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COMPUTER NETWORKING: {PRIVATE}

An Open Letter to Warren Buffett Re: Cisco Systems

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Mr. Warren Buffett
Chairman of the Board and
Chief Executive Officer
Berkshire Hathaway Inc.
1440 Kiewit Plaza
Omaha, Nebraska 68131

Dear Warren:

If You Think Coke Is A Good Investment . . .

Paul Johnson, CFA
Robertson, Stephens & Company
590 Madison Avenue
New York, NY 10022

February 20, 1997

Dear Mr. Buffett:

We have been ardent students and admirers of your investment career. Among other tenets of your investment discipline, we share the following:

- Long-term investment horizons;
- A focus on operating business fundamentals and not stock market sentiment;
- Fundamental analysis that focuses on neither value nor growth—rubrics, which as you have so presciently noted, in and of themselves are devoid of any utility as investment guideposts—but rather, on profitable growth, i.e., the deployment of large amounts of incremental capital at very high rates of return;
- A predilection for companies that have defensible franchises, with deep moats and high walls, sound business strategies, a high degree of customer control and some level of monopolistic pricing power;
- A rigorous valuation discipline.

We recognize that, having had some success on your own in identifying great businesses and acquiring interests therein when your benefactor, Mr. Market—at times a somewhat capricious fellow—has felt out of sorts, you have never had much use for securities analysts. Nevertheless, in the interest of market efficiency, we feel obliged to call your attention to an industry and a specific company within that industry that you may have overlooked or never occasioned upon in your investment journeys. This investment opportunity lies in a pond that, we believe, you have traditionally avoided in the mistaken belief that you lacked the requisite rod and tackle and that the fishing was too speculative. We assure you, however, we believe that the fish in this pond are not only well worth your time, but also well within your grasp.

We should note that we were also inspired to write to you by one of our colleagues at a competing firm across “the Street,” who wrote to you last year to outline an investment case for Kellogg Company.¹ If you found Kellogg to be impressive (even if you didn’t), and given that capital is a scarce resource (albeit perhaps not as scarce for you as for the rest of us), you should continue reading: we believe that you will find the fish to be much fatter and the fishing to be much easier in our pond.

The industry within which this investment opportunity lies did not exist ten years ago and, as evidenced by its continuing phenomenal growth rate, appears to be far from its prime. This industry has generated and continues to generate

¹ We refer to “Kellogg Company: An Open Letter to Warren Buffett”, CS First Boston research note dated July 11, 1996, prepared by Michael J. Mauboussin, Managing Director, CS First Boston.

extraordinary and sustained returns on invested capital and growth rates of a similar magnitude and duration. It not only has managed to internally self-finance out of operating cash flow an almost fivefold increase in invested capital over the past three years, but it has generated a considerable and growing amount of excess cash over and above what is required to fund such growth. Generating and sustaining this profitability and growth, moreover, the industry enjoys self-generating demand, formidable barriers to entry and ongoing consolidation. Those companies that gained “first mover advantage” in one or more segments of this industry have continued to prosper and to gain market share, with returns and growth fueled by the booming demand and protected by the barriers to entry and consolidation.

Conveniently, this industry is the industry that we follow, computer networking. **STOP! Do not throw out this letter!** We recognize that you perceive most, if not all, technology companies to lie outside your “circle of competence;” happily, we believe you are mistaken! If you will read to the end of this letter, we believe that you will see that the economic fundamentals of this industry and its companies are well within your grasp and, contrary to popular belief, do not require a Ph.D. in computer science or electrical engineering (or even a Columbia MBA for that matter).

We emphasize “you will see” as opposed to “we will show you” for, of course, we do not expect you to rely on the research of a securities analyst. The raw data and readily observable trends speak for themselves and require little, if any, interpretation.

As alluded to above, the computer networking industry, in general, and a host of computer networking companies, in particular, are fundamentally phenomenal businesses. We call your attention to one networking company in particular: Cisco Systems (CSCO \$64-7/8 Buy).

To give you an idea of just how phenomenal the operating fundamentals of both the networking industry, in general, and Cisco, in particular, are we thought The Coca Cola Company, a company with which we believe you are familiar, would provide a reasonable yardstick. In making our specific investment case for Cisco, relative to Coke, we will address the fundamental tenets of your investment philosophy set forth in the two recent biographies of your investment career, Roger Lowenstein’s *Buffett* and Robert Hagstrom’s *The Warren Buffett Way*.

Lowenstein offers the following guide—gleaned from your letters to shareholders, other writings and comments over the years—to your investment discipline:

- Pay no attention to macroeconomic trends or forecasts or to people’s predictions about the future course of stock prices. Focus on long-term business value—on the size of coupons down the road.
- Stick to stocks within one’s circle of competence.
- Look for managers who treat the shareholders’ capital with owner-like care and thoughtfulness.
- Study prospects and their competitors in great detail. Look at raw data, not analysts’ summaries.

Regarding the last of these investment guideposts, as noted above, you need not rely solely on our analysis of Cisco's long-term business value. In an effort to facilitate your analysis, we have set forth the raw data below. We believe that you will find this data presents a rather compelling picture of Cisco's prospects for long-term value creation.

As did our colleague Mr. Mauboussin, a Managing Director at CS First Boston, we will treat the other basic tenets of your investment discipline noted above in the context of Mr. Hagstrom's guide to your investment philosophy, which he sets forth in terms of business, financial, management and market tenets.

Business and Financial Tenets

Consistent Operating History/Attractive Returns

Coca Cola's operating performance and market position are enviable. The company has created a seemingly unassailable franchise. Having captured "mind-share," it enjoys what you refer to as deep moats and high walls. These competitive barriers have enabled Coca-Cola historically to generate very attractive operating returns from a rather large and growing base of invested capital.

Return On Invested Capital (ROIC)

As you noted in your Berkshire Hathaway 1992 Annual Report to Shareholders:

"Leaving the question of price aside, the best business to own is one that over an extended period can employ large amounts of incremental capital at very high rates of return. The worst business to own is one that must, or will, do the opposite—that is, consistently employ ever-greater amounts of capital at very low rates of return. Unfortunately, the first type of business is very hard to find . . ."

Indeed, it's not easy to find companies such as Coke that can apply large amounts of capital over extended periods of time at steadily wide positive spreads. That being said, set forth below is a comparison of the return on invested capital (ROIC) and its constituent components, net operating profit after tax (NOPAT) and invested capital, for both Coke and Cisco for (1) each of the quarterly periods spanning calendar Q1 1994 through Q4 1996, (2) the trailing four quarter period ending in each of the quarterly periods spanning calendar Q1 1994 through Q4 1996 and (3) each of their last six respective fiscal years spanning calendar 1991 through 1996.²

We use ROIC, as defined above, since we believe it to be the best metric for assessing a business' true profitability. Cash, in the form of capital, is the lifeblood of every business, public or private, irrespective of size or nature. As such, it is both a scarce and an essential resource and the one incontrovertible common denominator shared by Cisco and Coke and, for that matter, by every business enterprise.

² Given that Coke has not yet finalized and published its December 31, 1996 balance sheet, for purposes of calculating Coke's ROIC for each of calendar Q4 1996 and the four-trailing quarter period ending in Q4 1996, we have made the fairly conservative assumption (taking into account and not withstanding Coke's sale of its 49% interest in Coca-Cola & Schweppes Beverages Ltd.) that Coke did not invest any additional net capital in its business following the end of calendar Q3 1996—i.e., that invested capital at the end of December 31, 1996, remained at the September 30, 1996 level.

This focus on ROIC is founded on our shared belief that there is little utility to analyzing sales and earnings growth without also analyzing the invested capital required to generate such growth. To quote from your Berkshire Hathaway 1992 Annual Report:

“Growth benefits investors only when the business in point can invest at incremental returns that are enticing—in other words, only when each dollar used to finance the growth creates over a dollar of long-term market value. In the case of a low-return business requiring incremental funds, growth hurts the investor.”

As the data set forth in **Figures 1–3** shows, Coke and Cisco each offer rather enticing incremental returns on invested capital. As is also evident from the data, however, Cisco’s returns are significantly more enticing than Coke’s—in terms of both magnitude and consistency.

As you already know, Coke is a pretty good business. From 1991–1996, Coke generated year-in year-out annual ROIC between 25% and 35%. Over the past 12 quarters, Coke’s quarterly annualized ROIC ranged between 25% and 45% while we estimate that its weighted average cost of capital during this period was only approximately 14%. Given the consistency and size of such positive spreads, it is easy to understand your attraction to the company.

Based on the same metrics, Cisco appears to be a phenomenal business. Cisco has generated an extraordinary, in terms of both its magnitude and consistency, ROIC in the range of 130% to 195% during the past six years and 124% to 245% over the past 12 quarters. Moreover, since its inception in 1986, Cisco has consistently earned returns in excess of its cost of capital. By the way, Cisco has achieved these returns without using any financial leverage. Having no debt, the company’s estimated average cost of capital (i.e., expected returns to its equity holders) currently is approximately 18% (using an equity risk premium of 6.5%).

As **Figure 1** shows, depending upon which period one chooses to focus, each dollar of capital invested in Cisco generated approximately no less than three and as much as eight times more NOPAT as did each dollar of capital invested in Coke. During the last four quarters, Cisco generated more than four times as much NOPAT from each dollar of invested capital as did Coke. In the most recently completed fiscal quarter for each of the companies, Cisco generated more than five times as much NOPAT from each dollar of invested capital as did Coke.

Figure 1: ROIC

	1994				1995				1996			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Quarterly Annualized ROIC												
Cisco Systems, Inc.	213.3%	207.9%	245.1%	123.9%	123.4%	127.4%	142.7%	125.8%	137.2%	141.4%	155.2%	169.2%
Coca-Cola Co.	29.3%	38.7%	37.9%	32.3%	33.1%	45.1%	40.6%	27.6%	34.1%	42.9%	25.3%	30.5%
Rolling 12-Month Average ROIC												
LTM ROIC												
Cisco Systems, Inc.				180.2%	154.6%	139.0%	130.0%	129.8%	133.2%	136.8%	141.0%	151.4%
Coca-Cola Co.				34.6%	35.5%	37.2%	37.9%	36.4%	36.6%	36.3%	32.4%	33.1%
Annual ROIC												
	1991	1992	1993	1994	1995	1996						
Cisco Systems (FY July)	182.6%	156.1%	170.9%	194.6%	129.6%	134.3%						
Coca-Cola Co. (FY Dec.)	27.6%	29.8%	31.3%	34.6%	34.6%	24.4%						

Source: Company reports and RS & Co. estimates.

Figure 2: NOPAT (\$ in thousands)

	1994				1995				1996			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Quarterly Annualized NOPAT												
Cisco Systems, Inc.				\$369,011	\$406,034	\$457,993	\$525,317	\$604,829	\$706,726	\$849,081	\$995,002	\$1,142,569
Quarter/Quarter					10.0%	12.8%	14.7%	15.1%	16.8%	20.1%	17.2%	14.8%
Year/Year								63.9%	74.1%	85.4%	89.4%	88.9%
Coca-Cola Co.				2,567,295	2,643,684	2,780,591	2,871,741	2,860,046	2,970,681	3,057,775	2,868,223	2,997,202
Quarter/Quarter					3.0%	5.2%	3.3%	-0.4%	3.9%	2.9%	-6.2%	4.5%
Year/Year								11.4%	12.4%	10.0%	-0.1%	4.8%
Annual NOPAT												
	1991	1992	1993	1994	1995	1996						
Cisco Systems, Inc. (FY July)	\$40,407	\$80,220	\$164,732	\$301,656	\$457,993	\$849,081						
Year/Year	218.7%	98.5%	105.3%	83.1%	51.8%	85.4%						
Coca-Cola Co. (FY Dec.)	1,580,347	1,910,267	2,154,981	2,567,298	2,947,752	2,296,370						
Year/Year	17.4%	20.9%	12.8%	19.1%	14.8%	-22.1%						

Source: Company reports and RS & Co. estimates.

Figure 3: INVESTED CAPITAL (\$ in thousands)

	1994				1995				1996			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Invested Capital (End of Period)												
Cisco Systems, Inc.	\$152,516	\$164,919	\$153,441	\$348,304	\$383,597	\$432,322	\$452,228	\$596,184	\$642,016	\$792,134	\$792,134	\$792,134
Quarter/Quarter		8.1%	-7.0%	127.0%	10.1%	12.7%	4.6%	31.8%	7.7%	23.4%	0.0%	0.0%
Year/Year					151.5%	162.1%	194.7%	71.2%	67.4%	83.2%	75.2%	32.9%
Coca-Cola Co.	7,324,750	7,638,620	7,312,390	7,423,620	7,396,640	7,767,000	7,708,500	8,515,300	8,482,120	8,981,740	9,396,260	9,396,260
Quarter/Quarter		4.3%	-4.3%	1.5%	-0.4%	5.0%	-0.8%	10.5%	-0.4%	5.9%	4.6%	0.0%
Year/Year					1.0%	1.7%	5.4%	14.7%	14.7%	15.6%	21.9%	10.3%
LTM Average Invested Capital												
Cisco Systems, Inc.				\$204,795	\$262,565	\$329,416	\$404,113	\$466,083	\$530,687	\$620,640	\$705,617	\$754,604
Quarter/Quarter					28.2%	25.5%	22.7%	15.3%	13.9%	17.0%	13.7%	6.9%
Year/Year								127.6%	102.1%	88.4%	74.6%	61.9%
Coca-Cola Co.				7,424,845	7,442,818	7,474,913	7,573,940	7,846,860	8,118,230	8,421,915	8,843,855	9,064,095
Quarter/Quarter					0.2%	0.4%	1.3%	3.6%	3.5%	3.7%	5.0%	2.5%
Year/Year								5.7%	9.1%	12.7%	16.8%	15.5%
Invested Capital (End of Period)—FY												
	1991	1992	1993	1994	1995	1996						
Cisco Systems, Inc. (FY July)	\$30,510	\$108,496	\$132,895	\$164,919	\$432,322	\$792,134						
Year/Year	61.4%	255.6%	22.5%	24.1%	162.1%	83.2%						
Coca-Cola Co. (FY December)	5,715,544	6,402,160	6,878,560	7,423,620	8,515,300	9,396,260						
Year/Year	9.7%	12.0%	7.4%	7.9%	14.7%	10.3%						

Source: Company reports and RS & Co. estimates.

THE COMPANY:

Cisco is the largest networking vendor. The company has a dominant share of the market for network routers and has the largest installed base of networking devices, with approximately 78% share of the router market in 1996. Cisco has emerged as one of the leading vendors of LAN switches; we estimate that Cisco commands more than 50% of the LAN switching market. Cisco's recent acquisition of StrataCom extends the company's product portfolio to fully address the wide-area networking market.

In our view, Cisco continues to produce amazing financial results despite the transition within the networking industry to embrace LAN switching. Cisco has managed to transition its product line to now include the broadest offering of LAN switches in the industry, and the largest market share, while protecting its market position in the traditional router market. Cisco has moved into a class by itself within the industry; no other company has the product breadth, the distribution, customer account control or financial position. We applaud the company's performance.

INVESTMENT THESIS:

We believe that the company is uniquely positioned to benefit from accelerating demand throughout the networking industry.

Demand throughout the networking industry remains strong. The overall networking industry has posted impressive year-over-year growth in each of the past eight quarters and early indications suggest that this magnitude of growth will continue through the rest of 1997. We continue to believe that the networking industry is in the seventh to eighth year of a 20-year investment cycle. In our opinion, the future of the computer industry lies with continued investment in advanced networks and communications systems. As such, the longer-term outlook remains outstanding. In addition, the networking industry has consolidated among a few vendors, which should reap much of the billions of dollars invested in advanced networks over the next decade.

Cisco has emerged as the dominant vendor of networking equipment. As such, the company is the only vendor simultaneously benefiting from all three of the primary demand drivers in the industry: the upgrading of corporate networks; remote access; and the Internet. We estimate that Cisco is reaping approximately 45% of the revenues of the networking industry and almost 50% of the industry's profits

Cisco is the leading vendor of next generation LAN switching. Cisco has done a masterful job of managing the migration of its product line to include LAN and ATM switches as well as its traditional backbone and access router devices. Demand for the company's switching products continues to grow very rapidly, and Cisco has emerged as one of the key vendors of advanced LAN switching devices in the industry.

INVESTMENT RISKS:

Among the risks is the possibility of slowing in Cisco's revenue growth that would translate into lower than expected earnings and earnings growth.

Figures 2 and 3 break the respective companies' ROIC into its constituent components. As illustrated in the figures, Cisco dwarfs Coke in terms of both profitability and growth. Alternatively stated, like Coke, Cisco enjoys profitable growth, albeit three to eight times more profitable growth. This difference in rate of profitable growth is clearly evident in **Figures 4 and 5** below, which set forth graphical comparisons of growth rates in sales and profitability, respectively, for both Cisco and Coke.

Moreover, Cisco has outshone Coke in terms of consistency as well as rate of profitability and growth. The latter point is particularly noteworthy given the often heard plaint that high-tech companies cannot offer investors the consistency of growth afforded by Coke and other such "blue-chip" companies. Based upon the historical data, at least, as highlighted by Figures 4 and 5, Cisco's returns and profitable growth appear to be much more bankable than do those of Coke.

In calendar Q4 1996, Cisco generated more than 40% as much NOPAT from less than 10% as much invested capital as did Coke. By comparison, in calendar Q1 1994, Cisco generated approximately one-seventh (15%) as much NOPAT from approximately one-fiftieth (2%) as much invested capital as did Coke. In short, during this time, seizing business opportunities, Cisco generated consistent, phenomenally rapid and, most essentially, extraordinarily profitable growth. The rate of growth is manifested in both Cisco's 2,000% increase in annual NOPAT from \$40 million in fiscal 1991 to \$849 million in fiscal 1996 and its 2,700% increase in invested capital during this period from \$22 million to \$632 million (using average invested capital for each fiscal year).³ Similarly, during the past 12 quarters, as noted above, Cisco increased its quarterly NOPAT by more than 300% (from \$81 million to \$335 million) and its invested capital by over 400% (from \$153 million to \$792 million).

As evident in the graphs set forth in **Figures 4 and 5**, Cisco's revenues have been increasing steadily and dramatically on both a quarterly and an annual basis since Cisco's inception as a public company. Regarding profitability, Cisco has consistently, on both an (annualized) quarterly and annual basis, maintained its ROIC well in excess of 100%. Since calendar Q4 1994, moreover, Cisco has steadily increased its ROIC quarter-over-quarter. The aggregate increase over the past two years has been almost 50 percentage points.

By comparison, Coke generated volatile and not always positive incremental returns from a relatively much more modest—and hence, one would expect, a relatively much more manageable—rate of growth in terms of its invested capital. Notably, after steadily increasing from fiscal 1991 through 1994, Coke's ROIC remained flat in 1995 and then (even assuming no net increase in invested capital in the last quarter of 1996, the balance sheet of which has yet to be released) declined in 1996.

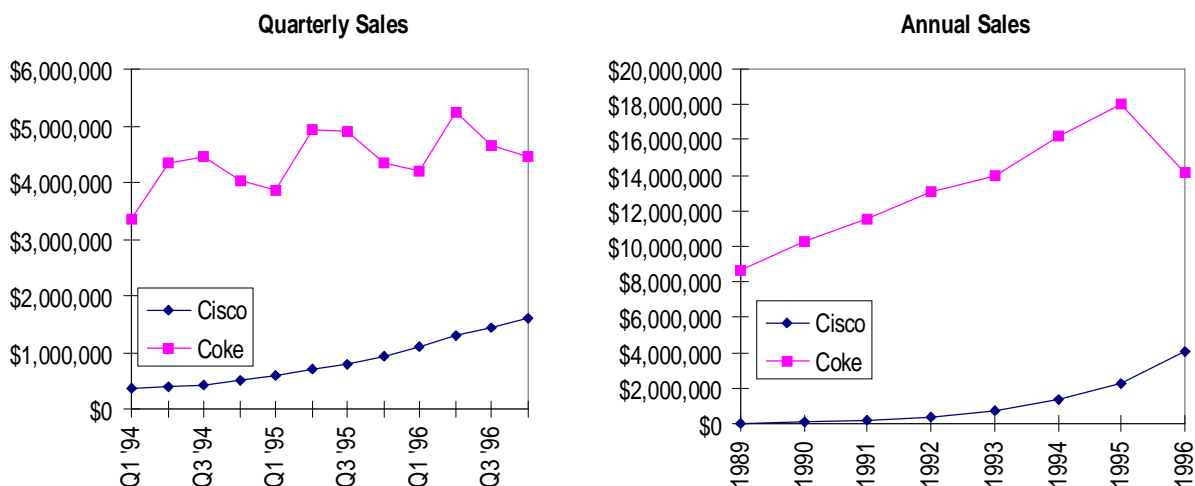
Over a long-term investment horizon, while the ROIC and NOPAT generated by both Coke and Cisco are impressive, the difference in their respective rates of profitable growth becomes glaring. At their current respective returns on invested capital for the last 4 quarter period of 151.4% and 32.4%, over a 30-year period, each dollar invested by Coke in its business will generate an impressive \$4,536 while each dollar invested by Cisco in its business will generate a return of

³ Using end-of-period invested capital, the increase for the six year period was approximately 2,450% (from \$31 million at the end of fiscal 1991 to \$792 million at the end of fiscal 1996).

\$1,025,600,000,000 (yes, you read correctly: a return in excess of \$1 trillion).⁴ Using the ROIC generated by Cisco in calendar Q4 1996 and Coke in calendar Q3 1996, the difference becomes even more glaring: one dollar invested in Cisco will grow to a mere \$7.984 trillion while each dollar invested in Coke will grow to \$868.⁵

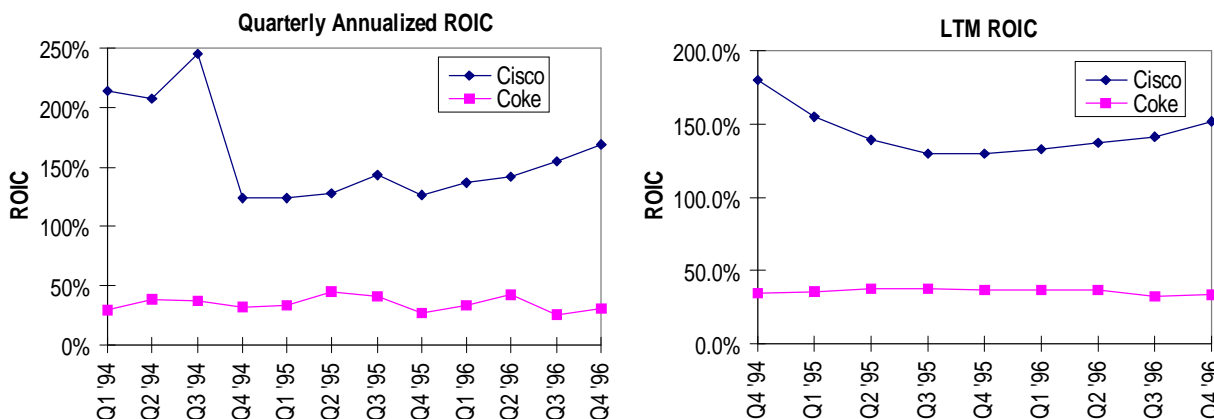
Cisco's profitable growth is the product of growing sales and relatively stable margins. Since its inception as a public company in 1990, Cisco has posted increases in sales, earnings and NOPAT in each and every quarter and annual

Figure 4: QUARTERLY AND ANNUAL SALES (\$ in thousands)



Source: Company reports.

Figure 5: QUARTERLY ANNUALIZED AND LTM ROIC (\$ in thousands)



Source: Company reports.

⁴ Cisco's LTM ROIC is for the calendar Q1-Q4 1996 period, while—due to the unavailability of Coke's December 31, 1996 balance sheet as of the date of this analysis—Coke's LTM ROIC is for the calendar Q4 1995-Q3 1996 period.

⁵ Even if we were to assume no increase in Coke's invested capital from calendar Q3 1996-Q4 1996, based on the \$779,821,000 of NOPAT generated by Coke in the fourth quarter, Coke would have generated an ROIC (annualized) and an LTM ROIC for the quarter of 30.5% and 34.7%, respectively, which would result in a return of \$2,940 and \$5,313, respectively, over a 30 year investment horizon.

period and increased both its gross and operating margins in all but two of the periods. As can be seen in **Figure 6**, Cisco increased its annual revenues from approximately \$129,000 in fiscal 1986 to \$365 million in fiscal 1992 and \$4.1 billion in fiscal 1996. As set forth in **Figure 7**, during the calendar Q1 1994 to Q4 1996 time period, Cisco grew its revenues from \$350 million to \$1.6 billion per quarter, an increase of more than 350%. As for margin stability, Cisco has achieved gross margins in excess of 65% and operating margins equal to or greater than 35% in each year since 1990.

Figure 6: ANNUAL SALES (\$ in thousands)

	1989	1990	1991	1992	1993	1994	1995	1996
Cisco (FY July)								
Net Sales	\$27,664	\$69,776	\$183,184	\$364,728	\$714,533	\$1,334,436	\$2,232,652	\$4,096,007
Year/Year		152%	163%	99%	96%	87%	67%	83%
Coke (FY Dec.)								
Net Sales	\$8,622,300	\$10,236,400	\$11,571,600	\$13,073,900	\$13,957,000	\$16,172,000	\$18,018,000	\$14,103,000
Year/Year		19%	13%	13%	7%	16%	11%	-22%

Source: Company reports and RS & Co. estimates.

Figure 7: QUARTERLY SALES (\$ in thousands)

	1994				1995				1996			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Cisco												
Net Sls	\$354,301	\$390,175	\$433,959	\$515,983	\$581,497	\$701,213	\$798,291	\$918,510	\$1,087,056	\$1,292,150	\$1,434,826	\$1,592,377
Y/Y		10%	11%	19%	13%	21%	14%	15%	18%	19%	11%	11%
Coke												
Net Sls	\$3,352,000	\$4,342,000	\$4,461,000	\$4,017,000	\$3,854,000	\$4,936,000	\$4,895,000	\$4,333,000	\$4,194,000	\$5,253,000	\$4,656,000	\$4,443,000
Q/Q		30%	3%	-10%	-4%	28%	-1%	-11%	-3%	25%	-11%	-5%

Source: Company reports and RS & Co. estimates.

Cash Balances

As previously noted, Cisco has managed to fuel the growth of its business and its phenomenal returns without the benefit of financial leverage. The company, moreover, while self-financing its growth, has generated and begun to accumulate a sizable and increasing amount of excess cash far greater than the working capital and growth opportunity needs of its business. The product of increasing customer demand, revenue growth and Cisco's increasing deployment of invested capital to support such growth, these cash balances, moreover, are growing at an accelerating rate.

Having generated more than \$1.2 billion of additional excess cash over the last four quarters, Cisco now has approximately \$2.5 billion of excess cash. Once again, it merits emphasis, Cisco is generating these extraordinary cash balances *while* investing in and growing its business at a phenomenal rate. This \$2.5 billion of excess cash represents four times as much cash as has been invested in Cisco's business since its inception.

While Coke has historically also generated large amounts of excess cash, we note that Cisco's excess cash balances are growing at a much more rapid rate than Coke's. The two primary drivers of this differential in growth are as follows: as noted above, Cisco generates significantly higher returns on each dollar of invested capital than does Coke; and Cisco requires significantly less capital to fuel

its revenues (i.e., to generate each dollar of incremental revenue) than does Coke. Finally, as will be discussed below, an extraordinarily large portion of each incremental dollar of revenue flows down to Cisco's NOPAT, consistent with other networking companies in general.

We also note that Cisco has efficiently applied its excess cash, in our opinion. Unlike Coke, Cisco does not pay cash dividends to its shareholders. We believe that the use of excess cash to pay dividends is highly inefficient from an economic point of view and is perhaps the worst possible use of such funds.

Each dollar of excess cash (which, we note, is after taking into account corporate taxes) generated by Coke and paid out as a dividend will be taxed in the hands of its shareholders (with the exception of tax-exempt institutions). Thus, each such dollar in the hands of Coke is worth significantly less than a dollar to the company's shareholders.

To the extent Coke does not believe it has any additional investment opportunities that will generate returns in excess of its current cost of capital, returning excess cash to its shareholders is an efficient and desirable use of such funds. Compared to distributing excess cash in the form of dividends, however, a stock repurchase program offers a far more economically efficient means by which Coke can generate value from its cash balances. We note that both Coke and Cisco have repurchased shares from time to time in the past several years (although Cisco recently suspended its stock repurchase program due to concerns over violating IRS proscriptions with respect to such stock repurchases in connection with the use of pooling of interest accounting for acquisitions). As with paying cash dividends, by repurchasing its shares out of its accumulated and unspent NOPAT, a company returns to its shareholders all or a portion of the excess cash generated by its operations and thereby reduces the negative financial leverage resulting from such excess cash. Unlike a cash dividend, however, the repurchase will only result in a shareholder's being taxed on his or her capital gain resulting from the repurchase. In addition, because the repurchase is made either in the open market or by means of a self-tender offer, it is limited to only those shareholders who desire to monetize all or a portion of their investment.

Regarding balance sheet management, Cisco is singularly the most impressive company that we follow (see **Figure 8**). In addition to its superb cash management, Cisco's working capital management was also impressive with inventories declining by approximately 10 days in the last quarter after having fallen by 16 days in the preceding quarter. Accounts receivable did increase sequentially as the table shows, but Cisco's management has indicated that (1) 6–8 days of the 10.5 day increase were attributable to difficulty in obtaining a critical mechanical component early in the quarter, which skewed shipments to later in the quarter, and (2) 2–3 days of slippage in receivables is attributable to sales in the quarter being more back-end loaded than expected. While we are always concerned with increases in accounts receivable, given that management has historically maintained receivables at a level well below the industry average, we are inclined to give management the benefit of the doubt (for at least one quarter). We also note that, at the time, Cisco's level of accounts receivable at the end of the July quarter appeared to be unsustainable. Even including the six to eight days attributable to the component constraint, Cisco's level of receivables is only slightly above the company's historical average and the industry average of approximately 50–55 days.

Figure 8: CISCO SYSTEMS, INC. BALANCE SHEET ANALYSIS (\$ in thousands)

	1994			1995				1996				1997	
	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2
Quarter to Quarter Growth													
Sales	21.6%	9.6%	9.0%	8.8%	15.8%	12.1%	21.8%	14.3%	16.4%	19.2%	18.9%	11.0%	11.0%
Inventories	33.1%	-10.2%	-15.8%	13.9%	72.9%	-3.8%	34.6%	81.8%	71.3%	41.6%	-4.0%	-19.1%	-16.3%
Cash	72.8%	52.3%	3.5%	52.8%	-7.3%	40.7%	20.6%	36.1%	-19.7%	39.1%	55.4%	23.0%	-13.3%
Receivables	11.6%	16.0%	17.5%	13.7%	9.5%	20.2%	8.1%	14.1%	12.0%	7.8%	17.6%	20.8%	36.2%
Net Cash	\$115,972	\$176,609	\$182,786	\$279,378	\$259,040	\$364,582	\$439,527	\$598,268	\$480,305	\$668,086	\$1,038,184	\$1,277,245	\$1,107,480
% Change	72.8%	52.3%	3.5%	52.8%	(7.3)%	40.7%	20.6%	36.1%	(19.7)%	39.1%	55.4%	23.0%	(13.3)%
Current Ratio	2.44	2.59	2.47	2.36	2.41	2.69	2.95	2.71	2.60	2.49	2.81	2.14	2.76
Cash/Current Liab.	0.76	0.99	0.89	1.02	0.92	1.15	1.30	1.25	0.94	1.02	1.35	1.09	1.17
Inventory Turns	12.58	12.48	15.53	17.15	13.67	12.28	13.06	9.35	6.33	5.06	5.89	7.36	9.88
Inventory Days	28.6	28.8	23.2	21.0	26.3	29.3	27.6	38.5	56.9	71.1	61.1	48.9	36.4
Quarter-End Turns	11.02	13.18	16.98	16.10	10.79	12.52	11.38	7.25	5.01	4.32	6.01	8.24	10.85
Quarter-End Days	32.7	27.3	21.2	22.4	33.4	28.7	31.6	49.7	71.8	83.4	59.9	43.7	33.2
Acct Rec. Turns	7.31	7.04	6.57	6.19	6.43	6.26	6.72	6.91	7.11	7.72	8.97	8.35	7.17
Acct Rec. Days	49.2	51.1	54.8	58.2	56.0	57.5	53.6	52.1	50.6	46.6	40.1	43.1	50.2
Quarter-end Turns	6.94	6.55	6.08	5.82	6.15	5.74	6.47	6.48	6.73	7.44	8.30	7.63	6.21
Quarter-end Days	51.9	54.9	59.2	61.9	58.5	62.7	55.7	55.6	53.5	48.4	43.4	47.2	57.9

Source: Company reports and RS & Co. estimates.

**Simple and Understandable Business/
Favorable Long-Term Prospects**

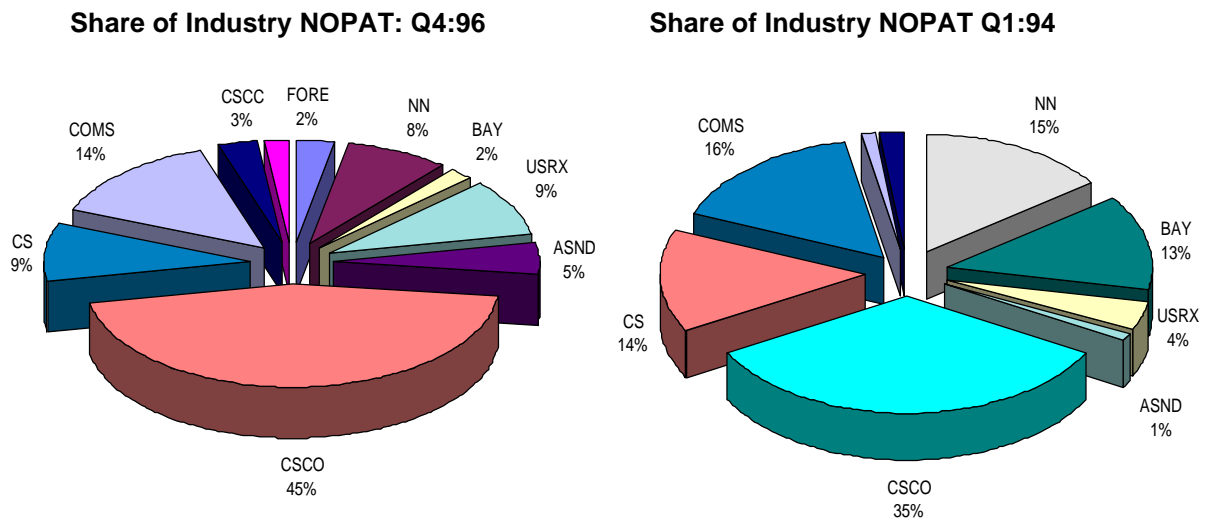
Computer networking products are relatively easy to understand. Fundamentally, in fact, Cisco's and Coke's products are fairly similar. Like Coca-Cola, Cisco's products are in high demand and have captured "mindshare." Within this context, while many people may consider Coca-Cola to be part of their lifestyles, Cisco's communications networking products form a large part of the core infrastructure of today's modern communication highways and, as such, are essential. Given the ongoing build-out of this infrastructure, which we currently estimate is in the sixth to seventh year of a 20-year investment cycle, Cisco's products have been met with strong and growing demand.

A Gorilla Is a Gorilla

Like Coke, only more so, Cisco has a remarkable franchise and has become the gorilla of its industry. As such, it has proven able to garner for itself an outsized share of the industry's revenues and profits while inflicting not inconsiderable pain on a number of its competitors. Among other touchstones of an industry gorilla, Cisco is characterized by the following traits:

- Rapid and accelerating growth.
- Strong and focused management that to date has consistently thought and acted like shareholders—in particular, optimizing their allocation of capital and concomitantly maximizing their returns therefrom.
- Volatile markets, which present buying opportunities.
- A dominant and growing share of the industry's total revenues and profits. Cisco is the largest networking vendor. Bay Networks, 3Com and Cabletron Systems traditionally have been Cisco's most direct competitors, with Bay and 3Com actually being larger than Cisco based on invested capital and Cabletron being almost two-thirds as large at the end of calendar Q4 1996. Cisco generates in excess of 75% more NOPAT from less than one-third as much invested capital as do these three competitors aggregated together. As further evidence of the strength of Cisco's leadership position in the networking industry, Cisco has increased its share of the industry's total profits while driving the industry's consolidation (see **Figure 9**).

Figure 9: SHARE OF INDUSTRY NOPAT, Q4:96 VS Q1:94



Source: Company reports and RS & Co. estimates.

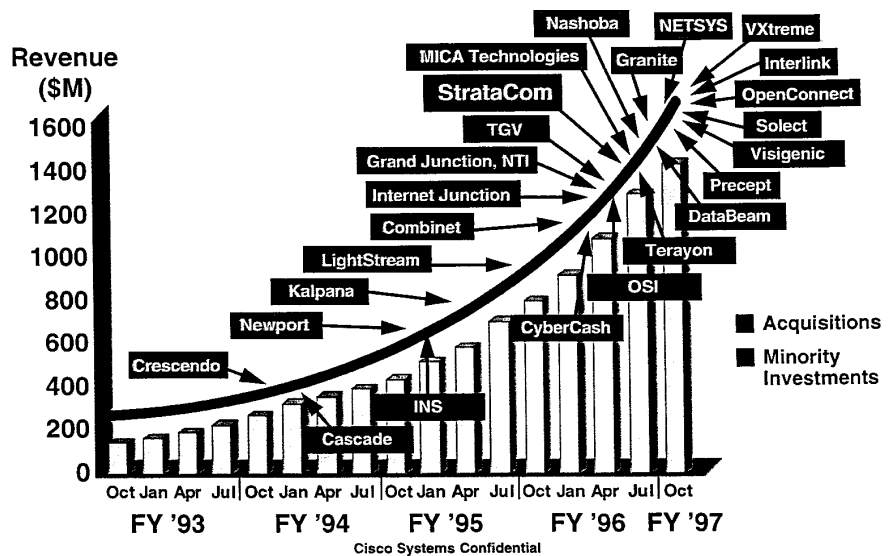
Figure 10: NETWORKING MARKET (\$ in millions)

	1994				1995				1996			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Cisco Systems												
Revenues	339.2	370.2	401.9	453.9	509.9	621.2	710.2	826.5	985.0	1,291.0	1,434.8	1,592.4
Relative Share	35.1%	34.5%	33.8%	33.4%	33.7%	35.1%	35.2%	35.3%	37.9%	43.5%	44.1%	45.4%
Q/Q growth	10.4%	9.1%	8.6%	12.9%	12.3%	21.8%	14.3%	16.4%	19.2%	31.1%	11.1%	11.0%
Yr/Yr growth	93.4%	77.3%	59.2%	47.8%	50.3%	67.8%	76.7%	82.1%	93.2%	107.8%	102.0%	92.7%
Bay Networks												
Revenues	265.1	289.1	299.6	314.2	337.1	390.7	438.3	541.6	521.7	535.5	522.7	518.7
Relative Share	27.5%	27.0%	25.2%	23.1%	22.3%	22.1%	21.7%	23.1%	20.1%	18.0%	16.1%	14.8%
Q/Q growth	-3.9%	9.0%	3.6%	4.9%	7.3%	15.9%	12.2%	23.6%	-3.7%	2.7%	-2.4%	-0.8%
Yr/Yr growth	32.1%	20.8%	17.2%	13.8%	27.1%	35.2%	46.3%	72.4%	54.8%	37.1%	19.3%	-4.2%
Cabletron Systems												
Revenues	136.2	148.3	161.1	176.4	189.8	204.7	218.7	231.4	245.8	261.5	281.0	290.8
Relative Share	14.1%	13.8%	13.5%	13.0%	12.6%	11.6%	10.8%	9.9%	9.4%	8.8%	8.6%	8.3%
Q/Q growth	10.2%	8.9%	8.6%	9.5%	7.6%	7.9%	6.8%	5.8%	6.2%	6.4%	7.5%	3.5%
Yr/Yr growth	47.6%	48.3%	47.4%	42.7%	39.4%	38.0%	35.8%	31.2%	29.5%	27.7%	28.5%	25.7%
3COM												
Total Revenues	135.5	151.1	177.2	210.6	228.9	250.3	291.7	315.0	336.0	378.0	416.0	461.0
Relative Share	14.0%	14.1%	14.9%	15.5%	15.1%	14.1%	14.5%	13.5%	12.9%	12.7%	12.8%	13.1%
Q/Q growth	10.8%	11.5%	17.3%	18.8%	8.7%	9.4%	16.5%	8.0%	6.7%	12.5%	10.1%	10.8%
Yr/Yr growth	67.1%	65.2%	74.5%	72.2%	68.9%	65.7%	64.6%	49.6%	46.8%	51.0%	42.6%	46.3%
Ascend												
Total Revenues	6.8	8.2	10.3	14.0	20.4	28.6	40.0	60.6	91.1	123.3	154.6	177.5
Relative Share	0.7%	0.8%	0.9%	1.0%	1.3%	1.6%	2.0%	2.6%	3.5%	4.2%	4.8%	5.1%
Q/Q growth	28.9%	20.8%	24.9%	36.1%	45.4%	40.4%	40.1%	51.4%	50.3%	35.4%	25.4%	14.8%
Yr/Yr growth	116.9%	119.3%	155.3%	164.8%	198.7%	247.1%	289.1%	332.9%	347.3%	331.6%	286.2%	192.8%
FORE Systems												
Total Revenues	14.3	16.8	21.3	28.8	37.3	43.4	51.1	63.5	75.3	83.4	98.0	112.6
Relative Share	1.5%	1.6%	1.8%	2.1%	2.5%	2.5%	2.5%	2.7%	2.9%	2.8%	3.0%	3.2%
Q/Q growth	29.4%	17.5%	26.6%	35.1%	29.7%	16.3%	17.8%	24.3%	18.4%	10.7%	17.6%	14.9%
Yr/Yr growth	193.3%	182.3%	201.6%	159.8%	160.5%	158.0%	140.1%	120.9%	101.7%	92.0%	91.7%	77.3%
Cascade Communications												
Total Revenues	6.3	8.5	15.0	20.2	23.5	29.1	36.0	46.2	56.0	78.8	84.6	88.2
Relative Share	0.7%	0.8%	1.3%	1.5%	1.6%	1.6%	1.8%	2.0%	2.2%	2.7%	2.6%	2.5%
Q/Q growth	109.5%	35.0%	76.9%	34.7%	16.1%	23.8%	23.7%	28.3%	21.3%	40.7%	7.3%	4.3%
Yr/Yr growth	856.5%	554.5%	651.4%	573.9%	273.5%	242.7%	139.7%	128.2%	138.4%	170.8%	134.9%	91.0%
Total	965.5	1,072.2	1,190.3	1,359.7	1,511.9	1,769.2	2,016.6	2,340.9	2,601.9	2,967.8	3,251.6	3,507.3
qtr/qtr	7.3%	11.0%	11.0%	14.2%	11.2%	17.0%	14.0%	16.1%	11.1%	14.1%	9.6%	7.9%
yr/yr	60.5%	54.4%	53.6%	51.1%	56.6%	65.0%	69.4%	72.2%	72.1%	67.7%	61.2%	49.8%

Source: Company reports and RS & Co. estimates.

- Along with formidable barriers to entry, industry consolidation, of which Cisco has been the primary driver. As shown in **Figures 9 and 10**, Cisco and its three largest competitors, 3Com, Cabletron and Bay, now account for more than 82% of the networking industry's total revenue (including both LAN and WAN products) and approximately 70% of its total profits. Cisco clearly commands a dominant share of both revenues and profits. In addition, Cisco has been increasing its market share at the expense of its rivals. From calendar Q1 1994 through Q4 1996, Cisco increased its share of the industry's profits from 35% to 45%. During this same period the collective aggregate profits of its three principal competitors declined from 43% to 25%. Cisco has shown itself adept at stifling competition and entering into new networking product niches by affecting a number of offensive and defensive acquisitions. These acquisitions have been facilitated by Cisco's rich stock price and \$2.5 billion cash hoard. **Figure 11** sets forth a list of the various acquisitions consummated by Cisco during the past three years.

Figure 11: ACQUISITIONS AND MINORITY INVESTMENTS



Source: Cisco Systems.

- A dominant share of the product markets in which it competes. As set forth in **Figure 12**, the company has a dominant share of the market for network routers, with an almost 80% share of the router market in 1996, and has the largest installed base of networking devices. Cisco also has emerged as one of the leading vendors of LAN switches; we estimate that Cisco commands more than 50% of the LAN switching market (see **Figure 13**). Cisco's recent acquisition of Stratacom extends the company's product portfolio to fully address the wide-area networking market.

Figure 12: NETWORK ROUTERS (\$ in millions)

	1994				1995				1996			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Cisco Svstems												
Revenue	\$329.2	\$353.2	\$375.9	\$412.9	\$451.9	\$551.2	\$600.2	\$651.5	\$745.0	\$857.0	\$934.8	\$1,020.4
Relative Share	71.0%	69.9%	70.7%	72.0%	73.0%	75.9%	75.6%	75.7%	78.3%	78.8%	80.1%	81.1%
Q/Q	8.9%	7.3%	6.4%	9.8%	9.4%	22.0%	8.9%	8.5%	14.4%	15.0%	9.1%	9.2%
Yr/Yr	91.0%	72.1%	51.3%	36.6%	37.3%	56.1%	59.7%	57.8%	64.9%	55.5%	55.7%	56.6%
Bav Networks (Wellfleet)												
Revenue	\$103.8	\$120.4	\$126.6	\$129.2	\$135.1	\$143.2	\$157.3	\$170.6	\$170.7	\$190.5	\$190.7	\$190.7
Relative Share	22.4%	23.8%	23.8%	22.5%	21.8%	19.7%	19.8%	19.8%	17.9%	17.5%	16.3%	15.2%
Q/Q	18.4%	16.0%	5.2%	2.0%	4.6%	6.0%	9.8%	8.5%	0.1%	11.6%	0.1%	0.0%
Yr/Yr	116.0%	103.2%	74.8%	47.4%	30.2%	19.0%	24.2%	32.1%	26.4%	33.1%	21.2%	11.8%
3COM												
Revenue	\$30.4	\$32.0	\$29.0	\$31.5	\$32.0	\$32.0	\$36.0	\$38.0	\$36.0	\$40.0	\$42.0	\$47.0
Relative Share	6.6%	6.3%	5.5%	5.5%	5.2%	4.4%	4.5%	4.4%	3.8%	3.7%	3.6%	3.7%
Q/Q	12.2%	5.3%	-9.4%	8.6%	1.6%	0.0%	12.5%	5.6%	-5.3%	11.1%	5.0%	11.9%
Yr/Yr	78.4%	52.8%	36.1%	16.2%	5.3%	0.0%	24.1%	20.6%	12.5%	25.0%	16.7%	23.7%
Total Revenues	463.4	505.5	531.5	573.6	619.0	726.4	793.5	860.1	951.7	1,087.5	1,167.5	1,258.1
Qtr/Qtr	11.1%	9.1%	5.1%	7.9%	7.9%	17.4%	9.2%	8.4%	10.7%	14.3%	7.3%	7.8%
Yr/Yr	95.1%	77.1%	55.3%	37.6%	33.6%	43.7%	49.3%	50.0%	53.7%	49.7%	47.1%	46.3%
Qtr/Qtr	(49.0)%	(18.4)%	(43.5)%	54.0%	0.1%	119.0%	(46.8)%	(9.0)%	26.8%	34.0%	(48.5)%	5.7%
Yr/Yr	(20.7)%	(55.0)%	(74.2)%	(63.8)%	(28.9)%	90.8%	79.6%	6.1%	34.4%	(17.7)%	(20.4)%	(7.5)%

* Cisco Systems and 3COM no longer breaks out revenues from routers, these are RS & co. estimates.

Source: Company reports and RS & Co. estimates.

Figure 13: LAN SWITCHING MARKET (\$ in millions)

	1994				1995				1996			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Cisco Systems	10.0	17.0	26.0	41.0	58.0	70.0	110.0	175.0	240.0	323.0	385.0	450.0
% relative share	35.5%	38.9%	42.7%	46.7%	48.2%	37.7%	41.7%	42.6%	50.3%	53.6%	56.1%	57.8%
Kalpana	8.0	9.0	9.0	15.0	20.0							
Catalyst	2.0	8.0	17.0	26.0	35.0							
3COM	12.8	19.1	25.5	32.3	42.0	70.2	95.0	110.0	115.0	139.0	152.0	166.0
% relative share	45.5%	43.7%	41.8%	36.8%	34.9%	37.9%	36.0%	26.8%	24.1%	23.1%	22.1%	21.3%
Synergetics	10.0	14.0	20.0	20.0	26.0							
Stackables				5.0	9.0							
Bay Networks					2.0	22.5	33.0	90.0	75.0	80.0	78.0	78.0
% relative share					1.7%	12.1%	12.5%	21.9%	15.7%	13.3%	11.4%	10.0%
Q/Q growth						1025.0%	46.7%	172.7%	(16.7)%	6.7%	(2.5)%	0.0%
Yr/Yr growth									3650.0%	255.6%	136.4%	(13.3)%
FORE Systems (ALANTEC)	4.7	5.4	6.1	8.5	10.3	12.3	13.9	16.8	20.6	28.8	32.3	39.4
% relative share	16.7%	12.4%	10.0%	9.7%	8.6%	6.6%	5.3%	4.1%	4.3%	4.8%	4.7%	5.1%
Q/Q growth	16.3%	15.1%	12.2%	40.4%	21.0%	19.3%	12.9%	21.1%	22.4%	40.1%	12.1%	21.9%
Yr/Yr growth	87.6%	53.8%	69.9%	110.9%	119.4%	127.4%	128.9%	97.4%	99.6%	134.4%	132.8%	134.4%
Xylan					1.4	4.5	8.4	15.5	23.4	28.2	35.4	41.5
IBM											5.4	9.6
% relative share					1.2%	2.4%	3.2%	3.8%	4.9%	4.7%	5.2%	5.3%
Q/Q growth						222.6%	87.2%	84.1%	50.7%	20.5%	25.7%	17.0%
Yr/Yr growth									1576%	526%	320%	167%
Network Peripherals	0.6	2.2	3.4	6.0	6.6	5.9	3.3	3.5	3.6	3.8	4.0	4.0
% relative share	2.3%	5.1%	5.5%	6.9%	5.5%	3.2%	1.3%	0.9%	0.8%	0.6%	0.6%	0.5%
Q/Q growth		244.2%	51.4%	78.5%	9.0%	(9.9)%	(43.9)%	5.2%	2.9%	5.6%	5.3%	0.0%
Yr/Yr growth					914.2%	165.6%	(1.6)%	(42.0)%	(45.3)%	(36.0)%	20.2%	14.3%
Total Market	28.2	43.7	61.0	87.9	120.3	185.4	263.7	410.8	477.6	602.8	686.8	778.9
qtr/qtr	75.9%	55.4%	39.3%	44.1%	36.9%	54.2%	42.2%	55.8%	16.2%	26.2%	13.9%	13.4%
yr/yr	280.4%	360.5%	368.9%	449.1%	327.3%	323.9%	332.6%	367.6%	297.0%	225.1%	160.5%	89.6%
qtr/qtr	229.1%	(27.1)%	(29.0)%	12.2%	(16.4)%	46.7%	(22.1)%	32.4%	(70.9)%	61.5%	(46.9)%	(3.7)%
yr/yr		95.2%	6.8%	91.3%	(51.4)%	(2.2)%	7.2%	26.5%	(56.0)%	(51.6)%	(67.0)%	(76.0)%

Source: Company reports and RS & Co. estimates.

Figure 14: ROLLING 12-MONTH AVERAGE ROIC

		1994	1995				1996			
		Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Bay Networks, Inc.	BAY	50.8%	55.7%	62.0%	64.2%	66.1%	55.8%	45.2%	36.8%	23.5%
3Com Corporation, Inc.	COMS	60.2%	59.8%	58.7%	55.8%	44.1%	40.4%	38.1%	37.3%	39.5%
Cabletron Systems, Inc.	CS	75.3%	74.3%	74.4%	74.5%	74.4%	67.9%	63.1%	59.8%	55.8%
Cisco Systems, Inc.	CSCO	180.2%	154.6%	139.0%	130.0%	129.8%	133.2%	136.8%	141.0%	151.4%
Ascend Communications, Inc.	ASND	138.7%	139.8%	131.5%	108.6%	120.7%	125.7%	117.3%	116.5%	109.9%
FORE Systems, Inc.	FORE	85.1%	82.7%	81.8%	83.1%	86.0%	58.2%	38.4%	29.0%	23.6%
PairGain Technologies, Inc.	PAIR	35.6%	37.0%	39.0%	42.3%	44.8%	52.0%	60.9%	67.7%	81.3%
Shiva Corporation	SHVA	75.2%	74.3%	81.7%	53.8%	43.7%	36.2%	37.6%	36.7%	27.8%
U.S. Robotics Corporation	USRX	26.4%	31.3%	35.4%	42.2%	46.8%	46.0%	45.6%	41.0%	36.6%
VideoServer, Inc.	VSVR				117.2%	145.1%	190.5%	196.6%	191.3%	188.5%
Sync Research, Inc.	SYNX							(98.8)%	(96.2)%	(95.3)%
TranSwitch Corporation	TXCC				(65.1)%	(37.4)%	(19.6)%	(11.5)%	(34.4)%	(71.4)%
Cascade Communications Corp.	CSCC	90.2%	98.7%	107.4%	110.4%	116.7%	132.8%	139.7%	131.0%	107.9%
Newbridge Networks	NN	66.5%	59.6%	52.6%	48.7%	45.4%	42.3%	44.7%	44.1%	41.0%
Optical Data Systems, Inc.	ODSI	34.9%	37.6%	40.2%	43.8%	40.8%	39.0%	35.8%	28.6%	21.6%
Stratacom Inc.	STRM	84.5%	90.4%	91.9%	89.0%	80.3%	71.4%			
Xylan Corporation	XYLN					4.1%	18.8%	24.8%	32.9%	34.0%
	Total Networking	76.1%	74.7%	74.2%	73.2%	70.5%	67.0%	64.5%	61.7%	58.6%
	Tot. Netw. without Cisco	58.1%	58.5%	59.0%	58.7%	55.6%	51.3%	47.9%	44.3%	40.0%
Microsoft Corporation	MSFT			127.9%	128.2%	132.5%	132.6%	139.0%	147.9%	161.2%
Intel Corporation	INTC	36.6%	36.8%	36.5%	36.1%	38.1%	35.9%	36.2%	39.9%	50.0%
Oracle Corporation	ORCL	54.3%	55.0%	64.2%	59.4%	57.4%	56.6%	59.5%	58.4%	58.2%
Computer Associates International, Inc.	CA	34.5%	38.0%	40.1%	32.3%	28.1%	25.6%	23.2%	25.1%	NA
Informix Corporation	IFMX	85.3%	81.0%	73.6%	68.8%	72.3%	66.3%	59.2%	52.1%	39.1%
Sybase, Inc.	SYBS	62.5%	41.1%	28.0%	15.0%	5.2%	0.8%	-10.9%	-10.0%	-11.9%
Compaq Computer Corporation	CPQ	29.6%	28.0%	28.5%	30.2%	30.8%	29.4%	28.2%	29.7%	32.5%
Dell Computer Corporation	DELL				62.0%	54.5%	53.6%	58.8%	71.3%	NA
Gateway 2000, Inc.	GATE							55.3%	61.3%	96.1%
Coca-Cola Co.	KO	34.6%	35.5%	37.2%	37.9%	36.4%	36.6%	36.3%	32.4%	33.1%
	G	20.4%	21.0%	21.3%	21.3%	20.8%	20.3%	20.0%	19.8%	19.3%
Amgen Inc.	AMGN	60.7%	61.8%	64.6%	67.9%	69.6%	69.0%	69.9%	67.7%	67.4%
	MRK	21.7%	22.2%	22.1%	21.9%	18.1%	17.9%	18.2%	18.8%	NA

* ROIC for GATE is the actual annualized ROIC for the quarter since financial statements for calendar Q1 1996 are not available.

CA and DELL have yet to release their financial statements for calendar Q4 1996.

Source: Company reports and RS & Co. estimates.

- Extraordinary profitability. The four leading vendors in the networking industry are highly profitable companies, which reflects the health of the industry, and probably is further indication of the barriers to entry that exist for companies trying to enter the industry. Cisco leads the industry with a fiscal 1996 operating profit margin of approximately 36%; its closest competitor, Cabletron, has an operating margin of almost 30%. Both Bay Networks and 3COM have operating margins of almost 20% (although Bay's operating margin dramatically deteriorated to 13% in the most recent quarter). Given its operating margins, revenue growth translates into very strong cash flow growth for Cisco. In fact, as noted above, Cisco has self-financed its growth over the last few years while generating enormous amounts of excess cash on its balance sheet. The financial health of the networking industry, in general, and Cisco, in particular, has never been stronger, and the outlook remains very robust. **Figure 14** sets forth a comparison of the profitability of Cisco with the profitability of a selection of some of the country's most profitable and well respected companies. As is clear from the table, Cisco's ROIC places it in a rarefied category, exceeded only by that of Microsoft for those companies of a similar size and maturity.
- Stable pricing and margins. Cisco enjoys stable prices and margins among other benefits conferred by the industry's high barriers to entry and Cisco's first mover advantage in its primary product lines.
- A large degree of control over their customers and markets, which has been conferred by Cisco's first mover advantage, the industry's high switching costs, Cisco's size and its attaining the status of the only full-service end-to-end networking equipment vendor. Cisco now offers a complete line of networking products and full service and networking integration. In so doing, Cisco has positioned itself to become the IBM of the '90s and the 21st century, albeit a more nimble customer-driven version. Cisco also has proven itself adept at freezing the market by making early (and often premature) product announcements when faced with potential competitive threats or discontinuities.

In our view, Cisco continues to produce amazing financial results despite the transition within the networking industry to embrace LAN switching. Cisco has managed to transition its product line to include the broadest offering of LAN switches in the industry, and to capture the largest market share, while protecting its market position in the traditional router market.

Moreover, Cisco's core router products continue to experience robust demand. As **Figure 15** shows, the router market experienced accelerating year-over-year growth for all of 1995 through the first quarter of 1996 and excellent growth for the last three calendar quarters of 1996. In our opinion, the continued growth is amazing in light of the size of this sector. While we saw some seasonality in this sector during the past quarter, the outlook for demand remains robust as the market continues to benefit from all three of the industry demand drivers. Despite the transition within the industry to LAN switching, demand for network routers continues to post exceptional year-over-year growth. High-end routers are used extensively to upgrade the performance of corporate networks and are a critical component of the infrastructure of the Internet, while low-end routers are a key piece of the market for remote access devices. Cisco continues to gain share and

dominate this market with an estimated approximately 80% market share, which has increased steadily during the past two years, and the company appears to have the strongest momentum of all of the networking vendors. We expect Cisco to be the key beneficiary of the continued strong growth in demand for routers over the next few years.

As for LAN switching, which many market pundits believed would turn the gorilla into a chimpanzee, Cisco has already emerged as the king in this market and continues to increase its market share, which as of the end of the December 1996 calendar quarter stood at approximately 56%. In light of the outstanding outlook for the growth in this market, we expect Cisco to continue to benefit the most from this growth trend. As **Figure 15** shows, this market first broke through a \$1 billion run rate in the September 1995 quarter, the market has posted significantly greater than 200% year-over-year growth in every quarter since March 1994, and it is now approaching a \$3 billion run rate. We believe the outlook for demand continues to be outstanding, and we estimate that this market will continue to post triple-digit growth through the end of 1997 and into 1998.

Surprise: A Simple and Understandable Operating Model

Contrary to what you and no doubt many other investors may believe, computer networking companies, including Cisco, generally have a fairly simple and understandable operating model. Most technology companies, particularly young ones, typically have simple income statements. In general, their capital structures are straightforward because these companies are almost always financed entirely with equity. Their income statements break down into four pieces: revenues, operating expenses, interest income/expenses (almost always income), and taxes. Since the operating model for most of these companies is very simple, with research and development, sales and marketing, and general and administrative expenses, NOPAT is simply a direct function of revenues minus operating expenses minus taxes. Using this formula, the key drivers of value creation—i.e., cash flow or NOPAT—are ROIC and growth in invested capital. Regarding the latter, growth in invested capital is driven by revenue growth.

Revenues can also be disaggregated as merely a function of units times average selling prices. History shows that average selling prices are stable and predictable over an intermediate time horizon for most technology products, with the possible exception of “commodity-like” products such as DRAMs, disk drives, and other PC-related components. We will develop this line of reasoning below under the discussion of pricing within the networking industry. If we accept the notion that pricing is fairly stable in the technology industry, then unit growth is the primary driver of revenue growth. Since unit growth is just the flip side to the demand cycle for the product, then demand is the primary driver of revenue growth. It then follows that unit demand is the key to technology investing.

We believe that this analysis can be inverted to develop a set of rules to guide technology investors.

Figure 15: NETWORKING INDUSTRY: NETWORK ROUTER & LAN SWITCHING MARKETS (\$ in millions)

	1994				1995				1996			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Networking Industry	965.5	1,072.2	1,190.3	1,359.7	1,511.9	1,769.2	2,016.6	2,340.9	2,601.9	2,967.8	3,251.6	3,507.3
qtr/qtr growth	7.3%	11.0%	11.0%	14.2%	11.2%	17.0%	14.0%	16.1%	11.1%	14.1%	9.6%	7.9%
yr/yr growth	60.5%	54.4%	53.6%	51.1%	56.6%	65.0%	69.4%	72.2%	72.1%	67.7%	61.2%	49.8%
Network Routers	463.4	505.5	531.5	573.6	619.0	726.4	793.5	860.1	951.7	1,087.5	1,167.5	1,258.1
relative share	48.0%	47.1%	44.7%	42.2%	40.9%	41.1%	39.3%	36.7%	36.6%	36.6%	35.9%	35.9%
qtr/qtr growth	11.1%	9.1%	5.1%	7.9%	7.9%	17.4%	9.2%	8.4%	10.7%	14.3%	7.3%	7.8%
yr/yr growth	95.1%	77.1%	55.3%	37.6%	33.6%	43.7%	49.3%	50.0%	53.7%	49.7%	47.1%	46.3%
LAN Switching	28.2	43.7	61.0	87.9	120.3	185.4	263.7	410.8	477.6	602.8	686.8	778.9
relative share	2.9%	4.1%	5.1%	6.5%	8.0%	10.5%	13.1%	17.6%	18.4%	20.3%	21.1%	22.2%
qtr/qtr growth	75.9%	55.4%	39.3%	44.1%	36.9%	54.2%	42.2%	55.8%	16.2%	26.2%	13.9%	13.4%
yr/yr growth	280.4%	360.5%	368.9%	449.1%	327.3%	323.9%	332.6%	367.6%	297.0%	225.1%	160.5%	89.6%

Source: Company reports and RS & Co. estimates.

Unit growth is a direct reflection of demand for the overall product. Demand for technology products tends to fall along traditional product cycles. Pricing is a function of competition. Barriers to entry, product substitution and rivalry among competitors are the primary determinants of pricing competition. Revenues are a function of units times average selling prices. Therefore, future revenues will be a function of unit growth (traditional demand analysis) and pricing trends (traditional supply analysis). Cash flow, as defined as NOPAT, is a function of these revenues minus operating expenses minus cash taxes. The value of the stocks is merely the present value of all of these future cash flows, discounted for risk. As such, the first principle of analysis is as follows:

Unit demand times pricing trends - operating expense - taxes = cash flows.

Demand. With respect to unit demand, we believe that Cisco is uniquely positioned to benefit from accelerating demand throughout the networking industry.

Demand throughout the networking industry remains strong. The networking industry posted excellent (greater than 60%) year-over-year growth in each of the past seven quarters, including the recently reported December quarter. We believe early indications suggest that this high level of growth likely will continue well past the end of 1997 and through 1998. We continue to believe that the networking industry is in the sixth to seventh year of a 20-year investment cycle. In our opinion, the future of the computer industry lies with continued investment in advanced networks and communications systems. As such, the longer-term outlook remains outstanding. The industry consolidation among a few vendors should result in these vendors reaping much of the billions of dollars invested in advanced networks over the next decade. Cisco should garner the gorilla's share, in our opinion.

Emergence as dominant networking vendor. Having emerged as the dominant vendor of networking equipment, Cisco is the only vendor simultaneously benefiting from all three of the primary demand drivers in the industry: the upgrading of corporate networks; remote access; and the Internet. We estimate that Cisco is reaping approximately 45% of the revenues of the networking industry and a similar share of the industry's profits.

Leading vendor of next generation LAN switching. In our view, Cisco has superbly managed the migration of its product line to include LAN and ATM switches as well as its traditional backbone and access router devices. Demand for the company's switching products continues to grow very rapidly, and Cisco has emerged as one of the key vendors of advanced LAN switching devices in the industry.

Current Demand Drivers. As noted above, there appear to be three primary drivers to the intermediate growth in unit demand for networks:

- Upgrading of corporate networks
- Extending the reach of the network
- The Internet

Upgrading of corporate networks. Singularly, in our opinion, the most important driver of demand for networking products over the next few years will be the upgrading of corporate networks. During the past five years internal networks have become a strategic platform upon which to deploy corporate applications. Nevertheless, given that most of these networks have insufficient bandwidth and

robustness to support the next generation of applications, we estimate that many of these networks will have to be upgraded over the next few years. We believe the primary beneficiary of this trend is the accelerating demand for LAN switches and high-end network routers.

Extending the reach of the network. The second driver of accelerating demand in the networking industry is the desire to extend the reach of the corporate network beyond the edge of corporate headquarters. The primary driver to “extending the network” is the need to support remote access to network-based applications and data in order for the corporation to conduct its business with remote branches, nomad sales staff, mobile executives and telecommuters. We believe the primary beneficiary of this trend is accelerating demand for remote access devices such as branch routers, WAN access hubs, and Frame Relay switches.

The Internet. Many industry pundits believe that the Internet will have a far-reaching and broad impact on virtually every industry, not just technology. Akin to shovel manufacturers during the Gold Rush of 1849, in our opinion, the equipment vendors are the companies best positioned to benefit from the initial hype over the Internet. Expanding at greater than 100% per year in dollar terms, we believe the network supporting the Internet provides one of the best market opportunities for the equipment vendors. The Internet (and other on-line service providers) is built on three basic technologies: remote access, network routing and WAN access. We expect all three technologies/products to continue to experience accelerating demand.

As a result of these forces, the intermediate to long-term outlook for the industry is outstanding. Given that Cisco is the only vendor participating in all three of the primary demand drivers, we believe that the intermediate to long-term outlook for Cisco also remains outstanding.

Near-Term Prospects. As noted above, the networking industry posted excellent (greater than 60%) year-over-year growth in each of the past seven quarters including the recently reported December quarter. We believe early indications suggest that this high level of growth likely will continue through the end of 1997 and well into 1998.

The following tables present the recent year-over-year and quarter-over-quarter industry growth rates (see **Figures 16 and 17**). As the figures show, the industry continues to post exceptional year-over-year and sequential growth rates. Interestingly, industrywide demand accelerated in each of the four quarters of 1995. Although the quarterly acceleration did not continue into 1996, the industry has continued to post impressive year-over-year and quarter-over-quarter sequential growth rates. We believe this trend supports our contention that the networking industry continues to show signs of being a young, rapid growth industry rather than a maturing industry. As **Figure 17** shows, we expect the networking industry to continue to post excellent year-over-year growth rates for the next few years.

Figure 16: QUARTERLY INDUSTRY REVENUE AND GROWTH RATES (\$ in thousands)

Calendar	1995				1996			
	March	June	Sept.	Dec.	March	June	Sept	Dec
Networking Industry	\$1,512	\$1,769	\$2,017	\$2,341	\$2,602	\$2,967.8	\$3,251.6	\$3,507.3
Quarter/Quarter Growth	11.2%	17.0%	14.0%	16.1%	11.1%	14.1%	9.6%	7.9%
Year/Year Growth	56.6%	65.0%	69.4%	72.2%	72.1%	67.7%	61.2%	49.8%

Source: Company reports and RS & Co. estimates.

Figure 17: ANNUAL INDUSTRY REVENUES AND GROWTH RATES (\$ in thousands)

	1992	1993	1994	1995	1996E	1997E	1998E	1999E	2000E
Networking Industry	\$1,607	\$2,971	\$4,588	\$7,639	\$12,328	\$18,521	\$26,307	\$35,536	\$46,189
Year/Year Growth	93.0%	84.9%	54.4%	66.5%	61.4%	50.2%	42.0%	35.1%	30.0%

Source: Company reports and RS & Co. estimates.

Long-Term Prospects. In our opinion, the future of the computer industry lies with continued investment in advanced networks and communications systems. As such, the longer-term outlook for the networking industry remains outstanding. We continue to believe that the networking industry is in the sixth to seventh year of a 20-year investment cycle. **Figure 17** presents annual revenues for the networking industry and our current growth estimates. As the figure shows, we expect the networking industry to continue to post excellent year-over-year growth rates for the next few years.

While we recognize that we have had a fairly healthy economy the last several years and that companies tend to cut their budgets for capital equipment during recessions, we note that networking equipment is fundamentally different from capital equipment in that networking equipment drives productivity and has largely become a competitive necessity.

Pricing. In addition to strong unit demand, as noted above, Cisco also has enjoyed remarkably stable pricing as a result of the ongoing and accelerating networking industry consolidation and the prevalence of high barriers to entry into the industry and the benefits conferred upon Cisco by its first mover advantage in its primary product lines. As evidence of this pricing stability, **Figure 18** sets forth Cisco's operating and gross margins for its fiscal years since the company's inception.

Industry Consolidation. Regarding industry consolidation, Cisco has been the principal driver of this trend, which has dramatically accelerated in the past 12 months.

In the networking industry, merger and acquisition transactions have been driven predominantly by the leveraging of complementary products and R&D to generate greater net cash flow from the same base of invested capital than could be individually generated by either of the independent companies. These networking merger and acquisition transactions have typically been of two varieties: a merger of two large established organizations—or alternatively, an acquisition of the smaller by the larger—each of which has existing commercial products, customers and sales forces and/or distribution channels. Such mergers and acquisitions include Cisco's recently completed acquisition of Stratacom.

Figure 18: OPERATING PROFIT AND GROSS PROFIT MARGIN (\$ in millions)

Fiscal Year July	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996
Net Sales	\$129	\$1,485	\$5,450	\$27,664	\$69,776	\$183,184	\$364,728	\$714,533	\$1,334,436	\$2,232,652	\$4,096,007
Cost of Goods	43	821	2,445	11,662	23,957	62,499	122,642	239,070	450,591	742,860	1,409,862
Gross Profit	86	664	3,005	16,002	45,819	120,685	242,086	475,463	883,845	1,489,792	2,686,145
Gross Margin	66.7%	44.7%	55.1%	57.8%	65.7%	65.9%	66.4%	66.5%	66.2%	66.7%	65.6%
Operating Profit	(36)	130	555	6,758	21,391	66,189	130,981	269,960	500,170	793,718	1,416,306
Margin	NM	8.8%	10.2%	24.4%	30.7%	36.1%	35.9%	37.8%	37.5%	35.6%	34.6%
Incremental											
Sales		1,356	3,965	22,214	42,112	113,408	181,544	349,805	619,903	898,216	1,863,355
Gross Profit		578	2,341	12,997	29,817	74,866	121,401	233,377	408,382	605,947	1,196,353
Gross Margin		42.6%	59.0%	58.5%	70.8%	66.0%	66.9%	66.7%	65.9%	67.5%	64.2%
Gross Profit		166	425	6,203	14,633	44,798	64,792	138,979	230,210	293,548	622,588
Y/Y % Grth		(461.1)%	326.9%	1117.7%	216.5%	209.4%	97.9%	106.1%	85.3%	58.7%	78.4%

Source: Company reports and RS & Co. estimates.

The other principal merger and acquisition paradigm that has emerged in the networking industry involves the acquisition by a mature company with an established sales force and/or distribution channels of a relatively young company having impressive R&D, technology and/or products but lacking sufficient marketing, sales and financial resources to commercialize its technology or to effectively capture the market opportunity on its own. Shareholders of the acquired company typically receive a significant premium for their shares. The acquirer in turn gains desired technology and products to complement and/or expand its current product line and perhaps to penetrate a rapidly expanding market niche when such technology and products would have been more costly and taken longer to design, develop and commercialize on its own. The acquirer typically can easily integrate the acquired technology into its own products and/or add the acquired products to its line-up. In many instances, the two companies already have in place a supply, joint marketing or joint venture agreement.

Cisco has effectively used both paradigms. Its acquisition of Stratacom has vaulted it into the wide-area networking space and in the process has made Cisco the only full service one-stop networking vendor. Regarding the second paradigm, Cisco has shown a willingness to acquire any potentially competing R&D technology and expertise that would have otherwise been too costly or taken too long to internally develop and commercialize.

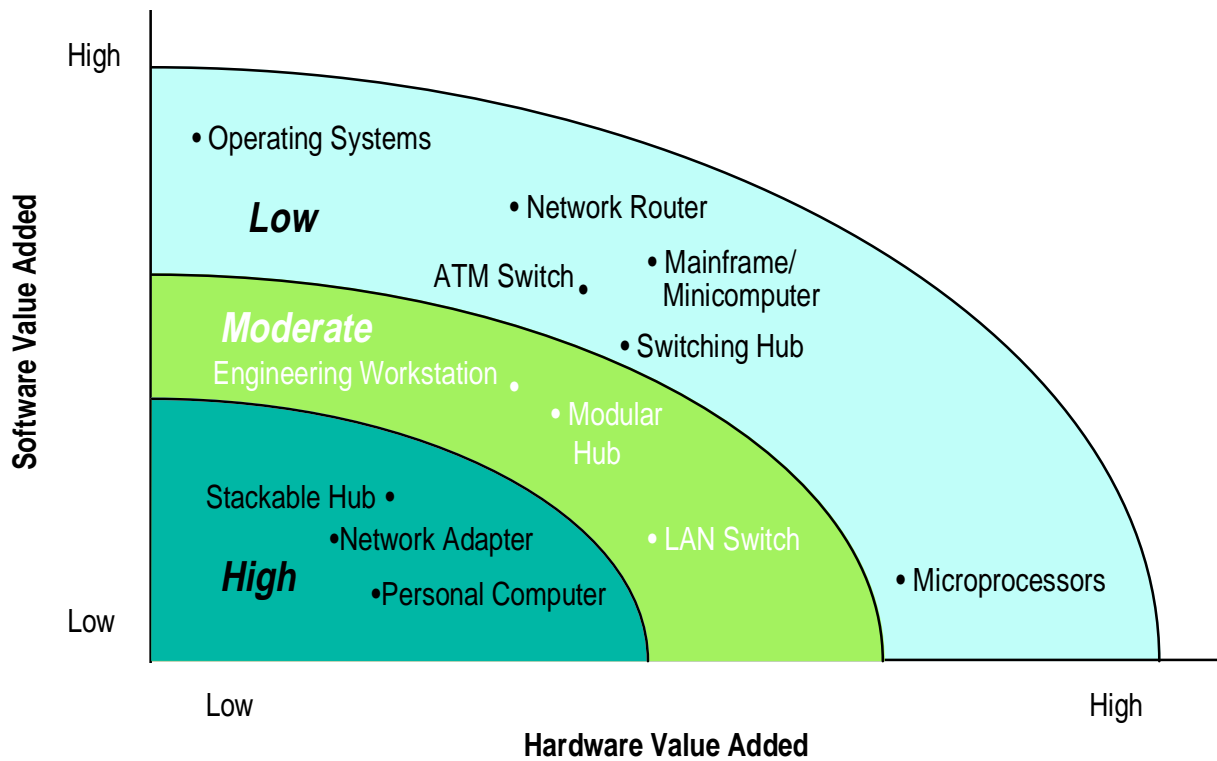
Cisco has completed 14 acquisitions in the past 12 quarters and has made an additional 12 equity investments (see **Figure 11**). While not all of these acquisitions can be justified as effective use of shareholders' capital based upon their individual returns, most have protected Cisco's core routing business by removing potential technological competitive threats. At the same time, as noted above, these acquisitions have extended and augmented Cisco's core routing technology. Given that routers are Cisco's proverbial cash cow, accounting for approximately 80% of Cisco's total revenues and a similar portion of its profits, this acquisition strategy is an effective use of Cisco's invested capital, in our opinion.

Interestingly, notwithstanding its huge cash balances, Cisco only paid cash for 2 of the 14 acquired companies: \$120 million for Lightstream and \$200 million for Telebit. We note that cash acquisitions result in large tax assessments on the acquired entity's shareholders, which in turn usually increases the cost of the acquisition to the acquirer. We believe this significant tax disincentive, together with the rich currency provided by Cisco's buoyant stock price, is largely responsible for most of Cisco's acquisitions taking the form of stock purchases or mergers.

Barriers to Entry. Industry consolidation is in large measure a function of the prevailing barriers to entry into, and the prominence of the first mover advantage principle in, the networking industry. Cisco's barriers to entry and first mover advantage are very similar to those enjoyed by Coke. We believe that two key barriers of entry exist in the networking industry: the technology involved in building these devices is very complex and the distribution of the products is closed to new vendors.

Complex Technology—It's the Software! **Figure 19** presents an interesting analysis of the complexity of the technology involved in designing advanced networking equipment. As the chart shows, there are two ways to add value to a technology product: hardware and software. Hardware solutions tend to be

Figure 19: TECHNOLOGY COMPLEXITY



Source: Robertson, Stephens & Company.

ASICs. Hardware integration follows Moore's Law, which states (in this application) that the density of custom ICs doubles every 18 months. Simply stated, it is virtually impossible to maintain a sustainable competitive advantage in hardware only, because of the need to keep up with Moore's Law. Hardware-based products need a constant effort to continuously integrate their functionality into even denser and more complex ICs. The treadmill of Moore's Law never slows down. On the other hand, software may be the best business ever invented by man. Software usually drags with it the need for specialized training. Specialized training, once learned, leads to switching costs. Switching costs are one of the best barriers to entry ever devised. People tend to hate to have to change their behavior unless forced. Therefore, the power of technology products come from their software content, not their hardware functionality. The only problem with this model is that customers need some type of hardware on which to run the software. In the PC world, Microsoft has outsourced its hardware manufacturing to Intel and the various PC manufacturers and has built a spectacular business selling software only. The networking vendors still build their own hardware, but it is the software that the customers seek. We will argue that the software content of these advanced networking devices such as a high-end router, ATM switch, or Switching Hub is on the level of complexity in terms of engineering as the early mainframes, minicomputers or PC operating systems. This stuff is complex and really hard to replicate.

Distribution. The hardest part of the business strategy for any start-up in the networking industry falls under the generic heading of distribution. In this sense, we use the word to mean “how do we get the product to our potential customers?” There appear to be three distinct distribution channels for networking products: direct sales, third-party distribution, and OEM sales. Cisco has developed an excellent direct sales organization as has Cabletron, one of its three principal competitors, while Bay Networks and 3COM, its other two principal competitors have developed excellent indirect, third-party distribution strategies. These four vendors have locked up much of the available distribution channels for networking products. As a consequence, the OEM channel has become the most viable strategy for distribution for the smaller networking vendors. Ironically, the best OEM channels are with the larger networking vendors. As such, because they have locked up most of the distribution channels, the big four networking vendors have become the gate keepers of distribution for the smaller vendors. The net result is that distribution has become the most important barrier to entry in the networking industry and has helped to protect the incumbent vendors—principally Cisco.

First Mover Advantage. First mover advantage is a phrase used to express the inherent advantages that come to the first company to exploit a new technology market. We believe there is an advantage to the first company to enter the market because of the economies of scale associated with technology products. Although most technology products do not experience traditional economies of scale as seen in traditional manufacturing industries such as automobiles and aluminum, they do exhibit similar advantages associated with scale. We have identified five such economies of scale: customer feedback, volume leverage from the cumulative production of integrated circuits, economies of scale from software based products, crucial early customer wins, and distribution. **Figure 20** presents these advantages.

- The first vendor in a market garners the bulk of initial customer feedback about the product. Customers will comment about the product’s performance, capabilities and price. Customers will make great suggestions about new features and capabilities as well as help debug the initial product offering (really to finish the engineering work and determine if that unexpected response is really an undocumented feature or a bug). This initial feedback is critical to a product’s success, and it is very difficult to obtain this information if a company is the second or third vendor to enter the market.
- There appear to be important economies of scale in software. Software development requires a lot of time, most of which must be accomplished before the product ships. This initial investment in software development will act like a fixed cost that can be amortized per unit of production over the life of the product. This cost structure will provide important economies of scale as the average cost of the product approaches the variable cost of the hardware as unit volumes increase. In addition, the software will create important product differentiation and lock in the customer; these two act as key barriers to entry from other competitors. Another potential source of benefit can come from architectural design of the product. For instance, if the product is designed with key systems software being separate from the base hardware, then the company will benefit from decreasing hardware costs (cumulative IC volumes and silicon integration) and the

Figure 20: NETWORKING INDUSTRY TECHNOLOGY OVERVIEW

First Mover Advantage -- Technology “Economies of Scale & Scope”

First mover advantage is a phrase used to express the inherent advantages that come to the first company to exploit a new technology market.

<ul style="list-style-type: none"> • Initial customer feedback 	<p>Initial feedback is critical to a products success and it is very difficult to obtain this information if a company is the second or third vendor to enter the market.</p>
<ul style="list-style-type: none"> • Economies of scale in software development 	<p>Economies of scale as the average cost of the product approaches the variable cost of the hardware as unit volumes increase.</p> <p>Software will create important product differentiation and lock-in the customer.</p>
<ul style="list-style-type: none"> • Cumulative volume production of integrated circuit manufacturing 	<p>Competitive advantage if a company has developed proprietary integrated circuits used in its products and achieves a level of volume production.</p> <p>“Moore’s Law.”</p>
<ul style="list-style-type: none"> • Initial customer wins deliver key economic value 	<p>Customers act as important reference accounts for new customers.</p> <p>Products can become perceived as the industry standard which will help to drive additional market share.</p> <p>Easier to get a customer to try a new technology or new product than it is to get that same customer to switch to a similar product from a different vendor.</p>
<ul style="list-style-type: none"> • Locking-up of distribution channels for new products 	<p>Three distribution channels available in the U.S.:</p> <ul style="list-style-type: none"> Direct sales, service and support; Indirect distribution (two-tier industrial distribution and Value-added Resellers - VARs); OEM relations with larger, established technology vendors (usually in an older technology market). <p>The first vendor to exploit these channels usually receives a competitive advantage because it is difficult for the second vendor to gain share in these channels.</p> <p>Interestingly, it has been difficult historically to support simultaneously more than one of these channels successfully.</p>

Figure 20: NETWORKING INDUSTRY TECHNOLOGY OVERVIEW

Natural consequence of First Mover Advantage

- First Mover Advantage (economies of scale) leads to highly concentrated market shares
- Market share leader emerges early and early market share is sustainable
- The industry structure can be described as Gorilla-Chimpanzee-Monkey

Market Position	Characteristics	Example	Investment Criteria
Gorillas	<ul style="list-style-type: none"> • Dominant Market Share (usually greater than 50%) • Highly profitable 	Cisco Microsoft Oracle	<ul style="list-style-type: none"> • Buy as gorilla exits chasm • Sell as market reaches maturity
Chimps	<ul style="list-style-type: none"> • Gorilla “wanna-bes” • Strong market share (usually 2-4, each with 10%-20% market share) • Profitable 	Bay Networks Cabletron 3COM	<ul style="list-style-type: none"> • Buy as chimp exits chasm • Sell if they falter • Sell when gorilla begins to flex muscle
Monkeys	<ul style="list-style-type: none"> • Hit and run artists (One-hit Wonders) • Very small market share (usually less than 5%) • Not profitable 	Network Peripherals Gandalf Networth	<ul style="list-style-type: none"> • Trading vehicles only • Must be very nimble • Sell on first signs of trouble

Source: Roberston, Stephens & Company.

ability to enhance the product's features through software changes only.

- Integrated circuit manufacturing benefits greatly from cumulative volume production. Manufacturing yields improve and average costs decrease dramatically as the cumulative volume increases. These are well documented features of IC production and act as traditional economies of scale. This benefit is only a competitive advantage if a company has developed proprietary integrated circuits used in its products and achieves a level of volume production. However, if a company uses standard IC components, the same economies of scale will result, but these benefits will accrue to the silicon vendor and will not act as a competitive advantage to the users of the technology.
- Initial customer wins also deliver key economic value because they can create enormous barriers to entry for new vendors entering the market. If used correctly, early customer wins can drive increasing market share as these customers act as important reference accounts for new customers. In addition, as a vendor builds market share, its products can become perceived as the industry standard, which will help to drive additional market share—resulting in increasing returns to scale. Equally important, it is always easier to get a customer to try a new technology or new product than it is to get that same customer to switch to a similar product from a different vendor.
- Finally, one of the key first mover advantages is the locking-up of distribution channels for the new product. There are three distribution channels available in the U.S., the primary initial market for most high-technology products. The three channels are direct sales, service and support: indirect distribution (two-tier industrial distribution and value-added resellers—VARs); and OEM relations with larger, established technology vendors (usually in an older technology market). The first vendor to exploit these channels usually receives a competitive advantage because it is difficult for the second vendor to gain share in these channels. Interestingly, it has been difficult historically to simultaneously support more than one of these channels successfully. Therefore, technology manufacturers must decide which of the channels will become their primary source of distribution and then stick with that strength.

We believe that all four of the large networking vendors are benefiting from first mover advantages. Cisco is the clear beneficiary of first mover advantage in network routing and LAN switching. Among Cisco's principal competitors, Bay Networks is benefiting from the first mover advantage in intelligent hubs; Cabletron is benefiting in intelligent hubs and next generation switching systems (hardware and software); and 3COM is benefiting from the first mover advantage in adapter cards and LAN switching. Except in new markets, we believe it will be difficult for the smaller vendors to overcome the first mover advantages of the incumbent vendors.

Obsolescence Risk. One of the unique aspects of the technology industry is the notion of obsolescence risk. Unlike more basic industries, technology is constantly going through periods of creative destruction. Once again the primary driver of this obsolescence is Moore's Law. The final risk to the incumbent vendors is one of creative destruction caused by new technology driven by the integration of systems-level functionality onto integrated circuits.

Figure 21 lays out a model from which we believe that technology obsolescence can be analyzed. We view technology-driven obsolescence as discontinuities. We view these structural changes in three flavors, which we call minor, moderate, and major discontinuities. We believe that the two “bookend” discontinuities—minor and major—are fairly easy to analyze. It is the moderate discontinuity that causes problems for investors because its impact on the incumbent vendors is more difficult to analyze. Keep in mind that technology moves forward constantly and technology obsolescence always represent some level of risk to the incumbent vendors.

Minor discontinuities are not that interesting because they represent very minor changes in technology. If these changes prove to be important to customers, then the incumbent vendors are sure to incorporate the new features/capabilities into the next interim release of their products. In general these minor discontinuities can create a window of opportunity of approximately six months. This is usually not enough time for the challenger to reach critical mass and mount a successful entrance into the industry. These challengers usually die or are acquired (although their economic value is usually not very high). By the way, much of what is reported in the weekly trade press centers on relatively unimportant minor discontinuities. Despite this fact, the trade press carries a lot of influence on Wall Street.

Major discontinuities are very important because they represent major changes in technology and can create new technology industries as a result. However, they are somewhat less interesting because they happen infrequently, although their impact is rather brutal. The introduction of the minicomputer, the PC and enterprise networks all represented major technology discontinuities. The wireless communications industry also probably represents a major discontinuity. Regarding Cisco, there does not appear to be any major discontinuity risk facing the networking industry, in our opinion.

Moderate discontinuities are vitally important to the future of the networking industry and represent the biggest risk to the incumbent vendors, including Cisco. Moderate discontinuities have two pieces. First, a new technology must be developed that offers a substantial increase in price performance. We estimate that the technology needs to drive a two to tenfold increase in price performance. We believe that this represents a large enough increase to change buying behavior. However, moderate discontinuities generally only create a window of opportunity for 18 to 24 months. It is during this time that the challenging company needs to reach critical mass to compete with the larger vendors in the market.

The second piece to the moderate discontinuity is the response from the incumbent vendors. The incumbent vendors will try to replicate the technology being offered by the challengers, but this will take time. If the incumbents can offer similar product capabilities, with either new or existing products, before the challenger can reach critical mass in terms of distribution and customer service and support, then the challenger will most likely die. If, on the other hand, the challenger can reach critical mass before the incumbent responds, the challenger has an excellent chance to reap the benefits of the first mover advantages in this new market as listed above.

Certainly the most interesting aspect of the recent acquisition binge under way in the networking industry is that it has worked as a neutralizing effect on some of the moderate technology discontinuities. Led by Cisco, the larger established networking vendors have taken the position that the smaller companies, private

Figure 21: NETWORKING INDUSTRY TECHNOLOGY OVERVIEW

Discontinuities Driven by Challenger

Level of Discontinuity	Delivered to Market as	Increase in Price/Performance	Window of Opportunity for Challenger	Required Incumbent Response	Result
Minor	New Feature	< 100%	6 months	New Feature in Product	Challenger Dies Most of the Time
Moderate	New Product	100% < X < 1000%	12-18 months	New Product	Challenger Dies if Incumbent Responds
Major	New Technology	> 1000% or 10 X	3+ years	New Technology	New Technology Wave, New Industry Established

New Networking Technologies:

Local Area

- Switching Moderate Discontinuity
- Gigabit Ethernet Minor Discontinuity
- ATM Moderate Discontinuity
- IP Switching Moderate Discontinuity

Wide Area

- Remote Access Moderate Discontinuity
- 56Kbs Modems Minor Discontinuity
- WAN Access Moderate Discontinuity
- ATM Moderate Discontinuity
- xDSL Moderate Discontinuity
- IP Switching Moderate Discontinuity

Figure 21: NETWORKING INDUSTRY TECHNOLOGY OVERVIEW

Product Strategy Lineage -- "The Next Microsoft!"

Product Phases	Product Features/Customer Acceptance
• Point Product	<ul style="list-style-type: none">– Solves specific set of problems– Drives initial customer acceptance
• Platform	<ul style="list-style-type: none">– Builds platform from which additional problems can be solved through new applications– Drives crossing the chasm problem
• Architecture	<ul style="list-style-type: none">– Builds entire environment whereby critical architectural services are provided by the product– Achieves customer lock-in
• Exploitation	<ul style="list-style-type: none">– Build applications that leverage architecture– Leverage customer's financial commitment

Source: Roberston, Stephens & Company.

and public, will be allowed to develop new technologies and to pioneer markets for products based on these technologies. The large companies will watch to see which of the markets actually develop. After the smaller companies have started to be successful, the larger companies will step in and acquire them. In our view, this strategy can be extremely effective and actually reduces shareholder risk.

As noted above, Cisco has been the principal architect of this strategy and the principal driver of this trend. As the gorilla of the industry, Cisco has been able to throw its weight around and acquire a number of the more promising start-up companies.

Management Tenets

Cisco's management has proven itself to be keenly attuned to shareholder interests—i.e., value creation. Its almost every action appears to be motivated by the desire to increase sales, gain market share and increase its stock price. The company's ROIC, growing excess cash, and stock repurchases speak for themselves (until the recent cancellation due to tax concerns regarding eligibility for continued pooling accounting treatment of acquisitions). The company's balance sheet is remarkably clean.

The company's management appears to be customer focused. Time and again it has claimed—and, more importantly, proven itself—to be technology agnostic and that it will provide whatever networking equipment its customers desire. Moreover, it has backed up these claims with actions—purchasing companies with technology that it could not otherwise provide. Its CEO, John Chambers, makes it a point to visit each of Cisco's largest customers at least once a year. The company strives to manage investor expectations and avoid “over-hyping” its stock during communications with the investment community.

In short, we believe Cisco to be an extremely well managed company, with management's focus being to maximize the value of Cisco's business.

Market Tenets

Given that Cisco has a fairly impressive business, the question arises as to whether an investor can purchase an interest in the company at a reasonable price. We believe that Cisco's stock can be purchased at a fair price.

We base this assessment, Mr. Buffett, on our shared belief that, as we stated earlier in this letter, the ability of a business to invest its capital at enticing incremental returns is the key driver to creating long-term market value. Given this belief, we have set forth in **Figures 22–24** a series of tables plotting (1) returns on invested capital, or ROIC (i.e., NOPAT divided by invested capital), on the x-axis, relative to (2) enterprise value based on closing market prices on February 19, 1997 divided by the invested capital deployed in their businesses as of the end of calendar Q4 1996, on the y-axis, for Cisco and a number of other “peer” companies, both within and outside of the networking industry. This latter measure (which, for convenience, we will refer to as EV/IC) is our version of a P/E ratio, with enterprise value—which equals market value plus net debt less excess cash—

substituted for market price and invested capital replacing earnings in the denominator of the metric. This measure provides us with the value being assigned by investors to each dollar of capital invested in a company.

Because ROIC measures the returns generated by each dollar of a company's invested capital and EV/IC measures the multiple assigned by investors to each such dollar of invested capital, we would expect to see a strong correlation between these two measures. Alternatively stated, we believe that, all other things being equal, the market assigns a higher (lower) EV/IC multiple to a company with a higher (lower) ROIC than to a peer company with a lower (higher) ROIC.

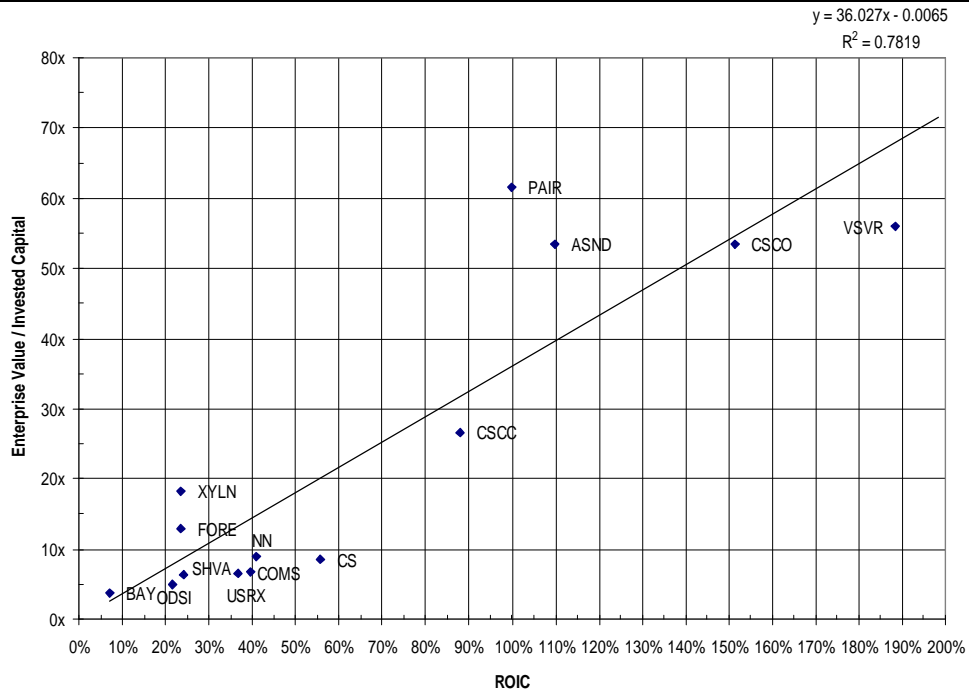
We have compared Cisco's EV/IC valuation relative to its ROIC with a number of different groups of companies. In particular, we have plotted the correlation between ROIC and EV/IC for Cisco and the following groups of companies:

- **Figure 22:** the 12 networking companies that we follow plus four other leading networking vendors.
- **Figure 23:** Cisco and other industry “gorillas”—i.e., companies that generate extraordinary ROIC and dominate their industries. We believe that in addition to Coke, Microsoft, Intel, Oracle, Computer Associates and Gillette (another company with which we believe you are somewhat familiar) all qualify.
- **Figure 24:** all 16 networking vendors from Figure 23, plus all seven of the industry gorillas from Figure 24, plus another six leading technology vendors.

We have further plotted the regression line for each of these groups of data points to indicate the “goodness of fit” of our data—i.e., the strength of the correlation between the ROIC metric and the multiple assigned by investors to each dollar of capital invested in an enterprise. If ROIC does in fact drive this multiple, one would expect to see the regression equation yield a high r^2 —i.e., the closer the regression is to one, the more predictive power we can ascribe to ROIC as a determinant of enterprise value divided by invested capital (as noted above, alternatively stated, this latter measure is simply the multiple assigned by the market to each dollar of capital invested by an enterprise in its business). We have set forth the r^2 value for each regression in the top right-hand corner of each of the tables. As you can see, each of the regressions has a very strong goodness of fit and thus indicates that, as we would expect, ROIC is a primary driver of EV/IC.

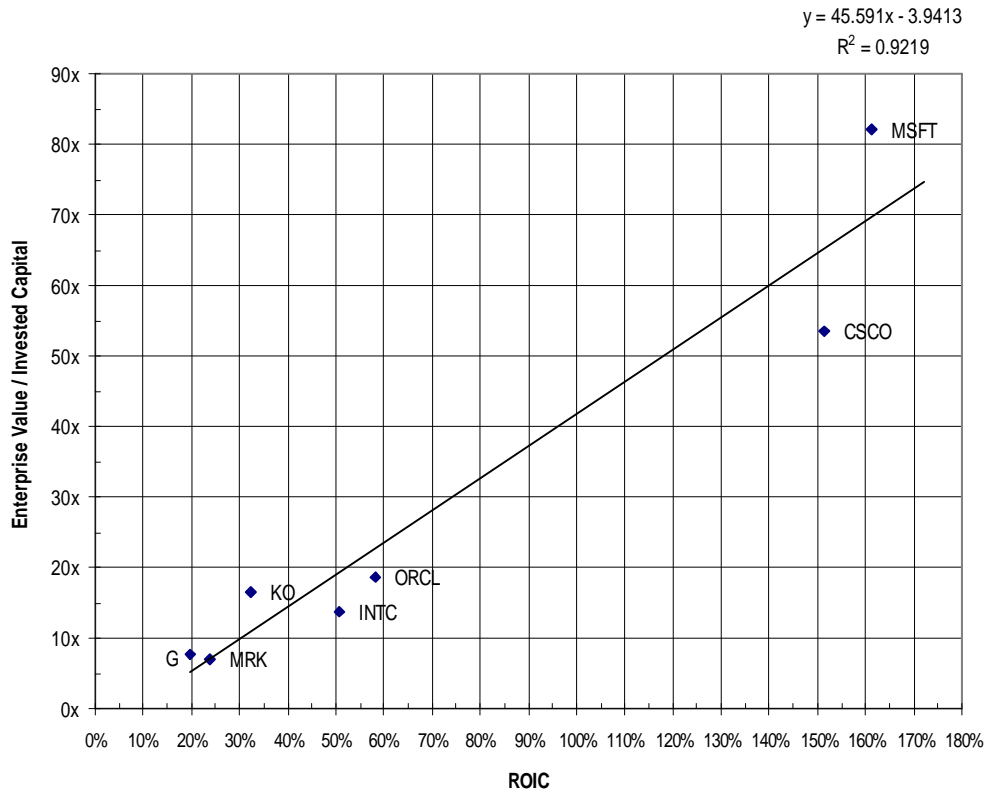
Each of these tables can be interpreted as follows: those companies that lie above the regression line are overvalued relative to their peers, those companies that fall below the line are undervalued, and those companies that lie on the line are fairly valued. We note that an alternative explanation of the data is that for those companies that lie above the regression line, investors have expectations regarding such companies' operating performance that are extraordinarily high relative to their peers. A company that lies above the line thus must deliver extraordinary returns relative to its peers if it is to sustain its extraordinary valuation. Similarly, for those companies that lie below the regression line, investors have expectations that are extraordinarily low relative to their peer companies. A company that lies below the regression line thus need only generate returns on its invested capital in line with its peers in order to earn a higher valuation.

Figure 22: EV/IC VERSUS ROIC ■ Networking Universe



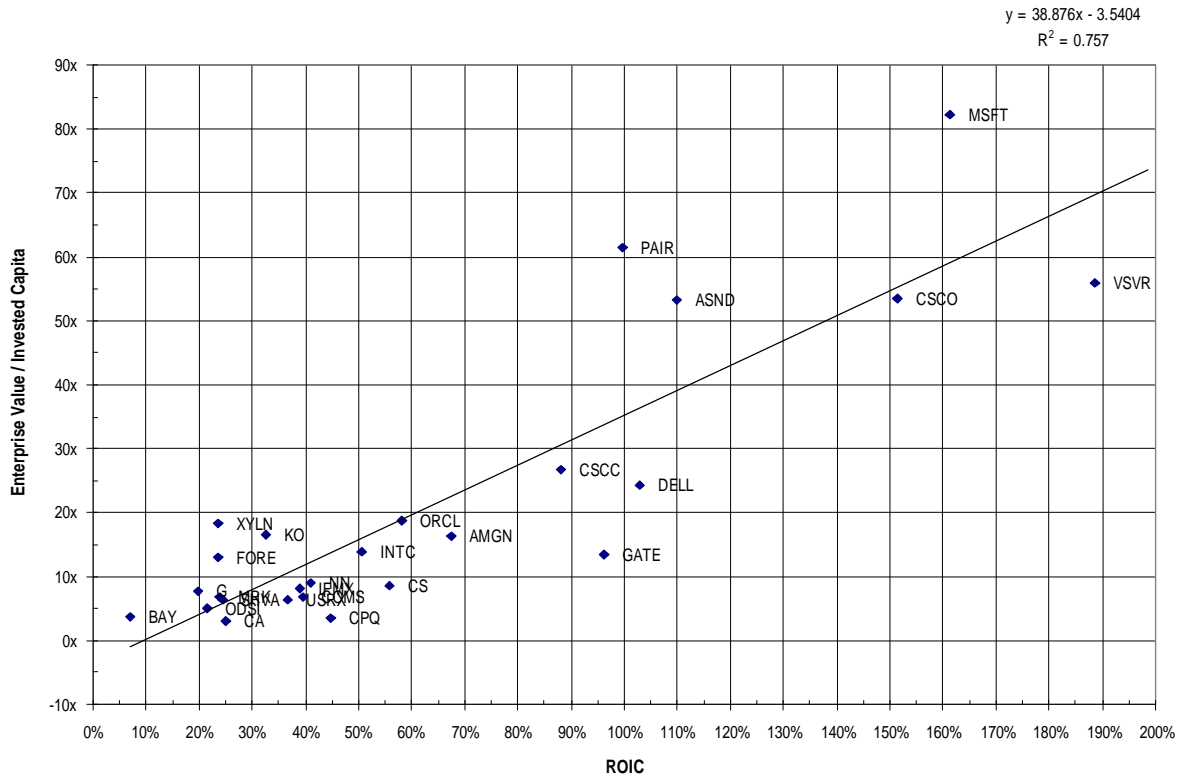
Source: Robertson, Stephens & Company.

Figure 23: EV/IC VERSUS ROIC ■ Gorillas



Source: Robertson, Stephens & Company.

Figure 24: EV/IC VERSUS ROIC ■ Everyone



Source: Robertson, Stephens & Company.

As can be seen in each of the tables, Cisco does not appear to be overvalued relative to any of the above peer groups of companies; rather, in each instance, Cisco appears to be slightly undervalued. Notably, Cisco appears to be undervalued relative to Coke when analyzed in the context of both the “gorilla” group of companies set forth in **Figure 23** and the larger networking universe together with gorillas and other leading technology vendors set forth in **Figure 24**. When we factor in Cisco’s competitive position within the networking industry, the industry’s barriers to entry and ongoing consolidation, and the trends driving industry demand, we believe that Cisco will continue to outperform both the market and its peer group of companies in terms of its ability to invest large amounts of additional invested capital at extraordinary incremental returns.

In closing, Mr. Buffett, give yourself a little credit. Go grab your rod and tackle. That big Cisco marlin looks like a trophy fish.

Sincerely,

Paul Johnson
Paul J. Silverstein

Note: Robertson, Stephens & Company maintains a market in the shares of Amgen Inc.; Ascend Communications, Inc.; Cisco Systems, Inc.; CyberCash, Inc.; Dell Computer Corporation; FORE Systems, Inc.; Informix Corporation; Intel Corporation; Microsoft Corporation; Oracle Corporation; PairGain Technologies, Inc.; Shiva Corporation; Sybase, Inc.; Sync Reserch, Inc.; 3Com Corporation; U. S. Robotics Corporation; VideoServer, Inc.; Visigenic Software, Inc. and Xylan Corporation has been a managing or comanaging underwriter for or has privately placed securities of Ascend Communications; CyberCash; PairGain Technologies; Sync Research; VideoServer; Visigenic and Xylan within the past three years.

Additional information is available upon request.

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Unless otherwise noted, prices are as of Wednesday, February 19, 1997.
