Clemens William ("Clem") Pratt

2 July 1936–16 January 2025

Leith H. Campbell
TelSoc Member

Abstract: This paper is an appreciation of the life and contributions of Dr C. W. (Clem) Pratt, who died in January 2025. He had a 38-year career with the PMG's Department and its successors, working first on traffic engineering and then expanding his career and interests into computing and operational support systems. He was a Distinguished Fellow of the Telecommunications Society of Australia, having been Vice-Chairman of the National Board for 17 years. He was active in the Statistical Society of Australia, serving as national Chairman for one term. He was a long-term member of the Advisory Council for the International Teletraffic Congresses and an influential educator on teletraffic engineering and related statistical methods.

Keywords: International Teletraffic Congress, Telecommunications Society of Australia, History of Australian Telecommunications

Introduction

Clem Pratt in 1982 (Source: *Telecommunication Journal of Australia*, *32*(3), 230)

Dr Clem Pratt, who has died at the age of 88, was a long-standing promoter of teletraffic engineering and statistical knowledge applied to telecommunications management and planning. He served as the Australian representative on the International Advisory Council of the International Teletraffic Congresses from 1970 to 2005 and received a Lifetime Achievement Award from that Council in 2005. He was President of the Statistical Society of Australia for 1969–1971. He served as Vice-Chairman of the National Board of the Telecommunications Society of Australia from 1982 to 1999. He

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was a member of the Editorial Board of the journal *Australian Telecommunication Research* from 1974 to 1995.

Early Life and Education

Clemens William Pratt (2 July 1936–16 January 2025) was born in Albury, NSW, the second of four children of Malcolm and Olga Pratt. The family later relocated to Dalby, Queensland. Clem attended Dalby State School, Concordia Memorial College in Toowoomba and Brisbane High School, where he was Dux in 1954 (Schuller, 2025).

Like many aspiring electrical engineers of the period, he joined the Post-Master General's Department (PMG) in 1955 as a cadet engineer in order to finance his university studies. He remained with the PMG and its successor organizations for 38 years before taking early retirement in 1993.

He attended the University of Queensland and graduated in 1959 as a Bachelor of Engineering (Electrical) with First Class Honours and a University Medal for outstanding merit. He continued his studies at the University of Queensland, graduating with a Bachelor of Science in 1962 and a Master of Engineering Science in 1961. His Master's thesis title was "Telephone Traffic and Crossbar Switching". The technical interests that would guide his career were already apparent.

The Public Service Board (on the recommendation of the PMG) awarded him a two-year scholarship to undertake postgraduate studies and he decided to enrol for a Ph.D. at Birkbeck College, University of London, under the supervision of David Cox (later Sir David Cox), then a rising star as a statistician and educator. It was ambitious to attempt to complete a doctorate by research in only two years, but he succeeded, graduating in 1963. His thesis was entitled *Congestion Problems in Automatic and Semi-automatic Telephone Exchanges*.

Clem had married Lois Richards in May 1959 in Gympie, Queensland. After the sojourn in London, they returned to Melbourne and made their long-term home there. Their three children were born there between 1965 and 1970 (Schuller, 2025).

His Career in the PMG

While Clem was studying, he was also contributing to projects in the PMG. After his undergraduate degree, he was promoted to Engineer Grade 1 and participated in some transmission optimisation studies. By 1961, he was looking at alternative routing design procedures. His clear expertise in mathematical methods was being recognised.

After his Ph.D. research in London, he joined the Victorian Planning Branch where he worked on the planning of the 21 exchanges in the Melbourne metropolitan network. He undertook

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various studies on economical or optimised designs. By 1966, he was an Engineer Class 3, Traffic Research (Pratt, 1993), using his knowledge of queuing theory and simulation. Importantly for his future career, it was becoming clear that future planning and design procedures would be increasingly computerised and Clem was formulating requirements for suitable computer programs. He did step back to earlier manual calculations, however, to advise engineers on how to do compound growth calculations on a slide rule (Pratt, 1968a).

At this time, Clem developed a two-week residential course in Traffic Engineering. This proved to be both timely and popular. As the final (and revised) published version of the course notes described it:

> In May 1967 the first Australian course in telephone traffic engineering was held in Kalorama, Victoria. This event was of special significance and marked the first venture by the Postmaster General's Department into residential training in an advanced technological field. Traffic engineering was chosen … because of its vital importance in the rapid expansion of telecommunications services using modern automatic switching systems.
>
> The course proved to be very successful and was repeated virtually unchanged in 1968, 1971, 1973 and 1974. The original course manual, prepared by Dr C. W. Pratt, who was the director of studies and principal lecturer throughout this period, was published in 1967 and received wide distribution in Australia and overseas (Telecom Australia, 1978, Foreword).

By 1972, he was Engineer Class 5, Traffic Engineering Section, and head of Traffic Engineering in Headquarters (Pratt, 1993). Here, he was a major contributor to a project to collect and analyse relevant measurements of network traffic, so that the data could be used for network management and planning. The project was called the Traffic Data Equipment project, because new equipment was installed in telephone exchanges, but the processing of this data by computer, the "TRA Application", was equally important. Clem contributed to both these aspects. He described the data to be collected and its processing in a paper for the *Telecommunication Journal of Australia* (TJA) (Pratt, 1973a). Clem's paper was described as "Part 1"; the "Part 2" paper, describing the actual exchange equipment, was written by Leo Tyrrell (1974).

At this time, Clem also began to contribute to international standards for traffic engineering and international network planning through the CCITT (now ITU-T), specifically Study Group XIII, Working Party 2 (Traffic Engineering). The work is described in Pratt & Tånge (1973), outlined below. Clem was Vice Chairman of the Working Party from 1970 to 1976.

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On 1 July 1975, Telecom Australia was formed, separated from the postal business, but still in government ownership. Telecom could now develop appropriate computer systems to support its business. Clem became Manager, Systems Planning Branch (Pratt, 1993). His education and background equipped him well for the task.

At that time, much of business computing was considered to be "automated data processing"; widespread decision support and control would come later. Also, limitations on computer memory and processing meant that, for an organisation of Telecom's size and diversity, many different computer systems would be required; it was necessary to plan in a way that ensured high-impact systems would be given priority and that data was not duplicated.

By 1979, it was clear that systems planning and development should be closely aligned and Clem became Manager of the newly formed Systems Development Branch. Many different systems were in development. Clem introduced a number of important reforms, including a formalised method for systems development and the evaluation of user benefits in assessing development proposals.

With the proliferation of computer systems across all of Telecom's business, differences in style and procurement started to become apparent. General business systems for accounting, personnel and inventory, for example, could be sourced from external suppliers, while network operations and support systems were closely tied to the telecommunications networks and required specific computing techniques and coordination with network development. For a year, Clem gained valuable experience as a *user* of these systems as Acting Superintending Engineer, Network Operations Branch within Engineering. Then, in 1985, Clem became Chief Engineer, Computer Support Services Division within Network Engineering.

In 1985, George Hams (Black, 2023) had compared Telecom with comparable overseas telecommunications utilities and had found Telecom lagging in a number of areas, including "the development of major operational information systems" (Campbell, 2017, p. 22). While Ian Campbell believes that no significant follow-on actions occurred, the report did stimulate further development of network operations support systems. Clem led that effort for three years.

In the 1980s, the United States and other countries became concerned that they were lagging in productivity compared with Japan and looked to find ways to catch up. The work of Edwards Deming, an influential statistician and educator, building on the Japanese experience popularised "Total Quality Management" (TQM) (Deming, 1982) as a productivity multiplier. Telecom management, which had been building towards likely direct competition, joined the

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TQM bandwagon and appointed Clem as General Manager, Performance and Quality in 1988 (Pratt, 1993) to lead the corporate drive.

Clem became an evangelist within Telecom for the TQM concept. In an address to an internal conference in 1989, he made a distinction between "quality" and "excellence" and noted:

> Total quality management philosophy holds that the customer is the final judge of quality and that improvement of quality in the eyes of the external customer in a competitive world demands improvement of all the activities within the enterprise (Pratt, 1989, p. 45).

Such a "philosophy" would require a profound culture change in Telecom. Clem was able to introduce new training, quality performance indicators and customer satisfaction surveys, but root-and-branch change eluded him and, indeed, remained an issue (couched in other language) in the organisation long after he left it.

With the merger in 1991 of Telecom and OTC into what became Telstra, there was a new push for network and systems modernisation to prepare Telstra for direct competition. This evolved into the "Future Mode of Operation" (FMO) project (Campbell, 2017, pp. 48–52). Clem was part of this as Manager, Network Modernisation Strategy. Clem was well suited to this role, with his wide understanding of the organisation and his background in modelling and simulation.

With the early stages of the FMO complete and the organisation and management continuing to churn with the advent of competition, Clem somewhat reluctantly took early retirement in 1993. Although it was "early" at the age of 57, he had by then chalked up 38 years in the PMG, Telecom and Telstra. He had witnessed and been a leader in the early computerisation of Telecom's operations and the greater quantification of business processes and management. These are trends that continue today.

International Teletraffic Congresses

The International Teletraffic Congress (ITC) series had been started under the chairmanship of Professor Dr Arne Jensen from Denmark in 1955, in order to bring together researchers, practitioners, academics and mathematicians to share knowledge and advances for understanding telecommunications traffic and its implications for network planning, design and management (ITC, 2016).

Tony Newstead from Australia (Newstead *et al.*, 2017) had attended the second ITC in The Hague and had prepared a paper for the third ITC in Paris in September 1961. Newstead had recently returned from London and asked Clem to present the paper on his behalf (Newstead *et al.*, 2017, Attachment A). This was Clem's first ITC. Subsequently, when in 1970 Newstead

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relinquished his position as the Australian representative on the ITC's International Advisory Council, he arranged for Clem to replace him. Clem remained on the Council for 35 years until 2005, when he received a Lifetime Achievement Award for his service at ITC19 in Beijing, China.

Clem used his relationship with the ITCs not only to gain the latest knowledge and techniques and bring them back for application in Australia, but also to encourage teletraffic research and understanding within the Australian technical community. He brought ITC to Australia, with ITC8 being held in Melbourne in November 1976; and he was a main organiser of the 1989 ITC Specialist Seminar in Adelaide.

Clem contributed three technical papers to the ITCs. He attended ITC5, in New York, in June 1967 and gave a paper on "The Concept of Marginal Overflow in Alternate Routing" (Pratt, 1993). Unfortunately, papers from ITC5 are not available online.

His second paper, for ITC6 in September 1970 (Pratt, 1970) was entitled "A Group of Servers Dealing with Queueing and Non-Queueing Customers". This situation was applicable to the case where a telephone exchange would have incoming calls from operators and from ordinary callers: operator calls would be queued and the operator would get the next available circuit; ordinary callers would hear a busy signal if no circuits were available and would have to redial. The purpose was to find the probability that an ordinary customer would encounter a busy signal given the number of available circuits ("servers") under any traffic assumptions. This could be used to determine the appropriate size of an exchange given some traffic forecasts. Clem used standard queuing theory to show how to solve the general case and to give solutions to two limiting cases that could be used for exchange dimensioning. Some numerical examples were provided.

His third contribution was to ITC7 in June 1973 (Pratt & Tånge, 1973), entitled "On Traffic Engineering Studies in the CCITT". This described the outputs from the then-recent CCITT (now ITU-T) international standards on traffic engineering (included in the CCITT "Green Book" after the plenary in 1972), especially from CCITT Study Group XIII, Working Party 2. It outlined the relevant questions that would be pursued by the CCITT in the next study period (1973–1976) and encouraged ITC attendees to contribute. One issue highlighted was the effect of repeated call attempts that can cause overload in a voice network (which remained a problem for network operators for many years, causing some infamous network failures, for example (Gorman, 1985), when thousands of fans in the USA used auto-diallers to try to get through, mostly vainly, to an agency to buy tickets for a Bruce Springsteen concert).

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Other Contributions and Interests

For the Telecommunications Society of Australia (TSA), Clem was appointed to the Council of Control, which later became the National Board, as Vice-Chairman in 1982. He remained in that position until 1999, when he was made a Distinguished Fellow of the Society ("New Distinguished Fellows", 1999, p. 31). The TSA published a second journal, *Australian Telecommunication Research* (ATR), from 1967 to 1995. Clem served on the Editorial Board from 1974–1995 (Gerrand, 1996, p. 35). He had been instrumental in setting a high standard for ATR from the beginning by submitting two papers to volumes 1 and 2 (Pratt, 1967; 1968b). He later provided a third paper (Pratt, 1973b), which was a version of his earlier ITC paper (Pratt, 1970).

Clem joined the Victorian Branch of the Statistical Society of Australia when it was founded and was a member of the Branch Council from 1965 to 1972. He served as President of the Victorian Branch, 1968–1969 (Pratt, 1993), and was the national President 1969–1971 (Gordon, 2025).

Clem had been a technical mentor and educator for many in the PMG and Telecom, and his abilities extended outside the organisation. In the 1960s, he had been a part-time lecturer and tutor at the University of Melbourne in Operational Research and Statistical Methods for Research Workers. He was the Telecom representative on the Mathematics and Operations Research Advisory Board at Footscray Institute of Technology from 1973 and chaired the board from 1979 to 1987. He was a member of the Institute's Council from 1987, transitioning to the Council of Victoria University of Technology when the Institute became a university. He was on the Advisory Board of the Teletraffic Research Centre at the University of Adelaide and became chair during the later years of the Telecom contract there. After his retirement from Telstra in 1993, he contributed to training courses in neighbouring countries, notably a course on "traffic engineering and forecasting" in Vietnam in November 1998.

Clem had a life-long interest in swimming and diving, starting in his school days and continuing during his university studies. In London, he joined the Highgate Diving Club and competed in competitions around the country, winning medals in springboard and firmboard events.

Clem had a love of classical music, playing the piano and organ, as well as singing. He was a member of the Royal Melbourne Philharmonic Choir, singing bass, for 12 years after his retirement from Telstra. He also played the organ at his local Lutheran church for 30 years.

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In later years, Clem was plagued by various health problems that gradually reduced his abilities. He passed away on 16 January 2025 and his funeral[i] was held at the Redeemer Lutheran Church, Glen Waverley, where he had been a founding member of the congregation.

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Endnote

[i] A video of the funeral may be viewed at https://www.youtube.com/watch?v=FHkUcfLKU-Y (accessed 22 July 2025).

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