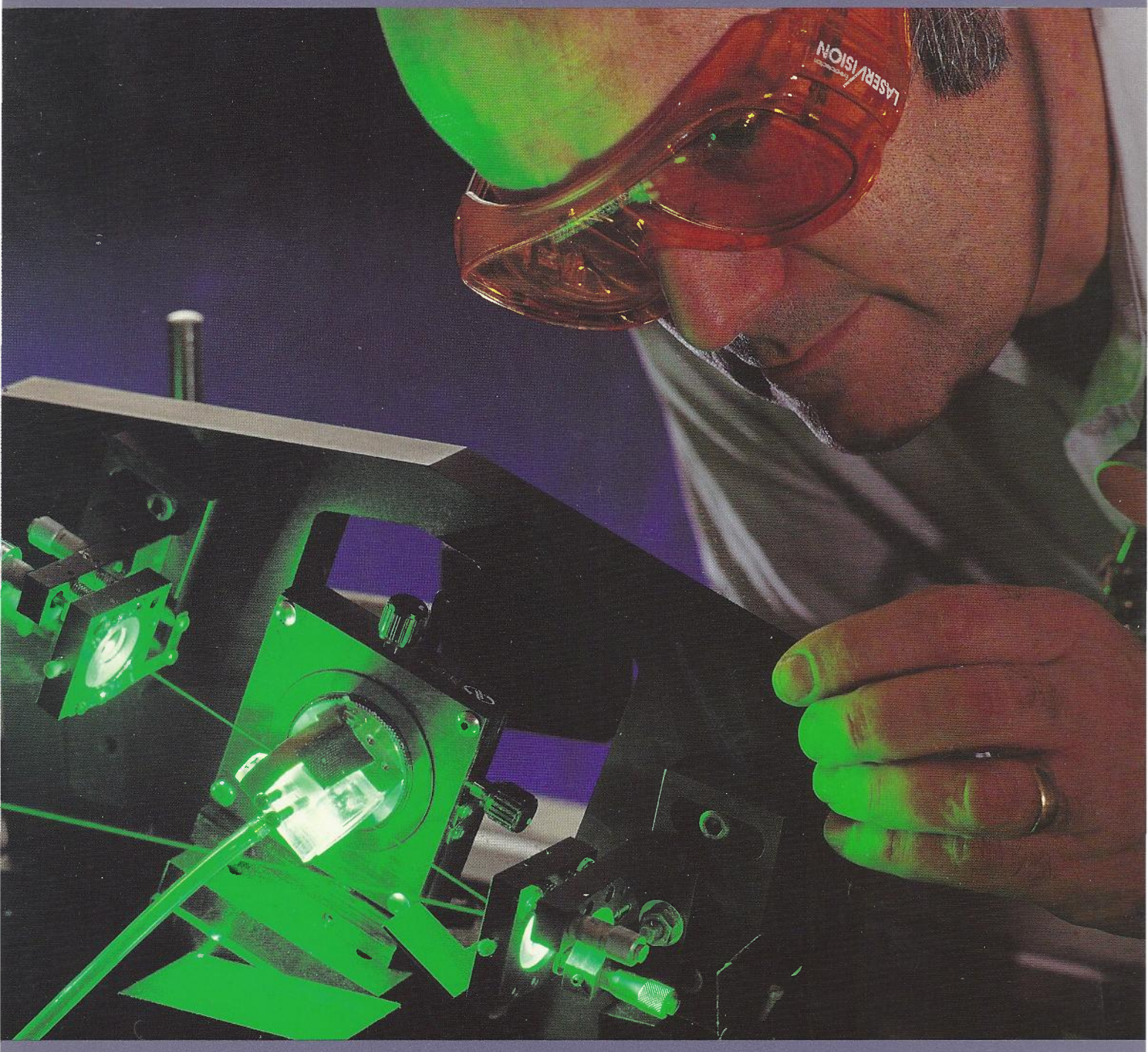
IN CONFIDENCE

RESEARCH

QUARTERLY 75



A RESEARCH UPDATE FOR TELSTRA STAFF ONLY

April 1994

FOREWORD

This quarterly publication provides brief insights into recent project activities and achievements of the Telecom Research Laboratories (TRL) that might be of wider interest or assistance to Telecom staff in the performance of their work. Information is provided under a number of headings including:

- The Telecom Research Laboratories – A Brief Overview;
- Broad Categories – by Activities;
- Research Laboratories' Information Transfer – includes Reports, Papers, Talks and Standards Contributions;
- Visitors to the Laboratories;
- Staff Contacts.

The names and telephone numbers of appropriate TRL personnel are included throughout the booklet. Interested persons are invited to make direct approaches for further information.

A.K. Mitchell
for DIRECTOR OF RESEARCH

Our Cover:

Geoff Stone using lasers to research the Wavelength Division Multiplexing technology for network switching.

The Research Quarterly has been printed on 100% Australian made Recycled paper.

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THE TELECOM RESEARCH LABORATORIES – A BRIEF OVERVIEW

Mission Statement

To provide Telecom with technological and scientific leadership, knowledge and expertise so that it can be the best provider of telecommunications and information services.

The Mission

Telecom Research Laboratories' (TRLs') mission is to provide Telecom with technological and scientific leadership, knowledge and expertise so that it can be the best provider of telecommunications and information services.

The mission is being achieved through seven key areas:

- provision of strategic advice and expert consultancy;
- value adding to Telecom's products and services;
- cost reduction of Telecom's equipment, systems and networks;
- technical support of Telecom's existing plant and equipment;
- transfer of technology to other parts of Telecom;
- increased ownership of Telecom's products through system and component design, and;
- maintenance of a highly skilled, expert and motivated workforce.

A Resource for Telecom

TRL is responsible for performing Telecom's research needs. TRL conducts a Research Programme derived from a corporately endorsed and approved Business Plan. The services that TRL provides are available to all other organisational units of Telecom.

The annual formulation of the Business Plan requires the consideration of corporate priorities and performance needs of R&D projects and related activities. This is in terms of the required "deliverables" and the resources needed to ensure their timely delivery. These processes require that specific projects are either funded by a particular "client" unit in Telecom or on a corporate basis.

Deliverables include:

- the conduct of the Research Programme in accordance with the approved Business Plan;
- the operation of Corporate Facilities (National Information Resource Centre, Intellectual Property Consultancy, and Time and Frequency Standards), and;
- the management of and participation in Corporate External R&D Programmes on behalf of Telecom.

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CUSTOMER SERVICES AND SYSTEMS

Analog Display Services Interface (ADSI)

The Analog Display Services Interface, which utilises advanced screen-based telephony, is an improved user interface which will enable the user to use existing and new telephony network features, and ADSI applications, with a context sensitive, visual interface.

The improved human interface of ADSI telephones will stimulate the usage of network features. A 5% incremental increase in the penetration of "Call Waiting" alone will generate an incremental annual revenue of $6.6M. Telecom plans to introduce over 50 network features in the near future.

ADSI applications can be developed utilising screen-based telephones for information and transaction services provided by a range of third party service providers. The screen can be used to guide customers through a transaction or to track down specific information they require. ADSI applications include electronic directories, voice-mail, home banking, home betting, home shopping, etc.

ADSI is targeted at Telecom's customers who normally use a "Telephone" to socialise and do business. It is based on an open interface and is an incremental technology to support a screen on a PSTN phone. ADSI is able to fill the product gap before the introduction of fully interactive video services. It can be developed to support the personal computer, integrate with Asymmetrical Digital Subscriber Loop (ADSL) video services, and provide Telecom with an initial market presence in advanced network services.

TRL have now completed the initial investigations of hardware and software requirements for supporting ADSI. TRL is planning to establish a laboratory demonstration to gain a more detailed understanding of the capabilities and limitations of ADSI and the technical requirements for Telecom to support ADSI. This will also enable TRL to investigate the most appropriate user interface for accessing Telecom's network features and ADSI applications.

Future work shall include the development of new ADSI applications for Telecom, such as Electronic White Pages and Voice-mail, and the integration of ADSI capabilities with other user interfaces, such as personal computers and ADSL set-top units.

(Contact: L. Law, Customer Services & Systems Branch, (03) 253 6742)

X.500 Interworking with the CED

The Corporate Electronic Directory (CED) software is based on the ITU-T X.500 series of recommendations. In order to claim full conformance with these recommendations it is necessary to be able to provide the X.500 services in an OSI environment. Until recently, the CED software has only provided the X.500 services over a communications protocol based on the Internet protocols. In early 1994, the CED project team has added the ability to provide X.500 services using the Remote Operations Service Element (ROSE). ROSE is an Application Service Element defined in the application layer of the OSI protocol stack.

The OSI protocol stack underlying the ROSE module of the CED is a commercial product, obtained from a third party vendor. The CED provides the X.500 services over the OSI stack on a Unix system only.

During June of 1994, the CED system was involved in an evaluation pilot for a potential customer in which the CED was required to interwork with third party X.500 Directory User Agents (DUAs). The customer who requested the pilot employed CSIRO as consultants to define and carry out the tests of the CED system. These tests demonstrated that the CED system conforms to the protocol requirements of the OSI environment and marked a major milestone in the development of the CED project.

During July of 1994, Telstra took part in an X.500 directory interworking pilot in Atlanta, Georgia. The pilot was hosted by Southern Company and attended by a number of X.500 system vendors. The interworking tests between these vendors' products included DUA interworking and tests of the distributed directory facilities of X.500. Although some problems did arise during the pilot, they were generally minor and were resolved quickly. The CED system was more than a match in performance compared to other systems involved in the pilot and made a very good general impression. The ability of the CED to be used as a directory for Message Handling Systems (a form of Electronic Mail) based on the ITU-T X.400 series of recommendations was also demonstrated.

The past six months have been a time of major development for the CED project and have demonstrated its ability to conform to the ITU-T X.500 directory specifications. Version 3.4 of the CED software successfully interworked with external systems provided by a number of vendors, establishing Telstra as a leader in the field of X.500 services. Additionally, Telstra's experience with the existing customer base of the CED resulted in the CED services being more readily tailored to customer requirements than other systems.

(Contact: M. Ennis, Customer Services & Systems Branch, (03) 253 6687)

Cryptology and Smart Cards Visit – May 1994

Andrew Mich participated in the Eurocrypt '94 Conference, the leading European conference on cryptology, at Perugia, May 9-12, 1994. The conference programme covered many theoretical and practical topics in communications security that are relevant to Telecom. Access to overseas security

technology is limited by export controls, thus Telecom may need to develop its own technology to ensure that its communications products and services remain secure.

At the Conference, Telecom Research Laboratories delivered a paper which was well received. The paper showed how to efficiently perform unconditionally secure authentication, and is a significant improvement on what is currently available. Such papers stimulate research in an area that should result in improvements to practical systems appearing in communication products.

Following the conference, Mr Mich visited three firms to investigate the state of the art in multi-function smart cards. These are smart cards that allow more than one application or service per card. Such cards have great potential for Telecom's future business, with increased:

- revenue, through fees from external service providers,
- customer convenience, with the customer being freed from the need to carry many cards,
- customer confidence, with the use of highly secure cryptographic algorithms,
- customer management, with billing and subscriber management being associated with one card, and
- customer service, with many new services for customers, such as home banking, home shopping, pay-TV applications, and low value cash-less transactions, such as vending machines, car parks, photocopying, and so on.

Mr Mich studied the multi-function card projects being carried out by IBM Research Laboratories in Stuttgart, by the smart card manufacturer Orga Card Systems in Paderborn, and by Europay, the Belgian operator of the Mastercard/Eurocard payment system. Talks at each firm with were held with project leaders and technical staff. The discussions ranged from the draft specifications for the multi-function cards, to operational concerns such as ownership of the card and privacy issues.

Discussions with the leaders in this field allow Telecom to gain insight into the technology trends, and help Telecom take best advantage of products on the horizon.

(Contact: A. Mich, Customer Services & Systems Branch, (03) 253 6530)

Design and Evaluation of the Helpdesk User Interface

Telecom Research Laboratories is currently designing the Helpdesk system for Mobiles Customer Service in order to provide a single front-end for customer support representatives to use when speaking to customers. The objective of designing such a system was to provide a system that would be easy to learn and use and eliminate the need to interact with different systems such as RACE and EASE during the same call.

The Human Factors Group has been working in conjunction with the AI section in the design and evaluation phase of the user interface. This collaborative process began early in the development process when the Human Factors Group was called in to advise on the requirements of the users. This early and continual focus on users ensures the interface will support the users, their work environment and the tasks they will need to carry out on the system. The Human Factors Kit's Window Design Styleguide for all Graphical User Interface Applications was also used as a guide during the design of the prototype to ensure the system was usable, consistent and cost effective.

Once a prototype of the system was designed, it was necessary to test it with a representative sample of end users. Selected users from all Australian regions were able to try out the system in their own work environment to enable us to identify potential usability problems and any design issues that were missed during the user requirements stage. This process can be seen as analogous to debugging code, where the first version of a system is refined several times before a final version is released. In this case, the testing also enabled the Human Factors Group to evaluate the usability of the system against preset goals, based on principles such as the effectiveness, flexibility and attitude of the users towards the system. These goals provide the "measuring stick" against which the design team can decide when the system is good enough.

Any usability issues identified from this testing were discussed with the AI team and solutions to problems were agreed upon. These changes are currently being implemented. The next stage will incorporate processes needed for handling Messagebank enquiries and processes currently being done by the MICA system. The Human Factors team will again participate in the user requirements and design phases for these parts of the system. Further usability testing in iterative test cycles will also be required to ensure any changes to the system do not introduce new usability problems. This process will again involve the end users of the system, which will give them an opportunity to have a direct impact on further development of the system.

The emphasis on early and continual user involvement, clear usability goals and detailed usability testing is enabling the design team to incorporate human factors issues effectively and efficiently into the project development. This early investment in time will ensure the end system will be usable for the intended users, which should decrease training time, increase productivity and eliminate the need for major overhauls of the system once it has already been developed.

(Contact: K. Burger, Customer Services & Systems Branch, (03) 253 6685).

An Explosion of Activities Related to TINA

Like it or not TINA is yet another acronym which is creeping into the lexicon of Telstra. It appears in influential strategy documents (Overall Systems Architecture 2), has been reported in the national press (The Australian, "Telstra, partners to build data highway", October 26th 1993), and is becoming familiar to senior Telstra executives. So what is TINA?

TINA stands for Telecommunications Information Networking Architecture. In a nutshell TINA provides a software architecture for telecommunications applications. So how will this help Telstra?

Telecommunications operators, such as Telstra, have traditionally built their business with the aid of two very different platforms. The first is specialised network equipment used to implement core services such as POTS (Plain Old Telephone Service), Spectrum, and AUSTPAC. The second is generic computing equipment used to implement support functions such as service activation, maintenance, and billing. These two platforms have made it difficult to integrate services and support. Couple these problems with the inherent distribution of telecommunications networks, and automation of key business processes becomes a nightmare.

To address these difficulties the TINA Consortium (TINA-C) has been formed, and is currently specifying a software architecture which includes:

- Distributed Processing Environment (DPE), and
- frameworks of re-useable objects.

How will these help?

The DPE will provide a "kernel" which allows programmers to develop service and support applications in a seamless fashion. It will include a set of "servers" which support the distributed deployment of the applications. In addition the DPE will provide a set of software development tools which will help convert specifications into implementations, simplifying the development process.

The object frameworks will specify a business model for telecommunications operators. Existing object models from ITU's Telecommunications Management Network and ISO's OSI Network Management activities are being taken into consideration. Also special care is being taken not to be too prescriptive, so that operators can still differentiate their services from their competitors (e.g. Telstra's FlexiPlans).

So what is Telstra is doing? Telstra is involved in TINA in the following ways:

- through representation in the TINA-C.
- by hosting the 5th International TINA Conference.
- by building prototype TINA systems.

TINA-C started work in January 1993 and Telstra has been a member from the outset. The consortium includes the world's major telecommunications operators and vendors, as well as key computer vendors. TINA-C has three levels of organisation and Telstra is represented in each. At the highest level, the Consortium Steering Board, Telstra is represented by Bob James (Group General Manager Strategic Development). At the next level, the Consortium Technical Committee, our representative is Peter Richardson from TRL. In the consortium's core team of researchers at Bellcore in the USA, our current representative is Alan Hopson, who recently took over from Geoff Wheeler. Both Alan and Geoff are from TRL.

From February 13th to 16th Telstra will be hosting the 5th International TINA Conference (TINA '95). This will take place at the Sheraton Towers Hotel Melbourne. The theme of the conference is "Integrating Telecommunications and Distributed Computing – from Concept to Reality". TINA '95 will include tutorials, technical presentations, demonstrations, and a video session. One feature of the conference mentioned above is the tutorials. These will provide an excellent opportunity to become acquainted with TINA, and Telstra staff are encouraged to attend. For more information on TINA '95 please contact Steve Leask (03 253 6238).

Work on prototyping TINA systems is split into three projects:

- PLATyPus (PLAtform for TINA Prototyping) is the most mature of these. Work commenced late 1992, and several milestones have already been achieved. These include the development of PLATyTools (a DPE software development tool set), and the implementation of a telecommunications service in a TINA environment. PLATyPus is the most advanced TINA experiment in the world and has made several valuable contributions to TINA-C. Work on PLATyPus is on-going.
- MSP (Multi-Services Platform) this project is a collaboration between Telstra and IBM. The first milestone is to produce a demonstration system for TINA '95, which supports video telephony. The approach is to integrate existing IBM and Telstra products using TINA concepts and principles. This project is progressing rapidly and is currently in the design phase. TRL's role in this project is to provide TINA expertise.
- The Operation Support System (OSS) Encapsulation project is currently in the planning stage. The goal is to encapsulate an existing OSS and integrate it into a TINA environment. The research value is to investigate how Telstra can migrate systems to TINA, whilst protecting its existing investment (many millions of dollars) in OSS. This project is being done in collaboration with ITG's Network Systems.

So is that it? No, possible activities just over the horizon include the commercialisation of PLATyTools by a major computer vendor, and Telstra's involvement in the TINA World Wide Demonstrations at TELECOM '95 in collaboration with others.

OK so I'm interested, how can I find out more? More information is readily available in several formats. An information pack with introductory papers can be provided, along with a 25 minute VHS PAL video. For those familiar with World Wide Web an on-line repository of documents is available to Telstra staff at "http:// www.tina.trl.oz.au/".

(Contact: S. A. Leask, Switched Networks Branch, (03) 253 6328
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TRANSMISSION NETWORKS AND STANDARDS

Assessing the Performance of the DECT Radio Technology in the Customer Access Network

Telecom is investigating the use of radio as a means for providing final distribution in the Customer Access Network (CAN). This practice involves replacing part or all of the cabling from the customer through to the exchange with a radio link and has the potential to reduce costs in situations where laying cables is difficult, or where rapid installation is required.

With a wireless connection, two types of customer access become possible: fixed and portable. In the fixed access scenario, the customer antenna is fixed to the house and connected to a standard telephone via in-house wiring. High gain directional antennas can be used to improve the gain of these fixed systems.

In the portable access scenario the customer unit is a portable handset, which could be used indoors, outdoors, or indeed anywhere in the coverage area. Low gain omni-directional antennas are essential for portable access.

A number of recently developed high capacity radio technologies are potentially suitable for these applications. One such technology is 'Digital European Cordless Telecommunications' (DECT) , which has been designed for use in indoor and outdoor microcell environments. It features simple, low cost customer and base station equipment, and provides a communications quality similar to that of a standard telephone.

Telecom Research Laboratories have recently evaluated the performance of DECT in the suburban microcell environment, with particular emphasis on determining the relative merits of different types of customer and base station antennas. The work involved field measurements to characterise radio propagation conditions, and software simulations to estimate the performance of a network of DECT links.

The TRL wideband channel sounder was used to characterise propagation conditions experienced in a typical suburban area. Two types of antennas were used in the experiments: an omni-directional antenna, and a directional antenna with a 3dB beamwidth of 64 degrees. Analysis of the measurements enabled pathloss, shadowing and fading models to be generated. These combine to describe the spatial variations in signal power.

A computer simulation was then used to estimate transmission performance for an isolated DECT radio link operating over the measured radio channels. Large numbers of simulation runs allowed a statistical model of isolated radio link performance to be compiled for each combination of antennas and customer access type.

A network simulation was then used to estimate the performance of a network of such radio links for fixed customer access. This simulation incorporated the pathloss, shadowing and fading models obtained from the field measurements, and the radio link models resulting from the transmission simulation. The network consisted of 144 base stations arranged in either a rectangular or triangular grid, with calls randomly placed in the service area. Traffic levels, base station spacing and antenna types were among the parameters which could be varied. Statistics such as probability of call blocking and dropping were used to form an overall 'Grade of Service' performance figure for each network configuration.

Outputs of this work include:

- Estimates of base station spacings achievable with various traffic levels, for different customer antennas and access types. In the measured environment, ranges of over a kilometer were achievable with omni-directional antennas.
- Insights into the functioning of macro diversity and antenna diversity. In particular, the studies have shown that omni-directional antennas can outperform directional antennas under certain circumstances.
- Simulation tools which can be used in further studies of radio network optimisation.

This study will form a basis for future experimental investigation of the DECT technology for these applications, as well as facillitate CAN radio network design.

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Optical Fibre Reaches Residential Customer Premises

A research program begun over ten years ago in the Optical Networks Section reached a significant milestone in March this year when one hundred and twenty customers in the Wollongong suburb of Cordeaux Heights began using fibre-to-the-customer-premises (FTTCP) equipment for telephone calls. These customers are connected to one of the most advanced optical fibre systems to have been deployed in customer access networks anywhere in the world. The equipment is designed to deliver telephony, ISDN (basic and primary rate), and 20 channels of distributive video over an integrated delivery platform. The platform uses a passive optical network architecture very similar to one proposed by staff in the Optical Networks Section, and implemented in the MACNET laboratory demonstration seven years ago.

The equipment for the trial was designed and built by NEC Australia under contract from Access and Transmission Technology in Network products. Many groups in Telecom have been involved in the project from specification through testing and installation to operation. The role of TRL has been primarily in testing the prototype and production equipment to ensure that it would operate successfully in the field. Many aspects of the overall system design, particularly in the software for network management and control, were substantially improved in response to feedback from TRL. A notable feature of the project has been the close co-operation between the NEC design team, the people in Network Products who managed the project, the field staff in Wollongong, and the evaluation team at TRL.

The trial, it should be stressed, is essentially a technology trial, to gain experience in the installation and operation of optical fibre systems in the CAN. The first part of this aim has been achieved, in that a number lessons have been learned in the process of specifying, designing, installing and commissioning this equipment. In particular, it has become very clear that software design is critical to the success of a complex transmission system such as this, because of the amount of software involved. The equipment itself makes extensive use of EPROMs to provide features such as flexible service allocation and comprehensive alarm monitoring, while the network management unit must support the maintenance of an extensive database of customer information, network configuration, service allocation and alarm status. From an operational perspective this software is a critical component in determining the reliability of the services being provided. In fact, all of the downtime of services in the early weeks of the trial was caused by software faults; there have not yet been any hardware failures in the field. A report summarising the lessons learned from the trial is currently being written.

It is planned that the trial will continue for two years. It is expected that in that time most of the important operational issues will become apparent, and at the end of the trial Telecom will have gained a considerable amount of valuable practical experience of the advantages and disadvantages of using optical fibre in the CAN.

(Contact: Greg Lampard, Transmission Networks and Standards Branch, (03) 253 6432)

TELECOMMUNICATION SCIENCE AND TECHNOLOGY

Powering an Optical CAN

The basic telephone service (POTS) has traditionally been powered via the copper pair from the local exchange. With the rapid deployment of new technologies such as optical fibre in the customer access network and the provision of the so-called "information super highway" there is an increasing need for local powering of equipment in the CAN.

The obvious source of power for CAN equipment is the local electricity grid, but it suffers planned outages for maintenance work and unplanned loss of supply due to equipment failure, accidents and natural phenomena, such as, storms. To provide an acceptable level of communication system availability, battery storage is required to power CAN equipment during AC outages.

Part of the work on powering an optical CAN has been a study of AC power outage statistics in the major Australian capital cities and the resulting implications for battery sizing and selection. Where suitable data is available it can be used to assist in both the choice of power architecture for powering, and the dimensioning of aspects such as, the battery reserve required to provide a specified power system availability. The results can have a major bearing on life cycle costing of the equipment, as do other factors such as the operating environment.

A model has been developed at TRL to estimate the reliability of a future CAN network using some of the statistics available for the Melbourne area. It is apparent that without back-up power to the remote units in the CAN, local AC mains failure would be the major contributor to system down-time.

(Contact: I. Muirhead, Telecommunication Science & Technology Branch, (03) 253 6542)

Evaluation of Moisture Resistant Connectors (MRC's)

The introduction of the sealed CAN is aimed at minimising the ingress of moisture into a joint enclosure and it is expected that the occurrence of moisture-related faults in cable connections will decline. However, complete implementation of the sealed CAN will take considerable time.

In the meantime the poor performance of moisture resistant connectors (MRCs), particularly in damp environments, has been a major problem in the field.

Two factors which may influence MRC performance have been evaluated:

- the reliability of connector terminations onto corroded copper conductors.
- the performance of grease filling compounds with regard to insulation type, wire size and connector body.

Many kilometres of air-core cable is currently in use within the network. Some of this cable contains corroded copper wires due to the ingress of water. The practice of re-making joints in fault prone areas often means corroded conductors are terminated with new MRCs. The reliability of these terminations depends upon the ability of the insulation displacement tines to displace the corrosion deposits and/or tarnish films on the wire during termination. The costly alternative to re-making joints is cable replacement.

The quality of these reterminations on corroded wire has been evaluated by measuring the contact resistance of joints after exposure to various environmental conditions, and by careful examination of the contact surface of the tine and wire. The tests showed that corroded cable can be reliably terminated with new MRCs.

It is generally acknowledged that MRCs in a continuously damp environment or completely immersed in water will eventually become faulty and cause 'foreign battery' to appear on the conductors. This is due to a low insulation resistance between the joint and the surrounding water. The performance of MRCs from three manufacturers was evaluated using wire with two types of insulation, and three wire gauges. Insulation resistance values were measured after immersion in salt solution for 24 days. The water permeation properties and physical integrity of several grease filling compounds were also examined.

The standard grease, recommended by TRL, gave excellent results and was superior in performance to other grease filling compounds. The type of insulation, and the diameter of the copper wire, did not affect the insulation resistance. Also there was no significant difference in the insulation resistance properties of MRCs with long entry ports compared with the standard MRC with short entry ports using the same grease filling compound.

(Contact: John Godfrey, Telecommunication Science & Technology Branch, (03) 253 6552)

Optical Component Problems

The reliability of Telstra's physical infrastructure is critical to its business success. This is especially so in equipment such as core transmission systems where the "revenue streams" at being handled are substantial. Consequently, it is important to know about and understand the elements making up key equipment so that reliability problems can be avoided, or, if not avoided then quickly overcome. Sometimes the weakest part of a system is not the most complex hard-to-make part but a seemingly ordinary aspect.

Recently, two components from optical transmission equipment, a laser diode module and an avalanche photodiode detector, were found to be failing due to loss of alignment within their module package. In both cases the optical output was focussed by a lens, and the alignment tolerances were quite small (around 1 μm for the laser and < 100 μm for the detector). In both cases the failure mechanism was identified as creep of solder used to hold parts of the module in alignment. The mechanism of solder creep, where soft solders can deform over time when under stress, has been known since at least the 1930s. Both designs attempted to minimise non-symmetrical stress on the solder joints to reduce the effect of solder creep. However, it is clear that it is not easy to produce a design which is stable to micron tolerances over a period of years, particularly when the package is subject to temperature variations, when using a deformable material. Accordingly, the failure rate of these components is expected to increase over time.

(Contact: Sandra Charles, Telecommunication Science and Technology Branch, (03) 253 6616)

TELECOMMUNICATION SCIENCE AND TECHNOLOGY

TRL INFORMATION TRANSFER

During the last quarter, the TRL staff have published or presented details of the progress and noteworthy achievements of various projects and activities. These publications comprise both official Telecom publications (in the form of Research Laboratories Reports and Branch Papers) and papers submitted for external publication in learned journals or presented to outside organisations (including professional institutions and societies).

Some of the listed Research Laboratories Reports and Branch Papers are confidential and restricted to appropriate areas within Telecom are indicated by the '*' included in the publication number. Only the titles of such publications are included hereafter.

Reports and Branch Papers 'for general use' are available on request and are also listed with abstracts or summaries of the contents of such publications appended after the lists.

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RESEARCH LABORATORIES REPORTS

8302* – The Stress Corrosion Susceptibility Factor (n) – A Comparison of Three Fibres.
Ostojic, P. & Lai, I.

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RESEARCH LABORATORIES BRANCH PAPERS

TRANSMISSION NETWORKS AND STANDARDS

TNS0359 – 'Calibration of Optical Spectrum Analysers and Evaluation of Wavelength'.
Rodney W. Pyke

TNS0360 – 'Application of Logarithmic or Linear Corrections, and Uncertainties for Optical Power Measurements'.
Rodney W. Pyke

TNS0362 – 'Wander and Jitter at SDH/PDH Boundaries'.
Eugene Zilberg & Duncan Gibson

TNS0363 – 'Evaluation of a Celwave PD220-7 Omnidirectional Base Station Antenna'.
Doug Farr & Brendan Edwards

TNS0364 – 'Investigatory Trip To Siemens – Optical Amplifier Development Status For Bass Strait'.
Frank Ruhl

TELECOMMUNICATION SCIENCE AND TECHNOLOGY

Component Analysis Report:

CAR94/001* – 'Reliability Evaluation of Memory Devices For The CLI Report'.
Thornton R.

CAR94/002* – 'Effects Of A Gas Filled Protector Operating On A TF200'.
Cranston B.

CAR94/004* – 'Filter And Surge Diverter Overcurrent Tests'.
Bondarenko E.

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Scott K., Petkovic N., Rogers T.

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Petkovic N.

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Parkinson S.

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Petkovic N., Liu C. and Rogers, T.

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Scott, K.

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'The Impact of Vehicular scattering on Mobile Communications', IEEE VTC 1994 Conference, June 7-10, Stockholm, 1994.
Millott L.J.

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Experimental Study of An S-shaped Two-coupler Optical Fiber Ring Resonator, Optical Engineering, USA, April 1994, Vol.33, No.4.
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Leech, P.W. Heazle, K.D. Deacon, G.B Dickson, R.S. West, B.O. Faith, M.E.* Frost, C.R.**

An Automated Test System for Fault Location in VLSI Circuits, 1994 IEEE International Reliability Physics Symposium, San Jose California, USA, April '94.
Rogers, T.P. Molnar, S.

Design of Compatible Glass Compositions for Heavy Metal Fluoride Fibres, 9th International Symposium on Non-oxide Glasses, Zhejiang University, Hangzhou, China, May 24-28, 1994.
Rowe, R.S. Rosman, G. Byrne, C.G.

The Role of GaF_3 in High NA Heavy Metal Fluoride Fibres, Presentation at 9th International Symposium on Non-oxide Glasses, Zhejiang University, Hangzhou, China, May 24-28, 1994.
Rowe, R.S. Rosman, G. Byrne, C.G

** denotes TRL Professionals. Other contributors are from Monash University Chemistry Department.*

RESEARCH LABORATORIES PAPERS PRESENTED/ PUBLISHED

ANSI T1E1.4 Meeting 6-10 June 1994

'Impulsive Noise Events of Relatively Long Duration'. T1E1.4/94-120.
Davies, W.A., Cole, A., Peacock, S., Potter, P., Crosby, D., Leach, K., Frigo, J., Karlson, P., Mendoza, P., Zidlicky, B., and McBride, A.

STANDARDS CONTRIBUTIONS

BIBLIOGRAPHIES

In the recent quarter the National Information Resource Centre has conducted literature searches to compile bibliographies on the following topics:

Clayton NIRC

94/111	Security in remote access networks
94/115	Electronic document management
94/0160	Sales force recruitment and assessment, 1992-
94/190	Intelligent software agents

Melbourne NIRC

445/94	Mass customisation
451/94	Multimedia applications for residential customers/small business
454/94	TQM culture
468/94	Broadband applications in manufacturing
469/94	Interactive voice response units/ continuous speech recognition
482/94	Information superhighway – update
513/94	Quality function deployment
514/94	Six Sigma
611/94	Commercialisation of the Internet
618/94	Customer service in service industries
661/94	Telephone calling behaviour
741/94	Fax-on-demand
797/94	Market segmentation – update
862/94	Customer service on the phone

Sydney NIRC

228/94	Team empowerment
224/94	Radar cross section
225/94	Smart phone and home banking
219/94	Interactive/online games and multimedia
176/94	Virtual phones and voice mail
174/94	Cable & Wireless managed network services
173/94	Interactive TV
164/94	Phonecards
168/94	Payment delivery systems
246/94	IDD and tariffs
243/94	Hot desking

To obtain a copy of a bibliography please contact the NIRC office which produced the bibliography. Full contact details are given below.

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VISITORS TO TRL

A wide variety of people from within Telecom and from external organisations visit the Laboratories, either as individuals or in groups. The visitors include executives, clients, researchers and officials of government and private organisations, and the purposes of such visits are to facilitate information transfer relating to the management and outcomes of R&D activities of mutual interest. Some notable visitors during the last quarter were:

April

Department of Communications and the Arts
Neville Stevens, Secretary.

European Communities Technology Delegation
Dr Loretta Anania, Scientific Officer, Directorate Generall III (Industry); Dr Silvano Gregoli, Counsellor, EC Delegation, Canberra.

May

DB Bain Group Services
Colin Wright, Network Engineering Director; Craig Castle, Senior Communications Manager; Wayne Houghton, Communications Manager.

Australian Broadcasting Corporation
Rosemary Sinclair, Director Strategic Development; Wal Lyneham, General Manager, Corporate Services; Spencer Lieung, National Manager, Technology Research & Development; Dilip Jadeja, Manager, Strategic Technology Development; Warwick Purdy, Acting Controller, Communications Services; Colin Griffith, Senior Policy Advisor, Corporate, Planning & Policy; David Swan, Voice Network Manager; Terry Cutler,Cutler & Co.; Dr Roger Buckeridge, Cutler & Co. accompanied by David Havyatt, General Manager, Media Account Group; Judi Tucker, Account Executive; Barry Ihle, Communications Consultant.

Seven Network
Craig Woolven, Network Telecommunications Manager; Colin Wright, Network Engineering Director accompanied by Kathy Curtis, Account Executive; David Chan, Communications Consultant; Barry Ihle, Communications Consultant.

Suncorp
Paul Harvey, Network Services Manager accompanied by Steve Tyrrell, Account Executive.

Westpac Bank
Jeff Mitchell, Chief Manager Customer Service; Gordon Herriott, Manager Westpac Communications Services, Jim Stabback, Manager Customer Service Centre Implementation, Branch Re-engineering Project accompanied by Chris Kavanagh, National Service Manager.

Monash University, Gippsland Campus
George Joyce, Andrew Winter, Jenny Vandersteen, Brian Stark, Andrew Border, Jenny Hill, Russell Frances, Hayden Gill, Chris Body, Bruce Bremner, Clive Murden, Mike Hall from Student Administration and Distance Education Centre accompanied by Brendan Gibbs, Regional Account Manager, Corporate & Government.

Monash University
36 Electrical Engineering Students accompanied by Moshe Zukerman, TRL.

The Australian
Mark Furness, Journalist accompanied by Tim Lloyd-George, Senior Media Relations Officer.

PRPR Pty Ltd/Telecom Technology Pty Ltd
Pauline Robson, Director; Jo Fenwick, Writer; Catherine Newell PR Officer, Telecom Technology Pty Ltd.

Melbourne University Electrical Engineering Department
Dr Mei Mei, Jason Choong, Steve Terrill, JamieEvans, Jennifer Yates, Senaka Munasinghe, Gamini Senarath, Vinod Mirchandani, Mike Cahill, Salaleem Khusrao, Aamer Ahmed, David Chan, Navid Rashid.

Ministry of Information Malaysia
Dato Fauzi Bin Abdul Rahman, Parliamentary Secretary; Mohan, Ministry; Vin D'Cruz (Malaysian/Australian) accompanied by Errol Amerasekers, Business Development Manager, Malaysia.

June

BP Australia
Joe Lacandro, Business Systems Manager accompanied by Peter Alkemade, Communications Consultant, Julie Marriage Corporate & Government Business, Corporate Account Assistant.

Ballarat University, Electrical & Electronic Engineering Department
Colin Kline with final year students Rajan Bharrachan, Christine Damen, Ewan Davis, Heath Harry, Lin Lam, Mark Lampard, Leigh Mellington, Stuart Sellars.

RAAF College
Flt Lt Jamie Boyd with Flg Officers – Brian Russell, Rob Bell, Gary Dunne, Steve Mitchell, Kathy Bell, Carolyn Chaplin, Alan Dundas, Glen Gurney, Ashley Howell, Boris Novak, Hugh Webster, Andrew Hanlon, Brigid San.

CableLabs
Craig Tanner accompanied by Bob James, Group General Manager, Strategic Development.

Heatherdale Christian College Year 11 Science Students
24 students and staff member.

VISITORS TO TRL

National Directory Services

Astrid Di Carlo, Manager Communications, HR; Anita Coia, Communications Co-ordinator, HR.

Advance Bank

Kevin Abrahamson, General Manager, Group Services; Kevin McNamara, Senior Chief Manager, Information Services Division; Bruce Sergent, Chief Manager, Systems; Terry Bird. Senior Manager Telecommunications accompanied by Account Executive to Advance Bank.

University of the Third Age Science & Technology Group

Brian Graham, Acting Tutor with Phyll Burke, Walter Schuetz, George Cody, Bob MacLoy, Ursula Rosner, Marie Goolleoski, David Watson, Bruce Peggie, Doug Young, John Slee and Ted Bramley (Students).

Lend Lease

Wayne Dyball, Manager ISD; Owen Price, Manager Emerging Technology; Greg Fisher, Manager Data Network Centre, Fiona Moore, National Manager Learning; Catherine Tang, ETG Project Manager; Hung Le, System Team Leader; Brian Little, Communications Analyst; Richard Homefield, Senior Operator accompanied by Michael Ash, Account Executive.

Telecommunications Industry Ombudsman

Warwick Smith with Grant Campbell, Wendy Maloney, Mike Tapper, Rose Searby, Christina Altamore, Sally Williams, accompanied by Ian Swinson, Business Protection, Mobiles.

Commonwealth Bank

Sally O'Neil, Chief Manager, Customer Services; Angela Tsagris, Assistant Analyst accompanied by Andrew Charitou Senior Account Executive; Mark Richards, Communications Consultant.

TRL's Organisation

TRL is headed by the Director of Research and comprises an Executive Group, the National Information Resource Centre and nine Branches. Details of the upper structure of TRL are given in the following table.

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– Standards & Regulatory Strategy	SRS	Peter Darling	634 8799	
• Group Manager:				
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– General Administration Staff		Erryn Ford	3 6611	e.ford@trl.oz.au

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