

Laguna Research Partners

OPPORTUNITY > BUSINESS MODEL > PERFORMANCE

Notes from INFOCOMM 2000

INDUSTRY BRIEF

June 22, 2000

Digital Cinema

The Trade Show ▶

INFOCOMM, organized by the International Communications Industries Association (ICIA), is the world's premiere showcase for cutting-edge visual and audio communications technology. The show features digital projection technology, teleconferencing systems, display devices, audio technology, computer hardware and software for the communications profession, and peripherals such as screens, monitors, control systems, and interfacing equipment.

In addition to exhibits, INFOCOMM hosts industry-related seminars and workshops.

INFOCOMM 2000 took place June 15 through 17 in Anaheim, California.

INFOCOMM 2001 will take place June 13 through 15 in Las Vegas, Nevada.

Web Sites ▶

www.infocomm.org/intl
www.icia.org

INFOCOMM 2000 Statistics ▶

Attendees: 25,000-plus
Exhibitors: 480
Exhibition space: 720,000 sq. ft.
New Product Rollouts: 100-plus
Seminars/Workshops: 65-plus

Key Digital Cinema Exhibitors ▶

Barco Digital Cinema
Christie Digital Systems, Inc.
Digital Projection Inc. (Imax)
Eastman Kodak Company
JVC Professional Products Company
NEC Technologies, Inc.
Panoram Technologies, Inc.
QuVIS, Inc.
Sony Electronics Inc.
Texas Instruments Digital Imaging

During June 16 and 17, Laguna Research Partners roamed the floors of INFOCOMM 2000 at the Anaheim Convention Center in Anaheim, California. We interviewed digital cinema industry leaders, inspected digital cinema equipment and viewed digital projector output for two solid days. Our findings at this most recent INFOCOMM are the basis for this Digital Cinema Industry Brief.

A recent visit to INFOCOMM 2000 indicates that the digital cinema industry, while still in its infancy, is beginning to develop at a sharply accelerating rate.

Digital Projector Placement ▶

We estimate that there are 20 digital projection movie theaters in place around the world today. Industry sources project that this figure will jump to the 40 to 100 range by the end of 2000 and to at least 500 prior to the release of *Star Wars: Episode II* in the summer of 2002.

Also, competing DLP (digital light processing) and D-ILA (Direct Drive Image Light Amplifier) digital projector technologies are currently generating image quality far beyond our recent expectations.

Digital Cinema Distribution ▶

Digital cinema distribution, industry insiders feel, will likely remain on special format DVD pending further evolution of the bandwidth and encryption capabilities of satellite and fiber optic distribution channels. Encryption standards are now being developed by industry executives and SMPTE, the Society of Motion Picture and Television Engineers.

Digital Cinema Content Creation ▶

To date, the emergence of digital cinema technology appears to have had its greatest impact at the content creation level. Acceleration in dual digital / film releases, and the highly visible digital creation of *Star Wars: Episode II*, are likely, we expect, to further boost the adoption of digital at the distribution and projection levels.

Analyst ▶ Kevin B. Skislock (skislock@LRPonline.net)

OVERVIEW: DIGITAL CINEMA at INFOCOMM 2000

Discussions with digital cinema industry leaders and close inspection of the performance capabilities of digital cinema hardware and software at INFOCOMM 2000 indicate that, while this industry is still very much in its infancy, the evolution of digital cinema has begun to accelerate sharply.

Most industry participants monitor the evolution of digital cinema within the context of three primary motion picture industry sectors: creation (also referred to as “acquisition” or “capture”), distribution, and projection (also referred to as “display”). To date, the emergence of digital cinema appears to have had its greatest impact at the creation level. Digital cinema projection capabilities, in our view, are now improving at an accelerated pace. Distribution is likely, we feel, to be the last industry sector to implement state-of-the-art digital capabilities on a broad scale.

We estimate that there are currently 20 digital motion picture projectors in place around the world at commercial theater locations. Industry sources expect that this figure will rise to a range of 40 to 100 by the end of 2000 and to roughly 500 by the summer of 2002. The assumptions supporting these projections are discussed further in the body of this report.

CREATION of DIGITAL CINEMA IMAGES

According to digital cinema industry experts we spoke with at INFOCOMM 2000, the digital videotape-based imaging formats now challenging traditional film appear to be winning supporters and users on several key fronts including cost, ease of use, image quality and increased artistic latitude.

The ever-increasing, and very visible, use of digital cinema technologies by *Star Wars* creator George Lucas also appears to be giving the digital cinema business a healthy boost. His use of Sony / Panavision digital videotape recording equipment for *Star Wars: Episode II* was widely discussed at INFOCOMM 2000.

Cost ►

Industry professionals pointed out to us at INFOCOMM that digital video can allow the use of smaller camera crews and lighting crews. This translates into lower production costs and greater mobility. Directors capturing digitally indicate that they can complete as many as 80 different “set-ups” in a given day. This is far more than directors using film are typically able to complete. Directors claim that their digital video crews can capture as much as five hours of tape daily.

Also, the low cost of digital video substantially reduces the “budget hurdle” for independent filmmakers. They typically operate in the sub-\$5 million budget range where the cost of film stock can represent a substantial portion of a film’s budget.

Ease of Use ►

The representatives of various digital video camera manufacturers at INFOCOMM emphasized how easy a digital video camera is to use on a movie set, particularly compared to conventional film cameras. Shoot set-up and knock-down is simplified. The small size of digital video cameras makes them lightweight and highly mobile. Finally, directors and crews indicate that digital video cameras are relatively rugged compared with conventional film cameras.

Image Quality ▶

In postproduction, the use of digital videotape precludes “generation loss” during editing and duplication.

Increased Artistic Latitude ▶

Digital videotape imaging devices such as Sony’s DSR-PD 100—this camera is extremely popular with professional filmmakers—provides directors, actors and crews with significant improvements in artistic flexibility and range.

- First, we witnessed an extensive demonstration of the DSR-PD 100’s capabilities at INFOCOMM 2000 and were just as impressed by its small size as we were by its rich image and flexible imaging capabilities. For example, the DSR-PD 100 is equipped with a lens that gives filmmakers a very tight, or close, focus. Tight shots of eyes or lips can be captured from ¼” away with perfect focus.
- Second, the low cost of digital videotape—versus expensive film stock—can have a significant positive impact on key intangibles. Directors can shoot rehearsals; this saves time and money when the spontaneity of rehearsal shoots results in final cut material. Directors can use multiple digital video cameras during a single take, including lightweight, mobile handcams shooting from angles that larger, heavier film cameras cannot match. Finally, the use of low cost digital videotape frees up actors and crew to focus on creative issues.

The “Lucas” Factor ▶

The digital cinema community, as evidenced by discussions at INFOCOMM 2000, has been energized by the planned use of digital capture in the making of *Star Wars: Episode II*.

In April 2000, motion picture director George Lucas announced that he would capture most of *Episode II* using a hybrid Sony HDW-F900 camcorder and Panavision lens camera system. The shoot will use digital 24-frame at 1920x1080 high definition sampling in place of conventional film for most of the movie’s live action scenes. (Three months of principle photography in Australia, Italy and Tunisia are scheduled to begin before the end of June. Roughly 18 months of postproduction activity is anticipated. Release is set for the summer of 2002.)

This Sony / Panavision camera first captures an image with its lens. The image is then passed through a prism that breaks the image down into its red, green and blue wavelengths. Three light-sensitive chips then analyze each of these wavelength groups. The data collected by each chip is converted into digital form and recorded onto videotape. Later, the tape’s digital content is transferred to hard drives for various postproduction activities such as special effects and editing. Finally, once postproduction is complete, the digital data is “burned” onto a specialized DVD for digital distribution, or is converted into an image that is exposed via specialized laser printers onto conventional film stock from which theatrical prints are made.

Lucasfilm’s decision to capture *Episode II* digitally reportedly came after four months of aggressive testing. These tests evaluated image performance and system functionality. Testing culminated in comparative shoots with conventional motion picture film including interior and exterior scenes, close-up and wide-angle takes, and complex blue-screen composite shots.

Regarding his decision to use digital capture, Lucas said at the time, “The tests have convinced me that the familiar look and feel of motion picture film are fully present in this digital 24P system, and that the picture quality between the two is indistinguishable on the large screen.” Jim Morris, president of Lucas Digital, was quoted as saying, “The image quality of the new Sony camera and the Panavision lenses exceeded our expectations, and really validate the 24P system as a great new tool for moviemaking. All of our hopes about doing digital capture for the big screen have started to be realized.”

DISTRIBUTION of DIGITAL CINEMA IMAGES

Most digital cinema industry leaders attending INFOCOMM 2000 appear to agree that there are three digital distribution modes that deserve close scrutiny over the near term: 1) digital disc (a special format DVD), 2) satellite and 3) fiber optic. The nearly unanimous opinion of industry participants is that DVD provides the most attractive delivery characteristics presently.

Longer-term, many industry sources point out, not all theater will have the “line-of-sight” necessary to download digital data from a satellite. Nor will all theaters have access to a fiber optic feed. For this reason, various forms of digital distribution will likely co-exist until a universal digital distribution solution is developed.

No one at INFOCOMM 2000 was willing to talk about the potential impact of digital distribution on Hollywood’s major distributors. The potential, we feel, though, is clear. Once the Internet is capable of moving beyond its current status as a compelling motion picture sales tool and becomes a low cost way for filmmakers to directly market their films to the general public, the impact is potentially huge. We believe that this is one important incentive for the studios to play a significant financial role in the placement of digital projectors in theaters around the world. Such a financing arrangement, though, appears to concern exhibitors because it could conceivably give the studios a great deal of say concerning the circumstances under which motion picture content is displayed by exhibitors.

Disney has played a significant role in the placement of early Texas Instruments (TI) DLP test sites. Technicolor has also become heavily involved in supporting the roll-out of sites.

DVD (special format) ▶

Until the motion picture industry can agree on a standard encryption method for protecting digital motion picture content, digital distribution via DVD offers an important advantage that neither satellite nor fiber optic can offer: physicality. Exhibitors taking part in digital projector field tests tell us that distributors are ensuring content security by having a studio representative personally handle the physical delivery, loading and unloading of digital motion picture content at field test sites.

The physical presence of distributor reps at digital projection sites is clearly not a viable operating model from a longer-term standpoint. Once digital projector placements pass the 40 to 100 level anticipated by industry sources for year-end 2000, placement growth will likely plateau, we feel, until distributors “sign off” on an industry standard for encryption technology.

Satellite and Fiber Optic ▶

Digital cinema distribution, industry insiders feel, will likely remain on special format DVD pending further evolution of the bandwidth and encryption capabilities of satellite and fiber optic distribution channels.

An important step towards the implementation of satellite and fiber optic distribution was taken on June 6, 2000 when Cisco Systems, Qwest Communications and Fox Entertainment Group digitally transmitted Fox’s animated adventure movie, *Titan A.E.*, over Qwest’s North American IP (Internet Protocol) backbone and DIS (Dedicated Internet Service). The movie was transmitted from Fox’s studio in Los Angeles via Qwest Communications’ “CyberCenter” in Burbank, California to an industry trade show in Atlanta, Georgia. The network uses Internet technology from Cisco including 12000 Series Internet routers running over a high-speed fiber backbone and Cisco 7140 VPN (Virtual Private Network) and security routers with integrated firewall and hardware Triple DES (Digital Encryption Standard) encryption. As the *Titan A.E.* data file reached Atlanta, it was stored on a QuVIS server and projected using a Texas Instruments *DLP Cinema*-based digital projector.

PROJECTION of DIGITAL CINEMA IMAGES

Discussion on the floor at INFOCOMM 2000 regarding digital cinema projection focused on two topics: 1) an obvious acceleration in the performance capabilities of digital cinema projectors and 2) the importance of developing an effective encryption standard for digital motion pictures as soon as possible.

Evolution of Performance Capabilities Begins to Accelerate ►

Impressive displays of regular DLP projection technology were hosted by Christie Digital Systems and Digital Projection, Inc. (an Imax Company) at INFOCOMM 2000. What was probably the most notable positive surprise of the show was the LCOS (liquid crystal on silicon) D-ILA (Direct Drive Image Light Amplifier) technology displayed by JVC. The performance of this year's high-end digital projectors was, simply, far beyond our expectations.

- Christie experienced “standing room only” crowds throughout the show, drawn in part by a continuous digital loop of the *Star Wars: Episode I* pod race displayed on its *Roadie S12* digital projector powered by three 1.1” Texas Instruments DLP DMDs (digital micromirror devices). The image thrown by this digital unit was very strong with resolution of 1280x1024 (1,310,720 pixels) and brightness of 12,000 ANSI lumens. The unit's contrast ratio is printed at 250:1 ANSI and more than 400:1 full field.

Also notable at the Christie exhibit was the performance of Christie's *Roadie X10*. This unit, another three-chip DLP-based system, has a native resolution of 1024x768 (786,432 pixels), delivers brightness of 10,000 ANSI lumens, and has a contrast ratio of greater than 250:1 ANSI and greater than 400:1 full field. The image delivered by this unit was simply astounding.

As indicated in a recent (June 14, 2000) Christie management interview with Laguna Research Partners, Christie was the first of three licensees that have been chosen by Texas Instruments to manufacture digital projectors using TI's new *DLP Cinema* technology. In a press release issued at the start of INFOCOMM 2000, Christie announced that

Panoram Technologies Introduces a Digital Cinema Editor's Dream

Panoram Technologies, Inc. developer of the very impressive image tiling technology discussed in the body of this report—please see page 6—has also developed a high-performance computer monitor that is the most practical and eye-catching we have ever seen. It was featured at INFOCOMM 2000.



Panoram's high-end PV290 (above) features three tightly integrated 18.1" (diagonal) 1280x1024 SXGA high-resolution LCD TFT flat panels that wrap the user in a total 3.9 million pixels of resolution on a horizontal array that measures 43.5"x12.5". The PV290 is outfitted with four inputs per panel including two VGAs, one S-video and one composite video input. This allows for a main multi-channel computer plus additional input devices such as laptops, DVD, teleconference, cable television, closed circuit and satellite. The system carries a list price of \$27,000.

In Q4:00, Panoram plans to introduce the PV230 (below) which will be comprised of three tightly integrated LCD TFT XGA flat panels of 1024x768 resolution. This equates to total resolution of nearly 2.4 million pixels. Inputs will include one VGA, one S-video and one composite video per panel. The PV230 will carry a list price of \$9,995.



Both PV (Personal Visualization) models are ideally suited for image processing, media production and video production. Other uses include real-time stock market data management, record and spreadsheet management, network management, Web site design and desktop publishing.

it expects to have first generation demonstration projectors powered by the Texas Instruments *DLP Cinema* engine available for shipment in Q3:00.

Asked by Laguna Research Partners about buyer interest levels for Christie's *DLP Cinema*-based projectors, Jack Kline, President of Christie, Inc., (the cinema products operation of Christie Systems) told us that he was surprised and gratified by the strong interest shown in what he said is, admittedly, a very expensive unit. Jack also indicated that purpose-built units that are "performance-optimized" and "cost-reduced" for widespread distribution to theaters will be available from Christie in about one year.

- Imax's Digital Projection (DPI) division threw a very impressive image onto its INFOCOMM 2000 screens with its *Lightning 15sx* digital projection unit. A three-chip DLP system, the Lightning's specs include resolution of 1280x1024 (1,310,720 pixels), brightness of 12,000 ANSI lumens and a contrast ratio of 275:1 ANSI / 500:1 on-to-off. This unit also boasts a pixel fill factor of 92%.

We found that Peter Nicholas, Digital Cinema Market Development Manager for Digital Projection, has a thorough understanding of the evolution of digital cinema and the DLP business arena. Peter indicates that Digital Projection, unlike any other competitor in the digital cinema space, is dedicated exclusively to the manufacture of DLP projectors.

Industry sources continue to speculate that DPI and conventional film projector manufacturer Ballantyne of Omaha would make a sound "strategic" match. Some level of strategic partnership between the two, say sources, would bolster both DPI's and Imax's book of motion picture exhibitor relationships.

- As we stated above, the most impressive positive surprise of INFOCOMM 2000, in our view, was delivered by JVC. Its LCOS (liquid crystal on silicon) D-ILA (Direct Drive Image light Amplifier) technology is based on a microchip design that incorporates a homeotropic (vertically aligned) liquid crystal layer and generates an inherent device contrast ratio of an astounding 1,000:1 and a pixel fill factor of a lofty 93%.

At INFOCOMM 2000, we closely scrutinized an 8'x10' motion picture image generated by JVC's DILA-G11 digital projector. The G11 has a resolution of 1365x1024 (1,397,760 pixels) with a pixel fill factor of 93%. Inspection of this projector's image from a distance of less than six inches revealed only minor pixelization. (Pixelization can also be referred to as the "grid" or "screen door" effect.) Image quality from a normal viewing distance was, in our opinion, outstanding.

Pete Zeidler, Business Development Manager for JVC Visual Systems Division, indicated that, by year-end 2000, JVC expects to have a prototype of its new QXGA top-end digital projector completed. The QXGA is expected to generate resolution of 2048x1536 (3,145,728 pixels), a contrast ratio of 1,000: 1 ANSI, light output in excess of 6,000 lumens and a fill factor of 93%. This impending release generated considerable discussion at INFOCOMM 2000.

- Also noteworthy at INFOCOMM 2000 was the FFP (Flat Front Projection) image tiling technology of Panoram Technologies, Inc. This technology, as demonstrated at INFOCOMM, utilized three Christie Digital projectors to create a seamless moving image having an aspect ratio of 3.3:1. Panoram's FFP software controls image tile blend-in, overlap, color match, color balance and black level to produce what is easily the highest quality multiple-moving-image tiling we have ever seen. This product's performance far surpasses our most recent expectations regarding multiple image-tiling systems.

Encryption ►

Once digital projection system placements reach an estimated 40 to 100 sites later this year, we expect to see placements plateau until motion picture studios, working with the Society of Motion Picture and Television Engineers (SMPTE), establish performance and encryption standards for digital cinema.

Industry contacts at INFOCOMM 2000 indicated that upcoming SMPTE conferences are likely to be important forums relative to the development of encryption standards for the digital cinema industry.

- SMPTE's 142nd Technical Conference and Exhibition, scheduled for October 18 through 21, 2000 in Pasadena, California will focus on the issue of "Content Acquisition, Processing, and Distribution in the Digital Millennium". This event will bring together thousands of professionals involved in motion imaging for both motion pictures and television. More than 70 companies are expected to showcase the latest advancements in motion imaging technology at the exhibition. Encryption will undoubtedly be a major topic of discussion at this gathering.
- Several months later, during February 8 through 10, 2001 SMPTE will hold its 35th "Advanced Motion Imaging Conference" in Washington, DC. Again, encryption is expected to be a key topic discussed at this conference.

A New Business Model for the Struggling Exhibitor Community ►

Most motion picture exhibitors are currently struggling under the burden of heavy debt loads following the torrid megaplex build-out of the past five years. Many of the digital cinema industry insiders we spoke with at INFOCOMM 2000 contend that the emergence of digital cinema will provide exhibitors with an array of new revenue and profit opportunities. This would be a welcome development for major exhibitors such as AMC, Loews Cineplex and Regal Cinemas.

Digital cinema appears to provide exhibitors with the opportunity to transition their "bricks and mortar" facilities from specialized motion picture venues to general use digital entertainment and communications centers. While such a transition could take years to occur, the positive financial impact on cash-starved exhibitors could be significant.

- As digital entertainment centers, this new generation of venues could display content such as live concerts. Such events could leverage the value of a theater's screens and parking facilities by generating revenue and profit streams that are superior to those generated by feature films limping through their fifth week of release.
- As digital communications centers, theaters could function as high-tech conference centers. Such events could provide theater owners with revenue and profit streams during hours when motion picture theaters are typically "dark."

Finally, digital cinema will position exhibitors to generate new revenue and profit streams from sources such as in-theater advertising. Industry studies show that in-theater advertising is five times more effective than in-home television advertising.

And, Again, the "Lucas" Factor ►

Finally, the digital cinema community has not only been energized by George Lucas' decision to capture *Star Wars: Episode II* digitally, but it is also clearly enthused by Lucas' continued interest in displaying new installments of his *Star Wars* saga on digital projection systems. Currently, industry sources indicate that *Episode II*—this installment is scheduled for release during the summer of 2002—appears to be headed for a dual digital /

film “day-and-date” (simultaneous) release. By the time *Star Wars: Episode III* is released during the summer of 2005, an all-digital release appears to be a possibility.

Industry experts say that the approaching 2002 release of *Episode II* could provide exhibitors with a strong incentive to work constructively with distributors in expanding digital theater placements. Some industry insiders project that as many as 500 digital theaters could be in place for *Episode II*'s premiere. This 500-theater target compares with only 20 digitally equipped movie theaters estimated to be in place around the world today. Industry sources expect the number of digital theaters to reach a range of 40 to 100 before the end of 2000.

As a matter of perspective, *Episode I* was released on nearly 3,000 screens across the US on Wednesday, May 19, 1999. The film generated box office revenue of \$28.5 million on its opening day, breaking the previous opening day record of \$26.1 million set in 1997 by *Jurassic Park: The Lost World*. The previous record for a Wednesday opening was \$17.4 million tallied by *Independence Day* in July 1996.

Recent Digital Cinema reports from Laguna Research Partners ▶

Christie Systems, Inc.
Management Interview
June 14, 2000
(10 pages)

Analyst Bio ▶ Kevin B. Skislock (skislock@LRPonline.net)

Kevin Skislock is Founding Partner and CEO of Laguna Research Partners LLC. He also serves as the Firm's senior entertainment analyst.

Kevin has more than 25 years of experience as a Wall Street stock analyst. Nearly half of his career has been spent analyzing stocks for leading buy-side money managers including CitiGroup and Wellington Management Company. On the sell-side of Wall Street, he has analyzed stocks for the institutional and retail investment clients of firms including a "research boutique" subsidiary of Paine Webber, Inc. and Dain Raucher Wessels, Inc.

Having served as a Director of Investment Research and Investment Strategy Committee member on the buy-side of Wall Street and a Director of Investment Research and Commitment Committee member on the sell-side, Kevin is respected for his insights regarding the effective development and execution of business models across all sectors of the economy. Kevin often takes an active role in the creation and development of new business enterprises. Most recently, he served as acting Chief Financial Officer and Director of SolarFlex Technologies, Inc., a developer of cutting-edge solar cell technologies based in California.

Kevin has been recognized by *Institutional Investor* magazine in their "Best of the Buy-side" rating of Wall Street's buy-side analysts. He has appeared on *NBC Nightly News with Tom Brokaw*, CNBC's *Market Wrap*, CNBC's *Business Center* and *The Wall Street Journal Report*, and is quoted widely in the general and financial press. He holds a BS degree in Economics from Villanova University in Villanova, Pennsylvania. He earned his MBA at the University of Chicago.

Companies mentioned in this report ▶

AMC Entertainment, Inc. (AEN-AMEX)
Ballantyne of Omaha, Inc. (BTN-NYSE)
Barco Digital Cinema (a division of Barco Projection Systems America)
Christie Digital Systems, Inc. (a division of Christie Systems, Inc.)
Cisco Systems, Inc. (CSCO-NASDAQ)
Digital Projection, Inc. (an Imax Corporation company)
Disney Company, The Walt (DIS-NYSE)
Eastman Kodak Company (EK-NYSE)
Fox Entertainment Group, Inc. (FOX-NYSE)
Imax Corporation (IMAX-NASDAQ)
JVC Professional Products Company (a division of JVC Americas Corp.)
Loews Cineplex Entertainment Corp. (LCP-NYSE)
Lucasfilm, Ltd. (privately held)
NEC Corporation (NIPNY-NASDAQ)
Panavision, Inc. (PVI-NYSE)
Panoram Technologies, Inc. (privately held)
QuVIS, Inc. (privately held)
Qwest Communications International, Inc. (Q-NYSE)
Regal Cinemas, Inc. (privately held)
Sony Electronics, Inc. (a division of Sony Corporation (SNE-NYSE))
Technicolor, a wholly-owned subsidiary of Carlton Communications Plc (CCTVY-NASDAQ)
Texas Instruments Incorporated (TXN-NYSE)

Laguna Research Partners LLC
Irvine, California 92614

T. 949.651.9053 / F. 949.651.9054
www.LRPonline.net

Laguna Research Partners LLC is a research and analysis firm that produces company and industry research reports. This report is based on Laguna Research Partners' independent analysis and judgement, but relies on materials supplied by the subject company and other sources believed to be reliable. Except as otherwise indicated, Laguna Research Partners has made no independent verification and does not guarantee the information's accuracy or completeness. The information in this report is subject to change without notice, and Laguna Research Partners assumes no responsibility to update the information contained in this report. This report should not be used as a complete analysis of the company, industry or security described in this report. The information contained in this report is not intended to be, and shall not constitute, an offer to buy any security. The securities of the subject company may involve a high degree of risk and may not be suitable for all investors. Investors are advised to consult their personal broker or investment advisor before making any investment decision concerning the subject company. This report contains forward looking statements made pursuant to the safe harbor provision of the Private Securities Act of 1995. This information may involve risks and uncertainties that could cause actual results to differ materially from the forward looking statements. Laguna Research Partners has received no compensation from the subject companies. Laguna Research Partners and/or its owners, officers, employees, and/or members of their families may hold a position in and/or engage in transactions with respect to the securities of the companies mentioned herein. © Laguna Research Partners LLC 2000. All rights reserved. Additional information is available upon request. No part of this report may be reproduced without the express written permission of Laguna Research Partners.
