

NEW OPTICAL NETWORKING STRATEGY FOR THE SERVICE PROVIDER MARKET

by

Tony Louie
B.A., Simon Fraser University, 1990

PROJECT SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF

Master of Business Administration
EMBA Program

in the Faculty

of

Business Administration

©Tony Louie 2004
SIMON FRASER UNIVERSITY
August 2004

All rights reserved. This work may not be
reproduced in whole or in part, by photocopy
or other means, without permission of the author.

APPROVAL

Name: Tony Louie
Degree: Master of Business Administration
Title of Project: NEW OPTICAL NETWORKING STRATEGY FOR THE
SERVICE PROVIDER MARKET

Supervisory Committee:

Dr. Ed Bukszar
Senior Supervisor, Associate Professor
Faculty of Business Administration

Dr. Elicia Maine
Assistant Professor
Faculty of Business Administration

Date Approved:

August 10, 2004

SIMON FRASER UNIVERSITY



Partial Copyright Licence

The author, whose copyright is declared on the title page of this work, has granted to Simon Fraser University the right to lend this thesis, project or extended essay to users of the Simon Fraser University Library, and to make partial or single copies only for such users or in response to a request from the library of any other university, or other educational institution, on its own behalf or for one of its users.

The author has further agreed that permission for multiple copying of this work for scholarly purposes may be granted by either the author or the Dean of Graduate Studies.

It is understood that copying or publication of this work for financial gain shall not be allowed without the author's written permission.

The original Partial Copyright Licence attesting to these terms, and signed by this author, may be found in the original bound copy of this work, retained in the Simon Fraser University Archive.

Bennett Library
Simon Fraser University
Burnaby, BC, Canada

ABSTRACT

The Service Provider segment of the Information Technology market is starting to once again invest in new technologies and infrastructure. After the IT meltdown of 2000, the market dynamics have changed and manufacturers such as Cisco need to re-evaluate their strategies to address the new challenges faced by their service provider customers. After the bubble burst, both manufacturers and service providers experienced significant industry consolidation, bankruptcies and excess capacity. Business models and strategies need to address these new challenges.

Cisco has emerged from the IT meltdown significantly stronger than the competition. As such, the company is positioned to further separate itself from the pack. One of the areas that offer the greatest opportunity for Cisco is the metro and edge optical networks. This paper analyzes the competitive advantages of Cisco and how it can leverage these qualities to craft a strategy to enter this market in the Canadian service provider segment where it has been traditionally shut out.

Cisco needs to develop a new creative strategy to win the multiservice (MSPP) metro core and edge optical networks in TELUS' CLEC territory. The optical metro core and edge networks would be a natural extension for the incumbent long haul optical vendor. The success of Cisco's strategic shift to gain entry into this market requires it to evolve its present relationship with TELUS by leveraging its IP, Optical+IP, Ethernet and MSPP market leadership and by bundling its competitive advantages into a program to create greater success for TELUS in its CLEC territory of Central and Eastern Canada. By focusing on driving success for TELUS, Cisco needs to evolve its customer-vendor relationship with TELUS to one of partnership. The steps and strategy to accomplish this progression in their relationship are also discussed.

Overall, Cisco needs to leverage its competitive advantages to draw greater revenue contribution from lines of business outside its core strengths of routing and switching solutions to meet internal goals and the expectations of the financial community and stakeholders. For Cisco to earn market share and leadership in new technologies such as optical multiservice platforms, the company needs to capture the service provider market segment.

TABLE OF CONTENTS

Approval.....	ii
Abstract	iii
Table of Contents	iv
List of Tables.....	vii
List of Figures	viii
Glossary or List of Abbreviations and Acronyms	ix
1 Cisco OVERVIEW AND THE COMET OPTICAL SBU.....	1
1.1 Introduction	1
1.2 Analysis Scope	2
1.3 The Basics of Optical Networking.....	4
1.3.1 SONET and SDH Optical Transport Protocols	4
1.3.2 Resilient Packet Ring	5
1.3.3 Wavelength-Division Multiplexing.....	5
1.3.4 Dense Wavelength-Division Multiplexing.....	7
1.4 Cisco's Optical SBU.....	7
1.5 Cisco COMET Solutions for Optical Networking.....	8
1.5.1 Cisco COMET Optical Solutions	9
1.5.1.1 Long Haul and Extended Long Haul Product Set	9
1.5.1.2 Point of Presence Product Set	9
1.5.1.3 Metro Core and Metro Edge.....	10
1.5.1.4 POP, Metro Core and Edge Solutions Sets	10
1.5.1.5 Cisco Transport Manager (Network-Wide).....	11
1.6 Metro Optical and Multiservice.....	11
1.7 Market Characteristics and Challenges.....	13
2 Optical Equipment Industry Analysis.....	15
2.1.1.1 Nortel Networks	15
2.1.1.2 Alcatel	16
2.1.1.3 Lucent Technologies	17
2.2 Five Factor Analysis.....	17
2.2.1 Threat of Substitutes – Low	17
2.2.2 Threat of Entry - Low	18
2.2.3 Bargaining Power of Suppliers - Moderate	20
2.2.4 Bargaining Power of Customers – Moderate to High	20
2.2.5 Rivalry Among Existing Competitors – High.....	22
2.3 Overall Assessment of the Optical Transport Equipment Industry	22
3 Internal Analysis	25
3.1 Strategic Fit Analysis.....	25
3.1.1 Product Strategy (9 out of 10 – Innovative).....	25
3.1.2 R & D Expense (10 out of 10 – High R & D Investment)	26
3.1.3 Structure (8 out of 10- Decentralized).....	28
3.1.4 Decision Making (8 out of 10 – Autonomous)	29
3.1.5 Manufacturing (9 out of 10 - Economies of Scope / Flexible).....	30

3.1.6	Labour (8 out of 10 – Highly Skilled / Flexible).....	31
3.1.7	Marketing (7 out of 10 – High Cost / Pioneering / Pull).....	33
3.1.8	Risk Profile (8 out of 10 – High Risk)	34
3.1.9	Capital Structure (9 out of 10 – Conservative).....	36
3.2	Strategic Fit Analysis Conclusions	36
3.3	Cisco’s Value Chain	37
3.4	Primary Activities.....	38
3.4.1	Supply Chain Management	38
3.4.2	Acquisitions.....	41
3.4.3	Marketing & Sales.....	43
3.4.3.1	Marketing	43
3.4.4	Sales – Direct, Channel Partners and Distribution	44
3.4.4.1	Sales Tools	48
3.4.5	Post Sales Services	49
3.4.5.1	Technical Assistance Centre.....	49
3.4.5.2	Planning, Deployment, Integration & Operations (PDIO).....	50
3.5	Support Activities	50
3.6	Cisco’s Culture	52
3.6.1	Putting Everything on the Web	52
3.6.2	The Company Culture Badge.....	53
3.6.2.1	Quality Team.....	53
3.6.2.2	No Technology Religion	53
3.6.2.3	Stretch Goals/Continuous Improvement	54
3.6.2.4	Teamwork.....	55
3.6.2.5	Empowerment	56
3.6.2.6	Trust/Integrity/Giving Back	56
3.6.2.7	Drive Change.....	57
3.6.2.8	Profit Contribution	57
3.6.2.9	Market Transitions	57
3.6.2.10	Open Communication.....	57
3.6.2.11	Customer Success.....	57
3.7	Financial Analysis	58
4	Chapter 4: Issues.....	61
4.1	Market Challenges	61
4.1.1	Service Providers.....	61
4.1.2	Canadian Service Provider Market.....	66
4.2	TELUS.....	66
4.2.1	ILEC Territory	67
4.2.2	CLEC Territory	68
4.3	Affects on Cisco	68
4.4	Evolving the TELUS – Cisco Relationship	69
4.4.1	Issue One: TELUS’ Perceptions of the Cisco COMET Solution Portfolio.....	73
4.4.2	Issue Two: TELUS’ Ability to Execute	74
4.4.3	Issue Three: TELUS / Cisco Relationship	75
5	Chapter Five: Recommendations	77
5.1	Cisco’s Vision for TELUS’ CLEC Network Evolution	77
5.2	Strategic Shift	80
5.2.1	Sharing the Risk	80
5.2.1.1	Hybrid Network Utility Pricing Model	80

5.2.1.2	Cisco's Advanced Services	81
5.2.1.3	Marketing Program Investment.....	83
5.2.1.4	Cisco's Enterprise Sales Operations (ESO)	83
5.3	Impacts to Cisco	84
5.4	Summary.....	85
Bibliography	89

LIST OF TABLES

Table 1 Financial Summary Comparison.....60

LIST OF FIGURES

Figure 1 Multiservice Aggregation Over Fibre	6
Figure 2 Optical Equipment Service Categories	10
Figure 3 Five Factor Analysis of the Global Optical Networking Equipment Market	19
Figure 4 Cisco's Strategic Fit Analysis.....	27
Figure 5 Marketing Organization Structure	33
Figure 6 Cisco's Value Chain	40
Figure 7 Cisco Sales Organization Relationship Mapping.....	45
Figure 8 Cisco Product and Service Fulfillment	45

GLOSSARY OR LIST OF ABBREVIATIONS AND ACRONYMS

ADM: Add/Drop Multiplexer. Digital multiplexing equipment that provides interfaces between different signals in a network

APS: Automatic Protection Switching. A method that allows transmission equipment to recover automatically from failures, such as a cut cable.

ATM: Asynchronous Transfer Mode. The international standard for cell relay in which multiple service types (such as voice, video, or data) are conveyed in fixed-length (53-byte) cells. Fixed-length cells allow cell processing to occur in hardware, thereby reducing transit delays. ATM is designed to take advantage of high-speed transmission media, such as E3, SONET, and T3.

BLSR: Bidirectional Line Switched Rings

CLEC: Competitive Local Exchange Carrier

COMET: Complete Optical Multiservice Edge & Transport

DS1: Digital Signal Level 1. Framing specification used in transmitting digital signals at 1.544-Mbps on a T1 facility (in the United States) or at 2.108-Mbps on an E1 facility (in Europe).

DS3: digital signal level 3. Framing specification used for transmitting digital signals at 44.736 Mbps on a T3 facility

DWDM: Dense Wavelength Division Multiplexing. Optical transmission of multiple signals over closely spaced wavelengths in the 1550 nm region (Wavelength spacings are usually 100 GHz or 200 GHz, which corresponds to 0.8 nm or 1.6 nm.).

ESCON: Enterprise System Connection. IBM channel architecture that specifies a pair of fibre-optic cables, with either LED's or lasers as transmitters, and a signalling rate of 200 Mbps

Ethernet: Baseband LAN specification invented by Xerox Corporation and developed jointly by Xerox, Intel, and Digital Equipment Corporation. Ethernet networks use CSMA/CD and run over a variety of cable types at 10 Mbps. Ethernet is similar to the IEEE 802.3 series of standards

FICON: fibre connectivity. FICON channels provide 100-Mbps bi-directional link rates at unrepeated distances of up to 20 km over fibre optic cables (compared with ESCON channels that support 17-Mbps link rates at maximum unrepeated distances of up to 3 km).

Gigabit Ethernet: Standard for a high-speed Ethernet, approved by the IEEE (Institute of Electrical and Electronics Engineers) 802.3z standards committee in 1996.

ILEC: Incumbent Local Exchange Carrier

IP: Internet Protocol

MSPP: Multiservice Provisioning Platforms

MSSP: Multiservice Switching Platform

OC-n: SONET optical carrier, Level n (such as n = 3, 12, 48, 192).

RPR: Resilient Packet Ring

SDH: Synchronous Digital Hierarchy. European standard that defines a set of rate and format standards that are transmitted using optical signals over fibre. SDH is similar to SONET, with a basic SDH rate of 155.52 Mbps, designated as STM-1.

SONET: Synchronous Optical Network. A standard format for transporting a wide range of digital telecommunications services over optical fibre. SONET is characterized by standard line rates, optical interfaces, and signal formats.

STM-n: Synchronous Transport Module level n. One of a number of SDH formats that specifies the frame structure for the 155.52-Mbps lines used to carry ATM cells.

STS: Synchronous Transport Signal: the frame format used by SONET

TDM: Time-Division Multiplexing. Technique in which information from multiple channels can be allocated bandwidth on a single wire based on preassigned time slots. Bandwidth is allocated to each channel regardless of whether the station has data to transmit. TDM usually refers to voice traffic.

UPSR: Unidirectional Path Switched Rings

VT-n: Virtual Tributary level n. SONET format for mapping a lower-rate signal into a SONET payload. For example, VT-1.5 is used to transport a DS-1 signal

WDM: Wave Division Multiplexing.

1 CISCO OVERVIEW AND THE COMET OPTICAL SBU

1.1 Introduction

Since 1984, when a group of Stanford computer engineers founded Cisco Systems, its engineers have been responsible for many of the advancements and continued development of IP- the basic language to communicate over the Internet and in private networks. Cisco Systems Inc. is now the worldwide leader in networking for the Internet. Cisco's Internet Protocol-based (IP) networking solutions are the foundation of the Internet and most corporate, education, and government networks around the world. The company's tradition of innovation continues today with Cisco creating leading products and key technologies that will make internetworking and the Internet more useful and dynamic in the years ahead. These technologies include: advanced routing and switching, voice and video over IP, optical networking, wireless, storage networking, security, broadband, and content networking. Along with these product solutions, Cisco also provides consulting, professional and maintenance services.

In addition to technology and product leadership, Cisco has been a pioneer in using the Internet to provide customer support, sell products, offer training, and manage finances within its own business. Drawing upon the company's own experiences, processes and customer focus, Cisco has established the Internet Business Solutions Group (IBSG) dedicated to helping top business leaders transform their own businesses into e-businesses. Also, to help bolster education around the world, the company has founded Cisco Networking Academies in 128 countries dedicated to teaching students to design, build, and maintain computer networks.

The various technology groups within Cisco are segmented into Strategic Business Units (SBU). Each SBU is responsible for the research and development, technical marketing and associated costs for their respective technologies. Cisco is best known for its routing and switching products. But other SBU's are gaining exposure and greater strategic value for Cisco. Although it is expected that the routing and switching markets will continue to grow, Cisco must leverage its leadership in those markets to capture more business in related technologies.

The Optical SBU was established in 1999. In that year, Cisco acquired Cerent of Petaluma, CA, Monterey of Richardson, TX, Pirelli Optical Systems from Italy, and Qeyton Systems from Sweden. These acquisitions allowed Cisco to compete successfully in the optical transport market. Cisco introduced its IP+Optical strategy in 2000 promoting the use of the high capacity of optics with the intelligence of IP as a smarter, more efficient and cost effective way for service providers to deliver services. This strategy was in stark contrast to pure optical competitors and highlighted Cisco's IP expertise as a foundation for entering the optical market.

1.2 Analysis Scope

This analysis focuses on the new strategy Cisco plans to implement to address the Metro Optical Networking Equipment market in Canada; specifically, as to how to best position Cisco's Metro Optical solutions for TELUS in its CLEC territories of Central and Eastern Canada. Should this new strategic direction prove successful, the model can be replicated for other service providers entering into new markets, such as Bell Canada's expansion into Western Canada and Shaw and Roger's entry into the voice market, as well as for other theatres that face similar challenges.

This document presents Cisco's strategy for a Multiservice network for TELUS' CLEC operations in Ontario and Quebec where both fibre and copper facilities are not as readily available as they are in its ILEC territories. The solution is designed to be cost effective and thus allows TELUS to preserve its investment in existing metro service and optical delivery technologies. Central to the new strategy will be Cisco's investment into TELUS. The proposed solution will follow a network utility model where Cisco will only bill TELUS for the equipment as customers are added to the new network on a per port basis. In addition, Cisco resources will be collocated within TELUS to assist in the implementation and operations of the optical equipment for one year or longer if necessary. This is a radical departure from Cisco's usual vendor-customer relationship with TELUS and in general with other customers.

The analysis is structured to first provide a high level technology overview of optical networking and to map how Cisco's COMET portfolio addresses the end to end requirements of the market. The focus of the product descriptions is the ONS 15454 which is the heart of Cisco's multiservice platform and the key product solution for the opportunity at TELUS. Rounding out the chapter is a description of the current market challenges and characteristics. After establishing a market and Cisco specific product baseline, chapter two contains a five factor analysis¹ of the optical networking equipment industry. The areas covered include: threat of substitutes; threat of entry; rivalry among existing firms and the bargaining power of suppliers and customers. The challenges and opportunities identified in this chapter are later incorporated into the issues discussed in later chapters. The chapter concludes with a discussion of the attractiveness and potential this market represents for Cisco.

¹ Michael E. Porter, *Competitive Strategy*. (New York: The Free Press, 1980).

and provides Cisco with an end to end presence within all of TELUS' service networks. Positioning Cisco equipment in all of TELUS' key networks will provide a stronger base to evolve the Cisco-TELUS relationship. Furthermore, Cisco will be in a better position to defend its existing presence, once entrenched, against the aggressive tactic of companies such as Juniper which has tried repeatedly to displace Cisco at TELUS and other service providers. This analysis also forms the foundation for several other documents such as the executive proposal to TELUS and the internal business case study to justify the new strategy.

1.3 The Basics of Optical Networking

Originally designed for service provider voice networks, optical networking technology is rapidly expanding to business end users. Large enterprises now consider it the transport medium of choice for mission-critical networks, including those used for storage, data centres, campus, and metropolitan area networking, and demanding applications that require low latency and high bandwidth, such as videoconferencing. More and more service providers are now looking to offer these services.

Optical networking uses thin glass or plastic optical fibre to transmit information in the form of light pulses. These infrared light pulses are created by lasers or LED's at one end of the fibre. It is far more reliable and offers greater transmission capacity than conventional copper-wire networks. Optical networks are found in a variety of areas. They are used to connect the Central Offices (CO) or Points of Presence (PoP) for service providers; connect two office buildings in a city; connect offices between two cities; etc. Fibre optic networks allow a vast amount of data to be transferred quickly and efficiently. Most fibre optic networks are passive in the sense that they allow a variety of traffic to transverse the network such as IP and TDM. Modern optical networks allow customers to place multiple services into a single fibre strand or lambda (λ). This aggregation or multiservice technique requires only one fibre optic link to carry voice, data and video between locations.

1.3.1 SONET and SDH Optical Transport Protocols

The most common optical transport protocol standards used are SONET and SDH. These protocols define the speeds, framing, and recovery schemes for optical transport throughout the world. SONET technology is most commonly found in North America, and SDH is prevalent outside of North America. Created for service provider equipment, SONET and SDH meet the needs of traditional voice traffic, where all traffic is high-priority and traffic patterns are generally

predictable. Other optical protocols are used, most notably in the enterprise environment, including Fibre Channel, FICON, ESCON, and other storage and mainframe transport protocols designed specifically for optical transmission.

1.3.2 Resilient Packet Ring

Because they were designed for the characteristics of voice traffic, SONET and SDH are limited in their ability to efficiently carry "bursty" data traffic. Voice traffic typically has consistent, well-characterized usage patterns, but data traffic "bursts" as large files are transferred. To overcome these limitations, industry groups are proposing a new protocol for optical transmission called Resilient Packet Ring (RPR). Taking advantage of the multiple priorities of data traffic, RPR creates shared bandwidth, which can be oversubscribed to promote network efficiency. Unlike point-to-point voice traffic, data traffic is characterized by the predominance of point-to-multipoint and multipoint-to-multipoint transmission, which RPR efficiently handles. RPR runs on top of SONET and SDH, enabling the efficient transport of data traffic on service provider networks.

1.3.3 Wavelength-Division Multiplexing

Wavelength-division multiplexing (WDM) is the ability to transmit multiple independent optical signals over a single fibre, allowing it to act like multiple fibres. In some ways, WDM is similar to a common radio. WDM and radio both transmit at specific frequencies and both use finely tuned receivers (filters) to pick up only the intended signal. In optical networking, the transmission source is a laser, or lasers (WDM), and the transmission medium is the optical fibre. On the other end of the fibre are multiple optical receivers that pick up only one optical frequency. Using WDM technology, an optical fibre can transmit numerous optical signals that are independent from one another.

Chapter three contains a detailed internal analysis of Cisco that discusses its structure, culture, practices and core competencies² the company has strived to achieve and how well these attributes create competitive advantages in line with a differentiation strategy. Within the analysis, Cisco's value chain is mapped out and dissected to evaluate the alignment of primary and supporting activities with the corporate strategy. The strategic fit analysis identifies the investments Cisco has made to follow its differentiation strategy while the value chain analysis highlights the practices of the company that creates its high performance environment. Central to the execution of Cisco's strategy is its business culture. The culture at Cisco is discussed in detail and is a key source of competitive advantage that has helped Cisco achieve its industry leading financial performance. These competitive advantages form the basis of the new strategy Cisco will follow to break into the Canadian service provider optical market; targeting the current opportunity at TELUS.

The final two chapters contain discussions regarding the optical networking equipment market dynamics; how they relate specifically to TELUS and how Cisco needs to evolve its relationships with service providers like TELUS to successfully compete and lead in this market. Chapter four incorporates the challenges identified earlier in the industry analysis and discusses the issues service providers are facing in today's market. The discussion centres on the current industry dynamics which have evolved over the last three years and created the need for service providers to leverage their relationships with companies like Cisco to meet these new challenges. This environment provides Cisco with an opportunity to transform its role from a technology provider to one of a business partner. This framework provides the structure that addresses the specific issues Cisco needs to overcome in its relationship with TELUS.

Chapter five concludes this paper with a detailed discussion of the recommendations to address the issues identified in the previous chapter and the industry challenges highlighted in chapter two. These recommendations leverage Cisco's competitive advantages to develop a strategy that will generate customer success and allow Cisco to effectively enter and capture the optical opportunity at TELUS. The new strategy could be deemed a "skunk works project" and the overall impact this new direction could have on Cisco's other service provider customers is also discussed.

The importance to the Cisco-TELUS account team to win the metro core and edge optical networks at TELUS is paramount to growing: Cisco's network footprint; overall revenue base;

² C.K. Prahalad, and Gary Hamel, "The Core Competence of the Corporation," Harvard Business Review, May-June (1990).

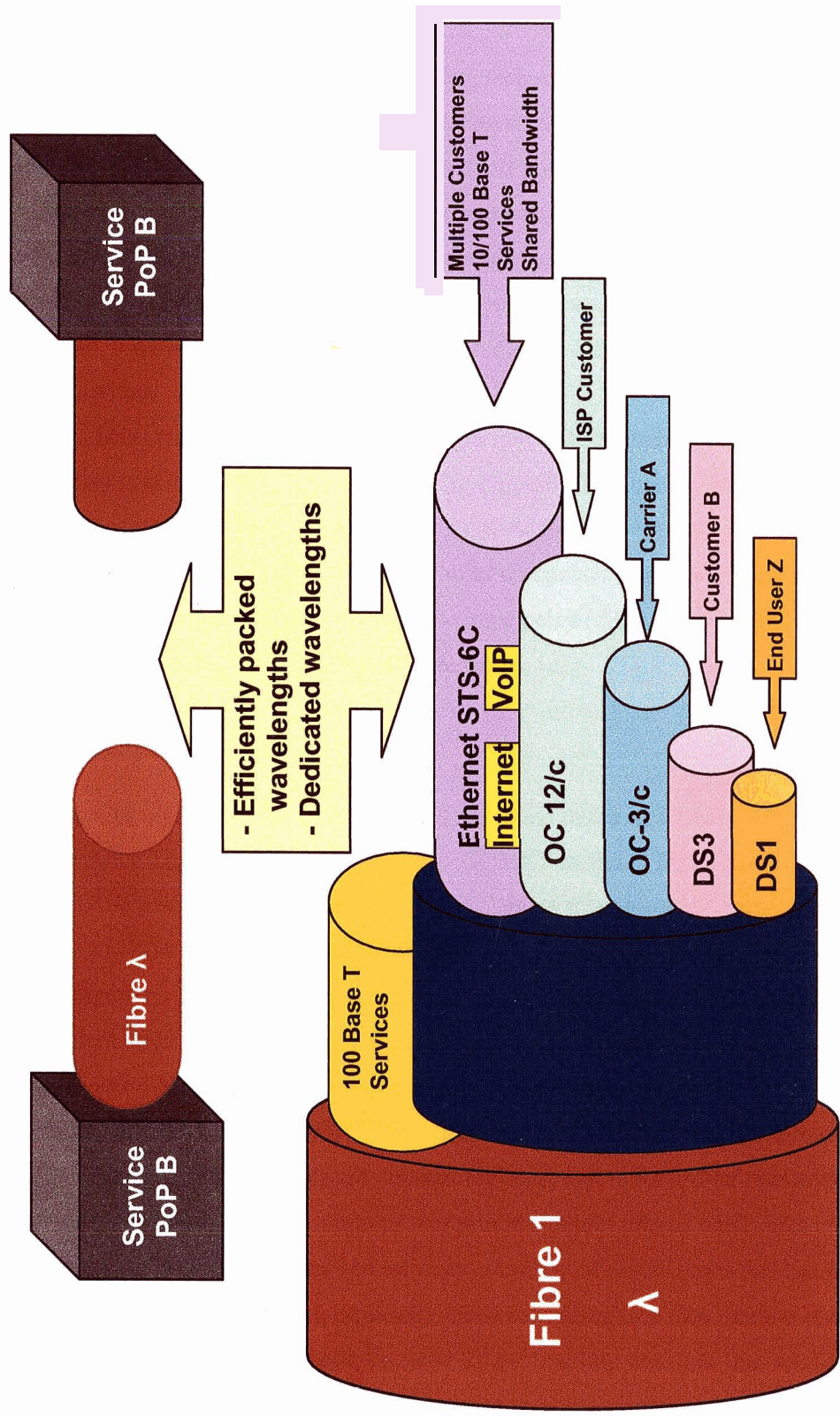


Figure Multiservice Over Fibre

1.3.4 Dense Wavelength-Division Multiplexing

Dense WDM or DWDM is a leading technology for extremely demanding networking solutions. The "density" refers to the closeness of the technology's signal frequencies to one another. DWDM platforms typically support all point-to-point and ring topologies, as well as a wide range of transmission distances. The technology can potentially transmit over hundreds or even thousands of kilometres using proper amplification and dispersion management techniques. Because DWDM is completely protocol-independent and transparent, it can carry any transport protocol, including SONET, SDH, storage protocols, data, video, and other types of transmissions.

Most metro DWDM platforms support up to 32 protected, or redundant, wavelengths, providing enormous density and scalability. Organizations can further increase density using service aggregation. Service aggregation supports multiple service types per wavelength for efficient transmission. This flexibility enables companies to efficiently maximize the carrying capacity of all of their wavelengths over a single pair of fibre, lowering the total cost of ownership and reducing equipment requirements.

1.4 Cisco's Optical SBU

Cisco's optical transport solutions are found under its COMET (Complete Optical Multiservice Edge & Transport) portfolio. COMET includes TDM, data and storage support, extensive topology capability and integrated element management. Target markets include service providers, cable companies and enterprise operations. The goal of the team is to help these segments evolve to a service transparent architecture - a network architecture that is not dependent upon nor limited to the types of services delivered on it. The idea is to make the optical network not only a carrier of traditional TDM traffic, but also a provider of various IP services, including voice over IP, video on demand, video conferencing, storage and security.

The growth and continued demand for faster and more resilient networks is forcing service providers to develop solutions that provide greater overall bandwidth capacity and flexibility for new applications and services. In many, if not all cases this has had to be done under a limited fibre footprint, especially when expanding into new markets and geographies. Given today's economic realities, the need for profitability demands that service providers increase the speed at which they deploy current and new services; maximize the utilization of existing capabilities; increase the variety of service offerings; and increase their capacity for services.

In metro edge networks, service providers and their enterprise customers need solutions that can cost-effectively bring wavelength and subwavelength services to edge access points in office buildings, campuses, and curb sides. Solutions for metro edge networks must be able to aggregate both data and telephony services in whatever configuration the network requires. Metro core networks require transport solutions that can support a variety of topologies, including linear, ring, and mesh. Scalable capacity must extend through the edge and metro core levels, and ultimately to service points of presence (PoP) and the long-haul network itself. Throughout the network, bandwidth must be utilized efficiently in all wavelengths to maximize service density.

1.5 Cisco COMET Solutions for Optical Networking

Scalable service provider platforms leverage fibre investment to achieve higher capacity, more varied services, and greater profitability. More than ever, today's evolving networks are driven by the demand for a wide array of high-bandwidth data services. Service providers must increase capacity and service offerings to meet customer requirements, but at the same time maintain their own profitability. Service providers need to lower capital and operating expenditures while they evolve their networks to a simplified architecture. In addition, service providers must accelerate time to market for the delivery of value-added services.

The Cisco Complete Optical Multiservice Edge and Transport (COMET) portfolio of optical solutions provides the foundation to deliver services to meet the demands of new bandwidth intensive applications. Cisco COMET brings together key innovations in IP, SONET/SDH, dense wavelength-division multiplexing (DWDM), Ethernet, and storage to create scalable, service-rich networks. Cisco COMET solutions enable enterprises and service providers to take advantage of fibre optic capabilities to provide much higher levels of service density that will lower the cost per bit delivered throughout the network, from the metro edge through the long-haul network. Cisco COMET solutions deliver profitability through:

1. Complete optical solution for all restoration techniques, topologies, and transmission requirements through end-to-end provisioning and management.
2. Multiservice delivery of all time division multiplexing (TDM) and non-TDM services to fully leverage density capabilities at the metro edge.
3. Edge support for all optical interfaces to optimize the providers' ability to offer the greatest number of service options in the provider edge.
4. Network capabilities that can scale from end to end that maximize service capacity.

1.5.1 Cisco COMET Optical Solutions

The Cisco COMET portfolio of products combines a range of technologies for optical networking that meets all these requirements. Cisco COMET technology innovations for the network include: multiservice provisioning platforms (MSPPs); a new generation of DWDM systems; and end-to-end provisioning across the optical infrastructure. The Optical portfolio can be divided into 4 areas: Long Haul; Service Point of Presence; Metro Core; and Metro Edge. Cisco's COMET portfolio includes product families that can either play distinctly in one of these four areas or can be used to cross over into several areas depending on the service providers' or enterprises' applications. All product solution sets support DWDM. POP and Metro Core and Edge devices support MSPP. These factors allow Cisco COMET customers to provision Layer 2 and 3 services on the COMET platform. A full complement of technology solutions would not be complete without a management platform to operate and monitor the network. Cisco's Transport Manager provides the necessary software for element management. Figure 1 depicts how the four optical market segments are related.

1.5.1.1 Long Haul and Extended Long Haul Product Set

The long-haul (up to 600 km between signal regenerations) and extended long-haul (up to 2000 km) products usually connect a service provider's Central Offices (CO) and/or Points of Presence (PoP). The key issues of concern for the SP include low cost per bit, reach and scalability. The Cisco product that fits into this category is the ONS 15808. The 15808 has protocol transparency so it is capable of interfacing with any equipment exporting SONET/SDH (and SONET/SDH compatible) interfaces up to 10 Gbps.

1.5.1.2 Point of Presence Product Set

Service points-of-presence (PoP's) groom traffic from the metro network and can perform edge and backbone switching. Service PoP's also act as hubs for Internet services (content, Domain Name Service, Virtual Private Networks, etc) as well as other applications deployed on a range IP routers.

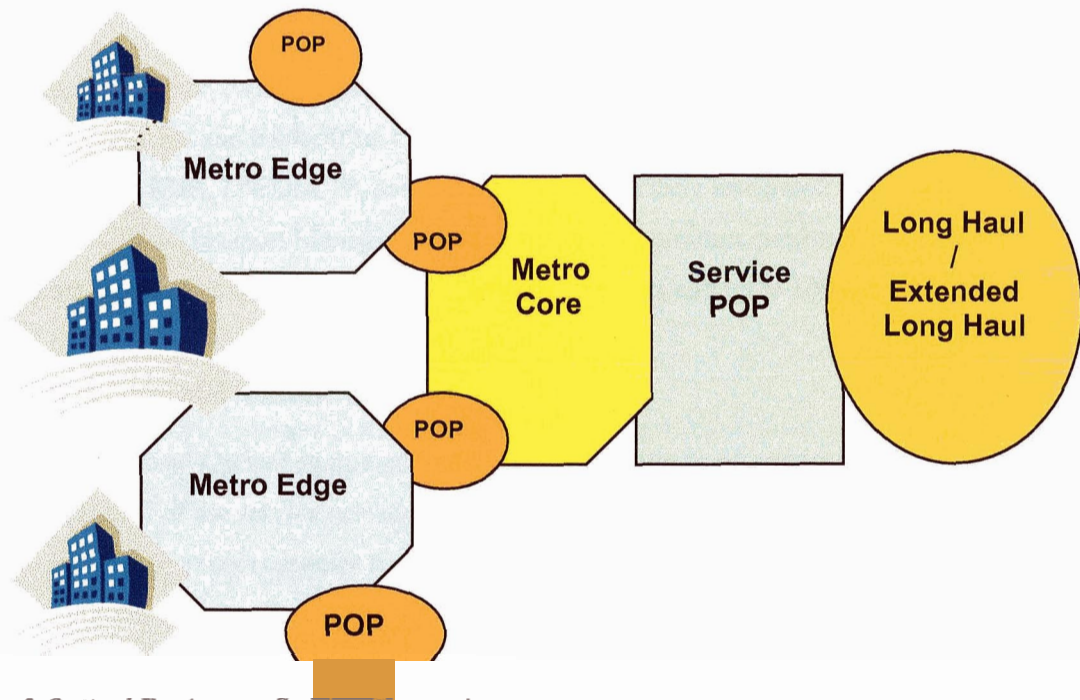


Figure 2 Optical Equipment Service Categories

1.5.1.3 Metro Core and Metro Edge

Metro core rings interconnect edge rings and deliver traffic to service points of presence (PoP's). The key technology and business drivers in this market are capacity, aggregation, and reliability. The biggest challenge to SP's is leveraging as much of the existing fibre infrastructure to increase capacity and efficiency while facilitating the creation and variety of present and planned services. The Metro edge delivers service and acts as an aggregation point.

1.5.1.4 POP, Metro Core and Edge Solutions Sets

The product families that address these 3 areas can be interchanged depending on the application and architecture. The Cisco product families include: 152XX, 153XX, 154XX, 155XX and 156XX. Each product family has size, capacity and functionality specifications that would need to be considered in designing the solution. The focus of the solution for TELUS, and also represents the greatest overall opportunity for Cisco globally is the 15454. The 15454 is discussed in greater detail in the Metro Optical section of this paper.

1.5.1.5 Cisco Transport Manager (Network-Wide)

Cisco Transport Manager (CTM) delivers the full power of Cisco ONS 15000 Series products to operations and back-office systems for their service provider customers. CTM supports SONET, SDH, DWDM, IP, and Ethernet making it truly integrated and technology independent. Cisco Transport Manager provides fault, configuration, performance, and security management capabilities on more than 1000 network elements and up to 100 simultaneous users.

1.6 Metro Optical and Multiservice

The long haul Optical equipment market provides little or no opportunity for Cisco in Canada since most of the service providers have completed their national transport network builds or are leasing excess capacity from others. The Metro Optical market, however, represents significant opportunity for Cisco. The global optical market is estimated to be \$6 Billion US annually, with Metro Optical Equipment accounting for a significant share of that market. Metro optical also represents the largest growth area for the industry. The market leaders in the overall optical transport space are Nortel Networks, Alcatel, Lucent and NEC – Cisco ranks about 6th behind Siemens and Marconi. However in the MSPP and Metro markets Cisco ranks 1st in both. Total revenue from Cisco's optical products totalled about \$400 Million US in 2003.

The optimism for the MSPP and Metro Optical markets stem from the limited amount of local facilities and the high cost to build those capabilities that are driving CLEC's to consider the advantages of multiservice architectures. One of the key design principles behind Cisco's vision for TELUS' Multiservice network is network element consolidation. Too often multiple devices are deployed resulting in increased CAPEX and OPEX costs. The architecture in the TELUS solution uses best in class MultiService Provisioning Platform, the ONS 15454.

The ONS 15454 MSSP is a true multiservice switching platform. In addition to having interfaces such as OC-48/STM-16 and OC-192/STM-64 for the high bandwidth metro aggregation, the MSSP also needs to eventually have interfaces for Ethernet and integrated DWDM as well. This multiservice functionality allows service providers to support current TDM services and carry the benefits of next generation services, such as Ethernet into the central office while still utilizing their existing SONET or SDH infrastructure. The multiservice functionality also gives the ONS 15454 MSSP tighter integration with metro core and long haul network, allowing the service provider to carry the strengths and benefits of the ONS 15454 MSSP from one edge of the optical network through the metro core and out to other edge points.

In addition to data switching capabilities, the MSSP must be able to leverage integrated DWDM functionality. Integrated DWDM allows the service provider to accomplish more in a single switching platform by mitigating the need to purchase another adjunct transponder to place traffic onto the DWDM infrastructure. By offering integrated DWDM, Ethernet, and STS/STM switching capabilities in a single switching platform, a service provider will be able to place the MSSP in the central office and use it not only for today's STS/STM switching and inter-office transport demands but also to generate additional high margin services as they are requested.

The Cisco ONS 15454 aggregates and efficiently concentrates data, voice, and video services for optimal transport across metro networks. Any service, including TDM, IP, ATM, and video, is easily handled in any of the Cisco ONS 15454's multiple general-purpose card slots. Various data streams can be carried separately or together and can be transported in a one-for-one dedicated bandwidth mode or in a concentrated mode with no limit on the oversubscription ratio. The ONS 15454 also supports packet and cell switching, providing provisionable data bandwidths and selectable bandwidth sharing - both dedicated - low latency networking and shared-maximum backbone bandwidth utilization, along with simple virtual LAN (VLAN) and packet priority provisioning.

Most of the COMET product line commands a 10-30% price premium over Cisco's competitors. Cisco's innovation and first to market strategy in the metro optical market creates differentiation from its competitors. Cisco COMET technology innovations include:

- Invented Multiservice platform (MSxP) category. These products revolutionize the SONET/SDH market segment with the widest range of service and transport interface types available in a single platform.
- First in industry to provide OC-3 to OC-192 interface support from single platform (15454).
- First in industry to support all optical topologies- UPSR, BLSR, mesh, linear, APS (15454).
- Invented Path protected Mesh Network Topology (PPMN).
- First in industry to provide 2 GB FC aggregation capabilities (155xx series).
- First MSPP to provide layer 2 and layer 3 switching (ML series Card)
- Most complete end-to-end product line provisioning capability - reducing provisioning time from days to minutes (Cisco Transport Manager - CTM).
- Estimated 44% market share in North America for MSPP

- Industry reach - Cisco optical has 1,000+ customers, including 200+ Enterprises deploying Cisco COMET solutions. Over 40,000 ONS 15454 systems shipped/in-service.

Differentiation is also created from competitors who provide only ADM-centric, low performance, hard-to-provision, point-product solutions. Cisco provides a complete, integrated, multiservice optical portfolio for campus, Metro Edge, Core, and Long Haul/Extended Long Haul networks. Additionally, unlike competitors who sell only point optical products, Cisco provides an entire portfolio of optical, voice, storage, switching and routing solutions that address the business, technology and service challenges that must be overcome across an entire network infrastructure.

1.7 Market Characteristics and Challenges

As data applications and requirements have become more sophisticated so have customers. The knowledge level within the SP market has traditionally been high. After years of rapid network builds by SP's they are now looking to earn the returns on their networks that have not yet materialized – their old mentality of “build it and they will come” is no longer, or perhaps was ever, valid. Bandwidth capacity is a commodity. Service providers need to develop differentiated and profitable services as opposed to just offering connectivity. Additionally, SP's are looking to better maximize their investment of existing equipment and optimize the efficiency of their operations. The traditional large service providers who survived the onslaught of new upstarts SP's are not as interested in bleeding edge technologies. Technology decisions are more based on business cases and strong ROI models as opposed to being first to market with the new cool service or technology.

The challenges of running a multivendor converged network have also become more pertinent in the SP market. Architectural and operational issues are affecting the SP's ability to quickly develop and provision services, leading to challenges for SP's to manage their customers' expectations and thus deliver satisfactory customer service. Furthermore, the greater number of vendor solutions and devices within the network add complexity to the design and ongoing operations. All of these factors have significant negative impacts for the service provider. Although a service provider may gain a temporary competitive advantage through the implementation of leading edge or next generation solutions, if that service provider cannot effectively manage the integration, operations and growth of the network, any potential benefits it hoped to gain will be lost and it would more than likely lose customers, creditability and brand

equity. Adding to the challenges the SP's face include the market demanding service providers to offer Service Level Agreements (SLA's) that carry significant financial penalties. The challenges in this market present interesting opportunities for Cisco to develop creative strategies to address the concerns of the service providers.

2 OPTICAL EQUIPMENT INDUSTRY ANALYSIS

The overall optical transport equipment industry is estimated to be \$6.1 Billion US and growing. The Metro Optical market is estimated to account for over 30% of annual optical transport sales and also represents the greatest area of growth. The continued strong performance of this product category masks the overall decline in long haul optical products since many service providers have already completed their long haul optical networks builds and are concentrating on the development of services. Additionally, enterprise customers are looking to metro optical solutions for their new data intensive requirements while government municipalities and utilities are also leveraging the advances in metro optical equipment to wire their own networks.

Customers and vendors are located throughout the world. The greatest concentration of customers is in North America, Europe and Asia. Each geography has key competitors. For example Lucent is very strong in the US but weaker in Canada and the rest of the world; Marconi is very strong in Europe but almost nonexistent in North America; and Huawei was almost exclusively sold in China until recently. Cisco sees its primary global competition to be: Nortel Networks, Alcatel, Lucent, Fujitsu, Ciena, Huawei and Marconi. In North America Cisco competes regularly with Nortel, Lucent, Fujitsu and Ciena. In the Canadian marketplace, Nortel is by far the dominant player. Both Lucent and Alcatel compete in Canada but neither company has gained much traction in the optical market. Other secondary point product competitors have not been a threat in the Canadian SP optical transport market.

The credibility of the existing competitors in the SP market was earned from each company's reputation, expertise, market position and financial and technical ability to fulfil on new features and products. These attributes have usually been adequate to quell any perceived advantages secondary point product competitors may have represented to the Service Provider market where a complete end to end product portfolio is required to be taken seriously. This may not be the case in the enterprise market where networks are generally less complex and much smaller.

2.1.1.1 Nortel Networks

Nortel Networks is the dominant optical transport vendor in Canada. Nortel is the incumbent vendor in all Canadian ILEC territories and has effectively shut out other vendors at TELUS and Bell as they have expanded their respective territories. Nortel also has a strong reputation and senior executive relationships with the executive management team at both

TELUS and Bell and effectively positions itself as a Canadian company when appropriate.

Nortel's overall strengths include:

- Broad customer base.
- Global optical portfolio and end to end solution.
- Incumbent in ILEC, RBOC and PTT around the world.
- The positioning of their version of RPR on their multi-service transport platform (SDH/SONET) – integration with their existing product sets.
- Reputable carrier vendor.
- Optical network expertise and highly reliable products.
- Thorough portfolio.
- Network management.

Nortel Networks is a formidable competitor in the optical transport market for Cisco. Cisco usually beats Nortel in the enterprise space and has made strong progress with service providers globally. Cisco has concentrated its efforts in working within the established Nortel optical footprint that already exists in the networks of many of Cisco's customers. Cisco's flanking strategy has focused on MSPP advantages that the COMET line has over Nortel's solutions in feature sets, scalability and density. Nortel has traditionally protected and won the long haul market but has not successfully gained traction in the multiservice market in the Metro Core and Edge. As optical transport moves up the data stack to offer Layer 2 and 3 services such as VPN's and video on demand, Cisco gains advantage as it is viewed as the industry leader in this space where it can leverage its market recognized expertise in IP.

2.1.1.2 Alcatel

Alcatel is not a significant competitor in North America but has a large presence in Canada due to its purchase of Newbridge Networks in 2000 which instantly gave Alcatel a significant footprint in the data network with all the ILEC's in Canada. Service providers are not looking to add net new vendors into their networks without a very compelling business case since the ongoing operational costs associated with adding another vendor into their network is immense. Alcatel's presence as the ATM, and in many case as the DSL vendor, for almost all Canadian ILEC's allow it to be a threat for the optical transport network. Alcatel's strengths include:

- Broad customer base.
- Customized global solutions.

- A full line of solutions for the Internet.
- Strong local presence in each geography in which it serves.
- Complete SDH portfolio and common modules.
- Strong management system.
- Lower price.
- Extended SDH feature set.

Alcatel has a huge long haul optical install base in Europe but has had limited success in North America. Alcatel is still perceived as an unproven player in IP and its multiservice roadmaps are continually shifting. Cisco's advantages are the same versus Alcatel as with Nortel – Cisco's expertise in IP networking.

2.1.1.3 Lucent Technologies

Lucent's stronghold is in the US market but like Alcatel, Lucent is another vendor that has presence in the SP market in Canada and would naturally pose as a threat for the optical transport business. Lucent's strengths include:

- Massive installed base of equipments – data, IP, optical and voice in most US based SP networks.
- Bell Labs R&D capability.
- Multiple resources available for dedicated support.
- Marketing new optical line.

Lucent's new product line has been well received in US markets but it has no large accounts in Canada. Some customers have expressed concern that Lucent has not released any details about product consolidation or future product direction in detail giving the impression that it still lacks an integration strategy to bring together different products into an intelligent network solution.

2.2 Five Factor Analysis

2.2.1 Threat of Substitutes – Low

There really is no economical replacement for optical transport in a service provider's network. Additionally, the high bandwidth requirements for services such as Storage Area Networking (SAN), video and other applications are most effectively delivered via optical networks. Until such a time where information can travel faster than the speed of light over

another medium, or compression technologies advance to a stage where copper and wireless networks can compete with optical technology, no true substitutes are worth examining. Long haul optical will continue to dominate as the chosen technology for connecting networks and Points of Presence over great distances.

In the metro optical market, service providers and enterprise customers prefer to use optical technology versus copper or wireless since many applications require large amounts of bandwidth and optical technologies offer the flexibility to share facilities (fibre strands) cost effectively and enjoy much lower distortion than either copper or wireless mediums. Only in areas where fibre is not available or not economical to install would copper be a preferred alternative. Furthermore, wireless does not offer the bandwidth required for fat applications over any distances outside of an office floor. Thus the overall threat of substitutes is low.

2.2.2 Threat of Entry - Low

Although there is a certain amount of common technology among the optical platforms from the existing firms, there is still a significant degree of proprietary patented technology development that is required to enter and compete in the optical equipment market. The high R&D costs and steep learning curve associated with developing and supporting optical transport technology further raises the entry barrier. The possibility of a potential new entrant looking to just skim the higher growth Multiservice segment of the optical transport market would not be successful in the service provider market since its product solution set would be incomplete without aggregation or other complementary optical products and not provide the end to end functionality that most SP's would demand. The lack of a complete solution set that covers all aspects of optical transport would signal to customers a lack of commitment and resources on the part of the potential entrant. Most customers would not make a large capital investment into an unproven optical manufacturer.

Additionally, the position of the established companies coupled with their respective market share makes the possibility of retaliation high; price competition among the existing firms already escalates quickly on all large opportunities. The overall downward trend in the prices of most networking equipment along with the ever present threat of price retaliation from the incumbents does not offer much incentive for entry into this market.

Optical Transport Equipment Market

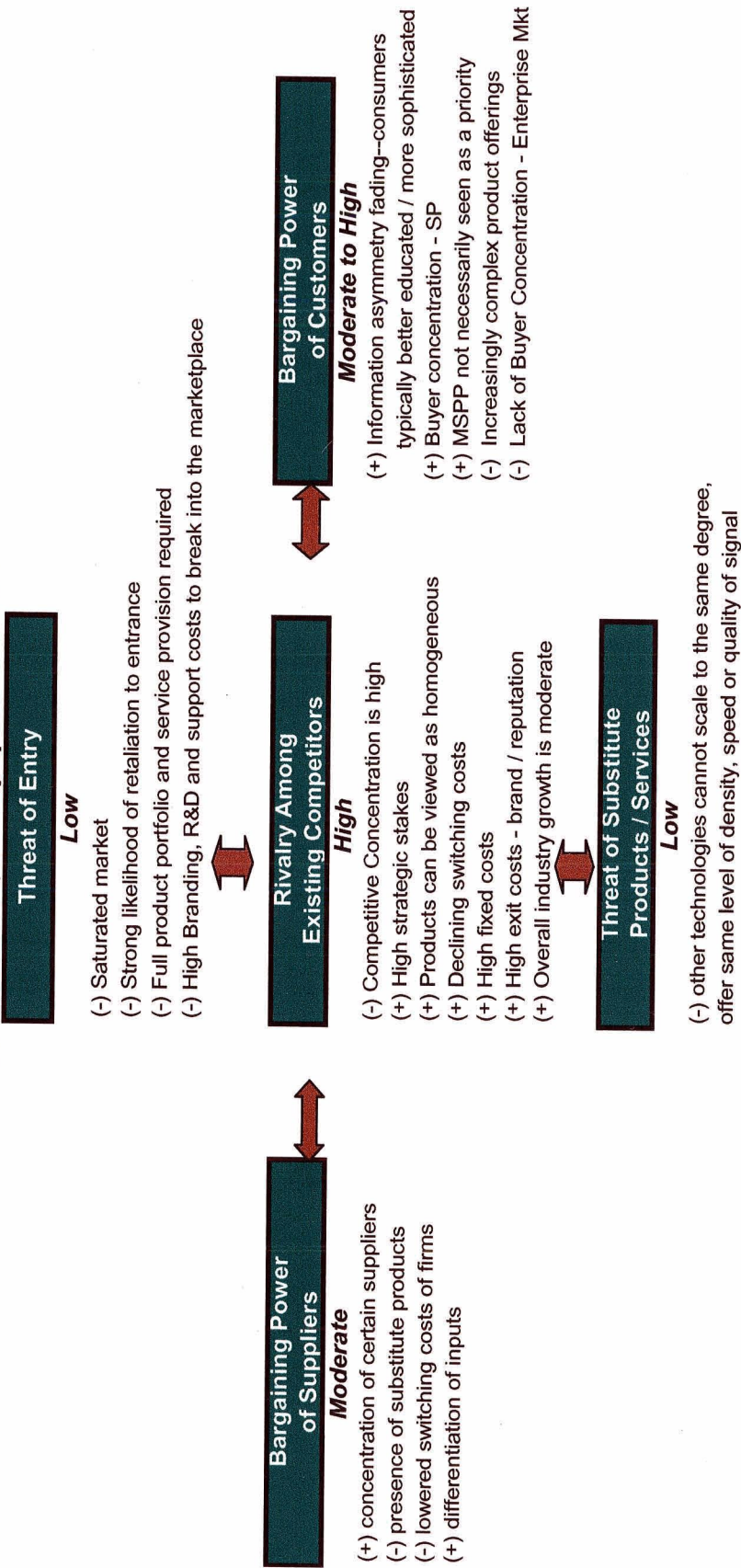


Figure 2 Five Factor Analysis of the Global Optical Networking Equipment Market³

³Adapted from: Michael E. Porter, Competitive Strategy. (New York: The Free Press, 1980)

2.2.3 Bargaining Power of Suppliers - Moderate

The bargaining power of suppliers is moderate. Manufacturers of optical transport equipment purchase common components from several suppliers. The consolidation of the component suppliers would ordinarily increase their negotiating power, however the asset specificity required to produce some of these components counteracts any potential bargaining leverage. Furthermore, low switching costs have resulted from the continued commoditization of the standard components required for the production of optical networking equipment which has further eroded the bargaining power of these suppliers.

Countering the bargaining power of manufacturers is the relative quality of the components. Certain suppliers are known to have higher quality products and command higher prices. The quality of the components can greatly affect the performance of optical networking equipment. The fault tolerance of optical end points is very low and requires a high level of precision. Assurances and proven track records for high quality products command higher prices and allow the suppliers to differentiate themselves. Components such as the laser and LED transmitters warrant premium price points.

The operating system software associated with these optical networking products is usually developed internally or obtained through acquisition. The most valuable and differentiable asset of these devices is the software that runs it. Thus component suppliers provide relatively common, homogenous inputs which provide them little bargaining power. Additionally, even if the component supplier has a strong reputation that it has earned from producing high quality components, the optical equipment manufacturers are not leveraging that supplier's brand equity (if it would even be known by the end user) in positioning the devices. Having Intel inside may be a selling feature for computers but individual component suppliers are not usually mentioned in the marketing collateral for optical equipment.

2.2.4 Bargaining Power of Customers – Moderate to High

The factors that have increased the bargaining power of customers include: more informed and sophisticated customers; concentration of buyers in the SP market and SP negotiation tactics. Service provider capital budgets have continued to shrink since the heady days of the tech bubble and along with them the requirement for long haul optical transport equipment. Additionally, the consolidation of service providers has formed powerful buying organizations for optical networking equipment. This concentration in the SP market has forced

prices of optical equipment downward. Furthermore, the negotiating tactics being employed by the SP's have placed additional downward pressure on prices.

As service providers build new PoP's and multiservice platforms, they are pressuring their incumbent long haul optical equipment vendors to deeply discount the metro core and edge optical components by threatening to go to other vendors. This is no empty threat since interoperability is supported among all optical equipment manufacturers. On the flip side, these same SP's are dangling the chance to win the metro core and edge business to competitive vendors since the metro optical build is the only opportunity to gain any optical business now that the long haul network build has been completed. It is not uncommon for SP's to use one vendor for the long haul network and another for the metro core and edge. This development has manifested itself due in part to the fact that long haul equipment suppliers have not invested heavily, until recently, into the development of multiservice platforms. Interoperability is not a huge technological hurdle and the management of the long haul network is relatively simple in comparison to the operations of a multiservice platform. Furthermore, different element management software would ordinarily be required regardless if the SP remained with the incumbent or not. These factors are well known to all the optical equipment vendors and provide an environment well suited for the SP's to play vendors off on one another to further lower prices.

Counteracting some of the power of the SP's is the added complexity of the multiservice platform. As mentioned, management of the long haul network is relatively straight forward when compared to the complexity of provisioning and operating the myriad of services at the metro core and edge. This fact shifts some negotiating leverage back to the manufacturer. Although at some level the SP can view optical transport as relatively homogenous, especially in the long haul segment, the metro core and edge networks are areas where the various firms can differentiate themselves. The factors that facilitate this include the features that enhance device functionality, service density, service variety and element management.

In the enterprise market, the opportunities are generally smaller, less complex and the price competition among the manufacturers is not as intense as in the SP market. Additionally, enterprise customers usually do not have the variety of equipment in their networks as SP's so they would lack the expertise and resources to consider any vendor's other than their incumbent data equipment provider. Furthermore the lack of buyer concentration within the enterprise market allows greater price discrimination for the optical equipment vendors.

2.2.5 Rivalry Among Existing Competitors – High

The optical transport equipment industry is fiercely competitive. The metro core and edge optical transport industry evolved from the long haul market segment which is characterized by relatively homogenous products where price wars dominated despite a limited number of firms competing in that space. The number of opportunities for long haul optical equipment was relatively few and once one firm won the contract all others were usually shut out.

The optical transport market is growing and Cisco's greatest area of opportunity lies in the metro optical core and edge market segments. The traditional long haul optical firms have recently invested heavily into new products that address the multiservice requirements of these markets to defend their established fibre optic network footprints. Often if the incumbent's next generation products are not ready for general deployment, the firm will offer work around solutions that leverage more expensive equipment at deeply discounted prices to block a potential competitor. The overall functionality of the older, although more expensive equipment, does not always meet the new requirements but can buy the incumbent enough time to produce the new equipment or at least develop a workable solution on the older platform. This same tactic is commonly used to deter SP's from introducing new optical equipment for the metro and edge networks since switching costs are low due to the interoperability with the competitor's equipment. The high costs to remain competitive through innovation and to continue to support their existing customers encourage firms to keep other manufacturers out of their optical base at all costs further intensifying the rivalry.

The potential damage to a firm's brand for exiting the market is high and provides ample ammunition for competitors to attack other areas of the network. Any technology losses to competitors within the SP multivendor converged production networks are significant since SP's are looking to streamline the number of vendors and elements in their networks to simplify operations and management of the network and gain operating efficiencies.

2.3 Overall Assessment of the Optical Transport Equipment Industry

The continued strong growth of high bandwidth applications, such as IP Video on Demand, IP TV, Storage Area Networking (SAN), etc., combined with the established and new yet to be created optical layer 2 and 3 service (Internet Access, VPN's, Transparent LAN) requirements of both business and consumer customers, are pushing service providers to consider optical multiservice platforms where fibre based services can be delivered cost effectively and efficiently to buildings, to offices and to the curb. This is especially true for CLEC's as they

expand their reach into territories where they face limited fibre and copper based infrastructures. Delivering services over fibre allows CLEC's to provide high value services over their own fibre facilities and to avoid the high access fees they would ordinarily pay to the ILEC.

As the demand for optical based services grow, traditional optical transport equipment manufacturers have had to move up the network stack to integrate the required layer 2 and 3 functionality. Optical solutions will have to move beyond transport and facilitate the provisioning of services. Firms, such as Cisco, with more experience in producing the equipment to deliver these types of services have already developed the MSPP abilities in its optical equipment ahead of many of the traditional long haul manufacturers.

This multibillion dollar market represents a huge potential area of growth for Cisco, as well as, an opportunity to displace the incumbent long haul equipment vendor as the supplier of choice for service providers who are building optical metro core and edge networks. As with most networking equipment market segments, the technical-features gap is closing among the various optical equipment manufacturers. Companies such as Cisco need to aggressively attack the service provider market to capture the optical metro and edge networks before incumbent long haul equipment manufacturers develop comparable feature sets.

Issues that the service provider will face include their ability to integrate another vendor's equipment into an established optical network footprint to facilitate MSxP platforms while providing a non-disruptive, profitable migration path for their legacy TDM applications, to efficiently operationalize and optimize the multiservice network and lower their total cost of ownership, to market and deliver new profitable differentiated services to consumers while cost effectively scaling their optical networks to meet their customers' demands. The service providers are also facing increasing competition. In Canada, Bell and TELUS are aggressively expanding into each other's territories and need to differentiate themselves by offering new services faster and a superior customer experience. Competition will also come from the cable companies who are starting to more aggressively enter the market to offer voice and data services to businesses. Additionally, these new services would be delivered over limited available fibre and copper infrastructures. For CLEC's their infrastructure constraints are even more pronounced than those of the ILEC's.

Since any feature superiority among the equipment suppliers can be eventually overcome, equipment suppliers need to also focus on the operational impacts their respective solutions will have on the service provider. The SP's ongoing operations, service migration and implementation challenges need to be examined. The skill sets required to effectively and efficiently operate and manage a MSPP optical network may not be readily available to the

service provider and equipment manufacturers need to provide complete end to end solutions that include project management for the equipment integration and best practices to operationalize the new equipment.

Another area that equipment manufactures also need to address is helping the service providers create and market new optical based services. The market may not care if their services are delivered via fibre or copper facilities. The marketing departments of the service provider need to develop marketing collateral and service offerings that will leverage the superior reliability, speed and variety of fibre based services. The services themselves and their associated advantages need to be easily understood by both the service providers' sales teams and their potential customers or the services will become commoditized and any opportunities to leverage these new services as a source of differentiation will be lost.

Overall, the optical equipment industry is growing and represents a good opportunity for manufacturers to expand their respective markets. The challenge for manufacturers will be in working with service providers to transform their traditional optical networks to multiservice platforms and in doing so create the marketing pull for the associated services.

3 INTERNAL ANALYSIS

Cisco has developed its competitive advantages through the execution of its differentiation strategy. The internal strengths at Cisco that map well into its strategic direction include:

- Innovative product strategy coupled with high R&D investment.
- Highly skilled and creative product and service development teams.
- Strong marketing / sales teams and channel partners with the skills to effectively communicate Cisco's value propositions and differentiating qualities.
- Strong brand recognition and a reputation for innovation and quality.

Cisco's differentiation strategy is further solidified in its company culture where the company structure is fairly flat and decision making is mostly autonomous. Furthermore, Cisco's strong balance sheet, financial performance and position allow it to make the investments and take on the risks to enhance its product breadth in existing markets and enter new ones.

Cisco's generic strategy is mapped in figure 4⁴. Cisco's core competencies and capacities will be examined as to how well each factor creates strategic fit for the firm. Additionally, Cisco's core competencies that create its competitive advantages and culture will be discussed.

3.1 Strategic Fit Analysis

3.1.1 *Product Strategy (9 out of 10 – Innovative)*

Continuous innovation is ingrained into the Cisco culture. Network architecture is evolving from best-of-breed point products, to end-to-end networks, to a network of networks to the Intelligent Information Network. The Intelligent Information Network is an architecture that enables the intelligent movement of data, voice and video across a system of networks. The products that Cisco develops and the markets it targets fall into areas where the company sees this evolution and builds upon its strengths. Cisco has also taken a systems lifecycle tactic as opposed to a stand alone product approach in addressing the market by offering solutions direct or via its partner ecosystem for product acquisition and services such as implementation, integration, optimization, and on going maintenance.

Cisco prides itself on its ability to produce innovative products. However, a significant portion of Cisco's intellectual capital was developed after the integration of an acquired

⁴ Adapted from Ed Bukszar, 2004 EMBA class notes

company. Cisco has purchased 81 companies in its twenty year history. One of Cisco's key core competencies is its ability to acquire companies and integrate their respective intellectual and human capital.

Acquisitions are a strategic product development and growth vehicle for Cisco, as well as, an efficient method to enter new markets as Cisco did in the optical equipment market. The Cisco culture is one that embraces acquisitions, with one in five of its employees having joined the company via an acquisition. This unique culture sets Cisco apart and has enabled it to successfully integrate new people, technologies, product and processes on an on-going basis to gain competitive advantage.

3.1.2 R & D Expense (10 out of 10 – High R & D Investment)

Cisco invests almost 18% of its gross revenues back into R & D. This represents over \$3 billion US dollars annually. Many of its competitors do not even have gross revenues that compare to the amount the company commits for R&D. Networking equipment such as routers, switches, optical and associated markets that Cisco competes in such as firewalls, storage, security, IPT and content switches require a high level of continuous innovation and investment to remain competitive. Additionally, as applications are continuously being added to customers' networks, they have expectations that their networking equipment investments will be protected and accommodate these new applications without "forklift" upgrades to their networking equipment. Companies such as Cisco leverage their portfolio mix to address all aspects of a customer's networking needs. The depth and breadth of the Cisco networking product portfolio is a source of competitive advantage. The Cisco product portfolio allows customers to work with just one supplier for all of their networking requirements. Choosing one supplier that can fulfill most, if not all of their networking needs allows customers to lower their overall operating costs and provides them with other benefits of implementing Cisco equipment end to end in their network. Although virtually all networking equipment can interoperate at some level, there are features that work best within proprietary modes such as security and quality of service features. The level of complexity of most of these products demands significant investment across the portfolio. Furthermore, the level of integration among the various Cisco products adds another level of complexity as changes in one product set may affect others.

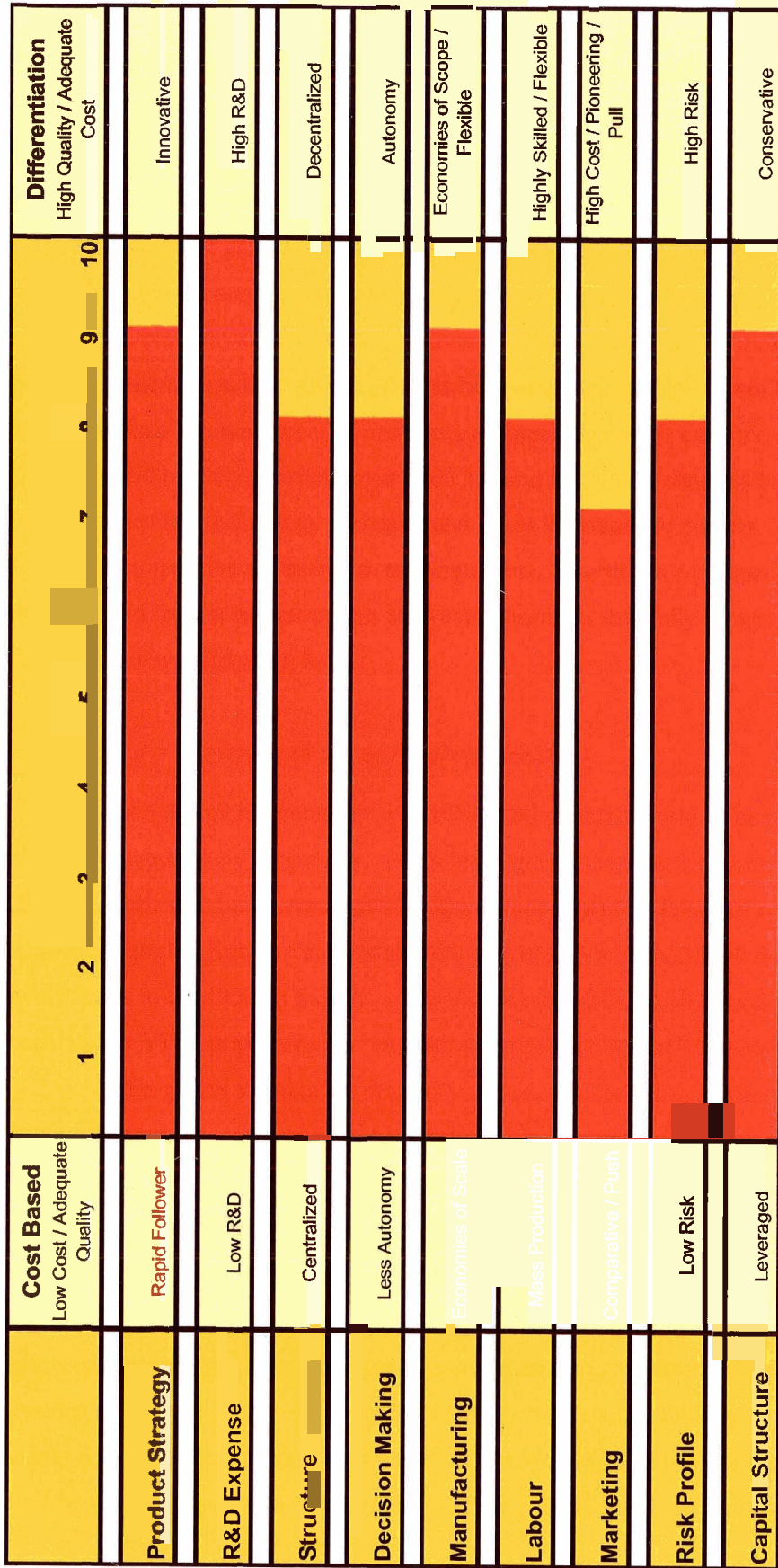


Figure 4 Cisco's Strategic Fit Analysis⁵

⁵ Adapted from Ed Bukszar, 2004 EMBA class notes

R&D dollars are spent on both hardware and software. Cisco works with chip manufacturers such as IBM and PMC Sierra to design solutions unique to Cisco. However the majority of R&D dollars is dedicated to fund the development of the device operating system. Hardware components are designed specifically for Cisco, but there are only limited levels of functionality that can be hard coded onto the chip set. The operating system software differentiates Cisco products from its competitors. Cisco continually invests to improve the reliability and functionality its products. The cost to launch a “next generation” device is significant. Not only do these new products need to be significantly more advanced than previous generations, they also need to be backwards compatible to work with older equipment to maintain Cisco’s commitment of investment protection to their customers. When Cisco launched their new 7600 Catalyst switch, over \$600 Million US was invested to bring it to market.

Cisco is a technology company and holds thousands of patents. These patents are a source of competitive advantage over competitors. In order to continually deliver innovative products and feature enhancements to existing products that fully integrate across their portfolio, R&D expenses will remain high.

3.1.3 Structure (8 out of 10- Decentralized)

Cisco is a global company with offices all over the world. The reporting structure of Cisco is segmented by geography. Cisco has 5 global theaters: US, Americas International (Canada, Latin and South America), EMEA (Europe, Middle East and Africa), Japan, and Asia Pacific (Australia, Korea, China, Malaysia, Thailand, Vietnam). Each theater has a vice president who reports to the COO in San Jose. Head office sets the overall direction for the company but each theater VP is empowered to run his/her territory as best as s/he sees fit.

These global theaters are primarily responsible for the in-territory sales and marketing. Although there are international teams responsible for product development, they do not report into the local theater managers since they are not directly responsible for product and service development – all development teams report into directors based out of Cisco research centres in San Jose, Boston or Raleigh. Cisco’s acquisitions span the globe and the integration of the human and intellectual capital is a challenge. Breaking up the core development team of the acquired company would greatly damage the value the acquisition would bring to Cisco. Fortunately for Cisco, the company has a strong virtual team philosophy ingrained in its culture that is also supported by processes and tools for success. The development teams leverage tools such as net meeting, video conferencing and other tools to bridge geographic challenges.

Additionally, in person meetings and working sessions are encouraged throughout the development cycle. By facilitating virtual working teams Cisco is able to capitalize on technical expertise wherever it may reside.

The structure within each theater is essentially the same across the board. Since the various theaters primary responsibilities are sales and marketing activities, local influences are integrated into each theater's strategy to better allow the company to work within the cultural norms of each market. Each theater also has its own marketing team that reports into head office which allows Cisco some flexibility to better target and service local markets. Larger theaters also have country managers. For example, Canada is part of the Americas International Theater but has its own country manager while others like Japan only have one theater manager. The country managers are given the authority and latitude to make decisions to best address their respective markets. This overall structure supports the autonomous decision making process at Cisco and capitalizes on the market and customer knowledge residing in each country.

3.1.4 Decision Making (8 out of 10 – Autonomous)

Cisco's decentralized structure and culture of employee empowerment facilitates autonomous decision making. Over the last year a company wide initiative for better processes and the development of cross functional teams has been established. An executive steering committee, represented by members of the various business units, set the direction of product development and marketing to ensure that the field produces products and services that align with the company's vision of the Intelligent Information Network. The layers of management below the executive are given an overall mandate and direction, but each business unit has the ability to fulfill those goals as it best see fit giving these groups the autonomy to craft creative solutions to maximize their success.

Guidelines are established for each technology family to ensure interoperability across the product portfolio to maintain Cisco's competitive advantage that is derived from Cisco's end to end functionality. Each technology strategic business unit is given the engineering, IT, marketing and financial resources to produce and develop their respective products. Product development is a creative process and requires the proper mix between freedom and control for optimal results. The SBU directors also meet regularly with the executive steering committee to provide status reports and to discuss development strategy. These sessions are forums for the feedback and at times justification for the strategic direction of the SBU.

At the country level, the general manager is responsible for the budget and resources within the geography to drive the required level of business and can allocate those resources as s/he best see fit. Each territory is given a quota and the sales figures are reported daily. These results are boiled down to the individual sales teams and so each member knows exactly where the country, team and where s/he individually stands in relation to the respective quotas. The online tools available to country manager allow him/her to not only see the end results but also sales forecasts and account plans. In addition, the request for aggressive discounts is fully automated so s/he can assess the margin for any deal of significant size before authorization.

Cisco also has companywide and countrywide quarterly reviews. The companywide meetings cover financial results and high level strategic direction. The countrywide meetings are much more granular. Individual account plans and results are presented and dissected by the country manager and his/her executive team. These reviews allow for critical feedback and direction from the executive for the individual account teams. The individual teams can then craft their strategies based on the overall guidance from the executive. Each team also has a significant level of autonomy to address the business opportunities within their territories. The executive reviews are designed to ensure the account teams are tracking towards their overall targets. The account teams are not micromanaged by the executive. This level of trust and autonomy is designed to encourage creativity and to leverage the deep intimate knowledge the account teams have concerning their business and customers.

By empowering all employees with the information, responsibility and ability to act as business managers, Cisco has leveraged their autonomous decision making culture into a high performing organization focused on companywide results and delivering high value solutions to their customers. The Cisco culture allows this level of creativity while maintaining customer focus provides Cisco with a sustainable competitive advantage.

3.1.5 Manufacturing (9 out of 10 - Economies of Scope / Flexible)

Cisco's manufacturing strategy is to focus resources in two core areas: New Product Introduction (NPI) and Supply Chain Management. Cisco uses an outsourced business model for manufacturing production. The relationships that Cisco has with its manufacturing partners allows it to enjoy the benefits from economies of scale and scope while maintaining enough control over the manufacturing process to ensure its quality standards are met. Cisco has integrated its manufacturing partners by leveraging its expertise in information technology systems to allow for greater flexibility and asset utilization.

The Cisco approach has its basis in the concept that companies can achieve breakthrough productivity by focusing on their core competencies, outsourcing systems/processes where they do not add sustainable advantage, and maintaining a centralized view into those processes that have been outsourced. Effective management of selected outsourced manufacturing operations enables Cisco to focus on manufacturing issues that are core, i.e., those where it adds sustainable advantage. Meanwhile, Cisco's manufacturing unit is positioned to meet the demands of its customer base with a comparatively small number of direct employees.

The manufacturing issues that Cisco feels are core to its business that remain in house include quality control and overall process management and improvement. The Engineering and Manufacturing Connection Online (EMCO) tool is one of the key initiatives that Cisco has developed to manage and optimize its supply chain. Cisco leverages the EMCO tool that facilitates collaboration by allowing Cisco suppliers, engineering, purchasing, and manufacturing to exchange key supply chain information in real time, including demand forecasts, inventory levels, product design specs, and part information.

3.1.6 Labour (8 out of 10 – Highly Skilled / Flexible)

Open communications, empowerment and teamwork are related to Cisco's development of human capital. Additionally, training is provided to all employees and has become so important that its managers' overall compensation is tied to the level of training their respective direct reports complete – all employees are required to complete a career development roadmap that is updated quarterly. The training provided goes beyond product knowledge. The in-house courses available at Cisco cover a variety of areas from general business acumen, sales, technical training and personal development. Also available to all full time employees is a \$7500 grant per year to take outside courses at accredited educational institutions.

Cisco has leveraged its IT capabilities to provide readily available information to all employees. Through its corporate intranet and portal communication strategy, information can be easily accessed or pushed to all employees. The scope of information available is vast and covers technical data, financial performance, market conditions, strategic planning, marketing strategy, performance metrics, etc. The openness of the information available may cause other companies some concern since information is seen as power in many organizations. Cisco sees information as empowerment. However, certain areas are considered confidential and that information may not be as accessible to all employees. Cisco trusts its employees to use their discretion regarding

accessing and sharing information – general guidelines are published on the internal website. Violations of these guidelines are grounds for termination.

Employees at Cisco are given the latitude to use their best judgment on how to meet their objectives. With the level of authority and the degree of information and tools available to them, they are empowered to make decisions to best meet their customers' expectations. This level of autonomy is earned and requires each employee to develop the skills required to meet his/her objectives.

Cisco has traditionally been a very individualistic company. This behavior was reinforced through the compensation plans and the metrics that employees were measured against. Even the development teams were so focused on their individual tasks, they did not always work as cohesive groups and different technology teams working on similar projects did not always share their work. Teamwork was seen more as a necessity to accomplish our tasks as opposed to a strategy to leverage knowledge.

In the last few years, teamwork has been a focus at Cisco. Cross functional teams have been mandated. Participation and contribution are tracked, measured and tied into compensation plans. From this improved degree of teamwork Cisco has seen more structured development in its products and account teams are sharing information to drive the overall success of Cisco. By sharing their knowledge in cross account and functional sessions, as well as, in other forums Cisco has effectively improved the knowledge and expertise of all employees.

Cisco is committed to building a development culture of continuous learning and employee involvement. Development is encouraged and supported by the company. Employees and managers work together to select development goals that are linked to business needs and support the employee's career interests. The objectives of the Performance Management and Development Process at Cisco are:

- Improve Cisco performance by aligning organizational initiatives and individual goals
- Enhance overall employee performance
- Grow Cisco talent to meet current and future business needs

Building the competencies of all employees at Cisco is an investment that benefits all stakeholders. Sustainable competitive advantage can be derived from having a workforce that is better educated and experienced than the competition. For example, Cisco can better position itself during customer interactions if the Cisco representative demonstrates not only technical knowledge but business acumen by thoroughly understanding of the customer's business and challenges and overall market conditions. For Cisco to sustain this comparative advantage,

customers need to view their Cisco account managers as trusted advisors and not just equipment suppliers. These positive interactions and strong customer relationships also provide reinforcement to the Cisco brand.

3.1.7 Marketing (7 out of 10 – High Cost / Pioneering / Pull)

Marketing is a critical function at Cisco. There are essentially two marketing groups within Cisco: Technical Marketing and Corporate Marketing. The structure of the marketing organizations and how they are positioned in Cisco is depicted in Figure 5.

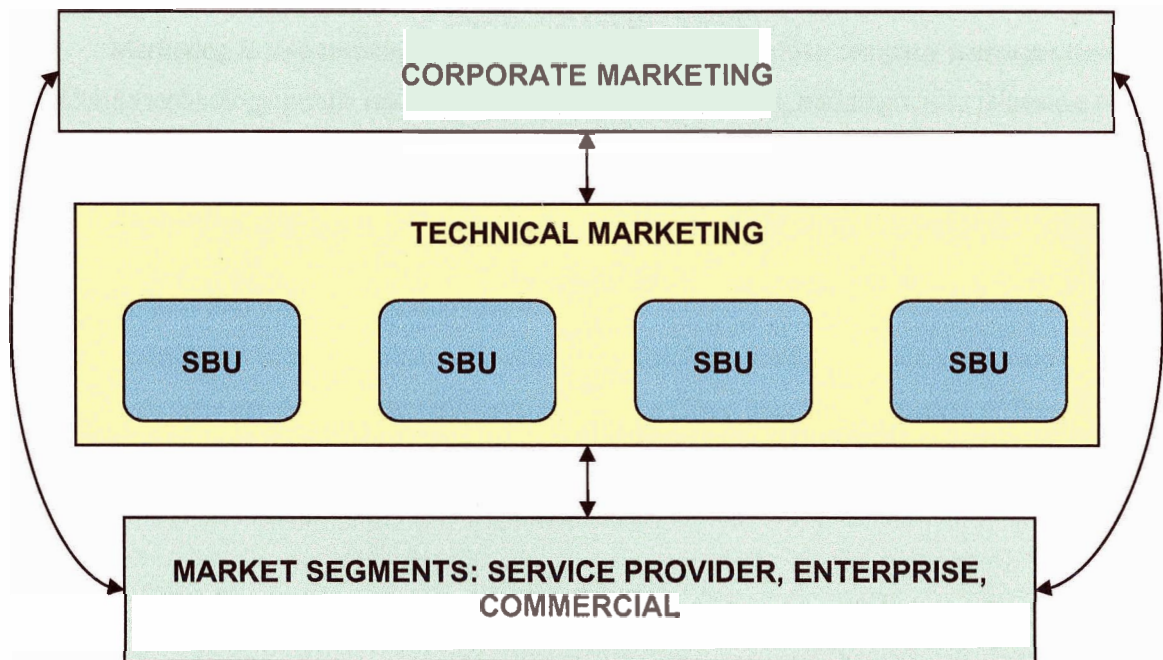


Figure 5 Marketing Organization Structure

The Technical Marketing department is responsible for the market research, collateral and product value proposition. Each SBU has its own marketing team that reports into the overall technical marketing VP. This structure facilitates greater product knowledge depth and understanding of where to position the product in the market.

Corporate Marketing builds global preference, confidence, and trust in the Cisco brand to gain a competitive advantage. Corporate Marketing communicates Cisco's vision and mission to targeted segments and create not only awareness and affiliations with the Cisco brand but also highlight the business advantages of having Cisco in your network.

An example of one of Cisco's successful Corporate Marketing initiatives is the Worldwide Education program. This program delivers and implements global strategies to promote e-learning models for education by creating and marketing Internet-based solutions to transform the way worldwide educational institutions approach teaching, learning, and administration. Another example is the Cisco CIO Forum. This event has been so successful that CEO's and CFO's outnumber the CIO's in attendance. This is a 4 day event where executives from invited Fortune 1000 companies meet with the Cisco executive team to discuss business issues and to hear Cisco's vision and strategy. The mindshare and networking among this elite group provide an ideal opportunity for Cisco to further differentiate themselves.

Marketing is also responsible for developing consistent cross-company messages through worldwide technology public relations and international seminars; building Cisco relevance to business and technical audiences through business strategies and solutions programs, its web site, and publications such as iQ and Packet Magazines. These events and resources are used to reach all audience levels from technical to business perspectives. The goal is not only to educate but to build awareness and trust in the Cisco brand.

Overall, the events, seminars and other media rich programs designed to educate and inform consumers are designed to pull customers to the Cisco brand. The success of these programs, seminar attendance and website hits has translated into industry wide adoption of Cisco products and acknowledgment of Cisco's leadership position.

3.1.8 Risk Profile (8 out of 10 – High Risk)

The technology bets Cisco places can be grouped as either market entry or product life cycle investments. Both carry significant risks for Cisco. Cisco assesses how companies can leverage their network investments to expand their applications to identify potential markets to enter. Product life cycle investments require analysis of where in the life cycle the product is and if that existing platform can adequately support new applications through memory and operating system software improvements or if a next generation release is required.

Cisco has entered several markets over the last few years. The most recent include the Telephony - specifically Voice Over IP (VoIP), Security and Storage Area Networking (SAN) markets. All these applications reside on a data network thus providing Cisco a strong base to enter the market. Different entry strategies were undertaken to address each market but all the intellectual capital to develop the associated products were brought into Cisco through acquisition. The costs and risks to acquire these technologies, to develop and to integrate them

are high. The risk factors include rejection by the market, interoperability issues and retaliation from incumbents. Markets such as the Telephony market had significant additional entry costs since VoIP was not just a new application for the data network but an entirely new submarket within the Telephony market that was unproven and dominated by an older, proven existing technology – TDM. Other risks include the availability of human capital with the applicable skill sets. Newer technologies usually imply a limited number of experts that can effectively develop the required operating software and chip technology.

Cisco is challenged when new applications are required by the marketplace and needs to decide if the device functionality or capacity needs to be expanded or to develop a next generation platform that would require customers to buy new equipment. Investment into existing product lines is ongoing to improve device performance. Added functionality is usually accommodated through new operating software releases and memory upgrades. If the customer application requires greater capacity, new equipment is usually required. Cisco needs to carefully balance how new applications will affect the operating software and capacity of existing equipment. If all new applications require equipment upgrades, consumers may revolt and look to Cisco competitors for solutions. Additionally, this tactic would violate Cisco's commitment to its customers to protect their network investments.

Risks are mitigated through close customer relationships and their involvement in the development of products and services at Cisco; superior market intelligence; and Cisco's position as market and thought leaders in its industry. Cisco does not generally enter markets where it cannot leverage the expertise of its human or intellectual capital. Cisco prides itself on hiring the best and brightest and retaining most of the employees from acquired companies. Additionally, Cisco uses third party consulting firms to ensure its compensation packages are industry leading to retain its human capital.

Cisco practices a conservative approach to launching next generation platforms of existing products. When products reach "end of sale", the marketplace is informed six months prior. The next generation platform would have already been released and generous trade-in campaigns offered to existing customers. Additionally, once the end of sale stage is reached, Cisco continues to support the older technology for five years. To protect consumer investment in Cisco technology, maintenance programs include all operating software upgrades. Maintenance services are available for as little as 8% of the product list price. These tactics mitigate the risk of alienating customers since adding applications would not necessarily require new equipment. Customers generally accept the fact that new equipment would be required if they need to add capacity and this is reflected in the Cisco portfolio mix.

Risks are also minimized by diversifying the product portfolio. Cisco has a strong router and switch equipment base. New technology initiatives usually build upon that strength and are funded by Cisco's already established product lines.

3.1.9 Capital Structure (9 out of 10 – Conservative)

Cisco is a publicly held company with a strong balance sheet and industry leading earnings. Cisco's financial year runs from Aug to July. For fiscal 2003 Cisco had revenues of \$18,878 and net income of \$3,578 million US. Gross profit margins for products and services were about 65%. Cisco also does not carry any long term debt and has cash and equivalents of \$20,800 million US. Cisco competes in markets that require large investments to either develop and / or acquire intellectual capital to remain competitive. Additionally, Cisco is seen as a market leader and innovator. Its strong capital position allows Cisco to more aggressively pursue complementary technologies and enhance existing platforms to breakaway from its competitors.

Cisco's conservative capital structure and healthy financial position provides the company with significant competitive advantage over competitors. The stakes are high in the internetworking equipment and services markets as are the associated risks. Under capitalized start-ups and competitors that are facing financial challenges cannot fund the required R&D or marketing to bring next generation devices to fruition as readily as Cisco. These same companies would also find it difficult to enter new markets through grassroots marketing campaigns or acquisitions due to the high costs associated with these strategies. Cisco, on the other hand, has the capital resources to both develop and acquire the intellectual capital and customer base to enter new markets. Furthermore, its strong financial position also allows Cisco to weather any downturn in IT spending and still maintain significant R&D investments and an aggressive acquisition strategy. Once markets start spending again, Cisco is usually in an even stronger position to capture more market share and enter new industry segments. For example, prior to the tech bubble burst, Cisco was about the same size as its next 4 largest competitors combined (based on market capitalization). Cisco is now 3 times as large as its next 6 largest competitors combined. Additionally, this financial muscle provides piece of mind to customers since Cisco has the resources to continue to develop products and services that will protect the customer's investment – a claim that not many of Cisco's competitors can make.

3.2 Strategic Fit Analysis Conclusions

Cisco's overall management practices and business activities support a differentiation strategy. The product strategy is founded on creating and refining innovative solutions to provide end to end functionality to fulfill the Intelligent Information Network vision Cisco has evangelized to its customers. Strong financial ability is required to support these efforts to the scale required for Cisco to maintain its leadership and innovation centric positioning since significant investments are required in R&D, acquisitions, marketing, and development of its human capital.

Cisco's manufacturing strategy is based on its belief that by focusing on its core competencies will allow Cisco to outsource functions that provide no sustainable competitive advantage. Thus, Cisco has outsourced its manufacturing and leverages its expertise in developing centralized web enabled systems and processes to manage its manufacturing relationships.

The autonomous decision making ability given to Cisco employees is supported by its decentralized management structure. This level of trust and support enhances the ownership and creativity required to meet the challenging targets Cisco sets for its employees. The Cisco culture is one of high performance and the company tries not to handcuff its employees through overbearing bureaucratic practices. Finally, Cisco's financial strength provides the resources required not only to fund the activities critical for Cisco's success but also the staying power to withstand market fluctuations in spending. The high level of support given to the various elements that make up Cisco's differentiation strategy provide the overall fit to facilitate the ruthless execution required for the company to further breakaway from competitors.

3.3 Cisco's Value Chain

Cisco practices a philosophy of outsourcing non core activities to concentrate on its core competencies to build sustainable competitive advantage. Value Chains are seen today as a major differentiating factor in a company. Cisco has positioned itself as the Internet company and advocates the networked business model as a source of strategic competitive advantage and operational efficiencies. The Internet is one of the single most important drivers of operational effectiveness and collaborative commerce. Cisco's continuous operational efficiency improvement mandate reaches in to its value chain activities and affects both internal and external processes and partnership / alliance arrangements. In evaluating its Value Chain⁶, Cisco

⁶ Adapted from Michael E. Porter, *Competitive Advantage*. (New York: The Free Press, 1985)

continuously asks itself questions about the effectiveness of its support activities on its primary activities. The Cisco Value Chain is depicted in Figure 6.

3.4 Primary Activities

Warehousing, inbound and outbound logistics and manufacturing at Cisco are fully integrated. The tools, metrics and processes are so integrated that it would be best to analyze these functions as the overall supply chain management practice at Cisco.

3.4.1 Supply Chain Management

As identified in the strategic fit analysis, Cisco's manufacturing strategy is to focus resources on New Product Introduction (NPI) and Supply Chain Management. This provides Cisco with a distinct competitive advantage and creates a unique value proposition for customers. Cisco uses an outsourced business model for manufacturing production. To do so, Cisco must effectively manage relationships with 500-600 active suppliers, about 5 major contract manufacturers and operations in over 20 factories, which are mostly partner owned. In addition, the Cisco supply chain includes numerous distributors and logistics partners.

To effectively achieve mastery over the complexities of Cisco's supply chain, there were a number of classic supply chain issues that needed to be solved. For example, information delays and distortion between levels in the supply chain led to parts shortages. Similarly, the lack of synchronized, closed-loop planning activities between Cisco and component suppliers resulted in long lead times for delivering products to customers. High variability in forecasts translated into missed targets for on-time shipments. Limited visibility into exception conditions resulted in frequent need to expedite orders. Finally, the absence of inter-enterprise process optimization led to excess inventory.

Beyond the basics, establishment of a best-in-class manufacturing supply chain required an additional set of difficult issues to be tackled. Among these were issues such as organizing the supply chain to support mass customization, managing outsourced manufacturing operations, and improving bi-directional visibility into the supply chain. Solving each of these issues carries with it significant corresponding benefits. For example, the ability to effectively build equipment to order helps to minimize the shelf time for parts inventory, which in turn reduces various inventory related costs, e.g., write-offs due to obsolescence or overstocking to ensure parts availability. The net result is lower cost of operation and better profits.

Effective management of selected outsourced manufacturing operations enables Cisco to focus on manufacturing issues that are core, i.e., those where it adds sustainable advantage.

Meanwhile, Cisco's manufacturing unit is positioned to meet the demands of its customer base with a comparatively small number of direct employees.

To address and manage the challenges of Cisco's supply chain strategy, the Engineering and Manufacturing Connection Online (EMCO) tools were developed. EMCO is the single point of access to web-based manufacturing applications, reports, tools, and information. EMCO facilitates collaboration by allowing Cisco suppliers, engineering, purchasing, and manufacturing to exchange key supply chain information in real time, including demand forecasts, inventory levels, product design specs, and part information. Currently, EMCO services over 19,000 users and more than 100 suppliers.

With each successive wave of the evolution of its supply chain solution, Cisco added new functionality as well as scope. In Wave 1, Cisco built the manufacturing ERP foundation that enabled the outsourced manufacturing model and established a single database architecture, which is the key ingredient of many vital information exchange applications. In addition, Cisco introduced breakthrough capabilities like Assemble-to-Order, which made it possible to link what customers wanted with what the company could build and Autotest, a tool that enables Cisco to have full control of the entire quality testing process without actually directly executing it

During Wave 2, Cisco extended internal systems out to partners and added internet capability. Some of the tools introduced in Wave 2 included a basic supplier portal (i.e., web interfaces into Oracle functionality), electronic demand signals, dynamic replenishment, and direct fulfillment. The availability of internet tools was leveraged to scale manufacturing production through an outsourcing strategy. This allowed Cisco to expand contract manufacturing globally and support a broad mix of products.

One of the key innovations introduced early in Wave 2 was the Single Enterprise concept. A select group of partners was brought onto the Cisco network and given direct access to Cisco supply chain applications to capture orders, obtain configurations, and exchange other supply chain information, enabling them to be more tightly integrated with Cisco. In addition, Cisco and these partners adopted a trading model that allowed for placement and fulfillment of orders without purchase orders or invoices. Internet-based tools enabled Cisco to extend some of the benefits of Single Enterprise to a broader set of supply chain partners.

During Wave 3, Cisco focused on operationalizing new tools and transitioning to internet-based processes. In 1999, Cisco introduced EMCO, which pulled together the previously developed supply chain applications as well as new ones in the context of a scalable, internet-based architecture with full authentication capabilities and full management of entitlements. The robust authentication capabilities and improved management of entitlements enabled Cisco to expand the usage of supply chain applications both internally and externally. The scalable architecture supports faster integration of new applications, so EMCO continues to add functionality that improves management of the supply chain as well as users who can take advantage of these applications.

Cisco's manufacturing strategy also presents one of the greatest challenges and opportunities for the company to "drink its own Kool-Aid" by integrating the disparate, heterogeneous systems of its partners into the networked business model it advocates. Cisco's outsourced manufacturing production strategy is a key competitive differentiator, with an overall goal to build the best quality product in the most efficient way possible, delivered to customers in a timely fashion. Cisco continuously evolves its manufacturing practices and processes toward increased productivity and higher efficiency. Cisco's real value-add in manufacturing is selecting core work in an area that drives collaborative expertise amongst manufacturing, engineering, contract manufacturer partners and component partners; so that it can enable innovation, quality, productivity and profitability on all sides of the relationship. Cisco believes that value engineering will help the company to optimize time to market, cost and quality around products, and provide a seamless global fulfillment capability to customers at the lowest cost.

The Cisco Supplier Performance Program is the means by which Cisco continuously evaluates its manufacturing suppliers. The intention of the program is to provide Cisco with a forward looking view to ensure that the company maintains an efficient process of evaluating its supply partners, providing continuous real-time data to help Cisco assess and adjust its relationships on an ongoing basis. Cisco evaluates all aspects of the supplier function, including lead times, quality, cost and flexibility. All information is collected and maintained on-line.

3.4.2 Acquisitions

A key core competency at Cisco is its ability to acquire companies and integrate their respective intellectual and human capital. Since Cisco was founded 20 years ago, 81 acquisitions have been successfully completed. Acquisitions are a strategic growth vehicle for Cisco. Speeding their time to new markets and adding teams with unique talents are some of the key

drivers. The Cisco culture is one that embraces acquisitions, with one in five of its employees having joined the company via an acquisition. This unique culture sets Cisco apart and has enabled it to successfully integrate new people, technologies, product and processes on an on-going basis.

Cisco's ability to effectively manage the acquisition process through to integration of the purchased company is a strategic competitive advantage. Not only do acquisitions provide possible technology and/or patents for competitive advantage but also human capital. Over 90% of the employees of purchased companies remain with Cisco. Moreover, with all the acquisitions Cisco has undertaken over the last 20 years, the actual integration process and the experience gained (learning curve) are also sources of competitive advantage. The speed and efficiency that company cultures, processes and systems are merged into a cohesive business unit or into Cisco's existing technology allow Cisco to leverage its newly acquired assets quickly and avoid the many pitfalls that its competitors like Nortel Networks has experienced.

Integration of acquired companies has become a recognized core competency at Cisco. Cisco has developed an internal best practice process to speed the integration of acquired companies. Cisco's Business Development (BD) team spearheads the entire process. The front end processes focus on strategic and culture fit of the target company with Cisco. SWOT analysis are conducted on the technology, management team and talent pool. Cisco stresses an open communications policy with the acquisition target and educates the new company on how things are done within Cisco. The process is not as draconian as this may sound. The Cisco executive and BD team want to ensure the acquisition target understands the expectations. Cisco engages in very frank open communications with the new management team on their new roles and responsibilities within Cisco. It is very important to Cisco that the new management team understand how it will be integrated into Cisco's overall strategy and if the team will be integrated into an existing SBU or if a new one will be created. Education and communication are paramount for both the acquired company and for the affected areas within Cisco.

Milestones the BD focuses on after acquisition announcement and preliminary due diligence has been completed include:

- Marketing plan and product roadmap to ensure SBU leads are in sync to avoid mixed messaging.
- Cisco engineers and marketing leaders assigned to integrating new product sets with manufacturing and logistics.

- Finalize SBU leadership and reporting to stabilize the first thirty days since uncertainty for leaders is difficult to hide and impacts the existing and acquired staff.
- Open discussion on roles/responsibilities, key success factors and set expectations with leaders through regular one on one sessions with Cisco executive sponsor/mentor. Articulate the vision - show org chart with how team fits in to Cisco.
- Identify mentors for all employees to engage shortly after announcement of acquisition.
- Address roadmap changes upfront to avoid any potential conflict and disagreement on product positioning before deal closes. Acquisition needs to understand how its solution fits in the overall Cisco product and solution portfolio.
- Set realistic expectations with new and existing staff - things will/do change

Once the announcement to close the acquisition is made, another set of milestones is identified. The focus of these activities surround continued education and check points that the newly acquired resources are integrating well into the Cisco culture. Weekly mentor meetings and executive briefings are common. Additionally, short-term wins are identified to enable the acquired team to build momentum.

Internal innovations, partnerships and acquisitions have always been a core part of Cisco's business strategy. Acquisitions speed time-to-market by providing immediate access to technology. Additionally, acquisitions allow Cisco to reduce development risk by adding cutting-edge technology only after it has met development milestones. Finally, acquisitions infuse Cisco with new entrepreneurial and technical talent. The acquired technology and talent of an acquisition, along with the time-to-market advantages, bring benefits that complement the many internal developments already underway at Cisco.

3.4.3 Marketing & Sales

3.4.3.1 Marketing

As noted in the strategic fit analysis, the marketing function at Cisco is divided into two broad teams – Technical Marketing and Corporate Marketing. The Technical Marketing department is responsible for the market research, collateral and product value propositions. This

structure allows the technical marketing teams to dive deep into the product specifications and performance characteristics that differentiate Cisco product from its competitors. Corporate marketing is responsible for brand strategy, identity and market intelligence. These marketing functions are core competencies and are considered to be resources for differentiation.

Cisco is viewed as a price leader in the industry where its reputation for quality and performance warrants price premiums for its products. Cisco is also viewed as industry thought leaders and innovators. Marketing builds its communication strategy around these Cisco qualities. The positioning and messaging from the marketing department is for customers to think of Cisco as a trustworthy leader, a confident partner, an influential expert, and a smart innovator.

The Cisco Brand Strategy & Management group within Corporate Marketing focused on the following core functions:

- Develop the corporate brand roadmap, architecture and co-branding strategy
- Establish product, program, and initiative naming guidelines and nomenclature
- Implement and enforces branding standards
- Protect Cisco trademark and copyrighted materials
- Educate and train employees on being brand stewards

The Technical and Corporate Marketing teams collaborate to produce competitive market intelligence that is disseminated to employees through web portals that target individual competitors. The information found on these portals is extensive and covers topics such as positioning, SWOT, pricing and case studies where Cisco has been successful and not. Market Intelligence delivers informed and insightful information and analysis to drive business strategy decisions at a corporate, market segments, and technology level. This information is invaluable to the Cisco sales teams and partners. The level of detail and the degree of accuracy of this information provides Cisco with a competitive advantage that facilitated greater success in competitive situations.

3.4.4 Sales – Direct, Channel Partners and Distribution

The sales organization is divided into two functional groups: direct sales; and channel. The direct sales organization is further segmented between Service Provider and Enterprise / Commercial account managers and teams. Direct sales are targeted at large Service Provider and Enterprise accounts that demand direct manufacturer coverage. Each group addresses a different area of the market and there are areas that overlap. Service providers in particular, present a

unique challenge to Cisco where the engagement model differs from how Cisco usually works with large enterprise customers.

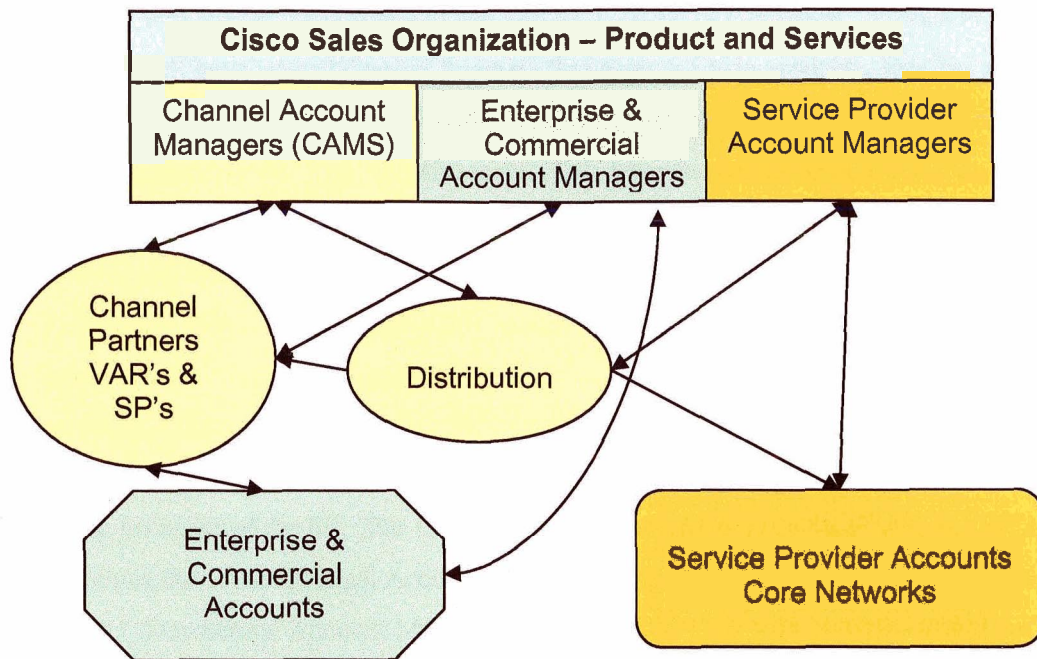


Figure 7 Cisco Sales Organization Relationship Mapping

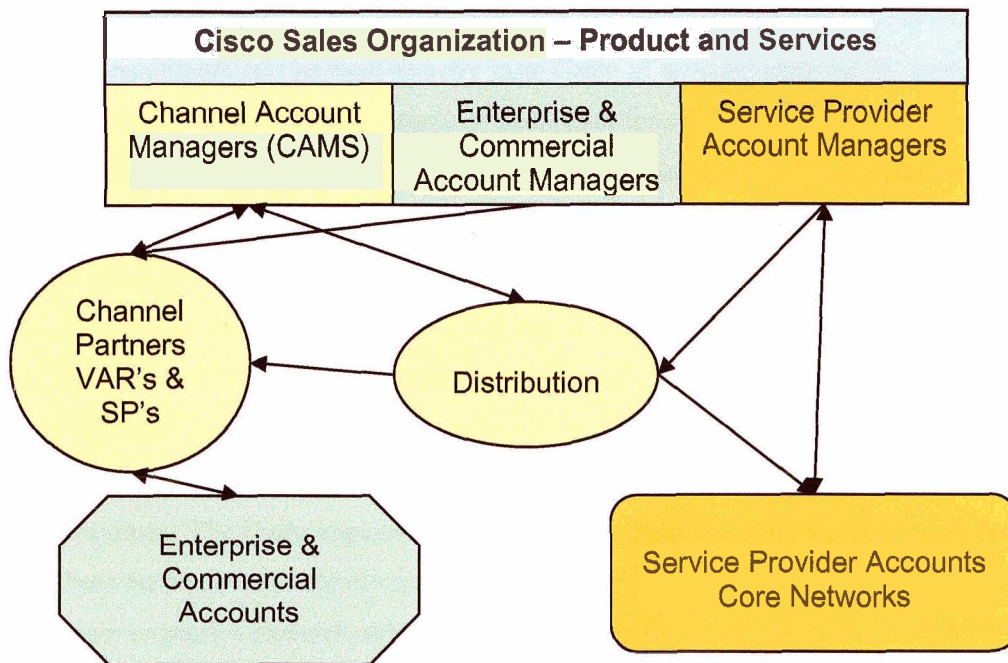


Figure 8 Cisco Product and Service Fulfillment

Service Providers present unique challenges from an account coverage perspective. SP's are complex and Cisco has adapted its coverage model to address their needs. However the model is not without its challenges and can still be a source of confusion. Service Providers like TELUS and Bell have several lines of business that engage Cisco products, services and resources. The SP's core networks that are usually the responsibility of the SP's CTO are supported by the Cisco SP Core account team. This team is comprised of product and service account managers, engineers and other support resources. The focus of this team is the architecture and operations of the Cisco equipment within the SP's networks.

Service Providers are also Cisco Channel Partners. Service Providers resell Cisco equipment to their customers as stand alone point products and as integral components of end to end solutions. These solutions include individual products and Cisco based managed services like Internet Access, VPN and IP Centrex. This area of business falls under the sales and marketing divisions of the SP. The Cisco resources that would be engaged with the SP's sales teams include the Cisco Channel Account Manager (CAM) and where applicable the Cisco Enterprise / Commercial Account Manager. The Cisco SP Core account team would not be ordinarily involved with the SP's sales organization unless the SP is crafting a custom solution that would impact the design requirements of the SP's Core networks.

Service Providers account for roughly 35% of Cisco's gross revenue. Service Providers can procure equipment and services directly from Cisco or arrangements can be made with a distribution partner such as Ingram Micro or Tech Data for product fulfillment.

Large enterprise accounts also have direct account coverage. These Cisco resources are generally shared in that the Cisco engineers, account and service managers look after several enterprise accounts. Large enterprise customers can have networks with the complexity that rivals some Service Providers. Such accounts would include Microsoft, most utility companies, banks, insurance companies and the federal and provincial / state governments. The decision to dedicate these resources is based on the strategic importance and the annual value of purchases made by the customer. The Cisco account managers advocate and evangelize the Cisco vision to the end customer. The Cisco engineers work with the customer's technical teams to spec and design Cisco based network solutions. If a partner has not already been involved, the Cisco account team engages a channel partner chosen by the end customer to work with on the overall solution. Accounts can be driven either by the Cisco account team or the channel partner's account team. The lead account team is generally the one that has the best relationship with the end customer. However, if the technology is new, the Cisco account team generally leads the

sales and implementation process with the channel partner participating in a support role. Sometimes, as in the case of an RFP or RFI, the channel partner needs to win the end customer's business after Cisco has specified the requirements.

The actual fulfillment of the products and services are delivered through the chosen partner. Only under extraordinary circumstances will Cisco bypass the partner. These circumstances include failure to deliver required resources to fulfill commitments or if the particular solutions the customer wants are outside the competencies of the available partners. However, Cisco will encourage the end customer to at least procure the equipment through a partner even if the partner may not have the resources to address the end customer's concerns from an implementation perspective. The Cisco Channel Account Manager is engaged to facilitate the working relationship among the Cisco partners and the associated Cisco account teams. Cisco differentiates between enterprise and commercial accounts based on the amount of money the customer spends with Cisco. Customers can move from either classification depending on where they are in their network lifecycle.

The channel partners provide equipment and services to the end customer. These services include, among others, Cisco branded services such as maintenance and PDIO. Partners can either resell Cisco branded or provide their own PDIO services such as installation and project management. Almost all enterprise and commercial accounts are encouraged to work with Cisco partners. Cisco classifies its channel partners based on their investments into training their sales and technical resources and business volume. Channel partners are awarded certifications such as Premier, Silver and Gold. Partners are required to recertify each year to validate their expertise on Cisco equipment. The rating system allows partners to differentiate themselves and the partner rating drives the discount level the partner receives. Almost all partners procure Cisco equipment through a distribution partner like Ingram Micro or Tech Data since many of them lack the resources or facilities to stock a wide selection of products. Only Silver and Gold partners can purchase directly from Cisco if they wish but the longer lead times associated with ordering directly through Cisco encourages channel partners to work with Cisco's distribution partners. However, the Silver and Gold partners would then receive a lower discount on Cisco equipment when the order is fulfilled through distribution.

Channel account managers are responsible for training partners on Cisco's technology and market value propositions. Other responsibilities include program management and partner certification. Cisco has also commissioned the Walker group to perform independent customer post sale satisfaction surveys on its partners and this measurement is taken into account when the partner reapplies for its annual certification. The results are shared with the partner to identify

areas that require improvement on a continual basis. The channel account manager works with the partner to develop programs to address any shortcomings. The channel account manager also facilitates interactions among partners and the Cisco enterprise and commercial account managers and teams. These meetings would cover activities such as joint strategic account planning.

Only large partners buy direct from Cisco. Most partners buy equipment and order services through Cisco's distribution partners. The Distribution Process (Project DISTI) is focused on providing end-to-end customer value while driving greater productivity and revenue targets within Sales, and to its Distributors. Within Cisco, the distribution supply chain infrastructure is comprised of 72 distributors world-wide, with holdings of \$930 million of Cisco inventory and sales of over \$5 billion of Cisco products and services to 30,000+ resellers, each selling into its core markets.

Over the next two years, Project DISTI will establish a global foundational infrastructure of standardized systems, processes, and operational policies that will be integrated with Cisco's top three global distributors (Ingram Micro, Tech Data and Comstor) and eventually, extending out to resellers and customers.

This global foundational infrastructure will provide transparency throughout the complex operations of Cisco's distribution business and will allow Cisco to better manage "back-end" functions such as inventory management. By leveraging technology and internet business expertise, Project DISTI will automate and simplify the process of purchasing Cisco products and services by customers and resellers, while enabling Cisco to capture customer data at its source. Project DISTI plays an integral role in the global process reengineering efforts currently underway within the Sales organization. The success of the partner community is paramount to Cisco since their sales coverage model cannot scale into a high touch direct model for its entire customer base. Distribution will be playing a larger role at Cisco since more and more resellers are being encouraged to buy through them.

3.4.4.1 Sales Tools

The sales tools available to both Cisco employees and partners are designed to increase productivity by streamlining processes and making relevant information readily available. These tools include on-line ordering, order tracking, pricing and configurators. Pricing information is real time and some large partners have integrated this tool into their ERP systems to expedite product procurement. The on-line configuration tools are also integrated in the on-line ordering tools. By doing this, no orders can be accepted if the configuration is not valid thereby reducing

the possibility of ordering incorrect and/or incompatible equipment. In addition, e-learning resources such as video on demand are available on-line for partners and internal staff that teach them how to use the tools step by step.

The expertise of the Cisco sales engineers and account managers provide Cisco with a strategic competitive advantage. It is a core competency that can be leverage to service customers directly and to increase the knowledge level of its partners. The availability and ease of use of the sales tools provide tangible benefits to both Cisco and its partners.

3.4.5 Post Sales Services

3.4.5.1 Technical Assistance Centre

The Cisco Technical Assistance Centre (TAC) is considered to be the best in the industry. Many independent consulting organizations have consistently rated the Cisco TAC above all other competitors based on customer surveys. The Cisco TAC is a follow the sun model offering live 24X7 support. This service is a key differentiator and provides Cisco with a competitive strategic advantage. The engineering staff on the TAC field questions regarding equipment and software failure and performance. The TAC is a break/fix service and is only available if the customer buys Cisco maintenance.

Other deliverables of Cisco maintenance services include software updates and upgrades; 24x7 access to Cisco On-line (CCO) and Advance Replacement of Parts (RMA). CCO is the web portal that customers use to open non critical cases with the Cisco TAC but it also contains other resources. These resources include trouble shooting guides with documented solutions to common networking issues, published known bugs, configuration guides and equipment registry to allow Cisco to notify customers of any new bugs in its software. The goal of CCO is to provide a self-help information portal for its customers. Almost 75% of all cases are solved by directing customers to specific published solutions on CCO. Once customers become familiar with this tool, they often solve the problems themselves without the assistance of the TAC. Cisco also offers advance replacement of defective parts. The customer can purchase delivery options from next business day to 2 hours.

Maintenance services provide customers with network investment protection. The quality of the engineering staff and the availability of relevant information on CCO provide a post sales experience that is appreciated by customers. Customer satisfaction surveys are issued after every case. The response rate is over 70%. The Cisco TAC engineers are compensated based on the timeliness of case closure, case volume and customer satisfaction as represented in the

surveys. This builds greater accountability for customer satisfaction and provides Cisco with a competitive advantage.

3.4.5.2 Planning, Deployment, Integration & Operations (PDIO)

Purchasing of equipment is just the first step in an IT project. The success of the project depends on the execution of the PDIO. Cisco has programs where partners can either provide all or some of the PDIO deliverables or engage Cisco where appropriate. These decisions are driven by both the customer's comfort level with the partner and the degree of complexity of the project and technology. In some situations Cisco acts as the project prime and outsources some tasks to its partners. PDIO projects are revenue opportunities that Cisco would prefer the partner, if applicable, to earn. This practice allows the partner to extract more value from its partnership with Cisco. PDIO services fulfill the end to end support commitment that Cisco makes to its customers. Networking solutions have become more complex. Having a strong professional services team is a source of differentiation for Cisco. The development of programs where Cisco partners can also leverage this expertise brings value not only to the end customer but also to the partner.

3.5 Support Activities

Cisco's primary activities are facilitated by its support activities. The generic support activities are categorized as: firm infrastructure; human resource management; technology management and development; and strategic management. An integral characteristic of all the support activities at Cisco is the use of internet technologies to streamline, to broadcast, to automate and to web enable all applicable functions. Cisco acts as a living case study for leveraging internetworking practices for continuous process improvement. These best practices are documented and shared with its customers through the Internet Business Solutions Group (IBSG). The integration of these best practices is the responsibility of the Business Technology Architecture Group (BTAG). The BTAG team is also available for consulting engagement to Cisco customers

The support activities touch all the functions within Cisco's Value Chain. Activities such as accounting and legal services are fairly common to most companies and Cisco is not much different. The roles of Cisco's IBSG and BTAG groups in the overall value chain merit additional comment. IBSG is focused on providing innovative ideas, solutions, and efficiencies to Cisco and its customers. In regards to Supply Chain Management (SCM) companies like

Cisco are building extended enterprises to best compete in the new Internet economy. An extended enterprise like Cisco combines the Internet's power with new business structures and processes to eliminate old corporate boundaries and geographic restrictions. Cisco's networked supply chains create seamless paths of communication among partners, suppliers, manufacturers, distributors / retailers, and customers. The IBSG group is also responsible for the creation of Cisco's Vendor Scorecards that are used to assess the performance of its suppliers and partners.

The Business Technology Architecture Group (BTAG) helps customers solve the perennial problems of business technology absorption and adoption. It always seems to be a matter of feast or famine, i.e., lots of technology investment with disappointing results or not enough technology investment to be competitive. Cisco, on the other hand, has gotten great results with its business technology initiatives, and BTAG was created from those experiences to continue Cisco's achievements and to help its top customers duplicate Cisco's success.

IBSG and BTAG are complementary teams within Cisco that provide tools, resources, and knowledge for helping both Cisco and its customers identify and quickly implement Internet business solutions that will provide the greatest impact and return. IBSG helps customers to understand the value of Internet business solutions and crafts a strategy appropriate for their business objectives. BTAG helps customers assemble and manage the expertise that is needed to translate their Internet business strategy into successful implementation projects, taking advantage of lessons Cisco has learned in the course of its own similar initiatives.

Process automation is a key initiative at Cisco. The company has a mandate to be a process-focused enterprise. Cisco considers this initiative as a way to improve productivity and to accelerate revenue growth and drive efficiency. This transition will also help employees understand how they can contribute to Cisco's productivity goals. By defining process in Cisco terms, employees can understand what changes they can make to impact their productivity numbers directly.

Additionally, customers will benefit from the consistency a process focus brings. As Cisco achieves greater consistency in its business processes, customers will see and experience improvements in product quality, product support and in Cisco's ability to propose and deliver solutions that are directly relevant to their business challenges. This goes directly to customer satisfaction. Shareholders will also benefit because the focus on process will give Cisco some efficiencies that will have an accelerator effect on its ability to capitalize on the inevitable upturn in economic activity. Above all, both customers and shareholders will see increased value as Cisco drives efficiencies through process to free up resources in order to innovate and create

opportunities in new markets. For employees, this means that the context work they do on a day-to-day basis will be easier and faster to do, and will free up time to focus on core work.

The process automation initiative is wrapped around a Define-Measure-Analyze-Improve-Control, or DMAIC, methodology (a piece of Six Sigma methodology). This is an end-to-end process improvement methodology that starts with customer needs, and uses some hard data to make a process more productive.

3.6 Cisco's Culture

Cisco sees its company culture as sustainable strategic competitive advantage. Maintaining a culture based on integrity, trust and open communications will be the driving factor in continuing the momentum Cisco has today. The key characteristics of the Cisco culture are reinforced daily and worn by every employee on their company badges. Cisco also "eats its own dog food" by "webifying" just about any possible application. Cisco has positioned itself as the Internet Company and accordingly Cisco has an Internet influenced culture.

3.6.1 Putting Everything on the Web

Cisco uses the Internet extensively both internally and externally. Cisco believes that having an Internet culture complements its technology investments and provides it with an ongoing case study of how companies can best leverage Internet technologies to drive productivity and achieve business goals. Cisco has web-enabled virtually all of its applications. This allowed Cisco to improve and enhance its supply chain and customer management. The integration of the Internet provided Cisco the ability to have easy access and communication with both customers and suppliers. Leveraging its Internet strategy to integrate all aspects of Cisco's value chain provides the advantage of reducing costs while simultaneously improving responsiveness and services offered to employees, partners, and customers. This Web-enabled system allows access to the entire Cisco network, with the proper authorization.

By Web enabling its business applications, Cisco created a self-help environment that extends out to employees, partners and customers. The Web-enabled system enhances customer management by providing customer self-service and offering around the clock customer support. Almost 70% of all customer technical issues are solved by giving customers direct access to information and networked applications available on the Cisco Technical Assistance Centre (TAC) web site. This translated to a savings of over \$500 Million US. Internally, employees experienced an increase in productivity by utilizing the Cisco Employee Connection (CEC) web

site. CEC is a portal that provides employees with up to date information and quick links to answer inquiries that augments optimization within the workplace and strengthens the Cisco culture by creating an informed and close knit community.

Having so many applications on the web allows employees to access information in a timely manner to be more efficient and productive. Information and access to tools are seen as empowerment at Cisco. The company practices a management by exception philosophy allowing employees to make decisions that best serve the business goals of their customers, teams and the company. This level of autonomy falls in line with the decentralized structure at Cisco and overall strategic fit.

3.6.2 The Company Culture Badge

The Cisco culture is reinforced daily since it is printed on the employee badges. The company badge set is actually comprised of 3 separate cards that contain: Cisco's vision and mission statements; the company culture and its fundamentals; the 3-5 year goals; and the current fiscal year initiatives. The guiding principles that appear on the company badge are highlighted below.

3.6.2.1 Quality Team

Maintaining the quality of their team is critical to Cisco's success. Cisco has a mandate to recruit the top 5 to 10 percent in the industry and manage out the bottom 5 percent. Cisco believes that a strong, high quality team will help it maintain its leadership position and ensure that Cisco remains one of the best places to work for high performers.

3.6.2.2 No Technology Religion

Cisco takes a "no technology religion" approach to product development. Time and time again, companies fall in love with a technology and ask their customers to use it. But this is not always best for customers. Because customer satisfaction is Cisco's number one priority, the company's employees are mandated to actively listen, share and explore to ensure Cisco provides the best solutions to meet their customers' needs. Thus Cisco did not and does not develop strictly proprietary systems opting instead to offer a range of products and solutions to fit each customer's needs – mass customization. Most customers have existing equipment and require flexibility to protect their investments while taking advantage of new technology.

3.6.2.3 *Stretch Goals/Continuous Improvement*

Goal setting and achievement are cornerstones of Cisco's culture. Employees are held accountable for their objectives. The reasoning behind stretch goals is founded on a belief that to be the very best, you must continually strive to work smarter and achieve increasing levels of efficiency and productivity. The objectives are designed to push employees to strive for excellence. These objectives are measured and are very specific. Sales people are expected to know how much they have sold year to date, what percentage of their quota has been met and where they expect to finish for the year. It is almost guaranteed when you are in San Jose or any regional head office location, the 2nd or 3rd question you would be asked if you ran into one of the executives would be, "where are you in relation to quota?". Compensation programs are designed to reward stretch target achievement. Sales plans provide healthy base salaries and target incomes for achieving quota but stretch targets provide the sales person multipliers that accelerate income significantly. However, the company has designed its compensation program to also guard against "sand-bagging" where a sales person will under represent the potential amount of business that could be earned in his/her territory for the fiscal year. Forecast accuracy provides additional income multipliers while "blue birds" that are not forecasted provide no additional benefit to the sales person. Overachievement also earns the sales person additional stock options. Employees that are not commission based also receive stock options. Their allocation is performance based. The metrics that justify the quantity of options granted is unique to each role.

Customer satisfaction ratings are also a source of additional bonuses for sales and operations staff. Cisco Technical Assistance (TAC) Engineers have open/close case ratio metrics that drive their bonus structure but the most important component of their overall compensation is the average customer rating of their performance and customer satisfaction metrics that are based on the automated email survey sent after every closed TAC case. Development teams are rewarded for delivering new solutions on budget and in a timely manner. Customer satisfaction ratings that are based on independent third party surveys provide the basis of their bonuses.

The pressure to perform can cause burn out, but it drives the sales, operations and development teams to greater intimacy with their customers so they can better understand the needs of their customers and where the business is coming from and where it is going. This level of knowledge, commitment and expertise provides Cisco with a sustainable competitive advantage.

3.6.2.4 *Teamwork*

Cisco has traditionally been a very individualistic company. This behavior was reinforced through the compensation plans and the metrics that employees are measured against. Even development teams were so focused on their individual tasks, they did not always work as a cohesive group and different technology teams working on similar projects did not always share their work. Teamwork was seen more as a necessity to accomplish tasks as opposed to a strategy to leverage knowledge and build competitive advantage.

In the last few years, teamwork has been a focus at Cisco. Cross functional teams have been mandated. Participation and contribution are tracked, measured and tied into compensation plans. This initiative starts at the top at Cisco. Executive VP's are mandated to chair cross functional teams and committees. From this improved degree of teamwork Cisco has seen more structured development in its products and account teams are sharing information to drive the overall success of Cisco. By sharing knowledge in cross account and functional sessions, as well as in other forums Cisco has effectively improved its expertise beyond posting information on its intranet.

Teamwork brings good people and good skills together in ways that help Cisco to continue raising the bar on its success. Teams are used throughout Cisco. Cisco defines teamwork and collaboration as the sharing of resources, information, and talent across functional and geographic lines to deliver the best solutions for its customers. The teamwork initiative comes from the top at Cisco. The "Teamwork across Cisco" recognition program is one of several programs that support this important initiative and illustrates exceptional cross-functional teamwork behaviors and provides teams of Cisco employees with company-wide exposure opportunities. By sharing these behaviors with all employees, this program leads to productivity gains, reduced operating costs and increased profitability for Cisco shareholders that builds upon Cisco's core competences and drives strategic competitive advantage.

The program provides opportunities for high level exposure (theatre- and company-wide) for teams that have produced successes for Cisco. Furthermore, it highlights cross-functional teamwork and collaborative behaviors and provides a way for all employees to share knowledge, experiences and achievements. John Chambers, Cisco's CEO, and senior leadership recognize teams through different mediums and at various events during the year such as quarterly and all hands meetings. The experiences of the quarterly finalists are shared with the entire organization through the Cisco Employee Connection portal, the "Teamwork across Cisco" Web site and senior leadership Web sites. These stories are communicated so that every employee and

manager will have clear examples of cross-functional teamwork and collaboration. In addition, each member of the quarterly winner receives awards to commemorate this event. At the end of each fiscal year a "Team of the Year" is selected and a \$5,000 charitable contribution is made in the team's name. Programs such as this reinforce the importance of teamwork at Cisco and also provide examples of success along with recognition and reward.

Teamwork is also a component of each employee's annual performance review. Although the weighting of the teamwork component is, at this time discretionary, its inclusion as a metric that can influence overall compensation provides additional motivation for the employee to participate in Cisco's teamwork initiatives. Teamwork will continue to be a challenge at Cisco as it is with many organizations however as programs like Teamwork Across Cisco gain traction and additional exposure is given to teams that have shared knowledge for customer success to drive new business for Cisco; more employees will participate and embrace the teamwork concept. After all, more business for Cisco translates to greater revenue for the company and less for the competition, and hopefully leads to a higher stock price that will benefit all employees.

3.6.2.5 Empowerment

Cisco believes it has been instrumental in creating and accelerating the Internet Revolution. The Internet Revolution is about knowledge and how to apply that knowledge for greater productivity, collaboration and efficiency. Cisco equates this with empowerment. By adding a clear strategic direction and facilitating employee empowerment to make quality business decisions, Cisco has created a foundation to keep its fingers on the pulse of its customers and respond quickly and effectively to their needs.

3.6.2.6 Trust/Integrity/Giving Back

Cisco was founded in an environment of open communication, empowerment, integrity and trust. These values remain at the forefront of its culture and business decisions. Cisco encourages a business environment that not only produces results but also ensures that Cisco is recognized as one of the most generous companies in the world. Cisco has established many charitable initiatives. These programs include the donation of equipment and the time of its employees. One program, that was not well publicized during Cisco's downturn after the tech bubble burst, allowed employees to forego severance packages and work for a charitable organization. Cisco paid employees one third of their annual salary for one year and allowed the

employees to continue vesting their Cisco options. After one year if there are open positions, the employees could return to work or exercise their options and move on.

3.6.2.7 Drive Change

In alignment with Cisco's R&D and acquisition strategies, the company believes that only by continuing to drive change in the industry will it stay one to two waves ahead of the competition. Cisco strives to be a catalyst and driver of change since this creates opportunity for innovation.

3.6.2.8 Profit Contribution

Frugality is one of Cisco's core values. At Cisco, frugality means getting the best value for everything it does, financially and otherwise. From this perspective, Cisco focuses on profit contribution by continuously reassessing everything it does to ensure it places the greatest number of resources in areas that have the greatest profit potential.

3.6.2.9 Market Transitions

Cisco believes the best opportunities to gain market share is during tough times, when markets, technologies, or geographies are in transition. Cisco can best leverage its financial resources and geographical reach to enter new markets and to grow its business during these transitions.

3.6.2.10 Open Communication

Good communications both internally and with its customers and partners directly affects customer success. Cisco expects every employee to work closely together and with customers to freely share and communicate ideas and concerns. Cisco's open communication policy compliments its teamwork and customer success mandates.

3.6.2.11 Customer Success

Customer success is Cisco's first priority as a company. The Cisco executive continually remind its employees that no matter how good they and/or customers may think they are, the one thing that can bring the company down is getting too far away from its customers. Above all customer success is the foundation of Cisco's culture. Cisco views itself as a business partner

that understands its customers' industries, business strategies within the industries, and how they will differentiate themselves in the marketplace. Cisco brings the additional benefit of a business partner who also understands the Web-based applications that will provide the greatest competitive advantage in the customers' industries. Customer success cannot be facilitated through selling them point products. This approach fits well with the end to end solution positioning Cisco has taken.

Strategies and processes can be copied. The framework for a company's culture can also be duplicated but not necessarily replicated. Cisco's culture is a key sustainable strategic competitive advantage. Cisco has successfully integrated its culture into the DNA of its employees and Cisco's culture motivates its employees to execute its strategy. A company that is bound by a strong culture and given a clear strategic direction and information to be successful will out perform. An area Cisco needs to be watchful over is maintaining its culture as it scales rapidly as the market rebounds.

3.7 Financial Analysis

Cisco's financial strength is a strategic competitive advantage. The capital structure has already been discussed as a source that fuels Cisco's high R&D and acquisition activities that are cornerstones in Cisco's overall differentiation strategy. Additionally, Cisco's financial resources allow it to weather the fluctuations in customer spending while maintaining its other investment strategies. Table 1 compares the financial performance of Cisco against Lucent and Nortel who will be the two other companies TELUS will be considering for its metro core and edge optical networks.

From a financial analyst perspective, Cisco is a strong growth orientated company that understands its business and customers. Metrics such as inventory turns show analysts that Cisco has a firm grasp on market demand and manufacturing. Gross margin and net income results indicate Cisco is winning business without significant discounting. Revenue per employee, and operating expenses as a percentage of sales measurements indicate Cisco is operating efficiently. Finally, significant R&D spending signal to the market Cisco is continuing to invest in existing technologies while also developing new ones. The market capitalization comparison versus Lucent and Nortel indicate the market also sees Cisco as a leader in the internetworking equipment industry.

An area of concern may be the negative growth result. Overall spending decreased significantly after the tech bubble burst but the market is recovering. This measurement masks

the fact that the average price for networking equipment has dropped over 30% in the last three years. Showing such a small decrease in revenue growth while making up the large void created by the exit and consolidation of many customers under price pressures indicate the market is rebounding.

Although the metrics highlighted in table 1 reflect Cisco is stronger in almost all financial performance measurements, the question that needs to be addressed is how does the superior financial performance of Cisco translate into a comparative advantage that is meaningful to customers and will win more business for the company? Enterprise and commercial customers have indicated in surveys conducted by third party agencies that their buying criteria for networking equipment include, among other factors, ease of use, reliability, reputation, support and cost. These broad qualities are also important to service providers but the complexity of their networks and embedded legacy systems require other considerations such as integration with other vendors' equipment, product roadmap, management tools and scalability beyond the scope of most enterprise customers.

Cisco's financial strength, stability and high R&D investment strategy should weigh heavily in the minds of service providers. The financial viability of a company and the success of a product line affect its ability to continue the required operational and integration support, as well as the R&D investment to deliver on future functionality and services. Furthermore, financial stability help validate a manufacturer's commitment to the market that it has the ability to protect customer investment.

Financial Comparison			
	Cisco	Lucent	Nortel
Revenue (\$US M)	\$ 4,713.00	\$ 2,075.00	\$ 2,520.00
Q/Q Growth	-2.7%	-8.9%	7.0%
Gross Margin	70.4%	21.9%	39.3%
R&D (\$US M)	\$ 798.00	\$ 389.00	\$ 491.00
Pro Forma Net Income/Revenue	22.9%	-26.6%	-2.5%
Employees	34,987.00	40,000.00	38,000.00
Annual Rev/Employee (\$US K)	\$ 537.00	\$ 191.00	\$ 265.00
Market Cap (\$US Bil) May 19, 2004	\$ 147.90	\$ 13.93	\$ 13.85
Revenue (\$US B) ¹	\$ 18.90	\$ 8.30	\$ 10.10
Gross Margin ²	70.4%	21.9%	39.3%
R&D (\$US B) ¹	\$ 3.20	\$ 1.60	\$ 2.00
R&D (% of Sales) ²	16.9%	18.7%	19.5%
Operating Expense ² (% of Sales)	41.2%	44.7%	38.6%
Net Income (% of Sales) ²	22.9%	-26.6%	-2.5%
Net Cash & Investments (\$US B) ³	\$ 21.20	\$ (1.20)	\$ 0.10
Inventory Turns	21.00	65.00	70.00

Earnings Reported as of Feb 4, 2004

Source: Most Recent Cisco, Lucent and Nortel Financial Statements & Yahoo Finance

(1) Annualized by multiplying current quarter by four

(2) Pro Forma most recent quarter (operating basis)

(3) Net Cash = Cash & Investments less Debt & Preferred Stock

Table 1 Financial Summary Comparison

4 CHAPTER 4: ISSUES

Customer success is one of the pillars of Cisco's culture and a guiding principle in crafting strategies to address the needs of the market. Cisco is in a unique position. The company has emerged from the IT bubble meltdown even further ahead of competitors in market share, earnings, market capitalization and overall market position. Cisco needs to capitalize on its leadership position and resources to further widen the gap between it and the competition. Key for Cisco to accomplish this goal will be getting closer to its Service Provider customers by becoming the trusted advisor and strategic business partner as opposed just another vendor. The service provider market holds tremendous potential for Cisco but it requires Cisco to develop new creative programs that better leverage Cisco's resources and market position to address the Service Providers' challenges. Additionally, these new strategies need to not only increase the existing Cisco network footprint but also position Cisco to capture other network elements within the SP market where it has previously been shut out.

Generally speaking, most Service Providers have built their Layer Two and Three Service networks with Cisco equipment while the long haul optical network has traditionally gone to other vendors. With its advances in MSPP technology, Cisco is now positioned to capture the optical metro core and edge networks. Service Providers have not yet jumped into creating optical based Metropolitan Area services. To create the market pull and urgency for SP's to build these new optical based services and networks, Cisco must consider alternatives to its traditional engagement model.

4.1 Market Challenges

4.1.1 *Service Providers*

Since the IT bubble burst, there have been scandals that crippled the industry and massive consolidation. Most large Service Providers are publicly held. With the IT meltdown and the overall sector falling out of favour with investors, the remaining SP's have had to merge to survive and expand their reach while dealing with falling stock prices that, among other things, adversely affected their ability to raise money in the capital markets. However, a few SP's were still able to expand their markets by building new facilities but these were the exceptions as opposed to the norm. Additionally, their overall revenue potential continued to fall as high bandwidth demanding dotcom's disappeared from the market and traditional businesses scaled back their Internet and networking initiatives. During this time, SP's experienced significant losses as network utilization was well below capacity which further dampened investment in

existing and new technologies. SP's focused on cutting costs and many valuable operational competencies were lost in the downsizing. Mergers also caused grief for the SP's operations staff since processes were not well documented and expertise went with the staff that were let go or left.

Although IT spending is starting to rebound, the post bubble hangover from 2000 still lingers today. Overall spending by the Service Provide sector fell accordingly until recently. The market consolidation placed pressure on the SP's to shelve network builds but as the anticipated demand is now starting to materialize SP's are spending again. In the last year when network builds were resumed, the knowledge gap was further exacerbated as new technologies were added to the SP's network before operational staff had been educated and gained the required competencies. Mergers and any network expansion created operational issues for SP's. Service Providers were faced with new technologies and platforms foreign to their existing networks. The integration of these new elements and / or wholesale network absorption along with their respective operational requirements were often beyond the capabilities of the existing staff. Further stressing the SP's resources was the overall trend towards convergence. The highly complex multivendor / multiplatform SP environment created challenges to find and retain the required skill sets to efficiently and effectively run their networks. The industry continues to evolve and bring with it more challenges. The dynamics within the industry are pushing SP's to reexamine their markets, competitors, network strategies and human capital capabilities.

SP's are facing a competitive environment that is changing with new competitors such as cable companies who are encroaching into the consumer and retail space with bundles of broadband access, cable TV, and consumer telephony. Additionally, operational and industry challenges with workforce changes, new technologies, and pressure from financial markets to reduce debt loads are creating a need to deliver services rapidly, profitably, and seamlessly.

There are three major industry dynamics taking place right now. First, the industry is going from a regulated to a quasi-regulated state due to continuing regulatory reform. In the US, Canada and Europe the industry is evolving into a market of deregulated de facto oligopolies heading down the path of commoditization. There is a need to find new sources of revenue instead of ones situated around commoditized services such as voice and access. Second, there is also a big shift in revenue structure. The biggest shift in terms of a mindset change is by the carriers themselves. A movement away from the traditional practices on how they presently generate revenues, which is time and distance based, to a new business model focused on bandwidth and services. The time and distance revenue model was based on where you called and how long you talked that was developed when long distance links were very expensive due to

limited resources. But now the industry is facing a fibre glut. For SP's to stay profitable, carriers must adjust to a business model built around bandwidth and services. Data services are the newer offering for SP's which they have struggled with the most. The third dynamic is how SP's are building their systems. Carriers are going from a largely vertical orientation and moving to a standards-based environment. For example, countries are evolving from having tariff or non-tariff barriers to a standards-based environment where national and global service providers are selling services to customers across the country and around the world. This move to an open systems model is driving vendor and supplier consolidation in the industry.

Due to the explosion of equipment suppliers in recent years, SP's were able to negotiate with quite a few vendors. The resulting price pressures bankrupted many manufacturers. Today, there are fewer manufacturers - due to consolidation and industry exit - where supplier uncertainty has become a major issue.

Carriers have also experienced significant consolidation. This highly competitive environment is forcing carriers to:

- Focus on reducing operating expenses to deal with new competitors.
- Validate ROI models on new architectures for new services.
- Operate transparently across region and infrastructures that they may not necessarily own.

All of these factors are driving inevitably towards the evolution of the full packet network. In order for this next-generation network to become a reality, common building blocks are needed. Carriers may build out networks that differ from each others', but they will all use the same building blocks. Cisco needs to lead in the development of these common building blocks, and to lead in facilitating SP success as each carrier defines it.

The SP industry requirements can be broadly grouped into four areas:

- Evolve current networks gracefully through packet network consolidation and thus lower total cost of ownership (TCO) for improved margins.
- Deploy new services for incremental revenue and reduce customer churns through service bundles and create "stickiness" with customers - drive customer loyalty.
- Expand the market by growing their customer bases and penetrate newer markets for value-added services.
- Manage change in a progress manner to minimize risks across all tenets.

Cisco's strategy to enable SP's success requires it to leverage and combine its strengths.

Cisco needs to help SP's:

- Deploy extensible and efficient infrastructures that support these new services by supplying technologies that are smarter, faster and longer lasting to help increase the ROI to the SP while reducing its overall operating costs.
- Capture new revenue and expand the market by increasing the service flexibility and variety delivered over Cisco infrastructures.
- Accelerate demand by partnering with Cisco who can provide unique expertise and relationships with enterprises.
- Manage business transformation by providing expertise through Cisco's extensive services such as IBSG, BTAG, Advanced Services, etc for efficiencies.

The long-term strategy for carriers is to consolidate silo networks to an all-packet network that supports both existing revenue streams and future new profitable services. Long term, the telecom industry cannot support service-specific networks. Networks will converge over standard platforms and open standards. Content, broadband and mobility will be drivers for these new profitable services. The gradual transformation of today's networks to an all-packet network provides a rich environment for Cisco to leverage its IP leadership to help SP's navigate this evolution. Cisco's COMET portfolio and its IP+Optical strategy are well positioned to facilitate this network convergence. This will enable the SP's to provide delivery of common services and the ability to migrate services over to new architectures. Cisco can provide sustained innovation to SP customers as they build new capabilities over their existing networks, offering both IP and other services over a converged core.

With these changed dynamics, service providers are looking to their vendors not just for their technology but also as an avenue to help generate and tap into demand for their services. Cisco is ideally positioned to help service providers succeed, in large part due to the unique customer connection it holds with enterprise and small/medium business customers. Most Service Provider vendors are still in their traditional role of selling and marketing only to the service providers, leaving them to deal with their end users on their own. Because of this model, service providers work with multiple vendors to help ratchet down capital expenditures. Often, they have a two-vendor strategy for central office equipment in order to get the best possible price for equipment purchases.

Cisco needs to approach service providers differently. Cisco can bring a "closed loop approach" by helping SP's connect many enterprise and SMB customers worldwide which buy

Cisco networking equipment. Cisco's customers are the potential customers for SP's - the more SP's can connect with the better their own business will be. This unique position provides a number of advantages to the service provider so that instead of being forced into a defensive posture of managing deals between vendors, a service provider can adopt a partner approach with Cisco and focus on top line revenue for profitable growth of its business. Cisco can partner with SP's by leveraging a wide range of proven programs to help advance SP success. These include:

- Joint activities with the Cisco to help sell market and support new services.
- Complementing a service provider's brand with Cisco's brand strength.
- Providing technical resources to train the SP's staff and optimize their networks.
- Providing extensive sales training programs to help an SP sales force advance their skill set in selling IP-based services.
- Providing web-based marketing support to assist with all aspects of conceiving, deploying, and marketing a service

Cisco provides a comprehensive approach to deploying services - from service creation to helping SP's map out what services to offer, to architecting the services, to training and marketing, to deployment and specific demand generation activities; SP's need to leverage these Cisco capabilities. Cisco's knowledge of the business customers' requirements enables it to anticipate the demand for new SP services. Cisco's unparalleled experiences in helping many service providers deploy IP/MPLS and IP+Optical services set Cisco apart from other vendors. Cisco has gone through this process with many service providers to help them not only capture market demand in residential, SMB and enterprise markets, but also to speed time to market by offering pre-tested solutions and support for deployment. TELUS has not engaged Cisco in this manner.

The evolution of telecommunications in a multi-service packet network leads to new challenges in business issues, technology choices, operations support, business continuance, interoperability, feature interactions, security issues and human resources. All of these challenges must be met in order to be successful; service providers can effectively manage these challenges if the right steps are taken. As networks have become more complex the service providers' support needs have evolved. The service provider now requires its networking vendor to look into its network as a whole, instead of simply fixing device level issues. Part of this requirement stems from the fact that the failure of a single networking device can have a profound impact on the overall network depending on the network's design.

Cisco Support Services uses the PDIOO model (Planning, Design, Implement, Operate and Optimize). Cisco Advanced Services proactively suggests the best practices for network design and optimization in order to achieve high performance availability and operational efficiency so that Service Providers attain their time to revenue and business objectives.

4.1.2 Canadian Service Provider Market

The issues in the Canadian market are similar to the challenges and dynamics described above. The focus of activity in Canada has been the actions of Bell and TELUS. Both Bell and TELUS have spent the last three years expanding into each others' backyards. Both companies have faced many challenges as they learn to compete as both an ILEC and CLEC. The Canadian market is relatively small by global standards where TELUS and Bell have emerged as the two dominant players. MTS' purchase of Allstream (formerly AT&T Canada) may create a legitimate threat but that has yet to be seen. The rivalry between the two companies is intense and both are facing new competition from Rogers and Shaw. However, TELUS' largest competition is Bell and Eastern and Central Canada represent the largest opportunity for TELUS.

4.2 TELUS

TELUS is the second largest service provider in Canada. TELUS operates as an ILEC in Western Canada and Eastern Quebec (through its purchase of QuebecTel) and as a CLEC in Central and Eastern Canada. TELUS is a full service telecommunications company offering business and residential voice, data and wireless services throughout Canada. TELUS is one of Cisco Canada's largest and most important customers. Its success in Central and Eastern Canada is vital to growing the overall business for the Cisco TELUS account team.

TELUS' business goals include being the Canadian leader in IP networking by unleashing the power of the Internet to deliver services to businesses and homes. TELUS is concentrating its efforts to optimize its efficiency and to generate value for its stakeholders by developing profitable services and strong cash flow. In its CLEC region, TELUS is focusing on developing these services for the business market. Additionally, TELUS is a world leader by being the first ILEC in North America to migrate its traditional TDM voice traffic to an IP Next Generation Network (NGN) based on Cisco equipment.

4.2.1 ILEC Territory

TELUS was created through the merger of Western Canada's two largest ILEC's – BC Tel and TELUS. Each company enjoyed the benefits of being a monopoly where they could amortize the cost of their infrastructure investments over many years in addition to serving a captive market. When the two companies merged each partner operated relatively autonomously until their systems and networks could be integrated. The new entity had to integrate disparate billing, network operations, provisioning and trouble ticketing systems all based on different vendors' equipment and software and different internal processes. Further complicating the integration was the variety of systems and processes that already existed within each partner operation centres. For example, BC Tel had seven different billing systems that were not integrated. This was the result of creating service network silos. TELUS is still struggling with some of these issues today.

The services TELUS offered at this time consisted of basic data and voice applications. However, these services were based on its traditional financial model of time and distance. As the market evolved and the needs of its customers changed, TELUS created higher capacity offerings based on bandwidth and services. However many of these services are based on technologies that cannot scale (ATM and Frame Relay) to the meet the demands of convergence and the services the market is starting to request.

TELUS enjoys the benefits and competitive advantage of owning the majority of the copper and fibre infrastructure in its ILEC territory. Competitors that required access to buildings and curbsides needed to either build new facilities or pay TELUS for access. These access fees contribute significant revenue to TELUS' operating income and represent barriers to competitors. Access fees are regulated by the CRTC to allow competitors the ability to interconnect with TELUS' infrastructure but it has not opened the market up to the level the regulatory body envisioned. Competitors such as Bell continue to build facilities to by-pass paying access fees to TELUS. Additionally, the scope of the access fee regulation has not facilitated profitable competition in the residential market for companies such as Sprint Canada or Bell. The cable companies pose the greatest threat to capture part of the residential voice market since they already have connectivity into the home and offer other services such as high speed internet and TV. TELUS has tried to counter the "triple threat" – voice, data and TV – through its yet to be launched TELUS TV service. TELUS is in a position where it needs to defend its ILEC territory from Bell who will be trying to skim the more lucrative business data and voice customers and from Shaw Cable who will be attacking the residential voice market.

4.2.2 CLEC Territory

TELUS operates as a CLEC in Central and Eastern Canada where it does not have the luxury of already having an extensive infrastructure footprint. TELUS entered the market with a limited number of services having to pay Bell significant access fees to reach its new customers. These services were essentially identical to what was being offered by Bell. Competition between the two companies revolved primarily around price. The lack of well documented processes and new operations staff created customer dissatisfaction as new clients endured long lead times and service inconsistencies.

TELUS has now completed most of the infrastructure builds in the Central and Eastern Canada areas it has targeted. TELUS is now looking to fulfill on its goal of creating new profitable services over its own infrastructure in Central and Eastern Canada. With most of its facilities in place, TELUS needs to create differentiated services to set itself apart from Bell. The challenges TELUS faces can be grouped into three categories. First is its ability to create profitable services that the market is demanding. The issues surrounding this challenge include platform / vendor selection and integration with its traditional services. Second is its ability to manage and efficiently operate its converged network. TELUS needs to be able to scale quickly and efficiently to generate the satisfaction levels required to gain new customers and their loyalty. Third, TELUS needs to be able to create the market pull for new services and educate its sales staff to effectively deliver on the value propositions the services promise.

Bell will ardently defend its territory from TELUS. A price war will not be an effective long term strategy for TELUS if it plans to have sustainable and profitable growth in Central and Eastern Canada. TELUS needs to leverage its relationships with both end customers and partners to deliver value and avoid price competition. TELUS can achieve these goals if it develops differentiated service bundles that can be facilitated over a converged multiservice network and wrap it around superior customer service. The mindshare, customer intimacy and loyalty these tactics will create will provide TELUS with a sustainable competitive advantage over Bell.

4.3 Affects on Cisco

As identified in the financial analysis, Cisco has emerged from the rumble of the IT bubble burst significantly stronger than the competition and needs to exploit its advantages to further widen the gap. In the years following the meltdown, most equipment manufacturers suffered massive inventory writes downs, significant drops in sales and intense pricing pressure that forced several companies to exit the market. Vendor stability and viability have become

considerable factors for service providers as they evaluate technology partners. The financial well being of the manufacturer affects its ability to support and continue the development of their products. SP's build networks with a long time horizon and Cisco's strong balance sheet provides it with a competitive advantage. Cisco's financial stability is only one competitive advantage it possesses but the company cannot expect SP's to choose Cisco on this fact alone.

Cisco was fortunate to only see a minor dip in its revenues when the market crashed. Cisco's revenues have been relatively flat the last three years. Although this achievement is significant given the overall decline of IT investment and the downward trend in equipment prices, the dynamics in the market require Cisco to reevaluate its strategies to gain entry and leadership in markets outside of its core strengths of routing and switching solutions. Even though IT spending in the service provider market is starting to once again gain momentum, for Cisco to achieve its FY 2005 target of a 20% increase in overall revenue, greater contribution to Cisco's revenue mix needs to come from other technologies such as optical, security and IPT.

The overall market is in a time of transition as Service Providers are looking to convergence and the benefits it offers. Cisco is uniquely positioned to lead this network evolution. Embracing change and market transitions as key opportunities to increase business is ingrained in the Cisco culture. Creative strategies need to be crafted and implemented to address the new concerns and challenges of the service provider market. Cisco needs to leverage its financial strength, market position, brand equity, enterprise knowledge and services to evolve the way it does business with its service provider customers and make them more successful.

4.4 Evolving the TELUS – Cisco Relationship

The Canadian optical market is dominated by Nortel Networks. Cisco faces a firmly entrenched incumbent vendor for the optical business at TELUS. The entry strategy to win the optical metro core and edge networks at TELUS requires Cisco to leverage its MSPP technology, IP and Ethernet leadership position and to help TELUS win customers for its new services. To accomplish this Cisco needs to evolve its relationship with TELUS.

A new strategy is being considered to gain a beachhead within TELUS' optical network and to leverage the greater functionality of the Cisco COMET solution set and the influence of Cisco's presence in the enterprise market. Winning the metro optical network at TELUS is paramount for the Cisco TELUS team. TELUS' network build outs for layer two and three services are reaching a saturation point – new revenue streams for the team are required for continued success. Furthermore, the presence of the Cisco COMET solution within the TELUS

network will firmly entrench Cisco technology throughout the network and expand Cisco's overall revenue base and potential with TELUS while better positioning Cisco to defend against other vendors.

The new strategy needs to presents to TELUS a comprehensive plan to establish TELUS as the pre-eminent trusted brand for IP and Ethernet services in Canada and assist TELUS in winning and growing its business in Central and Eastern Canada. Instrumental to achieving this goal is the evolution of TELUS' network capabilities in its CLEC region. The new architecture will provide the foundation for TELUS to address its published strategic imperative of IP Service leadership and Central and Eastern Canadian growth initiatives. Cisco and TELUS need to work as partners and transform their relationship from their current traditional vendor / customer model.

The TELUS / Cisco relationship has developed along the lines of most vendor / customer business arrangements. TELUS buys Cisco equipment at a set discount level and purchases maintenance for that equipment. Generating revenues based on that equipment was strictly the responsibility of TELUS. TELUS has implemented just about every available Cisco platform into its networks with the exception of optical. The network topographies, for the most part, follow Cisco guidelines. As the services offered by TELUS moved up the network stack and evolved from basic low data intensive connectivity to high bandwidth, data intensive quality of service (QoS) offerings, thereby added significant complexity to the architecture and management of these networks, TELUS' ability to efficiently execute became suspect. This resulted in long lead times for service delivery, network outages and general customer dissatisfaction. At the end neither the revenues from the creation of some of these new services met expectations nor did the ROI models that justified the services come to fruition. Both TELUS and Cisco are guilty of this "build it and they will come" strategy. TELUS was not able to generate the market demand and operational efficiencies required to earn profitable returns. Cisco did not work with TELUS enough to implement best practice processes to assist in the implementation and operations of its equipment or create programs to leverage the Cisco enterprise sales force to market the new services. Cisco only provided the equipment and basic network architecture. In Cisco's defence, TELUS did not want Cisco involved in these areas of its business.

The strategic shift from vendor to partner requires Cisco to address TELUS' business goals as well as technology requirements. Within the new optical strategy, Cisco needs to:

- Become more involved and lead to help TELUS grow Top and Bottom line revenue through a creative partnership investment model that matches new revenue streams to investment.

- Mitigate the risk to the TELUS brand as it develops and turns up new optical based services by including Cisco Advanced Services to assist in the build out and migration plans and to support ongoing operational efficiencies and optimization for this project and the entire Cisco based Core.
- Generate strategic competitive advantage for TELUS through first to market delivery of new differentiated Cisco based optical IP and Ethernet services.
- Build sustainable strategic competitive advantage for TELUS by partnering to deliver and operate new optical IP and Ethernet services that result in superior customer experiences.
- Invest in the promotion of new optical Cisco based IP and Ethernet services by both creating and funding marketing programs and education sessions for the TELUS sales force while leveraging the Cisco enterprise sales force to win more business for TELUS.

By implementing the proposed architecture and leveraging the existing strong relationship between the TELUS and Cisco engineering teams, TELUS will establish a foundation to offer differentiated advanced optical IP and Ethernet services. TELUS will then be in a better position to transition its revenue mix from declining circuit based revenues to new high growth and profitable IP based services thereby driving top and bottom line growth, increasing shareholder value and brand equity.

The partnership investment model is built on the philosophy of shared success. For the initial deployment Cisco will provide each 15454 chassis configured with its final projected complement of ports. The initial investment for of the fully configured chassis offered at significant discount is not due until 6 months after shipping. Afterwards, TELUS pays on a per port basis as customers are turned up. This will help TELUS match expenses to revenues, with Cisco bearing the initial cost and risk in a partnership model.

This will also enable TELUS to add and turn up ports on the different Cisco equipment that makes-up the infrastructure that delivers these services efficiently and quickly, in a manner that is not cost prohibitive. This plan allows TELUS to acquire new equipment on a per port basis and finance the growth of its businesses as new customers come on line.

Within the financial model for the optical core and edge networks, TELUS will pay an initial “start up” cost for optical particular platform that incorporates the maximum number of allowable ports. Then, as TELUS requires and turns-up units of ports, an incremental per port charge will be billed. Based on this model there will be no need for TELUS to physically install

interface modules for each and every instance when new customers are added since the required technology to deliver services will already have been implemented.

Cisco has worked closely with TELUS for the last 4 years to build its core Next Generation Network (NGN). The Cisco based NGN has formed the basis for significant wins such as TD Bank, and allowed a successful migration of toll voice traffic to IP, putting TELUS on the forefront of convergence globally. Through this relationship, TELUS and Cisco together have developed an intimate understanding of TELUS' NGN architecture and overall networking environment. Cisco's engineering and support team will be further leveraged for the successful implementation of the optical metro core and edge networks. This will ensure the success of TELUS' evolution to a fully IP based service provider in line with TELUS' strategic imperatives.

Cisco's leading position as trusted advisor for IP services to enterprises uniquely positions it to help TELUS execute. Cisco's Internet Business Solutions Group (IBSG) has lead successful engagements over the last 12 months in guiding the direction of other Cisco based solutions at TELUS such as IP-One and developing a Government vertical strategy that has resulted in two recent significant wins for TELUS – RCMP (\$9.6M, IP Telephony) and Ontario Integrated Justice (\$1.1M in IP Telephony ready LAN infrastructure). In addition to IBSG, Cisco will engage service acceleration resources and key Cisco enterprise sales and technical personnel to provide insight into enterprise IP service requirements. This will ensure TELUS services are best suited to enterprise requirements. By leveraging Cisco's national channel organization as a catalyst, Cisco will drive broader and deeper relationships between the TELUS sales organizational and Cisco. Current efforts have resulted in a 59% increase year over year in TELUS' Cisco product and managed services sales. Finally, Cisco will work with TELUS to develop a comprehensive education plan so TELUS will be able to execute on its IP Service vision, and deliver the levels of customer satisfaction required to establish TELUS as the trusted brand for optical IP and Ethernet services.

Evolving the overall relationship with TELUS provides a blueprint to move to a partnership model. However a number of issues need to be addressed before that evolution can occur. The issues facing the success of the optical multiservice initiative include: specific concerns regarding the Cisco COMET solution, TELUS' abilities to execute (architecture, operations, marketing and sales) and the overall TELUS / Cisco relationship, especially in regards to TELUS' vendor management strategy. Each of these broad issues needs to be boiled down to identify specific tactics for the overall success of TELUS and Cisco.

4.4.1 Issue One: TELUS' Perceptions of the Cisco COMET Solution Portfolio

The new TELUS CTO is an ex-VP from Nortel Networks. Presently he regards the Cisco optical solution portfolio as a distant second or third technology – however he views Cisco as the leader in IP and Ethernet solutions. Additionally the TELUS optical architecture team has worked closely with Nortel over the last few years and has only recently started to evaluate other optical vendors as a second source. TELUS also had an exclusive supplier contract with Nortel that expired in April of 2004. The expiration of this agreement provided the Cisco account team with the opportunity to win part of TELUS' optical network.

The core competency of the TELUS optical architecture team is designing long haul networks – connecting TELUS PoP's. Optical core and edge multiservice platforms are relatively new to the team since TELUS has not looked to leverage its fibre plant in Central and Eastern Canada to offer end-customer services. The Nortel devices in the TELUS optical network do not currently have the feature set to offer cost effective, fibre based IP/Ethernet services. However, this level of functionality and scalability is on the Nortel roadmap for release in 2005.

The service development teams at TELUS are not integrated with the optical design team. TELUS is a very silo based organization. The service development teams view the optical network strictly as transport. Neither the development teams nor the optical design teams have the expertise to design, create or operate optical based MSPP services. The lack of optical MSPP competencies is not a criticism aimed at TELUS since these teams have not been mandated to develop such services and associated competencies. Additionally, only recently in the past two years, has equipment been available that can cost effectively deliver IP/Ethernet services over fibre. Furthermore, TELUS owns the last mile in its home territory of BC and Alberta so the need to develop MSPP optical services was not present. Optical MSPP solutions would be better suited to TELUS' CLEC territory in Central and Eastern Canada where they have limited facilities.

Nortel's influence with the TELUS optical team and its overall senior relationships at TELUS are significant obstacles for Cisco. Since Nortel is the incumbent long haul optical equipment provider it is in the best position to leverage the existing optical network footprint to defend and capture the metro core and edge networks. Additionally, TELUS is not known for making decisions quickly. The longer TELUS waits to deploy optical based MSPP services the more difficult it will be for Cisco to win the metro core and edge networks since this will allow Nortel to release its MSPP solutions that will build upon the Nortel devices already in the TELUS network. The Cisco account team needs to create a greater sense of urgency and present a strong,

innovative business proposal to the TELUS executive that includes resources that will address architectural, interoperability and operational issues while creating the marketing pull for new optical based services in Central and Eastern Canada to grow TELUS' top and bottom line. Furthermore, the value proposition needs to be crafted such that Nortel cannot replicate the business proposal.

4.4.2 Issue Two: TELUS' Ability to Execute

Service providers like TELUS face many challenges as they evolve from monopoly environments to fiercely competitive markets. Although TELUS' ILEC territory is a competitive market, due to its dominant position, TELUS does not have the same level of urgency to become as efficient and productive as its US peers or other high tech companies. TELUS faces many internal issues that affect its overall ability to integrate new business practices and to drive change within its operations. Coupled with TELUS' expansion into Central and Eastern Canada, its resources are stretched and beyond its ability to effectively scale.

TELUS is in the enviable position of enjoying the benefits of owning the last mile within its ILEC territory and has been successful in leveraging that investment to develop services. However, in Central and Eastern Canada, TELUS does not have this luxury or the ability to practice a slow skimming strategy in regards to its infrastructure investments. TELUS' success in this new territory requires a rapid skimming strategy to satisfy its stakeholders and solidify its market position. For TELUS to effectively win significant market share in Central and Eastern Canada, it needs resources to meet the market challenges. TELUS' current resource shortfalls include expertise in optical MSPP competencies for design and operations and general marketing and sales.

The operational issues are complex in the SP multivendor environment. TELUS has essentially four major internetworking vendors: Nortel Networks, Cisco Systems, Lucent Technologies and Alcatel. Currently, Nortel is the exclusive optical network equipment vendor. Thus the knowledge base for optical network management is limited to Nortel products. The introduction of another vendor's equipment into this homogeneous network will require additional training and disrupt the operations team's status quo. Additionally, the field operations team that provides onsite support and installation services would also require training.

Building next generation optical MSPP networks is not enough to guarantee success in TELUS' CLEC market. TELUS needs to understand how to create differentiated services to win market share to grow its top and bottom line. The silo based structure at TELUS needs to be

broken down so marketing can be better integrated in the service development cycle. The marketing resources at TELUS also need to be included in planning activities and to be better informed so they can craft campaigns and collateral that will hit home with Central and Eastern based customers. Furthermore, clear and concise programs need to be communicated to and by the TELUS sales force. TELUS will need to provide training to its sales people so they can effectively communicate the business value TELUS can bring to the market. The greatest risk to the new Cisco strategy to address the metro and edge optical opportunity is TELUS' ability to effectively create, sell, manage and deliver profitable fibre based services.

4.4.3 Issue Three: TELUS / Cisco Relationship

The TELUS / Cisco relationship can be tenuous at times. Partnership is not a concept that TELUS has traditionally practiced. TELUS does not refer to any of its suppliers as partners. More strategic suppliers are referred to as vendors. Although one may argue referring to suppliers as vendors or partners is just a question of semantics, the fact that no suppliers are viewed as partners is telling of the attitude that has been adopted by TELUS.

TELUS has also undertaken the practice of vendor scorecards to assess the vendor's overall product performance. The scorecards carry potentially significant financial penalties based on TELUS defined metrics for non performance. However, exceeding performance metrics does not entitle the vendor to any additional benefits such as reduced discounts or more business. All vendors have been mandated to participate if they want to continue conducting business with TELUS. So far, Cisco has not completely complied. Cisco is pushing back on many of the metrics TELUS has developed for its other internetworking vendors. Cisco has taken the position that it cannot be held accountable for actions of TELUS employees who may have integrated or architected part of the network using Cisco equipment that may not have been designed for that purpose. Additionally, Cisco has argued that financial penalties cannot be assigned unless all TELUS operating staff achieves certain competency levels to assure Cisco that TELUS has taken the required steps to train and adequately prepare its staff to operate the network. Furthermore, unless the Cisco account and service teams are fully integrated with TELUS' operations, Cisco will not be able to proactively monitor network performance and ensure all operational processes are properly documented and adhered to by TELUS staff. Over 95% of network failures are due to human error of some kind, the majority are process errors. Cisco has been informed it is the last internetworking vendor to comply with the scorecard program. This fact has been highlighted to senior management at both TELUS and Cisco.

TELUS has traditionally looked upon Cisco as a product vendor. The advanced services that Cisco offers that are aimed at optimizing network performance and operations have not been purchased by TELUS. TELUS argues that these integration and consulting services should be included in the price TELUS pays for Cisco products. Additionally, TELUS believed its operations staff had the required competencies to manage its network effectively. However, the number of network outages and the penalties TELUS has had to pay under its Service Level Agreements (SLA's) for nonperformance to its customers would indicate otherwise. Furthermore, as TELUS has develop more IP based services that run on a multitude of various Cisco solutions that were developed by different technology teams within TELUS has added complexity and operational issues. The operational issues are a result of the silo based decision making within TELUS. The TELUS service development teams have not consulted its own operations teams before creating new services to assess the skill set requirements and impacts to network management.

5 CHAPTER FIVE: RECOMMENDATIONS

The new Cisco strategy for the metro core and edge optical opportunity at TELUS addresses the issues highlighted in chapter four. The issues are addressed through a new innovative business proposal that leverages Cisco's strategic competitive advantages to craft a value proposition that cannot be easily replicated by its competitors. However, before the Cisco team can effectively present the new business model to TELUS, the TELUS executive and CTO need to be convinced of the economic viability and the need to evolve to a MSPP platform for its CLEC market and Cisco's leadership in this technology. The elements in the proposal share the business risks of developing new optical based services between TELUS and Cisco, bundle Cisco's advanced services to assist TELUS in developing and operating the new MSPP platform and leverage the strength of Cisco's enterprise sales force to generate market demand while allowing TELUS to keep its existing Nortel optical footprint thereby protecting TELUS' network investment. This approach allows TELUS to keep its existing Nortel long haul optical investment while benefiting from a Cisco based metro core and edge designed solution.

5.1 Cisco's Vision for TELUS' CLEC Network Evolution

The TELUS network has undergone a remarkable change. From being largely identified with telephony, the network has become increasingly defined by the Internet and other forms of data communication. As the expectations of data networking have risen, TELUS has been continually forced to revise its estimates of bandwidth, types of delivery, and response times. Today's fast-growing demand for a wide array of high-bandwidth data services is being driven by enterprises that have to upscale and centralize their information technology to stay competitive. To meet customer requirements, TELUS finds that it must increase capacity and service offerings while ensuring its own profitability. TELUS is faced with the need to increase capacity, lower capital and operating expenditures, and evolve its networks to a simplified architecture. In addition, TELUS must accelerate time to market for the delivery of value-added services, and must be able to quickly add new services.

The traditional bandwidth bottleneck is in the metropolitan area network (MAN) which is also the most likely place for new revenue generation for TELUS. Because MAN's bridge the access and long-haul networks, they must scale easily and cost-effectively, as well as meet demands for an increasing array of broadband services, on-demand access, and service diversity. The inefficiencies and complexities associated with supporting new high-bandwidth services and scalability force MAN service providers to continually re-evaluate their network strategies.

Metro networks have thus become critical points in the overall migration to a more simplified, flexible, and scalable architecture.

Access or metro edge networks connect users to the larger public network. Here the emphasis is on service variety and customer response. As customer LAN's increase in speed and complexity, service providers are called on to improve the quality of their current services while delivering new types of high-bandwidth services to customer sites. The business challenge for TELUS is in finding ways to satisfy the diverse customer demands while making a rapid payback on new investments that result in profitable growth.

As traffic requirements arise in the existing network SONET services are activated on ADM nodes in the required source and destination locations. Depending on the type of equipment that is already deployed in the network this can be a very time consuming task and depending on the equipment, the process can be very manually intensive. The speed of deploying new services for customers can be an issue when there are many nodes between the source and destination nodes. Also, the existing equipment may not be able to scale as well as other SONET equipment requiring the additional cost in deploying more units to offer incremental services.

In areas where new services are required and TELUS does not have a foot print already established there will be a need to deploy new SONET equipment. TELUS has the ability and options to deploy many solutions in a new service area. TELUS can deploy Nortel's SONET solution which may have some deficiencies that need to be addressed to bring efficiencies to the network and therefore to TELUS as a whole.

In order to make the new CLEC portions of TELUS' network (where there are no SONET ADM's deployed) more efficient so that TELUS can have a lower capital expenditure payback period and a lower cost per bit Cisco is proposing a Multiservice unit that can address the initial PoP's need to offer several services at a much lower initial cost than deploying several sparsely populated specialized "per service" devices. The Cisco solution is based on its ONS 15454.

Multiservice provisioning platforms have emerged to address the constraints that legacy SONET/SDH equipment fails to overcome in the complex, evolving metro environment, without sacrificing the many benefits of SONET/SDH. Based on next-generation SONET and dense wavelength division multiplexing (DWDM) technologies, multiservice provisioning platforms enable service providers to deliver high-value voice, data, and wavelength services, over any optical transport link (OC-3, OC-12, OC-48, OC-192, and DWDM). Cisco is now the recognized market leader in this technology.

The Cisco account team can quote many independent research organizations that support Cisco's claim as the MSPP segment leader. However, the Cisco account team needs to leverage its executive bench to earn the mindshare of TELUS' CTO and senior management. For the executive level buy-in required to lay the groundwork for the Cisco metro optical core and edge solution, the account team needs to take a two pronged attack. Although the CTO is an ex-Nortel VP and strong Nortel supporter, he recognizes Cisco's IP and Ethernet market leadership. Additionally, the TELUS CEO, Darren Entwistle can influence the CTO's technology / service direction and strategy. The account team needs to win over the CTO through education and executive level contact. Reports, by organizations such as the Dell'Oro Group, rank Cisco as the number one global MSPP equipment supplier based on the estimated number of devices deployed and revenue. Additionally, Cisco has pioneered many of the advances in the MSPP market. The TELUS CTO needs to understand that Nortel does not own the next generation optical market. In addition to independent reports stating Cisco's leadership in MSPP technology, the Cisco account team needs to broker executive level meetings with the COMET SBU heads with the TELUS CTO. As the CTO is being educated on the MSPP market and technology, the account team needs to continue to work with the TELUS optical planning engineers.

In parallel, a relationship needs to be established between TELUS' and Cisco's CEOs. The two men have had telephone conversations, met at the Cisco CIO Summit and had an in person one on one meeting on June 17, 2004. A list of topics with executive briefings was drafted by the account team for the meeting. John Chambers, Cisco's CEO, carries significant political capital and influence. Facilitating a relationship for Darren Entwistle with John Chambers will provide Cisco and the account team the executive level contact required to successfully present the metro optical core and edge solution. The account teams needs to be careful to not to appear to be sidestepping the CTO by going directly to the CEO. The CTO needs to be kept in the loop on the Darren Entwistle and John Chambers meeting so that he is not caught off guard by the topics that will be discussed. Cisco needs to generate this mindshare at the executive level to be able to win the optical metro core and edge networks.

The areas that need to be discussed at this level should cover Cisco's commitment to help TELUS drive its IP leadership in Canada. Specifically, how will Cisco help TELUS maintain its leadership position and enhance its strength across all the key elements: network capabilities, applications, services and operating support systems? At a high level John Chambers needs to help Darren understand Cisco's approach and commitment in building and supporting 'carrier class' excellence in next generation networks. Additionally, the men need to discuss how the relationship between TELUS and Cisco needs to evolve so that TELUS can institutionalize more

efficient and effective mechanisms for getting access to leading-edge CISCO ideas, developing joint TELUS-Cisco value propositions and engaging in the marketplace. TELUS has already highlighted its investment into IP-One in the media and in its annual report. This service was brought to market through a joint collaborative effort between TELUS and Cisco and can provide a foundation to build upon.

5.2 Strategic Shift

5.2.1 Sharing the Risk

The new strategy is a bundled solution encompassed within a pricing / investment structure that allows TELUS to better match network investments to revenues and to improve cash flow management. The proposed solution will follow a hybrid network utility model where Cisco will only bill TELUS for the equipment as customers are added to the new network on a per port basis after an initial up front payment- unlike traditional network utility payment models where the end customer pays a fully loaded port cost only as facilities are activated. In addition, Cisco resources will be collocated within TELUS to assist in the implementation and operations of the optical MSPP network.

5.2.1.1 Hybrid Network Utility Pricing Model

Customer success is an integral component of the Cisco culture. SP's have built Cisco based networks to deliver a myriad of data services. With the consolidation in the market and increasing competition, service providers are looking for alternative business models to gain market share and offer new services. The new strategy Cisco is presenting to TELUS for its optical core and edge network defers the majority of the initial investment until such a time that TELUS begins turning up services for its customers. The model is based on shared risk and partnership. Cisco considered a full utility model where there would be no upfront cost to TELUS, however without an initial investment by TELUS there may be less motivation on its part to commit the resources required for success. By taking a mutual investment tactic, both organizations have "skin in the game" and will work towards shared success.

The nature of the Service Provider business is such that revenues do not necessarily always follow costs. In order to assist TELUS in maintaining positive cash flow as it launches new services and to finance the growth of subscribers, Cisco created a "revenue matching" financial model. This will enable TELUS to add and turn up ports on the different Cisco optical equipment that makes-up the metro core and edge infrastructure network that delivers these

services, in a manner that is not cost prohibitive. This plan allows TELUS to acquire new equipment on a per port basis and finance the growth of its businesses as new customers come on line.

Within the financial model for optical metro core and edge network, TELUS will pay an initial "start up" cost that incorporates a fully configured and scaled chassis with the maximum number of allowable interface ports. Then, as TELUS requires and turns-up units of ports, an incremental per port charge will be billed. Based on this model there will be no need for TELUS to physically install interface modules each and every instance that new customers are added. By providing fully configured devices, TELUS can quickly add customers and reduce the overall installation time to its end customer.

By sharing the risk and essentially offering TELUS a zero percent financing model for network growth, Cisco moves closer to being considered a partner versus a hardware vendor. Although the current TELUS philosophy does not foster such relationships at this time, successful projects like this should lay the groundwork for a more productive working partnership.

Cisco's competitors for the optical core and edge networks could offer a similar financial arrangement to TELUS. However, both Lucent and Nortel are in much weaker cash positions than Cisco and the optics of such an arrangement may not sit well with their senior management. From the financial comparison, both Lucent and Nortel lag behind Cisco in gross margin. Sacrificing profitability to grow the top line is not a sustainable long term strategy and eventually creates more problems and skews customer expectations. The financial component of the strategy is just one deliverable of the overall value of the proposal to TELUS. Even if Lucent and Nortel offer the same or even better financial terms, both competitors lack the expertise of Cisco to efficiently operationalize Optical+IP converged networks and its ability to drive the market pull for these new optical services.

5.2.1.2 Cisco's Advanced Services

Currently missing from the overall engagement model between TELUS and Cisco is the Advanced Services program. The Advanced Services portfolio provides proactive operational and consultative support, network optimization and operational best practices for Cisco networks. TELUS has taken the position that its annual spend with Cisco should warrant the inclusion of Cisco Advanced Services free of charge. However, when these services were originally offered as a service bundle with Cisco's maintenance program, TELUS negotiated the services out of the

program in exchange for lower prices. TELUS believed it had the required resources to fulfill on the deliverables of the Cisco Advanced Services portfolio internally. Over the last three years when the Advanced Services were not applied to the TELUS network, it has experienced continued network outages and process control challenges. The main issue facing the adoption of Cisco Advanced Services is an internal budget issue within TELUS. Network operations falls under the control of the VP of Operations while architecture and planning are the responsibility of the CTO who is a strong supporter of the Advanced Services program.

The inclusion of Advanced Services into specific projects like the optical metro core and edge networks allows the CTO to budget for the services and allows Cisco to expand the scope of the deliverables to include the rest of the TELUS Cisco based core. The challenge for Cisco will be to win over the VP of Operations once the optical metro core and edge networks are built since the Advanced Services will no longer be funded out of the CTO's budget at that time. Cisco is confident that the VP of Operations will see the value of the Advanced Services program and a compromise between the CTO and VP of Operations can be accommodated. The VP of Operations has been hesitant to support the Advanced Services program since she sees this as a potential outsource arrangement for overall network operations.

Cisco is not in the business of running an SP's networks since it is not a core competency. Cisco Advanced Services is not designed to take over the complete operations of an SP, although it has partners to whom it can out task this function. The value in Cisco's Advanced Services is the proactive support and consulting the Cisco Network Consulting Engineers (NCE) provide to the SP's operations and architecture teams to ensure they are utilizing and integrating the Cisco equipment and network management tools efficiently and effectively.

TELUS and Cisco have data on the time spent and overall difficulty TELUS has had in the past when it rolls out and integrates new networks and components. The project management assistance and overall deliverables of the Advanced Services program can be measured against these benchmarks to quantify the value TELUS receives from the program. The resulting operational efficiencies and increased customer satisfaction should encourage and prove to the VP of Operations that the Advanced Services program has value.

The Advanced Service program would also help improve the overall relationship between TELUS and Cisco and assist in the scorecard initiative. The NCE's will have the ability and visibility into the TELUS network to concentrate on the operational areas that drive the metrics within the TELUS scorecard. The areas being measured by TELUS identify the major areas of concern. The presence of the NCE's provide Cisco with the comfort level required to enter into SLA agreements with TELUS since it will then have some level of control and influence on the

operations and overall use of its equipment in the TELUS network. The management tools that proactively monitor TELUS network that are part of the Advanced Services program will produce the data to populate the scorecard and ensure both TELUS and Cisco that the results within the scorecard are valid. After all, TELUS' premise for undertaking its scorecard initiative was not only to measure the performance of its vendors but also to identify areas for improvement that will mitigate its risk due to network outages and overall customer dissatisfaction and damage to its brand. The scorecard can also be used to identify areas that TELUS also needs to improve internally. Furthermore, the scorecard should facilitate a more cooperative and open relationship with vendors and pave a path to partnership. If, instead the scorecard is used as a vehicle to extract penalties from vendors, any real long term benefits will be lost to such short term and unproductive actions and foster a potentially adversarial uncooperative environment.

5.2.1.3 Marketing Program Investment

Operational challenges aside, TELUS needs help in developing the marketing pull for new services. Although it has had success in winning some business in Central and Eastern Canada, its penetration is still relatively low. As part of the new engagement strategy, Cisco needs to become integrated with TELUS' marketing and sales teams. Cisco resources will be dedicated to working with the appropriate TELUS teams to develop marketing collateral, programs and incentives to win customers for TELUS' new optical based services.

Part of the program will allow TELUS to co-brand with Cisco. Both TELUS and Cisco logos will appear on advertisements and marketing collateral such as brochures highlighting the new optical based services. Additionally, the optical metro core and edge networks will earn Cisco Powered Network (CPN) certification. The CPN certification is recognized by most networking professionals as an assurance of quality and dependability.

5.2.1.4 Cisco's Enterprise Sales Operations (ESO)

The success of Cisco's Enterprise sales force is a competitive advantage that can be leveraged for TELUS. TELUS has already enjoyed some of the benefits of engaging with the Cisco ESO. TELUS' recent wins at both TD Bank (\$100M+ over seven years) and Co-operators Insurance (\$30M+ over seven years) were facilitated by the Cisco ESO. More formal meeting and relationship building activities will be planned between the TELUS sales force and Cisco ESO. Additionally, account planning sessions will be organized to identify areas where TELUS, with the help of the Cisco ESO, can most successfully sell its new optical based services. These

meetings and activities will also uncover other opportunities for TELUS in addition to optical services thereby solidifying a stronger working relationship with Cisco overall. This commitment by both the Cisco ESO and TELUS sales teams for mutual success will also provide another initiative to move the overall relationship to one of partnership.

5.3 Impacts to Cisco

TELUS currently spends approximately \$40M US annually with Cisco for its core infrastructure. Winning the metro core and edge optical networks is estimated to initially add \$20M US over 2 years to TELUS' purchase volume. As more customers and services are added to the networks, the anticipated annual run rate for the optical networks will be around \$5-\$6M US, plus related peripheral equipment which could double the yearly run rate. The incremental maintenance for the equipment will add another twenty percent. Leveraging this deferred payment model delays Cisco's ability to recognize the revenue from the project until TELUS has turned up the appropriate number of ports on the optical equipment. The initial configuration is deeply discounted. The initial configuration allows for twenty-five percent utilization. Once TELUS reaches fifty percent density on the equipment, the overall realized discount will be in line with its current discount level since these additional ports are added at the Cisco list price for the associated equipment. Going forward from fifty percent density, TELUS purchases additional ports at its standard discount. The overall profitability of equipment purchased does not increase, in fact it decreases slightly. The magnitude of that decrease depends on how long TELUS takes to add enough customers and services to reach fifty percent utilization and the associated time value of money. However, this cost to win the optical networks is small in comparison to other strategies that are strictly price driven where a deep discount is pegged for a specified number of years.

Winning the metro core and edge networks also increases the Cisco footprint and builds a broader base for Cisco to sell incremental high margin profession services thereby increasing the overall profitability to Cisco. The increased equipment volume also drives additional maintenance revenues that are also high margin. But the key success criteria this new strategy can delivery is providing a foundation to evolve the current customer – vendor relationship to a partnership model where price is less of a concern; the focus will be on generating profitability for TELUS on its services, increasing the TELUS brand equity and maximizing the efficiency of its operations. These valuable and differentiating goals will allow Cisco to earn better margins by

shifting TELUS' current price focused tactics to business generation and operational efficiency measurements that benefit both partners.

5.4 Summary

The new strategy is designed so that TELUS can efficiently and seamlessly build optical metro and edge networks and offer optical based services in its CLEC region. The architecture is unique to a certain degree since Cisco currently has a technological advantage over its competitors and the incumbent long haul optical vendor. However the success of the initiative depends on the non-technical and business factors that cannot be easily copied by Cisco's competitors.

Cisco's financial strength and good standing allows it to offer a deferred payment plan to TELUS that allows it to better match its costs to revenue and incur additional costs only when new customers are added. Although the investment is not huge, approximately twenty million dollars over two years, the optics for companies such as Nortel, which is facing financial stress and greater scrutiny in light of recent events, or Lucent which is also under financial duress, affect their ability to offer the same arrangement.

Cisco's Advanced Services is not a unique program since Nortel and Lucent have similar offerings. However, the presence of Cisco equipment in all of TELUS' other IP networks provides greater incentive to use the optical network as a catalyst to launch Cisco's Advanced Services to benefit the entire Cisco core at TELUS. The funding for the program is offset partly by the CTO office and by the account team. Funding for Advanced Services is included only for the first year. Renewal for Advanced Services would be at the standard TELUS discount after the first year to protect the ongoing pricing levels between TELUS and Cisco.

The areas that Cisco's competitors cannot easily copy include integrating TELUS' marketing and sales organizations with the appropriate Cisco resources. Cisco is the recognized leader in MSPP, IP, Optical+IP and Ethernet services. The brand recognition and equity of Cisco will prove to be a powerful vehicle for TELUS. Dedicating marketing resources to work with TELUS will generate pervasive and powerful messages to TELUS' potential Central and Eastern Canadian based customers. Above all, the influence of the Cisco ESO is a component of the overall package that cannot be easily copied. Prior engagements between the TELUS sales teams and the Cisco ESO proved to be very successful and form a foundation for future opportunities. Both the marketing and sales engagements will greatly help the TELUS brand and provide resources to gain customers and market share for TELUS in Central and Eastern Canada. The

strength of the Cisco marketing resources and ESO differentiates Cisco from its competitors. Few, if any competitors, have the MSPP, IP , Optical+IP and Ethernet leadership to influence the enterprise market to the level Cisco can. Thus, even if these competitors can offer a similar financial model, their ability to generate the market pull for new optical based services would not be comparable to Cisco's resources.

The greatest risk to Cisco is the uncertainty of TELUS' ability to execute. By including Cisco Advanced Services as a mandatory component to address ongoing operational and integration issues, Cisco hopes to mitigate risks. Cisco plans to generate the market demand and pull through a more tightly integrated relationship with the TELUS marketing and sales teams. This combined mutual effort and investment should move the overall relationship to a partnership focused on shared success.

This new strategy to enter into the Canadian metro core and edge optical equipment market builds upon the many strengths of Cisco. The new strategy bundles key competitive advantages that Cisco has to generate greater success for its service provider customers. The traditional customer – vendor relationship will evolve into a partnership as both the SP and Cisco invest in mutual success. The financial strength of Cisco allows it to be more creative on how it charges the SP for equipment and better matches new revenue to network investment for the SP. By taking on the majority of the risk during the initial phases of the network rollout, Cisco puts more “skin in the game” and fills the role of a partner instead of vendor by building trust and greater mindshare with the SP. The bundling of Cisco's Advanced Services to optimize the network build and ongoing operations not only helps the SP get to market faster and enjoy first mover advantages, but the best practices and processes will better prepare the SP to deliver superior customer service and earn customer loyalty along with operational excellence that will translate to competitive advantages for the SP. Finally, Cisco's enterprise knowledge and ESO can help the SP generate more sales for its new services. Through this new strategy Cisco will gain entry to markets such as the optical network where it was once previously shut out. The new revenue streams and other additional network elements that the SP will purchase will increase the overall percentage TELUS spends on its networks with Cisco versus Lucent, Alcatel and Nortel.

Cisco has targeted the service provider market. The overall success of its SP customers is vital for Cisco's long term growth and strategy. By encouraging SP's to build their services platforms with Cisco technology, enterprise and commercial end consumers can enjoy the benefits of having Cisco in their networks via the services the SP offers. Most of Cisco's SP customers offer managed services that Cisco can encourage its enterprise and commercial customers to integrate into their network strategies and complements their exiting IT

competencies or outsource the function to the SP. The SP can leverage Cisco's brand equity by co-marketing their managed services under the Cisco Powered Network (CPN) program. By becoming the outsource partner to the enterprise and commercial consumer the SP creates greater customer "stickiness" and better positions the SP to capture more business. This will translate to greater Cisco product absorption by the SP and extend the Cisco network footprint.

Evolving all of Cisco's relationships with its SP customers to a partnership model is in the best interest of the company. The SP's market position, business goals and existing relationship with Cisco all need to be closely examined before this model should be applied to win areas of the network that Cisco does not presently own. Leveraging Cisco's enterprise knowledge and ESO along with Cisco's Advanced Services should be common elements available to its SP partners. These three components may be enough to move the relationship to a partnership model depending on the current SP relationship. TELUS is unique since Verizon owns 26% of its common stock. However the two companies do not share a great deal of information and do not necessarily build their respective networks to the same specifications. For example, Verizon uses Cisco's wireless technology in its mobility division while TELUS has chosen Motorola. Similarly TELUS uses Cisco for its layer 2 aggregation while Verizon uses Lucent. Bell poses different problems if the model were to be applied to it. Bell owns portions of MTS and Aliant. But the Bell account team has been successful in segregating the account – Bell has different discount levels and programs from both MTS and Aliant.

Cisco can fence in the financial arrangements under non-disclosure agreements to reduce its risk that other SP customers would demand the same treatment. Additionally, each SP's requirements and relationships with other carriers would need to be assessed as to the applicability of the elements of this model. The various Cisco account teams need to determine if their respective accounts also need the financial component of the model to move the relationship to one of partnership and if it is required to win a particular network. Cisco needs to ensure that the account team approaches the service provider with the financial model as opposed to the other way around where the SP hears of Cisco's financial model and demands similar treatment. In the event that this occurs, it would be unlikely that the service provider will have the specific details of the program allowing Cisco an opportunity to repackage the offer as it best see fit. It is unlikely that competing SP's will learn of the specific financial arrangements.

The mutual investment component needs to be managed carefully so that Cisco does not overextend itself. Cisco should limit this approach to areas where the SP does not recognize Cisco's technology as the superior platform to build its network or in situations where the SP is not convinced the market is demanding the services Cisco claims. Cisco account teams need to

position the financial model carefully so that it is not improperly taken advantage of by the SP. The financial model should be positioned as a proof point that Cisco is willing to invest in creating services that it believes the enterprise and commercial markets are demanding. The scale of the model will depend on the business opportunity for the SP.

The overall risk to Cisco in offering similar programs to other service providers needs to be weighed against the risk to Cisco if another vendor captures the network in question. The rewards to Cisco are significant if it can win areas of the service provider network where it has been previously shut out, add to networks where Cisco can surround the incumbent and gain a beachhead to potentially replace the existing equipment or if it can eliminate a competitors' equipment from the service provider's network completely. This strategy will better position Cisco since service providers are looking to reduce the number of vendors in their networks to gain operational efficiencies.

The TELUS situation has progressed since the start of this analysis. John Chambers and Darren Entwistle met on June 17, 2004 and discussed elements of the optical strategy. The ideas were well received. Darren Entwistle acknowledged that TELUS needs to work with Cisco in a partnership model and recognized Cisco's brand equity and the influence of its ESO organization; both qualities were recognized as strategic competitive advantages Cisco possesses over its competition and he realizes that a partnership model will allow TELUS to better position its own brand and will drive more business for TELUS in its CLEC territory if it effectively leverages its relationship with Cisco. Furthermore, Darren Entwistle wanted to apply the marketing, ESO and Advanced Services elements to TELUS' layer 3 VPN services where Juniper has been gaining traction. TELUS has now committed to working exclusively with Cisco. The area that Cisco still needs to work on for the metro core and edge optical networks is convincing the architecture and technology teams of the superiority of the COMET platform versus Nortel and Lucent. At the executive level, Cisco has proven its competitive advantages from a business perspective and its market leadership in Optical+IP and MSPP. The technical "bake off" will be conducted by the end of June 2004 to prove out Cisco's superior functionality, scalability and flexibility to offer new differentiated service for TELUS to offer in its CLEC territory.

BIBLIOGRAPHY

Porter, Michael E. *Competitive Strategy*. New York: The Free Press, 1980.

Porter, Michael E. *Competitive Advantage*. New York: The Free Press, 1985.

Prahalad, C.K., and Gary Hamel. "The Core Competence of the Corporation." *Harvard Business Review*, May-June (1990).