

**New Technology and Work in the Australian Telecommunications
Sector: Big Brother is Watching You!**

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Abstract

This paper examines the impact of rapid technological change on the role and employment practices of Telstra technicians. It critically analyses the broad claims that often surround the independent 'knowledge worker' typology — linked to the concept of 'nomadic' workers' — against the reality of the Telstra technical workforce. Rapid technological change and the requirements of speed to the market have in some instances overtaken more traditional notions of retaining core competencies within the firm. The ramifications for Telstra workers included job cuts and an increased reliance on outsourcing strategies. New technologies have further raised ethical issues including their use in the monitoring of Telstra technicians. The paper concludes that new technologies are fostering a system of employment practices whereby in-house Telstra technicians increasingly provide a maintenance role, with new next generation networks (NGNs) being built by external fixed-term project workers.

Introduction

The telecommunications sector is characterised by rapid technological change facilitated by the digitization of data transfers and the introduction of next generation networks (NGNs). Dwyer defines NGNs as,

“a highly reliable data network (of networks) that transports packets of data from anywhere to anywhere. All it requires is a standard format packet of data, prefaced with an address. It will deliver the packet to the destination address within certain time limits. It is immaterial whether the packet is carrying text, voice, images, video or combinations of these” (2004:9).

The last sentence spells out the convergence of the formerly distinct sectors of voice, video, data and media.

These changes have influenced and in some cases transformed employment practices within the sector. To begin, the introduction of new products and services requires new skills and job classifications, while some former skills and job classifications have become obsolete (Ross 2003). New technologies have further led to the deskilling of some job classifications (Ross 2003). Second, researchers suggest that the rapid nature of technological change lends itself to short-term project work, rather than traditional long-term skills development within the firm (Dif 2004). Third, new technologies may change the way that work is allocated, monitored and performed. Lastly, technological determinism suggests that such changes may foster the development and convergence of employment practices towards an employment system that best suits the emerging technologies (Dunlop, 1993). Alternatively new technologies may prove disruptive and lead towards more fragmented decentralised employment practices that better suit specific local conditions (Katz and Darbishire 2000).

This paper considers these issues at Australia's largest telecommunications employer, Telstra. The paper begins by outlining the methodology used to gather data for this research project. It then considers background issues associated with

telecommunications in Australia and technological change. The paper focuses on the effects of technological change on a particular employee group/classification — technicians. It critically analyses the broad claims that often surround the independent ‘knowledge worker’ typology — linked to the concept of ‘nomadic’ workers’ — against the reality of the Telstra technical workforce. It further considers ethical issues associated with new technologies and the monitoring of this worker group.

Research Methods

The sheer scope of the technological changes occurring within the telecommunications sector have had significant impacts on employment practices across worker classifications throughout Telstra, however, space considerations prevent a detailed analysis of all these changes within one paper. This paper therefore focuses on one important Telstra worker group, the technicians. These workers have seen significant changes occurring to the way their work is performed and monitored, while a considerable portion of their former work has been outsourced. The very nature of technical work further means that new technologies have a direct impact on how their work is performed. Technicians therefore present an important and appropriate worker group for the research and analysis of the affects of technological change on employment practices within the telecommunications sector.

This paper forms part of a larger longitudinal study of Telstra. The data was collected from a broad range of sources during the period 1997 to 2007. Interviews were conducted with past and present senior managers at Telstra to examine the changing nature of its workforce in the face of deregulation and privatisation. During the period 2006 to 2007 the interviews focused on the influence of technological change on management strategies and changing work practices. These discussions with management were supplemented by interviews with union representatives from the Communications, Electrical and Plumbers Union (CEPU), the Community and Public Sector Union (CPSU) and Union Network International (UNI, the peak international telecommunications union), who were involved with the firm. This data was supported by direct observations; external and internal company reports; union documents; reviews of previous research on Telstra; and other publicly available sources. The data was also compared and cross referenced with similar interviews that were conducted with TelCo managers and telecommunications union representatives in Europe between 2005 and 2005. This allowed the data to be compared and contrasted with international trends.

Australian Telecommunications Sector

While the Australian telecommunications sector was fully deregulated in 1997, a number of factors allowed Telstra to continue to dominate the sector. To begin, Telstra’s ownership of the public switched telephone network (PSTN) allowed it to retain most of this revenue stream. In 2004-2005 Telstra received more than 75 per cent of the total PSTN revenue, including local, long distance, international and fixed to mobile calls (see Table 1). Further, Australia’s large land mass and relatively small population limited Telstra’s competitors from undertaking large scale investments in new networks; the returns on investment often did not justify the relatively high roll out costs. Many of Telstra’s competitors therefore need to access and use its PSTN network. New competitors complained to the Australian Consumer and Competition Council (ACCC) that Telstra set access prices to its PSTN that were well above

recovery costs. Telstra's response was that any attempt by the ACCC to enforce lower access prices would simply stifle further capital investment — i.e. why should Telstra build new networks simply to give its competitors cheap access (Interviews with Telstra). Such debates reflect overseas experiences. For example, the New Zealand government introduced legislation for the operational separation of Telecom New Zealand's retail and wholesale sections, in order to bolster competition (ACG 2006:20-23).

Table 1: Total PSTN revenue and revenue share by carrier 2001-02 to 2004-05

Telcos	2001-02		2002-03		2003-04		2004-05	
	A\$m	%	A\$m	%	A\$m	%	A\$m	%
<i>Telstra</i>	7068	78.7	7077	77.7	7103	75.4	6641	75.3
<i>Optus</i>	821	9.1	1115	12.2	1355	14.4	1336	15.1
<i>Others</i>	1098	12.3	915	10.0	962	10.2	847	9.6
All	8986	100	9106	100	9421	100	8823	100

Source: ACCC (2006:6)

Telstra's competitive advantage through its ownership and control of PSTN traffic is, however, declining. Table 2 outlines Telstra's PSTN revenues between 2003 and 2007. It shows that revenue from local calls during this period almost halved from approximately A\$1.5 billion to A\$845 million. This is of particular concern for Telstra as it has maintained a virtual monopoly on local fixed line calls which provide the firm with some of its highest profit margins. National long distance and international calls also exhibited significant decreases in revenue. It is interesting to note that by 2007 revenues from fixed to mobile calls were almost double those of local calls. But Telstra predicts that the introduction of capped mobile telephone bills is likely to reduce future revenues from fixed to mobile calls as consumers become more accustomed to mobile to mobile rather than fixed line to mobile telephone conversations (2007:14). Between 2003 and 2007 Telstra's overall income from the PSTN declined from 37 per cent to 30 per cent of Telstra's total revenue; a pattern that is set to continue (Telstra 2007). The reasons for this decline include changing consumer habits leading to the substitution effects of new products and technologies as voice traffic increasingly shifts from fixed to mobile services, along with the concurrent growth in the use of other communication mediums such as text messaging, email, voice over internet protocol (VoIP), international calling cards and wireless broadband services. Mobile revenues now account for approximately 40 per cent of all telecommunication revenues across the OECD countries, (OECD 2007a:71), with third generation mobile phones morphing into entertainment devices (Puddoo 2007). Changing consumer habits within Australia therefore reflect global trends. For example, the internet has overtaken television as the most heavily used medium amongst teenage boys in Hong Kong while AOL advises that the internet has become the primary communication tool for US teenagers (Puddoo 2007). This implies that PSTN based systems worldwide will be progressively phased out and shut down over time as TelCos shift towards fully integrated IP based networks (Dwyer 2004:3). Under this scenario the cost of making telephone calls becomes largely redundant as IP based calls can be made over the network at a negligible cost. Billing systems then become much more simplified, as customers will simply pay one monthly fee based on a bundle of services, rather than being billed separately for individual calls (Interview with Dwyer 2007).

Table 2: Telstra's PSTN Revenue: 2003-2007

	2003		2004		2005		2006		2007	
PSTN products	A\$m	% of total revenue	A\$m	% of total revenue	A\$m	% of total revenue	A\$m	% of total revenue	A\$m	% of total revenue
Basic access¹	3,083	14	3,237	15	3,362	15	3,318	14.5	3,333	14
Local calls	1,567	7	1,504	7	1,284	6	1,023	4.5	845	3.5
PSTN value added services²	280	1	259	1	250	1	246	1	257	1
National long distance calls	1,162	6	1,121	5	1,013	4	913	4	808	3.5
Fixed to mobile	1,517	7	1,597	8	1,566	7	1,491	6.5	1,491	6
International	307	2	266	1	234	1	201	1	184	1
Fixed interconnection³	N/A	N/A	N/A	N/A	N/A	N/A	286	1	276	1
Total PSTN Revenue	7,916	37	7,984	37	7,709	34	7,478	32.5	7,190	30
Total Revenue	21,616		21,280		22,657		23,062		23,960	

Notes: 1. Basic Access service includes installing, renting and maintaining connections between customers' premises and our Public Switched Telephone Network .
2. Includes, voicemail, call waiting, call forwarding, call conferencing and call return.
3. Fixed interconnection is made up of local and non local PSTN/ISDN access interconnection services provided to other carriers.

Sources: Telstra annual reports

But Australia's large land mass and relatively small population creates potential problems with this scenario. While reduced revenues coupled with relatively high maintenance costs may induce Telstra to shut down its PSTN network, regional areas that don't have access to equivalent broadband facilities will not be able to access the same level of IP network based products and services as city consumers. Regional consumers are already voicing concerns over Telstra's decision to shut down its regional CDMA mobile telephone network, as they are worried about the coverage of its replacement; Telstra's third generation mobile network. This then creates serious policy issues for the federal government over the future of regional telecommunications services (Sainsbury 2008).

The above continued decline in traditional PSTN revenue means that Telstra — along with former incumbent TelCos worldwide — has virtually no option other than to counter the reduction of its traditional revenue bases by cutting costs and placing greater emphasis and investments in new and emerging products and services. But these are often more competitive markets that don't generally provide the same profit margins as traditional PSTN services. In 2006 Telstra remained Australia's largest retail mobile service provider with 44 per cent of the market, followed by Optus with 33 per cent (ACCC 2007:11). However it faces more competition in this sector which is also showing signs of having reached market saturation (ACCC 2006:10). Telstra's share of mobile telephone services revenue across the Australian market fell from approximately 52 per cent to less than 47 per cent between 2002 and 2005; Optus

increased its share from around 25 per cent to 35 per cent during the same period (ACCC 2006:15). Telstra launched its third generation mobile telephone network in 2006 and by mid-2007 third generation mobile services accounted for almost 22 per cent of its mobile subscriber base (Telstra 2007:19). However from a business perspective simply transferring customers from its old mobile telephone network to its new network is not enough. Rather, Telstra will need to convince these consumers to take up its new mobile based third generation products and services in order to gain an adequate return on this large scale investment.

Despite the reduction of traditional PSTN revenue the introduction of ADSL and ADSL2 broadband technologies that operate over the copper wire network allowed Telstra to extend the PSTN's operations to cover these new products and services. It provided continued employment for the current cohort of Telstra technicians who were trained on the PSTN. The OECD estimated that by 2007 almost 81 per cent of Australian broadband connections were through ADSL technology, which was well above the OECD average of 62 per cent (OECD 2007). This again gave Telstra a competitive advantage in controlling ADSL services through its ownership of the PSTN; between 2006 and 2007 Telstra increased its sales of retail and wholesale broadband internet services by 66 per cent and 21 per cent respectively (Telstra 2007:9).

Despite the above apparent positive outlook for Telstra, interviews suggest that profit margins on ADSL services remain relatively low in comparison to traditional PSTN products (Interview with CEPU 2007). Telstra therefore needs to introduce technologies which operate at far greater speeds than ADSL — such as a fibre to the node (FTTN) network¹ — if it wishes to exploit the full range of potential new internet based products and services such as high speed high speed video on demand and internet based high definition television (HDTV) program services. A proviso here is the possibility of further breakthroughs in ADSL technologies which have continued to increase speeds over the copper wire network. Telstra had announced plans to roll out a FTTN network but the strategy was shelved when it failed to come to an agreement with the ACCC over access pricing for Telstra's competitors. Critics suggested that Telstra was trying to create a monopoly over the supply of future high speed internet based services, similar to its current control over the PSTN. But Telstra claimed that the ACCC's access pricing requirements were too low, making it uneconomic to proceed with the investment (Interviews with Telstra 2007). Interviews with Telstra management and other stakeholders suggests that Telstra will eventually go ahead with this plan and that much of the 'grandstanding' has been about Telstra trying to gain the best possible access pricing agreement. Telstra may also be involved in the incoming 2007 ALP government's commitment to spend A\$5 billion on a public/private partnership to build a high speed fibre optic network across Australia. However at the time of writing the details of this policy — including which firms will be involved — has yet to be finalised.

Telstra technicians

Table 3 shows that in 2005 Telstra remained by far the largest employer within the Australian telecommunications sector, followed by Optus communications. In

¹ Fibre to the node (FTTN) provides optical fibre to a local street corner node but then uses copper wire for the relatively short distance from the node to the premises (ACCC 2006:2).

contrast, Telstra's competitors are mainly smaller lean operators that generally use Telstra's network and employ non-union labour.

Table 3: Workers employed by Australia's five largest Telcos: 2005

Company	Employees
Telstra	39,406 (domestic full time)
Singtel Optus	9,865
Vodafone	1300
Hutchison	1200
AAPT	147
TOTAL	51,918

Source: Eason (2006)

While the above figures show that employment practices at Telstra cover a large percentage of Australia's telecommunication workers, this is a far smaller Telstra workforce than was the case prior to the deregulation of the Australian telecommunications sector. Between 1989 and 2007 Telstra cut its permanent workforce to less than half of its former size from 84,000 to around 36,000 employees (Telstra annual reports). Staff cuts were achieved through new work practices, outsourcing and the introduction of new technologies. For example, in the days of the former analogue technology, Telstra had operated about 5,000 telephone exchanges. The digitisation of the network allowed Telstra to substantially reduce this number and by 2007 it operated with around 200 exchanges. Digital exchanges required less maintenance than the former analogue systems, while repairing routine faults often involved relatively simple skills such as the replacement of 'plug and play' devices, such as circuit boards. This deskilled some former technical work.

If Telstra rolls out its planned FTTN network it will probably operate with around six to 12 exchanges in total (Interviews with former Telstra manager 2007). Former Telstra managers advised that the associated reduction in labour costs was built into Telstra's FTTN strategy. Dwyer notes that NGNs — such as the proposed FTTN — are characterised by dumb networks and smart terminals, the opposite of the current PSTN network. This has significant repercussions for Telstra technicians. FTTN networks require significantly less maintenance than the traditional copper wire network, while much of the equipment is software controlled that can be remotely configured via a computer terminal rather than in the field, allowing for further job cuts (Dwyer 2004:19). The ability to transfer digitised information quickly and cheaply also makes it easier for firms to shift such IT functions offshore. In 2004 Telstra announced that its IT outsourcing partner, IBM, would move a significant portion of its Telstra IT work to India, to access cheaper IT labour costs; about 450 IBM Australia workers were expected to lose their jobs (Crowe and Connors, 2004, p. 3). Telstra also formed direct links with Indian IT firms including the Bangalore-based Satyam Computer Services, which set up a Telstra branded internal unit (CEPU, 2004, p. 11).

Training & Outsourcing

The above changes have implications for Telstra training. As a government owned corporation Telstra had been one of Australia's largest technical trainers, including extensive in-house technical training facilities; training was extensive and broad based. During the 1990s Telstra reduced technical training to assist in reducing costs.

Table 4 shows that between 1989 and 1996 the number of Telstra technical trainee appointments was cut from 1,353 to five employees, with in-house technical traineeships being completely phased out by the following year. The reduction in Telstra's broad based technical training led to concerns about possible future skills shortages, while union officials alleged that Telstra was relying too much on the skills of its current cohort of skilled technicians (Interviews with CEPU 1998-1999). By 2007 the average age of a Telstra technician was between 45 and 50 years of age and Telstra managers agreed that there could be serious skills shortages in the future. Since 2002 these concerns have led Telstra to again recruit technical trainees. Older Telstra technicians complain that new workers are assigned to accompany them on jobs where they are expected to provide them with de-facto on-the-job training, although there are no formal agreements — and/or financial incentives — for them to do so (Interview with Telstra technicians 2007).

Table 4: Telstra Technical Trainees

Year	Number of Technical Trainees
1989	1353
1990	1241
1991 ¹	N/A
1992 ¹	N/A
1993	343
1994	88
1995	20
1996	5
1997	0

Notes: Figures for 1991 & 1992 were not available.

Sources: Telstra EEO reports (1989-1998).

But despite such concerns, the skill sets that Telstra requires have also changed, with some skills becoming redundant as previous processes were automated and/or were no longer required (Interviews with Telstra 2000-2007). For example the above shift towards the 'plug & play' technology model means that when a new customer subscribes to a Telstra internet service they receive a modem and instructions on how to connect up to the provider. If necessary they then get advice from a call centre representative — potentially based off-shore — who talks the customer through the process. Software problems are usually fixed on line, while faulty hardware is replaced rather than fixed. This then reduces R&D and training costs. Such changes led Telstra to shift towards more specific limited training in new off-the-shelf technologies. New workers therefore tend to receive narrow training in a number of specific areas — i.e. focused on specific jobs and/or tasks — rather than the broad based training that was received by older technicians (Interviews with Telstra technicians & CEPU). These changes have also made it easier to employ subcontractors to perform what is essentially often deskilled work (Interview with former CEPU official 2007).

Telstra counter union criticism by advising that they have committed to spending A\$200 million over a five year period — from 2006 to 2011 — on staff training (Interviews with Telstra 2007). This includes A\$67 million which will be spent specifically on Telstra field services staff; including technicians (Telstra Press Release 2006). But in contrast to its former in-house technical training programs, this

program was outsourced to an external provider, Accenture, which has created the 'Telstra Learning Academy' (Accenture 2007). Telstra advises that it is "undergoing a major transformation with the introduction of many new products and advanced technologies. The new Telstra Learning Academy will help ensure field staff have the skills to build, run and maintain these technologies." (Telstra 2006). The union response is that Telstra already had world class in-house training facilities that were allowed to be run down, while the Accenture agreement will lead to excessive payments to an American based MNC (CEPU 2006).

Telstra's decision to outsource the entire construction of its third generation mobile telephone network in 2005-2006 to the multinational enterprise (MNE), Siemens, further reduced its need to provide extensive in-house training (Interviews with Telstra 2007). This was essentially a 'turnkey' contract with Siemens engaging local and overseas workers on short-term contracts. During interviews a general theme amongst Telstra managers was that future large scale capital investments were also likely to be one off contracts with external providers. Telstra technicians are therefore unlikely to be engaged in future large-scale network construction. Rather they will be trained to the specific requirements of maintaining a network after it has been built. Further, when the PSTN is eventually phased out/shut down it is likely that many former broad based technical skills will no longer be required. As outlined above, NGNs generally require less maintenance than the PSTN, while work becomes more software/computer terminal based; as opposed to traditional technical field work. This is not to say that field technicians will no longer be required. However their number is likely to reduce, with concomitant changes in the way they perform their work.

Work allocation and monitoring

New technologies are demonstrated by Telstra's work allocation and monitoring processes. A typical Telstra field technician operates from a van, with work assigned by emails from a centralised dispatch centre that the worker receives via a laptop computer. The van is parked at the technician's home where technicians log on to the Telstra network and receive their first jobs for the day. They also have keys to numerous supply depots where they can pick up parts and/or products that they may require. Many technicians therefore essentially work on their own with little physical interaction with fellow workers and/or management. Telstra managers advise that supervisors are supposed to organise monthly team meetings for their technicians. However anecdotal evidence during interviews suggests that team leaders do not always hold such regular meetings, while some technicians advised that the necessity to complete jobs on time prevented them from attending the meetings anyway (Interviews with Telstra technicians & CEPU 2007).

In 2007 Telstra installed satellite navigation systems to their work vans, allowing the firm to monitor the whereabouts of their field technicians on a 24 hour a day basis. From an ethical perspective electronic monitoring should be relevant to the job being performed, it requires the employees consent and in general the methods used should be ordinary and reasonable (Carroll & Buchholtz 2003; Ferrell et al 2001; Vaught et al 2000). In this regard one CEPU union official considered that Telstra's strategy was 'monitoring gone mad', with concern for the bottom line overriding concerns such as job enjoyment and satisfaction (Interview with CEPU 2007). Tighter monitoring was also linked to higher stress levels, with union officials claiming there

was little consultation during the GPS installation process (Interview with CEPU 2007). GPS monitoring was also seen as an invasion of privacy, with Telstra citing technical reasons for refusing to turn off the GPS tracking devices during lunch breaks or after work; when some technicians were allowed limited private use of the vans. Finally, unions were concerned that the running of the GPS system was outsourced to a US based firm, where monitoring details were logged and stored. Again this was seen as a privacy issue with concerns over who had access to this data.

Telstra management countered that the GPS system provided added safety for technicians, as the firm knew exactly where they were operating in the field. Telstra managers further advised that as the technicians' employer they have every right to know where they operating while they are in Telstra's employ. Researchers suggest that using electronic devices for this type of 'surveillance' role creates an atmosphere of distrust that may heighten worker stress levels, decrease morale and increase feelings of job insecurity (Carroll & Buchholtz 2006:272 & 547; Vaught et al 2000:108). Despite these negative attributes, some research links electronic monitoring to increased productivity, although this tends to be predicated on worker perceptions of the fairness or otherwise of the monitoring system (Vaught et al 2000:108-09). Telstra managers argued that 'good' workers have nothing to fear, as it is only lower performing workers who are likely to have issues with their work and whereabouts. One senior Telstra manager advised that many complaints arose because of former work attitudes. For example, they alleged that in the days when Telstra was a government owned corporation it was common for one group of Sydney technicians to meet for a game of cricket during the afternoons, during normal work hours (Interview with Telstra 2007).

In 2007 Telstra was working on integrating its dispatch system with the GPS tracking system; moves towards developing a more automated dispatch system had already resulted in approximately 250 dispatch workers being made redundant in 2006 through the centralisation and automation of the system (Interview with CEPU 2007). Technicians and managers both agreed that a common problem with job assignments was that technicians frequently drove past other Telstra technicians who had just completed a similar job and were coming back from the same area to which they were being dispatched to undertake a new job. Obviously there were inefficiencies in the dispatch system that Telstra was hoping to overcome through linking the GPS tracking system to software programs that could automatically ascertain where technicians were operating and then allocate jobs more effectively as they came to hand. Telstra further hoped to develop this system to the point where the dispatch software program incorporated the individual skills levels of all their technicians, so that specific jobs could be allocated to the nearest available technician with the requisite skills. But Telstra has not developed the system to such levels of sophistication to date. Telstra has also been trialling knowledge management strategies such as the use of digital video cameras linked to laptops. Technicians could video record problems and/or faults and send them off to more experienced workers who could then diagnose the problem(s) and telephone and/or email back instructions on how to best remedy the situation (Interviews with Telstra 2007).

Telstra has linked these technologies to performance management strategies based on group and individual points performance management systems. One Telstra manager

commentated that performance management systems had previously been reactive, in that a worker's performance could only be measured and tabulated after the fact. However, the use of computer generated and recorded job assignments and corresponding on-the-job continuous reports from technicians on job completions, meant that worker performance could now be assessed during 'real time'. This however raises a number of issues. Many jobs tend to be idiosyncratic in nature, meaning that a simple addition of total daily job completions does not reflect the differing complexities of various jobs nor the different travelling time involved in driving to different job locations. It further raises the issue of quality control, as a 'piecework' system may induce workers to complete jobs as quickly as possible without regard to the long term — i.e. a 'band aid' solution. This problem was encountered by Telecom New Zealand when it outsourced its technical work to subcontractors who were paid on a piecework rate (Ross 2003).

Technological Change & Redundancy Provisions

The impact of technological change on redundancies has had a long history at Telstra. For example, the 1970s and 1980s witnessed the shedding of workers in labour intensive activities such as manual exchanges. These redundancies led to a period of industrial confrontation that included strike activity in the late 1970s — some of the first large-scale strikes in the history of these unions (Rice 1996:85). In 1980 Telecom management and the unions attempted to settle some of these ER issues by formulating the 'Consideration for the Introduction of Technological Change' agreement. This specified broad parameters for the introduction of new technology and included the provision for extensive consultation between management and unions (Telecom 1983). In 1983 this agreement was renewed for a further three years. Section 3.1 of the 1983 agreement states:

Telecom and the unions recognise that technological change should only be accepted where there is a demonstrable net benefit to the community...in considering the possibility of the introduction of new technology the principles set out hereunder shall be applied equally to an assessment of the maintenance or extension of existing technology (Telecom 1983:3).

This suggests something of a bias against the introduction of technological change. Section 3.4 further stated that unions should be advised and provided with appropriate information as soon as the introduction of any new technology was being contemplated (Telecom 1983:4). This agreement provided a good example of the then extensive union involvement in the management and introduction of new technology.

While the unions in principle remained opposed to redundancies they decided that in the circumstances it was in their members' interests for them to bargain for the best redundancy provisions that they could obtain (Interviews with CEPU 2002). In late 1991, Telstra management and the unions came to an agreement on redundancies that subsequently became the 'AOTC Redundancy Agreement 1993' (AOTC 1992:34). This agreement included a maximum of 84 weeks redundancy pay and a three month redeployment period. Telstra management agreed that during this three month period they would look for other areas within the firm where these workers could potentially be redeployed (AOTC 1993). The redundancy agreement has proved quite resilient and in 2007 workers under Telstra's collective agreements were still entitled to the same redundancy payments and conditions (Interview with CEPU & Telstra 2007). But the redundancy agreement has been a two edged sword for the unions, as it

allowed Telstra to carry out its downsizing strategies, while workers were prepared to trade off other conditions in return for keeping their redundancy entitlements. This effectively constrained union industrial campaigns. Further, Telstra has been a highly profitable firm which allowed it to continue to pay out relatively high redundancy costs.

Table 5: Telstra technical work groups

Telstra Technicians		Subcontractors	
<u>Collective agreement</u>	<u>AWAs</u>	<u>General Fieldworkers</u>	<u>NGN Subcontractors</u>
Union members	Non-union member	Non union members	Generally non-union members
<ul style="list-style-type: none"> • Permanent employee; • long-term job orientation 	<ul style="list-style-type: none"> • Permanent employee • reduced job security • shorter term job orientation 	<ul style="list-style-type: none"> • Project based work; • short term job orientation 	<ul style="list-style-type: none"> • Project based work; • short term job orientation
Hybrid of new employment practices grafted onto existing practices	Higher degree of transformation towards a new employment system	Subcontractor employees	Externally based 'nomadic' &/or 'knowledge workers'
Older workers: average age late 40s to early 50s – many will retire over next 5-10 years	Younger more recently employed workers	External workers — but includes some ex-Telstra workers	External workers — includes some overseas based workers
Public sector heritage	Private sector orientation	Private sector orientation	Private sector orientation
Trained in-house	Generic external training coupled with limited in-house job specific training	Generic external training coupled with limited in-house job specific training	Training & skills gained elsewhere — both in Australia & overseas
Broad based technical skills	Relatively narrow job and/or product specific skills	Often generic and/or semi-skilled; Some job-specific higher skills	Externally based NGN training & skills
Trained on PSTN; Some deskilling; more recent training on newer technologies (e.g. mobile phone & ADSL)	Trained on specific roles associated with PSTN & newer technologies	Training generally limited to lower skilled work but shifts to higher skilled job specific training over time	Training linked to NGN technologies.
Orientation shifting	Orientation shifting	Support role for	NGN building

from network building to network maintenance	from network building to network maintenance	network building & network maintenance	
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Independent Knowledge Workers?

Table 5 divides Telstra's technical work into four worker sub-groups and considers the effects of new technologies on the employment practices of each group. The first group, the Telstra in-house technicians, are the oldest group in terms of their history. But since 1996 they have been split between those employed under the collective agreement and those more recently engaged on individual AWAs. The technicians employed under the collective agreement tend to be older unionised workers and in 2007 they made up around 60 to 70 per cent of Telstra's technical workforce (Interview with CEPU & Telstra 2007). They were the recipients of broad based in-house training, although, as outlined above, new technologies have rendered some of these skills redundant. Many of these workers began their employment in a government owned corporation with the expectation of long-term careers within the firm. By 2008 the changes occurring to the employment practices of these workers could be considered more transitory than transformational. Despite the introduction of new technologies and associated automated monitoring and performance management systems they retained many former work practices and conditions. For example they retained a 36^{1/4} hour week — as opposed to technicians on AWAs who worked 38 hours per week — a relatively generous redundancy agreement and collectively bargained conditions of employment. Therefore in many respects they operated under a hybrid employment system with new tasks and employment practices grafted onto existing awards and collective agreements. But given that a large number of these workers have already retired and/or have been made redundant (see Ross 2003), while many of the remainder are due to retire within the next five to 10 years, the percentage of Telstra technicians operating within this hybrid system is diminishing. This process will be accentuated with the shift to NGNs that require fewer exchanges and reduced maintenance.

In contrast the technicians on individual AWAs — approximately 30 per cent to 40 per cent of all Telstra technicians in 2007 (Interview with Telstra 2007) — exhibit a higher degree of transformation towards a new employment system. Weakening revenue growth brought about by the decline of traditional PSTN revenues coupled with lower profit margins on newer products and services induced Telstra to continue reducing labour costs and improve labour productivity. In this regard the AWA technicians were generally younger more recently employed non-union workers, whose pay was more closely linked to individual performance based incentives. Telstra's former CEO Ziggy Switkowski openly stated that he no longer wished or expected all Telstra workers to have long-term careers within the firm. Individual contracts are therefore been linked to reduced job security (Ross 2003).

These workers lack the broad-based skills of their predecessors, instead relying on generic external training coupled with limited in-house job and/or product specific training. This has been facilitated by the deskilling of some former highly skilled jobs and the concomitant growth in 'plug and play' technology. Telstra also relies on the skills of its older technicians to fill the gaps in the knowledge of its more recent technical employees. But the shift to IP based NGNs decreases the value of these older broad-based skills, particularly given the likelihood that the PSTN will eventually be shut down. While the incoming 2007 Labour government pledged to

eliminate individual AWAs, this will involve a relatively long transition period. This classification of technician will therefore continue to form a significant part of Telstra's technical workforce for the foreseeable future.

Telstra's technical subcontractor workers can be split into general fieldworkers and those more recently employed on building NGNs. Telstra has employed subcontracted field workers since the early 1990s. During this period it steadily increased their role from basic generic 'pick and pipe' work to more highly skilled jobs (see Ross 2003). Many of these subcontractors therefore now compete head to head with Telstra technicians where they now perform somewhere between 30 per cent and 60 per cent of Telstra's field work; if you include unskilled and semiskilled work then it's closer to 60 per cent (Interviews with CEPU & Telstra 2007). These subcontractors have a short-term job specific time orientation linked to project based work and employ externally based workers. While these include some ex-Telstra workers; union research suggests that only around 10 per cent of ex-Telstra workers remain in the industry (Interviews with CEPU 2007). These workers have a private sector orientation, with generic skills sometimes coupled with limited job-specific training. Their general responsibility is to provide a supporting role for network building and maintenance.

This is in contrast to the role of the Ericsson subcontractors who were brought in to build Telstra's third generation mobile network; this included both Australian and international subcontractors. Importantly the Ericsson subcontractors brought in new NGN skills that Telstra did not possess. Thus the very nature of their skills meant they were gained externally to the firm. Following the completion of the network their job was finished and they moved on to new projects elsewhere. Of all the four groups profiled in Table 5 the high skilled short-term project work performed by the NGN subcontractors presents the closest fit to the independent knowledge worker typology. It also fits with Dif's description of 'nomadic' workers. While Telstra's fieldworker subcontractors also operate on a fixed-term project basis, these contracts are often managed on a more on-going basis. The skill levels of these workers are also generally below those of the NGN subcontractors. As such it would be difficult to classify many of these fieldworker subcontractors as 'knowledge workers'. In contrast to the subcontractors, Telstra's in-house collective agreement technicians are generally long-term employees, with skills built around the PSTN. While the AWA technicians have generally been employed for a shorter period, they are still engaged on a full time on-going basis. Therefore most Telstra technical workers do not fit the independent knowledge worker typology. But NGNs and associated new products and services are changing the type of work being performed. Further, new technologies are impacting on the way work is performed, measured and monitored. Given that Telstra plans to continue its strategy of outsourcing the building of future NGNs to external specialist providers, NGN technical worker will continue to build new networks, while Telstra's in-house technicians will provide an on-going maintenance role.

Conclusion

Factors associated with technological change and its associated impact on the employment practices of Telstra technicians were interlinked with other issues including the nature of the telecommunications sector, the concurrent deregulation of Australia's telecommunications and labour markets, global competitive forces and

geographic and political issues associated with Australia large land mass and relatively small population. New products and services impacted on the skill requirements for Telstra technicians, while Telstra used new technologies to monitor and control its workers. The latter development raised ethical issues and concerns that contrasted employer rights to monitor their workers with employee rights to privacy and associated stress related issues. Ethical viewpoints on the Telstra's electronic monitoring policies typically differed according to stakeholder perspectives. Further this research suggests that the emergence of the independent 'nomadic' knowledge worker is not widespread amongst current Telstra technicians. Rather these types of knowledge workers were more closely associated with external subcontractors engaged to build NGNs. The shift to IP based networks will likely see an increase in these fixed-term subcontracted employment practices, with a concurrent reduction in the number of traditional long-term Telstra technicians.

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