INTERACTIVE TV AS PUBLIC CLIENT/SERVER

Analysts discuss interactive television from a client/server perspective and point out the emerging players in this new industry sector.

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While corporations struggle through the conversion to client/server computing, a vast public-access version of client/server networking is underway. This public-access version is generally known as "interactive television,"

and "interactivity" has become the emblem of the whole nascent undertaking. But the buzz of new media and interactivity obscures the real technologies involved. Interactive television is best understood as a wide-area client/server project, except here the "clients" are not the captive audience of corporate employees but fickle, channel-surfing television viewers, who can choose to hit the off button anytime.

There are perhaps a few shepherds in Tierra del Fuego who have not yet heard about interactive television. The rest of us, however, have been subjected to a barrage of announcements about interactive TV alliances, partnerships, technology sharing agreements, deals and rumors. One deal is with Intel, Microsoft and General Instrument. Another with Time Warner, Silicon Graphics and Scientific-Atlanta. Yet another involving Tele-Communications (TCI), Time Warner and Microsoft. Then there's Kaleida, Motorola, Scientific-Atlanta and DSC Communications. Bell Atlantic. U S West. And on and on.

Since May of this year, when the announcements began coming in a near-daily blitz, the stocks of the companies involved have rocketed. Companies who have announced participation in interactive television saw their stocks rise an average of 11.7% between May 12th and June 15th, while *The Red Herring Technology 200* improved 1.96% during the same period, and the overall market moved up just .33%. (Without the troubled Apple stock, the performance of the interactive TV group was even better -- up 13.5%.) Everyone, it seems, wants an early piece of an industry estimated to grow to $300 billion within the next decade.

The View from the Long Wave

What we are witnessing in interactive television is the birth of a new secular theme -- a new industry sector that will be a generation in maturing. As we discussed in our first column about long-wave theory, the period 1987-90 marked the inception of a new long wave and, with it, the beginning of a virtually new computer industry. We identified consumer and entertainment systems as one of the emerging sectors that would fuel the growth of that new computer industry. And here is that sector, emerging like a missile shot. Capital is flowing into interactive television at a hectic pace, just what we would expect during the birth of a new secular concept.

The question is how an investor should proceed during a secular theme emergence. Like all births, new themes are a messy and risky business; something entirely unknown is coming into being. The first task, we believe, is to minimize the effect of the unknown. We need to understand this new industry sector, to arrive at a more detailed view of the technology, and to clarify the roles being performed by each of the players.

The Technology: A Public Client/Server Network

The companies that have announced participation in interactive television are creating the infrastructure for a large, public-access client/server network. Like all client/server systems, there are three main parts to the architecture: (1) the client, the user of the system services; (2) the

server, the repository of the information used by the client, and the distribution mechanism for the information; and (3) the network, which connects the client to the server. The public-access network, instead of serving up general ledger and sales data to clerks and executives in a commercial client/server system, will provide on-demand movies, games and shopping information to in-home customers. Eventually, subscribers will be able to order up interactive educational programs or business information. Forget walks to the video store, strolls to a friend's house for chess, or a drive to the mall. No need to commute to school or to work. We can stay home all the time now -- or that's the plan.

The client -- your home system -- will slowly begin to function more like a PC. The lowly cable converter box is on its way to becoming a "set-top box," which will have many of the components now standard in general-purpose computers. There will be a microprocessor, perhaps from Intel, Silicon Graphics or Motorola. There will be an operating system: Microsoft Windows in ROM or ScriptX from Kaleida, the Apple/IBM alliance. And there will be applications. The first ones will be "programming guides" to help you find out what programs are available and to let you place an order to view them at your convenience. Other early applications are likely to be interactive games and shopping order programs. There will be a network interface component, similar in function to the network card you currently use to connect your PC to a LAN. And finally, with your television set as the monitor and your remote control unit as the keyboard, you have completed the transformation of your home television into your home entertainment computer.

The network, however, may not be so easily converted. Cable companies and local phone companies both have lines running into your home, yet neither set of lines has the long-range capability for interactively transmitting the huge amounts of data in digitized movies. Cable companies' coaxial cable can carry more channels than the phone line copper wiring inside most homes, but it is the phone companies who have experience in two-way communications and switched networks. Cable companies and phone companies may try, initially, to use their existing wiring, but ultimately it will take fiber optic cables, Asynchronous Transfer Mode networks (ATM), and fast digital switches to make an interactive public network work. Will these new communication lines be owned by cable companies, phone companies or both? Or will some as-yet unknown wireless communications companies surmount the whole wiring problem, as Hewlett-Packard hopes to do with its wireless set-top box? Before interactive television becomes generally available, we are likely to see many hybrid solutions for the network, many alliances between phone and cable companies, and many battles among them.

Note: Stock symbols shown for public companies traded on US markets.

The server-side also must undergo technological change. Current client/server database management systems have been designed for short transactions, a few hundred bytes up and down the line. Public interactive networks, however, will require fast access to very large data objects -- movies and programs in digitized form. The "transactions" coming from the client-side may initially be short commands -- send, pause, rewind, play -- but the server's answer will be a long one -- portions of a program. In addition, huge storage repositories will be needed for the programs, and the technology to compress their storage space will become ever more crucial.

Finally, the public client/server network makes no sense without programming -- the movies and programs and games that subscribers pay to see and use. Once the technology issues are addressed, there will be some 500 channels. But what will fill all that programming time? To fill the endless hours will require the storehouses of film studios, broadcast networks, entertainment production companies, cable channels, business data publishers and educational program developers. The rights to these storehouses are valuable commodities indeed. According to industry reports, Microsoft is busy looking into the acquisition of program rights, which by itself should tell us that the next wave of "programming" will involve not sets of instructions written in a computer language but rights to digitized text, images, sound and music.

Now that we have a technology framework for interactive television, we can see how the players fit into the overall picture. Figure 2 shows a breakdown by technology subgrouping of the companies who have announced participation in interactive television. With the help of the framework, we were able to separate the potential competitors (those in the same subgroup) from potential allies (those in separate subgroups).

Investing in Public Client/Server

The contrarian view tells us that there can be many obstacles to the whole interactive TV scenario: technical problems, issues of ownership of the components, intellectual property disputes and FCC regulatory problems -- all in a completely unproven market. Yet, you may still decide to invest in this emerging market sector. If so, the next step is the formulation of an investment plan. The greatest mistake an investor can make is to recognize the investment merit of an idea and then fail to design a strategy to benefit from that idea. We therefore will propose two plans. One is a long-term, diversified strategy, and the other is a short-run approach. For reasons we hope to make clear, we will recommend the long-term approach.

To formulate our plans, we constructed a portfolio of the publicly traded U.S. companies listed in Figure 2 and analyzed the capital flow into and out of their stocks on a long-term (4- to 4 1/2-year) basis. Figure 3 shows the results. Only one stock, Zenith, is in a newly-emerging uptrend. Most of the issues are in a steep, persistent advance; they have risen significantly already, and our research indicates that they have powerful momentum to continue in an upward direction. A smaller group consisting of Intel, the phone companies, Time Warner and TCI is also advancing, but these stocks are not as high-flying. Another group's advance is more mature; these stocks could be nearing a top juncture. And the group consisting of Apple, IBM and Spelling is in a maturing decline, which could mean that these stock prices are near bottom junctures.

Of the stocks in our public client/server portfolio, Microsoft presents an anomaly: it gives us an ambiguous long-term trend reading. Its stock price has been holding on a plateau for 16 months, but it shows a persistent uptrend on the very long secular view. Microsoft is a stock that seems to be waiting for a new sentiment to develop. To date, the company's announced participation in interactive television does not appear to be the news the market is waiting for.

If we had to choose a short-run investment approach, we would pick the strongest performers shown in Figure 3. That is, we would choose the companies in the "Emerging Uptrend" and "Persistent Advance" categories. The resulting short-run portfolio is speculative, however. These are companies whose stock prices are flying high on the expectations created by interactive television and by the new computer industry in general. While their stock trends are showing the greatest capital flow in the near term, it will be tricky for investors to time the inevitable corrections in these stocks. That's why we consider them speculative. A more conservative short-run strategy would be to buy the issues in the category "Advancing: Moderately Steep."

We hope, however, that we do not have to choose a short-run investment plan, even a conservative one. The reason is this: During the emergence of a new secular idea, it is very difficult to know which players will remain involved over the 10-30+ year span of the theme. The very concept itself is bound to change over time. For example, U S West expects it will take *25 years* to build its interactive television infrastructure. Even if U S West manages to keep interactive TV in its business plan all that time, its suppliers will certainly change as the technology unfolds. During a secular emergence, if you try to pick single winners you might miss the whole play. There can be no single vehicle for investing in the concept.

We therefore apply an old portfolio management tool: diversification. To invest in interactive television during its emergence, we recommend that you pick at least one stock from each subgroup shown in Figure 2. This is a diversification strategy based on the underlying technologies. If your bet in one niche does not succeed, you may still stand to benefit in the

others. You must then hold the diversified portfolio for a long time -- many years -- riding along as the secular concept matures.

It may seem that many of the companies in Figure 2 are too speculative for a long-range strategy. It is true that the stocks of companies whose revenues stand to gain the most dramatically from interactive television already have great expectations built into their prices. Liberty Media, for example, has risen 29% in the last month, 1500% since 1991. DSC, likewise, has gone up 30% in the last month, 1300% since 1991. But these dramatic rises may indicate something more than speculation. DSC's rise looks huge, but a 1983 DSC investor is just now breaking even -- for the first time in 10 years. In other words, the new computer industry has brought the stock to life, given it a "new wave" existence. This is what happens under the influence of an emerging secular trend: Companies not part of the new trend languish, while others are reinvigorated by their participation in the new themes.

Once you have chosen your diversified portfolio, hold on for an interesting ride. If you'd like the ride to be a bit less bumpy, you can choose companies with fewer expectations built into the price, as in the conservative short-run approach. But, either way, the most difficult part will be sticking with the plan. At the first correction of the current speculative environment, you'll probably be tempted to start selling. Try not to. Try to take the whole ride, if that was your plan.

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Figure 2:

Companies With Announced Participation In Interactive Television

Rights to Programming
Time Warner (TWX)
Tele-Communications, Inc. (TCOMA)
Liberty Media (LBTYA)
Viacom (VIA)
Sega of America
Spelling Entertainment (SP)
Microsoft (MSFT)

Subscriber Services and Network Lines
Tele-Communications, Inc. (TCOMA)
Time Warner Cable (TWX)
Viacom (VIA)
Cox Cable
U S West (USW)
Bell Atlantic (BEL)

Advanced Network Switching Technology
AT&T (T)
DSC Communications (DIGI)

Server Machines
AT&T (T)
IBM (IBM)

Server Database Management Software
Oracle (ORCL)

Set-Top Boxes Scientific-Atlanta (SFA) General Instrument (GIC) Hewlett-Packard (HWP) TV Answer, Inc.
Set-Top Operating Software Microsoft (MSFT): Windows Kaleida (IBM/AAPL): ScriptX StartSight: proprietary environment
Set-Top Programming Guides Microsoft (MSFT): working on a guide? StarSight News America Pubs.: TV Guide On Screen
Set-Top Microprocessors Motorola (MOT): Power PC RISC Silicon Graphics (SGI): MIPS RISC Intel (INTC)
Interactive-Ready Televisions Zenith Electronics (ZE): StarSight system Mitsubishi: StarSight system