

**Emerging Opportunities in Satellite Communications**

***Internet via Satellite 2001  
Management Summary***

**from DTT Consulting**

***The completely revised and updated 4<sup>th</sup> Edition of the highly regarded Internet via  
Satellite Report***

## A 56% Increase in Market Size

**Internet via Satellite 2001**, published in May 2001, is the fourth edition of DTT Consulting's annual market research survey on the use of satellites for Internet services. It is an authoritative source of original and comprehensive data on the size and structure of the market. It provides the user with a wealth of contacts for potential ISP and service customers and a directory of all the significant suppliers in the market.

It shows actual size of and growth in the market over three years by sector and major geographic region, and provides robust conclusions about key current developments in the IP over satellite business. It takes a bottom up approach to research, using data from end-users and service providers to estimate market size.

It offers a comprehensive list of web sites and email addresses and other information sources to provide an excellent base from which to conduct further research and keep up to date with rapidly changing developments.

Our approach reflects almost four continuous years of research on Internet via satellite – since this sector started. We also have eighteen years of experience of consulting to new ventures and major organisations in satellite communications.

As with last year's Internet via Satellite Report we have provided a major regional analysis of the marketplace, listing all existing ISPs who use or might use satellite communications in Central and Eastern Europe, the CIS, the Middle East, Asia, Australasia, Oceania, Latin America, the Caribbean and Africa..

Due to the rapid development of the IP over satellite business, the report has been considerably expanded and now extends to four volumes. We have introduced new research techniques to identify satellite links. Purchasers of the Microsoft Word 2000 electronic version (available at a modest extra cost to subscribers) will be able to the hypertext links to visit the web sites of all known ISPs in the above regions and all of the main satellite carriers and many other organisations. It also provides several thousand email contacts through using hypertext links.

The **Internet via Satellite 2001** report runs to 798 pages. It contains approximately 195 charts and tables providing statistics and summary management information on market size and structure. The report is 374,700 words according to a Microsoft Word count. The original Internet via Satellite 1998 was 214 pages long, indicating just how fast the market for Internet via satellite has grown..

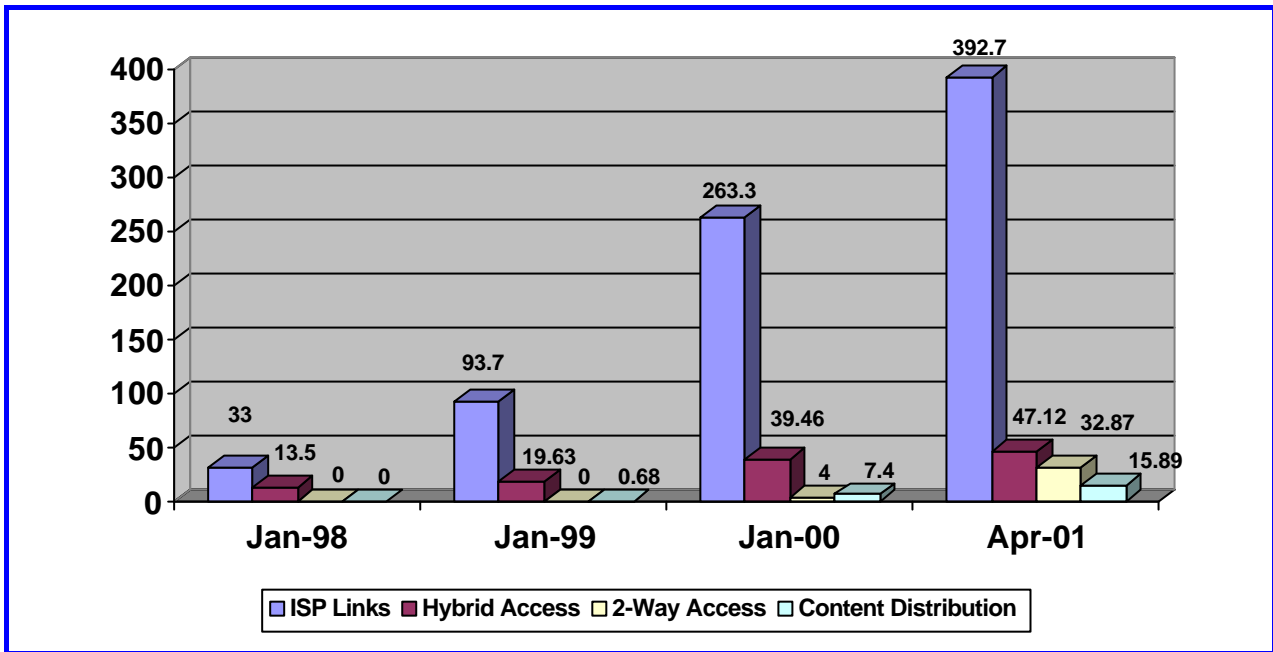
The report provides details of satellite carriers, operators and service providers involved in IP over satellite as well as those offering satellite-based two-way and hybrid access, content distribution and caching and Usenet feeds. It details all the known satellite links between ISPs and backbone, naming the ISPs and carriers involved as well as estimating or providing accurate bandwidth rates.

**Internet via Satellite 2001** is aimed at satellite operators, satellite service providers, satellite manufacturers, telecommunications carriers, ISPs, manufacturers of satellites, manufacturers of professional and consumer ground equipment, R&D institutions, regulatory and policy makers, financial institutions, consultants, broadcasters and media companies.

Internet via Satellite 2001 is aimed at senior management, consultants, business development executives, sales staff and researchers needing both raw data and refined information and an understanding of the economics of the current and evolving marketplace.

As at the end of April 2001, the equivalent of nearly 500 36 MHz transponders were being used for the four main Internet via satellite services, showing a growth rate of 56% from January 2000.

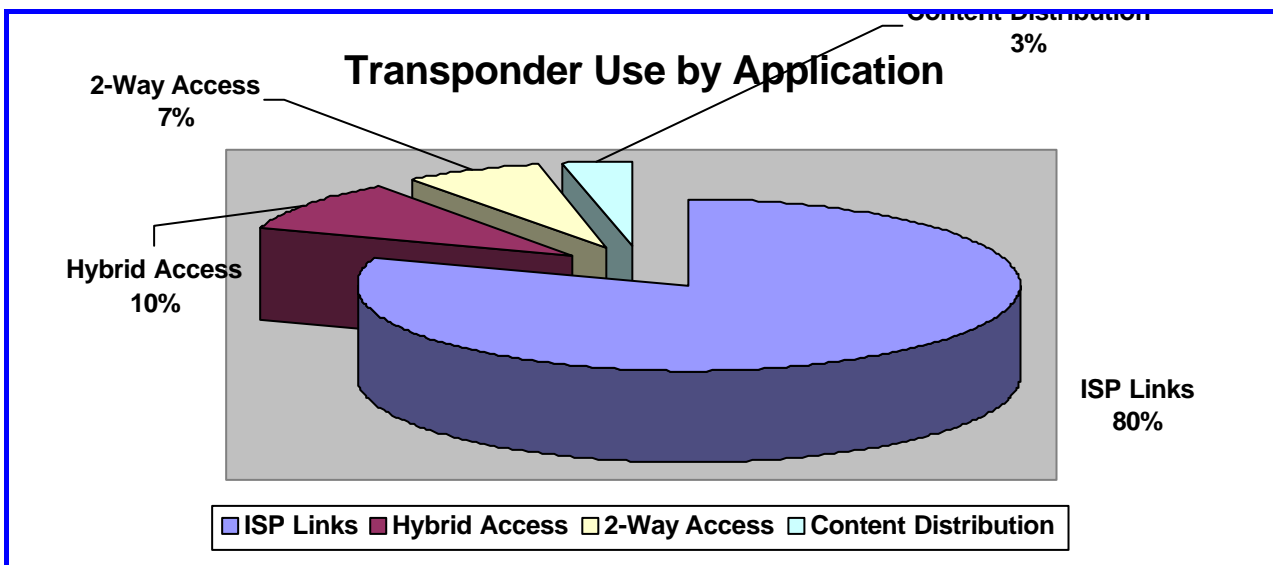
**Chart A: Market Growth, 36 MHz Transponder Equivalent Use for Internet Traffic**



Source: DTT Consulting, 2001

The following chart indicate just how important point-to-point satellite links are. They account for 80% of the market.

**Chart B: Market Share by Application, 36 MHz Equivalent, and April 2001**



Source: DTT Consulting, 2001

However, the last year or so has seen the launch of new two-way access services using inexpensive terminals. The launch of these services has been slow due to technical difficulties but our research suggests that ISPs are keen to be able to use the technology (and the older hybrid access systems) to offer their customers high-speed access.

This suggests that a new model of Internet via satellite may be emerging in which ISPs that have used satellites to link to backbone may focus on new satellite services even if they turn to fibre for their main point-to-point links. Such services include offering customers satellite-based access, streaming, multicasting and content distribution as well as specialised applications such as distance education and training. Indeed, the ISPs may also want satellite-based content distribution services for use by their leased line, DSL or dial-up customers.

A clear driver behind the content distribution services is the growth in broadband access services such as DSL and cable modems. However, these have been slow to develop so far which provides an opportunity for satellite-based two-way access.

In our view, satellite-based access is cost competitive for many users with 56 K dial up services in countries that have metered local call charges like the UK. As the alternatives are slow to develop, this suggests that many heavy Internet users have little option but to use satellites for some years to come.

Hitherto, the received wisdom in the USA is that two-way satellite access best serves the rural areas where cable and DSL will be absent. We are not convinced this is the case in much of the rest of the world.

Another key development in the Internet via satellite world has been the blurring of the distinction between hybrid access services and content distribution networks. It has proved very difficult to establish a successful business model for the hybrid-access technology but it provides an extremely cost effective data and video broadcasting platform.

Moreover the extension of the predominant DVB standards from one-way to two-way services (especially in the Ka-band multimedia satellite environment) offers Europe the prospect of another competitive advantage over the USA.

In the point-to-point market where ISPs use satellites to link to backbone, the last year has seen a large increase in the size of the market and an increase in the proportion of ISPs using satellites. Some 13% of ISPs are directly or indirectly (through another ISP) connecting to backbone via satellite – usually in the USA.

However, it is clear that the market is shifting to fibre. Back in 1998, Western Europe was one of the key markets for such satellite links; Central and Eastern Europe soon followed. In Western Europe such links are now commercially almost irrelevant and in most of the better developed countries of Central Europe satellites have been abandoned in favour of fibre.

That loss of market, though, is offset by new, more geographically distant, rapidly expanding markets. The Ukraine has been the best example in Eastern Europe over the last year or so. In Asia the liberalisation of the Indian market has opened what looks to be substantial short to medium term demand for satellite capacity. Demand for satellite capacity in Iran has offset the now nearly universal use of submarine fibre by the Gulf states.

It is also clear that fibre will never reach the more remote parts of even some of the most prosperous of countries such as Australia. Moreover, there are still some parts of the world where use of Internet has yet to grow substantially. These include much of the Asian part of Russia, parts of the Middle East and those parts of South East Asia and Africa where it has been politically repressed (Vietnam, Algeria, for example).

We also expect growing demand for satellite capacity and links from those parts of the world that may never have full access to international fibre such as much of Africa.

The Internet via Satellite 2001 report Contents and Table list is shown below.



## Internet via Satellite 2001 Table of Contents, Volume 1

<b>Section 1.0: Management Summary - 56% Annual Growth.....</b>	<b>19</b>
1.0.1: Market Size Estimates .....	21
1.0.2: Point-to-Point (ISP Link) Market Summary .....	27
1.0.3: Satellite-Based Internet Access .....	37
1.0.4: Content Distribution.....	44
<b>Section 1.1: Europe and the CIS Countries.....</b>	<b>50</b>
1.1.1: Albania .....	63
1.1.2: Armenia .....	66
1.1.3: Azerbaijan.....	70
1.1.4: Belarus .....	72
1.1.5: Bosnia and Herzegovina .....	75
1.1.6: Bulgaria .....	78
1.1.7: Croatia .....	90
1.1.8: Czech Republic .....	91
1.1.9: Estonia .....	95
1.1.10: Georgia .....	98
1.1.11: Greece .....	100
1.1.12: Hungary .....	103
1.1.13: Kazakhstan.....	106
1.1.14: Kyrgyzstan.....	112
1.1.15: Latvia .....	115
1.1.16: Lithuania .....	117
1.1.17: Macedonia .....	120
1.1.18: Moldova .....	122
1.1.19: Mongolia.....	124
1.1.20: Poland .....	126
1.1.21: Romania .....	144
1.1.22: Russia.....	152
1.1.23: Serbia, Montenegro and Kosovo .....	172
1.1.24: Slovakia .....	175
1.1.25: Slovenia .....	180
1.1.26: Tajikistan .....	182
1.1.27: Turkmenistan.....	183
1.1.28: Ukraine .....	184
1.1.29: Uzbekistan .....	196

## Table of Contents, Volume 2

<b>Section 2.1 Middle East.....</b>	<b>7</b>
2.1.1: Afghanistan.....	11
2.1.2: Bahrain.....	11

2.1.3: Cyprus .....	12
2.1.4: Iran.....	13
2.1.5: Israel .....	19
2.1.6: Iraq.....	22
2.1.7: Jordan.....	23
2.1.8: Kuwait .....	24
2.1.9: Lebanon.....	24
2.1.10: North Cyprus .....	28
2.1.11: Oman .....	28
2.1.12: Qatar .....	29
2.1.13: Saudi Arabia .....	29
2.1.14: Syria .....	31
2.1.15 Turkey.....	31
2.1.16: United Arab Emirates .....	41
2.1.17: Yemen.....	41

**Section 2.2 Asia .....42**

2.2.1: Bangladesh.....	49
2.2.2: Bhutan.....	52
2.2.3: Brunei .....	52
2.2.4: Burma (Myanmar) .....	52
2.2.5: Cambodia .....	53
2.2.6: China.....	53
2.2.7: East Timor .....	62
2.2.8: Hong Kong .....	63
2.2.9: India .....	72
2.2.9.1: Sources of Bandwidth Serving India .....	105
2.2.10: Indonesia.....	109
2.2.11: Japan.....	118
2.2.12: Laos .....	118
2.2.13: Macau .....	119
2.2.14: Malaysia.....	119
2.2.15: Maldives .....	120
2.2.16: Nepal.....	120
2.2.17: North Korea .....	121
2.2.18: Pakistan.....	121
2.2.20: Philippines .....	127
2.2.21: Singapore .....	135
2.2.22: South Korea .....	136
2.2.23: Sri Lanka.....	140
2.2.24: Taiwan .....	142
2.2.25: Thailand .....	146
2.2.24: Vietnam .....	149

**2.3: Australasia And Oceania .....151**

2.3.1: Australia.....	153
2.3.2: New Zealand .....	181
2.3.3: Oceania .....	187

## Table of Contents, Volume 3

<b>3.1: Africa .....</b>	<b>9</b>
3.1.1: Algeria .....	19
3.1.2: Egypt.....	20
3.1.3: Libya .....	26
3.1.4: Morocco.....	26
3.1.5: Tunisia .....	29
<b>3.1.6: Sub-Saharan Africa.....</b>	<b>30</b>
3.1.6.1: Angola .....	30
3.1.6.2: Ascension Island .....	31
3.1.6.3: Benin.....	31
3.1.6.4: Botswana .....	32
3.1.6.5: Burkina Faso .....	33
3.1.6.6: Burundi.....	34
3.1.6.7: Cameroon.....	34
3.1.6.8: Cape Verde .....	35
3.1.6.9: Central African Republic .....	35
3.1.6.10: Comoros.....	35
3.1.6.11: Congo Brazaville .....	36
3.1.6.12: Congo, Democratic Republic .....	36
3.1.6.13: Côte d'Ivoire .....	36
3.1.6.14: Djibouti.....	37
3.1.6.15: Equatorial Guinea .....	37
3.1.6.16: Eritrea .....	37
3.1.6.17: Ethiopia.....	38
3.1.6.18: Gabon.....	38
3.1.6.19: Gambia.....	38
3.1.6.20: Ghana .....	39
3.1.6.21 Guinea .....	42
3.1.6.22: Guinea Bissau.....	42
3.1.6.23: Kenya .....	43
3.1.6.24: Lesotho .....	46
3.1.6.25: Liberia.....	46
3.1.6.26: Madagascar.....	47
3.1.6.27: Malawi.....	48
3.1.6.28: Mali.....	50
3.1.6.29: Mauritania.....	50
3.1.6.30: Mauritius.....	51
3.1.6.31: Mozambique .....	52
3.1.6.32: Namibia .....	53
3.1.6.33: Niger .....	54
3.1.6.34: Nigeria .....	54
3.1.6.35: Reunion.....	61
3.1.6.36: Rwanda .....	61
3.1.6.37: Sao Tome & Principe .....	62

3.1.6.38: Senegal.....	62
3.1.6.39: Seychelles .....	63
3.1.6.40: Sierra Leone .....	63
3.1.6.41: Somalia .....	64
3.1.6.42: St Helena .....	64
3.1.6.43: Sudan .....	64
3.1.6.44: Swaziland .....	65
3.1.6.45: Tanzania.....	66
3.1.6.46: Tchad .....	68
3.1.6.47: Togo .....	68
3.1.6.48: Uganda .....	68
3.1.6.49: Zambia .....	70
3.1.6.50: Zimbabwe .....	71
<b>Section 3.2: South Africa.....</b>	<b>73</b>
<b>Section 3.3: The Americas .....</b>	<b>86</b>
3.3.1: Central and South America.....	98
3.3.2: Argentina .....	98
3.3.3: Belize .....	103
3.3.4: Bolivia .....	103
3.3.5: Brazil .....	105
3.3.6: Chile.....	131
3.3.7: Colombia .....	135
3.3.8: Costa Rica .....	137
3.3.9: Ecuador.....	139
3.3.10: El Salvador .....	142
3.3.11: Falkland Islands (Malvinas) .....	143
3.3.12: French Guiana .....	143
3.3.13: Guatemala .....	143
3.3.14: Guyana .....	144
3.3.15: Honduras.....	145
3.3.16: Mexico .....	146
3.3.17: Nicaragua .....	158
3.3.18: Panama .....	158
3.3.19: Paraguay .....	160
3.3.20: Peru.....	161
3.3.21: Surinam.....	163
3.3.22: Uruguay .....	163
3.3.23: Venezuela .....	165
<b>3.4: Caribbean Island States and Departments .....</b>	<b>169</b>
<b>3.5: Other Parts Of The World: Greenland.....</b>	<b>177</b>

#### Table of Contents, Volume 4

<b>Section 4 - Introduction.....</b>	<b>11</b>
<b>4.1: Satellite Internet Carriers.....</b>	<b>11</b>
4.1.1: Aaria .....	11
4.1.2: Adisam Telecom & Associates.....	11
4.1.3: Americatel .....	12
4.1.4: Atlanta International Teleport (AIT) .....	12
4.1.5: BAF Satellite And Technology Group .....	13
4.1.6: Banknet.....	13
4.1.7: Batelco .....	13
4.1.8: Belgacom.....	14
4.1.9: Bezeq Satellite Satcom Service .....	15
4.1.10: Bradmatt Telecom.....	15
4.1.11: BT Broadcast Services.....	15
4.1.12: Cable And Wireless .....	16
4.1.12.1: Cable & Wireless ISDNet (Incorporating Netsat SDCV) .....	16
4.1.12.2: C&W USA.....	16
4.1.13: Carrier2carrier (C2C) .....	17
4.1.14: Ceycom Global Communications .....	18
4.1.15: Chariot Internet.....	18
4.1.16: China Telecom.....	18
4.1.17: Chunghwa Telecom.....	19
4.1.18: Concert Satellite Services (Including BT Global Satellite Services).....	19
4.1.19: Corporate Satellite Communications .....	20
4.1.20: Crawford Online .....	20
4.1.21: Darcom .....	20
4.1.22: Detesat .....	20
4.1.23: Digex (Intermedia) .....	22
4.1.24: Digicom.....	22
4.1.25: Digital Technologies Corporation.....	23
4.1.26: Diversified Communications (DCI) .....	23
4.1.27: Eastern Space Systems .....	24
4.1.28: Embratel.....	24
4.1.29: Epoch Internet.....	25
4.1.30: ERE (ERE Energy And Telecom) .....	26
4.1.31: Esatel Communications .....	26
4.1.32: Extelcom (K&S International Communications).....	27
4.1.33: Fastnet Srl.....	27
4.1.34: Gilat Communications (Israsat) .....	27
4.1.35: Global One .....	28
4.1.36: Globecast .....	29
4.1.37: Golden Telecom Inc. (GTI) .....	30
4.1.38: GTS Czech Republic).....	31
4.1.39: Gulfsat .....	32
4.1.40: Hungaro Digital Kft.....	32
4.1.41: Hutchison Corporate Access .....	33
4.1.42: IDM Satellite .....	33
4.1.43: Impsat Fiber Networks .....	34
4.1.44: Indosat (PT Indonesian Satellite Corporation) .....	37

4.1.45: Infocom Satellite Communications .....	38
4.1.46: Internet Skyway.....	39
4.1.47: Intersat .....	40
4.1.48: IP Access International.....	40
4.1.49: IP Planet.....	41
4.1.50: KB Impus Service Gmbh.....	42
4.1.51: Kingston Mediastream.....	42
4.1.52: Korea Telecom .....	43
4.1.53: KPN .....	43
4.1.53.1: EUNET .....	44
4.1.54: Latinet.....	45
4.1.54.1: Telpan Communications Corporation .....	46
4.1.55: Lockheed Martin Global Telecommunications .....	46
4.1.56: Maksat Communications .....	49
4.1.57: MCI WorldCom And UUNet .....	50
4.1.57.1: UUNet.....	50
4.1.57.2: UUNet Pipex.....	51
4.1.57.3: UUNet Africa And UUNet SA.....	51
4.1.57.4: Satellite Data Networks .....	52
4.1.58: McKibben Communications .....	53
4.1.59: Media Sat.....	53
4.1.60: Merlin Communications International.....	54
4.1.61: Mir Teleport.....	54
4.1.62: Moscow Teleport.....	54
4.1.63: Netissat .....	55
4.1.64: Netsat Express .....	56
4.1.64.1: Netsat Distributors And Partners .....	58
4.1.65: Network Satellite Italia (NSI).....	59
4.1.66: New Skies Networks (Formerly AAPT Sat-Tel).....	59
4.1.67: NSN Network Services.....	60
4.1.68: NTL Satellite Services .....	60
4.1.69: Optus Spinnaker .....	61
4.1.70: Orbicom.....	61
4.1.71: Pacamtel.....	62
4.1.72: Paradox Digital.....	62
4.1.73: PCCW HKT .....	
4.1.74: Philcomsat .....	63
4.1.75: Planetel.....	64
4.1.76: PSINet.....	64
4.1.77: Redwing Satellite Communications .....	65
4.1.78: Rostelcom.....	65
4.1.79: Satcom Digital Networks.....	65
4.1.80: Satelindo (PT Satelit Palapa Indonesia) .....	66
4.1.81: Satellite Communications Systems .....	66
4.1.82: Satellite Media Services .....	67
4.1.83: Satko .....	68
4.1.84: Seabone (Telecom Italia International Services).....	68
4.1.85: Sentech.....	68
4.1.86: Singapore Telecom (SingTel).....	69
4.1.87: Skyhub Asia.....	70

4.1.88: SkyTiger (Usat) .....	70
4.1.89: Skyvision.....	71
4.1.90: Softnet Systems .....	71
4.1.90.1: Intellicom.....	72
4.1.91: Software Technology Parks Of India .....	73
4.1.92: Spaceline.....	75
4.2.93: Spacelink International.....	76
4.1.94: Spectrum Net .....	76
4.1.95: Subic Bay Satellite Systems .....	77
4.1.96: Taide Network .....	78
4.1.97: Telecom New Zealand (Netgate).....	79
4.1.98: Teleglobe Communications .....	79
4.1.99: Telenor Broadband Services.....	81
4.1.100: Teleport Bulgaria.....	84
4.1.101: Teleport International Benelux .....	84
4.1.102: Teleport-TP.....	84
4.1.103: Telkom SA.....	85
4.1.104: Telscape International.....	85
4.1.104.1: Interlink .....	86
4.1.105: Telstra Big Pond Direct .....	87
4.1.106: The Internet Group (IHUG).....	88
4.1.107: The Internet Solution (IS).....	88
4.1.108: TIBA (Teleport International Buenos Aires).....	89
4.1.109: Transtel Satellite Division.....	89
4.1.110: Ultracom.....	90
4.1.111: United Communications .....	90
4.1.112: United Network Access .....	91
4.1.113: Unitel Hellas .....	91
4.5.114: USA Teleport.....	92
4.1.115: Verinet Satellite Communications .....	92
4.1.116: Verestar.....	93
4.1.116.1: Interpacket Group .....	96
4.1.117: Verinet Satellite Communications .....	97
4.1.118: Verio .....	98
4.1.119: Vitacom .....	98
4.1.120: VSNL.....	99
4.1.121: W4 .....	101
4.1.122: Warsun International Communications .....	103
4.1.123: Wirelesscom .....	103
4.1.124: Xplorium.....	103

## **4.2: Wholesale Content Distribution Platforms .....104**

4.2.1: Cidera.....	104
4.2.2: Edgix.....	108
4.2.3: Espresso (Interpacket) .....	109
4.2.4: IBeam Broadcasting .....	110
4.2.4.1: IBeam Europe .....	111
4.2.5: Hughes Network Systems.....	111
4.2.6: Internet Skyway.....	112

4.2.7: Loral Cyberstar Worldcast Newsfeed.....	112
4.2.8: Multicast ISP .....	113
4.2.9: Net 36 .....	113
4.2.10: Orblynx .....	114
4.2.11: Planet Connect.....	115
4.2.12: Williams VYVX .....	116
4.2.13: Other Content Distribution Networks.....	116
<b>4.3: Hybrid Satellite-Based Internet Access Services.....</b>	<b>117</b>
4.3.1: 88direct (PT Jaring Data Interaktif).....	117
4.3.2: Access1 .....	117
4.3.3: Astra-Net One-Way Users .....	117
4.3.4: Astronet-Jaring .....	122
4.3.5: AT-Sky .....	123
4.3.6: Barracuda Internet Services .....	124
4.3.7: Bekkoame Spacenet.....	124
4.3.8: Canalpro.....	125
4.3.9: Chinacast Turbo 163.....	125
4.3.10: Connect2Internet Satellite .....	126
4.3.11: Deltasat .....	126
4.3.12: DirecPC .....	127
4.3.13: Easysat .....	130
4.3.14: Emperion (Formerly Satworks) .....	131
4.3.15: Esat .....	131
4.3.15.1: Global Media Technology .....	132
4.3.16: Europe Online .....	132
4.3.17: Falconstream.....	133
4.3.17.1: Distributors For Falconstream.....	134
4.3.18: Fast@Xs (Digistar Networks) .....	134
4.3.19: Heliosnet.....	135
4.3.20: Hextel.....	135
4.3.21: Inetvu (C-Com Satellite Systems) .....	135
4.3.22: Infosat .....	136
4.3.23: IP Access International.....	137
4.3.24: IP Active (Orbicom) .....	137
4.3.25: Iperspace .....	137
4.3.26: Ision Internet .....	138
4.3.27: Korea Telecom Megapass .....	138
4.3.28: Luckylink .....	139
4.3.29: M2SS (PCCW HKT) .....	139
4.3.30: Mach 6 (M6).....	139
4.3.31: MCast (Globecast).....	140
4.3.32: Mega Wave (NTT Satellite Communications) .....	141
4.3.33: NonStopNet (Nebulink).....	141
4.3.34: NTV Internet.....	142
4.3.35: Orientnet .....	142
4.3.36: Pick Sat .....	142
4.3.36.1: Globalxchange .....	143
4.3.37: Planetsky.....	143

4.3.38: Polycom.....	144
4.3.39: Satin .....	144
4.3.40: Satnet .....	144
4.3.41: Show-Net Internet Solutions .....	145
4.3.41.1: Dealers For Show-Net Services.....	145
4.3.42: Shin Sat (Thaicom) Net Turbo .....	146
4.3.43: Siyanda Broadband Satellite Communications .....	147
4.3.44: S Kumars.Com.....	148
4.3.45: SkyDSL.....	149
4.3.46: Spacegate .....	151
4.3.47: Spaktelco .....	151
4.3.48: Speedcast .....	151
4.3.49: Starspeeder (CBL - Communication And Banking Luxembourg) .....	151
4.3.49.1 Starspeeder Distributors.....	152
4.3.50: Telefónica Mundo.....	152
4.3.51: Telstra Big Pond Advance .....	152
4.3.52: Uniway (Unitel).....	153
4.3.53: Velocity (Microspace Communications).....	153
4.3.54: Other Networks And Players .....	154
<b>4.4: Two-Way Access Services.....</b>	<b>155</b>
4.4.1: BroadEdge .....	155
4.4.2: Cable & Wireless Optus .....	155
4.4.3: Direcpc 4.....	156
4.4.4: Heartland Communications .....	156
4.4.5: IDirect.....	158
4.4.6: Kokua Communications (Formerly PC-Sat Europe).....	158
4.4.7: LG Information And Communications .....	159
4.4.8: Miraeonline.....	160
4.4.9: Netsystem.Com.....	160
4.4.10: Powersky (Global Convergence).....	160
4.4.11: SES Multimedia BBI .....	161
4.4.12: Skycrossing (Alphastar) .....	162
4.4.13: Skyline .....	163
4.4.14: Skyonline (Formerly Direc-To-Phone) .....	163
4.4.15: Starband .....	164
4.4.15.1: RStar Networks (Zapme! Corporation) .....	166
4.4.16: Tachyon .....	167
4.4.17: Vsat Net .....	168
4.4.18: Websat .....	169
4.4.19: Other Two-Way Developments .....	170
<b>4.5: Satellite Operators .....</b>	<b>171</b>
4.5.1: Arabsat.....	173
4.5.2: APT Satellite Telecommunications .....	173
4.5.3: Chinasat (China Telecommunications Broadcast Satellite Corporation) .....	174
4.5.4: Eutelsat .....	175
4.5.4.1: Any Interesting Eutelsat User - M2sat .....	177

4.5.5: Hughes Communications .....	177
4.5.5.1: Panamsat.....	177
4.5.5.2: Spaceway.....	178
4.5.6: Inmarsat Horizons/Inmarsat 4 .....	179
4.5.7: Insat (ISRO).....	179
4.5.8: Intelsat .....	180
4.5.9: Intersputnik .....	181
4.5.10: Japan Satellite Systems (Sat).....	181
4.5.11: Koreasat .....	182
4.5.11.1: A Koreasat User, Anysat.....	182
4.5.12: Lockheed Martin Global Telecommunications .....	183
4.5.12.1: Astrolink .....	183
4.5.12.2: Lockheed Martin Intersputnik .....	184
4.5.13: Loral Space And Communications .....	184
4.5.13.1: Loral Cyberstar .....	185
4.5.13.2: Loral Global Alliance .....	188
4.5.13.2.1: Loral Skynet .....	188
4.5.13.2.2: Satmex .....	189
4.5.13.2.3: Europe * Star .....	190
4.5.13.2.4: Stelat .....	190
4.5.13.2.5: Loral Skynet Do Brasil.....	191
4.5.14: Mabuhay.....	191
4.5.15: Measat (Binariang Satellite Systems).....	192
4.5.16: Nahuelsat .....	192
4.5.17: Netsat28 .....	193
4.5.18: New Skies Satellite (NSS).....	194
4.5.19: Nilesat (The Egyptian Satellite Co).....	195
4.5.20 :PT Telekomunikasi Indonesia (PT Telkom) .....	195
4.5.21: Russian Satellite Communications Company.....	195
4.5.22: SES Global .....	196
4.5.22.1: Americom Asia-Pacific .....	197
4.5.22.2: Asiasat .....	197
4.5.22.3: Columbia Communications Corporation.....	198
4.5.22.4: GE Americom.....	199
4.5.22.5: NSAB.....	200
4.5.22.6: Star One .....	201
4.5.23: Shin Satellite Public (Thaicom).....	202
4.5.24: Sinosatcom (Sino Satellite Communications Company).....	204
4.5.25: Singtel ST-1 And Optus B And C .....	204
4.5.25.1: Cable & Wireless Optus .....	205
4.5.26: Telesat Canada.....	205
4.5.27: Türksat .....	207
4.5.27.1: Eurasiasat.....	208
4.5.28: WildBlue (Formerly ISky And Ka-Star Satellite Communications).....	208
<b>Section 4.6: Bandwidth Exchanges .....</b>	<b>210</b>
4.6.1 Arbinet-Thexchange .....	211
4.6.2: Asia Capacity Exchange .....	211
4.6.3: Bandwidth Market .....	211

4.6.4: Band-X.....	212
4.6.5: Enron Broadband Services .....	212
4.6.6: Iacto .....	213
4.6.7: Interxion.....	213
4.6.8: London Satellite Exchange .....	213
4.6.9: Ratexchange (Formerly Netamerica).....	214
4.6.10: Satcap.....	215

**Appendices.....216**

4.7: Acknowledgements .....	216
4.8: General Web Sites Covering Internet.....	218
4.8.1: Web Sites Covering Internet Via Satellite.....	218
4.9: Glossary Of Terms.....	219
4.10: List Of Acronyms .....	229
4.11: Other Titles And Services From DTT Consulting.....	235

**List of Tables and Charts, Volume 1**

Chart A: Market Growth, 36 MHz Transponder Equivalent Use for Internet Traffic .....	21
Chart B: Market Share by Application, 36 MHz Equivalent, and April 2001 .....	21
Chart C: Market Share by Application, 36 MHz Equivalent, and January 2000 .....	22
Chart D: Market Share by Application, 36 MHz Equivalent, and Jan 1999 .....	22
Chart E: Market Share by Application, 36 MHz Equivalent, and January 1998.....	23
Table F: Split of Market by 36 MHz Transponder Equivalent.....	23
Chart G: Market Growth, MBit/s of Satellite Capacity Leased by Application.....	24
Chart H: Market Share by Application, MBit/s, and April 2001 .....	24
Table I: Split of Market in MBit/s Terms .....	25
Chart J: Market Growth, By Value, Transponder Lease, US\$M.....	25
Chart K: Market Share by Value, Transponder Leases, and April 2001 .....	26
Table L: Spit of Market by Transponder Lease Value, US\$ m.....	26
Table M: ISP Market Summary, April 2001 .....	27
Chart N: Growth in ISP use of Point-to-Point Satcoms Links .....	28
Table O: Satellite Link by Region, April 2001 .....	28
Table P: ISP Connections to Backbone by Region, Winter 1998 to 2001 .....	29
Chart Q: Growth in ISP Point-to-Point Satcoms Link Usage .....	29
Chart R: Where are the World's 438,345,702 Internet Users? .....	30
Table S: Capacity by Interconnect Point, April 2001, MBit/s.....	30
Chart T: ISP Satellite Capacity by Interconnect Point MBit/s, April 2001 .....	31
Chart U: ISP Satellite Capacity by Interconnect Point MBit/s, Jan 2000 .....	31
Chart V: ISP Satellite Capacity by Interconnect Point, MBit/s Jan 1999 .....	32
Chart W: ISP Satellite Capacity by Interconnect Point, MBit/s Jan 1998.....	32
Chart X: ISP Point-to-Point Satcoms Link Market, by Region, April 2001 .....	33
Chart Y: ISP Point-to-Point Satcoms Link Market, by Region, MBit/s, January 2000 .....	33
Chart Z: ISP Point-to-Point Satcoms Link Market, by Region, January 1999 .....	34
Chart AA: ISP Point-to-Point Satcoms Link Market, by Region, January 1998 .....	34
Table AB: Satellite ISP Links by Carrier, April 2001 .....	36
Chart AC: Growth in Satellite Access Market, Units Installed and in Use .....	37
Table AD: Installed Base of Satellite-based Internet Access Devices .....	37
Chart AE: Growth in Installed Base (in use) of Hybrid Satellite Access Terminals, 000s .....	38

Chart AF: Number of Transponders (36 MHz equivalent) Used for Hybrid Access .....	39
Chart AG: Satellite Capacity, MBit/s, Leased for Hybrid Access .....	39
Table AH: Estimated Subscribers to Hybrid Internet Access Services, end of April 2001 .....	40
Table AI: Estimated Satellite Capacity Used for Hybrid Internet Access Services, April 2001 .....	42
Table AJ: Estimated Installed Base of Two-Way Internet Access Terminals, end of April 2001 .....	43
Table AK: Estimated Satellite Capacity Used for Two-way Internet Access Services, April 2001 .....	43
Table AL: Planned and Existing Content Distribution, Caching and Usenet News Feeds .....	45
Chart 1.1: Western and Eastern European and CIS Satcoms Point-to-Point Demand from ISPs .....	50
Table 1.1 Summary of ISPs in Central and Eastern Europe and the CIS, April 2001 .....	54
Table 1.1.1: Summary of ISPs, Western Europe, April 2001 .....	55
Table 1.1.2: Known: Satellite ISP Links Serving CEE & CIS Countries .....	55
Table 1.1.3: Internet Statistics, Central & Eastern Europe and the CIS .....	61
Table 1.1.4: Internet Statistics, Western Europe .....	62
Table 1.2: Summary of Albanian ISP Links to Backbone .....	65
Table 1.3: Summary of Armenian ISP links to Backbone .....	69
Table 1.4: Summary of Azerbaijani ISP Links to Backbone .....	71
Table 1.5: Summary of Backbone Links of ISPs in Belarus .....	73
Table 1.6: Summary of ISPs in Bosnia Herzegovina .....	77
Table 1.7: Summary of Bulgarian Direct Satellite Links to Backbone .....	79
Table 1.8: Summary of all Bulgarian ISP Links to Backbone .....	83
Table 1.9: Summary of Croatian ISP Links to Backbone .....	90
Table 1.10: ISPs in the Czech Republic .....	92
Table 1.11: Summary of Estonian ISP Links to Backbone .....	96
Table 1.12: Summary of Georgian ISP Links to Backbone .....	99
Table 1.13: Summary of Greek ISP Connections to Backbone .....	101
Table 1.14: ISPs in Hungary.....	103
Table 1.15 : Summary of Kazakhstan ISP Links to Backbone .....	109
Table 1.16: Summary of Kyrgyzstan ISP Backbone Links .....	113
Table 1.17: Summary of Latvian ISP Links to Backbone .....	116
Table 1.18: Summary of Lithuanian ISP Links to Backbone .....	119
Table 1.19: ISPs in Macedonia .....	121
Table 1.20; Summary of Moldovan ISP Links to Backbone .....	123
Table 1.21: Summary of Mongolian ISP Links to Backbone .....	125
Table 1.22: Summary of Polish ISP Links to Backbone .....	128
Table 1.23: Summary of Romanian Direct Satellite Links to Backbone .....	145
Table 1.24: Summary of Romanian ISP Links to Backbone .....	147
Table 1.25: Rostelcom's Trunk Network .....	153
Table 1.26: Geographic Distribution of Internet Users in Russia .....	153
Table 1.27: Growth in Number of Russian Internet Users .....	154
Table 1.28: ISPs in Russia .....	161
Table 1.29: Summary of Serbian ISP Links to Backbone .....	173
Table 1.30: Licensed and Operational ISPs in Slovakia .....	177
Table 1.31: Summary of Slovenia ISPs to Links to Backbone .....	180
Table 1.32: Summary of Tajikistan ISP Backbone Links .....	182
Table 1.33: Summary of Ukrainian ISP Links to Backbone .....	187
Table 1.34: Summary of Uzbekistan ISP Links to Backbone .....	197

## **List of Tables and Charts, Volume 2**

Chart 2.1.1: Satellite Point-to-Point Demand in the Middle East.....	7
--	---

Table 2.1.1: Middle East ISP Market Summary.....	8
Table 2.1.2: Satellite ISP Links Serving the Middle East .....	9
Table 2.1.3: Summary of Cypriot ISP Connections to Backbone .....	12
Table 2.1.4: Summary of Iranian ISPs.....	17
Table 2.1.5: Summary of Known Israeli Satellite Links to US Backbone .....	19
Table 2.1.6: Summary of International Links of Israeli ISPs .....	21
Table 2.1.7: Summary of Jordanian ISP Connections to Backbone .....	23
Table 2.1.8: Summary of Kuwaiti ISPs .....	24
Table 2.1.9: Summary of International Links of Lebanese ISPs.....	27
Table 2.1.10: Summary of North Cyprus ISP Connections to Backbone .....	28
Table 2.1.11: Summary of Saudi ISPs .....	30
Table: 2.1.12: Summary of Main IP Satcoms Connections to Turkey.....	35
Table 2.1.13: Turkish ISP Links to Backbone .....	37
Chart 2.2.1: Growth in Use of Satellite Point-to-Point Links, Asia, MBit/s .....	42
Table 2.2.1: ISPs and Satellite Links in Asia .....	43
Table 2.2.2: Satellite ISP Links Serving Asia .....	44
Table 2.2.3: Internet Statistics and Capacity Used to Link Asian ISPs.....	48
Table 2.2.4: Summary of Bangladeshi ISP Connections to Backbone.....	51
Table 2.2.5: Summary of Known Chinese ISP Links to Backbone.....	57
Table 2.2.6: Chinese International IP Capacity.....	61
Table 2.2.7: Use of International Private Leased Circuits for the provision of Internet Service ....	63
Table 2.2.8: Summary of Known Hong Kong ISP Links to Backbone .....	65
Table 2.2.9: Summary of Known India Links to International Backbone.....	73
Table 2.2.10: Summary of Licensed India ISPs .....	75
Table 2.2.11: ISPs who have clearance In Principle to set up International Gateways .....	89
Table 2.2.12: Summary of Indonesian ISP Links to backbone .....	113
Table 2.2.13: Summary of Malaysian ISPs .....	119
Table 2.2.14: Gateway Capacity of some Nepalese ISPs, May 2000.....	120
Table 2.2.15: Summary of Nepalese ISP Links to Backbone.....	121
Table 2.2.16: Summary of Pakistani ISP Links to Backbone.....	125
Table 2.2.17: Known International Satellite ISP Links, Philippines .....	128
Table 2.2.18: Summary of Filipino ISPs and Their Links to Backbone.....	131
Table 2.2.19: Summary of Singapore ISPs.....	135
Table 2.2.20: Summary of Korean ISPs .....	137
Table 2.2.21; Summary of ISPs in Sri Lanka .....	141
Table 2.2.22; Summary of ISPs in Taiwan.....	143
Table 2.2.23: Thai Fibre and Satellite Connections to Backbone .....	147
Table 2.2.24: Summary of Thai ISPs.....	148
Chart 2.3.1: Growth in Point-to-Point Satellite ISP link Demand, Australasia and Oceania .....	151
Table 2.3.1: ISP Satellite Link Capacity Used for Internet Traffic, Australasia .....	152
Table 2.3.1.1: Australasia & Oceania ISP Market Summary.....	153
Table 2.3.2: Summary of Australian ISPs .....	159
Table 2.3.3: Summary of New Zealand ISPs .....	183
Table 2.3.4: Summary of Pacific Island ISPs and their links to the USA .....	187

### **Table and Charts, Volume 3**

Chart 3.1.1: Summary of Growth in Africa ISP Links to Backbone via Satellite.....	9
Table 3.1.1: ISPs and Satellite Links in Africa .....	9
Table 3.1.2: Satellite ISP Links Serving Africa .....	11

Table 3.1.3: Internet Statistics and Capacity Used to Link African ISPs .....	15
Table 3.1.4: Summary of Algerian ISP Links to Backbone .....	20
Table 3.1.5: Summary of International Links of Egyptian ISPs .....	23
Table 3.1.6: Summary of Moroccan ISP Links to Backbone .....	27
Table 3.1.7: Summary of ISPs in Tunisia .....	29
Table 3.1.8: Summary of ISPs in Angola .....	31
Table 3.1.9: Summary of ISPs in Benin .....	32
Table 3.1.10: Summary of Botswana ISP Connections to Backbone .....	33
Table 3.1.11: Summary of ISPs in Burkina Faso .....	34
Table 3.1.12: Summary of ISPs in Cameroon .....	35
Table 3.1.13: Summary of ISPs in the Democratic Republic of Congo .....	36
Table 3.1.14: Summary of ISPs in Ivory Coast .....	37
Table 3.1.15: Summary of Eritrean ISPs .....	38
Table 3.1.16: Summary of ISPs in Ghana .....	40
Table 3.1.17: Monthly Kenya Telecom Charges for IP Access .....	43
Table 3.1.18: Licensed Kenyan ISPs .....	44
Table 3.1.19: Internet Exchange Points in Sub-Saharan Africa .....	45
Table 3.1.20: Summary of Kenyan ISP Links to Backbone .....	46
Table 3.1.21: Summary of ISPs in Madagascar .....	48
Table 3.1.22: Partial List of ISPs in Malawi .....	49
Table 3.1.23: Summary of ISPs in Mali .....	50
Table 3.1.24: Summary of ISPs in Mauritania .....	51
Table 3.1.25: Summary of ISPs in Mozambique .....	53
Table 3.1.26: Summary of ISPs in Namibia .....	54
Table 3.1.27: Summary of Nigerian ISPs .....	57
Table 3.1.28: List of Licensed Internet Companies in Nigeria .....	58
Table 3.1.29: Summary of ISPs on Reunion Island .....	61
Table 3.1.30: Summary of ISPs in Senegal .....	63
Table 3.1.31: Summary of ISPs in Swaziland .....	65
Table 3.1.32: Summary of Tanzanian ISP Links to Internet Back .....	67
Table 3.1.33: Summary of Ugandan ISP links to Backbone .....	69
Table 3.1.34: Summary of Zambian ISP Links to Backbone .....	70
Table 3.1.35: Summary of Zimbabwe ISPs .....	72
Table 3.2.1: International Capacity Leased By South African 1st Tier ISPs, 21st January 2001 ...	73
Table 3.2.2: Summary of South African ISP Links to International Backbone .....	75
Chart 3.2.3: Simplified Schematic of South African Connections to Backbone .....	84
Chart 3.3.1: Growth in Point-to-Point Satellite ISP Link Market, Latin America .....	86
Table 3.3.1.1: Summary of North America Satellite ISP Link Market .....	89
Table 3.3.1: ISPs and Satellite Links in Latin America & the Caribbean, April 2001 .....	91
Table 3.3.1b: Internet Statistics, Latin America & the Caribbean .....	92
Table 3.3.2: Known: Satellite ISP Links Serving Latin America & the Caribbean .....	93
Table 3.3.3: Major Satellite Capacity Deals Latin American IP Traffic .....	96
Table 3.3.4: ISPs in Argentina .....	99
Table 3.3.5: ISPs in Bolivia .....	104
Table 3.3.6: Embratel's International Internet Capacity .....	106
Table 3.3.7: Summary of Brazilian ISP Connections .....	107
Table 3.3.8: ISPs in Brazil .....	109
Table 3.3.9: ISPs in Chile .....	133
Table 3.3.10: ISPs in Colombia .....	136
Table 3.3.11: Costa Rica .....	138

Table 3.3.12: ISPs in Ecuador .....	141
Table 3.3.13: ISPs in El Salvador .....	142
Table 3.3.14: ISPs in Guatemala .....	144
Table 3.3.15: ISPs in Guyana .....	145
Table 3.3.16: ISPs in Honduras .....	145
Table 3.3.17: ISPs in Mexico .....	147
Table 3.3.18: ISPs in Nicaragua .....	158
Table 3.3.19: ISPs in Panama .....	159
Table 3.3.20: ISPs in Paraguay.....	161
Table 3.3.21: ISPs in Peru .....	162
Table 3.3.22: ISPs in Surinam.....	163
Table 3.3.23: ISPs in Uruguay.....	164
Table 3.3.24: ISPs in Venezuela .....	167
Table 3.3.25: ISPs in the Caribbean .....	171

#### **Tables and Charts, Volume 4**

Table 4.1.1: Embratel's International Internet Capacity.....	25
Table 4.1.2: DirecPC Enterprise Edition, Impsat Base .....	36
Table 4.1.3: Infocom SCPC Asymmetric Channel Rate Card.....	39
Table 4.1.4: Infocom Broadband Receive Only Service Rate Card .....	39
Table 4.1.5: Intellicom Internet Access Charges .....	73
Table 4.1.6: Verestar Space Segment Sources, February 2001 .....	93
Table 4.3.1: Costs Of SkyDSL Package .....	149
Table 4.3.2: Cost Of Sky Slices .....	150
Table 4.5.1: Time Table For Deployment Of Anysat Service.....	183