

Report of the Committee of Inquiry into
TELECOMMUNICATIONS SERVICES IN AUSTRALIA

Volume 2

Background papers

Australian Government Publishing Service

Canberra 1982

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ISBN for set of three volumes: 0 644 01231 5

ISBN for Volume 2: 0 644 01229 3

Volume 1: Main report

Volume 3: Consultants' and research reports

Printed by P. J. Thompson, Commonwealth Government Printer, Canberra

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SECTION 1

EXISTING LEGISLATIVE AND ADMINISTRATIVE ENVIRONMENT

Prepared by the Secretariat of the Telecommunications Inquiry

INTRODUCTION

Overview

- 1.1 The Australian Constitution, at s.51(v), empowers the Commonwealth Government to legislate for "postal, telegraphic, telephonic and other like services".
- 1.2 The following Commonwealth statutes regulate telecommunications services in Australia:
 - Telecommunications Act 1975;
 - Wireless Telegraphy Act 1905;
 - Overseas Telecommunications Act 1946;
 - Broadcasting and Television Act 1942;
 - Telecommunications (Interception) Act 1979.
- 1.3 With the exception of the Telecommunications (Interception) Act 1979 -- administered by the Commonwealth Attorney-General -- the enactments are administered by the Minister for Communications.

TELECOMMUNICATIONS ACT 1975

Introduction

- 1.4 The Telecommunications Act 1975 established the Australian Telecommunications Commission (Telecom). The Act confers a qualified monopoly on Telecom for the provision of most telecommunications services within Australia. The Act also:
 - prescribes certain functions and duties for Telecom;
 - imposes certain obligations and external controls;
 - grants certain immunities.

Functions of Telecom

1.5 Section 5 of the Act specifies Telecom's functions:

- "(a) to plan, establish, maintain and operate telecommunications services within Australia;
- (b) to operate such other services as the Commission is authorised by this Act to operate;
- (c) to provide, at the request of the Australian Government, technical assistance outside Australia in relation to the planning, establishment, maintenance and operation of telecommunications services in countries outside Australia; and
- (d) to do anything incidental or conducive to the performance of any of the preceding functions."

Duties of Telecom

1.6 S.6 of the Act provides that:

- "(1) The Commission shall perform its functions in such a manner as will best meet the social, industrial and commercial needs of the Australian people for telecommunications services and shall, so far as it is, in its opinion, reasonably practicable to do so, make its telecommunications services available throughout Australia for all people who reasonably require those services.
- (2) In performing its functions in accordance with sub-section (1), the Commission --
 - (a) shall comply with any directions given to it under section 7; and
 - (b) shall have regard to --
 - (i) the desirability of improving and extending its telecommunications services in the light of developments in the field of communications;
 - (ii) the need to operate its services as efficiently and economically as practicable; and
 - (iii) the special needs for telecommunications services of Australian people who reside or carry on business outside the cities.

(3) Nothing in this section shall be taken --

- (a) to prevent the Commission from interrupting, suspending or restricting, in the case of emergency, a service provided by it; or
 - (b) to impose on the Commission a duty that is enforceable by proceedings in a court.
- (4) It is the duty of the Commission, in performing its functions, to comply with the provisions of any Convention to the extent that it imposes obligations on Australia in relation to matters within the functions of the Commission."

Telecom's 'monopoly'

1.7 Telecom's 'monopoly' of telecommunications services and the exceptions to that monopoly derive from s.94, which provides that:

"(1) Subject to sub-sections (2) and (3), a person other than the Commission --

- (a) shall not erect, maintain or operate a telecommunications installation within Australia; or
- (b) attach a line, equipment or apparatus to a telecommunications system . . .

(2) Sub-section (1) does not apply to the erection, maintenance or operation of telecommunications installations --

- (a) by the Australian National Railways Commission or by the railway authority of a State, being installations required for the transmission, by lines located wholly within the boundaries of lands vested in the Australian National Railways Commission or in that authority, of communications the transmission of which is necessary for the working of the railways for which the Australian National Railways Commission or that authority is responsible;
- (b) by an authority of a State responsible for operating tramway or omnibus services in the State, being installations required for the transmission, by line, of communications the transmission of which is necessary for the operation of the tramway or omnibus services for which the authority is responsible;
- (c) by any person authorized by the Commission to do so under section 13 to the extent and on the terms and conditions subject to which that person is so authorized under that section;

- (d) by any person who is the holder of a licence under the Wireless Telegraphy Act, to the extent that the person is authorized by the terms of the licence;
 - (e) by the Australian Broadcasting Commission or the Special Broadcasting Service in accordance with the Broadcasting and Television Act 1942 or by a person doing any act in pursuance of sub-section 73(2) or 74(1) of that Act;
 - (f) by the holder of a licence under Part IIIB of the Broadcasting and Television Act 1942 (other than a licence to which section 130A of that Act applies) in accordance with the terms of the licence;
 - (g) by any person, being installations which are capable of use only for the transmission of communications within or upon land or premises of which he is the owner or occupier and which are used solely for his own purposes; or
 - (h) by the Overseas Telecommunications Commission in relation to Division 3 of Part II of the Overseas Telecommunications Act 1946--1973 in so far as this applies to telecommunications installations and systems owned and operated by the Overseas Telecommunications Commission for communications between Australia and overseas and otherwise not inconsistent with the Overseas Telecommunications Act 1946--1973.
- (3) Sub-section (1) does not apply to the attachment of a line, equipment or apparatus to a telecommunications system to the extent that the attachment is authorized by the Commission under section 13 and the terms and conditions subject to which it is so authorized are complied with.
 - (4) The Commission may authorize a person to take possession of, remove or destroy the whole or any part of a telecommunications installation established, maintained or operated in contravention of this section and may enter on premises at any reasonable hour of the day for that purpose."

1.8 The substantive power enabling Telecom to permit other persons to establish telecommunications installations and attach equipment to a telecommunications system is contained in s.13, which provides that:

"(1) The Commission --

- (a) may authorize a person to erect, maintain or operate a telecommunications installation other than an installation for the purpose of transmitting or receiving messages by means of wireless telegraphy; and

- (b) may authorize the attachment of a line, equipment or apparatus, including equipment or apparatus for the purpose of transmitting or receiving messages by means of wireless telegraphy, to a telecommunications system.
- (2) The Commission may specify, in an authorization issued under sub-section (1), the period in respect of which, and the terms and conditions subject to which, the authorisation is to operate."

Telecom's financial policy

- 1.9 The Act imposes certain financial and operating obligations on Telecom. S.73 of the Act provides that Telecom shall pursue, as far as practicable, a policy directed towards securing in each financial year revenue sufficient:
- . to cover its current expenditure and provisions for depreciation, long service leave and, as determined by the Minister for Finance, superannuation payments in respect of its staff;
 - . to provide not less than 50 percent of its capital expenditure requirements.
- 1.10 Telecom is also required to operate as efficiently as possible and make available services at rates and charges which are as low as practicable, consistent with the duty described in the preceding paragraph (s.73(2)).

Charges for telecommunications services

- 1.11 Telecom may make, with the approval of the Minister, determinations fixing or varying:
- . rentals payable in respect of standard telephone services provided by Telecom;
 - . the charges for telephone calls made within Australia, other than charges for special services provided by Telecom in connection with those calls;
 - . the charges for transmission within Australia of telegrams that are lodged at telegraph offices otherwise than by means of a telecommunications service provided by Telecom (s.11(1) refers).
- Telecom may determine without reference to the Minister all other rentals and charges for telecommunications services and other services provided by it (s.11(2) refers).

- 1.12 In applying to the Minister for approval of a determination for 'basic' charges, Telecom is required to specify the estimated amount of revenue for the relevant financial year and the proportion of that revenue to be provided for capital expenditure requirements. The Minister may require Telecom to furnish additional information (s.11(3)).
- 1.13 Particulars of rentals and charges determined by Telecom must be published in the Gazette (s.11(6)).
- 1.14 S.12 specifies that Telecom may be reimbursed by the Commonwealth Government should the Minister refuse to approve a determination for basic charges. This section applies if revenue received is insufficient to enable Telecom to meet the requirements of the financial policy prescribed in s.73 subject to Telecom's compliance with specified procedures (see paragraph 1.9 above).
- 1.15 The Minister may specify any concessional rentals or charges that should, in the Minister's opinion, be provided for persons included in a specified class of persons (s.12(4)).

Other powers of the Minister for Communications

- 1.16 The Telecommunications Act 1975 gives the Minister several important powers over Telecom.
- 1.17 The Minister may, after consultation with Telecom, issue written directions on Telecom's performance of its function and powers as appear to the Minister to be necessary in the public interest (s.7 refers). In that event, a copy of any such direction must be laid before each House of Parliament within fifteen days after issue of the direction.
- 1.18 The Act also empowers the Minister to:
- determine how any surplus revenue is used (s.76(2));
 - determine the form of estimates Telecom prepares in respect of receipts and expenditure for each financial year and the date by which such estimates are to be submitted to the Minister (s.78);
 - approve Telecom entering into any contract involving the payment or receipt of over \$500 000 (or such higher amount as is prescribed by the regulations) or entering into a lease of land for over 10 years (s.79).

Obligations of Telecom in relation to the Minister

- 1.19 Under the Act, Telecom is required to:
- furnish an annual report and financial statements (audited by the Auditor-General) to the Minister as soon as practicable after 30 June each year (s.29 refers);

- furnish to the Minister any reports, documents and information requested by him (s.100 refers);
- keep the Minister informed of its operations at all times (s.100);
- obtain a licence under the Wireless Telegraphy Act 1905 to establish radiocommunications systems involved in provision of telecommunications services.

1.20 The Minister is required to have the report and financial statements and associated Auditor-General's report laid before each House of Parliament within 15 sitting days of that House after its receipt by the Minister (s.99).

Powers of the Minister for Finance

1.21 The Telecommunications Act 1975 empowers the Minister for Finance in relation to the value of Telecom's assets and liabilities at vesting day (1 July 1975), to determine:

- the times and instalments for repayment of the value of the outstanding excess of assets over liabilities;
- the interest rate to be paid by Telecom on the outstanding excess;
- different interest rates in respect of different parts of the excess (s.71);
- money lent to Telecom at interest rates and on terms and conditions determined by that Minister out of moneys appropriated by Parliament for the purpose (s.72(2));
- Telecom's annual provision for superannuation payments payable, or likely to become payable, in respect of Telecom's staff (s.73(3)(b)(i)).

Powers of the Treasurer

1.22 The Telecommunications Act 1975 empowers the Treasurer to approve:

- any borrowing of moneys by Telecom (s.72(1));
- the manner in which surplus funds may be invested, except where the funds are invested in Commonwealth securities or on fixed deposit with approved banks (s.75(2)).

Particular powers, exemptions and protections (Telecom)

1.23 The Act confers certain privileges on Telecom -- in particular:

- . the power to take easements over land (s.10(1)); to enter and inspect land (s.15(1)), to construct telecommunications installations on land (s.16(2)) and to cut down or lop trees on land (s.17);
- . exemption from taxation under any law of the Commonwealth or of a State or Territory (s.80);
- . protection from legal actions in respect of any loss or damage suffered by a person:
 - by reason of any default, delay, error, omission or loss, whether negligent or otherwise, in the transmission or delivery of a telecommunications message by Telecom;
 - by reason of any default, delay, error or omission, whether negligent or otherwise, in respect of the provision, maintenance or operation of a telecommunications service (s.101).

STAFFING AND INDUSTRIAL RELATIONS

Application of the Telecommunications Act 1975

1.24 Telecom's staff are employed under the Telecommunications Act 1975. The Act prescribes certain terms and conditions of employment of Telecom staff and empowers Telecom to determine other terms and conditions.

1.25 The Telecommunications Act 1975 empowers Telecom to decide:

- . how many officers should be appointed and eligibility conditions for employment (s.39);
- . to engage temporary employees (s.42);
- . the terms and conditions of employment (s.43);
- . that an officer or employee not complying with a direction to perform work not be paid salary (s.43A);
- . to create and abolish staffing positions and determine applicable salaries (s.44);

- to alter the designation or classification of a staffing position (s.45);
- to appoint a person as an officer, or transfer or promote an officer, to fill a vacant position (s.46);
- to set qualifications for specified positions (s.48);
- to transfer, demote or retire an officer if the officer is excess to requirements (s.55), or inefficient or incompetent (s.56);
- to discipline an officer for misconduct, after certain procedures have been followed (s.58);
- to make By-laws with respect to certain matters, including the terms and conditions of employment of staff (s.111).

1.26 Some terms and conditions of employment are provided for in the statute. The Act provides for:

- promotion of officers to be subject to certain prescribed criteria (s.47);
- an officer to appeal against certain decisions made by Telecom, including decisions:
 - to promote another officer (s.51);
 - to transfer, demote or retire an officer (ss.55(3) and 56(2));
 - to discipline an officer (s.62);
- appeals against decisions concerning matters such as promotions, transfers and disciplinary action to be heard according to certain prescribed procedures by independent review tribunals, constituted by:
 - a Chairman, appointed by the Minister;
 - an officer nominated by Telecom;
 - an officer nominated by the appropriate staff organisation (ss.51-53 and 58-65);
- compulsory retirement of officers at 65 years of age, and discretionary retirement at 60 years (s.54).

1.27 The Telecommunications Act 1975 also empowers the Conciliation and Arbitration Commission to prevent or settle industrial disputes and to hear and determine industrial questions in respect of the Service (s.67). The Act also establishes a Consultative Council comprising representatives of Telecom and staff organisations (s.109).

- 1.28 Under the Act, regulations may be made with respect to certain matters, including the application of particular staffing disciplinary provisions in the Act and the payment and assessment of costs in proceedings before a staffing Disciplinary Appeal Board (s.112).
- 1.29 Other Commonwealth statutes which affect Telecom's staffing and industrial relations are described at paragraph 1.103.

GENERAL TELECOMMUNICATIONS REGULATIONS

Overview

- 1.30 Section 112 of the Telecommunications Act 1975 enables other regulations to be made with respect to certain matters, including the following:
- . prohibition against the sending over a telecommunications service of indecent, obscene or offensive communications, or the use of a telecommunications system for the purpose of harassing a person;
 - . penalties by way of a fine not exceeding \$200 or imprisonment not exceeding 6 months, or both, for offences against the regulations.
- 1.31 Sections 48 and 49 of the Acts Interpretation Act 1901 require certain procedures to be followed in the making of regulations. These include the laying of such regulations before Parliament within a certain period, and empower either House of Parliament to pass a resolution disallowing any regulation.

TELECOMMUNICATIONS BY-LAWS

Overview

- 1.32 Telecom is empowered by s.111 of the Act to make By-laws with respect to certain matters, including the following:
- . the establishment, maintenance, operation and provision of telecommunications services and facilities;
 - . the terms and conditions governing the provision to or use by any person of telecommunications services or facilities;
 - . the terms and conditions governing the use by a person of a telecommunications service or facility provided in part by the Commission and in part by that person;

- the protection of the telecommunications network, services or facilities from injurious interference from an electric line or installation or by reason of the operation of electrical apparatus, machinery or equipment;
- the publication of telecommunications directories;
- the receipt, transmission and delivery of inland telegrams;
- the terms and conditions of employment of officers and employees;
- penalties by way of a fine not exceeding \$200, or imprisonment not exceeding 6 months, or both, for a breach of a By-law.

1.33 Under s.111(3) of the Telecommunications Act, sections 48 and 49 of the Acts Interpretation Act 1901 apply to the Telecommunications By-laws as they do to regulations. Certain procedures must be followed in the making of the By-laws:

- By-laws must be laid before each House of the Parliament within 15 sitting days of that House after the making of the By-laws;
- either House of Parliament may then pass a resolution disallowing any By-law;
- any By-law so disallowed thereupon ceases to have effect.

Scope of Telecommunications By-laws

1.34 Telecom has issued the following By-laws:

- the Telecommunications (General) By-laws -- containing detailed provisions relating to, inter alia, the provision of telecommunications facilities, services such as telex, Datel and private lines, and approvals for terminal equipment;
- the Telecommunications (Charging Zones and Charging Districts) By-laws -- containing provisions relating to the basis of charging for telephone calls and details of grouping of exchanges into charging zones and charging districts for that purpose;
- the Telecommunications (Community Calls) By-laws -- containing provisions relating to the basis of charging for community calls and details of grouping of exchanges into charging zones for that purpose;
- the Telecommunications (Staff) By-laws -- containing detailed provisions relating to the terms and conditions of employment of Telecom staff;
- the Telecommunications Staff (Salaries) By-laws -- containing provisions relating to salary rates of Telecom staff;

- the Telecommunications (Consultative Council) By-laws -- containing provisions relating to the functioning of the Consultative Council established by s.109 of the Telecommunications Act.

BY-LAWS APPLICABLE TO LEASED NETWORK CAPACITY

Overview

- 1.35 The By-laws specify the terms and conditions under which 'private' leased line capacity may be provided for:
- sole use by an authorised individual or organisation (Part XII refers);
 - shared use by authorised individuals and organisations (Part XIII refers);
 - attachment of apparatus ('device, fitting, equipment or machine') to 'private' line installations is permitted under prescribed terms and conditions (Part XIV refers).

Lines wholly provided by Telecom: general conditions

- 1.36 In respect of "lines wholly provided by the Commission" (Part XII Division 1 refers), Telecom has the power to restrict use made of such lines by the lessee. Specifically the By-laws state that such lines may only be used exclusively for the "business . . . or . . . the purposes of" the lessee (By-law 198 refers).
- 1.37 Telecom also reserves the right to refuse an application for sole use (By-law 194(2) refers) as well as for shared use of a 'private' line (By-law 207(1)).
- 1.38 Telecom may terminate use of a jointly leased and used 'private' line by an individual or organisation at any time (By-law 207(2) refers) and will arrange for temporary lease of private lines (By-law 197(1) refers).

Leased capacity tariffs and charging policies

- 1.39 Telecom may:
- set and vary charges for installation of lines and apparatus together with connection and rental of private lines for both local and trunk leased lines (By-law 196(1) to (5) refers);

- require an applicant for a temporary lease to pay the prevailing tariff rate for permanent private line connection in which case the rental charge is levied at a rate of 50 percent in excess of that applicable to a permanent line lease. (By-laws 197(2)(a) and (b) refer);
- supply, install and maintain any apparatus connected to such lines (By-law 195(1) refers);
- require applicants to supply, install and maintain such apparatus at their own cost (By-law 195(2) refers) and obtain prior approval for connection of any apparatus to be supplied by the applicant (By-law 195(3) refers);
- prevent lessees of private lines from altering or modifying connected apparatus without prior approval (By-law 195(4) refers).

Lines not wholly provided by the Commission: general conditions

1.40 Where private lines are not "wholly provided by the Commission", (Part XII Div. 2 refers), Telecom may:

- restrict use of the line by and for the sole purpose of the applicant (By-law 202 refers);
- levy fees and charges determinable by the Commission under By-law 196 for rental of any part of the line provided by Telecom together with an additional 'licence fee' fixed by the tariff for any part of the line erected by the applicant (By-law 203 refers).

This Division of the By-laws concerns part privately erected (PPE) lines, which are described in Sections 2 and 4.

Shared use of private lines

1.41 In respect of shared use of private lines provided by Telecom (Part XIII refers) Telecom provides a service subject to the following arrangements:

- joint application by two or more individuals or organisations for provision of a private line interconnecting their respective premises (By-law 206(1) refers);
- application by one party for a private line to connect his premises to those of one or more other parties (By-law 206(2) refers);
- restrictions on use of shared facilities to transmission and reception of telecommunications "relating exclusively to the business" of the individuals or organisations to whose premises the line is connected (By-law 208(1)(a) refers);

- prohibition of carriage of unauthorised third party traffic on the line (By-law 208(1)(b) refers);
- prohibition of resale of line capacity or other disposal of the line (By-law 208(1)(c) refers);
- prohibition of interconnection of the line to premises of other individuals and organisations without prior approval by Telecom (By-laws 208(1)(c) and 209(1)(2) & (3) refer);
- setting of special conditions for line usage by Telecom "to meet the circumstances of a particular case" (By-law 208(1)(f) refers).

1.42 Such lines may only be installed, used and operated under terms and conditions which give Telecom the authority to:

- require the applicant to obtain permission to establish, maintain, or use a line which "passes beyond the boundary of the land of which he is the owner or occupier" (By-law 199(1) refers);
- comply with specified technical standards in relation to type, method and standard of construction and materials to be used therein (By law 199(2) refers);
- reserve the right to erect any part of the line passing over or through public property (By-law 199(3) refers);
- opt to supply all or part of any apparatus connected to a private line erected by an applicant and to require the applicant to maintain all or part of such apparatus at his own cost (By-laws 200(1) and (2) refer).

PERMITTED ATTACHMENTS -- BY-LAWS

Authority to attach apparatus

1.43 Any apparatus authorised by Telecom for attachment to a service or private line must be either provided by Telecom or be of a type approved by Telecom (By-law 216).

Application for approval

1.44 A person who wishes to supply apparatus for attachment to a service or private line can apply to Telecom for type approval and is liable to pay costs of examination and testing done by Telecom (By-law 217).

1.45 Telecom can refuse to grant an approval where:

- . apparatus of similar type is available from its standard range;
- . the attachment might impair the operation of the telecommunications system;
- . the attachment might cause injury or damage (By-law 219).

Authority to supply

1.46 Any authority given by Telecom to supply apparatus will be subject to conditions including:

- . the authority cannot be transferred to any other person;
- . at least 14 days' notice must be given to the Commission of the grantee's intention to attach apparatus;
- . the authority is conditional upon Telecom agreement for the subscriber or lessee of a private line to attach the apparatus (By-law 218).

Application by subscriber or lessee

1.47 A subscriber or lessee of a private line can apply to Telecom for permission to attach apparatus to the service or line (By-law 221).

1.48 Apparatus will be provided by Telecom subject to certain conditions, including:

- . Telecom will maintain the apparatus;
- . the permission is given to the subscriber or lessee personally and cannot be exercised by any other person without Telecom's permission (By-law 221).

1.49 Where approval is given to attach apparatus obtained from an approved supplier, the apparatus may be connected subject to maintenance of that apparatus by the lessee (By-law 221).

SERVICES BY-LAWS

Public switched telephone calls

1.50 The Telecommunications By-laws relating to provision of services carried over Telecom's public switched network prescribe terms and conditions as follows:

- Telecom may limit the duration of telephone calls (By-law 54);
- a subscriber may allow a person working in the same building or occupying the same private residence to use his telephone (By-law 57).

Wide area telephone services

1.51 Under the relevant By-laws, a subscriber:

- may not make an outward call from the service (By-law 77B);
- may arrange with Telecom for calls to the service to be made from any part of the Commonwealth or selected area (By-law 77B);
- must pay applicable charges in respect of calls made to the service (By-law 77D).

Public telephones

1.52 The By-laws provide for:

- Telecom to determine when and where public telephones are provided (By-law 147);
- public telephones to be used for local and trunk calls (By-law 148);
- a subscriber to make his telephone service available for public use but must exhibit a notice to that effect (By-law 151).

Calls over radiocommunications systems

1.53 The provision of voice services over radiocommunications systems is subject to the subscriber holding a licence, if required, under the Wireless Telegraphy Act 1905 (By-law 132). Telecom may limit the period of a call (By-law 133).

High frequency fixed services

1.54 A person residing in an area served by a control station may apply to become a subscriber to this service (By-law 126) in which case:

- the service must be two way (By-law 129);
- a subscriber may not permit any person other than his agent, servant or employee to use the service or unit (By-law 125).

Very high frequency (VHF) fixed services

- 1.55 A person living in an area served by a radio concentrator provided by Telecom may apply to become a subscriber to a VHF fixed radio telephone service subject to conditions including:
- . Telecom may opt to provide an applicant for a standard telephone service with a VHF fixed radio telephone service operating through a radio transmitter and receiver located at an exchange (By-law 131B);
 - . a VHF service must be a two-way service (By-law 131E).

Radio paging services

- 1.56 A person may apply to Telecom to become a subscriber to a home area, a regional area or the national radio paging service. Conditions applicable to these services include:
- . a subscriber may receive a signal from, but not transmit a signal to, appropriate base stations and may be connected through the base station to a telephone exchange for the purpose of receiving a signal (By-law 120);
 - . Telecom may permit a subscriber to a home area or regional area radio paging service to temporarily operate the service through other than his ordinary base station (By-law 124).

Public automatic mobile telephone services

- 1.57 A person who owns or controls a vehicle, vessel, etc. within an area in which the Commission has established facilities for a public automatic mobile telephone service may apply to become a subscriber to the service on the basis that, among other things:
- . a public automatic mobile telephone service must be a two-way service (By-law 116D);
 - . Telecom may permit a subscriber to use his service temporarily in an area other than that in which he ordinarily uses his service (By-law 116E);
 - . a subscriber must pay a service charge and any other specified charge or charges (By-law 116F).

Public telegram service

- 1.58 Relevant By-laws provide that:
- . telegrams may be only lodged at locations determined by Telecom (By-law 155);

- telegrams may be addressed to telex and telephone numbers (By-law 158);
- senders may prepay the cost of a reply (By-law 169) or acknowledgement of delivery (By-law 179);
- a person may forward a multiple telegram to several persons in one locality or in different localities served by one Telecom office, or to one person or organisation at several addresses at one locality or in different localities served by one Telecom office (By-law 172);
- 'collect' telegrams may be accepted by Telecom (By-law 173).

Public telex services

- 1.59 Telecom may establish facilities for a public telex service at its discretion, permitting:
- a person to apply to become a subscriber to a public telex service (By-law 146B);
 - a subscriber to a public telex service to send messages to or receive messages from a subscriber to any other telex service (By-law 146C);
 - a subscriber to book a telex call, arrange for a conference or broadcast call or make a particular person telex call (By-law 146C);
 - a person to transmit from a specified location a telex message to a subscriber to a telex service or a public telex service (By-law 146E);
 - a person to make prior arrangements to have forwarded to him a telex message transmitted by a subscriber to a telex service or a public telex service (By-law 146EA);

Private telex services

- 1.60 A private telex subscriber may make his service available for public use (By-law 146J).

Datel private services

- 1.61 Telecom permits:
- shared use of a service for persons occupying the same premises (By-law 103);

- the provision of a temporary service subject to payment of specified costs (By-law 107).

Document and picture facsimile services

- 1.62 Telecom may establish facilities for the receipt, transmission and delivery of telecommunications messages by facsimile or phototelegraph equipment at certain locations. Conditions include:
- a message or document may be transmitted unless it is obscene or offensive or is not capable of satisfactory reproduction or transmission (By-law 185);
 - multiple telecommunications messages may be forwarded by a sender (By-law 190).

Relationship to the Wireless Telegraphy Act 1905

- 1.63 Telecommunications installations (systems) involving radio communications distribution require a separate licence granted by the Minister under the Wireless Telegraphy Act 1905 (WT Act). Telecom itself is assigned a block of radiocommunications frequencies under that Act pursuant to s.8 of the Telecommunications Act. Telecom may not establish or use stations and appliances for the purpose of transmitting or receiving messages by means of wireless telegraphy except in accordance with licences granted to it under the WT Act.
- 1.64 When a new service (such as cordless telephones) involves the use of both radiocommunications and Telecom's public network, the Department of Communications (DOC), on behalf of the Minister, and Telecom each write specifications for the equipment before a WT Act licence and Telecom approval are granted. Where both types of specifications are prepared, the supplier is obliged to include reference to both approvals on the identification plate of the equipment.
- 1.65 Until about 18 months ago, DOC required an applicant for a WT Act licence to satisfy DOC that communications over the proposed radiocommunications network could not be provided by Telecom or by use of Telecom's network. Consultation with Telecom on WT Act licences is now limited to technical matters.

WIRELESS TELEGRAPHY ACT 1905

Overview

- 1.66 The Wireless Telegraphy Act 1905 (WT Act) empowers the Minister to engage in radiocommunications and to license and regulate other persons (including Telecom) engaging in radiocommunications.

1.67 Any use of radiocommunications not authorised by the Minister is prohibited. Section 6(1) of the Act provides that except as authorised by or under the Act, no person may:

- establish, erect, maintain, or use any station or appliance for the purpose of transmitting or receiving messages by means of wireless telegraphy; or
- transmit or receive messages by wireless telegraphy.

Role of the Minister for Communications

1.68 The WT Act grants to the Minister the "exclusive privilege of establishing, erecting, maintaining, and using stations and appliances" for the purposes of:

- transmitting messages by wireless telegraphy within Australia, receiving messages so transmitted;
- transmitting messages by wireless telegraphy from Australia to any place or ship outside Australia;
- receiving in Australia messages transmitted by wireless telegraphy from any place or ship outside Australia (s.4).

1.69 The Minister is empowered to license others to engage in radio communications. Section 5 of the Act provides that:

"Licences to establish, erect, maintain or use stations and appliances for the purpose of transmitting or receiving messages by means of wireless telegraphy may be granted by the Minister for such terms and on such conditions and on payment of such fees as are prescribed."

Role of the Department of Communications

1.70 In assisting the Minister to carry out the abovementioned functions, the Department of Communications (DOC) has a planning, licensing and regulatory role. DOC advises on the administration of the radio frequency spectrum and the application of international agreements concerning the usage of the spectrum.

1.71 In particular, the Radio Frequency Management Division of DOC performs the following functions:

- investigation of breaches of the WT Act and Regulations and of interference to reception of all radiocommunications services (including broadcasting);
- prototype testing of manufacturers' equipment to DOC standards;

- . examining licence applications for services for compliance with established licensing (and technical) policy;
- . conducting examinations for Certificates of Proficiency for radio operators;
- . designing systems and developing technical standards;
- . frequency spectrum planning and the assignment of frequencies in all bands except broadcasting.

1.72 DOC consults with other Commonwealth Government bodies on use of the spectrum and significant issues are discussed in the Australian Interdepartmental Telecommunications Advisory Committee. As well as DOC, Telecom and the Overseas Telecommunications Commission are represented on this Committee, together with the Departments of Defence, Transport and Construction, and Science and Technology.

Wireless Telegraphy Regulations

1.73 The Wireless Telegraphy Regulations made pursuant to s.10 of the WT Act give the Minister (or an authorised officer) powers concerning matters such as:

- . the grant, renewal, transfer, suspension and revocation of licences (Regulations 9-11, 13, 16 and 17);
- . the variation of licence conditions (Regulation 13);
- . the design, installation and maintenance of licensed equipment (Regulation 20);
- . the technical operating conditions (including operating power, frequency and location) of a station (Regulations 22-24);
- . the competence of persons operating a station (Regulation 26);
- . the transmission and reception of messages on behalf of the public (Regulation 28).

OVERSEAS TELECOMMUNICATIONS ACT 1946

Overview

1.74 The Overseas Telecommunications Act 1946 established the Overseas Telecommunications Commission (OTC), which is empowered to provide overseas telecommunications services and engage in certain other activities.

Functions of OTC

1.75 Section 34 of the Act prescribes OTC's functions:

- the establishment, maintenance and operation in Australia of cable and radio telegraph services for the conduct of 'public communications' between Australia and other countries;
- the establishment and maintenance in Australia of radio transmitting and receiving apparatus to permit the conduct of overseas telephone services in respect of public communications;
- the establishment, maintenance and operation in Australia of any other radiocommunications services in respect of which a licence is granted in pursuance of the Wireless Telegraphy Act 1905;
- all further developments of cable or radio transmission or reception for overseas telecommunication purposes in Australia as related to public communications, including the establishment, maintenance and operation of overseas facsimile services;
- the conduct of investigations and research with the object of improving the efficiency of the overseas telecommunications services generally.

BROADCASTING AND TELEVISION ACT 1942

Overview

1.76 The Broadcasting and Television Act 1942 (B & T Act) regulates radiocommunications used for broadcasting (i.e. for transmission by radiocommunications of program material intended for reception by the general public). The Act establishes several authorities to regulate, advise on, or provide radio and television services. As well, the Minister is empowered by the Act to undertake planning and technical activities.

Establishment of broadcasting authorities

1.77 The Act establishes:

- the Australian Broadcasting Tribunal (ABT), which is empowered to grant licences for public and commercial radio and television stations and regulate the non technical aspects of licensed station operation (s.7 refers);
- the Australian Broadcasting Commission (ABC), which provides the (Government funded) National radio and television services and the overseas shortwave radio service (Radio Australia) (s.30 refers);

- the Special Broadcasting Service (SBS), which provides (Government funded) multilingual radio and multicultural television services (s.79C refers);
- the Broadcasting Council, which is an advisory body consulted by the Minister on matters generally affecting radio and television in Australia (ss.111C(2) and 134(1)(ba)). The Council consists of a Chairman (appointed by the Minister), a representative of the Department of Communications and nominees from each sector of the broadcasting industry (Regulation 6 of the Broadcasting Council Regulations).

Powers of the Minister for Communications

- 1.78 Section 111C(1) of the Act provides that it is the responsibility of the Minister:
- to plan the development of radio and television services in Australia;
 - to determine standards and practices in relation to the technical equipment used for radio and television services and the operation of such equipment;
 - to investigate and correct interference with the transmission and reception of radio and television signals;
 - to conduct examinations, or make or approve arrangements for the conduct of examinations, and to issue certificates, as to the competence of persons to operate technical equipment used for radio and television services.
- 1.79 For the ABC and SBS, the Minister is responsible for arranging for the provision and operation of transmitting stations (ss.73 and 79ZJ).

Role of the Department of Communications

- 1.80 In assisting the Minister to carry out the abovementioned responsibilities, the Department of Communications (DOC):
- develops and maintains system standards, transmission standards and planning guidelines for the introduction of new broadcasting systems;
 - develops and presents to the Minister planning proposals for the improvement and extension of existing broadcasting services and the introduction of new services;
 - develops and administers standards relating to technical performance of broadcasting stations;

- . maintains technical and financial oversight of capital and maintenance programs in Government funded services (the ABC and SBS);
- . develops, negotiates and formalises arrangements and agreements for sharing of transmitting facilities between operators in different sectors of the broadcasting system.

Role of Telecom

- 1.81 Pursuant to s.73 of the B&T Act Telecom carries out, as agent for the Minister, the design, procurement, installation, operation and maintenance of the National Transmitter network for the ABC. Telecom performs similar work for the SBS.
- 1.82 In addition, as part of its common carrier role, Telecom provides, on a rental basis, lines for the relay of radio and television programs to regional and remote stations of the ABC network.
- 1.83 Telecom operates a large number of commercial television transmitters located at National television transmitting sites or at sites owned by Telecom. Telecom also operates 'receive only' earth stations associated with translator stations for the Remote Area Television Scheme, which receive ABC television signals from Intelsat IV.

Relationship to the Telecommunications Act 1975

- 1.84 While s.94(2) of the Telecommunications Act exempts the holder of a B&T Act licence, the ABC and SBS from the prohibition in s.94(1) against using a telecommunications installation, the prohibition still applies to the holder of a licence under s.130A of the B&T Act for a community television aerial system. To operate such a system, a person requires both a B&T Act licence granted by the ABT and an authority from Telecom under the Telecommunications Act.
- 1.85 Section 112 of the B&T Act requires broadcasters to obtain approval from Telecom for the use of lines linking studios and transmitters.

Relationship to the Wireless Telegraphy Act 1905

- 1.86 The B&T Act provides for certain exemptions to the general prohibition under s.6 of the WT Act and Wireless Telegraphy Regulations 5 and 14 on the use of radiocommunications (see paragraph 1.67 above). The exemptions include:
- . any broadcasting activities by the holder of a B&T Act licence (s.89D);
 - . the use of an ordinary domestic radio or television receiver (s.130(2)).

- 1.87 Section 130 of the B&T Act precludes the grant of a WT Act licence for any purpose for which a licence may be granted under Part IIIB of the B&T Act.
- 1.88 Section 112 of the B&T Act requires broadcast licensees to obtain WT Act licences for the use of fixed microwave links for program relay purposes, and for radiocommunications between studios and transmitters and studios and outside broadcast vans.

TELECOMMUNICATIONS (INTERCEPTION) ACT 1979

Overview

- 1.89 The Telecommunications (Interception) Act 1979 prohibits the interception of a communication passing over a telecommunications system controlled by Telecom. Exemptions are provided for any action by a Telecom officer in the course of the officer's duties and the interception of a communication in pursuance of a warrant (s.7).
- 1.90 A person is also prohibited by s.7 from divulging to another person any information obtained by intercepting such a communication, subject to certain exceptions relating to:
- . the operations of the Australian Security Intelligence Organisation (ASIO) or for other purposes of security;
 - . certain law enforcement activities;
 - . the actions of a Telecom officer in the course of the officer's duties.

Role of Telecom

- 1.91 The Act prescribes, at ss.9,10,11,20 and 21, the circumstances under which warrants may be issued (by the Attorney-General, the Director-General of ASIO or a judge) authorising a person to intercept communications. These provisions also define the role of Telecom in relation to the exercise of the authority conferred by such a warrant.

NATIONAL SATELLITE SYSTEM

Incorporation of AUSSAT Pty Limited (AUSSAT)

- 1.92 AUSSAT Pty Ltd was incorporated on 6 November 1981 in the Australian Capital Territory. No enabling legislation was necessary to establish AUSSAT. The Company's primary objective is to own and manage the Australian national satellite system scheduled to be operational during 1985.

- 1.93 The authorised share capital of the Company is \$100 million divided into 100 million shares of \$1 each. At present the sole beneficial shareholder of the Company is the Commonwealth of Australia. However, AUSSAT's Memorandum of Association directs the Company to convert to a public company as soon as practicable with up to 49 percent of the issued share capital owned by persons other than the Commonwealth of Australia or its authorities and to obtain listing on stock exchanges in Australia.
- 1.94 The business of the Company is managed by a Board of thirteen directors (including a Chairman and Deputy Chairman of Directors). All are non executive directors appointed by the Commonwealth of Australia. The Chief Executive Officer of the Company is the General Manager.

Powers and functions of AUSSAT

- 1.95 The powers and functions of AUSSAT are set out in its Memorandum and Articles of Association. Changes to either may be effected in accordance with the relevant provisions of the Companies Act 1981.
- 1.96 Under its Memorandum and Articles of Association, AUSSAT:
- . is primarily established to carry on a business of operating a national telecommunications system for Australia and neighbouring regions through the use of satellites;
 - . must make available sufficient satellite transponder capacity as may be required by:
 - the Australian Broadcasting Commission to provide television and broadcasting services for remote homesteads and communities;
 - Telecom Australia to provide remote telephony and emergency services;
 - the Commonwealth of Australia (through two satellites) to provide and maintain air navigation services and related safety services;
 - . may purchase, lease, exchange, hire or otherwise acquire any satellites, earth stations, transmitting and receiving equipment, communications installations and facilities (inter alia) which are necessary or convenient for the purpose of its business;
 - . construct, improve, maintain, develop, work, manage, carry out or control any satellites, earth stations, transmitting and receiving equipment, communications installations and facilities which may seem calculated directly or indirectly to advance the Company's interests;

- . is subject to Commonwealth and State taxes and charges;
- . must obtain the Treasurer's approval in relation to:
 - investment and dealings with moneys of the Company not immediately required;
 - loans or advances of credit to any person;
- . may not enter into contracts without the approval of the Minister for Communications, either given generally or in relation to:
 - a contract for procurement of a satellite or earth station;
 - any other contract, transaction or arrangement involving the giving or receiving by the Company of a consideration exceeding an amount of value of \$500 000;
- . is required to have 'proper regard' to policies of the Government of the Commonwealth of Australia in relation to offsets, preferences to Australian goods and services and salaries and conditions of service of employees;
- . is required to provide space station transponder capacity and other services as efficiently and economically as possible and conduct its affairs in accordance with normal commercial practices for a tax paying business venture;
- . must provide from its internal resources, including retained earnings, a reasonable proportion of its capital expenditure in future to maintain 'over time' an appropriate balance between total shareholders' equity and total liabilities and pay a reasonable dividend on paid up share capital.

Relationship between AUSSAT and OTC(A)

- 1.97 During September 1980 and pending the formation of AUSSAT, the Commonwealth Government designated the Overseas Telecommunications Commission (Australia) as the interim owner and manager of the satellite system. In that interim role OTC accepted responsibility for purchase of the satellites and their associated ground monitoring facilities together with the so called major city 'gateway' earth stations which will provide access to the satellites. AUSSAT is planning to locate these major earth stations in each capital city including Darwin and Canberra.
- 1.98 To enable OTC to undertake these additional responsibilities, licences were issued pursuant to the Wireless Telegraphy Act 1905 under the relevant provisions of the Overseas Telecommunications Act 1946. The issue of those licences permitted OTC to release the satellite system's technical specifications in the form of a Request for Tender (RFT) and also allowed OTC to undertake the evaluation of manufacturers' responses to the RFT.

- 1.99 The enabling licences were originally issued to cover the period 18 September 1980--31 July 1981 but were subsequently extended until 31 July 1982 pending decisions on the final owner and operator of the satellite system.
- 1.100 Following AUSSAT's formation during November 1981, responsibility for the ownership and management of the satellite system, including the major earth stations, passed from OTC to AUSSAT. During December 1981 an amendment to the Overseas Telecommunications Act was proclaimed which, among other things, enabled OTC to provide technical and other services to AUSSAT.
- 1.101 Since AUSSAT's incorporation OTC has provided through its National Satellite Division all of AUSSAT's staffing resources including managerial, engineering, technical and commercial functions plus general administrative support activities. This assistance has been provided by OTC to AUSSAT on a cost reimbursement basis. At the time of writing (October 1982), it was expected that these arrangements would not continue beyond end October 1982, at which time AUSSAT would be in a position to employ its own staff.

OTHER COMMONWEALTH STATUTES AFFECTING TELECOM

Overview

- 1.102 There are a number of general Commonwealth statutes which also regulate the activities of Telecom.

Staffing and industrial relations

- 1.103 Commonwealth statutes which relate generally to Telecom include:

- Superannuation Act 1922

Section 97(1) of the Telecommunications Act 1975 provides that Telecom is a prescribed authority for the purposes of the Superannuation Act 1922. All employees of Telecom are required to contribute for superannuation or provident benefits on retirement.

- Long Service Leave (Commonwealth Employees) Act 1976.

This applies to all Telecom staff (and all other Commonwealth employees) and requires Telecom to provide certain long service leave entitlements. Telecom is obliged by s.73(3)(b) of the Telecommunications Act 1975 to make financial provision for long service leave.

- Compensation (Commonwealth Government Employees) Act 1971.

Sections 5 and 7(6) of this Act require Telecom to be liable, as a prescribed authority of the Commonwealth, to provide compensation in respect of its employees for injury or disease, loss or destruction of, or damage to certain property occurring in circumstances connected with their employment.

- Maternity Leave (Commonwealth Employees) Act 1973.

This Act provides for an entitlement to maternity leave for female employees in the APS and of certain prescribed Commonwealth employing authorities.

- Commonwealth Employees (Employment Provisions) Act 1977.

This Act applies to all Commonwealth employees (including Telecom employees) and empowers the employing authority (e.g. Telecom) to suspend employees taking industrial action and to stand down employees who cannot be usefully employed as a result of industrial action (ss. 4 and 5). Where the employing authority or a Minister is of the opinion that it is in the public interest, the employing authority may terminate the employment of employees taking industrial action (s.8). An employing authority shall comply with any directions given to the authority by a Minister in relation to the exercise by the authority of the authority's powers under this Act (s.12).

- Public Service Amendment Act 1978.

This Act (which came into operation in March 1981) sets out the provisions relating to the rights of permanent officers of the APS who are employed in statutory authorities not staffed under the Public Service Act 1922 to return to the APS.

Judicial and administrative review

- 1.104 The following statutes provide for review of administrative decisions of Commonwealth departments and authorities and for a procedure to deal with these organisations in the exercise of their administrative functions:

- Freedom of Information Act 1982

It is understood that this Act will come into operation on 1 December 1982. The Act provides persons with a legally enforceable right to obtain access to documents in the possession of an authority such as Telecom unless the document is an 'exempt' document. In the application of the Act, Telecom is specifically exempted in relation to documents concerning its "competitive commercial activities."

• Administrative Decisions (Judicial Review) Act 1977

This Act allows "aggrieved" persons to obtain reasons in writing for decisions affecting them and to have decisions of an administrative character reviewed in the Federal Court.

The Court is empowered, according to the circumstances:

- to quash a decision;
- to refer the matter back to the decision-maker for further consideration;
- to declare the rights of the parties;
- to direct the making of a decision;
- to order the doing or the refraining from doing of any other act or thing as the Court considers necessary to do justice between the parties.

The Court is not concerned with the merits of a particular decision but only with whether the decision has been taken legally and properly. Decisions by Telecom which are subject to the Act would include decisions made under s.13 of the Telecommunications Act in relation to the authorisation of a person to establish a telecommunications installation or to attach equipment to a telecommunications system.

The Act gives Commonwealth employees, including Telecom staff, the right to seek reasons in writing and appeal to the Federal Court on personnel decisions taken pursuant to the Telecommunications Act 1975.

• Ombudsman Act 1976

The Ombudsman's function is to investigate complaints about administrative action of officials, being principally concerned with the manner or the procedures by which officials have gone about the matter which is the subject of complaint. Specific grounds for intervention include:

- action contrary to law;
- action which is unreasonable, unjust, oppressive, or improperly discriminatory;
- action based on a mistake of law or fact.

Following an investigation, the Ombudsman reports, in the first instance, to the Department or authority concerned and the responsible Minister, and may make suggestions and recommendations in the report. Where a Department or authority fails to take appropriate action, the Ombudsman can report the matter to the Prime Minister and also to Parliament.

- Administrative Appeals Tribunal Act 1975

The Tribunal is empowered to review certain administrative decisions "on their merits". Decisions under review can be affirmed, varied, set aside or a new decision substituted or remitted to the decision-maker for reconsideration.

An application to the Tribunal for review may be made by a person or persons "whose interests are affected by the decision". Telecom is subject to the Act only in respect of decisions by Telecom under the Telecommunications (General) By-laws to:

- require a subscriber to rent an additional service due to overloading of an existing service (By-law 32); or
- direct a subscriber to alter, remove or re-erect portion of a telecommunications installation because of interference to another installation (By-law 45).

Miscellaneous legislation

1.105 Telecom is also subject to the following statutes:

- Lands Acquisition Act 1955

This statute provides that the acquisition of land required for the purposes of the Commonwealth shall be effected under the Act. The Minister for Administrative Services (or a delegate) approves acquisitions by agreement and the Governor-General approves compulsory acquisitions. The Department of Administrative Services arranges property acquisition and disposal and leasing of accommodation for Telecom;

- Remuneration Tribunal Act 1973

This Act provides for the Remuneration Tribunal to set salaries and allowances payable to the holders of public offices. In relation to Telecom, the Tribunal determines salaries and allowances for the Commissioners, the Managing Director and the Chief General Manager;

- Trade Practices Act 1974;

- Sales Tax (Exemption and Classification) Act 1935;

- Australian Security Intelligence Organisation Act 1979;

- Patents Act 1952;

- Trade Marks Act 1955;

- Copyright Act 1968;

- . Crimes Act 1914;
- . Commonwealth Motor Vehicles (Liability) Act 1959;
- . Environment Protection (Impact of Proposals) Act 1974.

1.106 In addition to these statutes, it should be noted that, if proclaimed, the Preference to Australian Goods (Commonwealth Authorities) Act 1980 will require Commonwealth authorities to give preference to the procurement of goods of Australian origin or having an Australian content. The Act has been passed by Parliament but has not yet been proclaimed.

OTHER POLICY AND ADMINISTRATIVE ARRANGEMENTS

Overview

1.107 In addition to statutory constraints on Telecom's activities, Telecom is also subject to general government policy. These policy arrangements include:

- . staffing and industrial relations;
- . borrowings.

Staffing and industrial relations

1.108 Telecom is subject to general Government policy and co-ordination arrangements. These include the Government's industrial relations co-ordination arrangements.

Borrowings

1.109 Administrative regulation of the borrowing programmes of semi-government authorities such as Telecom is effected through the Loan Council. The Council determines the terms and conditions applicable to issues of inscribed stock. Authorities with investment programmes in excess of \$100 million per year, such as Telecom, are subject to additional restrictions. A summary of controls operating over Telecom's borrowings follows:

- . a total annual loan programme is approved and must be completed in 12 months between July to the end of June;
- . timing of the approach to the market must be approved by Loan Council;

- . the amount to be raised in an individual loan is approved and may not be exceeded without a further approach to Loan Council;
- . private treaty and public loans may not be sought simultaneously;
- . floating rate loans are not permitted;
- . the minimum term for a loan is 4 years;
- . maximum interest rates for various terms are determined by Loan Council;
- . underwriting and brokerage fees are fixed;
- . no other discounts or premiums may be offered on loan stock;
- . rate relativity between private treaty and public rates are determined by Loan Council;
- . overseas markets may only be accessed by permission of Loan Council;
- . a period of at least 2 months must elapse between the closing of one public loan and the opening of the next;
- . no more than two-thirds of the total annual programme may be raised before 30 December. The total programme includes infrastructure allocations. If such allocations are unable to be raised in the second half of the year, due to market difficulties, they can be raised offshore.

SECTION 2

NATIONAL TELECOMMUNICATIONS INFRASTRUCTURE

Prepared by the Secretariat of the Telecommunications Inquiry

TELECOM'S NATIONAL TERRESTRIAL NETWORK

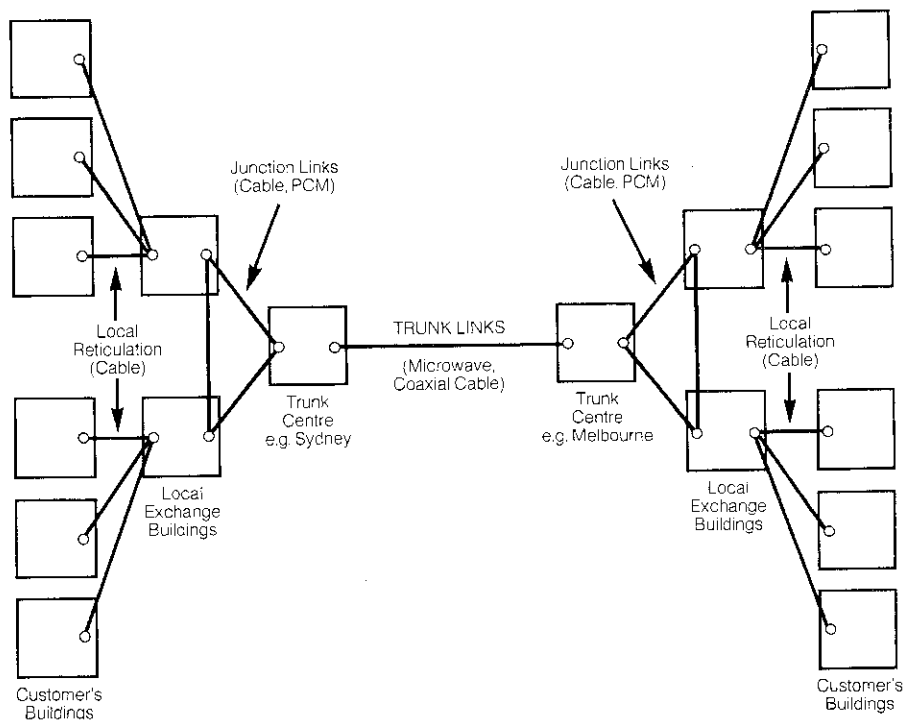
Overview

- 2.1 The communications needs of a modern developed nation are diverse and complex. They produce increasing pressures for faster, high volume information processing, storage, retrieval and transfer. A national telecommunications infrastructure must keep pace with the resulting demands for transmission and service capability. It must be constantly upgraded, extended and maintained. It must undergo a continuing process of 'grafting' new transmission and switching technologies onto the old.
- 2.2 This 'grafting' process is characteristic of the planning and development of a national telecommunications infrastructure. It requires continuing application and integration of high technology and a level of new investment in network facilities consistent with that objective.
- 2.3 A national telecommunications infrastructure is vital to national development as is co-ordinated planning of all transmission systems and associated support facilities comprising that infrastructure.
- 2.4 The present Australian national telecommunications infrastructure is terrestrially based. The advent of the planned national satellite system (NSS) scheduled to go into service in 1985 will add another dimension to the existing national infrastructure.
- 2.5 Guided and non guided, reticulated and radiated distribution technologies are utilised in the present national terrestrial network. These range from wired telephony and wireless telegraphy through to pre-operational optical fibre distribution modes. They encompass single strand telegraphy and telephony, twisted wire pairs, single quad cables and coaxial cables, together with narrowband and broadband microwave radio transmission systems. They include systems established, owned, operated and maintained by Telecom and other interests.
- 2.6 Telecom is presently undertaking network development projects involving digital transmission and switching facilities, analogue and digital radio concentrator systems and the use of satellite transmission facilities. Some of these developments are in a pre-operational stage. Others are being tested in Telecom's Experimental Plant Centre at Maidstone, Victoria.

The core network

- 2.7 The national terrestrial 'core' network consists of conduits and aerial distribution plant forming the supporting infrastructure for dedicated transmission facilities in the four notionally separate overlay networks. The core network is illustrated in Figure 2.1.

Figure 2.1: The National telecommunications core network infrastructure.



- 2.8 By the end of 1982, there will be four such notionally dedicated public switched transmission systems in the national terrestrial network. Three -- the telephony, telegraphic (public telegram) and telex networks -- have been in place for some time. The fourth -- the public switched data network -- is being installed this year and is expected to be operational by December 1982.
- 2.9 The national terrestrial network also provides a wide range of specialised transmission systems, most of which rely on leased Telecom capacity.

THE PUBLIC SWITCHED TELEPHONE NETWORK

Introduction

- 2.10 By far the largest of the public switched networks is dedicated to carriage of public telephone voice traffic. This network interconnects over five million telephone subscribers, who use some 7.7 million telephone handsets. The network includes some 5 500 telephone exchanges. Over 98 percent of subscribers are connected to automatic exchanges and have access to STD calling facilities. A programme is underway to convert all manual exchanges (serving some 60 000 subscribers) to automatic operation by 1990.
- 2.11 The public switched telephone network comprises three functional segments:
- . the customer network;
 - . the junction network;
 - . the trunk network.
- 2.12 The structure of the public switched telephone network is shown in figures 2.2 and 2.3.

Figure 2.2: Structure of the telephony network.

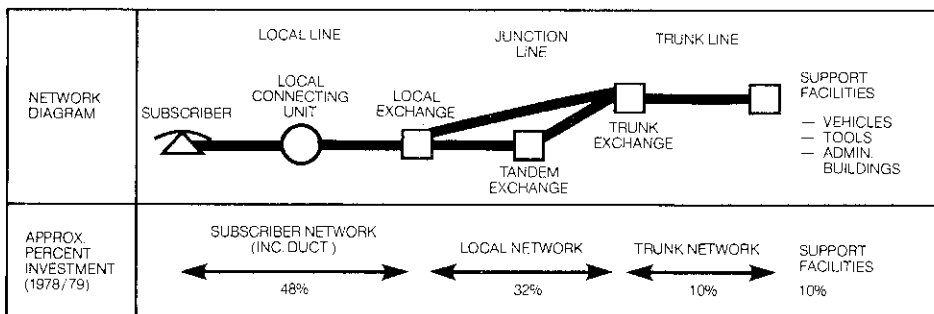
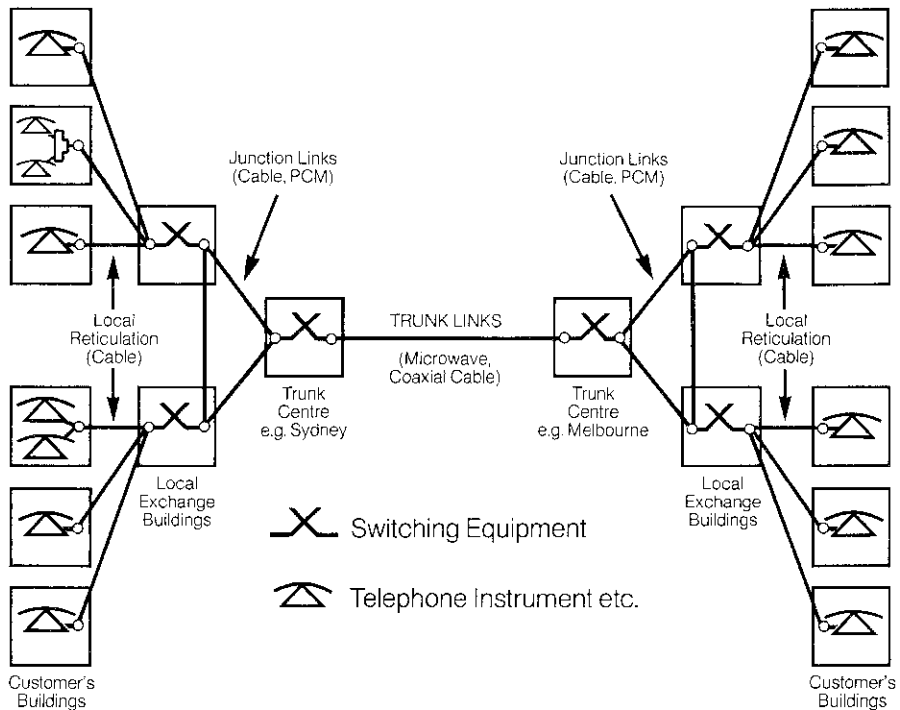


Figure 2.3: The national public switched telephone network.



The customer network

2.13 The customer network comprises:

- . subscriber terminal equipment;
- . the lines connecting subscriber terminal equipment to the local exchange;
- . part of the internal plant in the local exchange.

This segment accounts for about 48 percent (\$3 900 million) of total communications plant asset value and includes about:

- . 7.7 million telephone handsets;
- . 44 000 data modems;
- . 25.5 million kilometres of conductors in customer lines;
- . 5.1 million exchange lines.

The junction network

2.14 The junction network comprises:

- . plant connecting subscriber lines to one another within a local charging area;
- . plant connecting customer lines to the trunk network;
- . part of the internal plant in the trunk and tandem exchanges, together with circuits interconnecting switching facilities therein.

This segment accounts for about 32 percent (about \$2 600 million) of total communications plant asset value.

The trunk network

2.15 The trunk network comprises:

- . transmission systems (inter-city trunk bearers) between different charging zones;
- . most of the plant in trunk exchanges.

It accounts for about 10 percent (about \$800 million) of total communications asset value.

2.16 The national telephone network is also used to provide transmission systems for a number of non voice services. For example, data traffic is carried either over leased telephone lines or the automatic public switched telephone network (paragraph 2.8 refers).

The inter-city telephone network

2.17 The trunk network is subdivided into the inter-capital network and the intra-state and regional networks. This sub-section outlines the inter-capital trunk network.

2.18 The inter-capital network links the cities of Perth, Adelaide, Melbourne, Canberra, Sydney, Brisbane, Darwin and Hobart. It also serves the international satellite earth stations at Ceduna and Moree. Telecom's broadband communications network is illustrated in Figure 2.4. Figures 2.5 and 2.6 show arrangements for inter-capital trunk route diversity and security.

2.19 The inter-capital routes include wideband microwave radio systems with a per system bearer capacity ranging from 600--2 700 circuits, and coaxial cable systems with capacities from 1 200--2 700/3 600 circuits or combinations of these.

2.20 Circuits provided on the inter-capital trunk routes are classified by Telecom into two distinct categories: trunk telephone circuits and special services. The table below shows the transmission capacity of inter-city trunk network bearers and special service lines. Table 2.1 gives a breakdown of direct inter-capital city trunk and special service circuits:

Table 2.1: Direct inter-capital city trunk and special service circuits

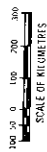
Route	Trunk Circuits	Special Services(1)
Sydney--Melbourne	2 573	949
--Brisbane	1 207	338
--Adelaide	657	66
--Perth	437	45
--Hobart	41	8
--Canberra	1 006	290
--Darwin	190	1
Melbourne--Brisbane	609	71
--Adelaide	605	279
--Perth	388	112
--Hobart	179	117
--Canberra	340	4
--Darwin	22	18
Brisbane--Adelaide	105	7
--Perth	98	3
--Canberra	57	28
--Darwin	48	4
Adelaide--Perth	121	77
--Canberra	34	17
--Darwin	42	23
Perth--Canberra	36	18
TOTAL	8 795	2 475

(1) Special services circuits are given in terms of number of circuits providing transmission capacity equivalent to a voice circuit bandwidth to 4 KHz.

Source: Telecom data

Figure 2.4: Telecom's broadband communications network 1981.

Telecom Australia Broadband Communications Network—Long-Term Planning 1981



NOTES

- 1 TWO SEPARATE PARALLEL ROUTES
- 2 STONEY CARBONARA-MELBOURNE
- 3 STONEY BRISBANE
- 4 BRISBANE CYPRE
- 5 MELBOURNE-BENDIGO
- 6 MELBOURNE-MURRELL
- 7 PERTH-NORTHAM
- 8 ADELAIDE-BIRRI
- 9 ADELAIDE-PT AUGUSTA BY 1983
- 10 BRISBANE-TOWNSVILLE
- 11 GEE LONG-MELBOURNE
- 12 TWO PARALLEL SYSTEMS
- 13 STONEY-NEWCASTLE
- 14 STONEY-DUNBO
- 15 DUNBO-COBAR
- 16 NORTHAM-PT AUGUSTA BY 1983

- 17 TROPICSCATTER SYSTEM
- 18 AUSTRALIAN NATIONAL BULLWINKS SYSTEM
- 19 GAS PIPING SYSTEM
- 20 TROPICSCATTER SYSTEM REPLACED BY RADIO 1982

SATELLITE FACILITIES

EAST TO WEST TV RELAY FACILITIES AVAILABLE VIA INTELSAT
SATELLITE & THE MURPHY & CANNONWATER EARTH STATIONS
REARLY AREA TV RELAYS ESTABLISHED VIA INTELSAT
SATELLITE 1980
NATIONAL SATELLITE SYSTEM EXPECTED TO BE ESTABLISHED BY 1986

- ESTABLISHED AT 1980
- ESTABLISHED AT 1980 (ONLY)
- TO BE ESTABLISHED BY 1985
- TO BE ESTABLISHED BY 1980
- TWO OR MORE ROUTES PROVIDED

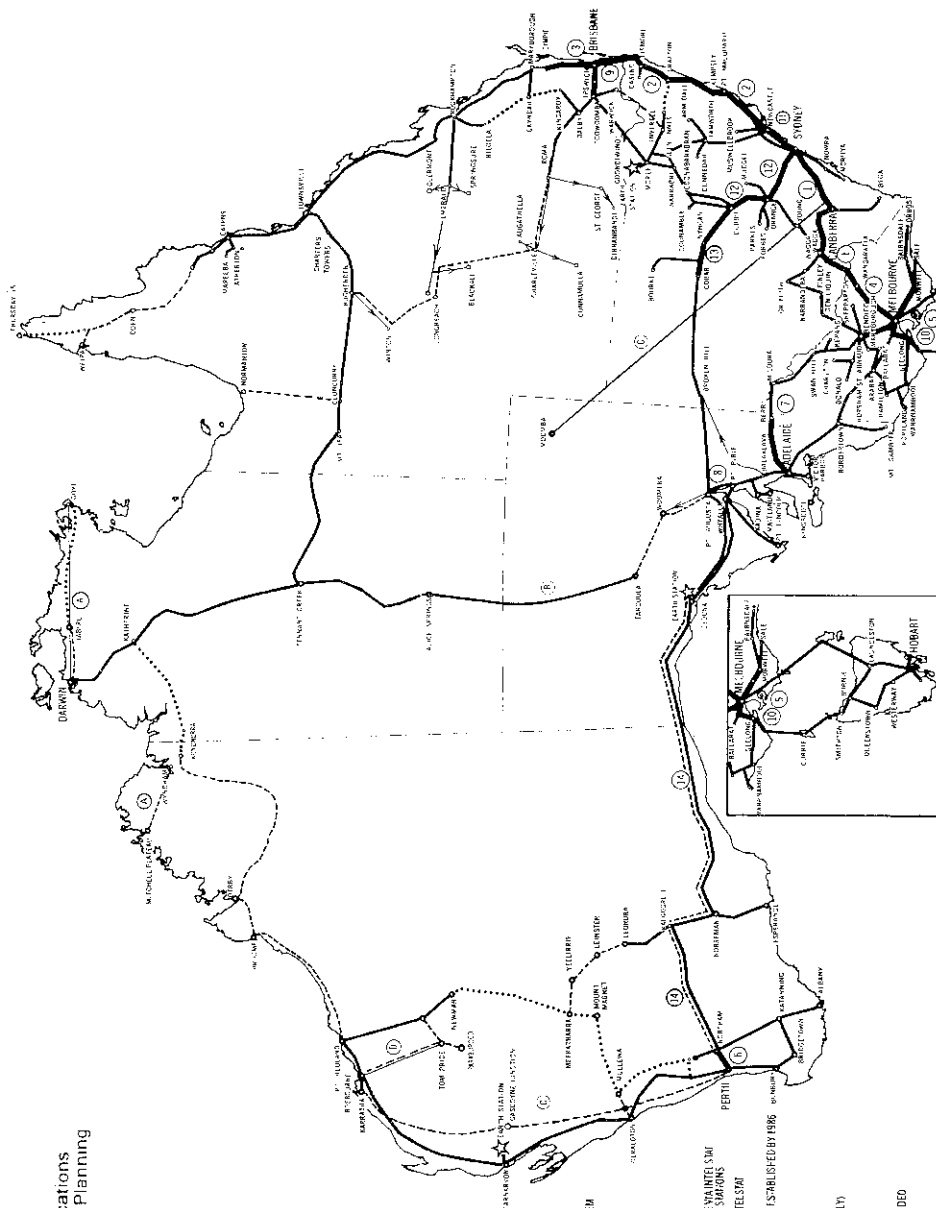


Figure 2.5: Inter-capital trunk route diversity

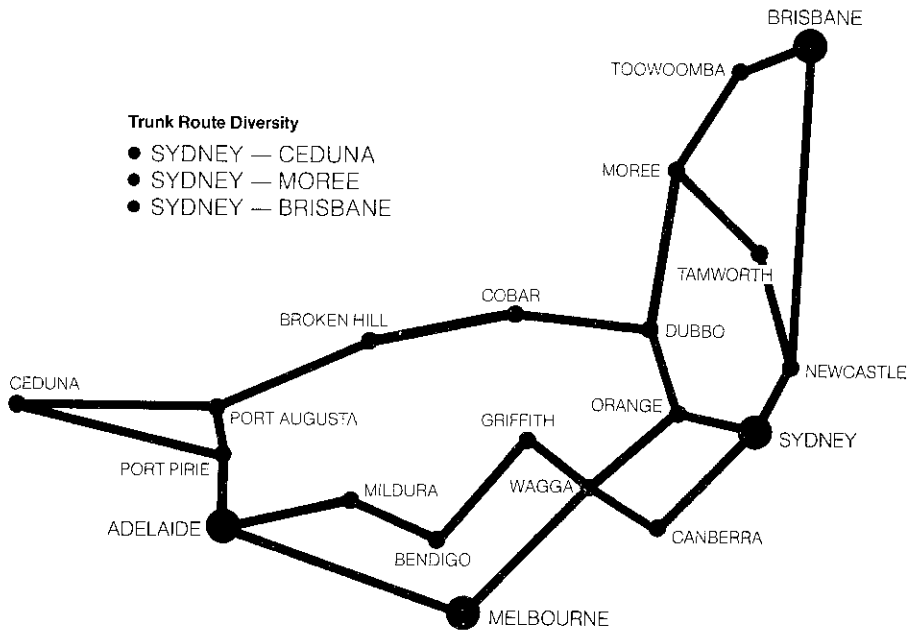
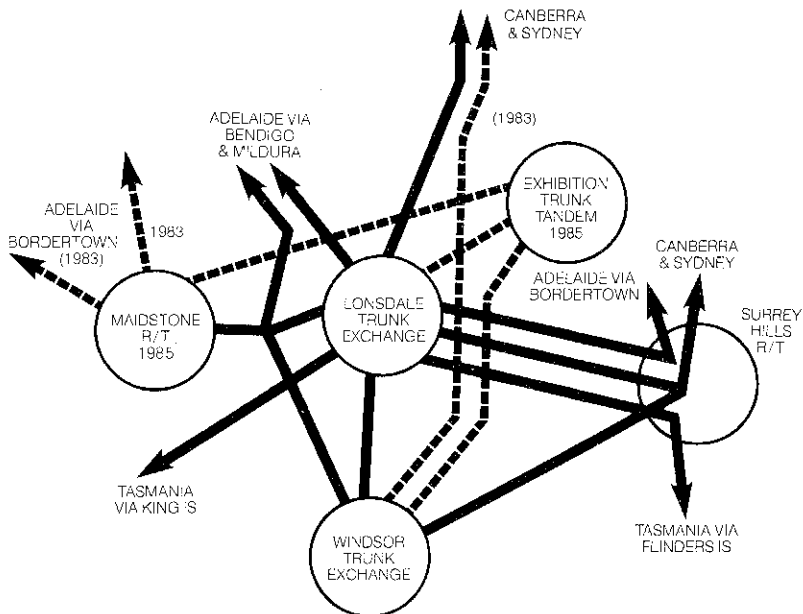


Figure 2.6: Inter-capital trunk route security arrangements (1981-1985)



THE TELEX NETWORK

Structure

- 2.21 At 30 June 1981 the telex network connected around 34 000 subscribers throughout Australia. International transmission of communications between domestic and overseas subscribers is facilitated via the Overseas Telecommunications Commission [OTC (A)].
- 2.22 At 30 June 1981, the network included the following switching facilities:
- . 7 cross bar trunk and switching facilities in associated subscriber exchanges;
 - . 34 035 teleprinter terminals supplied by Telecom;
 - . 3 771 customer lines and trunk circuits connecting teleprinter terminals on a dedicated private line basis.

Figure 2.7 (page 44 refers) illustrates the structure of the public switched telex network.

THE TELEGRAPH NETWORK

Structure

- 2.23 The telegraph network is used basically for delivery of Telecom's public telegram service, via a system known as the Transmitter Reperforator Switching System (TRESS).
- 2.24 TRESS is a message switching system which uses paper tape storage and electromechanical switching facilities. All messages into the system are stored on tape and forwarded when switching equipment, links and receiving channels become available.
- 2.25 The TRESS network comprises:
- . 5 transit switching centres;
 - . 382 outstation telegraph offices attached to the transit switching centres;
 - . standard teleprinter terminals;
 - . telegraph circuits in the form of cable pairs or derived voice frequency telegraph circuits carried over a voice channel. A single voice channel can accommodate some 36 telegraph circuits.

THE DATEL NETWORK

Structure

- 2.26 Telecom's Datel service is provided by means of leased lines and the public switched telephone network. Figure 2.8 (page 44 refers)

LEASED LINES AND PRIVATE NETWORKS

Leased lines

- 2.27 Telecom provides a number of types of leased lines including:
- . tie lines;
 - . outdoor extension lines;
 - . broadcast lines;
 - . television relay (broadcast quality) lines;
 - . telegraph private lines;
 - . data private lines;
 - . wideband lines;
 - . other private lines (these include music distribution, alarm, fire services, public address, private property, security and relay set lines).

Figure 2.7: The public switched telex network.

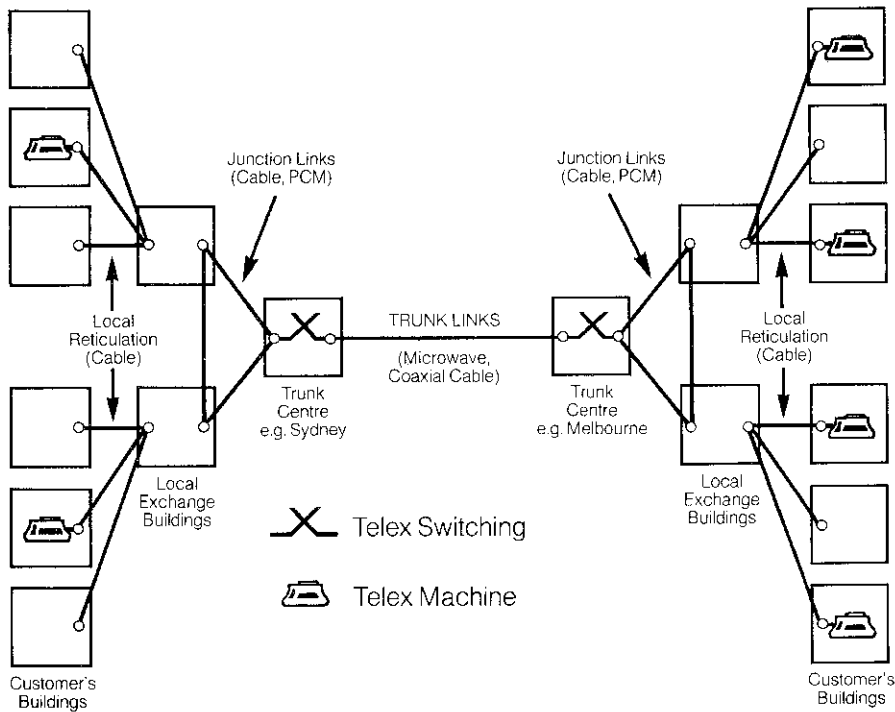
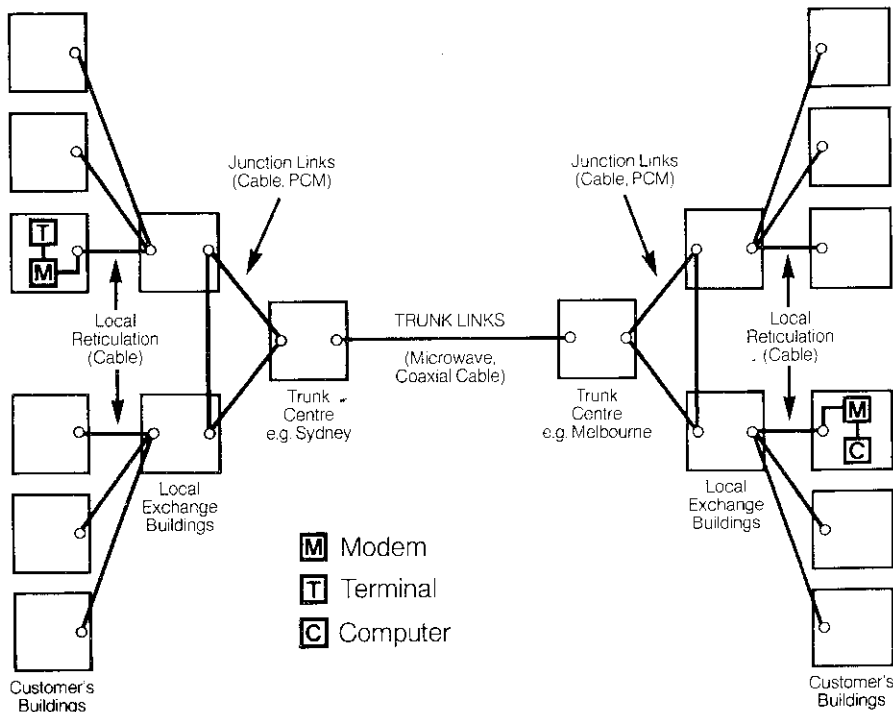


Figure 2.8: The Datel leased line network with interconnection to the public switched telephone network.



2.28 Table 2.2 details numbers of leased lines provided by Telecom.

Table 2.2: Estimates of leased lines in operation at 30 June 1982(1)

TYPE OF LINE	LINES OVER TRUNK DISTANCE(2)	LINES WITHIN LOCAL NETWORK	TOTAL LINES	TOTAL CUSTOMERS
Telephone tie lines	700	16 300	17 000	4 310
Sound broadcast lines	550	7 250	7 800	800
Data private lines	5 400	21 660	27 060	n/a
Television relays	107	168	275	100
Telegraph private lines	n/a	n/a	n/a	n/a
Outdoor extension lines	150	119 850	120 000	36 000
Wideband lines (non television; non sound broadcast; full time)	8	50	58	27
Other private lines	750	125 250	126 000	25 000

(1) Figures represent estimates only

(2) Most trunk distance services are inter-city.

Source: Telecom data

2.29 The Telecommunications Act 1975 and By-laws permit the development and use of private networks by authorities, organisations and common interest groups. Leased networks can be provided using Telecom lines and Telecom approved permitted attachments.

Private networks

2.30 Private networks provided wholly by persons other than Telecom can be authorised under the Telecommunications Act 1975, the Wireless Telegraphy Act 1905 or the Broadcasting and Television Act 1942.

2.31 Those authorised under the Telecommunications Act 1975 include:

- . State public utilities (transport and energy);
- . S.A. State Police Department;
- . pipeline authorities;
- . remote mining establishments;
- . media production houses operating closed circuit television systems.

2.32 Those authorised under the Wireless Telegraphy Act 1905 include:

- . State and territory divisions of the Royal Flying Doctor Services and similar organisations (e.g. Northern Aerial Medical Transport Service in the Northern Territory);
- . Department of Defence HF radio network;
- . QANTAS (local area network digital microwave distribution system);
- . private companies using analogue microwave links in local area networks for intra-company communications;
- . NSW Police Department;
- . radio paging system operators;
- . taxi and courier service operators;
- . remote mining establishments.

2.33 Those authorised under the Broadcasting and Television Act 1942 include CATV systems for local distribution of radiated television signals.

SPUR LINES

Policy

2.34 Telecom has a spur line policy which was designed to meet requests for the provision of telecommunications facilities from industrial and other undertakings located in rural and remote areas ahead of the normal expansion of the network.

2.35 The policy evolved in two stages. The first was associated with the provision of a customer's service accessing the public network. The procedure adopted in this instance was for the applicant to meet the total cost of provision of the service and to undertake to maintain the service to appropriate Telecom specifications.

2.36 Due to practical difficulties in this approach, particularly with the need for applicants to retain design and maintenance staff for their privately owned communication systems, Telecom decided to introduce an alternative policy under which it would undertake to extend the public trunk network into the area. Both of these policies are current.

Existing spur lines

2.37 Spur lines presently in operation are shown in Table 2.3.

Table 2.3: Spur lines in operation

	LOCATION	ORGANISATION
WA : Trunk	Kambalda Newman Pannawonica Tom Price Paraburdoo	Western Mining Corporation Mt Newman Mining Co Cliffs Robe River Iron Associates Hamersley Iron Pty Ltd Hamersley Iron Pty Ltd
: Subscriber	Barrow Island Forrestania Goldsworthy Kambalda Koolan and Cockatoo Islands Lake MacLeod Leinster Lake Argyle Dam Marandoo Newman Smoke Creek Telfer Teutonic Bor Tom Price, Paraburdoo	Western Australian Petroleum Ltd AMAX Exploration Goldsworthy Mining Ltd Western Mining Corporation BHP Minerals Ltd Dampier Salt (operations) Pty Ltd Agnew Mining Ltd WA Government Marandoo Mining Ltd Mt Newman Mining Co Argyle Diamond Mines Ltd Newmont Holdings Pty Ltd Seltrust Mining Corporation Pty Ltd Hamersley Iron Pty Ltd
SA/NT : Trunk	Gove Peninsular Nhulunbuy, NT Jabiru	Nabalco Pty Ltd Jabiru Town Development Authority
SA/NT : Subscriber	Jabiru Alyangula, Groote Eylandt NT Olympic Dam (Roxby Downs Project)	Ranger Uranium Mines Pty Ltd Groote Eylandt Mining Company (GEMCO) Roxby Management Services Pty Ltd
Qld : Trunk	Middlemount Gregory Moranbah Greenvale Gunpowder Dysart Weipa	Capricorn Coal Management Pty Ltd Dampier Mining Co Utah Development Co Queensland Nickel Pty Ltd Gunpowder Copper Ltd Utah Development Co Commonwealth Aluminium Corporation Ltd

Source: Telecom

PLANNING FOR FUTURE NETWORK DEVELOPMENT

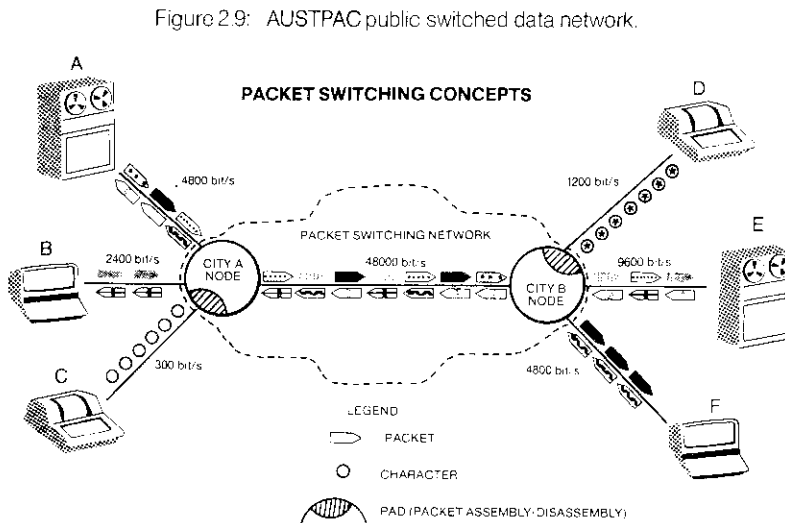
The public switched data network

2.38 Telecom is currently establishing a public switched data network using digital transmission techniques. The service to be marketed over the network is known as AUSTPAC. The network will use packet switching and store and forward techniques in which data is split up into small segments by the customer's computer or data terminal equipment (DTE). Each packet is switched and transmitted. No channel is reserved exclusively for a pair of terminals for the duration of a call through the network.

2.39 The network is designed to provide:

- high level performance and reliability;
- interconnection between terminals with different characteristics, operating in either the character or packet switched mode;
- interconnection with packet switched networks in other countries;
- interconnection with the telex network.

Telecom expects there to be up to 5 500 terminals operating through the AUSTPAC system by 1984, of which about 5 000 would be connected via the public switched telephone network,



Digital signalling transmission and switching

- 2.40 Digital transmission systems using pulse code modulation (PCM) are already being installed in local junction networks. Over 1 800 such systems will be installed by 1985. Table 2.3 details the number of PCM systems in operation over the period 1980--1985.

Table 2.3: Number of PCM systems in operation

	1980--81	1981--82	1982--83 (1)	1983--84 (1)	1984--85 (1)
NSW	15	30	80	270	480
VIC	31	120	260	510	800
QLD	39	72	130	260	400
SA	13	14	15	21	30
WA	4	10	28	63	98
TAS	4	5	6	7	8
TOTAL	106	251	519	1 131	1 816

(1) Estimates

Source: Telecom data

- 2.41 These will add another approximately 46 000 circuits overall capacity between 1981--82 and 1984--85. Table 2.4 shows the number of PCM type circuits in service over the period 1980--1985.

Table 2.4: Number of PCM type junction telephone circuits in service

	1980--81	1981--82	1982--83 (1)	1983--84 (1)	1984--85 (1)
NSW	439	829	2 227	8 034	14 203
VIC	921	3 477	7 537	15 209	23 795
QLD	1 153	2 148	3 741	7 709	11 356
SA	365	390	447	606	639
WA	103	283	821	1 866	2 916
TAS	93	99	156	176	236
TOTAL	3 074	7 226	14 929	33 600	53 145

(1) Estimates

Source: Telecom data

- 2.42 Plans for use of digital signalling transmission technology on inter-city trunk routes are designed to provide digital data communications over existing analogue radio microwave bearers. The first such digital systems will have a per bearer capacity of 2 MBit/s. Later systems will be digital radio and digital cable systems with a per bearer capacity of 140 MBit/s, equivalent to 1 920 voice circuits. These are scheduled to be operational by 1984.
- 2.43 Telecom plans to replace existing analogue network switching facilities by digital facilities progressively. AXE digital telephone exchange system has been selected as standard hardware for future local telephone exchanges. Some 250 000 subscriber lines are expected to be connected to such exchanges by 1985.
- 2.44 Digital switching in trunk exchanges is also being considered. The planning objective is to improve service quality and reduce prime, operating and accommodation costs and ensure more efficient utilisation of the network.

The integrated digital network (IDN)

- 2.45 The introduction of PCM transmission techniques is the first stage in the evolution of an integrated digital network (IDN). The IDN concept is designed to integrate both network transmission and switching facilities using all digital technology. The final stage is the installation of digital telephone exchanges, a process which is already occurring in Australia with the cutover to AXE digital tandem exchanges.
- 2.46 The development of an IDN will facilitate fully compatible switching of 64 kbps circuits between originating and terminating exchanges. It will also facilitate:
- . economic expansion of network switching;
 - . improved transmission performance at lower cost;
 - . the use of smaller buildings to accommodate exchanges;
 - . capability for direct switching of a significant volume of urban trunk traffic from digital trunk tandems and associated cost benefits;
 - . earlier and less costly introduction of more sophisticated subscriber facilities than would be possible with existing analogue switching facilities.
- 2.47 Telecom's present plans for the introduction of AXE digital tandem exchanges will provide additional capability to improve customer billing to facilitate either multimetering or call charge recording for individual subscribers.
- 2.48 The first AXE digital exchange is expected to be operational by mid December 1982.

Digital Data Network (DDN)

2.49 Telecom is installing a Digital Data Network (DDN) to go into service by 1983. A technical trial of the DDN linking Sydney, Melbourne and Canberra started in September 1981. The DDN will provide the equivalent of point to point digital leased lines. The transmission technology involves the multiplexing of circuits in a data terminal into higher speed circuits. These are connected to main data centres where further multiplexing is effected to produce even higher capacity data links or 'streams' with a per stream transmission capacity of 2 MBit/s. Data traffic is then transmitted to other main data centres and terminals for progressive demultiplexing.

2.50 The DDN will have the capability to:

- offer increased service reliability;
- allow speedy reconfiguration of the network in the event of circuit failures to provide alternative traffic routing;
- enable economies of scale to be derived by Telecom in terms of equipment, operating and maintenance costs.

Telecom expects that some 1 400 network terminating units (NTU's) will be connected initially to the DDN. Expansion of the network to about 100 suburban and provincial centres by 1985, with 40 000 NTU's connected by 1986, is anticipated.

Optical fibre systems

2.51 Telecom already has a number of pre-operational optical fibre systems in place within metropolitan local services areas. By 1985, these and other links will be in commercial service. They will be used for local interconnections and links with inter-capital trunk routes. The local links will connect city centres to outlying radio terminals as detailed in Table 2.5.

Table 2.5: Proposed introduction of optical fibre systems

ROUTE	LENGTH (km)	TRANSMISSION RATE (MBit/s)	NO. OF FIBRES	SCHEDULED COMMISSIONING DATE
MELBOURNE				
Exhibition to Maidstone	15	140	12	March 1983
SYDNEY				
Haymarket to Waverley	6	140	10	June 1984
Haymarket to Dural	41	140	20	1984--1985
ADELAIDE				
Waymouth to Prospect	6	140	18	1984--1985
BRISBANE				
Woolloongabba to Mt Gravatt	7	140	16	1984--1985

Source: Telecom data

- 2.52 Telecom is also considering introduction of single mode optical fibre systems in the long distance trunk network. It expects commercial application of that technology will be cost effective by 1985. Work has already started on installation of ploughed optical fibre cable over a 76 km length in Victoria between Melton and Ballarat. Planning schedules envisage completion of system installation to enable pre-operational trials by mid 1985. If the trials are successful, network integration of a single mode optical fibre system will follow shortly thereafter. Present planning also envisages application of such transmission systems as part of the inter-city trunk network on both inter-capital and country trunk routes. The first installation on the Sydney--Melbourne route could be in service by 1988. Another is proposed to go into service between Perth and Adelaide by 1990.

Wideband local microwave distribution (MDS) systems

- 2.53 Telecom has already installed one (private) MDS system for wideband PABX to PABX transmission of traffic within a local charging area. This is a 34 MBit/s digital radio system installed for QANTAS in Sydney, between Mascot Airport and the Centrepoint Tower. A number of similar systems have reached the advanced planning stage. A digital radio system is planned for installation in early 1983 between the Lonsdale telephone exchange, Melbourne, and Tullamarine airport to service Ansett, TAA, QANTAS and the Department of Transport.
- 2.54 Telecom intends to provide short haul small capacity digital radio systems between local exchanges and customer premises and remotely located premises of individual customers as a standard leased network facility by 1983.
- 2.55 In planning for future local area network development, Telecom has undertaken field evaluations of digital radio transmission systems with the capability to operate in the 10 GHz frequency range. Telecom is already operating short haul wideband digital radio systems using this frequency in inter-exchange network transmission systems.

Digital radio concentrator systems (DRCS)

- 2.56 Digital radio transmission and switching techniques will also be used by Telecom to upgrade and extend network facilities and services in low density rural and remote areas of Australia via digital radio concentrator systems.

Satellite transmission facilities

- 2.57 Telecom expects to use leased capacity in the planned NSS to extend transmission facilities and services to those residents in remote and isolated areas who otherwise would not be serviced in the foreseeable future by the Telecom terrestrial network. It also expects to use leased NSS capacity to provide route diversity and back-up facilities over long haul inter-city trunk routes. Volume 2, Section 3 details relevant Telecom plans.

THE NATIONAL SATELLITE SYSTEM (NSS)

Technical overview

- 2.58 This sub-section draws mainly on information contained in the eight volume Request For Tender (RFT) documentation issued to potential system suppliers towards the end of 1980. The national satellite system will operate in two basic modes:

- . the Fixed Satellite Service (FSS);
- . the Broadcasting Satellite Service (BSS), described in the RFT as the Homestead and Community Broadcasting Satellite Service (HACBSS).

Fixed satellite service (FSS)

- 2.59 Features of the fixed satellite service are:

USE

To link earth stations at fixed points anywhere in Australia for either one way or two way transmission.

OPERATING FREQUENCIES

Uplink: 14.00 to 14.5 GHz
Downlink: 12.25 to 12.75 GHz

TRANSPONDERS

Low and high powered transponders will enable system access for the FSS.

The ground area covered by a transmitted satellite signal to earth is referred to as the 'beam contour' or footprint. Satellite antennae sub-systems can be designed to produce shaped footprints to minimise signal spillover into locations contiguous with the intended geographical service area. Figures 2.10 and 2.11 illustrate the coverage areas for NSS national and spot beam footprints (page 54).

Homestead and community broadcast satellite service (HACBSS)

- 2.60 The HACBSS will facilitate one way transmission of radio and television signals originating from one source in each of four discrete service areas for direct broadcast for reception by comparatively low cost satellite earth stations geographically dispersed in remote areas within the relevant service areas.

Figure 2.10: National Beam Footprint Coverage for FSS Transponders

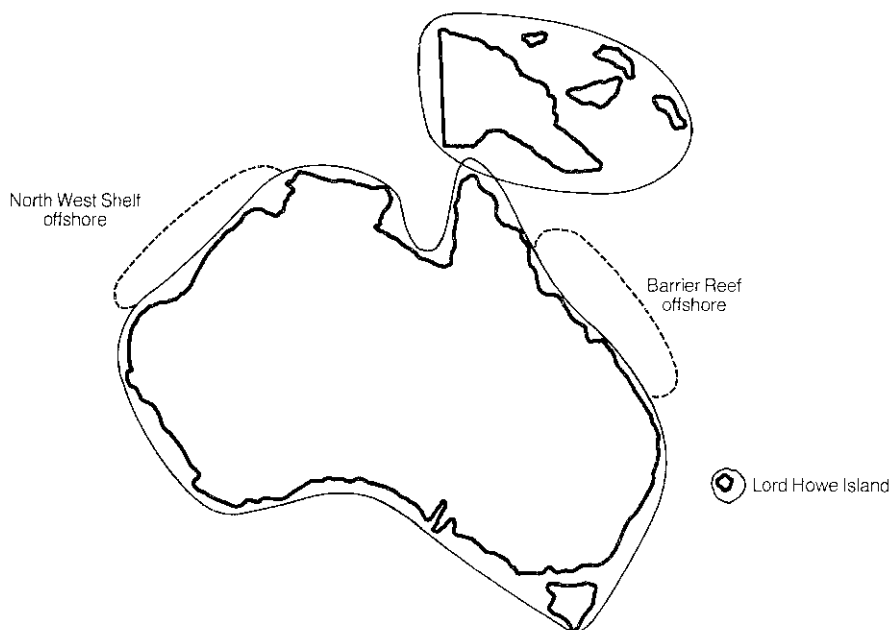
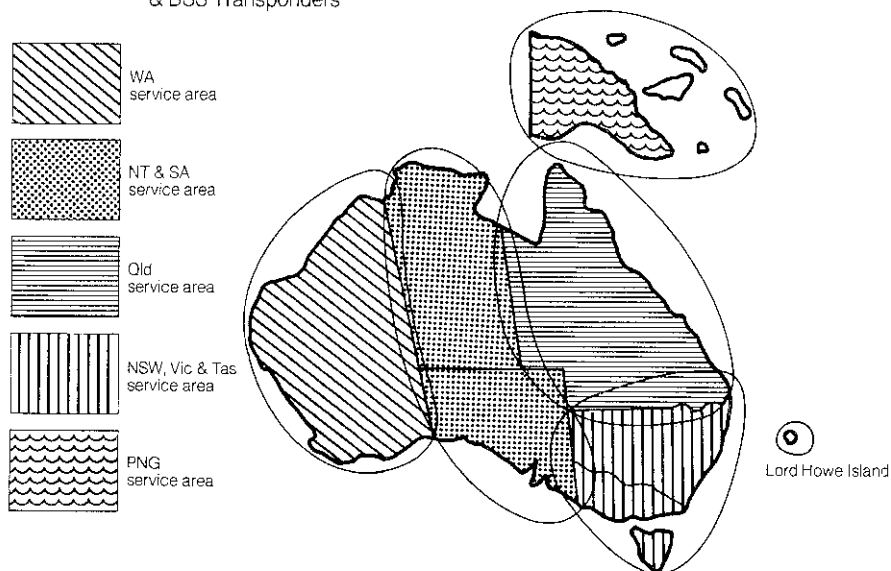


Figure 2.11: Spot Beam Footprint Coverage for FSS & BSS Transponders



Space segment

2.61 The space segment includes:

SPACECRAFT

- . three spacecraft (one operational and one back-up or spare in orbit and one standby on the ground, with option for purchase of a fourth craft);
- . spacecraft to be identical D class models;
- . each spacecraft to have a minimum service life of seven years.

SPACECRAFT CONTROL FACILITIES

- . two Tracking, Telemetry, Command and Monitoring stations, one to be located in Sydney and the other in Perth, one to monitor the operational satellite, and the other to monitor the in-orbit back-up craft;
- . one Satellite Operation Control Centre in Sydney capable of exercising full control over the satellite system.

Transponder capacity

2.62 Details of per transponder capacity in the NSS are outlined below:

RF POWER OUTPUT

FSS: 11 x 12 watt transponders per spacecraft;
HACBSS: 4 x 30 watt transponders per spacecraft.

BANDWIDTH

45 MHz for all transponders, whether operating in FSS or HACBSS mode.

FSS MODE

- . one relay quality performance analogue television signal, with quality depending on the size of earth station;
- . the per transponder traffic carrying capacity for other types of telecommunications services will depend on:
 - the number of users accessing individual transponders through discretely located earth stations;

- system multiplexing techniques;
- size of the earth stations accessing the relevant transponder.

HACBSS MODE

- one direct broadcast quality television signal together with a minimum of two radio signals.

Major city or gateway earth stations

- 2.63 The RFT specified a requirement for ten major city earth stations. It is expected that one will be installed in each of the State capital cities, with an additional station located in Canberra, Hobart, Rockhampton and Townsville respectively.

Telecom remote telephony subscriber service (RTSS) and temporary thick route earth stations

- 2.64 The following earth stations were specified in the RFT:
- homestead telephone earth stations (and associated exchange equipment);
 - community telephone earth stations with optional capacity to provide for reception of:
 - HACBSS TV and radio signals;
 - conference facility able to be used for School of the Air service;

Department of Transport earth stations

- 2.65 The RFT specified stations with the capacity to handle voice and data traffic for point to point communications.

Television and radio receive only stations

- 2.66 These stations are specified for co-location at provincial terrestrial transmitter sites. They would operate in the FSS mode enabling relay via the HACBSS signals of programme material from an originating source for final distribution to viewers/listeners via regional terrestrial transmitters.

ABC regional receive only stations

- 2.67 These were specified in the RFT by the Department of Communications with Telecom as the tendering authority for stations designed to receive a HACBSS service. They would be purchased by the general public and used to receive signals from the NSS for broadcast reception. Should a second HACBSS service be provided these stations could also be used to receive that service in a similar manner.

Minor earth stations

- 2.68 Stations specified in Volume 8 of the RFT by OTC(A) for AUSSAT would provide access to the satellite system for provision of voice/data circuits for both point to point and point to multipoint communications for private user networks. RFT specifications for these minor earth stations were included to furnish necessary operational experience for potential service requirements of, and earth station facility operation by, commercial users.
- 2.69 Key technical characteristics of the various classes of earth stations are summarised in Table 2.6.

System investment

- 2.70 Current AUSSAT estimates of the value of installed equipment are:

Purchase of three satellites, satellite control stations, together with launch of two satellites including launch insurance	\$166 million
Ground equipment, sites and buildings for the major city earth stations	\$59 million
Total	<u>\$225 million</u>

Table 2.6: Key technical earth station characteristics

TYPE OF EARTH STATION	TYPE OF SERVICES TO BE PROVIDED	REQUIRED CHANNEL CAPACITY
Major City	HACBSS Television	1 TV + two or three broadcast sound channels per transponder
	FSS <ul style="list-style-type: none"> • program exchange/distribution • TV/sound 	1 TV per transponder, up to 20 sound channels per transponder. Multi-voice channels
Telecom Remote Telephony Temporary Thick Route	FSS <ul style="list-style-type: none"> • small earth stations <ul style="list-style-type: none"> -- individual subscriber -- community • Transportable earth stations 	1 cct 2--12 ccts
Department of Transport	FSS Voice (2 way) Data (9.6 kbps)	1--60 ccts
Receive only earth stations in operation in Homestead and Community	HACBSS, TV Receive only	To receive 1 TV, two or three radio programs
Regional Receive only	FSS For rebroadcasting to provincial transmitters	One TV per transponder 2 or more sound channels, plus multiple broadcast sound channels for ABC general radio program distribution needs
Minor Earth Stations	FSS Voice (one or two-way data)	approximately 500 voice channels

SECTION 3

AUSTRALIAN TELECOMMUNICATIONS SERVICES

Prepared by the Secretariat of the Telecommunications Inquiry

INTRODUCTION

Perspective

- 3.1 The Telecommunications Act 1975 defines a 'telecommunications service' as:
- "(a) a service for transmitting, by means of electric or electro-magnetic energy --
 - (i) sounds, including speech and music;
 - (ii) visual images;
 - (iii) signals for the communication, whether as between persons and persons, things and things or persons and things, of any matter otherwise than in the form of sounds or visual images; or
 - (iv) signals for the actuation or control of machinery or apparatus; or
 - (b) a service for receiving any such sounds, images or signals that have been transmitted by means of electric or electro-magnetic energy . . .".

Service classifications

- 3.2 This paper classifies telecommunications services by the following service categories:

VOICE SERVICES

- . These encompass all those services associated with voice telephony and radiocommunications traffic. They include:
 - all voice telephony messages and applications irrespective of whether they are made through terminals located on subscriber or public premises;
 - all voice messages distributed via Telecom provided radio communications transmission facilities.

INFORMATION AND COMPUTER BASED DATA SERVICES

- These cover all text messages and computer communications carried over Telecom provided public switched networks. Thus they include: telex, telegraphic, data and document facsimile communications services. They do not include any data messages which are transmitted for reception in a visual display form (see below). Advanced services planned for future introduction by Telecom will allow both data and voice traffic to be combined into one integrated signal for transmission over digital data networks.

IMAGE SERVICES

- These include those services transmitted as some form of video signal for reception on a video display terminal, be it a television receiver or some kind of video display unit (VDU).

INTEGRATED TRAFFIC (DIGITAL DATA) SERVICES

- These are services for which digital transmission technology is used to combine two or more different types of traffic (voice and data, voice and image, or voice, image and data) into one traffic stream of a digitally encoded signal.

PRINTED DIRECTORY SERVICES

- These refer to Telecom's printed directory services.

- 3.3 It should be noted that these definitions differ in some respects from those used by Telecom.

VOICE TELEPHONY SERVICES AND APPLICATIONS

Dimensions of present telephone services

- 3.4 At June 1981 Telecom had 5 069 342 non business and business telephone subscribers.
- 3.5 Table 3.1 breaks down the total number of telephone subscribers by the type of service access provided i.e. whether connected to an automatic or manual exchange. Table 3.2 breaks down the number of total telephone subscribers into non business and business categories.

Service accessibility

- 3.6 All subscribers connected to automatic exchanges have automatic connection for both local and trunk (STD) calls. Volume 3, Section 3 gives a detailed comparison of the level of service accessibility for metropolitan and non metropolitan subscribers. At June 1981, 98.6 percent of subscribers had access to STD and over 92 percent of trunk calls were made by STD.

- 3.7 In metropolitan areas, subscribers have access to large numbers of other subscribers at local call rates -- e.g. in Sydney over 1 000 000 and in Brisbane more than 300 000. In country areas, however, only 60 percent of subscribers have access to more than 1 000 other subscribers. In some areas the number of other subscribers within the local call area is as low as 10--20.

Service penetration and quality

- 3.8 Almost every Australian business and approximately 80 percent of homes have access to a telephone service.
- 3.9 Available information indicates that the penetration of telephone services in many metropolitan areas is approaching saturation, with the figure in more recently established areas being somewhat lower. This is balanced however by the relatively low penetration levels in non metropolitan areas. Table 3.3 details penetration levels in selected metropolitan and non metropolitan areas.
- 3.10 Indicators used by Telecom to assess the quality of telephone subscriber services include:
- . total unsatisfied demand for services including the number of deferred applications (i.e. those services which cannot be provided within three months);
 - . the number of customer fault reports;
 - . call losses due to technical faults or non availability of equipment.
- 3.11 Deferred applications have fallen since the establishment of Telecom. Table 3.4 shows demand for services from 1975--81 and charts the change in that time of unsatisfied demand.
- 3.12 Over the period 1975--81 there was a growth in the demand for new services of 65.5 percent, while the proportion of unsatisfied demand as a proportion of new service connections fell by 38 percent.
- 3.13 Consistent with the relatively low penetration of services in non metropolitan areas, demand for new services and unsatisfied demand are quite high. Demand and unsatisfied demand for selected country and urban areas during 1980--81 is shown in Table 3.5.
- 3.14 The standard of service in non metropolitan areas is primarily dependent on the nature of the service available. If a subscriber is connected to an automatic service, then reliability and technical performance of that service differs little to that currently being provided to metropolitan subscribers.
- 3.15 If a service is other than an automatic service then there are significant differences. These include:
- . lack of STD facilities;
 - . limited time of access in the case of non continuous manual services;

- poor accessibility and privacy in the case of party line services;
- poor reliability -- particularly for those services connected by part privately erected lines.

Growth in services and calls

- 3.16 Table 3.6 charts the steady growth of voice telephony services between 1975 and 1981.
- 3.17 The same table also details growth trends over the same period of local and trunk telephone calls. During 1980--81, some 5 552 million local and 678 million trunk calls were made. The rate of growth in trunk calls has far outstripped that in local calls. Between 1975 and 1981 the respective increases were 96.5 percent and 56.9 percent.

Revenue

- 3.18 In 1980--81 Telecom derived \$2 342 million in revenue from subscriber telephone calls, rentals and other charges. This represented an increase since 1975--76 of 77 percent and was 89.8 percent of Telecom's total earnings. Table 3.7 charts the relevant revenue streams since 1975. Table 3.8 shows the annual rate of revenue growth over the same period.

Public telephones and leased coin telephones

- 3.19 Telecom provides a public telephone service which offers:
- telephone services for those not connected to a telephone service;
 - an emergency service;
 - a facility to the travelling public.

The number of public telephones has remained more or less static in recent years, with a total of 31 976 in operation at 30 June 1981.

- 3.20 In addition a supporting service is provided by coin telephones which are mainly leased to businesses and public organisations. Leased coin telephones do not provide the range of services available on most public telephones. They do not provide STD services and are only available during business hours.
- 3.21 In contrast to the generally static situation with public telephones, the number of leased coin telephones has doubled over the period 1977--78 to 1980--81. At 30 June 1981 there were 47 000 units in operation, with 10 500 units being installed during the year 1980--81.
- 3.22 Table 3.9 shows trends in numbers of public telephones and leased coin telephones.

Inward Wide Area Telephone Service (INWATS)

3.23 The Inward Wide Area Telephone Service (INWATS) allows a participating customer to receive telephone calls originating within specified service areas, typically at trunk call distance but with the originating caller being charged only for a local call irrespective of the origin of their call. The participating customer meets the balance of the call charge.

3.24 There are two categories of INWATS services:

- . Austwide;
- . Statewide.

The first INWATS service was introduced in Tasmania in September 1979, with the first Austwide service being established in July 1980.

3.25 In June 1982 there were 435 INWATS customers utilising 812 services. In 1981--82 over 5 million calls were made to INWATS services, with revenue from the service totalling \$45 million.

Other operator services

3.26 Telecom offers a range of operator services in addition to its operator directory assistance. They are:

- . trunk calls assistance and operator connected services;
- . service assistance (difficulties and faults);
- . international calls assistance and operator connected services;
- . wakeup or reminder calls.

Recorded information services

3.27 Recorded information services are provided:

- . solely by Telecom;
- . by Telecom with private organisations providing the recorded information;
- . by private organisations with their own recorders and information, using Telecom's public switched telephone network lines and switching.

3.28 Where private organisations provide the recorded information only, they do so under a contractual arrangement with Telecom. Where the information content of services is wholly privately provided, Telecom charges an annual fee based on rental and installation costs to the information provider. At June 1982 there were 86 private services in operation.

3.29 Details of recorded information services in operation during 1980--81 and the number of calls to those services are shown in Table 3.10.

- 3.30 In 1980--81, some 146 950 000 calls were made to recorded information services. Of these, 104 710 000 were made to Telecom services and 42 240 000 were made to private services. The number of calls represented an increase of 27 percent since 1975. A detailed breakdown of traffic movements over the period 1975--81 is given in Table 3.11.
- 3.31 Calls to recorded information services generated approximately \$13 225 000 in revenue based on local call rates.

RADIOCOMMUNICATIONS VOICE SERVICES

Introduction

- 3.32 The following paragraphs outline voice services carried over Telecom provided, operated and maintained radiocommunications networks. Services include:
- . radio paging services;
 - . the public automatic mobile telephone service (PAMTS).

Telefinder service

- 3.33 Telefinder is a service which enables radio paging of a subscriber within a certain radius of a base transmitter. The actual radius varies depending on the city or town in which the service operates as the service is guaranteed to serve the city and suburbs of the relevant town or city. The service allows subscribers to be paged through the public switched telephone network.
- 3.34 The service was introduced in 1973. Before 1978--79 Telefinder was restricted to a local paging service in each capital city and Canberra. In 1979--80 a regional service was introduced followed by a national service in February 1981. The service is now available in all capitals, Canberra, Darwin and some regional centres.
- 3.35 At June 1981 there were 70 220 telefinder services in operation. This represented an increase since June 1975 of 64 112 services. Table 3.12 gives a detailed summary of annual growth in services over the period.

Public Automatic Mobile Telephone Service (PAMTS)

- 3.36 This service allows telephone calls to be made from vehicles and other mobile units operating within a local charging area. Subscribers to the service have the same access as subscribers to the standard public switched telephone service. The service provides a number of additional features including last number redialling and visual display.
- 3.37 The PAMTS service was introduced in Melbourne and Sydney in September and December 1981 respectively. The system in each city has a nominal capacity of 4 000 customers. At 30 June 1982 there were 521 customers in Melbourne and 650 in Sydney.

REMOTE AREA SERVICES

Introduction

- 3.38 Remote areas are defined as those areas which for all practical purposes are beyond the range of the existing telecommunications network. The telecommunications needs of the approximately 44 000 people within these areas are as a general rule being served by High Frequency (HF) radio telephone services.

HF radio telephone services

- 3.39 These services are provided by Telecom and are operated from Broken Hill, Katherine and Alice Springs. The services are operated through manual exchanges and are interconnected to the national network. They are available on a 24 hour basis. The circuits are shared among a number of subscribers and are therefore highly congested with typical delay access of 4 hours.
- 3.40 Outpost HF services are provided by Telecom in Darwin and by the Royal Flying Doctor Service in 12 other localities. The service is available for use by members of the public but does not generally provide a service interconnecting to the public switched telephone network. Recently, however, users of these services have been given limited access to the network by the establishment of Radphone services from a number of RFDS outpost bases.
- 3.41 The School of the Air service operates in a similar manner to outpost services from approximately 12 base schools. It provides an educational service and is not generally available for use by the public except in emergency situations.
- 3.42 Standards of service are generally poor and are not comparable with automatic telephone services provided in metropolitan and most country areas. The services are characterised by:
- . poor technical performance subject to propagational conditions at the time;
 - . lack of privacy;
 - . difficulty of access;
 - . limited times of access.

DATA SERVICES

Telex

- 3.43 Automatic telex services were introduced in 1966. At June 1981 there were 33 975 such services in operation. This represents a growth since

June 1975 of 130 percent. In 1980--81, a total of 43 057 000 telex calls were made, an increase since 1975 of 57.4 percent. Table 3.13 gives a statistical analysis of growth in telex services and traffic over the period 1975--81.

- 3.44 Revenue from telex service rental and calls totalled \$59 175 000 in 1980--81. This represented approximately 2.3 percent of Telecom's gross earnings over the period. Table 3.14 details revenue from telex rental and calls 1975--81.
- 3.45 A public telex service has recently been established. Telecom may provide facilities at its business offices or elsewhere, or allow a telex subscriber to provide public access to equipment on his premises to send telex messages.

Telegraphy: the public telegram service

- 3.46 The public telegram service is the nation's oldest telecommunications service. Telecom has responsibility for the service within Australia. Australia Post acting as Telecom's agents accepts telegrams in hard copy form for telegraphic transmission at any post office. Telegrams may be lodged and delivered by hand, telephone or telex.
- 3.47 The number of telegrams handled over the year 1980--81 was 5 061 011 -- a drop of 68.6 percent since 1974--75.
- 3.48 Trends in telegram services and revenue are outlined in Table 3.15.

Computer-based data services

- 3.49 Telecom's data services facilitate data communications between:
- . remote terminals and computers including distributed microprocessing units and central processing units;
 - . between different computers.
- 3.50 Telecom offers two main data services:
- . the Datel service which offers:
 - a public data service where modems are provided which allow data communications over the public switched telephone network;
 - the Datel service which uses private leased lines;
 - . the analogue data service (ADS) which enables private provision of modems.

- 3.51 The Datel service was introduced in 1969. It enables transmission of data at rates of between 4 800 Bit/s to 48 KBit/s on a leased line and up to 4 800 Bit/s on the public switched telephone network.
- 3.52 At 30 June 1981 there were 43 955 data modems in operation in connection with the Datel service, an increase of 37 976 since 30 June 1975. Demand for data services makes it one of the fastest growing of all Telecom services, increasing at an average rate of 29 percent per year since 1975. Details of the growth in use of and demand for modems over the period 1975--81 is at table 3.16.
- 3.53 In 1980 the ADS was introduced for customers preferring to use data terminal equipment incorporating built-in modems. This service relaxed previous restrictions on the use of modems other than those supplied by Telecom. The ADS is an alternative to the Datel service. At present the ADS is limited to the use of integrated modems on voice bandwidth leased lines in metropolitan areas at a maximum data transmission rate of 1 200 Bits/s.
- 3.54 Service extensions are dependent on the success of initial phases of the service.

PRINTED DIRECTORY SERVICES

Printed directories

- 3.55 Printed directories are provided annually for each of the telecommunications services provided by Telecom, except non telex data services. Directories are published for public telephone (both white and yellow pages), the telex, telegraphic and facsimile services.
- 3.56 There are 53 telephone directories covering the whole of Australia, with a total distribution last year of 12 million copies. Each subscriber receives a free listing in the directory covering the area in which the service is located.

CONSULTANCY SERVICES

Consultancy

- 3.57 Telecom provides a range of formal and informal consultancy services including:
- . sales advisory and product consultancy services, giving free advice to customers on the suitability of Telecom products and services for their requirements;

- professional consultancy services, for which a fee is charged; these are generally used by larger business customers who require large or complex telecommunications networks for which standard facilities are not available.

Sales advisory consultants and product consultants are located at Telecom's Business Offices.

TELECOM'S PLANS FOR SERVICE DEVELOPMENT

Voice telephony services

- 3.58 In 1984 Telecom proposes to commence the introduction of:
- automatic customer dial-up of telephone conferences;
 - a wide range of small business systems (SBS).

Telex and 'teletex'

- 3.59 Telecom is studying the feasibility of introducing a new generation telex service call 'teletex'. The service will allow communications between word processors with an interface to telex. It offers a substantially higher transmission rate than existing telex services.
- 3.60 Teletex is planned to be introduced using the existing public switched telephone network in the same way as public Datel services operate. In addition, the packet switched network being established for the AUSTPAC service (paragraph 3.61 refers) has the inherent capability to fully support the provision of teletex services.

AUSTPAC

- 3.61 Telecom plans to introduce a digital packet switched data service (AUSTPAC) in December 1982. The service will offer:
- increased levels of performance and reliability over existing data services, using either the public switched telephone network or private leased lines;
 - the capacity to interconnect different computers and terminals;
 - suitability for transmission of small volumes of data over long distances due to volume sensitive, distance independent tariffs.

Telecom expects there to be up to 5 500 terminals operating through the AUSTPAC system by 1984 of which about 5 000 would be connected via the public switched telephone network.

Digital Data Service (DDS)

3.62 The Digital Data Service (DDS) will gradually replace the Datel Service as the main leased line service, offering speeds of 1 200 bps to 48 kbps. It will offer a basic range of point to point and multi point services functionally similar to Datel services. The transmission mode will be digital with the following features:

- . high reliability and rapid fault restoration;
- . rapid provision of services;
- . increased network design flexibility.

3.63 Long distance tariffs for the service will be less distance dependent than those of the Datel service and will be up to 70 percent lower than the equivalent Datel tariffs.

3.64 The services will commence operation in December 1982. By June 1983, Telecom expects that about 1 400 network terminating units will be in operation.

Directory services

3.65 Telecom plans to install a national computer-based directory assistance system throughout Australia at an estimated cost of \$20 million. Preliminary work began in March 1981 and Telecom expects the system to be fully operational by 1984--85. The objective is to improve the speed of service to customers while improving productivity and operator working conditions.

3.66 An automatic call distribution system is also being installed which will enable more efficient handling of calls to operators.

'Videotex' services

3.67 In 1980 Telecom proposed to the Minister for Communications that Telecom be permitted to provide 'videotex' services in Australia. The proposal was to establish in the first instance a 'videotex' service for Melbourne and Sydney which would be expanded to other capital cities and country areas.

The proposal provided for:

- . connection of users to the central information store in the public switched telephone network;
- . ownership and operation of the central information store by Telecom;

- . sale and servicing of customer terminals by private enterprise;
- . information sold over the service not to be provided by Telecom;
- . charges to customers throughout Australia to be the same and consist of a local call fee and access charges.

3.68 In October 1981 the Government decided that Telecom should not proceed with that proposal. Since that time a number of privately initiated 'videotex' pre-operational systems have commenced or been announced.

3.69 The range of services which could be provided over a 'videotex' system include:

- . residential services:
 - information input and retrieval and access to databases;
 - communication between separate terminals;
 - electronic newspapers and mail;
 - electronic games;
 - educational and encyclopaedic information;
 - shopping, ordering and banking;
 - classified advertisements;
- . business services:
 - general information services such as airline schedules, traffic and freight data, statistical and market information etc;
 - closed user group services offering specialised subscription services such as advisory services, commodity trading rates, etc;
 - in-house services such as staff news, internal directory, sales and production performance etc.

Two-way (interactive) services

3.70 Developments in telecommunications and computer technology enable residential users to be linked to a broad range of interactive or 'two-way' services via a two-way cable.

3.71 The Report of the Australian Broadcasting Tribunal on the introduction of cable and subscription television services in Australia indicated that the main advantage of the services is access to information retrieval systems, computational systems and networks. It lists possible two-way services as:

- . interactive instructional programs;
- . fire and burglar alarm monitoring;
- . interactive video and computer games;
- . remote shopping;

- electronic mail delivery;
- electronic delivery of newspapers and periodicals;
- computer time sharing;
- catalogue displays;
- stock market quotations;
- transportation schedules;
- reservation services;
- banking services;
- direct opinion response on local issues;
- electronic voting;
- interactive counselling;
- library, reference and other information retrieval services;
- dial up video and audio libraries.

PLANNED EXPANSION OF THE MARKET: AUSSAT AND THE NATIONAL SATELLITE SYSTEM

Service capability

- 3.72 The national satellite system scheduled to be operational by 1985 is designed with the capability to cater for the following prime service requirements:
- remote area communications including:
 - remote telephony subscriber satellite service (RTSS);
 - improved communications for the School of the Air services;
 - ABC Homestead and Community Broadcasting Satellite Service (HACBSS);
 - general broadcasting applications:
 - television and radio programme assembly and distribution between station and studio centres;
 - relay of television and radio programme material from an originating studio to regional terrestrial transmitters;
 - aeronautical communications applications:
 - air traffic control via high reliability voice and data communications between manned control centres;
 - equally reliable voice links for unmanned air-ground-air VHF repeater station air traffic control operations;
 - offshore communications services to provide general and specialised communications services to Norfolk Island, Lord Howe Island, and the Northwest Shelf;

- Telecom trunk provisioning additional to that required for isolated areas to provide itinerant and back-up capacity for Telecom's main trunk route services;
- miscellaneous business uses for an unspecified range of audio, image and data communications applications for both institutional and business traffic;
- emergency and disaster communications applications via transportable earth stations to facilitate rapid temporary restoration of services for essential communications, together with public safety and law enforcement communications in the event of national emergency or disaster;
- specialised remote sensing applications, e.g. operation of remote sensing services via geographically dispersed data collection platforms for earth resources monitoring and evaluation for both public and private sector users;
- communications services for Papua New Guinea, specifically:
 - thin route rural telephony services to be operated by the PNG Postal and Telecommunications Department similar to those to be provided by Telecom for Australia;
 - distribution of a national television service in PNG.

3.73 Table 3.17 details projected NSS user requirements.

INQUIRY SURVEY OF POTENTIAL BUSINESS USER SERVICE REQUIREMENTS AND APPLICATIONS

Survey scope

3.74 In the course of the Inquiry a confidential survey of potential user requirements and service applications using the national satellite system was undertaken. Relevant matters covered by the survey included:

- views of existing major users of telecommunications services on the advantages of service delivery via satellite in preference to existing Telecom terrestrial transmission facilities;
- specific services being considered for delivery via the national satellite system by existing Telecom major business customers;
- particular services applications not deliverable by existing terrestrial transmission facilities on the grounds of either performance capability, constraints or cost effectiveness;

- criteria which would lead existing major business customers to use the national satellite system in preference to the national terrestrial network for specified services.

3.75 Responses to the Inquiry survey canvassed the views of a representative sample of Telecom's existing major business customers. Those whose views were represented account for some five percent of Telecom's present gross earnings.

Advantages of service delivery via satellite

3.76 Relevant responses on the above were couched in the following typical terms:

- ownership of earth stations would give users control, security and flexibility;
- high bandwidth transmission capability;
- flexibility for variable transmission speeds through dynamic allocation of traffic;
- ready accessibility to any desired location;
- broadcast ability for economic multipoint distribution;
- distance independent costs;
- alternative or back-up to Telecom subject to cost effectiveness over distance;
- installation under control of user, independent of a third party;
- greater flexibility for users enabling dynamic assignment of traffic on demand (by volume and time) because of greater nodal connectivity than available with terrestrial circuits.

Specific services being considered for delivery via the NSS

3.77 In relevant responses many of the points covered under the previous sub-heading were addressed. Further applications identified were:

- economic connection of dial up terminals in remote regions (i.e. remote job entry (RJE) applications for multipoint access to a central database);
- videoconferencing applications (far less costly via satellite);
- wide bandwidth digital communications such as computer load sharing, distributed data processing and electronic document distribution;

- . improved quality, flexibility and accessibility for distribution of television services;
- . all transmission services if economics are favourable.

One organisation expressed the negative view that on present projected cost estimates few of the services offered would be more cost effective compared with existing services.

Service applications constrained by technical characteristics and availability of existing national terrestrial transmission systems

3.78 Respondents typically identified the following for user services and applications:

- . a private wideband data distribution system;
- . computer load sharing;
- . videoconferencing;
- . broadcast facsimile image traffic;
- . distributed electronic printing;
- . broadcast update of working data bases for access by home computers;
- . transmission of wideband video services for distribution to local multipoint distribution systems (via cable or fibre optic).

User criteria for use of the NSS in preference to existing terrestrial transmission facilities

3.79 Major telecommunications users endorsed the following criteria for preferential use of the NSS:

- . cost effectiveness;
- . availability;
- . reliability;
- . flexibility;
- . security (e.g. independence from land lines);
- . response times.

3.80 Most respondents placed great emphasis on the interdependence of cost, availability, reliability and flexibility of comparable facilities as a factor influencing selection of terrestrial versus satellite distribution systems.

Table 3.1: Subscriber telephone facilities and services

TYPE OF SERVICE	TYPE OF CONNECTION	NUMBER OF SERVICES
Ordinary exchange services	Automatic	4 508 498
	Manual	54 841
	Total	4 563 339
Party line services	Automatic	710
	Manual	3 663
	Total	4 373
Private branch exchange services	Automatic	467 548
	Manual	2 106
	Total	469 654
Public telephones	Automatic	30 877
	Manual	1 099
	Total	31 976
Total Services		5 069 342

Source: Telecom Annual Report 1980--81

Table 3.2: Subscriber categories

TYPE OF CONNECTION	BUSINESS	NON BUSINESS
Automatic	1 360 024	3 647 609
Manual	29 509	32 200
Total services: 5 069 342		

Source: Telecom Annual Report 1980--81

Table 3.3: Residential telephone penetration at 30 June 1979

DISTRICT	TOTAL CHARGEABLE SERVICES	NO. OF DWELLINGS
Bankstown	117 779	133 536
Chatswood	93 034	69 898
Kempsey	29 481	37 796
Dubbo	38 946	50 894

Source: Telecom data

Table 3.4: Demand for telephone services 1975--81

YEAR	DEMAND NO. OF NEW SERVICES	CHANGE %	NO. OF NEW CONNECTIONS	CHANGE %	UNSATISFIED DEMAND	CHANGE %	UNSATISFIED DEMAND/ NEW SERVICE CONNECTIONS %	CHANGE %
1974	394 291	-	368 182	-	116 000	-	31.5	-
1975	332 391	(15.7)	345 529	(6.2)	102 000	(12.1)	29.5	(6.3)
1976	318 010	(4.3)	335 484	(2.9)	86 000	(15.7)	25.6	(13.2)
1977	376 408	18.4	375 648	12.0	86 000	0	22.9	(10.5)
1978	423 286	12.5	432 701	15.2	75 000	(12.8)	17.3	(24.5)
1979	465 186	9.9	462 300	6.8	78 000	4.0	16.9	(2.3)
1980(1)	499 590	7.4	499 836	8.1	79 000	1.3	15.8	(6.5)
1981(1)	550 026	10.1	530 653	6.2	97 000	22.8	18.3	15.8

(1) 1979--80 and 1980--81 figures are not directly comparable with previous years due to four weekly reporting.

Source: Telecom annual reports and Telecom data

Table 3.5: Demand for telephone services in metropolitan and non metropolitan areas 1980--81

	KEMPSEY	DUBBO	BANKSTOWN	CHATSWOOD
Applications	6 721	5 136	14 826	4 591
Demand as % of services	22.2	12.6	12.5	4.9
No. of new connections	4 152	4 331	13 7	4 361
Unsatisfied demand	2 569	805	1 059	230
Unsatisfied demand/ new service connections	66.9	18.6	7.7	5.3

Source: Secretariat Analysis of Telecom Data

Table 3.6: Growth in telephone services and calls 1975--81

YEAR	NUMBER OF SERVICES	GROWTH %	NO. OF LOCAL CALLS (MILLIONS)	GROWTH %	NO. OF TRUNK CALLS (MILLIONS)	GROWTH %	TOTAL NO. OF CALLS (MILLIONS)	GROWTH %
1974	3 361 190	-	3 357	-	312	-	3 669	-
1975	3 538 948	5.3	3 560	6.0	345	10.6	3 905	6.4
1976	3 700 195	4.6	3 720	4.5	374	8.4	4 094	4.8
1977	3 907 043	5.6	3 924	5.5	412	10.2	4 336	5.9
1978	4 165 945	6.6	4 186	6.7	462	12.1	4 648	7.2
1979	4 449 468	6.8	4 483	7.1	523	13.2	5 006	7.7
1980	4 742 662(1)	6.6	5 061(2)	12.9	582(2)	11.3	5 643	12.7
1981	5 069 342(1)	6.9	5 552(2)	9.7	678(2)	16.5	6 230	10.4

(1) These figures show the number of services in operation at 18 June 1980 and 17 June 1981

(2) Local and STD figures for 1979--80 and 1980--81 are not comparable with those for previous years.

Source: Telecom Annual Reports.

Table 3.7: Revenue derived from subscriber telephone calls and other charges

	RENTAL	CONNECTION FEES	TRUNK (STD, MANUAL & OVERSEAS INCL. ISD)	LOCAL	TOTAL CALLS	TOTAL CALLS & RENTAL	TOTAL CALLS & RENTAL & CONNECTIONS	OTHER	TOTAL TELEPHONE
	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000	\$'000
1975--76	416 831	58 447	469 388	370 192	839 580	1 256 411	1 314 858	16 281	1 331 139
1976--77	454 111	77 465	565 422	401 909	967 331	1 421 442	1 498 907	8 039	1 506 946
1977--78	495 420	80 719	662 625	416 205	1 078 830	1 574 250	1 654 969	8 006	1 662 975
1978--79	533 295	88 206	808 496	402 561	1 211 057	1 744 352	1 832 558	10 478	1 843 036
1979--80	602 655	102 091	923 417	431 957	1 355 324	1 958 029	2 060 120	12 413	2 072 532
1980--81	674 102	119 556	1 033 442	499 729	1 533 171	2 207 273	2 326 829	15 060	2 341 889

Source: Telecom data

Table 3.8: Percentage growth in telephone revenue

	RENTAL	CONNECTION	TRUNK	LOCAL	TOTAL CALLS	TOTAL CALLS & RENTAL	TOTAL CALLS & RENTAL & CONNECTIONS	OTHER	TOTAL TELEPHONE
	%	%	%	%	%	%	%	%	%
1976--77	8.9	32.5	20.5	8.6	15.2	13.1	14.0	(50.6)	13.2
1977--78	9.1	4.2	17.2	3.6	11.5	10.8	10.4	0	10.4
1978--79	7.6	9.3	22.0	(3.3)	12.3	10.8	10.7	30.9	10.8
1979--80	13.0	15.7	14.2	7.3	11.9	12.2	12.4	18.5	12.5
1980--81	11.9	17.1	11.9	15.7	13.1	12.7	12.9	21.3	13.0

Source: Secretariat analysis of Telecom data

Table 3.9: Growth in public and leased coin telephone services

	PUBLIC		LEASED COIN	
	NO.	CHANGE %	NO.	CHANGE %
1975--76	32 925		n/a	
1976--77	32 814	(0.34)	n/a	
1977--78	32 538	(0.85)	24 000(1)	
1978--79	32 248	(0.90)	31 559(1)	31.5
1979--80	32 255	0.02	37 459(1)	18.7
1980--81	31 976	(0.87)	47 000	25.5

(1) Redphones only

Source: Telecom Annual Reports

Table 3.10: Recorded information services

SERVICE	CALLS (millions)
<hr/>	
TELECOM SERVICES:	
Time	72.56
Weather	13.90
Sport (total)	10.24
Stock exchange	5.06
Boating weather	1.62
Others	1.33
Total Telecom	104.71
<hr/>	
PRIVATE SERVICES:	
TAB	14.07
News	8.00
Dial-a-record	7.86
Horoscope	1.99
Pools results	1.59
Exchange rates	1.05
Lotto results	1.04
Others	6.65
Total Private	42.24
<hr/>	
Total Telecom & Private	146.95
<hr/>	

Source: Telecom data

Table 3.11: Growth in calls related to recorded information services

YEAR	COMMISSION SERVICES ('000)	GROWTH %	PRIVATE SERVICES ('000)	GROWTH %	TOTAL SERVICES ('000)	GROWTH %
1974	99 354	-	21 544	-	120 898	-
Base Year						
1975	96 943	(2)	18 818	(13)	115 761	(4)
1976	82 614	(15)	18 895	0	101 509	(12)
1977	83 578	1	22 352	18	105 930	4
1978	86 741	4	21 998	(2)	108 739	3
1979	93 622	8	28 443	9	122 065	12
1980	103 700	11	41 384	6	145 084	19
1981	104 707	1	42 235	2	146 942	1

Source: Telecom Annual Reports

Table 3.12: Telefinder services in operation 1975--81 (1)

	NO. OF SERVICES	% GROWTH
1974	2 184	
1975	6 108	179.7
1976	9 761	59.8
1977	16 275	66.7
1978	26 981	65.8
1979	39 604	46.8
1980 (2)	52 190	31.8
1981 (2)	70 220	34.5

(1) A count of exchange numbers allocated in the provision of single and dual Telefinder services.

(2) 1979--80 and 1980--81 figures are not directly comparable with previous years due to four weekly reporting.

Source: Telecom Annual Reports

Table 3.13: Growth in telex services 1975-1981

YEAR	NUMBER OF SERVICES	GROWTH %	NUMBER(1) OF CALLS '000	GROWTH %	DEMAND FOR NEW SERVICES	GROWTH %	CONNECTIONS OF NEW SERVICES %	GROWTH %
1974	12 857	-	21 490	-	3 475	-	3 282	-
1975	14 766	14.8	27 356	27.3	3 352	(3.5)	3 375	2.8
1976	17 047	15.4	27 036	(1.2)	3 834	14.4	3 965	17.5
1977	19 601	15.0	29 435	8.9	4 391	14.5	4 319	8.9
1978	22 724	15.9	32 177	9.3	5 366	22.2	5 156	19.4
1979	25 901	14.0	35 797	11.3	6 010	12.0	5 448	5.7
1980(2)	29 731	14.8	37 415	4.5	6 629	10.3	6 777	24.4
1981(2)	33 975	14.3	43 057	15.1	7 916	19.4	7 816	15.3

(1) Includes only those originating and terminating within Australia.

(2) 1979--80 and 1980--81 figures are not directly comparable with previous years due to four weekly reporting

Source: Telecom Annual Reports

Table 3.14: Telex revenue 1975--81

YEAR	TELEX RENTALS \$ 000	GROWTH %	TELEX CALLS \$ 000	GROWTH %	TOTAL REVENUE \$ 000	GROWTH %	PROPORTION OF TOTAL EARNINGS %
1974	9 607	-	8 513	-	18 120	-	-
1975	11 481	19.5	11 759	38.1	23 240	28.3	2.2
1976	14 090	22.7	17 417	48.1	31 507	35.6	2.2
1977	16 219	15.1	20 021	15.0	36 240	15.0	2.2
1978	18 655	15.0	26 081	30.3	44 736	23.4	2.4
1979	21 495	15.2	24 890	(4.6)	46 385	3.7	2.3
1980	25 644	19.3	28 936	16.3	54 580	17.7	2.4
1981	29 830	16.3	29 345	1.4	59 175	8.4	2.3

Source: Telecom Annual Reports

Table 3.15: Trends in telegram traffic

YEAR	TRAFFIC '000	CHANGE %	REVENUE \$'000	CHANGE %
1974	18 002		19 499	
1975	16 093	(10.6)	25 775	32.2
1976	12 930	(19.7)	29 423	14.2
1977	10 397	(19.6)	31 511	7.1
1978	8 966	(13.8)	31 303	(0.7)
1979	7 076	(21.1)	35 187	12.4
1980	5 431	(23.2)	32 497	(7.6)
1981	5 061	(6.8)	33 006	1.6

Source: Telecom Annual Reports

Table 3.16: Data modems in operation 1975--1981

YEAR	NUMBER OF MODEMS IN OPERATION	CHANGE %	DEMAND FOR NEW DATA MODEMS	CHANGE %	CONNECTIONS OF DATA MODEMS	CHANGE %
1974	3 728		2 537		2 053	
1975	6 019	61.5	3 686	45.3	2 917	42.1
1976	9 139	51.8	4 838	31.3	4 144	42.1
1977	13 792	50.9	5 934	22.7	5 865	41.5
1978	19 286	39.8	7 541	27.1	7 123	21.4
1979	26 291	36.3	10 349	37.2	9 240	29.7
1980(1)	35 299	34.3	12 559	21.4	12 544	35.8
1981(1)	43 955	24.5	14 895	18.6	13 900	10.8

(1) 1979--80 and 1980--81 figures are not directly comparable with previous years due to four weekly reporting.

Source: Telecom Annual Reports

Table 3.17: Projected estimates of NSS user requirements as at September, 1982

USER	APPLICATIONS	INDICATIVE TRANSPONDER REQUIREMENTS	
		MIN NR	MODE
ABC	TV programme assembly, production and exchange	3	FSS
ABC	HACBSS	4	BSS
Combined commercial) television licensees)		5	FSS
PNG Government	HACBSS	1	BSS
- To be decided	second HACBSS	4	BSS
PBAA	Radio programme assembly, production and exchange	-	FSS
SBS/	TV/Radio programme assembly, production and exchange	1	FSS
Telecom	Remote area communications)		
	Main telephony trunk/backup)	1	FSS
DOT	Aeronautical communications	4	FSS
Major business	voice/data/image	2	FSS
Miscellaneous business/institutional	voice/data/image	1	FSS
PNG	telephony	2	FSS
TOTAL FSS		19	FSS
TOTAL BSS		9(1)	BSS
COMBINED TOTAL		28	

(1) There are only four BSS transponders per satellite spacecraft. If PNG does use one BSS transponder, some adjustment would need to be made re allocation of BSS transponders on the second in-orbit satellite.

Source: Analysis of data available to Committee

SECTION 4

TELECOM PRICING POLICIES AND CHARGES

Prepared by the Secretariat of the Telecommunications Inquiry

INTRODUCTION

Scope

4.1 This section gives background information on Telecom's pricing policies and charges. For ease of reference to relevant chapters in Volume 1 of the Committee's Report, the section deals with pricing policies and charges under the following classifications:

- . leased Telecom network capacity;
- . part privately erected (PPE) lines;
- . terminal equipment;
- . network services and other customer services.

Leased lines

4.2 Telecom currently categorises 'leased line services' to include all aspects of leased line supply, installation and maintenance together with associated facilities (e.g. modems). This section makes a distinction between transmission systems (the leased lines) and terminal equipment (modems).

Part privately erected (PPE) lines

4.3 In rural country areas there are some 20 000 PPE lines. These lines are installed by subscribers living beyond the limits of Telecom's existing national terrestrial network. They may be exclusive (i.e. reserved for the sole use of one subscriber) or shared (i.e. party lines). Cost of installation and maintenance of PPE lines has in the past largely been borne by the subscriber. Telecom's past and present policies on subscriber capital contribution to lines connecting subscribers to the nearest local exchange in rural country areas is discussed at paragraphs 4.18--4.22.

Terminal equipment

4.4 This section covers installation, rental and maintenance charges in respect of items of terminal equipment (e.g. telephone handsets, PABX's, PMBX's, small business systems (SBS), teleprinters, telegraph terminals, Telefinder paging units and the public automatic mobile telephone service (PAMTS) transceivers etc).

Network services

- 4.5 Network services are those which require access to Telecom's public switched networks for calls and messages between terminals located on customer premises for which call fees apply.

LEASED TELECOM LINES

Rentals for leased lines: charging principles

- 4.6 Rentals for leased capacity may or may not reflect the period of time for which the user transmits traffic over the line or the volume of traffic transmitted while the line is in use. Connection charges are designed to recoup part of the installation costs. They vary according to the type of line and the technology involved.
- 4.7 In certain cases, the trunk portion of a line may be leased on a part time basis. In that case annual rentals are set having regard to the potential use of that capacity. Leased lines may be provided on a temporary basis -- six months or less -- in which case the rental charge reflects a recovery of overhead and administrative costs in a shorter time span.
- 4.8 For temporary leasing, Telecom's standard approach is to double the rental involved, with a ceiling limit equivalent to the rental for one year. Special tariffs apply to television relay and broadcast lines leased on a temporary basis.
- 4.9 Temporary television relay and broadcast lines are leased on an itinerant basis, with rental charges reflecting:
- . the time for which the line is requested;
 - . the distance involved;
 - . the line quality required.
- 4.10 In respect of television relay 'tail' lines (i.e., lines within a local call area) the first line is charged at \$500 per radial half kilometre and the second and each subsequent lines at \$350 per radial half kilometre. It is Telecom's stated policy to remove this discount.

Group and supergroup lines (wideband capacity): rentals

- 4.11 For group and supergroup circuits (providing bandwidth equivalent to 12 and 60 times that of a voice grade private line respectively) the tariff is currently 10 times and 40 times respectively that for a single leased line over the same distance.
- 4.12 These discounts apply to multiple leases over the same route by the same customer. There is no discounting based on overall aggregation of lines leased by an individual customer.

Other private lines: rentals

- 4.13 Other private line rentals and charges do not reflect the effective use actually made of the lines by the customer. They are not based on either the period of time for which the user transmits traffic over the line, or the volume of traffic transmitted while the line is in use. Typically, the price (and cost) components of line rentals are set to recover:

- . fixed overhead elements;
- . distance dependent elements;
- . part distance dependent elements (for example, regeneration conditioning equipment).

- 4.14 Standard rental charges cover the costs of providing the leased line and standard line termination equipment only. Where line conditioning equipment or regeneration equipment is required to ensure line quality (e.g., to minimise signal loss during transmission), then the line rental is adjusted to reflect the costs of such conditioning.

Line connection charges

- 4.15 Connection charges are formulated to recover some of the costs associated with:

- . service provision in the first instance;
- . labour and materials involved in the design, administration and installation processes.

- 4.16 The connection fee varies with the type of line and hence the technology involved. As a general rule, where standard types of leased lines are involved (for example, voice grade private lines such as alarm, security, tie line and outdoor extensions), standard and universal connection charges based on average costs apply. In the case of non standard or developing services -- where experience is too limited to allow for the development of reliable average costs (e.g., wideband services) -- connection charges are assessed and applied on a case by case basis. In many cases the terminal equipment connected to leased private lines at the customer's premises has been purchased separately by the customer and is subject to a permit to attach. Where the terminal equipment is sold or rented by Telecom, line rental charges and terminal equipment rental and maintenance charges are distinct and separate.

- 4.17 The following table lists charges for selected annual full time rental tariffs (excluding tails) over selected charging distances effective 1 September 1982.

Table 4.1: Annual rental charges for leased line categories over
selected traffic routes

(a) <u>Sydney--Canberra</u> (249 km)	
	Effective
	1.9.82
	\$
. Telegraph line (50 and 75 Baud):	3 260
. Telephone line:	4 810
. Data (Datel) lines:	
-- 2 400 Bit/s	6 939
-- 4 800 & 9 600 Bit/s	7 357
-- 48 000 Bit/s	24 835
. Two way television relays:	
-- protected	209 600
-- unprotected	178 160
(b) <u>Sydney--Melbourne</u> (718 km)	
	Effective
	1.9.82
	\$
. Telegraph lines (50 and 75 Baud):	5 372
. Telephone line:	9 500
. Data (Datel) lines:	
-- 2 400 Bit/s	12 098
-- 4 800 & 9 600 Bit/s	13 454
-- 48 000 Bit/s	56 276
. Two way television relays:	
-- protected	584 800
-- unprotected	497 080

(c) Sydney--Adelaide (1 175 km)

Effective
1.9.82

\$

. Telegraph line (50 and 75 Baud):	7 428
. Telephone line:	14 070
. Data (Datel) lines:	
-- 2 400 Bit/s	17 125
-- 4 800 & 9 600 Bit/s	19 395
-- 48 000 Bit/s	86 895
. Two way television relays:	
-- protected	950 400
-- unprotected	807 840

(d) Sydney--Perth (3 331 km)

. Telegraph line (50 and 75 Baud):	13 932
. Telephone line:	29 237
. Data (Datel) lines:	
-- 2 400 Bit/s	28 055
-- 4 800 & 9 600 Bit/s	32 506
-- 48 000 Bit/s	171 679
. Two way television relays:	
-- protected	2 589 960
-- unprotected	2 205 728

NETWORKS: PPE LINES

Telecom's capital contribution policy

- 4.18 Volume 2, Sections 1--2 and Volume 3, Section 3 refer to Telecom's general policies and procedures for provision of PPE lines. Discussion in this section is confined to policies and procedures affecting subscriber costs associated with installation and maintenance of PPE lines and their connection to the nearest local exchange.
- 4.19 Under past Telecom policies, certain non metropolitan subscribers were required to make a capital contribution to the cost of provision of lines between their premises and the nearest local exchange. The extent of the capital contribution was dependent on the distance between the subscriber's premises and the nearest local exchange. Paragraphs 4.21--4.22 summarise changes in relevant Telecom policies and capital contribution requirements and charges since 1950.

4.20 Prior to 1 January 1982, a capital contribution based on the distance between the subscriber and the nearest local exchange was required from rural country subscribers for:

- . connection of a new service;
- . upgrading of an existing service as part of the rural conversion program.

Telecom's rural conversion program -- discussed in detail in Volume 3, Section 3 -- is concerned with conversion of all remaining manual exchanges to automatic operation by the year 1990.

Changes 1950--1982

4.21 A chronology of changes in capital contribution policies and related charges is outlined below:

- . Before 1950, an applicant for connection of a new subscriber telephone service was entitled to a specific grant towards the cost of the line connecting the subscriber to the nearest local exchange. Any capital costs for line provision in excess of that grant were borne by applicants. Once lines were installed, subscribers had to maintain that section of the line beyond a prescribed distance from the local exchange.
- . In 1950, the Australian Post Office (APO) introduced a policy whereby applicants made no contribution to the capital costs of subscriber lines within a few kilometres distance from the nearest local exchange. This came to be known as the 'free line plant entitlement' ('free line'). The length of the 'free line' depended on whether the line provided was connected to an existing APO transmission system (route) or whether wholly new subscriber line construction was required.
- . In 1970, the 'free line' limit was extended to a point 24 kms radial distance from the nearest local exchange. The demand for new connections generated by introduction of this policy placed a heavy strain on APO capital resources.
- . In 1973, the APO introduced a revised 'free line' policy. Under this policy, the APO bore the capital cost of external plant provision for connection of all new services for subscribers whose premises were located within 8 kms radial distance from the designated local exchange. A mandatory contribution towards the capital cost of plant provision beyond that distance of \$160 per half radial kilometre was payable by the applicant.
- . In 1976, the 'free line' entitlement was extended from eight to 12 kilometres for certain services.

- . In 1977, the 'free line' entitlement was further extended to 16 kms for new subscriber services to be connected to an automatic exchange, or for those services to be upgraded from manual to automatic connection. This applied to services programmed for conversion from manual to automatic within two years of the date of application.
- . In the same year (1977) subscribers connected to local exchanges via VHF Motorola radio telephony group transmission systems were given the option of paying a fixed annual rental of \$500 in lieu of both capital contribution and connection charges where no repeater was required in the radio link connecting the subscriber to the nearest local exchange.
- . In 1978, the fixed annual rental option was extended to all rural subscribers beyond the 'free line' distance irrespective of the type of service or the manner of provision.

Revised rural charges effective 1 January 1982

- 4.22 Effective 1 January 1982, Telecom introduced a new policy to replace both the \$160 per half radial kilometre beyond the 'free line' distance and the \$500 fixed annual rental options. As expressed in advice from Telecom:

"The (new) rural connection and conversion fees are not direct capital contributions based on the cost of the length of line but are service fees reflecting the higher average costs of provision of services in rural areas. The rural fees, which are related to the standard fee, are considerably lower than charges levied under former rural policies but reflect the higher increased irrecoverable costs of providing services in rural areas."

TERMINAL EQUIPMENT

Overview

- 4.23 For charging purposes, Telecom categorises terminal equipment into 'basic' and 'non basic' categories. 'Basic' terminal equipment refers only to the first or 'standard' telephone handset installed on the premises of a subscriber.
- 4.24 Telecom charges for terminal equipment are set for:
- . installation;
 - . rental (including maintenance);
 - . removal (relocation).

- 4.25 Installation charges are those made for connection of a new subscriber service. They relate to provision of terminal equipment and internal wiring on customer premises and any other subscriber external plant required to connect the service to the designated local exchange. They are once only or non recurrent charges.
- 4.26 Rental charges are the recurrent charges set by Telecom for subscriber services facilitated by connection to the national terrestrial network through actuation of Telecom supplied, installed or maintained terminal equipment. The scales of rental charges vary according to the type of service provided (e.g. telephone, telex, data), the type of terminal equipment through which the service is accessed and whether it is a business or non business service. As a general rule, rental charges include any maintenance by Telecom of terminal equipment on subscriber premises together with associated wiring on such premises and subscriber external plant. The rental charges set by Telecom may or may not cover the actual maintenance costs incurred by Telecom in provision of the service.
- 4.27 Removal charges are levied for relocation of terminal equipment either within the same subscriber premises on which the equipment was installed, or to another distant location -- e.g., when a non business subscriber moves house, or a business subscriber moves from existing to new premises.
- 4.28 This sub-section does not attempt an exhaustive summary of installation and rental charges for all terminal equipment. Instead, related charges for selected representative services are identified.

The first or standard telephone handset

- 4.29 Present Telecom charges for provision of the first Telecom handset or subscriber premises are summarised in Table 4.2 on the following page.

Table 4.2: 'First' telephone handset on subscriber premises

SUBSCRIBER CATEGORY	ITEM	INSTALLATION CHARGES		RENTAL CHARGES QUARTERLY	
		NEW CONNECTION \$	CONNECTION AS IN PLACE SERVICE \$	BASIC RENTAL \$	PENSIONERS CONCESSIONAL RENTAL \$
Non business	Colorfone	)	15 for	26.25	17.50
	Wallfone	) 150	first in place service	26.25	
Business	Colourfone	)	10 for	45.00	-
	Wallfone	) 150	each additional in place service (also applies to non business)	45.00	-

Source: Telecom

Business PABX's

4.30 Table 4.3 sets out Telecom rental charges for selected PABX systems.

Table 4.3: PABX rental charges

TYPE OF PABX	ANNUAL RENTAL CHARGE \$
ARD 520 (per PABX)	480
Other types (per rental unit)	84
Contractor supplied (per maintenance unit)	34

Source: Telecom

Business PMBX's

4.31 Details of PMBX installation and rental charges are given in Table 4.4 below:

Table 4.5: PMBX installation and rental charges

TYPE OF PMBX	INSTALLATION CHARGES (ONCE ONLY)		QUARTERLY RENTAL CHARGE	
	SWITCH- BOARD	PER EXTENSION TELEPHONE	SWITCH- BOARD	PER EXTENSION TELEPHONE
	\$	\$	\$	\$
Cordless type with capacity for --				
. 2 telephone lines and 6 extensions	288.00	63.00	46.00	5.00
. 3 telephone lines and 12 extensions	388.00	63.00	77.50	5.00
. 4 telephone lines and 10 extensions	388.00	63.00	117.50	5.00
. 5 telephone lines and 16 extensions				
Cord type with capacity for --				
. 40 extensions	891.00	63.00	267.50	5.00
. 80 extensions	1 089.00	63.00	495.00	5.00

Source: Telecom

Small business systems (SBS)

4.32 Table 4.5 gives details of installation and rental charges for selected SBS Terminal equipment.

Table 4.5: SBS installation and rental charges

TYPE OF SBS	INSTALLATION CHARGES (ONCE ONLY) BUSINESS	QUARTERLY RENTAL CHARGES
	\$	\$
Intercom System 1/2	139.00	30.00
Intercom System 1/3 main handset with --		
. one indoor point	139.00	36.00
. two indoor points	202.00	46.50
one outdoor point	)	36.00 (2)
two outdoor points	) POA (1)	46.50 (2)
Commander 'N' and 'S' Series --		
. designed to suit your individual needs	POA (1)	

(1) Price available on application

(2) Does not include outdoor line rental charge

Source: Telecom

Teleprinters (Telex service)

- 4.33 Previously, teleprinters have only been available for rental by subscribers. Effective 1 September 1982, Telecom introduced a cash sale option for telex subscribers. Installation and rental charges for terminal equipment enabling subscribers to access the telex service were increased as of 1 September 1982. For rentals, the increase for some items was 28 percent. Present charges are set out in Table 4.6 below:

Table 4.6: Telex terminal equipment charges

TYPE OF EQUIPMENT	INSTALLATION	ANNUAL RENTAL
	CHARGE (ONCE ONLY) \$	CHARGES \$
<hr/>		
FOR A NEW SERVICE		
<u>Send/receive page</u>		
<u>teleprinter</u>		
. basic unit	300	1 080
. with tape transmitter	300	1 356
. with tape perforator	300	1 410
. with tape perforator and transmitter	300	
-- MIDO KPT		1 584
-- TX 20		1 752

Source: Telecom

- 4.34 Rental and maintenance charges for teleprinters and accessories have been increased. These increases are consistent with rises in teleprinter charges on telex services. Table 4.7 below gives relevant details.

Table 4.7: Teleprinter rentals

ITEM	ANNUAL RENTAL CHARGES
	\$
(a) Teleprinters	
5 level	768.00--1 584.00
7 level	1 200.00--2 400.00

Source: Telecom

Radio paging service (Telefinder)

- 4.35 Telefinder subscribers purchase or lease the paging unit privately from an approved supplier and obtain a telephone number from Telecom. Telecom advises that Telefinder subscribers are charged an annual rental fee. This fee is a contribution towards costs and profits and covers the cost of providing the transmitter, paging terminal, wires from the terminal to transmitter and wires from the terminal to the telephone set.
- 4.36 A new 'multi-regional' service is to be introduced in late 1982. This service is a selected extension of the existing 'regional area' service and is designed to meet the needs of commercial travellers. Telecom advises that it fills the void between 'regional area' and 'national' services and when introduced will allow customers to operate in two regions within a State (e.g., Melbourne and Ballarat).

- 4.37 Table 4.8 following sets out Telefinder charges applicable 1 September 1982.

Table 4.8: Telefinder charges

ITEM	ANNUAL
	RENTAL CHARGES \$
Home Area Service	69.00
Regional Area Service	120.00
Multi-Regional Service (i.e. Melbourne and one other region <u>or</u> Sydney and one other region	168.00
National Service	225.00

Source: Telecom

Public automatic mobile telephone services (PAMTS)

- 4.38 The PAMTS was introduced in Melbourne and Sydney in September and December 1981 respectively. The service provides PAMTS subscribers with a mobile automatic telephone service. The service gives subscribers access to the public switched telephone network broadly within the metropolitan charging zone and includes facilities such as display of a called number and a memory store of 16 numbers.
- 4.39 Telecom permits PAMTS subscribers to rent or purchase mobile transceiver equipment. In either case, a network rental ('facility') charge is payable by the subscriber. Components of the 'facility' charge are summarised in Table 4.9 below.

Table 4.9: PAMTS purchase and 'facility' charges

PURCHASE AND FACILITY CHARGE COMPONENTS	ANNUAL CHARGING RATE \$
<u>Network facility charge</u>	800
<ul style="list-style-type: none"> includes maintenance of -- Mobile transceiver unit whether owned by the subscriber or rented from Telecom 	
<ul style="list-style-type: none"> Transceiver unit rental 	1 000
<u>Purchase</u>	
<ul style="list-style-type: none"> Transceiver unit -- including sales tax 	5 370

Source: Telecom

NETWORK SERVICES

Voice telephony pricing policy

4.40 The call charging structure is based on a system which groups exchanges into zones and charging districts. This system is described by Telecom as group charging. Charges fall into two basic categories:

- local call rates;
- trunk call rates.

Local call charges

4.41 Local call charges are not time based. They apply to calls between subscribers connected to exchanges in the same and adjoining charging zones. This zoning arrangement is predominantly distance related. Under this arrangement, subscribers have access at local call rates to all other subscribers typically located within 32 kilometres of other subscribers.

Trunk call charges

- 4.42 Trunk call charges are time based. They apply to calls made between non adjoining charging zones. Two categories of trunk charging rates apply:
- . calls between zones in the same or adjacent charging districts are based on the distances between zone centres;
 - . calls between zones in different non adjoining charging districts are based on distances between the various centres in the charging districts.
- 4.43 There are two types of trunk calls:
- . operator connected calls -- e.g. national or international trunk calls connected by a Telecom operator. In the case of national trunk calls, a surcharge applies if the called number could have been accessed direct via STD facilities;
 - . metered calls over trunk distances are charged at different rates for:
 - STD calls;
 - Community Access calls;
 - INWATS.

Charging policies applicable to each call category are outlined in the following paragraphs.

STD call charges

- 4.44 STD calls made between customers in non adjoining zones are charged on the basis of unit timed meter registrations.
- 4.45 The number of meter registrations recorded varies according to:
- . call duration;
 - . time of day call is made;
 - . day of the week call is made;
 - . distance over which call is made.

4.46 Table 4.10 sets out the charging call rates presently applicable:

Table 4.10: STD charging call rates

CHARGING RATE CATEGORY	TIME	
Day	Mon--Sat	8 am--12.30 pm 1.30 pm--6.00 pm
Intermediate	(Mon--Sat (Sun	12.30 pm--1.30 pm 8.00 am--6.00 pm
Night	Mon--Sun	6.00 pm--9.00 pm
Economy	Mon--Sun	9.00 pm--8.00 am

Source: Telecom

4.47 Table 4.11 below relates the charging rate category to the distance over which the call is made as a basis to calculate the estimated charge. These charges are in force as from 25 January 1982.

Table 4.11: Meter registrations by rate and distance

DISTANCE (1)	COM- MUNITY CALL (1)	25 Km to 50 Km (1)	50 Km to 85 Km	85 Km to 165 Km	165 Km to 325 Km	325 Km to 645 Km	645 Km to 1 145 Km	OVER 1 145 Km
SCALE(2)								
Day	4	8	16	30	48	60	72	80
Intermediate	4	6	12	24	36	40	48	60
Night	4	4	8	15	24	30	36	40
Economy	4	4	7	12	20	24	29	32

(1) The minimum call charge is 12c. Meter registrations and calls are charged in multiples of 12c.

Source: Telecom Sydney Telephone Directory

Charging zones

4.48 Since 1960 Telecom has applied the following charging principles:

- . LOCAL CHARGES
 - exchanges are grouped to form zones;
 - calls within a zone and to adjacent zones are treated as local calls.
- . TRUNK CHARGES
 - trunk calls are charged on a zone basis;
 - zones are grouped to form charging districts;
 - calls other than local calls within a charging district to adjacent districts are charged at trunk rates;
 - trunk rates are based on the distance within the zone centres;
 - calls between districts which are not adjacent are charged at a trunk rate based on the distance between district centres.

The 1960 Community Telephone Plan

4.49 The Community Telephone Plan for Australia was introduced in May 1960 with the following objectives (inter alia):

- . provide a telephone service for as many people as possible;
- . extend the areas in which local calls might be made;
- . enable telephone users to dial directly to any other subscriber within Australia;
- . improve the standard of transmission over long distances, particularly in outback areas.

The plan enabled:

- . a significant number of trunk calls to become local calls;
- . most Australians to have very wide access on an untimed local call basis.

The 1979 review

4.50 The review resulted in application of two new charging principles, namely:

- . introduction of a community call charging rate;
- . setting of a maximum rate for call charges within a charging district and between centres in adjoining districts.

4.51 Telecom rationale for the above changes was based on the following considerations:

- . rural properties and many small settlements have established a 'community of interest' with towns providing a substantial range of services;
- . there is justification for a 'low cost link' between a country telephone subscriber and a town providing essential services.

(Note: the above information was extracted from Telecom's publication 'Community Access 80', June 1979.)

Criteria for identification of service towns

4.52 Telecom has explained that factors taken into account in designation of 'service towns' included:

- . availability of medical services, shops, schools, banks, service stations, transport facilities and special business facilities 'appropriate' for the nearby rural communities;
- . special business facilities including stock and station agents, seed merchants, farm machinery and mining equipment suppliers;
- . bypassing of towns providing a reasonable range of services was avoided -- the consideration being the consequences of diverting business to larger centres;
- . established traffic (telephone) patterns and accessibility of towns by normal transport;
- . representations by particular telephone users;
- . although most country communities have a business and social link with their parent capital city, there is a strong link between many country communities on a regional basis;
- . in less closely settled areas the distances between such communities may be hundreds of miles;
- . a telephone charging district in the country can have a radius of around 300 kms with about 30 exchanges serving up to 2 400 subscribers.
- . a charging district within a closely settled area could have 70 exchanges and up to 24 000 subscribers within a radius of 60kms;

- as a desirable objective, irrespective of the distance involved, country people calling within their own charging district should not pay any more than the rates applicable to trunk calls between centres from 65 kms to 165 kms apart;
- continuous representations had been received from customers seeking adjustments to zoning boundaries to meet changing community circumstances since 1960.

Timing for introduction of Community Access 80

4.53 Timing for introduction of community access call rates took account of the following:

- need for technical modifications at many telephone exchanges;
- long term program for upgrading of manual rural exchanges;
- Telecom expectations of increased traffic on some routes as a result of community access call rate availability and consequent need to provide additional circuits to some exchanges;
- forecast reduction of about \$13 million in annual revenue and once only capital costs of \$2 million to equip exchanges for the new reduced charging arrangements -- including facility to permit restriction of calls to six minutes in some areas.

4.54 The maps of the various states and the Northern Territory showing designated communities are provided at Figures 1-- 7 inclusive.

4.55 Information provided by Telecom indicates that Community Access 80 charging structures were designed to limit the amount people would pay for STD calls within their charging district to an adjoining district. Examples of savings to subscribers under the CA80 scheme effective May 1980 are given below.

4.56 Charges for a three minute call effective as at May 1980 under Community Access 80:

Distance	CA80 Charge	Standard trunk charge
• Bourketown to Mt Isa	\$0.81	\$1.80
• Thursday Island to Cairns	\$1.35	\$2.70

Zone boundary changes and designated service centres

4.57 As an example of the community access to designated service towns in Queensland, Mount Isa is the service town for subscribers connected to exchanges in the following locations:

Bedourie	Gunpowder	The Monument
Boulia	Headingly	Urandagie
Camooweal	Marion Downs	Wills River
Dajarra	Mary Kathleen	Yelverton
Duchess	Stanbroke	

4.58 Normanton is the designated service town for subscribers connected to exchanges in locations below:

Bourketown	Cubean	Warren Vale
Cobbold	Donors Hill	Wernadinga
Croydon	Milgarra	

INWATS charges

4.59 The Inward Wide Area Telephone Service (INWATS) allows public switched network telephone subscribers to make trunk calls to the number of an INWATS subscriber for the cost of a local call. The INWATS subscriber pays Telecom an amount for call charges, based on the length of the call and the time of the day the call was made. INWATS is available in an AUSTWIDE or STATEWIDE configuration depending on the lessee's requirements. Pricing components for charges to INWATS subscribers include:

- . an installation charge of \$240 for each exchange line;
- . a charge for each call.

4.60 Current Telecom charges per call minute are:

Table 4.12: INWATS charges

CHARGE RATE(1)	AUSTWIDE	STATEWIDE		
		NSW/VIC/WA	QLD/WA	TASWIDE
Day	69c	35c	40c	21c
Intermediate	54c	29c	32c	17c
Night	34c	18c	20c	11c
Economy	27c	15c	16c	9c

Charging rate categories are as follows:

Day Rate	-- Mon to Sat	8.00 am: 12.00 am
	-- Mon to Sat	2.00 pm: 6.00 pm
Intermediate Rate	-- Mon to Sat	12.00 am: 2.00 pm
	-- Sun	8.00 am: 6.00 pm
Night Rate	-- Mon to Sun	6.00 pm: 9.00 pm
Economy Rate	-- Mon to Sun	9.00 pm: 8.00 am

Charges are computed on a hourly utilisation rate.

Source: Telecom

NETWORK SERVICES INFORMATION AND COMPUTER-BASED DATA SERVICES

Telegrams

4.61 Telegrams are charged on a basis of a minimum fee for twelve words plus a charge for each additional word. Special additional charges apply to telegrams sent to or from outposted radio stations, while double rates apply to urgent telegrams. There are twenty variations of basic telegram charges depending upon mode of address and rate sent.

- 4.62 The 'standard' charge usually refers to a telegram sent to a street address for messenger delivery. The present cost for hand delivered telegrams is \$4.92 for 12 words and \$6.20 for 20 words. There is an additional charge of 16 cents for each additional word.

Telex

- 4.63 Telecom has a general pricing policy of reducing the existing distance related price differential for automatic telex call fees to reflect more closely the costs of provision and maintenance. Charges for calls up to 645 kilometres have been increased. Charges for calls for distances over 645 kilometres have not changed.
- 4.64 Charges for calls up to 165 kms have recently been increased by 20 percent for the day rate and 50 percent for the night rate. The night rate charge will restore the standard discount (50 percent) of day rate calls. Calls between 165 kms and 645 kms have been increased by 12.5 percent for the day rate and 25 percent for the night rate. Charges for manually connected telex calls and the operator surcharge have also risen. Table 4.13 lists call charges based on distance and type of call effective 1 September 1982.

Table 4.13: Telex call charges

RATE CATEGORY		Up to 165 Km	165 Km to 645 Km	Exceeds 645 Km
AUTOMATIC(1) (Periods between meter registrations -- sec)	Day Rate (sec) (8 am--6 pm daily)	60	40	15
	Night rate (sec) (6 pm--8 am daily)	120	72	30
OPERATOR CONNECTED (For each 3 minutes or part thereof)	Ordinary Calls(\$) (2)	0.80	1.10	2.00
	Conference and (3) Broadcast Calls	0.80	1.10	2.00

(1) Each meter registration charged at 10 c

(2) Additional surcharge per operator connected call is one dollar

(3) Additional surcharges are as follows:

- per call party \$1.00
- particular person and fixed time call \$1.20
- reverse charge calls per called party \$0.60

Source: Telecom

Datel

4.65 Datel services may be provided by private lines or through the switched network. The principal charges for these services are as follows:

. PRIVATE LINE

The total cost of a Private Line Datel Service is made up of two components -- a line access charge for each terminal of the Service and a line rental charge for the circuits linking the telephone exchanges to which the terminals are connected.

-- Line Access Charges

Annual Rentals and 'once only' Installation Fees cover the provision of a modem, modem cabinet (if required) and line from subscriber premises to the local telephone exchange.

Table 4.14 gives details of relevant charges.

Table 4.14: Datel line access charges

SPEED AT WHICH DATA IS TRANSMITTED	FOR EACH LINE TERMINAL	
	ANNUAL	INSTALLATION
	RENTAL \$	FEE \$
Up to 300 Bit/s	220	240
600/1 200 Bit/s	480	240
2 400 Bit/s	630	490
2 400 Bit/s fall-back	1 094	890
4 800 Bit/s	800	580
4 800 Bit/s fall-back	1 714	980
9 600 Bit/s	2 120	680
48 000 Bit/s	4 000	1 100

Source: Telecom

-- Line rental charges

Annual rental covers the provision and maintenance of a line between the two terminals in the case of a point to point service, and between the end and intermediate terminals in a multipoint service (the rental for each section of a multipoint service is calculated separately).

Table 4.15 details rental charges.

Table 4.15: Datal line rental charges

CHARGEABLE RADIAL DISTANCE	300 Bit/s		2 400 Bit/s		4 800 Bit/s		9 600 Bit/s		48 000 Bit/s	
	1 200 Bit/s	HD	1 200 Bit/s	FD	2 400 Bit/s	4 800 Bit/s	9 600 Bit/s	48 000 Bit/s		
	\$		\$		\$		\$		\$	
Under 10 km										
-- For each 1 km or part thereof		66.00		90.00	132.00	132.00	132.00	310.00		
Exceeding 10 km but not 40 km										
-- For the first 10 km	660.00		9000.00	1 320.00	1 320.00	1 320.00	1 320.00	3 100.00		
-- For each additional 1 km or part thereof	52.00		82.00	104.00	104.00	104.00	104.00	245.00		
Exceeding 40 km but not 1200 km										
-- For the first 40 km	2 220.00		3 360.00	4 440.00	4 440.00	4 440.00	4 440.00	10 450.00		
-- For each additional 1 km or part thereof	9.00		9.00	11.00	13.00	13.00	13.00	67.00		
Exceeding 1200 km										
-- For the first 1200 km	12 660.00		13 800.00	17 200.00	19 520.00	19 520.00	19 520.00	88 170.00		
Fixed Circuit Rental (surcharge applies to all circuits exceeding 40 km)	100.00		200.00	200.00	200.00	200.00	200.00	400.00		

Source: Telecom

SWITCHED NETWORK SERVICE

Annual Rentals and 'once only' Installation Fees: cover the provision of an exchange line, ~~modem~~, modem cabinet (if required), and standard telephone or datelphone.

Table 4.16: Rental and installation fees (1)

SPEED AT WHICH DATA IS TRANSMITTED	ANNUAL RENTAL \$	INSTALLATION FEE \$
200/300 Bit/s (Asynchronous)		
With standard telephone	380	235
With datelphone	440	285
600/1 200 Bit/s (Synchronous and Asynchronous)		
Half duplex with standard telephone	480	235
Half duplex with standard telephone and low speed backward channel facility	480	235
Half duplex with datelphone	540	285
Half duplex with datelphone and low speed backward channel facility	540	285
Full duplex with standard telephone and switched network adaptor	680	300
2 400 Bit/s (Synchronous)		
Half duplex with standard telephone and switched network adaptor	880	385
4 800 Bit/s (Synchronous)		
Half duplex with standard telephone and switched network adaptor	1 240	475

(1) Manual answering modems or automatic answering modems (where available) may be provided on these services

Source: Telecom

- 4.66 The Datel switched network service enables a Datel subscriber to access a distant computer by connection via the public switched telephone network for a local call fee for each connection. The following surcharges apply to Datel private line rentals for subscribers accessing this service:

Table 4.17: Computer access surcharges

RENTAL SURCHARGE PER ANNUM		
RANGE OF EXCHANGE LINES ACCESSING THE PRIVATE LINE AT ANY ONE TIME	300 BIT/S EXCHANGE LINE DATA RATE \$	600/1 200 BIT/S EXCHANGE LINE DATA RATE \$
1--2	800	1 200
3--5	1 200	1 800
6--10	1 600	2 400
11--50	2 000	3 000
51--100	2 400	3 600
101--500	2 800	4 200
501--1 000	3 200	4 800
1 001--5 000	4 000	6 000

Source: Telecom

Analogue Data Service (ADS)

4.67 ADS can be provided either by private line or on a switched network. Charges for both types of service are as follows:

. PRIVATE LINE ADS

The cost of an ADS Private Line consists of three components:

- Local access rental -- covers the cost of the circuit between a customer's premises and the local telephone exchange. This charge is applicable to each end of the line.
- Line rental -- the 'per kilometre' cost of the circuit between the telephone exchanges to which the terminals are connected. The line distance is measured radially.
- Installation charge -- a 'once only' fee applicable to each terminal location.

Table 4.18 details the charges:

Table 4.18: ADS charges

CHARGING CATEGORY	SERVICE TYPE	
	ADS-1(2 wire) \$	ADS-2(4 wire) \$
Local access rental	150 pa	300 pa
Line rental -- each km or part thereof	Same as for interchange rental for 300/1 200 HD DPL	Same as for interchange rental for 4 800 DPL
Installation charge per terminal	215	340

Source: Telecom

SWITCHED NETWORK ADS

Outstation/Instation Service (Customer-provided modem) covers the provision of an exchange line service and modem connection socket:

Table 4.19: Switched network ADS

	ANNUAL RENTAL \$	INSTALLATION FEE (Once only) \$
Exchange line service	180	150
Modem connection socket	2	38

Source: Telecom

Digital Data Service (DDS)

4.68

The Digital Data Service (DDS) is a new public leased line data service to be introduced by Telecom at the end of 1982. Section 3 of this Volume describes the DDS.

4.69 Australia has been divided into nine zones for charging purposes (zone boundaries coincide with State boundaries, except for Western Australia and Queensland which have both been divided into northern and southern zones). Within each State there may be three types of centres, primary, secondary and tertiary.

- The primary DDS centre will be the principal centre in each zone e.g. Sydney, Melbourne, Darwin. The boundaries of a primary centre will coincide with the boundaries of the local telephone district (i.e. local call area). Within the boundaries of each primary centre a number of smaller centres may be located to provide geographical coverage of DDS to all areas of the primary centre. No transmission charges will be applicable to services connected via a smaller centre to the major centre in that zone.
- Secondary DDS centres will encompass Canberra and large provincial centres within a zone e.g. Newcastle and Geelong. Some zones will not have any secondary centres. The boundaries of a secondary centre will coincide with the boundaries of the local telephone zone. Within the boundaries of each secondary centre a number of smaller centres may be located to provide geographical coverage of DDS to all areas of the secondary centre. No transmission charges will be applicable to services connected via a smaller centre to the local secondary centre in that zone.
- Tertiary DDS centres will be small provincial and regional centres e.g. Dubbo, Taree, Morwell. The boundaries of a tertiary centre will nominally be within an 8 km radial distance of the local telephone exchange.

Some centres near zone boundaries may be allocated to two zones e.g. Albury/Wodonga, Coolangatta/Tweed Heads, and Broken Hill.

4.70 Although customers' total charges will depend on their overall network configurations, the pricing elements making up the totals are designed to facilitate calculation of charges. The three basic pricing elements that will be used to construct DDS charges are:

- an installation charge for each Network Terminating Unit (NTU) required to support a service;
- an annual access charge for each NTU required to support a service;
- an annual transmission charge for the data transmission capacity used by a customer on each chargeable route.

4.71 The charges for each of these price elements are as follows:

- **INSTALLATION**

The pricing elements that will be used to construct installation and other 'once only' charges are listed below. An installation charge will be applicable to each NTU in a customer's network.

Table 4.20: Installation charge elements (\$ per NTU)

ITEM	DATA RATE (Bit/s)
	2 400--9 600
Primary centre installation	500
Secondary centre installation	750
Tertiary centre installation	1 000
Datel access	1 250
Change of data rate	200
Outdoor removal (1)	300
Indoor removal (1)	150

(1) Charges apply to transmission speeds of 2 400, 4 800 and 9 600 only.

Source: Telecom

ACCESS

The pricing elements that will be used to construct annual access charges are shown in the following table. An access charge will be applicable to each NTU in a customer's network and will cover the annual cost of connection to a DDS centre from any point in a designated service area.

Table 4.21: Access charge elements (\$ p.a. per NTU)

TYPE OF SERVICE	DATA RATE (Bit/s)	PRICING ELEMENT (\$)
Point to point (X21 bis)	2 400	1 596
	4 800	2 352
	9 600	3 468
	48k	8 100
Point to point (X21)	2 400	1 500
	4 800	2 256
	9 600	3 372
	48k	8 004
Multipoint (X21 bis)	2 400	2 148
	4 800	2 904
	9 600	4 020
	48k	8 652
NETPLEX (X22)	48k	8 004
Datel Access (1) (Point to point)	2 400	4 500
	4 800	6 768
	9 600	10 116
Datel Access (1) (Multipoint)	2 400	5 052
	4 800	7 320
	9 600	10 668

(1) Datel Access will enable customers to access a primary centre from a location in its zone

Source: Telecom

• TRANSMISSION

The pricing elements that will be used to construct annual transmission charges are listed below. A transmission charge applies to the transmission capacity used by a customer on each chargeable route.

Table 4.22: Transmission charge elements (\$ p.a.)

CHARGEABLE ROUTE	DATA TRANSMISSION CAPACITY (bit/s)					
	2 400 Bit/s	4 800 Bit/s	9 600 Bit/s	19.2 KBit/s (1)	48 KBit/s	EACH ADDITIONAL 48 KBit/s
Transmission between two primary centres or between a primary and a secondary centre in another zone						
Less than 1 145 km	3 996	6 000	9 000	13 500	20 004	15 000
More than 1 145 km	6 000	9 000	13 500	20 196	30 000	22 500
Transmission between a secondary centre and its zone primary centre						
	996	1 500	2 256	3 372	6 240	3 744
Transmission between a tertiary centre and its zone primary centre						
	1 500	2 256	3 372	5 064	9 372	5 616

(1) NETSTREAM option only

Source: Telecom

AUSTPAC

4.72 A new packet switched service, known as AUSTPAC will be introduced in December 1982. Volume 2, Section 3 describes the AUSTPAC service. AUSTPAC charges are made up of three components:

- access;
- usage;
- facilities.

4.73 Charges for each of these components are as follows:

ACCESS

-- PACKET MODE TERMINALS (X25) VIA A DEDICATED SYNCHRONOUS LINK

DATA RATE	ONCE ONLY INSTALLATION CHARGE \$	MONTHLY ACCESS RENTAL \$	ANNUAL ACCESS RENTAL \$
2 400 Bit/s	750	200	2 400
4 800 Bit/s	750	300	3 600
9 600 Bit/s	750	450	5 400
48 000 Bit/s	1 500	1 000	12 000

This charge includes the provision of a modem/Network Terminating Unit (NTU) and line to the nearest packet

-- ASYNCHRONOUS (X28) CHARACTER MODE TERMINALS VIA A DEDICATED ASYNCHRONOUS LINK

DATA RATE	ONCE ONLY INSTALLATION CHARGE \$	MONTHLY ACCESS RENTAL \$	ANNUAL ACCESS RENTAL \$
Up to 300 Bit/s	300	100	1 200
1 200 Bit/s	350	150	1 800

This charge includes the provision of a modem/NTU and an access line.

-- ASYNCHRONOUS (X28) CHARACTER MODE TERMINALS VIA A DATEL EXCHANGE LINE (DXL)

DATA RATE	ONCE ONLY INSTALLATION CHARGE \$	MONTHLY ACCESS RENTAL \$	ANNUAL ACCESS RENTAL \$
110/200/300 Bit/s	230	29.80	358
1 200 Bit/s Full Duplex	300	54.80	658

This charge includes the provision of a modem/NTU, an exchange line and a standard telephone or Datelphone.

-- ACOUSTIC COUPLERS

Acoustic coupler access to AUSTPAC will be available, however customers wishing to avail themselves of this service will need to apply for a Network User Identifier (NUI). Once a customer is issued with a NUI, calls may be initiated from any telephone service in the region where the NUI is registered.

--- NETWORK USER IDENTIFIER (NUI)

All terminals accessing AUSTPAC via the PSTN require to be issued with an NUI. A once only registration fee of \$50 is required plus \$3 per month (\$36 p.a.) rental fee applicable for each region where the NUI is registered up to a maximum charge of \$15 per month.

-- SYNCHRONOUS NON-PACKET MODE TERMINALS (IBM 2780 AND IBM 3270)
VIA A DEDICATED SYNCHRONOUS LINK

Charge yet to be determined.

Note: All use charges are distance independent.

. USAGE

- VOLUME: Traffic volume is expressed in terms of
kilosegments.
A segment equals 64 octets (1 octet equals 8 bits).
A packet (1 024 Bits max.)
A kilosegment may be up to 512 000 bits.

- RATE: 80 cents/kilosegment (0.08 cents/segment)
Minimum charge/call = 10 segments; i.e. 0.8 cents.

After hours discount

Traffic volume charges will be discounted by 50 percent for data switched between the following hours (Australian Eastern Time):

MON. TO FRI. midnight--8 am, 6 pm--midnight

SAT, SUN &
National Public Holidays all day

-- CONNECT TIME:

- a) Terminals with dedicated access:
30 cents/hour (0.5 cents/minute).
- b) Terminals with PSTN access:
\$3.00/hour (5 cents/minute) + 12 cents/call.
NOTE: There are no STD charges for PSTN access.

. FACILITIES

-- OPTIONAL FACILITIES CHARGES

FACILITY	REGISTRATION	
	OR FACILITY CHARGE	RENTAL
	(once only)	(\$/month)
. Closed User Group (each terminal per C.U.G.)	10	1
. Fast Select Acceptance	10	--
. Reverse Charge Acceptance	10	--
. Direct Call	10	--
. Logical Channels (each) (except 1st or PVC)	10	2
. Permanent virtual circuit (each)	10	40

Note: Acceptance of a user application for inclusion in a Closed User Group is dependent on consent being given by the 'owner' of the Group.

LEGEND



MAIN SWITCHING CENTRE



PRIMARY SWITCHING CENTRE



SECONDARY SWITCHING CENTRE



MINOR SWITCHING CENTRE



CLOSED NUMBERING AREA & CHARGING DISTRICT BOUNDARY



CLOSED NUMBERING AREA BOUNDARY



CHARGING DISTRICT BOUNDARY



ADJACENT DISTRICTS

BURNIE NUMBERING AREA TITLE

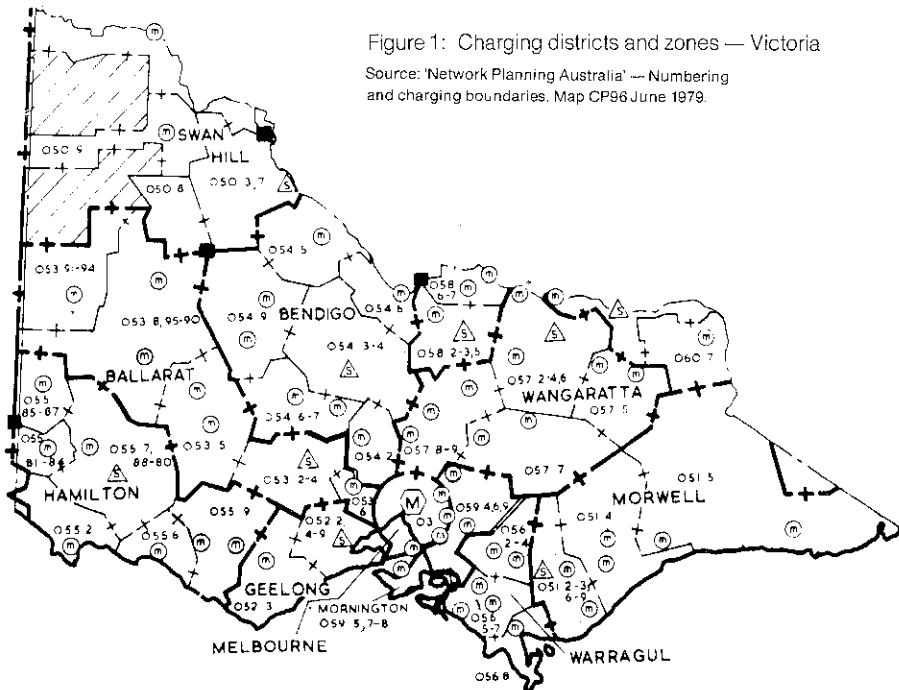
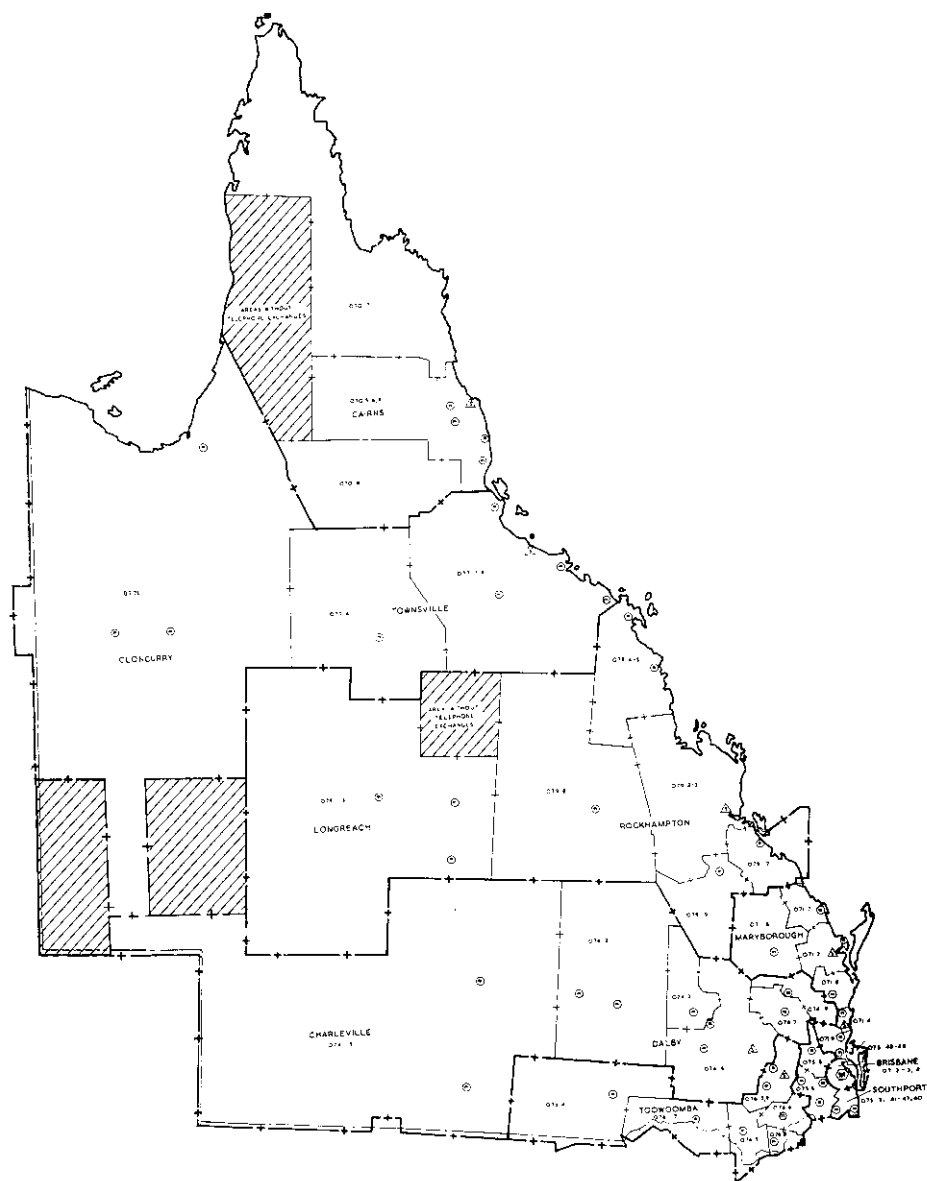


Figure 1: Charging districts and zones — Victoria

Source: 'Network Planning Australia' — Numbering and charging boundaries. Map CP96 June 1979.

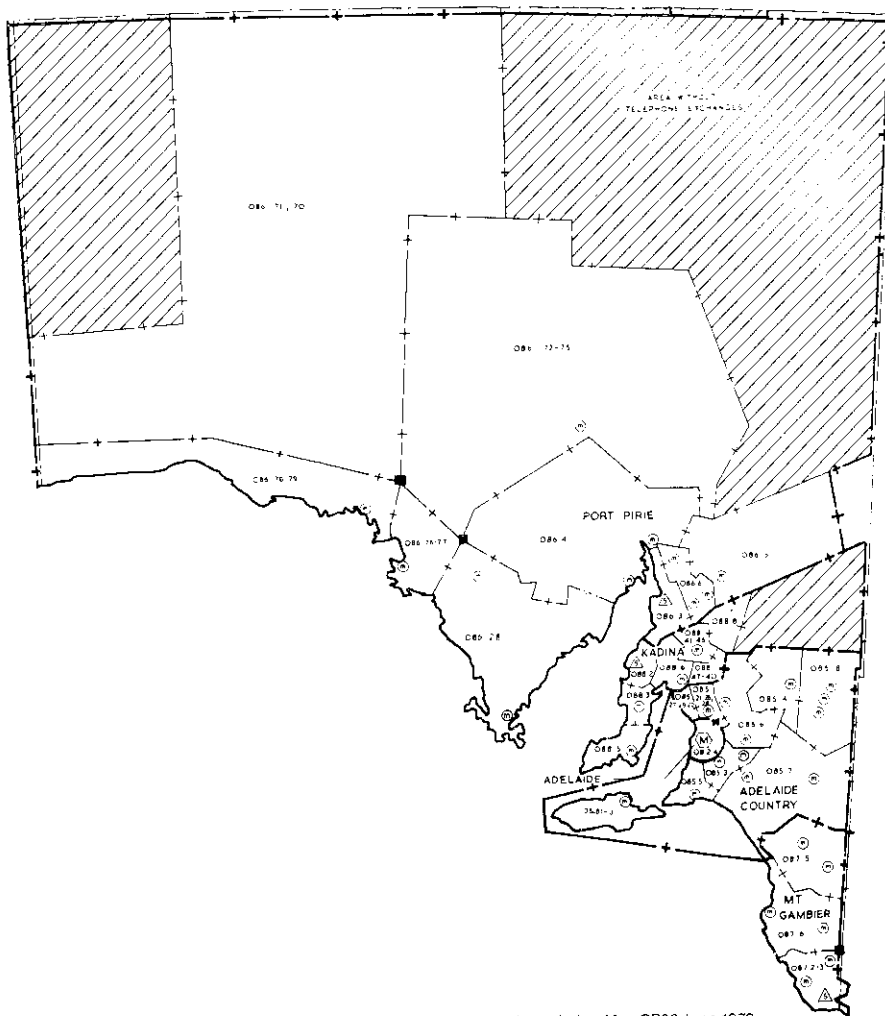
Source: 'Network Planning Australia' --- Numbering and charging boundaries. Map CP96 June 1979.

Figure 3: Charging districts and zones — Queensland



Source: 'Network Planning Australia' — Numbering and charging boundaries. Map CP96 June 1979.

Figure 4: Charging districts and zones — South Australia



Source: 'Network Planning Australia' — Numbering and charging boundaries. Map CP96 June 1979.

Figure 5:
Charging districts and zones —
Northern Territory

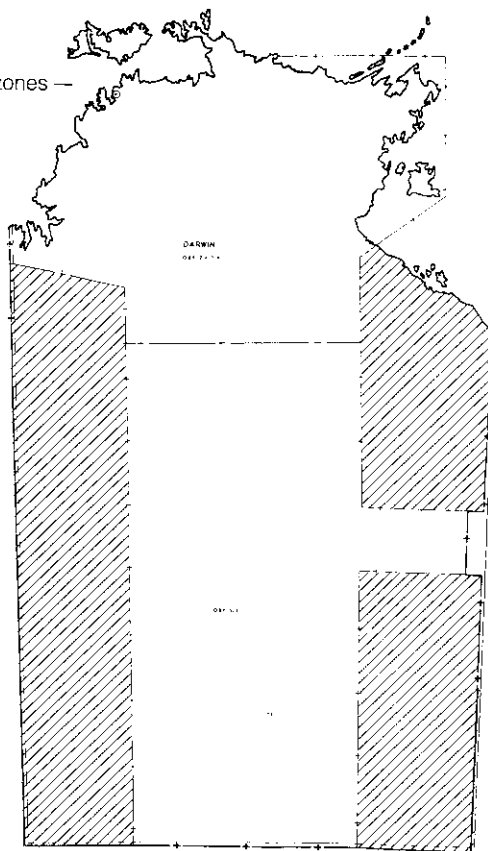
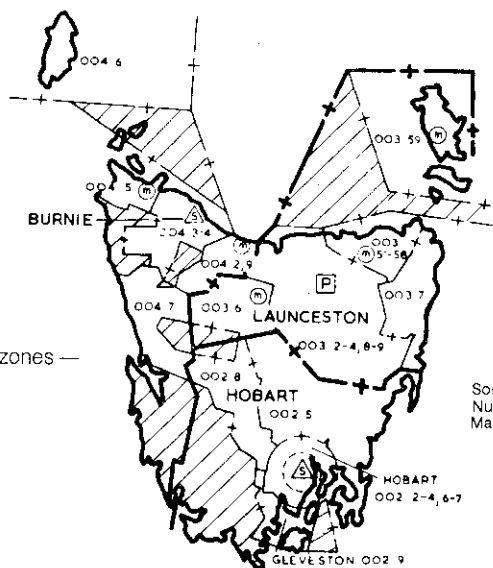
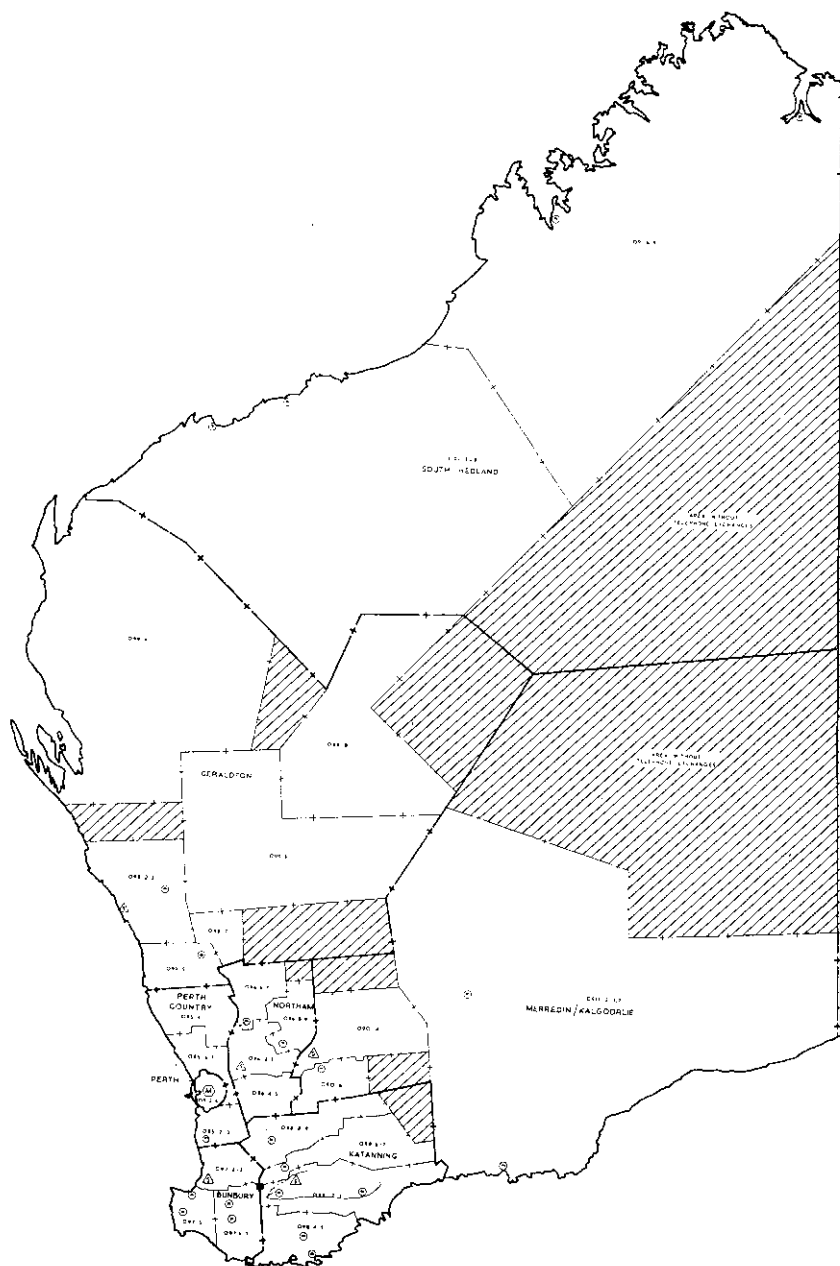


Figure 6:
Charging districts and zones —
Tasmania



Source: 'Network Planning Australia' —
Numbering and charging boundaries.
Map CP96 June 1979.

Figure 7: Charging districts and zones — Western Australia



Source: 'Network Planning Australia' — Numbering and charging boundaries. Map CP96 June 1979.

SECTION 5

THE AUSTRALIAN TELECOMMUNICATIONS MANUFACTURING INDUSTRY

Prepared by the Secretariat of the Telecommunications Inquiry

INTRODUCTION

Scope of the existing telecommunications manufacturing industry

- 5.1 The telecommunications equipment industry is not readily definable. The equipment requirements of telecommunications services involve suppliers of material ranging from electronic components to fabricated metal products.
- 5.2 The major industry categories included in telecommunications manufacturing are electronic equipment n.e.c. (Australian Standard Industry Classification (ASIC) 3352) and part of radio and TV receivers' audio equipment (ASIC 3351). There are also establishments engaged in manufacturing electric or telephone cable and wire (ASIC 3355).

Market size

- 5.3 Estimates of the size of the market for telecommunications equipment are complicated by the problems of definition. Industry submissions indicate a total market for telecommunications equipment of over \$600 million.
- 5.4 An analysis of the size of the market by the Department of Industry and Commerce is shown in Table 5.1.

Table 5.1: Domestic market for ASIC 3321: television sets, radios, communication and other electronic equipment, \$ million, 1975--76

	IMPORTS		LOCAL PRODUCTION SALES		TOTAL	
	SHARE OF MARKET SEGMENT		SHARE OF MARKET SEGMENT		ARE OF MARKET TOTAL	
	\$M	%	\$M	%	\$M	%
ADP	156	94	10	6	166	11.5
Components	147	70	63	30	210	14.5
Consumer	370	50	370	50	740	51.3
Communication	66	25	198	75	264	18.3
Medical, Industria and Other	18	20	45	80		4.4
Total	757	52	686	48	3	100.0

Source: The Australian Electronics Industry: a Report by the Electronics Industry Advisory Council, Department of Industry and Commerce, AGPS, Canberra 1980

Manufacturing processes

- 5.5 A survey of employment in the electronics manufacturing industry undertaken by the former Department of Employment and Youth Affairs categorised the manufacturing processes used in the electronics manufacturing industry.
- 5.6 Table 5.2 below indicates that of the 70 responding establishments:
- 40 percent had at least some involvement in comprehensive processing (including 14 percent which were engaged exclusively in processing);
 - 83 percent undertook at least some assembly from purchased imported components while 71 percent assembled locally produced components (60 percent of establishments assembled exclusively from either local or imported components).

Table 5.2: Electronics Manufacturing Industry, Establishments
by Manufacturing Process(1)

NATURE OF MANUFACTURING PROCESS	ESTABLISHMENTS WHICH USE PROCESS	
	No.	%
Comprehensive processing from raw materials	28	40
Assembly of imported components of material	58	83
Assembly of Australian-made components or material	50	71

(1) There were 70 respondents to the survey but some establishments produce in two or more product ranges.

Source: Survey of Employment in the Electronics Manufacturing Industry Reports, Department of Employment and Youth Affairs, March 1980

Profitability

- 5.7 In August 1978 the Department of Industry and Commerce conducted a finance study on the electronics industry in Australia and in particular the telecommunications and industrial and professional electronics segments. Most of the major companies in the industry and some smaller producers participated.

The participants were:

Telecom Australia
Amalgamated Wireless (Australasia) Ltd
Philips Industries Holdings Ltd
Standard Telephones and Cables Pty Ltd
Teletronics Pty Ltd
Electronic Associates Pty Ltd
Morris Productions Pty Ltd
Information Electronics Ltd
Plessey Pacific Pty Ltd
Varian Techtron Pty Ltd
Siemens Industries Ltd
Automatic Totalisators Ltd
BWD Electronics Pty Ltd
L M Ericsson Pty Ltd

Source: The Australian Electronics Industry. A Report by the
Electronic Industry Advisory Council, Department of
Industry and Commerce, AGPS, Canberra, 1980

5.8 The report sought to identify the nature and significance of the financing problems that could arise in the industry in the future. It noted that during the period 1973--77 internally generated funds financed around 41 percent of the total funds available in the group, 17 percent through retained earnings and 24 percent via depreciation allowances. For manufacturing, internal funding provided around 58 percent of the funds available, 33 percent from retained earnings and 25 percent through depreciation. The relatively low level of self financing was seen as a direct reflection of the poor profit performance of the industry since the contribution of depreciation to internal funding remained relatively stable.

5.9 The study concluded that:

"The present financial position of the group of companies examined in this study is generally unsatisfactory. Profitability is low in comparison to manufacturing overall with several companies suffering losses in recent years. The level of short term debt is high and capital expenditure is declining. The financial problems arising in the period to 1985 will depend primarily on the approach adopted within the industry towards its future. A continuation of the present emphasis on the local market seems likely to produce any significant change to the present financial position although rationalisation in the industry could raise profitability. The demand for funds is likely to remain relatively low and should be met without undue strain by most participants in the industry. Alternatively if the industry should seek to expand into export markets, financial constraints could arise for sections of the industry. In general, the large companies and the foreign owned companies could probably raise the finance needed for such a change. However, the smaller companies are likely to

face considerable difficulties in securing the venture capital they would require and in financing adequate research and development programs." (1)

Employment

- 5.10 ABS data (see Table 5.3 below) shows that employment in the manufacture of electronic products fell from 32 286 persons in 1971--72 to 20 649 persons in 1979--80, a decline of 36 percent. This rate of decline was more than twice the rate of decline in employment in manufacturing industry as a whole which fell from 1.30 million to 1.15 million over the same period.

Table 5.3: Comparison of employment as at 30 June in
electronics manufacturing with total manufacturing
industry 1971--72 to 1978

YEAR	<u>ELECTRONICS MANUFACTURING (1)</u>		<u>TOTAL MANUFACTURING</u>	
	NO. OF		NO. OF	
	ESTAB- LISHMENTS	AT 30 JUNE	ESTAB- LISHMENTS	AT 30 JUNE
	(No.)	(Persons)	(No.)	(Persons)
1971--72	294	32 286	36 147	1 302 784
1972--73	302	30 936	36 437	1 297 588
1973--74	340	33 559	37 173	1 338 910
1974--75	243	31 795	26 973	1 245 237
1975--76	251	26 433	27 507	1 200 440
1976--77	240	23 748	26 849	1 176 159
1977--78	223	21 514	26 065	1 144 549
1978--79	249	21 506	26 312	1 143 891
1979--80	257	20 649	27 430	1 154 184

- (1) Refers to establishments manufacturing products falling within ASIC Code 3321 (television sets, radios, communication and other electronic equipment). In 1977--78 ASIC Code 3321 was replaced by Codes 3351 and 3352.

Source: Manufacturing Establishments: Details of Operations by Industry Class, Australia, 1971--72 to 1979--80 ABS, Canberra

- 5.11 Available ABS data shows that the electronics industry employs a higher proportion of females than does manufacturing industry as a whole (43 percent compared to 25 percent in 1979--80) and that the decline in female employment in the electronics industry between 1971--72 and 1979--80 was greater than that for males.

1. Finance Study for the Electronics Industry Advisory Council, in the Australian Electronics Industry. A Report by the Electronic Industry Advisory Council, Department of Industry and Commerce, AGPS, Canberra, 1980.

- 5.12 A survey of employment in the Electronics Industry was conducted during August and September 1979 by the Department of Employment and Youth Affairs on behalf of the Electronics Industry Advisory Council.
- 5.13 At 30 June 1979, the 70 establishments responding to the survey employed 10 458 persons directly in the manufacture of electronic goods and 15 641 persons in total, accounting for some 70 percent of the industry's total employment.
- 5.14 The survey showed that 59 percent of the persons employed were engaged in the manufacture of professional electronic and telecommunications equipment, followed by electronic consumer products (29 percent), electronic components (9 percent) and computers and allied office equipment (3 percent) (see Table 5.4).
- 5.15 The survey also found that most establishments tended to specialise within a particular broad product area as previously defined, e.g. 81 percent of firms manufactured one group of products, 16 percent manufactured two groups, and 3 percent manufactured three groups of products.
- 5.16 Employment in the industry is largely concentrated in New South Wales, Victoria and to a lesser extent, in South Australia. The survey indicated that at 30 June 1979 the proportion of total surveyed employment in these States was: New South Wales 68 percent; Victoria 23 percent and South Australia 7 percent.
- 5.17 About one third of establishments in the industry, each employing in excess of 100 persons, account for some 90 percent of total industry employment. The remainder of the industry employment is fairly evenly spread between establishments of various sizes.

Table 5.4: Distribution of employment in the manufacture of electronic products, 30 June 1979

PRODUCT GROUP	EMPLOYMENT	
	Persons	%
Electronic consumer products	3 025	29
Computers & allied equipment	316	3
Professional electronics & telecommunications equipment	6 167	59
Electronic components	950	9
Total	10 458	100

Source: Survey of Employment in the Electronics Manufacturing Industry. Department of Employment and Youth Affairs, Melbourne 1980. (Hereafter DEYA Survey).

5.18 The survey results confirm the decline in electronics industry employment shown by the ABS Census of Manufacturing data for the period 1973--74 to 1977--78. The results indicate that employment in the industry continued to decline by some four percent between 1977--78 and 1978--79.

5.19 Respondents who experienced a reduction in employment levels over the five year period to June 1979 attributed the decline to:

- . weak domestic demand;
- . import competition;
- . effects of technological change.

5.20 Firms whose employment increased listed levels of local demand and technological change as the major contributing factors.

5.21 The DEYA survey concluded that:

"The changes which will affect the operation and/or structure of the industry over the next five years are expected to increase the knowledge and skills required of employees and make it difficult to obtain suitably skilled labour. Most respondents also considered that changes in the industry will necessitate both retraining some existing employees and recruiting persons with new knowledge and skills from outside the organisation.

Establishments which considered that new more advanced skills will be required over the next five years referred most frequently to the following areas; computer technology, management, systems engineering, semi-conductor applications, micro processor technology, digital technology, process control and distribution."

5.22 The substantial decline in employment in the industry is in common with industry trends in other countries. Table 5.5 refers.

Table 5.5: Employment in telecommunications equipment 1960--1979(1)

	1960	1970	1975	1979	ABSOLUTE CHANGE 1970--1979
	'000	'000	'000	'000	
Australia		20.6(72)		10.5	(49)
Austria	8.3	13.6	12.3	12.5	(8)
Belgium	15.2	25.9	27.6	23.2	(10)
Canada	24.1	32.6	30.3	26.3	(19)
France		54.9	75.9(73)		n/a
Finland		3.0	7.0	7.0	133
Germany				50.0	n/a
Italy		31.0	57.3		
Japan		94.6	86.1	84.4	(11)
Netherlands				10.0	n/a
Norway	16.9	17.1	18.7	21.2	24
Portugal	0.6	5.4	4.9	5.6	4
Sweden			69.0(76)	71.0	n/a
United Kingdom	53.5(58)	66.1	92.0	68.0(78)	3
United States	89.5	142.0	118.5	124.4	(12)

(1) Source of data is derived from replies to questionnaires completed by selected telecommunications equipment manufacturers.

Source: Telecommunications Equipment Industry Study OECD, Paris, 1981

- 5.23 While Table 5.3 shows a decline in employment levels in the electronic manufacturing industry this decline has not been consistent across the industry. Employment in electronic equipment manufacturing increased by 10 percent between 1977 and 1980. Table 5.6 gives some recent data on employment trends in radio and TV receivers, audio equipment, electronic equipment; electric and telephone cable and wire compared with total manufacturing industry. The electronic equipment industry employed 40 percent females in 1979--80 compared with a manufacturing industry average of 25 percent.

Tariff protection

- 5.24 The local manufacture of telecommunications equipment initially developed under relatively high levels of tariff protection. During the early development years, tariffs were generally between 37.5 percent and 55 percent. A general tariff reduction in 1973 reduced this level of protection to between 28 percent and 41 percent.

Table 5.6: Employment in Electronic Equipment Manufacturing Industry and Total Manufacturing Industry: 1978--1980

DESCRIPTION	NO. OF ESTABLISHMENT/ EMPLOYMENT		1977--78	1978--79	1979--80
	ESTABLISHMENTS (NO)		46	52	48
RADIO & TV	EMPLOYMENT	MALE	3 343	3 114	2 126
RECEIVERS,	(PERSONS)	FEMALE	3 488	3 330	2 368
AUDIO		TOTAL	6 831	6 444	4 494
EQUIPMENT (ASIC NO. 3351)					
	ESTABLISHMENTS (NO)		177	197	209
ELECTRONIC	EMPLOYMENT	MALE	8 771	9 128	9 600
EQUIPMENT	(PERSONS)	FEMALE	5 912	5 934	6 555
NEC		TOTAL	14 683	15 062	16 155
(ASIC NO. 3352)					
	ESTABLISHMENTS (NO)		31	31	30
ELECTRONIC	EMPLOYMENT	MALE	3 735	3 437	3 392
& TELEPHONE	(PERSONS)	FEMALE	1 499	1 516	1 245
CABLE & WIRE		TOTAL	5 234	4 953	4 637
(ASIC NO. 3355)					
	ESTABLISHMENTS (NO)		26 065	26 312	27 430
TOTAL	EMPLOYMENT	MALE	854 176	852 982	862 365
MANUFACTURING	(PERSONS)	FEMALE	290 373	290 909	291 815
(ASIC NO. 21-34)		TOTAL	1 144 549	1 143 891	1 154 180

Sources: Manufacturing Establishments, Details of Operations by Industry Class, ABS, Cat. No. 8203.

- 5.25 The IAC reported that while an increased scale of production attained over previous years had reduced the protective needs of the industry profitability in the industry had nevertheless declined to an unsatisfactory level. The IAC concluded that the manufacture of this equipment should be afforded assistance. A duty rate of 30 percent was recommended and implemented in that year. The IAC recommended a further review of assistance five years from the date of the 1976 report.

Imports and exports

- 5.26 Total imports of telecommunications equipment n.e.c. (SITC No. 764) rose by 50 percent from \$165 million in 1978--79 to \$247 million in 1980--81. Exports for 1980--81 were \$40 million. Table 5.7 shows that Australia has one of the highest trade deficits for telecommunications equipment in the OECD. Table 5.8 sets out exports of telecommunications equipment by destination for 1979.

Table 5.7: Significant trade balances in the OECD region in respect of telecommunications equipment (1), 1979

	(\$US million)		
	EXPORTS	IMPORTS	BALANCE
TRADE SURPLUS COUNTRIES			
Japan	3 079	259	2 820
Germany	1 983	1 029	954
Sweden	916	206	710
United Kingdom	1 180	639	541
France	1 015	616	399
The Netherlands	1 000	615	385
Belgium--Luxembourg	532	408	124
Italy	613	506	107
Switzerland	304	205	99
TRADE DEFICIT COUNTRIES			
United States	2 397	2 755	-358
Canada	501	698	-197
Australia	22	202	-180
Austria	92	248	-156
Spain	92	207	-115
Norway	89	172	-83
Finland	42	110	-68
Greece	20	77	-57

(1) Related to telecommunications equipment n.e.c (SITC item 764 Revision 2).

Source: Telecommunications Equipment Industry Study, OECD, Paris, 1981

Table 5.8: OECD EXPORTS OF TELECOMMUNICATION EQUIPMENT(1) BY DESTINATION, 1979 (\$US million)

To	OECD				Total		Non-OECD			Total non-OECD	unspeci- fied	Total world
	EEC	EFTA	USA	JAPAN	OTHER (2)	OECD	OPEC	LDCs (3)	COMECON			
Belgium	331	33	6	-	16	386	40	99	3	142	4	532
Luxembourg												
Denmark	94	59	8	5	8	174	9	18	5	32	-	206
France	235	59	14	3	65	376	203	405	30	638	-	1 015
Germany	735	348	43	4	130	1 260	196	497	31	724	-	1 983
Ireland	35	5	1	-	1	42	5	3	-	8	-	50
Italy	201	50	9	1	65	326	119	156	11	286	1	613
The Netherlands	207	33	10	14	71	335	375	126	-	501	165	1 000
United Kingdom	321	65	64	15	89	554	300	307	18	625	-	1 180
Total EEC	2 158	652	154	43	446	3 453	1 246	1 612	98	2 956	170	6 578
Austria	65	8	3	1	4	81	1	8	2	11	-	92
Finland	9	22	-	-	-	31	1	1	9	11	-	42
Iceland	-	-	-	-	-	-	-	-	-	-	-	-
Norway	36	21	6	1	3	67	6	14	3	23	-	89
Portugal	8	-	-	-	3	11	2	5	-	7	-	18
Sweden	219	159	20	1	43	442	265	196	13	474	-	916
Switzerland	121	30	8	1	15	175	66	61	2	129	-	304
Total EFTA	458	241	36	3	69	807	340	284	30	654	-	1 461
Australia	2	1	2	-	4	9	1	12	-	13	-	22
Canada	43	9	320	3	22	397	28	73	3	104	-	501
Greece	16	-	-	-	-	16	-	1	2	3	-	20
Japan	554	94	934	-	178	1 760	229	1 069	22	1 320	-	3 079
New Zealand	1	-	-	-	2	3	-	1	-	1	-	4
Spain	28	3	2	-	2	35	39	18	-	57	-	92
Turkey	-	-	-	-	-	-	-	1	-	1	-	1
United States	578	93	-	109	318	1 098	325	964	11	1 300	-	2 397
Yugoslavia	3	1	-	-	1	5	3	12	36	46	-	51
Total OECD excl. Yugoslavia	3 830	1 092	1 448	158	1 041	7 577	2 209	4 032	167	6 408	170	14 155

(1) The data relates to SITC item 764 of the new commodity classification 'Telecom, equipment n.e.c.' which mainly comprises electrical line telephonic and telegraphic apparatus. However, certain items relating to radio receivers (such as CB radios) are also included.

(2) Comprises Australia, Canada, New Zealand, Greece, Spain, Turkey and Yugoslavia.

(3) LDCs loosely defined as non-OECD minus OPEC and Comecon.
Note: Figures may not add due to rounding; - denotes zero or less than \$500 000
Source: OECD 'Statistics of Foreign Trade' (series B - 2nd Revision).

Introduction

- 5.27 The major force behind the growth of the industry since the Second World War was the Australian Post Office (APO).
- 5.28 In the late 1940's the APO adopted a policy of buying the Australian made product wherever possible. This policy led to the rapid expansion of the Australian industry's manufacturing capacity in components, telephone equipment and sophisticated telecommunications devices fields. The policy extended to areas not directly related to electronics e.g. plastic moulding.
- 5.29 An example of the benefits flowing to the industry from this policy was the 'approved contractor scheme' for Private Automatic Branch Exchanges (PABX). Before the introduction of this scheme in 1957, all PABX's were marketed and installed by the APO's own technicians. The result of such support was the development by STC of the Australian Pentaconta PABX in 1962. Subsequently, STC became the world research centre in this field for its parent company, the International Telephone and Telegraph Corporation of the USA. The ensuing development of technical and manufacturing facilities gained export sales for Australia.

Restructuring within the industry

- 5.30 By the early 1960's certain characteristics about the industry were becoming apparent. Too many producers in the relatively small local market meant that economies of scale could not be achieved. The fall-off in consumer demand for television receivers and the 1960--61 'credit squeeze' intensified these problems.
- 5.31 The result was a general consolidation and rationalisation of production and marketing within the industry. Some companies, such as Admiral, Stromberg--Carlson and A.G. Healing disappeared from the industry. Others, in particular STC, moved their resources away from the saturated consumer field to specialise in other areas -- in the case of STC, the high technology telecommunications field.
- 5.32 Takeovers and mergers also occurred in the industry during the 1960's and 1970's. The Philips group interests have progressively extended since 1972 to include Kriesler (A'asia) Pty Ltd and Electronic Industries Ltd including its subsidiaries, Astor Electronics, Eclipse Radio, Radio Corporation Ltd and A.W. Jackson Ltd. The takeover of the British Pye Group by Philips' overseas parent in 1967 gave the company a major shareholding in Pye Australia.

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1. Drawn from the Australian Electronics Industry, A Report by the Electronics Industry Advisory Council, Department of Industry and Commerce, AGPS, Canberra, 1980

- 5.33 A second example of this trend towards 'rationalisation by acquisition' was the Plessey group. During the sixties, Plessey took over Ducon Industries Ltd and the Rola Group of companies and emerged as one of the largest suppliers of electronic components in Australia.
- 5.34 Another characteristic of the industry in the sixties was the increasing activity of the wholly owned subsidiaries of overseas corporations. Apart from the previously mentioned extensions of the Philips and Plessey groups, such companies as Collins Radio Company (A'asia) Pty Ltd, L.M. Ericsson Pty Ltd, Fairchild (Aust) Pty Ltd and NEC Australia Pty Ltd have established manufacturing enterprises in Australia. In fact, of the half dozen major companies involved in the Australian electronic industry, the only two Australian owned are AWA and IRH Industries Ltd.
- 5.35 The pressure for structural change in the industry intensified during the 1970's. This pressure resulted from changes in the level of economic activity, the introduction of labour saving technology and reduction in the level of tariff assistance applying to electronic equipment.
- 5.36 Those changes were in part a response to the growth of the electronics industry in Japan and South East Asia.
- 5.37 Individual companies underwent significant structural change in the face of these market and technological pressures. These changes generally resulted in the Australian industry being better placed to meet the challenges of the eighties. Consequently, productivity has improved and new high technology product areas have been introduced.
- 5.38 During the seventies STC withdrew from the manufacture of HF transmitters, HF aerial systems, microwave links, instrument landing systems, non directional beacons, VHF and UHF radio telephone equipment, banking terminals and semi conductors. The Components Division of Plessey, which in 1970 manufactured and marketed the Ducon, Garrard and Rola range of products in factories in Sydney and Melbourne now specialises in the marketing of imported electronic components.
- 5.39 The product rationalisation which has taken place in the Australian electronics manufacturing industry has also increased the dependence of the industry on overseas manufacture of electronic components.

- 5.40 Increased dependency on overseas manufacture has increased supply lead times. Table 5.9 refers.

Table 5.9: Supply lead-times of equipment components 1976--1979

	1976-77 (weeks)	1978 (weeks)	1979 (weeks)
Integrated circuits (TTL/DTL)	8 to 10	12	30
Integrated circuits (CMOS)	8 to 10	12	40
Transistors	8 to 10	12	20
Diodes	8 to 10	12	20
Resistors (carbon)	13	13	20
Resistors (wire wound)	18	20	50
Mica capacitors	16	20	32
Polystyrene capacitors	16	26	26

Source: The Australian Electronics Industry: A Report by the
Electronics Industry Advisory Council, AGPS, Canberra,
1980

- 5.41 These changes have resulted in the need to maintain higher stocks of components and materials.
- 5.42 Restructuring has also occurred in the telecommunications cable industry over recent years.
- 5.43 The first significant change occurred in July 1973 with the merger of Olympic Cables Pty Ltd with the cable division of Nylex Corporation Ltd to form Olex Cables Limited. The company so formed is jointly owned by Olympic Consolidated Industries Ltd and Nylex Corporation Ltd. In 1974 Conqueror Cables Ltd acquired the cable operation of Camelec Ltd, Adelaide, that business continuing as the Camelec Division of Conqueror Cables Ltd. Beacon Cables (Australia) Pty Ltd, Taree, NSW a small specialist supplier to Telecom Australia ceased business in 1976.
- 5.44 The most recent major change has been the merger of Conqueror Cables Ltd and Pirelli Cables Australia Ltd in June 1978 to form a new company Pirelli Ericsson Cables Ltd jointly owned by the international companies Pirelli and Ericsson.
- 5.45 Considerable plant rationalisation has occurred within the local cable industry following this major activity and as a result of changes in the level of demand for telecommunications cable, Austral Standard Cables Pty Ltd, the largest local manufacturer of telecommunications cables, owned by Metal Manufacturers Ltd and Standard Telephones and Cables Pty Ltd, has closed manufacturing operations in Melbourne.

- 5.46 On the formation of Pirelli Ericsson Cables Ltd a rationalisation of manufacturing operations between the existing plants took place leading to concentration in one location of all telecommunications plant owned by the previously separate companies.
- 5.47 The capacity of the industry exceeds current demand. Plant investment by the industry has been influenced by the need to reduce costs and expand facilities for the manufacture of the new technology cables such as cellular plastic insulated cables with and without petroleum jelly filling.
- 5.48 Higher technical levels required by the network have necessitated many smaller changes in manufacture and a substantial increase in highly sophisticated testing equipment and procedures.
- 5.49 The industry has responded to the projected need for optical fibre cables for use in the network in the next decade. The industry has the technical skills and production experience to move with this change which will render obsolete some older types of cable.

Research and development(1)

- 5.50 Because of the highly sophisticated and dynamic nature of telecommunications technology, the research into and development of, new systems (e.g. switching systems) makes heavy demands on both human and capital resources. The high cost of supporting such activities makes their economic viability critically dependent on markets on a world scale. This has led to a high level of concentration within the world industry. Design and development of major new systems are centred upon some twelve companies which, through their affiliates in various countries, control the production facilities which satisfy the world's demand for this type of equipment.
- 5.51 Where the costs of development are high, local suppliers can take advantage of the process of technology transfer in two ways:
- . the cost of the generic system development is largely paid for by sales in markets external to Australia;
 - . a large amount of the risk elements is removed since laboratory and field trials have already been conducted before the equipment reaches Australia.
- 5.52 While it is not economically viable for Australian industry to initiate and implement basic design and development there will be opportunities to adapt new equipment to the needs of the local market.
- 5.53 Considerable scope also exists for the application of Australian research and development skills to the development of equipment peripheral to the mainline systems.

1. This section owes much to the report of the Electronics Industry Advisory council: The Australian Electronics Industry, AGPS, Canberra, 1980.

- 5.54 The electronics industry in Australia is comprised of both Australian owned companies and of overseas owned companies. Many of the latter are subsidiaries of very large companies based in Europe, the USA and Japan. The latter companies have access to large research and development organisations throughout the world and thus to the developments in technology emanating from those organisations.
- 5.55 The Australian Electronics Industry Advisory Council believes that the international companies should support local development more than they do currently and use their international marketing outlets to promote the end product. The products selected should be those which are applicable to the Australian market and which fill 'gaps' in overseas markets' products which are within the productive capacity of the local industry.
- 5.56 The Electronics Industry Advisory Council has suggested that additional R&D expenditure could be encouraged partly through increased incentives to business and partly through Telecom undertaking a 'pump priming' function by allocating a gradually increasing proportion of its development work to industry.
- 5.57 Government interest in telecommunications R&D also flows from the national security and defence importance of telecommunications and electronics generally. In 1977-78 the Defence Science and Technology Organisation spent some \$9.4 million on development of new equipment in industry.
- 5.58 The result is an industry largely dependent on overseas technology with an increasing trend for involvement in an assembly operation. The future trends in microelectronics technology seem likely to hasten the trend to reduce the Australian added value of telecommunications equipment for a given equipment volume, as more of the functions to be performed are incorporated in imported integrated circuits with a progressively increased scale of integration made possible by advancing microelectronics processing technology.
- 5.59 In general, it is the smaller companies in the industry which can most readily adopt the advantages of new technology since they are not restrained by the significant investment in plant and human resources typical of the larger companies.

RECENT DEVELOPMENTS

Potential industry impact of 'CTV'

- 5.60 Of particular significance is the impact of the possible introduction of 'cable television' ('CTV') on the local cable manufacturing industry. In its report on 'CTV' the Australian Broadcasting Tribunal recommended that applicants be encouraged to make the maximum use of Australian manufactured hardware in the construction and operation of 'CTV' systems.(1)

1. Cable and subscription television services for Australia, Report August 1982, Australian Broadcasting Tribunal, AGPS, Canberra, 1982

Impact of establishment of the national satellite system

- 5.61 The Minister for Communications recently announced that approximately half of the work contracted for the provision of earth stations to operate with the national satellite system would be placed with local manufacturers.
- 5.62 The contract with Hughes Communications International, the company which will manufacture the satellites and associated ground monitoring facilities, includes provision for \$5.1 million Australian content. This amount covers work related to spacecraft elements and wiring harnesses, electronics subsystems for the two ground control stations and engineering support services. The Hughes organisation has also undertaken to place orders with Australian firms and provide high technology transfer to Australia to the order of 30% of the space segment contract value.

TELECOMMUNICATIONS EQUIPMENT

Network Equipment

- 5.63 Digital signal handling and computer control techniques have already been introduced into the Australian network in the form of pulse code modulation (PCM) inter-exchange transmission systems and stored program controlled (SPC) exchanges (10C trunk exchanges, ARE 11 local exchanges and in the near future, AXE local exchanges). SPC exchanges in service utilise electronic technology for control functions but adhere to electromechanical technology for line switching. Growth of PCM transmission systems will alter the economic balance in favour of the adoption of SPC exchanges using digital signal handling processes to replace the electromechanical with fully electronic technology. The growth in demand for data transmission services will be serviced by Telecom's introduction of a new digital data network (DDN) and a packet switched network (AUSTPAC), both of which will be realised by electronic technology.
- 5.64 Telecommunications network equipment supplied to Telecom can be categorised as follows:
- . exchange switching equipment;
 - . transmission equipment;
 - radio;
 - cable.

- 5.65 STC, Ericsson and Plessey manufacture crossbar equipment which is being phased out. Crossbar modernisation equipment is manufactured by Ericsson and STC while AXE is manufactured by Ericsson. Manufacture and installation of AXE equipment is less labour intensive than the crossbar equipment.
- 5.66 The major suppliers of radio transmission equipment to Telecom are NEC, GT&E, Siemens and GEC, with NEC being the major manufacturer. Broadband equipment for 900 channels and above is the major requirement and involves mainly imported technology. Medium capacity bearers (up to 120 channels) providing links between regional centres and small capacity 91--60 channels) have similar total sales.
- 5.67 The major suppliers of cable equipment are STC, ASC, Olex and Pirelli. Most equipment is locally manufactured.

Terminal equipment

- 5.68 The two telephone manufacturers in Australia, STC and AWA, account for about 95 percent of Australian production capacity in telephone instruments. This total capacity exceeds 1 million instruments per year. About 800 000 telephones are manufactured each year. The share for each company is determined by competitive tender and varies from year to year. The share is also affected by differences in product mix between rotary dial table phones and wall phones, Touchphones, etc. Production runs of at least 400 000 phones are generally regarded as cost effective.
- 5.69 In addition to the standard 800 type phones and Ericofons, Telecom has recently commenced marketing trials for 'premium phones'. These are likely to become the standard phones of the future and their manufacture will maintain economic manufacturing volumes. Production lines have been designed to be able to handle these market developments.
- 5.70 In addition to standard and premium phones there are public and private (leased) coin phones and multi feature phones. Multi feature telephones include such features:
- . hands free operation;
 - . number display;
 - . cordless (radio) operation;
 - . charge monitoring.
- 5.71 Telecom's purchases of PABX systems from the three major suppliers, Siemens, Philips and NEC, provide the basis for the continuation of local manufacturing facilities.
- 5.72 As a result of a ministerial decision late in 1980 Telecom has been precluded from the facsimile and telephone answering markets. There are nine suppliers of facsimile machines. All equipment is imported and supplied to users by the private sector which is responsible for installation and maintenance.

- 5.73 Telecom is currently excluded from the answering machine market. Telecom has indicated that the marketing of telephone answering machines through its nationwide system of Telecom Business Offices and sales outlets would enable a growth rate of 20 percent per annum to 1988 to be achievable.
- 5.74 Teleprinters are manufactured by SAGEM and Centre Industries with Telecom operating as the sole supplier to the market and doing all installation and maintenance.
- 5.75 These are electronic key telephone systems derived from earlier generation multi wire electromechanical key telephone systems. They use microprocessors to give enhanced facility ranges and simple four wire cabling arrangements. They have always been a Telecom monopoly.

SECTION 6
TELECOMMUNICATIONS TECHNOLOGY

Prepared by the Secretariat of the Telecommunications Inquiry

THE ORIGINS OF MODERN TELECOMMUNICATIONS SYSTEMS

Telegraphy and telephony

- 6.1 Modern telecommunications systems derive from two separate nineteenth century inventions: telegraphy and telephony. Telegraphy was invented about 150 years ago and involved transmission of information by Morse code. Telephony was invented some 50 years later. Transmission techniques associated with telegraphy and telephony respectively were traditionally viewed as two discrete types of transmission technology. Telegraphy involved signal transmission in a stream of on/off pulses using digital transmission techniques. Telephony involved transmission of a continuous voice current using analogue transmission techniques. (paragraphs 6.23 to 6.26 elaborate on these techniques and their use in telecommunications systems).

Wireless telegraphy

- 6.2 The transmission of signals via wireless telegraphy followed closely behind the establishment of the world's first public automatic switched telephone network in 1892 in Indiana, USA. By 1901, Marconi had successfully transmitted a wireless telegraphy signal in Morse code across the Atlantic. Further development of Marconi's transmission techniques led to the first voice radio broadcast over a wireless transmitter, the forerunner of today's radio broadcasting stations and more recent microwave radio telecommunications distribution systems.
- 6.3 The successful application of radio broadcasting distribution systems between 1900 and 1930 gave rise to speculation that wireless telegraphy distribution technologies might supplant existing wired distribution systems. The former technological advance led directly to the development of radar by 1935. This development was accelerated by radar research and application during the Second World War. Even before that time, work on refinements of the cathode ray tube had facilitated the introduction of public broadcast television services.

Computer technology

- 6.4 Commercial use of computerised information processing technology in the 1950's paved the way for application of an unprecedented capability to store, process, retrieve and disseminate a multiplicity of data.

Present trends

6.5 Present trends in the development of telecommunications systems have been primarily facilitated by the increasing use of:

- . miniaturised solid state semiconductor (microchip) technology;
- . digital signal encoding and switching;
- . multiplexing and transmission techniques;
- . processor control of equipment and systems;
- . transmission systems with increasing bandwidth.

Application of the above is enabling services which could previously only be supplied discretely to be combined into a single transmission signal. Integration of computers and telecommunications equipment has occurred in telephone exchange equipment. Advanced digital techniques for the transmission of telecommunications signals are being applied to increase the traffic carrying capability of existing analogue based networks.

6.6 Conventional and more recent distribution technologies being used in modern telecommunications networks are outlined in paragraphs 6.40 to 6.67 of this section.

TELECOMMUNICATIONS CONCEPTS

Definitions

6.7 Communications is defined as the conveyance of information between points of origin and destination.

6.8 Telecommunications is a special means of communications whereby information is conveyed over a distance and transmission is effected by means of electromagnetic signal transmission via guided or unguided transmission media.

6.9 The four basic elements in any communications process are:

- . a source of information origination or transmitter;
- . a message (content) -- in voice, image or data form;
- . a transmission medium;
- . a destination facility or terminal.

Types of transmission systems

- 6.10 Transmission systems are variously classified by the telecommunications industry as:
- . guided and unguided systems; or
 - . reticulated and radiated systems.
- 6.11 'Guided systems' are telecommunications systems in which electromagnetic signals are transmitted from point to point along a fixed path. 'Unguided systems' are systems in which such transmission occurs by radiation in a given direction or is omni-directional.
- 6.12 Reticulated telecommunications distribution is a common term used by Telecom to describe those systems in which signals are transmitted from point to point within the physical confines and traffic carrying capability of a manually constructed link along a fixed transmission path. Distribution modes in such systems may involve the use of telephony or telegraphic wires, broadband coaxial cables, multiple broadband channels, cable systems or optical fibres as the physical transmission medium.
- 6.13 Radiated telecommunications distribution systems is the term commonly used to describe those in which the path of transmitted signals is not confined to, or guided along a fixed transmission path. Typically they involve simultaneous transmission of information from one to many points. Such transmission is commonly described as a 'broadcast distribution mode'. In this mode, transmitted signals are not confined to or guided along a fixed transmission path from one point to another. Signals are originated at one transmitting source and then radiated out. The distance from the transmitting point at which signals may be satisfactorily received will depend on a number of factors including the power level at which the signals are emitted from the originating point.

Types of communications channels

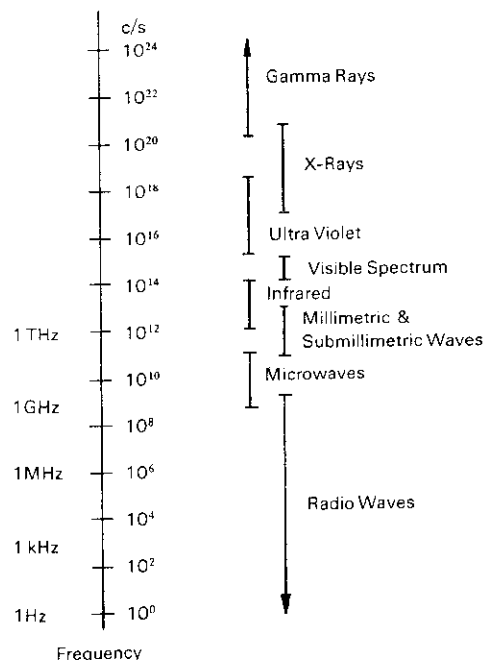
- 6.14 A telecommunications channel or bearer is the basic transmission element provided for the conveyance of a signal within a telecommunications network, or a distribution system within such a network. It is characterised by its information carrying capability. Transmission capability refers to the information capacity expressed in terms of traffic volume, transmission speed, bandwidth etc. For example, a typical television channel has a bandwidth of 5.5 MHz, while linking computers might require up to 2MBit/s.

- 6.15 There are many kinds of transmission media used in telecommunications networks. These are generally categorised in terms of the transmission mode involved. For example, reticulated distribution systems may involve copper wire pairs, coaxial cable, multiple channel broadband cable ('CTV') systems, optical fibre or laser distribution modes. Radiated distribution systems may involve the use of either terrestrial or satellite microwave radio distribution communications channels. They are also characterised according to their capacity to transmit signals in one or more directions.
- 6.16 A simplex channel has the capability to transmit traffic in one direction only. A half duplex channel is capable of transmitting traffic in two directions but not simultaneously. A full duplex channel has the capability to transmit traffic in two directions simultaneously.

Bandwidth

- 6.17 The range of frequencies transmitted over a given communications channel is referred to as the bandwidth. The bandwidth of a particular channel is expressed in terms of the difference between the highest and lowest frequencies at which transmission over that channel takes place. Figure 6.1 shows the frequency range in the electromagnetic spectrum.

Figure 6.1: The Electromagnetic Spectrum



Source: Karbowski A E Communications System in 'Information, Computers, Machines and Man' Sydney 1971.

- 6.18 Different types of telecommunications traffic require differing amounts of bandwidth or bandwidth equivalent. Examples are:
- . voice telephony: 3.3 KHz;
 - . television relay: 5.5 MHz.
- 6.19 Thus the traffic carrying capability of a channel is often expressed in terms of its bandwidth. It may also be expressed in terms of its transmission speed capability. Transmission rates of typical communication channels include:
- . telegraphy 50 Bit/s
 - . telex 200 Bit/s;
 - . data (Datel service in voice circuit) 300--960 Bit/s;
 - . digital telephone signal (CCITT) 64 KBit/s;
 - . digital telephony (per pair) 2 MBit/s;
 - . satellite transponder
 - (3 year old technology) 50 MBit/s;
 - . colour television 100 MBit/s;
 - . 4 mm coaxial cable 120 MBit/s;
 - . optical fibre (multimode, graded index), typically 400 MBit/s;
 - . satellite capacity (3 year old technology) 800 MBit/s;
 - . optical fibre (mono-mode), typically 1 000 MBit/s.

ANALOGUE AND DIGITAL SIGNAL TRANSMISSION TECHNIQUES

Signal modulation and encoding

- 6.20 The transmission of information content is effected in the form of a signal. Signal transmission requires encoding of the information content into either analogue or digital mode for transmission via a carrier wave.

Analogue signal modulation

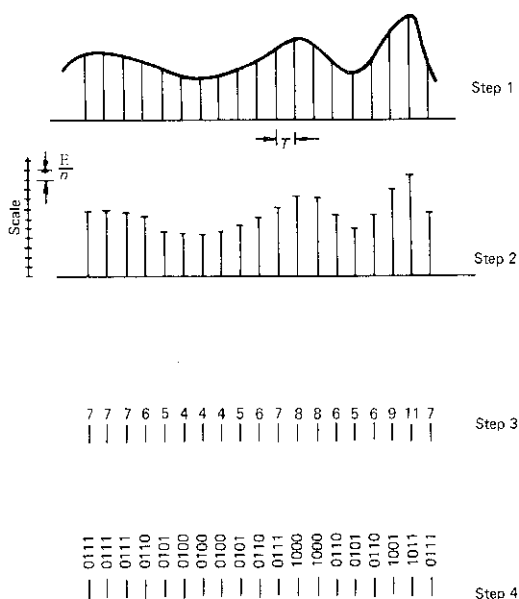
- 6.21 Analogue transmission is the process whereby an electrical signal continuously replicates, or is analogous to, the varying patterns in the information content being transmitted. Thus the electrical signals generated by the microphone of a telephone handset will vary according to the loudness and continuity of the voice conversation being conducted. Analogue techniques have been the predominant signal transmission mode on Telecom's network.

Digital signal encoding

6.22

By contrast, digital signals are discontinuous, being transmitted in a stream of on/off pulses. In telegraphy, the earliest form of electronic digital transmission, this stream of pulses varied according to the dots and dashes of the Morse technique of signal encoding. Morse signal encoding involves a three symbol value -- one for a dot, one for a dash and the other for the intervening pause when no information is transmitted. Modern digital transmission techniques are organised differently with the stream of pulses having only two values generally described as a binary code. A binary code is based on a binary arithmetical formula in which the symbol '1' for 'on' (i.e. the existence of the pulse), the other '0' for 'off' (i.e. the absence of the pulse) (Figure 6.2 refers).

Figure 6.2: Steps in Conversion from Analogue to Digital Form



Source: Karbowiak A E Communications System in 'Information, Computers, Machines and Man' Sydney 1971.

Notes: T = Time

$\frac{E}{n}$ = minimum detectable amplitude (energy) change

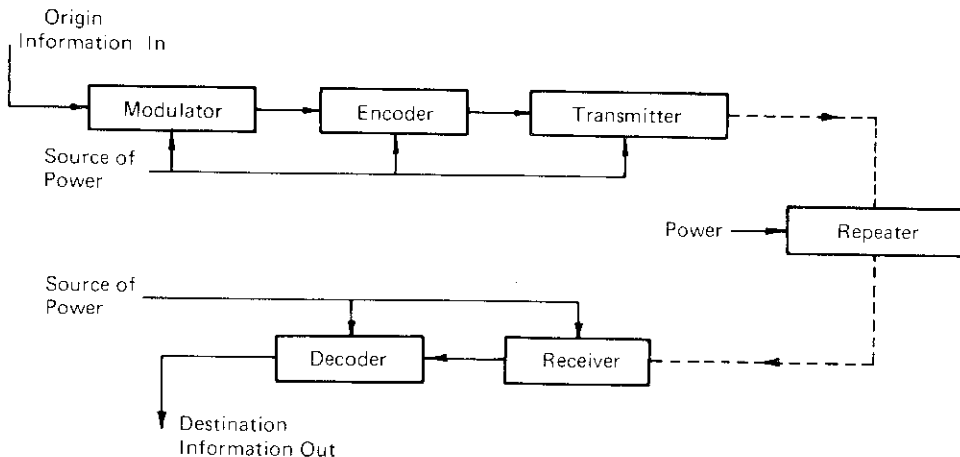
Analogue transmission and existing national public switched networks

- 6.23 Most existing national public switched telecommunications networks are designed around analogue transmission techniques. The networks were primarily designed for voice telephony, a transmission function for which analogue techniques are well suited. At the time of development of these networks, it was more economic to use analogue techniques, but this is changing, with the establishment of digital networks now being cheaper than analogue networks.

Data transmission over analogue networks

- 6.24 Data information in digital form has to be modulated as an analogue signal for transmission over such networks. This requires an intervening process, the conversion of the signal from a digital into an analogue mode. This is effected by use of special terminal equipment known as 'modems' (Figure 6.3 refers).

Figure 6.3: Data Communication System



Source: Karbowiak A E Communications System in 'Information, Computers, Machines and Man' Sydney 1971.

The influence of computer technology

- 6.25 The use of modems became widespread with the increasing demand for carriage of data communications over telecommunications networks. With the advent of silicon and microchip technology, the information processing capability of computers has increased significantly as has the speed with which computers can communicate with each other.

- 6.26 There is an increasing interest in the use of digital techniques due to reduced costs the speed and volume of data communications now required. As major telecommunications users move towards increasing computerisation of their information storage, analysis and retrieval functions, an increasing demand for high speed transmission capability is generated. Since volume and rate of transmission capability is directly related to, among other things, channel bandwidth, the stage has been reached where the existing analogue network tends to place constraints on the effectiveness with which such organisations use the new computer technologies. These networks can support speeds of up to 9.6 kBit/s capacity in most applications. A higher speed capability of 48 kBit/s is available using group bandwidths, but this has only found limited application in the Australian environment.
- 6.27 Network operators are moving to integrate transmission systems based on new distribution and switching technologies into existing networks. At the same time, advanced research is being undertaken into use of the higher frequency ranges of the electromagnetic spectrum for signal transmission.
- 6.28 Improved digital transmission and information processing techniques enable better throughput efficiency in signal information content. Application of these techniques facilitates the design of digital transmission systems. The use of digital techniques in analogue networks enables increases in the traffic carrying capacity of the networks.

Implications for national public telecommunications networks

- 6.29 National public telecommunications network operators are faced with the substantial problems in having to upgrade facilities to maximise the benefits of technical innovations facilitated by new technology developments to meet specialised requirements of major customers. At the same time, network operators who are also national public common carriers have a responsibility to continue to provide a level of service compatible with the requirements of the majority of their customers, namely residential or non business users.
- 6.30 They must also take account of existing massive investments in analogue network plant and supporting infrastructure. Their response has been to implement a transitional process characteristic of national telecommunications networks. In planning for the provision of the first digital network transmission facilities, this is achieved by a process of overlaying a digital system onto a 'core' analogue terrestrial network.

Integrated digital networks

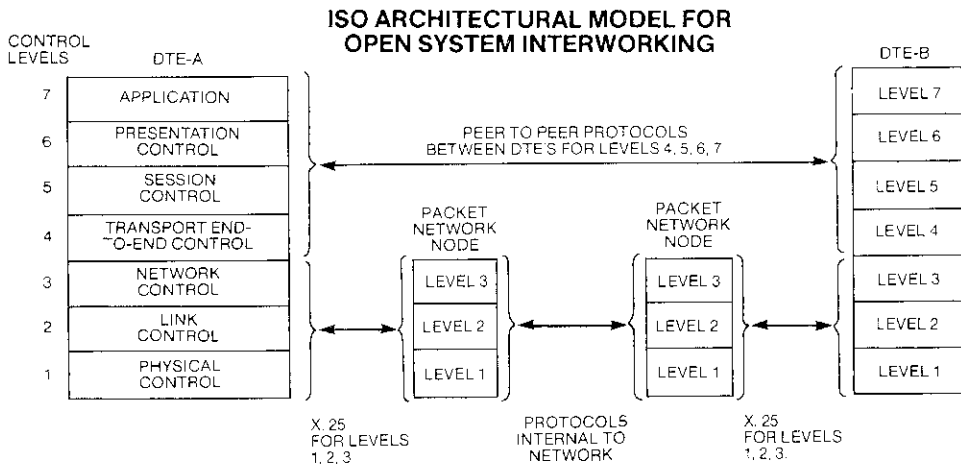
- 6.31 The use of digital technologies has made it practical and economic to merge switching and transmission technologies, thereby avoiding the need to modulate/demodulate signals. The application of this process in relation to digital networks is commonly described in terms of an integrated digital network (IDN). An IDN is one in which connections established by digital switching are used for the transmission of digital signals for a single service, currently telephony.
- 6.32 The first step towards an IDN is the provision of digital transmission links between the exchanges. A technique called pulse code modulation (PCM) is the most commonly used method of encoding analogue signals for digital transmission. PCM transmission techniques permit a range of signals, e.g. voice, video and data to be combined for simultaneous transmission in a single traffic stream.
- 6.33 Given the extent to which existing national public switched telecommunications networks are based on analogue techniques and the associated massive investments therein, analogue and digital systems are likely to co-exist in such networks for the foreseeable future.

Integrated services digital networks

- 6.34 The implementation of an Integrated Services Digital Network (ISDN) is similarly characteristic of the ongoing process of the progressive technological upgrading of existing national public telecommunications networks to take advantage of the increased performance capability of developments in telecommunications distribution and switching technologies.
- 6.35 The significance of ISDN is the convergence of computer and telecommunications technologies which has facilitated ISDN implementation. An equally significant, related factor is the accelerated pace of change flowing from this convergence. The establishment of an ISDN depends on the progressively widening application of digital technology in current networks and the development of suitable terminal equipment. An integrated digital network is a network in which the same digital switches and digital paths are used to establish connections for different services, for example, telephony and data.
- 6.36 The development of an ISDN is a further evolutionary step from the establishment of an IDN. In the IDN, the integration of digital exchanges and digital transmissions between these exchanges takes place. In the establishment of an ISDN, lines between customer terminals and exchanges are provided which are capable of carrying digitally encoded signals for a variety of services.

- 6.37 An ISDN can provide higher capacity network facilities at reduced cost and with improved reliability. It will have a simpler architecture than a large number of separate service networks and will therefore offer increased flexibility, allowing interconnection between a variety of different transmission systems (Figure 6.4 refers).

Figure 6.4: ISO Architectural model for open system interworking



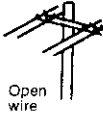



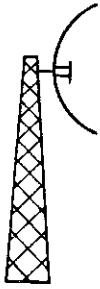

Source: Telecom

TELECOMMUNICATIONS TRANSMISSION TECHNOLOGIES

Transmission systems

- 6.38 Telecommunications infrastructures may encompass the full range of commercially practicable transmission technologies. Line transmission systems include copper wire, coaxial cable and multiple broadband channel cable and optical fibre distribution modes. Radio systems include both terrestrial and satellite microwave radio facilities (Figure 6.5 refers).

Figure 6.5: Communication Systems

Type		Operating frequency	Channel capacity	Repeater spacing (attenuation)
 Open wire	One pair	36 to 84 kHz (go) 92 to 140 kHz (return)	$12 + 3 + (1)$ $= 15 + (1)$	95 to 110 kms (0.25 db/km)
	Maximum 16 pairs	As above	$240 + (16)$	
 Balanced pair	One pair	12 to 252 kHz	60	20 to 50 kms (2.5 db/km)
	Maximum 24 pairs	As above	1440	
 Coaxial G.B.		Up to 4 MHz	960 (One super channel)	10 kms
		Up to 12 MHz	3 super channels	5 kms
 Coaxial U.S.		Up to about 3 MHz	720	13 kms
		L3 system	1 TV channel + 600 speech channels	6 kms
Single wire transmission line		About 100 to 1,000 MHz	Probably a few TV channels	About 3 to 16 kms
 Microwave links		Below 500 MHz	Maximum of 60	65 to 80 kms
		500 to 1,000 MHz	Up to 120	65 to 80 kms
		2,000 MHz	240×6 or $1 \text{ TV} \times 6$	50 to 65 kms
		4,000 MHz	600×6 or $1 \text{ TV} \times 6$	40 to 50 kms
		6,000 to 8,000 MHz	600×6 or $1 \text{ TV} \times 6$ Maximum $2 \text{ TV} \times 6$	40 to 50 kms
		11,000 MHz	Less than 600	Less than 30 kms
 Long haul waveguide (H_{10})		30,000 MHz up to about 100,000 MHz	1,000 super channels = several hundreds of TV channels = several hundred thousands of speech channels	30 to 65 kms 1 attenuation 2.5 db/km
Optical fibre		250 to 400×10^{12} Hz	1-5 TV channels/fibre	10-100 kms

Communication Systems and their Capacity.

Source: Karbowiak A E Communications System in 'Information, Computers, Machines and Man' Sydney 1971.
Modified to include optical fibre.

Wire pairs

- 6.39 A single pair of copper wires has the capability to provide directional duplex communication between distant points. The most common application of this capability is a voice telephone conversation between two individuals.
- 6.40 Modern modulation and multiplexing techniques allow the simultaneous transmission of up to 60 voice channels per one pair of copper wires.
- 6.41 While wire pairs are designed primarily for carriage of voice signals, they are also used to transmit data communications. Narrowband facsimile or image traffic (typically text facsimile or photographic image facsimile) may also be carried over such transmission facilities. Special techniques are used to condition voice grade lines to allow transmission of data and image traffic at speeds of up to 9.6 kbps. This provides the capability, for example, to transmit a slow scan video image in one direction only.

Coaxial cables

- 6.42 Coaxial cables consist of a thick copper wire mounted in a tube surrounded by insulation and protected. The size of the cable is dependent on the number of tubes included. High frequency electromagnetic signals may be transmitted down such cables with much smaller signal distortion.
- 6.43 One coaxial cable tube can carry 3 600 full duplex voice circuits. This is equivalent to the bandwidth required to carry three relay quality television signals. Traffic carrying capability may be increased by use of advanced multiplexing techniques. Coaxial cables can transmit signals in the higher frequency ranges of the radio spectrum. Given the relatively low signal distortion characteristics of coaxial cables, a single cable can carry large volumes of information. Coaxial cables are also characterised by negligible transfer of energy from one circuit to another.
- 6.44 Common applications of coaxial cable distribution systems in existing national telecommunications networks include carriage of inter-city telephony traffic on trunk routes, and inter-city relay of television signals between a program origination source and a television broadcasting transmitter. For the latter, local coaxial links are required to link television studios and transmitters. These are commonly referred to as local 'tails'.

Large capacity cable systems

- 6.45 Coaxial cable distribution technology is also applied to provide very large capacity local cable television ('CTV') distribution systems in some overseas administrations. These have the capability to accommodate up to 50 television channels.

- 6.46 The use of 'CTV' systems in some overseas countries (eg USA and Canada) is extensive, where their major application is for transmission of multiple television channels for entertainment purposes. These large capacity systems are equally capable of carrying any type of telecommunications traffic which can be carried over a single coaxial cable. Their use for telecommunications traffic presently accounts for but a minor fraction of overall system capacity.
- 6.47 In North America, however, switching technologies are being developed for use with established public switched local area distribution systems. These are essentially public switched telecommunications networks which provide a range of specialised transmission facilities for carriage of a multiplicity of information services. They are used to provide mainly television services and, to a lesser extent, voice, data and information services.
- 6.48 Large capacity cable systems, like wire pair and coaxial cable transmission facilities may involve either, or both, aerial and underground installations.

Optical fibre transmission systems

- 6.49 As increases in capacity relate to increases in the frequency used, a more advanced reticulated distribution technology has been developed using electro-optical transmission techniques. The 'simplest' form of this technology involves the use of glass fibres with the capability to transmit signals in the visible and infra-red bands.
- 6.50 Optical fibres are hair-like glass threads used to transmit information in the form of light pulses. These threads are packaged inside cable sheaths for protection. Optical fibres are capable of carrying signals at very high transmission rates.
- 6.51 The advantages of optical fibre over coaxial cable can be summarised as follows:
- . low signal attenuation allows longer repeater spacings, with substantial financial savings in repeater equipment;
 - . optical fibre signals are immune to electrical interference.
- 6.52 One factor which originally limited the transmission capacity of optical fibre was dispersion of the signal. In transmission of light along the fibre, individual light pulses suffer dispersion. These problems have now been overcome by controlled grading of the refractive index in the fibre. The new technology is concerned with single mode fibres for trunk transmission. These systems are free of the above limitations. Another initial problem was that joined sections of fibre tended to cause significant signal loss. Jointing techniques have now been developed to overcome this problem.

Terrestrial microwave radio

- 6.53 Microwave radio links are widely used for the transmission of high volume, long distance telephone traffic, and for television program distribution. They operate in the ultra high frequency portion of the spectrum and operate on the basis of line of sight transmission. Repeaters must therefore be erected within line of sight of each other and are spaced about 50 kilometres apart.
- 6.54 A limitation of the line of sight transmission characteristics of terrestrial microwave radio distribution facilities is that tall buildings, hills and other physical obstacles can cause problems in signal reception. This is particularly noticeable in reception of broadcast television signals. Such problems can be overcome by correctly siting a number of antennae. Overseas, where this is not practicable, community antennae cable distribution systems are used in localised distribution systems to overcome reception difficulties.
- 6.55 As with other radiated distribution systems, microwave transmission facilities are also affected by interference due to atmospheric conditions.
- 6.56 A single terrestrial microwave radio point to point bearer has a capability of 6 MHz transmission using conventional multiplexing techniques. It can carry one relay quality television signal, or the equivalent of about 1 200 telephone voice circuits.
- 6.57 Microwave radio bearers can also be used in local area distribution systems for PABX to PABX transmission of wideband data streams. Typical traffic carrying capability of existing systems varies from 2 MBit/s to 34 MBit/s depending on the bandwidth of the microwave radio bearer.

Satellite distribution technology

- 6.58 Satellite communications systems have been described as 'relays in the sky'. In principle, a satellite operates very much like a terrestrial microwave relay station. A satellite receives radio signals in a given frequency band, changes their frequency and retransmits them.
- 6.59 Satellites use radio microwave frequencies, 26 GHz (S Band), 4--6 GHz (C Band), 12--14GHz (K Band), for reception and transmission of signals. The present generation of satellites can carry up to 25 repeater units, known as transponders, per spacecraft. Transponders typically have a bandwidth of around 36--45 MHz. This gives them the capacity to carry one relay quality television signals or approximately 1 000 two way voice channels, depending on:
- . the size of the earth station accessing the satellite system;
 - . the effective isotropic radiated power (EIRP) emitted;
 - . the multiplexing techniques used.

Signal attenuation in satellite systems

- 6.60 In satellite transmissions, signal attenuation arises from a number of factors. One of the most important is the distance over which the signal is transmitted. The distance also produces a phenomenon known as signal propagation delay.

- 6.61 A related phenomenon in satellite transmission is echo. Propagation delay and echo are characteristic of all satellite communications systems irrespective of their operating frequencies. These, together with the phenomenon of rainfall attenuation, have been the major technical constraints on use of satellite communications systems for business commercial use overseas. The former (propagation delay and echo) can be and to a large extent have been offset by application of advanced transmission technologies.
- 6.62 Satellite links are widely used overseas for both voice and data communications because they are cheaper than terrestrial circuits over certain distances and with certain system configurations.

Echo in satellite links

- 6.63 Echo is present in most telephone circuits. It is exacerbated on satellite circuits because of the propagation delay. On short haul terrestrial circuits the echo occurs almost immediately and therefore is not noticeable. The echo is due to impedance mismatch between line and circuit equipment. It tends to vary from line to line. On terrestrial circuits the problem is relatively simple to overcome. This is done by using echo suppressors on the return path.
- 6.64 For long haul terrestrial and satellite circuits, the conventional method used is the echo suppressor. This is a fairly sophisticated switch which 'listens' to the line in both directions. It decides which one has speech at any given instant and places very high loss in the other direction. This is effective unless both parties to a telephone conversation talk simultaneously.
- 6.65 For satellites, another device called an echo canceller is being used by system operators in North America. This has proved effective, but expensive. It works by generating a replica of the echo and inserting it into the return conversation path subtracting it from the real echo.

TRENDS IN TELECOMMUNICATIONS SERVICES

Introduction

- 6.66 The limitations of the existing analogue public switched telephone network with regard to transmission rate and bandwidth make it increasingly unsuitable for the provision of a wide range of advanced services. Discussion in this section has focussed on developments in digital transmission techniques to overcome these constraints. The ultimate development of these techniques will see the establishment of ISDN's capable of carrying virtually all services.

Classification of services

6.67 Technically, services have been classified according to the technological parameters which facilitate the planning and provisioning of services over new or established plant:

- . transmission bandwidth;
- . the type of signal;
- . traffic characteristics.

6.68 In this discussion of services trends, services are categorised according to bandwidth, namely 'voice' bandwidth (or narrowband) services and 'wideband' services. In an all-digital network these distinctions will disappear and services will be categorised as integrated digital services, being transmitted in continuous data streams at varying bit rates.

Telephone terminals

6.69 Over the next decade, telephone terminals will become increasingly sophisticated, with features such as keypads, displays, digital voice coding in the terminal and intelligence. The use of digital techniques in terminals will make it cost effective to introduce additional facilities such as last number re-dial, repertory dialling, call duration and cost information display, time, alarm, calculator, etc. In the longer term, terminals will also support voice message services such as personal recorded announcements, incoming message storage and voice reminder messages.

Centralised facilities

6.70 There is a limit to the range of facilities that can be provided solely by an advanced terminal. Facilities such as centralised reception services, automatic transfer and 'follow me', call waiting identification, call charge recording, conference calling and voice store and forward facilities require network information and control. These are already available using small business systems (SBS), PABX's or a public telecommunications network.

Rural services

6.71 The introduction of digital radio concentrator systems (DRCS), small remote digital switching systems and domestic satellite systems will facilitate the provision of enhanced telephony services to remote areas. The DRCS will be used for voice services in rural areas, and as small remote exchanges become economic, the DRCS can be extended.

Mobile services

6.72 Current trends in mobile radio services include the development of high density cellular networks supporting both voice and low speed data services. Another trend is the development of paging services with two way capability and closer interaction between the mobile telephony and paging networks.

- 6.73 Other longer term possibilities may be the development of portable units offering a range of services and the use of satellites to provide Australia wide services.

Information and computer-based services

- 6.74 The continued growth in data traffic will result in an increasing demand for the provision of more diverse and improved data transmission services.

Data transmission services

- 6.75 The primary developments in Australian data transmission services are the Digital Data Service and AUSTPAC services, providing leased data services and packet switched data services respectively. These are discussed in greater detail in Volume 2, Section 3.

Computer-based 'videographic' (telematic) services

- 6.76 These services include all text and graphics transmission services such as facsimile, 'videotex', 'teletex' and telewriting. Trends in the provision of these services include interworking between telematics terminals, for example between 'teletex' and facsimile, or 'videotex' and 'teletex'. In addition, the availability of suitable transmission capability will greatly increase the transmission speed of telematic services.

Message store and forward services

- 6.77 Computer-based text store and forward services, also known as 'electronic mail', have resulted from the capability of networking computers. An integrated store and forward service would include text, speech and facsimile as well as database access capabilities. Over the next two decades individual store and forward services will develop which may be incorporated into large PABX's or terminals.

Other computer-based services

- 6.78 The expected major growth areas in computer-based services will be to support information transfer and text processing. The use of information retrieval services, including 'videotex', is expected to increase. Research in various administrations is aimed at interconnection of retrieval services enabling future 'videotex' facilities to provide gateways for other services. Such services may be nationally or internationally based and be purely retrieval oriented or provide computational facilities not available on the host 'videotex' service.

- 6.79 It is expected that communicating word processing will form a major applications growth area in Australia, occurring primarily in the business sector. Point of sale and credit validation transactions may be expected to increase over the next five years at rates determined mainly by the availability of inexpensive transmission.

TV conferencing

- 6.80 Commercial development of TV coding techniques, increasing penetration of PCM digital transmission and optical fibre cable technology is overcoming past constraints on provision of television conferencing services. The establishment of large capacity cable systems and digital microwave radio and satellite transmission systems may also assist the development of these services.

TELECOM'S STAFFING AND INDUSTRIAL RELATIONS

Prepared by the Secretariat of the Telecommunications Inquiry

INTRODUCTION

Overview

7.1 Prior to 1975, the Postmaster-General's Department operating as the Australian Post Office (APO) was responsible for the provision of both postal and telecommunications services throughout Australia. It was Australia's largest employer, with a staff of more than 120 000 of which about 85 000 were concerned with telecommunications.

7.2 As with any other Department of State, APO staff were employed in the Australian Public Service (APS) under the Public Service Act 1922. The Public Service Board (PSB) was responsible for:

- . the setting of rates of pay and other conditions of service;
- . the determination of the number and classification of staff.

There was a division of responsibility between the APO and the PSB in relation to industrial relations and associated personnel matters.

7.3 In 1974 the Report of the Commission of Inquiry into the Australian Post Office (Vernon Report) recommended that postal and telecommunications services should be provided by two separate statutory authorities. The Report concluded that while these services were essentially community services, they also had the basic characteristics of commercial enterprises. The Report recognised that the increasingly commercial nature of the enterprises required greater independence from Government in the areas of staffing and industrial relations. Specific recommendations included:

- . the boards of the corporations should determine pay, classifications and conditions of service;
- . the organisation of industrial relations responsibilities should be revised and strengthened, and the matters on which management has a responsibility to consult staff associations should be identified and formal consultation processes established;
- . industrial disputes should not be dealt with by the Public Service Arbitrator, but should be heard and determined by separate arbitral authorities.

- 7.4 The recommendations were generally accepted by the then Government and implemented in the Telecommunications Act 1975, the Postal Services Act 1975 and the Postal and Telecommunications Commissions (Transitional Provisions) Act 1975. Relevant features of the statutes include:
- . each Commission is empowered:
 - to appoint officers and employees;
 - to determine the number and classification of staff, rates of pay and other conditions of service;
 - . all staff compulsorily transferred from the APO are employed on terms and conditions of service no less favourable than those of the APS at the time of transfer and maintained all sick and recreation leave credits;
 - . a consultative council for each Commission is established, comprising management and staff organisation representatives;
 - . the Conciliation and Arbitration Commission has responsibility for award determination and resolution of industrial disputes;
 - . staff of the Commissions are covered by general Commonwealth legislation (Volume 2, Section 1 refers).

- 7.5 The Telecommunications Act 1975 and associated Regulations and By-laws prescribe in detail the terms and conditions of employment and rights and obligations of Telecom staff. They also codify a range of staff and management procedures. Relevant provisions are described in Section 1 of this Volume.

DISTRIBUTION OF TELECOM'S WORKFORCE

Dimensions and distribution

- 7.6 Telecom's total work force as at 17 June 1981 comprised 89 992 full time staff, comprising 78 852 permanent officers and 11 140 temporary employees, and 2 079 part time staff (Table 7.1 refers).

Table 7.1: Telecom's staff numbers as at 17 June 1981

	NSW	VIC.	QLD.	SA	WA	TAS.	HEAD- QUARTERS	AUSTRALIA
PERMANENT OFFICERS								
Male	20 635	15 441	10 500	6 714	5 318	1 886	2 762	63 256
Female	5 391	3 824	2 423	1 457	1 336	366	799	15 596
Total	26 026	19 265	12 923	8 171	6 654	2 252	3 561	78 852
TEMPORARY EMPLOYEES								
Male	3 165	1 085	1 642	451	349	146	35	6 873
Female	1 783	790	832	451	283	104	24	4 267
Total	4 948	1 875	2 474	902	632	250	59	11 140
TOTAL FULL TIME STAFF								
Male	23 800	16 526	12 142	7 165	5 667	2 032	2 797	70 129
Female	7 174	4 614	3 255	1 908	1 619	470	823	19 863
Total	30 974	21 140	15 397	9 073	7 286	2 502	3 620	89 992
PART TIME STAFF								
Male	71	34	13	25	7	4	2	156
Female	585	463	320	241	169	71	74	1 923
Total	656	497	333	266	176	75	76	2 079

Source: Telecom Annual Report 1980--81

- 7.7 Eighty (80) percent Telecom's workforce is employed in the capital cities, with the remainder dispersed through provincial cities, towns and remote areas of Australia.
- 7.8 Tables 7.2 and 7.3 summarise Telecom staffing by occupational groups and functions.

Table 7.2: Occupations of Telecom's full time staff as at
17 June 1981

DESIGNATION GROUP	NO. OF STAFF
Accounting Machinist	430
Artisan	2 252
ADP	527
Building Services	1 571
Clerical/Administrative	10 812
Clerical Assistant	6 434
Data Processing Operator	693
District Operations	85
Drafting	1 448
Engineer	2 298
Executive	175
Food Services	213
Linesman	23 034
Miscellaneous	1 420
Phonogram Operator	527
Storeman	815
Technical	397
Telecom Technical:	
Assistant Technician	4 426
Technician (Telecom)	8 641
Technical Officer	10 539
Other	205
Telegraphist	540
Telephonist	8 347
Trainees:	
Apprentice Artisan	390
Apprentice Technician (Telecom)	1 268
Technician (Telecom) in Training	151
Technical Officer (Telecom) in Training	112
Trainee Technical Officer (Buildings)	15
Trainee Technical Officer (Sc.)	1
Trainee Technical Officer (Telecom)	347
Trainee Linesman	58
Linesman in Training	1
Trainee Lines Serviceman	41
Lines Serviceman in Training	180
Lines Officer in Training	17
Trainee Draftsman	62
Draftsman in Training	--
Accounting Machinist in Training	1
Cadet CSO	--
DPO in Training	7
Trainee Computer Operator	24
Transport	430
Typist	1 058
TOTAL	89 992

Source: Telecom Annual Report 1980--81

Table 7.3: Functional analysis of Telecom staff as at 17 June 1981

FUNCTIONAL CATEGORIES	DIRECT LABOUR	INDIRECT LABOUR	ENGINEER -ING	RDI (1)	TOTAL
<u>Provision of</u>					
Network	16 508)				
Customer Equipment	4 938)				
Teleg. and Data	443)	2 636	2 818	799	28 223
Broadcast and TV	81)				
<u>Operations and Maintenance of</u>					
Network	13 863)				
Customer Equipment	4 333)				
Teleg. and Data	715)	4 178	610	143	24 608
Broadcast and TV	766)				
<u>Operating Staff</u>	9 007				9 007
<u>Engineering</u>			8 226		8 226
<u>Research</u>	225				225
<u>Administration</u>	2 586				2 586
<u>Other</u>					
Personnel and IR		1 452			1 452
Finance and Acc.		3 039			3 039
Supply		1 863			1 863
Inf. Systems		806			806
Comm/Cust. Serv.		1 735			1 735
Workshops			2 854		2 854
Auto Plant			1 421		1 421
Training (Field)	940		162		1 102
Directories		461			461
Sub Total Other	940	9356	4 437		14 733
 Total Operations Staff	 51 594	 18 981	 16 091	 942	 87 608
Long Term Leave Staff					2 384
Total Full Time Staff					89 992

(1) Research, Development and Innovation Program

Source: Telecom information supplied to Committee

- 7.9 Telecom's full time staff account for about 22.5 percent of all persons employed by the Commonwealth and about 36 percent of Commonwealth employees not covered by the Public Service Act 1922.

STAFF ASSOCIATIONS

Overview

- 7.10 The complexity of management is reflected by the following:
- 23 groups embracing around 160 designations;
 - 18 awards (covering 23 staff organisations) determined by the Conciliation and Arbitration Commission relating to pay and conditions within Telecom;
 - 28 staff organisations have members in Telecom.

Table 7.4 details coverage and membership of Telecom staff organisations in 1980.

Table 7.4: Telecom staff organisation coverage 1980(1)

STAFF ORGANISATION	MEMBER- SHIP IN TELECOM	TYPE OF WORK	COMMENT
<u>Administrative & Clerical Officers' Association</u> (ACOA)	7 000	All types of clerical and administrative occupations including personnel, accounting, industrial relations and administrative/management work in all functional areas.	Dominant coverage. Some overlap with Heads of Departments, Divisions and Branches Association and Federated Clerks' Union.
<u>Association of Draughting Supervisory and Technical Employees</u> (ADSTE)	1 500	Detail drafting and design drafting. Occupations including supervisory staff. Planning, programming, design and general technical assistance to professional engineers. Preparation of briefs on building layouts and services.	Major coverage. Some overlap with Professional Officers' Association. Significant coverage. Overlap with ATEA and Professional Officers' Association.

STAFF ORGANISATION	MEMBER- SHIP IN TELECOM	TYPE OF WORK	COMMENT
<u>Association of Professional Engineers' Australia</u> (APEA)	600	Professional engineering work including engineering management.	Approximately 1/5 of engineers are members. Remainder are members of Professional Officers' Association.
<u>Australian Public Service Artisans' Association</u> (APSAA)	850	Electrical and mechanical installation and maintenance, motor vehicle testing, repair; manufacture of cabinets; painting etc.	Significant coverage. Shares membership (in some areas) with ATEA and with a number of other Unions e.g. ETU, AMWSU.
<u>Australian Public Service Association (Fourth Division Officers)</u> (APSA FDO)	3 500	Messengerial and minor clerical duties. Typing, data processing, etc.	Shares membership in Assistant area with APTU. Dominant coverage in other areas.
<u>Australian Postal and Telecommunications Union</u> (APTU)	26 000	Installation and maintenance of conduits, cables, aerial lines, radio towers etc. Operate plant (bulldozers etc.) and drive motor vehicles.	Exclusive coverage except for supervisory positions, where coverage is shared with EPOA.
		Carriage of stores etc.	Exclusive coverage of Motor Drivers.
		Receipt, storage and issue of stores.	Coverage shared with FSPU.
		Messengerial and minor clerical duties.	Coverage shared with Australian Public Service Association (Fourth Division Officers) and Federated Clerks' Union.
<u>Australian Postal and Telecommunications Commissions Heads of Departments, Divisions and Branches' Association</u> (APTC HDDBA)	100	Controlling officers of the most significant functional areas in each State.	Dominant coverage. Some overlap with Administrative and Clerical Officers' Association and Professional Officers' Association.

STAFF ORGANISATION	MEMBER- SHIP IN TELECOM	TYPE OF WORK	COMMENT
<u>Australian Telecommunications Employees' Association (ATEA)</u>	25 000	Installation and maintenance of telephone exchange equipment and television broadcast transmitters, and telephone subscribers' equipment.	Shares membership of telecommunications technical officers with Telecommunications Technical Officers' Association (latter has roughly 25 percent of total). Exclusive coverage of remainder.
		Electrical, mechanical etc. installation and maintenance and repair, renovation etc. of equipment.	Membership shared with Australian Public Service Artisans' Association Electrical Trades Union, Amalgamated Metal Workers & Shipwrights Union etc.
		Production planning, programming, design, equipment supply and laboratory work.	Membership shared with Telecommunications Technical Officers' Association and ADSTE.
<u>Australian Telephone & Phonogram Officers' Association (ATPOA)</u>	9 000	Assisting subscribers in arranging local, national and international telephone calls; receiving phonograms.	Exclusive coverage.
<u>External Plant Officers' Association (EPOA)</u>	600	Standards inspection or control of major line construction activities.	Exclusive coverage.
		Assisting engineers in planning, programming etc. of lines work.	Membership shared with APTU.
<u>Professional Officers' Association Australian Public Service (POA)</u>	1 500	Professional Engineering work including Engineering management. Professional scientific work in metallurgy, materials, etc.	Shares membership in professional engineering area with APEA -- has bulk of staff in membership.
		Design drafting and supervision of drafting work.	ADSTE has vast bulk of membership.

STAFF ORGANISATION	MEMBER- SHIP IN TELECOM	TYPE OF WORK	COMMENT
<u>Telecommunications Technical Officers' Association</u> (TTOA)	1 200	Installation and maintenance of telephone exchange equipment, radio and television broadcast transmitters and telephone subscribers' equipment.	Shares membership with ATEA (latter having roughly 75 percent of total).
		Programming, design, equipment and supply laboratory work.	Membership shared with ATEA and ADSTE.
<u>Telecommunications Traffic & Supervisory Officers' Association</u> (TTSOA)	300	Supervision, management and administration of Chief Telegraph Office. Supervisors directly control telegraphists in a type of leading hand cum foreman situation. Chief Telegraph Officers handle receipt and onward transmission of telegram traffic as well as telex assistance.	Exclusive coverage.
<u>Union of Postal Clerks and Telegraphists</u> (UPCT)	500	Telegraphists -- operation of teleprinters and other transmission equipment for despatch and receipt of telegrams. telegrams.	Exclusive coverage.

(1) The membership figures in the table above are approximations only and are drawn from a survey of staff organisations in 1980.

Source: Telecom

The Commission also deals with large employee organisations which have a small number of their members in Telecom -- typically less than 50 members would be employed from each organisation.

The organisations in this category include:

AJA	Australian Journalists' Association
AMWSU	Amalgamated Metal Workers' and Shipwrights' Union
ASCJ	Australian Society of Carpenters and Joiners
ASE	Australian Society of Engineers
BWIU	Building Workers' Industrial Union
ETU	Electrical Trades Union
FCU	Federated Clerks' Union
FSPU	Federated Storemen and Packers' Union
NOPA	Non-Official Postmasters' Association
OPDU	Operative Painters' and Decorators' Union
PGEU	Plumbers and Gasfitters Employees' Union
PKIU	Printing and Kindred Industries Union
RANF	Royal Australian Nursing Federation
VBEFA	Vehicle Builders Employees' Federation of Australia

7.11 Large employee organisations representing segments of the Australian workforce and with significant membership in Telecom include:

- . ADSTE (Telecom 1 500; outside Telecom 19 500);
- . APEA (Telecom 600; outside Telecom 15 200).

Some examples of employee organisations with significant membership in Telecom with the remainder in Australia Post and/or the APS are:

- . ATEA (Telecom 25 000; Australia Post 500);
- . APTU (Telecom 26 000; Australia Post 21 000);
- . ACOA (Telecom 7 000; Australia Post 2 000; APS 41 000);
- . APSA (Telecom 3 500; Australia Post 1 300; APS 27 200).

The above numbers are approximations based on 1979--80 figures.

REGULATORY FRAMEWORK

Overview

7.12 The regulatory and policy framework and machinery established to enable Telecom to manage staffing and industrial matters derive their authority from both statutory and administrative sources.

Statutory

- 7.13 The Telecommunications Act 1975 and relevant By-laws define many of the terms and conditions of employment and give Telecom a broad range of statutory powers (Section 1 refers).
- 7.14 The Telecommunications Act 1975 provides for the establishment of a Telecommunications Consultative Council to provide formal consultation arrangements between Telecom management and staff associations.
- 7.15 The Act empowers the Conciliation and Arbitration Commission to arbitrate on industrial disputes within the Commission. By s.67 of the Act the Conciliation and Arbitration Commission is empowered to:
- . prevent or settle by conciliation or arbitration industrial disputes in respect of the Service;
 - . hear and determine industrial questions in respect of the Service submitted to it.
- 7.16 The handling of Telecom's staffing and industrial relations is also subject to Commonwealth legislation generally applicable to Commonwealth employees. These statutes include:
- . Superannuation Act 1922;
 - . Superannuation Act 1976;
 - . Long Service Leave (Commonwealth Employees) Act 1976;
 - . Compensation (Commonwealth Government Employees) Act 1971;
 - . Commonwealth Employees (Employment Provisions) Act 1977;
 - . Public Service Amendment Act 1978;
 - . Administrative Decisions (Judicial Review) Act 1977;
 - . Maternity Leave (Commonwealth Employees) Act 1973.

The operation of these statutes as they affect Telecom is discussed in Section 1.

Administrative

- 7.17 General government policy and co-ordination arrangements are applied administratively to Telecom in relation to such matters as staff levels and the resolution of industrial disputes.

TELECOM'S POLICIES AND PRACTICES

Corporate plan

- 7.18 In 1977 Telecom released a Corporate Plan for the period 1977--78 to 1986--87 which stated corporate objectives and defined areas where particular efforts would be made during the following five years. The following staff and organisation objectives were stated:
- to foster a well trained and efficient staff sensitive to the customers' and organisations' needs and a working environment offering opportunities for development of staff;
 - to maintain an effective organisation capable of adapting to changing demands and environment;
 - to provide job satisfaction, good working conditions and just pay rates.
- 7.19 On the basis of these objectives Telecom proposed action over the following five years to develop and implement programs to improve communications within the organisation and to develop skills, range of experience and mobility of staff. The plan also outlined proposals for formal consultation with staff associations on matters of concern to employees.
- 7.20 Telecom has formed two branches at Headquarters to look at long term industrial relations policy including technological change. Telecom's State industrial relations branches implement national policies and deal with State level disputes. District disputes are handled by District Managers. These procedures are in accordance with Telecom's policy of devolving responsibility to the appropriate organisational level.

SELECTED ISSUES

Telecommunications Consultative Council

- 7.21 Telecom's enabling legislation provides for the establishment of a Telecommunications Consultative Council comprising representatives of the Commission and organisations of officers and employees (s.109 refers). The functions of the Council, as prescribed in the Telecommunications (Consultative Council) By-laws, are to consider and report on:
- any matter in relation to the Service referred to it by the Commission;
 - any matter which the Council or a staff organisation considers to be of general effect or interest in relation to the Service (By-law 5 refers).

- 7.22 The By-laws also provide for the Council to be comprised of seven representatives from the Commission and ten representatives from the range of employee organisations with staff in the Commission (By-law 2 refers). The Council's Chairman is nominated by Telecom, with the Deputy Chairman being selected by the Council from the representatives of organisations (By-law 3 refers). The Council is a national body. To date Telecom representatives have been selected from Headquarters staff while the union representatives have been federal officials of the unions concerned. The Council usually meets twice yearly.
- 7.23 Among the issues considered by the Council have been consultative arrangements for the introduction of new technology, staff concessions, the policy and procedure for appointment of staff from outside the Commission, staff development schemes and consultative procedures relating to office accommodation proposals.
- 7.24 Telecom also engages in continuing consultation with unions on a regular basis on matters affecting the welfare and working conditions of staff.

Staff ceilings

- 7.25 Telecom prepares an annual manpower plan which has regard to demand for services, financial provision and general Government policies. The planning process starts each year in October/November with approval by the Commission in June the following year.
- 7.26 Until 1981--82 the manpower plan approved by the Commission was the one put into operation. Towards the end of the planning process for the year 1981--82, the Government advised the Commission that Telecom's staffing level at June 1982 was to be 2 000 less than at June 1981.

Co-ordination Committee

- 7.27 Telecom is required to consult with the Department of Employment and Industrial Relations and the PSB under industrial relations co-ordination arrangements. These arrangements have been implemented by executive decision of Government. They are administered by the PSB and the Department of Employment and Industrial Relations.
- 7.28 Under these arrangements Telecom must refer union claims and proposed management responses which affect direct labour costs. Telecom is unable to make an offer or enter into a commitment without assessment and approval by the Committee.
- 7.29 Committee decisions are appealable to the Minister who may raise the matter with the Minister for Employment and Industrial Relations or Cabinet.

TECHNOLOGICAL CHANGE

Overview

- 7.30 Technological change is having an increasing impact on the provision of telecommunications services. Telecommunications since its inception has been subject to a succession of new technologies. Recent developments leading to more efficient electronic switching systems, higher capacity transmission systems and broad based computerisation of operations have added a new and substantial dimension to the consideration of this matter within telecommunications administrations.

Employment effects of new technologies

- 7.31 The introduction of new technology can have both beneficial and adverse implications for staff both generally and in a particular activity or field of the organisation.
- 7.32 Brief descriptions of possible effects of technological change within telecommunications systems follow:
- . the replacement of conventional telephone exchanges with computer-controlled semi-electronic and fully electronic exchanges means that substantially fewer technical staff may be needed for maintenance and fault rectification, but other staff usually with different skills are required for the installation of the new exchanges;
 - . computerised testing systems may reduce the demand for test desk operators who monitor lines for noise and signal loss;
 - . the demand for telephone operators can decrease due to the introduction of cordless switchboards, automated billing, pre-recorded computer generated messages and computerised directory assistance systems.

Present policies and practices

- 7.33 Telecom's Corporate Plan acknowledged that its ability to respond to future customer demands for new and improved services depended upon the adoption of new technology. It also maintains that in introducing new technology early discussions should be held with staff to keep them fully informed.
- 7.34 Telecom has not declared any staff redundant due to the introduction of new technology.
- 7.35 Where manual country exchanges are converted to automatic operation, Telecom offers surplus telephonists employment elsewhere in Telecom, although these offers may be in other areas. In the case of transfer to a position of different designation, Telecom gives any necessary training.

- 7.36 To counter potential loss of promotional opportunities resulting from the introduction of new technology, Telecom has introduced career structures for technical and lines staff and telephonists. The distinction between third and fourth division has been removed and mandatory educational requirements for manager positions have been abolished.
- 7.37 Telecom applies special conditions for those staff who are required to change their work location due to the introduction of new technology. Recent examples include conditions such as 12 months notice of impending change, compensation in certain circumstances for increased fares or travelling time, no loss of salary and retraining, if required, at Telecom's expense.
- 7.38 Wherever possible, selection of staff for redeployment takes account of personal circumstances and preferences. Telecom has not required any staff to move their homes as a result of technological change.

1978 Determination

- 7.39 In 1977 the Commonwealth Public Service Arbitrator handed down Determination No. 509, which provides for:
- . the notification of a redundancy situation;
 - . the period of notice to be given;
 - . income maintenance;
 - . the obligation on the part of the employer to find alternative employment.
- 7.40 In 1978 the Conciliation and Arbitration Commission handed down the Australian Telecommunications Commission Employees' (Conditions of Redundancy) Award 1978 which gives Telecom employees substantially the same benefits as Determination No. 509 including:
- . the requirement that Telecom make every endeavour to place an employee in other suitable employment or arrange training for such alternative employment;
 - . income maintenance payments for periods of six to twelve months to those persons unable to be re-employed or those continuing in employment at a lower salary.

1978 Dispute

- 7.41 In 1978 a major dispute occurred between Telecom and the ATEA concerning the introduction of new technology. It involved disagreement over:

- . the introduction of new ARE II exchange switching equipment into the telecommunications network and particularly the organisation of the maintenance function;
- . changes to the technical staff structure.

Bans and limitations were applied in certain areas by ATEA members.

- 7.42 The dispute was resolved by agreement between the parties under the auspices of the Conciliation and Arbitration Commission. The agreement provided for a trial of alternative maintenance organisations for the equipment and the development of a new technical staff structure.
- 7.43 In 1979 the Commission determined that new provisions concerning the introduction of new technology would be included in the Australian Telecommunications Commission Technical and Trades Staff (Salaries and Specific Conditions of Employment) Award 1975. The Award now provides, inter alia, that:
- . no ATEA members will have their employment terminated as a result of the introduction of new technology. This clause has effect for 5 years from 31 October 1977;
 - . no ATEA members will ever have their employment terminated as a result of ARE II equipment.

Role of Telecommunications Consultative Council (TCC)

- 7.44 Telecom and relevant unions are parties to an agreement developed through the TCC concerning consultative arrangements to apply with future cases of technological change. The agreed principles for the introduction of technological change include:
- . proposed changes in technology which could affect staff will be jointly considered by Telecom and the unions before any decisions are made to adopt these changes or purchase equipment;
 - . the unions will be given the earliest possible notice of likely change;
 - . Telecom will assist the unions by providing information and familiarisation to ensure that union officials understand the ramifications of the technology;
 - . assessment of technological innovations will take into account matters such as effects on staff and job satisfaction.
- 7.45 Telecom approved the TCC document and introduced measures to ensure compliance with the agreed principles. Guidelines were prepared by Telecom's Industrial Relations Department to assist with the understanding and consistent application throughout Telecom of its principles.

- 7.46 The agreement applies for a period of three years, commencing 16 April 1980. In April 1982 the TCC reconvened its New Technology Sub-Committee to determine the procedure to be followed in reviewing the agreement.

Retraining

- 7.47 Telecom undertakes an extensive training program (expenditure during 1980--81 was approximately \$90 million) which is part of its policy of implementing programs to assist staff development. The introduction of new technologies will increase demands for retraining.

VOLUME 2

SECTION 8

REVIEW OF OVERSEAS TELECOMMUNICATIONS PRACTICES

Prepared by the Secretariat of the Telecommunications Inquiry

INTRODUCTION

Purpose

8.1 This section provides an overview of developments in national telecommunications practices in selected countries:

- . United Kingdom;
- . West Germany;
- . Sweden;
- . Canada;
- . Japan;
- . France;
- . United States.

Scope

8.2 In examining each of these countries, particular attention has been given to:

- . population and demographic characteristics;
- . level of development of telecommunications in terms of service dimensions;
- . general structure of national telecommunications service providers, the market structure and the extent of competition in the provision of equipment and services;
- . regulatory environment;
- . overall trends and issues in the telecommunications sector.

Rationale for selection of countries reviewed

8.3 The selected countries are among the ten leading telecommunication countries. Each has more than four million telephones and a telephone density exceeding 40 per 100 of the population. The market size and telephone densities of the major telecommunication countries are set out in Table 8.1.

Table 8.1: The top ten telecommunications countries

(Countries with both more than 4 million telephones and telephone densities exceeding 40 per 100 population as at January 1980.)

COUNTRY	MARKET SIZE (Millions of Telephones)	PERCENTAGE OF WORLD'S TELEPHONES	TELEPHONE DENSITY PER 100 POPULATION
USA	175.5	37.2	79.1
Japan	55.4	11.7	47.6
UK	26.7	5.7	47.7
W. Germany	26.6	5.6	43.4
France	22.5	4.7	41.4
Canada	15.6	3.3	65.6
Australia	7.4	1.6	52.0
Netherlands	6.9	1.5	48.6
Sweden	4.4	0.9	70.4
Switzerland	4.4	0.9	70.4

Notes:

1. There are 15 countries with more than 4 million telephones. Those omitted are Soviet Union (23 m), Italy (18 m), Spain (11 m), Brazil (6.5 m), Mexico (4.5 m).
2. There are 14 countries with more than 40 telephones per 100 population. Those omitted are Denmark (61.4), New Zealand (55.0), Finland (47.1), Norway (42.3).

Source: Telecom submission

- 8.4 Telecommunications service providers in the selected countries are regulated monopolies with ownership by either the state or private enterprise or a combination of both. Most industrialised Western countries organise telecommunications services as a monopoly although the nature of these monopolies varies between countries. Table 8.2 gives an analysis of the ownership and regulatory and competitive environment of the telecommunications service providers in the respective selected countries.

Table 8.2: Comparison of ownership, monopoly, regulation and competition in telecommunications in Australia and selected overseas countries

	AUSTRALIA	CANADA	FRANCE	GERMANY, F.R.	JAPAN	SWEDEN	UNITED KINGDOM	UNITED STATES
<u>Ownership</u>								
domestic	public	mixed	public	public	public	public	public	private
international	public	public	public	public	private	public	public	private
<u>Major Carriers</u>	Telecom; OTC	Bell Canada; CNCP; TCT; Telesat	France Cables et Radio; Transpac	Deutsche Bundespost	Nippon Telegraph & Telephone Public Corporation (NTT); Kokusai Denshin Denwa Co Ltd (KDD)	Televerket	British Telecom; Cable & Wireless PLC	AT&T; GTE; Western Union; International Record Carriers
<u>Specialised Carriers</u>	No	Yes	Yes	No	No	No	Proposed	Yes
<u>Regulation</u>	Dept. of Communica- tions and/or Telecom	Canadian Radio- television Commission; Provincial Commissions	DOT	Deutsche Bundespost	NTT and/or Ministry for Posts and Telecommunications	Televerket	Agency for customer premises equipment being established; Secretary of State for Industry can authorise network competition	Federal Communications Commission (FCC); State Public Utility Commissions
<u>Competition</u>	limited competition exists but in customer equipment market	competition exists but varies in different provinces	competition in customer premises and terminal equipment; market change seem unlikely	very limited competition in customer premises market only; pressures for competition but early change unlikely	considerable competition in customer premises market only; change seems unlikely	limited	limited competition in customer premises market only; considerable competition should evolve	open in customer premises market; becoming open network services -- except local telephone service

Source: Telecom submission and Secretariat findings and analysis

8.5 Most selected countries have in recent years re-assessed the continuing relevance of monopoly in telecommunications services. There have been significant developments in this regard in the United States, Canada, United Kingdom, West Germany and, to a lesser extent, in Japan.

8.6 Countries selected are advanced industrial states with broadly comparable economic bases but have dissimilar demographic and social factors. Table 8.3 compares their population and demographic features.

Table 8.3: Comparison of population and demographic features: June 1980

	AREA KM2	POPULATION(1) (000's)	POPULATION DENSITY PER KM2	RATE OF POPULATION INCREASE 1975--80 %	URBAN POPULATION %
Australia	7 686 848	14 616	2	1.6	86.0 (2)
Canada	9 976 139	23 959	2	1.3	75.5 (2)
France	547 026	53 713	98	0.4	70.0 (3)
German FR	248 577	61 566	248	0.4	n/a
Japan	372 313	116 782	314	1.5	75.9 (4)
Sweden	449 964	8 316	18	0.4	82.7 (5)
UK	244 046	56 010	230	0.2	77.5 (6)
USA	9 363 123	227 658	24	1.0	73.5 (7)

Notes: (1) Preliminary figure
 (2) as at June 1976
 (3) as at November 1975
 (4) as at October 1975
 (5) as at February 1975
 (6) as at June 1973
 (estimates for England and Wales)
 (7) as at April 1970

Sources: Demographic Yearbook 1979, Thirty-first Issue, United Nations, New York, 1980.
 Main Economic Indicators -- OECD -- April 1982 OECD, Paris 1982.

Overview

8.7 Telecommunications developments in each of the selected countries are discussed in subsequent paragraphs. Comparative data on aspects of telecommunications investment and financial and service performance are included for ease of reference in tables at the end of this section:

. Dimensions of Service

Table 8.5 -- Voice telephony service

Table 8.6 -- Non voice telephony service

Table 8.7 -- Traffic

. Telephone Service Penetration

Table 8.8 -- Main lines and sets

Table 8.9 -- Residential and business/institution main lines

. Access to Service

Table 8.10 -- Accessibility of services

. Performance

Table 8.11 -- Telephone service performance

. Productivity

Table 8.12 -- Labour productivity

. Telecommunications investment

Table 8.13 -- as share of GDP

Table 8.14 -- as share of GFCF

. Financial Performance

Table 8.15 -- Comparison of financial performance of selected
PTT's

. Consumer Costs

Table 8.16 -- Average working hours required to earn equivalent of
annual telephone bill (Siemens)

Table 8.17 -- Manhours required to earn equivalent of annual
telephone bill (Telecom)

8.8 Telecommunications administrations in the selected countries vary in their degree of public regulation and give different emphases to the role of competition in the structure of their national telecommunications service industry. These differences are especially evident in approaches to:

- . resale of capacity to third parties;
- . attachment of terminal equipment to common carrier networks;
- . setting of equipment standards;
- . regulation governing the establishment and use of independent networks;
- . interconnection of independent networks with common carrier networks;
- . regulation of telecommunications prices;
- . support to local telecommunications manufacturing industries;
- . relative size of the national investment in telecommunications.

The new telecommunications technologies are causing different countries to review the continuing relevance of regulated monopoly. Increasing liberalisation of telecommunications is most evident in North America and in the United Kingdom. In Western Europe, on the other hand, regulated monopoly is being maintained and in some cases strengthened -- most evidently in France and Germany.

UNITED KINGDOM

Population and demographic characteristics

8.9 Main demographic features include a median size population concentrated in a small area, very high population density, highly urbanised population and with a very low rate of population increase.

Service dimensions and performance

8.10 Relevant dimensions of service and performance are as follows:

- . Dimensions of service

As at 31 March 1980 there were 17.7 million main lines and 26.7 million telephone sets connected to the public network. This represented an annual growth since 1975 of 6.7 percent and 5.6 percent respectively.

As at 31 March 1980 there were 85 400 telex subscriber lines and 19.6 million subscriber terminals which represents an annual growth rate since 1975 of 9.4 percent and 6.0 percent respectively. As at 31 March 1980 there were 80 000 private leased circuits and 69 000 data terminals connected to the public telephone and telex network. Growths for the year 1979 to 1980 period were 23.1 percent and 15.0 percent respectively.

- Dimensions of traffic

Total telephone traffic as at 31 March 1980 was 19 857 million calls, which represents a 6.7 percent annual growth since 1975. Telegram traffic shows an average annual decline of 13.1 percent for the same period. In 1980 there were 3.3 million paid telegrams transmitted. National telex traffic totalled 91 million calls, an annual growth of 9 percent.

- Telephone service penetration

As at 31.3.80 there were 47.7 telephone sets per 100 inhabitants and 31.7 telephone main lines per 100 inhabitants. This represents an annual growth for the period from 1975 to 1980 of 5.6 percent and 6.7 percent respectively. Residential main lines exhibited an annual growth rate for the period from 1975 to 1980 of 1.1 percent. In 1980, 80.4 percent of all main lines were residential. Business/institution main lines decreased 4 percent to 19.6 percent.

- Accessibility of services

All telephone main lines were connected to automatic exchanges, (1980) while 96.4 percent of main lines were equipped with ISD dialling. This represents a 0.01 percent and 13.6 percent annual growth rate respectively for the period from 1975 to 1980.

- Telephone service performance

The number of new applications for main lines and the total demand for main lines increased annually by 7.8 percent (to 1.9 million) and 7.2 percent (to 3.03 million) respectively from 1975 to 1980. For that same period the numbers on the waiting list for connections increased 20.8 percent (to 262 000) and the percentage of waiting list applications to total demand for main lines increased 12.4 percent.

- Labour productivity

Total staff in telecommunications decreased 0.6 percent per annum (to 240 100) for the period from 1975 to 1980. The number of telephone sets per employee increased 6.2 percent annually to 111 sets per employee while the number of main lines increased 7.3 percent annually to 73.8 main lines per employee.

. Financial performance

As a percentage of GDP, telecommunications investment decreased 7.0 percent annually (to 0.71 percent) while as a share of GFCF it decreased annually 5.6 percent (to 3.43 percent) during the period 1975 to 1980.

For the 1980 financial year, the ratio of sales to funds employed was 0.55, while the ratio of depreciation to sales was 0.26 and operating profit to sales was 0.13. The self financing ratio was 1.09 for the 1980 financial year.

. Tariff structure

Tables 8.16 and 8.17 compare the number of working hours required to earn the equivalent of the annual telephone bill in the United Kingdom.

Competition models and market structure

- 8.11 Until 1974, broadcasting and telecommunications administration and regulation was the responsibility of the Ministry of State for Posts and Telecommunications. In March 1974, that Ministry was 'dissolved' and its responsibilities vested in the Secretary of State for the Home Office. Legislation administered by the latter Ministry includes:
- . Wireless Telegraphy Act 1967;
 - . Independent Broadcasting Authority Act (1974);
 - . Enabling legislation for the British Broadcasting Corporation;
 - . Post Office Act 1969.
- 8.12 Under the Post Office Act 1969, the British Post Office had an absolute monopoly over telecommunications. In 1980, the British Government moved to end that monopoly with the introduction of the British Telecommunications Bill.
- 8.13 With the enactment of the Bill, which superseded the Post Office Act 1969, a new public corporation called British Telecommunications (BT) came into being on 1 October 1981. Its responsibilities are to provide national telecommunications and data processing services formerly provided by the Post Office.
- 8.14 Concurrent with the introduction of the Bill into the House, the Government commissioned Professor M. Beesley in mid 1980 to examine and report on the leasing of network capacity and the provision of services to the public by private operators.
- 8.15 In his report Professor Beesley found:
- "(a) that in the home market there should be no restriction on the freedom to offer services to third parties over BT's network, because

- (b) the prospective benefits to consumers outweighs the prospective loss of net revenues by BT.
- (c) We think this is the case even were the present constraints on BT's pricing policy and investment budget maintained. However,
- (d) it is logical to maintain these constraints in a regime or freer competition. In particular, the existing trend towards moving tariffs towards costs should be taken further.
- (e) Prices at which BT offers leased circuits should continue to be announced. Customers should be able to lease these at the appropriate price irrespective of the use made of them. BT should be free to determine its level.
- (f) There will be needs, not often manifest, to safeguard customers' interests with respect to conditions of supply. Different aspects of this should be undertaken by the Department and by the Director-General of Fair Trading.
- (g) BT should be free to engage in competition in the non voice markets. To require this to be done via a separately accounting subsidiary is useful, but of less importance than the rules governing transactions, for which the Department and the Director-General should share a monitoring role".(1)

8.16 The Report aroused considerable public debate. The Government has not yet announced firm decisions on all of the recommendations contained in the Report.

8.17 In 1981 the UK Parliament enacted the British Telecommunications Act 1981 which provided for progressive liberalisation of UK telecommunications services. Subsequent developments include:

- . the licensing of the Mercury Consortium in February 1982 to run a telecommunications network in competition with BT;
- . the BT network is increasingly being used by other firms for a widening range of network services.
- . the government also announced a general policy permitting bona fide value added network service operators to use the BT and Mercury networks;
- . competition will be introduced in the telephone apparatus (terminal equipment) market once approval for the new standards has been granted.(2)

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1. Liberalisation of the Use of the British Telecommunications Network: A Study by Professor Michael Beesley, HMSO, London 1981.
 2. The Future of Telecommunications HMSO, London, July 1982.

Regulatory environment

- 8.18 Under the British Telecommunications Act 1981 BT has the 'exclusive privilege' of running telecommunication systems throughout the British Isles, by conveyance 'through the agency of electric, magnetic, electromagnetic, electro-chemical or electro-mechanical energy'. [s12(1)]
- 8.19 Excluded from the telecommunications privilege of BT are:
- a telecommunication system conveyed by light and which is capable of being received or perceived by the eye [s13(1)a];
 - a telecommunication system's apparatus situated on premises occupied by the operator or located in vehicles, vessels, aircraft or hovercraft [s13(1)b];
 - the running by a single individual of a system where the apparatus is under his control and is for domestic purposes only [s13(1)c];
 - a business telecommunications system provided the system is for the 'purposes of that business' and that only the business or BT controls the apparatus and its location [s13(2)].
- 8.20 The Act gives broad discretionary powers to the Secretary of State to oversight BT activities and to licence new competitors. In addition to the Powers of the Secretary of State over the Corporation contained in s5, 6, 7 & 8, further discretionary powers of the Secretary of State include:
- granting a licence for the running of any such telecommunication system (s 15);
 - approving connection of subscribers' apparatus to the telecommunication system run by BT.

Overall trends and issues

- 8.21 A government committee published in 1977 a review of the activities of the Post Office recommending a split between the postal and telecommunications activities of the Post Office. This was implemented in the British Telecommunications Act 1981. The Report commented:
- "We are not convinced that the balance of advantage to the community favours the continuation of the existing boundaries to the monopoly in the United Kingdom."(3)
- 8.22 In July 1980 the government announced proposals relaxing the telecommunications equipment monopoly. It expressed its intention also to allow people more freedom to resell capacity, for example in the data processing field, where services are not provided by BT.
- 8.23 The report commissioned from Professor Michael Beesley in September, 1980 to examine these issues (paragraph 8.15 refers).

3. Report of the Post Office Review Committee, HMSO, July 1977.

- 8.24 In July 1982 the Government announced that it would introduce legislation which, while keeping BT as a single enterprise, will enable it to incorporate BT under the relevant Companies Act as 'British Telecommunications PLC'. The legislation will allow up to 51 percent of shares in the company to be offered on the market in one or more transactions. The government indicated that once the intended public shareholding has been achieved it will relinquish control of the commercial decisions of BT PLC.
- 8.25 In announcing these decisions on the future of BT, the government also indicated that BT's exclusive role in licensing will be terminated and a new Office of Telecommunications, modelled on the Office of Fair Trading, will be established to oversee the telecommunications services industry.
- 8.26 As a consequence of the changes summarised above the key issues emerging in the UK are:

. Terminal equipment and standards

While the British Telecom has approved some 10 000 items of privately supplied equipment for attachment to its network most of these are telemetry equipment. The rest are remote alarms, Prestel terminals, answering and facsimile machines, modems, certain data terminals and PABX's. In relation to other terminal equipment, BT's current policies are:

- BT supplies PABX's of up to 100 line capacity while larger PABX's are supplied privately;
- all PABX's are maintained by BT;
- BT competes with private suppliers in provision of modems for use on private circuits but has a monopoly in the use of modems on its own network;
- data terminals are privately supplied;
- those attached to BT-supplied modems have to be approved while those attached to approved private modems do not, since the approval procedure for the modems includes checks to protect the network from malfunctioning terminals;
- telex machines are exclusively supplied by BT but private teleprinters can be attached to private circuits;
- BT competes with approved private telephone answering machines although BT only supplies machines without call recording facilities;
- BT has a monopoly on the supply of telephone handsets;
- facsimile machines are supplied exclusively by the private sector.

The Government's announced objective is to liberalise the terminal equipment market by 1983 with BT retaining a monopoly over the provision of the first telephone only. BT will also continue to maintain existing and all analogue PABX's and will compete with private firms in the maintenance of digital PABX's.

BT will be free to compete in all sectors of the equipment supply market.

Under new procedures following the introduction of the British Telecommunications Act, standards and specifications are being drawn up by the British Standards Institute (BSI) and then applied by the British Electrotechnical Approvals Board (BEAB).

Standards issued by the BSI will be primarily based on minimal performance requirements, rather than the detailed technical structure of the equipment and will specify the appropriate testing procedures.

- Specialised services and resale

Non voice messages between public networks and leased circuits are permitted other than between third parties. The messages must relate exclusively to the business affairs of the organisations.

The Government has decided not to permit resale for the time being.

Since early 1982 BT has been required to issue licenses to private companies wishing to offer a service over the telecommunications network which in BT's judgment is a genuine 'added value' to the basic transmission and switching of the public network. The Department of Industry has the responsibility to define what constitutes a 'genuine value added service'.

- Alternative networks

Large companies have been permitted to construct their own networks -- British Leyland has a microwave link: this has not been shared with other users but has been limited to the proprietors' own use.

A consortium known as the Mercury Consortium, has been granted a licence to construct an optical fibre network. Initially the venture is planned to link seven major business centres in Britain using optical fibre cables laid alongside British Rail's tracks. BT has agreed that Mercury will be able to interconnect with the public network. Mercury will be able to lease and offer private international circuits although BT will remain the sole international carrier. It will link directly to international communications satellites from its own independent earth station.

- . Manufacturing industry

BT purchases about 75 percent of the total UK sales of telecommunications equipment; 85 percent of the total sales originate from the four leading suppliers; GEC, STC, Plessey and Pye-TMC(Philips). BT has gradually moved away from long term contracts with market sharing between supplying firms towards competitive tendering being limited to a few suppliers.

WEST GERMANY

Population and demographic characteristics

- 8.27 Main demographic features include a median size population with a very high population density and a highly urbanized population.

Service dimensions and performance

- 8.28 Relevant dimensions of service and performance are as follows:

- . Dimensions of service

As at 31 December 1980 there were 20.5 million lines and 28.6 million telephone sets connected to the public network. This represents an annual growth since 1975 of 9.9 percent and 7.8 percent respectively.

As at 31 December 1980 there were 137 000 telex subscriber lines and 24.3 million subscriber terminals which represents an annual growth since 1975 of 5.9 percent and 6.5 percent respectively.

- . Dimensions of traffic

Total telephone traffic as at 31 December 1980 was 21 655 million calls, which represents a 9.2 percent annual growth since 1975. Telegram traffic decreased by an average 4.7 percent annually for the same period. In 1980 there were 4.4 million paid telegrams transmitted. National telex traffic totalled 1 771 million minutes, an annual growth of 3.6 percent for the same period under consideration.

- . Telephone service penetration

As at 31 December 1980 there were 46.4 telephone sets per 100 inhabitants and 33.4 telephone main lines per 100 inhabitants. This represents an annual growth for the 1975 to 1980 period of 7.9 percent and 9.9 percent respectively.

- Accessibility of services

All telephone lines are connected to automatic exchange and are equipped with ISD dialling.

- Telephone service performance

The total demand for main lines increased 10.5 percent per annum (to 2.2 million) from 1975 to 1980. The waiting list increased 9.6 percent annually (to 87 000) and the percentage of waiting list applications to total demand for main lines decreased one percent per annum (to 3.9 percent).

- Labour productivity

Total staff in telecommunications increased 1.1 percent annually (to 195 000) for the period from 1975 to 1980. The number of telephone sets per employee increased 6.7 percent annually to 146.4 telephone sets per employee while the number of main lines increased 8.7 percent annually to 105.3 main lines per employee.

- Financial performance

As a percentage of GDP, telecommunications investment increased 2.7 percent annually (to 0.67 percent) while as a share of GFCF it increased 0.2 percent annually (to 2.85 percent) during this period 1975 to 1980.

For the 1980 financial year, the ratio of sales to funds employed was 0.42, while the ratio of labour content, depreciation, and operating profit to sales was 0.50, 0.13 and 0.07 respectively.

- Tariff structure

Tables 8.16 and 8.17 detail the number of working hours required to earn the equivalent of the annual telephone bill.

Competition models and market structure

- 8.29 Deutsche Bundespost (DBP) is the sole provider of telecommunications services. Although it has the exclusive right to provide and service terminal equipment, private suppliers have been permitted into the market place. DBP is the regulatory agency for both the network and equipment supply.

Regulatory environment

- 8.30 Under the constitution, the Federal Government has the right to legislate and administer posts and telecommunications. Under Article 87 of the Basic Law, DBP is the federal administration responsible for administering and regulating telecommunications. The DBP is managed by the Federal Minister of Posts and Telecommunications supported and is supervised by a 24 member Administrative Council.
- 8.31 The Telecommunications Installations Act authorises DBP to establish and operate telecommunications installations for public use. Some liberalisation has occurred and private equipment may be connected to the network provided it meets DBP's standards.

Overall trends and issues

- 8.32 In 1973 the Federal Government set up a 'Commission for the Development of the Telecommunications System'. The Commission was directed to make proposals for an 'economically reasonable and socially desirable' communications system for the future.
- 8.33 One of the terms of reference required investigation of the question 'by whom and under what general conditions should the various technical installations of a future communications system be planned, established and operated'. A special working group was set up by that Commission to study alternative organisational models for future communications systems. Studies were made of institutional and legal structures in other countries. The working group also looked closely at options for organisational structure to establish and operate broadband networks.
- 8.34 The Commission's recommendations in 1976 favoured discrete development of the telephone network and narrowband transmission of data rather than the broadband network development. Notwithstanding the detailed studies of alternative structures for operation, management and regulation of German national telecommunications, DBP remains the national common carrier.
- 8.35 In February 1981 the German Monopoly Commission published a report which called for far reaching limitations on the monopoly position of DBP. The Commission recommended that the DBP should be excluded from the supply of terminal equipment with the exception of the first telephone. The Monopoly Commission called for extended licensing of specialised networks and the general licensing of leased line resale. DBP argued against resale and the move towards cost related prices that would need to be implemented. DBP argued that this would result in a general increase in tariffs for the majority of customers and a change to the policy of introducing distance independent tariffs. DBP responded to some criticisms of its administration of telecommunications by placing private equipment approvals in the hands of a new and separate division at the Telecommunications Engineering Establishment (TZ) in Darmstadt.

The following have been the consequences of the changes discussed above:

- Terminal equipment and standards

Private suppliers are allowed to install interface equipment and all peripheral equipment on internal company networks. All equipment must be installed to conform with DBP line interface standards.

With regard to particular types of terminal equipment the current policy is:

- PABX's are supplied in all configurations by both DBP and by private companies;
- modems are supplied by the DBP except those attached to international leased circuits;
- approved data terminals are privately supplied;
- telex machines are privately supplied but are DBP maintained;
- telephone handsets and those with simple additional facilities such as a handset with volume control are DBP supplied;
- more complex apparatus such as telephone answering machines are privately supplied;
- facsimile machines are competitively supplied;
- mobile radio equipment is privately supplied.

- Specialised services and resale

The use of voice leased circuits is governed by regulations which in general exclude resale. In the field of data transmission DBP leases 'fixed circuits' together with modems with charges varying according to transmission speeds. Third parties are allowed access provided that the third party is only a co-user. Circuits must not serve 'mainly or exclusively' the purpose of transmitting data for third parties.

Networks operated by private companies are generally not allowed. DBP provides both a circuit switched and packet switched data network.

- Alternative networks

Private systems may be established by large public undertakings (e.g. the Federal Railway) within a group of premises belonging to one company and within a radius of 25 km. Other private systems may occasionally be licensed but no use of a private system other than by the operator is allowed.

- Manufacturing industry

Until 1974 switching equipment was procured on a strict quota basis with the four major suppliers enjoying a pre-determined share of the market. Since then the market shares have been adjusted by some two percent per year in line with producers' relative prices. The four suppliers account for 90 percent of the total domestic telecommunications equipment sales.

SWEDEN

Population and demographic characteristics

- 8.37 Principal demographic features include a relatively small population with a low population density, highly urbanised population and with a low rate of population increase.

Service dimensions and performance

- 8.38 Relevant dimensions of service and performance are as follows:

- Dimensions of service

As at 31 December 1980 there were 4.8 million main lines and 6.6 million telephone sets connected to the public network. This represented an annual growth since 1975 of 2.7 percent and 4.1 percent respectively.

For the year ended 31 December 80 there were 14 700 telex subscriber lines and 5.9 million subscriber terminals which represented an annual growth since 1975 of seven percent and 2.3 percent respectively. For the same period, there were 31 000 data terminals connected to the public telephone and telex network. This represents an annual growth from the period from 1975 to 1980 of 29.8 percent.

- Dimensions of traffic

Total telephone traffic as at 30 June 1980 was 19 645 million calls, which represents a 3.2 percent annual growth since 1975. Telegram traffic decreased 45.2 percent per annum for the same period and in 1980 there was 163 000 paid telegrams transmitted.

- Telephone service penetration

As at 31 December 1980 there were 79.6 telephone sets per 100 inhabitants and 58.0 telephone main lines per 100 inhabitants. This represents an annual growth for the 1975 to 1980 period of 3.8 percent and 2.5 percent respectively. Residential main lines

exhibited an annual decline from 1975 to 1980 of 0.5 percent and for the 1980 year 83.1 percent of all main lines were residential. Business/institution main lines increased 2.7 percent annually to 16.9 percent.

- Accessibility of services

All telephone lines are connected to automatic exchanges and are equipped with ISD dialling.

- Telephone service performance

The number of new applications for main lines and the total demand for main lines increased 1.6 percent annually (to 263 000) and 0.6 percent annually (to 760 000) respectively from 1975 to 1980.

- Labour productivity

Total staff in telecommunications increased one percent per annum (to 40 000) for the period from 1975 to 1980. The number of telephone sets per employee increased three percent annually to 165.5 telephone sets per employee while the number of main lines increased 1.7 percent annually to 120.5 main lines per employee.

- Financial performance

As a percentage of GDP, telecommunications investment increased three percent annually (to 0.40 percent) while as a share of GFCF it increased 4.8 percent annually (to 1.88 percent).

For the 1980 financial year, the ratio of sales to funds employed was 0.61 while the ratio of labour content, depreciation and operating profit to sales was 0.39, 0.25, and 0.03 respectively. The self financing ratio for the same financial year was 0.95.

Tariff structure

Tables 8.16 and 8.17 detail the number of working hours required to earn the equivalent of the annual telephone bill.

Competition models and market structure

- 8.39 Televerket (Telecommunications Administration) is a state owned public utility administered by the Ministry of Transport and Communications. It is operated on a commercial basis with each telecommunications area and division responsible for its own economic results. Actual costs of operation and depreciation of fixed assets are covered by Televerket's current income. Televerket operates through subsidiary companies and joint ventures in the fields of telephone consultancy, telecommunications materials manufacture, alarm services and development and design of telecommunications services.

- 8.40 A considerable proportion of Televerket's activities, particularly those relating to ordinary household telephones, are not subject to competition. Equipment such as modems may be attached to the network subject to Televerket approval.

CANADA

Population and demographic characteristics

- 8.41 Principal demographic features include a relatively small population widespread over a vast land mass, a low population density, highly urbanised and with a comparatively high rate of population increase.

Service dimensions and performance

- 8.42 Relevant dimensions of services and performance are as follows:

- Dimensions of service

As at 31 December 1980 there were 10 million main lines and 16.5 million telephone sets connected to the public network. This represented an annual growth since 1975 of 3.8 percent and 4.7 percent respectively.

As at 31 December 1980 there were 50 500 telex subscriber lines which represents an annual growth since 1975 of 6.2 percent.

- Dimensions of traffic

Total telephone traffic for 1980 was 26 841 million calls which represents a 4.8 percent annual growth rate since 1975. Telegram traffic decreased 23.7 percent annually for the same period and in 1980 there were 1.4 million paid telegrams transmitted.

- Telephone service penetration

As at 31 December 1980 there were 68.6 telephone sets per 100 inhabitants and 41.4 telephone main lines per 100 inhabitants which represents an annual growth for the 1975 to 1980 period of 3.6 percent and 2.7 percent respectively. Residential main lines declined from 1975 to 1980 at the rate of 0.4 percent annually and in 1980 83.6 percent of all main lines were residential. Business/institution main lines increased 1.9 percent annually to 16.4 percent.

- Accessibility of services

99.98 percent of main lines are connected to automatic exchanges. This represents a 0.04 percent annual growth rate for the period from 1975.

. Labour productivity

Total staff in telecommunications increased 3.7 percent per annum (to 108 100) for the period from 1975 to 1980. The number of telephone sets per employee increased 0.9 percent per annum to 152.9 telephone sets per employee while the number of main lines increased 0.1 percent per annum to 92.3 main lines per employee.

. Financial performance

For the 1980 financial year, the ratio of sales to funds employed for Bell Canada was 0.40, while the ratio of labour content, depreciation and operating profit to sales was 0.36, 0.17 and 0.30 respectively. The self financing ratio of Bell Canada for the 1980 financial year was 0.50.

. Tariff structure

Tables 8.16 and 8.17 detail the number of working hours required to earn the equivalent of the annual telephone bill.

Competition models and market structure

8.43 The Canadian telecommunications industry is structured similarly to that in the United States. Federal and provincial bodies regulate the industry. Services are provided by more than 200 companies, with a small number of major private companies or government owned corporations dominating the scene. The ten largest companies provide 97 percent of all the Canadian telephone service with Bell Canada accounting for 60 percent of the total.

8.44 There are three telecommunications networks: Trans-Canada Telephone System (TCTS), CNCP Telecommunications and Teleglobe Canada, which have a monopoly respectively in national telephone, national telegraph and international telecommunication services.

8.45 TCTS is an unincorporated consortium comprising the nine major telephone companies and the domestic satellite carrier, Telesat Canada. Bell Canada is the largest TCTS member owning and operating approximately 60 percent of the 16.9 million telephones in Canada(4). Approximately 93 percent of Canada's telephones are owned and operated by members of TCTS.

8.46 Bell Canada has a number of subsidiary companies engaged in other fields of activity within the telecommunications industry. These include:

- . the Computer Communications Group (CCG);
- . Bell Communications Systems Inc. (BCSI);
- . Bell-Northern Research (BNR).

CCG provides specialised data communications services to business customers. BCSI is engaged in the sale, installation and maintenance of what Bell Canada describes as 'interconnect telephone systems'. Within the Canadian telecommunications industry, CCG is classified as the 'data communications arm' of TCTS. BNR undertakes a wide range of research and development projects relating to telecommunications network transmission switching and associated activities.(5)

- 8.47 CNCP Telecommunications, a partnership of the major railroads, Canadian National and Canadian Pacific, operate a monopoly telegraph service. The partnership has an extensive data transmission service and private line voice and non voice services.
- 8.48 Teleglobe Canada, a government corporation is the international carrier, except for the United States and certain other countries and uses both satellite and submarine cable for its traffic.
- 8.49 The operator of Canada's national communications systems -- known as the Anik systems -- is Telesat Canada. Until recently Telesat owned, installed, operated and maintained all earth stations accessing the Canadian ANIK satellite system. CRTC has relaxed previous restrictions on ownership of earth stations. Liberalised regulations however apply to receive only earth stations.
- 8.50 The federal government has a predominant role in the regulations of telecommunications in Canada. The major common carriers--including the national carrier, Bell Canada--are subject to regulation by the Canadian Radio-television and Telecommunications Commission, (CRTC), while the remaining telephone carriers are subject to provincial regulation.

Regulatory environment

- 8.51 The federal regulatory agency is CRTC which regulates the two largest service providers, Bell Canada and British Columbia Telephone (which provide 70 percent of the country's telephones). CRTC regulates Telesat Canada and broadcasting and cable television systems and approves tariff structures for telecommunication services. Telecommunications services for which there is effective competition (such as CNCP services except for its regulated monopoly telegraph service) are exempt from CRTC controls. Other service providers come under provincial jurisdiction except Teleglobe which is a non-regulated public corporation of the federal government.
- 8.52 Overseeing the orderly development and operations of communications is the Department of Communications. For domestic telecommunications the Department's principal functions include:
- . extending existing telecommunications systems and services;
 - . developing and introducing new communication systems, facilities and resources

- . managing the radio frequency spectrum;
- . developing the federal government's telecommunications services.

Overall trends and issues

- 8.53 Trends in telecommunications technology coupled with demands for increased competition in the industry has led to a re-evaluation of the regulatory policy governing the industry. Federal and state inquiries have examined or are currently examining the industry and significant decisions have been made in the regulation of the industry. In recent decisions the CRTC has introduced significant elements of competition into telecommunications markets.
- 8.54 One of the most important consequences of this technological thrust in telecommunications has been a reassessment of the economic rationale for much of the regulation in the industry. The importance of these technological developments in the provision of new services and new markets has been recognised by a number of Government Reports(6). Specific recommendations have been made for the introduction of greater competition in the telecommunications sector.
- 8.55 The CRTC has recently inquired into issues of competition in the marketing of terminal equipment. Decisions as to whether Bell Canada will remain a monopoly supplier of the first telephone set are also relevant. The current inquiry of the Restrictive Trade Practices Commission into the effects of vertical integration have significant long-term implications on market structure and competition in the terminal equipment market.
- 8.56 Emerging as key issues as a consequence of these changes in the telecommunications sector are the following:

- . Terminal equipment and standards

Deregulation has proceeded more slowly and tentatively in Canada compared with the United States. The most important change in federal regulation has been the growth in regulatory authority of the CRTC.

The CRTC has recently opened the door to increased competition in the 'foreign attachment' market with its interim decision to allow Bell Canada subscribers to connect terminal equipment that meets accepted technical standards.

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6. In addition to the annual reports of the Canadian Radio-television and Telecommunications Commission specific reports dealing with these significant technological developments include:

.'The Information Revolution and its Implications for Canada'
Department of Communications, Canadian Government Publishing
Centre, Hull, Quebec, 1980

.'Reforming Regulation', Economic Council of Canada, Canadian
Government Publishing Centre, Hull, Quebec 1981

Standards for attachments are oversights by DOC with manufacturers of equipment being required to submit specifications in the first instance. If the equipment meets established standards, then a licence is issued by DOC.

- Alternative networks

The issue of competition in long distance transmission arose from the introduction of satellite transmission. A number of decisions has been made in respect of interconnection to the common carrier network, the most important of which was the CNCP decision. CNCP is the only specialised common carrier in Canada providing transcontinental microwave network for private line voice and non voice services as well as public non voice services. The consortium, which has a monopoly of telegraph services, competes with TCTS for business telecommunications services applied for interconnection to the Bell Canada local distribution network. Subsequently, the CRTC approved CNCP's application on the basis that regulated companies controlling essential facilities must make these facilities accessible. Further, it was ruled that regulated companies cannot create an unfair advantage through discriminatory tariffs to undermine competition.

- Manufacturing Industry

The manufacturing industry is dominated by Bell Canada's subsidiary, Northern Telecom, which for the 1981 financial year had sales of over \$2.5 billion dollars. Approximately 34 percent of sales were to the parent and associated companies, while 48 percent of the remainder were exported, principally to the United States. The other general manufacturer is AEL Microtel, a subsidiary of British Columbia Telephone Company.

To help maintain the viability of the industry, particularly from competitors from the United States, the government provides considerable financial assistance. Although Bell Canada now has a policy of open procurement for supplies of telephone equipment, the vertical integration of Northern Telecom within Bell Canada's overall structure has been subject to the scrutiny of a number of government departments, particularly the Consumer and Corporate Affairs Bureau. In 1980 the Telecommunications Equipment Inquiry addressed the problems of foreclosure of the manufacturing industry market through vertical integration.

JAPAN

Population and demographic characteristics

- 8.57 Main demographic features include a large population concentrated in a small area, very high population density, highly urbanised population and with a comparatively high rate of population increase.

Service dimensions and performance

8.58 Relevant dimensions of services and performance are as follows:

- Dimensions of service

As at 31 March 1980 there were 38.6 million main lines and 53.6 million telephone sets connected to the public network. This represented an annual growth rate since 1975 of 5.5 percent and 6.4 percent respectively.

As at 31 March 1980 there were 27 300 telex subscriber lines which represents an annual growth rate since 1975 of 10.5 percent. For the same period, there were 85 300 private leased circuits. This represents an annual growth rate for the period from 1975 to 1980 of 19.6 percent.

- Dimensions of traffic

Telegram traffic for the period from 1975 to 1980 decreased 2.4 percent annually and in 1980 there were 41 million paid telegrams transmitted. National telex traffic totalled 167.6 million minutes, an annual decrease of 8.2 percent per annum for the same period.

- Telephone service penetration

As at 31 March 1980 there were 46.0 telephone sets per 100 inhabitants and 33.1 telephone main lines per 100 inhabitants which represents an annual growth for the 1975 to 1980 period of 5.4 percent and 4.5 percent respectively. Residential main lines exhibited an annual growth rate from 1975 to 1980 of 1.5 percent and for 1980 65.8 percent of all main lines were residential. Business/ institution main lines decreased 2.7 percent annually to 34.2 percent.

- Accessibility of services

All main lines are connected to automatic exchanges. 35.7 percent of main lines are equipped with ISD dialling. This represents a 0.5 percent and 114 percent annual growth rate respectively for the period from 1975.

- Telephone service performance

The number of new applications for main lines decreased 11.8 percent annually (to 1.3 million) while the total demand for main lines increased 1.6 percent annually (to 4.3 million) from 1975 to 1980. For the same period the numbers on the waiting list annually decreased 53.5 percent (to 116 000) and the percentage of waiting list applications to total demand for main lines annually increased 1.6 percent (to 2.7 percent).

. Labour productivity

Total staff in telecommunications increased 1.2 percent annually (to 335 000) for the period from 1975 to 1980. The number of telephone sets per employee increased 5.1 percent annually to 160.1 telephone sets per employee while the number of main lines increased 4.3 percent annually to 115.3 main lines per employee.

. Financial performance

As a percentage of GDP, telecommunications decreased 5.2 percent annually (to 0.81 percent) while as a share of GFCF it decreased 4.2 percent annually (to 2.37 percent) for the period 1978 to 1980. For the 1980 financial year, the ratio of sales to funds employed was 0.44, while the ratio of labour content, depreciation and operating profit to sales was 0.30, 0.28 and 0.16 respectively. The self financing ratio for the 1980 financial year was 0.68.

. Tariff structure

Tables 8.16 and 8.17 detail the number of working hours required to earn the equivalent of the annual telephone bill.

Competition models and market structure

8.59 Telecommunications is the responsibility of the government corporation, Nippon Telegraph and Telephone Public Corporation (NTT), while a private company, Kokusai Denshin Denwa Co Ltd (KDD) has the monopoly for public international telecommunications. KDD is a joint stock company with the shares restricted to the government, local public entities or Japanese national or Japanese juridicial persons.

8.60 The domestic telecommunications monopoly of NTT is supplemented by a number of wire broadcast telephone companies in rural areas. These are operated by local public agencies such as municipal or co-operative bodies and the instrument used by the companies permits information to be simultaneously transmitted to every house subscribing to the system. Between broadcast periods the instrument is used as a telephone with a number of the systems having partial access to the NTT telephone network.

Regulatory environment

8.61 The operating telephone companies are controlled by the government through the Minister of Post and Telecommunications. Telecommunication services are regulated and supervised by the Minister in conformity with the Constitution and relevant laws.

8.62 Regulation of telecommunications is principally through the following laws:

- . The Radio Law;
- . The Broadcast Law;
- . Wire Communications Law;
- . Wire Broadcast Law;
- . Law regarding regulation of the operation of wire broadcasting service;
- . Nippon Telegraph and Telephone Public Corporation Law;
- . Kokusai Denshin Denwa Company Ltd. Law;
- . Public Telecommunications Law¹
- . Law regarding interim arrangements for the expansion of telegraph and telephone facilities.

8.63 For basic and universal services the rates are stipulated in laws by the Diet. Minor rates have to be approved by the Minister for Posts and Telecommunications.

Overall trends and issues

8.64 An administrative reform commission has recommended increased participation of private enterprise within five years.

FRANCE

Population and demographic characteristics

8.65 Principal demographic features include a median size population with a large population density, highly urbanised population and a very low rate of population increase.

Service dimensions and performance

8.66 Relevant dimensions of services and performances are as follows:

Dimensions of service

As at 31 December 1980 there were 15.8 million main lines and 24.7 million telephone sets connected to the public network. This represents an annual growth rate since 1975 of 17.3 percent and 12.3 percent respectively.

As at 31 December 1980 there were 82 200 telex subscriber lines and 19.1 million subscriber terminals which represents an annual growth rate since 1975 of 8.9 percent and 15.4 percent respectively. For the same period, there were 56 200 private leased circuits and 21 300 data terminals connected to the public telephone and telex network. This represents an annual growth for the period from 1975 to 1980 of 28.1 percent and 24.9 percent respectively.

- Dimensions of traffic

Telegram traffic for the period from 1975 to 1980 decreased 7.8 percent annually and in 1980 there were 8.6 million paid telegrams transmitted. National telex traffic totalled 215.5 million minutes, an annual growth of 10.4 percent for the same period.

As at 31 December 1980 there were 45.9 telephone sets per 100 inhabitants and 29.4 telephone main lines per 100 inhabitants which represents an annual growth for the 1975 to 1980 period of 11.9 percent and 17 percent respectively. Residential main lines exhibited an annual growth rate from 1975 to 1980 of 3.5 percent and for 1980 72.5 percent of all main lines were residential. Business/institution main lines decreased 8.0 percent annually to 27.5 percent.

- Accessibility of services

All main lines are connected to automatic exchanges. This represents a 1.1 percent annual growth rate for the period from 1975.

- Telephone service performance

The number of new applications for main lines and the total demand for main lines increased annually by 18.3 percent (to 2.2 million) and 19.2 percent (to 2.8 million) respectively from 1975 to 1980. For the same period the numbers on the waiting list decreased 9 percent annually (to 532 000) and the percentage of waiting list applications to total demand for main lines decreased 29.9 percent annually (to 19 percent).

- Labour productivity

Total staff in telecommunications increased 8 percent annually (to 157 900) for the period from 1975 to 1979. The number of telephone sets per employee increased annually by 4.2 percent to 140.7 telephone sets per employee while the number of main lines increased 9.4 percent annually to 87.8 main lines per employee.

- Tariff structure

Tables 8.16 and 8.17 detail the number of working hours required to earn the equivalent of the annual telephone bill.

Competition Models and market structure

8.67

The Directeur Generale des Telecommunications (DGT) is responsible for all aspects of telecommunications. Ultimate authority is through the Secretary of State for Posts and Telecommunications. The administration provides the funding for capital investment to establish new facilities and networks. These are provided and marketed commercially either through joint ventures or by a series of wholly government owned companies. The latter are given considerable autonomy to market

services within guidelines set by government. These totally owned 'quasi' public bodies are limited companies generally operating as subsidiaries of a parent organisation France Cables and Radio (FCR). For instance, the packet switched network Transpac is run by a separate company with a small proportion of private investment. Transplex is another older data communications network operated by a DGT subsidiary, while Enterprise Generale de Telecommunications (EGT) is a company marketing accessories such as answering machines, facsimile machines and radio pagers.

- 8.68 In the 7th national plan, adopted in 1975, telecommunications was designated a 'priority action programme'. Within the plan's overall objectives (principally full employment and a positive balance of foreign trade) specific objectives were set for DGT. Apart from improving the domestic network, these were intended to give French manufacturing industry support and incentives to export its products. The plan stated that by 1982 French industry should be exporting 25-35 percent of its output. By 1985, the target is 50 percent.

Overall trends and issues

- 8.69 The French Government embarked in 1975 on a large scale program of development for its computing and telecommunications industries. The French telecommunications system is carefully planned and regulated in accordance with the government's perception of the national interest. The government is opposed to service liberalisation.
- 8.70 Emerging as key issues as a consequences of these developments in the telecommunications sector are the following:

- Terminal Equipment and standards

Until 1975, equipment procurement was based on quotas agreed with two cartels -- one for switching equipment and one for transmission. Since 1975, these cartels have been abandoned in favour of more open competition between suppliers under the guidance of the Direction des Affaires Industrielles et Internationales (DAII) within the DGT. The industry has been largely restructured to equip it to meet the challenge of digital technology.

Apart from the first telephone on site (and any second telephone attached to the same exchange line), most equipment is supplied by one of the approved telephone installers.

Although DGT has the power to specify the standards of interface connection for interface and peripheral equipment, it does not, however, specify the type of equipment that may be supplied or installed. DGT licenses interface and peripheral equipment as well as provides equipment in a competitive market.

- Specialised services and resale

Transpac is operated by a DGT subsidiary, and a number of special services such as one for companies in the travel industry, are provided by Transpac. Privately operated Value Added Network

Services (VANS) are not allowed but private message handlers are allowed to operate services. Circuit sharing is regulated and the use of leased circuits is only permitted to connect the offices of a company and/or its subsidiaries or where there is only one unconnected circuit between two different organisations. The connection of private circuits to the Public Switched Telephone Network (PSTN) at both ends is not allowed, and connections at one end require special permission unless both termination points are in the same local telephone area.

- Alternative networks

There are some ten alternative networks in France used by organisations like the French Railways (SNCF), Paris Metro, the Army and the Police. Any possible dilution of the transmission monopoly has been pre-empted by plans for Telecom-1, DGT's own satellite.

- Manufacturing Industry

DAII oversees and co-ordinates purchasing policy operating within the overall telecommunication target set by DGT. Basically, DAII has two functions:

- to meet the telecommunication requirements as set out by the priority action plan, the Direction de la Production;
- to draw up an industrial strategy applicable to telecommunication equipment suppliers which takes into account the need for exports.

Competition has been encouraged with calls for bids being pursued in all areas including the large transmission and switching sectors. To limit the dependence on suppliers to public sector telecommunications orders, DAII has encouraged suppliers to diversify their production and their clientele while increasing their export orders. DGT has set an export target of 50 percent of telecommunications manufacture by 1985(7).

UNITED STATES

Population and demographic characteristics

3.71

Principal demographic features include a relatively large population widespread over a vast land mass; a low population density; highly urbanised population and a comparatively median rate of population increase.

7. DAII 1980 Annual Report, Paris, 1980.

Service dimensions and performance

8.72 Relevant dimensions of services and performance are as follows:

- Dimensions of service

As at 31 December 1980 there were 94.3 million main lines and 180.4 million telephone sets connected to the public network. This represented an annual growth rate since 1975 of 3.2 percent and 3.9 percent respectively.

As at 31 December 1980 there were 159 200 telex subscriber lines which represents an annual growth rate since 1975 of 5.8 percent.

- Dimensions of traffic

Total telephone traffic for 1980 was 256.8 billion calls which represents a 4.4 percent annual growth rate since 1975. Telegram traffic increased 7.7 percent annually for the same period and in 1980 there were 49 million paid telegrams transmitted.

- Telephone service penetration

As at 31 December 1980 there were 78.9 telephone sets per 100 inhabitants and 41.2 telephone main lines per 100 inhabitants. This represents an annual growth rate for the 1975 to 1980 period of 2.8 percent and 2.1 percent respectively. Residential main lines exhibited an annual decline from 1975 to 1980 of 0.2 percent and for 1980 83.7 percent of all main lines were residential. Business/institution main lines increased 1 percent annually to 16.3 percent.

- Accessibility of services

99.9 percent of main lines are connected to automatic exchanges.

- Telephone service performance

For the period from 1975 to 1980 the numbers on the waiting list exhibited an annual growth rate of 11.3 percent to 65 000.

- Labour productivity

Total staff in telecommunications has increased 1.3 percent per annum (to 956 000) for the period from 1975 to 1980. The number of telephone sets per employee increased 2.5 percent annually to 188.6 telephone sets per employee while the number of main lines increased 1.9 percent annually to 98.6 main lines per employee.

- Financial performance

As a percentage of GDP, telecommunications investment increased annually by 1.9 percent (to 0.81 percent) while as a share of GFCF it decreased 0.5 percent (to 4.92 percent).

For the 1980 financial year, the ratio of sales to funds employed for AT&T was 0.49, while the ratio of labour content, depreciation and operating profit to sales was 0.35, 0.14 and 0.32 respectively. The self financing ratio for the 1980 financial year was 0.62.

• Tariff structure

Tables 8.16 and 8.17 detail the number of working hours required to earn the equivalent of the annual telephone bill.

Competition models and market structure

- 8.73 In the United States companies providing telecommunications services are privately owned and usually have a monopoly in a particular region or locality. Eighty percent of the local telephone service is provided by the American Telephone and Telegraph Company (AT&T) through its 23 Bell subsidiary companies. The rest of the market is divided between three major carriers -- General Telephone and Electric (GTE), United Telecommunications, Continental Telephone -- and over 1400 smaller firms.
- 8.74 Long distance telephone service is provided by Bell's Long Lines Department. Since 1959 other carriers -- specialised common carriers -- have entered the market following the FCC's 'above 890' decision. This decision, which permitted private microwave links about 890 Megahertz, and other decisions of the network, have led to the domestic long distance communications market being served by the traditional telephone industry, specialised common carriers, record carriers, resellers, miscellaneous common carriers, value-added services, satellite carriers, shared user and private networks.
- 8.75 The major satellite common carriers are:
- RCA Americom;
 - American Satellite Corporation, (ASC);
 - Western Union;
 - Satellite Business Systems (SBS).

RCA Americom is a subsidiary of the Radio Corporation of America (RCA), one of the largest US manufacturers of radiocommunications equipment. It is the largest domestic common carrier of image telecommunications services in the USA. ASC is mainly a resale carrier offering specialised business telecommunications services. Western Union operates two dial-up national public telegraph networks, a national telex network. Western Union owns and operates one of four commercial communications systems in the USA. SBS was formed by COMSAT General Corporation, IBM and the AETNA Casualty and Insurance Company. It operates a commercial communications satellite system set up to provide dedicated switched line intra organisational networks with integrated voice, data and image services.

- 8.76 Although new suppliers have entered the traditional long distance common carriers' markets, these companies have not made substantive inroads in terms of their penetration of the overall long distance marketplace.

Regulatory environment

- 8.77 Government control over the telecommunications services is organised through public regulatory processes divided between the Federal Communications Commission (FCC) and various state service commissions. In practice, the regulatory scene is complex and includes several Departments of Government, principally the Department of Commerce (the National Telecommunications and Information Administration) and the Department of Justice (the Anti-trust Division). A variety of Congressional Committees have an interest in telecommunications, especially the House and Senate Sub-committees on Communications.
- 8.78 The courts have also provided interpretations of the regulatory arrangements. Many FCC decisions have been appealed.
- 8.79 The FCC's policy is essentially regulation of tariffs for basic services with maintenance of standards of attachments to the network.

Overall trends and issues

- 8.80 In the 1930s, the requirements of local traffic dominated common carrier communications, and the objective of policy primarily focused on providing a universal service at reasonable cost. Dominating the telephone market AT&T with its affiliated companies generated 94.3 percent of all local exchange messages.(8) As a result, AT&T took on the status of a public utility, with the common carrier obligation to serve all customers.
- 8.81 In the 1950s AT&T, which largely dominated the local, long distance and attachments market, was subject to anti-trust action by the United States Justice Department. This matter was settled in 1956 by a consent decree by which the company was allowed to keep its manufacturing arm, Western Electric; in return, AT&T agreed to operate only in a regulated market.
- 8.82 Restructuring of telecommunications is now occurring on a number of fronts, including legislative and regulatory action as well as the restructuring of the dominant common carrier, AT&T. Two companion Bills -- the Telecommunications and Competition and Deregulation Act of 1981, S898 and the Telecommunications Act of 1981, HR5158 -- are at various stages in the legislative approval process. Pending the outcome of this legislation, the Justice Department has reached an out of court settlement with AT&T in January 1982 on a long running anti-trust suit.

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8. Telecommunications in Transition: The Status of Competition in the Telecommunications Industry. Committee Print 97V. 3 November 1981. Government Printing Office, Washington, 1981.

- 8.83 Action to deregulate the telecommunications industry has centred on restructuring AT&T (assets total \$134 billion)(9) which occupies a dominant and strategic position in the national telecommunications market. To this end the Justice Department's settlement of the anti-trust suit resulted in an agreement whereby AT&T would divest some two thirds of its assets by sale of its 22 local operating companies. In return, it would be allowed to retain its long distance services, Western Electric and Bell Laboratories, and be permitted to enter new fields of data processing and telecommunications.
- 8.84 As previously noted, the first major overhaul of the regulations governing telecommunications is currently being considered by Congress. The Telecommunications Competition and Deregulation Act of 1981, S898 which would regulate and restructure the telecommunications industry has been passed by the Senate.
- 8.85 The principal features of the Telecommunications Competition and Deregulation Act of 1981 include, inter alia, the following:
- . establishes as the national policy the promotion of competition in the telecommunications industry;
 - . directs the FCC to reduce or eliminate regulation of telecommunication service as competition develops unless the change would damage national security;
 - . allows AT&T to direct the operations of a separate subsidiary as long as the costs are properly allocated;
 - . continues regulation of ordinary telephone services and basic telecommunications services;
 - . directs the FCC to prevent unreasonable charges for basic telephone services. The FCC would be allowed to set subcharges on rates to subsidise rural telephone services;
 - . bars federal offices, states and local governments from regulating cable television rates;
 - . directs the FCC within 30 days of enactment of the Bill to identify the carriers to be regulated;
 - . classifies AT&T as a dominant-regulated carrier and allows the FCC under certain conditions to reclassify any regulated carrier.

9. Fortune, 30 November 1980.

The magnitude of AT&T's dominant position can be gauged from the following statistics of the company -- revenue \$51.7 billion (1980); resources include 24 000 buildings 117 000 motor vehicles and 142 million telephones or 8 out of 10 telephones in the US; employs one million workers (one percent of the American workforce). Time, 18 January 1982.

- 8.86 The companion Bill, the Telecommunications Act of 1981, HR5158 would revise the provisions of the Communications Act relating to telecommunications which aims to boost competition in the telecommunications industry. It would allow AT&T to set up a subsidiary to provide unregulated data processing services. The subsidiary would be designed to minimise the possibility that AT&T would use its revenue from monopoly areas such as the local phone service to subsidise competitive services the subsidiary would provide. This Bill differs from Bill S898, in that it gives AT&T two options for setting up the subsidiary, depending on the services it offers.
- 8.87 The key issues which emerge as a consequence of these changes in the telecommunications sector are as follows:

- Terminal equipment and standards

The increased diversity in terminal equipment has led to the emergence of new market entrants reducing the influence of the providers of telecommunications services. New technologies and new types of equipment have encouraged the entry of firms accelerating the innovation process and creating a demand from some sections of the community for the liberalisation of markets.

To a large extent the telephone industry in the United States has become vertically integrated with the two largest operating companies AT&T and General Telephones procuring equipment through their own suppliers. Thus AT&T obtains its requirements from its subsidiary, Western Electric, while General Telephone relies heavily on its subsidiary manufacturing group for its requirements. The move to increase competition in the terminal equipment market has therefore been centred on separating the manufacture and sale of terminal equipment. New suppliers have entered the PABX and modern markets following elimination of barriers to interconnect equipment to the public network. However residential telephones are still almost exclusively supplied by the local telephone companies.

On the matter of standards the FCC maintains its role as the authority to rule on the acceptability of attachments. Minimum standards relating to protection of the network apply. The procedure adopted by FCC is to require the applicants to certify that attachments meet the required standards.

- Specialised services and resale

Technological progress has led to increasing differentiation of demand for specialised equipment and services. Public and private monopolies have often been able to respond effectively to the need to provide undifferentiated services over a wide area of users, particularly where this involves basic use of the network. However, differentiated demand has led service providers to consider allowing specialised services over the service provider's network.

Other carriers have also entered the telecommunications service market as a result of the FCC decision on resale, particularly in providing Valued Added Network Services (VANS). VANS use their own hardware and software to offer enhanced transmission service (packet switched) over the existing telecommunications. With the arrival of the 'Value Added Common Carriers', the distinction between telecommunications and data processing has blurred. As the former is regulated and the latter is not, AT&T has been forbidden since the 1956 settlement with the Justice Department to offer data processing services. Subsequently in its Computer II decision(10), the FCC authorised AT&T to provide enhanced non voice services on a deregulated basis through a separated subsidiary.

Miscellaneous Common Carriers have emerged by providing terrestrial microwave transmission services for radio and television programings. Revenues for these carriers and the Specialised Common Carriers are extremely small. Table 8.4 shows these specialised and miscellaneous carriers have a miniscule share of the total market compared to AT&T.

- Alternative networks

The experience in the United States has suggested that introduction of resale competition has increased the pressure to promote alternative networks for switching and transmission. Technological changes such as the development of satellite communications have reduced the investment necessary to provide alternative networks.

- Manufacturing industry

The major common carriers -- AT&T, General Telephone & Electric (GTE), United Telecommunications and Continental Telephone -- have integrated backwards into the production of telecommunications equipment. Historically, the market structure has exhibited vertical integration which reinforced horizontal market power. For instance, AT&T, which accounts for the bulk of equipment purchases, obtained in 1980 84 percent of its internal equipment requirements from its subsidiary, Western Electric.(11) The importance of this is twofold: it reduced the scope of entry into the equipment market and made it difficult for competing common carriers to procure equipment on equally favourable terms.

The pressure for change has come from two areas -- rapid technological innovation and an altered legislative and regulatory environment. Competitive forces have emerged in the telecommunications industry due to declining costs of operating equipment, alternative technologies and increased private demand for equipment.

10. Second Computer Inquiry, Final Decision, 77 FCC 2d 384 423(1980).

11. Telecommunications in Transition, op cit.

Table 8.4: Total operating revenues of common, specialised and miscellaneous carriers, 1979--1980

	AMOUNT		MARKET SHARE	
	1980 \$000	1979 \$000	1980 %	1979 %
All companies	62 655 860	55 787 395		
All telephone carriers	62 199 210	55 507 948	99.20	99.50
Bell system(1)	51 842 210	46 410 948	82.70	83.20
AT&T Long Lines	3 516 343	3 192 718	5.60	5.70
All Independents(2)	10 357 000	9 097 000	16.50	16.30
Total Specialised Carriers	415 295	248 828	.66	.45
American Microwave	48	37	.00	.00
Business Telecomm Corp	922	850	.00	.00
MCI	205 597	124 829	.33	.22
Southern Pacific	152 594	95 285	.24	.17
Transportation Microwave	976	973	.00	.00
US Telephone Comm.	3 419	N/A	.01	N/A
USTS	41 599	20 982	.07	.04
Midwestern Relay	1 431	889	.00	.00
Western Telecommunicatios	3 995	634	.01	.00
Total Miscellaneous Carriers	41 355	30 619	.07	.06
Top 5 Miscellaneous Carriers	28 185	18 681	.05	.04
. Western Telecommunicatons	9 322	3 597	.01	.01
. Southern Satellite	5 905	4 264	.01	.01
. Eastern Microwave	5 687	5 002	.01	.01
. United Video	4 025	2 505	.01	.01
. Midwestern Relay	3 246	3 313	.01	.01

(1) Includes Cinn and SNETCO

(2) Includes GTE

Source: Telecommunications in Transition: 'The Status of Competition in the Telecommunications Industry Committee'. Print 97V. 3 November 1981. Government Print Office, Washington, 1981.

Competition in the terminal equipment market has developed to a greater extent than in the terminal and switching equipment market. With the elimination of tariff restrictions on customers' ability to connect equipment to the public network, a large number of new suppliers have entered the market. Economic factors, technological innovations and merging technology have interacted to meet rapidly expanding private demand for equipment.

The residential phone equipment, on the other hand, is still almost totally provided for by the local telephone companies. Even where independent suppliers have made inroads into the market, AT&T still supplies the majority of all telecommunications equipment. AT&T has been able to maintain significant market power by means of a 'migration strategy' -- i.e. a nationwide program to increase the rates for certain customers to lease newer AT&T products.

Transmission and switching equipment market, unlike the terminal equipment market, is completely controlled by AT&T and GTE through their subsidiary manufacturing companies. Effectively, the largest users, the common carriers, have both the incentive and ability to exclude competition in this market.

Table 8.5: Dimensions of voice telephone service -- number of telephone main lines and telephone sets: 1980

COUNTRY	MAIN	GROWTH	TELEPHONE	GROWTH
	LINES (000'S)	P.A. 1975--1980 %	SETS (000'S)	P.A. 1975--1980 %
Australia	4 743	6.0	7 153	6.3
Canada	9 979	3.8	16 531	4.7
France	15 791	17.3	24 686	12.3
Germany, FR	20 535	9.9	28 554	7.8
Japan	38 611	5.5	53 634	6.4
Sweden	4 820	2.7	6 621	4.1
United Kingdom	17 717	6.7	26 651	5.6
United States	94 282	3.2	180 424	3.9

Note: Year ends 31 December for all countries except Australia (30 June) and United Kingdom/Japan (31 March).

Source: Yearbook of Common Carrier Telecommunications Statistics, 9th Edition, ITU Geneva, 1981

Table 8.6: Dimensions of non-voice telephony service -- numbers of telex lines, subscriber terminals, private leased circuits and data terminal equipment: 1980

COUNTRY	TELEX SUBSCRIBER LINES (000's)	GROWTH P.A. 1975--80 %	NO. OF SUBSCRIBER TERMINALS (000's)	GROWTH P.A. 1975--80 %	NO. OF		GROWTH P.A. 1975--80 %	NO. OF		GROWTH P.A. 1975--80 %
					PRIVATE LEASED CIRCUITS (000's)	DATA TERMINAL EQUIPMENT (000's)		PRIVATE LEASED CIRCUITS (000's)	DATA TERMINAL EQUIPMENT (000's)	
Australia	29.7	14.9	5 587	5.0(1)	27.7	7.8	46.5	7.8	31.3	--
Canada	50.5	6.2	--	--	--	--	--	--	--	--
France	82.2	8.9	19 116	15.4	56.2	21.3	28.1	21.3	24.9	--
Germany FR	137.0	5.9	24 268	6.5	--	--	--	--	--	--
Japan	27.3	10.5	--	--	85.3	--	19.6	--	--	--
Sweden	14.7	7.0	5 937	2.3	--	31.0	--	31.0	29.8	--
United Kingdom	85.4	9.4	19 639	6.0	80.0	69.0	23.1(2)	69.0	15.0(2)	--
United States	159.2	5.8	--	--	--	--	--	--	--	--

(1) for the period 1977--1980

(2) for the period 1979--1980

Note: Year ends 31 December for all countries except Australia (30 June) and United Kingdom/Japan (31 March).

Source: Yearbook of Common Carrier Telecommunications Statistics, 9th Edition, ITU Geneva, 1981

Table 8.7: Dimensions of traffic -- telephone, telegrams and telex: 1980

COUNTRY	TOTAL NATIONAL TELEPHONE TRAFFIC (millions of calls)	GROWTH P.A. 1975--80 %	NATIONAL PAID TELEGRAMS (000's)	GROWTH P.A. 1975--80 %	NATIONAL TELEX TRAFFIC (000's minutes/ calls)	GROWTH P.A. 1975--80 %
Australia	5 376	6.6	5 431	(24.3)	37 415	6.5
Canada	26 841	4.8	1 423	(23.7)	--	--
France	--	--	8 558	(7.8)	215 490	10.4
Germany, FR	21 655	9.2	4 407	(4.7)	1 771 092	3.6
Japan	--	--	41 050	(2.4)	167 600	(8.2)
Sweden	19 645	3.2	163	(45.2)	--	--
United Kingdom	19 857	6.7	3 300	(13.1)	91 009	9.0
United States	256 783	4.4	49 011	7.7	--	--

Note: Year ends 31 December for all countries except Australia/Sweden (30 June) and United Kingdom/Japan (31 March).

Source: Yearbook of Common Carrier Telecommunications Statistics, 9th Edition, ITU, Geneva, 1981

Table 8.8: Telephone services penetration -- main lines and
telephone sets per 100 inhabitants: 1980

COUNTRY	TELEPHONE	GROWTH	TELEPHONE	GROWTH
	SETS/100	P.A.	MAIN LINES	P.A.
	INHABITANTS	1975--1980	/100	1975--1980
	%	%	INHABITANTS	%
	%		%	
Australia	48.9	5.0	32.5	4.8
Canada	68.6	3.6	41.4	2.7
France	45.9	11.9	29.4	17.0
Germany, FR	46.4	7.9	33.4	9.9
Japan	46.0	5.4	33.1	4.5
Sweden	79.6	3.8	58.0	2.5
United Kingdom	47.7	5.6	31.7	6.7
United States	78.9	2.8	41.2	2.1

Note: Year ends 31 December for all countries except Australia (30 June) and United Kingdom/Japan (31 March).

Source: Yearbook of Common Carrier Telecommunications Statistics, 9th Edition ITU Geneva, 1981.

Table 8.9: Telephone service penetration -- residential main lines v. business/institution main lines: 1980

COUNTRY	RESIDENTIAL	GROWTH P.A. 1975--1980	BUSINESS/ INSTITUTION	GROWTH P.A. 1975--1980
	%	%	%	%
Australia	71.9	2.0	28.1	(14.0)
Canada	83.6	(0.4)	16.4	1.9
France(1)	72.5	3.5	27.5	(8.0)
Germany, FR	--	--	--	--
Japan	65.8	1.5	34.2	(2.7)
Sweden	83.1	(0.5)	16.9	2.7
United Kingdom	80.4	1.1	19.6	(4.0)
United States	83.7	(0.2)	16.3	1.0

(1) As the 1980 data is not available, the data for 1979 has been incorporated in the table. The period of growth covers the period from 1976 to 1979.

Note: Year ends 31 December for all countries except Australia (30 June) and United Kingdom/Japan (31 March).

Source: Yearbook of Common Carrier Telecommunications Statistics, 9th Edition, ITU Geneva, 1981

Table 8.10: Accessibility of services -- main lines connected to
automatic exchange or equipped with ISD: 1980

COUNTRY	CONNECTED	GROWTH	EQUIPPED	GROWTH
	TO AUTOMATIC EXCHANGES	P.A. 1975--1980	WITH ISD	P.A. 1975--1980
	%	%	%	%
Australia	98.50	0.50	5.30	105.00
Canada	99.98	0.04	--	--
France	100.00	1.10	--	--
Germany, FR	100.00	0	100.00	0
Japan	100.00	0.50	35.70	114.00
Sweden	100.00	0	100.00	0
United Kingdom	100.00	0.01	96.40	13.60
United States	99.90	0	--	--

Note: Year ends 31 December for all countries except Australia (30 June) and United Kingdom/Japan (31 March).

Source: Yearbook of Common Carrier Telecommunications Statistics, 9th Edition ITU Geneva, 1981.

Table 8.11: Telephone service performance -- demand and waiting list for main lines: 1980

COUNTRY	NEW APPLICATIONS FOR MAIN LINES (000's)	GROWTH P.A. 1975--80 %	TOTAL DEMAND FOR MAIN LINES (000's)	GROWTH P.A. 1975--80 %	WAITING LIST FOR MAIN LINES (000's)	GROWTH P.A. 1975--80 %		WAITING LIST/ TOTAL DEMAND		CHANGE P.A. 1975--80 %
								MAIN LINES	%	
Australia	636	12.6(1)	951	11.2	10	(9.7)	1.1	(21.4)		
Canada	--	--	--	--	--	--	--	--	--	
France	2 194	18.3	2 794	19.2	532	(9.0)	19.0	(29.9)		
Germany FR	--	--	2 222	10.5	87	9.6	3.9	(1.0)		
Japan	1 333	(11.8)	4 326	1.6	116	(53.5)	2.7	1.6		
Sweden	263	1.6	760	0.6	--	--	--	--	--	
United Kingdom	1 901	7.8	3 029	7.2	262	20.8	8.6	12.4		
United States	--	--	--	--	65	11.3	--	--	--	

(1) for the period 1976--1980

Note: Year ends 31 December for all countries except Australia (30 June) and United Kingdom/Japan (31 March).

Source: Yearbook of Common Carrier Telecommunications Statistics, 9th Edition, ITU Geneva, 1981

Table 8.12: Labour productivity -- total staff, telephone sets and telephone main lines per employee: 1980

COUNTRY	TOTAL	GROWTH	TELEPHONE	GROWTH	MAIN(1)	GROWTH
	STAFF IN	P.A.	SETS/	P.A.	LINES/	P.A.
	TELECOMMUN- ICATIONS (000's)	1975--80 %	EMPLOYEE (000's)	1975--80 %	EMPLOYEE (000's)	1975--80 %
Australia	87.2	(0.4)	82.0	6.8	54.4	6.5
Canada	108.1	3.7	152.9	0.9	92.3	0.1
France(2)	157.9(3)	8.0	140.7	4.2	87.8	9.4
Germany FR	195.0	1.1	146.4	6.7	105.3	8.7
Japan	335.0	1.2	160.1	5.1	115.3	4.3
Sweden	40.0	1.0	165.5	3.0	120.5	1.7
United Kingdom	240.1	(0.6)	111.0	6.2	73.8	7.3
United States	956.6	1.3	188.6	2.5	98.6	1.9

- (1) Telephone sets/employee and main lines/employee statistics exhibit high variability as between high/low density areas within each of the selected countries; it would therefore be inappropriate to compare overall national productivities as between countries of significantly different population densities and size without regard to these different geographic characteristics.
- (2) The 1980 data is not available and the 1979 data has therefore been substituted. Growth is measured for the period from 1975 to 1979.
- (3) Total staff includes staff of the overseas departments and has been calculated from the figures supplied for operating, technical and other staff.

Note: Year ends 31 December for all countries except Australia (30 June) and United Kingdom/Japan (31 March).

Source: Yearbook of Common Carrier Telecommunications Statistics, 9th Edition, ITU, Geneva, 1981

Table 8.13: Telecommunications investment as a share of GDP:
1975--1980

COUNTRY	1975 %	1976 %	1977 %	1978 %	1979 %	1980 %	GROWTH
							P.A. %
Australia	1.22	1.17	1.23	1.18	1.04	1.00	(4.0)
Canada	--	--	--	--	--	--	--
France	--	--	--	--	--	--	--
Germany, FR	0.59	0.50	0.48	0.53	0.59	0.67	2.7
Japan	1.04	1.00	0.85	0.92	0.85	0.81	(5.2)
Sweden	0.35	0.31	0.32	0.32	0.36	0.40	3.0
United Kingdom	0.99	0.93	0.73	0.65	0.68	0.71	(7.0)
United States	0.79	0.74	0.73	0.82	0.83	0.81	1.9

Note: Year ends 31 December for all countries except Australia (30 June) and United Kingdom/Japan (31 March).

Source: Yearbook of Common Carrier Telecommunications Statistics, 9th Edition ITU Geneva, 1981.

Table 8.14: Telecommunications investment as a share of GFCF:
1975--1980

COUNTRY	1975	1976	1977	1978	1979	1980	GROWTH
	%	%	%	%	%	%	P.A. %
Australia	4.72	4.39	4.73	4.54	4.04	3.98	(3.5)
Canada	--	--	--	--	--	--	--
France	--	--	--	--	--	--	--
Germany, FR	2.82	2.40	2.31	2.52	2.60	2.85	0.2
Japan	2.91	2.81	2.61	2.86	2.59	2.37	(4.2)
Sweden	1.48	1.31	1.38	1.54	1.69	1.88	4.8
United Kingdom	4.50	4.28	3.50	3.13	3.31	3.43	(5.6)
United States	5.04	4.66	4.20	4.50	4.58	4.92	(0.5)

Note: Year ends 31 December for all countries except Australia (30 June) and United Kingdom/Japan (31 March).

Source: Yearbook of Common Carrier Telecommunications Statistics, 9th Edition ITU Geneva, 1981.

Table 8.15: Comparison of financial performance of selected PTT's

RATIOS	Telecom(1)		AT&T(2)		British Telecom(3)			Bundespost(2)			Televerket(1)			Bell Canada(2)			NTT(3)		
	1979	1980	1981	1979	1980	1981	1979	1980	1981	1979	1980	1981	1979	1980	1981	1979	1980	1981	
SALES:																			
FUNDS	0.27	0.28	0.30	0.48	0.49	0.51	0.48	0.55	n/a	0.45	0.42	n/a	0.60	0.61	0.53	0.39	0.40	0.45	
EMPLOYED																			
LABOUR																			
CONTENT:	0.54	0.56	0.55	0.35	0.35	0.36	n/a	n/a	n/a	0.49	0.50	n/a	0.40	0.39	0.35	0.34	0.36	0.34	
SALES																n/a	0.30	n/a	
DEPRECIATION:																			
SALES	0.20	0.20	0.20	0.13	0.14	0.13	0.24	0.26	n/a	0.15	0.13	n/a	0.22	0.25	0.36	0.18	0.17	0.16	
OPERATING																			
PROFIT:	0.19	0.20	0.17	0.33	0.32	0.32	0.16	0.13	n/a	0.08	0.07	n/a	0.02	0.03	0.02	0.31	0.30	0.31	
SALES																0.08	0.16	n/a	
SELF FINANCING	0.81	0.81	0.82	0.67	0.62	n/a	0.79	1.09	n/a	0.80	0.55	n/a	0.92	0.95	0.92	0.46	0.50	0.57	
																0.69	0.68	n/a	

(1) Financial year ends 30 June

(2) Financial year ends 31 December

(3) Financial year ends 31 March

n/a not available

Sources: Annual Reports of respective PTT's

Table 8.16: Average working hours required to earn equivalent of
annual telephone bill: 1982(1)

Australia	76
Canada	n/a
France	64
Germany, FR	57(2)
Japan	43(2)
Sweden	28(2)
United Kingdom	80(2)
United States	50

(1) Telephone charges consist of: installation fee, distributed over 10 years; subscription rate for the largest local network, resp. the highest tariff class; charges for 700 local calls, and 200 long distance calls (3 mins) up to 100 km (daytime rates and nighttime rates mixed)

(2) Local calls timed

Source: Siemens Study on National Telephone Tariffs Worldwide, 1982

Table 8.17: Manhours required to earn equivalent of annual
telephone bill(1)

	RESIDENTIAL	BUSINESS
Australia	34	186
Canada	n/a	n/a
France	63	272
Germany, FR	37	194
Japan	n/a	n/a
Sweden	17	67
United Kingdom	44	276
United States	24	156

(1) Based on Australian call package

Source: Telecom submission

INQUIRY PROCEEDINGS

COMMITTEE APPROACH

Establishment

- 9.1 On 23 September 1981 the then Minister for Communications, The Right Honourable Mr Ian McC Sinclair MP, announced the establishment of the Committee to hold a public inquiry into telecommunications services in Australia.

Submissions

- 9.2 The Committee subsequently placed public notices in national metropolitan and regional newspapers detailing the Committee's Terms of Reference and inviting written submissions from individuals and organisations.
- 9.3 Submissions were invited by 11 December 1981. The Committee indicated that if any organisation was unable to meet this deadline, outline submissions would be accepted by that date, subject to final submissions being received by 26 February 1982.
- 9.4 The Committee received written submissions from a wide range of sources, including:
- . Telecom;
 - . telecommunications equipment manufacturers and suppliers;
 - . consultants;
 - . users and user groups;
 - . Federal, State and local governments and departments;
 - . Telecom staff members;
 - . Members of Parliament and political parties;
 - . public interest and community groups;
 - . individuals.
- 9.5 Some 143 public written submissions were received. An alphabetical list of those who made submissions is at Attachment A. A number of confidential submissions were also received.

- 9.6 Public submissions were placed on display for inspection in the offices of the Department of Communications in all capital cities and Canberra. Public notices were placed in newspapers in the appropriate cities providing details of public access procedures. Those who had forwarded submissions were advised that the Committee would accept supplementary written material in amplification of points made in submissions or in comment on issues raised in other written submissions, subject to the material or comment being received before completion of the Committee's public hearing schedule. A significant number of those who had made submissions used this opportunity to provide further information to the Committee.

Public hearings and meetings

- 9.7 The Committee conducted a program of public hearings in March, April and May 1982. Hearings were held in Melbourne, Sydney, Adelaide, Brisbane and Broken Hill.
- 9.8 Public hearings were open and informal and not subject to legal rules of evidence. Proceedings were transcribed by the Commonwealth Reporting Service.
- 9.9 The Committee also conducted a series of informal discussions in Queensland and Northern Territory. Due to time constraints, Mr Davidson and Professor Karbowiak attended meetings in Queensland while Mr Dick and Mr King visited areas in Northern Territory.
- 9.10 A list of parties who attended public hearings and informal discussions is at Attachment B.
- 9.11 The Committee also held a small number of private discussions with some of those organisations and individuals who had made confidential submissions.

Visits

- 9.12 Members of the Committee visited various locations as part of their examination. These included:
- . the School of the Air in Katherine;
 - . Royal Flying Doctor Service bases in Broken Hill and Mount Isa.
- 9.13 Members also visited a large number of Telecom offices and installations throughout Australia in order to obtain first-hand information on Telecom's administration and operations.

ALPHABETICAL LIST OF SUBMISSIONS

<u>ORGANISATION OR INDIVIDUAL</u>	<u>ADDRESS</u>	<u>STATE</u>
Administrative and Clerical Officers' Association; Australian Postal and Telecommunications Union; Australian Public Service Association (Fourth Division Officers); Australian Telephone and Phonogram Officers' Association; Professional Officers' Association, Australian Public Association of Draughting, Supervisory and Technical Employees; Telecommunications, Traffic and Supervisory Officers' Association	Sydney	NSW
Administrative and Clerical Officers' Association and Australian Public Service Association (Fourth Division Officers), Joint Section Committee, Australian Bureau of Statistics	Belconnen	ACT
Albury-Wodonga Telecommunications	Wodonga	Vic
Alexander, A D (on behalf of a number of telephone subscribers in Central Western	Barcaldine	Qld
Amalgamated Wireless (Australasia)	Sydney	NSW
Association of Professional Engineers, Australia	Melbourne	Vic
Australian Advisory Council on Bibliographic Services (also on behalf the Library Association of Australia)	Parkville	Vic
Australian Associated Press Pty Ltd	Sydney	NSW
Australian Association of Occupational Therapists	Camperdown	NSW
Australian Broadcasting Commission	Sydney	NSW
Australian Capital Television Pty	Watson	ACT
Australian Computer Equipment Suppliers' Association Limited	Canberra	ACT

<u>ORGANISATION OR INDIVIDUAL</u>	<u>ADDRESS</u>	<u>STATE</u>
Australian Computer Society Incorporated	St Lucia	Qld
Australian Consumers' Association	Chippendale	NSW
Australian Council of Trade Unions	Melbourne	Vic
Australian Electronics Industry Association	Sydney	NSW
Australian Federation of Consumer Organizations Inc	Manuka	ACT
Australian Labor Party	Canberra	ACT
Australian Labor Party Castlemaine Branch	Campbells Creek	Vic
Australian Labor Party Chandler Branch	Noble Park	Vic
Australian Labor Party Oakleigh Branch	Murrumbeena	Vic
Australian Labor Party Rye Branch	McCrae	Vic
Australian Labor Party Highett/West Moorabbin Branch	Moorabbin	Vic
Australian Mutual Provident Society	Sydney	NSW
Australian Postal Commission	Carlton South	Vic
Australian Telecommunications Commission	Melbourne	Vic
Australian Telecommunications Consultants Association	Fisher	ACT
Australian Telecommunications Employees Association	Melbourne	Vic
Australian Telecommunications Users Group	Sydney	NSW
Bambling, P J J	Dingo	Qld
Bell Telephone & Communications Systems Pty Ltd	Sydney	NSW
Bishop, A W	Lawson	NSW
Bologna, F	Bundamba	Qld

<u>ORGANISATION OR INDIVIDUAL</u>	<u>ADDRESS</u>	<u>STATE</u>
Brisbane Chamber of Commerce	Brisbane	Qld
Bureau of Meteorology	Melbourne	Vic
Burke, J P	Toora	Vic
Business Telecommunications Services Pty Limited	Sydney	NSW
Capital Communications	Willoughby	NSW
Caskey, J D	Condobolin	NSW
Chamber of Manufactures of New South Wales	Sydney	NSW
Christian Television Association	Adelaide	SA
City of Hamilton Industrial Promotion Committee	Hamilton	Vic
Cochrane, D	Heckenberg	NSW
Colonial Mutual Life Assurance Society Limited	Melbourne	Vic
Committee Investigating Telecom Accounts	Wollongong	NSW
Commonwealth Press Union, Australian Section	Sydney	NSW
Communications Facilities Pty Ltd	Sydney	NSW
Confederation of Australian Industry	Canberra	ACT
Council of the City of Ararat	Ararat	Vic
Council of the City of Keilor	Keilor	Vic
Council of the Shire of Benalla	Benalla	Vic
Council of the Shire of Burke	Burketown	Qld
Council of the Shire of Kerang	Kerang	Vic
Council of the Shire of Wentworth	Wentworth	NSW
Council of the Shire of Woorayl	Leongatha	Vic
Council of the Shire of Wycheproof	Wycheproof	Vic

<u>ORGANISATION OR INDIVIDUAL</u>	<u>ADDRESS</u>	<u>STATE</u>
Council of the Town of Stawell	Stawell	Vic
Country Women's Association of NSW, Condobolin Branch	Condobolin	NSW
CSR Limited	Sydney	NSW
Datapoint Corporation Australia	North Sydney	NSW
Datec Pty Ltd	Sydney	NSW
De Boer, J	Sydney	NSW
Denis J Morgan & Associates	West Ryde	NSW
Department of Communications	Belconnen	ACT
Department of Finance	Parkes	ACT
Department of Harbours and Marine	Brisbane	Qld
Department of Industry and Commerce	Canberra	ACT
Dick Smith Electronics Pty Ltd	North Ryde	NSW
Donald, G	Melton	Vic
Duckett, S J	Fairfield	Vic
Everingham, D MHR	Canberra	ACT
Federation of Australian Commercial Television Stations	Sydney	NSW
Fisher, P S, MHR (on behalf of Swan Hill Taxi Cab Company)	Swan Hill	Vic
Frochter, H	Dianella	WA
Glossa Communication	Burwood	NSW
Goodyear Tyre & Rubber Co. (Australia) Limited	Sydney	NSW
Gough, R	Kew	Vic
Grace Bros Holdings Limited	Broadway	NSW
Herald and Weekly Times Limited	Melbourne	Vic
Hill, C	Mt Pleasant	WA

<u>ORGANISATION OR INDIVIDUAL</u>	<u>ADDRESS</u>	<u>STATE</u>
IBM Australia Limited	Sydney	NSW
Information Retrieval Services	Melbourne	Vic
Institution of Radio and Electronics Engineers Australia	Sydney	NSW
Interstate Police Communications Co-ordination Committee	Adelaide	SA
Isolated Children's Parents' Association	Talwood	Qld
Kirk, K	Hope Valley	SA
Kitto, K M S	Buderim	Qld
Langdale, J V	North Ryde	NSW
Lello, K	Hobart	Tas
Liddle, M	South Hedland	WA
Life Insurance Federation of Australia	Melbourne	Vic
Livestock & Grain Producers' Association of New South Wales	Sydney	NSW
L M Ericsson Pty Ltd	Broadmeadows	Vic
McLean, D J	Klemzig	SA
Max Christmas & Associates	fers Paradise	Qld
Melbourne Chamber of Commerce	Melbourne	Vic
Morris Productions Pty Limited	Campsie	NSW
National Library of Australia	Canberra	ACT
New South Wales Government	Sydney	NSW
News Corporation Limited	Sydney	NSW
North Broken Hill Limited	Broken Hill	NSW
Northern Territory Government	Darwin	NT
Office Equipment Industry Association of Australia Limited	North Sydney	NSW

<u>ORGANISATION OR INDIVIDUAL</u>	<u>ADDRESS</u>	<u>STATE</u>
Parry, S J	Lyons	ACT
Peoples Association Monitoring Communications	Bayswater	Vic
Primmer, Senator C G, (on behalf of Bendigo City Council)	Warrnambool	Vic
Professional Officers' Association	South Melbourne	Vic
Public Broadcasting Association of Australia	Sydney	NSW
Qantas Airways Limited	Sydney	NSW
Quandem Telecommunications	Kew	Vic
Queensland Government	Brisbane	Qld
Queensland Graingrowers Association	Toowoomba	Qld
Roberts, B	Port Pirie	SA
Robertson, R C	Scarborough	WA
Robinson, I G	Darwin	NT
Royal Australian Planning Institute NSW Division	North Sydney	NSW
Royal Flying Doctor Service of Federal Council	Sydney	NSW
Royal Flying Doctor Service of NSW Section	Sydney	NSW
Rupert Public Interest Movement Inc	Dickson	ACT
Rural Telephone Subscribers'	Nebo	Qld
Samuel, A R	Melbourne	Vic
Shell Australia Limited	Melbourne	Vic
South Australian Country Women's Association Inc	Kent Town	SA
South Australian Government	Adelaide	SA
Standard Telephones and Cables Pty	Alexandria	NSW

<u>ORGANISATION OR INDIVIDUAL</u>	<u>ADDRESS</u>	<u>STATE</u>
Standards Association of Australia	North Sydney	NSW
Swan Television & Radio Broadcasters Limited	Tuart Hill	WA
Sydney Chamber of Commerce	Sydney	NSW
T R Services Pty Ltd	Chatswood	NSW
Telecommunication Technical Officers Association, NSW Branch	Milsons Point	NSW
Telephone Recorded Information of Australia	South Perth	WA
Totalizator Agency Board of NSW	Sydney	NSW
Totalizator Agency Board of Victoria (with and on behalf of the following TAB organisations: ACT, Qld, SA, Tas, Vic, WA)	Melbourne	Vic
Treasury	Canberra	ACT
Victorian Association of Citizens Advice Bureaux	Melbourne	Vic
Victorian Consultative Committee on Social Development	Collingwood	Vic
Victorian Employers Federation	Hawthorn	Vic
Victorian Teachers' Union	Camberwell	Vic
Walladge, D E	Utakarra	WA
Weber, B	Walgett	NSW
Webster, K N	Bullcreek	WA
Withers, H	Wentworth	NSW
W M Squair & Associates (on behalf of a group of telephone subscribers north of Warren)	Dubbo	NSW

PUBLIC HEARINGS AND MEETINGS

First Session MELBOURNE 24-26 March 1982

Australian Telecommunications Commission
Australian Telecommunications Users Group
Confederation of Australian Industry
Life Insurance Federation of Australia
Albury-Wodonga Telecommunications Committee
Australian Council of Trade Unions
Australian Advisory Council on Bibliographic Services and
the Australian National Library
Australian Postal Commission
Totalizator Agency Boards of Vic, ACT, Qld, SA, Tas and WA

Second Session SYDNEY 14-15 April 1982

Australian Electronics Industry Association
Standard Telephones and Cables Pty Limited
Australian Federation of Consumer Organizations
Standards Association of Australia
Australian Labor Party
Business Telecommunications Services Pty Limited
Federation of Australian Commercial Television Stations
Australian Broadcasting Commission
QANTAS Airways Ltd
Australian Associated Press Pty Ltd and
Communications Facilities Pty Ltd

Third Session MELBOURNE 22-23 April 1982

Combined Unions including:
Administrative and Clerical Officers' Association
Australian Postal and Telecommunications Union
Australian Public Service Association
Australian Telephone and Phonogram Officers' Association
Professional Officers' Association, Australian Public Service
Association of Draughting, Supervisory and Technical Employees
Telecommunications, Traffic and Supervisory Officers'
Association
Australian Computer Equipment Suppliers' Association Ltd
L M Ericsson Pty Ltd
Victorian Consultative Committee on Social Development
Australian Telecommunications Employees Association
Shell Australia Limited
Herald & Weekly Times Limited

Fourth Session SYDNEY 28 April 1982

IBM Australia Limited
Institution of Radio and Electronics Engineers Australia
Datapoint Corporation Australia
Australian Mutual Provident Society

Fifth Session BROKEN HILL 5 May 1982

North Broken Hill Limited
W M Squair & Associates
Livestock and Grain Producers' Association of New South Wales
Royal Flying Doctor Service of Australia, NSW Section
and Federal Council

Sixth Session ADELAIDE 6 May 1982

South Australian Government
Interstate Police Communications Co-ordination Committee

Seventh Session BRISBANE 11 May 1982

Australian Computer Society Incorporated
Isolated Children's Parents' Association

Eighth Session MT ISA 12 May 1982

Rural Telephone Subscribers' Association
Richmond Branch of the National Party of Australia

Ninth Session DARWIN 12 May 1982

Northern Territory Government
Northern Territory Confederation of Industry and Commerce
National Aboriginal Conference
Northern Land Council

Tenth Session BURKETOWN 13 May 1982

Council of the Shire of Burke

Eleventh Session KATHERINE 13 May 1982

School of the Air
Katherine Town Council

Twelfth Session BLACKALL 13 May 1982

Rural Telephone Subscribers' Association
Blackall Chamber of Commerce

Thirteenth Session NHULUNBUY 14 May 1982

Nhulunbuy Corporation Ltd
Nabalco Pty Ltd