alcatel and STC took the view that the balance of advantage between cable and satellite might change, as it had in the past, it is doubtful whether competition from satellites is now effectively constraining the prices charged by suppliers of submarine cable systems. We therefore conclude that submarine cable and satellite systems are separate markets. The proposed merger directly affects only the submarine cable systems market.

The market for submarine cable systems

7.20. Submarine cable systems may be divided into long-haul (repeatered) and short-haul (unrepeatered). The suppliers generally operate on a global basis, particularly for repeatered systems. Supply should therefore also be considered on a global basis although indigenous suppliers may be favoured within a country or region.

Long-haul systems

7.21. Long-haul submarine cable systems require the installation of repeaters underwater at regular intervals in order to maintain the quality of transmission. This increases substantially the unit equipment cost of a system because of the high degree of reliability necessary for a planned life of 20 to 25 years without underwater maintenance.

7.22. There are few significant suppliers in the long-haul market sector. Apart from Alcatel and STC, there are only AT&T and three Japanese firms (KDD, NEC, and Fujitsu Ltd (Fujitsu)). Sector shares over the four years 1990 to 1993 are shown in Table 7.1.

TABLE 7.1 **Percentage market shares in the long-haul sector, 1990 to 1993**

	%
STC	19
Alcatel	19
Combined	38
AT&T	36
Japanese firms	24*
Pirelli	2†
	100

Value $6,788 million over the four years.

Source: MMC estimates based on information provided by STC.

*Individual shares not available.

†In most cases Pirelli had a share of the contracts but that share did not include the supply of repeaters. In the other cases, Pirelli had the whole contract and, it is assumed, subcontracted repeater manufacture.

7.23. AT&T is the world's largest manufacturer of telecommunications equipment as well as the largest carrier of switched telecommunications traffic. AT&T manufactures all main parts of the system except the cable. It has its own cable-laying ships. Alcatel and NT told us in their joint submission (Alcatel/NT) that following its world-wide reorganization in 1990 to create a separate submarine systems business, AT&T had evidenced a clear intention to compete actively across the market as a supplier of submarine cable systems.

7.24. AT&T and KDD, as suppliers of these systems, have signed a technical co-operation agreement and are developing optical amplifier technology together.

7.25. As we have already indicated, both Alcatel and STC manufacture all the main parts of the submarine cable system but subcontract cable-laying to firms such as BT (Marine) Ltd. STC purchases multiplex equipment and opto-electronic components from elsewhere in the group and optical fibre from Corning in the USA or Optical Fibres (Deeside) Ltd, a joint venture between Corning and BICC. Alcatel purchases optical fibre from within the Alcatel group.

7.26. NEC and Fujitsu usually purchase optical fibre cable but manufacture the other main parts of the system themselves. They do not have their own installation capacity. KDD, the largest Japanese overseas telecommunications carrier, recently increased its involvement in the supply of submarine cable systems. KDD has its own cable-laying ships but does not manufacture any of the main parts of the system.

7.27. Expenditure in the industry on R&D is high—about [*] per cent of turnover for STC and Alcatel, which believed that AT&T spent relatively more than that. The figures for other companies are not available, but NEC told us that the R&D expenditure on submarine cable systems was relatively higher than for other products.

Short-haul systems

7.28. The maximum length of an unrepeatered system has reached about 350 km but systems may be festooned around coasts, thus covering much longer distances without the use of underwater repeaters.

7.29. The suppliers of repeatered systems also supply over 60 per cent of the unrepeatered systems but there are five other suppliers (see Table 4.4). Sector shares over the four years 1990 to 1993 are set out in Table 7.2.

TABLE 7.2 **Percentage market shares in the short-haul sector, 1990 to 1993**

	%
STC	22
Alcatel	22
Combined	44
AT&T	12
Japanese firms	7
Pirelli	16
NKT	7
Others	14
	100

Value $779 million over the four years.

Source: MMC estimates based on information supplied by STC and Alcatel.

The short-haul sector is at present only about one-tenth of the size of the total market for submarine cable systems but its share is expected to increase to around one-fifth over the next few years (see paragraph 4.35).

Purchasing of submarine cable systems

7.30. Submarine cable systems may be purchased by a single telecommunications carrier where the system lies within a single country. More frequently, submarine cables link two or more countries. The cable system is then owned by a consortium of carriers, which may include not only carriers operating in the countries at either end of the cable but also carriers intending to use the cable for through traffic. The consortium may also include investment-only participants. The consortium owns the cable system and each member may use it in proportion to his share in the consortium. It is usual for a procurement group, consisting of the largest members of the consortium, to do the detailed work of choosing the system and to manage the operation of the system, once built. The procurement group

*Figure omitted. See note on page iv.

will either issue a general invitation to tender or invite one or more specific suppliers to bid. Following receipt of the bids, there is a further period of negotiation with the supplier or suppliers. The purchasers may invite one or more suppliers to form themselves into a consortium, for example where all the criteria set out at the bidding stage cannot be met by one supplier.

7.31. A number of those providing evidence referred to the leading or predominant role of AT&T as a purchaser of submarine cable systems. As shown in Table 4.8, AT&T accounts for a larger share of international telecommunications traffic than any other carrier—about 70 per cent more than Deutsche Telekom, the next largest carrier.

Demand for submarine cable systems

7.32. Table 4.6 shows that orders for optical fibre submarine cable systems between 1986 and 1993 totalled over $10 billion. About half of these orders were placed in 1991 and 1992. However, ordering is inevitably lumpy and orders for 1993 are at a much lower level than in 1991 and 1992. Nevertheless, the trend has been of an increasing volume and value of orders over time. About half these orders have been in Asia or the Pacific and the remainder in the Atlantic, Caribbean, North Sea and Mediterranean areas. The proportion of orders in Asia or the Pacific has been increasing over time (see paragraph 7.35).

7.33. Alcatel told us that it expected continuing growth in the market, with orders of $12 billion to $14 billion in aggregate over the next five years. STC's estimates suggest a total market value of up to $15 billion for all submarine systems over the same period.

7.34. As we noted in paragraph 7.29, short-haul (unrepeatered) systems are expected to account for a larger share of the market in future.

7.35. With very high rates of growth in many Asian economies and in their telecommunications infrastructure, the importance of Asia and the Pacific in the submarine cables market is expected to increase. Alcatel thought that 60 to 65 per cent of the value of new orders would be in those regions. There is also a tendency for new systems, especially in the Asian and Pacific regions, to be increasingly complicated networks rather than simple point to point links (see paragraph 4.36).

7.36. Future orders are also expected to be made increasingly by 'independent' purchasing consortia. An example of this type of independent consortium is the FLAG (Fibre-optic Link Around the Globe) system. This is a proposed 28,000 km link between the UK and Japan, with landfalls currently expected to include Gibraltar, Italy, Egypt, Saudi Arabia, UAE, India, Thailand, Indonesia, Malaysia, Hong Kong and Korea. Investors in FLAG are led by NYNEX Corporation (see paragraph 4.37).

Links between companies

7.37. Alcatel/NT told us that, traditionally, major contracts such as those for the transatlantic links had tended to be shared out between the suppliers in proportion to the share held by the relevant national carrier in the purchasing consortium. Thus Alcatel would receive a share of the supply contract in relation to France Telecom's share in the purchasing consortium and similarly for STC and British Telecommunications plc (BT).

Competition in the supply of submarine cables systems

7.38. Technology has advanced rapidly in the supply of submarine cable systems. The increase in capacity of optical fibre systems since they were first introduced in 1986 has resulted in the cost per circuit falling to about one-sixteenth of its original level, as indicated in Figure 4.3. As we have said, this trend is expected to continue.

7.39. There has been a degree of liberalization in the international telecommunications market, encouraging operators to become more aggressive in their purchasing behaviour. New independent operator groupings have emerged (see paragraph 7.36). BT commissioned the first European link to

be provided by Japanese suppliers in 1989. Cable & Wireless plc (C&W) participated with Sprint International Inc in establishing the first 'private' transatlantic cable (PTAT 1).

7.40. All the suppliers of repeatered submarine systems now offer optically-amplified systems operating at 5 Gigabits per second (Gbits/s). Competition between similar technology products will be primarily on the basis of price, quality of service and product reliability and delivery dates, although fully open tendering has up to now been limited (see paragraph 4.30). The main technological advances such as the move to optical amplification seem to have resulted from the competitive response of suppliers to pressure from operators for improved performance, in order to satisfy a rapidly expanding demand for telecommunications. We were told that the capacity of optically amplified systems was expected to increase to 40 Gbits/s as a result of current research into wavelength division multiplexing and soliton technology (see paragraphs 2.28 and 2.29).

7.41. Subsidiary technological advances have involved improving the capacity (bit-rate) of existing technology and have enabled one supplier to gain a short-term competitive advantage over the others. Thus, STC developed a 420 Megabits per second (Mbits/s) system which enabled it to win the contracts for PTAT 1 and NPC independent systems, and a similar advance enabled Fujitsu to win the contract for the UK/Germany 5 System.

Barriers to entry

Long-haul systems

7.42. There are a number of requirements for entry into the long-haul sector of the market. First, the potential supplier must have access to underwater repeaters and the associated optical amplification technology. Secondly, long-haul underwater systems operate at higher capacity than land cables and short-haul underwater systems. Third, long-haul systems carry a high-voltage electrical current to operate the repeaters, imposing additional requirements on the cable. In short, suppliers of long-haul submarine systems require access to more advanced technology than other telecommunication cables suppliers. Alcatel/NT estimated a new entrant's development and proving costs for a long-haul system at £47 million. A new entrant would also have to convince purchasers of the reliability of his system.

7.43. From a purchaser's point of view, the risks of contracting with a new entrant are therefore high. Consequently they are likely to prefer to stay with existing suppliers with a good record.

7.44. Pirelli Cavi SpA (Pirelli) told us that it intended to enter the long-haul market in 1996. However, Alcatel/NT thought Pirelli was initially most likely to compete at the shorter end of that market, where Italian carriers may be significant purchasers. Pirelli would not then be a significant immediate challenge to existing suppliers for longer-distance contracts, which continue to account for the bulk of the repeatered sector.

Short-haul systems

7.45. Submarine cable systems for the short-haul sector of the market comprise terminal equipment and optical fibre cable. A potential supplier could purchase terminal equipment and subcontract manufacture of the cable to an existing manufacturer of electrical or telecommunications cable. In practice, however, entry is most likely to be by an existing cable manufacturer with spare capacity. The main cost facing a potential new supplier is in designing, developing and testing the underwater cable and in the systems technology. One supplier estimated the R&D at £3 million to £5 million and thought it would take about two years. Alcatel/NT thought the cost would be higher at some £12 million. As we have already indicated, the laying of the cable may readily be contracted out.

7.46. Entrants into the short-haul market since the introduction of optical fibre cable include Pirelli, NKT Elektronik (NKT), Siemens Bros & Co Ltd, Nokia Cables and GPT Submarine Communications. All of these were existing cable manufacturers. The number of entrants into the short-haul sector confirms that entry barriers are not excessive.

The public interest issues

Competition

7.47. We concluded in paragraph 7.19 that there was a separate market for submarine cable systems and in paragraph 7.20 that supply of these systems should be considered on a global basis for both sectors of the market, repeatered and unrepeatered.

Long-haul systems

7.48. As we showed in Table 7.1, STC and Alcatel both had 19 per cent of the long-haul sector of the submarine cable systems market over the period 1990 to 1993, giving the combined entity a share of 38 per cent of a sector worth about $6,788 million over that period. AT&T had 36 per cent and Japanese firms 24 per cent between them. Pirelli accounted for the remaining 2 per cent, but did not itself manufacture the repeaters for the contracts concerned (see Table 7.1).

7.49. Both Alcatel and STC argued that the merger would enable Alcatel to compete more effectively with AT&T, whose dominance of international telecommunications had been significantly enhanced by its alliance with KDD (see paragraph 4.43). On balance, customers were inclined to support this view. The danger of creating an AT&T/Alcatel duopoly was recognized, but largely discounted because of the presence in the market of powerful and knowledgeable purchasers who were well able, where necessary, to negotiate a competitive price. BT told us that if it was not satisfied that it was receiving bids for a contract at competitive prices, it would have the option of 'encouraging' a bid from a new entrant to the long-haul sector.

7.50. Although we received evidence that STC has been a lively competitive force in this sector of the market, there was a general lack of anxiety about the proposed merger amongst purchasers, which included BT, C&W and Deutsche Telekom. There were other factors such as systems reliability and technical capability which might be enhanced by the scale of the merged entity. On balance they tended to believe that their interests would not be damaged by the merger.

7.51. On the other hand the Department of Trade and Industry was concerned that the merger could lead to further concentration of market power in an already imperfect market with high entry barriers. This view was broadly shared by a UK supplier and a European supplier (see Chapter 5).

7.52. There was general agreement that the need to acquire a reputation for supplying reliable repeatered systems represents a severe barrier to the entry of new suppliers. This is supported by the evidence that no new suppliers have entered the long-haul sector in recent years despite a robust increase in demand. Although Pirelli may start supplying complete long-haul submarine cable systems in 1996 (see paragraphs 7.44 and 7.48), it is unclear how far it will be able to compete with the existing suppliers. Alcatel/NT argued that entry could occur with the assistance of major purchasers. However, the bulk orders are expected to be in the Asia-Pacific region where the largest purchasers are AT&T and KDD, who are themselves major suppliers and are therefore likely to enjoy a degree of preference. For all these reasons, market performance is likely to depend on competition between existing suppliers rather than new entry.

Short-haul systems

7.53. Table 7.2 shows that STC and Alcatel both had 22 per cent of the short-haul sector of the market over the period 1990 to 1993, giving the combined entity a share of some 44 per cent of a sector worth $779 million over that period. AT&T had 12 per cent, Japanese firms 7 per cent, Pirelli 16 per cent and NKT 7 per cent. Other suppliers shared the remaining 14 per cent.

7.54. Despite the significant increase in concentration after the proposed merger, there was virtually no concern expressed about competition in the short-haul sector. The generally-held view was that there would be ample remaining competition and that in any event entry was relatively easy, particularly for existing cable manufacturers.

Other issues

STC's future as a UK business

7.55. We noted some concern that STC's future as an important UK business might be jeopardized by the proposed merger, if, for example, some of STC's R&D and manufacturing were transferred to Alcatel establishments in France. A UK supplier thought that at best STC would become a manufacturing outpost of Alcatel. As a consequence it was thought there would also be knock-on effects on STC's UK suppliers.

7.56. C&W, on the other hand, thought that STC was unlikely to have a long-term independent future, partly because it would be unable to achieve on its own the necessary economies of scale and partly because it was in a volatile business where there was only a limited number of contracts in any year. C&W said that STC was known to be the more vulnerable of the main manufacturers. BT also expected at least one of the main suppliers to be driven out of the market. It suggested that STC would have difficulty in funding the heavy R&D and capital costs required for the next generation of submarine cable systems without the backing of a large parent company.

7.57. Alcatel told us that in view of the differences in STC's and Alcatel's existing optically-amplified systems, and the expected increase in market demand for the foreseeable future, each entity would continue with its own development and manufacture of these systems. Moreover, Alcatel would be committed to fulfilling the contract specification for STC's orders for at least three years, and these specifications could not in any event be met by Alcatel's existing manufacturing facilities within the time-frame of the contracts. There was therefore no immediate scope for rationalization of the parties' facilities. There would, nevertheless, be early savings on procurement. The rationale for the merger lay in the development of future generations of high-capacity systems, in order to be able to offer an independent alternative system to that being developed by AT&T and KDD Submarine Cable Systems Inc. In its perception there was a strong underlying pressure from AT&T for its next generation submarine cable technology to be universally adopted. Alcatel would expect to achieve significant synergies in developing systems through the focusing of R&D in the particular centres of excellence within each business's sites, but its projected business plan for the merged entity showed that R&D expenditure was expected to increase in absolute terms over the next five years.

7.58. Alcatel also assured us that in the longer term it planned to maintain and develop STC as a strong UK-based company, with its own identity, R&D capabilities, and UK production facilities. It pointed to its record in regard to the Anglo-French venture, GEC Alsthom NV, and its acquisition of Telettra Spa in Italy, The Network Transmission Systems Division of Rockwell International Corporation in the USA and AEG Kabel AG in Germany, as evidence of the policy that it intended to apply to STC. Alcatel said that in the case of each of these acquisitions, it has eliminated duplication and furthered specialization by pooling R&D, developed exports and improved productivity, and built upon the existing R&D and industrial presence of the acquired company. In managing these acquisitions, it had established centres of excellence in different countries, with each designated centre taking a 'lead house' role in relation to specific products or systems.

7.59. By joining the two R&D teams under a common head who would have the role of co-ordinator, Alcatel said that it believed specialization, efficiency and work progress would be improved. In the absence of the merger Alcatel and STC could fail to keep pace with the technological alliance forged between KDD and AT&T. There was in these circumstances a material risk that the next transatlantic link, as well as the developing multi-point networks in the Pacific, would be of US and Japanese design, with both Alcatel and STC relegated to the role of subcontractor.

7.60. STC's senior management told us that they were initially wary about the proposed merger but had been pleasantly surprised by Alcatel's positive attitude towards the maintenance of STC's independence as a business, subject to the co-ordination of R&D and marketing activities. They were confident about the future of Greenwich as a centre of excellence for opto-electronics and submarine systems and of Southampton as one of the most ideal locations for cable supply. They believed Alcatel had a good track record for growing global businesses.

7.61. Only two of STC's suppliers who responded to our enquiry about the proposed merger expressed concern about the possible closure of STC's plants in the UK.

Employment

7.62. We received no representations from trade unions representing STC's workforce.

7.63. Alcatel said that it had no plans to make any redundancies in either its own or STC's business. It had assumed relatively constant employment levels (consistent with growth in sales). This is consistent with Alcatel's description of its plans for STC (see paragraphs 7.57 to 7.59).

UK telephone users

7.64. Alcatel/NT recognized that UK telephone users could be indirectly affected by the merger to the extent that it had an influence on prices paid by the UK operators BT and Mercury (a subsidiary of C&W) for international services. Both BT and C&W said that the effects of the merger, either favourable or unfavourable, on the prices of international calls were likely to be very small. The Telecommunications Users' Association believed the merger would inevitably present a narrowing of market choice, but new investment in STC by a third party could be seen to benefit the public interest. The Office of Telecommunications believed that price control arrangements affecting BT until at least 1997 were sufficient to ensure that customers were protected from any abuse in the form of higher prices that might result from the acquisition (see paragraphs 5.9 and 5.10).

Benefits

7.65. It was argued in the joint submission that in the long term the proposed merger would ensure that Alcatel/STC, as an independent supplier, would be able to supply the new generations of systems in competition with AT&T and KDD. There were varying degrees of support for this view from BT, C&W, Deutsche Telekom and Telekom SA. Alcatel/NT also argued that the benefits of the merger would increase as Alcatel and STC developed the new generations of systems. The combined capacities of the two businesses in R&D and systems development would ensure that the new technologies could be developed and brought to the market more rapidly and more economically for the benefit of telecommunications operators, and ultimately telecommunications users world-wide. The result would be a greater flow of business for the enhanced STC research, development and manufacturing facilities in the UK.

Conclusion on the public interest

7.66. We were impressed by the generally high regard for STC in the industry both as a competitor and an innovator. We do not have much doubt that there would be benefits to competition in its continuing as an independent force in both the repeatered and unrepeatered sectors of the market. We believe, however, that STC is unlikely to be successful in an increasingly demanding market without the long-term wholehearted support of a strong parent company, ideally itself committed to the telecommunications market. It is not clear that this support will be forthcoming from NT for what it regards as a 'non-core' business.

7.67. NT told us that it had discussed the possible sale of STC with prospective purchasers but only Alcatel had made a firm offer. BT said that from its standpoint a merger of STC with AT&T or a Japanese company might present more problems than the proposed merger with Alcatel where the balance was reasonably neutral. Either of the former alternatives might leave Alcatel in a vulnerable position.

7.68. The senior management of STC said that they had given some consideration to a management buy-out but had decided that it would be impracticable. In their view it would be impossible for STC on its own to provide the levels of guarantees both in terms of organization and financially to enable the company to survive on its own. It was essential, on a reputation basis alone, to have the backing of a large parent company. Customers expected STC's products and support to be available over a period of 20 to 25 years.

7.69. NT told us that it intended to return the £600 million proceeds of the sale of STC to the UK, first in order to reduce its indebtedness in the UK and secondly to support future growth of its other businesses in the UK. It had spent about £[*] million in the UK over the three years since it had taken over STC PLC, about £[*] million in capital and £[*] million in R&D. NT said that these sums had been invested to grow the core businesses it had acquired from STC PLC and to develop them on a global basis. If the proposed sale of STC did not go forward, however, STC would face strong competition for funding, and might not be able to secure funds at an appropriate level, given the expected heavy demands of NT's core business.

7.70. As to the future of STC after the proposed merger, Alcatel has pointed to its policy of developing its foreign acquisitions. We have no reason to believe it would not implement this policy following the acquisition of STC. On the contrary, it clearly thinks highly of STC's UK facilities and of its ability as a supplier of submarine cable systems, and it would hardly be in Alcatel's interests to damage an expensive acquisition.

7.71. The merger will increase an already high level of concentration amongst suppliers in the long-haul sector of the market. This may, however, be inevitable, as BT and C&W have suggested, given the increasing sophistication of the product and the consequent increasing demands for R&D and capital investment. As we have seen, barriers to entry are high in an industry subject to rapid technological change.

7.72. The short-haul sector is also highly concentrated and is taking an increasing share of the total market. But the technological demands are not so great, making the sector attractive to the smaller competitors; there is a larger number of suppliers; and in any even market entry is relatively easy.

7.73. Despite the high levels of concentration in both sectors of the submarine cables systems market there has been remarkably little concern expressed by components suppliers, telecommunications users or competitors. Notwithstanding the arguments of Alcatel and STC, we are not convinced that the proposed merger will strengthen competition. STC has clearly been a lively independent competitor, and we recognize the dangers inherent in the further concentration of supply in the long-haul sector of the market. However, we are satisfied that STC will need the long-term wholehearted support of a strong parent company if it is to continue to thrive. We accept that Alcatel intends to provide that support and to continue both to manufacture submarine cable systems and to carry out concomitant R&D in the UK. The proposed merger is therefore likely to be a means of preserving STC's presence in the UK as a significant exporter and employer at the leading edge of telecommunications technology. We believe that any tendency which the merged group might have to abuse its market position will be kept in check by competition between suppliers and the strong countervailing power of the purchasers of submarine cable systems. We therefore conclude that the creation of the merger situation that we have identified may not be expected to operate against the public interest.

G C S MATHER *(Chairman)*

I S BARTER

N H FINNEY

D J JENKINS

G WHITTINGTON

A J NIEDUSZYNSKI *(Secretary)*

28 January 1994

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*Figure omitted. See note on page iv.

Glossary

Analogue system — A system in which the transmitted electrical signal has a continuously variable parameter (eg amplitude or frequency) which corresponds directly (and characterizes) the sound (or other) source.

APCN — Asia Pacific Cable Network.

AT&T — American Telephone and Telegraph Company. The major international carrier in the USA and also a supplier of **submarine cable systems.**

BT — British Telecommunications plc.

C&W — Cable & Wireless plc.

Cable-laying vessel — A vessel specially equipped to lay cables on the sea-bed.

Coaxial cable — A cable where the outer metallic return conductor is around the inner core conductor.

Digital system — A system which transmits data encoded as a stream of bits or binary digits (0s and 1s).

DTI — Department of Trade and Industry.

ECMR — European Community Merger Regulation.

Festoon system — A **submarine cable system** which links a series of points along a coast.

Fibre-optic cable — A cable which uses **optical fibre** as the transmission medium, and in which the signal is transmitted as light.

FLAG — Fibre-optic Link Around the Globe. A proposed 28,000 km link between the UK and Japan, serving a number of Mediterranean, Middle East and Asian countries along the route, which is to be developed by a group of investors led by **NYNEX.**

Fujitsu — Fujitsu Ltd, Japanese electronics company and supplier of **submarine cable systems.**

Gbits/s — Gigabits (1,000,000,000 bits) per second.

Hz — Hertz. Vibrations per second.

KDD — Kokushin Denshin Denwa Co Ltd, the largest Japanese overseas telecommunications carrier and also a supplier of **submarine cable systems.**

Km/sec — Kilometres per second.

Land line — A cable which runs only across land.

Laser — A source of intense monochromatic light.

Long-haul system — A cable system which requires submarine **repeaters.**

Mbits/s	Megabits (1,000,000 bits) per second.
Microwave link	A transmission system in which signals are transmitted through the atmosphere.
Multiplexing	Electrically combining incoming signals into a higher-speed signal for onward transmission.
NEC	Nippon Denki Kabushiki Kaisha, Japanese electronics company and supplier of **submarine cable systems**.
NTT	Nippon Telegraph & Telephone Corp, Japan's national telecommunications carrier.
Nm	Nanometer. A measure of length one thousand millionth of a metre.
NT	Northern Telecom Limited.
NTEL	Northern Telecom Europe Limited.
NYNEX	NYNEX Corporation, the holding company for local telephone operating companies in New York and New England, USA. It leads the investors in the **FLAG** project.
OFTEL	Office of Telecommunications.
Optical amplifier	An amplifier used in a fibre-optic system which amplifies the signal in light.
Optical fibre	Fibres of ultra-pure glass, having a central core of higher refractive index glass than an outer cladding, capable of conducting modulated light signals by total internal reflection.
Optical fibre cable	Consists of **optical fibres** either singly or several per cable, surrounded by various protective claddings.
Pirelli	Pirelli Cavi SpA, Italian manufacturer of cables.
Power-feed equipment	Equipment which supplies the electrical power which drives the **repeaters**.
PTAT	A privately-owned transatlantic cable system commissioned by a group of investors led by **C&W**.
Pump laser	A laser light source used in conjunction with special fibre to provide optical amplification.
R&D	Research and development.
Repeater	A unit which contains an amplifier to boost signal strength and an equalizer to correct distortion. A unit is placed at intervals along a submarine cable to allow longer cables to be used. The unit retimes, reshapes and amplifies a signal for onward transmission.
Short-haul system	A cable system which does not use submarine **repeaters**. The maximum distance for this type of system is about 350 km at present.

Soliton transmission	The propagation of a pulse of energy through a medium without dispersion, so that the pulse arrives unbroadened.
Submarine cable system	A system which connects two or more remote land terminals by an underwater cable.
TAT systems	A series of transatlantic telephone cable systems.
Terminal equipment	The land-based part of a **submarine cable system**, which comprises transmission equipment, **power feed equipment** and supervisory software.
TPC	Trans-Pacific Cable.
Unrepeatered system	A **submarine cable system** which does not use **repeaters** (see **short-haul system**).
WDM	Wavelength division multiplexing. The simultaneous transmission of data on two or more closely-spaced wavelengths through the same **optical fibre**. This increases the capacity of optically-amplified systems.

APPENDIX 1.1
(referred to in paragraphs 1.1 and 7.1)

The conduct of the inquiry

1. On 27 October 1993 the Department of Trade and Industry sent to the MMC the following reference:

> Whereas notice has been given to the Director General of Fair Trading of proposed arrangements which might result in the creation of a merger situation qualifying for investigation, as defined in section 64(8) of the Fair Trading Act 1973 ('the Act'), in that:
>
> (a) enterprises carried on by or under the control of Alcatel Cable SA will cease to be distinct from enterprises carried on by or under the control of STC Ltd (incorporated in the United Kingdom), and
>
> (b) the value of the assets to be taken over exceeds £30 million;
>
> Now therefore the Secretary of State in exercise of his powers under section 64, 69(2) and 75(1) of the Act, hereby refers to the Monopolies and Mergers Commission ('the Commission') for investigation and a report within a period ending on 28 January 1994 the following questions:
>
> (i) whether arrangement are in progress or in contemplation as described in paragraph (a) above which, if carried into effect, will result in the creation of a merger situation qualifying for investigation;
>
> (ii) if events so require, whether the actual results of these arrangements are the creation of such a situation; and
>
> (iii) if so in either case whether the creation of that situation may be expected to operate or (if events so require) operates against the public interest.
>
> In relation to the questions in paragraphs (i) and (ii) above if the Commission find either paragraphs (a) or (b) of section 64(i) satisfied they shall not consider the other.
>
> 27 October 1993
>
> *(signed)* JOHN ALTY
> *An Assistant Secretary in the*
> *Department of Trade and Industry*

2. The composition of the group of members of the MMC responsible for this report is indicated in the preface.

3. Notices inviting interested parties to submit evidence to the MMC were placed in the *Financial Times, The Engineer* and *World Telecom Daily.*

4. In addition we sought evidence and views from Government departments; OFTEL; cable and telecommunications operators and suppliers; trade associations; trade unions; and the CBI. Written evidence was received from many of them and hearings were held with some of them. Their evidence is summarized in Chapter 5 and they are listed in Appendix 5.1.

5. We received a joint written submission from Alcatel and Northern Telecom (the parent company of STC Limited) and held both joint and separate hearings with them, and with STC. Some members and staff visited STC's repeater factory and research facilities at Greenwich, and the cable factory at Southampton.

6. Some of the information obtained in the course of our inquiry was of a confidential nature and our report contains only such information as we consider necessary for an understanding of our conclusions.

7. We should like to thank all those who helped us in our inquiry, and in particular Alcatel, Northern Telecom and STC.

APPENDIX 3.1
(referred to in paragraphs 3.14 and 3.17)

NTEL (formerly Northern Telecom PLC): consolidated profit and loss accounts

£ million

	Period from 21.1.91–31.12.91	*Year to 31.12.92*	*Forecast year to 31.12.93*
Turnover	682.9	662.2	[
Cost of sales	(379.8)	(465.2)	
Gross profit	303.1	197.0	
Marketing, selling and distribution expenses	(61.4)	(60.5)	
Administrative expenses	(72.0)	(70.9)	
R&D expenses	(49.9)	(39.3)	
Provision for write-downs no longer required and exceptional items	0.0	13.7	*
Operating profit	119.8	40.0	
Goodwill amortization	(22.0)	(26.6)	
Income from interests in associated companies	19.8	3.1	
Profit before interest and tax	117.6	16.5	
Interest payable and similar charges	(81.4)	(78.4)	
Profit/(loss) on ordinary activities before taxation	36.2	(61.9)	]
			per cent
Gross profit as a percentage of turnover	44.4	29.7	[
Profit before interest and tax as a % of turnover	17.2	2.5	*
R&D expenses as a % of turnover	7.3	5.9	]

Source: NTEL.

*Figures omitted. See note on page iv.

APPENDIX 3.2
(referred to in paragraph 3.18)

NTEL (formerly Northern Telecom PLC): group capital employed

£ million

	As at 31 December		
	1991	*1992*	*Forecast 1993*
Tangible fixed assets	202.1	221.1	[
Investments in associated companies	90.3	81.8	
Stocks and debtors less creditors other than borrowings	30.7	169.0	
Capital employed	323.1	471.9	
Sources of capital employed			
Share capital and reserves	511.4	463.4	*
Provisions for liabilities and charges	199.3	140.8	
Shareholders' funds	710.7	604.2	
Borrowings net of cash	644.9	873.6	
Total sources of funds	1,355.6	1,477.8	
Less: intangible asset:			
Goodwill	(1,032.5)	(1,005.9)	
Sources of capital	323.1	471.9	]

Source: NTEL.

*Figures omitted. See note on page iv.

APPENDIX 3.3
(referred to in paragraph 3.20)

NTEL: cash flow statements

£ million

	Period from 21.1.91–31.12.91	*Year to 31.12.92*	*Forecast year to 31.12.93*
Net cash inflow/(outflow) from operating activities			
Operating profit	119.8	40.0	[
Depreciation	36.0	33.0	
Provisions no longer required and exceptional items	0.0	(13.7)	
Net pension credit	(18.2)	(13.8)	
Increase/(decrease) in working capital	(7.9)	(57.2)	
	129.7	(11.7)	
Returns on investments and servicing of finance	(78.8)	(25.0)	*
Tax paid	(25.6)	(1.2)	
Investing activities	(591.7)	(39.2)	
Cash (outflow) before financing activities	(566.4)	(77.1)	
Financing activities movement in loans and finance lease obligations	275.6	37.1	
Group loans received	300.0	34.0	
Increase/(decrease) in cash and cash equivalents	9.2	(6.0)	]

Source: NTEL.

*Figures omitted. See note on page iv.

APPENDIX 3.4
(referred to in paragraph 3.25)

STC Submarine Systems: profit and loss accounts

£ million

	Years ended 31 December				
	1989	*1990*	*1991*	*1992*	*Forecast 1993*
Sales*	179.3	105.7	170.2	217.8	[
Cost of sales	(123.0)	(90.7)	(125.8)	(149.8)	
Gross margin	56.3	15.0	44.4	68.0	
Warranty allowance	(7.0)	8.5	(8.5)	(8.3)	
Selling and marketing	(2.8)	(2.6)	(2.9)	(5.3)	
Administration and general	(1.0)	(1.2)	(1.3)	(1.9)	
R&D	(11.2)	(11.4)	(12.9)	(16.1)	‡
Other	0.1	0.0	0.0	0.0	
Operating earnings	34.4	8.3	18.8	36.4	
Interest income/(expense) and exchange gain/(loss)	0.0	(0.2)	0.0	(1.7)	
Earnings before tax	34.4	8.1	18.8	34.7	]
					per cent†
Gross margin as a percentage of sales	31.4	14.3	26.1	31.3	[
Operating earnings as a percentage of sales	19.2	7.9	11.1	16.7	‡]

Source: STC.

*1992 sales and profit shown above are as statutorily accounted for by STC; however, they exclude sales of £7.8 million and profit before interest and tax of £2.3 million of a contract (the 'Kwajalein' contract) which STC said were accounted for statutorily through other divisions of Northern Telecom but which were sales attributable to the business being divested.

†Percentages are calculated on figures rounded to the nearest £'000.

‡Figures omitted. See note on page iv.

APPENDIX 3.5
(referred to in paragraph 3.30)

STC Submarine Systems: capital employed

£ million

	As at 31 December				
	1989	*1990*	*1991*	*1992*	*Forecast 1993*
Fixed assets					
Property, plant and equipment	35.3	31.6	37.0	46.2	[
Investment in Thailand joint venture company	0.0	0.0	1.4	5.0	
	35.3	31.6	38.4	51.2	
Stock and debtors less creditors other than borrowings	61.0	119.3	41.1	20.0	
Capital employed	96.3	150.9	79.5	71.2	*
Sources of capital employed					
Borrowings net of cash	4.6	1.1	20.4	61.4	
Provisions	26.5	12.2	17.6	16.0	
Net investment	65.2	137.6	41.5	(6.2)	
	96.3	150.9	79.5	71.2	]

Source: STC.

*Figures omitted. See note on page iv.

APPENDIX 3.6
(referred to in paragraph 3.31)

STC Submarine Systems: funds flow statements

£ million

	Year ended 31 December				
	1989	*1990*	*1991*	*1992*	*Forecast 1993*
Earnings before tax	34.4	8.1	18.8	34.7	[
Add:					
Depreciation	0.2	5.1	4.7	3.4	
Movements in provisions:					
Inventory	1.7	(4.9)	1.1	6.8	
Other provisions	(1.8)	(14.3)	5.4	(1.6)	
Cash generated by operations	34.5	(6.0)	30.0	43.3	
Other sources of funds					
Reduction in receivables	0.4	0.0	49.1	21.4	
Reduction in other assets	0.0	0.0	0.0	6.5	
Reduction in inventory	7.6	1.3	1.3	0.0	
Increase in trade payables	3.7	0.0	0.8	0.0	
Increase in accruals	0.0	0.0	30.6	0.0	*
Increased down-payments	0.0	0.0	20.9	40.6	
Increase in inter-company balances	0.0	3.2	0.0	2.8	
Reduction Thailand equity	0.0	0.0	0.0	0.0	
Cash flows in	11.7	4.5	102.7	71.3	
Application of funds					
Increase in fixed assets	14.8	1.4	10.1	12.6	
Increase in receivables	0.0	47.2	0.0	0.0	
Increase in other assets	3.2	1.1	3.5	0.0	
Increase in inventory	0.0	0.0	0.0	3.5	
Reduction in trade payables	0.0	1.0	0.0	2.4	
Reduction in accruals	1.4	8.6	0.0	10.5	
Reduction in down-payments	2.2	3.7	0.0	0.0	
Reduction in inter-company balances	3.0	0.0	1.2	0.0	
Increase in Thailand equity	0.0	0.0	1.4	3.6	
Cash flows out	24.6	63.0	16.2	32.6	
Net cash flow	21.6	(64.5)	116.5	82.0	
Cash transferred to NT	21.6	(64.3)	114.9	82.4	
Net cash movement on balance sheet	0.0	(0.2)	1.6	(0.4)	]

Source: STC.

*Figures omitted. See note on page iv.

APPENDIX 3.7
(referred to in paragraphs 3.36 and 3.37)

Alcatel Cable: incremental effect of the acquisition upon the earnings of Alcatel Cable

The table below shows the forecast contribution that would be made by the acquisition of STC Submarine Systems to Alcatel Cable's earnings. [

Details omitted. See note on page iv.

]

Source: Alcatel Cable.

APPENDIX 4.1
(referred to in paragraph 4.26)

Analysis of number of orders

1. Table 1 shows the number of long-haul orders and the percentage of these orders obtained by each supplier. A comparison of Table 1 with Table 4.2 for the period 1990 to 1993 shows that, on the basis of the number of orders (Table 1), the shares of Alcatel and STC are similar to their shares on the basis of value of orders (Table 4.2). However, AT&T's share is much smaller and that of the Japanese much larger on the basis of the number of orders. This is because AT&T was involved in a small number of large orders and the Japanese in a large number of small orders (many of them domestic to Japan). A comparison for 1986 to 1989 shows a different pattern.

TABLE 1 **Orders for submarine cable systems: long-haul**

		*% of number of orders by supplier**				
	*Number of orders**	*STC*	*Alcatel*	*Japanese companies†*	*AT&T*	*Pirelli‡*
1986	5	40	0	0	40	20
1987	8	0	47	7	31	15
1988	8	24	2	31	31	13
1989	7	29	29	14	3	26
1990	11	18	13	41	19	9
1991	9	23	25	25	26	0
1992	12	21	12	39	23	4
1993	9	14	33	19	13	20
1986–89	28	21	21	14	26	18
1990–93	41	19	20	32	20	8

Source: MMC estates based on information provided by STC.

*Where an order was split between more than one supplier each supplier was allocated a share of the order in proportion to its share of the value of the order. STC indicated that, where it was not among the successful suppliers, it was not aware of the value of orders or the share of each supplier. The figures are based on its best estimates.

†In a number of cases no information was available on the suppliers of Japanese domestic contracts. We have assumed it was one of the Japanese companies.

‡In most cases this represents Pirelli's share of contacts where that share did not include supply of repeaters. In the other cases Pirelli had the whole contract and it is assumed that repeater supply was subcontracted.

2. Table 2 shows the number of short-haul orders and the percentage of these orders obtained by each supplier. Comparison with Table 4.4 for 1990 to 1993 shows that Pirelli's share is rather higher and the shares of STC and AT&T rather lower on the basis of the number of orders. Again, a comparison for 1986 to 1989 shows a different pattern.

TABLE 2 **Orders for submarine cable sytems: short-haul**

		% of number of orders by supplier*						
	*Number of orders**	*STC*	*Alcatel*	*Japanese companies†*	*AT&T*	*Pirelli‡*	*NKT*	*Others*
1986	4	0	25	0	25	20	0	25
1987	10	10	20	20	0	10	20	20
1988	21	10	5	14	5	48	14	5
1989	15	7	40	20	0	0	33	0
1990	14	14	25	0	14	25	14	7
1991	41	7	13	20	5	40	5	10
1992	19	11	26	3	11	5	5	39
1993	16	31	25	0	6	25	6	6
1986–89	50	8	20	16	4	24	20	8
1990–93	90	13	20	9	8	28	7	15

Source: MMC estates based on information supplied by the companies. STC information has been used except for contracts on which Alcatel information showed that Alcatel was the successful bidder where Alcatel information has been used.

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*Where an order was split between more than one supplier each supplier was allocated a share of the order in proportion to its share of the value of the order. STC indicated that, where it was not among the successful suppliers, it was aware of the value of orders or the share of the successful supplier. The figures are based on its best estimates. In addition there was one contract for which no information was available on the successful suppliers. This has been omitted from the table.

†In a number of cases no information was available on the suppliers of Japanese domestic contracts. We have assumed it was one of the Japanese companies.

‡Other suppliers comprises GPT, Nokia, Siemens and Simplex.

APPENDIX 5.1
(referred to in paragraph 5.1)

Interested third parties which provided evidence

1. The following companies and individuals provided written evidence. Those starred also attended a hearing.

Associated British Ports
British Telecommunications plc
BT (Marine) Ltd
*Cable & Wireless plc
*Department of Trade and Industry
Deutsche Bundespost Telekom
European Commission
European supplier
*Mr K Fitchew
Four Seasons Roofing Group Ltd
France Telecom
NEC Corporation
*NYNEX Corporation
Office of Telecommunications
PDM Neptics Ltd
Tando Chemicals Ltd
Telecom Denmark Ltd
Telecom SA Ltd
Telecommunication Users' Association
Telefonica de Espana
UK supplier

2. We wrote to 22 operators and 9 replied with evidence, and to 35 suppliers and 6 replied with evidence. A number of companies replied saying that they had no comment to make on the proposed acquisition.

APPENDIX 6.1
(referred to in paragraph 6.24)

Alcatel/STC: submarine systems business: projected business plan, 1994 to 1998

*£ million**

	1994	%	*1995*	%	*1996*	%	*1997*	%	*1998*	%
Sales	[									
Cost of sales										
Gross profit										
R&D										
Marketing										
Administrative and general										
Warranty provisions										
Operating profit										]

Figures omitted. See note on page iv.

Assumptions:

[

Details omitted. See note on page iv.

]

Source: Alcatel.

*Converted from French francs at FF8.7 to £1.

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