

INTERNET 2000
the path to the Total Network

Stephen E. Arnold

with research assistance from

Erik S. Arnold

Arnold & Associates, Kentucky, USA

Infonortics Ltd

For my wife, without whose patient support and encouragement this book would not have been written.

And to my son Erik, who reawakened my interest in the Internet.

Both are riches that stagger me with their value.

Stephen E. Arnold, Harrod's Creek, Kentucky 40027, USA

This publication is copyright © 1994 Infonortics Ltd. No part of this publication may be photocopied, re-sold or re-published without the express permission of Infonortics Ltd.

ISBN 1-873699-08-5

Printed in England

Infonortics Ltd.
9a High Street,
Calne, Wiltshire SN11 OBS, England

Publisher's Preface

Networking has a long and honourable history. Human beings have normally been gregarious and attached importance to interacting together; the gathering in the clearing in the forest, and the communication of danger via networks of beacons and bonfires on high ground, gave way to the formal moot or meetings — and eventually to the signal flags, the semaphore codes, the Morse key, the telex and telegraph, the fax machine, the telephone . . . The latter has probably been the biggest force for networking since time began; the ability to communicate directly from one's home or one's desktop with literally hundreds of millions of fellow humans constitutes a revolution of unparalleled dimensions and importance.

But as well as offering immense advantages, even the revolutionary telephone suffers from major drawbacks when it comes to networking. People often wish to communicate precise data, or large volumes of data; and the spoken word is not too apposite for such communication. Furthermore, people often wish to communicate with “anyone who is interested” or with “all my colleagues”; and the telephone is really only suitable for one-to-one communication rather than one-to-many.

The emergence of global data networks over the past twenty or so years promises to bring about one of the last great revolutions in human networking; the ability to communicate using any mixture of text, graphics, motion video or sound with any number of colleagues or like-minded individuals no matter where on this planet they happen to be; to be able to communicate one-to-one, or one-to-many; to be able to communicate interactively and in real-time. That is what the future holds. That is also what we can study in the present, in 1994 and 1995, as the Internet shows us the way the world of networking is going to be, the Internet shows us some of the problems we may meet, the Internet shows us some of the new opportunities that are going to become available.

This, to me, is the vital importance of Stephen Arnold's pace-setting new Briefing. The information future lies with networks and with networking; and the Internet which is here and now is a real, working model of a global network for the exchange and interchange of data and information. We can observe it working; we can note all the little frictions and disadvantages; we can note what can now be done better — or more cheaply, or more easily — than was done before. In other words, we have the very good fortune to be able to study the future in action just before it arrives.

Harry Collier

Contents

Publisher's Preface	iii		
Chapter 1: The Internet: a new environment	1	Chapter 4: US State and local initiatives	38
1. An American creation	2	1. Activity in American state and local government	40
2. Explosive growth	4	1.1. Florida: a price list for electronic information	42
3. Principal uses of the Internet	5	1.2. Texas and technology transfer: revenue from patents licensing	43
4. What the Internet is	6	1.3 California: reducing costs for transportation and its supporting infrastructure	44
The Internet Can Be.	8	1.4 Utah: planning for the future	46
5. What the Internet is not	9	1.5 Kentucky: off to the data races	48
6. Difficult issues	11	2. Grassroots advocates	49
Chapter 2: Background to the Internet	13	2.1 The Centre for Civic Networking	49
1. The origin of the Internet	14	2.2 Freenets	50
2. Benefits	14	3. Outlook 2000	51
3. Drawbacks	15	Chapter 5: Business on the Internet	52
4. The emergence of the community	15	1. What anti-advertisers say	54
5. Today's Internet — an unexpected entity	15	2. The case for fee-based applications	55
6. A working definition	16	3. Fair use guidelines	55
7. More recent initiatives	18	4. How opponents react to commercialisation	56
8. Who runs the Internet?	19	5. Representative business approaches	56
9. As the twig is bent	21	5.1 Checklist of marketing tactics	57
10. American as apple pie	21	5.2 Bits 'n Bytes Online	57
11. Outlook 2000	22	5.3 The Internet Business Journal	58
Chapter 3: The US government and the Superhighway	23	5.4 Electronic Book Technologies	59
1. The plan	26	5.5 Online Career Center	60
2. The heavy traffic of policy	28	5.6 Novell Inc.	61
2.1 Legislative activity	28	6. Charging mechanisms	61
2.2 GPO Access	29	6.1 The library paradigm	62
2.3 The Boucher bill	30	6.2 The cost recovery approach	63
2.4 The Markey bill	30	6.3 The free sample	64
2.5 Other initiatives	30	6.4 Third-party funding	65
3. Detours ahead	31	6.5 Bundling print and electronic information	65
4. Complex forces at work	32	6.6 Traditional buyer-seller relationship: CommerceNet	66
5. EDGAR	32	7. Outlook 2000	67
6. The government information reality	34	Internet business tactics	69
7. Snapshots of US government information initiatives	35	Chapter 6: The international arena	70
7.1 NTIS	35	1. Factors influencing Internet usage	75
7.2 Maritime Commission	35	2. Regional activities	77
7.3 Office of Management and Budget	36	2.1 Western Europe	77
7.4 The White House	36	2.2 Eastern Europe	78
7.5 The Library of Congress	36	2.3 North Africa	80
7.6 The Supreme Court	37	2.4 Latin America	80
7.7 Fed World	37	2.5 Pacific Rim	80
8. Outlook 2000	37	3. Selected country Internet activities	81
		3.1 Canada	81
		3.2 France	82

3.3 Germany	83	5.1 Call backs	122
3.4 Japan	83	5.2 Challenge-response systems	123
3.5 South Africa	84	5.3 Kevlar smart card	123
3.6 United Kingdom	84	5.4 SmartDisk	123
4. Outlook 2000	86	5.5 Firewalls	124
4.1 Some thorny issues	86	6. Encryption	125
4.2 Rapid progress detectable	87	6.1 Data encryption standards	125
Chapter 7: Network technology	88	6.2 Public key encryption	126
1. An Internet information void	91	6.3 Kerberos	127
2. TCP/IP: the Internet protocol	92	6.4 Application to electronic mail	127
3. Connecting an organisation's network to the Internet	94	7. Copyright	128
3.1 The basic network: one computer to a remote computer	95	7.1 A test case	129
3.2 The dial-up connection	95	7.2 Alternatives for publishers	130
3.3 One computer to other computers in one location	96	8. Software piracy	131
3.4 A direct link to the Internet	97	9. A snapshot of Internet hacker tricks	132
3.5 The messy reality: mixed environments	99	9.1 Basic precautions	133
4. The evolution of a connection	99	10. Outlook 2000	135
5. Internet maintenance: an often overlooked cost	100	Chapter 9: Internet's impact on software innovation	136
6. Special considerations	101	1. Electronic Mail: a core application	137
6.1 SNA from IBM	101	1.1 <i>LISTSERV</i>	139
6.2 Technical factors to consider	102	1.2 <i>USENET</i>	141
6.3 Novell environments	103	2. Moving data: ftp and telnet	142
6.4 Router and bridge selection	103	2.1 <i>ftp</i> (File Transfer Protocol)	143
7. Directory services	104	2.2 <i>Telnet</i>	145
7.1 Enterprise-wide network directory services	104	3. Triggering innovation	146
7.2 Today's Internet directory services	105	3.1 <i>Mosaic: the first commercial Internet application</i>	147
7.3 Tomorrow's single global directory	106	4. Outlook 2000	148
8. Bandwidth	106	Chapter 10: Internet 2000 and the Total Network 149	
9. Representative costs for bandwidth	107	1. Likely scenarios	150
9.1 Serial line Internet protocol (SLIP) / point-to-point connections (PPP)	108	1.1 Scenario One: Commercialisation	150
9.2 ISDN	109	1.2 Scenario Two: Collapse	152
9.3 ATM	109	1.3 Scenario Three: Hiving	153
9.4 Leased circuits	109	1.4 Common Threads	154
10. Video	109	2. Some practical considerations	155
11. Outlook 2000	111	3. The vectors of change	157
Chapter 8: Security and copyright	113	Appendix A: Selected international Internet access contacts	160
1. A secure Internet?	114	Appendix B: Network speed overview	167
2. Security challenges	116	Appendix C: Selected US government information sites	170
3. US government activity	117	Appendix D: US national network infrastructure contacts	173
3.1 Other security activity	119	Appendix E: Advertising on the Internet — frequently asked questions and answers	174
4. Routine challenges: passwords and electronic mail	121	Glossary	180
4.1 Passwords	121		
4.2 Electronic mail	122		
5. Physical security techniques	122		