1

PM 1 3 1/2 x 4 PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT

National Library
of Canada

Acquisitions and
Bibliographic Services Branch

395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale
du Canada

Direction des acquisitions et
des services bibliographiques

395 rue Wellington
Ottawa (Ontario)
K1A 0N4

1980-01-01

1980-01-01

NOTICE

The quality of this microform is heavily dependent upon the quality of the original thesis submitted for microfilming. Every effort has been made to ensure the highest quality of reproduction possible.

If pages are missing, contact the university which granted the degree.

Some pages may have indistinct print especially if the original pages were typed with a poor typewriter ribbon or if the university sent us an inferior photocopy.

Reproduction in full or in part of this microform is governed by the Canadian Copyright Act, R.S.C. 1970, c. C-30, and subsequent amendments.

AVIS

La qualité de cette microforme dépend grandement de la qualité de la thèse soumise au microfilmage. Nous avons tout fait pour assurer une qualité supérieure de reproduction.

S'il manque des pages, veuillez communiquer avec l'université qui a conféré le grade.

La qualité d'impression de certaines pages peut laisser à désirer, surtout si les pages originales ont été dactylographiées à l'aide d'un ruban usé ou si l'université nous a fait parvenir une photocopie de qualité inférieure.

La reproduction, même partielle, de cette microforme est soumise à la Loi canadienne sur le droit d'auteur, SRC 1970, c. C-30, et ses amendements subséquents.

**Cutting the Cord:
A Telecom Solution to the Crisis of Capitalism**

by
LISE BALLANTYNE

A thesis submitted to
the Faculty of Graduate Studies and Research
in partial fulfillment of
the requirements for the degree of

Master of Arts

**Department of Journalism and Communication
Carleton University
Ottawa, Ontario**

May 11, 1993

copyright
1993, Lise Ballantyne

National Library
of Canada

Acquisitions and
Bibliographic Services Branch

395 Wellington Street
Ottawa, Ontario
K1A 0N4

Bibliothèque nationale
du Canada

Direction des acquisitions et
des services bibliographiques

395 rue Wellington
Ottawa (Ontario)
K1A 0N4

Author's name

Author's name

The author has granted an irrevocable non-exclusive licence allowing the National Library of Canada to reproduce, loan, distribute or sell copies of his/her thesis by any means and in any form or format, making this thesis available to interested persons.

L'auteur a accordé une licence irrévocable et non exclusive permettant à la Bibliothèque nationale du Canada de reproduire, prêter, distribuer ou vendre des copies de sa thèse de quelque manière et sous quelque forme que ce soit pour mettre des exemplaires de cette thèse à la disposition des personnes intéressées.

The author retains ownership of the copyright in his/her thesis. Neither the thesis nor substantial extracts from it may be printed or otherwise reproduced without his/her permission.

L'auteur conserve la propriété du droit d'auteur qui protège sa thèse. Ni la thèse ni des extraits substantiels de celle-ci ne doivent être imprimés ou autrement reproduits sans son autorisation.

1-877-829-8289

Author: Lise Ballantyne

Dissertation Abstract Information is arranged by broad, general subject categories. Please select the one subject which most closely describes the content of your dissertation. Enter the corresponding four digit code in the spaces provided.

SUBJECT TERM

--	--	--	--

SUBJECT CODE

U·M·I

Subject Categories

THE HUMANITIES AND SOCIAL SCIENCES

COMMUNICATIONS AND THE ARTS

Art, General	0120
Art History	0121
Arts and Crafts	0122
Arts and Sciences	0123
Art and Literature	0124
Art and Music	0125
Art and Religion	0126
Art and Society	0127
Art and Technology	0128
Art and Visual Arts	0129
Art and Writing	0130
Art and Education	0131
Art and Health	0132
Art and Law	0133
Art and Medicine	0134
Art and Philosophy	0135
Art and Psychology	0136
Art and Sociology	0137
Art and Anthropology	0138
Art and Archaeology	0139
Art and Linguistics	0140
Art and Mathematics	0141
Art and Physics	0142
Art and Chemistry	0143
Art and Biology	0144
Art and Environmental Sciences	0145
Art and Earth Sciences	0146
Art and Space Sciences	0147
Art and Oceanography	0148
Art and Atmospheric Sciences	0149
Art and Geology	0150
Art and Meteorology	0151
Art and Climatology	0152
Art and Oceanography	0153
Art and Hydrology	0154
Art and Environmental Engineering	0155
Art and Environmental Planning	0156
Art and Environmental Policy	0157
Art and Environmental Law	0158
Art and Environmental Economics	0159
Art and Environmental Management	0160
Art and Environmental Education	0161
Art and Environmental Health	0162
Art and Environmental Law	0163
Art and Environmental Economics	0164
Art and Environmental Management	0165
Art and Environmental Education	0166
Art and Environmental Health	0167
Art and Environmental Law	0168
Art and Environmental Economics	0169
Art and Environmental Management	0170
Art and Environmental Education	0171
Art and Environmental Health	0172
Art and Environmental Law	0173
Art and Environmental Economics	0174
Art and Environmental Management	0175
Art and Environmental Education	0176
Art and Environmental Health	0177
Art and Environmental Law	0178
Art and Environmental Economics	0179
Art and Environmental Management	0180
Art and Environmental Education	0181
Art and Environmental Health	0182
Art and Environmental Law	0183
Art and Environmental Economics	0184
Art and Environmental Management	0185
Art and Environmental Education	0186
Art and Environmental Health	0187
Art and Environmental Law	0188
Art and Environmental Economics	0189
Art and Environmental Management	0190
Art and Environmental Education	0191
Art and Environmental Health	0192
Art and Environmental Law	0193
Art and Environmental Economics	0194
Art and Environmental Management	0195
Art and Environmental Education	0196
Art and Environmental Health	0197
Art and Environmental Law	0198
Art and Environmental Economics	0199
Art and Environmental Management	0200

EDUCATION

Education, General	0201
Education, History	0202
Education, Theory and Practice	0203
Education, Research	0204
Education, Policy	0205
Education, Administration	0206
Education, Curriculum	0207
Education, Instruction	0208
Education, Assessment	0209
Education, Evaluation	0210
Education, Improvement	0211
Education, Innovation	0212
Education, Leadership	0213
Education, Management	0214
Education, Organization	0215
Education, Planning	0216
Education, Research	0217
Education, Theory and Practice	0218
Education, Administration	0219
Education, Curriculum	0220
Education, Instruction	0221
Education, Assessment	0222
Education, Evaluation	0223
Education, Improvement	0224
Education, Innovation	0225
Education, Leadership	0226
Education, Management	0227
Education, Organization	0228
Education, Planning	0229
Education, Research	0230
Education, Theory and Practice	0231
Education, Administration	0232
Education, Curriculum	0233
Education, Instruction	0234
Education, Assessment	0235
Education, Evaluation	0236
Education, Improvement	0237
Education, Innovation	0238
Education, Leadership	0239
Education, Management	0240
Education, Organization	0241
Education, Planning	0242
Education, Research	0243
Education, Theory and Practice	0244
Education, Administration	0245
Education, Curriculum	0246
Education, Instruction	0247
Education, Assessment	0248
Education, Evaluation	0249
Education, Improvement	0250
Education, Innovation	0251
Education, Leadership	0252
Education, Management	0253
Education, Organization	0254
Education, Planning	0255
Education, Research	0256
Education, Theory and Practice	0257
Education, Administration	0258
Education, Curriculum	0259
Education, Instruction	0260
Education, Assessment	0261
Education, Evaluation	0262
Education, Improvement	0263
Education, Innovation	0264
Education, Leadership	0265
Education, Management	0266
Education, Organization	0267
Education, Planning	0268
Education, Research	0269
Education, Theory and Practice	0270
Education, Administration	0271
Education, Curriculum	0272
Education, Instruction	0273
Education, Assessment	0274
Education, Evaluation	0275
Education, Improvement	0276
Education, Innovation	0277
Education, Leadership	0278
Education, Management	0279
Education, Organization	0280
Education, Planning	0281
Education, Research	0282
Education, Theory and Practice	0283
Education, Administration	0284
Education, Curriculum	0285
Education, Instruction	0286
Education, Assessment	0287
Education, Evaluation	0288
Education, Improvement	0289
Education, Innovation	0290
Education, Leadership	0291
Education, Management	0292
Education, Organization	0293
Education, Planning	0294
Education, Research	0295
Education, Theory and Practice	0296
Education, Administration	0297
Education, Curriculum	0298
Education, Instruction	0299
Education, Assessment	0300

Philosophy, General	0301
Philosophy, History	0302
Philosophy, Theory and Practice	0303
Philosophy, Research	0304
Philosophy, Policy	0305
Philosophy, Administration	0306
Philosophy, Curriculum	0307
Philosophy, Instruction	0308
Philosophy, Assessment	0309
Philosophy, Evaluation	0310
Philosophy, Improvement	0311
Philosophy, Innovation	0312
Philosophy, Leadership	0313
Philosophy, Management	0314
Philosophy, Organization	0315
Philosophy, Planning	0316
Philosophy, Research	0317
Philosophy, Theory and Practice	0318
Philosophy, Administration	0319
Philosophy, Curriculum	0320
Philosophy, Instruction	0321
Philosophy, Assessment	0322
Philosophy, Evaluation	0323
Philosophy, Improvement	0324
Philosophy, Innovation	0325
Philosophy, Leadership	0326
Philosophy, Management	0327
Philosophy, Organization	0328
Philosophy, Planning	0329
Philosophy, Research	0330
Philosophy, Theory and Practice	0331
Philosophy, Administration	0332
Philosophy, Curriculum	0333
Philosophy, Instruction	0334
Philosophy, Assessment	0335
Philosophy, Evaluation	0336
Philosophy, Improvement	0337
Philosophy, Innovation	0338
Philosophy, Leadership	0339
Philosophy, Management	0340
Philosophy, Organization	0341
Philosophy, Planning	0342
Philosophy, Research	0343
Philosophy, Theory and Practice	0344
Philosophy, Administration	0345
Philosophy, Curriculum	0346
Philosophy, Instruction	0347
Philosophy, Assessment	0348
Philosophy, Evaluation	0349
Philosophy, Improvement	0350
Philosophy, Innovation	0351
Philosophy, Leadership	0352
Philosophy, Management	0353
Philosophy, Organization	0354
Philosophy, Planning	0355
Philosophy, Research	0356
Philosophy, Theory and Practice	0357
Philosophy, Administration	0358
Philosophy, Curriculum	0359
Philosophy, Instruction	0360
Philosophy, Assessment	0361
Philosophy, Evaluation	0362
Philosophy, Improvement	0363
Philosophy, Innovation	0364
Philosophy, Leadership	0365
Philosophy, Management	0366
Philosophy, Organization	0367
Philosophy, Planning	0368
Philosophy, Research	0369
Philosophy, Theory and Practice	0370
Philosophy, Administration	0371
Philosophy, Curriculum	0372
Philosophy, Instruction	0373
Philosophy, Assessment	0374
Philosophy, Evaluation	0375
Philosophy, Improvement	0376
Philosophy, Innovation	0377
Philosophy, Leadership	0378
Philosophy, Management	0379
Philosophy, Organization	0380
Philosophy, Planning	0381
Philosophy, Research	0382
Philosophy, Theory and Practice	0383
Philosophy, Administration	0384
Philosophy, Curriculum	0385
Philosophy, Instruction	0386
Philosophy, Assessment	0387
Philosophy, Evaluation	0388
Philosophy, Improvement	0389
Philosophy, Innovation	0390
Philosophy, Leadership	0391
Philosophy, Management	0392
Philosophy, Organization	0393
Philosophy, Planning	0394
Philosophy, Research	0395
Philosophy, Theory and Practice	0396
Philosophy, Administration	0397
Philosophy, Curriculum	0398
Philosophy, Instruction	0399
Philosophy, Assessment	0400

LANGUAGE, LITERATURE AND LINGUISTICS

Language, General	0401
Language, History	0402
Language, Theory and Practice	0403
Language, Research	0404
Language, Policy	0405
Language, Administration	0406
Language, Curriculum	0407
Language, Instruction	0408
Language, Assessment	0409
Language, Evaluation	0410
Language, Improvement	0411
Language, Innovation	0412
Language, Leadership	0413
Language, Management	0414
Language, Organization	0415
Language, Planning	0416
Language, Research	0417
Language, Theory and Practice	0418
Language, Administration	0419
Language, Curriculum	0420
Language, Instruction	0421
Language, Assessment	0422
Language, Evaluation	0423
Language, Improvement	0424
Language, Innovation	0425
Language, Leadership	0426
Language, Management	0427
Language, Organization	0428
Language, Planning	0429
Language, Research	0430
Language, Theory and Practice	0431
Language, Administration	0432
Language, Curriculum	0433
Language, Instruction	0434
Language, Assessment	0435
Language, Evaluation	0436
Language, Improvement	0437
Language, Innovation	0438
Language, Leadership	0439
Language, Management	0440
Language, Organization	0441
Language, Planning	0442
Language, Research	0443
Language, Theory and Practice	0444
Language, Administration	0445
Language, Curriculum	0446
Language, Instruction	0447
Language, Assessment	0448
Language, Evaluation	0449
Language, Improvement	0450
Language, Innovation	0451
Language, Leadership	0452
Language, Management	0453
Language, Organization	0454
Language, Planning	0455
Language, Research	0456
Language, Theory and Practice	0457
Language, Administration	0458
Language, Curriculum	0459
Language, Instruction	0460
Language, Assessment	0461
Language, Evaluation	0462
Language, Improvement	0463
Language, Innovation	0464
Language, Leadership	0465
Language, Management	0466
Language, Organization	0467
Language, Planning	0468
Language, Research	0469
Language, Theory and Practice	0470
Language, Administration	0471
Language, Curriculum	0472
Language, Instruction	0473
Language, Assessment	0474
Language, Evaluation	0475
Language, Improvement	0476
Language, Innovation	0477
Language, Leadership	0478
Language, Management	0479
Language, Organization	0480
Language, Planning	0481
Language, Research	0482
Language, Theory and Practice	0483
Language, Administration	0484
Language, Curriculum	0485
Language, Instruction	0486
Language, Assessment	0487
Language, Evaluation	0488
Language, Improvement	0489
Language, Innovation	0490
Language, Leadership	0491
Language, Management	0492
Language, Organization	0493
Language, Planning	0494
Language, Research	0495
Language, Theory and Practice	0496
Language, Administration	0497
Language, Curriculum	0498
Language, Instruction	0499
Language, Assessment	0500

PHILOSOPHY, RELIGION AND THEOLOGY

Philosophy, General	0422
Philosophy, History	0423
Philosophy, Theory and Practice	0424
Philosophy, Research	0425
Philosophy, Policy	0426
Philosophy, Administration	0427
Philosophy, Curriculum	0428
Philosophy, Instruction	0429
Philosophy, Assessment	0430
Philosophy, Evaluation	0431
Philosophy, Improvement	0432
Philosophy, Innovation	0433
Philosophy, Leadership	0434
Philosophy, Management	0435
Philosophy, Organization	0436
Philosophy, Planning	0437
Philosophy, Research	0438
Philosophy, Theory and Practice	0439
Philosophy, Administration	0440
Philosophy, Curriculum	0441
Philosophy, Instruction	0442
Philosophy, Assessment	0443
Philosophy, Evaluation	0444
Philosophy, Improvement	0445
Philosophy, Innovation	0446
Philosophy, Leadership	0447
Philosophy, Management	0448
Philosophy, Organization	0449
Philosophy, Planning	0450
Philosophy, Research	0451
Philosophy, Theory and Practice	0452
Philosophy, Administration	0453
Philosophy, Curriculum	0454
Philosophy, Instruction	0455
Philosophy, Assessment	0456
Philosophy, Evaluation	0457
Philosophy, Improvement	0458
Philosophy, Innovation	0459
Philosophy, Leadership	0460
Philosophy, Management	0461
Philosophy, Organization	0462
Philosophy, Planning	0463
Philosophy, Research	0464
Philosophy, Theory and Practice	0465
Philosophy, Administration	0466
Philosophy, Curriculum	0467
Philosophy, Instruction	0468
Philosophy, Assessment	0469
Philosophy, Evaluation	0470
Philosophy, Improvement	0471
Philosophy, Innovation	0472
Philosophy, Leadership	0473
Philosophy, Management	0474
Philosophy, Organization	0475
Philosophy, Planning	0476
Philosophy, Research	0477
Philosophy, Theory and Practice	0478
Philosophy, Administration	0479
Philosophy, Curriculum	0480
Philosophy, Instruction	0481
Philosophy, Assessment	0482
Philosophy, Evaluation	0483
Philosophy, Improvement	0484
Philosophy, Innovation	0485
Philosophy, Leadership	0486
Philosophy, Management	0487
Philosophy, Organization	0488
Philosophy, Planning	0489
Philosophy, Research	0490
Philosophy, Theory and Practice	0491
Philosophy, Administration	0492
Philosophy, Curriculum	0493
Philosophy, Instruction	0494
Philosophy, Assessment	0495
Philosophy, Evaluation	0496
Philosophy, Improvement	0497
Philosophy, Innovation	0498
Philosophy, Leadership	0499
Philosophy, Management	0500

SOCIAL SCIENCES

Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	032
Academic Programs	

The undersigned recommend to the Faculty of Graduate Studies
and Research acceptance of the thesis

**"Cutting the Cord:
A Telecom Solution to the Crisis of Capitalism"**

submitted by Lise Ballantyne, B.A.
in partial fulfillment of the requirements for
the degree of Master of Arts

Thesis Supervisor

Chair, Department of Journalism & Communication

Carleton University

Date

ABSTRACT

Broadly, this thesis uses the language of the Regulation School to examine the development of telecommunications in Canada during the 20th century. More specifically, it discusses the political, economic, and social forces at play in the regulatory arena of the 1990s, using the recent regulation of digital cordless telephones (DCTs) as a case study.

The overriding objective of the thesis has been to provide an analysis of the social significance of digital cordless telephones. Such an analysis distinguishes the following work from other assessments of technological innovations which focus on its social impacts. This approach is informed by the work of Innis (1951), Williams (1974), and Wilson (1988). All three theorists agree on the importance of understanding technological innovations in a context of both limitations and crisis. Indeed, it is Wilson's particular belief that "new technologies may provoke as well as respond to crisis" (1988:12).

This thesis marries the above approach with that of the Regulation School and argues that wireless Personal Communication Services (PCSs) are a partial response to the economic, political, and social crisis of advanced capitalism. As the first public wireless PCSs, the digital cordless telephone is expected to help usher in an era of economic prosperity and political stability. As one state official said:

What we have here is not a technology in search of a market. It's a market in search of solutions (Davis, 1992:5).

Dedicated to my partner in life, Rick, and to our sweet daughter Tristen

Acknowledgments

My thanks goes to all faculty members of the Department of Communication at Carleton University. Their keenness and dedication to learning inspired me to continue with my education.

In particular, I wish to thank Professor Vincent Mosco for the time he has spent in guiding me, for his ability to put things in perspective, for his promptness, and finally, for letting me do my own thing.

Lise Ballantyne
Ottawa
March 19, 1993

Table of Contents

	Page
Abstract	iii
Dedication	iv
Acknowledgements	v
Table of Contents	vi
List of Tables	viii
List of Figures	ix
 CHAPTER ONE:	
The Political-Economic Transformation of Capitalism: A Regulation Approach	
Introduction	1
1.1 An introduction to the approach	4
1.2 The Canadian case: a different fordism	8
1.3 The crisis of capitalism and the challenge to political economy	10
1.4 Limitations of the approach	12
1.5 Limitations of the Thesis	14
Conclusion	15
 CHAPTER TWO:	
The Evolution of Telecom Fordism in Canada - Introduction	17
The pre-fordist period	18
2.1 Mobilizing the workforce	18
2.2 Telecommunications pre-fordism	22
2.3 Devising a mode of regulation	24
The fordist period	28
2.4 Overview of the fordist system	29
2.5 Forging a compromise in communications	32
Conclusion	35
 CHAPTER THREE:	
The Breakdown of Telecom Fordism and the Transition to a New Post-Fordist Arrangement - Introduction	37
3.1 Theorizing the transition	38
3.2 The transition of telecom fordism in Canada	46
3.3 The fordist telecom agenda in Canada	50
3.4 Personal Communication Services in the post-fordist era	59
Conclusion	62

CHAPTER FOUR:	Personal Communication Networks and Services: A Case Study of Digital Cordless Telephones - Introduction	64
4.1	Defining Personal Communication Networks and Services	65
4.2	Technical issues	68
4.3	Historical background	74
4.4	Contending infrastructures and competing providers	78
	Conclusion	81
CHAPTER FIVE:	Regulating Personal Communication Services - Introduction	82
5.1	Phase one - setting standards	83
5.2	Phase two - issuing licenses	84
5.3	Phase three - interconnection	88
5.4	Strategic Alliances	92
5.5	Natural monopoly - old Rational, new Rhetoric	95
	Conclusion	97
CHAPTER SIX:	Future Uses of Digital Cordless Telephones and Some Social Implications - Introduction	99
6.1	Design and development	100
6.2	Market applications	101
6.3	Social implications	103
6.4	Dealing with privacy and intrusion	108
	Conclusion	113
CONCLUSION:		115
APPENDIX A:	Basic Terms Common to Wireline and Wireless Communications	125
APPENDIX B:	License Conditions	128
APPENDIX C:	List of Applicants	131
BIBLIOGRAPHY:		133

LIST OF TABLES

TABLE	DESCRIPTION	PAGE
1	The Distinctive Features of Two Regimes of Accumulation	6
2	Telephone Service in Canada, 1920-30	26
3	Average Rates of Growth for the Advanced Capitalist Countries Over Various Time Periods Since 1820	30
4	Unemployment Rates	40
5	Time Lost in Work Stoppages	40
6	Structure of Civilian Employment in Selected Advanced Capitalist Countries, 1960-1981	41
7	Major Canadian Telecommunications Carriers 1989	51
8	Estimated Total Revenues for Telecommunications Carriage Industry - 1990	52
9	Profile of Bell and Unitel	56
10	Major Telecommunications Equipment Manufacturer Revenues	68
11	Spectrum Allocation in Canada and the United States	74
12	Licensees for Public Digital Cordless Telephone Service in Canada	85
13	Standards for Digital Cordless Telephones	86
14	Present and Possible Uses for Cordless Digital Telephony	103

LIST OF FIGURES

FIGURE	DESCRIPTION	PAGE
1	Suburban Growth in Montreal and Toronto	20
2	Urban Growth in Comparative Perspective	21
3	Real Wages and Family Incomes in the USA, 1947-1986	31
4	Existing Information Industries Growth Index	45
5	Telecommunications Services Industry	57
6	Estimated Revenues of Major Telecommunications Carriers (In Canadian Dollars 1990)	58
7	Cellular Telephone Revenues	66
8	Cellular Telephones by Province	67
9	Basic PCN Configuration	70
10	CT2 System Configuration	71

LIST OF APPENDICES

APPENDIX	DESCRIPTION	PAGE
A	Terms Common to Wireline and Wireless Communications	126
B	License Conditions	131
C	List of Applicants	134

CHAPTER ONE

THE POLITICAL-ECONOMIC TRANSFORMATION OF CONTEMPORARY CAPITALISM: A REGULATION APPROACH

Introduction

Telecommunications has played a central role in the development of capitalism in North America. Since the establishment of the telegraph in the Nineteenth Century, telecommunication technologies have been heralded as solutions to certain perceived problems. This thesis argues that the new generation of wireless personal communications is perceived by capital and by the state as a solution to the economic, political, and social problems within late twentieth century capitalism.

In early capitalism, the state sought to fulfill the need to unite the country by funding and supporting the deployment of "nation-building" systems of transportation and communication. With the establishment of capitalism, an emphasis on mass production and mass consumption demanded a whole new way of thinking, and once again, communication technologies were perceived as a way to achieve this goal. The role of telecommunications in sustaining a disciplined workforce and in creating a mass market became crucial. In advanced capitalism, the ideals, goals, and compromises upon which the preceding stages of capitalism were built are being challenged. This breakdown has encouraged a set of new responses and solutions in an attempt to recapture what is referred to by some as the heyday of capitalism. As the nerve center of the information society and one of the bases of sound economic growth, in advanced capitalism the telecommunications industry has taken on an ever significant role in restructuring our economy and our lives.

Though this process began long ago, the decision to divest AT&T of its Regional Bell Operating Companies constitutes one of capital's most significant attempts to meet the

challenges posed by the breakdown of the fordist capitalist system. In symbolic terms, this cutting of the cord between the parent company and its offspring will be seen in history as one of the first decisive steps toward a new post-fordist society. In real terms, the actual process of cutting the cord has begun with the introduction of public digital cordless telephone service. What **wireline** communications was to the establishment of capitalism, **wireless** personal communications will be to the preservation of the capitalist system in the next century.¹

In fulfillment of the stated argument the thesis is comprised of six chapters. The first chapter has four main objectives. First, it seeks to offer a personal interpretation of what has come to be known as the "regulation approach" to the current capitalist crisis. Second, it seeks to provide a discussion of a few central ideas which link it to political economy. Third, it attempts to take into account the historical and national specificity of Canada by relating the approach directly to the Canadian experience. Fourth, it provides a critique of the Regulation School with a view to addressing the limitations of the approach and thus of the thesis.

In the second and third chapters, the usefulness of the regulation approach is demonstrated by applying the model to telecommunications in general. For analytical purposes, the chapters discuss the pre-fordist, fordist, and post-fordist eras respectively. The objective here is to provide a broad discussion of the transformation of the telecommunications industry using the language of the regulation approach. An attempt is made to situate various telecommunications innovations within an historical context in order to observe how these developments parallel other fundamental social and economic changes within the stages of capitalist development. Each chapter discusses the economic

1. The thesis concentrates on personal wireless communications as distinguished from mass wireless communications such as broadcasting.

and social conditions of the period in question in terms of understanding the relationship between the state and the telecommunications industry. The section concludes by narrowing the field of analysis to the realm of Personal Communication Services (PCSs). At their most basic, PCSs such as cellular, paging, and digital cordless telephony, allow people or devices to communicate independent of fixed location by attaching numbers to people instead of places.

Chapter four begins by demystifying the concept of Personal Communication Services and elaborates upon its relationship to digital cordless telephony. The chapter is largely dedicated to providing pertinent technical information, as well as the historical development of digital cordless telephones in the United Kingdom, the United States, and Canada.

Chapter five charts the development of digital cordless telephony in the regulatory arena with an examination of the three-phase process undertaken by the Department of Communications: the setting of equipment standards, the selection of service providers, and the interconnection of digital cordless telephones to the public switched telephone network. The analysis effectively demonstrates the extent to which political decisions affect the development of communication technologies in terms of their commercial success, who will control them, and whether or not they will benefit the public.

Finally, chapter six provides a discussion of the potential social implications associated with the use of digital cordless telephones. Since this realm has been virtually unexplored this chapter charts new territory. While a number of potential benefits and problems are elaborated upon, the chapter emphasizes the invasion of privacy and the potential intrusiveness associated with digital cordless telephony.

1.1 An introduction to the approach

The Regulation School offers more of an approach to understanding regulation and development within the accumulation process than a specific theory (Lipietz, 1987:17).² Its ideas and propositions which are largely associated with the work of authors like Aglietta (1979), Boyer (1979), Lipietz (1987,1988), and Mazier et al (1984) stem from a belief that since the 1970s capitalism in the advanced industrial world is in a state of economic and political crisis. It is maintained that this state of crisis has led to a number of attempts at restructuring, of which the European Community's economic union and the move toward continental free trade agreements are the most frequently cited examples.

Before it became recognized as a global approach, the Regulation School model was initially used to understand the crisis of the postwar development model in France in the 1960s and 1970s. Over the last decade it has become one of the most important paradigms in French political economy (Noel, 1987:303). Although not yet a unified theory, the regulation approach provides a set of recurrent concepts like "regimes of accumulation" and "forms of regulation".

Regulationists see capitalist development as a succession of periods, each period having a specific institutional framework with corresponding social norms (Noel, 1987:311). Whereas the specific institutional frameworks are referred to as regimes of accumulation, their corresponding social norms are referred to as forms of regulation. More specifically, regimes of accumulation are particular schemas of reproduction (Lipietz, 1987a:33).³ However, in order for a particular regime of accumulation to be realized and to reproduce

2. The regulation approach is still far from being unified; the theoretical framework has been built gradually, through the contribution of many authors who have differed on certain theoretical questions. Consequently, no single book captures the approach perfectly. Much of the early work is seen as transitional and even Aglietta has modified his analysis in recent works.

3. As Lipietz further explains, "a regime of accumulation describes the fairly long-term stabilization of the allocation of social production between consumption and accumulation" (1987:14).

itself for any length of time, it must be accompanied by a very particular form of regulation - that is to say, the appropriate norms, procedures and habits which will either coerce or persuade private agents to conform to its schemas (Lipietz, 1987a:33).

While regimes of accumulation are characterized as either extensive or intensive in nature, forms of regulation are characterized as either competitive or monopolistic. Regimes of accumulation and forms of regulation, Lipietz insists, are *chance discoveries* made in the course of human struggle (1987a:15). Not every mode of regulation can regulate every regime of accumulation, and a single mode can encompass a combination of different partial forms of regulation (Lipietz, 1987a:15). A period of non-crisis within capitalist development, then, depends upon the occurrence of a given regime of accumulation and a certain form(s) of regulation which just happen to stabilize at the same time.

The course of capitalist development can be divided into a number of stages. However, as outlined in Table I, two particular regimes of accumulation/modes of regulation have been prevalent in the recent history of advanced capitalism.⁴ The first is the regime of "extensive accumulation" which was dominant until World War I and which was characterized by the expansion of capitalism into new sectors, new areas, and new countries. During this period, productivity grew only moderately and consumption patterns remained relatively stable. At this point, the problem for individual capitalists was less to sell than to meet an expanding demand for consumer goods by the rising middle classes. Wages were simply costs and growth did not alter existing production techniques (De Vroey, 1987:53).⁵

4. The two formations outlined are ideal types, and to some extent overlapping. However, the delineation is useful in helping us sort out how capitalism works and changes through history.

5. In extensive accumulation a cut in wages has no negative consequences for capital. On the contrary it increases profit, since the loss in outlets affects the independent producers and not the capitalists.

Table 1
THE DISTINCTIVE FEATURES OF TWO REGIMES OF ACCUMULATION

A. Features of the wage-relation:	Extensive Accumulation	Intensive Accumulation
	<ul style="list-style-type: none"> -wages considered as simple costs -wages negotiated individually -emergence of workers' movement -unemployed cared for by the family or by public charity -women and children withdrawn from the labour force -balance of power favours capital 	<ul style="list-style-type: none"> -wages now seen as a necessary component of supply and demand -wages negotiated collectively -integration of workers' movement in state and collective bargaining institutions -unemployed now cared for by a system of social assistance under state control -women re-integrated into social labour force -necessity for social consensus based on a regular increase in real wages, the development of public goods, and the extension of paid holidays
B. Commodity relations:	<ul style="list-style-type: none"> -workers just beginning to be integrated in a capitalist process of production -mode of life still traditional -most commodities that are bought are non-capitalist; they are produced by independent producers rather than by wage-labour 	<ul style="list-style-type: none"> -rapid technical changes in the production system, characterized by assembly-line production and leading to the mass production of standardized commodities -mass consumption
C. Spatial dimensions:	<ul style="list-style-type: none"> -British hegemony -prevailing national boundaries 	<ul style="list-style-type: none"> -American hegemony -transnationalization of production and exchange
D. Role of the state:	-non-interventionist	-active
E. Type of Regulation:	-competitive	-monopolistic

Source: Adapted from De Vroey, Michel. 1984. A regulation approach interpretation of contemporary crisis. Capital and Class. Number 23, 45-66.

As is characteristic of an extensive regime of accumulation, the form of regulation was "competitive". Wages were negotiated on an individual basis, the pricing system was flexible, and the state was noninterventionist (de Vroey, 1984:52).

After a long transitional phase during the interwar period, the dominant regime became one of "intensive accumulation" with a corresponding "monopolistic" form of regulation. Referred to as the golden age of capitalism, from the 1950s to the 1970s production and consumption were constantly transformed through high productivity growth and rapidly rising real wages. Wages came to be seen as more than just a cost and were perceived as a necessary component of demand and supply. While wage decreases might benefit capitalists by increasing their profit margins, they had the negative effect of restricting demand. Thus, the new problem for individual capitalists was in selling rather than in producing (Noel,1987:312). This regime's concomitant form of regulation was monopolistic. As such, real wages were collectively negotiated, the price system was fixed, and the state was much more active (Noel, 1987:312).

By establishing a contrast between the regimes of accumulation, each with its form of regulation, the regulation approach effectively characterizes "capitalism as a succession of historical structures, each of which has its own coherence" (Noel,1987:317). According to regulationists each historical structure has its own internal limits. When exhausted, these limits lead to a crisis and possibly to a new regime (Noel,1987:317). It is generally maintained that with extensive accumulation the system reached its limits as a result of overproduction. The system was stabilized by achieving a compromise between labour, management, and government which ensured that there would be sufficient demand for supply. In the 1960s and 1970s, with intensive accumulation, the limits arose as a result of a crisis in the organization of labour, largely attributed to the decline in productivity gains and thus the profit necessary to increase real wages and to

fund the welfare state. Complicating the matter, both production and markets were stretching beyond national boundaries and increasingly difficult to control. These factors seriously undermined the established regime of accumulation and its mode of regulation; the very foundation of what is called the "fordist system" (Lipietz, 1987b:23).

The concept of fordism refers to the model of development which was prevalent in the advanced capitalist countries after the Second World War; in other words, the so-called golden age of capitalism. As Lipietz explains (1987b), fordism had three different elements: first, it was a form of organization of labour which combined the principles of Taylorization with mechanization. Second, its regime of accumulation was one in which productivity gains were shared between owners and workers. Since real wages grew in parallel to gains in productivity, individual capitalists were assured a stable market. Third, its monopolistic mode of regulation reflected a set of institutionalized compromises between government, management, and trade unions in which productivity gains were extended to all workers. The welfare state allowed those who were unable to work to still be consumers (1987b:19).

1.2 The Canadian case: a different fordism

Though the concept of fordism encompasses a number of general elements, it is subject to historical and geographical variations. Indeed, Lipietz insists that we must study each national social formation in its own right. He argues that the development of capitalism in any given country is the result of internal class struggles and competition between capitals, resolved at the level of the nation-state. Even if economic interests and international ideological pressures appear to abolish frontiers, it is still up to the state to integrate those pressures and interests (1987a:18-23).

As Jenson (1989) has rightly argued, Canada is one of a group of countries in which the regime of accumulation was fordist, but whose fordism was *different*, both economically and politically. Canada's particular version of fordism, she maintains, is having profound effects on the ways in which we are experiencing the current crisis. For example, Jenson remarks that not only has the Canadian political party system not suffered from the assault of social movements, but that there has also been less of an ideological attack on the welfare state and on organized labour here than elsewhere. Admittedly there has been a corrosion of the welfare state in terms of the amount it spends on social programs, and collective bargaining rights have been weakened, but the state's responsibility for income redistribution and protection is being upheld by the public (1989:76-77).

The reasons for this, argues Jenson (1989), lie in both the nature of the mode of regulation and the hegemonic paradigm which were established in Canada during the fordist regime of accumulation. First, since 1945 Canada has been obliged to develop its economic policy domestically, but with an eye to continental integration.⁶ In fact, our geographical proximity to the world hegemon, the United States, has significantly influenced our particular brand of fordism. Second, whereas in most western European countries the class compromise was organized around partisan politics, in Canada the state facilitated the compromise between capital and labour. Since the union movement did not organize around a class-based understanding of the world, it appeared as just another lobby group. Unions thus struggled for years to extract the benefits of the fordist wage relation and it was only in the mid-1960s that the fordist mode of regulation in Canada took on the same characteristics as those of the central fordist countries. As a result of its specific type of class compromise, the fordist paradigm which emerged in Canada was based on a discourse of nation-building, rather than a discourse of class. The

6. Here, Jenson describes Canada's brand of fordism as "permeable; as in permeable to international effects, especially from the continental economy.

social compromises of the welfare state were rationalized in terms of the needs of the whole nation and the federal system in general. Therefore, when the crisis of fordism appeared, it touched institutions such as federalism and not the familiar institutions which have accompanied fordism - the welfare state and the labour movement. As the economy weakened and fragmented, the postwar emphasis on nation-building was confronted by the linguistic and regional demands of province-builders (1989: 76-88).

1.3 The crisis of capitalism and the challenge to political economy

As both Lipietz (1987b) and Jenson (1989) maintain, economic crisis led to a resurgence in political economy. Foremost, the crisis has provided the impetus for economic analyses which reject neo-liberal solutions and which seek alternative responses to emerging domestic and international uncertainties. The regulation approach is one perspective which has gained recognition in this area (Lipietz, 1987b:17).

Unlike neo-liberal economic theory which offers market-based solutions and rejects social solidarity, the regulation approach offers an economic analysis which focuses on the complex interrelations, habits, political practices, and cultural forms that allow the capitalist system to remain intact and function coherently for a certain period of time (Harvey, 1990:122). Herein lies the main difference between mainstream liberal economics and the economic approach of the Regulation School. The first attempts to uncover specific causes for the crisis with the view of offering specific and traditional solutions. These are almost always market-based and are founded on the unstated premise that capitalism is a static system and therefore predictable. Conversely, the objective of the regulation approach is to understand why traditional economic and political structures are no longer working by analyzing different models of development throughout history. It seeks to do this not by focusing on the causes of the crisis but why

there was no crisis before (Lipietz, 1987:18). It perceives capitalism as an open and dynamic system. As David Harvey maintains, the virtue of the Regulation School is that it insists we look at the entire package of relations and arrangements that contributed to the stabilization of the capitalist system (1990:123).

The economic and political uncertainties of the 1970s and 1980s have also prompted analyses which shift attention away from an exclusive focus on the state and its apparatuses, towards a broader conception of the political and economic arena. As Jenson (1989) has elaborated, theorists of the state - whether from an instrumentalist, structuralist, or Gramscian perspective - have all struggled to theorize the relationship between the state and society by juggling two basic notions. The first is the recognition that politics play a crucial role in organizing and stabilizing the process of capital accumulation; the second is that its role cannot be reduced to an analysis of the 'needs of capital'. Jenson argues that the regulation approach can effectively deal with these two notions because it not only looks at the total system but focuses on the concrete actions of political actors in different economic situations. As such, it overcomes the problem of 'agentless structures' within traditional state theory (1989:70-72).

In addition, as Jenson (1989) demonstrated when she charted the specific development of fordism in Canada, Canadian political economy has finally been liberated from previous rigid models of capitalist development. No longer do Canadian political economists need to fruitlessly search for evidence of such fordist elements as class mobilization. They can begin to appreciate Canada's national specificity and in doing so, come to understand how organized labour in Canada has succumbed to assault in the crisis of fordism (Jenson, 1989:88). The regulation approach facilitates this process by providing a number of insights and useful categories which emphasize less the specific political arrangement of the post-war years, and instead focuses more on the particular regime of accumulation

in place at the time (Jenson,1989:69). Although regulationists insist that there is no international regime of accumulation in the true sense of the term, there can be said to a "world configuration" that temporarily guarantees the compatibility of different regimes with different growth rates (Lipietz,1987a:40). Thus, the categories provided by the regulation model allow political economists to address the specificities of their nations while situating their analysis within an international context.

To the extent that the crisis in fordism prompted a renewal of interest in political economy, scholars have been attempting to deal with the structural changes of the 1970s. Yet, the field of political economy has lacked coherence. According to Noel:

"[the] problem is that, so far, political economy has mostly meant the addition of political dimensions to economic studies ... [few] studies have genuinely integrated the two disciplines (Strange, 1985:24 in Noel, 1987:307)."

Regulation theory provides them with the possibility to go beyond ad hoc explanations, to link political and economic change into an integrated dynamic framework (Noel, 1987:307).

1.4 Limitations of the approach

The greatest criticism of the Regulation School is its inability to adequately address the question of class action. From this theoretical weakness stem a number of other criticisms.

Though the importance of class struggle in bringing about institutional and structural changes is stressed by authors such as Lipietz (1987a) and Aglietta (1984), the notion of class is used somewhat exogenously to close the theoretical gap between the economy and social change. In an analysis which sees the economy as an institutional framework

consisting of actors which have conflictual interests, the concept of class is a likely explanatory factor (Noel, 1987: 323). However, as Noel argues, the notion of "class struggle remains an ad hoc element in an incomplete theory" (1987: 323). Regulationists are not able to genuinely integrate this social dimension into their analysis. Consequently, they are unable to directly address **how resistance is formed, and indeed how it is mobilizing to push for a change of structures** (Noel, 1987: 322). From this theoretical flaw stem additional difficulties.

Foremost, although the approach provides a detailed account of the current crisis, it **never explicitly describes the causal chain** underlying it. Regulationists counter such a criticism by reaffirming their focus on understanding how capitalism is stabilized and why crises do **not** occur. However, Noel argues, this dismissal actually stems from their inability to adequately incorporate the concept of class into their analysis (1987: 323). Whereas the generally accepted idea of overproduction reasonably accounts for the Great Depression and the eventual rise of the fordist model, the causes of the current crisis are much less straightforward. Key regulationists stress the importance of class struggle in explaining how institutions and structures are changed. Aglietta (1984) refers to the importance of working class insurgencies which periodically trigger crises and challenge the frameworks within capitalism. Mazier, Basle, and Vidal (1984)⁷, refer to a social phenomenon whereby fordism was slowly undermined by workers' resistance, and Lipietz refers to class struggle in production (Noel, 1987: 322). Yet, none of these authors are able to elaborate on how resistance is formed and how it is mobilizing for change, or more specifically, on the **causes of change**.

The above comments about class action have also led to another criticism of the regulation approach, which has to do with the construction of new regimes of

7. Here, Noel refers to the authors of the much acclaimed *Quand les crises durent* Paris: Economica, 1984.

accumulation and modes of regulation. Since the period of intensive accumulation and monopolistic regulation seems to be exhausted, **what will the new structures look like?** Regulationists usually dismiss this question by arguing that history is open, and hence that predictions cannot be made and indeed should not be made. While agreeing that history cannot be predicted, Noel argues that this should not prevent regulationists from explaining the outcomes of crises post hoc (1987: 323). The fordist period has been in crisis for approximately two decades now, yet regulationists do not seem to be able to offer more than a descriptive account of it. Though detailed, their account fails to provide a clear understanding as to how change proceeds. Although regulationists insist on the openness of history, this does not mean that a theory of change is not possible. To overcome this, they must seek to understand how social cohesion is maintained **and** constrained (Noel, 1987: 333).

1.5 Limitations of the thesis

As elaborated upon, the greatest theoretical flaw within the regulation approach is its inability to fully integrate the notion of class action into its framework. Although regulationists maintain that the state is the "archetypal form of all regulation" and that it is at the level of the state that class struggle is resolved (Lipietz, 1987a: 18), no mention is made of **how** these struggles are resolved or even how they were formed in the first place. Knowledge of this process is crucial to understanding how the various groups within the regulatory arena compete and eventually arrive at a compromise. More broadly, it is necessary in understanding how a social relation which is in contradiction is solved or transformed.

The impact of this weakness was most evident when attempting to understand how consumers groups and unions were able to mobilize for change in the pre-fordist to post-fordist eras. While it is established that a compromise was reached between corporate

capital, consumers, and the state in the fordist period, the regulation approach does not provide the theoretical tools necessary to understand how this compromise was reached, how it was maintained, and how it has subsequently been eroded.

Finally, the thesis is limited by the over-reaching nature of the regulation approach and its lack of any clear or decisive priority. In its attempt to be all-encompassing, the regulation approach lacks a coherent and adequate objective. Though it is obviously concerned with economic development, the purpose which fuels its analysis is not clearly defined.

Conclusion

The above chapter demonstrated the usefulness of the regulation approach in explaining the historical evolution of capitalism and the qualitatively different phases that characterize it. In this respect it goes beyond standard economics and political economy and prompts these disciplines to adopt a more critical and integrated approach. In particular, by insisting we analyze specific institutional social relations, the regulation approach was shown to overcome the problem of 'agentless structures' within state theory.

As well, its key concepts were shown to be useful in understanding Canada's national specificities within an international context. Jenson's work in particular (1989) demonstrated how Canada's particular version of fordism is affecting the form the current crisis is taking. Her analysis concluded that the welfare state and the labour movement in Canada have not been subject to the same ideological attacks as elsewhere. This is largely because the Canadian fordist model did not develop around class politics but slowly evolved around an emphasis on nation-building. This has serious ramifications

not only on how we are experiencing the crisis but also in terms of how and if Canadians will be able to mobilize for change.

Ultimately, the regulation approach seeks to provide a full-fledged dynamic theory. However, its inability to genuinely integrate a class analysis within its framework seriously undermines this objective. Until it can adequately bridge the gap between its own economic dimension and the social and historical dimensions that it wishes to integrate, its theory will be incomplete.

Whereas Chapter One established the theoretical groundwork for the thesis, Chapter Two demonstrates the usefulness of the approach by applying the model to telecommunications in general. Specifically, it situates various telecommunications innovations within an historical context and draws conclusions from observed parallels between these developments and other fundamental social and economic changes in late capitalism.

CHAPTER TWO

THE EVOLUTION OF TELECOM FORDISM IN CANADA

Introduction

The previous chapter outlined the basic theoretical tenets of the regulation approach as well as the particular way this school of thought comprehends the transformations that have occurred within the capitalist system. In addition to using the language of the regulation approach, this chapter draws from the work of Raymond Williams (1974) on television in the United States and Britain. Williams' work is particularly useful in that it rejects a determinist view of technology, and instead restores the notion of "intention" to the study of technological development. He states his position in the following terms:

Such an interpretation would differ from technological determinism in that it would restore *intention* to the process of research and development. The technology would be seen, that is to say, as being looked for and developed with certain purposes and practices already in mind. At the same time these purposes and practices would be seen as *direct*: as known social needs, purposes and practices to which the technology is not marginal but central (1974: 14).

Specifically, this chapter extends the regulation approach in pragmatic terms to the sphere of communications by looking at the evolution of what Mosco (1990) has referred to as 'telecom fordism' in Canada. Beginning with the pre-fordist period, the chapter outlines the social, political, and economic conditions which appropriately coincided to form the basis for the boom years of capitalism. The second section which is dedicated to the fordist period, elaborates upon the tense but firm relationship that arose between the nation state, corporate capital, and the workers' movement during this time. Each section emphasizes the role of communications and elaborates upon the conditions leading to the compromises specific to telecommunications in the fordist period.

THE PRE-FORDIST PERIOD

It is generally accepted that the fordist period represents the long postwar boom years from 1945 to 1973. However, how the fordist system was put into place is a complicated story which spans over half a century. As Harvey (1990) explains, it was the result of a myriad of individual, corporate, institutional, and state decisions in response to various crises within capitalism. In the end, however, it was the conscious decision to align the workforce to a system of mass production and mass consumption that was to truly usher in this period. This shift from an extensive to an intensive mode of accumulation coincided with a shift from a competitive to a monopolistic form of regulation and would bring about a period of economic and political stability, known as fordism.

The telecommunications sector, during this time, was just beginning to carve out its role. Unknown to most, the power struggles in telecommunications would have far reaching consequences. In particular, the early social and political evolution of the telephone would significantly shape the telecom communications structure. From the beginning, communication technologies were **intended** innovations designed to solve very particular problems in the capitalist system. Initially intended as devices to unite the country, the economic and political significance of telecommunications soon became apparent.

2.1 Mobilizing the workforce

According to Harvey, there were two major impediments to the spread of fordism in the inter-war years. First of all, the state of class relations was not conducive to a system of production that was so routinized and required the worker to work long hours. In addition, the system demanded little from workers in the way of traditional craft skills and gave complete control over production to owners. The second barrier was the lack of a new mode of regulation to match the requirements of fordist production. It took the

shock of the Great Depression and the near collapse of capitalism to push society to devise a new role for the state (1991: 128).

The Great Depression and the subsequent mobilization efforts required during the Second World War necessitated large scale planning and the rationalization of the labour force. Though the need to improve efficiency during a time of war could not be dismissed by capitalists or a resistant workforce, how workers were to be mobilized as well as how state planning was to be rationalized was a matter of great dispute (Harvey, 1991: 127).

The eventual form that the state was to take was the outcome of solutions devised to deal with the lack of effective demand for product. The solution was to discipline the workforce to more efficient and thus mass production, as well as mass consumption. The disciplining of the workforce to the purposes of capital accumulation was a very long, intricate, and ongoing affair. According to Harvey, the process of controlling labour, in the first instance, requires a mixture of repression, habituation, co-optation and cooperation both in the workplace and in society at large. More specifically, the socialization of the labour force entails the social control of education, training, persuasion, the mobilization of certain social sentiments (like the work ethic), and psychological propensities (such as individual initiative). Combined with the formation of dominant ideologies such values are cultivated by the mass media, and by public and state institutions (1990:123-124).

Telecommunications was crucial to the development of a market system. Not only was the ability to communicate quickly across vast distances an absolute necessity to the eventual establishment of the fordist system, it was also essential in fostering the norms and values necessary for both production and consumption *en masse*. This need to communicate coincided with the rise of the industrial age and the related growth of cities

and hence the dispersal of the population (see figures 1 and 2). The railroad, the telegraph, and the telephone can thus be seen as solutions to a very particular problem. Not only would they help to fulfill a particular set of social needs, as utilities these services would be instrumental in outlining a form of regulation that would, in the decades to come, appropriately coincide with an extensive form of accumulation.

Figure 1

SUBURBAN GROWTH IN MONTREAL AND TORONTO

Source: Leroy O. Stone, *Urban Development in Canada* (Ottawa: Dominion Bureau of Statistics, 1964), p. 27. Reproduced by permission of the Minister of Supply and Services Canada.

In C. Armstrong and H.V. Nelles, Monopoly's Moment, University of Toronto Press, 1986:135.

Figure 2
URBAN GROWTH IN COMPARATIVE PERSPECTIVE

Source: Leroy O. Stone, *Urban Development in Canada* (Ottawa: Dominion Bureau of Statistics, 1968), p. 137. Reproduced by permission of the Minister of Supply and Services Canada.

In C. Armstrong and H.V. Nelles, *Monopoly's Moment*, University of Toronto Press, 1986:136.

2.2 Telecommunications pre-fordism

Electrical telegraphy had been suggested as a technical system as early as 1793, however a working system was not established in Canada until 1847. It is interesting to note that it was the development of railways, themselves a response to industrialization, which finally clarified the need for telegraphy (Williams, 1974: 16). The telegraph was established as a general system of communication by the 1870s and in the same decade the telephone system began to be developed, in this case as a new and **intended** invention (Williams, 1974: 16).

As Williams makes clear, the notion of intention must be understood at different levels. On the one hand, the development of early communications technology can be seen as a direct response to the rise of a new kind of expanded, mobile, and complex society. On the other hand, the influence is less direct in that there were other social and political relationships and needs emerging during this time. The priorities of the expanding commercial system were collapsed within a definition of the needs of the larger structure: passing of necessary information, or maintaining contact and control. In other words, what was primarily a commercial intention acquired social and political intentions of a general kind. As a result, in this phase modern electric technology became oriented to uses of person to person (1974: 20). The historical development of the telephone company provides an excellent example of this integrative process.

Contrary to popular belief, Alexander Graham Bell did not create the telephone. Though his two main patents eventually anchored it, the telephone system was really the creation of many inventors all working in competition with one another largely for commercial interests (Armstrong and Nelles, 1986:66). Inasmuch as the Bell Telephone Company had attained virtually complete control over Canada by 1900, this achievement was the result of numerous calculated and often vicious struggles.

With the cancellation of the crucial Alexander Graham Bell patents in 1885, the Bell Telephone Company of Canada faced the unique challenge of preserving its monopoly. Canadian Bell was the first telephone company exposed to legal competition and its development was closely followed by its American counterpart. Management at the Bell Telephone Company of Canada foresaw the major railroads and the telegraph companies as its main rivals and immediately set out to contain them. The strategy they devised called for a speeding up of the construction of lines, the devolution of control over the Maritime region to permit concentration in Central Canada and in the West, and ruthless competition. At times, Bell even went so far as to compete with itself in order to drive out rivals (Armstrong and Nelles, 1986:108).

In the 1880s and 1890s it was technically possible to connect the telegraph and railroad companies to the Bell lines, but Bell Telephone vigorously and effectively precluded all those possibilities. By 1885 Bell Canada had persuaded most of the railroad companies to grant it cheap and exclusive permission to string its wires on telegraph poles and bridges owned by the railroads, as well as the exclusive right to install telephones in train stations and freight depots (Armstrong and Nelles, 1986:110). Only the promoters of Canadian Pacific Railway possessed the necessary resources to successfully compete with Bell. In 1888, the Federal Telephone Company, financed by CPR, established a rival network in Montreal, the very heart of Bell's territory. When it became evident that neither company could drive out the other, Bell sought an accommodation. It feared that the success of The Federal Telephone Company in Montreal might prompt it to establish links in other large cities such as Toronto. In a calculated move, Bell was able to buy out Federal and thus eliminate competition in the heart of its territory (Armstrong and Nelles, 1986:111-112).

Once it had taken care of the railroad and telegraph companies, Bell sought to deal with the competition emanating from the cities and towns within its territory. It did this by agreeing to bury its wires, offering to pay the cities five percent of its gross profits for five years, by installing free phones in city hall, and by fixing maximum rates at \$50 dollars for businesses and at \$25 dollars for dwellings. In return for this it received a monopoly on telephone service for the lifetime of the agreement (Armstrong and Nelles, 1986:110).

As is evident today, these historic maneuvers were to have long lasting consequences. However, these early economic and political struggles were not the only factors which would significantly shape the telecommunications industry and hence our telecom experience. At the same time that entrepreneurs were busy fulfilling their individual commercial interests, there arose a recognition that the public's interests needed to be protected. Though the process began even before the twentieth century, its influence on the telecommunications industry is best understood by observing the development of utilities in Canada.

2.3 Devising a mode of regulation

While the social, economic, and technological conditions which would lead to the establishment of fordism were in place, the appropriate form of regulation was yet to be devised. Early debates over the control of utilities significantly influenced the eventual mode of regulation which was to reign. Again, the telephone industry would play a particularly important role in establishing the legitimacy of both private and public monopolies, a legacy that survives to this day.

Communications, light, power, and transportation utilities, which scarcely existed in the mid-nineteenth century quickly became some of the biggest enterprises in the country. As

industrial mammoths, utilities not only provided their customers with essential services, they also supplied much of the currency upon which finance capital depended (Armstrong and Nelles, 1986:3). Just as important as their role in the development of the Canadian capital market, was the mode of regulation which was to result from the many disputes over their ownership and control. In Monopoly's Moment, Armstrong and Nelles (1984) meticulously document the emergence of a somewhat distinctly Canadian style of regulation between 1880 and 1930.

To a lesser extent than Europe, but more so than the United States, pre-fordist Canada began to rely upon public ownership of its utilities. Far from being the product of a strong ideological commitment to public enterprise, a larger public interest sector than in the United States was possible partly because the legal process was different in Canada. Canadian corporations possessed a significantly weaker bargaining position than their American counterparts, and were obliged to seek solutions to their problems in the legislature. The monopolies which arose at this time, were therefore also legal entities dependent upon public bodies for their rights and privileges (Armstrong and Nelles, 1986:322).

The emergence of state-owned utilities occurred despite profound skepticism about their efficiency. Though these "monopoly makers" had as much interest as anyone in restoring harmony and dispelling these beliefs, they were not the ones to initiate the process of accommodation through regulation. As Armstrong and Nelles argue:

At the outset the utility owners were not the ones who demanded regulation, as some historians would have it; once it was proposed by others, however, they had definite views about the kind of regulation preferred (1986:323).

In Canada, firms were able to apply their new technologies without much time lag and they were able to effectively protect their turf against private rivals. A compliant political system initially permitted this new form of business with a minimum of restrictions, and

monopoly status was achieved without serious political interference before the turn of the century. Bell Telephone obtained a charter with sweeping powers from Parliament before anyone really understood the implications of declaring the telephone business a public service. Once empowered, the Company was then able to clear the telegraph operators from the field and neutralize its most threatening rival, the Canadian Pacific Railway. All this before it had even obtained comprehensive patent protection (Armstrong and Nelles, 1986:324).

Indeed, as Nelles and Armstrong maintain, this was "monopoly's moment". Not only had Bell Telephone gained monopoly status by 1891, but by the turn of the century the street railways had established control in their respective cities, and the electric light and gas companies had dispersed into a number of regional private monopolies (1986:324).

Table 2
TELEPHONE SERVICE IN CANADA, 1920-30

<i>Year</i>	<i>Total Telephones</i>	<i>Business Telephones</i>	<i>Residential Telephones</i>	<i>Pole Line Mileage</i>	<i>Cost of Property & Equipment</i>
1920	856,000	266,000	590,000	161,270	\$144,560,969
1921	902,000	280,000	622,000	178,093	158,678,229
1922	944,000	289,000	655,000	184,147	167,332,932
1923	1,009,000	311,000	698,000	188,408	179,002,152
1924	1,972,000	305,000	767,000	193,399	193,884,378
1925	1,143,000	325,000	818,000	194,370	210,535,795
1926	1,201,000	341,000	860,000	201,604	227,155,900
1927	1,260,000	355,000	905,000	204,245	243,999,135
1928	1,335,000	377,000	958,000	207,566	263,201,651
1929	1,383,000	398,000	985,000	220,525	291,589,148
1930	1,403,000	406,000	997,000	222,113	319,101,191

Source: *Canada Year Book* (Ottawa, King's Printer, 1932), p. 614; M. C. Urquhart and K. A. H. Buckley, eds., *Historical Statistics of Canada* (Toronto: Macmillan, 1965), Table S323-331, p. 559.

In C. Armstrong and H.V. Nelles, Monopoly's Moment, University of Toronto Press, 1986:295.

As these monopoly holders set about maximizing the return on their investment, opposition arose from a loosely federated national movement which combined the suspicions of victimized consumers with the grievances of angry municipal corporations. Leaders of the movement demanded that the political process that had initially permitted the creation of these powerful monopolies, now make them accountable to the public rather than merely to their shareholders (Armstrong and Nelles, 1986:324-325).

However, no single set of institutional arrangements solved the social and political disequilibrium created by the rise of the new monopolies. Rather, as Armstrong and Nelles have documented, a number of different regulatory solutions arose in different jurisdictions. Since jurisdiction over property and civil rights was largely a provincial matter at this time, national regulation was not possible even within those areas that did fall under federal law. The Bell Telephone Company, for example, had been assigned to federal jurisdiction by 1904, however that did not prevent five other provinces from creating their own provincially-owned or regulated telephone companies (1986:325).

Canadian utility owners like Bell Telephone, then, entered the regulatory debate determined to protect themselves against the possibility of a public takeover. In province, after province, utility owners actively sought to sway public opinion in their favour through "acceptable" forms of regulation. The wide range of regulatory instruments which arose in the various jurisdictions was a result of the reconciliation of the interests of producers and consumers (Armstrong and Nelles, 1986:326). As Armstrong and Nelles point out, the desire for regulation was essentially protective. On the one hand, consumers sought protection against the real and imagined abuses of private monopoly and cities sought access to crucial infrastructures. On the other hand, the utilities sought protection against public ownership and political opportunism. At this time, confidence and security were considered to be more important than efficiency. The goal was to

achieve some sort of equilibrium between the demands of the public and those of business (1986:327). In addition, it was becoming increasingly clear that communications and information were essential to the functioning of a democratic society (Mosco and McDowell, 1993:2).¹

In the 1930s, groups ranging from educators, consumer lobbyists, trade unions, to librarians fought to retain the notion that information and communications were rights of citizenship. Their cause was taken up by professional bodies, user groups, and workers' organizations which entered the political arena to advance their beliefs. These early efforts entrenched the notion that the both the means of communication and the content of information were more than commodities. They were essential and vital public resources which needed to be regulated in the public interest (Mosco and McDowell, 1993:1-2). This was to have a profound impact on the way telecommunications came to be regulated.

THE FORDIST PERIOD

Once the proper configuration of the state was devised and its powers firmly established by 1945, the fordist regime of accumulation formed the basis of a long postwar boom that stayed largely intact until 1973. The fordist regime of accumulation at this time and its accompanying mode of regulation, must be seen as an entire way of life. The emphasis on mass production as well as on mass consumption demanded a whole new way of thinking. The so-called heyday of capitalism, however, depended on a series of compromises and repositionings between the state, the labour movement, and large corporate capital. The political and social bargains arrived at with the telecommunications industry exemplify this arrangement

¹ Even prior to the twentieth century, the notion of the public interest was alive. As Mosco has pointed out, public postal stations, libraries, and education were considered essential tasks of the state even in these early times (1993:3).

2.4 Overview of the fordist system

The postwar period saw the rise of a series of industries based on technologies which had matured in World War Two and reached new levels of rationalization. These industries not only helped to finance the economy, by providing stable employment they also created the basis for effective and expanding demand. This demand was also fed by state-sponsored reconstruction efforts of war torn economies, suburbanization, urban renewal, the development of infrastructures, and the expansion of transportation and communication systems. (Harvey, 1990:132).

As a result of these forces, during the fordist period material living standards rose for most people of the advanced industrial countries, and corporations benefited from a stable economic environment and increased profits. In addition, crisis tendencies were contained, mass democracy was preserved and the threat of war between capitalist countries seemed remote (Harvey, 1990:129).

The phenomenal growth that occurred, however, in the postwar boom depended on a series of compromises between the major actors in the capitalist development process. The state was required to take on a new role and build new institutional powers, corporations had to curb their ambitions in some respects, and workers and unions had to adapt their new role in the workplace and the economy. It was this tense, but firm relationship between the state, organized labour, and capital which was to form the basis for the postwar boom.

The political ground for the kinds of labour control and compromise that made fordism possible varies a great deal from one country or region to another. In the United States, for example, unions won considerable power over collective bargaining, preserved some

shop floor control over job specifications, security and promotions, and wielded an important political power over such matters as social security benefits, minimum wage, and other similar issues. In contrast, Jenson (1989) has demonstrated that in Canada the **state** facilitated the fordist compromise between capital and labour. Since the union movement did not organize around a class-based understanding of the world as in the US and Western Europe, it appeared as just another lobby group. Canadian unions thus struggled for years to extract the benefits of the fordist wage relation and it was only in the 1960s that Canada took on the same characteristics as the central fordist countries.

Table 3

AVERAGE RATES OF GROWTH FOR THE ADVANCED CAPITALIST COUNTRIES OVER VARIOUS TIME PERIODS SINCE 1820

	Annual percentage rates of change		
	Output	Output per Capita	Exports
1820-1870	2.2	1.0	4.0
1870-1913	2.5	1.4	3.9
1913-1950	1.9	1.2	1.0
1950-1973	4.9	3.8	8.6
1973-1979	2.6	1.8	5.6
1979-1985	2.2	1.3	3.8

Source: Maddison, 1982, (1820-1973) and OECD (1973-1985). In David Harvey, The Condition of Postmodernity, 1990: 132.

Figure 3
REAL WAGES AND FAMILY INCOMES IN THE USA, 1947-1986

Source: Historical Statistics of the United States and Economic Reports of the President.

In David Harvey, The Condition of Postmodernity, 1990:131.

2.5 Forging a compromise in communications²

The early evolution of telegraphy and telephony in Canada and in the U.S. was largely competitive with patent licenses to the technologies involved distributed roughly on a regional basis among railroad and independent companies. The railroad companies, Canadian National Railways and CP Limited, were historically granted telegraph franchises along their rail lines in support of their development of a national rail system (Globerman and Carter, 1988: 4).

The blueprint for the fordist arrangement in telecommunications in Canada was established when the CNCP Telecommunications partnership was formed in 1961 between the telecommunications departments of the two major railways. Given the separation between telegraphy and telephony, CNCP emerged to hold a de facto monopoly in the domestic telegraph market, while the member companies of the then TransCanada Telephone System (now Stentor) came to hold a de facto monopoly in the inter-city voice market (Globerman and Carter, 1988: 4).

The state permitted these de facto monopolies during the fordist period, both in the U.S. and in Canada, in the belief that it would not be economically or socially viable to establish two competing systems. The underlying premise was that the nature of the technology itself, namely its complexity and cost, was adequate reason for granting these industries special status. However, as Babe (1990) and Armstrong and Nelles (1986) have shown, the telephony and telegraphy monopolies were not technologically caused natural occurrences, but rather the result of favourable policy decisions and economic agreements which segregated the two technologies and then permitted restrictive and frequently predatory practices in their respective industries (Babe, 1988).

². This section focuses mainly on the compromise reached in telephony and radio since both these technologies have influenced the development of the digital cordless telephone.

As in the sphere of production, the state sought to implement a fordist compromise within the telecommunications sector. Within this compromise, a narrow class fraction of monopoly providers, such as Bell Canada, controlled the market for the production of facilities and the provision of services and received state support for a guaranteed, stable return on capital. In return, the monopoly holders were to provide universal service and stable employment. The state's role was to protect this hegemonic position by defending monopoly as "natural" and by managing conflict among industry, consumer, and trade union organizations (Mosco, 1990: 2).

As such, state support did not only help establish and protect telecommunications corporations and their services, it also secured certain broader public interest goals based on principles of fairness and equity. Telephone and telegraph companies were legally obliged to provide service to all, at reasonable and fair prices - hence universal service. It is significant that the Canadian telephone industry was able to achieve this goal as a government regulated monopoly (Horwitz, 1989: 13). Today, 98 percent of Canadian homes have telephones, about the highest percentage in the world. In 1946, the figure was only 44 percent (Canada, 1987: 19).

Another communication technology which was to eventually emerge as a social technology after the Second World War was radio. Until the end of the First World War, radio telegraphy and radio telephony proved important to the military. It was not until after the war period that the notion of selling radio receivers to households even occurred to American and Canadian manufacturers of radio transmission and receiving equipment (Babe, 1988: 69). Although we have become accustomed to listening to the radio as a broadcast medium and as a form of mass communication, such was not always the case. In the United States, AT&T announced in 1922 that it would open a radio station and network in which any person or group interested in reaching a wide audience could lease

time on the company's "toll broadcasting station" (Babe, 1988: 70). The eventual development of the radio as a social technology occurred only once the commercial needs of the broadcasting industry were collapsed within the broader needs of society.

As in telecommunications, the needs of the public became embedded within broadcasting. As a result, the fordist arrangement in the broadcasting industry embodied certain social or equity based values. Since the airwaves were deemed the property of the people, the holders of broadcast licences were expected to operate as public trustees (Horwitz, 1989: 13). Ultimately, broadcast regulation was founded upon a number of rationales, of which the most prevalent is spectrum scarcity. This rationale holds that where there is a finite number of usable frequencies the state is obliged to allocate the scarce resource in the public interest (Finkelstein, 1989: 220). Though technical improvements have served to redefine the issue of spectrum scarcity, the fordist arrangement within radio broadcasting was based in large part on this doctrine

As Finkelstein maintains, the regulation of the broadcasting industry rested on a number of other rationales as well. The "prior grant" theory, for example, maintained that the state should regulate licensees because they were initially granted protected access to the airwaves over other prospective applicants. Perhaps the most compelling rationales for content regulation in broadcasting are the impact and privacy theories. The impact theory is based on a perception of the broadcast medium as a monolithic force. It is asserted that the broadcast medium is a preponderant source of news and commentary, and that it is both pervasive and invasive. The privacy theory assumed that audiences are captive and as such have the right to be protected "from assault" by unwelcome and unforeseen messages. However, the rationale which has had the greatest effect on the regulation of the electronic media in general, is the historically Canadian view of communication as a

public service and a vehicle of national unification and cultural protection (Finkelstein, 1989: 219-232).

The compromise that ultimately led to the fordist arrangement in broadcasting was founded on many of the above premises. Individual broadcast licensees were allocated a part of the spectrum at no cost, were allowed to operate in a relatively protected market and to reap the rewards of their undertaking. In return, they were deemed "public trustees" and were required to fulfill certain social obligations. The state played an active role in mediating conflict between the licensees themselves, consumers, and the many interest groups which sought equal representation.

Conclusion

In the pre-fordist period the role of the state was still being actively defined. While the public began to rely increasingly on the state to represent its interests and to shield it from potential abuses by monopoly holders, private enterprise sought to protect itself from over zealous policy makers. As documented by Armstrong and Nelles (1986), the desire for regulation at this time was largely protective, and confidence and security were considered much more important than efficiency. The goal was simply to achieve some form of equilibrium between the demands of the public and those of business.

It was not until approximately 1945 that a more strictly defined role was carved out for the state. The fordist period marks the beginning of the so-called boom years when economic development was well established. At this point the state turned its attention to the political arena and sought to mediate the demands of capital, consumers, and workers. As a result, it was instrumental in establishing a uniquely Canadian fordist arrangement in the telecommunications sector in which monopoly providers were allowed to control a lucrative market and in return were to provide universal service and stable employment.

The preceding chapter charted the historical development of the pre-fordist and fordist periods of capitalist development that would lead to a fordist arrangement in telecommunications. Communication technologies such as the telegraph, the telephone, and radio were employed to demonstrate two main points. First, that the development of communication systems in particular have always been foreseen, not in a utopian way but technically. The social development of the telegraph, the telephone, and radio can be seen as both an incentive as well as a response to a society characterized by rapid growth and the increasing need to communicate. Second, the development of these technologies demonstrates the centrality of communications to the development of the capitalist mode of production.

CHAPTER THREE

THE BREAKDOWN OF TELECOM FORDISM AND THE TRANSITION TO A NEW POST-FORDIST ARRANGEMENT

Introduction

The progression of capitalism is reflective of the varying degree of emphasis placed upon certain values and goals at any one moment in history. Though capitalism in general is concerned with economic growth, during the fordist period concerns for security, equity, and nation building were greatly emphasized. In the post-fordist period these values have taken a back seat to greater concerns over efficiency, productivity, and competition. Like many others, the telecommunications industry has been significantly influenced by this shift in perspective.

This chapter seeks to extend the historical analysis which was begun previously by theorizing about the breakdown of fordism and the current transition to a post-fordist regime. The objective is to demonstrate how certain conditions, prevalent since the 1970s, are helping to establish the blueprint for a new post-fordist arrangement in telecommunications. The chapter concludes by providing a general discussion of the development of Personal Communication Services (PCS). PCS is a generic term which encompasses any system that brings communication directly to one person rather than to a fixed place, such as the digital cordless telephone. It will be argued that PCSs are being developed and implemented as a response to certain perceived economic and social problems associated with advanced capitalism.

3.1 Theorizing the transition - general overview

From the onset opposition to the fordist economic system arose from various quarters. These forces were to eventually unite into a strong cultural and political movement just when fordism appeared to be at its apogee (Harvey, 1990:139).

Harvey explains that as expectations rose the inequalities of the system became increasingly difficult to sustain. Large segments of the workforce were denied access to privileged work in mass production and consequently were unable to participate in the much touted joys of mass consumption. At this point, the legitimation of the state depended on its ability to spread the benefits of fordism to all segments of the population. The state bore the responsibility for providing adequate health, educational, and housing services. However, its ability to provide collective goods depended upon continuous increases in productivity. The economic problems particular to the 1970s made it increasingly difficult for the state to fulfill this obligation and hence, maintain its role as an arbitrator between workers and owners. In addition, growing consumers dissatisfaction with the blandness and depersonalized nature of mass produced goods and services, the resurgence of a vigorous feminist movement which countered the surge of women in low-paying jobs, and the capacity of unions to resist deskilling in the workplace, were all signs that the fordist regime of accumulation was on tenuous ground (1990: 138-139).

Harvey maintains that on the surface, these problems were the result of rigidities embedded within the fordist regime. For example, rigid and long-term fixed capital costs discouraged flexibility in design and in production and presumed that the economy as well as consumer tastes would remain constant. As well, there were rigidities within the labour force itself. Attempts at reskilling were resisted by a strong workers' movement. Even the state was trapped within the rigidity of its role as a provider of services. The

only flexible tool was in monetary policy and the ability of the state to print money at whatever rate was necessary to keep the economy floating. And so began the economic problems of the 1970s with the sharp recession of 1973 (1990: 142-145). Subsequently, the 1970s, 1980s, and 1990s have been economically, politically, and socially turbulent times.

A number of key authors such as Lash and Urry (1987), and Halal (1986), have come to characterize this transition in different terms. Halal (1986) for example, offers a celebratory account of what he regards as the new and much improved capitalism, while Lash and Urry (1987) on the other hand, view the transition in negative terms as the end of organized capitalism. Nonetheless, both authors agree with Harvey (1990a, 1990b) that the transition from a fordist to a post-fordist regime encompasses a more flexible form of accumulation. As such, I am more partial to Harvey's interpretation.

According to Harvey's particular vision, *flexible accumulation* is marked by a direct confrontation with the rigidities of fordism and rests on flexibility within labour processes, labour markets, and products and patterns of consumption. It involves the emergence of entirely new sectors of production and new markets, and enormous leaps in commercial, technological, and organizational innovation. It is leading to rapid shifts in the patterning of geographical development and in the distribution of the workforce (1991: 156). Not only have entirely new industries moved to previously undeveloped regions and nations, but more significantly, there has been a large increase in service sector employment (Harvey, 1991; Lash and Urry, 1987).

Table 4
UNEMPLOYMENT RATES

Annual Average	Total for both sexes	National Average	Total for both sexes
1966	3.4	1979	7.4
1967	3.8	1980	7.5
1968	4.5	1981	7.5
1969	4.4	1982	11.0
1970	5.7	1983	11.8
1971	6.2	1984	11.2
1972	6.2	1985	10.5
1973	5.5	1986	9.5
1974	5.3	1987	8.8
1975	6.9	1988	7.8
1976	7.1	1989	7.5
1977	8.1	1990	8.1
1978	8.3	1991	10.3
		1992	10.8*

Source: Statistics Canada, Canadian Economic Observer
Historical Statistical Supplement 1991/1992,
Table 2.6, page 38.

* Information reflects first quarter results only

Table 5
TIME LOST IN WORK STOPPAGES (thousands of person-days)

Year	Total	Year	Total
1976	11,610	1984	3,872
1977	3,308	1985	3,181
1978	7,393	1986	7,134
1979	7,834	1987	3,984
1980	8,976	1988	5,046
1981	8,879	1989	3,724
1982	5,795	1990	5,154
1983	4,444	1991	2,582

Source: Statistics Canada, Canadian Economic Observer
Historical Statistical Supplement, 1991, Table 2.9,
Page 40.

Table 6

Structure of civilian employment in selected advanced capitalist countries, 1960-1981, illustrating the rise of the service economy

Percentage of employed population in:

	AGRICULTURE			INDUSTRY			SERVICES		
	1960	1973	1981	1960	1973	1981	1960	1973	1981
Australia	10.3	7.4	6.5	39.9	35.5	30.6	49.8	57.1	62.8
Canada	13.3	6.5	5.5	33.2	30.6	28.3	53.5	62.8	66.2
France	22.4	11.4	8.6	37.8	39.7	35.2	39.8	48.9	56.2
W. Germany	14.0	7.5	5.9	48.8	47.5	44.1	37.3	45.0	49.9
Italy	32.8	18.3	13.4	36.9	39.2	37.5	30.2	42.5	49.2
Japan	30.2	13.4	10.0	28.5	37.2	35.3	41.3	49.3	54.7
Spain	42.3	24.3	18.2	32.0	36.7	35.2	25.7	39.0	46.6
Sweden	13.1	7.1	5.6	42.0	36.8	31.3	45.0	56.0	63.1
UK	4.1	2.9	2.8	48.8	42.6	36.3	47.0	54.4	60.9
USA	8.3	4.2	3.5	33.6	33.2	30.1	58.1	62.6	66.4
OECD	21.7	12.1	10.0	35.3	36.4	33.7	43.0	51.5	56.3

Source: OECD Labour Force Statistics in The Condition of Postmodernity, David Harvey, 1991: 157

This increase in service sector employment is attributed not so much to retailing, distribution, transportation, and personal services, as to producer services, finance, insurance, real estate, and certain other sectors such as health and education. Despite the fact that the exact interpretation of this information is a matter of considerable controversy, this marked shift in occupational structure since the 1970s cannot be dismissed (Harvey, 1991: 157).¹

In addition, both the desire for and the ability to increase flexibility and mobility have led employers to seek even greater control over a workforce already weakened by two severe recessions. Faced with heightened competition, employers have taken advantage of

¹. Even the basic definition of what is meant by *service* is disputed.

weakened unions and the large pool of unemployed workers to push for more flexible production and labour contracts (Harvey, 1991: 150). The eighties and nineties have witnessed a shift from the traditional nine to five workday to more flexible arrangements involving sub-contracting, part-time work, short-term contracts, job sharing, and the like. Although the term 'flexible' may be a misnomer in that we must question who benefits from this increased flexibility, such a shift in the patterns of work demonstrates the extent to which owners are realigning their production centers to deal with competitive pressures.

In addition, this transitional period has been characterized by a wave of bankruptcies in the 1980s and 1990s as many organizations have been unable to adapt their high volume, standardized production centers to rapid and flexible production systems. Conversely, there has been an increase in the number of new small businesses, many of which are in the sub-contracting or consultancy area (Harvey, 1991: 155-156). It appears that the Fordist emphasis for economies of scale has been beaten out by a new emphasis on economies of scope. As both Harvey (1990) and Lash and Urry (1987) point out, mass production is being replaced by a capacity to produce a variety of goods cheaply in small batches. In order for such an increase in the variety and in the pace of innovations to be meaningful and worthwhile, flexible accumulation has had to be accompanied by a form of flexible consumption. In other words, accelerating turnover time in production would be fruitless if turnover time in consumption was not also reduced. For this to occur,

the relatively stable aesthetic of Fordist modernism has given way to all the ferment, instability, and fleeting qualities of a postmodernist aesthetic that celebrates difference, ephemerality, spectacle, fashion, and the commodification of cultural forms (Harvey, 1991: 156).

The enhanced capacity for geographical dispersal, batch production, and the pursuit for niche markets has not necessarily diminished corporate power. In fact, Harvey insists that in an era characterized by swift and uncertain decision making, the well-organized corporation has a definite advantage over the small business. Capital, he argues, has not become disorganized as Lash and Urry (1987) maintain, rather it is becoming even more tightly organized as a result of its enhanced powers of flexibility and mobility. Harvey points to two parallel developments which have encouraged this tighter organization: the commodification of information and the complete reorganization of the global financial system (1991: 155-158).

The first results from our ability to measure, monitor, package, and transmit up-to-date information from around the globe. The increasing commodification of information can be seen as both an outcome as well as a propelling force within the crisis of fordism. The technical developments themselves are the outcome of the capitalist mode of production in place between 1945 and 1973 which sought to process ever increasing amounts of information and to communicate quickly across large distances. The emphasis on efficiency, rationalization, and progress was imperative not only to the establishment and eventual extension of the fordist agenda internationally, it was also a necessary component of a system based on mass production and mass consumption. However, the refinement of these techniques can be seen as the result of a conscious desire to monitor, package, and sell information. This development itself is largely the result of the crisis within fordism and the need to extend production and consumption to new uncharted areas.

In turn, the commodification of information is also propelling the crisis of fordism. As Mosco has noted, the telecommunications industry in particular is playing a significant role in deepening and extending the process of making information a marketable

commodity and a means of social management. As he argues, large telecommunications users, including transnational business, the state and the global organizations representing them, are accelerating the process through research, development, regulation, and policy (1990: 2-3).

Just as access and control over information flow has become a necessity for the corporation, control over the vehicles for propagation of popular taste and culture has become important (Harvey, 1991: 160). The importance of the cultural industries is made evident by their significant market value. Over the past decade, the traditional information industries, including publishing, broadcasting, film, video and sound recording, have grown faster than Canada's Gross Domestic Product (figure 4). Revenues (in current dollars) for these four industries have grown from nearly \$4.5 billion in 1977 to over \$11 billion in 1985, which represents almost a three-fold increase in the market value of the information products they sell in Canada in less than a decade (Canada, 1987: 16).

Figure 4

EXISTING INFORMATION INDUSTRIES INDEX OF GROWTH

Publishing, Broadcasting, Film, Video, and Sound Recording

NOTE: Indices are based on aggregate industry revenues and values of GDP measured in current dollars, with 1974 equalling 100.

Source: Canada. 1987. Communications for the Twenty-first Century. Page 16.

The second development which Harvey argues has allowed capital to become more tightly organized involves the complete reorganization of the global financial system. The collapse of the Bretton Woods agreement in particular signaled a realignment in the balance of forces at work in global capitalism. It entailed a shift towards the empowerment of finance capital vis a vis corporate, state, and personal financing, largely attributed to the enhanced capacity to switch capital flows around independent of time and space constraints (Harvey, 1991: 165).

Finance and communication have always been closely linked. As Mulgan argues, the competitive deregulation of telecommunications during the 1980s was mirrored in finance (1991: 226). As transparency in trading became a primary element in the success of financial centers, the leading deregulators in telecommunications, the USA, UK, and Japan, also began to compete in financial services. Banks as well as other leading corporations expanded their traditional role and began to provide general financial services. Communication technologies served to make it easier to diversify by allowing corporations to internationalize without incurring the costs of establishing physical branches (Mulgan, 1991: 226).

3.2 The transition of telecom fordism in Canada

During the fordist period, telecommunications regulation was designed to protect consumers from overcharging by the monopoly providers of telecommunications services. Regulation was seen as the means to ensure the policy goal of universal availability of affordable telephone service. In the post-fordist period, the arguments which formerly supported the establishment of monopolies are being reconsidered. At present, a shift is occurring in Canada from a planned telecommunications infrastructure, governed by the goal of universal service, to one dominated by market forces. What were originally public goods available to all are slowly being transformed into private goods

This is being achieved by in part deregulating the industry and thereby undermining the complex set of benefits which was negotiated between corporate capital, labour, and consumers during the fordist period.

As Horwitz makes clear, deregulation or re-regulation could not have occurred without a great number of underlying factors: changes in the legal conceptualization of the public interest, economic conditions such as inflation and productivity decline since the 1970s, and the rise of public interest groups (1989:198). According to Mulgan, "[the] history of regulation and deregulation can be understood as a succession and accumulation of three different types of control" (1991: 141). During the pre-fordist period "sponsoring control" enabled the state to use its powers to achieve specific ends such as the creation of new communication infrastructures like the telegraph and telephone. During the fordist period there was a shift from this type of control to a more "restrictive control" concerned with restraining the institutions which arose as a result of the creation of infrastructures or with protecting public services from disruptive competition. In general, deregulation has involved the removal of both types of control (1991: 151).

Both sponsoring control and restrictive control are now giving way to what Mulgan refers to as a form of "arbitrary control" in which the state takes on the role of an overseer. This shift in the perspectives of government reflects the prevailing view that the government is incapable of determining which technologies will prove either viable or socially valuable. Instead, these decisions are increasingly being left to the market (Mulgan, 1991: 155). In short, the concept of natural monopoly which provided the theoretical base for provision through regulated monopolies, has been called into question. Competition now seems more natural, while restrictive regulation is perceived as a barrier to industrial and national development (Mulgan, 1991: 138).

The process of deregulating the telecommunications industry in Canada started in the 1970s when the CRTC began to directly relax certain competitive restrictions in the domestic market. One important area affected by federal and provincial regulatory decisions is interconnection. Historically, the carriers had the exclusive privilege over the hardware that transmits signals to and from the network. Since 1979, private companies have been allowed to own telephone equipment, telex equipment, and satellite earth stations. As a result, independent interconnect companies have been allowed to compete alongside traditional service providers (Globerman and Carter, 1988: 7).

A second important pro-competitive decision reached by the CRTC involved the reselling and sharing of telecommunications facilities and/or services in all areas except for the provision of basic local and long-distance voice services. This decision opened up the telecommunications sector to new participants - unregulated companies interested in leasing facilities in order to provide services other than basic telephone service (Globerman and Carter, 1988: 10).

Third, the CRTC permitted the interconnection of noncarrier-provided private local systems and public non-voice systems to the facilities of the federally regulated carriers. This ruling allows cable companies, for example, to interconnect to the public switched network (Globerman and Carter, 1988: 10-11).

These decisions, coupled with the end of monopoly provision of some telecom equipment, the reorganization of Bell Canada into the Bell Canada Enterprises, the privatization of Teleglobe and Telesat, the divestiture of the AT&T monopoly in the U.S. indicate that the telecommunications industry is shifting to a post-fordist regime in which the needs of corporate users take precedence (Mosco, 1990: 8).

Traditionally, the telecommunications industry was organized around a specific fraction comprised mainly of telephone companies. Customers, including large business users paid minimal attention to the industry. As Dan Schiller has documented (1981), this has changed considerably since the 1950s. Today, 1 percent of users in the U.S. account for as much as 33 percent of telephone company revenues (Mulgan, 1991: 153). Their ability to exercise market power has enabled large, mainly transnational users to become directly involved in decisions about the industry. Over the last decade in particular, telecommunications has become a vital part of doing business in all sectors. As Mosco has noted, decisions regarding the telecom industry's structure, pricing policy, network development, and regulation are no longer left to one particular fraction of capital. Business users are now organized in cross-cutting national and international organizations such as the Canadian Business Telecommunications Users Association (CBTA), the Information Technology Association of Canada (ITAC), and the International Users Group (INTUG) (1990:8).

In the 1970s a coalition of large users began to seriously push for change on a number of fronts (Mosco, 1990: 8). In the U.S large users lobbied and received the support of key branches in the state, thus enabling them to obtain the necessary capital to finance potential competitors such as MCI. At the same time, other users challenged the AT&T monopoly in the courts on anti-trust grounds (Horwitz: 1989). Judge Greene's decision to end AT&T's monopoly was the most significant in a long series of successful attacks on the fordist telecom arrangement which began in the sixties (Schiller, 1981).

The attack on the telecom fordist compromise was prompted by the inability or refusal of monopoly providers and regulators to fulfill the demands of large users. Large transnational businesses required flexible global networks that could provide the quick transmission of large quantities of voice, data, and video communication at low cost. In

addition, they sought telecommunications systems that would allow them to gather and thus sell information that they generated in the course of doing business. Since monopoly providers were guaranteed a stable return on capital there was little incentive to either offer discounted services or to provide specialized services to large users. Afraid of disrupting a system that benefited customers and workers, the regulatory bodies steadfastly supported the monopoly providers (Mosco, 1990: 11). Whereas regulation in the fordist era was more concerned with the security afforded by monopoly service, the transition period is highly concerned with efficiency.

3.3 The post-fordist telecom agenda in Canada

In order to understand this transformation and to assess the prospects of a post-fordist regime in Canadian telecom, it is important to understand the character of fordism in this industry. The industrial and regulatory structure for telecommunications in Canada differs significantly from that in many other countries. Until 1989, Canada had a complex mixture of federal and provincial legislation, policies, and regulation. The Canadian telecommunications carriage industry consisted of a mixture of private, governmental and joint private-governmental corporations and organizations, generally each regulated by a single federal or provincial regulatory agency (Canada, 1988a: 5). However, as the economy weakened and fragmented and telecommunications became a vital industry, the federal government sought to gain control over it. Also aware of the growing significance of telecommunications, the provinces refused to relinquish control. Thus began a long and heated battle between the federal and provincial governments, which the federal government was to eventually win.

TABLE 7
Major Canadian Telecommunications Carriers, 1993

<u>COMPANY</u>	<u>OWNERSHIP</u>	<u>TERRITORY</u>
Newfoundland Telephone	private	Newfoundland
Terra Nova Telecommunications	private	Newfoundland
Island Telephone	private	P.E.I.
New Brunswick Telephone	private	New Brunswick
Maritime Telephone and Telegraph	private	Nova Scotia
Bell Canada	private	Ontario, Quebec & Eastern N.W.T.
Quebec Telephone	private	Quebec
Telebec Ltee	private	Quebec
Northern Telephone	private	Ontario
Manitoba Telephone	provincial	Manitoba
SaskTel	provincial	Saskatchewan
Alberta Government Telephones	private	Alberta
Edmonton Telephones	municipal	Edmonton
BC Tel	private	British Columbia
NorthwesTel	private	N.W.T, Yukon & Northern B.C.
Unitel Communications	private	Canada
Telesat Canada	private/public	Canada
Teleglobe Canada	private	International Overseas
Cantel Inc.	private	Canada
CellNet	private/public	Canada
cable companies	private	specified territories

Source: (updated) McPhail and McPhail, 1989:55. In Mosco Vincent 1990. Transforming Telecommunications: Political Economy and Public Policy. Page 16.

TABLE 8
Estimated Total Operating Revenues for
Telecommunications Carriage Industry - 1990

Telecommunications Carrier	Total Operating Revenues (\$ millions)	% of Total Operating Revenues
Alberta Government Telephones	1189.3	7.8
BC Tel	1852.6	12.2
Bell Canada	7654.7	50.3
Island Telephone	51.2	0.3
Manitoba Telephone	541.7	3.6
Maritime Telephone and Telegraph	442.6	2.9
New Brunswick Telephone	324.1	2.1
Newfoundland Telephone	256.9	1.7
SaskTel	574.5	3.8
Telsat	177.8	1.2
Subtotal Telecom Canada	13065.4	85.9
Edmonton Telephones	261.2	1.7
Northern Telephone	35.2	0.2
Northwestel	84.1	0.6
Quebec Telephone	223.5	1.5
Telebec	159.8	1.0
Teleglobe	234.0	1.5
Other Independents	140.0	0.9
Unitel	362.2	2.4
Subtotal	14565.4	95.6
Cantel	334.2	2.2
BCE Mobile	329.2	2.2
Total of Major Telecommunications Carriers	15228.8	100.0

Source: Company Annual Reports
 In Communications Canada - Factsheet, 1992. Telecommunications in Canada: Some Facts.
 Appendix A.

As a result of a decision by the Supreme Court in 1989, the privately-owned company members of Stentor have come under the authority of the federal regulatory agency, the CRTC.² With the privatization of Alberta Government Telephone (AGT), only the provincial Crown corporations in Manitoba (MTS) and Saskatchewan (SaskTel) were not subject to CRTC authority, because of immunity conferred on them by their status as Crown corporations (Canada, 1992:11).

Traditionally, the presence of provincial crown monopolies in the prairies and of a U.S. owned company in British Columbia have been sources of dissent and conflict within the Stentor consortium.³ More specifically, they have resisted attempts to introduce competition, making it impossible for national companies to establish their networks across Canada. Despite the lack of competition, these companies have been able to provide the lowest cost and most accessible telephone service on the continent (Mosco, 1990: 15-17). However, with new telecommunications legislation, the Canadian federal government hopes to gain authority over the major facilities-based carriers in all the provinces, putting both local and long-distance services under the umbrella of federal regulation (Jaffrey, 1992: 49), effectively diminishing any challenge to its post-fordist agenda.

Members of the Stentor consortium have responded in different ways to the demands of large users for lower rates and greater choice in services. In general the group opposes introducing competition into the industry. However, when Bell first defended its territory

². While the authority of the CRTC on inter-provincial communications has been confirmed, jurisdiction over intra-provincial communications remains open to interpretation (Discussion with Vincent Mosco, February 1993).

³. Stentor, formerly Telecom Canada, is an organization representing the largest telephone companies operating in each province and Telesat Canada, the domestic satellite carrier. It is responsible for the Revenue Settlement Plan (RSP) which is the mechanism used by member telephone companies to share jointly-earned long distance revenues (Canada, 1992). Bell Canada, a division of Bell Canada Enterprises (BCE), is by far the largest telephone company operating in Ontario and Quebec and uses its near monopoly to lead the consortium (Mosco, 1990: 14).

introducing competition into the industry. However, when Bell first defended its territory against CNCP in the mid-eighties it supported what it called rate rebalancing, a plan which would shift the cost burden to local subscribers (Mosco, 1990:15). During the recent Unitel hearings, Bell rejected competition outright, arguing instead that the economies of scale that they have achieved as a regulated monopoly will now allow them to lower long distance rates on par with those in the U.S. by 1996, without raising local rates (Lacasse, 1991: C-1).

The transformation and the conflicts in the Canadian telecommunications industry has been intensified as a result of changes occurring in the United States. Large users in Canada began their attack on the fordist telecom arrangement in the late 1970s. As previously outlined, they were successful in obtaining a number of privileges. However, the recent decision by the CRTC to permit competition in the provision of long distance public telephone service constitutes the most serious attack yet on telecom fordism in Canada. Indeed, it can be seen as the blueprint for a new post-fordist telecom arrangement in Canada.

In May of 1990, Unitel Communications Inc., formerly CNCP, applied to the CRTC for permission to offer competitive long distance telephone service in British Columbia, Ontario, Quebec, and Atlantic Canada.⁴ In July of the same year, BCRL a joint venture of BC Rail Telecommunications, Call-Net Telecommunications and Lightel Inc. applied to provide the same service in British Columbia, Ontario, and Quebec. After a two year hearing process, the CRTC granted both companies permission to enter into what the state has dubbed "consumer friendly competition" (Canada, 1992).

⁴.In 1985 and 1986 the CRTC refused to allow CNCP (now Unitel) to compete in the public long distance market.

During these proceedings the CRTC played the role of an overseer in mediating the goals of capital and consumers. The introduction of "consumer friendly competition" constitutes a calculated attempt to balance the competing interests of these two groups, and reflects an arbitrary form of control. Aware of the impact of the AT&T divestiture in the U.S. on local rates, Mr. Spicer has stated:

I want to make it clear that the Commission has taken steps to ensure that affordable local rates are maintained. The competitive long distance structure the Commission has developed balances the interests of residential and business consumers, incorporating the principle of affordable local rates while making long distance services less expensive (Canada, 1992: CRTC News Release).

The Commission's decision represents a Canadian version of the post-fordist telecom arrangement established in the U.S. as a result of the AT&T divestiture. Negotiations between large users, providers, and consumers in Canada have resulted in an arrangement in which Unitel, BCRL, and resellers will be required to make contribution payments towards the telephone companies' local service subsidy, based on the amount of business they take from the telephone companies. As well, they will be required to make partial payments towards the costs telephone companies incur in modifying their networks so that competitors can start offering their services (Canada, 1992). This arrangement reflects the widespread belief that local service is subsidized from long distance revenues. As well, it allows any company that can meet the necessary requirements to offer long distance service.

Just as MCI presented itself as the little American company that would slay the monopoly giant AT&T (Mosco, 1990: 12), Unitel cast itself as the little guy fighting giants to secure a brighter more competitive future for Canada. For their part, the telecoms portrayed themselves as paternalistic companies concerned that consumers get universal access to low local rates (Rinehart, 1992). In contrast to the image it projected, Unitel

Communications had revenues of about \$400 million in 1991 from a telecommunications network that stretches from St. John's Newfoundland to Victoria. In fact, Unitel which is owned sixty percent by Canadian Pacific and forty percent by Rogers Communications, ranked fifth in 1991 in the Financial Post's top five hundred corporations (Rinehart, 1992). Rogers Communications is the leading cable television firm in Canada.

PROFILE OF BELL AND UNITEL
Table 9

COMPANY	Bell	Unitel
OWNERSHIP	BCE Inc. 100%	Canadian Pacific Ltd. 60% Rogers Communication Inc. 40%
EMPLOYEES	55,230	3,100
REVENUE	\$7.7 B	\$418.3 M
PROFIT (LOSS)	\$966 M	\$(25.2) M
CAPITAL	\$2.34 B	\$258.4 M

All figures for 1990

Source: Bell Canada. Canadian Pacific Financial Report.
In The Ottawa Citizen. April 9, 1992. C-1.

High domestic long distance rates and the lack of choice are recognized as the main factors encouraging Canadian businesses to push for competition in the telecommunications industry (Canada, 1992). Large users in Canada have argued that lower rates, increased responsiveness and a greater variety of service packages will make Canadian businesses more competitive with their counterparts in the United States and around the world. To push their point further they have threatened to bypass the regulated local telephone system if rates do not drop. Though many critics such as Mulgan (1991) argue that the threat of bypass is relatively insignificant, an American study on bypass published in 1986 found that 16 to 29 percent of large volume telephone users were currently bypassing. Another 19 to 53 percent indicated plans to initiate or increase

bypass (Horwitz, 1989: 275). Regardless of the actual figures, the issue of bypassing is significant in that it provides a rationale for reallocating resources to meet the demand of large corporate users (Mulgan, 1991: 155).

The appeal by Monty Richardson, executive director of the Communication Competition Coalition (CCC), that "lower long-distance rates and better telecommunications services are critical to the country's economic survival" (Lacasse, 1991: C10) demonstrates the extent to which gaining control of the telecommunications industry is perceived as crucial in dealing with the breakdown of fordism.⁵ More and more, telecommunications networks are constituting the new infrastructure of the economy. There is every reason to expect that they will continue to grow in importance as more new services are added (Canada, 1987: 46).

Figure 5
TELECOMMUNICATIONS SERVICES INDUSTRY

Note * telecommunications services: local and toll telephone service and other telecommunications services (includes CNCP, Teleglobe and Telesat);

Note * 1974 equals 100: indices based on revenues measured in current dollars by Statistics Canada

Source: Canada, 1987. Communications for the Twenty-first Century. Page 46.

⁵ The Communications Competition Coalition is comprised of a group of business executives dedicated to breaking telecommunications monopolies and to establishing a deregulated market (Lacasse, 1991:C10).

In fact, the state is increasingly relying on the telecommunications sector as a significant means of generating revenue and employment. Telecommunications, in Ontario alone, employs 90,000 people and generates over \$9 billion in annual revenues (McCalla, February 22, 1993). In addressing the importance of this sector Premier Bob Rae recently announced that the Ontario government will spend up to \$250 million over the next four years to make the province a leader in telecommunications (February 13, 1993, Citizen: D2). The federal government has addressed the importance of this sector by seeking to gain exclusive control over it and by aligning itself with industry in promoting new products and services. In March 1989, representatives of the government and the telecommunications industry in Canada met to discuss the need for a "national strategy in the face of a changing and more competitive international environment" (Vision 2000 Inc., 1991: 3).

In Communications Canada - Fact Sheet. 1992. Telecommunications in Canada: Some Facts. Page 1.

Fearing that Canada's four percent share of the world's telecom market could be cut in half by the year 2000, the meeting led to the establishment of Vision 2000 Inc., a non-profit organization dedicated to research and development. In 1991, this private and public sector partnership began to focus on achieving a leadership position in advanced personal communications. In the belief that advanced personal communication services "will be as pervasive as personal computers are today by the turn of the century" Vision 2000 has focused its *business* strategy on expediting their development (Vision 2000, 1991:4). The recent development of a public digital cordless telephone constitutes the first advanced Personal Communication Service.

3.4 Personal Communication Services in the post-fordist era

Personal Communication Networks (PCNs) refers to the array of radio-based cellular and microwave technologies offering the personalization of communication by attaching numbers to individuals instead of fixed places (Mulgan, 1991: 114).⁶ The designation Personal Communication Service (PCS) has become a generic term which encompasses the services resulting from PCN technologies such as radio paging, cellular and mobile satellite service, and digital cordless telephony.

Just as the social development of the telegraph, the telephone, and radio can be seen as an incentive as well as a response to fordism, the development of Personal Communication Service.. (PCSs) can be seen as a response to conflicts and problems in the economic and social order of late capitalism. More specifically, PCSs are the outcome of a society in transition from a period of intensive accumulation to one based on "flexible

⁶ Fernand Leger, Director of Spectrum and Orbit Policy, Department of Communications, maintains that the designation PCN is largely an American term. A more accurate and universally accepted term is Future Public Land Mobile Telecommunications Systems (FPLMTS). According to Leger, the FCC has refused to cooperate a number of times in establishing global standards for wireless transmission in an effort to capture the market for itself (Interview: February 12, 1993). It appears the US is attempting to repeat history in television.

accumulation". On the one hand, Personal Communication Networks and Services reflect our need for differentiated and flexible service, for increased mobility, and for open versus closed communication networks. In this respect they appear to be the product of a society which is increasingly attempting to rework and in some instances to defy traditional fordist principles of standardization and centralized control. On the other hand, the implementation of PCSs also suggests that they are an attempt to maintain and even extend the existing social and economic order by increasing and *individualizing* social control. In this sense, PCNs can be seen as yet another control technology, albeit in a revised and updated form.

The development of advanced Personal Communication Services during this period of economic crisis is consistent with historical trends in the implementation of communication technology. Although communication systems are generally only thought of in terms of their ability to transmit conversations, films or sounds, as Mulgan (1991) suggests, they are also "control infrastructures". The very first telegraph network was designed to control the movement of trains, the radio to control the movement of ships, while today's computer networks are primarily used to control flows of aircraft, missiles, goods, ideas, and money (Mulgan, 1991:2). With the breakdown of fordism, standard telephony and telegraphy services have given way to a multitude of new networks, softwares and applications in an attempt to meet the needs of a corporate world and a population which appear to be rejecting many of the rigidities of the previous system. Personal Communication Services such as the Digital Cordless Telephone can be expected to facilitate the production, distribution and exchange of commodities and information, however, they may also serve to extend control over the workforce.

The transition from a fordist to a post-fordist system has entailed a number of substantial spatial and temporal transformations, notably in the location of work and of people. As

Lash and Urry argue, there are particular spatial patterns associated with each of the phases of capitalist development (1987:84). During the early fordist regime operations were highly centralized. Control over the workforce was maintained by simply housing one's operations and workers under one roof and by replacing human labour with machinery (Wilson, 1988: 103). As operations began to be dispersed not only nationally but globally and capitalist relations began to be extended, new ways were sought to convey information and decisions, and maintain control (Lash and Urry, 1987:84-85). In the post-war period, computer technology contributed to social control in the workplace by eliminating the human factor of production from sectors which remained beyond the grasp of automation (Wilson, 1988: 104). The development of Personal Communication Systems and their use, particularly in the workplace, is consistent with the historical trend towards new and more rigid forms of control. What is different about PCNs is how this control is now being extended to a more individualized sphere. By assigning numbers to individuals in lieu of places or things, control now manifests itself at a more personal level. Indeed, the development of PCNs can be likened to advances in computer technology, which Wilson suggests have been adapted to meet complex problems of management control (1988: 106).

Personal Communication Services are a partial response to the failing fordist capitalist system. They represent a particular solution to a particular set of perceived problems. Furthermore, they signal an attempt to save the status quo by overcoming the bottlenecks in hierarchical and bureaucratic corporate institutions. As such, Personal Communication Networks can be seen not only as control technologies but as "conserver technologies" in which entrenched social, economic, and political structures seek to maintain or conserve their authority and control.⁷

⁷. The term "conserver technology" was borrowed from Kevin Wilson's analysis of the application of computers in the workplace (1988:105).

Conclusion

This chapter began by providing a particular yet general account of the breakdown of fordism. It was argued that the rigidities within the fordist regime significantly contributed to its breakdown. This has led to what a number of authors refer to as a more flexible accumulation process in which product differentiation, batch production, and short turnover time are the hallmarks.

Though corporate power may appear on the surface to be losing its edge, it was argued that capital is in fact become even more tightly organized. This was largely attributed to the commodification of information and to the reorganization of the global financial system. Communications has played a central role in both of these processes. Communication technologies have served to extend the commodification of information by enabling capital to monitor, package, and sell information. This has allowed capital to extend production as well as consumption to new uncharted areas. Just as access and control over information flow has become a necessity for the corporation, control over the vehicles for the propagation of popular tastes has become important. In a highly competitive world, it is not only the products that matter but the image. This was shown to be increasingly evident in the growing market value of the cultural industries.

Communication and finance have also always been linked. Indeed, the deregulation of the telecommunications industry mirrored the deregulation in finance. The ability to switch capital flows around independent of time and space constraints permitted banks to compete in financial services. This has led to the empowerment of finance capital vis a vis state, personal, or even corporate financing.

As well, it was argued that while deregulation is often portrayed as the end of regulation and hence the end of state control, it can more accurately be seen as the end of one **type**

of control and the beginning of another. What is significant is that as a political phenomenon, deregulation undermines the complex set of benefits negotiated during the fordist period. The role of the state and its regulatory agencies is now to provide what is believed to be the best climate for economic growth.

The process of deregulation really began in the eighties in Canada with a number of decisions which directly relaxed certain competitive restrictions in the domestic telecommunications industry. However, the recent decision by the CRTC to allow competition in the public long distance market signals the most serious attack yet on the fordist telecom arrangement. It can be seen as the Canadian version of the post-fordist telecom arrangement which was established in the U.S. as a result of the AT&T divestiture.

Just as deregulation is an attempt by capital to deal with the breakdown of the fordist system, the introduction of Personal Communications Services signals their attempt to maintain the status quo by introducing innovative technology. Personal Communications Services permit capital to further defy the constraints of time and space, and to increase their control over information, ideas, and people. In short, it permits corporate power to become more tightly organized and to maintain the existing economic and social order. As such, PCSs can be seen as both *control* technologies and *conserver* technologies.

CHAPTER FOUR
PERSONAL COMMUNICATION NETWORKS AND SERVICES;
A CASE STUDY ON DIGITAL CORDLESS TELEPHONES

Introduction

The previous chapter concluded this thesis's application of regulation theory to telecommunications in general and introduced the concept of Personal Communication Services (PCSs) as a technological application with significant social implications. It was argued that PCSs signal an attempt by capital to save the status quo by overcoming the bottlenecks in hierarchical and bureaucratic corporate institutions. While on the surface PCSs appear to reflect our need for differentiated, flexible service and increased mobility, they can also be seen as an attempt to conserve and even extend the existing social and economic order by increasing and individualizing control. In this sense, it was argued that PCNs are yet another control and conserver technology, albeit in a revised and updated form.

The Regulation School approach was particularly useful in its ability to situate telecommunications in general within a broad analytical framework. The purpose of the following section is to apply the above analysis in concrete terms to one specific Personal Communication Service, digital cordless telephones.

This chapter begins by demystifying the concept of personal communications and its application to digital cordless telephones (DCTs). The historical development of DCTs in the UK, the US, and Canada, as well as the pertinent technical issues surrounding this technology are addressed. The purpose of this chapter is to provide the information which will be essential to understanding the regulatory environment in which Personal Communication Services are emerging.

4.1 Defining Personal Communication Networks and Services

In the early days of land mobile radio, the only systems were private two-way voice dispatch systems, generally used by police departments and large businesses. Today a plethora of private and public network services exist that include both voice and data, with private services giving way to shared and public services such as cellular, and personal communication services. As an evolution of the cellular radio concept, the Personal Communication Network has been identified as a critical emerging technology for public network communications (see Appendix A for glossary of terms).

At its most basic, the Personal Communication Network (PCN) is defined as a network capable of supporting a variety of Personal Communication Services (PCS) such as paging, cellular, air-to-ground and mobile data transmissions, cordless residential and pay phone service, cordless office systems, and mobile satellite services.¹ PCNs allow people or devices to communicate independent of fixed location by providing "person to person" rather than "station to station" connection via multiple low powered base stations. For example, instead of communicating via a stationary pay telephone connected to the public network by wire, using a small portable handset the user can access the network via strategically placed radio receivers.

Personal Communication Networks can function wireless or wireline and can be used to transmit data as well as voice traffic. Although four companies offer a nationwide wireless data service in Canada there are relatively few subscribers, with most companies targeting users who need a mobile wireless capability for dispatch, transportation tracking, and field sales and service applications.² Subscribers include the Otis elevator company, several courier companies, ambulances, taxis, and so on. (Blackwell, 1992:15).

¹. While Personal Communication Networks encompass mobile satellite services such as the Canadian Mobile Satellite project (MSAT), the focus of this thesis is on voice communication by stationary land technology.

². The companies offering wireless data service in Canada are Cantel Mobitex, Mobidata (now Bell ARDIS), CanCom, and Telesat Canada.

In contrast, growth in the PCN industry seems to be focused largely on transmitting voice traffic. Whereas there is a limited demand for wireless data service, wireless voice service is expected to appeal not only to business but to the public as well. Many believe that cordless digital telephones (DCTs) constitute the first step in providing service based on a Universal Personal Telecommunications number (UPT). The potential for growth in Personal Communication Services and its infrastructure, Personal Communication Networks, varies significantly among industry leaders. While some optimistically predict a \$60 billion worldwide growth industry by 2001 (Joseph, 1992:61), market watcher Joe Greene, Director of Communications Research at International Data Corporation in Toronto, calls this figure "ludicrous". He estimates as a more realistic figure, \$50 to \$100 million over the next four to five years (Blackwell, 1992:5).

Figure 7

Source: IDC Canada Ltd.

Cukier Wendy, The Globe and Mail, March 17, 1992, C3.

Figure 8

Source: NBI/InDepth Information Inc.

Cukier Wendy, The Globe and Mail, March 17, 1992, C3.

The impetus for the development of this technology is coming from several directions. The cellular carriers are beginning to reach saturation on their systems and are planning to change from analog technology to digital in order to increase capacity.³ With this change comes the opportunity to broaden their market and introduce different grades and types of service. Technically, the digital cordless telephone is similar to cellular but without the cell. Both function over radio waves, but unlike the numerous transmission zones that allow cellular callers to phone from moving vehicles, cordless callers must be near a base station. Though cordless telephone service is now very limited, industry leaders in telecommunications as well as the federal government are moving to establish public cordless networks in 1993 (Lorinc, 1992: 26). When the service appears in

³. The use of digital technology will allow cellular providers to increase capacity at triple the rate of analogue (Blackwell, 1992:15).

Canada, it is anticipated that consumers will be able to purchase a compact handset, weighing only 170 grams (6oz), for approximately \$250 and subscribe to networks for another \$7 to \$20 a month (Lorinc, 1992:26).

4.2 Technical Issues

At the heart of the development of Personal Communication Services in North America and abroad has been the acceptance by industry and government of an appropriate equipment standard. With the North American sales potential of the technology at \$12 billion by the year 2000, the choice of a common standard has significant implications for manufacturers in Canada and abroad (Financial Times of Canada, 1991: 8).

Table 10

**Major Telecommunications Equipment Manufacturers
Revenues**
(in billions of dollars)

MANUFACTURER	COUNTRY	REVENUES
ALCATEL	FRANCE	\$12.4
AT&T	UNITED STATES	12.0
SIEMENS	GERMANY	6.6
ERICSON	SWEDEN	6.4
NORTHERN TELECOM	CANADA*	6.1
NEC	JAPAN	5.8

* World-wide revenues 1989. Canadian portion of Northern Telecom is 2.8 billion

Source: Communications Canada estimates

Another concern is standardization. Locally oriented Canadian digital cordless telephones presently do not function in Europe, which uses an older standard and a different radio band, nor in Asia. In the US, standards have been left up to the manufacturers. As a result, various versions of DCTs are being developed for three different frequencies. They are expected to be available in five years, with each unit able to function in all three radio frequencies (Lorinc, 1992:28).

Such universal applications are becoming increasingly important as the scope of telecommunications expands. For example, the CT2 Plus "module" inside digital handsets could eventually be installed directly into portable computers or fax machines, efficiently combining electronic data, wireless communications and the phone system for the first time. To achieve this, the global communications industry and governments will have to concentrate on further aligning technical standards and removing transmission barriers (Lorinc, 1992:28).⁴

The most basic PCN configuration is similar to existing cellular service - with two-way calling and contiguous coverage (see Figure 9). However, in areas which are highly populated such as housing developments, shopping malls, office parks, and downtown, coverage may be achieved through clusters of small cells. Due to the smallness of the cells required, high speed handoff (service continuity), in fast-moving cars for example, may not be possible. However, a low-power, low-cost pocket handset is possible and is expected to attract a much wider market than cellular currently addresses (Parker, 1991:65).

⁴. Currently, an aggressive competition is underway for the implementation of a network that would allow wireless communications around the globe. Often referred to as PCN, all such network proposals involve launching low orbit satellites to receive and relay the communication stream. Motorola's Iridium proposal is the most glamorous at a projected cost of \$3.4 billion (Bowlby, 1992:3).

Figure 9
Basic PCN Configuration

Source: Parker Nicholas. April 1991. Personal Communications Services Poised for Growth. Telecommunications Policy. Page 65.

The second configuration or standard is CT2 (second generation cordless telephone), named after the technology developed in the United Kingdom. This is essentially a one-way call-out system, although some form of two-way calling could be implemented either through the use of a pager within the handset, or a system that would permit users to log on to a local base station for incoming calls. Base stations are placed at convenient urban locations, such as railroad stations, airports, shopping malls, and street corners. Each base station is linked directly to the public switched telephone network (see Figure 10); they are not networked together, which means that there is only spot coverage and handoff between base stations. A person wishing to place a call needs to stand within approximately 200 feet of a base station. The attraction of CT2 is its low cost (Parker, 1991:65).

Figure 10
CT2 System Configuration

Source: Parker Nicholas. April 1991. Personal Communications Services: Poised for Growth. Telecommunications Policy: 65.

In conjunction with Calgary-based Novatel Communications, LM Ericsson of Sweden has developed the CT3 system for third generation cordless telephones. Based on Digital European Cordless Telephone technology, the Ericsson system offers advanced features such two-way calling, roaming, service continuity, and full speech encrypting. Ericsson is marketing its system primarily for office use (Parker, 1991:65).

One factor restricting the development of PCSs in North America in particular, is the lack of available frequency spectrum. In general, the basic PCN configuration requires more spectrum than the CT2 spot coverage systems. For example, while a basic PCN may require anything from 10-100 MHz, a CT2 system may require from 1-10 MHz (Parker, 1991:66). In the United States the Senate has permitted the FCC to auction 39 MHz of spectrum as a test (Advanced Wireless Communications, September 30, 1992:9). The proposed spectrum frequencies for PCSs in the US are 900 MHz and 2 GHz, forcing the relocation of microwave operators presently located in the 2 GHz zone (Advanced

Wireless Communications September 30, 1992:5). In response to criticisms from microwave operators the FCC has approved a compromise that proposes a waiting period from three to ten years. According to Sherry Marshall, an FCC commissioner, the Commission is hoping this will promote sharing of the 2 GHz band (Advanced Wireless Communications September 30, 1992:5).

In Canada, the Department of Communications has allocated part of the band 944-948.5 MHz band for use by all of the various components (public access, residential, and business systems, etc.) of digital cordless telephone service. It expects this spectrum to be sufficient for the near to medium future and has reserved the 948.5-952 MHz band for future expansion should it be warranted. Systems already operating in this band were given notice for removal as early as 1987 (Interview, Leger: February 12, 1993). It is anticipated that at the date of the introduction of cordless telephone systems, there will be few remaining fixed systems operating in these bands and these systems will be primarily located in remote areas of Canada.

The Radio Advisory Board of Canada (RABC) has strongly recommended that a common spectrum for North America be established, but has also indicated that a Canada-only market for digital cordless telephone service is large enough to permit its development (Communications Canada, May, 1992:5-6). Fernand Leger, Director for Spectrum and Orbit Policy at the Department of Communications, suggests that the FCC may not be cooperative in establishing global spectrum and equipment standards in order to eventually gain control over the equipment market (Interview: February 12, 1993). What is generally perceived to be indecisiveness by the FCC may well be part of its strategy to compete head-on for control of what is expected to be a very lucrative market. This tactic has been especially useful for the US in the development of television

In Canada, all radio communication issues fall under the Radiocommunications Act and are governed solely by the Department of Communications.⁵ The airwaves are deemed a limited public resource and as such licensees are obliged to pay an annual users fee. Approximately \$100 million dollars is recovered yearly in spectrum fees; 25 to 30 percent of which is derived from the cellular industry alone.⁶ It is expected that the licensees of digital cordless telephone service will pay a fee of approximately \$10 dollars per public base station (Leger, Interview: February 12, 1993). An area the size of a mall, for example, can be expected to house five to six base stations (Interview, Bosquet: February 12, 1993).⁷

When dealing with spectrum issues DOC must also take into account the designation of spectrum for Future Public Land Mobile Telecommunications Systems (FPLMTS) which resulted from the World Administrative Radio Conference (WARC) in 1992, as well as its endorsement to the development of an international standard by the International Telecommunications Union (ITU). The goal of these standard setting bodies is to make global wireless access or FPLMTSs as seamless as the wired networks are today (M.C.H., 1991:2).

⁵ Bill C-62, known as the new Telecommunications Act, will integrate the Radiocommunications Act with all other telecom legislation and as such recognized the importance of the airwaves.

⁶ The cellular industry uses approximately 50 MHz. Some parts of the spectrum, such as that below 3 GHz, are considered scarce and are at a premium.

⁷ According to Bosquet, many of the licensees have already made arrangements with malls, subway stations, and other public places for the exclusive right to set up base stations.

Table 11

SPECTRUM ALLOCATION IN CANADA AND THE UNITED STATES

	FREQUENCY BAND	DIFFICULTIES
CANADIAN ALLOCATION	944-948.5 MHz (948.5-952 MHz has been reserved)	Systems operating in this frequency band have been notified for removal. Users have not contested.
UNITED STATES ALLOCATION	900 MHz 2 GHz	Relocation to new frequency has been contested by microwave users.

4.3 Historical background⁸

Developed in Europe in 1978 as an alternative to conventional pay phones, PCN as a concept first surfaced as a Telepoint service offering. Telepoint service can be most easily explained as the application of cordless public pay phones. Initially proposed as a solution to pay phone problems such as under-utilization, vandalism, fraud, and cash mismanagement, the concept of Telepoint service led to the development of a specific technology to support a new generation of cordless telephones.

In 1988, led by the British Department of Trade and Industry, in cooperation with the Office of Telecommunications, the concept of advanced mobile communications services was aggressively undertaken for the mass market in the UK. Central to this effort was the development of an inexpensive handset that could be mass produced at low cost. Telepoint handsets had to be consumer-oriented, pocket-sized devices convenient enough

⁸ Unless otherwise indicated, the historical information provided in this section draws on Andres Llanas, Jr., September 1992. *The Prospect for Personal Communications*. Telecommunications.

for people to take wherever they went. To keep the cost of the handset down and minimize the cost of the Telepoint system infrastructure, the handsets were initially designed for outbound-calling capability only.

In addition, base stations (also known as Telepoints) had to be established. These were sophisticated radio receivers which would connect Telepoint calls to the public switched telephone network (PSTN). Telepoint service providers initially placed base stations in high-traffic pedestrian areas, such as airports, train and subway stations, and shopping malls. At the time, it was also felt that Telepoint base stations would become popular for residential users or small businesses, so that subscribers could use the same handset as a conventional cordless telephone at home or at the office. However, while the technology has since evolved to this point, market acceptance is still low.

Proponents believed that the installation of Telepoint base stations would be relatively simple and inexpensive. In London, for example, receivers were hidden behind small signs located in train stations and other high pedestrian traffic areas. The subscriber would stand beneath the sign which advertised the Telepoint services, aim the handset's antenna at the sign, and call. The call would be received by the RF device hidden behind the sign and connected to the PSTN, and would cost no more than a pay phone call.

Despite industry optimism, all Telepoint service was discontinued in the UK by late 1991, with some 3300 base stations installed but only 800 subscribers. Although envisioned as a moderately priced service, with subscriber handsets planned at \$200, service connection fees at \$60, and a monthly service charge of \$15, it did not do well in a failing British economy. Market awareness for PCNs was found to be low and those who used the service did not find it to be as convenient as they anticipated since they could only receive and could not call out. Base stations tended to be located in busy

places such as a main road or railroad station with high ambient noise. Furthermore, the planned costs did not materialize and when a large enough mass market did not develop, the service was discontinued (Joseph, 1991:61-62). As well, many maintain that the technical standards were too lax. In particular, subscribers to one service - there were four - could only use their own network's Telepoints (Lorinc, 1992:28).

While efforts were rapidly underway to develop standards in the UK and to license Telepoint service providers in the UK, American entrepreneurs flooded the FCC with applications for experimental licenses to test PCSs in the US. FCC licensing requires each licensee to submit quarterly progress reports of their tests. It was evident in reviewing the reports that many applications were merely political attempts by large telecommunications companies to keep abreast of current developments. However, many other companies have made serious attempts to understand the limitations associated with cordless CT2 technology in the US marketplace. Many experimenters have been operating or planning Telepoint-type systems and personal communications networks in various cities around the US, including Monticello, Elmira, and Ithaca, New York; Washington, DC; Orlando, Florida; Houston and San Diego.

Some of the test results provided interesting insights into the feasibility and practicality of PCN services. As a result, in July 1989 the FCC opened an inquiry into Personal Communications Services, asking industry for input on how these new technologies and services should be advanced and implemented. Later, the Commission approved applications for experimental licenses and announced a broad-based Notice of Inquiry with comments due by October 1, 1990.⁹ Most tests are being done in large urban areas and most trials are continuing and will be monitored by the FCC as it attempts to refine its technical and regulatory thinking on PCNs. Since that time, the FCC issued its first

⁹. By July 1992, the FCC had granted 123 experimental licenses, incorporating both technical and marketing approaches (Joseph, 1992:63).

"Policy Statement and Order" in October, 1991 and has held several hearings, the latest of which was in Washington, DC, in December of 1991 (Parker, 1991:66).

In the hopes of gaining pioneer status, as of August 1992, over 165 companies had filed applications with the FCC, with approximately 160 licenses being issued. By October, 1992 the FCC had granted pioneer's preference in personal communications to Mobile Telecommunications for a data-only network in the 900 MHz range. In the 2 GHz band it had awarded pioneer's preference to three applicants: American Personal Communications, Omnipoint Corporation, and Cox Entertainment. There were 56 finalists competing in that band (Advanced Wireless Communications October 14, 1992:1).

At present, there is no common standard for PCNs in the US. It is expected that over the next few years, a multitude of systems and services will emerge in most major cities across the US, many with totally incompatible technologies. It appears that the FCC believes that the power of the market will ultimately force a coming together or rationalization of these technologies to provide mass-produced, low-cost handsets and base stations (Parker, 1991:66).

In contrast to the FCC's reliance on market forces to determine technical standards, the Canadian Department of Communications has supported an industry structure based on a limited number of competitive service providers in any given service area. In 1989 DOC established the industry advisory committee of the Radio Advisory Board of Canada (RABC) to assess the technical merits of competing technologies. The committee's mandate was to establish service for the public, with success "inextricably linked to the penetration of the market by a common handset" (Merrill Shulman, Chairperson, RABC, Spring 1992). Based on the preliminary forecasts by the RABC, DOC has concluded that the implementation of a digital cordless telephone service in Canada offers the possibility

of numerous benefits including the prospect of increased productivity, industrial benefits to the Canadian telecommunications industry, and an enhanced quality of life for physically disabled individuals (Communications Canada, May, 1992:2).

The RABC expects there will be more than 10 million new digital cordless telephones in use in Canada by the end of the decade. However, 90 percent of the phones are expected to replace inferior cordless phones and will be used only at the home or office, which means users will pay no usage fees for each call. Only 20 percent of PCN telephones or two million users are estimated to sign up for public service so that they can use the phone away from home or the office. However, that market is forecast to be worth more than \$1 billion a year (Surtees, 1992:B4).

4.4 Contending infrastructures and competing providers

Throughout 1992 local exchange carriers and cellular service providers in Canada began to make known their interests in digital cordless telephones. Prospects for cellular networks in particular are affected by cordless telephone networks, costing a fraction of the \$110-per-month average for cellular subscribers. In fact, Canada's \$800 million a year cellular telephone industry has yet to make a profit. Fewer than 3% of the potential subscribers have signed up to the \$2 billion cellular networks set up by Rogers Cantel Mobile Communications Inc. and BCE Mobile Communications Inc. Cantel lost \$15 million in the first quarter on sales of \$100.6 million. Its long-term debt is \$667 million or 2.7 time equity. BCE Mobile lost \$5.6 million on revenues of \$97.7 million. Its debt is \$355 million or 89 percent of equity (Financial Times of Canada (b), 1992:22)

Early in the year, Cantel Cellular and Bell Mobility Cellular (previously Bell Cellular) both announced the introduction of digital-cellular service (Blackwell, 1992:15).¹⁰

¹⁰ In early December, 1992, Popfone asked DOC to grant it monopoly status to build a national network for the new cordless public telephone system. The request was denied outright by Mr. Bratty (Citizen (a), 1992:C6).

Though digital cellular offers clearer reception, less cross-talk, and better transmission and encrypting, the market for this service has reached saturation. Digital cordless appears to be the service that many cellular providers are banking on for continued growth.

In the US, McCaw Cellular, the largest cellular operator, is conducting the trial of Ericsson's CT3 technology in Orlando, Florida. It appears that the company hopes to carve out a similarly large portion of the new personal communications market or expects to gain enough familiarity with the technology to compete successfully with the new systems (Llana, 1992:40). As well, at the December 1991 hearings in Washington, DC, Clifford Bean of Arthur D. Little (ADL) presented a very encouraging picture for PCN/PCS in the US. He pointed to the results of ADL's Delphi project which estimates that by 1998 there will be 25 million subscribers for PCN services, and that a universal wireless PABX/public PCN handset will evolve by 1998 (Llana, 1992:40).

Indeed, Shelby Bryan, co-founder of the Millicom cellular company, clearly regards PCNs as an alternative telephone network. "The PCN" he argues "provides the technological basis which will enable practicable competition at the local loop level", and creates the opportunity to complete the process of deregulation in the US (Bryan, 1991:54). The level of cellular service currently available would not be suitable, as dropped calls or delays would not be tolerated. In order for PCNs to be successful, the quality of calls must be comparable to that experienced in a wireline mode.

The cellular and telephone companies have indicated that they can provide PCN service and that it is a natural adjunct to their existing businesses. However, with market projections aimed at 25-35 percent of the market, these operators do not physically have enough capacity on the frequency bands allocated to them. Success, for cellular and

¹¹ Cantel maintains that it will have every cell site equipped by July 1993; Bell Mobility Cellular says it will be fully equipped by the first quarter of 1993 (Blackwell, 1992:15).

telephone companies, then, depends on their ability to gain expanded spectrum capacity, or to use their existing spectrum more efficiently. The cellular operators will most likely adopt methods that enable them to use their existing spectrum allocations more efficiently (Bryan, 1991:55).

As Clifford Bean of ADL maintains, the seemingly aggressive entry of telephone companies into the mobile field has created a possibility for service integration. He notes, however, that there is anti-RBOC sentiment in the mobile industry that represents fears of competitive dominance by these potential "giants". There is also the fear that small entrepreneurs may be swallowed up or driven out of business. While the entry of RBOCs and large independent companies may hinder fair competition, according to Bean, the integration of services likely to result from their entry may hasten their deployment to the public (Bean, 1989:75).

In November, 1992, two of the US's three long distance carriers announced that they wanted to operate national networks supporting wireless communications. First AT&T announced that it had offered \$4 billion for a one-third stake in McCaw cellular. This was rapidly followed by an announcement by MCI that it wanted to form a broad-based consortium of wireless service providers. These announcements are rumored to result from Sprint's purchase of Centel, an independent telco whose properties include Centel Cellular (Advanced Wireless Communications November 11, 1992:1). It appears that all three carriers see a synergy between wireless communication and long distance service.

One group of contenders that has been overlooked is the cable TV operators, many of whom are experimenting with CT2 technology. These players have an installed infrastructure awaiting exploitation. Considering the fact that cable operators service the majority of North American households, they could garner far more subscribers for PCN services than any of their competitors. The potential for conflict between wireless and

wireline service could increase if the wireline carriers refuse to provide reasonable access fees. Wireless carriers could effectively by pass existing wireline systems.

Rogers Cablesystems Limited has developed a new technology known as the Neighbourhood Extender which will permit extensive public cordless telephone service in residential areas via the cable distribution network. Rogers Cable argues that it can offer **neighbourhood DCT** service at a substantially lower cost than more conventional network configurations which rely on the telephone network (Canada Popfone, Expression of Interest: Gazette Notice D/GTP-004-91:1). Home and office DCT service is expected to be provided via the public switched telephone network.

Meanwhile, in the US, Time Warner's cable unit and MCI agreed to test a technology created by First Pacific which will permit the delivery of phone services over the existing cable-TV infrastructure. Specifically, the test will provide alternative telephone access to MCI's network, using a part of Time Warner's cable system in Queens, New York. Where regulations permit in the US, First Pacific's technology will enable cable-TV providers to broaden their services by selling excess capacity to long-distance telephone carriers. The Baby Bells are potentially the big users. (Marcial, December, 1992:78).

Conclusion

Despite the failure of Telepoint in the United Kingdom, there is no lack of contenders for the provision of advanced personal communication services in North America. Cellular providers, wireline telephone companies, cable companies, and equipment manufacturers are all joining the foray to compete in what is expected to be a very lucrative market. Whereas the Federal Communications Commission has left the development of Personal Communications Services largely in the hands of business, the Canadian Department of Communications has taken a more active role in mediating the demands of private and public interests.

CHAPTER FIVE

REGULATING PERSONAL COMMUNICATION SERVICES

Introduction

The purpose of the previous chapter was to provide the historical and technical information necessary to understand the regulation of digital cordless telephones. The following section provides a detailed discussion of the regulatory process undertaken by the Department of Communications in terms of three phases: setting standards, licensing, and interconnection.

The analysis demonstrates the extent to which early regulatory decisions affect the development of communication technologies. The decisions taken by the Department of Communications regarding digital cordless telephone service reflect Canada's cautious liberalization of the telecommunications industry. Indeed, it is argued that DOC officials still ascribe to the rationale of the natural monopoly, though the process of achieving this status has changed as has the justification for it. Monopolies are now acceptable if they result from competition. This process is considered justifiable and inevitable in the face of globalization.

Though the final structure (monopoly) of the DCT regulatory process may parallel the development of wireline telephony, the ultimate outcome will be fundamentally different. The benefits gained in the fordist telecom period will have to be redefined and renegotiated in the post fordist telecom era. Regulatory decisions taken today regarding the digital cordless telephone may significantly bear upon our future wireless telecom experience.

5.1 Phase One - Setting Standards

In mid-1990, the Department of Communications assessed the merits of the UK's CT2 system (developed by Northern Telecom), Northern Telecom's CT2 Plus system, and the CT3 system developed by Ericsson.¹ Test licenses were later granted to ten independent companies which were expected to report plans and results to the Department. These licenses were granted to both regional and national service providers with the condition that they provide both inter-system and intra-system access.² Two of the participants were to be selected to test CT2 Plus technology, and one licensee was to experiment with wireless PABX applications, using Ericsson's technology.

In July, 1991, the Radio Advisory Board of Canada found there was little support for CT2, with opinions evenly divided between a CT2 Plus and CT3 standard. Not surprisingly, CT3 technology was supported by Ericsson Paging and Novatel Communications, while CT2 Plus was favoured by Northern Telecom, Bell Northern Research, GPT, Motorola Canada, and BC Mobile (Joseph, 1991:62).³ Based on the development of the technologies and the result of field trials, the RABC chose the CT2 Plus Class II system as the appropriate technology for a public cordless telephone service. It was argued that while the CT3 system had technical potential, Ericsson had not seriously undertaken its development as a public service (RadioComm 92:43).

Not surprisingly, not everyone was pleased with the decision. Opponents argue that the CT2 Plus Class II technology is different from and intrinsically more expensive than standards adopted elsewhere, particularly in Europe. "The danger" according to Chris Osborne, Manager of Operations and Engineering at BCE Mobile, "is that Canada will be

¹ Northern Telecom's technology is the standard in the UK as well as in the Pacific Rim (Financial Times of Canada, 1992:17).

² With inter-system access subscribers of one service provider must be given automatic access on other service providers' systems. With intra-system access subscribers are allowed to use other systems when they roam on a coast-to-coast basis (Communications Canada, May, 1992:11).

³ Motorola presently supplies CT2 handsets to Europe and Asia, while Northern Telecom supplies the switches and the base stations.

stuck with an orphan standard" (Blackwell, 1992:15). This could mean delayed introduction, higher prices for hardware - because manufacturers will have to amortize their engineering over a much smaller potential market - and less choice for consumers (Blackwell, 1992:15).

Manufacturers like Motorola wanted to sell simpler CT2 Plus Class I phones, which it is already selling in Europe and Asia, as an interim step before moving to the Class II technology. However, mindful of Britain's failure, Canadian regulators require all the manufacturers to conform to CT2 Plus standards and insist that all services provide equal access. "As long as you subscribe to one network, you get automatic access to the others" says Parke Davis, a federal telecommunications official (Lorinc, 1992:28). Supporters of the decision contend that selling two different, but not entirely compatible CT2 Plus products would only confuse and annoy consumers. David Annan, general manager of Cantel's personal communications division, has argued that "Canadians would feel ripped off" if they had to purchase new handsets (Blackwell, 1992:15). The CT2 Plus system was designed to add on features in the long run in order to provide consumers with some insurance against obsolescence (Lorinc, 1992:28).

5.2 Phase Two - Issuing Licenses

In early 1992 The Department of Communications issued a call for license applications from companies and consortia to offer a public access cordless telephone service. In December 1992, Perrin Beatty announced that four out of seven applicants had won a license to compete in the emerging cordless telephone market, expected to be offered to Canadians within a year. The licenses were awarded to companies representing both cellular radio-telephone operators and to new consortiums of investors from the communications industry: Rogers Cantel Mobile Inc., Mobility Personacom Canada Ltd., Canada Popfone Corp., and Telezone (see Table 4.3).

2 of/de 2

PM-1 3 1/2"x4" PHOTOGRAPHIC MICROCOPY TARGET
NBS 1010a ANSI/ISO #2 EQUIVALENT

Table 12

**LICENSEES FOR PUBLIC DIGITAL CORDLESS TELEPHONE SERVICE IN
CANADA**

Rogers Cantel Mobile Inc. of Toronto, an arm of Rogers Communications Inc., owned by Ted Rogers

Mobility Personacom Canada Ltd., the personal communications arm of the Mobility Canada; created to its members to better compete with Rogers Cantel Mobile Inc. Led by BCE Mobile Communications Inc., the new company will co-ordinate its approach in order to provide consistent service across Canada. Owners include the mobile subsidiaries of the nine members of the Stentor long distance consortium, as well as units of Quebec-Telephone of Rimouski, city-owned Edmonton Telephones Corp. and Thunder Bay Telephones. Ownership of the company is based in proportion to revenue, with BCE Mobile of Montreal owning almost 66 percent.

Canada Popfone Corp., a consortium of 37 investors from the cable-television and telecommunications industry created by entrepreneurs Mike Kedar and Charles Sirois (Videoway in Montreal).

Telezone, led by Robert Koven, President of Toronto-based radio paging company Telezone Inc.

Source: Lawrence Surtees, The Globe and Mail, September 25, 1992, B13 and December 23, 1992, B1.

Table 13
STANDARDS FOR DIGITAL CORDLESS TELEPHONES

	PCN	CT2	CT2 PLUS CLASS II	DECT	CT3
APPLICATION	MASS CELLULAR	TELEPOINT	HOME AND TELEPOINT	OFFICE AND TELEPOINT	OFFICE AND TELEPOINT
STATUS OF STANDARD		NOW UK	NOW CANADA	NOW UK	
EQUIPMENT MANUFACTURES		NORTHERN TELECOM MOTOROLA	NORTHERN TELECOM MOTOROLA		ERICSSON (SWEDEN)
BENEFITS OF SYSTEM	LOW COST	LOW COST	ADD ON POTENTIAL PUBLIC USE	TWO WAY CALLING ROAMING SERVICE CONTINUITY FULL SPEECH ENCRYPTION	TWO WAY CALLING ROAMING SERVICE CONTINUITY FULL SPEECH ENCRYPTION
MAIN PROBLEMS	NOT FUNCTIONAL IN MOVING VEHICLE REQUIRES GREATER BANDWIDTH THAN CT2	ONE WAY CALLING ONLY SPOT COVERAGE ONLY	GREATER COST DIFFERENT STANDARD THAN EUROPE	GREATER COST NOT FOR PUBLIC USE	GREATER COST NOT FOR PUBLIC USE

According to David Bosquet of the Radio Regulatory Branch of the Department of Communications, a three phase **comparative** process was used to select licensees. The comparative selection process was influenced by the Department's responsibility to provide equal access to the spectrum while ensuring its efficient and effective use in the best interests of the public. Accordingly, the selection process was open to the public and each submission was evaluated equally and given due consideration. This type of licensing process is relatively recent to the Department and is used whenever a new national service is being established. It was first employed in granting licenses for cellular service, and subsequently it has been used to grant licenses to national paging companies and air to ground telecommunications service providers (Interview, February 12, 1993).

Whereas the **competitive** process generally granted licenses on a first come first serve basis, the comparative process demands that the chosen licensees fulfill a set of criteria that fall into three categories (see Appendix B):

Musts	Non-subjective criteria that must be met by the applicant. For DCTs, service must be provided in at least 7 of 22 metropolitan regions identified by the Department. Failure to meet a musts criteria does not disqualify a submission, but is noted in the panel's recommendations to the Minister.
Wants	Criteria that are desirable for the establishment of the service. Each criteria is given a relative value one against the other as they do not have the same degree of importance. Examples are the experience the applicant has in the provision of telecommunications services and what service is being proposed.
Suitability	Criteria that address the attributes and weaknesses of the applicant and proposal with respect to the service. For example, the economic viability of the proposed service.

In addition to the above criteria, spectrum management policy demands that spectrum be granted only to service providers whose businesses are eighty percent Canadian owned. However it is interesting to note that seven US companies, such as Time Warner Incorporated and Bell Atlantic International, applied for licenses (see Appendix C for list of applicants). According to David Bosquet of DOC, these proposals were rejected largely because they failed to meet the other criteria (Interview, February 12, 1993). Had they been perceived as viable and serious contenders, these applicants may have been selected. The Minister makes all final decisions regarding licensing and has the authority to overlook any established criterion.

5.3 Phase Three - Interconnection

It is expected that by June, 1993, the CRTC will have approved interconnection arrangements. Between June and September of 1993, private systems for use in the home and the work place should be available for purchase. Public digital cordless telephone service is expected to begin in late 1993, early 1994 (Davis, 1992:3). Throughout the forthcoming process, the industry expects to play a leading role. The RadioComm Association of Canada, a trade association that represents the interests of radio common carriers has set up a Public Cordless Telephone Service Provider Committee. The Committee is expected to formulate interconnection proposals, study and comment upon regulatory issues, and coordinate the use of common terminology and signage, and plan industry public relations/awareness campaigns. At the same time, the RadioComm Association is forming a Strategic Planning Committee to look at key issues that will affect the future of public cordless telephone service. The major topic of interest is planning for the introduction of future personal communications services in the 1800 MHz range (Davis, 1992:4).

The inevitable interconnection of public digital cordless telephone networks to the public switched telephone network suggests, at the very least, the rise of a supplementary telephone service. If the expectations of many business leaders are realized, DCT providers could, in the future, successfully compete with traditional wireline telephone providers. It is largely in the provision of **public** cordless telephone service that interconnection becomes an issue.

In the residence, service will be possible by simply purchasing a cordless telephone and a small base station. The base station may be plugged into any existing telephone jack and will permit inbound and outbound calls within a 200 metre range of it. There will be no extra charge to users of cordless phones in the home and the service will be no different than before. In the business environment, portable handsets will communicate with an office PBX having a built-in base station to provide radio links to the handsets. It is expected that private businesses will purchase these PBX facilities themselves. For the cordless telephone service provider, these residential and office systems do not offer revenue opportunities since they are directly connected to the PSTN.

Conversely, in order to use these same handsets in **public** areas the consumer will need to subscribe to one of four service providers. It is here that the effects of competition, between the services providers themselves and between infrastructures, will be most significant. Though calls will be relayed through the airwaves via base stations, these stations must also eventually connect to the PSTN. However, en route to the PSTN it is technically possible and economically feasible to connect to the cable infrastructure. Maclean Hunter has argued that by utilizing portions of its coaxial and fiber optic cable television system, a third party would not be required to provide connection to the PSTN, thereby simplifying the process. In terms of radio coverage, Maclean Hunter foresees locating base station antennas at some of its existing paging antenna sites (Maclean Hunter Cable TV, Expression of Interest: SMRR-004-91).

Whether or not the interconnection of DCT networks to the PSTN will eventually lead to competition at the local level is not only technically, but politically unclear as well. Traditionally, the main distinction in the regulatory sphere has been between **local and long distance service**. The provision and maintenance of telephone booths has been traditionally viewed as an inconsequential **public service** requiring little regulation. With the introduction of DCTs the realm of public telephone service stands to be significantly expanded. As one of the four chosen licensees of DCTs, will Mobility Personacom Canada Limited, 66 percent of which is owned by BCE Enterprises, be allowed to subsidize its public service from local and long distance revenues? It is evident, that as a new national public service, digital cordless telephony complicates matters in the regulatory arena. Without foresight and planning it could further erode the state's commitment to affordable local wireline service.

Whereas the introduction of competition in long distance service was the result of extensive public hearings, the interconnection of DCT networks to the PSTN is expected to be granted without much ado. Regulators and entrepreneurs insist that the extent to which public DCTs will become competitive with local wireline telephone networks is highly dependent on consumer acceptance of the product and the service. This places the prospective threat or benefit of competition squarely in the hands of capital and in the marketplace, and literally shuts out crucial public debate.

When confronted with this issue, the Director of Strategic Policy Planning at DOC, David Waung, argued that competition at the local level began with the introduction of analog cordless telephones and cellular telephones. According to Waung, from a policy perspective, the interconnection of digital cordless phones to the PSTN constitutes nothing more than "a change in equipment and service" (Interview: March 2, 1993). The *wait and see* attitude adopted by the Department of Communications not only reflects its view of the cordless phone as simply a supplementary service, but it is also indicative of

its pro-competition stance. In the early 1980s most industry and government forecasts widely underestimated the diffusion of facsimile machines, answering machines, and cellular telephones (1992:372). Given that forecasts of the telephone have often been far off the mark, the future may bring a number of surprises for DOC officials.

Whether or not competition at the public level will interfere or compete with local wireline service is unknown. What is certain is that obtaining telephone service will become more and more confusing to the consumer. A person requiring cellular, cordless, local wireline service, and long distance wireline service may very well end up subscribing to four different providers. To complicate matters, for each service consumers will have to choose from numerous competing service providers.

In the long term, David Bosquet of DOC foresees a convergence between cordless, cellular, paging, and mobile satellite services. "The consumer will not want to walk around with a belt full of devices" (Interview: February 12, 1993). The Canadian market for pocket pagers, for example, is undergoing a transformation. Public relations campaigns are repositioning pocket pagers as "mobile communications messaging units". Presently, only 2 percent of Canadians use pagers, versus 4 percent in the U.S., 10 percent in Hong Kong, and 15 percent in Japan (Scotland, February 23, 1993). According to Dave Neale, Director of Sales and Marketing at Cantel, sales are surging to single parents, the elderly and teenagers looking to keep in touch with families and friends (Scotland, February 23, 1993).⁴

The potential convergence of services reached new heights with the recent alliance between five industry giants. In early 1993, Apple Computer, AT&T, Sony, Motorola, Philips Electronics, and Matsushita Electric announced their investment in General

⁴. A report (1992) prepared for the Department of Communications by the Local Networks Convergence Committee further elaborates upon this issue.

Magic, a project aimed at creating a new class of personal communication products. The portable, handheld devices will mix computing and telephone capabilities using technology developed by General Magic (Hill and Yamada, February 9, 1993).

According to Marc Porat, General Magic's Chief Executive Officer:

The alliance's shared long-term vision is to bring personal communications to people who may not use a computer today, to people whose personal technology is a car, a television set and a telephone (Hill and Yamada, February 9, 1993).

According to analysts, General Magic's product could be a future generation wireless telephone, and serve as a beeper, fax machine, cellular phone, appointment book, note-taker, message sender and an easy to use link with thousands of databases offering information from restaurant menus to financial data. As envisioned, it will also receive and transmit video snippets (Hill and Yamada, February 9, 1993).

5.4 Strategic Alliances

According to Marshall and McDowell (1993), the issue of technical convergence has largely fallen into disuse since the 1980s. They argue that it has been replaced by "increasingly unchallenged propositions about the globalization of all economic activities, and especially of communications markets" (Marshall and McDowell, 1993:3). In terms of the development of digital cordless telephone service, the two arguments appear to be fuelling each other. Furthermore, adherence to such arguments has led to a number of strategic alliances between industry leaders.

During the first phase of the licensing process, DOC received approximately 87 applications from interested parties (see Appendix C). Partly in view of their belief that a number of personal communication services such as paging, cellular, satellite, and cordless would eventually converge, DOC encouraged the formation of consortiums. The underlying assumption was that consortiums would be more viable and thus better able to compete not only in the national marketplace, but globally as well. The convergence of

services and possibly of infrastructures is seen to be inevitable in the face of economic globalization.

The strategic alliances formed by the four chosen licensees is indicative of the convergence process. Telezone, for example, maintains that it will enter into alliances only with businesses in certain selected areas of the marketplace: paging companies, cable television operators, PABX manufacturers, and long distance telephone resellers (Expression of Interest: Gazette Notice No. SMRR-004-91). Canada Popfone is a consortium of 37 investors with expertise in paging, mobile radio communications, long distance networks, paging, cellular, cable TV, financial and entertainment programming, and so on. Rogers Cantel Mobile is affiliated with Rogers Cable TV Limited, and currently provides a wide range of cellular, paging, and mobile data and voice messaging services. Finally, Mobility Personacom Canada Limited is owned by the mobile subsidiaries of the nine members of the Stentor long distance consortium. It is led by BCE Mobile, a major paging and cellular service provider.

Whereas the above strategic alliances suggest the potential of a convergence of services and an ensuing struggle for control, the following alliances are indicative of the global positioning occurring in the telecommunications industry. Recently, Bell Canada joined forces with MCI Communications Corporation of Washington D.C. to develop products jointly and to expand together globally. According to analysts, the Bell-MCI alliance will permit Bell and its Stentor allies to draw from a number of advanced MCI services, thereby allowing it to better compete with its new rival, Unitel. Unitel has been recently invigorated by a 20 percent equity infusion from AT&T of New York and the right to access AT&T technology (Bagnall, 1993:4). Furthermore, MCI and BCE Telecom International Inc. each have a minority stake in Clear Communications Inc., a new long distance carrier which has acquired 17 percent of the market in New Zealand since May,

1991. As well, BCE Telecom International has purchased a 20 percent share of Mercury Communications Limited owned by Cable and Wireless (Bagnall, 1993: 4). Alliances are becoming the norm among telecommunications carriers.

For Canadians, while the prospect of having competing domestic telephone companies seems confusing, the prospect of having foreign competing carriers is baffling. During the multilateral trade negotiations under the General Agreement on Tariffs and Trade, the United States demanded that Canada and other industrialized countries open up their long distance markets to unrestricted, foreign competition (Fagan, 1992:B1). North America offers enormously profitable long distance telephone traffic. Calls between Canada and the US alone were worth approximately \$3.3 billion in 1991. And the market continues to grow between 15 and 30 percent annually (Ramsay, 1993: 34). For now, foreign challengers are content to remain on the sidelines until they get a clearer picture of how laws and government policies will affect the deregulation of Canada's telecommunications industry. In the meantime, major carriers such as the Nippon Telegraph and Telephone Company, British Telecom PLC, and Cable and Wireless PLC are establishing Canadian subsidiaries. Cable and Wireless Telecommunications of Toronto has pledged to become a full Canadian carrier by building its own network or by buying a piece of Unitel Communications (Ramsay, 1993:34). As the world telecommunications market becomes liberalized, critics argue that these alliances will turn into buyouts, as large companies absorb smaller, weaker rivals. These large telecommunications giants will know no geographical boundaries. Ironically, while the move toward liberalization is serving to break up national monopolies, it is also paving the way for the formation of international oligopolies.

5.5 Natural Monopoly - Old Rationale, New Rhetoric

As one of the conditions of license, each of the DCT service providers is expected, over a set number of years, to provide nation wide service (refer to Appendix B). At the time of licensing each licensee was expected to eventual establish approximately 15,000 base stations, at a cost of \$5000 to \$10,000 dollars per station (Interview, Bosquet: February 24, 1993). The projected total cost of the infrastructure is 1 billion dollars (Interview, Leger: February 12, 1993). However, in the belief that establishing and maintaining four infrastructures would be wasteful, DOC officials are in reality "pushing for only one infrastructure" (Bosquet, Interview: February 12, 1993). Two possible scenarios are likely: the rise of one infrastructure and one service provider or the rise of a jointly-shared infrastructure and two or more service providers. Both situations involve the rise of a monopoly or an oligopoly. This not only appears to contradict the objectives of DOC's licensing conditions, it suggests that the natural monopoly rationale is alive and well. What has changed, however, is the association made between natural and competition. DOC officials are hoping that a single infrastructure is put into place either through some form of industry cooperation or, as is likely, through competition. In this so-called era of globalization, this process is considered natural and inevitable.

If the end result is the same, then what distinguishes this process from that of wireline telephony and telegraphy? A closer examination demonstrates that while the rationale remains largely the same, the rhetoric has changed.⁵ This involves more than just a change in myths, it constitutes the foundation for a new telecom experience.

The early evolution of telegraphy and telephony in Canada was largely competitive, with patent licenses to the technologies involved, granted roughly on a regional basis among railroad and independent companies. The railroad companies, Canadian National

⁵. Part of the new rhetoric consists of avoiding such terms as monopoly. Thus, "pushing for one infrastructure" becomes a useful way of avoiding the issue of who will control this single infrastructure

Railways and CP Limited, were historically granted telegraph franchises along their rail lines in support of their development of a national rail system. In 1961, the CNCP Telecommunications partnership was formed between the telecommunications departments of the two major railways. Given the separation between telegraphy and telephony, CNCP emerged to hold a de facto monopoly in the domestic telegraph market, while the member companies of the then TransCanada Telephone System (now Stentor) came to hold a de facto monopoly in the inter-city voice market (Globerman and Carter, 1988:4).

In the development of **wireline** telephony, the state permitted these de facto monopolies in the belief that it would not be economically feasible to establish two competing systems. The state was able to uphold its position by forging a compromise with the monopoly holders and by promoting the belief that the nature of the technology itself, namely its complexity and cost, was adequate reason for granting this industry special status.

In the development of **wireless** telephony, history seems to be repeating itself but without the payoff to the public. With wireline telephony, the state sought to implement a compromise within the telecommunications sector. Within this compromise, a narrow class fraction of monopoly providers were allowed to control the market and received state support for a guaranteed, stable return on capital. In return, the monopoly holders were to provide universal service and stable employment (Mosco, 1990). The "push for only one infrastructure" is paving the way for a de facto monopoly in the provision of public cordless telephone service, but without any of the traditional benefits to the public. The concept of universal service has given way to the implementation of a national service, with affordability and access dictated by the market. The state is able to uphold its position by promoting the belief that monopoly status is necessary in order to compete

in the global marketplace. Monopoly status is promoted as being justifiable if attained through competition.

As Babe (1990) has demonstrated, the wireline telephone monopoly was the result of favourable policy decisions and economic agreements which permitted restrictive and predatory practices. In similar fashion, decisions taken by DOC regarding digital cordless telephones seem to favour Mobility Personacom Canada Limited which is led by BCF Mobile Communications Incorporated. Not only is it one of the chosen licensees, but it stands to gain from the CT2 Plus standard which was developed by Northern Telecom, BCE's manufacturing division. In addition, it will benefit from the inevitable interconnection of all DCT networks to the PSTN.

Conclusion

The previous analysis of the regulation of digital cordless telephones clearly demonstrates the extent to which political decisions can shape the development of a communication technology. Even at this early stage, it is evident that the choice of standards and the selection of service providers will have a significant bearing on the commercial success of the technology, who will control it, and whether or not it will be affordable and accessible to all. In short, the regulatory process serves a vital function in mediating public and private demands.

The three phase regulatory process undertaken by DOC is indicative of its primary and market oriented objective of regulating competition. However, the Department demonstrated its caution in liberalizing the telecommunications industry; its DCT licensing process was comparative rather than truly competitive, and it is vying for the establishment of one single public DCT infrastructure. This suggests, at least to some degree, that DOC still adheres to the natural monopoly rationale. What has changed, however, is what is meant by natural and who is to benefit from it.

The Department has chosen to *wait and see* what the long term social significance of its decisions will be. The interconnection issue, for example, remains a cloudy area. Does it pose a potential threat to affordable local service? Is it different than analog cordless or cellular service? What efforts will be undertaken to ensure that cross-subsidization does not threaten present local wireline service? The interconnection question, like many others, has been dismissed as irrelevant by DOC officials. While industry experts and state officials have spent considerable time and effort attempting to predict the economic benefits of this technology, no serious attempt has been made to grasp the social significance or to guide the eventual usage of the digital cordless telephone.

The early decisions taken by DOC, together with its wait and see approach, will greatly influence our *telecom experience* in the future. As the first personal wireless communication device intended for public use, the regulatory decisions made concerning the digital cordless telephone will undoubtedly affect the development and the social impact of future wireless services.

CHAPTER SIX

FUTURE USES OF DIGITAL CORDLESS TELEPHONES AND SOME SOCIAL IMPLICATIONS

Introduction

The preceding two chapters provided a concrete economic and political analysis of one particular personal communication service, the digital cordless telephone. The historical development of the DCT in the United Kingdom, the United States, and Canada, as well as pertinent technical issues were addressed. Particular emphasis was placed on three phases of the regulatory process: the setting of standards, the licensing process, and the upcoming interconnection issue.

This chapter extends the previous analysis to the social sphere. Although the realm of social implications in this area has been virtually unexplored, William Dutton provides some insight as to how social scientists should go about filling this void.¹ He suggests that the social impact of any communication technology will depend on the way it is designed, implemented, and used within specific social and organizational settings. Indeed, it is likely to be designed and implemented in ways that are biased towards serving some interests and values, rather than others. Communication technologies can thus be seen as malleable in their effects (Dutton, 1992:377). The crucial question, then, becomes: What kind of social implications are being shaped by decisions on the design and development of digital cordless telephone service?

¹. William Dutton is a professor in the Annenberg School of Communication at the University of Southern California.

6.1 Design and Development

In the Department of Communications' view the development of DCTs serves the interests of both the public and private domain. Cordless telephones are perceived as a way to meet the Canadian consumer's need for a low cost, portable, high quality, personal communications device. According to the Department, DCTs will help fulfill a public need for enhanced personal safety, security, and mobility. As well, their development is expected to increase the use of the public switched telephone network by all parties, including persons with physical disabilities (Communications Canada, May, 1992:2-3). A primary DOC objective, however, is to provide Canadian business with a new tool to enhance productivity by providing:

public digital cordless telephone service on a competitive basis across the country, hence stimulating competition in the provision of personal communications services (Communications Canada, May 1992:3).

As elaborated upon in the previous chapter, DOC objectives made at the onset of the process, greatly influenced the design and development of the product in terms of the equipment standards chosen, the *comparative* licensing process undertaken, the choice of service providers, and the implementation strategy for the service. Beyond this, early decisions were also made to ensure intra and inter-operability between service providers and to ensure that the technology could technically provide service to persons with physical disabilities.

In setting the policy for digital cordless telephones, the Department of Communications appears to have taken a dual approach. Foremost, its objective has been to foster economic growth and competition in the private sector. Launching a *public* DCT service seemed to hold the greatest market potential. Serving the public interest became an adjunct to fostering innovation and competition in the private sector.

6.2 Market Applications

The three main market applications for digital cordless telephones are business or the office environment, residential, and Telepoint or public access. To date the Department of Communications has emphasized the public service aspects and has attempted to license only this type of service. However, the inter-operability of digital cordless telephones in both public and private settings, and the fact that it is expected that widespread private usage will provide the basis for a viable public service, renders the following discussion on both private and public uses of the cordless telephone applicable.

One particularly interesting application of a Personal Communication Network is the "wireless PABX" concept. A wireless PABX is essentially a form of cordless telephony for use in the business environment. In the office this application provides the user with limited access into the public network, and allows employees to carry their phones around with them. This type of arrangement is usually deployed in a large office complex or manufacturing environment. Research at Arthur D. Little indicates that there are currently 50 million Americans whose jobs require them to move around in the course of their daily business activities and need to communicate with others while "on the move" - locally, nationally, or internationally (Bean, 1989:75).

Over the years there has been an ongoing effort to improve the efficiency of passing information between employees in all types of business environments. With the advent of the telephone, the passing of information between two people became instantaneous. However, more often than not, the called party was not available, requiring the caller to leave a message. Upon returning the call, the original caller was often not available - thus beginning an endless round of *telephone tag*. Studies have shown that some 60 percent of business calls do not reach the intended party on the first try (RD/Microwave Applications, 1992:54). Voice mail has alleviated some of this inconvenience, however, it has not solved the basic problem of communicating with someone whose location is

unknown. The various paging services which emerged only succeeded in informing people that someone was trying to reach them. Putting a telephone and not just a pager in someone's pocket seemed to be the next logical move. Wireless phone access in the office is being touted as the latest method to regain much of the lost productivity believed to result from missed phone calls.

Several North American telephone companies have launched personal communication trials that focus on creating private PCS networks for offices. Several of the tests also involve public PCNs in neighbourhoods near those offices, allowing office handsets to be used outside with public base stations that function like pay phones. Prior to this, the main testers of office wireless networks, which do not require user licensing, were hardware manufacturers. Service providers such as telcos typically do not earn anything from a private network unless its handsets are used in a public system, where per-call usage charges are levied (Advanced Wireless Communications November 11, 1992:6).

Bell Canada, as part of its field trials, provided cordless telephone service to five floors of the DOC headquarters building and distributed about thirty handsets to selected users, between September and December 1991. In a speech at the Cellular Business Conference on Personal Communications in Florida, in October of 1992, Parke Davis highlighted several informal observations made by Departmental staff as a result of that experiment (Davis, 1992:2)

Support staff who were responsible for providing telephone receptionist services, as well as for such other duties as delivering documents and making photocopying, became early and enthusiastic advocates of the new technology.

Some employees used the cordless telephones even within their own offices, since they could then move about freely during a call.

Employees who could only smoke in designated areas took their cordless phones with them.

"Call backs" were reduced and more flexibility was afforded in dealing with calls.

² Parke Davis is the Director for Industry, Structure and Services at DOC.

The voice quality was so high that virtually no outside callers were aware that a cordless telephone was being used.

Staff could be located or "found" through the simple expedient of telephoning them.

6.3 Social Implications

As a result of the mass market appeal of digital cordless telephones, as more users join in, the new technology will begin to affect how things are done. In order to begin to understand about the potential impact of wireless voice communication, it may be helpful to list some of the present and possible uses for this technology (see Table 13). Many more could be added, but this list shows some of its expected daily and commonplace uses, many of which are presently being fulfilled by cellular service, the wired telephone, and the fax machine. It is to be expected that some uses will become more important with cordless telephony, and others merely incidental.

Table 14

PRESENT AND POSSIBLE USES FOR CORDLESS DIGITAL TELEPHONY

Selling, bargaining	Monitoring
Talking, chatting	Surveillance
Negotiating	Teaching and Learning
Flirting	Buying
Listening	Computing
Lying	Planning
Testing	Organizing
Gambling	Counselling, advising
Searching	Market Timing (buying and selling stock)
Researching	Calling for help
Reporting	Ordering
Managing	

Source: Adapted from Coates and Jarratt. 1990. Future Uses of Cellular Technology.

Telecommunications Policy. Page 80.

The social significance of the widespread use of digital cordless telephones will result from the way in which people use the technology.³ New uses will be discovered, innovations that solve old and new problems will be created and marketed, and individual decisions and behaviour will encourage change as well as be changed. Cordless digital telephony offers all the capabilities of the standard telephone system. However, as the *common person's cellular*, there is potential for change in a number of new areas.⁴

The acceleration of transactions. As a direct response to the needs of businesses and individuals operating in a world system dependent on the timely exchange of information, digital cordless telephony increases the capability for speeding up transactions across the board, from confirming the sale of a house to buying a bushel of corn. Spontaneous transactions become easier not only for the business person with access to cellular, but for the general public. In short, certain transactions may become faster and more frequent not only in the office but in the home and in public as well.

Increased public and individual safety. Digital cordless telephony has the potential to increase our sense of security because of its mobility. The capability to use it outdoors or indoors, at home or away from home, to alert the police, an ambulance, or a therapist may serve to increase our sense of security. Cordless telephony may extend the safety benefits of the cellular telephone to the public at large. The ramifications of this are potentially significant. Women may feel safer walking home at night; parents may feel reassured that they can communicate with their children anywhere, anytime; and the elderly and the disabled may feel reassured that they can carry a communicating device on their own person.⁵

³. Though this is a simple statement it directly contradicts the widespread belief, as brought forth by Coates and Jarratt, that "the social impacts will come out of the capabilities of the technology" (1990:80).

⁴. The following section on the social implications associated with digital cordless telephones is adapted from work done by Coates and Jarratt (1990) on the implications of cellular telephony.

⁵. DOC requires that magnetic coupling with hearing aids be available as an option on handsets in order that these personal telephones may be used by the hard of hearing community (Communications Canada, May 1992:3).

Altering our concept of time and space. Digital cordless telephony, like many emerging information technologies may change our relationship to time and distance. If we are at a distance from our place of work or away from our work station we will no longer have to wait until we get there to receive and make calls or accomplish tasks. Cordless telephones enables us to be indifferent to place, thereby collapsing time and space even further. This may very well affect our use of time by expanding the workday. The technology offers the mixed benefit of making us available for work or communication at all times. Proponents argue that it will allow time to be used more efficiently by enabling employees to accomplish more tasks. Opponents insist that the cordless telephone has the potential to violate one of the working person's last opportunities to get away from the job and the stress it entails. The boss will be able to reach you in places once considered to be private. Although the phone may be turned off, doing so will undoubtedly have ramifications for at least some workers.

It may raise expectations. A technology like cordless telephony, that adds to and expands human capabilities, also creates new expectations of human abilities. This increases the tension people may experience in using it and contributes to the overall stress level in all human action. Employers, friends, family and customers may substantially increase their expectations of performance from cordless telephone users, thus adding to personal tension and stress. While cordless technology has the capability of easing time by allowing individuals to do two things at once, more likely it will simply *liberate* the worker to do two jobs at once.

The move to 24-hour, round-the-clock work. The spread of information technology, the growth of a one-world economy, and the demand by some workers for more flexible work schedules is serving to redefine the standard nine to five work day, and moving work out of the office into the home, onto the road, into offsite meetings and new work arrangements. The need to manage business and events in real time across the nation and

around the world, and the computer's ability to operate 24 hours a day, 365 days a year, partly fuels this trend. Because of its accessibility to the general public, the widespread use of digital cordless telephones may extend the move to 24-hour, round-the-clock work. It also attests to our society's desire to fit humans into the rationale, machine-like mould of the computer.

The effect on personal communications. As work spreads around the clock and to novel locations, the likelihood that colleagues will work not only in different places but at different times of the day, may increase, thus expanding the need to communicate and leave messages and information for others. Like many communication technologies which have preceded it, the use of digital cordless telephones will not only facilitate communication it may also serve to increase the need to communicate.

As well, a technology that can change our concepts of space, time, and distance may very well affect how we communicate on a personal level. As the *common person's cellular*, DCTs may encourage telephone communication over face to face communication. If, as predicted, we all eventually possess our own digital cordless telephone and our own personal communication number, social interaction between workers, friends, family, siblings, and so forth will undoubtedly be altered. Children may integrate its use in their games, and co-workers may rely on it for simple uses such as wishing one's colleague 'good morning'. Not only will the amount of communication increase, face to face communication, privacy, and intimacy may have new meaning in this context. Meetings between people may very well gain more significance as they become less necessary for many transactions.

Possible health risks. Digital cordless phones, like cellular phones, should be viewed as radios and not telephones. As radios, they must meet the requirements of radio frequency emitting devices set in Canada and the United States. Although manufacturers and

suppliers of radio products claim that the intensities of these fields of radio frequency are below the norms set by officials, in early 1993 DOC received information suggesting that this is not always the case. As a result, the Department's research center is developing a number of experiments to measure the electromagnetic fields emitted by cellular telephones. To date, cellular and cordless telephones are exempt from frequency safety standards. Absorbing radio waves above safe levels can lead to changes in behaviour, the nervous system, and at much greater doses, the immune system. While health officials claim that cellular telephones are safe, researchers at the Herzberg Laboratories for Physics claim that radio telephones may produce microwave radiation up to three times more intense than safety standards allow. They emphasize that it is very difficult to measure the field of a radio telephone and recommend that phones carry a warning sign until more research is conducted (Rinehart, February 13, 1993). Meanwhile, some researchers have found that ham radio operators die of cancer at twice the average rate. As well, in 1992 the March of Dimes published a study linking drugs and other shocks to our bodies (men and women) during the preconception and prenatal periods as a cause of miscarriage and other diseases. One of the shocks to our bodies is our exposure to power-line magnetic fields, however, it also occurs from radio telephones (Green, 1993:74).

Increasing control. Though digital cordless telephones constitute only the first of many possible applications of PCNs, the potential of this technology to be used for increasing control is significant. By assigning communication numbers to individuals rather than to places, the possibility for tracking, monitoring, and thus controlling their behaviour and actions increases many times fold.

New forms of struggle. Both the increasing mobility of employees and the sophistication of struggle in the work place has been accompanied by an increase in the technologies designed to track and control them. Inasmuch as computer technology permits the tracking and control of stationary workers via their keystrokes and their output, the

concept of wireless office communications is intended to extend this to the ever increasing number of mobile workers. As communication rises in importance due to the increasing constraint of time and space, control over the actual performance and quantity of work achieved is being extended to the control over personnel outside of the office. As an adjunct to the computer, wireless communications may serve to increase control over workers.

6.4 Dealing with privacy and intrusion

"Cellular phones give callers incredible range and mobility, yet offer little more protection of privacy than does shouting across the street"

*Minister of Communications, Perrin Beatty
June 29, 1992*

Privacy concerns are not new. However, advances in communication and information technologies make many more subtle privacy intrusions possible. While many Canadians may enjoy the benefits of a digital cordless telephone, this technology raises new privacy concerns. In the words of Perrin Beatty, "we need to pay closer attention to the privacy implications of information technologies at all stages of their development and use" (Canada, Telecommunications Privacy Principles, 1993:3).

In the first week of December, 1992, Communications Minister Perrin Beatty announced a number of measures, including legislation, to protect the privacy of cellular telephone users. "The cellular phone isn't a telephone at all," Mr. Beatty said at a news conference. "It is a radio. Every conversation is a radio broadcast, transmitted on radio waves. Every conversation, unless specially treated, can be monitored by anyone with a scanning receiver (Canada, December 9, 1992)." It is estimated that in Canada there is approximately one million cellular subscribers, while there are hundreds of thousands of radio scanners capable of monitoring cellular calls. Scanners, as the Radio Shack

Christmas catalogue boasts, "Help you keep up with all the action in the neighbourhood." As an article in the Toronto Star noted, there are entire clubs whose members monitor radio frequencies, including cellular calls (Beatty, December 2, 1992:2).

In the United States the response to the problem has been to ban the interception of cellular phone calls. But since legislation was introduced in 1986, very few, if any, convictions have been registered. Recently, new legislation was passed in the United States banning the importation and manufacture of cellular scanners altogether, in the hopes that suppressing the technology will somehow eliminate eavesdropping. Insofar as scanners can be made at home by anyone with a few dollars and a solder gun, this measure will most likely be ineffective (Beatty, December 9, 1992:3).

In Canada, Minister Beatty maintains that no single measure can solve the problem of cellular privacy. Instead, he has argued for a combination of three elements: prevention, protection, and prosecution.

As a preventative measure the Department of Communications is expected to widely distribute copies of a simple brochure throughout Canada informing consumers about the limitations of cellular service and suggesting ways to improve their privacy. As well, cellular service providers have been asked to take a leadership role in informing their customers about the safest ways to transmit confidential information (Beatty, June 29, 1992:3).

In terms of protecting the consumer, telephone companies are exploring the feasibility of ensuring that any call made through a cellular service is identifiable by an audible beep on the line. As well, cellular service providers are expected to give consumers some degree of protection by offering effective and affordable encrypting services (Beatty, December 9, 1992:4). To date Rogers Cantel does not offer an encrypting service on its analog system, while Bell Mobility Cellular charges \$59.95 a month, in addition to its

basic charge per minute.⁶ In late November, 1992, Bell Mobility cut its encrypting charges by almost two thirds, yet the service is still far from affordable.

In early December 1992, the Minister also announced the creation of a Telecommunications Privacy Protection Agency to enforce six Telecommunications Privacy Principles established by DOC earlier.⁷ The Agency will be funded by industry and run by consumer groups, privacy experts and industry representatives (Communications News Release: December 7, 1992). According to Beatty, service providers for digital cordless telephones are expected to abide by the six Telecommunications Privacy Principles (December 22, 1992:3).

Many organizations such as the Canadian Direct Marketing Association maintain that the Agency is a "blatant duplication" of consumer protection practices already in place. Parke Davis, Director of the Telecommunications Policy Branch, Department of Communications, argued that it was not sufficient to have CDMA discipline members who offended the group's privacy rules. Davis said that a "more balanced jury was required" and added that if the agency proved ineffective, Bill C-62 would give the government the power to direct the CRTC in dealing with privacy and telemarketing matters (Media Brief, January 8, 1993).

In early December, 1992, Mr. Beatty also announced that the government will shortly introduce amendments to the Radiocommunications Act that will specify that the unauthorized use of intercepted cellular communications is illegal. The bill will make it an offence to divulge information obtained through cellular eavesdropping, and convicted offenders will be liable to stiff fines. In addition, victims of wrongdoing will have the

⁶ The encrypting service consists of a small black box which plugs into one's cellular unit.

⁷ Industry associations such as the Canadian Bankers' Association, who are heavy users of telecommunication services, the Canadian Cable Association, Stentor, the Canadian Direct Marketing Association and the Canadian Standards Association have developed, or are now in the process of developing privacy guidelines for their respective members (Beatty: June 29, 1992:4).

right to sue perpetrators for civil damages (Communications News Release: December 9, 1992). It is important to note that, in the field of radiocommunications, interception itself is not an offense. In Canada, there has been no court case involving, for example, the unlawful interception of cellular telephone communication (Communications Canada, June 1992:6). Opposition to this legislation has sprung from a number of quarters. The Canadian Association of Journalists, in particular, maintains that it infringes upon the freedom of the press. The Association argues that since cellular and cordless telephones are radio devices which use the **public** airwaves, interception should not be prohibited.

Because it is digital, the new cordless telephone is expected to alleviate some of the privacy problems associated with analog cellular telephone service. However, digitization does not offer complete protection. As George Botulynsky, Chief of Telecommunications Policy Analysis and Development, maintains "digitization only refers to a particular type of coding; it does not provide encrypting" (Interview: February 24, 1993). Although most low cost, common scanners currently on the market are not able to decode digital transmissions, this does not preclude their development and subsequent use. According to Mr. Botulynsky, consumers should still take "active steps" in protecting their privacy when using digital cellular or cordless telephones (Interview: February 24, 1993). Such an active step would entail paying for encrypting services, presently offered by only one cellular provider for \$60 dollars a month. Privacy is possible but at a cost. This appears to be in violation of the Department of Communications' third Telecommunications Privacy Principle which states:

When telecommunications services that compromise personal privacy are introduced, appropriate measures must be taken to maintain the consumers' privacy at no extra cost unless there are compelling reasons for not doing so (Canada. Telecommunications Privacy Principles, 1992:7).

While digital cordless telephones offer some degree of privacy over cellular telephones, they also raise new concerns over intrusion. It may be useful at this point to distinguish

between privacy concerns and a closely related dimension, intrusion. An individual's privacy is violated when personal information is gathered, disseminated or used in ways that are not authorized by the individual. An intrusive technology is distinctively different from the compulsory disclosure, unauthorized gathering, dissemination or use of personal information (Dutton, 1992). Intrusiveness is most often associated with telemarketing and wire tapping but is taken to new dimensions with the introduction of digital cordless telephones.

The ability to be reached anywhere, anytime creates a new set of concerns. According to DOC's fifth Telecommunications Privacy Principle:

Fundamental to privacy is the right to be left alone. A balance should exist between the legitimate use of unsolicited of telecommunications and their potential for intrusion into personal privacy. All parties have a responsibility to establish ground rules and methods or redress so that Canadians are able to protect themselves from unwanted and intrusive telecommunications (Canada, Telecommunications Privacy Principles Five, 1992:8).

Though it is not considered to be a significant issue, the possible intrusiveness of DCTs has been addressed to some extent by the industry itself. To date, solutions to this potential problem have been technical in nature and consist largely of adding features to the existing device. Since a privacy impact analysis of this technology has not been undertaken, no serious effort has been made by policy makers to deal with the potential problems associated with DCTs. As with most other technologies, a "lets wait and see" attitude permeate the development of cordless telephones and personal communication services generally. The Department of Communications is presently distributing leaflets alerting the public about the privacy concerns associated with cellular telephones. Though the extent of this problem was not foreseen, it was identified as a concern in the early development of cellular and could have been dealt with more appropriately.

Past experience permits us to make at least some predictions about the future. The digital cordless telephone will undoubtedly be intrusive; only the extent to which it will be so is unknown. Taking a proactive stance in dealing with this issue could involve simple measures such as alerting the public to its potential abuse. Public displays, pamphlets, health and privacy warning signs on the devices, insightful media coverage, encouraging service providers to educate the public, and establishing guidelines for its use in the work place could significantly shape the way DCTs will eventually be used.

Conclusion

As our society becomes more and more mobile, the communication needs of both private and public interests have increased as well as changed. The communications industry has responded to the need for ubiquitous access and availability by creating radio networks, cellular telephones, and now, wireless voice communication.

A communications technology which permits instantaneous contact between individuals *anywhere, anyplace, anytime*, seems undaunting. However, as a personal communications device the DCT leaves some measure of control to the individual. As with cellular telephony, one's number need not be given out to everyone; the device itself can be turned off; calls can be re-routed. The possibility also exists to have different telephone numbers for different uses such as business, personal, and community activities.

As an *intended* technology created to fulfill specific perceived needs, cordless digital telephony will be seen by many users as an improvement, substituting for current equipment and expanding present uses. However, for many others, cordless telephones will only contribute to their existing stress in meeting the demands of home and work. The ubiquitous nature of cordless telephones can seriously interfere with our private lives and our private times. Turning the unit off may seem like a simple solution; but will we

feel free to do so without guilt. After all, how many people presently turn off their telephone. Attaching answering machines to our cordless phones seems somewhat contradictory.

The state has the opportunity to play a proactive role in addressing many of the concerns expected to arise from the widespread use of digital cordless telephones. Further personal communication services are expected to evolve rapidly between 1992 and 1995. Regulatory decisions as well as public measures taken now will help determine if digital cordless telephones, as of the first of many Personal Communication Services to come, will or will not be developed in the public interest.

CONCLUSION

The thesis argued that wireless Personal Communication Services are perceived by corporate capital and the state as a partial solution to the crisis of advanced capitalism. This was supported in a number of ways: first, by restoring the notion of intention to the study of technological development; second, by demonstrating that communication technologies have historically been perceived as solutions to very particular problems; third, by demonstrating that capitalism is indeed in a state of crisis and transition and that solutions are actively being sought; fourth, by pointing to the increasing reliance on telecommunications to help solve the crisis of capitalism; finally, by elaborating upon the growing perception that the greatest growth potential lies in wireless telecommunications, particularly in the development of and widespread use of Personal Communication Services.

The overriding objective of the thesis was to understand how the economic and political environment specific to advanced capitalism is influencing the *social* development of personal communications, particularly digital cordless telephony. Broadly, this was achieved by uncovering how the mode of accumulation and the mode of regulation have changed from the pre-fordist to the post-fordist period and how this has affected the development of telecommunications in general. More specifically, though, the objective was achieved by charting the historical development of DCTs, by observing the three-phase process employed in regulating the service, and finally, by elaborating upon its potential significance to society. It was maintained throughout the thesis that understanding the development of digital cordless telephony will be crucial to comprehending our telecom experience of the future. Digital cordless telephony is the first national public wireless telecommunications service to be launched.

Restoring the notion of intention to the study of technological development provided a crucial and fundamental starting point to the study of wireless Personal Communication Services. It not only shaped the course of study undertaken but directed it as well. In opposition to technological determinism, such an interpretation assumes that technologies are developed with very direct purposes and practices in mind. Though the initial intention may be commercial, such a priority is usually always collapsed within a definition of the needs of the larger structure. From this, the thesis was able to demonstrate that technological innovations, and communication technologies in particular, are the result of known and identifiable social needs.

Electrical telegraphy had been suggested as a technical system as early as 1793, however a working system was not established in Canada until 1847. It did not become a general system of communication until the late 1870s, the same decade the telephone system began to be developed, in this case a new and intended invention. While the development of these early communication technologies can be seen as a direct response to the rise of a new kind of expanded, mobile, and complex society, the influence was also less direct in that there were other social and political relationships and needs emerging during this time. It was not until the priorities of the expanding commercial system were collapsed with the necessity to communicate and to maintain contact and control that modern electric technology became oriented to uses of person to person and popularized.

Another communication technology which was to eventually emerge as a social technology was the radio. Until the end of the First World War, radio telegraphy and radio telephony proved important to the military. It was not until after the war period that the notion of selling radio receivers to households even occurred to American and Canadian manufacturers. As with the telegraph and the telephone, radio eventually came to be used as a broadcast medium and a form of mass communication only when the

commercial needs of the industry itself were collapsed within the broader needs of society.

As yet another new and intended communication technology, the development of digital cordless telephony is still in its infancy. Promoted as a national public wireless communication service, digital cordless telephony is intended to fill the gap between cellular and paging services. More specifically, it is being developed as the "common person's cellular" and is expected to fulfill a number of needs, from increasing productivity in the workplace to enhancing personal security. While cordless telephones became a visual reality decades ago with Maxwell Smart and the Star Trek fleet, they did not become a technical reality until the need for untethered communication became significant.

Historically, communication technologies have been perceived as solutions to very particular needs and problems. The mode of accumulation and the mode of regulation which predominated during the various phases of capitalist development were instrumental in defining these needs and problems and in solving them. In the pre-fordist era, emphasis was placed on extracting and manufacturing natural resources and on nation-building. At this time, the role of the state was still being actively defined and the telecommunications industry was just beginning to carve a role for itself. The development of the telegraph and the telephone was directly tied to the realization of these objectives.

How the fordist mode of accumulation was put into place was the result of a myriad of corporate, individual, institutional, and state decisions, however, in the end it was the conscious decision to align the workforce to a system of mass production and mass consumption that was to truly usher in this period. The shift from an extensive to an intensive mode of accumulation coincided with a monopolistic form of regulation that

would bring about a period of economic and political stability, known as fordism. Though the rise of monopolies and the recognition that the public's interests needed to be protected began prior to the twentieth century, early debates over the control of utilities significantly influenced the fordist mode of regulation. Communications, light, power, and mobility utilities, which scarcely existed in the mid-nineteenth century, quickly became some of the biggest enterprises in the country. While a number of utilities were state-owned, the telephone company would play an important role in establishing the legitimacy of both private and public monopolies. As monopoly holders set about maximizing the return on their investment, consumers demanded that the political movement that had initially permitted the creation of these powerful monopolies, now make them accountable to the public rather than merely to their shareholders. The desire for regulation at this time was largely protective. On the one hand, consumers sought protection against the real and imagined abuses of private monopolies and cities sought access to crucial infrastructures. On the other hand, utilities sought protection against public ownership and political opportunism. At this time, confidence and security were considered to be more important than efficiency. Although no single set of institutional arrangements was to solve the social and political disequilibrium created by the rise of monopolies, the state's role was finally defined.

Once the proper configuration of the state was devised and its powers firmly established in 1945, the fordist regime of accumulation formed the basis of a long postwar boom that stayed largely intact until 1973. The so-called heyday of fordism, however, depended upon a series of compromises and repositionings between the state, the labour movement, and large corporate capital. The political and social bargains arrived at with the telecommunications industry exemplify this arrangement. The blueprint for the fordist arrangement in telecommunications in Canada was established when the CNCP Telecommunications partnership was formed in 1961. Given the separation between

telegraphy and telephony, each came to hold a de facto monopoly in the inter-city voice market. The state permitted these monopolies in the belief that it would not be commercially or socially viable to establish competing systems. The underlying premise was the nature of the technology itself, namely its complexity and cost were adequate reason for granting these industries special status. As in the sphere of production, the state sought to implement a fordist compromise within the telecommunications sector. Within this compromise, a narrow class fraction of monopoly providers, such as Bell Canada, controlled the market for the production of services and facilities and received state support for a guaranteed, stable, return on capital. In return, the monopoly holders were to provide universal service and stable employment. The state's role was to protect this hegemonic position by defending monopoly as natural and by managing conflict among industry, consumer, and trade union organizations. As such, state support did not only help establish and protect telecommunications corporations, it also secured broader public interest goals based on principles of fairness and equity. The economic problems of the 1970s, however, would prove to be detrimental to the social achievements reached during this period.

The attack on the telecom fordist compromise was prompted by the inability or refusal of monopoly providers and regulators to fulfill the demands of large users for more flexible and global networks at lower cost and for more specialized services. In the seventies, a coalition of large users began to seriously push for change on a number of fronts. The process of deregulating the telecommunications industry in Canada started in the seventies when the CRTC began to relax certain competitive restrictions in the domestic market. However, the recent decision to permit competition in the provision of long distance public telephone service constitutes the most serious attack yet on telecom fordism in Canada. Indeed, it can be seen as the blueprint for a new post-fordist telecom arrangement in Canada in which the needs of business take precedence. The prevailing

view is that lower long-distance rates and better telecommunications services are critical to the country's economic survival. Indeed, it was argued that gaining control over the telecommunications industry in general is perceived as crucial in dealing with the breakdown of fordism. More and more, telecommunication networks are constituting the new infrastructure of the economy and there is every reason to expect that they will grow in importance. The federal government has addressed the importance of this sector by seeking to gain exclusive control over it and by aligning itself with industry in promoting new products and services. In the belief that Personal Communications Services will be as pervasive by the turn of the century, as personal computers are today, the state has aligned itself with business in implementing the first public wireless Personal Communication Service, digital cordless telephony.

In a recent worldwide survey of 3,500 executives, it was found that nearly all the respondents believe wireless communications will improve productivity and over a third of them expect wireless services will eventually cost less than wireline ones. Furthermore, the Washington, D.C. office of the accounting firm Deloitte and Touche found that nearly half of the chief information officers, telecommunications directors, and other corporate executives surveyed said they expect the distinction between wireless and wireline services to blur by mid-decade. Ninety-six percent, however, said they expect wireless to supplement rather than replace wireline services. By mid-decade, half of the respondents expect their wireless services to cost less than wireline ones, while the other half expects the additional cost to be only in the order of 10 percent (Advanced Wireless Communications, March 3, 1993:9).

Personal Communication Services are the outcome of a society in transition from a period of intensive accumulation to one based on flexible accumulation. While they reflect our need for differentiated and flexible service and for increased mobility, they can also be seen as yet another control and conserver technology, particularly in the

workplace. Many of those areas which have escaped control through computerization may now be controlled through cordless telephony. Furthermore, they signal an attempt to save the status quo by overcoming the bottlenecks in hierarchical and bureaucratic corporate institutions and thereby overcoming some of the rigidities of fordism.

Despite the failure of Telepoint in the United Kingdom, there is no lack of contenders for the provision of advanced Personal Communication Services in North America. Cellular providers, wireline telephone companies, and equipment manufacturers are all joining the foray to compete in what is expected to be a very lucrative market. The Department of Communications has spent the last year actively regulating the service. Its cautious attempts to liberalize the telecommunications industry are reflected in the conditions that licensees must adhere to. Though the state has largely taken on the role of an overseer, the notion of the public interest is not completely lost. Historically, Canada has had a strong commitment to the principles of universality. Although these remain today, what has changed is how these principles are to be attained. Equitable service and access are now expected to flow from competition. However, as an examination of digital cordless telephony has shown, competition is restricted to four consortiums. Regardless if the chosen licensees cooperate with each other or compete, we can safely say that the state has sanctioned an oligopoly, if not a monopoly. This is deemed to be natural and right in face of globalization. Coupled with other decisions made by the Department of Communications, it will significantly influence if and how the public interest will continue to be served.

Serving the public interest, however, is not just a matter of ensuring that technologies and services are affordable and accessible, it also involves understanding the social implications associated with innovations. Drawing from the very limited literature available on wireline and cellular telephony, this section of the thesis began by thinking

about the ways in which digital cordless telephones could be used. From this it became possible to actually predict a number of potential problems such as the lack of security and the potential for intrusion. It also became possible to think about other implications which, though less clearly defined, should not be readily dismissed. The potential benefits of increased public and personal security and the ability to accelerate transactions across the board, were placed in juxtaposition with the potential for abuse in the workplace.

The extent to which Personal Communication Services such as the digital cordless telephone alter the way we do things will of course depend on their economic and social viability. This appears to be the line of reasoning behind many of the policy decisions taken by the Department of Communications, as well as the basis for its wait and see attitude toward regulation. It is sadly reflective of the government's inability to determine which technologies will prove either economically viable or socially valuable. This inability is rooted in the state's failure to realize that economic and social viability are inextricably linked. While economic projections of technological innovations abound, social implications are believed to be beyond "predictability". As this thesis demonstrated, we can make sound predictions based on our knowledge of previous technologies.

Marshall McLuhan's (1964) assumption that "the content of any medium is always another medium" provides an avenue for at least beginning to understand the social nature of communication technologies. Digital cordless telephony is certainly not a new concept, it merely combines the radio with the telephone. The radio is well known for its lack of security and its potential to emit harmful rays, while the wireline telephone enhanced our ability to communicate quickly across vast distances. Both dramatically altered our personal and business lives. The digital cordless telephone merely amplifies these existing trends. As a public service, we can predict that security will be a

significant issue, that the health hazards associated with radio usage will now be extended to a broader segment of the population, that communication will not only be facilitated it will increase, and that it may be intrusive particularly in the workplace. While predictions are usually not realized in their entirety, they provide the opportunity for leaders in government and industry to be proactive in developing and implementing new products and services. In the case of digital cordless telephony, this could be as simple as informing and educating the public of potential hazards or it could be as extensive as postponing the introduction of a service until the problems are resolved.

Academia has a crucial role to play in promoting proactive policy making. Policy concerns decisions about the production, distribution, and the use of telecommunications. From a critical perspective this entails going beyond the traditional economic focus on competition, rate structures, monopolies, and rates of return to a deeper analysis of the underlying structures which influence policy making. The regulation approach and its focus on the complex interrelations of capitalist society was beneficial in this area. It served to situate the development of Personal Communications within a wider context and to demonstrate how the social forces of our time influence policy decisions. By linking telecommunications to the wider social structure, the regulation approach provided an appropriate framework by which to understand the historical development of communication technologies.

As an approach, however, the Regulation School does not appear to adhere to any specific political agenda. While it seeks to understand why traditional economic and political structures are no longer working, its purpose for doing so is not clearly defined. As a result, the regulation approach could significantly benefit by integrating itself within the tradition of political economy. In a broad sense, political economy is a discipline which in its sensitivity to history seeks to explain the social totality or the social process

of how something comes to be. Like the regulation approach, it does this by analyzing the relationships among institutional forces. However, political economists go beyond regulationists by integrating the notion of class to their analysis and by attempting to uncover the links between institutional and class forces. This crucial difference benefits political economists in two fundamental ways. First, it serves to ground political economy around the notion of class and class action; something that is lacking in the regulation approach. Secondly, it provides political economists with a moral sense or purpose - to effect positive change within a presently unequal system.

How change is to be effected is not always clear. At its most basic level, it entails giving all persons in a society a voice either directly or through representation. The academic community, along with a number of other institutions, has traditionally been charged with this responsibility. In the telecommunications arena, however, academics, politicians, interest groups, and so forth have largely failed to adequately represent the public. The development and use of telecommunications has grown in leaps and bound over the last ten years. Though highly critical of the inability of the state to be proactive in its policies, scholars themselves have been content to debate and criticize the introduction of each new innovation only once its affects were being felt. Clearly, scholars, industry leaders, state officials, and the public need to work more closely together in assessing the social implications of all technologies before they are made available. As this thesis demonstrated, social analyses of how technologies affect people on a personal level have rarely been undertaken. While scholars must necessarily discuss the "wider picture", they must also aim to bring their analysis down to a more pragmatic and useful level. Cutting the Cord - A Telecom Solution to the Crisis of Capitalism takes one small step toward achieving this.

APPENDIX A

BASIC TERMS IN WIRELINE AND WIRELESS COMMUNICATIONS

Analogue Cordless Telephone: Typically used in the home, it allows the user to be up to 300 meters from a transmit/receive point.

Analogue Transmission: Consists of the exact transmission and representation of a signal. Does not encode the signal in any way.

Base station: refers to a stationary piece of transceiver equipment that makes up a single element of the terrestrial infrastructure. A fixed station, depending on its configuration, may communicate with one or with many mobile stations at a given time. The fixed and mobile station establish a communications link with one another through the use of radio signals, etc. Connection of the fixed station to the larger network infrastructure may vary so each is described.

Cellular telephony: a communication service which provides connection to the Public Switched Telephone Network without tying an individual to a fixed location. The service is similar to that offered and expected from Plain Old Telephone Service, but the user may be in a mobile (ie: pedestrian or vehicular) environment.

CT-2: A standard for the "portable phone booth" cordless telephone. It allows people to make calls but not receive them within range of a low-powered antennae typically located in public areas such as shopping malls. Implemented in Britain as Telepoint

CT-2 Plus: An enhanced version of CT-2 that allows users to make and receive calls. Manufactured by Motorola.

CT-3: A standard developed by L.M. Ericsson Telephone Company of Sweden to provide service similar to CT-2 Plus but with more features and at a higher cost. Geared for office use.

Digital Transmission: Consists of a highly encoded form of transmitting an analogue signal, represented by 1s and 0s that can be easily manipulated by computer.

Mobile station is a transceiver device, often very portable, which remains with the individual and moves as he or she moves.

Plain Old Telephone Service (POTS) refers to the standard, wired, fixed telephone first invented by Alexander Graham Bell.

Public Switched Telephone Network (PSTN) refers to the telephone and telecommunications infrastructure which interconnects most POTS (and other) telecommunications services.

An individual owns or rents his or her mobile station and subscribes to a **cellular service**. Planned and constructed by a third party, this service is a large network of fixed stations "connected" to one or more **Mobile Telephone Switching Offices (MTSO)**. This third party charges subscribers a basic monthly service charge, air time charges, and any long-distance tolls incurred.

Residential cordless telephone combines normal connection to the PSTN with the convenience of untethered telephone use in and around the home. Unlike cellular telephony, since the individual owns both the mobile station and the fixed station, there is no need for an intelligent infrastructure, and no service charges are levied. Typically, the mobile and fixed station are dedicated to one another. Security codes prevent use of a fixed station by unauthorized mobile stations. In most cases, these devices transmit very low power levels, so range is limited to approximately 1000 feet or less from a fixed

station. A cordless phone can be thought of as a standard cordless POTS phone, without the cord.

WPABX, or Wireless Private Automatic Branch Exchange, is essentially a form of cordless telephony for use in the business environment. Wireless PABX can take different forms. Its most basic configuration replaces the cordless phone on one's desk with a mobile station and a fixed station similar to those used for residential cordless telephony. This base station would reside on one's desk or in some central location. Extra signalling features are often implemented that allow use of the numerous features available on a PABX such as hold, call forward, speed dial, etc. As with the residential cordless phone, the user's mobility is limited to the range of his or her mobile and fixed station. The *new generation of WPABX* offers more sophistication. The cordless system discussed earlier, limits the mobile station's access to a single associated fixed station. The next-generation mobile station will have the ability to initiate and receive calls from any fixed station on a campus. The mobile station can be tracked by the WPABX network and handed-off between adjacent fixed stations. Thus, intelligence, similar to that in the cellular network, is required. The network is, in fact, very similar to cellular, with just the MTSO replaced by a PABX. The radio requirements for WPABX, however, are much less stringent compared to cellular, due to mobility restricted to pedestrian speeds, lower power base stations, etc.,.

APPENDIX B

License Conditions Department of Communications

1. The system must be installed in an expeditious fashion and provide service in the following metropolitan areas by March 31, 1998:

<p>Calgary, Alta. Montreal, Que. Quebec City, Que. Vancouver, B.C. Charlottetown, P.E.I. Hamilton, Ont. Kitchener, Ont. Oshawa, Ont. Saint John, N.B. Sherbrooke, Que. St. John's, Nfld. Victoria, B.C. Winnipeg, Man.</p>	<p>Edmonton, Alta. Ottawa, Ont. Toronto, Ont. Trois-Rivières, Que. Chicoutimi, Que. Halifax, N.S. London, Ont. Regina, Sask. Saskatoon, Sask. St. Catharines, Ont. Sudbury, Ont. Windsor, Ont.</p>
--	--

In addition, public service must be offered by March 31, 1998, in 7 of the above metropolitan areas and in each of the following regions:

- Atlantic Canada,
- Quebec,
- Ontario,
- the Prairies/North West Territories, and
- British Columbia/Yukon

2. A minimum of two per cent of your adjusted gross revenues for the period from 1 April 1993 to 31 March 1998, is to be spent on research and development activities in the evolution of personal communications technology. Research and development expenditure reported against other licensed radio communication services are not to be included as part of your commitment.

Research is defined as the planned investigation undertaken with the hope of gaining new scientific, technical or social knowledge and understanding. Such investigation may or may not be directed towards a specific practical aim or application.

Development is defined as the translation of research finding or other knowledge into a plan or design for new or substantially improved material, devices, products, processes, systems or services. The costs of development include testing and demonstration costs until the process, system, or service is totally acceptable for commercial use/normal service offering. Such costs include overhead costs.

Adjusted gross revenues are defined as total service revenues less inter-carrier payments, bad debt and third party commissions.

Variations in year-to-year targets will be permissible to the extent they reflect general economic conditions and investment opportunities. However, the resultant overall commitment based on total revenues during the five-year period remains.

3. An annual report must be submitted during the first five years of operation. The report must be submitted within 120 days of the licensee's fiscal year end.

The report must include an update on the implementation of the public cordless telephone systems in the areas outlined in condition 1 above. The report must include an audited statement of research and development expenditures for the fiscal year covered by the report. It must also provide a short description of the major research and development activities.

The reports are to be submitted, in writing, to the Director General, Radio Regulatory Branch.

4. In accordance with the Telecommunications Policy Framework announced by the Minister of Communications on July 22, 1987, all telecommunications carriers are required to be under effective Canadian ownership and control. A minimum level of eighty per cent Canadian ownership and control in fact by Canadians of the licensee must be maintained. The Minister must be notified in advance of any change in the ownership or control in fact of the licensee that would have the effect of reducing the level of Canadian ownership below the eighty per cent level or would result in control in fact to other than Canadians.

5. The system must conform to the minimum standards set out in Radio Standards Specification RSS 130, Digital Cordless Telephones in the Band 944 to 948.5 MHz and the Standard Radio System Plan SRSP 508, Technical Requirements for Digital Cordless Telephone (DCT) Systems Operating in the Band 944-948.5 MHz, as revised or amended.
6. Any transfer of this authority must be in accordance with departmental policy RP 010, Policy Guidelines Concerning the Transfer of Radio Licences. The transfer of any authority for this service will not normally be permitted within the first three years of operation. Furthermore, any transfer is subject to review by the Minister.
7. A radio authorization must be obtained for all public cordless telephone base stations.
8. Prior to the offering of this service in any telephone service area, PSTN interconnection tariff(s) approved by the appropriate regulatory authority, must be available for all public cordless telephone service providers.
9. Inter-system roaming must be offered and demonstrated.

APPENDIX C

List of Applicants Department of Communications

Amtelecom Inc.
 BCE Mobile
 Bell Atlantic
 Bell Canada
 Blanshard Municipal Telephone System
 British Columbia Telephone Company
 Brooke Municipal Telephone System
 Cable Atlantic
 Cablecasting Limited
 Canadian Independent Telephone Association
 Cie de Téléphone de Courcelles Inc.
 Citipage
 Classic Communications Ltd
 Cochrane Public Utilities Commission
 Co-op de Téléphone de Valcourt
 Cogeco Inc.
 Coldwater Communications Inc.
 Communication Services Inc.
 Compagnie Téléphone Nantes Inc.
 Dial Direct Paging Ltd.
 Dryden Municipal Telephone System
 Durham Telephones Limited/ Otonabee Telephones Ltd
 KD Tel
 First Cellular Communications Inc.
 Gilles Lepage/Eric Bergeron/Jean-Louis Gauvreau
 Gosfield North Municipal Telephone System
 Hav Municipal Telephone System
 Huron and Kinloss Municipal Telephone System
 Hurontario Telephones Limited
 John Downs In Trust
 Keewatin Municipal Telephone System
 Keith V. Stevens in Trust
 Kenora Municipal Telephone System
 La Compagnie de Téléphone de Lambton Inc.
 La Compagnie de Téléphone Upton Inc.
 La Compagnie de Téléphone de Warwick
 La Société de Téléphone de la Baie
 La Compagnie de Téléphone de St-Victor
 Lanser Telecom Inc.
 Le Groupe Vidéotron Ltée
 Le Téléphone de St-Liboire de Bazot Inc.
 Maclean Hunter Cable TV
 Manitoba Telephone System
 Maritime Telegraph & Telephone Company Limited
 Mobile Canada
 Mornington Municipal Telephone System
 Motorola Canada Limited
 New Brunswick Telephone Company Limited
 Newfoundland Telephone
 North Frontenac Telephone Co.

North Norwich Telephones Ltd.
Northern Telephone Limited
Northstar Engineering (Canada) Ltd.
Northwestel Inc.
Ontario Northland
People's Telephone Company
Prince Rupert City Telephones
Québec-Téléphone
Rogers Cablestems Limited
Rogers Cantel Mobile Inc.
Roxborough Telephone Company Ltd.
SaskTel
Sogetel
South Bruce Rural Telephone Co. Ltd.
La Téléphone de St-Liboire de Bagot Inc.
Télébec
Télécom Québec Inc.
Téléphone Daaquam Inc.
Téléphone Guévremont Inc.
Téléphone de St-Ephrem Inc.
Téléphone Milot Inc.
Telesat Mobile Inc.
Telesat Canada
Télésvstème Entreprises Ltée
Canadian TeleLink Paging Services Ltd.
Telus Corporation
The Telezone People
The Manitoulin Island Telephone Company Limited
The Bruce Municipal Telephone System
The CUC Group/ Call-Net Telecommunications Limited/Scotagroup Enterprises Inc.
The Island Telephone Company Limited
Thunder Bay Telephone
Timewarner
Tuckersmith Municipal Telephone System
Unitel
Wightman Telephone Limited

END

1 2 - 1 2 - 9 3

FIN