

Forum Highlights Several Key Opportunities For Server Vendors

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■ UBS Server Forum Highlights Long-term Growth Drivers

We held our Server Technology Forum at the Plaza Hotel in New York. Presenters included IBM, HP, EMC's VMware, Fujitsu, RLX Technologies, ClearCube, & an end user panel. In general, the conference painted an upbeat picture for blades & x86 servers, backing our views & results from our recent CIO survey that servers & storage will benefit into 2006.

■ Blades Provide Exciting Opportunity

Blades were highlighted as a significant growth opportunity that could expand to as much as 25% of the market in 5 years as multiple presenters outlined respective blade strategies for both servers & PC's. Most importantly, blades present higher ASPs & up-selling opportunities into management software & services (supporting margins as the market migrates away from proprietary systems).

■ Server Virtualization A Reality

Server virtualization was another hot topic & we continue to believe that EMC's VMware is an emerging leader. IBM, HP & Fujitsu all spoke highly of VMware's products. We believe our revenue estimate for VMware of \$310 mm for 2005 (+42% y/y) could be conservative.

■ Panel Highlights Opportunities in Blades and Storage

Our panel highlighted growth opportunities in blades & was optimistic about potential for increased spending in server & storage management software overall in 2005.

UBS Server Technologies Forum Highlights Rapid Growth in Blades & Management Software

Yesterday, we held our Server Technology Forum at the Plaza Hotel in New York City. Presenters included IBM's Susan Whitney (GM, eServer xSeries), Hewlett-Packard's Brad Anderson (SVP & GM, ISS Technology Solutions Group), EMC VMware's Diane Greene (EVP of EMC & President of VMware), Fujitsu's Richard McCormack (VP Product & Solutions Marketing), RLX Technologies' Doug Erwin (CEO), and ClearCube's Carl Boisvert (CEO). We also held an IT Spending Panel with UBS IT personnel and Industry guest speaker Timothy Prickett Morgan (Computerwire).

Presenters were generally upbeat on blades and prospects for growth in x86 servers, backing our views and recent CIO surveys that suggest servers can benefit from integration and consolidation into 2005 (Unix sales were generally characterized as flat). Our panel also highlighted storage as the sector's major growth area next year, with a focus on storage management software in particular. Several presenters cited VMware's growth prospects and solid market position, as well as a desire to introduce more products utilizing AMD's Opteron processors (in addition to Intel).

We estimate that the overall server hardware market approximates \$50 billion in size, growing in the mid single digit range over the next few years. We believe the Unix portion (about 36% of the market) should experience about flat growth in 2005, with the Windows (about 32% of the market) growing 10% and the Linux portion (about 10% of the market) growing about 22%. At our conference, HP cited IDC estimates of blade revenues reaching \$7 billion by 2008 (from under \$1 billion currently) and believes that blades could grow from what he estimates as 5% of the current marketplace to closer to 25% by the 2007–2008 timeframe. One of the biggest issues that hardware companies (IBM and HP) should continue to grapple with going forward is navigating the mix shift away from Unix and mainframes, toward x86 architectures based on Windows and Linux operating systems.

Key Takeaways for Companies:

IBM (Buy 1): Solid xSeries Growth Should Continue for Big Blue

Susan Whitney (GM of eServer xSeries business) outlined IBM's solid market strategy in servers & blades (with IBM Bladecenter) quite effectively, highlighting opportunities in software & services. Ms. Whitney also expanded on IBM's desktop strategy in light of its pending PC business sale and noted that while IBM does not view the desktop PC business as strategic, the company may look to take desktops & move it into the server space. We continue to believe that PC blades could fit well with IBM's strengths in software & services. Additionally, IBM noted that it expected to work more with AMD (in addition to INTC) with the potential for new dual core AMD blades in the future.

We believe IBM is one of the best positioned to benefit from our server market integration thesis. Our checks show solid demand should bode well for the company's hardware business well into 2005. IBM's x-series server division is the company's fastest growing server segment (up 26% in 3Q04, with blades up over 100%) reflecting the transition towards industry standard server architecture. We believe IBM did a good job in outlining the operating efficiencies that blades offer with estimates vs. a typical 1-U server being: 25% lower cost, 33% more power efficient, 50% less floor space, and lowering cable costs by up to 86%.

We are forecasting xSeries revenue growth of 15% y/y in 4Q04, resulting in 20% y/y growth for FY04. For FY05 we estimate 15% growth y/y and note that xSeries estimates include workstations that are growing at a slower rate, partially offsetting the growth for servers, especially blades. We estimate that the xSeries business accounts for about 6% of IBM's total revenue based on the related storage, services and financing revenues.

We also believe that IBM will benefit from two other hot trends outlined at our conference: Blades and Software. Specifically in PC blades, we continue to believe that ClearCube's products (or similar technologies) would fit in well with IBM's focus on higher end solutions, as evidenced by the company's recent intention to exit the PC business. In software, IBM's strategy is based on "Middleware Everywhere." Rather than an Operating System (OS) centric approach like that of Microsoft, this approach embraces giving away the operating system (i.e. Linux) and adding a middleware stack to it to perform value-added functions like Web services, systems management and database applications. The IBM software stack represents a solution with hardware and services no one can match — and provides a steady source of recurring revenue as well (60% of IBM's software revenue is recurring license revenue). In blades, IBM highlighted its Director software that plugs into EMC's VMware, the "ad hoc" standard in the industry for server virtualization. We continue to believe that improving fundamentals in hardware could coincide with better utilization rates in consulting, helping drive earnings momentum for IBM.

[Valuation for IBM -- Momentum Building?](#) Given our confidence that IBM can continue to deliver solid results and is improving its execution in key areas, our target price of \$115 is based on 18-19x our 2006 EPS estimate of \$6.20. This target still reflects a slight premium to the current market multiple. We believe modest improvement within its services division and improving corporate IT demand will offset ongoing challenges within IBM's 300mm fab. We still believe IBM's hardware momentum is sustainable and should help drive growth in very profitable software and maintenance. Furthermore, the POWER5 rollout also should help drive Unix server momentum well into 2005.

HP (Neutral 2) – Strong Market Position Creates Opportunities in Blades

Brad Anderson (GM of ISS Group) of HP discussed how his \$8.1B business could grow through expanding in blades. Anderson did a good job of describing how the significant up-sell opportunities for higher margin software & services can help support margins in the ESS business as the market shifts toward lower-priced hardware and away from higher margin Unix businesses. HP has an installed base of over 8 million x86 servers (including over 100K blades) and the company's ISS group has strength in numbers as the world's largest Intel server vendor. HP expects the blade market to grow rapidly and aims to vie for market lead with IBM, citing its software management solution. Mr. Anderson cited IDC estimates of blade revenues reaching \$7 billion by 2008, and believes that blades could grow from what he estimates as 5% of the current marketplace to close to 25% by the 2007–2008 timeframe.

HP's Enterprise Storage and Servers group (ESS) accounted for over 19% of the company's revenues in 4Q04, with servers specifically accounting for 15.4% of sales. ESS experienced a recovery (after a tough 3Q) with revenues of \$4.1 billion (+7% y/y) with operating margins of 2.6%. Recent strength has been provided by Industry Standard Servers (ISS), which turned in 4Q revenue growth of 16% y/y (to \$2.2 billion) with record unit shipments (+18% y/y) due to a rebound in ProLiant server sales benefiting from a high backlog at the end of the prior quarter and putting some major execution issues to rest. IDC estimates that HP currently has 31% market share in x86 servers with an estimated 2004-2008 CAGR of 7%. Business Critical servers (BCS) revenue also grew 3% y/y (vs. our -8% y/y estimate) with HP-UX increasing 8% y/y and NonStop growing 13% y/y helping offset Alpha revenue decline of 27% y/y. The ESS segment achieved profitability in 4Q04 with an operating margin of 2.6% after a significant misstep in the prior quarter when the segment lost over \$200 million.

HP believes that Sun has provided a "window of opportunity" into the mid-range market, which the company estimates as a \$19.6 billion market opportunity, with potential for higher ASPs and gross margins than the x86 market. HP believes that its BladeSystems have 38% share of the server blade market and that the company has shipped more blades than any other vendor in the category (according to IDC). As with IBM, we believe HP will have the opportunity to benefit from its market strength in servers and fuel sales in its other business lines. The company's ability to "execute," as highlighted at HP's analyst day, will dictate much of the company's ability to succeed in the ESS segment and overall.

EMC (Buy 1) – VMware Impressive, Estimates Could Be Conservative for this Disruptive Force

Server virtualization was another key topic discussed at our conference and we continue to believe that VMware, which EMC purchased back in January for \$625 million, will be one of the leaders in the emerging technology. Diane Greene (President and founder of VMware) highlighted the history of the company and how it went from relative anonymity to one of the hotter segments of the market today. While Diane Greene cited Microsoft as its potential competition, we were most impressed by how IBM, HP and Fujitsu spoke of VMware as a strategic partner in server virtualization and a leader in the x86 server virtualization marketplace. We believe EMC has paid “special” attention to VMware by allowing it to run autonomously, enabling EMC’s competitors to maintain relationships with the company without creating unnecessary conflicts (VMware’s sales force remains completely separate from EMC and the recently merged sales teams of LEGATO and Documentum – two other recent acquisitions by EMC).

We continue to believe that server virtualization represents a burgeoning market and view it as a possible disruptive technology in the marketplace that could have an adverse effect on our market growth estimates in 2005 and 2006. We note that continued acceptance of VMware server virtualization technology may even result in a negative implication for blades, if customers were to chose to integrate onto virtual servers rather than consolidate onto blades. For example, Diane Green stated that about 5-15% of a typical x86 server’s capacity is utilized and that its typical customer can consolidate CPU’s at a 4:1 clip. VMware’s software solution can cut costs on hardware about 30%, software about 20% with about 70% savings on operational expenses. According to Greene, about 75% of Intel’s server systems are targets for virtualization, with only 3-5% penetrated to date.

VMware accounted for \$61 million in revenues in 3Q04 or 11% of EMC’s total software revenues. We estimate that VMware will report revenues of \$71 million in 4Q04, resulting in \$218 million in revenue for 2004 (up over 100%). We continue to believe that VMware will experience rapid growth with 42% y/y growth forecasted for 2005 to \$310 million in revenues, which would result in approximately 13% of EMC’s software revenue (3.4% of total). Given the findings at our conference with VMware’s partners, we believe these estimates could prove to be conservative.

Chart 1: UBS VMware Estimates

	Mar-04	Jun-04	Sep-04	Estimates						
				Dec-04	2004E	Mar-05	Jun-05	Sep-05	Dec-05	2005E
VMware revenue	\$39	\$47	\$61	\$71	\$218	\$72	\$75	\$79	\$84	\$310
<i>% of total EMC software revenue</i>	8%	9%	11%	12%	10%	12%	12%	13%	13%	13%
<i>% growth y/y</i>	N/A	N/A	N/A	N/A	N/A	84%	59%	31%	18%	42%
<i>% growth q/q</i>	N/A	20%	28%	17%		1%	4%	5%	6%	

Source: Company reports and UBS estimates

Valuation for EMC - Our target of \$17 is based on 4x EV/sales, which is in-line with EMC's "pre-bubble" ranges in the 1990s. We believe that the shares should have momentum into year-end and beyond given EMC's leadership position in storage.

Fujitsu (Buy 2): Sun Alliance On Track

Richard McCormack (V.P. of Product & Solutions Marketing) provided an overview of Fujitsu's (covered by UBS analyst Hitoshi Shin in Japan) operations and discussed its relationship with Sun.

The majority of Fujitsu's business is in the Asia-Pacific region and the company also has a significant presence in Europe through its partnership with Siemens (Fujitsu-Siemens). In addition, Fujitsu is one of the world's largest IT services companies with a significant amount of revenue from consulting. The company seems to resemble HP (more than IBM) because of its exposure to PCs and consumer electronics. Fujitsu's total revenue overall approximates \$45 billion.

The relationship with Sun seems to be tracking to plan with Fujitsu and Sun scheduled to rollout the next generation SPARC-based Unix server products by mid-2006 that will be code named the Advanced Product Line (APL), which is expected to eventually replace Sun's SunFire systems and Fujitsu' PrimePower products. Each company is expected to manufacture its own chips with Sun utilizing Texas Instruments as a foundry.

While these two companies are collaborating on technology, it seems likely Sun and Fujitsu will also be competing for business with their respective SPARC-based systems in several geographies.

Like the major server vendors, Fujitsu also offers Intel-based products (Primergy) consisting of blades, tower and rack servers. In addition, the company plans to rollout an Intel Mainframe server, leveraging the high-end chip technology it acquired with the acquisition of Amdahl (a mainframe competitor with IBM) in 1997.

RLX: Pioneer in Blades Seeking New Partners

RLX Technologies' Doug Erwin (CEO) discussed its Control Tower 6G blade server management software, which offers more granular system management capabilities utilizing monitoring, policy and task chains.

- Monitoring – Observe and evaluate the hardware for any problems such as heat buildup
- Policy - allocate resources according to workload and other parameters
- Task chain enacts defined tasks such as providing notification of any problems

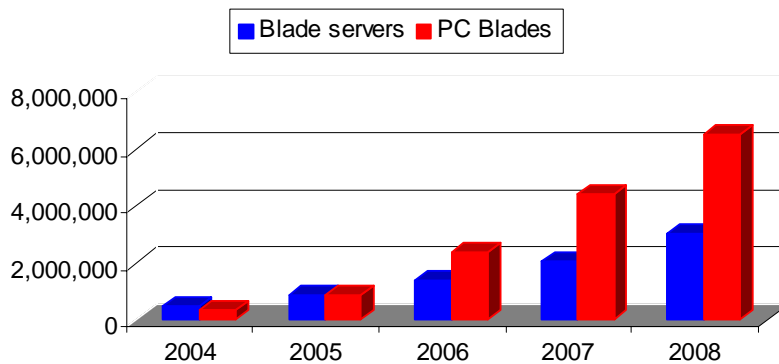
The company's strategy is to partner with market leaders and indicated that a partnership with a major OEM is on the horizon (possibly Dell). We believe that RLX could bring its management software capabilities to partners (like Dell), who are just beginning to make a serious effort in the blade market. Erwin championed Dell's business model as a potential disruptive force in the blade market over the long-term, a view that was shared by many of our panelists. It seems that RLX is experiencing 5-6x growth this year for its blade solutions and expects to grow about 100% next year.

ClearCube: The VMware of PCs?

CEO Carl Boisvert discussed the expanding PC blade market opportunity (pegged at about \$13 billion total). ClearCube provides an alternative to today's current corporate PC network infrastructure. Instead of CPU's at each user's location, ClearCube provides a software suite that enables companies to utilize PC Blades in a centralized, secure location allowing remote management from anywhere globally. End users merely need a monitor and a keyboard and a network connection. ClearCube's solution optimizes security, power, CPU usage, and storage, while reducing maintenance costs significantly.

PC Blade deployment is still in its early stages. However, IDC projects over 350 thousand PC blades will be sold in '04, representing a small fraction (less than 1%) of the 120 million desktops units shipped (69% of total PC units). By 2008, the PC blade market is expected to be 2x the blade server market while the number of PC blades is forecast to expand to 6.5 million units (about 4% of total desktops shipped, or about 149 million units, representing 60% total PCs shipped). ClearCube believes it is well positioned to benefit from the PC upgrade cycle by deploying its solution in next generation business desktop environments. The three verticals the company is targeting are: financial services, healthcare, and government.

Chart 2: Blade Market Projections



Source: Clearcube

The company has a distribution agreement with IBM, where IBM will market and distribute ClearCube products in Japan. We note that IBM's recent sale of its 'unprofitable' PC business to Lenovo (\$650 million in cash and up to 18.9% ownership in Lenovo) supports our view that IBM views the desktop as being less significant and could eventually migrate toward PC blades over time, which we believe could become a big market opportunity. IBM Global Services seems to be a major revenue generator for ClearCube as well, with potential deals that could eventually amount to \$250 million in revenue outstanding.

UBS IT Panel Discussion Highlights Growth in Blades and Storage

We held a UBS IT user panel with Industry guest speaker Timothy Prickett Morgan from Computerwire, UBS' Rens Troost (Distributed Systems), UBS' Joel Nachman (Shared Services and Sourcing) and UBS' Robert Meuche (Global Unix Engineering). We believe highlights included bullish comments on the potential growth for storage, needs for consolidation in servers due to over purchasing during the lead up to Y2K, and potential for upgrades to Solaris 10 for Sun's extensive install base. We also believe another common hot topic between our panel participants was the need to increase spending on server and storage management software. In general, our panel members expect 2005 to build on the growth experienced in 2004 after the sustained downturn in spending the IT market experienced in 2002 and 2003.

UBS' server purchases estimates grew significantly in 2004, so our IT team does not expect too much of an up-tick in 2005 outside of a continued movement toward blades. However, we think storage purchases should experience a significant increase with spending expected to rise by 100% next year fueled by management software purchases (EMC and NTAP should benefit). While Windows and Linux continue to gain traction, the panel indicated that these two OS' would not likely replace Unix, which has some pent-up demand as the current install base is ageing (Y2K purchases) and needs to be refreshed (bullish

commentary near-term, in our view). The panel also agreed that it was not cost effective to migrate off the Sun Solaris platform for all applications. In addition, purchases of AMD Opteron servers were expected to increase in the short-term given favorable power consumption and price/performance.

■ **Statement of Risk**

Hewlett-Packard's, Dell's, Sun's and IBM's businesses all face formidable competition from each other and from other vendors. All companies face risks from volatile hardware pricing and component costs. Also, each company faces geo-political risk and could even face risk from global health threats, such as SARS. All companies also face international currency risk, which can impact revenues and profits.

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UBS rating	Definition	UBS rating	Definition	Rating category	Coverage ¹	IB services ²
Buy 1	FSR is > 10% above the MRA, higher degree of predictability	Buy 2	FSR is > 10% above the MRA, lower degree of predictability	Buy	41%	33%
Neutral 1	FSR is between -10% and 10% of the MRA, higher degree of predictability	Neutral 2	FSR is between -10% and 10% of the MRA, lower degree of predictability	Hold/Neutral	50%	33%
Reduce 1	FSR is > 10% below the MRA, higher degree of predictability	Reduce 2	FSR is > 10% below the MRA, lower degree of predictability	Sell	9%	27%

1: Percentage of companies under coverage globally within this rating category.

2: Percentage of companies within this rating category for which investment banking (IB) services were provided within the past 12 months.

Source: UBS; as of 30 September 2004.

KEY DEFINITIONS

Forecast Stock Return (FSR) is defined as expected percentage price appreciation plus gross dividend yield over the next 12 months.

Market Return Assumption (MRA) is defined as the one-year local market interest rate plus 5% (an approximation of the equity risk premium).

Predictability Level The predictability level indicates an analyst's conviction in the FSR. A predictability level of '1' means that the analyst's estimate of FSR is in the middle of a narrower, or smaller, range of possibilities. A predictability level of '2' means that the analyst's estimate of FSR is in the middle of a broader, or larger, range of possibilities.

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Rating/Return Divergence (RRD) This qualifier is automatically appended to the rating when stock price movement has caused the prevailing rating to differ from that which would be assigned according to the rating system and will be removed when there is no longer a divergence, either through market movement or analyst intervention.

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US Closed-End Fund ratings and definitions are: Buy: Higher stability of principal and higher stability of dividends; Neutral: Potential loss of principal, stability of dividend; Reduce: High potential for loss of principal and dividend risk.

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Companies mentioned

Company Name	Reuters	Rating	Price
Adobe Systems Inc. ^{4a,6a,6b,6c,7,16}	ADBE.O	Buy 1 (RRD)	US\$62.76
Apple Computer Inc. ^{8,16}	AAPL.O	Buy 2 (RRD)	US\$64.91
Dell Inc. ^{4a,6a,6b,6c,7,16}	DELL.O	Neutral 1	US\$42.38

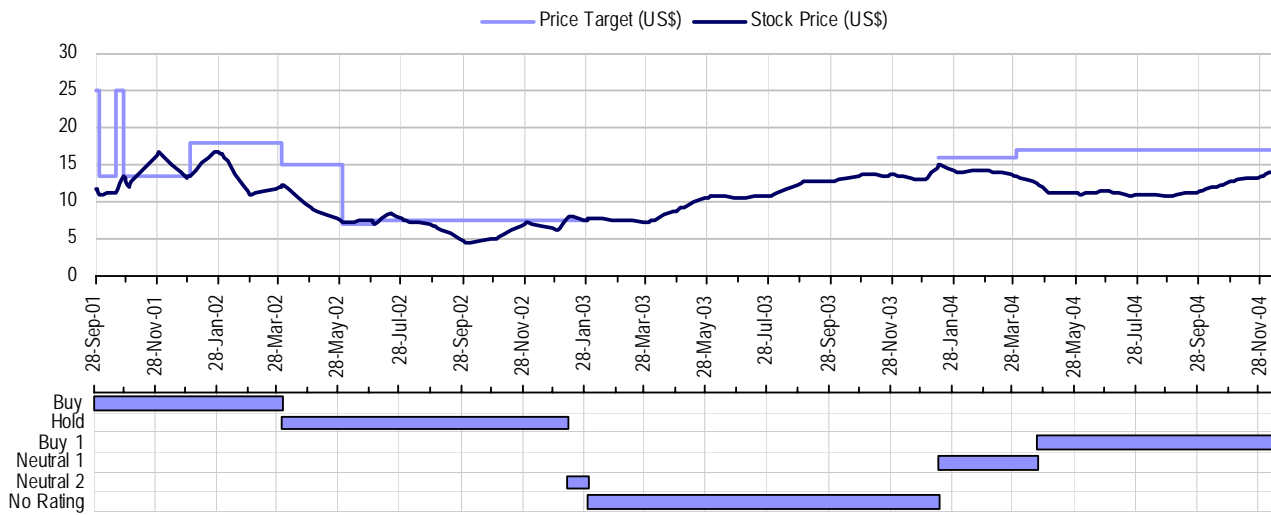
Company Name	Reuters	Rating	Price
Elect. for Imaging ^{2a,4a,6a,6b,7,16}	EFII.O	Neutral 2	US\$17.90
EMC Corporation ^{4b,6c,7,16}	EMC.N	Buy 1 (RRD)	US\$14.22
Hewlett-Packard Co. ^{4b,5,6a,6b,7,16}	HPQ.N	Neutral 2	US\$20.70
IBM Corp. ^{2b,4a,6a,6b,6c,7,8,16}	IBM.N	Buy 1	US\$96.45
Intel Corp. ^{6b,6c,7,8,16}	INTC.O	Buy 2	US\$22.63
Network Appliance ^{6b,7,16}	NTAP.O	Neutral 1	US\$32.88
Sun Microsystems ¹⁶	SUNW.O	Neutral 2	US\$5.38
Xerox Corp. ^{2a,4a,6a,13,16}	XRX.N	Neutral 2	US\$16.41

Price(s) as of 13 December 2004. Source: UBS.

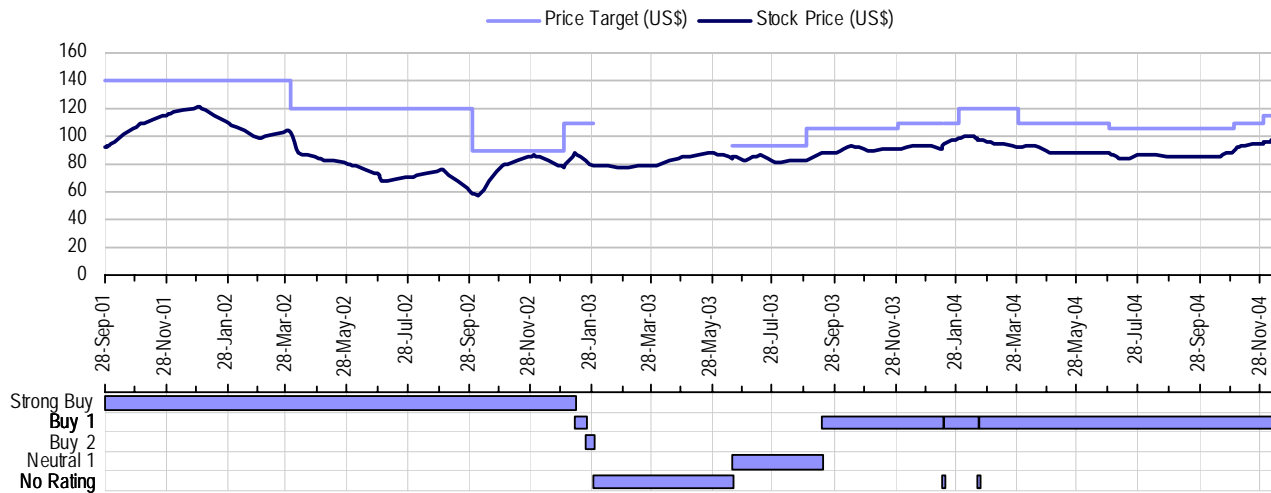
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Unless otherwise indicated, please refer to the Valuation and Risk sections within the body of this report.

EMC Corporation (US\$)



IBM Corp. (US\$)



Source: UBS; as of 13 December 2004.

Note: On October 13, 2003, UBS adopted new definition criteria for its rating system. (See 'UBS Investment Research: Global Equity Ratings Definitions and Allocations' table for details.) Between January 11 and October 12, 2003, the UBS ratings and their definitions were: Buy 1: Excess return potential > 15%, smaller range around price target; Buy 2: Excess return potential > 15%, larger range around price target; Neutral 1: Excess return potential between -15% and 15%, smaller range around price target; Neutral 2: Excess return potential between -15% and 15%, larger range around price target; Reduce 1: Excess return potential < -15%, smaller range around price target; Reduce 2: Excess return potential < -15%, larger range around price target. Prior to January 11, 2003, the UBS ratings and definitions were: Strong Buy: Greater than 20% excess return potential, high degree of confidence; Buy: Positive excess return potential; Hold: Low excess return potential, low degree of confidence; Reduce: Negative excess return potential; Sell: Greater than 20% negative excess return potential, high degree of confidence. Under both ratings systems, excess return is defined as the difference between the FSR and the one-year local market interest rate.

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