

WINTERGREEN RESEARCH, INC.

**DWDM Market Opportunities, Strategies, and Forecasts,
2003 to 2008**

DWDM



Picture by Susie Eustis

MOUNTAINS OF OPPORTUNITY

**WinterGreen Research, Inc.
Lexington, Massachusetts**

www.wintergreenresearch.com

REPORT # SH29821300

275 PAGES

76 TABLES AND FIGURES

2003

\$2,800

CHECK OUT THESE KEY TOPICS

DWDM MARKET SHARES

DWDM FORECASTS

DWDM CARRIER TRENDS

Market Segmentation

Metro DWDM Line Systems

Network Management

SUBMARINE DWDM

OPTICAL ARCHITECTURES

SYSTEMS APPROACH TO DWDM

LIGHTING DARK FIBER

WAVELENGTHS

DWDM APPLICATIONS

TUNABLE LASERS

LONG HAUL TERRESTRIAL DWDM LINE SYSTEMS

FORWARD ERROR CORRECTION

TRANSPARENT METRO DWDM EQUIPMENT

OPPORTUNITY ABOUND

WinterGreen Research, Inc.

Lexington, Massachusetts

www.wintergreenresearch.com

DWDM Market Opportunities, Strategies, and Forecasts, 2003 to 2008

DWDM brings innovative technologies to the broadband market. Platforms are evolving that extend transmission systems into access, supporting the engagement of multiple value added services on DWDM platforms. There is a convergence of transmission and digital loop carrier platform technology.

Companies need to have a technology that combines both time-to-market and time-to-volume production. Market advantage is achieved by a sustainable product offering. Metro DWDM represents a major market shift impacting DWDM inventory and products, creating a differentiation between products and a major product advantage for companies with affordable lasers.

Market Conditions

Economies have slowed worldwide. Telecommunications infrastructure investment has slowed worldwide. Delay in spending for capital equipment relates in part to overcapacity. The telecommunications industry has enormous overcapacity. The Internet continues to have more users and drive more traffic on networks, but the revenue still comes from voice services.

DWDM, gigabit routers, terabit routers, and fiber networks have increased the dark fiber capacity in the networks and have created a situation where profitability for service providers depends on utilizing existing plant. Proprietary circuit switches that cost \$1 million can be replaced with a \$150,000 IBM, Hewlett Packard, or Sun server loaded with call control soft switch software. Wireless communications promise to replace narrowband wireline services. The long distance and metro networks that use DWDM are achieving broadband systems capability.

Optical networking is evolving the capability to achieve Networks are evolving all optical systems capability. Capital spending is evolving to remove network bottlenecks and permitting carriers to pursue profitable revenue opportunities.

DWDM Growth Opportunities

DWDM growth opportunities relate to lighting dark fiber, implementing broadband networks, and creating a platform for value added services delivery. The ability to increase transport capacity is needed universally. High bandwidth is needed to improve productivity and increase supply chain efficiency.

DWDM GROWTH OPPORTUNITIES

Metro systems implementation

New regional markets

Lighting dark fiber

E-services demand

Storage area network SAN market opportunities

Value added services demand

High bandwidth demand

Supply chain efficiency demand

Metro markets are shifting as the prices for laser components come down.

DWDM Market Size

DWDM markets are expected to grow from \$3.4 billion in 2002 to \$3.6 billion in 2008.

Companies Profiled

Market Leaders

Nortel Networks
Alcatel
NEC
Ciena
Lucent Technologies
Tellabs
Siemens
Sorrento

Other Market Participants

ADVA Optical	JDS Uniphase
Agilent Technologies	Huawei
Avici Systems	Lightbit
Avonex	Lumentis
Cisco Systems	Manticom Networks
Corning	Marconi
ECI Telecom	Optical Micro Machines
Ericsson	PacketLight
Fujitsu Optical Transport Solutions	Sycamore Networks
Hewlett Packard	Telect

DWDM Market Strategies and Forecasts, 2003-2008

REPORT METHODOLOGY

THIS IS THE HUNDRED AND THIRTIETH REPORT IN A SERIES OF MARKET RESEARCH REPORTS THAT PROVIDE FORECASTS IN COMMUNICATIONS, TELECOMMUNICATIONS, THE INTERNET, COMPUTER, SOFTWARE, AND TELEPHONE EQUIPMENT. THE PROJECT LEADERS TAKE DIRECT RESPONSIBILITY FOR WRITING AND PREPARING EACH REPORT. THEY HAVE SIGNIFICANT EXPERIENCE PREPARING INDUSTRY STUDIES. FORECASTS ARE BASED ON PRIMARY RESEARCH AND PROPRIETARY DATA BASES. FORECASTS REFLECT ANALYSIS OF THE MARKET TRENDS IN THE SEGMENT AND RELATED SEGMENTS. UNIT AND DOLLAR SHIPMENTS ARE ANALYZED THROUGH CONSIDERATION OF DOLLAR VOLUME OF EACH MARKET PARTICIPATION IN THE SEGMENT. INSTALLED BASE ANALYSIS AND UNIT ANALYSIS IS BASED ON INTERVIEWS AND AN INFORMATION SEARCH. MARKET SHARE ANALYSIS INCLUDES CONVERSATIONS WITH KEY CUSTOMERS OF PRODUCTS, INDUSTRY SEGMENT LEADERS, MARKETING DIRECTORS, DISTRIBUTORS, LEADING MARKET PARTICIPANTS, OPINION LEADERS, AND COMPANIES SEEKING TO DEVELOP MEASURABLE MARKET SHARE. OVER 200 IN DEPTH INTERVIEWS ARE CONDUCTED FOR EACH REPORT WITH A BROAD RANGE OF KEY PARTICIPANTS AND INDUSTRY LEADERS IN THE MARKET SEGMENT.

YOU MUST HAVE THIS STUDY

DWDM Market Opportunities, Strategies, and Forecasts, 2003 to 2008

Table of Contents

DWDM EXECUTIVE SUMMARY

DWDM EXECUTIVE SUMMARY	ES-1
DWDM Brings Innovative Technologies To The Broadband Market	ES-1
DWDM Market Shares	ES-2
DWDM Carrier Trends	ES-4
DWDM Market Forecasts	ES-7
Next-Generation DWDM All Optical Transport Platforms	ES-8

DWDM DYNAMICS AND MARKET DESCRIPTION

1. DWDM MARKET DYNAMICS AND MARKET DESCRIPTION	1-1
1.1 DWDM Market Dynamics	1-1
1.2 Wave Division Multiplexing (WDM)	1-1
1.3 DWDM Systems	1-2
1.3.1 Metro Markets	1-4
1.3.2 Metro Versus Long-Haul WDM	1-5
1.3.3 Challenges of Telecommunications Network	1-6
1.4 DWDM Applications	1-7
1.5 Market Conditions	1-8
1.5.1 More Efficient To Put Together A Telecommunications Network	1-9
1.5.2 Delay In Spending For Capital Equipment	1-9
1.5.3 Capital Spending Decreasing	1-10
1.6 Optical Amplifiers Re-Amplify All Of The Channels On A WDM Fiber	1-11
1.6.1 Implications for Optical Networking	1-12
1.7 Wavelengths	1-13
1.7.1 Optical Sonet And DWDM Systems	1-13
1.7.2 Sonet	1-14
1.8 Transparent Metro DWDM Equipment	1-17
1.8.1 Increase In Data Traffic On The Public Network	1-20
1.8.2 Existing Public Network Transmission Infrastructure	1-21
1.9 Enabling Ethernet Network Computing Protocols	1-21

DWDM MARKET SHARES AND MARKET FORECASTS

2. DMDW MARKET SHARES AND MARKET FORECASTS	2-1
2.1 DWDM Growth Opportunities	2-1
2.2 DWDM Market Shares	2-3
2.3 DWDM Market Forecasts	2-8
2.4 Long-Haul DWDM Sector	2-11
2.4.1 Long-Haul DWDM Market Shares	2-11
2.4.2 Long-Haul DWDM Market Forecasts	2-16
2.5 DWDM Metro	2-18
2.5.1 DWDM Metro Market Shares	2-19

2.6	CWDM Market Shares	2-25
2.7	Metro DWDM and CWDM Market Forecast, Dollars	2-28
2.7.1	Service Provider Ethernet Technology	2-31
2.8	Metro DWDM and CWDM Market Forecast, Ports	2-33
2.9	Lighting Dark Fiber	2-40
2.9.1	All-Optical Network	2-40
2.9.2	Optical Metro Markets	2-41
2.9.3	Redefining Network Configuration	2-41
2.9.4	Impact of High Speed Networks	2-42
2.10	DWDM Regional Analysis	2-43

DWDM PRODUCT DESCRIPTIONS

3. DWDM PRODUCT DESCRIPTION	3-1
3.1 Long-Haul Terrestrial DWDM Line Systems	3-1
3.1.1 Nortel Long-Haul DWDM Optical Networks	3-1
3.1.2 Alcatel Long-Haul DWDM Network Solution	3-4
3.1.3 Alcatel Long Haul DWDM High-Performance Features	3-8
3.1.4 Alcatel 1640 Optical Add/Drop Multiplexer (80/160 channel DWDM System)	3-10
3.1.5 Alcatel Out-Of-Band Forward Error Correction Advanced Error Detection	3-12
3.1.6 NEC	3-15
3.1.7 Long-Haul Dense Wavelength Division Multiplexing (DWDM) System	3-18
3.1.8 Fujitsu FLASHWAVE® Long Haul	3-18
3.1.9 Fujitsu FLASHWAVE® 7700 Long Haul	3-18
3.1.10 Fujitsu FLASHWAVE® 7300 Transponder	3-20
3.1.11 Fujitsu Self Healing Networks	3-22
3.1.12 Ciena Long Haul DWDM	3-22
3.1.13 Corning Terrestrial Long-Haul DWDM	3-23
3.1.14 L M Ericsson / Marconi	3-23
3.1.15 Tellabs 7000 Optical Transport	3-24
3.1.16 ECI Telecom DWDM	3-25
3.1.17 Lightbit	3-27
3.2 Metro DWDM Line Systems	3-28
3.2.1 Nortel Metro DWDM Optical Networks	3-29
3.2.2 Nortel OPTera Metro Portfolio	3-29
3.2.3 Alcatel Metro DWDM	3-32
3.2.4 Ciena Metropolitan Networking	3-34
3.2.5 ADVA	3-35
3.2.6 ADVA Carrier-Class Infrastructure Secure, High-Speed Private Optical Network Service	3-37
3.2.7 Ciena MultiWave Metro One™	3-38
3.2.8 Ciena On Line Metro Platform	3-38
3.2.9 Ciena Lightworks Services	3-40
3.2.10 Ciena LightWorks Services Approach	3-42
3.2.11 Cisco Metro	3-42
3.2.12 Cisco Incorporates Photonics Technology Innovation With The MSTP Strategy	3-48
3.2.13 Lucent Metro Optical Solutions	3-49
3.2.14 ECI Telecom LumiNet™ Medium Range DWDM Optical Networking Solution	3-51
3.2.15 PacketLight Integrated Metro Optical Products	3-53
3.2.16 PacketLight Metro DWDM Products	3-53
3.2.17 NEC DWDM / Tellium Optical Switches	3-54
3.2.18 Manticom Networks DWDM Metro Cable Industry Transport Solution	3-55
3.2.19 Redback DWDM	3-56

3.2.20	Lumentis Technology Combines DWDM and CWDM	3-57
3.2.21	Lumentis Technology Eliminates Amplifiers	3-57
3.2.22	Tellabs 7100 DWDM Next Generation Optical Transport Systems	3-59
3.2.23	Marconi DWDM	3-60
3.2.24	Fujitsu FLASHWAVE 7500	3-60
3.3	Submarine DWDM	3-61
3.3.1	Alcatel Submarine	3-62
3.3.2	Corning Submarine	3-63
3.3.3	NEC Repeatered Submarine System	3-63
3.3.4	NEC R320 Submarine Repeater	3-67
3.3.5	ECI Telecom	3-68
3.4	Network Management	3-68
3.4.1	Network Management Software	3-69
3.4.2	Nortel Network Management Software	3-69
3.4.3	PacketLight Network Management Products	3-71
3.4.4	Redback NetOp SmartEdge	3-71
3.4.5	Ericsson NEM / Marconi	3-75
3.4.6	Marconi Management System Service ON	3-75
3.4.7	Fujitsu FLASHWAVE LightGuard™ Solution	3-75
3.4.8	Tellabs Management	3-76

DWDM TECHNOLOGY

4. DWDM TECHNOLOGY	4-1
4.1 Optical Architectures	4-1
4.1.1 Support For Transitioning To An All-Optical Network	4-3
4.2 40 Gbps DWDM	4-3
4.3 DWDM Facilitates Capacity Expansion and Flexibility	4-4
4.3.1 DWDM Capacity Expansion Combining Voice And Data	4-6
4.3.2 DWDM Incremental Growth	4-10
4.4 Unifying Optical Layer	4-10
4.5 Key Characteristics of DWDM Systems	4-12
4.5.1 Wavelength Upgrades	4-13
4.6 Optical Networking	4-13
4.7 Forward Error Correction	4-14
4.8 Systems Approach to DWDM	4-14
4.8.1 Ericsson Engine	4-16
4.8.2 Ciena Optical University	4-16
4.9 DWDM Standards Activities	4-17
4.10 Tunable Lasers	4-17

DWDM COMPANY PROFILES

5. DMDW COMPANY PROFILES	5-1
5.1 ADVA Optical	5-1
5.1.1 Adva Global Marketing Strategy	5-2
5.1.2 Adva Solutions	5-2
5.1.3 Adva Strategic Alliances	5-3
5.1.4 Adva Regional Focus	5-3
5.1.5 ADVA Product Positioning	5-5
5.1.6 ADVA Business Model	5-5
5.1.7 ADVA Optical Networking Revenues	5-5
5.1.8 ADVA Coarse Wavelength Division Multiplexing (CWDM)	5-6

5.1.9	ADVA Optical Networking	5-6
5.1.10	ADVA Market Topography	5-7
5.1.11	ADVA Focus On Storage Network And Ethernet-Based Technology	5-7
5.2	Agilent Technologies	5-8
5.3	Alcatel	5-8
5.3.1	Alcatel VND Division Markets Digital Loop Carrier (DLC) Multi-Service Access Solutions	5-9
5.3.2	Fourth Quarter Business Update:	5-10
5.3.3	Alcatel Participation In Communications Network Equipment Markets	5-12
5.3.4	Alcatel Metro DWDM	5-12
5.3.5	Alcatel and Optics	5-15
5.3.6	Alcatel and Tellabs / Sprint DWDM Metro Equipment	5-17
5.3.7	Alcatel Fiber Optic Submarine Cable Repair	5-18
5.4	Avici Systems	5-19
5.4.1	Avici Systems Research And Development	5-19
5.5	Avonex	5-20
5.6	Ciena	5-20
5.6.1	BT / Ciena Strategic Partnership	5-21
5.6.2	Ciena / WaveSmith Networks	5-22
5.6.3	Ciena Revenue	5-22
5.6.4	Ciena Acquires ONI Systems	5-23
5.7	Cisco	5-23
5.7.1	Cisco Acquisitions and Investments	5-24
5.7.2	Cisco Strategic Alliances	5-24
5.8	Corning	5-24
5.8.1	Corning Low-Loss Optical Fiber	5-25
5.8.2	Corning Telecommunications Segment	5-26
5.9	ECI Telecom	5-27
5.9.1	ECI Telecom Revenue	5-28
5.9.2	ECI Telecom Customers	5-29
5.9.3	ECI Telecom Next-Generation Intelligent Optical and Transmission Solutions	5-30
5.10	Ericsson	5-31
5.10.1	Ericsson Partners	5-32
5.10.2	Ericsson Positioning	5-32
5.10.3	Ericsson 3G Positioning	5-34
5.10.4	Ericsson CDMA	5-34
5.10.5	Ericsson Wi-Fi	5-35
5.10.6	Ericsson Mobile handsets	5-36
5.10.7	Ericsson Broadband Access Unit Fibre-To-The-Home	5-36
5.10.8	Ericsson / Marconi Partnership	5-38
5.11	Fujitsu Optical Transport Solutions	5-39
5.11.1	Fujitsu DWDM	5-40
5.11.2	Fujitsu Network Communications Optical Transport Solutions	5-41
5.12	Hewlett Packard	5-42
5.12.1	Hewlett Packard Positioning	5-42
5.12.2	Blade Server Positioning Leverages Optical Networks	5-43
5.12.3	HP Blade Server Partner Program	5-44
5.12.4	Hewlett Packard / Compaq	5-44
5.13	JDS Uniphase	5-44
5.14	Huawei	5-45
5.14.1	Huawei Global Operations	5-46
5.14.2	Huawei ADSL Positioning	5-47
5.15	Lightbit	5-48

5.15.1	Lightbit WaveXchange™ Operating At Speeds Of 10Gb/s And Greater	5-49
5.15.2	Lightbit Next Generation DWDM Transmission Systems	5-50
5.16	Lucent Technologies	5-50
5.16.1	Lucent Service Provider Network Positioning	5-51
5.16.2	Lucent Optical Networking	5-52
5.16.3	Lucent Service Provider Network Positioning	5-53
5.16.4	Lucent Technologies Strategic Positioning	5-54
5.16.5	Business Forces Driving Change For Lucent	5-55
5.16.6	Lucent Metro Optical Solutions	5-56
5.16.7	Lucent Digital Loop Carrier	5-57
5.16.8	Lucent High Density Multi-Service Access Platform	5-59
5.16.9	Lucent AnyMedia® Access System	5-61
5.17	Lumentis	5-62
5.17.1	Lumentis Architecture	5-63
5.17.2	Lumentis Eliminating Amplifiers	5-63
5.17.3	Lumentis Performance and flexibility	5-64
5.17.4	Lumentis Dynamic Networking	5-65
5.17.5	Lumentis CWDM and DWDM	5-66
5.17.6	Lumentis Storage market	5-66
5.17.7	Lumentis Funding	5-67
5.18	Manticom Networks	5-67
5.19	Marconi	5-68
5.19.1	Marconi Revenue	5-68
5.19.2	Marconi Customers	5-70
5.19.3	Marconi Financial Restructuring	5-70
5.20	NEC	5-72
5.20.1	NEC Solutions (America)	5-73
5.20.2	NEC USA	5-74
5.20.3	NEC Long Haul Submarine DWDM Systems	5-74
5.20.4	NEC Integration Of Computers And Communications	5-75
5.20.5	NEC Handsets	5-76
5.20.6	NEC Handset Customers	5-77
5.20.7	NEC Third Quarter Revenue Of The Fiscal Year Ending March 31, 2002	5-77
5.20.8	NEC Networks	5-78
5.20.9	NEC Solutions (America)	5-81
5.21	Nortel Networks	5-81
5.21.1	Nortel Product Development	5-83
5.21.2	Nortel Core Business Segments	5-84
5.21.3	Nortel Optical Networks	5-84
5.21.4	Nortel Strategic Alliances And Acquisitions	5-86
5.21.5	Nortel Service Optical Networks Vision Of Framework	5-86
5.21.6	Nortel Networks Ethernet Over DWDM	5-87
5.21.7	Nortel Surviving The Downturn	5-88
5.21.8	Nortel Networks Corporate Strategy	5-89
5.21.9	Nortel Customers	5-91
5.21.10	Nortel Product Differentiation	5-91
5.22	Optical Micro-Machines	5-92
5.23	PacketLight	5-93
5.23.1	PacketLight Networks Access Platform	5-94
5.24	Sycamore Networks	5-94
5.25	Sorrento	5-95
5.25.1	Sorrento Networks Revenue First Quarter Fiscal 2004	5-96

WINTERGREEN RESEARCH, INC.

5.25.2	Sorrento Customers	5-96
5.25.3	Sorrento Networks Transport Of Video-On-Demand Services	5-96
5.26	Telect	5-97
5.27	Tellabs	5-97
5.27.1	Tellabs Customers	5-98
5.27.2	Tellabs Products	5-98
5.27.3	Tellabs Financials	5-99
5.27.4	Tellabs Optical Networking Products	5-102
5.27.5	Tellabs Next -Gen SDH and Managed Access Systems	5-102

List of Tables and Figures**DWDM EXECUTIVE SUMMARY**

Table ES-1 DWDM Growth Opportunities	ES-2
Figure ES-2 Worldwide DWDM Market Shares, 2002	ES-3
Figure ES-3 Worldwide DWDM Market Shares, Dollars, First Half 2003	ES-4
Figure ES-4 Worldwide DWDM Market Forecasts, Dollars, 2003-2008	ES-8

DWDM MARKET DYNAMICS AND MARKET DESCRIPTION

Table 1-1 DWDM Applications	1-8
Table 1-2 DWDM Service Breadth	1-19

DWDM MARKET SHARES AND MARKET FORECASTS

Table 2-1 DWDM Growth Opportunities	2-1
Table 2-2 Market Advantage Achieved by Sustainable Product Offerings	2-2
Figure 2-3 Worldwide DWDM Market Shares, 2002	2-4
Table 2-4 DWDM Market Shares, Worldwide, 2002	2-5
Figure 2-5 Worldwide DWDM Market Shares, Dollars, First half, 2003	2-6
Table 2-6 DWDM Market Shares, Worldwide, First Half 2003	2-7
Figure 2-7 Worldwide DWDM Market Forecasts, Dollars, 2003-2008	2-9
Table 2-8 Worldwide DWDM Market Forecasts, Dollars, 2003-2008	2-10
Figure 2-9 Worldwide Long haul DWDM Market Shares, Dollars, 2002	2-12
Table 2-10 Long haul DWDM Market Shares, Worldwide, 2002	2-13
Figure 2-11 Worldwide Long haul DWDM Market Shares, Dollars, First Half 2003	2-14
Table 2-12 Long haul DWDM Market Shares, Worldwide, First Half 2003	2-15
Figure 2-13 Worldwide Long haul DWDM Market Forecasts, Dollars, 2003-2008	2-17
Figure 2-14 Worldwide Metro DWDM Market Shares, Dollars, 2002	2-20

Table 2-15	2-21
Metro DWDM and CWDM Market Shares, Worldwide, 2002	
Figure 2-16	2-23
Worldwide Metro DWDM Market Shares, Dollars, First Half 2003	
Table 2-17	2-24
Metro DWDM Market Shares, Worldwide, First Half 2003	
Figure 2-18	2-25
Worldwide CWDM Market Shares, Dollars, 2002	
Table 2-19	2-26
CWDM Market Shares, Worldwide, 2002	
Figure 2-20	2-27
Worldwide CWDM Market Shares, Dollars, First Half 2003	
Table 2-21	2-28
CWDM Market Shares, Worldwide, First Half 2003	
Figure 2-22	2-29
Worldwide Metro DMDW Market Forecasts, Dollars, 2003-2008	
Figure 2-23	2-30
Worldwide CWDM Market Forecasts, Dollars, 2003-2008	
Table 2-24	2-31
Worldwide Metro DWDM and CWDM Market Forecasts, Dollars, 2003-2008	
Figure 2-25	2-34
Global Long Haul DWDM Market Forecasts, Ports, 2003-2008	
Figure 2-26	2-35
Global Metro DWDM Market Forecasts, Ports, 2003-2008	
Figure 2-27	2-36
Global CWDM Market Forecasts, Ports, 2003-2008	
Figure 2-28	2-37
Global DWDM Market Forecasts, Ports, 2003-2008	
Table 2-29	2-38
Worldwide DWDM Market Forecasts, Ports, 2003-2008	
Table 2-30	2-39
Worldwide Metro DWDM and CWDM Market Forecasts, Ports, 2003-2008	
Table 2-31	2-42
Impact of Optical Switching on IP Transport Speeds	
Table 2-32	2-44
Worldwide DWDM Market Forecasts, Percent, By Region, 2003-2008	
Table 2-33	2-45
Worldwide DWDM Market Forecasts, Dollars, By Region, 2003-2008	

DWDM PRODUCT DESCRIPTIONS

Table 3-1	3-2
Nortel Long-Haul DWDM Key Features	
Table 3-2	3-5
Alcatel Long-Haul DWDM Network Solution Features	
Table 3-3	3-6
Alcatel Long-Haul DWDM Network Solution Functions	
Table 3-4	3-9
Alcatel Long Haul DWDM High-Performance Features	
Table 3-5	3-12
Out-Of-Band Forward Error Correction Advanced Error Detection Wavelength Transport Features	

Table 3-6	3-16
NEC SpectralWave 160 Features	
Table 3-7	3-17
NEC SpectralWave 160 Functions	
Table 3-8	3-19
Fujitsu FLASHWAVE® 7700 Dense Wavelength Division Multiplexing (DWDM) Long Haul Functions	
Table 3-9	3-21
Fujitsu FLASHWAVE® 7300 Transponder Features	
Table 3-10	3-26
ECI Telecom Long Range DWDM Luminet Benefits	
Table 3-11	3-30
Nortel OPTera Metro Key Features	
Table 3-12	3-35
Ciena Metropolitan Transport Family	
Table 3-13	3-39
Ciena LightWorks Architecture Functions	
Table 3-14	3-43
Cisco Metro DWDM Positioning	
Table 3-15	3-45
Cisco Metro DWDM Positioning	
Table 3-16	3-50
Lucent Metro Customer Positioning	
Table 3-17	3-52
ECI Telecom Medium Range DWDM Luminet Benefits	
Table 3-18	3-64
NEC DWDM Submarine Transmission Distances	
Table 3-19	3-65
NEC DWDM Submarine Transmission Key Features	
Table 3-20	3-70
Nortel Network Management Software Functions	
Table 3-21	3-73
Redback NetOp SmartEdge Capabilities	

DWDM TECHNOLOGY

Table 4-1	4-1
New Optical Architectures	
Table 4-2	4-7
DWDM Capacity Expansion Functions	
Table 4-3	4-9
DWDM Capacity Expansion Features	
Table 4-4	4-11
Means for Carriers to Integrate the Diverse Technologies	
Table 4-5	4-15
Systems Approach To DWDM	

DWDM COMPANY PROFILES

Table 5-1	5-14
Alcatel Metro DWDM Positioning	
Table 5-2	5-16
Alcatel Terrestrial Optical Networking Strategy	

Table 5-3	5-17
Alcatel Submarine Optical Networking Strategy	
Table 5-4	5-31
ECI Telecom Products	
Table 5-5	5-43
HP Ecosystem Of Compatible Blade Server Products	
Table 5-6	5-56
Business Forces Driving Change	
Table 5-7	5-58
Lucent Broadband Access Solutions	
Table 5-8	5-58
Lucent Broadband Digital Loop Carrier Positioning	
Table 5-9	5-60
Lucent AnyMedia Access System Family of Products	
Table 5-10	5-83
Nortel Product Development	
Table 5-11	5-85
Nortel Optical Networks DWDM Competitive Issues	

ABOUT THE COMPANY

WINTERGREEN RESEARCH, FOUNDED IN 1985, PROVIDES STRATEGIC MARKET ASSESSMENTS IN TELECOMMUNICATIONS, COMMUNICATIONS EQUIPMENT, HEALTH CARE, AND ADVANCED COMPUTER TECHNOLOGY. INDUSTRY REPORTS FOCUS ON OPPORTUNITIES THAT WILL EXPAND EXISTING MARKETS OR DEVELOP MAJOR NEW MARKETS. THE REPORTS ASSESS NEW PRODUCT AND SERVICE POSITIONING STRATEGIES, NEW AND EVOLVING TECHNOLOGIES, AND TECHNOLOGICAL IMPACT ON PRODUCTS, SERVICES, AND MARKETS. MARKET SHARES ARE PROVIDED. LEADING MARKET PARTICIPANTS ARE PROFILED, AND THEIR MARKETING STRATEGIES, ACQUISITIONS, AND STRATEGIC ALLIANCES ARE DISCUSSED. THE PRINCIPALS OF WINTERGREEN RESEARCH HAVE BEEN INVOLVED IN ANALYSIS AND FORECASTING OF INTERNATIONAL BUSINESS OPPORTUNITIES IN TELECOMMUNICATIONS AND ADVANCED COMPUTER TECHNOLOGY MARKETS FOR OVER 30 YEARS.

ABOUT THE PRINCIPAL AUTHORS

ELLEN T. CURTISS, TECHNICAL DIRECTOR, CO-FOUNDER OF WINTERGREEN RESEARCH, CONDUCTS STRATEGIC AND MARKET ASSESSMENTS IN TECHNOLOGY-BASED INDUSTRIES. PREVIOUSLY SHE WAS A MEMBER OF THE STAFF OF ARTHUR D. LITTLE, INC., FOR 23 YEARS, MOST RECENTLY AS VICE PRESIDENT OF ARTHUR D. LITTLE DECISION RESOURCES, SPECIALIZING IN STRATEGIC PLANNING AND MARKET DEVELOPMENT SERVICES. SHE IS A GRADUATE OF BOSTON UNIVERSITY AND THE PROGRAM FOR MANAGEMENT DEVELOPMENT AT HARVARD GRADUATE SCHOOL OF BUSINESS ADMINISTRATION. SHE IS THE AUTHOR OF RECENT STUDIES ON WORLDWIDE TELECOMMUNICATIONS MARKETS, THE TOP TEN INTERNET EQUIPMENT COMPANIES, THE TOP TEN CONTRACT MANUFACTURING COMPANIES, AND THE TOP TEN TELECOMMUNICATIONS MARKET ANALYSIS AND FORECASTS.

SUSAN EUSTIS, PRESIDENT, CO-FOUNDER OF WINTERGREEN RESEARCH, HAS DONE RESEARCH IN COMMUNICATIONS AND COMPUTER MARKETS AND APPLICATIONS. SHE HOLDS SEVERAL PATENTS IN MICROCOMPUTING AND PARALLEL PROCESSING. SHE HAS THE ORIGINAL PATENTS IN ELECTRONIC VOTING MACHINES. SHE HAS NEW PATENT APPLICATIONS IN FORMAT VARYING, MULTIPROCESSING, AND ELECTRONIC VOTING. SHE IS THE AUTHOR OF RECENT STUDIES OF THE REGIONAL BELL OPERATING COMPANIES' MARKETING STRATEGIES, INTERNET EQUIPMENT, BIOMETRICS, A STUDY OF INTERNET EQUIPMENT, WORLDWIDE TELECOMMUNICATIONS EQUIPMENT, TOP TEN TELECOMMUNICATIONS, DIGITAL LOOP CARRIER, WEB HOSTING, WEB SERVICES, AND APPLICATION INTEGRATION MARKETS. MS. EUSTIS IS A GRADUATE OF BARNARD COLLEGE.

WINTERGREEN RESEARCH, INC.

ORDER FORM

Return To: WinterGreen Research, Inc.
6 Raymond Street
Lexington, MA 02421 USA
Phone: (781) 863-5078 --- Fax: (781) 863-1235 or (781) 860-0897

PLEASE ENTER MY ORDER FOR:

DWDM Market Opportunities, Strategies,
and Forecasts 2003-2008

-ALL REPORTS ARE AVAILABLE IN EITHER PRINT OR PDF-
_____ **PDF** _____ **PRINT**

_____ ENCLOSED IS MY CHECK FOR \$2,800 FOR SINGLE COPY, \$3,800 FOR WEB SITE POSTING

_____ PLEASE BILL MY COMPANY USING P.O. NUMBER _____

_____ PLEASE CHARGE MY MASTERCARD/VISA/AMERICAN EXPRESS _____

CARD NUMBER _____ EXP. DATE _____

If charging to a Credit card you may e-mail the order form, but not the card information

Fax or Call with credit card information - Do not send card number as e-mail - You may send the order as e-mail

_____ ADDITIONAL COPIES, @ \$375 (EXTRA COPY PRICE IN EFFECT ONLY WITH INITIAL ORDER)

NAME _____ TITLE _____

SIGNATURE _____

COMPANY _____ DIVISION _____

-

ADDRESS _____

CITY _____ STATE /

ZIP _____

TELEPHONE _____

FAX _____

EMAIL _____

PLEASE NOTE: RESIDENTS OF MASSACHUSETTS AND CONNECTICUT MUST INCLUDE APPROPRIATE SALES TAX

SUBSCRIBERS OUTSIDE THE UNITED STATES MUST PROVIDE PREPAYMENT IN U.S. FUNDS

REPORT # SH29821300 275 PAGES 76 TABLES AND FIGURES 2003 \$2,800