LOCATION-BASED SERVICES AND THE SURVEILLANCE OF MOBILITY: AN ANALYSIS OF PRIVACY RISKS IN CANADA

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INTRODUCTION

It is commonly agreed that privacy advocates and regulators in all countries need to concentrate on a new dimension to the privacy problem – not only who we are and what we are doing, but also where we are doing it. We are now a "mobile" society, and there is extraordinary potential for "mobile" surveillance.[1] A closer examination of the rhetoric, however, reveals that there are a plethora of possible relationships between the device-user and remote organizations in a "mobile" environment. As a result, as Clarke notes, "there is ample scope for people to mean different things when they use the word 'mobile'." [2]

There are three purposes to this report: first to discuss the ambiguities within current rhetoric about the "mobile" surveillance issues and perhaps to suggest a better conceptual framework for analyzing the surveillance implications of mobility and location; second, to identify the kinds of "data subjects" whose movement and location might currently be traced in the Canadian context and who therefore might be at risk; and third to analyze the legal implications according to the framework of principles contained in the federal Personal Information Protection and Electronic Documents Act (PIPEDA). What then are the major challenges to compliance in Canada? What kinds of guidance might the OPC provide to encourage compliance? What issues may be raised as a result of specific questions related to mobility and location that are not apparent in more traditional or static forms of surveillance?

There are, of course, an increasing number of speculative press reports about products and services that are being planned, and whose surveillance implications might be significant. The technologies are complicated, dynamic and increasingly converging. It is impossible to conduct any overall risk-assessment (or Privacy Impact Assessment) of mobile technologies broadly construed. Instead, this study will attempt to identify the kinds of individuals (data subjects) whose movement and location might currently be tracked by the application of various products and services currently available within the Canadian marketplace. This analysis is based on the assumption that privacy analysts and regulators need to gain a better purchase on the distribution of privacy risks in different contexts.[3] Some categories of people get monitored more than others. What kinds of people are most likely to have their location or whereabouts monitored today, now and in Canada?

Under these circumstances, the responsibilities and rights contained within Canada's privacy protection laws are directly relevant. The ultimate aim of this project is to get a better purchase on the privacy implications of location-based services that are currently available within the Canadian marketplace, and therefore what specific challenges

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[1] Bennett, Colin J. and Priscilla Regan eds. 2004. "Mobilities," Surveillance and Society Vol 1, Issue 4 at: http://www.surveillance-and-society.org/journalv1i4.htm and Ontario, Information and Privacy Commissioner, 2001, "Privacy in a Wireless World" at: http://www.ipc.on.ca/scripts/index_.asp?action=31&N_ID=1&P_ID=11263&U_ID=0

[2] Clarke, Roger. (2002) "Wireless Transmission and Mobile Technologies," at: www.anu.edu.au/people/Roger Clarke/ EC/WMT.html

[3] Bennett, Colin J. and Charles D. Raab, 2003. The Governance of Privacy: Policy Instruments in Global Perspective, Hampshire, Ashgate Publishing Limited

might face the Office of the Privacy Commissioner of Canada, and her provincial counterparts[4].

THE RHETORIC

If you were to pick up a newspaper in any major city around the world these days, there is a good chance you might come across a disquieting article with an alarming title such as: "Big Brother Under the Bumper: Boulder Residents Find Mysterious Tracking Systems on Their Cars"[5], "Stalkers Use GPS to Track Victims"[6], or "Better Slow Down: Your Car's 'Black Box' is Watching You"[7]. Or you might be caught off-guard by such a panic inducing question as "Does Your Car Have a Spy in the Engine?"[8] Such rhetoric is commonplace within the privacy literature, prone to "Big Brother" symbolism and exaggeration.

So the task is to distinguish fact from the fiction, and so should privacy and data protection agencies. How are tracking devices being used or misused, and by whom? What are the claimed benefits of such devices and are they legitimate? Who is at risk of having their privacy violated and in what way? How can privacy rights be protected? With the media hype surrounding these issues beginning to burgeon, we try to offer factual, comprehensive, and accessible information regarding the types of technology that exist, how it is or could be used and by whom.

For example, children and teenagers are often cited as the object of tracking devices in the name of their own safety. An article in a California newspaper entitled "Take That Corner too Fast and Mom will Find Out" analyses the growing market of telematic devices that "allow nervous parents the opportunity to track how and where their

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[4] From 2001 to 2003, Colin Bennett was involved in an international project, funded by the US National Science Foundation[4], to analyze the range of social and ethical implications of new geographic information systems. A component of this project related to the kinds of mobile surveillance devices which are proposed here for study. A significant amount of primary documentary material was accumulated for this project. However, the project did not address, in an explicit way, of value to contemporary regulators, how privacy protection rules were to be implemented. Nor was the project explicitly focused on Canada. This proposal, therefore, builds upon this existing work by exploring in greater detail the intersection of locational technologies and privacy protection values in Canadian society. Funded by the National Science Foundation in the USA (Grant Nos. SES-0083271, SES-0083348),the project attempted to gain an analytical understanding of the implementation of personal identification in geographically coded information systems, and an appreciation of the effect that identification practices have on individual privacy, sociability, trust, and risk. Co-researchers were P. Regan, D. Phillips, C.D. Raab and M. Curry.

[5] Warner, Joel and Pamela White, "Big Brother Under the Bumper: Boulder Residents Find Mysterious Tracking Systems on Their Cars", Boulder Weekly, 2003, http://www.boulderweekly.com/controversy.html

[6] "Stalkers Use GPS to Track Victims", Associated Press via Wired News, February 6, 2003, http://www.wired.com/news/wireless/0,1382,57576,00.html

[7] Valenti, John. "Better Slow Down: Your Car's 'Black Box' is Watching You", Newsday, September 19, 2004, http://www.newsday.com

[8] Wald, Matthew L. "Does Your Car Have a Spy in the Engine?", The New York Times, October 27, 2004 http://www.nytimes.com/2004/10/27/automobiles/27EALD.html?oref=login

children are driving".[9] A product called Omnitrack, for example, is a computer monitoring device that keeps track of where and how fast the vehicle is travelling and then sends this information to the parent's home computer. At about $1000, the product is marketed as "peace of mind" and claims to also lead to safer drivers and the provision of hard evidence in court cases. After drawing readers in with a provocative title, the author quotes a 16 year old girl who professes: "I'm not worried about it. If you're following the rules, there shouldn't be a problem".[10] This is an argument that repeatedly makes an appearance in articles tackling privacy issues regarding technology. An article in The Los Angeles Times "Go Ahead, Just Try to Disappear", begins with startling evidence of the proliferation of tracking devices which can be used to track teenagers, mobile workers, even pets, and ends with the complacent quote from a willing subject: "I don't mind, I have nothing to hide".[11] The problem with this type of reporting is that it leaves the reader in a state of paralysis and the reader is lured into a sense of complacency.

Consider the following: Do or will corporate enterprises have access to location data in order to, narrow their marketing strategies to your son or daughter depending on where they go on a daily basis? If given access to such data, could, for example, insurance companies be able to increase or decrease insurance rates on your teenager's car? Would they be willing to pay for this type of data? What is the infallibility of location tracking technology? Although there may in fact be very real potential benefits, what are the costs of such data falling into the wrong hands? Consider the possibility of computer hackers accessing precise location data of a 16 year old daughter.

Regarding the use of such devices for young children, there is a similar cause for concern. An article in the St. Paul Pioneer Press (Minnesota) looks at the use of RFID (Radio Frequency Identification) chips in keeping tabs on children. At Paramount's Great America in Santa Clara, California, for example, the Star Watch program uses wristbands with RFID chips worn by the child to broadcast a signal to antennas throughout the amusement park. A central computer then sends the location of a child to kiosks around the park; when a parent waves their Star Watch over a reader at one of these kiosks, the location of their child (or children) is displayed.[12] The system is described as a tool for parents and the provider of "peace of mind". A similar system used in Denmark's Legoland, argues the author, has proved valuable by enabling parents o locate their lost child faster and easier. A school in Osaka, Japan has announced that it will begin using a similar device to track children on campus by installing RFIP chips in students' nametags or clothes.

In this case, the problem seems opposite to that discussed above. Tracking devices for children appear to be presented without debate altogether. It is as though children are

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[9] Hood, Joel. "Take That Corner too Fast and Mom will Find Out", The Modesto Bee, January 3, 2005, http://www.modbee.com/local/story/9697128p-10579744c.html

[10] Ibid.

[11] Colker, David. "Go Ahead, Just Try to Disappear", The Los Angeles Times, December 27, 2004, http://www.latimes.com/business/la-fi-gps27dec27,0,163095.story?coll=la-home-headlines

[12] Diaz, Sam. "Chip Allows Parents to Track Children", St. Paul Pioneer Press (Minnesota), August 7, 2004, http://www.twincities.com/mld/pioneerpress/9341477.htm?1c

the property of their parents and without privacy and security concerns that exist separate of mom and dad. If consumers are presented with one-sided accounts of the benefits of such tracking systems, this may be good news for the company, but bad news for the child. In addition, consider this and other such tracking devices in the hands of a stalker, a thief, or a pedophile. And consider that vulnerable subjects are not limited to children and teenagers: location tracking devices are being marketed towards the elderly, disabled, health care patients and so on.

The recent explosion of rhetoric surrounding RFID tags substantiates a closer look at the rapid advancements in technology and the corresponding coverage but the media. Take, for instance, an article proclaiming "Miami Journalist Gets 'Chipped'"[13]: Angela Swafford, a Miami-based journalist agreed to get "chipped" by the company on whom she is writing a story to be published, Applied Digital Solutions (NASDAQ: ADSX) of West Palm Beach, Florida. In the article she admits that being implanted by the "Veri Chip" which uses RFID technology is "All in the name of exploration of new frontiers…and of good stories".[14] Another good example cited within the article is the headlines in England which read "Cap Cyborg is a Media Tart. True". The article refers to a British professor Kevin Warwick who, having been previously implanted such chips in the name of research, announced that he would be implanting a GPS-tracking device in a British girl. The announcement was presided by media coverage of the death of two British girls who had been kidnapped and was followed by attempts by Warwick to profit from what has been called a publicity stunt by charging reporters up to $125 for 10 minutes of interview time.[15]

"Paying for drinks with a Wave of the Hand"[16] is another article which demonstrates the attempt to benefit from the potential media windfall. At the Baja Beach Club in Barcelona, Spain, VIP patrons have allegedly been implanted with the Veri Chip and are using it as a sort of cash card. Conrad K. Chase, the director of the club, explains: "By simply passing by our reader, the Baja Beach Club will know who you are and what your credit balance is. From the moment of their implantation they will also have free entry and access to the VIP area".[17] The objective is apparently to obfuscate the need for credit cards and ID and eliminate theft of such documents. Calling it the "wave of the future", Chase cites the goal of the company is to market Veri Chip as a "global implantable identification system".[18]Another article written by Sue Shellenbarger in The Wall Street Journal asks "Can Technology Ease Elder-Care Concerns?"[19].

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[13] Gossett, Sherrie. "Miami Journalist gets 'Chipped': Implantable-ID company puts product into science writer", WorldNetDaily, April 29, 2003. Http://worldnetdaily.com/news/printer-friendly.asp?ARTICLE_ID=32286
[14] Ibid.
[15] Ibid.
[16] Gossett, Sherrie. "Paying for Drinks with a Wave of the Hand: Club-goers in Spain get implanted chips for ID, payment purposes", WroldNetDaily, April 14, 2004. Http://worldnetdaily.com/news/printer-friendly.asp?ATICLE_ID=38038
[17] Ibid.
[18] Ibid.
[19] Shellenbarger, Sue. "Can Technology Ease Elder-Care Concerns?", The Wall Street Journal Online, CareerJournal.com

Shellenbarger recounts her experience of testing her theory that "technology holds promise in helping families care long-term for the elderly" by submerging herself in "a world of high-tech elder care".[20] After donning a transponder and being monitored around the clock in Oatfield Estates in Milwaukee, Oregon, the author proclaims that in relation to other elderly-care homes, the technology allows for more freedom of the individual: "Keeping the right to take a stroll far outweighs the aggravation of being monitored".[21]

Despite the attempts by such companies to portray their products to the media and thus the population at large in a positive and unthreatening light, as potentially useful and lifesaving devices for our loved ones and ourselves, and as simply "the wave of the future", the flurry of media retorts warning us of government dominated and regulated personal tracking (a.k.a. Big Brother) is overwhelming. And this is where the need for accurate, reliable, and accessible information becomes so important. While reports on RFID tags and the implantable VeriChips are igniting a panic not only in the security and privacy fields but also among the general public, the limitations of such devices are generally left out of such documents. The reality is that RFID chips are only readable at a short range – the current products have a maximum range of about 30 feet and most must be scanned within inches of the reader.[22]

While the media can be manipulated as an advertising force on the one hand, on the other such use of the media might also be used to achieve the opposite, that is, to silence the media and the public by disseminating reports that deny recent developments in order to calm the population and prevent an explosion of suspicions. Applied Digital Solutions (mentioned above), for example, become known for what it termed "Digital Angel", a personal location device (PLD) that uses GPS and can be implanted in humans. (The use of GPS in such an implantable chip represents a significant advancement of such PLD's in that it does not require the subject to be confined within a specific area such as with the RFIP chips mentioned above and the subject does not have to be within a certain distance from a magnetic reader in order to have their ID recorded) After announcements that the company had begun to test a prototype resulted in a barrage of protest and concern regarding the potential uses for such a device, the company retreated from further public discussion except for issuing numerous denials that it was planning to unveil such a device. On May 13, 2003, the company announced that it had "created and successfully field-tested a prototype of a GPS implant for humans".[23]

When analyzing the potential costs and benefits of such devices, the need for public awareness is revealed, and the risks do not lie solely with the individual, but also for with government and industry. Consider cases involving Acme Rent-a-Car, Payless Car

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[20] Ibid.
[21] Shelenbarger, "Can Technology".
[22] McHugh, Josh. "A Chip in Your Shoulder: Should I get an RFID implant?", November 10, 2004, http://slate.msn.com/id/2109477/
[23] Gossett, Sherrie. "GPS Implant Makes Debut: Company field tests prototype used to track movements of human host", WorldNetDaily, May 14, 2003. Http://worldnetdaily.com/news/article.asp?ARTICLE_ID=32572

Rental, and Budget Rent A Car in the US all of which have received media attention that has been, though not plentiful, scandalous. The high profile tracking case of Acme in New Haven involved the company imposing $150 fines on customers every time they drove above 79 miles/h for more than 2 minutes.[24] Another case describes how a client who rented a Ford Escort from Payless returned from a 12-day road trip to be charged with a fine of $3,405.05 as a result of crossing state lines, and thereby violating his contract with Payless. The Budget case is similar: at least four customers were billed $1 a mile for every mile driven beyond state lines. [25] These cases illicit all kinds of questions and privacy issues, including: Who, if anyone, can profit from the tracking of individuals? Can individuals be tracked without their knowledge or consent? How should this use of technology be communicated to the customer or consumer? Are there legitimate justifications for the use of such devices by companies such as Acme? As Neil Abrams, an auto rental consultant is quoted as saying: "When you put a perfect stranger in a $30,000 vehicle, you have to protect yourself".[26]

There are also plenty of examples from Canada. An article in the London Free Press opens with "Big Brother could be watching your every move as you drive".[27] As the author proceeds to discuss the Canadian decision of Regina vs. Gauthier (2003), it is hard not to feel insecure and violated as you step into your own car. Gauthier, who had been speeding at 131km/h in a 50km/h zone when he was in an accident, was unaware that there was an EDR (Event Data Recorder, also known as a 'black box') in his car that could record several seconds of data such as speed before an accident, and that could be used in court. (for further information on this and other legal cases involving EDR's see page 26) Another article in The Toronto Star takes the opposite approach, appearing to advertise the benefits of the new Autograph Program being tested by Aviva Canada Inc, the largest insurer of Ontario automobiles to determine the success of a monitoring device in determining insurance costs: "Are you a low mileage driver? Do you avoid driving a rush hour, or on weekend nights? Do you keep your speed under 120km per hour on the highway? Then you could be a candidate to save up to 25 per cent on your auto insurance – if you choose to give up some privacy about your lifestyle".[28]

There is a pattern of media coverage when new surveillance technologies appear. A quite polarized debate of claim and counter-claim leaves the public confused about the balance of risks and benefits. This analysis attempts to advance the debate and fill that void.

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[24] Elliott, Christopher. "Some Rental Cars are Keeping Tabs on the Drivers", The New York Times, January 13, 2004, http://www.nytimes.com/2004/01/13/business/13gps.html
[25] Ibid.
[26] Ibid.
[27] Canton, David. "Cars May Inform on Bad Drivers", London Free Press, October 16, 2004, http://www.canoe.ca/NewsStand/LondonFreePress/Business/2004/10/16/671216.html
[28] Daw, James. "Device Records Driving Habits", The Toronto Star, October 14, 2004, http://www.thestar.com

THE ACADEMIC ANALYSIS

Unfortunately, the state of academic analysis is not sufficiently developed to gain a better purchase on the privacy risks of mobile technologies which can be of practical use. An immediate problem is a conceptual one. The words "mobile" and "mobility" have entered the literature without adequate definition, and on the basis of an uncritical assumption that a new technological paradigm is upon us. Thus, Katz and Aakhus concluded that, "Although quiescent now, the privacy/monitoring issue could become of paramount importance to the future of human rights".[29]

Clarke has proposed four different meanings when mobile technologies are discussed. First, devices may be 'mobile' in the limited sense of being able to be "in a different location at any given time from that in which they were at one or more previous times." Second, the term 'mobile' could mean that "a device could be anywhere, or, more carefully expressed, a device might be in any location from which transmission to another device is possible." A third interpretation of 'mobile' is in "the more substantial sense of currently moving relative to the earth's surface, but nonetheless capable of sustaining data transmission, e.g., as a passenger in a plane, a train, a taxi, or a car, or, less safely, as the driver of a car." A final sense of the term "is to refer to devices that are designed to be easily and conveniently portable, and to rely on wireless transmission, possibly to the extent that they do not support cable-based connections."[30]

Much of the academic literature on surveillance, location and mobility is interested in larger problems than that related to the protection of personal information and the reduction of privacy risks. Indeed, there are many sociologists and communications experts who would explicitly contend that privacy is *not* the antidote to surveillance.[31] The discourse and policies of "privacy" fall far short of addressing the challenges of contemporary surveillance, Lyon argues.[32] There are four elements to Lyon's argument. First, privacy policy echoes rather than disturbs the classification and sorting of individuals as "disembodied abstractions." It reinforces individuation, rather than community, sociability, trust and so on. Second, privacy is conceived frequently as a "means of compensating for human errors and computer failures"; it tends to get conflated, in other words, with system and data "security." Third, privacy protection policies are "cumbersome and unresponsive" to the rapidity and diversity of technological change. At root, privacy claims tend not to see surveillance as a social question, but as a problem that can be addressed by properly implementing the fair

[29] James E. Katz and Mark Aakhus (eds). Perpetual Contact: Mobile Communication, Private Talk, Public Performance. (Cambridge: Cambirgde University Press, 2000) p. 302.
[30] Clarke, Roger. (2002) "Wireless Transmission and Mobile Technologies," at: www.anu.edu.au/people/Roger Clarke/ EC/WMT.html
[31] Stalder, Felix. 2002. "Privacy is not the Antidote to Surveillance", Surveillance & Society 1(1): 120-124, www.surveillance-and-society.org
[32] Lyon, David. Surveillance Society, Tim May (ed), Open University Press, 2001, p150.

information principles doctrine in relation to the personal data on discrete individuals. These criticisms have been echoed by other sociologists of surveillance.[33]

Much of the more recent literature on mobility and location echoes the need to see surveillance in far broader contexts.[34] Many are interested in how new surveillance techniques are changing the nature of place and space, and how, this affects questions of social trust [35].. Others have researched how the tracking of mobile devices normalizes relations between the watchers and the watched and how individuals can use their mobile devices to assist in their own surveillance as well as to resist it.[36] New surveillance technologies bring sharply into focus the important theories of people such as Virilio[37] or Castells[38], interested no less in framing macro-level theories about modernity and post-modernity.

Just as there are concerns about the utility of the concept "privacy" there are also profound debates about the limitations to the concept of surveillance, which has been expanded to embrace any capture of personal information, whether identifiable or not, and whether having positive or negative implications for the individual.[39] There is, however, an important distinction between the routine capture of personal data and the subsequent analysis of that data for the purposes of making a decision about that person.[40] The routine capture of personal data is a feature of modern societies whenever we book an airline ticket, make a credit card purchase, reserve a hotel room, surf the Internet and so on. But the everyday capture and storage of such data is qualitatively different from the use of that data to determine whether the person should or should not fly, would or would not be a credit risk, will or will not be able to pay your hotel bill, or may or may not be downloading child pornography. The analysis of the risks of surveillance needs to be sensitive to the distinction between the routine capture of data and the subsequent use of that data. The concept of "surveillance" conflates these two distinct processes.

The analysis of "mobile" technologies also needs to remain sensitive to this important distinction. There are a wide variety of "mobile technologies" that are portable, that rely

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[33] See Rule, J. , McAdam, D., Stearns, L. and Uglow, D. (1980), The Politics of Privacy: Planning for Personal Data Systems as Powerful Technologies, Elsevier, New York; Gandy, O. (1993), Panoptic Sort: A Political Economy of Personal Information, Westview Press, Boulder, CO; Marx, G. (1999), 'Ethics for the New Surveillance', in C. Bennett and R. Grant (eds), Visions of Privacy: Policy Choices for the Digital Age, University of Toronto Press, Toronto, pp. 38-67.

[34] Bennett and Regan, "Mobilities".

[35] John Urry, Sociology Beyond Societies: Mobilities for the Twenty-First Century (London: Routledge, 2000)

[36] Nicola Green, "Who's Watching Whom? Monitoring and Accountability in Mobile Relations" in Baary Brown, Nicola Green and Richard Harper eds. Wireless World: Social and Interact ional Aspects of the Mobile Age (London: Springer, 2001)

[37] Virillio, Paul. Speed & Politics, Semiotext, 1986.

[38] Castells, M. (1996), The Rise of the Network Society, Blackwell Publishers, Oxford.

[39] Lyon, Surveillance Society.

[40] Bennett, Colin J. (2005) "What Happens When You Buy an Airline Ticket (Revisted), Prepared for the Workshop on "State Borders and Border Policing", Aug 20-22, 2004, Kingston Ontario.

on wireless transmissions and that may be used to communicate from any location to another device. But none of these interrelated definitions implies *per se* that the location, less still the identity, of the user is necessarily known. This surveillance potential requires a further convergence of technology, standards-setting and organizational interests to produce what has come to be called, "location-based services" (LBS). That convergence has begun, but it is no means complete. The combination of cellular technologies, geographic positioning systems (GPS) and mapping products has produced a number of new applications designed to assist consumers, employers, parents and others "locate" individuals and objects in real time.

This study will not be examining products that are not at some level available to Canadians. It will not examine the extensive and complex world of human implant technology, and "wearable computing" because these products are sufficiently under-developed to reach any sound conclusions about their privacy implications. The study will exclude from the analysis video-surveillance technologies, including webcams and camera phones, even though these are now inherently "mobile" in character. For the purposes of this project, of interest are technologies currently available in Canada that can enable an individual or an organization to determine precisely where an identifiable individual may be located at any given time. A lengthy, but by no means comprehensive, list is included in Appendix One.

Privacy might be a fundamentally flawed, ambiguous, and culturally specific concept, but it is the only ethical formulation through which regulation and resistance might currently be framed in Canada. Regardless of technology, regardless of organization, who are the kinds of people that are currently at risk of having their actual location tracked at any given time, and thus their privacy invaded? The following framework provides at least a starting point for the analysis of these important questions.

The People at Risk

Those in Emergency

In order to understand the current risks for people using a wireless device to place a 9-1-1 call, some historical context is in order. Canada has a similar system of primary and secondary Public Service Answering Points (PSAPs), sometimes called Central Emergency Reporting Bureaus, funded and operated by municipal governments. Primary PSAPs serve to screen calls and to route them to the appropriate secondary PSAPs operated by the respective fire, police and ambulance services. So when a customer dials 9-1-1, the wired carrier being used, transports the call to the dedicated switch operated by the Incumbent Local Exchange Carrier (ILEC).[41] This kind of basic service has been in existence in Canada since the mid-1970s, although the pace of development has varied from region to region. As more sophisticated telecommunications services developed, a second generation of 9-1-1 service emerged

[41] The main ILECs are Bell (operating in Ontario and Quebec), and Telus (for BC and Alberta). Until the late 1990s, all incumbent local exchange carriers were represented by a common trade association, known as Stentor.

in the mid-1980s. The so-called "Enhanced 9-1-1" service permits the transfer of Automatic Number Identification (ANI) and Automatic Location Identification (ALI) to the PSAPs. With call-back number and location information displayed on a video display terminal, emergency operators can still assist the caller where verbal communication was impossible, or connection was terminated. Over time, ANI data was matched against street addresses in the ALI database, and emergency personnel directed to the exact location from which the call originated. The ANI/ALI system had become "the benchmark feature of E9-1-1 across North America."[42]

In every region in Canada, however, the implementation of the ANI/ALI system was not without difficulty as there were "underlaps" and "overlaps" caused by the wide variety of addressing systems used by local communities, and the fact that these systems rarely conformed with the addressing and billing information held by the respective ILEC.[43] Thus, some addresses fell through the gaps and had no access to 9-1-1 service. Other addresses fell into more than one 9-1-1 region, causing confusion as to the closest emergency dispatch center. Moreover, the cost for 9-1-1 had always come from the property tax base of local communities. The extra expense of administering an enhanced 9-1-1 system meant that the cost had to be passed along to subscribers, raising the question for the ILEC of who to bill when the telephone exchanges and municipal boundaries were not consonant.

A third generation of E9-1-1 emerged in the early 1990s, therefore, as a result of the need to standardize the addressing system for emergency response services and to deal with billing anomalies. The Public Emergency Reporting Service (PERS) is a cooperative effort by the ILECs and local municipalities. In Ontario, for example, local governments essentially apply to the ILEC (Bell Canada) to be included in the 9-1-1-PERS system. In return, Bell requires that all streets are numbered in a consistent and accurate format. The system requires that every household shall have an address, and every street a name. Therefore, the address, rather than the phone number, drives the PERS system and the boundary conflict problem is hopefully eliminated Of course, as a result of historical accident, municipal reorganization, or amalgamation, there may be duplicate street addresses in some communities So when a municipality decides to introduce 9-1-1 PERS, it must ensure that each household or business is assigned a unique civil address – a number, a street name, a street suffix, and in some cases a directional indicator.[44]

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[42] Gow, Gordon. 2002. "Territorial Boundary Crossing and Regulatory Crossroads: The Case of Wireless Enhanced Emergency (9-1-1) Service in Canada." Paper delivered to the Third Wireless World Conference, University of Surrey, July 17-18, 2002.

[43] Personal interview with Judy Tottman, Regional Manager 9-1-1 Service, Bell Canada. August 16, 2002. .

[44] See for instance, the efforts by the City of Kingston to convince residents of the benefits of 9-1-1-PERS: "Therefore, in order to proceed with the application to improve emergency services for the Kingston community, 131 civic addresses have been identified to be changed to reflect numbering standards acceptable to Bell Canada. The City of Kingston is prepared to offer as much support and clerical assistance as possible to ensure this transition a smooth one. If your address is affected by the this you will receive a "change in address" package that includes a voucher towards the purchase of new civic address numbers for your home and other helpful information to get you started, such as most frequently asked questions, change in address forms and contact information

Once the municipalities have drawn new maps based on a standardized street address, they then add the location and coverage area of emergency response dispatch centers. These maps may arrive with Bell's 9-1-1 Service office in a variety of digitized, or non-digitized, forms. Bell then digitizes in standard format, and overlays the telephone number, and an Emergency Service Number (ESN) that is associated with a clear Emergency Service Zone, and enters this information into its 9-1-1 routing system. Thus there should be far less confusion about the location of the closest emergency dispatch center, as the ANI/ALI database has been standardized, and supplemented with vital information about the location of emergency response services.

These three stages of enhanced 9-1-1 service have progressed in Canada regardless of the problems associated with making 9-1-1 calls from a cellular phone. Yet, as is the United States, the E9-1-1 system quickly exposed the distinction between wireline calls with ANI/ALI capability, and wireless calls which had no enhanced capability at all. The policy problem in Canada is neatly expressed by this advice leaflet from the Canadian Wireless Telecommunications Association (CWTA):

> When you call 9-1-1 on your home telephone, your call is sent to the nearest emergency response centre. In many locations, the E9-1-1 network also passes along your telephone number and address so a 9-1-1 operator can call you back, if necessary, and help can be sent immediately to your exact location. Unlike your home telephone, mobile phones generally do not pass along the telephone number or any other customer information when you make a call. This means that, when you call 9-1-1, you have to give your complete number to the E9-1-1 operator – including your mobile phone area code. This is important because the operator may have to call you back if you are disconnected. In addition, you have to tell the operator, as best you can, exactly where you are. Remember, your mobile phone can be used anywhere service is available. Only you can provide your precise location or the location of the emergency."[45]

This problem with wireless calls was recognized from the genesis of the 9-1-1 PERS network. Only in the mid-1990s, however, did the Canadian PSAPS voice strong concerns. Although the problem was initially debated within the CRTC's Canadian Industry Steering Committee (CISC), the CRTC was unwilling to take the kind of strong interventionist stance as did the FCC in the United States. So the issue migrated to the trade association of the wireless industry, the CWTA. Since 1997, an E9-1-1 Working Group has been working under the auspices of CWTA. This group includes membership from the four major cellular providers in Canada (Bell Mobility, Telus Mobility, Rogers Wireless), from police departments, and from other representatives of the PSAP community. A member of the CRTC maintains a watching brief.

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for some of the common government agencies, organizations and household service providers." Available at: http://www.city.kingston.on.ca/residents/emergency/9-1-1/index.asp.

[45] Canadian Wireless Telecommunications Association. "E9-1-1 Health and Safety Issues" Available at: http://www.cwta.ca/safety/E9-1-1/health-9-1-1.php3.

The main approach of this committee has been to organize and monitor trials. The first occurred in Calgary, Alberta from October 1999 to April 2000, largely as a result of a technical proposal submitted by Telus, the ILEC in the West. Four wireless service providers participated in the trial, which tested the interconnection between the provincial 9-1-1 platform, operated by Telus, the wireless carriers and the PSAPs. This enabled the delivery of information relating to the location of the wireless antenna receiving a 9-1-1 call, as well as the 10-digit telephone number of the mobile subscriber placing the call. This functionality is equivalent to what the FCC established as part of its "Phase I" requirements.[46] The results demonstrated that the technical solutions could be applied in any other province with a similar E9-1-1 PERS delivery platform. However, the limited trial area and the involvement of only one PSAP meant that the delivery of call-back numbers to secondary PSAPs, and the associated routing issues, could not be properly examined.

A second trial was therefore initiated in Toronto and North York in Ontario, a potentially more complex urban environment, involving more than one primary PSAP. The trial participants were Toronto and York region PSAPs, Bell Canada, and four wireless carriers (Bell Mobility, Rogers Wireless, Microcell and Telus Mobility). The goals were to interconnect wireless carriers to the existing 9-1-1 PERS platform, to display the 10-digit wireless Call Back number and cell site/sector identification, and to transfer information to secondary PSAPs. Technically, this process required the establishment of a separate, routable and non-dialable Emergency Service Routing Digit (ESRD) which assigns a ten-digit number to each cell-site/sector. The ESRD is then delivered to the ALI database where it is cross-referenced with street address. So when a customer dialed 9-1-1 on a wireless phone, the PSAP received both the wireless customer's 10-digit call-back number, as well as the 10-digit ESRD. The display of the ESRD, and the associated cell site sector address, is then used by the emergency personnel to identify the location of the originating cell site or sector where the 9-1-1 call entered the wireless network, using the existing ANI/ALI display terminal[47].

The trial exposed some technical complications relating to the existing voice, data and database technology and architecture and particularly the signaling arrangements between different switching technologies. The trial found that the routing of wireless 9-1-1 calls had improved, but not without some problems associated with the misrouting of calls to the wrong PSAP. False call-back numbers from unsubscribed handsets also continued to plague the system. But these are difficulties inherent in the mobile character of the technology. Callers may travel between several cell sites by the time the call is initially made, and the emergency dispatch is initiated. Moreover, the call sector may not necessarily be the nearest to where you are when the call is made; calls are rerouted when one sector is very busy. On the positive side, there was clear evidence that the combination of cell site address, call-back number and other information allowed emergency response teams more accurately to pinpoint location

[46] Alberta E9-1-1 Advisory Association. "Alberta Wireless 9-1-1 Trial Report" Available at: http://www.cwta.ca/safety/E9-1-1

[47] Gow 2002, p. 9

and, in some instances, to save lives. The system also allowed PSAPs to identify abusive, frivolous or mistaken callers more effectively.[48]

As a result of the success of this trial, Wireless E9-1-1 is now available as a commercial tariff in most provinces, in conformity with a CRTC decision in 2001 that allowed Bell Canada to charge all WSPs a monthly rate of $0.02 for each of its wireless working telephone numbers equipped with outward calling, so that they might access Bell's 9-1-1 PERS network.[49] No doubt implementation would be speedier if the PSAPs and the wireless carriers could have resolved a contentious dispute over the provision of subscriber records. Public safety agencies have sought wireless subscriber records, and want the ALI database to include the home or business address of all wireless customers. The wireless carriers have also protested that such subscriber information is going to be very misleading in ascertaining the location of a wireless caller. Subscriber records are also notoriously unreliable given that many cellular phone customers buy prepaid packages, and have no incentive to provide accurate names and addresses for billing purposes. In one of its only interventions on E9-1-1 questions, the CRTC has ruled, in a decision regarding Microcell, that in an emergency, subscriber records could be of value to PSAPs.[50] But there has been no general ruling that these records should be provided as a matter of course.

Few carriers, however, are able to transmit exact location coordinates to PSAPs – the "Phase II" process mandated by the American FCC. There have been extensive debates about the relative merits of most effective locational solution; through a handset-based GPS chip, or a triangulation method, or a combination of both. From a technological perspective this requires that wireless providers find a way to communicate the geographic location of a cell phone with some degree of accuracy. Wireless companies, equipment manufacturers, emergency response providers, and companies that offer locational solutions have been actively engaged with this issue.[51] Phase Two implementation will no doubt bring many benefits for the emergency response communities. On the other hand, the investment in infrastructure by the PSAPs is likely to be enormous. A further trial is now underway in Toronto to analyze the technical issues with Phase II implementation, but the technical complexities are enormous. GPS technology is adequate to pinpoint location is the wireless device user is outdoors, but there are enormous difficulties if the caller is located within a tall building. Many 911 calls are also made by individuals who are in motion, driving along Highway 401 in Toronto, for example. In this instance, therefore, the caller may be moving not only between different "locations" but also between different cell towers.[52]

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[48] Ontario 9-1-1 Advisory Board. "Wireless Enhanced 9-1-1 Trial Report" Available at: http://www.cwta.ca/safety/E9-1-1/

[49] CRTC Order 2001-902. December21, 2001. Available at: http://www.crtc.gc.ca/archive/ENG/Orders/2001/o2001-902.htm

[50] CRTC Order 2000-831. September 8, 2000. Available at: http://www.crtc.gc.ca/archive/ENG/Orders/2000/O2000-831.htm.

[51] See for example: www.cell-loc.com www.triangulation.com www.globallocate.com

[52] Interview with Michael Widmer, Bell Mobility, March 3, 2005.

Bell Mobility has begun to offer enhanced E-911 services are part of its "MyFinder" package of services. For a small fee, consumers can choose to have their location transmitted to PSAPs when they call 9-1-1 allowing for faster emergency response times and providing the operator with crucial callback information should the call be disconnected. For the reasons provided above, however, the locational data is often likely to be imprecise. In its present stage of Phase I, the system may only be able to locate the customer within a general area of 1,000 meters more or less, or not at all depending on the strength of the GPS and cell phone signals in that area. (According to Bell, when Phase II is complete, a caller's location will be pinpointed to within an area of 150 meters).[53] Bell Mobility states in their pamphlet on Cell phone Features: Safety and Directory Services: "Service accuracy may vary by location. Cell tower technology can only be provided to 9-1-1 call centers that are capable of supporting this feature".[54] The service is a free enhancement included in the 9-1-1 access fee of $0.25.The Bell Mobility Privacy Policy also provides a series of "opt-in" options for the transfer of these data.

MyFinder allows customers to receive location specific information through their mobile browser service. MyFinder find's the location of the user's mobile device and then provides personalized directions and information on nearby locations and services, such as hospitals, restaurants, gas stations, etc. The program can provide the specific address and location of the requested destination as well as the expected distance and time of travel to get there by vehicle or foot. Used in conjunction with the MapMe software application, users can view a live, real-time map of where they are, zoom in/out, pan in all directions, display street names, and get step-by-step directions to almost any point of interest. Roadside Assistance" and "#TAXI" are additional services that use GPS and cell tower technology to locate customers and send roadside assistance or taxi service as quickly as possible. Roadside Assistance is accessed by dialing #RESCUE win Canada from most Bell Mobility handsets and devices and costs $5.00/month for 5 service calls per year as well as additional services such as up to $50 toward towing charges. #TAXI is accessed by dialing #-T-A-X-I from a Bell Mobility cell phone and finds the first available Taxi based on the caller's location for $1.25 per call.[55]

So far, the Canadian community of privacy commissioners and advocates has rarely contributed to this debate. It can be seen, however, that the important public safety considerations articulated by the PSAPs is driving a good deal of the commercial decisions of Canadian wireless carriers. Furthermore, the particular method of implementation has specific privacy implications, including whether or not the disclosure of locational information is limited to 911 calls, whether anonymous 911 calls are possible, and whether locational data, once disclosed to 911, are subject to secondary

[53] "Finder Services", Bell.ca.
[54] "Customize Your Phone", pamphlet on Cellphone Features: Safety and Directory Services, Bell Mobility, 2004.
[55] Ibid.

use.[56] A host of interrelated concerns are informing the standards-setting process in Canada, and will thus structure the conditions for the collection of personal information.

Mobile Workers (truck drivers, postal workers, couriers, etc)

Any employee with a cellular device is susceptible to having his/her actions and movements monitored whether he/she is at home, on an airplane, and of course in a company's vehicle. A variety of products are now available for the surveillance of the mobile workforce. Tracking devices are fast becoming an essential component to any business that requires the management of a large workforce over a large geographic area. By tracking its mobile workers, companies can increase productivity, save time and expenses, minimize downtime, optimize vehicle utilization, reduce mileage and man hours, secure mobile assets, and reduce mileage costs.

Trackem, for example, provides a solution using GPS, geo-fencing, and Mapquest, giving the employers the ability to track workers or vehicles with Motorola handsets. As a Java Application added to the handset, the system requests the "position" details (data) from the GPS in the wireless phone. This information is transmitted to the Trackem servers every 2 minutes during a "network ping" and manipulated by servers into legible maps, reports, distances & mileage logs, speed metrics, direction, location and more. The data can be requested securely via the Handset or the Internet. Trackem can be turned OFF by end user via the Handset. Motorola i58sr handsets can be hard wired into vehicles and used as "black box" to transmit data.[57]

Another service is provided by a company called FleetBoss whose Global Positioning Solutions uses GPS receivers and fleet management software to "provide vehicle tracking and information to increase productivity, efficiency and profits."[58] FleetBoss claims to: 1) lower fuel bills, 2) increase fleet productivity, 3) reduce overtime and billing errors, 4) stop unauthorized vehicle use, 5) improve asset safety and liability, and 6) elevate customer service. It is claimed that these products can lower fuel bills, increase fleet efficiency, raise fleet productivity, control moonlighting, eliminate theft, monitor speeding, reduce accidents, identify unauthorized vehicle use, verify billing time and even be of benefit to employees:

> The Boss fleet management system "builds character" for fleet drivers who tend to drift from the desired routes and procedures of management. With The Boss system, you'll be able to see who is driving, where and when they are going and for how long. As a result, the "meeting after the meeting" is cancelled, your fuel bills go down, the excuses go away and productivity rises because side trips and

[56] Gow, Gordan A. and Mark Inhat, 2004. "Prepaid Mobile Phone Service and the Anonymous Caller: Considering Wireless 911 in Canada," Surveillance and Socety Vol 1, Issue 4 at: http://www.surveillance-and-society.org/articles1(4)/anonymous.pdf

[57] http://www.trackem.ca/index.htm

[58] http://www.fleetboss.com/

non-service stops become a non-issue. With the ability to always "ride" with your drivers using The Boss fleet management system, you can monitor who, what, where and when your vehicles and tools are supposed to be used. Do you think your vehicles and tools might last longer? How much money are you losing from moonlighting? How else would you know?[59]

CES Wireless Technologies[60] offers fleet solutions with real time vehicle transfer data without monthly service fees. Products and services include:

- Mobile Messaging & Vehicle Status Terminals
- Seamless Work Order and Back Office Processing
- Vehicle Tracking Systems
- GPS (Global Positioning System)
- AVL (Automatic Vehicle Location)
- Mapping & Dispatch Software
- Multiple Client/Workstation Software
- DTMF Microphones - Commercial and Heavy Duty
- Telephone Interconnect - Repeater Maker
- CTCSS Encoders and Decoders
- ANI Modules (Automatic Identification Systems)
- OEM and Custom Product/Software Development
- Project Management & Consultation

Atlas Track, a product by Networks in Motion (NIM) that works with GPS and Nextel's wireless network allows business to monitor their employee's whereabouts by having employee's use their mobile phones to send messages to the home office as often as once a minute. This allows the dispatcher to then identify the location of the phone and whether it's stationary or moving, pull up maps that show the current location of all employees, 3) get a map of route traveled by a particular worker, the specific address he/she visited, the vehicle speed at any given moment, and receive an automated warning whenever a driver is stuck in traffic or speeding. Used with AtlasBookMobile, this product would also be able to assist with navigation.[61]

Trimble Mobile Solutions, Inc. offers TrimView Ready Mix Fleet Management Solution. The system includes hardware, wireless connectivity, software and service to enable fleet managers to use real-time vehicle location and status to improve dispatch decision making. Below is an example provided by Trimble of how their tracking solution can improve a company's efficiency:

[59] www.fleetboss.com (accessed November 2003)
[60] http://www.ceswireless.com/
[61] Finkle, Jim. "GPS tracking via cell phones a new ally for managers", The Orange County Register, Santa Ana, California, June 29, 2004. Http://menafn.com

> To be efficient, ready mix concrete dispatchers must constantly check incoming customer orders against concrete production and delivery capacities. Historically, truck drivers have used radio, cell phones, or push button status boxes to send information to dispatchers. The problem: drivers must provide status updates manually, and do it consistently. Often the dispatcher receives incomplete or inaccurate information from the field. The TrimView RM fleet management system solves this problem by using GPS technology and sensors to automate the delivery cycle. Dispatchers no longer need to depend on drivers for timely status information. Instead, they receive automated information via the Internet including: truck status when loading at the plant, leaving the plant, arriving at the job, adding water to the concrete, starting/ending the concrete pour, washing the vehicle, leaving the job, and arriving at the plant to complete the delivery cycle. The TrimView RM fleet management system automates the entire process.[62]

Canadian companies are also offering similar products. Tailwind Management Systems, Inc, based in Victoria, BC offers TAILWIND Carrier Management System software for truckload operations and freight brokerage companies. In addition to managing all aspects of a transport carrier's operations and administration, the Elite version provides GPS tracking to increase productivity, efficiency, and profitability.[63]

Another Canadian business is AirIQ, which has clients that now include most of the major rental car firms in North America, owners of commercial transport fleets and service companies that operate a "mobile workforce" facilitating the dispatch of routing of calls. Very simply, a location device (AirIQ Onboard), comprising a computer processor, GPS receiver and wireless transceiver, is installed into each vehicle and keeps track of where the vehicle is (generally within 100 yards), what direction it is going, what speed it is traveling, and records and reports additional vital information. The GPS transmits data to the onboard receiver, determines a latitude and longitude "fix", and calculates the differences in fixes to determine the speed and direction of the vehicle. By pre-selecting parameters, clients choose the circumstances under which a vehicle will report. This information is then transmitted by wireless networks to the AirIQ Network Operations Center in Toronto. Clients can view and access their own fleet information on digitized maps at the password protected site (www.AirIQonline.com) by using a standard Internet browser. For commercial transport fleets, customers can manage driver behavior more effectively, locate vehicles, predict shipment arrival, inventory vehicles, provide automated maintenance reminders and retrieve lost or stolen vehicles. For service companies, the products are customized to allow fleet managers to increase efficiencies by ensuring that "the right person gets to the right place at the right time".

The corporate publicity states that "AirIQ develops mobile asset and workforce management solutions to rental vehicle fleets, commercial transport fleets and service companies…AirIQ empowers companies to manage and protect mobile resources (people and vehicles)."[64] For

[62] http://www.trimble.com/news/031505d.htm
[63] www.tailwindys.com
[64] www.AirIQ.com

commercial transport fleets, customers can manage driver behavior more effectively, locate vehicles, predict shipment arrival, inventory vehicles, provide automated maintenance reminders and retrieve lost or stolen vehicles. For service companies, the products are customized to allow fleet managers to increase efficiencies by ensuring that "the right person gets to the right place at the right time".

Additional companies that utilize dedicated in-vehicle GPS systems to keep track of its vehicles include Digital Dispatch Systems Inc. of Vancouver which is utilized in taxi companies and Grey Island Systems, Inc. based in Toronto. Its Interfleet system displays the movement of vehicles on a secure website and creates reports on the details of fleet operations, such as an individual vehicles speed, direction, etc.[65]

These and other applications are currently being deployed by many companies that have an interest in managing their "mobile workforce": commercial fleet operators, taxi and limousine companies, courier and postal services, janitorial services, and so on. Potentially millions of "mobile" employees are now susceptible to more intensive and extensive surveillance, about which they may have little knowledge and control. Much of the initial analysis has focused again on consumer applications, with particular attention to the feasibility of "m-commerce." There has generally been less attention paid to the employer-employee relationship. Yet, any employee with a cellular device is susceptible to having his/her actions and movements monitored whether he/she is at home, on an airplane, and of course in a company's vehicle.

There are, of course, inherent limitations to onboard telematic technologies. Because these systems utilize wireless technology to communicate to and from the vehicle, the vehicle must be within cellular coverage to communicate; cellular covers approximately 95% of populated North America and some remote rural areas are still outside normal cellular coverage. Additionally, the GPS receiver must have a direct line of sight with the satellites to provide accurate location information; communication in cities with tall skyscrapers therefore poses difficulties.

Employee rights advocates in the US are increasingly raising privacy issues that arise with the use of such technology. Largely as a result of a U.S. mandate requiring wireless companies to have all cell phones installed with GPS capabilities by December 31, 2005, (initially intentioned to assist emergency personnel response) as well as increasingly accurate GPS technology, employee-tracking devices are growing exponentially. "Anti-GPS" language has begun to emerge in the collective bargaining contracts of some unions. There are several states that are considering implementing bills that would require employers to disclose information regarding the use of such electronic location monitoring systems. Although it appears as though employers are already getting used to the idea of being tracked – the International Brotherhood of Teamsters has been quoted as saying "The technology is useful, because it can improve the services a company provides its customers. We want to assist companies

[65] Buckler, Grant. "GPS Tracking More Affordable for Small Business", CTV.ca, June 23, 2004, http://ctv.globetechnology.com

with those purposes" – from an employee rights advocate perspective, the lack of federal or state law and privacy guidelines is disturbing. The president of the National Workrights Institute, Lewis Maltby, explains that the potential for abuse in the absence of privacy policies should be of paramount concern. [66]

Examples of potential problems are already emerging in the US. Chicago city employees agreed to carry geo-tracking phones only after their unions won concessions that allowed the workers to shut off the tracking features after work and during lunch time. In 2003 the Massachussetts state highway department faced a potential strike by snowplow drivers during the most crucial time of year when they proposed the use of GPS cell phones to monitor its independent contractors. The drivers eventually conceded. A representative from the Privacy Rights Clearinghouse in San Diego has made the following statement regarding the use of employee tracking devices: "There are good business reasons for using it, but it must be coupled with a very robust privacy policy".[67] Canadian unions appear to have been slower than their US counterparts in challenging this aspect of employee surveillance.

In the employment context, Lyon argues that the worker is now expected to be geographically mobile, and willing to work variable hours. "Work has become more individualized, and so have surveillance methods".[68] The workplace is defined less in spatial terms (as a place where all workers have one roof over their heads), but in terms of surveillance. You are in the workplace, where and when your activities can be monitored. And due to the availability and relative cheapness of new surveillance methods, those occasions and places are increasingly difficult to define.

The Elderly, Disabled and Health Care Patients and their Caregivers

The array of products that are marketed towards individuals in this category emphasize that their use will bring peace of mind, more accurate and faster treatment, and life-saving service.

Benefon's[69] GSM+GPS line of "Health and Elderly Care" products, for example, are advertised as being "extremely useful for elderly and disabled people because these people can now easily call for help if needed and service providers will be able to locate them".[70] The Benefon Seraph is described as a personal "guardian angel". Graphical user language, simple icons, and simple design make it user friendly and therefore suited for the elderly, person in distress, etc. Benefon Track One has these same features but can also be used as a normal mobile phone: "Benefon Track One is a

[66] "Car 54…(Use of GPS Units)", McGlinchey Stafford PLLC, July, 2004, http://www.mcglinchey.com
[67] Charny, Ben. "Big Boss is Watching", CNET News.com, September 24, 2004, http://news.com
[68] Lyon, Surveillance Society, p40.
[69] Benefon products are available in Canada from it's distributor Virtual Wave Inc. in Ottawa, OT. http://www.virtualwave.com
[70] http://www.benefon.com/usage_areas/health_elderly_care

state-of-the-art communication device with a combination of full feature Dual Band GSM Phone, high-performance GPS receiver and Mobile Phone Telematics Protocol (MPTP)". It contains a "BeneGuard" alarm button for activating emergency protocol and transferring user location to the alarm centre.[71] Benefon Life Line software is the user operated safety and emergency back-end solution that "guarantees that help can be sent fast to the right location".[72] The PC application is installed in a service centre where a service centre officer can see the location of patients on a map screen (provided by Tele Atlas) and provide the appropriate response. This relationship is diagrammed below:

(Diagram taken from www.benefon.com)

Another example of products available under this category is the Wanderless™ System (WS) produced by Locator Systems Corp. in Victoria, BC.[73] The WS is marketed towards care providers of Alzheimer's or Dementia patients who may wander, optimizing quick tracking/monitoring which allows the caregiver to monitor, locate, and safely return the patient home. In addition to the safety and security of the patient, WS also reduces stress and provides peace of mind for the caregiver. The system consists of: 1) Personal Locator Beacon (PLB), a lightweight, waterproof, durable transmitter that can be incorporated into clothing or accessories, (can include optional body temperature and heart rate sensors) and; 2) Receiver Handset and Antenna that can be used inside buildings or outdoors, and can monitor multiple patients by assigning a unique ID to each PLB. Using Radio Frequency Identification (RFID), the PLB's communicate with the receiver. WS advertises as an ideal system for institutional use, mobile and discreet, low cost, no wiring or installation, and peace of mind:

> An advanced yet simple-technology system that gives you added peace of mind in the event of a patient wandering. The system is so small that the wanderer and tracker can

[71] http://benefon.com/pdf/products/track_one/track_one_nt_brochure.pdf
[72] http://www.benefon.com/products/life_line/
[73] http://www.locatorsystemscorp.com

> enjoy 100% discreteness in its use. The discrete body-worn antenna and pocket-sized receiver are easy to use. This system saves precious minutes normally lost getting a search party together for a patient. You, the caregiver; can provide the first level of response and resolve wandering issues as soon as they happen, precluding the need for a search party. Furthermore, the system's forward-compatibility will allow it to "dove-tail" or integrate with advanced Search and Rescue networks being developed at the community level.[74]

The PLB-10, for example, is a brass tube construction of approximately 1x2.5cm and 20 grams, with a frequency of 146-220 MHz and a magnetic on/off switch. This rugged RFID has a 5km range, a 45 day life with a user changeable battery, and is submersible in water. The ideal applications for this device are advertised as a hiker or child safety beacon, asset location, car, bicycle, marine, sports location, and for people with Dementia or Alzheimer's. [75]

Such products are available not only for patients and the elderly, but also their nurses and home-care workers. Emergency locator devices are becoming more and more in demand in the public sector for lone worker protection in areas ranging from nurses and homecare workers to parking attendants. Home nurses, for example, are often in risky neighbourhoods alone at night, and may also be working with patients who may have problems or try to harm them, and therefore require emergency assistance.

Benefon is one company that advertises their products as "a solution for lone worker protection", giving workers "reassurance when they know that there is a service centre looking for them and being able to send them assistance if required".[76] The Orbis Cybertrak solution with Benefon Trak Pro NT handsets has a 24-hour alarm service which pinpoints the locations of home visitors and has a Beneguard emergency button on the handsets which connects to an emergency response team. Recordings of incidents can be used as evidence in a courtroom.[77] Benefon also advertises this and other similar products as essential for other such lone-workers as security guards, taxi drivers, police, etc.

Children and Teenagers

Teen car tracking is being advocated as a way to bring down the number of teenage fatalities in motor vehicle accidents, as well as an opportunity to lower insurance rates, recover stolen cars, and monitor the dangerous behaviour of teen drivers. There are several different types of teen car tracking devices including what can be called

[74] Ibid.
[75] http://www.locatorsystemscorp.com/documents/LSCproductlistAug04.pdf
[76] http://www.benefon.com
[77] Ibid.

"passive" systems and "real-time" devices which send data to a server, allowing parents to track the car on the internet. This system can also be used to send alert messages to the server or the parents cell phones when the driver has travelled beyond a certain distance or above a certain speed.[78] "The advantage of real-time systems is that you can know at every moment where your teen driver is and what his/her speed and driving direction are".[79]

Examples of passive systems without GPS are the Davis CarChip data logger, which is basically a black box that plugs into the car (post 1996 model) and logs trip details such as speed, acceleration, distance, date and time, etc. Different models log different number of hours. The RS-1000 from Road Safety is another example of such a device, however the RS-1000 sets off an audible warning alarm when operating in an unsafe manner, for example, at high speeds, failure to buckle up, etc. This data are then recorded which can be viewed later on a computer.[80] Examples of other passive systems with GPS are Travel Eyes2, the Shadow Tracker, and the Protrack Scout Data Logger from Alltrack USA. These devices can store travel data for up to 1200 hours, including information on speed, location, travel routes, miles traveled, where stops were made, etc. The data can then be downloaded to mapping software on a PC.[81]

An excellent example of real-time teen car tracking devices is the DriveTronics Co-Pilot Ultimate Driver Safety System. Easily installed in any vehicle, the device continuously monitors about 15 driving parameters for activities such as excessive speed, hard acceleration, hard breaking, hard cornering, turn signals, vehicle maintenance, vehicle idling, and other programmable inputs. "Forbidden zones" that the parents do not want their teenager to enter and "safety zones" that parents do not want their teen to leave can also be assigned. Curfews can be programmed to prevent the car from starting or to issue a warning if the vehicle is driven after a certain time of day. The system warns the driver with digital voice if any set parameter is violated. [82]

> The instant voice warning feedback to the driver helps to constantly train the driver every time he gets behind the wheel, and helps to prevent accidents because it lets the driver know to stop that action before it leads to an accident".[83]

All data and warnings are recorded and can be printed in detailed reports so parents (or companies) can identify high risk drivers. In addition, there is a "panic button" that reports the vehicles exact location, a built in satellite navigation system, and built in vehicle access control which can adjust driving rules automatically depending on different drivers or prevent certain drivers from starting the vehicle altogether. There are

[78] http://www.gps-practice-and-fun.com/teen-car-tracking.html
[79] Ibid.
[80] Ibid.
[81] Ibid.
[82] Ibid.
[83] http://www.drivetronics.com/driver_safety.htm

a multitude of other options and attachments, including a "stealth mode" which silences all warnings in the vehicle so the driver is unaware that his driving is being recorded.[84]

Other such devices are LockDown GPS from Advanced Tracking Technologies, the SafeParents.com Vehicle Location System[85], Tracker III GPS/GSM teen car tracking device from National Scientific Corporation, and The Car Guardian from Networkcar. (This list is far from exhaustive)

Other tracking devices for children or teenagers are cell-phones with incorporated GPS chips. With the Teen Arrive Alive (TAA) program, the teenager or child uses a Nextel GPS enabled cell phone loaded with the TAA program, then the parent can call the Locator Hotline or go to their online account on the TAA website to find out the child's last known location, what direction they are travelling in, and at what speed. Although only available on Nextel GPS enabled cell phones, area coverage includes major cities in Canada and additional carriers are planned to be added this year.[86]

uLocate Family Finder is another such device that uses GPS enabled cell phones (specifically requires Motorola phones i830, i730, i710, i88s, i58sr) with software and it operates with Nextel, Southern LINC, and Telus/Mike networks (Canada).[87] It allows family members to receive alerts when a child arrives at or departs from home, school, or elsewhere, and the locations can be viewed on the internet or mobile phone. Locations are transmitted from the phone every two minutes and data is stored for 90 days. "Improve family efficiency and safety – Peace of mind".[88]

Returning to the issue of cell phones and devices marketed towards locating children, As new mobile phones are equipped with locator chips – and currently Bell Mobility is the only service provider in Canada currently to offer GPS chips in all their new phones – questions should be raised about the longterm marketability of products such as those listed above. Bell Mobility has already unveiled several devices marketed at parents who can use them to track the location of their children. The "Kittyphone" has a locator chip and can be pre-programmed with emergency numbers so that children or disabled adults can easily call for help and be quickly located.[89] Bell Mobility president Michael Newman has proclaimed: "The implications of a product line like this are extraordinary", and "the future of location-based services is a very bright one".[90]

The rights of children and teenagers are rarely carefully considered within the relentless market drive to 'locate." A panel of very articulate and technologically proficient

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[84] Ibid.
[85] http://www.safeparents.com/track_teen_drivers/
[86] http://www.teenarrivealive.com/gpsprogram.htm
[87] http://www.ulocate.com/
[88] Ibid.
[89] Kapica, Jack. "Bell Pushes Tracking Technology", The Globe and Mail, April 14, 2004, http://www.globetechnology.com/servlet/story/RTGAM.20040414.gtkapicaapr14/BNStory/Technology/?query=privacy
[90] Kapica, "Bell".

teenagers at the 2005 Computer Freedom and Privacy conference expressed universal suspicion of tracking devices such as those listed above.[91]

Drivers and Vehicle Telematics

Analysts have coined the term "telematics" to describe the collective group of technologies that enables communication, information and entertainment services delivered to motor vehicles via wireless technology in real-time. The industry is complex, dynamic and impossible to categorize within any degree of precision. To date, the primary values have been confined to issues of safety through automatic accident notification and emergency assistance functions. A second set of concerns relate to security, with features such as stolen vehicle tracking, remote door locking and unlocking, and remote monitoring. A third set of applications relates to information services; most notable are the navigation systems that provide digital maps and dynamic route guidance. A fourth, and more futuristic set of applications lies in entertainment, although the market for onboard devices that allow web browsing, and movie watching, has not been proven (InCode Telecom, 2001, p.1). Vehicles have ceased to be simply a means of transport. They have become technologies which process information about the outside world for the benefit of the driver, and can relay information about the vehicle and the driver to other agencies.

Here is a selection of current examples.

DEAL OF THE MONTH!

StreetPilot III Deluxe
Newly Overhauled
Colour auto routing GPS, USB,
128MB card, voice, MapSource
CD(all of Canada,USA,Hawaii
& Puerto Rico) $499.00

(Advertisement taken from http://www.radioworld.ca/gps/magelln.php#rm700)

This is an advertisement for one of many products sold by Garmin through Radioworld dealers in Canada for GPS automotive auto-routing. The StreetPilot III with a Mapsource City Navigator CD-Rom (with all of Canada, USA, Hawaii & Puerto Rico included) is nicknamed the "over-the-road 'co-pilot'" and provides voice prompted directions, the nearest location of any interest point (including gas stations and

[91] "The Next Generation: Teens Speak Out," CFP, 2005, April 15, 2005.

restaurants), and access to the shortest and fastest routes, upcoming turns, estimated time of arrival and the like. Other such GPS auto navigation solutions by Garmin are the iQue series and the GPS-Map series.

Magellan offers a similar portable auto navigation device, RoadMate 300 and 700. Magellan Roadmate offers a built in Map database of US and Canada, and can be transferred from one car to the next. “Imagine having a personal assistant in your car, guiding you turn by turn, with a friendly voice and visual signals, even when you don’t know the address.”[92]

TomTom manufactures the TomTom GO and the TomTom GO+ which are similar to the Magellan Roadmate, however they also offer Navigator 2004, a Bluetooth GPS for Palm Wireless car navigation system which includes a wireless bluetooth GPS receiver. The Cobra Electronic Corporation sells NAV One, a similar portable navigation system for vehicles that contains route navigation, 2 million points of interest, a gyro that takes over in tunnels and underpasses when satellite signals are lost, a trip planner that stores directions for up to 10 destinations per plan, and more.[93] (See picture below)

(Picture taken from http://www.onstar.com/canada_english/jsp/index.jsp)

OnStar is another such solution. By combining GPS, an Advanced Automatic Crash Notification (AACN) system that uses Event Data Recorders (EDR, ie. Black Box), wireless telephone technology, and emergency service providers, OnStar is a fully integrated in-vehicle system:

> OnStar offers an unparalleled combination of safety, security, and convenience. Services to help keep you and your family safe while traveling. With 24/7 connectivity to a live Advisor, you have the peace of mind of knowing that when you need help, OnStar can pinpoint your location and quickly contact help on your behalf. With its simple push-button operation, OnStar is easy to use when you're driving.[94]

OnStar can provide and store directions, provide safety before, during, and after a crash, automatically call a telematics service centre when the vehicle is involved in a

[92] http://www.radioworld.ca/gps/magelln.php#rm700
[93] http://www.radioworld.ca/gps/cobra.php#navone
[94] http://www.onstar.com/canada_english/jsp/index.jsp

crash, assist authorities in locating stolen vehicles, remotely unlock doors, and records data before a crash (such as speed, brake application, etc.) which could then be used in court. By 2007, OnStar will be standard in the full range of GM retail cars, trucks, and SUVs in Canada and the US.

Mercedes-Benz Tele Aid is a similar system. Through a combination of GPS and wireless communications technology built into the vehicle, Tele Aid provides location specific security, information, and conveniences, roadside assistance and emergency aid, anti-theft customer alarm notification, and precise vehicle locating and stolen vehicle tracking. In addition, Tele Trek provides real time route assistance and voice delivered traffic updates.[95]

Event Data Recorders (EDR): The "Black Box"

Although EDR's known as "black boxes" do not allow for the sort of active tracking by GPS devices such as OnStar mentioned above, the prevalence of these devices as well as their increasing use in courtrooms as evidence necessitates a discussion of the devices and potential privacy issues. The EDR's function similarly to a Flight Data Recorder that has been used in the airline industry for over 40 years. Originally designed to improve vehicle safety, the device also records several seconds of data leading up to a crash, such as speed, acceleration, brake application, etc. [96]

In Canada there have been several cases where such data has been used in court to in an attempt to incriminate the vehicle driver: In the case of *Canada v. Daley*, 2003, EDR evidence was accepted in a Dangerous Driving Causing Death charge. The EDR of a 2000 Pontiac Sunfire showed a speed of 124Km/h in a 60 Km/h speed zone and the charged individual was found guilty.[97] In the case of *Canada R. v. Gauthier*, 2003, the EDR in Eric Gauthier's Pontiac Sunfire showed that he had been driving at least 131 km/h when he hit another car in Montreal, 2001, and killed 19 year-old Yacine Zinet. Despite the fact that there were no witnesses, he was convicted of dangerous driving as a result of EDR evidence.[98] The defense had made an attempt to prevent such evidence on the grounds that it violated the Canadian Charter of Rights and Freedoms.[99]

In two other Canadian cases, EDR information did not affect the courts' decision: In *Canada R. v. Gratton*, 2003, 5 occupants of a 1987 Ford Taurus station wagon were killed when it crashed into a 2000 Chevrolet and EDR data was not accepted as evidence. In *Canada R. v. Brander*, 2003, EDR evidence was submitted when an

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[95] http://www.teleaid.com/
[96] Canton, David. "Cars May Inform on Bad Drivers", Canoe Network, October 16, 2004, http://www.canoe.ca
[97] "EDR Case Law", Harris Technical Services – Traffic Accident Reconstructionists, http://www.harris technical.com/cdr5.htm
[98] "Car's 'Black Box' Convicts Montreal Driver", CBC News Online, October 24 2003, http://www.cbc.ca/stories/2003/10/24/blackbox031024
[99] "EDR Case Law".

unmarked police car crashed into a Tempo that crossed its path, but the court decided to disregard it. [100]

EDR's are in millions of cars across Canada despite the fact that most drivers do not even know they exist.[101] No formal rules currently exist in Canada governing the use of EDR information as evidence in court, however court cases in Ontario and Quebec show that the data is being used anyway without any guidelines. At present, California, the only North American jurisdiction with rules on EDR use, allows the use of such data *only with the car owner's compliance or with a court order*.[102]

Although onboard telematics systems have been developed and applied by major vehicle manufacturers for the consumer market, their application to the car rental industry provides a particularly fruitful subject for analysis. A couple of well-publicized cases involving car rental agencies have recently brought these issues to the fore.[103]

Rental Car Clients

Rental car companies have also discovered the potential gains in using in-car navigation systems. In Canada, Hertz offers its NeverLost intelligent transportation system that uses Magellan GPS technology and smart sensors to identify exactly where you are at any time and show you how to get wherever you want to go:

> Drive with confidence, no matter where you are. No more fumbling with maps, hunting for street signs or having to ask for directions. There's less wasted travel time for business renters and more peace of mind for leisure renters.[104]

The system uses voice prompts and visual directions, roadside assistance, route mapping, thousands of points of interest, and includes all available digital maps for Canada and the U.S. A new map opens automatically as the client travels from one map area to another. After selecting your destination (which can be a street address, intersection, freeway entrance, or pre-programmed point of interest), visual map directions with voice prompts guide the driver to the desired location. The claimed benefits are that it saves time, reduces the stress that comes along with driving in a new

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[100] Ibid.
[101] For a list of all vehicles equipped with EDR's as of December 17, 2004, go to http://www.harristechnical.com/downloads/cdrlist.pdf; the report also contains information on the specific amount of data maintained by the different cable module in different car models.
[102] Bowman, John. "Indepth: Black Box", CBC News Online, October 23, 2003, http://www.cbc.ca/news.background/black box/ For an excellent report outlining procedures that attempt to assure accurate recovery, presentation, and interpretation of data while optimizing the security of an individuals' private records, see "Protocals for the Recovery, Maintenance and Presentation of Motor Vehicle Event Data Recorder Evidence" at http:.www.harristechnical.com/articles/mvedr.pdf.[102]
[103] The Acme car rental company, which used onboard telematics systems to track and fine drivers $150 each time they exceeded a certain speed, was ordered by the state of Connecticut to cease the practice and pay back the fines it had collected.
[104] http://www.hertz.com/byr/whyhertz/neverlost_canada1.jsp

city, it allows the client to drive with confidence, and is hassle-free. Additional features are clear colour displayed visuals on a high resolution screen, voice prompts in 7 different languages, an Instant Locate button that shows your exact location and can be extremely useful if in the need of roadside assistance. The nominal daily fee on Neverlost in addition to the car rental price is $13 CDN or $9 USD.[105]

The following diagram illustrates the map coverage of Hertz Neverlost in Canada:

Canada Map Coverage

Alberta	Ontario
Banff/Lake Louise	Barrie
Calgary	Guelph
Edmonton	Hamilton
	London
	Kingston
British Columbia	Kitchener
	Niagara/St. Catharines
Kamloops	Ottawa
Kelowna	Toronto
Squamish	Windsor
Vancouver	
Victoria	
Whistler	Québec
	Gatineau
	Hull
	Montréal
	Québec

(taken from http://hertzneverlost.com/coverage.php)

Avis offers Avis Assist, Motorola's hand-held GPS enabled VIAMOTO mobile phone with location based software that "talks you through directions to a location". It can provide traffic reports, voice prompts, connection to a representative at their call centre, and emergency roadside assistance.[106] Currently, however, Avis Assist is only available in the US, as are similar devices used by Discount and National rentals.

[105] http://hertzneverlost.com/index.php
[106] http://www.avis.com/AvisWeb/JSP/US/en/deals/us_assist.jsp

Individuals in Professional and Recreational Outdoor Activities

For many professional and recreational marine and outdoor activities (hiking, mountain biking, sailing, hunting, search and rescue, back country skiing, etc.) accurate and user friendly navigation and tracking devices are becoming commonplace, and according to manufacturers, essential.

The Benefon Esc! NT2002 is a personal navigation phone, mobile control center and safety device, in one. The phone can assist with navigation by displaying detailed maps of your exact location with way points and directions, as well as provide two-way communication of location tracking information. A user can send and receive route requests, locate other users of Benefon equipment, and let others locate you. In addition, alarm buttons send a emergency messages with the users location to a predetermined number. [107] (see picture below)

(picture taken from http://benefon.com)

Magellan makes several products specifically designed for outdoor recreation such as the Meridian Marine, SporTrak series, and eXplorist series. The eXplorist 600 for example, features a 3-axis electronic compass, a baromatic pressure altimeter, barometer, thermometer, the ability to expand GPs mapping via a high-speed USB data port and unlimited secure digital card storage, and a PC-style memory system for track logging. In addition, the rugged construction is waterproof, pocket-sized, and has backlit colour display. With the Magellan MapSend Streets & Destinations Canada software which contains highly-detailed maps that can be easily downloaded from the users PC to their handheld GPS receiver, the user can choose the regions and level of detail including streets, lakes, rivers, coastlines, parks, railways and points of interest for all of Canada. The data can then be updated or overwritten. Waypoints and routes can be created on the PC then edited and downloaded to the GPS receiver. Thousands of different routes can be saved on the PC for recording the user's every journey and for ease of future use. The GPS search function finds street addresses and points of interest, and will direct the driver to those points of interest.[108]

[107] http://benefon.com/usage_areas/outdoor_sport/ and http://www.gpscentral.ca/products/benefen/benefon.htm

[108] http://www.radioworld.ca/gps/magellan-new-products/magellan_explorist_600.php

Garmin manufactures a growing line of wearable wrist navigation devices. The Foretrex 101, 201, and Geko products, for example, have enhanced GPS accuracy of 15 metres or less, extensive storage for waypoints, and reversible routes and tracks. "With the help of Garmin's exclusive TracBack® technology, hikers can mark a campsite, go trekking all day, and follow the electronic "breadcrumb trail" back to camp in time for dinner."[109]

> Its easy-to-use interface and basic GPS capabilities are perfect for outdoor enthusiasts who would rather replace the batteries than recharge the unit in the field. This unit features Garmin's intuitive operating logic, utilizing six dedicated buttons to simplify navigation. Whether it's a campsite, deer stand, or other place of interest, users can mark its location, identify the waypoint, and navigate to it later using the GoTo function. Also, with the help of Garmin's exclusive TracBack® technology, users can retrace their steps by following an electronic breadcrumb trail back to their original starting point.[110]

Prisoners and Offenders

Tracking devices are being marketed as a way of monitoring parole sentences and letting prisoners leave for weekends and holidays as well as a way to locate criminals on probation and possible re-offenders. The benefits, claims Benefon, is "Societies can develop economies through wider adoption of and more cost effective reinforcement of parole sentences".[111] The Benefon Seraph (mentioned above) and the Benefon Track Pro, for example, could be used as a requirement that offenders send messages in certain intervals informing the authorities of their location. An alarm will automatically be sent to the prison supervisor if such a requirement is not met. By sending an alarm when the offender is entering a forbidden area, Benefon Track Pro could prevent the offender from entering or leaving that area. In addition, Benefon Life Line can be installed in a proscribed area, for example, a jail, and officers can then track the locations and movements of offenders within that area.[112]

Pro Tech Monitoring, Inc., is a Delaware Corporation based in Odessa, Florida that has been a leader in developing GPS technologies for the purpose of offender tracking. Offering a system more advanced than what they describe as the "house arrest" products or ones that require the subject to "check in" as mentioned above, Pro Tech has developed a product that uses SMART (Satellite Monitoring and Remote Tracking) System Technology that enables monitoring and supervision beyond the confined area

[109] http://www.radioworld.ca/gps/gps_garmin.php
[110] Ibid.
[111] http://benefon.com/usage_areas/offender_tracking/
[112] Ibid.

of a prison or area of residence. First used in Florida in the late 1990's, several other states in the US now use GPS to monitor released felons and several others are currently testing out pilot programs before deciding to implement the technology. Arkansas is looking at using it to keep track of violent offenders on parole: "It would allow probation officers using a computer to monitor parolees 24 hours a day to make sure that they are going to work, going home at night, and staying away from areas they have been ordered to stay away from".[113]

Offenders wear a tamper-resistant GPS ankle bracelet connected wirelessly to a tracking device on the belt that automatically sets off an alarm if it is turned off or if it enters a pre-programmed "zone of exclusion", which could be anyplace from a playground or school zone to a bar or individuals neighborhood. An officer can detect any violations on a computer and can review the recorded movement of the parolee.[114]

The claimed benefits of such a system include the rehabilitation of prisoners, lower rates of incarceration, behaviour modification, and ultimately increasing safety and feelings of comfort and security in the community. In addition, significant decreases in the cost of such systems in the last few years have made it significantly cheaper than the costs of incarceration. It costs about $12USD a day for constant monitoring or $5USD to review previous days. Leroy Brownlee, chair of Arkansas' Post Prison Transfer Board claim such a system could save the state thousands of dollars per year in prison costs.[115] Florida's Seminole County Sheriff Don Eslinger explains: "It's either wear the GPS device or go to jail. Most them find this much more advantageous than sitting in a cold jail cell, and it also saves us between $45 and $55 a day".[116]

The company has also recently unveiled "the most powerful and complete public safety solution possible", its CrimeTrax^{SM} system. By linking the movement of offenders being tracked with GPS devices to reported criminal activity, CrimeTrax alerts officials when an offender is near a crime scene. "Crime scene correlation" is said to drastically improve law enforcement service while decreasing the number of repeated offenses.[117] The American Civil Liberties Union has already given its support. It should be noted however, that technology does not obfuscate the potential for human error, the best example presenting in the case of convicted Texas rapist Lawrence Napper who was equipped with a GPS tracking device upon his release which recorded his location continuously. After racking up 444 violations in nine months, it wasn't until abducted and sexually assaulted a six year old boy that he was finally arrested and convicted. There have been speculations that his and other parolees warrants for numerous parole

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[113] Moritz, Rob. "High-tech Tracking for some Parolees Being Considered", Arkansas News Bureau, September 19, 2004, http://www.ptm.com/arkansasnews_091904.shtml
[114] "Eyes in the Sky: GPS System Monitors Parolees 24/7", abcNews.com, http://www.ptm/primetime_050902.shtml
[115] Moritz, "High-tech Tracking".
[116] Scheeres, Julia. "GPS: Keeping Cons Out of Jail", Wired News, http://www.ptm.com/wirednews_101502.shtml
[117] "ProTech Monitorin, Inc. Introduces CrimeTrax and additions to Sales Team", Odessa, Florida, July 26, 2004, http://www.ptm.com/crimetrax_092304.shtml

violations were withdrawn because that meant sending the parolees back to prison thus making the system appear a failure.[118]

Pro Tech Monitoring, Inc. is not the only company offering inmate and offender solutions and such solutions are not limited to use in the US. Alanco Technologies, Inc. has recently combined its technology solution TSI PRISM with AeroScout, Inc.'s WiFi-based Real Time Locating Services (RTLS) technology to together provide inmate tracking technology for a pilot project in Europe. AeroScout is based in San Mateo, California and provides Wi-Fi wireless network solutions for asset and people locating in various industries. Based in Scottsdale, Arizona, Alanco's TSI PRISM system is already used in prisons in California, Michigan, Illinois, and Ohio.[119] The system is made up of two personal transmitters (wristwatch transmitters worn by inmates and belt transmitters worn by officers and staff) and 5 infrastructure components including indoor and outdoor antennas, calibration transmitters, collection nodes, a central server, and client terminals. The benefits of this system are cited as follows:

- ▪Enhances safety for the general public & safety within the correctional facility
- ▪Improves staff utilization
- ▪Automatically conducts perpetual headcounts
- ▪Reduces operating costs
- ▪Reduces costs of litigation and internal investigations
- ▪Reduces insurance premiums
- ▪Deters inmate created prison violence
- ▪Achieves true inmate accountability[120]

Alanco has also been granted exclusive rights for the development of new market applications in Japan for its TSI PRISM RFID tracking technology.[121]

Conclusions and Implications

The literature on surveillance leaves us with the overwhelming message that the quantity and quality of surveillance have changed. The volume of data collected and stored by both public and private organizations has facilitated a range of new practices that have developed incrementally and without much public attention or opposition. That system has developed through the uncontrolled decisions of thousands of decentralized public and private organizations, all making supposedly rational decisions that one more incremental invasion of privacy is a price worth paying for greater

[118] "Eyes in the Sky".
[119] "Alanco Wins Technology Development/Supply Contract for European Prison Pilot", Alanco Technologies, Inc, 2004, http://alanco.com/releases/040605.asp
[120] Http://www.tsilink.com/products.htm (For more information on Technology Systems International, Inc. (TSI) see http://www.tsilink.com/aboutus.htm)
[121] "Alanco Announces Cooperation with NTT Data to Develop New TSI PRISM Markets in Japan", Alanco Technologies, Inc., April 4, 2005, http://alanco.com/releases/040405.asp

efficiency and/or profit. The examples cited above are supportive of David Lyon's conclusions about surveillance and the "monitoring of everyday life".[122] Surveillance is "Janus-faced", according to Lyon. The same process both empowers and constrains. It gives us a variety of advantages (security, convenience, ease of communication and so on). It also enhances the power of the modern organization to the detriment of individual privacy and to the disadvantage of marginalized groups. He demonstrates how surveillance systems have grown up to compensate for the weakening of face-to-face social relationships in which mechanisms for social integration are increasingly removed and abstract. Surveillance, then, is the necessary glue that builds trust in a "society of strangers." The "Invisible Frameworks" of integrated information and communications networks contribute to the "orchestration" of this society of strangers.

It is possible to argue that a further paradigm shift is underway with the development of mobile technologies, and associated location-based services. As these practices assume a greater importance, they become important sources of valuable information in themselves. Surveillance in turn has accommodated these changes by also becoming more mobile.[123]

From the examples listed above the potential challenges to existing regulatory frameworks, such as that framed by the Personal Information Protection and Electronic Documents Act (PIPEDA) in Canada are enormous. Locational data can be extraordinarily sensitive. It can be monitored remotely, without the individual's knowledge and consent. It may be collected continuously and stored indefinitely. The level of consumer education and experience is low. And the potential value of such information government and for business is enormous.

However, as with all other technologies, the risks are not uniform. We therefore need a more finely tuned set of categories for understanding the main sources of the privacy challenges. The most useful set of distinctions have been drawn as a result of the work of the Internet Engineering Task Force's work in this area. The GEOPRIV Working group, headed by Henning Shulzrinne of Columbia University has tried to answer the following questions.[124]

What is meant by locational information? It can be *geo-spatial* -- the position on the globe defined in terms of longitude, latitude and altitude. It can be *civic* – the locational coordinates that are provided as a result of political decisions about borders and boundaries made by international and state actors, such as time-zone, country, street, postal address. And it can be *descriptive*, or the type of location such as school, hotel, airport, city square and so on. Generally and from the point of view of surveillance, it is the descriptive information that is most interesting. By and large we are not so concerned about geo-spatial or civic information in and of itself. But when that information is connected with further descriptive information about the type of location

[122] Lyon, Surveillance Society.
[123] Bennett and Regan, "Mobilities".
[124] http://www.ietf.org/html.charters/geopriv-charter.html . Presentation by Henning Schulzrinne at CFP 2005, April 15, 2005, Seattle.

and the function that is, or should be, performed in that location, then important contextual information is added.

Who or what may be tracked? Objects may be tracked, such as shipping containers, medical equipment, postal packages and so on. Vehicles may be tracked, such as flights, cars, buses, subways trains. And of course persons may be tracked, as an identifiable individual or perhaps as a function or an office, such as a police officer, a postal worker, an insurance investigator. In many instances, it is not necessary to know who is on the scene, so long as the correct type of person is at the appropriate place.

How may location be determined? First it may be end-system based, meaning that the end system measures and conveys location. The most common example would be a GPS chip in a handset, or a wireless card in a personal computer. Secondly, however, it may be network-based, meaning that the end-user has little or know knowledge or control over how location is determined and communicated. Examples might be an ethernet switch, or an 802.11 access point.

Who may be the location recipients? They may first be personally known (such as family members, your company). They may institutionally known (such as the PSAP at an emergency call center, or the AAA service, or a Pizza delivery business). And they may be unknown to the target (such as surveillance by the cell phone company, or by Onstar, or by a car rental company).

Location is contextual information, but just one piece of information. The important problem in understanding risk is to determine the other behaviors that might be inferred from those data. *From the categories above, we could conclude that the highest risks may be encountered where descriptive locational information about identifiable individuals is being tracked by a networked based system by recipients who are unknown to the individual.* The least risk is associated with the tracking of basic geo-spatial coordinates through an end-user application by people know to the individual.

So far, there have been few attempts to apply standard information privacy principles to locational data. The IETF's Geo-Privacy Working group is trying to develop some technical standards and policy rules for the collection and disclosure of locational information, broadly construed. The problem in the United States, where there is no general statutory framework is that rules have to be reinvented on a sectoral or functional level. This working group is discovering that there is a significant need to develop granular privacy controls sensitive to the risk, but also that the dependencies are incredibly complicated and contingent. They have discovered that the rules must be sensitive to the different forms of locational data, they must distinguish between location and future location (i.e. the trajectory of where one might be traveling to), they must be sensitive to the wide variety of location-based services, and they must be understandable for end-users. They must also be aware of the complex liability issues. If a wireless carrier allows the 9-1-1 function to be turned off, for example, then could it be liable if that user was not able to be located in a timely fashion?

In Canada, Bell Mobility has developed a Privacy Policy which gives some initial insights into the regulatory challenges. As an addition to the Bell Privacy Policy and Bell Code of Fair Information Practice (both of which reflect the legislative requirements of the Personal Information Protection and Electronic Documents Act (PIPEDA)), Bell Mobility has created a special Privacy Policy which applies to all of its Finder Services discussed above. The general location of a particular wireless phone is already known when it is turned on via nearby radio towers to enable Bell Mobility to know how to bill a customer for the calls they make and receive. With Finder services, however, a customer's wireless phone's location and/or number as well as personalized data the user has input into their phone may necessarily be used or disclosed in order to provide certain Finder services. This information is safeguarded under the same principles in the Bell Privacy Policy and the Bell Code of Fair and Information Practices.[125]

The Privacy Policy for Bell Mobility's Finder Services endeavors to emphasize as fully as possible the measure of control the consumer has over his own location data. The following assurance is repeated for each service:

> When you subscribe to MyFinder services, you are in ***full control*** of the times at which your location will be available to Bell Mobility, beyond what is required to provide you with network connectivity and service billing. If your phone is equipped with an Assisted GPS chip, you may turn the Assisted GPS chip 'off', if you prefer. The feature will automatically be reactivated if you place a 911 call. Your *Privacy Profile* is a simple, password protected, privacy management tool that allows you to choose whether MyFinder can locate you, and if so, at what times of the day and on which days of the week…[126]

Bell Mobility ensures that privacy is maintained due to the conscious steps required before location information can be shared. In addition, when a request for location information is made by the user, they are first warned by an on screen prompt that MyFinder will be accessing their location. The services thus cannot be used unless the user agrees to release their location information, except with MapMe options which allow the user to manually enter a location. The last 'Find Me' location request is retained until replaced by a new one. Under the Roadside Assistance service, the provider will retain information on each call such as the phone number, the location of the phone at the time of the call, the type of service required, etc. This information is retained for 7 years. [127] Bell Mobility has made a very good effort to apply some practical rules to these new applications. The Code does, however, signal some of the significant challenges for the implementation of Schedule One to PIPEDA.

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[125] "Privacy Policy for Bell Mobility's Finder Services", eLegal Canton, April 2005, http://www.canton.elegal.ca/archives/2005/04/index.html

[126] "Finder Services", Bell.ca.

[127] Ibid.

From the examples discussed throughout this paper, the following regulatory challenges for Canadian Privacy Commissioners seem apparent.

- *The consent of vulnerable data subjects*

Section 3 of Schedule One of PIPEDA states: "The knowledge and consent of the individual are required for the collection, use or disclosure of personal information, except when inappropriate." Many of the products listed above are targeted towards the monitoring of vulnerable peoples: the elderly, teenagers, employees, prisoners and offenders, and so on. The success of these products are often predicated on the very absence of knowledge and consent. Some of them simply cannot work if the subject had the option of switching off, and many of the monitored groups, if given the choice, would probably not "consent" to have their location tracked. Teenagers, for example, generally do not want their parents to know where they are on a Saturday night. In other instances, the acceptance of a level of monitoring has become a condition for the acceptance of a product or service (such as renting a car) or for employment as part of a mobile workforce. These applications bring sharply into focus the provisions inherent in Section 4.3.3 of Schedule One of PIPEDA: "An organization shall not, as a condition of the supply of a product or service, require an individual to consent to the collection, use, or disclosure of information beyond that required to fulfill the explicitly specified and legitimate purposes."

- *All-in-one opt-in or opt-out solutions are not appropriate*

As evidenced by the Bell privacy policy and the efforts of the IETF, a simple all-in-one solution of "opt-in" for the transfer of locational data to third parties cannot be implemented. Locational data may be collected and disclosed by the wireless service provider to a number of third parties. Some of that locational data need not be especially "personal." If one wants to know the weather, it is sufficient to communicate that one is in Victoria, BC, rather than on the corner of Government and Broughton. Other locational coordinates necessarily require greater degrees of precision – for emergency services, taxi services, the delivery of goods and so on. Locational data, therefore, is collected and disclosed in each of the applications listed above along a continuum of granularity. Any standard for informed consent must be sensitive to these differences.

- *The difficulty of ascertaining "sensitivity"*

A related difficulty concerns the distinction between sensitive and non-sensitive data. This distinction has always been controversial within the privacy literature. It appears in the 1981 Council of Europe Convention and the 1995 European Data Protection Directive. There is, therefore, an expectation that national laws recognize that some categories of data (health, political and religious affiliations, ethnicity, sexual preference and so on) require special protection and should only be collected and processed with the explicit consent of the data subject. PIPEDA also makes this distinction and the

evolving interpretation of this and provincial legislation suggests that opt-in standards are required when "sensitive data" are at stake.

Yet, these distinctions attempt to separate the inherent properties of the data from the context in which they are collected and used. Many commentators find such analysis misguided.[128] It is probable that the addition of a locational dimension to the analysis further complicates and erodes these distinctions. Behavior in one place might be insensitive, and in another sensitive. For instance, sexual orientation is commonly regarded as a "sensitive" form of information. Locational technologies might track whether or not someone attends gay and lesbian bars, bookstores, and so on: for the "outed" gay or lesbian, perhaps not particularly sensitive, for someone who has chosen to shield sexual orientation from employers and family members, extraordinarily sensitive. The locational dimension serves to further erode the already fragile distinction between the sensitive and the non-sensitive.

- *The distinction between location and trajectory*

A further complication resides within the fact that locational tracking also implies mobility. The products analyzed above all tend to assume a "mobile" data subject. The information that might be captured, therefore, is inherently time-sensitive. It betrays knowledge about where the data subject is, where he/she has been and where he/she is going. Data protection standards tend not be particularly attuned to this important distinction. A data subject may not be particularly concerned that he/she is traveling along a particular highway at a particular speed. He/she may be very concerned that others would discover the end point of the journey – an illicit visit to a drug dealer, or to the home of someone who is not one's partner, or (in contravention of a no contact order) to a former partner, or (in contravention of court order) to one's children, and so on.

- *The problems of data quality*

A related point concerns data quality. Principle 6 of Schedule One states: "Personal information shall be as accurate, complete, and up-to-date as is necessary for the purposes for which it is to be used." Current locational technology is simply not sufficiently refined to connect identifiable individuals with precise geo-spatial coordinates. In many applications, that precision is not necessary. Data accuracy becomes a concern when requests are made for the transaction records of all those who may have made a cell phone call in a particular area at a particular time where a crime had been committed. The low quality of the data may lead to wrongful accusation, and possibly arrest. A related question, then, concerns subject access. How can an individual be informed of the "existence, use and disclosure of his or her personal information and be given access to that information."

[128] See Bennett and Raab, pp. 54-55.

- *The problems of liability*

With respect to several of these services, there are clear liability issues. For instance, if consumers believe that their handsets are E-911 capable without having to activate, then emergency services could be delayed if the locational data is not transferred in a timely fashion. The same issues may arise with respect to other services, such as Roadside assistance. Bell Mobility has clearly erred on the side of caution, in not allowing customers to deactivate the E-911 capability. It is clear that concerns about legal liability will continue to be raised by wireless service providers and others, and will continue to complicate the application of information privacy principles.

To conclude, there are many ways in which the traditional "fair information principles" doctrine can cope with the privacy risks inherent in location-based technologies and services. To be sure, in having a national set of privacy principles enshrined in law, Canada is ahead of the United States in its ability to protect vulnerable populations from excessive intrusions. On the other hand, there are obviously some specific issues related to the locational dimension that any data protection agency will need to address. In Canada, t is incumbent on federal and provincial privacy commissioners to consider ways in which the general public should be educated about the capture, use and disclosure of locational information. They might also consider ways in which they might become involved more closely with the standards-setting processes which have such profound and long-term impacts on surveillance practices; the negotiation of the rules relating to E-911 capability through the CWTA is one such process. As with every other surveillance practice, however, it is quite obvious that with respect to location-based services as well, activists, analysts and regulators are having to play catch-up – trying once again to change the tire on a moving car.

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