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# COMPUTERWORLD

## Users laud Spectrum network manager

BY JOANIE M. WEXLER  
CW STAFF

Seven months after Cabletron Systems, Inc.'s leap into the enterprise network management software fray with its artificial intelligence-based Spectrum announcement, nary a technical criticism has fallen from the tongues of beta-test users of the product, which became generally available earlier this month.

In fact, many beta users are now in purchase negotiations for the \$50,000-and-up, Unix-based software, designed to centrally manage very large internetworks that comprise a hodge-podge of various vendors' equipment.

"Spectrum is the only product that does the trick for us because we have about a dozen diverse network management systems that we're trying to pull together onto one screen," explained Mike Turico, manager of applied research at Motorola, Inc. in Schaumburg, Ill. Turico said he has been beta-testing Spectrum for nearly one year on the 100,000-node Motorola network and has committed to purchasing at least one copy.

"My job is to make all those management systems one, and Spectrum is really the only way I can do it," Turico explained.

### Development options

To date, Cabletron has developed software modules for managing about 40 diverse types of network equipment. Customers can work in tandem with Cabletron to develop modules for current-

ly unsupported devices, develop it themselves or turn to a third party.

Beta-test user John K. Scoggin Jr., supervisor of network operations at Delmarva Power & Light Co. in Wilmington, Del., said Spectrum already "supports every major vendor" in his network, including equipment from Wellfleet Communications, Inc., Proteon, Inc., Cabletron and "soon, Banyan Systems, Inc. network servers."

Cabletron repositioned itself as a network management company when it formally introduced Spectrum at last fall's Interop '90 show in San Jose, Calif. Some considered the move a stretch for the Rochester, N.H.-based company, whose roots are in cabling, wiring hubs and network interface cards.

However, the concept of a centralized network manager that gives users a graphical view of a heterogeneous network from a variety of perspectives was appealing to at least 30-plus companies that are currently testing the product.

Scoggin explained that he took a chance on testing Spectrum because of his solid experience with Cabletron's hardware technology,

service and support. Scoggin, on his fourth Spectrum beta-test version, is "now ready for prime time," he said, having filed a letter of intent to purchase.

To stave off industry uneasiness about a once-cabling company selling and supporting such an expensive and important product against the likes of Digital Equipment Corp., IBM and others, Cabletron said it has added 35 Spectrum support people during the past six months and currently has the capability to install three Spectrum sites per week. In addition, Ca-

bletron Chairman Craig Benson has pledged that he "won't sell more product than he can support."

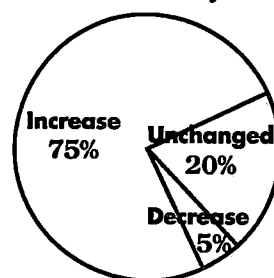
Mike Prudhomme, a senior engineer at systems integration house SSDS, Inc. in Littleton, Colo., commented, "Perceptionwise, Cabletron is at a disadvantage because a lot of people don't want to spend that kind of money unless it's with IBM or DEC. However, those vendors only have six- and seven-member programming teams for their enterprise managers; Cabletron, on the other hand, has a 40-person team."

Prudhomme has

### Budget blitz

*With the enterprise network management market still ripe, Spectrum's success could hinge on Cabletron Systems, Inc. quickly grabbing market share*

Integrated network management budget plans over the next two years



Percent of respondents

Base: 500 Fortune 1000 firms

Source: Business Research Group  
CW Chart: Doreen St. John

been using Spectrum since last August and "probably will purchase it," he said. In addition, he has recommended the product to large networking customers such as the federal Veterans Administration and Lockheed Corp.

Turico and Scoggin said that one current gray area involves where the responsibility will lie for keeping Spectrum modules updated with equipment software upgrades. Another shortcoming is that the product currently supports no wide-area networking equipment.

Turico is now designing his own Spectrum module for his Codex Corp. 6290 fast-packet multiplexer. Scoggin does not want to invest in the development effort, so he said he will stick with separate management systems for now.

## Spectrum select

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*Users and analysts agreed that Spectrum is not for the "casual" user with a relatively simple network. They paint a profile of the product's target audience:*

- Operators of large corporate internetworks (generally 1,000-plus nodes) that are multivendor in nature.
- Those with a fairly sophisticated networking staff for developing modules for unsupported devices and for tailoring existing modules, if desired, to the company's preferred set of default recoveries.
- Those who want to meld multiple existing network management systems.

## Stock Fads Fade as Investors Return to the Basics for 1991 Earnings and Products Regain Importance

By CRAIG TORRES

Staff Reporter of THE WALL STREET JOURNAL

If 1990 is pointing to the way of the future, this year may be one of the best ever for the back-to-basics investor.

Gone is the country-fund fad, the buy-out mania and the super-growth stock craze. Fundamental-style investing is in fashion again in the stock market.

The 1990 winner's circle is perhaps the most unusual group of stocks in three years: None is in Standard & Poor's 500 Stock Index. Nine of the top 10—all except Foxboro—did well because the companies are leaders in their field, management is strong, and earnings are expected to grow substantially.

### Classic Niche Companies

Cabletron Systems and EMC Corp. are classic niche companies benefiting from trends in the computer industry. Cabletron makes a key trouble-shooting part, known as an intelligent hub, that monitors signals of computers in a network. "Local area" networks are a hot trend in computing these days.

Don Rode, analyst at SoundView Financial Group Inc., continues to recommend the stock, citing Cabletron's strong position in the trend of linking computers.

EMC makes computer parts that allow companies to speed up their machines and hold more information. Also, the company is leading a new revolution in disk technology.

"When people have a budget crunch, they look for increased performance, but they want to do it at a lower cost," says EMC Chairman Richard J. Egan. "That's why we are going to have a good year.

Both companies typify the new kind of growth stock emerging in today's market, which is highly sensitive to earnings performance. What's valuable today is the company that can grow faster than the economy through strong demand for unique products. Investors are shunning companies that are boosting earnings through financial transactions; even the value of well-known brand names, which underpins so many growth stocks, is being questioned these days.

### Unique Trends

"We are returning to an environment

different than the past 20 years; growth will not be fueled by excessive debt creation," says Ellen Harris, who oversees some \$16 billion as chief investment officer for PaineWebber's domestic mutual funds. Most likely, the economy, and many corporations, will enter a period of slow growth without the engine of deficit spending or aggressive bank lending, she says. The big winners in the stock market this year are likely to be companies whose earnings are benefiting from unique trends that put them outside of the economic cycle.

"Why did strong companies do reasonably well" in 1990? asks Ms. Harris. "Because we've run out of fads." This year will be characterized by "back-to-basics" investing, she thinks.

This may be the year when a significant number of money managers begin to beat the indexes because earnings on the S&P 500 should be "relatively punk," Ms. Harris says.

L.E. Myers is another example of a company that finds itself in a growth cycle while the overall economy is slowing. Myers erects transmission towers and lines that shuttle electricity across states or to the city next door. For the past few years, utilities were spending more money on developing power plants than they were on shipping energy. Myers, only a few years ago, was on the brink of bankruptcy. But now that the trend has switched, the company is poised for better earnings growth.

"We are at the onset of what many in our industry believe will be a long transmission and distribution cycle" in electrical energy, says Charles Brennan, chairman. Normally, these cycles last for five or 10 years. Investors appreciate Mr. Brennan's putting his own money on the line: He became the company's largest shareholder in early 1990.

### Hidden Treasures

Many of 1990's losing stocks are mainly financial or real estate issues, but there were some outstanding performers in these groups, too. A case in point is Clayton Homes, which at first glance seems to be a stock that few investors would want to own. The company makes, sells and helps finance purchases of mobile homes. Most

of the buyers are middle-income families. Lately, about half of Clayton's earnings come from fees made on its mortgage business, says Anne F. Carlisle, who follows the company for Equitable Securities Corp. in Nashville, Tenn.

Clayton doesn't particularly dominate its market. Ms. Carlisle says the company's success is related to its management, which keeps close tabs on mortgage borrowers, and on other aspects of its business. She is still recommending the stock, expecting earnings growth of about 20% this year.

But debt finance and real estate will continue to be dangerous for many companies this year, predicts Chriss Street of Seidler Amdec Securities Inc. The trends found on the losers' list aren't likely to change. "By the end of this year, you will see established companies who have good operating earnings facing bankruptcy because they won't be able to roll their debt over," says Mr. Street. His candidates are some insurance concerns, and perhaps a defense contractor or two.

"There is no longer a greater fool" to come along and refinance debt-laden companies, he says. For 1991, he is predicting another major financial collapse. Look for that around March or April of this year, he says, which happens to be the months many companies filed for bankruptcy protection last year.

### Once-Burned Investors

If the stock market is truly turning back to basics, says Paul D. Ehrlichman, vice president at Brandywine Asset Management, shares of a big consumer growth stock or two may have a spot on the 1991 losers' list. Many of these stocks are excessively expensive, he contends.

"The market is returning to fundamentals because people were burned. And they will get burned [again] in the highly valued growth stocks" this year, he predicts. Investors will begin to shun these stocks when they begin to realize that growth rates are mature. Some consumer non-cyclical companies have very strong product and brand franchises, but they must spend millions of dollars on advertising to protect their leadership, Mr. Ehrlichman says. Also, these companies will find it difficult

to pass on price increases to consumers, he suspects.

Mr. Ehrlichman concedes that consumer growth stocks are bucking his prediction today. "Asking someone to sell Merck or Coke is like asking them to sell their child," he says. Even his value-investing colleagues, he says, are hoarding a few big growth names in their portfolios to boost returns.

Michael Painchaud, principal at the stock research firm Market Profile Theorems in Seattle, says the market is still focusing on earnings. But he detects a new conservatism among investors that could, if it takes hold, result in dumping growth stocks with high price-earnings ratios.

Investors "are not comfortable with the economic environment and they will hide under the turtle shell," he says.

## Big Board's 10 Best Performers

COMMON STOCK	CLOSING PRICE	CHANGE FROM '89	COMMENTS
<b>Cabletron Systems</b>	28 1/2	204.0%	Company makes a key component that facilitates linking computers in so-called local area networks
<b>U.S. Surgical</b>	71 3/8	160.7	Medical products company hit on a major innovation for less invasive surgery, more new products expected
<b>Signal Apparel</b>	10 1/2	147.1	New management and marketing concepts built investor confidence, though the company posted a third-quarter loss
<b>EMC Corp.</b>	8	146.2	Profit growth comes from products that help users squeeze more productivity from existing computer systems
<b>Foxboro Co.</b>	51 7/8	126.8	Only takeover stock in winner's circle, acquired by Stebe PLC, a British engineering concern, for \$52 a share in June
<b>L.E. Myers Group</b>	15 1/8	124.1	Near bankruptcy a few years ago, electric line specialist benefits from utilities' move toward energy distribution
<b>Oregon Steel Mills</b>	24	97.9	West Coast expansion of natural gas pipelines brought big contracts to Portland-based company
<b>Clayton Homes</b>	13 3/4	96.4	Mobile home maker's conservative credit posture lured investors despite fears of credit crunch
<b>International Rectifier</b>	11	91.3	Semiconductor maker won a patent infringement suit, helping secure leading position in electrical components market
<b>Fabri-Centers of America</b>	25 3/4	87.3	Specialty retailer benefited from enlarging its fabric stores and housewares shops, and moving into mall locations

## Big Board's 10 Worst Performers

<b>Amdura</b>	3/32	-98.4%	An acquisition nudged the company into a cash crunch, and it filed for bankruptcy in April
<b>Prima Motor Inns</b>	13/32	-98.3	Falling property values, a hotel-room glut, and too much debt sent the second-largest U.S. hotel chain into bankruptcy
<b>AmBase</b>	5/16	-97.4	Financial services concern found itself with too much debt and too little cash; trying to sell businesses to stay solvent
<b>Monarch Capital</b>	9/16	-96.7	Real estate charges put this insurance and financial services concern in violation of loan covenants
<b>United Merchants</b>	1/16	-96.3	Heavy debt load caused a cash squeeze and forced this apparel concern into bankruptcy
<b>Major Group</b>	1/8	-95.5	Florida-based real estate development concern took hefty charges to reorganize operations
<b>Far West Financial</b>	11/32	-94.7	Souring junk bond and real estate portfolios saddled the California thrift with big losses
<b>Leisure Technology</b>	1/8	-94.6	Los Angeles-based developer ran into cash shortage when housing markets deteriorated
<b>Ames Department Stores</b>	9/16	-94.6	Suppliers balked when this junk debt-heavy retailer ran into a cash squeeze, it filed for bankruptcy in April
<b>General Development</b>	9/16	-94.2	Big Florida developer filed for bankruptcy in April; four former executives face criminal charges

### OTC Best Performers

COMMON STOCK	CLOSING PRICE	% CHANGE
<b>Lifeline Systems</b>	18 1/4	386.7%
<b>Samna Corp.</b>	18 1/2	289.5
<b>B.I. Inc.</b>	11 1/2	283.3
<b>Cabot Medical</b>	9 3/4	262.9

### OTC Worst Performers

<b>Phoenix Medical Tech.</b>	1/16	-98.6%
<b>Landmark Com. Bancorp.</b>	1/16	-98.5
<b>Silk Greenhouse</b>	1/4	-98.4
<b>Empire Financial</b>	3/32	-98.4

### Amex Best Performers

COMMON STOCK	CLOSING PRICE	% CHANGE
<b>OEA Inc.</b>	39 3/4	162.8%
<b>Schult Homes</b>	4 3/4	94.4
<b>Thermo Cardiosystems</b>	13 3/4	91.0
<b>Inestar Corp.</b>	5 1/4	88.4

### Amex Worst Performers

<b>Price Communications</b>	3/16	-96.9%
<b>First Conn. Small Bus.</b>	1/2	-96.8
<b>Balfour MacLaine</b>	1/4	-96.5
<b>Firstcorp Inc.</b>	1/8	-95.0

Note: Excludes stocks whose 1989 closing price was below \$2; OTC stocks from Nasdaq National Market System

# COMPUTERWORLD

## COMPUTER INDUSTRY

### Smart hubs owe it all to LANs

*Despite economy, LAN boom will ensure continued need for smart hubs*

BY JOANIE M. WEXLER  
CW STAFF

So-called "smart hubs" may be more than smart: If analysts are right, they may be lucky, too. The local-area networking boom will prevent vendors of smart hubs from becoming casualties of a sagging economy, according to analysts. In fact, revenue opportunities abound for makers of the products — intelligent wiring centers that interconnect dissimilar LANs and bundle in centralized network management and other functions.

Smart hubs are popular because they interconnect various flavors of LANs running over different types of cabling. This heterogeneous scenario is common in large firms where LANs grew up independently and before department managers realized that the networks would eventually need to communicate.

In addition, LAN topologies such as Ethernet's bus or token-ring's ring are configured logically within the smart hub rather than physically throughout a building.

Each node is star-wired back to the wiring center, allowing for centralized network management.

Smart-hub vendors are packaging network management modules

with their products, as well as an array of routing, bridging, terminal server and protocol analysis capabilities.

Currently butting heads in the sizzling smart-hub market are Mountain View, Calif.-based Synoptics Communications, Inc. and Cabletron Systems, Inc. in Rochester, N.H. Each company reported revenue in excess of \$48 million for its recently ended fiscal third quarter. Synoptics' revenue marked a 131% increase over the comparable period last

year; Cabletron showed an 80% increase.

Thomas Erickson, a financial analyst at Minneapolis-based Wessels, Arnold & Henderson, estimated that Synoptics is earning a staggering 68.9% gross margin on its Lattisnet 3000 wiring concentrator, which accounts for nearly 100% of the firm's business. Cabletron, Erickson said, is earning margins of about 60% on Multi Media Access Center, which competes with Lattisnet for smart-hub market share while accounting for 50% of its manufacturer's business.

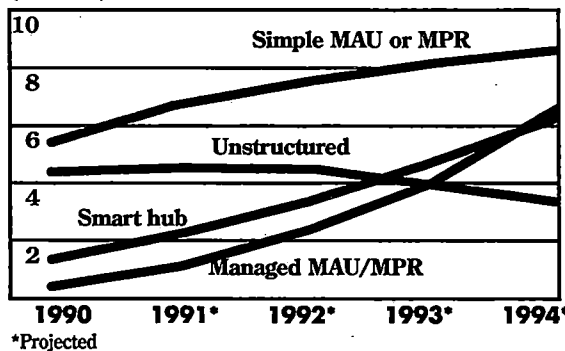
Erickson predicted that Synoptics' \$175 million in 1990 revenue will jump 66% to the \$290 million range in 1991 and that Cabletron's \$180 million in 1990 will double this year.

#### Family ties

*Smart-hub vendors will likely weather inclement economic conditions as users continue to invest in LAN equipment*

#### Managed multistation access unit (MAU)/multipoint repeater (MPR) and smart-hub connections

Number of U.S. installed connections (in millions)



Source: Forrester Research, Inc.

CW Chart: Paul Mock

#### Competition

The figures are just as impressive for other smart-hub players. For example, comparatively small Chipcom Corp., based in Southboro, Mass., rang up sales of \$28 million in 1990 — up from sales of \$17 million in 1989 and about \$10 million in 1988.

The reasons why these companies and their competitors will continue to thrive in an industry suffering budget cutbacks and slashed operating costs is that the

recession has thus far bypassed the LAN market, said Mary Modahl, director of network strategy research at Cambridge, Mass.-based Forrester Research, Inc.

### No end in sight

Forrester expects the smart-hub boom to continue for at least the next several years (see chart). "Though companies are buying less, when they buy, they buy LAN-based technologies," Modahl said.

In addition, "smart hubs are very complementary to routers, which are also showing tremendous growth," said Nick Lippis, principal consultant at Northeast Consulting Resources, Inc. in Boston. "With routers being bundled into the devices, the hubs serve as another distribution channel for router vendors."

While the smart-hub market is relatively new, not all of the companies contending for it are. The big-name computer players are providing competition for the niche players by offering slimmed-down

## In terms of hubs

What will smart hubs mean to the computer industry? For that matter, what does "smart hub" mean?

**Smart hub:** An intelligent wiring center supporting multiple access methods and media. Many devices offer bridging, routing and sophisticated network management down to port monitoring on a LAN. These are targeted toward large company headquarters.

**Multipoint repeater (MPR):** A wiring center for Ethernet LANs that generally supports one access method (carrier-sense multiple access with collision detection) but a variety of media (coaxial, twisted-pair and fiber). Aimed at smaller sites connecting into a corporate network, it can be managed or unmanaged.

**Multistation access unit:** A wiring center for token-ring LANs that supports one access method (token passing) but a variety of media (twisted-pair and fiber). Like the MPR, it is aimed at smaller sites connecting into a corporate network and can be managed or unmanaged.

## Humble beginnings

**H**ow does a company go from selling cabling out of a garage in 1983 to winning kudos as the New York Stock Exchange's top performer in 1990, with stock skyrocketing 204% during the year?

"Remember your roots," advised Craig Benson, chairman and chief operating officer at the now-\$200 million Cabletron Systems, Inc. The Rochester, N.H.-based firm manufactures intelligent wiring centers, network adapter cards and network management systems.

"Everyone has a corporate philosophy," Benson said. "Ours wound up being customer service because we started as a cable company, and there was simply no other way for us to differentiate ourselves. We have found that as long as you show people you're willing to work with them and not abandon them — whether what you're solving is [actually] your problem or not — they'll stick with you," Benson added.

Benson also attributes the success of his company, which he and President Robert Levine co-founded in 1983, to quick decision-making.

"Our biggest enemy in this business is time," he said. "If we make a decision and it's wrong, we can fix it quickly. And if we're right — well, we're that much ahead." However, he added, "You can't have people believing that just because you're bigger, it takes you longer to react. If you do, you open the door for smaller companies to intrude."

JOANIE M. WEXLER

versions of the hubs that interconnect several networks of the same type.

For example, AT&T rolled out a managed multipoint repeater that supports up to 12 Ethernet LANs, and IBM introduced its Controlled Access Unit, a managed multistation access unit for Token-Ring networks.

Digital Equipment Corp., however, has indicated plans for a full-fledged smart hub, acknowledging that it cannot ignore competition from vendors bundling terminal-server support into their wiring centers.

Terminal servers, which connect multiple dumb terminals or other devices to a LAN, account for about 50% of DEC's networking business [CW, Jan. 14]. Smart-hub vendors currently offering modular terminal server support include Cabletron Systems, Inc., Racal Interlan and Tandem Computers, Inc. subsidiary Ungermann-Bass, Inc.

The boom notwithstanding, smart-hub vendors will face many challenges during the next several years, Erickson said. For instance, he said, although vendors insist they have barely broken ground with their products, the risk of commoditization already looms on the horizon.

William A. Lanfri, vice president of business development at Synoptics, maintains that the risk is slight. "Manageability is key, and there is constant pressure to improve throughput for high-speed data networking," he said. "It's only been in the last year that this has been discussed in terms of smart hubs."

In addition, Synoptics has been a leader in pushing the industry toward a standard for running the 100M bit/sec. data rates of Fiber Distributed Data Interface LANs over twisted-pair wiring — another technology that could eventually be supported by the company's Lattisnet 3000, Lanfri said.

## BACKGROUND

Contact: *Darren Orzechowski*  
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### CABLETRON'S INTERCONNECT PRODUCTS

CAB 7

Cabletron Systems, Inc. is a complete supplier of standards-based network management solutions, including LAN hardware and software products based on Ethernet, Token Ring and FDDI standards. With the exception of Digital Equipment Corporation, Cabletron is the only LAN vendor that manufactures its own network hardware and software products *and* provides LAN design, installation and support services.

As part of its hardware products suite, Cabletron manufactures five families of intelligent interconnect equipment based on its *Integrated Network Architecture*. INA is a concept that allows companies to set up virtually any kind of standard network using any kind of wiring technology, giving them a single source for all their connectivity needs. INA lets customers build and manage a global, distributed network of interconnected LANs that transparently work together regardless of which media type or network standard they choose.

The following is an overview of Cabletron's interconnect equipment:

#### **Multi Media Access Center (MMAC)**

The Multi Media Access Center (MMAC) is one of Cabletron's cornerstone technologies. The hardware-based product lets companies plug in the type of networking connectivity they need, regardless of media or network type. It is an intelligent network wiring center through which desktop computers access today's complex enterprise networks.

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## **CABLETRON'S INTERCONNECT PRODUCTS -2/**

Designed to accommodate the variety of network media used in corporate-wide Ethernet, Token Ring and FDDI networks, the Cabletron MMAC enables disparate media to interconnect and act as *one network*. The product can support Ethernet running over unshielded twisted pair wiring, IBM data cabling (shielded twisted pair), thick or thin coax cable, fiber optic cable and AUI transceiver cable, all in the same chassis.

The MMAC mixes media types through a variety of plug-in modules called Media Interface Modules (MIM), each supporting Ethernet over a different kind of cable. Users can mix-and-match MIMs to suit their needs by inserting modules into one of the eight slots in the MMAC's multiport, modular chassis.

The MMAC is distinguished from other kinds of network hubs through its use of a Flexible Network Bus. This means the hub is *dynamically self-configurable*. Users do not have to replace the box if a malfunction occurs. Since MMACs are modular, users can keep a low-cost replacement modules on hand and swap it without shutting down the system. No other hub product offers this type of network protection.

The MMAC's Flexible Network Bus lets users easily change media types when desired. This preserves their hardware investment by allowing users to upgrade with future networking technologies as they become available.

The MMAC also features built-in LANVIEW management software and LED-based diagnostics. This allows users to monitor and control each MMAC on the network remotely from a PC running Cabletron's Remote LANVIEW/Windows or SPECTRUM integrated graphical network management packages.

### **Desktop Network Interface (DNI) Cards**

Cabletron's Desktop Network Interface (DNI) cards were the industry's first Ethernet and Token Ring PC cards with built-in network management and analyzer capabilities. DNI PC cards are plug-in boards for PC/AT, PC/XT,

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## **CABLETRON'S INTERCONNECT PRODUCTS -3/**

MicroChannel (PS/2) and Apple SE; SE30 and Mac II computers that allow communication and information sharing with other users on the network. They support twisted pair, fiber optic and coaxial cable media through a built-in transceiver on the card.

With LEDs, on-board management and analyzing software, network managers can gather information from, and control each PC through, a remote network management station. Using Remote LANVIEW or SPECTRUM management software *and* a local traffic statistics program included with each card, managers and users can identify and solve network-traffic or workstation access problems more quickly and easily than with conventional PC adapter cards.

### **Desktop Network Interface Cards Explained**

As faster and more efficient networking technologies enters the marketplace, Cabletron's DNI cards will continue to evolve, providing customers with dependable communication connections. Already, Cabletron has released a line of DNI cards that enables users of IBM PC/XT, PC/AT, MicroChannel and Macintosh MAC II computers to connect to 4 and 16 megabit-per-second (Mbps) Token Ring networks.

The DNI cards provide the first fiber optic PC cards available for both IBM PC and Macintosh platforms. Users planning to move up to forthcoming high-speed FDDI networks can take advantage of fiber optic DNI cards for Ethernet networks today (10 Mbps) while their network migrates to higher speeds in the future.

All DNI PC cards support the Simple Network Management Protocol (SNMP). This means they can be managed by any SNMP-compliant management system, such as Sun Microsystems SunNet Manager, or by Cabletron's Remote LANVIEW or SPECTRUM management software. When combined with Cabletron's MMACs and bridges, the DNI PC cards offer the most completely integrated approach in the industry.

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## **CABLETRON'S INTERCONNECT PRODUCTS -4/**

DNI PC cards provide drivers for Novell Netware, PC/TCP, Sun NFS, NDIS, FTP Banyan and DECnet operating systems. This feature allows end-users to run multiple applications on different network operating systems simultaneously. DNI PC cards also incorporate shared memory, or "parallel I/O" technology. Parallel I/O speeds up data transmission by allowing data to move from both the network and PCs to memory simultaneously. To further accelerate data transmission, DNI PC cards move multiple blocks of data at a time. By comparison, competitive PC adapter cards can move data only one character at a time.

### **Transceivers**

Transceivers are required to attach one or more PC nodes to the network and allow them to communicate with other users. Transceivers can serve as standalone devices, or, as with Cabletron's DNI PC cards, can be included with other network devices.

Since transceivers support only one type of network media, different transceivers must be used for different types.

Cabletron manufactures a range of transceivers for twisted pair, coax and fiber optic media. These include the MT-800 Multiport transceiver -- an eight port model that eliminates the need to install eight separate transceivers on the network.

### **Repeaters**

Repeaters amplify signals from one segment of cable and pass the signals to other parts of the network. Repeaters increase the distances you can run a LAN by regenerating a signal as it weakens along the cable. Regeneration eliminates noise and reduces data errors. Cabletron manufactures a variety of repeaters for all network media types.

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## **CABLETRON'S INTERCONNECT PRODUCTS -5/**

### **Bridges**

Bridges connect two LAN types, passing or preventing information exchange between the two segments. They reduce the number of frames passing through a network by filtering and rerouting data not destined for the opposite LAN.

Alternately, bridges forward those data intended for a target on the other LAN.

Cabletron manufactures local and remote bridges. Local bridges link two adjacent LANs, while remote bridges connect two geographically diverse LANs through a T1 (telephone) or X.25 satellite link.

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## BACKGROUND

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### CUSTOMER APPLICATION BRIEFS

CAB 8

#### Case Western Reserve University

Case Western Reserve University, a leading research college located in Cleveland, Ohio, has designed and installed what may be the *most advanced educational system computer network in use in the U.S.* Through a futuristic, multi-media network that combines voice, data and video, the Case Western *CWRUnet* network gives each student and faculty member access to a diverse range of powerful information resources and institutions, including libraries, hospitals, museums, video satellites, cable television, NASA research centers and national supercomputing facilities.

Realizing that networking technology is rapidly evolving, Case Western designed into the *CWRUnet* architecture the ability to handle future networking technologies as they are developed. The foundation of *CWRUnet* is a high-speed fiber optic network backbone from Cabletron that links desktop computers in each dorm room, office and lab to other university facilities, as well as the outside world.

Unlike other institutions that simply string fiber optic cable between campus buildings, Case Western runs multi-mode cable, single-mode cable, coaxial cable and unshielded twisted pair wire directly into each room through a single faceplate (for double-occupancy rooms, a faceplate is installed for each student). Case Western envisions in the near future an advanced workstation for each user running multiple windows for different kinds of media. For example, a student would be able to do a library search in one window, display a cable program in a

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## **CUSTOMER APPLICATION BRIEFS -- 2/**

video window, and retrieve voice messages in another, simultaneously.

"We decided that with a little more investment we could install twisted pair and coax cable to take advantage of today's electronics, and at the same time, set up the network for multi-media fiber-based electronics of the future," said Dell Klingensmith, director of the school's Information Network Services. "Now we never have to go back and rewire the rooms and basement; the fiber is already in place."

Case Western runs their data communications using Cabletron's Multi Media Access Centers (MMACs) as the hub. For video communications, the University is establishing four signal types that students can receive just like television channels. These include signals from the University's local cable productions for such programs as convocations or addresses from the president; a satellite downlink used by the law school; normal television channels from central antenna; and local and educational cable programs from North Coast cable.

Case Western is also involved on the State of Ohio's OARnet -- an educational and research network. This allows students and faculty to access a wide range of services including the Ohio Supercomputing Center and a large distributed library system shared by all public schools. Students can tap into seven major libraries, such as the Cleveland Public Library -- the fifth largest in the world -- to do abstract and catalog searches from a desktop computer in their dorm room.

Case Western Reserve University also participates in a network project linking seven local institutions, including the Cleveland Art Museum, Museum of Natural History and the Cleveland Institute of Music. The University also connects into FREENET, a large Bulletin Board Service and E-Mail system.

Case Western has expanded the network from 1,800 active faceplates to 8,000 campus wide. They chose Cabletron products because they provided the network management technology needed to maintain such a complex network.

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## **CUSTOMER APPLICATION BRIEFS -- 3/**

"Case Western selected Cabletron as its network supplier because we share a common vision of what networking will be like in the future. Cabletron's network management strategy, both in hardware and software, is directly in sync with ours. Cabletron's network management -- in the cards, in the smart hub electronics and in the software -- allows us to manage what we have in place today while laying the foundation for future product management," Klingensmith said.

### **Martin Marietta Corporation, Information Systems Group**

The Information Systems Group of Martin Marietta is using Cabletron's 10BASE-T twisted pair Ethernet products to network its Chantilly, VA-based facility for office automation and host computer access. The network supports 150 users of both Apple Macintosh computers and a variety of PCs, and will soon grow to about 300 users. "Our Mac-to-PC communications is very smooth," said Phil Stanley, project manager for the group. "We installed Ethernet boards directly in the Macs rather than using a bridge from an AppletalkLAN to the Ethernet."

This ability to easily integrate a variety of systems and media was a key reason Martin Marietta chose Cabletron. All PCs, Macintoshes and other equipment interconnect through six Cabletron MMAC-8 "intelligent wiring centers" housed inside building telephone wiring closets. Each MMAC contains an Intelligent Repeater Module with on-board management intelligence as well as PC and Macintosh Ethernet interface modules. Stanley manages and controls this entire physical layer of the network from a single workstation, using Cabletron's Remote LANVIEW/Windows network management software.

Stanley explained a key advantage to using Cabletron's Remote LANVIEW/Windows and intelligent MMAC wiring center is the ability to isolate and correct network problems without affecting other users. "If an Ethernet board goes bad, it can 'scream', sending out all kinds of garbage data that would screw up the network," Stanley explained. "If Cabletron equipment detects that condition, it will shut down the port it's connected to in the wiring closet. At the time we made our decision, if we had purchased hubs from SynOptics or other

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## **CUSTOMER APPLICATION BRIEFS --4/**

vendors, the whole board would shut down, shutting down all the users connected to the board as well."

### **Office Of The Chief Of Navy Research**

The Office of the Chief of Navy Research (OCNR) in Arlington, VA, installed an extended Ethernet network based on Cabletron equipment for office automation. The network is also used to administer contracts for research grants.

The network links two buildings with fiber optic cable from a single Cabletron MMAC intelligent wiring center. "It's a really clean way to join the buildings," said Todd West, electronic engineer for the OCNR's planning and procurement office. The network also includes a thick-wire backbone spanning the entire building with MMACs on each floor running thin-wire to each computer.

The Navy plans to set up a wide area network to link the other command offices in Tokyo, London and universities across the country into a single, cohesive enterprise network to streamline research grant administration.

According to West, Cabletron's Remote LANVIEW/Windows network management software plays a key role in maximizing network uptime. "If a LAN segment goes down on some floor, I can quickly find out where it is and fix the problem. Before LANVIEW and Cabletron's MMAC hubs, I had to climb a ladder to check the repeater status lights in the ceiling by trial and error until I found the faulty segment. It's a tremendous improvement to be able to actually see a graphical representation of the network problem on screen," he said.

### **Electronic Publishing Prepress Systems**

Electronic Publishing Prepress Systems (EPPS), Bedford, MA, specializes in computer systems for newspaper and magazine industries. The company installs large editorial or pagination systems made up of industry-standard PCs

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## **CUSTOMER APPLICATION BRIEFS --5/**

and UNIX workstations networked to DEC hosts. The systems are based on the company's J11 software, an editorial word processing and formatting system for editors and reporters. EPPS also offers an application that handles order entry for retail and classified advertising.

Once a proprietary system running on a single, large DEC PDP-11 CPU, EPPS has increasingly moved to distributed, networked solutions using Cabletron products in many sites. "There is a trend in the newspaper editorial systems market to provide more distributed processing using multiple PCs or workstations, rather than the traditional method of big centralized computers with dumb terminals. This trend requires networking. Because of this, we have chosen Cabletron as a recommended vendor in the Ethernet area," said Craig Muzilla, product manager at EPPS.

EPPS installations range from small prepress systems with 15 to 30 users, to large newspapers with over 1,000 network nodes. Its customers include the *Toronto Globe*, *The New York Times* and other major newspaper and magazine publishers throughout the world.

While J11 uses a proprietary operating system, EPPS has ported terminal emulations of J11 to DOS and UNIX platforms. This allows editors to input copy using the familiar J11 interface while also taking advantage of the many DOS or UNIX productivity packages available, such as spreadsheets and database programs.

EPPS selected Cabletron as its LAN supplier due to its comprehensive product offering, Muzilla said. "Most LAN vendors in the Ethernet area don't have everything we need. Cabletron, however, provides soup to nuts. If we need to fill a hole, if we need installation services, they can provide that. Many of the other vendors can't", he said.

"If we need coax or traditional thicknet, they can provide it," Muzilla continued. "If we require twisted pair and 10BASE-T, they have that too. In contrast, most

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## **CUSTOMER APPLICATION BRIEFS --6/**

other vendors specialize in only one area. Cabletron simply has a more extensive offering and continues to broaden its product range. They also have a good distribution channel throughout Europe and are expanding internationally. Since over 50 percent of our sales come from international sources, that is pretty important to us."

### **National Semiconductor**

National Semiconductor has adopted Cabletron as its networking standard for twisted pair Ethernet connectivity corporate wide. At its corporate headquarters in Santa Clara, CA, for example, Cabletron products link and manage a campus network of 1,200 nodes in 35 buildings.

Buildings are linked by a high-speed fiber optic backbone wired to Cabletron's MMAC intelligent wiring centers in each building's wiring closet. Unshielded twisted pair wiring ties each user to the MMAC. The Ethernet runs DECnet and TCP/IP protocols and is used primarily to network engineering workstations.

National Semiconductor selected Cabletron because the large size of its network required advanced network management capabilities, according to Gene Churchwell, manager of National's voice services. "Cabletron is the standard for our twisted pair Ethernet corporate-wide. One of the best things about Cabletron is its Remote LANVIEW diagnostics and management software. We can tell if a device is 'streaming' garbage onto the network. Just by looking at the on-board LEDs we can tell a lot. Or with the network management software itself we can go in and look at each individual node, deactivate it, or take any required action, all from a remote location," Churchwell said.

### **Dow Chemical**

Dow Chemical, Louisiana Division, manages its 1,000 node network with Cabletron's Remote LANVIEW/Windows. The network, which connects 330 buildings with fiber optic and twisted pair connections, uses Cabletron's MMACs

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## **CUSTOMER APPLICATION BRIEFS -7/**

and existing telephone lines to connect users.

Dow Chemical chose Cabletron hardware and software because its comprehensive network management capabilities allowed the company to grow and control its network economically without having to add new network management personnel.

"The network here at Dow has been continuously growing at a rapid rate," said Randy Peairs, network specialist at Dow. "We could not afford to keep hiring people to keep up with the network growth, so we decided on a network management package that offered centralized management features and could be controlled by our four-person staff." That package was Cabletron's Remote LANVIEW/Windows.

"The color-coded icons provided with Cabletron's management software has made our job of finding network failures much easier and faster. Before, the only way we were able to tell if there was a network failure was by the flood of calls from users complaining the network was down. Now we can see the problem and fix it before they even realize a problem existed."

"Right now we are managing all of our MMACs on the network with Remote LANVIEW/Windows. The biggest advantage to this hub management is that it lets us go down to the board and port level on each MMAC. In the future, we hope to purchase some of Cabletron's DNI cards to allow us to get even more specific statistics on the network."

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## BACKGROUND

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### CABLETRON'S INTEGRATED NETWORK ARCHITECTURE

CAB 9

The foundation of Cabletron's networking product family is its *Integrated Network Architecture* (INA). The INA includes all of Cabletron's standards-based products and services necessary to build and manage a global, distributed platform of interconnected local area networks (LANs).

Cabletron's INA-based products and services work together transparently regardless of the media or network standards the customer chooses. Supporting all the major international networking standards, INA gives customers a "one-stop-shop" for their LAN connectivity needs. Cabletron's INA supports the following networking standards:

Media	LANs	WANs	Network Management
UTP	Ethernet	9.6 - 56 Mbps	IEEE 802.1
STP	10BASE-T	Subrate T1	SNMP
Coax	Token Ring	T1	CMIP
Fiber Optic	FDDI	ISDN	Remote LANVIEW
	Appletalk	DS-3	SPECTRUM
		SONET	HP Openview
			DEC EMA

With INA, groups of disparate networks become a single system in which all devices can be managed from a remote network management workstation. The INA also provides a framework for seamless network evolution and expansion as customer needs grow, or as new networking technologies enter the market.

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## **CABLETRON'S INTEGRATED NETWORK ARCHITECTURE -- 2/**

LAN connectivity is expanding dramatically, transcending all traditional geographical and organizational boundaries. Cabletron's INA enables companies to interconnect LANs and WANs into *global enterprise networks*, giving each employee unprecedented power and access to the company's information and computer resources through an electronic window on the desktop.

The INA has three cornerstone technologies -- the Multi Media Access Center (MMAC) intelligent wiring hub, Remote LANVIEW and SPECTRUM network management platforms.

The MMAC is an advanced intelligent wiring center that integrates LANs and WANs, and Ethernet, Token Ring, FDDI and Appletalk, using any media type.

Remote LANVIEW is Cabletron's INA-based network management system that enables a network administrator to manage every device and diagnose problems at the network's physical layer. It provides a framework for true interoperability in multi-vendor and multi-protocol environments. Remote LANVIEW also can integrate network management capabilities with a wide range of other network applications.

SPECTRUM is Cabletron's INA-based network management platform for managing networks and networked systems. The protocol-independent management package goes far beyond the current generation of management systems to provide a cohesive, powerful and flexible environment for managing multivendor networks.

Cabletron INA-based products provide the network building blocks from which companies can mix media and network standards to meet the individual connectivity needs of all their LAN users. INA-based products that support international standards include:

**Multi Media Access Center (MMAC)**

- for Ethernet, Token Ring and FDDI (all media types)

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## **CABLETRON'S INTEGRATED NETWORK ARCHITECTURE -- 3/**

### **Desktop Network Interface (DNI®) Cards**

-for Ethernet (coax, 10BASE-T and fiber optic)  
for Token Ring (shielded/unshielded twisted pair, 4 and 16 Mbps)

### **Transceivers**

-for Ethernet (coax, 10BASE-T and fiber-optic)

### **Repeaters**

-for Ethernet (all media types)

### **Concentrators**

-for Token Ring (UTP, STP and fiber-optic)

### **Bridges**

-for Ethernet (local and remote), Token Ring and FDDI

### **Routers**

### **Remote LANVIEW Network Management Systems**

-DOS and UNIX versions

### **SPECTRUM Advanced Management System**

-advanced platform for managing networks and networked systems

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## BACKGROUND

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### WHAT CUSTOMERS SAY ABOUT CABLETRON

CAB 10

"Case Western selected Cabletron as its network supplier because we share a common vision of what networking will be like in the future. Cabletron's network management strategy, both in hardware and software, is directly in sync with ours. Cabletron's network management -- in the cards, smart hub electronics and software -- allows us to manage what we have in place today while laying the foundation for future product management."

"I can give you facts and figures on Cabletron's products in terms of network uptime that blow away the cards and equipment we purchased previously from other vendors."

"We met with high-level people who were responsible for Cabletron's technical direction. We were impressed by their openness, willingness to listen and work with us, and to share their technological underpinnings and future product direction. We looked at many vendors over the last three years, and none were as open as Cabletron."

"We saw Cabletron's whole operation, from development to production, and were extremely impressed. They offered both tough quality assurance and the ability to get products to market quickly."

"The key to Cabletron's uniqueness is its approach to product design. They build products in such a way to allow variations and different technologies. They build products in modular form so you can add on or upgrade easily and inexpensively."

**Dell Klingensmith, Director**  
**Information Network Services**  
**Case Western Reserve University**

"We evaluated their product line carefully and concluded, based on price/performance and future functionality, that Cabletron was the way to go. Tufts is installing new Cabletron equipment that will replace our old SynOptics gear."

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## **WHAT CUSTOMERS SAY ABOUT CABLETRON -- 2/**

"We have a fiber optic network backbone in the final stages of implementation, and we're positioning Cabletron's MMACs for both their Ethernet and Token Ring capabilities at critical network junctions. Cabletron MMACs will serve both departmental LAN as well as backbone interface needs. And we're looking to install FDDI within the next two years. Cabletron's commitment to FDDI was important to us."

"Network management was also important to us. We felt Cabletron's product offering is better than many solutions on the market. It's SNMP-compatible; it's able to manage bridges, MMACs and any other SNMP-compliant device on the network, including our Xyplex terminal servers. This allows us to extend our network management to integrate third-party products..."

"Cabletron's Remote LANVIEW/Windows is very powerful. Any entry-level network management package will give you about 80 percent of the functionality you need. What LANVIEW does is make it a very generic, flexible, highly adaptable solution. It offers that extra 20 percent functionality that really makes it a top product as opposed to just a good solid performer."

"There were several key reasons we decided to replace SynOptics and go with Cabletron. First, their products are very price competitive. Second, its product functionality was competitive and usually better than other solutions. Third, with the introduction of standards, these products are somewhat becoming commodities. Thus, we're looking for value-added features such as price/performance, product line commitment, UNIX-based, and graphical network management interfaces. We believe Cabletron has a strong product commitment in all those areas."

**John Patterson, Director of Technical Services and Telecommunications  
Tufts University**

"Cabletron's and SynOptics hardware are very similar. There are few idiosyncrasies between the two that make Cabletron a better choice, but the real issue for us is that Cabletron is an East Coast company with great technical support. SynOptics is a West Coast company with lousy support."

"Another thing is that SynOptics' twisted pair Ethernet is comparable to Cabletron's, but Cabletron's 10BASE-T standard when it becomes the standard will require no physical change in the cabinet. I can intermix cards and transceivers with the existing Cabletron twisted pair technology. You can't do that with SynOptics. I only want one network vendor for components."

"The last advantage Cabletron has is its network management. Since Salomon Brothers has a heavily routed environment, we need a network management package that will communicate through the routers. And since all of Cabletron's intelligent repeater modules become pseudo-nodes on the network, in other words

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## **WHAT CUSTOMERS SAY ABOUT CABLETRON - 3/**

they get IP addresses, we can communicate through their network manager."  
"They have another network manager that's undercover now that is based on a UNIX system. From what I've seen of it, it's phenomenal."

**Mark Sanders**  
**Vice President, Internetworking Management**  
**Salomon Brothers**

"Their Remote LANVIEW network management software is what sold me on Cabletron. LANVIEW has a lot of capabilities. It allows me to see what is going on in the network, providing overviews, summaries and all the detailed information I need. However, the Cabletron hardware has been so reliable thus far that I haven't had to do much network troubleshooting."

"We did an evaluation to determine whose twisted-pair products to go with, comparing three other vendors with Cabletron. Adding up all the various parameters that go into making these kind of decisions, Cabletron easily came out on top."

"One example of Cabletron's technological advantage is its ability to isolate network problems without affecting the other users. If an Ethernet board malfunctions, it can 'scream' garbage data onto the network. When Cabletron equipment detects this condition, it will shut down the port it's connected to in the closet. At the time we made our decision, if we had used a SynOptics box or some other hub, it would have shut down all the users connected to that board."

**Phil Stanley**  
**Project Manager, Martin Marietta Corp.**

"We've been really impressed with Cabletron products. Its LANVIEW network management software is very good. We are still putting in place the different pieces of our network, and Remote LANVIEW has been a big help in letting me identify and solve network problems."

"If a LAN segment goes down on some floor, I can quickly find out where it is and fix the problem. Before LANVIEW and Cabletron's MMAC hubs, I had to climb up on a ladder to check the repeater status lights in the ceiling by trial and error until I found the faulty segment. It's a tremendous improvement to be able to actually see a graphical representation of the network problem on screen."

**Todd West, Electronic Engineer**  
**Office of the Chief Of Naval Research**

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## **WHAT CUSTOMERS SAY ABOUT CABLETRON -- 4/**

"There is a trend in the newspaper editorial systems market to provide more distributed processing using multiple PCs or workstations, rather than the traditional method of big centralized computers with dumb terminals. This trend requires networking. Because of this, we have chosen Cabletron as a recommended vendor in the Ethernet area."

"Cabletron is local to the area; their prices are highly competitive; and they have a comprehensive product offering. Most LAN vendors in the Ethernet area don't have everything. Cabletron, however, provides soup to nuts. If we need to fill a hole, if we need installation services, they can provide that. Many of the other vendors can't."

"If we need coax, they have it. If we need traditional thicknet, they can provide it, if we need the upcoming twisted-pair and 10BASE-T, they can provide that also, whereas most other vendors specialize in one area. Cabletron simply has a more extensive product offering and they continue to increase that product offering."

"They also have a pretty good distribution channel throughout Europe and are expanding internationally. Since over 50 percent of our sales comes from international sources, that is pretty important to us."

**Craig Muzilla, Product Manager**  
**Electronic Publishing Prepress Systems**

"Cabletron is the standard for our twisted pair Ethernet corporate wide. One of the better things about Cabletron is their LANVIEW diagnostics on the equipment as well as Remote LANVIEW management software. We can tell if a device is 'streaming' -- just by looking at the on-board LEDs we can tell a lot. Or with the network management software itself we can go in and look at each individual node, deactivate it, or take any required action, all from a remote location."

**Gene Churchwell, Manager Voice Services**  
**National Semiconductor**

"The network here at Dow has been continuously growing at a rapid rate. We could not afford to keep hiring people to keep up with the network growth, so we decided on a network management package that offered centralized management features and could be controlled by our four-person staff. That package was Cabletron's Remote LANVIEW/Windows."

"The color-coded icons provided with Cabletron's management software has made our job of finding network failures much easier and faster. Before, the only

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## **WHAT CUSTOMERS SAY ABOUT CABLETRON -- 5/**

way we were able to tell if there was a network failure was by the flood of calls from users complaining the network was down. Now we can see the problem and fix it before they even realize a problem existed."

"Right now we are managing all of our MMACs on the network with Remote LANVIEW/Windows. The biggest advantage to this hub management is that it lets us go down to the board and port level on each MMAC. In the future, we hope to purchase some of Cabletron's DNI cards to allow us to get even more specific statistics on the network."

**Randy Peairs, Network Specialist  
Dow Chemical, Louisiana Division**

**# # #**

## BACKGROUND

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### MARKET OVERVIEW

CAB 12

Cabletron Systems competes in the PC LAN market as a *complete systems supplier* of network interconnect hardware and management products. According to industry analyst Salomon Brothers (2/12/90), Cabletron is ranked 10th in the broad U.S. PC LAN market.

According to the Salomon Brothers report, the top 10 PC LAN suppliers are, in descending order: IBM, Novell, 3Com, Western Digital, DEC, Banyan, AT&T, HP/Apollo, Apple and Cabletron.

### Three Classes Of Competition

Cabletron has three classes of competition. First are the large computer manufacturing companies, such as Digital Equipment Corporation, IBM and Hewlett-Packard. The second type are the independent LAN vendors that, like Cabletron, also offer a broad product line. These include 3Com Corporation, Interlan and Ungermann-Bass.

The third class of competitor Cabletron faces are the so-called *Smart Hub* vendors. These companies manufacture network management products that monitor data traffic, gather statistics and generate alarms. Smart hub vendors offer sophisticated network management software that permits remote enabling and

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## **MARKET OVERVIEW - 2/**

disabling of ports. These network management packages feature consoles with graphical user interfaces.

The primary competitors today in the smart hub market are Cabletron and SynOptics. Salomon Brothers ranked SynOptics 12th in its 2/12/90 study. Although both companies appear to offer similar products, there are many important distinctions between the two. Cabletron, for example, manufactures *all* of its own products and has a much larger installed base of "nodes": 2,000,000 plus worldwide nodes compared with SynOptics' 1,000,000 nodes. Cabletron employs more than twice as many people and has thousands more customer sites using its products worldwide.

### **The Growth Of Enterprise Networks**

The PC LAN market is one of solid growth. Spending increased by 48.7 percent in 1988 and 30.6 percent in 1989. Salomon Brothers projects that customers will buy \$5.64 billion, or a 4.5 percent gain. International Data Corporation (IDC) forecasts an even brighter market. It concluded the PC LAN market will grow from approximately \$7 billion in 1988 to almost \$20 billion in 1993.

LANs are growing to encompass what people used to call "data communications." Today, companies are moving toward *Enterprise Networks* -- LANs or groups of connected LANs that extend beyond all traditional geographical and organizational borders.

The two primary LAN technologies today are Ethernet and Token Ring. Ethernet is still the dominant network, however, Token Ring is also gaining in popularity. With the development of the new IEEE 10BASE-T standard, Ethernet networks can now operate at 10 Mbps over low-cost unshielded twisted/pair (UTP) wiring. This makes Ethernet highly competitive with Token Ring's 4 and 16 Mbps communication speeds. Cabletron believes 10BASE-T/Ethernet will have a

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## **MARKET OVERVIEW - 3/**

significant impact on the market, providing an easy and inexpensive new way to give network connectivity to a larger group of users.

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## BACKGROUND

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### **10BASE-T Ethernet: THE RS-232 OF THE '90s**

*CAB 13*

Access to computer networks in the 1990s will be as commonplace as having a telephone on a desktop, thanks to the emerging 10BASE-T networking standard. 10BASE-T is an IEEE standard for running Ethernet networks over low-cost, unshielded twisted-pair (UTP or telephone-type) wiring at 10 megabits per second (Mbps).

10BASE-T is an important new standard because it will make network connectivity "too cheap to avoid," according to Barry Rheinhold, manager of the 10BASE-T Consortium's Interoperability Lab at the University of New Hampshire. "It will deliver network services to the desktop with the same ease and technology as today's voice services. Companies will no longer have to go back and rewire their building to get high-performance data communications."

The 10BASE-T standard reduces networking cost and makes connectivity easier in several ways. It dramatically reduces installation costs, taking advantage of media already in place. Most buildings wired for telephones within the last 10 years can accommodate data communications for 10 Mbps Ethernet networks using the same UTP. The telephone companies have built extra wires into their specifications for data and for their own future product expansion.

For new installations, or wiring older buildings, UTP is extremely inexpensive. Moreover, it is easy to use and install. Virtually everyone knows how to plus a

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## **10BASE-T ETHERNET -- 2/**

telephone into a wall jack. And the telephone companies have a structured wiring scheme to make installation easier and more efficient. It uses a radial wiring approach in which wires to each user emanate out from a central hub in the wiring closet. The hub forms the connection to the network backbone.

This wiring structure makes it easier to control the network with network management software like Cabletron's Remote LANVIEW/Windows because it allows users to locate and isolate network problems. "The old Ethernet bus-type architecture -- in which all the devices are networked through a single cable -- is like the old style Christmas tree lights. When one bulb went out, the whole string went and you were then left to figure out which bulb was broken. Using the same analogy with 10BASE-T, if one bulb breaks the others will still work, and you can quickly find and fix the problem," said Rheinhold.

10BASE-T also brings the cost benefits of standards to the market. Until recently, Ethernet networks were based on proprietary hardware. "If you used one vendor's bridges, you usually had to use their hubs, transceivers, boards and other interconnect equipment as well," said Rheinhold. "With 10BASE-T, customers will be able to mix and match network components from a variety of vendors to suit their needs. It will increase competition between vendors, providing customers with the benefits of more value-added features and competitive prices. And it will give them more options and flexibility in setting up an Ethernet network.

For these reasons, 10BASE-T Ethernet running over UTP will change the way many businesses do networking. Cabletron believes it will be the RS-232\* of the 1990s.

Cabletron has become a major player in the 10BASE-T market. It helped forge the 10BASE-T standard as an active member in the IEEE 802.3 10BASE-T committee.

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## **10BASE-T ETHERNET -- 3/**

Cabletron was the first company to announce and ship a 10BASE-T product, and today incorporates the standard on its Multi Media Access Center (MMAC) intelligent hubs, Desktop Network Interface (DNI) PC cards and TPT-T transceivers.

Cabletron has built its 10BASE-T product line to extend the distances of twisted pair network links to more than 100 meters, as well as adding cable integrity electronics to ensure proper connectivity.

"10BASE-T is going to quickly become the most important draft standard for those companies who are intrigued with running Ethernet over twisted pair," said Howard Anderson, managing director for the Yankee Group. "Users are going to migrate in droves to those vendors who can ship to this standard. Cabletron is in an excellent position to compete in this market with a manageable twisted pair solution. Users are ready to move almost in sync with those vendors because of the inherent superb economics of using twisted pair technology."

**\* RS-232, most commonly associated with the serial port connections found in virtually every computer hardware, is the most widely used interface standard to connect computers with peripheral devices such as modems, mouses, printers or other computers.**

**# # #**

## BACKGROUND

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### GLOSSARY OF TERMS

CAB 14

**10BASE-T** -- An emerging IEEE standard for operating Ethernet networks at 10 Mbps over unshielded twisted-pair (telephone-type) wiring.

**AUI Transceiver Cable** --An interim section of special cable that enables a transceiver to accept a variety of other media such as twisted pair wiring or fiber optic cable.

**Backbone** -- The cabling segment of a network to which network hubs connect to span longer distances at faster communications speed, such as floors of a building or multiple buildings in a campus network.

**Bridges** -- Equipment that connects different LANs together, allowing devices on separate LANs to communicate. Bridges filter out and reroute data not destined for the opposite LAN, as well forward data intended for the other LAN.

**Common Management Information Protocol (CMIP)** -- The emerging OSI protocol standard for multi-platform network management.

**Desktop Network Interface (DNI) PC Cards** -- Cabletron's plug-in network adapter cards for PC/AT, PC/XT, Microchannel (PS/2) and Apple SE, SE-30 and Mac II computers. DNI cards enable PCs to connect into Ethernet networks, and communicate and share information with other users on the network. They

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## **GLOSSORY OF TERMS - 2/**

support twisted pair, coax and fiber optic cable.

**Enterprise Network** -- Networks that encompass an organization's LANs, corporate MIS systems and wide-area networks on a national or global scale.

**Ethernet** -- The most widely used LAN standard. It allows computers to access the network on a transmit-at-will basis. If two transmissions collide, they try again until they get through. It runs on both twisted pair and coaxial cable.

**FDDI** -- Fiber Distributed Data Interface. An emerging standard for 100 Mbps fiber optic LANs. It uses a "counter-rotating" Token Ring topology.

**Gateway** -- A computer system and its software that permit two networks using different protocols to communicate with each other. For example, gateways are used to connect PC-based LANs to IBM mainframes (SNA gateways) or to X.25 packet-switched public network systems (X.25 gateways).

**INA** -- Cabletron's Integrated Network Architecture. INA is a concept that lets customers build a manage a global, distributed network of interconnected LANs using products that transparently work together, regardless of the chosen media type or network standard. All Cabletron products and services are based on the INA.

**LAN** -- Local Area Network. A computer network spanning a limited geographical area, a few miles at most. It provides communications between computers and peripherals.

**LANVIEW** -- One of Cabletron's conerstone network management technologies. Initially developed as an LED diagnostic indicator solution. Today it is a comprehensive integrated software system for monitoring and controlling

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## **GLOSSARY OF TERMS -- 3/**

physical layer network connectivity.

**MMAC** -- Cabletron's hardware-based Multi-Media Access Center. One of Cabletron's cornerstone network management technologies. A modular, intelligent wiring hub for LANs with large numbers of nodes and one or more types of media including twisted pair wiring, coax cable and fiberoptic cable.

**Network Operating System** -- Software used to connect devices, share resources, transfer files and perform network activity.

**Network Topology** -- The geography or layout of a network. Networks are usually laid-out in star, ring or bus topologies.

**Node** -- A point in a network where service is provided or used, or communications channels are interconnected. Nodes are sometimes synonymous with PCs or workstations on a network. Cabletron has over 1,800,000 nodes worldwide.

**OSI** -- Open System Interconnection. Communications reference model defined by the International Standards Organization (ISO). It is a seven layer communications protocol intended as a standard for the development of communication systems worldwide.

**Packet Switching Networks** -- A networking technique for handling high volume traffic in a network. Packet switching breaks apart all messages to be transmitted into fixed-length units called packets. The packets are routed to their destination through the most expedient route, and all the packets in a single message may not travel the same route.

**Protocols** -- Sets of rules for communicating between computers. Protocols govern

-more-

## **GLOSSARY OF TERMS -- 4/**

format, timing, sequencing and error control.

**Remote LANVIEW/Windows** -- This Cabletron software allows users to manage and control the physical layer of a local area network from a single workstation using a graphical user interface.

**Repeaters** -- Devices that amplify signals from one piece of cable and pass them on to another piece of cable without changing the signals' contents. Repeaters extend the maximum length of LAN connections.

**Simple Network Management Protocol (SNMP)** -- An element of the TCP-IP protocol suite used for standard network management. SNMP allows network users to manage from a single workstation all devices on the network that support the protocol.

**SPECTRUM** -- Cabletron's advanced management platform for managing networks and networked systems. The protocol independent management package goes far beyond the current generation of management systems to provide a cohesive, powerful and flexible environment for managing multivendor networks.

**TI** -- A digital transmission system developed by AT&T which sends information at 1.544 Mbps. TI circuits are becoming the preferred backbone communications channel for large organizations because many PBXs can connect directly to TI lines, as well as some LANs using gateways.

**TCP/IC** -- Transmission Control Protocol/Internet Protocol. A set of industry standard protocols developed by the Department of Defense to link dissimilar computers across networks.

**Token** -- A unique combination of bits used in token ring LANs. When a

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## **GLOSSARY OF TERMS -- 5/**

workstation receives a token, it is given permission to transmit data over the LAN. *See Token Passing, Token Ring.*

**Token Passing** -- A LAN access method by which a token is passed from workstation to workstation, thereby passing permission to send a message. When a workstation has a token, it can send. It then attaches the message to the token which "carries" it around the LAN. Every station between the sender and receiver "sees" the message, but only the receiving workstation accepts it. The receiving workstation then releases the token to be used by the next station. The entire process takes fractions of a second. *See Token, Token Ring.*

**Token Ring** -- A type of network in which workstations are given access to the network by a token that passes from station to station in a ring. The IEEE standard for token ring LANs has a raw data speed of 4 Mbps.

**Transceivers** -- Devices required to attach one or many nodes to the network and allow the nodes to communicate with other users. Transceivers can be standalone devices, or part of another device's printed circuit board. Since transceivers typically support only one type of network media, multiple transceivers must be used to support networks with different media.

**Twisted Pair** -- Two insulated wires twisted around each other and sometimes encased by a shield, jacket or insulation. Twisted pair wiring is most often used to connect telephones, terminals and computers to PBXs. The advantages to using twisted pair wiring in LANs are many. They are easier to install, inexpensive and easier to change than coaxial cable. Disadvantages are that they are sometimes too thin, unshielded and spliced too many times.

**UNIX** -- A standard computer operating system developed by AT&T.

**Unshielded Twisted Pair (UTP)** - *See Twisted Pair.*

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## **GLOSSARY OF TERMS -- 6/**

**VLSI** -- Very Large Scale Integration. The technique of putting hundreds of thousands of transistors onto a single integrated circuit.

**X.25** -- A standard international communications protocol used in packet switching networks.

**# # #**

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## BACKGROUND

### CORPORATE FACT SHEET January 1992

#### CORPORATE PROFILE

- Founded in 1983 by S. Robert Levine and Craig Benson
- Technology developed at Cabletron Systems, Inc., Rochester, NH
- Manufactures all products at four U.S. based manufacturing facilities
- Networking technologies include manageable Ethernet, Token Ring and FDDI products
- Traded Over NYSE Under Symbol CS
- Initial Public Stock Offering -- May 1989
- Secondary Public Stock Offering -- December 1990
- Third Public Stock Offering -- September 1991
- FY 1991 Revenue: \$180.5 Million -- Net Income: \$35.9 Million
- More than 2 Million Nodes Installed to Date at more than 25,000 customer sites

#### CHARTER

To provide standards-based, technologically advanced networking systems through the *Integrated Network Architecture* strategy of providing a framework for seamless network evolution and expansion as customer needs grow or new networking technologies enter the market.

#### TECHNOLOGY MILESTONES

- JULY 85: TDR 5000 and LAN MD Introduced as First Products to Verify Ethernet LANs
- JUNE 86: LANVIEW Diagnostics Introduced as First LED Indicators of Network Performance
- JULY 86: ST 500 Introduced as First Ethernet Transceiver to Include Built-in Diagnostics
- MAR 87: Integrated Network Architecture Unveiled as Strategy for Product Migration Path
- MAR 88: MMAC Introduced as Industry's First Modular Intelligent Device for Central Location of Transmission Media and Data
- MAR 88: Remote LANVIEW Network Control Management Introduced
- SEP 89: Desktop Network Interface Cards (DNI) Introduced
- SEP 89: Remote LANVIEW/Windows, Cabletron's Network Management Software Introduced

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## CABLETRON FACT SHEET - 2/

- NOV 89: Industry's First 10BASE-T Products Introduced with Management
- JAN 90: SNMP Agents Added to DNI® cards
- JAN 90: First Token Ring Module for MMAC
- FEB 90: First 10BASE-T Chip Made Available to OEM Markets
- MAR 90: LANVIEW Network Analyzer Introduced
- APR 90: Joint Technology Alliance With cisco Systems Announced
- JUN 90: Intelligent Repeater Bridging Module (IRBM) Introduced
- JUN 90: First to Integrate Analyzing Capabilities into the Hub
- JULY 90: Remote LANVIEW/SunNet Manager Introduced
- AUG 90: FDDI Technology for Shielded Twisted Pair Announced
- SEP 90: Token Ring Connectivity Product Family Introduced
- SEP 90: Artificial Intelligence-Based Inductive Modeling Technology (IMT) Introduced
- SEP 90: Joint Technology Alliance With National Semiconductor to Develop First Integrated Twisted Pair/FDDI Interface Announced
- SEP 90: MRX/MRXI Low-connectivity 10BASE-T Solution Unveiled
- SEP 90: Strategy for CMIP Migration Unveiled
- OCT 90: Ethernet/FDDI Bridging Module Introduced
- OCT 90: SPECTRUM Advanced Management System Introduced
- OCT 90: SNMP Technology Introduced for Western Digital and 3Com Adapter Cards
- OCT 90: FDDI Research Technology for STP Presented at ANSI Meeting
- DEC 90: MMAC/Novell Lantern Monitor Introduced
- JAN 91: MacLANVIEW Network Analyzer Introduced
- FEB 91: High density 10BASE-T interface cards introduced for MMAC hub
- FEB 91: Remote LANVIEW/Windows introduced based on Microsoft Windows 3.0
- FEB 91: NetView gateway capabilities introduced for SPECTRUM and Remote LANVIEW/Windows
- MARCH 91: MRX-2 and MRXI-2 standalone 14 port wiring concentrators introduced
- MARCH 91: Strategic alliance announced with Cayman Systems to integrate Appletalk gateway technology into MMAC
- APRIL 91: Version 2.1 introduced of Remote LANVIEW/Windows offering support for third party MIB extensions
- MAY 91: AT&T Accumaster gateway capabilities announced for SPECTRUM
- MAY 91: Cabletron earns licensing rights to Alliance OSI software from Touch Communications

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## CABLETRON FACT SHEET - 3/

- JUNE 91: Cabletron/Silicon Graphics alliance results in joint development, marketing and distribution agreement
- JULY 91: Cabletron demonstrates FDDI twisted pair technology at distances exceeding 100 meters
- OCT 91: FDDI product line introduced at Interop
- OCT 91: Cabletron introduces at InterOp the E2-Hub Card™ -- a desktop hub/adaptor card for personal computers
- OCT 91: Cabletron introduces at NetWorld the MR9T low-cost 10BASE-T wiring hub
- NOV 91: Cabletron introduces the TRMM (Token Ring Management Module) for the Multi Media Access Center hub series
- NOV 91: High density Token Ring modules introduced for the MMAC
- DEC 91: Cabletron introduces the FOMIM-38, FOMIM-32 and FOMIM-36, new single mode fiber modules for the MMAC

## CORPORATE MILESTONES

- DEC 88: Named 7th Fastest Growing Privately Held Company in America by *Inc.* magazine
- MAY 90: Named 2nd "Hottest Growth" Company in America by *Business Week* magazine
- MAY 90: Named #1 Socially Responsible Stock by *Money* magazine
- NOV 90: Named 2nd in the *Forbes* magazine Survey of America's "Best Small Companies"
- JAN 91: Co-founders named National Entrepreneurs of the Year by *Inc.* magazine
- JAN 91: Rated as New York Stock Exchange's #1 performance stock in 1990
- JUN 91: Rated #531 in *Business Week's* ranking of "America's 1000 Most Valuable Companies"

## SALES & MARKETING

- Distribution Through Cabletron's Worldwide Sales Force, select Value Added Resellers (VARs) and Original Equipment Manufacturers (OEMs)
- Sales Locations in the United States (40), United Kingdom, West Germany, France, Sweden, Spain and Australia.

# # #



City/State: Rochester/Cabletron

Event: \_\_\_\_\_

Date: \_\_\_\_\_

# OFFICE OF PRESIDENTIAL ADVANCE CONTACT SHEET

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<u>ROBERT TUOHY</u>	<u>TELECOMM. MGR.</u>	<u>x 1446</u>
<u>ROGAN FATTERSON</u>	<u>Facility Maint</u>	<u>x 1433</u>

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## BACKGROUND

**Contact:** *Darren Orzechowski*  
*Cabletron Systems, Inc.*  
*(603) 332-9400 Ext. 1282*

### CABLETRON'S MOST RECENT PRODUCT AND SERVICE ANNOUNCEMENTS

#### Single Model Fiber Modules Announced

December 16, 1991      Enabling users in campus-wide environments to utilize the superior qualities of single mode fiber cabling, Cabletron introduces a new line of Ethernet connectivity products including the FOMIM-38, FOMIM-32 and FOMIM-36 modules and FOT-F3 transceiver.

#### High Density Token Ring Modules Introduced

November 19, 1991      Cabletron introduces twenty-four port Token Ring modules for the MMAC hub series -- the highest Token Ring port concentration offered in the industry.

#### Next Generation Token Ring Management Module Introduced

November 18, 1991      To extend the performance and functionality of its Token Ring network management products, Cabletron introduces the TRMM (Token Ring Management Module) for the MMAC hub. The module is built on state-of-the-art technology, harnessing the power of object oriented software and RISC-based processing.

#### MR9T Hub Introduced at Networld

October 15, 1991      Cabletron targets small workgroup environments with the introduction of the MR9T, a standalone, wall-mountable Ethernet 10BASE-T hub that provides connectivity for up to nine users at \$77 per connection.

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## **CABLETRON'S PRODUCT ANNOUNCEMENTS -- 2/**

### **Introduction of E2-Hub Card™**

October 9, 1991 Cabletron introduces the E2-Hub Card™ -- a desktop hub/adaptor card solution providing connectivity for up to nine users. Cards in the series are designed for easy installation into IBM PC and compatible computers.

### **Integrated Backbone-to-Desktop FDDI Solutions Unveiled**

October 9, 1991 Cabletron unveils integrated FDDI solution at the Interop trade show in San Jose, California.

### **Integrated Backbone-to-Desktop FDDI Solutions Announced**

September 9, 1991 Cabletron announces plans to introduce at Interop the industry's first completely integrated FDDI solution including Media Interface Modules (MIMs) for the MMAC and manageable network interface cards. Products to begin shipping in Q1 1992.

### **Twisted Pair FDDI Solutions Presented**

June 25, 1991 Cabletron announces development of a low cost, integrated solution enabling 100 Mbps FDDI signals to transmit over shielded and unshielded twisted pair cabling at distances exceeding 100 meters. Presentations of the technology were given at the American National Standards Institute (ANSI) X3T9.5.5 meeting.

### **Cabletron/Silicon Graphics Alliance**

June 17, 1991 Cabletron aligns with Silicon Graphics, resulting in joint development, marketing and distribution agreement.

### **OSI Network Management Agreement**

May 13, 1991 Cabletron gains broad licensing rights to incorporate Alliance OSI software from Touch Communications into its full line of networking products.

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## **CABLETRON'S PRODUCT ANNOUNCEMENTS -- 3/**

### **AT&T Accumaster Gateway For SPECTRUM**

May 6, 1991                      Gateway to AT&T's Accumaster System introduced for SPECTRUM network management platform.

### **Remote LANVIEW/Windows 2.1 Introduced**

April 29, 1991                  Cabletron introduces enhanced version of Remote LANVIEW/Windows, offering support for third party MIB extensions.

### **Japanese Market Penetration**

March 18, 1991                  To aggressively penetrate the Japanese marketplace, Cabletron names Networkd its sole Japanese distributor.

### **Strategic Alliance Signed With Cayman Systems**

March 11, 1991                  Cabletron and Cayman announce strategic development alliance to integrate Appletalk gateway technology into MMAC series.

### **Introduction of MRX-2 and MRXI-2**

March 5, 1991                      Cabletron introduces MRX-2 and MRXI-2 standalone 14 port wiring connectors designed to provide management capabilities to low-cost connectivity work areas.

### **NetView Gateway Capabilities**

February 12, 1991                Cabletron introduces gateways to IBM's NetView mainframe-based management system for its Remote LANVIEW™ and SPECTRUM™ network management platforms.

### **Enhanced Remote LANVIEW/Windows Capabilities**

February 12, 1991                Cabletron enhances the company's mid-range network management software platform using Microsoft Windows 3.0 to produce a graphical window into the physical layer of the network.

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## **CABLETRON'S PRODUCT ANNOUNCEMENTS -- 4/**

### **Lower 10BASE-T Networking Costs**

February 12, 1991      Cabletron lowers 10BASE-T per port wiring costs by approximately 25 percent with the introduction of two high-density Media Interface Modules™ (MIMs), the TPMIM-24 and TPMIM-34, for the MMAC wiring hub.

### **Terminal Server Integrated into the MMAC**

January 29, 1991      Cabletron and Xyplex announce incorporation of terminal server technology into the MMAC intelligent wiring hub with the introduction of the ETSMIM -- an Ethernet Terminal Server Media Interface Module for the MMAC series.

### **MacLANVIEW Network Analyzer**

January 10, 1991      Cabletron introduces a new addition to its extensive line of network monitoring and troubleshooting products with the MacLANVIEW Network Analyzer -- a powerful program designed for Apple Macintosh® personal computers operating in an Ethernet 802.3 or LocalTalk network environment.

### **MAC II Manageable Token Ring Adapter Cards**

January 10, 1991      Using shielded twisted pair (STP) or unshielded twisted pair (UTP) cabling, users of Mac II series computers can connect to 4 or 16 megabit per second (Mbps) IEEE 802.5 Token Ring networks.

### **Novell's LANtern Incorporated into MMAC**

December 3, 1990      Cabletron develops the industry's first integrated remote network monitoring module by combining Novell's LANtern™ and Cabletron's MMAC intelligent wiring center.

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## **CABLETRON'S PRODUCT ANNOUNCEMENTS -- 5/**

### **Mid-Range Intelligent Wiring Hub**

November 19, 1990

Cabletron introduces the MMAC-5FNB -- an intelligent modular network hub engineered to integrate up to five Ethernet, Token Ring and FDDI Media Interface Modules (MIMs) and one management/repeater module into a mid-sized chassis.

### **Western Digital SNMP Support**

October 29, 1990

Cabletron develops a technology to transform personal computers utilizing Western Digital non-intelligent network interface cards into Simple Network Management Protocol (SNMP) manageable devices.

### **SPECTRUM™ Introduced To The Public**

October 10, 1990

Cabletron demonstrates its SPECTRUM™ Advanced Management System to the public. At InterOp, the system is featured by Novell, Banyan, Xylogics and by the SNMP Interoperability solutions showcase, as well as Interop's network operating center.

### **3Com SNMP Support**

October 10, 1990

Cabletron introduces an application to run on top of 3Com personal computer interface cards transforming the cards and personal computers into SNMP devices.

### **Ethernet-to-FDDI Bridge**

October 10, 1990

Cabletron introduces the industry's first Ethernet-to-FDDI bridging module (EFDMMIM) for intelligent wiring hubs, allowing Ethernet networks the speed of an FDDI backbone.

### **SPECTRUM™ Introduced**

September 18, 1990

Cabletron introduces SPECTRUM™, a new enterprise network management software system based on the company's breakthrough Inductive Modeling Technology™.

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## **CABLETRON'S PRODUCT ANNOUNCEMENTS -- 6/**

### **Inductive Modeling Technology Software**

September 10, 1990      Cabletron announces its new Inductive Modeling Technology™ Artificial Intelligence (AI) core software, providing an agile, adaptive and automatic way to model and control complex entities.

### **MRX/I Low-Cost Hub Solution**

September 10, 1990      Cabletron introduces a low-cost solution for low-connectivity work areas with their 14 port, 10BASE-T compliant MRX and MRXI hubs.

### **Token Ring Product Line**

September 10, 1990      Cabletron introduces the industry's broadest line of manageable 4/16 Mbps Token Ring products.  
**PRODUCT FEATURES:**

- Flexible Network Bus Backplane Architecture for the Multi Media Access Center (MMAC)
- Remote LANVIEW™ Network Management
- Desktop Network Interface (DNI®) Cards
- UTP Media Interface Modules for the MMAC
- STP Media Interface Modules for the MMAC
- Repeater Media Interface Module for the MMAC
- Management/Bridging Modules for the MMAC
- Standalone Passive Concentrator

### **Twisted Pair/FDDI Technology**

August 17, 1990      Cabletron announces development of a technology combining the affordability of twisted pair copper cabling with the speed of the FDDI standard.

### **SunNet Manager Software**

July 31, 1990      Cabletron introduces LANVIEW™/SunNet manager, the first third-party software package to run on Sun Microsystems' SunNet manager.

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## **CABLETRON'S PRODUCT ANNOUNCEMENTS -- 7/**

### **Intel On-Site Maintenance**

July 24, 1990

Cabletron announces an agreement with Intel to offer worldwide, on-site maintenance service and support.

### **Intelligent Repeater Bridging Module**

June 19, 1990

Cabletron introduces the Intelligent Repeater Bridging Module (IRBM), a combination repeater, and bridge module that merges analyzing functionality and network management capacity to the smart hub.

### **cisco Systems Internetwork Routing**

May 14, 1990

Cabletron and cisco Systems announce strategic alliance to integrate internetwork routing technology into the Multi Media Access Center intelligent wiring concentrator.

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## BACKGROUNDER

Contact: *Darren Orzechowski*  
*Cabletron Systems, Inc.*  
*(603) 332-9400*

### WHAT THIRD PARTIES SAY ABOUT CABLETRON

CAB 3

"While it is true that most people tend to think of hardware as performance-competitive (it tends to be price/performance oriented), I don't think you put all hardware in one big basket and say the smart hub market is a dog because it's so competitive and software's not. *I think that's too simplistic.*"

"Cabletron is in a market *where there is a lot of value-added*. There's an opportunity to go in and differentiate yourself by offering the customer several different access methods and wiring types, and that, combined with network management and LAN interconnection features makes these products, in my opinion, not commodities."

*"I do think they're in a good market where there are three principles competitors -- Cabletron, SynOptics and Ungermann-Bass. There will be some companies that enter the market specializing in fiber."*

"No one has a complete LAN interconnection product offering. Ungermann-Bass has announced that, but not yet delivered it. SynOptics is OEMing a low-end bridge; there is still room for Cabletron to differentiate on that aspect. People have come to know Cabletron as a company they can trust with their network system."

On SPECTRUM:

"Cabletron is the first wiring closet competitor to cross into the realm of network management integration. In complexity and price, SPECTRUM falls in a class with Digital's EMA, IBM's Netview, and AT&T's Accumaster Integrator. Can little \$150 million-a-year Cabletron compete in the big leagues? We think it can."

"Cabletron has upped the ante for wiring closet competitors."

**Mary Modahl**  
**Director, Network Strategy Research**  
**Forrester Research**

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## WHAT THIRD PARTIES SAY ABOUT CABLETRON -- 2/

"Cabletron is doing very, very well because people are really interested in unshielded twisted pair (UTP) cabling. It's easy to install, and in many instances you can use previously installed wire. It's a big market these days, worth about \$6 to \$7 billion dollars, with UTP making up about \$200 million of the market."

"They share with Synoptics about 12 percent each of the concentrator market. There are a couple of other players -- David Systems, Ungermann-Bass, NYNEX, AT&T and the regional Bell companies."

*"What differentiates Cabletron is the company's network management products. Networks are becoming more commonplace. If you look at the arena they are in, only about 18 percent of those computers are connected right now. There are upwards of 30 million personal computers in the business environment that can be networked. Cabletron will play a very important role in that they can now deliver upstream messages to integrated network management packages, primarily from Hewlett-Packard and their LANVIEW product, which we consider to be one of the standard interfaces."*

"Network management is a way to take care of some of these networks, and Cabletron is becoming prolific in this area. Their products are starting to be connected to existing terminal-to-host environments, and the ability to manage that is critical to MIS. With the advent of PC LANs, MIS sort of lost control of the network and computing environments around them. The MIS guys now want some way to rationalize their job and they see network management as a terrific opportunity to gain control of those disparate networks."

**Doug Gold**  
**Director of Networking Systems**  
**International Data Corporation**

"Cabletron is a rapidly growing LAN component and systems supplier. With over 75,000 unshielded twisted pair LAN nodes shipped to date, the company's 10BASE-T products should be seriously considered."

"The company's success to date has been in the more traditional coaxial-based Ethernet products, but now is expanding its business into the twisted pair LAN market."

"Since its founding in 1983, the company has watched its growth climb steadily with worldwide sales of \$54.8 million in 1988 and estimated revenues of \$100 million for 1989."

*"We remain very positive on Cabletron. Cabletron has begun to shed its board level image to a company focusing on integrated system solutions. We expect the company will migrate its Ethernet backbone towards the emerging Fiber*

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## **WHAT THIRD PARTIES SAY ABOUT CABLETRON -- 3/**

Distributed Data Interface (FDDI) by Q1 '91 and provide Token Ring support at the wire center level in the same timeframe. Additionally, look for the company to continue heavy emphasis on providing network management across its entire product line, providing both physical and logical (separate at first) tools to do so."

### **Gartner Group, Inc. Report January 1990**

"Sears Business Centers is aggressively competing in the enterprise network market. Cabletron provides us with the media layer capability so our clients will have high performance networks with the kind of quality and integrity they have come to expect from Sears Business Centers. This partnership helps provide our customers with total solutions."

"No other possible partner had the national presence, technical strength, engineering expertise and reputation for quality we found at Cabletron."

### **William F. Lenahan Vice President and General Manager Sears Business Centers**

"National Semiconductor formed a strategic partnership with Cabletron due to its commitment to support all networking standards, particularly in the new 10BASE-T standard marketplace. Cabletron established itself early as the leader in the 10BASE-T market. Their people know the standard inside and out, and have been able to bring high-quality 10BASE-T products to market faster than any other player in their segment."

"National is committed to working with Cabletron to develop highly integrated, cost-effective VLSI solutions that comply with existing and emerging standards. Our joint efforts in VLSI and network management technology resulted in the industry's first Ethernet LAN repeater with comprehensive network management and control capabilities. Both companies are using this foundation to develop new generation Ethernet LAN products that are more reliable and affordable."

### **Richard Brand Network Product Marketing Manager National Semiconductor**

"10BASE-T is going to quickly become the most important draft standard for those companies who are intrigued with running Ethernet over twisted pair. Users are going to migrate in droves to those vendors that can ship to this standard."

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## **WHAT THIRD PARTIES SAY ABOUT CABLETRON -- 4/**

Cabletron is in an excellent position to compete in this market with a manageable twisted pair solution. Users are ready to move almost in sync with those vendors because of their inherent superb economics of using twisted pair technology."

**Howard Anderson, Managing Director  
The Yankee Group**

"Their products are good, and they have been successful moving from a components manufacturer to a provider of systems solutions."

**Bill Redmond, Senior Research Analyst  
The Gartner Group  
Communications Week, Feb. 26, 1990**

"Cabletron Systems and EMC Corp. are classic niche companies benefiting from trends in the computer industry. Cabletron makes a key trouble-shooting part, known as an intelligent hub, that monitors signals of computers in a network. "Local area" networks are a hot trend in computing these days."

**THE WALL STREET JOURNAL, January 2, 1991  
Big Board's 10 Best Performers, Cabletron #1**

"Cabletron Systems, Inc. -- which the judges applauded for its fast growth and quick decision making -- began its rise back in June, when the company was given a regional award. It was one of 281 companies honored regionally -- selected from more than 2,600 applicants. "

**Inc. magazine, January, 1991  
Selection of Co-founders Benson and Levine as  
National Entrepreneurs of The Year**

"Cabletron Systems, Inc. is riding the wave of a booming local area network market as companies reach for the efficiencies they can gain by purchasing products that connect, internetwork and manage their multivendor systems."

**Investor's Daily, March 13, 1991**

"Cabletron is one of the industry's hottest suppliers in the blossoming market for office computer network gear."

**Business Week, March 20, 1989**

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## **WHAT THIRD PARTIES SAY ABOUT CABLETRON -- 4/**

"At the core of Cabletron's network management offering is Remote LANVIEW, a menu<sup>TM</sup>driven software package based on HP's Open View... Fully functional and easy to use, it is one of the better Ethernet physical-layer network management packages on the market."

**International Data Corporation  
Local Area Networks Report, March 1990**

# # #

## BACKGROUND

Contact: *Darren Orzechowski*  
*Cabletron Systems, Inc.*  
*(603) 332-9400*

### LAN CONNECTIVITY ANYWAY, ANYWHERE

CAB 4

The trend dominating computer networking over the last few years is the growth of enterprise *networks* -- seamless access to a company nationwide or worldwide computer resources through a local area network (LAN).

Networks are expanding almost organically as groups of autonomous LANs band together into larger networks and reach out to corporate MIS systems and wide-area networks. Company mergers, acquisitions or restructuring are also forcing new groups of users -- and different kinds of LANs -- together. While LANs once meant simple file and printer sharing with nearby colleagues, today LAN users can access file servers around the globe.

Because of this proliferation, connectivity is one of the main concerns when today's businesses buy networks. Since the world is no closer to adopting a unified networking standard architecture today than it was 10 years ago, companies need networking solutions that transcend all geographical, organizational and architectural boundaries. They can no longer be bound by Ethernet-only or Token Ring-only LANs that service a limited number of users. Companies need networking solutions that can merge the many different network media, protocols, operating systems, buses, wiring, systems and applications into a *seamless global network*.

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## CONNECTIVITY ANYWAY, ANYWHERE -- 2/

Cabletron Systems is in the business of selling connectivity. Its corporate charter is to provide network connectivity anyway, anywhere.

Through a family of standards-based network PC cards, smart hubs, bridges, transceivers, repeaters and other components and services,

Cabletron provides the most flexible and comprehensive network platform available. Only Digital Equipment Corporation offers as broad a range of LAN design, installation and manufacturing services.

The foundation of Cabletron's networking product family is its Integrated Network Architecture (INA). The INA includes all of Cabletron's standards-based products and services necessary to build and manage a global, distributed platform of interconnected local area networks (LANs).

All Cabletron products and services are based on its *Integrated Network Architecture*. INA gives companies a "one-stop shop" for all their connectivity needs. It lets them build and manage a global, distributed network of interconnected LANs. All INA products work together transparently regardless of which media type or network standard the customer chooses.

Cabletron's network management solutions accommodate each user's preference for LAN connectivity or desktop computing. Departmental Ethernet LANs and Token Ring LANs can coexist and communicate within a company's enterprise network. Using the Multi Media Access Center (MMAC) -- Cabletron's modular network smart hub -- users can plug Ethernet, Token Ring, and FDDI, as well as future networking standards, into the same concentrator. PC, UNIX workstation and Apple SE and Macintosh users can transparently exchange information within the Cabletron environment. And users can integrate seamlessly into high-speed FDDI backbone networks, spanning floors, buildings, cities, states and countries with a wide area network T1 or X.25 link.

Cabletron designs, manufactures and markets products for every available

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## **CONNECTIVITY ANYWAY, ANYWHERE -- 3/**

networking media. These include unshielded twisted-pair, IBM data cabling, thin and thick coax, fiber-optic and AUI transceiver cable, all in the same MMAC hub.

Cabletron can provide comprehensive connectivity because of its commitment to all networking standards. It supports all existing and emerging standard protocols and applications, including the Simple Network Management Protocol (SNMP) for standard network management; TCP/IP for multivendor, heterogeneous network communications; Sun Microsystems' NFS; Novell Netware and DECnet. All Cabletron's network interfaces comply with established physical media standards including IEEE 802.3 10BASE-2, 10BASE-5, FOIRL and 10BASE-T.

Cabletron has been an active player in forging the new and emerging international standards that will reshape the nature of networking in the 1990s. Cabletron executives helped draft the new 10BASE-T standard for running Ethernet over low-cost unshielded twisted-pair wiring. 10BASE-T provides, for the first time, interoperability between Ethernet equipment and any vendor's 10BASE-T product. Cabletron was the first networking company to announce and ship a 10BASE-T product, and today offers this capability across its full range of networking products.

Cabletron also helped develop the ANSI standard for FDDI networks. Used as fiber optic network backbones, FDDI provides a high-speed data highway for connecting groups of departmental LANs.

Cabletron has become a leader in the 10BASE-T and FDDI marketplaces by working very aggressively with major chip vendors to develop compatible products. Cabletron and National Semiconductor, for example, co-developed a 10BASE-T Ethernet LAN repeater with comprehensive network management and control capabilities. By providing input at the systems level, Cabletron has helped chip manufacturers develop standards-based silicon that allows it to provide the highest degree of functionality and performance at the most economical cost.

# # #

## BACKGROUND

Contact: *Darren Orzechowski*  
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*(603) 332-9400*

### **REMOTE LANVIEW AND SPECTRUM: CAB 5** **CABLETRON'S VISIONS OF NETWORK MANAGEMENT FOR THE '90s**

At one time or another, a computer network is going to fail. This fact is inevitable, regardless of the quality or design of network components. A few years ago, when most network users were banded together in small, isolated local area networks (LANs), network downtime was more of an inconvenience than it was a serious business problem.

But today LAN connectivity is expanding dramatically, transcending all traditional geographical and organizational network boundaries. These new *enterprise networks* distribute the information and resources of a company on a global scale, giving each employee unprecedented access and power through an electronic window on the desktop.

Today, network downtime can cost a company thousands of dollars in lost productivity, information and opportunities.

For these reasons, Cabletron believes network management will be the most important technology for making enterprise networks a vital, profitable and competitive resource in the 1990s. In Remote LANVIEW<sup>®</sup> and SPECTRUM<sup>™</sup> Cabletron has developed the most comprehensive network management system available today to keep networks up and running, and to fix them quickly when problems occur.

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## **REMOTE LANVIEW AND SPECTRUM -- 2/**

Cabletron's Remote LANVIEW is a powerful integrated network management system for monitoring and controlling physical layer connectivity -- the wiring, adapter cards, electronics, interconnect devices and computers that make up a network. SPECTRUM, like Remote LANVIEW, provides management for these areas of the network, but extends to management of multivendor networks within proprietary protocols as well as industry standard protocols.

As enterprise networks continue to expand and new users are added, they become more costly and complex. The sheer number of new user connections is outpacing a company's ability to keep up with network demands. Remote LANVIEW and SPECTRUM were developed to meet the following needs:

- \* to make enterprise networks less costly to build and maintain,
- \* require fewer skilled people to manage,
- \* and protect past investments in equipment and trained people.

Both management systems are important technologies because most network problems begin at the physical layer. These problems include broken cables, loose connections, power outages, "jabbering" workstations and faulty components. Finding, diagnosing, isolating and correcting these problems without losing network productivity is the most difficult and labor-intensive aspect of network management. With SPECTRUM, assigning artificial intelligence to each device, even the non-intelligent cable, gives the network administrator complete control over even the most remote devices.

Both Remote LANVIEW and SPECTRUM can manage standards-based networks such as departmental LANs running Ethernet or Token Ring over low-cost twisted-pair wiring. Both network management platforms can direct campus-wide networks using high-speed FDDI fiber-optic backbones to link numerous

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## REMOTE LANVIEW AND SPECTRUM -- 3/

buildings. They can also manage global-scale corporate networks involving thousands of users running multiple protocols over wide-area networks.

Remote LANVIEW and SPECTRUM support all media types, including coaxial cable, fiber optic, shielded and unshielded twisted pair wiring. They provide an open and multivendor framework that can integrate with a range of upper-layer network management systems such as IBM's Netview, AT&T's Unified Network Management Architecture and DEC's Enterprise Management Architecture.

Remote LANVIEW and SPECTRUM are also built to support the Simple Network Management Protocol (SNMP) and ISO Common Management Information Protocol (CMIP) standards. Cabletron's commitment to international standards protects a company's investment in installed systems, today and in the future. It also makes it easy to integrate with upper-level management solutions such as the SNMP-compliant SunNet Manager from Sun Microsystems.

### Distributed Network Management

Both of Cabletron's platforms are based on the company's Integrated Network Architecture. The INA includes all of Cabletron's standards-based products and services necessary to build and manage a global, distributed platform of interconnected LANs. The INA enables all Cabletron products to work together transparently and be managed easily regardless of which media type or network standard the customer chooses.

Remote LANVIEW was the industry's first solution to enable users to manage all physical layers of a network. Users can monitor and control all hardware from hubs, bridges and PC cards, down to each individual node on the network, from anywhere in the world. *(From this point forward, the remaining portion of CAB 5 will deal exclusively with Remote LANVIEW. SPECTRUM is covered extensively in CAB 6.)* This functionality is achieved through Remote LANVIEW's integrated components. These include Remote LANVIEW/Windows -- a server-based

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## **REMOTE LANVIEW AND SPECTRUM -- 4/**

graphical user interface; intelligent LANVIEW "back-end" modules built into each network device that collect data and carry out control functions; and a central management information database that gathers data from each network device.

By separating the user interface, application and database functions, Remote LANVIEW takes advantage of distributed processing to increase performance when managing the network. Network monitoring and computation are performed on devices close to where the data resides, minimizing communications overhead. By comparison, there are no competitive solutions that integrate all the information and control aspects of Remote LANVIEW/Windows.

### **Integrated Graphical Network Management**

Remote LANVIEW/Windows combines Remote LANVIEW management software with Hewlett-Packard's *OpenView* and Microsoft Windows user interfaces to provide a full-color graphical window into the physical layer of the network. This graphical user interface makes it easier to master network management because it gives users a visual representation of all network devices and how they are performing.

Most competitive management systems require trained management personnel to monitor and interpret lists of data. When a problem is discovered on the network, managers have to try and find the faulty device by reading off a map of the network stored away in some file cabinet.

Both Remote LANVIEW/Windows and SPECTRUM present an on-screen true-to-life topological network map with color-coded icons representing a wide range of devices and their performance status. It is a multi-layered network map that lets users zoom in and out of locations on the network, from cities and buildings to

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## **REMOTE LANVIEW AND SPECTRUM -- 5/**

floors, rooms and individual PCs. The interface not only tells users what the device is and how it's working, but *where* it is so they can take immediate action when needed.

### **Built-In Network Management On Every Device**

Cabletron is the only company to integrate network management intelligence into each network device -- including its line of intelligent PC cards, hubs, bridges, transceivers and repeaters. This approach contrasts sharply with competitive physical-layer management systems, which are typically sold as add-on products. Remote LANVIEW was the first solution to distribute network management intelligence across the entire network.

Intelligent "back-end" control modules on each network device communicate with Remote LANVIEW/Windows management workstations and also report through an upper-level network management system. For example, a network alarm condition would immediately alert a local network manager and then be passed upward to a central management center running Netview.

### **Network Control**

While other physical layer network management packages allow some degree of network monitoring capability, few allow users to actually control the network remotely from a desktop computer anywhere in the world. With Remote LANVIEW, networks can be controlled down to the individual user, and built-in automatic LANVIEW controls isolate problems before they affect network performance.

For example, if a PC malfunctions and starts sending "garbage" data out into the network, a network manager can identify and locate the offending PC and shut off its network port at the local network hub without affecting other users, all

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## **REMOTE LANVIEW AND SPECTRUM -- 6/**

remotely from a network management workstation. With competitive solutions, the network manager would have to locate the offending PC by trial-and-error and physically shut down the entire board inside the hub, shutting down all other users connected to the board as well.

### **Building On The ISO Framework**

Remote LANVIEW addresses all of the network management functions defined by the International Standards Organization (ISO). The ISO framework expands the traditional focus of network management from simple, low-level performance monitoring and fault detection to include the following advanced capabilities:

**Configuration Management** -- A toolset to easily track moves, adds and changes to the network. It includes a dynamic adaptive routing function that allows devices to automatically find alternate routes when any communication link fails, without operator intervention.

**Fault Management** -- Automatic and intelligent fault management tools reduce network downtime and improve serviceability. Remote LANVIEW's threshold alarm feature quickly identifies and isolates network problems before they affect network performance. It also includes facilities for remote diagnosis, integrated testing tools and automatic logging of faults and error rates.

**Performance Management** -- A rich set of statistical tools to help optimize network performance. It includes comprehensive trend analysis to simplify analysis and planning, and easy-to-use graphical tools to enhance data and report presentations.

**Accounting Management** -- Tools to help track network usage and allocate costs. System connect time monitors allow expenses to be allocated based on usage,

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## **REMOTE LANVIEW AND SPECTRUM -- 7/**

making it easier for companies to plan network expansions.

**Security Management** -- Tools to help protect a company's vital information without inhibiting network performance. Node and device authentication allows restricted and controlled access to sensitive information. Remote LANVIEW's bridge and gateway access control provides added security in multi-vendor environments.

### **Leadership In Network Management**

Remote LANVIEW/Windows is the latest in a series of LANVIEW technological innovations that have made Cabletron the leader in physical layer network management. LANVIEW-NCM was the industry's first physical layer network management and control solution. Cabletron was the first company to incorporate built-in diagnostics across its entire product line. It was also the first company to develop Ethernet monitoring and troubleshooting equipment.

To maintain this competitive advantage, Cabletron is actively developing more powerful VLSI devices, system software and network elements to support all network management requirements. Cabletron believes enterprise networks will continue to grow in influence, acceptance and complexity. Comprehensive network management solutions like Remote LANVIEW and SPECTRUM will be the key to keeping pace with the rapid evolution of networking in the 1990s.

# # #

## BACKGROUND

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### **SPECTRUM: Advanced Management System for Multivendor Networks**

CAB 6

Cabletron's SPECTRUM advanced management system represents a new generation in network management. It's unique approach and architecture provide capabilities beyond the reach of previous products and beyond the ambitions of most.

Historically, network management products have been primarily remote device consoles, providing access to the statistics and alarms generated by the intelligent devices on the network and allowing the user to modify variables in the device. They were most often focused on managing a particular vendor's devices and were closed-ended applications.

Later, with the advent of graphical presentation capabilities, vendors began to add a graphical layer on top of the remote console facilities in order to give the user a picture in which the various devices could be recognized and their status understood at a glance.

More recently, emerging standards such as SNMP and CMIP have allowed these systems to embrace more than a single vendor's equipment, providing the possibility of *integrated network management*. A large number of vendors have rallied around this banner and have produced a generation of multivendor device management systems. Some vendors have even opened their own applications which have access to the device information and to process it however they wish.

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## **SPECTRUM -- 2/**

The limitation to these systems, however, is that they are still based on the original network management paradigm, which is remote access to device information. They have at best, an incomplete model of the network topology, and more typically, a user drawn or purely hierarchical representation. Without a structured representation of the network interconnections as a basis, these systems cannot begin to go beyond the current remote monitoring capabilities and therefore cannot address one of the fundamental challenges facing businesses today: *the effective management of mission critical networks.*

The current generation of management systems places a tremendous burden on the network administrator. First, the administrator must be a networking expert in order to understand the implications of a particular attribute in a device changing. Second, he must understand the topology of each section of the network in order to understand what may have caused the change. Third, he must sift through reams of information and false alarms in order to get to the cause of a problem and fourth, he must keep track of endless administrative details in order to effectively utilize the large human and capital resources for which he is given responsibility.

In short, he must be not only an expert in networking technology, but have had a substantial tenure with the particular organization in order to understand the current configuration and procedures, let alone plan for future growth. Couple this with the inherent overflow of management information and irate users when the network experiences problems.

*The need for highly trained network administrators creates several problems for businesses. The first problem is finding experts in networking technology.*

Networking, being a young field, has very few experts, and those that do exist have been absorbed in this quickly growing industry and can command a hefty salary. The technology is complex and diverse and expertise can only come with

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## **SPECTRUM -- 3/**

time. The second problem is time. *The networking industry is burgeoning for one reason: Networks provide a competitive advantage in the sharing and processing of information.* Networks must be deployed quickly in order to compete, which brings us to the third problem: Reliability, which encompasses uptime, security and performance. As businesses learn to use networks, they soon begin to depend on networks. In some cases a network outage can cost a company millions of dollars, all of which rests on the head of the elusive networking expert.

The solution to these problems is not to replace or eliminate these experts. It has become obvious that the network administrator will become increasingly important to the success of the enterprise. Instead, the solution is to lessen the burden of the network experts by eliminating mundane tasks and details thereby allowing the time and energy to focus on the critical tasks of planning, deployment and solving the technical problems. This can be accomplished through a new generation of management system which can systematize the knowledge of the networking expert such that most common problems can be detected, isolated, and repaired either automatically or with the involvement of less skilled personnel. This is the only way to solve these pressing problems and make effective use of that scarce and valuable resource, the networking expert.

In order to achieve these goals, such a system must have certain characteristics:

- *It must have a thorough and precise representation of the network and the various networking technologies involved.*

This requires an entirely new approach to network management software. It is not enough to extend the old paradigm to include the connections between devices. A network is much more than the devices and the wires which connect them. It involves the protocols, the technologies and the applications running on the devices. Without consideration for these aspects of the network, the model is incomplete. A networking expert cannot diagnose a problem without knowing

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## **SPECTRUM -- 4/**

whether the cable happens to be running Ethernet or Token Ring. Nor can he diagnose a problem without understanding the differences between source-routing and spanning-tree bridges. In short, the system must be able to represent a multi-dimensional model of the network.

- *The system must be very flexible and extensible.*

Technologies are very wide-ranging and are changing at a dramatic pace. It must allow for not only the modeling of new devices, but also the modeling of new technologies, media, applications and protocols. It should not only provide certain "canned" models, but must allow the customer to develop his own models. With the advent of new technologies almost on a weekly basis, the network administrator can't afford to depend on any vendor to provide the complete solution. The vendor's priorities will always be different than his own in certain areas. The system must also be extensible and able to be customized in the user interface area so that it can be tailored to the environment.

- *The system must provide a facility for efficiently encapsulating the expert's knowledge into the system in a way that's maintainable, extensible and provides good run-time performance.*
- *The system must allow for the systematization of administrative procedures.*
- *The system must provide an architecture and platform sophisticated enough to handle real-world enterprise networks. That is, it must provide distributed information management, security based on multi-dimensional administrative domains and run on a scalable hardware platform.*

Without these features, the network management system will run out of steam long before the enterprise network is fully deployed, and before the expensive and

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## **SPECTRUM -- 5/**

time-consuming process of switching management architectures will begin again.

## **SPECTRUM Functionality -- Release 1.0**

### **GRAPHICAL NETWORK MAP**

SPECTRUM provides a complete graphical representation of the network from several perspectives.

First, it provides a geographical view of the network with environmental facilities laid-out on hierarchical maps which can take the user from a world view down to a particular room in a building.

Second, SPECTRUM provides a sophisticated topological view of the network, showing the interconnections between networks and devices at progressively finer levels of detail. It is the only product of its kind that can accurately depict a large-scale network from high-level interconnections between LANs down to individual devices and the cables which connect them. These maps can represent networks composed of routers, bridges, repeaters, multiplexers and the end-point equipment which they connect, regardless of the equipment's manufacturer.

### **INDUCTIVE MODELING TECHNOLOGY**

SPECTRUM is built around a real-time modeling engine known as the Virtual Network Machine (VNM). The VNM uses an artificial intelligence technique known as model based reasoning to provide a level of management sophistication unparalleled in the industry. The VNM contains a model of the entire network, not only the devices, but the cables, the LANs and subnets, the rooms and buildings, the applications and protocols, and the ways in which they interrelate.

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## **SPECTRUM - 6/**

In the VNM network model, every entity has the capacity to hold intelligence, whether it is a router or a cable. Each entity has its own type of intelligence; an Ethernet LAN has a different intelligence than a Token Ring LAN; a twisted-pair segment has different intelligence than a coaxial segment. Each entity can use that intelligence and the information it gathers from the network or from other models to derive its own status, consolidate or pre-process information, discover configuration information or formulate recommendations for the user. The intelligence modules, like the rest of SPECTRUM are fully programmable and extensible.

Through this modeling, even abstract entities such as LANs and subnets can be queried as to their status, their utilization, etc. This allows the SPECTRUM user interface to present to the user a much more coherent view of the network and one which is much closer to the way he views the network in his own mind. The VNM intelligence is used today to provide advanced features such as:

- Automatic isolation of hard failures.
- Automatic isolation of soft error sources.
- Automatic topology discovery.
- Intelligent alarm filtering.

The uses of this capacity in the future are limited only by the imagination.

## **MULTIVENDOR MANAGEMENT**

SPECTRUM provides a totally open environment for managing networked equipment and applications, independent of protocol, manufacturer or nature of the device. This means that the network administrator can achieve truly integrated network management without being locked into any single-vendor hardware solution. This gives the flexibility to choose the best components available for the particular application while still maintaining the cost-savings and advantages that only an integrated management solution can provide:

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## **SPECTRUM -- 7/**

- Rapid and effective fault isolation (reduced network down-time ).
- Reduced training for network administrators (lower personnel costs, shorter learning-curves, more effective personnel).
- No duplication of management hardware (reduced capital expenses, uncluttered work spaces ).
- Simplified administration (eliminates redundant information, more accurate information, more efficient use of resources, improved level of service ).

## **EXTENSIBILITY**

At the heart of SPECTRUM's multivendor support is a unique architecture so flexible that it can be extended in almost any direction:

- New protocols.
- New Devices.
- New Graphics.
- New Perspectives.
- New Applications.
- New Technologies.
- New functionality for any of the existing items above.

This feature enables SPECTRUM users to benefit from current technology without the concern of being locked into a narrow definition of network management.

## **POWERFUL FUNCTIONALITY**

SPECTRUM provides a comprehensive network management environment. With SPECTRUM, the network administrator can begin managing the

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## **SPECTRUM -- 8/**

network on day one with a feature-rich management facility and then extend it incrementally from there, at the user's own pace.

SPECTRUM's core facilities include:

- Full Graphical Mapping.
- Extensible Event-Logging Facility.
- Alarm Management Facility.
- Alarm-Rollups through configurable intelligent filters.
- Automatic fault isolation (suppresses the symptoms and identifies the causes of problems).
- Automatic mapping of router interconnections.
- Automatic mapping of bridge and hub configurations ( for selected vendors).
- Statistics logging and analysis.
- Consolidation of statistics from multiple LANs.
- Full SNMP support ( including enterprise extensions ).

With these capabilities as the starting point, the system can be extended at several levels: basic enhancements, such as vendor-specific SNMP MIB extensions can be done in a matter of minutes using a powerful end-user customization facility; SPECTRUM's Software Developer's Kit allows the system to be extended in almost any direction. This openness and extensibility virtually guarantees that SPECTRUM will be able to grow along with the organization and will not be obsoleted as networking devices and technologies change.

## **THE TECHNOLOGY**

SPECTRUM is based on the latest available technologies including:

- UNIX
- X.Windows

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## **SPECTRUM -- 9/**

- OSF Motif
- Object-Oriented Design
- Object-Oriented Database
- C++ Programming Language ( 100% )
- Client-Server Computing Model
- Artificial Intelligence

**# # #**

(Snow/Simon)  
CABLETRON  
DRAFT ONE  
JANUARY 12, 1992

PRESIDENTIAL REMARKS: CABLETRON SYSTEMS, INC.  
ROCHESTER, NEW HAMPSHIRE  
WEDNESDAY, JANUARY 15, 1992  
?? time

[Introductory acknowledgments]

[jokes]

First, thanks for the tour of this terrific plant. I know that New Hampshire has had its share of hard times in the last year, but you've certainly flourished.

You've also done it the old fashioned way: You had an idea. You took huge risks. You worked hard. You believed in your product. And you succeeded.

The American economy depends on smaller companies like Cabletron -- smaller companies that keep getting larger by offering a good product at a good price. In eight years, you've gone from a gleam in the eyes of Bob Levine and Craig Benson to one of the fastest-growing firms in America. You sales have jumped from \$100,000 in your first year -- to an estimated \$275 million this year. You don't have any debt -- and you've built an impressive cash reserve. No wonder Cabletron has become a regular feature on the pages of the business magazines: Forbes, Inc., Business Week, Money. I guess you can think of yourselves as capitalist centerfolds. \\

Here's something else I find impressive: Everyone who works for Cabletron owns stock. In an age when stockholders of other

May 1989

companies complain about lacking access to the leaders -- you work side by side. That's great. It also gives you even greater incentive to be the best.

As you know, I just came back from a long trip to Asia -- one of the most successful trips of my Presidency. I visited Australia, Singapore, Korea and Japan, to open markets for American businesses and promote the cause of free and fair trade.

We signed 39 different marketing opening agreements -- I talked with Bob and Craig about some of them earlier -- and I know that <sup>aggressive</sup> ~~good, fit~~ American companies will use of those openings to build even greater markets for themselves.

You know, we live in an entirely different world than the one that existed just three years ago, when I took the oath of office. The Cold War has drawn to a close, and we've entered an Age of Competition -- an era in which nations will define their strength in terms of their ideas and economic strength.

The Granite State has dived into that new world. New Hampshire's jobless rate would be twice what it is today if you didn't have a vigorous export business. Cabletron's a perfect example. This company was born in a garage nine years ago. Today, you serve 25,000 customers around the globe, maintain offices in England, Germany, France, Spain, Sweden and Australia. And you understand that protectionism really is nothing more than defeatism and cowardice -- a fear that America can't compete in the new market-oriented world.

Most people who embrace protectionism also put a bear hug around the past. They want the good old days back more than they want to accept the challenges of the days that lie ahead. Well, folks, the world's moving ahead. Some people may reminisce about the past. I will lead us into the future we made possible. \\  
 \

You've heard me say before that the economy is my top priority. But that's not news. It always has been. I came to New Hampshire four years ago, and promised to do all I could to keep an economic boom going. You may even remember a famous line from my acceptance speech: Read my lips. No new taxes.

When I took office, I tried to go that promise one better. I tried to cut taxes, reduce regulations and put in place some measures to hold the line on spending. But every time I tried, Democratic leaders in Congress said no.

Then we ran into a unique situation. I asked Congress in 1990 to help cut the national debt -- which was too high then, and is too high now. ~~We sent negotiators out to Andrews Air Force Base, and my team~~ <sup>negotiators</sup> tried over and over to hold the line -- to get sensible spending cuts with no new taxes.

In the midst of these talks, Saddam invaded Kuwait. Congressional bargainers threatened to use Gramm-Rudman spending caps to slash our defense budget ~~at~~ <sup>as</sup> just ~~the time~~ <sup>^</sup> we were sending brave men and women to the gulf. They said: "Read our votes. New taxes -- or no new defense spending."

I had to make a tough decision. I could pull our troops back -- break our vow to liberate Kuwait and humiliate the United

States before the entire world -- or get the best budget agreement I could. Some of my opponents opposed going to Kuwait -- it was my job to make the tough call. I made the right one. Today, Kuwait is free, and the only ones who live in fear of Saddam are his food tasters.

By the same token, anyone who knows me knows that I'm the last guy who wants to raise taxes. No Republican President likes taxes. Ronald Reagan certainly didn't.

I'm also the last guy to sit still while our economy struggles to regain its form.

In a little less than two weeks, I'll deliver my State of the Union Address and I'll lay out my proposal to get America up to speed. Of course, you in New Hampshire get to hear lots of economic proposals from people who want to become President. But you also have to decide which plans are election-year fluff -- and which will produce jobs and prosperity for Americans.

Let me propose a three-point test of credibility <sup>measure</sup> -- and <sup>a little quality control</sup> challenge you to ~~submit~~ my plan ~~to it~~ and my opponents' plans ~~to~~ <sup>against</sup> it.

Point One: Does the plan work? Bottom line: Will it create jobs and get the economy up to full speed?

This point seems obvious, but some people seem to believe that you build an economy up by knocking a President down -- or by passing a law with the word, "jobs" in the title. <sup>If it were that easy,</sup>

You're in the jobs business. You know that an sound program <sup>no one would</sup> must start with sound policies at home -- low taxes, regulations, <sup>ever be unemployed</sup>

and no counterproductive lawsuits. It must eliminate trade barriers abroad. And it must build a foundation for future prosperity -- good roads, neighborhoods liberated from the fear of crime and drugs; and an ~~education system~~ <sup>schools</sup> that gives our children educations for the 21st Century, and helps retrain workers to compete in our fast-paced international marketplace. I've been trying to do these things from Day One. Look it up.

Second: Does the plan help you keep your house in order? A sound plan should preserve the value of your hard-won assets -- especially your home. It also should enable you to choose affordable housing, good educations for your children, and decent health care for your family.

Third: Does the plan get Washington's house in order? We need to put a lid on government spending. We've got to get rid of programs that don't work or that duplicate others. Taxpayers deserve to get their money's worth for the \$1.4 trillion they pay out in taxes. We can't afford normal election-year hype. We've got real challenges ahead -- and we need leaders who can meet them.

I've really enjoyed seeing your great company, and I can tell you -- we're going to do whatever it takes to keep America the greatest economic, political, military and moral power on earth. Thank you. May God bless you and the United States of America.

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