Global Equity Research

UBS Warburg

April 1, 2002 | **PC Hardware, PC Software, Server and Enterprise Hardware** | **United States**

EMC Corporation (EMC) — Hold

Key Statistics

Price	$11.92
52-Wk Range	$45-11
Price Target	$15.00
Return Pot'l.	25.8%
Mkt. Cap(MM)	$26,471
Sh. Out.(MM)	2,220.7
Float	99%
Inst. Hldgs.	59.5%
Avg. Volume(K)	21,792
Curr.Div./Yield	None/NA
Sec.Grwth.Rate	NA
Convertible?	No

Quarterly Earnings Per Share (fiscal year ends December)

	2001A	2002E	*Prev*	2003E	*Prev*
1Q	$0.18	($0.04)			
2Q	0.05	(0.03)			
3Q	(0.12)	(0.01)			
4Q	(0.03)	0.03			
Year	**$0.08**	**($0.05)**		**$0.20**	
FC Cons.:	$0.08	($0.01)		$0.24	
P/E:	149.0x	NM		59.6x	
Revs.(MM):	$7,091	$6,095		$7,710	

EMC Corp. designs, makes, markets and supports a wide range of storage-related hardware, software and service products for the open systems, mainframe and network attached information storage and retrieval system market.

Source: UBS Warburg LLC and First Call consensus estimates

EMC: "What Ails EMC?" - Part IV - Competition Heats Up

Competition Heats Up

Six months ago we published "What Ails EMC?" Our analysis then led us to conclude that EMC's stock would remain under near-term pressure due to a number of factors which included: (1) a maturing product cycle, (2) increased competition, (3) EMC's using wrong distribution model and, (4) excess expense structure in their financial model.

We now expect another wave of competitive pressure over the next couple of quarters. Key competitors are launching new storage offerings and we are concerned that EMC's new product introduction in the fall could face significant transition risk. Accordingly we are lowering revenue and earnings estimates for EMC for the March, June and September quarters. Our new '02 revenue estimate is $6.1 billion or down 14% y/y (was $6.6 billion or down 7%) and our new '02 EPS calls for a ($0.05) loss from breakeven previously. We have anticipate some additional restructuring announcements to reduce expense structure – but our EPS assumptions are dependent on the actual streamlining actions.

EMC's domination of the high end disk array market is over and arguably competitors can claim superior hardware performance today. And while we believe EMC management is sincere in its push to become a 'middleware' leader – the financial model is still heavily dependent on hardware performance.

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Investment recommendation: We are maintaining our cautious view of EMC for the near term. As we have highlighted before, we believe down-side risk to the stock is $6/share (or 1.1X NTM sales) which represents the same price/sales that EMC has traded it in past times of financial pressure – although we note EMC's current financial performance is much worse than at any time in the nineties. Even if we adjust EMC's price to sales for the market's relative premium to historical levels, we still see downside risk to $7/share. We are lowering price target to $15 from $18. And while we have been cautious on EMC stock in the near term while maintaining our long term Buy rating, we think it prudent to lower our rating to Hold.

"What Ails EMC?" Revisited

We kicked off a series of notes titled, 'What Ails EMC?' in October of last year. At that time, we identified various negative factors that we thought would keep near-term pressure on EMC's stock. These factors included: (1) a maturing product cycle; (2) increased competition; (3) EMC's distribution model was too limiting; and (4) EMC's financial model has the wrong expense structure to support expanded distribution channels. In the short term, we are adding "Product Transition Risk" to our concerns. We review these strategic and competitive factors below.

Maturing Product Cycle and Product Transition Risk

Thanks to its high-end Symmetrix offering, EMC has become the dominant enterprise storage provider. However, we think the company will release the next generation of this product sometime during late summer or fall and we believe there is risk that competitive actions could hamper a smooth transition. While we don't know what EMC will do to upgrade the platform (the company is very quiet on future developments) we expect some combination of the following enhancements:

- Replace the proprietary SCSI 'back-end' switch with Fiber Channel fabric and support for Fiber Channel drives: We expect future versions of Symmetrix to move away from proprietary SCSI switch back end and use full fiber channel connections. This would enhance performance and reliability while lowering the hardware cost. Such a change should improve the upgrade path from EMC's mid-range Clariion to high-end Symmetrix. EMC will be one of the last to make the move to Fiber Channel.
- Improve internal bandwidth – add more shared-buses or replace the shared bus architecture with switch fabric: Symmetrix is based on a shared bus architecture – the same as when the product was launched in 1990. Over time EMC has upgraded the number of busses as well as increased processor speed. That said, Symmetrix's quad bus architecture currently has a maximum throughput of 1.6 GB/sec which compares poorly to the HDS' 6.4 GB/sec internal bandwidth (even after accounting for control data overhead, HDS' cross bar switch provides 3.2 GB/sec rates). So more buses or a new switched architecture appear likely from EMC.
- Better integration and upgrade path from Clariion to Symmetrix: New Symmetrix products will likely include a more integrated upgrade path from Clariion to Symmetrix alleviating certain limitations inherent due to architecture differences between the products (i.e., inability to replicate between high-end Symmetrix arrays and mid-range Clariion devices) and the use of different storage software. There are likely to be economies for EMC by adopting a common hard drive architecture when Symmetrix joins Clariion in the use of Fiber Channel drives and fabric. We think this can be accomplished with increased reliance on common software to integrate the two platforms.
- Integrate AutoIS functionality and management tools: We expect EMC to further implement its AutoIS strategy in future versions of Symmetrix. The WideSky middleware layer (a communication and coordination layer between EMC management solutions and both EMC and non-EMC hardware platforms) will likely offer greater functionality when used in conjunction with EMC's branded products.
- Integrate NAS and SAN capabilities in single package at lower costs: In late February, EMC announced a new high-end Celerra Data Mover (NAS) along with product and software enhancements. We expect EMC to continue to work on a more efficient and cost effective way of adding NAS and SAN capabilities in the same package without the inherent higher costs we think they incur today. We are unsure if this will be directly addressed by the next generation Symmetrix

In the past, EMC has done a good job of managing transitions to new products. This time, however, we think potential announcements from HDS and IBM may force EMC to promote the new Symmetrix in order to compete – a move that could adversely affect EMC shipments in the June and September quarters.

New Competitive Environment

Throughout most of the 1990's, EMC maintained a clear IP advantage over its competition. Today, however, EMC's competitors (specifically IBM and Hitachi Data Systems) offer sound hardware and software alternatives at very competitive prices. The competitive dynamics are very obvious in the relative revenue growth rates of EMC, IBM and HDS shown in the following table.

Exhibit 1a

Storage Leader Board – Top 3 Enterprise Storage Vendors

($ million)

	2000 Storage Revenue (Billion)	y/y Growth	2001 Storage Revenue (Billion)	y/y Growth	2002E Storage Revenue (Billion)	y/y Growth
EMC	$8.9	32%	$7.1	-20%	$6.1	-14%
HDS	$2.0	20%	$2.1	4%	$2.7	30%
IBM	$0.9		$1.2	26%	$1.3	10%
	$2.9		$3.4	17%	$4.0	18%
Total	$11.9	30%	$10.5	-11%	$10.1	-4%

Source: Company reports and UBS Warburg estimates. EMC total revenues, HDS enterprise storage revenues, IBM Shark revenues.

Exhibit 1b

Storage Leader Board - Storage and Enterprise Server Vendors

($ million)

	1997	1998	1999	2000	2001	2002E	2003E	2004E	2005E
Storage Vendors									
EMC	4,023	4,861	5,983	7,968	5,916	4,800	5,960	6,910	8,290
HDS	607	850	1,660	2,000	2,080	2,704	3,380	4,225	5,281
NTAP	145	249	470	980	826	997	1,476	2,022	2,668
STK	1,542	1,625	1,649	1,411	1,359	1,435	1,550	1,628	1,709
Total	6,316	7,585	9,763	12,359	10,181	10,321	12,366	14,785	17,948
		20.1%	28.7%	26.6%	-17.6%	1.4%	19.8%	21.5%	21.4%
Enterprise Server Vendors									
IBM	1,637	1,894	3,029	2,970	3,223	3,276	3,473	3,751	4,051
HP	332	349	527	538	563	495	446	401	361
CPQ	897	1,166	1,515	1,970	1,750	1,888	2,096	2,326	2,582
SUNW	1,100	1,400	1,800	2,350	1,880	1,756	1,607	1,598	1,572
DELL	-	60	250	1,000	1,250	1,650	1,780	1,836	1,903
Total	3,966	4,869	7,122	8,828	8,666	9,065	9,401	9,912	10,469
		22.8%	46.3%	24.0%	-1.8%	4.6%	3.7%	5.4%	5.6%
Top 9 External Storage	10,282	12,453	16,884	21,188	18,847	19,386	21,767	24,697	28,417
		21.1%	35.6%	25.5%	-11.0%	2.9%	12.3%	13.5%	15.1%

Source: Company reports and UBS Warburg estimates.

Note: EMC Product revenues, HDS worldwide external storage, Netapp total revenues, STK product revenues. HP, Sun and enterprise storage revenues adjusted to remove double counting of HDS OEM sales. Dell enterprise storage revenues adjusted to remove double counting of EMC OEM sales.

Key Symmetrix product characteristics are now matched by HDS' Lightning. And our industry checks indicate that HDS and IBM are due to raise the bar with product revisions before EMC is ready to ship the new Symmetrix solution. With EMC already showing signs of competitive pressure, we wonder if additional competitive announcements will force EMC to pre-sell their new Symmetrix to remain competitive. This in turn will raise the transition risk in the June and September quarters and is the reason behind our EPS reductions.

We expect IBM to introduce a new version of Shark (likely including enhanced Regatta functionality) during the third quarter. This would be about one year after IBM's last major Shark upgrade which was launched in the summer of '01. Unlike past Shark upgrades, we expect IBM to move to the leading edge of microprocessor technology in Shark and incorporate "Regatta" technology in Shark. Accordingly, we expect a larger performance boost for Shark than past upgrade cycles when a less aggressive microprocessor technology approach was taken. We also believe IBM is very close to announcing its "Storage Tank" software strategy which provides virtualization and storage management to compete with EMC's AutoIS initiative.

While HDS arguably has with its Lightning the highest performance enterprise disk array today and has easily generated the best market share performance over the last 18 months, we believe a major new HDS product announcement is also likely to come ahead of the new Symmetrix. Past visits with Hitachi Data Systems management lead us to believe that expanded software capabilities are coming as well. The competitor we are most concerned about impacting EMC is HDS whose existing product already has a performance edge and the company is already showing good market share momentum – a new product with improvements over current Lightning offering could cause competitive problems for EMC.

With the competition closing the technology gap, EMC has embarked on a major software initiative (AutoIS) with a goal of becoming a middleware provider (through its WideSky offering) to the storage industry. We think EMC has a chance to leverage its significant install base and perhaps eventually become the de facto storage middleware standard. However, EMC is still in the early days of this program and there is reluctance among some major storage vendors to share their own APIs which are critical to the WideSky's success. We believe EMC is benefiting because no group of vendors is making a move to form a consortium to challenge EMC's AutoIS initiative. And any delay in countering EMC will continue to give EMC a development edge. That said, we still think there are a few unanswered questions surrounding EMC's AutoIS.

- Does EMC's customer base want improved software tools for managing robust storage growth or are they more focused on buying cost effective storage systems
- Will industry participants buy into EMC's vision and provide the necessary access to API level intelligence that will allow EMC's software to do more than monitor other vendors' systems?
- Can EMC win in a server-centric software environment where their competency has historically been at the storage subsystem?
- Do customers want a separate storage management environment in addition to their existing system management environments.
- Can successful middleware strategy offset margin compression in the increasingly competitive storage hardware arena?

Distribution Model

When EMC resurrected the Dell/Clariion OEM relationship last fall, we thought it signaled an important change in EMC's go to market strategy – we have viewed EMC's reluctance to embrace the OEM channel as the major factor behind's HDS' success with HP (HWP) and Sun (SUNW) which we estimate will cost EMC over $1 billion in UNIX server-attached revenues in 2002. We think EMC's mostly direct distribution model has too high an expense level and as a storage point product company, we think EMC will face increasingly difficult pressure from established server vendors such as IBM (with Shark) and Sun and HP (with their HDS-Lightning based product lines). Storage is not always independent from the server sale – particularly when the server supplier has a strong storage offering.

In November 1995, HP signed a reseller agreement with EMC to resell EMC's Symmetrix line of high-end enterprise storage solutions as part of their Unix server installations. This relationship terminated in June 1999. At that time, HP began OEMing HDS' 7700E array in its SureStore E Disk Array MC256. Prior to its agreement with HDS, all of HP's high-end storage (from 1996 through Spring 1999) was EMC product and HP accounted for 19% of EMC's product revenues in (see Exhibit 2). By our estimates, HP will sell over to $0.6 billion of HDS product in 2002 – sales that EMC has effectively foregone.

Exhibit 2

HP High-end Storage

($ million)

	1996	1997	1998	1999	2000	2001	2002(E)
HP Enterprise Storage	$835	$1290	$1451	$1155	$1278	$1157	$1180
HP/EMC Resell	287	504	718	219			
HP/HDS OEM				320	750	725	620

Source: Company reports and UBS Warburg estimates.

Further evidence of EMC's lost OEM opportunity is found with Sun who has recently included HDS' Lightning product for its customers' high-end storage needs. How important is the Sun Unix opportunity to EMC? We are hearing that Sun is continuing to build momentum with this offering as they roll it out internally and in their reseller channel. At Sun's current pace (management indicated in February that it is on track to ship 500 systems by June) Sun could ship well over 1,000 HDS Lightning systems in calendar '02. If we estimate Sun's typical external storage system averages 4TB and price per MB ranges from $0.10 to $0.20, then Sun could sell around $700 million of HDS external storage in this calendar year. Or looking at it another way, we estimate that 50% of EMC's storage is predominantly attached to UNIX environments and about 50% of this is attached to SUN servers. So, almost 25% of EMC's enterprise storage is primarily attached to Sun servers. We believe EMC's reluctance to OEM storage through Sun will result just under $1 billion "lost" revenue in 2002. Taken together, both Sun and HP should ship over $1.2 billion HDS high-end storage product in 2002.

Is storage independent from the server sale? In our 1999 survey of 40 large Sun customers in the United States most indicated that after choosing Sun storage at the original time of sale, customers often brought in additional vendors for add-on storage (Exhibit 3). At the initial server sale, server vendors captured the bulk (around 70% in our survey) of the storage sale. EMC often gained a foothold on add-on storage sales because customers were unhappy with storage from their server supplier. It follows that if the server vendor initially provides a solid storage offering (like the HDS Lightning), EMC is precluded from opportunity to make add-on sales. Furthermore, even with a poor storage product, about one-third of Sun's server customers only used Sun storage, these loyalists were not likely to buy EMC before and are even more likely to "stick with Sun" now that they are offering a competitive alternative to EMC's storage solutions. Finally, the HDS agreement should help Sun to increase original server storage sales – note that our survey results showed that 36% of Sun's customers did not use any Sun storage and this percentage is likely to drop now that Sun is offering a world class storage solution.

Exhibit 3

Sun Storage Loyalty Level

	100% Sun Storage	Mixed Environment	0% Sun Storage
% Respondents	32%	32%	36%
Will continue to buy from Sun	60%	10%	0%
Will look to other storage vendors	40%	90%	100%

Source: UBS Warburg Enterprise Server Survey.

We believe it is critical that EMC re-engages the OEM channel – otherwise, too much opportunity will be lost to Hitachi Data Systems and others if EMC maintains its mostly-direct go to market strategy. And while we view the new OEM arrangement with Dell as a great potential partnership, we worry that EMC has to overcome damaged relationships with past OEM customers. And we view EMC's expense structure as being way out of line to support a cost-effective OEM channel.

Financial Model

We believe a reasonable Gross Margin range throughout EMC's product cycle is 39-55%. To arrive at this range, we estimate 25% of EMC's sales consist of proprietary hardware with a 55-65% gross margin. About half of the company's sales are commodity hardware with 20-35% gross margin and the remaining 25% consists of software at 60-85% gross margins. This results in a weighted average gross margin in the 39-55% range (see Exhibit 4).

Exhibit 4

What is EMC's Sustainable Gross Margin?

		Gross Margin	
Proprietary HW	26%	50-65%	
Commodity HW	52%	20-35%	
Total HW	77%		
Software	23%	60-85%	
Total Rev	100%	40-51%	(Weighted)

Source: EMC 4Q:01 reports and UBS Warburg estimates.

In its last quarter, EMC posted 37% gross margins (and we expect GMs to fall further to 36% in the March quarter). Meanwhile, the bulk of EMC's expense structure is driven by a large direct sales effort that is very expensive to support. As a percentage of revenues, sales and marketing expense has increased over 11 percentage points from just under 21% that it averaged between the six years '95 to '00 to current levels above 32% (see Exhibit 5).

Exhibit 5

EMC Gross Margin and Expense Structure

	1998	1999	2000	2001	2002(E)
Gross Margins	45%	54%	61%	45%	38%
SG&A	20%	21%	24%	31%	31%

Source: Company reports and UBS Warburg estimates.

Add research and development expenses of $200 million per quarter and EMC's expense structure is clearly mismatched with the current gross margin reality. Earlier in EMC's product cycle (take the three years from '98 to '00 for example) when the company's IP advantage provided for gross margins north of 50%, operating expenses averaged 30% (9% R&D and 22% SG&A) and the company could get 21% operating margins. EMC is currently competing late in its product cycle with gross margins at the bottom of the 39-55% range. With lower expenses (say 12% R&D and 26% SG&A) EMC's late-in-cycle normalized earnings power for 2002 would provide operating margins of 1% and EPS of about $0.05 – whereas early-in-cycle normalized earnings power for '02 would yield operating margins of 12% and EPS of $0.25 (Exhibit 6 shows normalized EPS at various operating margins based on our 2002 revenue estimate). Clearly, EMC is in need of more restructuring if they are to achieve "normal" levels of profitability.

Exhibit 6

EMC EPS Sensitivity to Operating Margin – 2002 Revenues

Revenue	Operating Margin	EPS
$6.1 bb	3%	$0.06
"	5%	$0.10
"	7%	$0.14
"	9%	$0.18
"	11%	$0.22
"	13%	$0.26
"	15%	$0.30

Source: Company reports and UBS Warburg estimates.

With its AutoIS initiative, EMC is not only providing an open platform for a competitive suite of monitoring, automation, provision and reporting tools to facilitate TCO improvement for its customers, but the company is also aiming to increase the mix of higher margin software sales. With AutoIS the question becomes: How large a part of EMC's mix must AutoIS become to make an impact on EMC's financials? To answer this question, we start by sizing AutoIS in 2003 at a bullish $500 million incremental revenue scenario. At a 75% variable margin, this business would add $0.15/share to the bottom line – which leaves investors to decide how much value to afford this opportunity. If we take our current EPS estimate of $0.20 for 2003 (which includes a conservative AutoIS ramp) and add an incremental $500 million or $0.15/share "homerun scenario" from AutoIS in 2003 we end up with PES of $0.35 per share – and the stock is still richly valued at P/E of 34X this aggressive AutoIS scenario.

If we project that the value on EMC is shifting to middleware and take our base line software forecast of $2 billion and add another $500 million AutoIS upside revenue we end up with $2.5 billion software revenues in 2003. Using an aggressive VRTS like valuation of 10X revenues software business we come up with roughly $12 valuation for the middleware business. And we incorporate this valuation in setting our longer term $15 per share price target (was $18 share). This appears to be a very aggressive middleware forecast and a premium valuation that we doubt investors will pay up for it in the short term. This valuation also appears aggressive because a good part of EMC's software is closely coupled with hardware sales and the company's success in API sharing is meeting resistance.

Earnings Revisions and Valuation

New Estimates

We expect a wave of competitive pressure to affect EMC over the next couple of quarters. Key competitors are launching new storage offerings and we are concerned that EMC's new product introduction (which we believe will come in the fall) could face significant transition risk.

Accordingly we are lowering revenue and earnings estimates for EMC. For the March quarter, we are lowering our revenue estimates to $1.3 billion or down 45% y/y (from $1.4 billion or down 39% previously). Our March quarter estimate goes to a loss of ($0.04)/share from a loss of ($0.03)/share previously. For the June quarter, we have lowered our revenue forecast to $1.4 billion or down 31% y/y (from $1.6 billion or 21% previously). We are modeling a slight reduction in expenses for the second quarter which results in a new loss of ($0.03)/share from a loss of ($0.01)/share previously. And in September, we are now modeling $1.5 billion in revenues (down from $1.7 previously) concurrent with a loss of ($0.01)/share (from $0.01/share gain previously).

For the year, our new '02 revenue estimate is $6.1 billion or down 14% y/y (was $6.6 billion or down 7%) and our new '02 EPS is for a ($0.05) loss from breakeven previously. We have anticipated some additional restructuring announcements to reduce expense structure – which, depending on how quickly they are implemented, could result in improvements to our new bottom line expectations.

Valuation

We have already shown what EMC needs to do to achieve normalized earnings of $0.05/share on our $6.1 billion revenue forecast for 2002. The company would need to make significant changes in their distribution model and financials to get back to respectable earnings levels. We would caution investors that "What Ails EMC" is a lot more than the economy. We believe that the June and September quarters could see a significant increase in competitive pressure along and higher transition risk than EMC has faced in the past.

EMC's current earnings and financial performance is far below any period in the 90's – still, if we use the eight-year period between 1991 and 1998, EMC traded at an <u>average</u> EV-to-Sales multiple of 3.3X or in line with EMC's current stock price. During that same period, the price to sales multiple found downside valuation support at 1.1X revenues. Using this historical precedent and applying it to our $6.1 billion forecast for 2002 revenues, we arrive at downside risk to $6 per share. If we adjust that for the relative higher valuations found in the market today, the downside risk is still $7 per share.

While we clearly believe EMC is taking the right strategic direction with their middleware strategy, in light of the earnings risk in the June and September quarters, we believe it is prudent to remain cautious on EMC stock in the near term. Our longer term price target of $15 per share is unlikely to be realized in the near term because of the near term earnings risk. And we are concerned there is still significant downside earnings risk in the stock. And while we have been cautious on EMC stock in the near term while maintaining our long term Buy rating, we think it prudent to lower our rating to Hold to be more clear. Network Appliance remains our favorite in this sector.

Statement of Risk

Investing in stocks in this sector implies a high degree of risk due to high levels of competition, rapid technology change and execution risks. High valuations add to these risks.

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