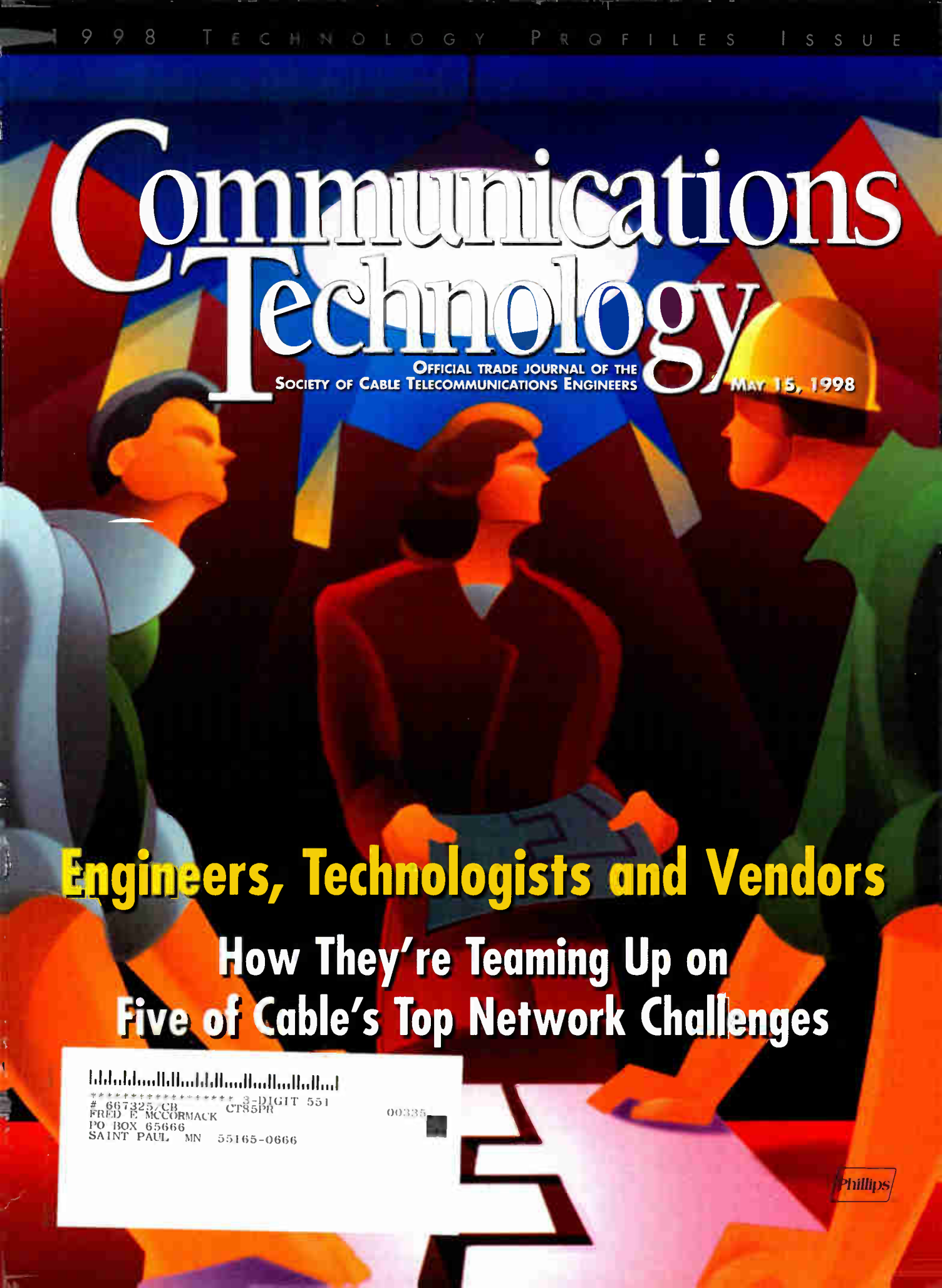
1998 TECHNOLOGY PROFILES ISSUE

Communications Technology

OFFICIAL TRADE JOURNAL OF THE SOCIETY OF CABLE TELECOMMUNICATIONS ENGINEERS

MAY 15, 1998



Engineers, Technologists and Vendors

How They're Teaming Up on Five of Cable's Top Network Challenges

Communications Technology

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How Engineers and Vendors Are Fending Off the "Good Ol' Days" Blues

It's late. You're exhausted. Everyone else went home hours ago, but you're still squinting bleary-eyed at design scenarios, system maps and all those troublesome rebuild budget numbers. Short on sleep and long on lukewarm office coffee, you allow yourself a little indulgent excursion into the Wonderful World of Cable Engineering Nostalgia ... Ah, the good ol' days of cable TV.

Remember when the headend was just a smattering of racks with satellite receivers, signal processors, modulators and scramblers? Oh, for the days when you just had to worry about 30 or 40 channels of analog video!

And as for "hitting 9s" and reliable two-way communications over your network, well, that was something best left for the future. High-speed data and telephony services? Sure, you could do it, but perhaps it was a bit too Blue Sky for the moment. You weren't in any sort of a race, anyhow. Your system was just great for one-way entertainment-based services, and to be perfectly frank, there wasn't too much truly worrisome competition out there vying for your subscriber base.

YES, THOSE WERE THE DAYS

But, hey, wait a minute, wasn't that not so many years ago? And come to think of it, didn't you spend a huge chunk of your time tweaking the system because equipment stability was not so good? Remember those late nights, short on sleep and long on lukewarm office coffee when you were dealing with the likes of power supply failure, overheating, and less-than-reliable fitting contacts? Add to that the fact that equipment often was quite bulky with awkward test points, and the good ol' days are coming back into not-so-agreeable focus.

Now that you think about it, it really wasn't so pleasant either when you had to rely mainly on your subscribers as status monitors instead of depending on a solid network management system. Those customers certainly got more than a tinge irritable when they experienced extended system downtime, and were none too happy while your technical crew went out to find the problem—which you didn't know anything about until the subs started calling.

THE CHANGE

We all know that our industry has been transformed by deregulation and competition. The cable engineer is making the change to cable telecommunications engineer, providing data, telephony and video services across their broadband networks. And because customers have a bevy of service providers to choose from—mainly in the form of telcos and direct broadcast satellite companies—you've got to work harder to keep your old and new subscribers' business.

YOU'RE NOT ALONE OUT THERE

Even though you may feel a bit solitary on those late nights in the office pouring over hybrid fiber/coax (HFC) upgrade models, you know you're really not. The cable telecommunications vendor community is out there too, working late to bring you the most advanced technologies our industry has ever seen. And if you think about all the technological standardization efforts that are going on right now, you realize that vendors are working fairly closely with each other as well.

These things are what our *Technology Profiles* issue is all about this year. Cooperation between system engineers and their vendors has reached a new level.

FIVE ISSUES

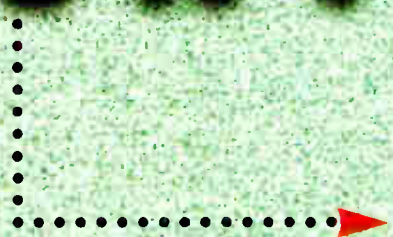
While you most certainly have more than five challenges in your network right now, we've broken off that many (in different areas of the network) to illustrate how cable engineers, technologists and vendors are coming together to find the most reliable solutions.

- How have headend equipment manufacturers responded to system engineers' space constraints?
- What's been done to improve cable and test equipment, and what role did technologists in the field play in making it better?
- Outside plant transmission equipment is certainly hardworking and solid, but what's being done to avoid outages caused by power surges or environmental stress?
- What about ingress at the customer premise? Can anything really be done?
- And finally, we asked the question, "What's in that NOC?" Straight from the vice president of engineering at Time Warner San Diego comes a detailed outline of all the equipment that went into the making of a network operations center.

So enjoy the next 70-odd pages highlighting our industry's spirit of cooperation. And next time you're longing for the good ol' days of cable, think about all your fellow engineers and vendor partners out there working toward the same goal you have—to make broadband *the* next-generation communications force to be reckoned with.

Laura K. Hamilton
Senior Editor

HEADEND EQUIPMENT



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25	51	77	103	129	155	181	207	233	259	285	311
26	52	78	104	130	156	182	206	234	260	286	312

A. Are you a member of the SCTE (Society of Cable Telecommunications Engineers)?

01. ___ yes
02. ___ no

B. Please check the category that best describes your firm's primary business (check only 1):

Cable TV Systems Operations

03. ___ Independent Cable TV Syst.
04. ___ MSO (two or more Cable TV Systems)
05. ___ Cable TV Contractor
06. ___ Cable TV Program Network
07. ___ SMATV or DBS Operator
08. ___ MMDS, STV or LPTV Operator
09. ___ Microwave
10. ___ Telecommunications Carrier
11. ___ Electric Utility
12. ___ Satellite Manufacturer
13. ___ Satellite Distributor/Dealer
14. ___ Fiber Optic Manufacturer
15. ___ Data Network
16. ___ Commercial TV Broadcaster
17. ___ Cable TV Component Manufacturer
18. ___ Cable TV Investor
19. ___ Financial Institution, Broker, Consultant
20. ___ Law Firms or Gov't Agencies
21. ___ Program Producer or Distributor & Syndicators
22. ___ Advertising Agencies
23. ___ Educational TV Stations, Schools and Libraries
24. ___ Other (please specify)_____

C. Please check the category that best describes your job title:

Technical/Engineering

25. ___ Vice President
26. ___ Director
27. ___ Manager
28. ___ Engineer
29. ___ Technician
30. ___ Installer
31. ___ Corporate Management (Chairman,Owners, Presidents, Partners, Executive/Senior Vice Presidents and Treasurers)
32. ___ Management (Vice Presidents, General Managers, Systems Managers & Directors)
33. ___ Programming (Vice Presidents & Directors and Managers & Producers)
34. ___ Sales (Vice Presidents, Directors & Managers and Sales Representatives)
35. ___ Marketing (Vice Presidents, Directors & Managers and Sales Representatives)
36. ___ Other (Company Copies & Other Titles & Non-Titled Personnel, please specify)_____

D. In the next 12 months, what cable equipment do you plan to buy?

37. ___ Amplifiers
38. ___ Antennas
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40. ___ Cable Tools
41. ___ CAD Software, Mapping
42. ___ Commercial Insertion/Character Generator
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56. ___ Telephone/PCS Equipment
57. ___ Power Suppls. (Batteries, etc.)
58. ___ Video Servers

E. What is your annual cable equipment expenditure?

59. ___ up to $50,000
60. ___ $50,001 to $100,000
61. ___ $100,001 to $250,000+

F. In the next 12 months, what fiber-optic equipment do you plan to buy?

62. ___ Fiber-Optic Amplifiers
63. ___ Fiber-Optic Connectors
64. ___ Fiber-Optic Couplers/Splitters
65. ___ Fiber-Optic Splicers
66. ___ Fiber-Optic Transmitter/Receiver
67. ___ Fiber-Optic Patchcords/Pigtails
68. ___ Fiber-Optic Components
69. ___ Fiber-Optic Cable
70. ___ Fiber-Optic Closures & Cabinets

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79. ___ Signal Level Meters
80. ___ Spectrum Analyzers
81. ___ Status Monitoring
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97. ___ up to10 miles
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The Headend's Come a Long Way

How Manufacturers Are Responding to Engineers' Needs

By George Walter

As we approach the 21st century, we have seen a lot of changes in what used to be the "typical" headend. Competitive forces, consumer demand, new technology and new revenue opportunities have all had an impact on what has to reside in a very limited space.

These changes have resulted in a whole new set of challenges for the CATV system engineer.

Those people and companies looking to be noticed can really capitalize during this paradigm shift. Changes in government regulation and new technologies like direct broadcast satellite (DBS) have dramatically changed the way the typical MSO operates.

As MSOs started to demand more from suppliers, technology allowed manufacturers to develop some new and exciting products for the headend. To really appreciate how much the headend has changed, let's first take a look at its evolution including the latest in management and maintenance, and then what may be in store for the headend of the future.

WHAT IT WAS

In the not too distant past, the headend consisted of a handful of racks with satellite receivers, signal processors, modulators and scramblers to produce about 30 to 40 channels of analog video. Local ad insertion was done via a few 3/4-inch tape players, and character generators were used for local messaging.

Stability of the equipment was not the greatest, so the system engineer spent quite a bit of time tweaking the system. The system would experience routine type failures in the form of bad connectors, poor fitting contacts, poor power supplies and overheating. This of course kept the engineering staff quite busy, but the subscriber constantly frustrated.

The equipment in these racks was usually quite bulky, with awkward test points, cooling fans and multiple pots for tweaking. However, many engineers now look back at this time and refer to it as "when life was good."

Then things started to change. Deregulation transformed many cable operators into "broadband service providers." The Baby Bells started talking about offering video services and many cable operators began looking at offering telephony and data services.

Meanwhile, subscribers were asking for more movie channels, more pay channels, more sports channels, more educational channels, and more children's channels—more of everything! To make all of this work would take some creative design and a lot of investment.

GOOD AND BAD NEWS

To cost-justify the investment, MSOs had to look at combining several headends with digital fiber rings, as well as expenditures in the hybrid fiber/coax (HFC) network.

The good news was that once the plant was rebuilt, many new revenue streams could be initiated.

The bad news was that this meant even more gear in the headend. The five or six racks turned into a minimum of 20 racks, and things were just beginning. Headends now had to house banks of servers for ad insertion and data services. Video channels offered was a minimum of 80 and many times over 100. With the advent of acceptable return paths, we start to see cable modem hardware in the headend as well.

The problems were clear. The headend had to be bigger. With so many more subscribers depending on a single system, and more services coming from that system, there was no room for poor reliability or heavy maintenance.

SPACE AND HEAT

The obvious issue to be addressed first was space. There had to be a way to fit more gear in less space.

Headend manufacturers took a page out of the telecom book and started to look at high-density vertical packaging. Since modulators are needed for each video channel offered, they were changed first. One manufacturer is able to get as many as eight modulators in a five-rack unit high chassis. This almost doubled the amount of equipment for a given space.

In addition, manufacturers are starting to integrate stereo encoders in the modulators further reducing overall space requirements. Vertical mounting with "plug-and-play" modules also makes it easier for system engineers to swap out modulators for routine maintenance. Since the system uses a standard chassis, modulator modules could be mixed with stereo encoders, scramblers or channel processors to make the overall system more flexible.

Other manufacturers were able to dramatically reduce the amount of heat generated by their headend products to allow for higher density mounting. By using microprocessors to replace heavy analog circuitry, modulators are able to produce higher quality output, and reduce heat by as much as 50%.

Many of the older style products required as much as 80 watts of power per channel, whereas new styles are as low as 40 watts! Since heat was always a major problem, this is a welcomed development that contributes to reducing size as well as increasing reliability.

MAINTENANCE

Now that you have all of this equipment in your headend, you have to worry about maintenance and performance. Since many of the newest headends now feed digital supertrunking systems (which then feed HFC networks), the overall distances and number of subscribers has dramatically increased. Systems that once fed 30,000-40,000 subs, are now part of a larger system, which feeds several hundred thousand subs. This means that the output from the headends must be

stable and of higher quality.

New systems are outputting 80 channels with carrier-to-noise (C/N) levels above 60 dB and spurs and harmonics 65 dB down! This helps the system engineer get even further out in the plant with fewer amplifiers. One side benefit is a better return path because of fewer actives.

Output stability also is an issue. Most modulators now have video automatic gain control (AGC) as standard, and a few manufacturers have developed auto leveling circuits to produce stable RF levels at the output of the combiners (or even predetermined tilt). Phase noise, differential phase, and differential gain also have been improved with the newer designs.

As operators gear up to offer increased broadband services, they must make sure that not only is the spectrum allocated for video performing optimally, it must not contribute noise to other parts of the spectrum. These performance issues are critical in meeting the demands of the newer systems as well as reducing the maintenance time needed by the system engineer to keep the system running in top form.

NETWORK MANAGEMENT

The next step in this "evolutionary" process is considered by many as a revolutionary. Of course what we are referring to is automation and high-level system management. As manufacturers started to integrate microprocessors into the design of their newest products, it was only natural to have remote control of these products via a computer interface.

For most products, remote control started out as simple control via an RS-232 connection. The newest products could execute simple internal testing based on parameters, which were either factory set or programmable by the system engineer.

If the product (or element) was operating outside of these preset parameters, alarms could be sent back to the controlling computer via the same RS-232 connection. At this point, the pieces were in place to utilize the same type of element management systems used in local and wide area networks (LANs and WANs) for CATV systems.

Several manufacturers started offering "hooks" into their systems where their own proprietary software packages could send control information and receive alarm information. These products were then combined with sophisticated "management" software, quite often in a client/server environment, to make offerings we see today.

As was the case with computer network management systems and telephone network management systems, once the foundation is built, it is endless how far the system can develop. This automated approach dramatically effects how a headend is managed.

Now instead of having routine scheduled maintenance, the system will constantly monitor the appropriate elements and either adjust as necessary, or notify the system engineer that intervention is required. In addition, it moves system "tweaking" from a screwdriver at the front or back of a rack, to a keyboard and monitor at a control panel (or from a laptop at the engineer's home). With the density and complexity of headend equipment and the use of network management to monitor and maintain it, there's been a big change in the system engineer's job description.

DO YOU NEED IT?

A common question asked by system operators just becoming familiar with software management is: "Why do I need it?" The answer becomes obvious only when a majority of the products in the headend are managed by the system and the entire system becomes fully operational.

As mentioned before, the biggest advantage is in measurements and maintenance. A good system manager will not only tell you when something is bad or going bad, but also produce documentation as to just how well the system is running. The system can be programmed to produce weekly reports showing overall headend performance as well as details in performance of any given channel.

Since system engineers now have a lot of additional equipment they must be responsible for, their time becomes more and more valuable. If they can rely on a management package to do some of the routine maintenance, and to pinpoint the cause of a failure if one does occur, they can save many hours of unproductive time.

Test and measurement gear used for Federal Communications Commission proof-of-performance (POP) testing can be integrated into the system manager. Once this gear is configured and operational, regular POP can be done with accompanying documentation with very limited involvement of the system engineer.

Things such as auto leveling of the RF output typically took a system engineer a couple of hours a week, and now it can be done automatically. The second benefit of a system manager is the automatic backup. In the event that any element in a system should fail, the system should have at least one (and sometimes two or three) means of determining exactly where the failure occurred. The manager can now configure the backup unit to replicate the failed unit, and then activate it in the system. This typically reduces downtime from 45 minutes or more to two minutes or less.

Bob Sullivan

The plethora of channels offered over today's networks is only one factor that has changed the "typical" headend. Competitive forces, consumer demand, new technology and new revenue opportunities all have impacted the amount of equipment that has to reside in limited headend space.

Headend managers today can automatically backup satellite dishes (steerable), low-noise block converters (LNBs), satellite receivers, modulators, demodulators and scramblers. The list of elements that can be managed and backed up grows every day. As more and more headend elements become part of a system management package, the system

engineer spends less time fire fighting and more time adding services.

ARE MANUFACTURERS DOING ENOUGH?

With the changes that have already occurred in the headend, and system engineers facing a whole new set of challenges, are manufacturers doing enough? The two biggest concerns for operators when discussing new equipment and management systems are training and standardization.

With the addition of new technologies, as well as new gear, headend engineers are in constant need of training. The Society of Cable Telecommunications Engineers has made major steps in developing training programs, but for the newest gear on the market, the manufacturers' must play a larger role.

System engineers need to know how to get optimal performance out of their new equipment and also need to understand how the equipment works with other manufacturers equipment. The same goes for testing procedures. During initial setup and turn on, the system engineer must be the "master" of all of the new equipment in the headend, and since much of it is now computer-controlled, there are many new ways of doing initial configuration and alignments.

Many engineers have requested better documentation and easier access to manufacturers phone support. The "SCTE-List" forum on the Internet is proof of this. Routinely, engineers are asking for information on how to get optimum performance or how to get equipment from two different manufacturers to work together.

The second big concern for system operators lies in network management. As mentioned before, most system managers for the headend are still proprietary and really only work well with one manufacturer's equipment. As most engineers know, the typical system will have several different types of equipment from many manufacturers.

Since the real advantages of a headend manager can only be felt if most of the headend is being managed, hooks for all the equipment are important. Some manufacturers have begun to offer drivers for others' equipment, or offer "interfaces" in the form of contact closures, but this is only a limited solution.

What MSOs need is a standard operating system or protocol that all equipment drivers will be written to. This will make setting up new equipment or changing equipment easier and dependable. In the future you can expect to see standard interfaces that fit into one of several high-end system managers for complex (but very efficient) high-level headend control and management.

The cable headend has come a long way in the past 25 years and it is still evolving. We have seen small buildings no larger than a garage with a dish farm in back change into large 50,000 square foot buildings that could withstand almost any natural disaster imaginable. We have seen the days of constant intervention by the system engineer with a tweaker turn into nights by the computer monitoring a system 100 miles away.

What will come next? Competition and technology are sure to drive the future, and those manufacturers who respond quickly to the operators' needs will be the most successful. ■

REFERENCES

1) Bob Doody, executive vice president of Audio Video Corp., a systems integrator working on headends for 21st Century Cable, Comcast, Jones and Charter.

2) David Lang, headend system specialist of Scientific-Atlanta.

3) Nick Fielibert of Barco, a Belgian manufacturer of high tech electronics (including cable headends).

The author would like to thank the following people for providing background information: Tom Gorman of Jones; Andy Paff, consultant, previously with ANTEC; John Scibberras of ANTEC/ESP; Tom Hall, senior manager new business models for Nortel; Robert Lown, technical manager, Cox San Diego; Jim Haag, principal cable architect of Jones Intercable; Wes Simpson, director of marketing for ADC; Chris Bourick, group vice president, Jones Intercable; John Lidsinger, director of engineering, Comcast; and Steve Taber, technical manager, TCI Northwest.

George Walter is has an electrical engineering degree from Syracuse University and over 10 years of experience in sales and marketing management of visualization and cable products. He may be reached at gwwalte@ibm.net.

BOTTOM LINE

THE OLD HEADEND ISN'T WHAT IT USED TO BE

In the not too distant past, the headend consisted of a handful of racks with satellite receivers, signal processors, modulators and scramblers to produce about 30 to 40 channels of analog video. Local ad insertion was done via a few 3/4-inch tape players, and character generators were used for local messaging.

Stability of the equipment was not the greatest, so the system engineer spent quite a bit of time tweaking the system. Equipment was usually quite bulky with awkward test points.

Then things started to change. Deregulation transformed many cable operators into telecommunications providers. To make all of this work would take some creative design and a lot of investment.

Headend equipment manufacturers responded to the changing needs of today's system engineers. Equipment integration, dramatically reduced heat generation, and network management systems are only just a handful of the improvements made by vendors responding to new headend demands.

PDI, A Company Dedicated To Quality, Value and Service

PDI manufactures and distributes products for cable TV, wireless, private cable, multichannel multipoint distribution service (MMDS), multiple dwelling units (MDU's), direct broadcast satellite (DBS), local area networks (LANs) and Telco applications. PDI's products are marketed under the "Supreme Series" trademark. PDI offers a complete line of headend equipment as well as custom filters, custom tier traps, taps, line passives, private labeled splitters and specialty passives. Products from over 40 prominent manufacturers fill our 35,000 square-foot warehouse and engineering facility. PDI's surplus division buys and sells converters, trunk amps, test equipment, taps, line passives and much more.

PDI-60CMS

The PDI-60CMS is a high-performance, SAW filtered stereo modulator designed especially for adjacent channel headend systems. The double SAW filters ensure excellent vestigial sideband response. Spurious rejection is greater than 60 dB. The built in automatic modulation control provides 87.5% modulation for a wide video input range. IF loops are provided to work with scrambling encoders. 5-year warranty

PDI-60AP

The PDI-60AP is a professional quality, user friendly, high performance TV signal processor designed primarily for cable TV headend operation. Rock-solid PLL controlled tuning by advanced microprocessor ensures precise UHF/VHF or cable TV (STD/HRC) channel access. Careful design of the input achieves a wide dynamic range and very low noise figure. Input tuning

PDI-60CMS 550MHz 60dBmV agile stereo modulator with built-in BTSC/MTS stereo generator

PDI-60AP agile in, agile out heterodyne processor

PDI-SE-2 BTSC/MTS stereo generator

covers the range of 54 to 806 MHz and is controlled by another PLL circuit with 12.5 or 25 kHz offsets. Both the input and output channels have non-volatile memories that restore the channels automatically in the event of a power failure. SAW filtering guarantees broadcast picture quality. A standby carrier oscillator provides a video level for system pilot AGC control if the input drops below a useable level. 5-year warranty

PDI-SE-2

The PDI-SE-2 stereo generators, utilizing new technology, offer the cable TV system operator a low-cost, user-friendly way to upgrade existing channels for BTSC stereo. They will work with most cable TV video modulators. Incorporated in the units is dbx (r) licensed companding giving the subscriber rich stereo sound. Balancing of stereo signals from any local source is easily accomplished utilizing front panel controls and deviation meters. The PDI-SE-2 requires only 1 3/4" of rack space to hold either one or two generators. 2-year warranty

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PDI is prepared for the 21st century. Our products are designed to meet your present-day requirements, while compatible as equipment for tomorrow's full-service network requirements. Our value sets the industry standard.

PDI offers a complete line of analog state-of-the-art headend equipment: modulators, stereo modulators, demodulators, processors, encoders, satellite receivers, stereo generators and passive headend combiners. PDI will respond to your headend requirements with the total dedication of our entire engineering and quality control staff.

Call us to discuss your next requirements. Find out why cable operators nationwide agree that PDI headend equipment offers serious performance at an unbeatable value. ■

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Reader Service Number 150

THE CHALLENGE

Design a headend for high signal quality that also minimizes out-of-service conditions and lowers corrective maintenance costs.

THE SOLUTION

PULSAR Modulators from Barco

High signal quality, automatic back-up and remote monitoring in one intelligent modulator

PULSAR modulators provide complete software control, allowing you to monitor and manipulate all modulator functions from a central location. In the event that lost or degraded signal is detected, you can remotely route the signal to a back-up modulator without the expense or delay of dispatching a technician to the headend.

Even better, your subscribers won't experience an extended loss of service.

- Available in fixed frequency or tuneable versions to provide maximum flexibility
- Phase Locked Loop techniques assure long term signal stability
- An intelligent "white limiter" and video AGC prevent overmodulation and automatically optimize the modulation depth for various nonstandard video input signal levels
- Available with BTSC encoder
- Full remote control with ROSA software

Find Out More!
PULSAR is just one of the many BARCO headend solutions that make broadband CATV networks more flexible, efficient and reliable.

And, like all BARCO headend equipment, PULSAR can be remotely monitored and controlled by ROSA, BARCO's CATV network management software. For additional information, visit our Web site at www.barco-usa.com or call 770/218-3200.

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BARCO Headends Provide High-Performance Solutions for Today's Networks

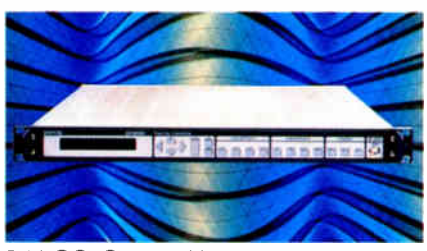
BARCO Group, headquartered in Kortrijk, Belgium, operates four major lines of business: Visualization, Automation, Communication Systems and Graphics. With five U.S. subsidiaries and North American headquarters in Kennesaw, GA, BARCO Communication Systems has over 30 years' experience in providing high quality, high performance broadband communication systems worldwide. In addition to its analog and digital headend products, its complete headend and network management systems, and its broadcast display products, the company offers digital compression and transmission products to the cable TV, broadcast and telecom industries.

KEY PRODUCTS

PULSAR Modulator

BARCO's PULSAR is a unique microprocessor-controlled modulator for cable TV headend applications where high output RF signal quality, remote monitoring, and automatic provisioning/alignment are desired. PULSAR modulators feature complete software control capability via an RS-485 interface, providing remote monitoring and control of all modulator functions. In the event that lost or degraded signal is detected, software control enables alternative signal routing and remote configuration for back-up modulators to quickly restore programming without the expense or delay of dispatching a technician to the headend.

Intelligent microprocessor-controlled modulator provides full software control, auto set-up and alignment.



BARCO Gemini Upconverter saves money and space in hub site headends.

BARCO QUASAR DVB Compliant QAM TV Modulator

Gemini Upconverter

BARCO's Gemini Upconverter is an alternative to conventional modulators, offering savings in both cost and space for hub site headends. Only one rack unit high by a half rack wide, Gemini accepts digital or analog IF inputs (such as from a fiber ring) and upconverts the signal for distribution to subscribers. Two units may be mounted in a single, one-rack unit space. The Gemini is available in either fixed channel or agile versions.

QUASAR DVB Compliant QAM TV Modulator

BARCO's Quasar, a digital video broadcast (DVB) compliant quadrature amplitude modulation (QAM) modulator for transmission of digital signals is characterized by its extremely high flexibility, n-QAM capability, combined with a selection of different bit rates and channel bandwidths make Quasar ideally suited for virtually every cable TV or microwave multipoint distribution service (MMDS) system. Quasar can take digital signals directly off the satellite and modulate them for distribution to the subscriber. It eliminates additional signal conversion equipment and has the benefit of complete remote monitoring and control via the ROSA system. The QAM capability of the Quasar digital modulator is selectable between 16, 32, 64 or 256. The Quasar can handle different bit rates and operates in 6, 7 or 8 MHz bandwidth environments. BARCO's QAM modulator is available in either a fixed channel or an agile version with RF output up to 860 MHz. ■

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Web address: HYPERLINK http://www.barco.com www.barco.com
Chief Sales Contact: David Wright

CT's Technology Profiles

General Instrument: Poised for Growth in 1998

General Instrument Name Returns

On February 2, 1998, General Instrument changed its name back from NextLevel Systems Inc. to General Instrument Corp. and moved its headquarters from Chicago, IL, to Horsham, PA. In addition to being the corporate headquarters for General Instrument, Horsham is the location of three of its principle strategic business units: Digital Network Systems, Advanced Network Systems and Transmission Network Systems. The company's Satellite Data Network unit will continue to be based in San Diego. The General Instrument name was chosen for its strong brand equity in the company's cable and satellite TV business.

Systems and components for high-performance broadband networks

General Instrument designs and manufactures end-to-end broadband telecommunications systems, including digital and analog programming encryption/decryption systems and end-to-end addressable transmission systems like consumer set-top terminals and descramblers.

The product lines include MPEG-2 (Moving Pictures Experts Group) digital compression technology, amplifiers, Cableoptics (optoelectronics), conventional distribution electronics, a full line of headend equipment for digital and analog applications, and a complete end-to-end network monitoring solution—all backed by industry-leading customer support services.

Cable modems

The fastest available on the market, with raw speeds of up to 27 Mbps-downstream, connect the computer to the Internet using the cable TV infrastructure. MPEG-2 digital satellite systems featuring DigiCipher II encryption and access control technology are available, offering secure satellite delivery of entertainment, business and educational services.

North America's leading operators choose GI

In late 1996, GI unveiled the industry's first mass-deployed digital cable set-top terminal, which is based on open standards and delivers a new set of enhanced programming services. Since then, GI has been the only company in the world mass-deploying two-way, interactive digital cable TV systems and set-top terminals. To date, more than 700,000 digital set-top terminals have been shipped, and over 500 digital headend systems have been installed, reaching more than 25 million North American homes.

Since announced in December 1997, General Instrument has completed definitive agreements with 12 of the leading North American cable TV operators under which it is obligated to supply 15 million of its advanced digital terminals over the next 3 to 5 years at an estimated value of $4.5 billion. GI also announced plans to acquire from TCI the authorization functions of TCI's Headend In The Sky (HITS) organization, providing an access control service to support the mass deployment of digital cable TV systems throughout North America.

In February, PRIMESTAR awarded GI a $180 million contract to supply high-power digital receivers for its direct broadcast satellite (DBS) service to consumers.

Complementing its world leadership in digital cable TV systems, GI is also the world market share leader in the advanced analog category, having shipped 3.2 million CFT advanced analog cable TV terminals in 1997.

Developing tomorrow's technology

In December 1997, GI announced that it is working with Cisco Systems to develop an interoperable MCNS (multimedia cable network system) -based, two-way cable modem network using GI's cable modems. The following month, GI announced that it is the first company to launch cable modems with a major national computer retailer—CompUSA.

In January 1998, GI also announced a strategic alliance with Sony Corp. to develop digital TV technology. In this partnership, the world's leading developer of broadband network technology and one of the world's leading developers of digital consumer electronics will join forces to develop future generations of digital cable TV devices and high definition TV (HDTV) products.

A look to the future

GI is world leader in analog and digital systems that provide video, audio and high-speed Internet/data services over cable and satellite TV networks. Any content, any network, anywhere in the world—that's the technological foundation on which GI's future is built. ■

For more information:

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Communications Technology Business Profile

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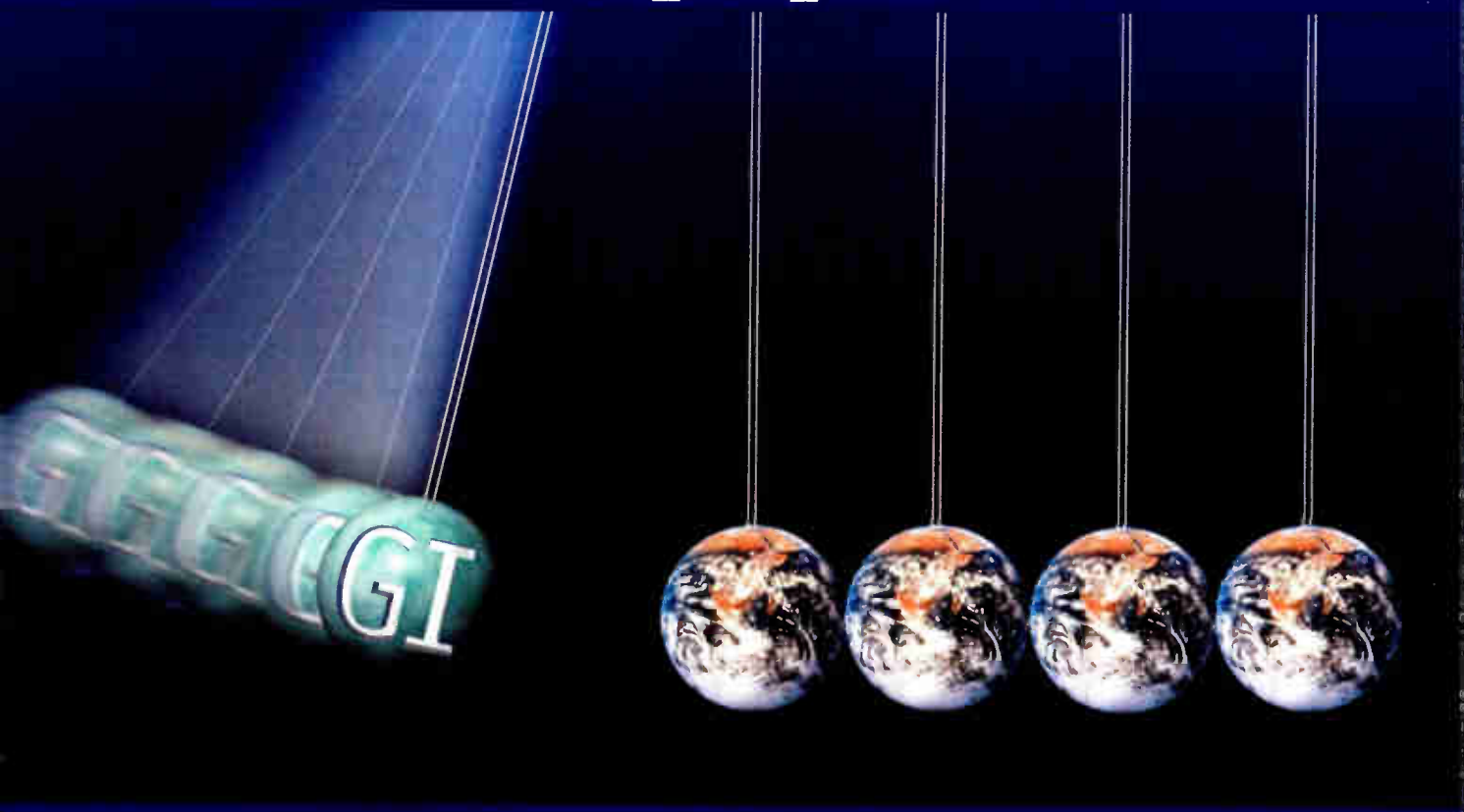

At General Instrument, we've been creating momentum for 50 years. Five decades ago, we set the cable industry in motion. Today, we continue to play a pivotal role with our unsurpassed satellite and cable technologies. And that's just the beginning of our contributions to the industry.

As General Instrument enters a new era, we will build on our existing innovations such as advanced analog, digital compression, hybrid fiber-coax, digital cable, interactive services, cable modems and satellite delivery systems. It's all part of our commitment to the next generation of communications.

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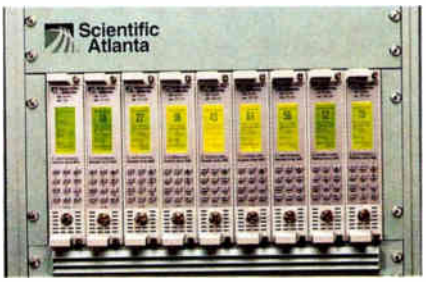
Power &Tel is proud to carry quality products from Scientific-Atlanta—Power & Tel is S-A's largest distributor, and both companies continue to grow while developing systems to ensure that all our customers' needs are met. Featured here are three of S-A's newest product lines: Continuum headend systems, Prisma optical networks and 8600X home communications terminals.

Continuum

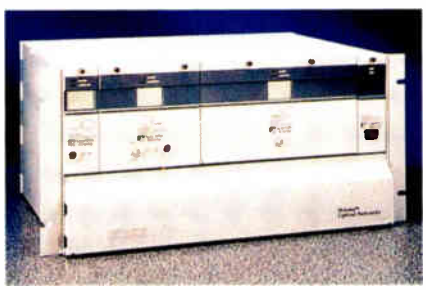
Offering the highest packaging density in the industry, the Continuum headend system's front-loaded plug-and-play modules give you best-in-class performance for all video delivery architectures. You get controllers, modulators, stereo encoders and more—all designed to support interactive HFC networks.

Prisma

Interactive HFC networks can be composed of multiple technologies. The Prisma family of optical network products provides the spectrum of choices: forward or reverse, 1,310 nm or 1,550 nm; modular or rack packaging; EDFAs, DFBs, EMTs; indoor or outdoor; analog short or long haul; digital interconnect and transport systems—these are the building blocks of interactive networks. The Prisma family is an end-to-end line of optoelectronic transmission products.



Continuum headend systems: The need for more space is important.



Prisma optical networks: Fast, flexible deployment capability

Home communications terminals: Surpass the capabilities of traditional set-tops.

8600X home communications terminals

The 8600X home communications terminal turns a TV set into a single center for home entertainment, home shopping and information. The 8600X set-top features:

- Simple on-screen menus
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- Simple VCR recording
- Simple pay per view (PPV) ordering, including one-button "buy" reminders and on-screen confirmation
- Such popular user functions as parental control, volume control and favorite channel memory

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Quintech is the industry leader in broadband signal management products. QEC's product family includes all the elements needed to effectively manage broadband RF signals within a teleport, broadcast studio or headend facility.

The product line includes RF switching, routing, sensing, splitting, combining and distribution products from DC to 2.3 GHz and frequency conversion between any bands including satellite frequencies.

Q-Switch® family of broadband RF switching and routing products

Spanning the frequency range from DC to 2.3 GHz, the Q-Switch patented SRF switches, SRR routers and SRM matrix switching systems manage and automate RF switching and routing under manual or computer control. The broad frequency range of Q-Switch cover satellite L-band, IF signals at 44, 70 or 140 MHz, laboratory test signals and forward and reverse path RF signals in the HFC network.

Magic-Q™, Narrow-Q™ and Flexi-Q™ family of RF combiners and splitters

The Magic-Q broadband combiner, the Narrow-Q narrowcast combiner and the Flexi-Q reconfigurable splitter/combiner are some of the unique and highly advanced RF combining and splitting products QEC has developed for today's headends.

The Magic-Q is optimized for combining cablecast signals.

The Narrow-Q is optimized for combining narrowcast signals, while minimizing cross-talk possibilities.

The Flexi-Q reconfigurable splitter/combiner product has dozens of applications within the Cable/HFC, MMDS/LMDS, PCN/PCS, wireless, broadcast and satellite industries, as a rack-mounted, very linear RF splitter or combiner.

Q-Stack™ frequency stacking and bandwidth expansion product

Q-Stack is the answer to return path bandwidth limitations. QEC has applied years of leadership in frequency conversion to develop a very advanced return path frequency stacking system. Q-Stack features FSU modules, which are drop-in upgrades to nodes with multiple return paths. The FSU 042 converts four returns into a 5-200 MHz band for transport to the headend over one fiber. The FSD modules at the headend or hub site downconvert the 5-200 MHz signals back to the original 5-42 MHz bands. Other frequency plans are available for 5-65 MHz returns or for OTN applications.

By quadrupling the return bandwidth from a node and keeping each return in separate bands, Q-Stack allows the operator to optimize the use and efficiency of the fiber plant.

Product positioning and future deployment solutions

Quintech has devoted 100% of its resources to developing signal management solutions that help HFC engineers deal with the implementation of advanced services.

The essence of QEC's product design is to use a modular approach that allows the system to grow. QEC can share its real-world experience, gained from having been a key player in the implementation of some of the world's leading networks, to assure that future growth and services can be implemented without limitation. ■

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"**NARROW-Q™**" NARROWCAST COMBINER OPTIMIZED FOR THE INSERTION LOSS AND ISOLATION REQUIRED TO COMBINE HIGH SPEED DATA, CABLE TELEPHONY, AND OTHER FREQUENCY RF CARRIERS WHICH ARE FREQUENCY REUSED IN THE SYSTEM.

"**RPS**" REDUNDANT DC POWER SUPPLY TO EFFECTIVELY MANAGE LNB POWERING. THE RPS SERIES PSU'S AND OUR LS SERIES OF RACK MOUNTED POWER DIVIDERS SEPARATE LNB POWERING FROM SATELLITE RECEIVERS.

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Videotek—Ride with the Winners

Located in Pottstown, PA, Videotek Inc. is a leading manufacturer of test and measurement equipment, video demodulators, routing switchers, color correctors and processors, and related equipment for the professional video and TV broadcast markets. Videotek is ISO-9001 certified.

Videotek is committed to a policy of achieving zero defects throughout the entire organization. Implementation of this policy makes it essential that each person be committed to performance exactly as required.

Established in 1974 to provide color TV monitors to the off-line editing market, Videotek is now one of the industry's leading manufacturers.

DM-100 utility demodulator

The newest member of its long-established successful line of TV demodulators is the DM-100 utility demodulator for high quality video and audio demodulation in a compact package. The DM-100 is a utility demodulator intended for industrial, cable TV and master antenna TV applications. This small and flexible demodulator provides all of the features needed for system applications and can operate from a variety of power sources, including 12 VDC, 120 VAC and -48 VDC.

BTSC-100 aural TV stereo demodulator

The BTSC-100 aural TV stereo demodulator for high-quality BTSC and SAP demodulation was introduced by Videotek. The unit is used in NTSC systems and converts a 4.5 MHz carrier or composite aural input into both stereo and SAP baseband outputs. Small, powerful, and priced right for cable TV applications, the unit can be used in headends or other distribution locations where the aural information is available—in 4.5 MHz or composite formats—and wherever there is a need for local baseband audio insertions.

Videotek DM-100 utility demodulator

BTSC-100 aural TV stereo demodulator


VTM-200 multi-format on-screen monitor

VTM-200 family of multi-format on-screen monitors

The VTM-200 family of multi-format on-screen monitors provides a revolutionary means by which to monitor and measure 601 and AES digital and composite and component analog (NTSC or PAL) video and audio signals for less than half the cost of traditional methods. The output is SVGA compatible for display on any standard computer monitor. The output display includes video picture, waveform, vector and optional audio—each in one high-resolution quadrant of the screen or any element in a full screen view. ■

For more information:

Videotek Inc. • 243 Shoemaker Rd. • Pottstown, PA 19464
Phone: (610) 327-2292 • Fax: (610) 327-9295
www.videotek.com
Chief sales contact: Peter H. Choi, vice president, sales
Same phone and fax as above
sales@videotek.com

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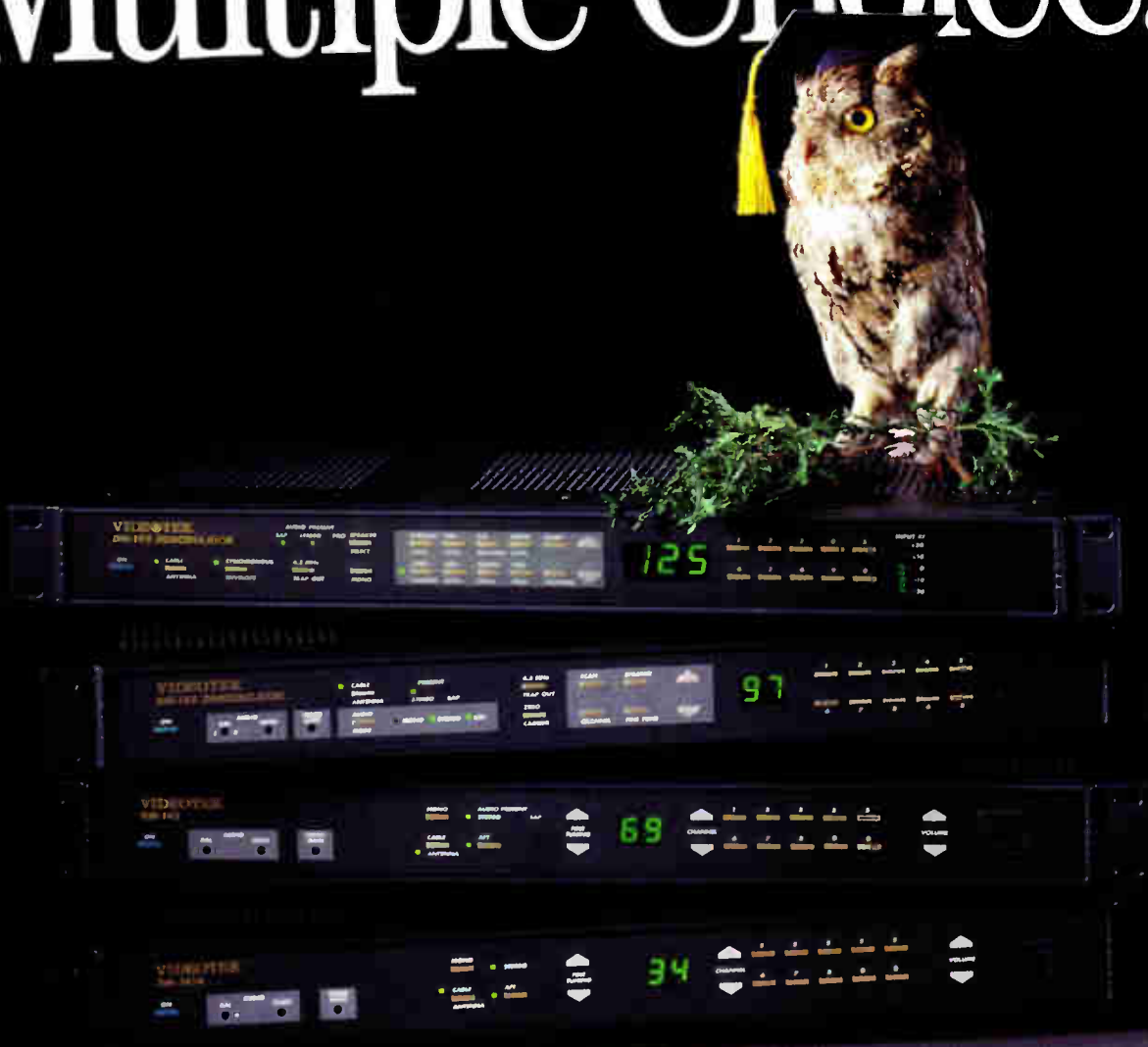

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WHO combines premium quality & intelligent design with smart prices?
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With two new choices in agile demodulators, you have more reasons than ever to choose Videotek. At half the price of our competition, this foursome of demods with full front panel control, brings in up to 192 channels and has features that include Pro channel, zero carrier pulse, synchronous and envelope detection, simultaneous stereo and SAP capabilities, plus two baseband outputs.

Two of the models, the DM-192 and DM-154 have been ***specifically designed*** for FCC compliance testing. For other applications, the DM-145 and DM-141A round out our product family.

Innovation in agile demodulators has been our specialty for two decades, making Videotek the wise choice.

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Call today to take advantage of our FREE 30-day trial or to receive a copy of the white paper report "Agile Demodulators in the Cable TV Industry." Contact Joy Bozeman at 1-800-800-5719 or e-mail your request to 104472.577@compuserve.com.

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Reader Service Number 155

Viewsonics: Products You've Relied on for a Quarter of a Century

Viewsonics is a success story whose roots date back to 1974. It was then that we first began manufacturing coaxial connectors, which we marketed to cable TV distributors. Before long, the demand for our high-quality products grew. With a team of expert engineers and technicians in place, we set ourselves apart from the competition by designing and manufacturing several unique products like the Lockinator™ Locking Terminator, 40 million of which are keeping cable systems secure throughout the world.

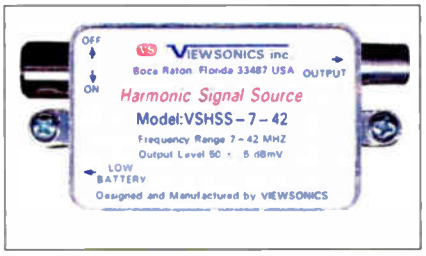
Viewsonics: Products with the competitive edge

How does Viewsonics consistently stay ahead of its competitors? We do it with products that are designed by skilled engineers in our comprehensive lab at our headquarters in Boca Raton, FL. And since our manufacturing plants in Russia and China are wholly owned, we control every phase of the process—from design to delivery—assuring our products meet the highest standards at the most competitive prices.

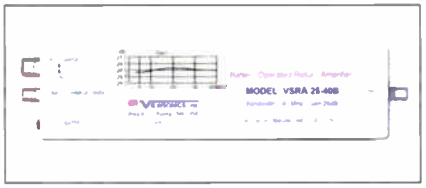
Our products meet the demands of today's cable systems

Viewsonics is a leader in creating unique return path products to facilitate interactivity of a full-service network.

VSMA-25-40 and VSMA-10-40



VSHSS-7-42 harmonic signal source



VSRA-25-40B battery operated return path amplifier

Our VSRA-14/25-40C, VSMA-10-40 and VSMA-25-40 return path amplifiers (shown here), offer the gain and high isolation you need to prevent cross talk in headend and node applications. Their range of size gives you the option to save headend space, as does our VSMPIRB-48, a rack mounted, 48 output return path multiport isolator.

In addition to space-saving designs, our products incorporate portability, as in the VSRA-25-40B, a battery-operated return path amplifier with 25 dB of gain for the most accurate signal level readings.

So whether you're one of our customers in New England or New Zealand, Kazakhstan or Kalamazoo, you can choose from over 200 quality Viewsonics products to satisfy your every need.

And if we don't have exactly what you're looking for, we can custom design it to your specifications. That's a feature you just can't get anywhere else. ■

Be sure to visit our website at www.viewsonics.com

For more information:

Viewsonics Inc. • 6454 E. Rogers Cir. Boca Raton, FL 33487 • (800) 645-7600

Standard Communications Corporation

Since 1981, the Satellite and Broadband Products Division of Standard Communications Corp. has specialized in supplying commercial satellite quality TV reception and headend equipment.

Delivering the best in advanced technology, unique design and practical features makes Standard Communications satellite and broadband products unsurpassed in our industry.

STRATUM modulator system

The STRATUM modulator system is an 80-channel, self-healing, advanced broadband network modulation system, housed in a single, six-foot rack. The system provides optimum rebroadcasting quality and spurious free RF performance from 54-550 MHz and exceeds all NTC7 specifications. During failure within a rack, the backplane automatically routes all input/output signals to the backup modulator on the daisy-chain. STRATUM's unique design approach enables multiple RF channels to be combined in either a master headend or a remote digital hub environment.

Agile IRDII (MT650)

The Agile IRDII (MT650) satellite receiver/descrambler is a low profile, compact C/Ku-band receiver and integrated VideoCipher descrambler, designed specifically for a continuous duty cycle master headend environment. The Agile IRDII features a fully synthesized PLL tuning circuit, with microprocessor control over the dual conversion C/Ku-band 950-1450 MHz RF input while still providing an industry standard 70 MHz IF. One of its most notable features is the RS250B Broadcast Certification along with the low profile 1.75" design chassis, allowing for 50% more rack space.

The STRATUM modulator system

The Agile IRDII (MT650) satellite receiver/descrambler

The DSG2000BD stereo generator

DSG2000BD stereo generator

The DSG2000BD stereo generator is the smallest and most sophisticated BTSC stereo encoder on the market.

The DSG2000BD stereo generator actually digitizes the incoming audio signals before they are processed. By using digital signal processing (DSP) techniques, the DSG2000BD generates a cleaner, clearer stereo signal, with specifications above traditional analog units. It's one rack high and includes audio test jacks for stereo and SAP signals, an auxiliary audio input for commercial insertion or EAS applications, and for further convenience, a built-in Bessel-Null Test Signal and input level indicators to guarantee that critical levels are set properly.

Product positioning and future deployment solutions

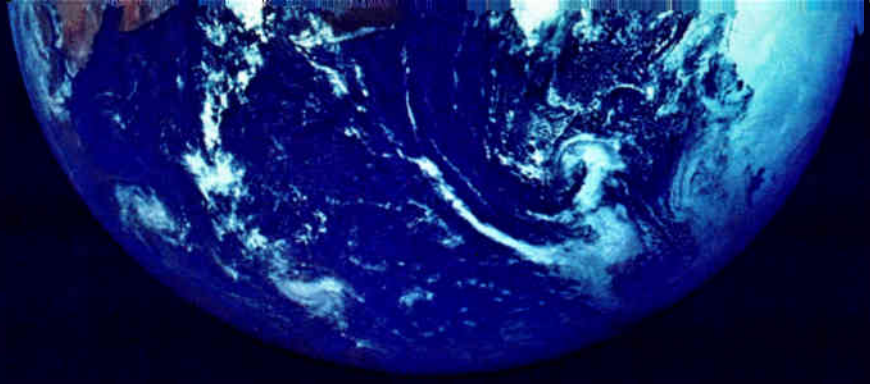
Building the future of CATV headends is all in a day's work for Standard Communications' Satellite and Broadband Products Division. As a company that specializes in headend equipment, Standard has been an innovative force in CATV headends since 1981. Recently, we revolutionized the industry again with the industry's first DSP-based BTSC stereo encoder, the DSG2000BD.

Today, Standard is working to build headend equipment that is smaller, better and ready for the future.

As the industry moves toward a digital future, traditional parameters of performance will give way to new specifications and standards as analog signals give way to bits and bytes. As the cable industry goes digital, so does Standard, with a line of digital modulators, processors, IRTs and IRDs designed to take the cable operator well into the next century. ■

For more information:

Standard Communications Corp. • P.O. Box 92151 • Los Angeles, CA 90009-2151
Phone: (310) 532-5300 • Fax: (310) 532-0397
www.standardcomm.com
Chief Sales Contact: Donald Vanderweit
Phone: (310) 532-5300; Fax: (310) 532-0397
dvanderwei@stdcom.com



CONSERVE YOUR SPACE.

With headend rack space being scarce or sometimes non-existent, Standard Communications brings you the STRATUM, the first and smallest headend modulation system of its kind anywhere in the world.

STRATUM accommodates up to eight vertically-mounted modules - plus a power supply - in a space only seven-inches high. Which means it gives you a whole spectrum of channels in minimal rack space but with maximum flexibility.

STRATUM gives you easy access to computer remote control, Integrated Status Monitoring and Emergency Alert capabilities. And to help keep your cable service available 24 hours a day, Standard's exclusive *Smart Link* protocol instantly re-routes input and output signals in a network redundancy module when an error is detected. If the power goes out, *Smart Link* automatically switches to DC power supplied through the unit's rear panel.

In a world of increasing demands and decreasing space, STRATUM is the solution. Call the Standard Communications Satellite and Broadband Division for full details today.

Standard Communications

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PRODUCTS DIVISION

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WEBSITE: http://www.standardcomm.com/satcom

Reader Service Number 157

Blonder Tongue Laboratories Meeting Our Customers' Needs

CATV quality stereo modulators

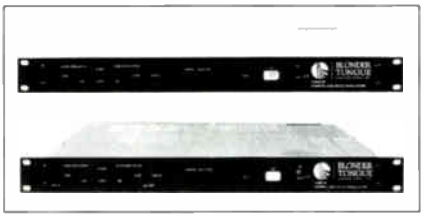
The CAM-60 Series of IF modulators provides cable TV grade performance without the cable TV price tag. They are channelized agile, heterodyne audio/video modulators with broadband noise of -95 dBc and spurious response of -60 dBc. The CAM-60 series offers an external IF loop, perfect for video all-call and emergency broadcast applications; the CAMD also provides separate visual and aural IF loops. An optional integrated BTSC stereo encoder module is also available with 20 dB stereo separation, <1.0% THD and 60 dB SNR.

VideoMask™ interdiction system

The VideoMask Interdiction System is an addressable subscriber system that provides a whole-house signal jamming solution for the operator. When considering a rebuild or new build, the operator can now choose to control a base analog service with interdiction and add digital set-tops incrementally. With VideoMask interdiction, the operator can provide 100% addressability of the analog block without the cost, incompatibility and complications associated with analog set-tops in a mixed technology system.

Headend grade spectrum analyzer

The BTSA-8558C is a high dynamic range (70 dB) headend grade spectrum analyzer. It is lightweight and battery operated with a wide array of controls that allow for quick setup and measurement in the field, as well as on the bench. The BTSA-8558C can be used in a wide array of applications: from identifying low level beats in the headend to measuring return path performance in the field—all of this for an incredibly affordable price.



CAMS/CAMD channelized agile audio/video modulator

VideoMask four port interdiction field unit (VMIU)

BTSA-8558C 1000 MHz spectrum analyzer

Product positioning and future deployment solutions

Blonder Tongue is a designer, manufacturer and supplier of a comprehensive line of electronics and systems equipment for the franchised cable industry and the non-franchised cable TV industry. BT's policy is to meet customers' needs by providing high quality, low cost products as well as extensive product and customer support.

For example, Blonder Tongue offers cable headends in both prefabricated form or as individual products. Headends are provided, at customer request, completely racked, assembled and drop shipped to headend locations. If a customer uses BT's VideoMask interdiction equipment, this full service program will provide pre-assembled pedestal and/or wall mounted assemblies.

The headends and multiple subscriber interdiction assemblies are factory pretested, tuned and burned in prior to shipment.

Blonder Tongue constantly strives to provide the highest quality, state-of-the art products. Technological advances and engineering changes are continually being implemented to ensure superior performance at economical prices. ■

For more information:

Blonder Tongue Laboratories Inc. • 1 Jake Brown Road • Old Bridge, NJ 08857
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VIDEOMASK™ INTERDICTION

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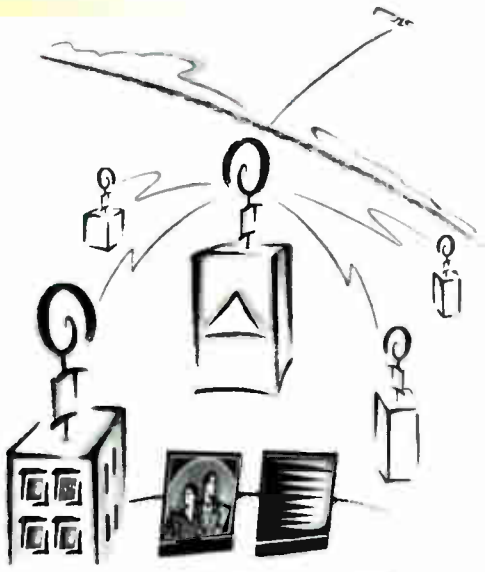

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Video Data System Steers its Leading Messaging Capabilities to EAS and Other Advanced Applications

Video Data System celebrates a quarter of a century serving the television industry

In 1998 Video Data Systems is celebrating 25 years of serving the cable industry. Early groundbreaking solutions included the first multi-channel character generator and the first microprocessor-controlled character generator. The company also developed the first electronic program guide using system specific data delivered over computer-controlled telephone lines for real-time display on a dedicated cable channel. The company continues to provide specialized products to major accounts, such as Viewer's Choice, Fox TV, Showtime and CNN International Networks. While building on its strengths, the company has more recently entered the arena with a specialized multichannel text-based messaging system for Emergency Alert System (EAS) applications and a low-cost photo-imaging display system for revenue or local origination applications.

KEY PRODUCTS

MCM-96 multichannel text messaging system

The new MCM-96 is a modular text-based messaging system capable of providing keyed text or billboard displays on up to 96 channels simultaneously. Designed for multichannel environments, the MCM-96 is a cost-effective solution for a range of applications, including EAS, pay-per-view (PPV) interstitial overlay, cross-channel promotion and logo insertion, among others. A number of advanced capabilities are available for creating flexible EAS solutions. The MCM-96 offers total flexibility in displaying text, such that displayed text can be unique to each channel, simultaneously displayed on all channels, or displayed on selected channels. Display cards offer monochrome or full-color displays from a single line message, logo, or crawl to a full page two-region display with a crawl line. Local or remote access is available via personal computer (PC), Internet, touchtone phone, or local area network (LAN). The MCM includes a 3-year warranty.

VidSTAR

VidSTAR meets the challenge of the most demanding text and graphics creation and display scheduling needs—advertising and promotional displays, electronic billboards and public access channel bulletin boards. VidSTAR's Windows-based creation software supports local, remote, or networked communications, simple page and folder organization, and flexible scheduling from a simple event loop to time-specific events. Expanded features include macro, multiple day scheduling and spell checker.

The latest advance in the VidSTAR family is the VidSTAR Photo Imaging System, providing operators with a simple means of creating still-image local commercials and standalone channels, such as classified advertising channels or real estate channels. A series of stills can be assembled from imported graphics overlaid with text and synched to a digital audio track to create "shows."

800 Series

The 800 Series provides everything from simple crawl insertion to full-color character generation in a low-cost solution to meet all your video text/titling needs. A selection of compact, easy-to-use systems is tailored to your applications: video promotions, announcements, emergency bulletin displays and so forth. All systems include real-time nonvolatile date/time display, 50 ns font resolution, a crawl line, and remote access via a PC.

Series 800 systems include: System 800 Crawl Inserter, System 810 Page Titler with Crawl Line, System 830 and 830E Color Billboard with Crawl Line, and System 840 and 840E Color Messaging System with Crawl Line. The 800 Series even provides multichannel capabilities with options for real-time event control and a meteorological data station. Full expandability means the Series 800 system will meet your needs both today and tomorrow.

Product positioning and future deployment solutions

Video Data Systems continues to expand its line of automated display systems, taking advantage of new technology and adapting its existing technology to new applications. The MCM-96 is a perfect example, incorporating Video Data's multichannel text capabilities into a system that meets and exceeds the Federal Communication Commission's requirements for EAS. ■

For more information:

Video Data Systems • 40 Oser Avenue • Hauppauge, NY 11788
Phone: (516) 231-4400 • Fax: (516) 231-4405
Web address: www.videodatasys.com
Sales Contact: Barry Kenyon and Charlie Baum
E-mail: sales@videodatasys.com

25 Years of Brilliant Messages

For 25 years, Video Data Systems has been delivering industry leading display and control systems – character generators, titlers, keyers and automated playback systems. Whether you're producing simple text crawls, bulletin boards, or still-image advertisements with graphics, we have a system to meet your needs.

MCM-96

Power in multichannel messaging – Perfect for EAS

With the power to display keyed text or billboards on up to 96 channels, you'll be surprised at how cost effective this messaging system is. Its applications include everything from EAS text overlay, pay-per-view interstitial overlay and cross–channel promotion to logo insertion, among others.

- *Four font styles*
- *Inserts any size logo (optional), soft or hard keyed, 256 colors*
- *Colored text & backgrounds*

LogoSTAR

Specialized for logo insertion

The new LogoSTAR lets you key bitmap logos anywhere on the screen. You can display one large logo or up to 32 smaller logos. The key level is adjustable for a transparent or hard keyed image. Bitmap images can be changed remotely. And when you need to add a bit of pizzazz, LogoSTAR even gives you the tools for logo or palette animation and options for time and temperature.

VidSTAR

Creative, automated information displays

VidSTAR meets the challenge of the most demanding text/titling and graphics creation and display scheduling needs. Not only does it provide creative flexibility when working with text and graphics, it gives you complete schedule and playback automation control for a variety of devices.

- *Text or image backgrounds*
- *Unlimited True-Type fonts*
- *Up to five independent display regions*

Photo Imaging System with Audio

Using digital camera snapshots and high impact graphics (accepts all standard file formats), create eye-catching ads and local channels. VidSTAR Photo Imaging gives you everything you need to create your own advertising channels, such as real estate or classified ad channels, local advertisements and informational channels for corporate, community or cable local origination.

800 Series

The economical workhorse of character generators

Thousands and thousands of these rugged little systems are installed world-wide. Why? Because they provide a powerful basic feature set at a very economical price. Choose a system for crawl or page titling, color billboard displays, and more. Options include remote Windows PC access, weather instrumentation and realtime event control.

VIDEO DATA SYSTEMS

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www.videodatasys.com

headend equipment

FRONTLINE COMMUNICATIONS

FrontLine Leads the Way in EAS and Digital TV

FrontLine was formed to manufacture Emergency Alert System (EAS) and personal computer (PC) based character generator products for the cable, broadcast and multichannel video markets. Having been associated with quality EAS products since 1989, FrontLine has installed hundreds of sites, covering thousands of channels throughout the world. With an excellent reputation for quality, reliability and service, the company offers customers the most comprehensive range of EAS systems from a single source. Providing all current EAS technology, they also have the expertise to advise on which solution or solutions are best for the needs of any operation, now and for the future.

KEY PRODUCTS

All-Channel Message system (ACM)

The All-Channel Message system is a patented display device for presenting textual information on multiple channels. With the ACM, each channel can be treated independently, so messages can be shown on individual channels, any group of channels, or all channels simultaneously. Each channel provides a multi-page, genlocking character generator, an A/B switch for both video and stereo audio, and a "system" audio for all-channel audio messages and alerting.

FrontPager™

Working in conjunction with the FrontLine EAS controller, FrontPager, FrontLine's unique software add-on, provides the unique capability of communicating emergency information via a simple alpha-numeric pager. In this way, all facility engineers and technicians can be informed whenever an EAS test or actual message is displayed on the system. Even community leaders, such as the mayor or fire chief, can always be informed, which is an extremely valuable service to offer to any community.

One of FrontLine's exclusive All-Channel Message system four-channel modules

FrontPager offers unique paging software for FrontLine EAS products.

DynaGen multi-region display with Image Display Board background

DynaGen PC-based character generator

The DynaGen series of PC plug-in boards comprises three products: the DynaGen multi-channel, multi-region character generator; the Spectra single region, broadcast style titler; and the Image Display Board (IDB) for the playback of full screen GIF formatted files. All three products are designed to operate in either the NTSC or phase alteration line (PAL) video standard. The product's unique design allows you to link multiple channels together and in turn tie them into complete systems.

Product positioning and future deployment

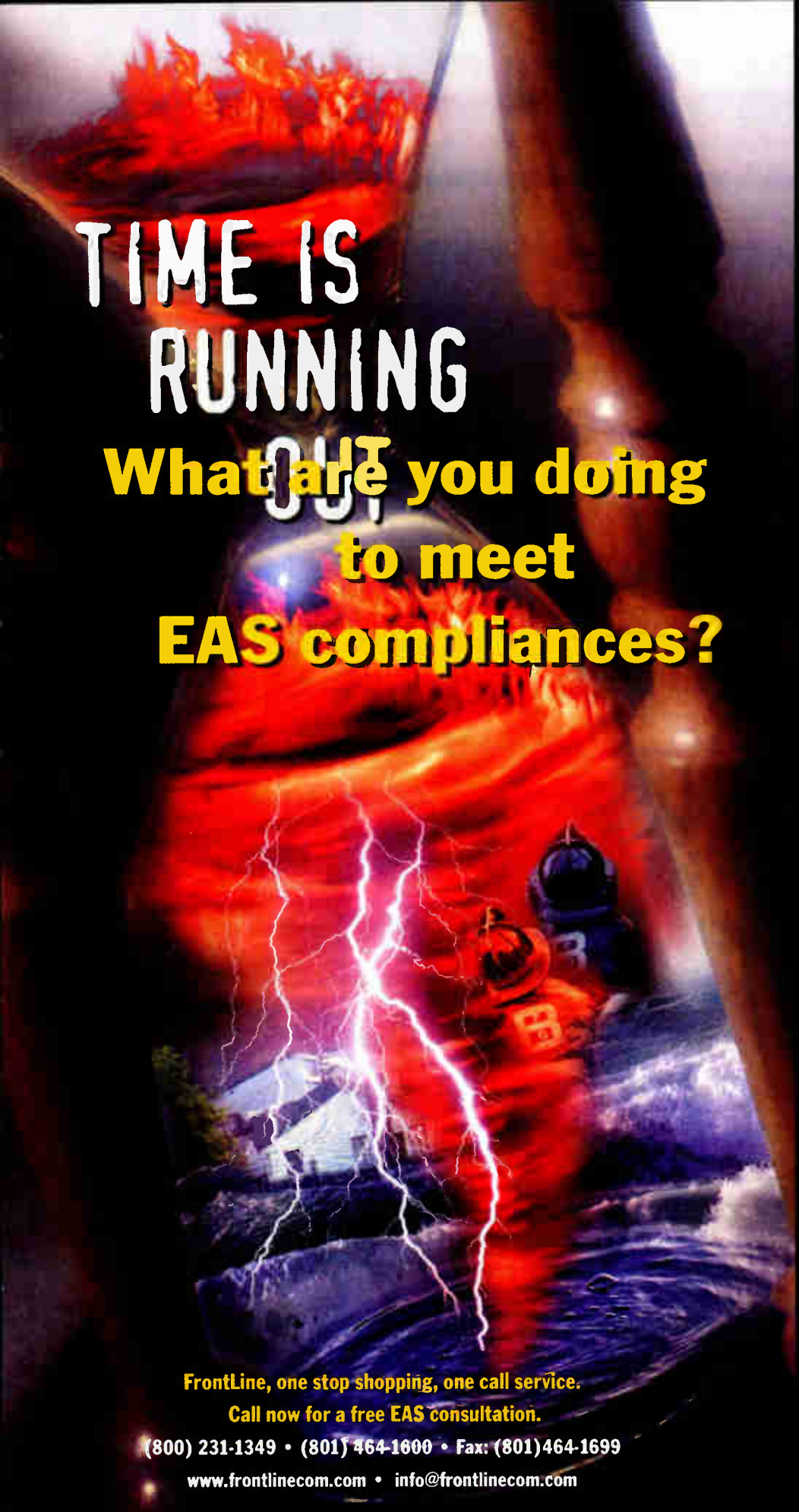
FrontLine is a preeminent manufacturer of EAS and PC-based character generator products for the cable, broadcast and multichannel video markets. In addition, FrontLine's service organization provides service and installation support for other products as well.

From the simple to complex, FrontLine creates EAS solutions to fit today's requirements and that are flexible enough to expand for your future growth. To answer any questions or for more detailed information please call (800) 231-1349 or visit FrontLine on the Internet at www.frontlinecom.com. ■

Communications Technology Business Profile

For more information:

FrontLine Communications LLC • 404 West Ironwood Dr. • Salt Lake City, UT 84115
Phone: (801) 464-1600/(800) 231-1349 • Fax: (801) 464-1699
www.frontlinecom.com
Chief Sales Contact: Tom Harmon
Phone: (801) 464-1600/(800) 231-1349 • Fax: (801) 464-1699
Email: info@frontlinecom.com



The winds of change are upon us. On December 31, cable and wireless operations must be in compliance with the new Emergency Alert System requirements. For you, it means more work and some new equipment.

Don't panic.

FrontLine has everything you need. We're the EAS specialists, and we can advise on and supply the best solution for your operation—whether it's baseband switching, IF, text messaging or a combination of these.

Our patented All Channel Messaging (ACM) system is loaded with functionality to take you beyond EAS. You can use it for the community bulletin board or local sports scores. Better yet, use it to advertise and switch that pay-per-view special.

FrontLine is dedicated to innovations in EAS technology. For instance, we are the only company offering a Digital EAS system. And we're rising to new levels with Audio-Tag™, providing revenue generating sponsorship of EAS tests and alerts as a standard feature, and FrontPager™, an automatic EAS paging system.

FrontLine: the source for all your EAS needs.

FrontLine, one stop shopping, one call service.
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FRONTLINE
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Reader Service Number 160

LINE EQUIPMENT

Line Hardware Rarely Fails By Itself

But What About Power Surges and Environmental Stress?

By Andrew Morris

Line equipment has become increasingly reliable in recent years and cable operators are discovering that their biggest challenges are related to power and installation. Line equipment itself, it seems, rarely fails.

According to Scientific-Atlanta's Alan McBride, vice president of corporate staff, technical operations, "The electronics have become so reliable that a cable system can easily achieve the four 9s without redundancy in fiber and coax equipment." The four 9s or 99.99% availability allows for 53 minutes a year of total network outage. Achieving this level of availability will put cable systems on a performance par with the phone companies.

This level of network availability is essential if cable systems are going to compete in the arena of data and telephony services. These interactive services are forcing cable operators and their equipment vendors to address reliability and redundancy throughout the cable plant.

Cable equipment manufacturers are addressing these issues in a number of areas. Manufacturers have extensive R&D labs and their equipment is subjected to extensive life testing.

Training is a significant part of most manufacturers programs and they are making efforts to teach their customers correct installation and maintenance procedures.

Status monitoring and network management are beginning to play important roles as cable operators strive to achieve the level of network availability and reliability that is commonly associated with telephone companies.

THE IMPORTANCE OF POWER

In recent years, power-related failures have proven to be the source of most outages. Hugh McCarley, director of engineering technology, Cox Communications states, "We are seeing hardier equipment. Outages are more related to power than to equipment failure itself."

Cable systems are beefing up power systems in their outside plant in a variety of ways. This includes the installation of redundant power supplies, battery backup for those power supplies and the addition of emergency generators.

Cox is beginning to install power supplies with four-hour standby in systems that offer data and telephone service. "Our long-term goal is indefinite powering but that is three to five years away. We also are looking at deploying generators fueled by natural gas," says McCarley.

Scientific-Atlanta's Graham Mobley, staff vice president, technology directions, states, "Our equipment is as robust as possible. It is designed so that a technician can perform hot splicing in the field." S-A's equipment is highly surge protected and can withstand lightning strikes according to Mobley.

The power issue is so critical in regard to lifeline telephone services that Steve Allen, an outside plant engineer at Roseville Telephone Company, believes, "The cable industry is too scared to offer 911 lifeline services. They are saying let's do cable modems instead."

Even if that proves to be true, the effort to offer telephony services has produced an added side benefit for the cable network as a whole.

"With the requirement for network powering of telephone equipment, we have increased the current carrying capacity of our line equipment," says Mobley. "Our Version 3 amplifiers and line extenders have 15 amp current capacity and are rated to withstand surges up to 25 amps."

S-A's multimedia taps are rated for 12 amps of through current and feature a trademarked surge-resistant circuitry that S-A calls SRC.

Dave Grubb, General Instrument's vice president of marketing, transmission network systems business unit, agrees with Mobley. "A side benefit is that we have built a more rugged amplifier for power handling portions of the network. Shorting a tap with a screwdriver will not take down an amplifier," says Grubb.

GI has increased the current carrying capacity of its line extenders from 7 amps to 15 amps and from 10 amps to 15 amps for its amplifiers. GI Starline taps offer 12 amp power passing and GI Starline passives can handle 15 amps, states Grubb.

Electroline has designed its telephony SuperTap so that the directional coupler and choke remain in the housing when the faceplate is removed. The result is uninterrupted signal flow on the through leg when the faceplate is changed or upgraded.

Mitchell Goldberg, vice president, product applications at the company, claims, "This is superior to a bus bar design for handling power when the directional coupler is removed in a conventional tap. With our design you never get arcing and you get much better return loss performance."

NETWORK ARCHITECTURE

Network architecture has a significant impact on the reliability and availability of a network. As fiber is driven deeper into the plant, there are less active devices between the headend and the home. Not only does this improve quality but it improves reliability as there are fewer powered devices that can fail.

David Eng, C-COR senior vice president, worldwide sales, states, "Hybrid fiber/coax (HFC) has become adopted as the standard architecture."

S-A's Mobley adds, "One laser transmitter at the headend or hub driving out to the node replaces several distribution amplifiers, cable connectors, and other devices that require power. This architecture is inherently more reliable."

McCarley indicates that Cox is building 750 MHz plant with fiber nodes

that pass 1,000 homes. The Cox architecture features a ring network for diverse routing and Cox selects equipment with redundant electronics. McCarley states that the reverse path is implemented in the same manner.

"This type of architecture is very important when deploying residential high-speed data service," explains McCarley.

Allen agrees. "You need deep, deep fiber. You cannot do data with a 30 amp cascade."

CT's Grubb states, "Our StarGate 2000 telecommunications optical node provides an optional third optical receiver for backup should the narrowcast (550-860 MHz) receiver fail. It features an automatic path switchover through either status monitoring or local switch driver modules."

McCarley doesn't currently see the need for building an 860 MHz plant. "I believe 750 MHz is where we need to be today and where we will be for several years. You pay a premium for a 860 plant and I don't think it's worth doing at this time. On the other hand if Gallium Arsenide (GaAs) chip technology improves and you could get a higher bandwidth at a lower cost, we might consider 860."

"We intend to have analog up to 550 MHz with digital compressed video, telephone and data running from 550 to 750 MHz. This could change according to what happens with high definition (HDTV). We may have to add 6 MHz for each broadcast stations' HD signal in each market. I think we'll know better in two to three years."

CT's Grubb states, "The GaAs amplifier technology we've developed results in a net improvement to the total network. It lets us reduce components and you have fewer active devices between the headend and the tap. GaAs is a proven technology but is new to cable and people are justifiably cautious."

C-COR's Eng believes that the trend is toward customers requiring higher capacity and more bandwidth in their networks. "750 MHz has been standard until recently but we are beginning to see increasing inquiries for 860 MHz equipment. We've been shipping 860 MHz to domestic customers for at least one and a half years now. The operators are adding bandwidth in accordance with where they want to draw the line between analog and digital."

C-COR's Navicore product line provides an upgrade path for cable systems. A Navicore RF amp can be upgraded to an optical node. Multiple receivers and transmitters in that node can be configured for redundancy or for varied services.

"We provide the cable operator with an upgrade path and they are able to protect their investment," states Eng.

TESTING IS KEY FOR MANUFACTURERS

In order to ensure that equipment is reliable, cable TV equipment manufacturers go to extensive lengths to test their equipment and their equipment design.

Scientific-Atlanta performs highly accelerated life testing (HALT) to guarantee the reliability of their products. S-A's McBride states, "We are looking for latent defects and we want to assure the quality of our design with this testing. We perform thermal testing, we power cycle the equipment and we put the equipment through different vibration modes."

CT's Grubb says, "We put our equipment in an environmental chamber at 60°C. The equipment is subjected to this for thousands of hours as we look for any unexpected failure modes. We take data to validate our reliability predictions using Bellcore methods."

C-COR subjects regular samples of its equipment to environmental stress tests. Eng states, "We have two environmental chambers and use them to subject our equipment to overtemperature testing and measure the performance of our equipment over a large temperature range. It enables engineering to flesh out weak points and take corrective action."

Electroline's SuperTaps are subjected to salt spray and air pressure tests. They are mounted in aluminum housings and use sealed gaskets for waterproofing as well as for prevention of electromagnetic interference.

Raymond Cadieux, vice president of engineering for the company states, "The highest failure rate item in our addressable SuperTaps are latching relays and they have a 25 year mean time between failure (MTBF)."

INSTALLATION IS KEY FOR OPERATORS

The second major cause of failure in the outside cable plant is poor installation. Steve Allen criticizes cable systems that hire inexperienced installers. "Training and wages is a big issue," says Allen. "You can purchase the best component in the world but if it's not installed right ... A good component can last 20 years but if the installer kinks the cable ..."

Allen also states the cable industry does not sufficiently understand and study corrosion and electrolysis. "What destroys a cable system," says Allen, "are things like water, acid rain, gas fumes, dissimilar metals and bird droppings. All of these things contribute to rapid deterioration of connection and reliability. There are

BOTTOM LINE

INTELLIGENT NETWORKS MAKE MONEY

Manufacturers of cable TV equipment report that line equipment hardly ever fails. Power surges and lightning strikes are bigger problems in the outside plant. What's a cable system engineer to do?

Well, if a cable system wants to offer telephony and data services, it has got to start thinking about redundant power supplies, battery backups and emergency generators.

Steve Allen, an outside plant engineer with Roseville Telephone Company, who has worked for Western Communications, Viacom and Jones Intercable correctly states, "Intelligent networks make money."

This, perhaps, explains the change in attitude cable operators have towards system reliability. Intelligent networks require sophisticated equipment and will only make money if they prove themselves reliable and available at all times.

The days of the subscriber as status monitor is thankfully fading into the past. Cable operators cannot afford to have their customers experience system problems. These customers have too many choices and can quickly find another provider of data, telephone and yes, video services.

In fact, intelligent status monitoring and network management is starting to become an integral component of the cable system of the future. The era of self-diagnosing and self-healing hybrid fiber/coax (HFC) cable systems may not be too far away.

simple ways to deal with corrosion if you understand what is going on. In some places, use plastics instead of metals. In other places, use better metals. For ten cents more you can use something that will last ten times longer."

C-COR's Eng states, "We are always looking toward higher quality and lower cost. We design in as much quality as possible for our equipment. We try to keep component parts to a minimum. Our amplifier housings have special coatings to withstand difficult environments. The effects of corrosion are easily visible for the eye to see."

Electroline promotes its addressable tap as a means of making the drop cable a permanent connection to the home. Remotely turning service on and off at the tap means the cable operator does not have to connect and disconnect the drop cable according to service activation or deactivation.

Goldberg states, "You install it properly once, heat shrink it, completely seal it from radio frequency interference (RFI) and ingress and you never have to go back to it."

He points out that the phone companies have been remotely turning service on and off for years from their central offices. "The phone companies do not roll a truck to activate or deactivate service."

NETWORK MANAGEMENT

A growing area for maintenance of the cable system outside plant is status monitoring and network management. These are becoming essential tools for a cable system attempting to achieve 99.99% availability.

GI's Grubb states, "There is lots of interest perking up in this area. With a computer in the headend you can monitor the health of outside plant devices."

S-Vs McBride says, "With the advent of telephony and interactive services, the cable operator is changing his tune about the customer as status monitor. He needs to be proactive in the discovery of failures."

Mobley adds, "This goes hand-in-hand with new services. Because you see more and more equipment with reverse path, the concept of monitoring is taking on speed."

Eng of C-COR says, "Network management is becoming more and more important. 'Agents' can be installed in active components such as amplifiers and power supplies. Through these agents an operator can turn on or off certain legs of a bridger amp. They can check for ingress, for example. It is scalable and you can start by monitoring an external power supply and then you can add sensors to monitor the housing, the temperature, power, voltage, control and hybrid output."

A DIFFICULT ROAD AHEAD

Cable systems, by their broadband nature, have a very difficult road as they strive to achieve the reliability and availability required of a provider of interactive services. While equipment manufacturers are responsive to the needs and desires of cable system operators, it is ultimately up to the operator to create an interactive system that is truly reliable and always available. ■

Andrew Morris is a freelance writer out of New York. He may be reached via e-mail at amorris@usa.com.

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Founded by engineer George M. Pfundt (1896-1987) in 1936, GMP began as a specialty machine shop for the local Bell Telephone company and for the electric utility company. GMP expanded to a production shop after landing a contract with Western Electric Company and, subsequently, formed a close relationship with Bell Telephone Laboratories in New Jersey, which enabled it to manufacture prototypes of products for experimental use within the Bell System.

Having outgrown the original factory building, the company built a 100,000 square foot plant in Trevose, PA (a Philadelphia suburb) and moved there in 1957.

Applications

GMP product applications include the placement of copper conductor, coaxial and fiber-optic cable both aerially and underground. Accepted as industry standard are the GMP aerial cable lashing machines, Adams continuous duty winches and fiber-optic cable pullers. The complete line of 600 products also includes cable reels and rollers, cable cutters, unique modular plug pressing tools and other specially-designed tools.

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GMP is perhaps best known for its line of premium quality cable lashing machines, sometimes called simply 'lashers' or 'spinners,' that wind stainless steel wire around telephone, power and multi-media cable, thereby securing or 'lashing' it to the supporting messenger strand between poles. In the 1940s, the company pioneered the modern automatic lashing machine with Bell Telephone Laboratories, establishing the telephone industry standard in lashing technology.

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The Adams® Continuous Duty Winches are another of GMP's most recognizable lines. The first Adams winch was conceived in the 1950s through the combined efforts of engineer Frank Adams and, once again, the Bell Telephone Laboratories. The resulting winch specifications became the accepted standard within the North American telephone industry. And, since then, GMP has continued to add practical design enhancements to the Adams Winch product line.

GMP continues to invest in new product R&D, state-of-the-art manufacturing, quality assurance, distribution and inventory-control equipment to maintain its continuing ability to meet the changing needs of work crews in the field who rely on the ruggedness, practicality and safety of GMP equipment. ■

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TRANSMISSION EQUIPMENT

Why Cable and Test Equipment is Improving Every Year

More Power, More Accuracy, But Less Cost

By George Lawton

Improvements in today's cable plant's transmission fall into two general categories:

1) Advances in the plant equipment itself.

2) Advances in test and measurement equipment and techniques for pinpointing problems.

Plant equipment is being upgraded by moving to a fiber backbone and by using 1,550 nm fiber-optic technology for improving the reach or capacity of existing fiber networks.

One of the facilitators for these advancements is declining costs in the equipment required. Oleh Sniezko, vice president of engineering at TCI, noted, "We are seeing very good trends in the cost, both for raw bandwidth and for upgrading the entire network to two-way. TCI's plans are very aggressive and ambitious for the next two years."

LIGHTING UP TO FIBER

Lasers are getting more powerful on the high end and less expensive on the low end. According to Bob Jordan, vice president of broadband communications products at Ortel, 1,310 nm power levels were up to about 10 mW in 1993. Over the last five years he has seen laser demand in two areas: low-cost low-power lasers (6-8 mW) and high-power lasers (13-16 mW). The use of higher power lasers fulfills a need for connecting hubs over longer distances. At the high end, Jordan has seen some 1,310 nm lasers operating at 20-25 mW, which are generally used to fulfill the gaps between the lower cost 1,310 nm lasers, and the higher-cost 1,550 nm technology.

"1,550 nm fiber equipment has typically been used for supertrunking, but there is an increase of its use in the distribution network."

1,550 nm technology is relatively new to the cable industry, which has more or less standardized on 1,310 nm. But 1,550 is capable of delivering signals over a longer range thanks to its lower attenuation and the increased power of 1,550 nm lasers coupled with optical amplifiers.

1,550 nm fiber equipment has typically been used for supertrunking, but there is an increase of its use in the distribution network, according to Jordan. 1,310 nm equipment has been cheaper, but 1,550 is becoming cost-effective through the use of optical amplifiers. Optical amplifiers can optically boost an analog or digital signal to travel over 100 km without requiring a repeater or regenerator, and can be stringed together to carry a signal over virtually any distance. This increased power also can be used for splitting an optical signal across a greater number of fibers.

Time Warner Cincinnati's trunk network uses 1,550 nm analog technology to interconnect 18 buildings, while the fiber-to-the-neighborhood links uses 1,310 nm analog technology. Mike

"Lasers are getting more powerful on the high end and less expensive on the low end."

Bertolino, headend manager for TW Cincinnati, noted that the 1,550 nm products are working out pretty good, enabling his system to meet the Time Warner specs for carrier-to-noise ratio (C/N) and composite triple beat (CTB) when measured in the home.

Bertolino noted that the optical time domain reflectometers (OTDRs), which measure the distance to a break or kink in a fiber-optic cable, have come a long way. He explained, "They are much smaller, more powerful, and more accurate. Now, rather than a tech carrying a huge lab-grade OTDR, he can carry a small meter and get good results. It is now the size where it is manageable if you have to climb a pole. They have LCD screens and are easy to use. These things can be operated at the push of a button and you don't have to be an engineer or technical wizard to shoot a fiber."

Bertolino has seen these smaller OTDRs being delivered by vendors such as Hewlett-Packard, Photon Kinetics, Wavetek and Tektronix.

When testing fiber, Bertolino recommends that technicians use a fiber scope. It magnifies the head of the fiber by 50-100 times in order to ensure that the fiber is clean. Traditionally, Bertolino's crew has used power meters for determining the loss after a new fiber termination is made. But if a problem is detected, a new fiber terminator must be installed on the cable. Using a scope is a more proactive approach to finding contaminants before they become a problem.

Bertolino said, "Most of our transmission is analog, and it requires a high return loss on fiber-optic connectors. Using a scope is the only way to see how clean it is. It magnifies the tip so you can see if there is any dust or water droplets or anything like that."

PREDISTORTION

One advance in fiber-optic technology is the improvements in predistortion technology, which enable lasers to operate over a longer distance. Ortel's Jordan said that the company has shrunk this predistortion technology down from a 4 x 5-inch board to a circuit about the size of a credit card, which will lead to considerably smaller lasers, and denser fiber-optic enclosures for the cable industry. The new units have half the parts, offer improvements in

TIPS FOR GETTING THE MOST OUT OF YOUR TEST EQUIPMENT

Mike Bertolino, headend manager for Time Warner Cincinnati, recommends working more with manufacturers to get further information on your test equipment. He noted, "A lot of manufacturers have applications engineering people that will come out to your site and give you a little tutoring. For pretty much every piece of equipment we have, the manufacturers gave us some equipment and dedicated some factory employees to training. As people get up to speed, we take training classes one step further and tailor it for our needs. As future technicians come along, we do in-house training."

Ken Ditto, product manager for cable TV testing products at Tektronix, noted, "Sometimes the people that should be using test products are not because they are feeling a little intimidated.

"With a piece of test equipment you have invested a lot of money in, it is worth some nonpressure exposure to it. Otherwise technicians will be reluctant to use it during a stressful situation like an outage. It is not unusual to come to a system with some valuable piece of equipment gathering dust. I was with one tech that knew a drop was broken, but did not know where. Instead of using a TDR, he cut the drop in the middle, and then replaced the half that did not work," adds Ditto.

John Breeden, product manager for fiber-optic cable testers at Tektronix, said, "You want to make sure that you document the system completely. Some people just lay the fiber in the ground, and if it works, it works." But over the course of time, a well-documented plant can make it easier to resolve problems during an emergency.

Oleh Sniezko, vice president of engineering at TCI, recommends doing an engineering analysis for an entire market before beginning an upgrade. The TCI engineering team decides whether to do a forward path upgrade, and then two-way. He noted that 50% of their systems are not being touched in the forward direction because they already have 450 MHz or greater capacity. These markets are only being upgraded for two-way.

Sniezko said the biggest single issue for testing the return path is alignment, not ingress. "If you can get the right signal levels into your electronics, you should be well ahead of everyone else."

When doing testing, Sniezko does not find that ingress is a major problem, provided you have good equipment for the reverse plant. He noted, "If we do it right, we do not have to repeat this stuff all the time. We can cut our maintenance effort and cost significantly."

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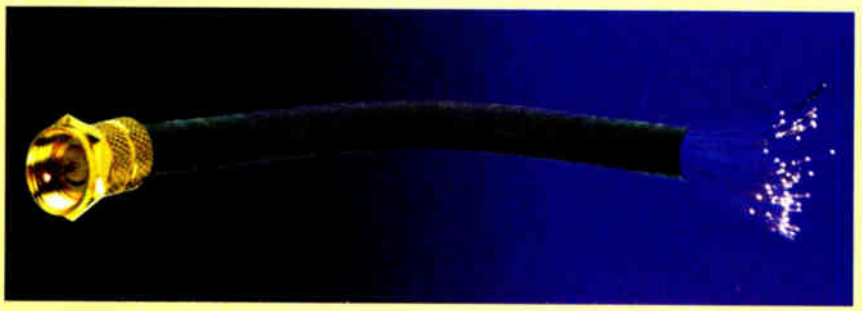

performance and reliability, and draw a lot less power than their predecessors.

Jordan also sees an increased need for network management agents in all of the active devices in the network. He said, "Ultimately, every active device will be managed. That will not happen all at once, but it certainly will occur over the next couple of years."

BYTE INTO DIGITAL

Digital technology facilitates the delivery of a variety of new services that promise to give cable operators new revenue streams such as near-video-on-demand (NVOD), Internet access and telephony. If the plant has enough bandwidth, digital signals can be modulated onto empty channels. Many of the proposed digital services are designed to operate within empty 6 MHz bands typically used to carry analog video.

There is some mixed thought about the necessity of testing a system just for digital. Gene Faulkner, national sales manager for Hukk Engineering, noted, "I talk to a lot of people that can't wait to buy and deploy test equipment for digital signals. But I run into an equal number that believe that if you keep analog working, then the digital will just fall into line. I personally think they need the test equipment. When I look at a DBTS (headend in the sky) satellite feed, sometimes I find that the power level and signal-to-noise ratio (S/N) were much lower than the engineer thought they would be, even though the analog levels were perfectly within acceptable limits. That just tells me that they will have to have something to take this thing apart."

Faulkner noted that although most analog meters have a digital power option these days, that only tells you what the power level is. He believes there is a need for equipment that performs 64-QAM (quadrature amplitude modulation) and 256-QAM testing and analysis, average power, bit error rate (BER) counts, modulation constellations, S/N, and adaptive equalizer stress. Faulkner also believes that any digital equipment ought to have analog built in so that a technician can easily look at an adjacent analog channel with the same piece of equipment.

Digital test equipment is likely to be reserved for senior technicians because of its high cost, Faulkner said. "Digital test equipment is not going to be sold like Chicklets. Not every tech is going to get a digital tester, at least not right now."

TURN ON THE RETURN

According to Lisa Pelgrim, a senior analyst at Dataquest, only about 20% of all cable networks in the United States are two-way capable today. However, operators across the country are busy turning on the return path in order to be able to support interactive services.

But opening up the return path can lead to new problems caused by ingress. Time Warner Cincinnati was one of the first networks in the United States to turn on the return path in order to offer the QUBE service in the early 1980s. TW's Bertolino said they initially used bridger switches in the return path to keep the return noise low. But the newest plant has no bridger switches, so they have more noise to contend with. "We have to pay real close attention to the noise on the return path," Bertolino noted.

Bertolino said they have standardized on Wavetek's Stealth Sweep System, which also is capable of sweeping the reverse path enabling them to balance the amplifiers in the return direction. They also can use it as a mini-spectrum analyzer for tracking down noise.

When they start getting involved in cable modems, Bertolino wants to automatically monitor the reverse path. He is looking at equipment from different companies that routinely monitors reverse noise, and then trips an alarm when it goes beyond a certain level.

He said there are several manufacturers that do some of what he wants, but not everything. One of the big issues is that it would cost his system too much to simultaneously monitor each of the 730 nodes in his network. Bertolino wants a system that he can deploy in phases to monitor regions (and eventually smaller areas) as costs go down and the need for real-time monitoring of the reverse path increases. ■

George Lawton is a freelance writer specializing in telecommunications topics. He may be reached at glawton@best.com.

BOTTOM LINE

MORE FIBER MEANS NEW APPROACH TO TESTING AND MAINTENANCE

Changes to the cable plant require new approaches to proper testing and maintenance.

The increased use of fiber is creating a demand for highly portable fiber-optic optical time domain reflectometers (OTDRs), and increasing the need to use fiber-optic scopes.

Digital services are driving a demand for new types of testers for monitoring average digital power, digital modulation constellations and bit error rate (BER).

Firing up the return path is creating a need to align the amplifiers in the return direction, and to detect and identify the source of ingress in the return path direction.

Silicon Valley Communications Inc. Announces Advanced, Modular, Bi-Directional, Optical Transmission Equipment for HFC Networks

Based in Santa Clara, CA, Silicon Valley Communications' technology and products serve the rapidly growing optical communications and multimedia markets with advanced fiber-optic transmission and distribution systems for broadband video and digital networks.

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Universal chassis

SVC's Universal Chassis is available in two compact, 13-inch-deep models to meet system configuration requirements: a one-rack unit model and a three-rack unit model. The 1 RU model accommodates two SVC plug-in modules and includes a built-in universal AC power supply; the 3 RU model accommodates 12 SVC plug-in modules. Provision for +24 V backup power operation is standard in both models.

All SVC broadband products, including the universal chassis, headend transmitters, EDFAs and downstream and reverse path modules, are compatible with the SNMP-compliant SVC Network Management software and other open platforms.

CT's Technology Profiles

Optical transmitters

SVC 1310 nm optical transmitters have been designed expressly for demanding communications applications. A full range of models of the SVC headend 1310 nm transmitters cover link loss budgets of 4 to 16 dB for 80/110 channel NTSC (750MHz), 60 channel PAL (860MHz), and 42 channel CENELEC (860MHz) systems applications.

1 RU 1550 transmitters

SVC 1 RU 1550 externally modulated transmitters are offered in 30 km, 65 km or 100 km versions. These transmitters will offer superior CNR, CSO and CTB system performance over the transmission distances described above. Three standard frequency plans are offered: 77/110 channel NTSC, 60 channel PAL, and 42 channel CENELEC. Each unit contains a high-performance optical modulator and precision electronics to provide near linear modulation over the range of 40 MHz to 862 MHz.

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Silicon Valley Communications is actively focused on advanced research and product development activities to satisfy the interactive bi-directional needs of the Information Superhighway. Due to the various cable network systems now deployed, SVC is listening carefully to engineering and economic requirements and working with cable operator conversion teams to understand the most effective application of our research and development efforts. The products announced above reflect the flexibility and modularity required for efficient and reliable bi-directional systems.

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transmission equipment

Wavetek Offers a Complete Line of Communications Test Solutions

Wavetek Corp. develops, manufactures and distributes a broad range of products for testing communication networks, precision instruments to calibrate and test electronic equipment, and handheld electronic test tools. Wavetek is the global leader in cable TV test; a premier supplier of test equipment for wireless, fiber optic and local area network communications; and is recognized worldwide for its precision calibration and metrology products.

Wavetek's customers are supported by a network of Wavetek personnel and independent representatives and distributors in all major markets worldwide.

Cable TV

Wavetek has become the world leader in cableTV test by continually developing new products, or offering upgrades to current products, that are designed to help customers meet their current and future testing needs.

Wavetek recently introduced the PathTrak performance monitoring system, the first return path monitoring system devoted to monitoring and analyzing multiple return paths in today's advanced hybrid fiber/coax (HFC) networks. PathTrak is designed to improve the availability and quality of return path networks. By automatically isolating problems to a single return path, PathTrak reduces troubleshooting and fault location time, therefore reducing maintenance costs. PathTrak also stores historical performance records to aid in characterizing return path performance and trend analysis.

The popular Stealth sweep system, and the complete line of signal level and leakage detection meters, offers comprehensive testing in an easy-to-use, handheld package.

With the latest firmware, the Stealth now offers improved reverse sweep and spectrum display speed, self-calibration, and additional features for reverse noise and ingress troubleshooting.

Wavetek's newest Stealth firmware offers new features for reverse ingress troubleshooting.

The MTS 5100 mini-OTDR is designed to handle single- and multimode installations.

The Home Wiring Test System helps verify the quality of a cable installation.

Telecommunications

Telecommunications technology provides the infrastructure for the communication "superhighway." Optical fiber has become the standard transmission medium for all telecom networks. Wavetek serves this expanding market with a broad range of test equipment, including mini and mainframe optical time domain reflectometers (OTDRs) and digital transmission analyzers.

Wavetek's MTS 5100 is a multi-purpose OTDR designed to maximize fiber test productivity. The MTS provides installers the best performance and modularity for any field situation in a single test platform. It handles single and multimode installations, in-service testing and out-of-band monitoring. Along with a 16-hour battery life, the MTS features optical testing from 635 to 1625 nm and dead zones as low as one meter. The MTS has two available bays featuring field interchangeable modules with varying dynamic ranges and wavelengths, as well as a light source, power meter and a visual fault locator.

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transmission equipment

Scientific-Atlanta: Maximizing The Revenue Potential Of Your HFC Network

At Scientific-Atlanta, we are committed to helping network operators maximize revenue generation by deploying new video, data and voice services over hybrid fiber/coax (HFC) networks.

To enable the most cost-effective and reliable delivery of two-way interactive services over HFC, the network architecture must be matched to individual business models, service levels and technical requirements. An HFC network enabled with a Scientific-Atlanta transmission infrastructure can be deployed in multiple unique architectures to address these requirements.

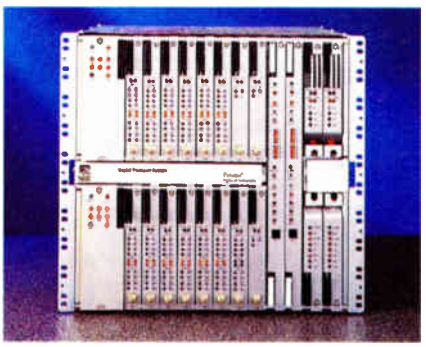
As a full system supplier that is leading the way in developing architectures for two-way interactive services, Scientific-Atlanta can help you choose the right solutions for any network operator's business model. Consider our family of cutting-edge HFC components, which includes:

Advanced headend systems for ultra-reliable programming

Providing a new level of performance, efficiency and ease of use, Scientific-Atlanta's flagship Continuum™ headend system is designed to integrate seamlessly with a variety of new headend interconnect system architectures.

Driving fiber deeper with Prisma optoelectronics systems

Robust, economical delivery of multimedia services depends on optimizing fiber deployment and utilization. That's why Scientific-Atlanta is leading the way toward a comprehensive optical network architecture with its Prisma™ family of optoelectronics products. Prisma Digital Transport is a SONET/SDH multiplexer for transporting video and two-way broadband services over regional headend-to-hub fiber interconnects and network backbones. The system can be deployed for low-cost, one-way video transmission and upgraded to two-way with the simple addition of a plug-in module. And, the Prisma dense wavelength division multiplexing (DWDM) platform, scheduled for release in the second calendar quarter of 1998, will multiplex up to eight Prisma Digital Transport systems on the same fiber, dramatically increasing network operators' per-fiber transmission to 128 video channels.



Prisma Digital Transport system

Plug-in modules provide SONET/SDH compliant multiplexing of uncompressed video.

Leadership in RF technology

RF amplifiers have long been a key component in broadband systems. And for just as long, Scientific-Atlanta has relentlessly evolved this category to set the standards for delivering new services. For example, Scientific-Atlanta's LE III line extender was the industry's first RF amplifier application of Gallium Arsenide (GaAs) FET integrated circuit technology.

A robust link between network and customer

The drop network is the crucial sphere where system and subscriber meet. To successfully deliver new video, data and voice services, Scientific-Atlanta's taps and passives have been designed with the high performance specifications needed to utilize the entire available bandwidth—up to a stringent 1 GHz.

Scientific-Atlanta: One source for end-to-end HFC solutions

Few companies have the expertise and breadth of products to address network migration choices as comprehensively as Scientific-Atlanta. As a full-system supplier that understands the challenges of evolving networks, we are committed to helping network operators maximize the full revenue potential of their systems. ■

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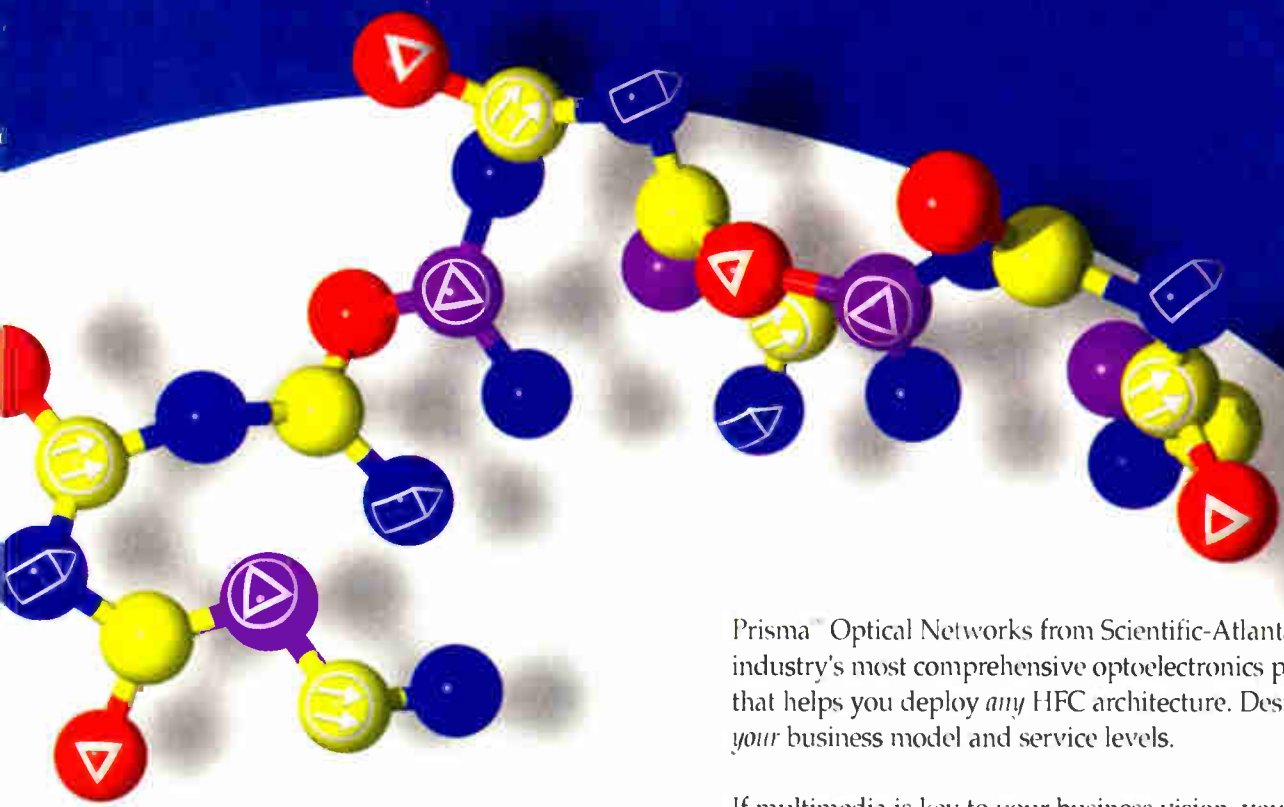

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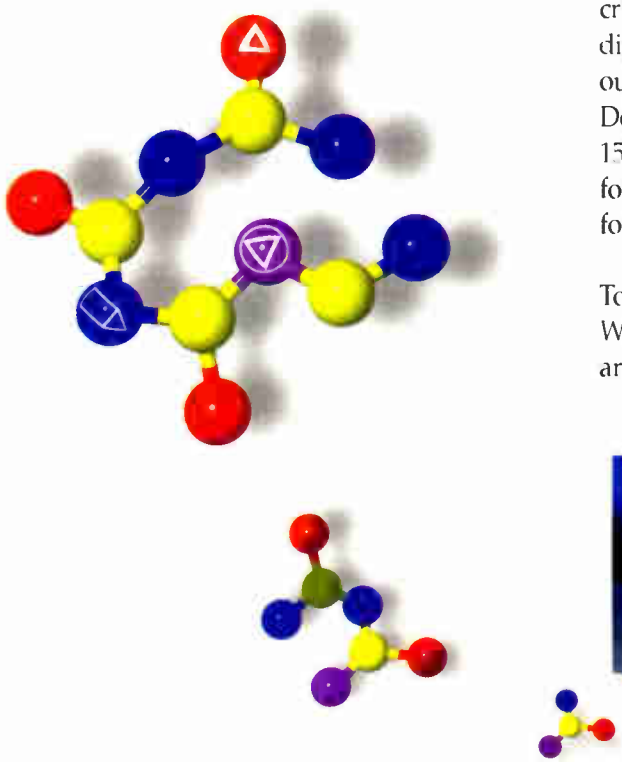

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High-Performance Products for the Advanced Broadband Network

Harmonic Lightwaves designs, manufactures and markets digital- and lightwave-based communications systems that deliver video, audio and data over hybrid fiber/coax (HFC), satellite and wireless networks. Harmonic's advanced solutions enable cable TV and other network operators to provide a range of broadcast and interactive broadband services that include high-speed Internet access and video-on-demand (VOD).

With its New Media Communication subsidiary, Harmonic offers cable, satellite and wireless operators a range of standards-based broadband communication systems that reach from the headend to the end-user.

PWRLink™ II

The new PWRLink II is half the size of Harmonic's earlier PWRLink transmitter, yet it still offers the same high performance. It allows operators to lower their overall cost of ownership, and they actually cost less per unit than our original model.

At many hubs, space becomes the limiting factor as new targeted services require additional equipment. Deploying the new PWRLink II is a very cost-effective way to expand your network. You double your capacity without adding racks or reducing floor space—simply scale down your rack requirements.

MAXLink™ 1,550 nm transmission system

Harmonic's MAXLink Transmission System is a family of high-performance 1,550 nm transmitters and optical amplifiers designed for long-haul applications and fiber-dense distribution networks. This system is ideally suited for hybrid analog/digital transport over redundant rings and hub interconnect architectures. A flexible array of transmitter and amplifier models allows you to customize your system to meet your specific application needs.

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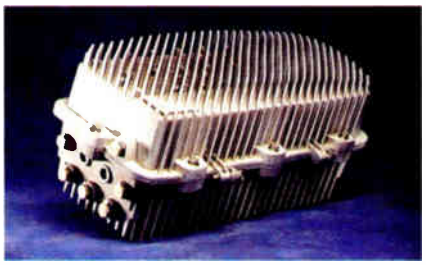
The industry's most cost-effective, compact 1,310 nm distributed feedback (DFB) transmitter



PWRBlazer scaleable node

PWRBlazer™ optical node family

Harmonic's PWRBlazer family offers a full line of optical nodes for any application—from supertrunking to distribution-to-the-node. The PWRBlazer scalable node is designed to meet network operators' immediate and long-term needs and can be easily reconfigured and upgraded to meet future network demands, such as delivering Internet access, video-on-demand (VOD) and other targeted services. This unique node is ideally suited for fiber and power redundant and scalable networks.

The PWRBlazer optical node and Mini Node complete the product line, offering solutions for fiber-rich architectures and fiber redundant networks, and fiber-to-the-curb and fiber-to-the-building applications, respectively.

Product positioning

Harmonic Lightwaves is setting industry standards with the rollout of our new high-density, low cost DFBs, our latest 1,550 nm transmitters and optical amplifiers, a full range of optical nodes, and second-generation digital headend equipment. With these latest innovations, Harmonic provides a comprehensive system with the flexibility to add new services, such as Internet access, now or in the future.

We also realize that to succeed in the highly competitive communications arena, providers of video and data services need more than high-performing products. That's why we back our technology with a responsive sales team and the superior support and technical service that you need to ensure profitable network operations.

From the start, we work with you to develop the technical strategy that best suits your needs, whether it's building a new broadband network or redesigning a current system to integrate new services. Once your network is up and running, we continue to support you with comprehensive technical assistance and training.

Our high performance products and people are always there to support you. ■

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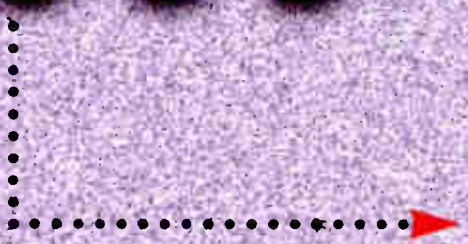

Ingress and the Customer Premises

The Engineering Community Works Together to Tame the Beast

By Daisy Whitney

One of an engineer's worst nightmares has reared its head again, only this time in a potentially more threatening fashion. The pesky problem of ingress has taken on a life of its own as cable operators begin to prepare and deploy two-way networks, but vendors say they are ready to tackle the noisy beast.

As MSOs begin to activate the reverse path, cable equipment manufacturers have stepped up efforts to control ingress (especially in the tricky area of the customer premises), though the electrical phenomena may never be completely eliminated.

INGRESS CONTROL CHOICES

Cable vendors have a number of solutions to offer system engineers, running the gamut from traps, to training to tightening. Each method has its share of advocates, but cable operators will ultimately need to decide what works best for each system.

Manufacturers and engineers are working both in tandem and alone to develop solutions that will lessen the effects of noise in the return path. While ingress is a fact of cable life and may never be truly eliminated, since engineers can't control what goes on in a customer's home, there are a number of methods to contain the errant signals.

> **"Manufacturers have stepped up efforts to control ingress ... though the electrical phenomena may never be completely eliminated."**

Controlling ingress was not as big a priority in the past. However, as operators rebuild and activate their networks to provide two-way service, they have needed to find solutions and find them fast.

"It becomes more important because we are intending to use the reverse path," says Paul Gemme, Time Warner's vice president of engineering. "Now that we are going to use the two-way path with Pegasus and Road Runner, we are very serious about ingress and interference in the forward and the reverse," he says.

NO SHORTCUTS

About 95% of ingress comes from the subscriber drop. 25% emanates from between the tap and the ground block, while the other 70% comes from between the ground block and the in-home devices. Of the total ingress that comes from home, about 40% is caused by connector leaks, Gilbert Engineering estimates.

Many of the causes of ingress are improper tightening of connector components and improper connector installation involving cable prepping, says Stan Hardin, product engineering manager for drop cable for CommScope. The cable manufacturer, based in Hickory, NC, trains its customers to alleviate ingress.

"A lot of technicians have the tools available to them but they may not use them all the time," Hardin says. "I think people get comfortable with a way of doing assembly work. Sometimes shortcuts are taken. There needs to be reinforcement in the technician's mind that taking shortcuts, although it looks like you're saving time in the near-term, in the long term it can cause problems."

The company teaches cable installers the best way to install its products to ensure maximum shielding, such as proper cable prepping, making sure the braid is folded back evenly, and using recommended installation and cable prepping tools.

PROPER TRAINING

Periodically, CommScope will work with system engineers on design, but Hardin emphasizes that most ingress can be controlled if the components in the subscriber drop are installed properly. The company has worked with TCI of Oregon to test drop cable to see how the shielding degrades over time and to determine the best

BOTTOM LINE

THE INGRESS DILEMMA

As MSOs begin to activate the reverse path, cable equipment manufacturers have stepped up efforts to control ingress (especially in the tricky area of the customer premises), though the electrical phenomena may never be completely eliminated.

Cable vendors have a number of solutions to offer system engineers, running the gamut from traps, to training to tightening. Each method has its share of advocates. Manufacturers and engineers are working both in tandem and alone to develop solutions that will lessen the effects of noise in the return path. While ingress is a fact of cable life and may never be truly eliminated, since engineers can't control what goes on in a customer's home, there are a number of methods to contain the errant signals.

shielding configuration to increase the life expectancy of drop cable. CommScope has also designed a thinner, more flexible outer jacket for its cable to provide better shielding, but while such technical advancements can help control ingress, the best solution still lies in training.

"Proper installation is the best way to avert the problem," says Hardin.

The training program is relatively informal, allowing the company to send its application engineers and product managers to a customer's site, at their request, for a training seminar. In the past, training sessions have covered the correct methods of terminating coax, how to ensure tight and leak-free connections, and proper trunk and feeder cable construction techniques.

CommScope is adding some formality to the program, says Mark Afrutz, director of technical services, by producing manuals on construction guidelines, which it has been doing since the Society of Cable Telecommunications Engineers Emerging Technologies Conference in late January. The company has visited Century, CableOne, Comcast and TCI, among others, to talk to either technicians or contractors who are doing the installs.

Times Fiber offers similar options to its cable customers. The cable manufacturer provides construction manuals, training videos and on-site tailored training sessions to address ingress, according to Alan Amato, director of engineering.

"We find that educating the operator as to what factors to consider in determining the proper level of shielding effectiveness for a drop cable in a specific noise environment, coupled with training of installers on properly using a quality connector will go a long way to reducing ingress problems," Amato wrote in a response to questions from *Communications Technology*.

Times Fiber also is concluding a study, at the request of a Top 10 MSO, to answer the following question: "How does power on the drop cable affect the corrosion process?"

STRONGER PRODUCTS

Fellow drop cable manufacturer Belden, based in Richmond, IN, has a different take on the problem. Doug Bremneke, product engineering group manager, says better, stronger products will do the trick. His customers have migrated to more heavily shielded products to combat ingress. Larger MSOs are opting to pay a premium for a better shielded cable, which can cost 8 to 10 cents a foot compared to the standard 5 cents for foil tape shields with a 60% braid. While the cable with three to four shields is not a new offering, says Bremneke, customers are more interested in it as they activate their reverse paths.

Bud Campbell of Gilbert Engineering maintains that the best way to combat ingress is a combination of training and shielding. As the vice president of engineering for the Phoenix-based connector manufacturer, he offers installation training for cable operators and their construction crews. The company maintains five different systems to test the effectiveness of shielding under different conditions, something telephone companies have been taking advantage of more than cable operators, he says.

THE SUB WILD CARD

Nonetheless, most of the ingress problems arising from connectors in cable systems are due to improper installation. Tightening up the connections will do a world of good, he says.

While Time Warner does discuss ingress and interference very carefully with its vendors, Paul Gemme, vice president engineering, believes controlling the errant signals can be done by the system.

"I view ingress and interference and trying to keep them reduced as an operational issue. I don't think technology is going to do anything to prevent it. I think we've put in good equipment. It's just that things get loosened up, customers put in their own splitters and don't tighten up connectors," he says.

Cable operators should do a signal leakage test every time they visit a customer's home, says Gemme. "The reason to do that is because anytime you have the potential for signals getting into a cable, you have signal leaking out of the cable also. You can't have one without the other."

CABLE MODEMS

While Time Warner's systems may bear the brunt of controlling ingress, the operator has begun to work closely with cable modem manufacturers, since many of them have never dealt with the RF restrictions they confront when designing products for a cable plant.

To prevent harmonics and other interference from entering the reverse path and to ensure cable is well-shielded, Time Warner has outlined these elements in the modem specifications for RFI shielding. "It's an education process for vendors," Gemme says. Since much of this information is new, Gemme advocates circumspect monitoring and testing of the development of new products.

"As we continue to work with new manufacturers that have not been involved in the cable industry before, we have to educate them as we go along about the reverse path," Gemme explains.

F-CONNECTORS AND MORE

In addition to newer vendors, Time Warner also works closely with industry veterans like CommScope and Times Fiber to make sure F-connectors are sealing the cable properly and not creating areas to introduce ingress.

The operator also is in the process of reviewing and evaluating actives and passives such as splitters and house amplifiers. It will then distribute a list to its systems of what products it recommends for purchase.

"The single most important thing [to prevent ingress] would be to pay close

attention to signal leakage in the system and in the home, and secure the plant so you don't have ingress coming into the reverse. We also need to continue to educate vendors as to the importance of having security against ingress, so they know how to make products that meet our needs," Gemme says.

NODE BY NODE ATTACK

Marcus Cable advocates cleaning up the ingress node by node if possible. If the signals are coming from a customer's home, then the system needs to go into the home and fix the wiring because customers may have installed their own splitters or used lower quality electronics store types, says Jeff Tokar, director of new business and technology for the Texas-based MSO. Ideally, an operator will want to find the source of the ingress and clean that up, as well as tighten up the plant in general. However, these tactics don't eliminate all the potential leakage areas, necessitating the installation of traps (high pass filters).

TRAPS

"You'd rather not trap. It's your last ditch effort. You want to find the source of it," Tokar says. While trapping benefits a plant, an operator must assess whether the incremental gain justifies the high cost of installing the traps. Marcus installed traps in systems where it has low value taps, says Tokar.

He points out that Com21 has developed a trap that works extremely well in two-way systems.

Com21 unveiled its Ingress Noise Blocker (INB) at the Western Show and is currently testing the product with the Palo Alto Cable Co-op. It blocks all signals in the 5 to 40 MHz range—the range ingress is usually transmitted in—in the upstream path. However, when the modem does need to transmit upstream, it sends a pilot signal to open the trap, allowing the signals to pass through for a brief moment. Com21 has licensed its technology for the trap to filter manufacturer Eagle Comtronics in New York, says Rick Wallsworth, director of product management for Com21. Eagle will be able to provide the trap at a price competitive to other high-pass filters, in the $5 to $10 range, whereas Com21 would charge $20, he says.

In its trials in Palo Alto, Wallsworth has seen noise floor levels range from no fluctuation to three dB, a 50% to 60% improvement over standard levels of 5 to 10 dB, he says. The product not only works on homes with cable modems, it also helps to eliminate ingress on all homes.

Traps are probably the best defense against ingress, but they can be costly, says Jim Farmer, chief technical officer for ANTEC. Traps work best when a subscriber does not need two-way access. In the event one does, then the trap should be placed after the point where the two-way service is connected to the drop, he says.

Despite the cost, traps are important since plant tightening is not enough, Farmer adds.

"Trapping is the best countermeasure. If you have problems with loose connections you'll probably fail the cumulative leakage index (CLI). If you pass the CLI, the plant may be tight enough. Then, the problem is in the drop. The solution is to clear up the drop or put in a trap," Farmer explains.

Depending on the complexity, the cost could run from $25 to several hundred dollars to replace the drop cable and poorly performing splitters, he estimates. In that case, a $2 to $5 trap, or even $5 to $10 for Eagle's product, looks more attractive.

Scientific-Atlanta has pursued a different path. It has made adjustments to its products outside the home to improve the boxes inside the home. By making adjustment to taps, splitters and amplifiers, S-A has increased the efficiency of its converter boxes and decreased the amount of ingress that can get into the reverse path.

"Where boxes are transmitting near the highest level you have the least chance for ingress to get in," says Bob Loveless, S-A's director of strategic technology planning for the terrestrial networks systems division. As the tap values decrease, the boxes transmit at a lower level, he explains.

To solve this problem, S-A has created new products that add loss to the reverse domain and do not add loss to the forward domain. "If you can make all boxes operate at a high level, you've made it equally tough for all houses to support ingress," he says. The way to achieve uniform levels of transmission from the boxes is not through manipulating or changing the in-home devices themselves, but rather through adjustments made to devices along the path outside the home.

The amplifier-to-house path is critical and balancing out the levels in that path will help prevent ingress from entering at the more susceptible low-level spots. S-A has added reverse loss to its amplifiers, causing them to operate at higher levels. In turn, the converters then operate at a higher level.

S-A also developed reverse path software that helps MSOs to design their reverse path. The use of the software is free. An operator loads in the laser characteristics and the software replicates how the plant will operate as it comes up through the various levels. That way a system engineer knows at what levels to set the plant.

Since S-A, or no one else for that matter, can control what a customer does in his or her home, the changes need to be made externally. When a customer does turn on the ham or CB radio or pager, then what is outside the home is protected better so the customer's actions won't impact the equipment inside the home. ■

Daisy Whitney is an editor at Phillips Business Information's "Cabled TV Daily." She may be reached via e-mail at pepr@worldnet.att.net.

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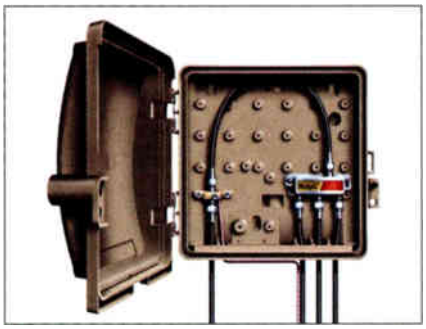
Keptel network interface devices

Keptel Network Interface Devices provide added environmental protection for critical drop components. Basic configurations house a splitter and ground block with the ability to upgrade to handle telephony interfaces. These lockable enclosures also inhibit tampering with the contents and provide a neat and orderly appearance at the side of the home.

V-gis™ V-chip

Beginning in 1998, TeleWire Supply will provide the broadband communications industry with V-gis™ V-chip technology from Tri-Vision International. Unlike common channel blocking technologies, V-gis allows parents to select programming suitable to the needs of their families based on the rating codes recently approved by the Federal Communications Commission. Content can be selected based on levels of violence, sex, language and dialogue.



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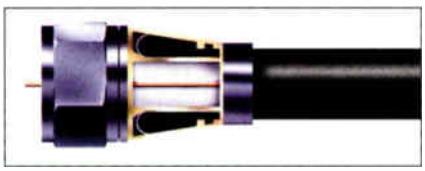

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Company profile

Hybrid fiber/coaxial (HFC) networks are evolving at a record pace, and broadband system operators are turning to TeleWire Supply for product and system solutions to accommodate new digital and interactive services.

TeleWire Supply, an ANTEC company, is a leading supplier of the wide range of products needed to build, upgrade and maintain communications networks. It provides a variety of products from leading manufacturers, as well as its own proprietary brands, to meet the changing requirements of today's broadband systems.

The combination of its technical support, customer service, inventory and sales coverage provides TeleWire with an established nationwide distribution system geared toward providing outstanding service and customer satisfaction. ■

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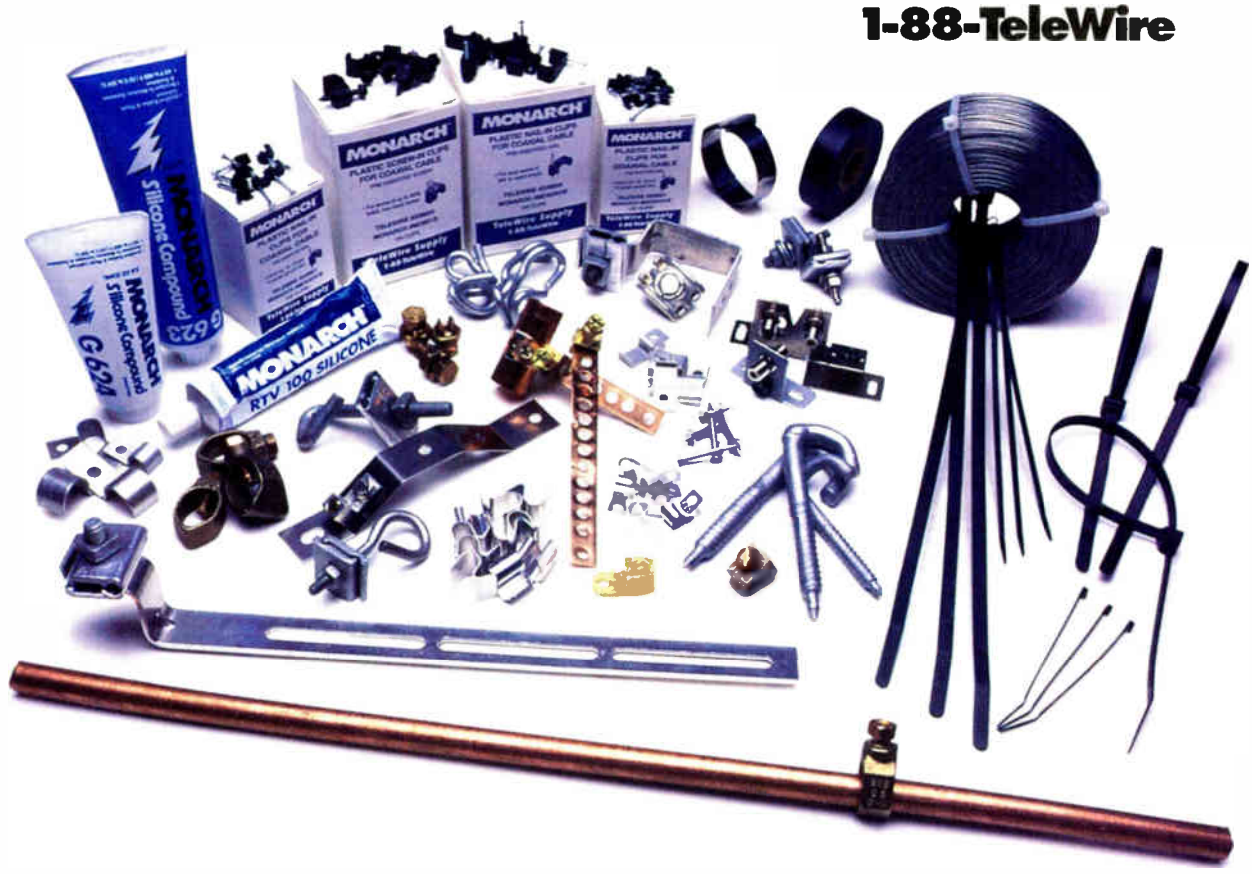
1-88-TeleWire



Reader Service Number 167

NETWORK OPERATIONS CENTER

A Real-World NOC in San Diego

What's in it, How it Works

By Roger Kramer

In 1994, our network operations center (NOC) was conceived as a headend/hub monitor and communications control center for Time Warner San Diego's soon-to-be upgraded hybrid fiber/coax (HFC) plant. The NOC was to provide a centralized location from which the health of all system operations could be monitored and from which resources could be immediately dispatched to provide reliable service to 190,000 cable customers.

The NOC itself was to provide a number of functions and services all under the following four broad categories:

1) Security: We would have to monitor 14 distribution hubs and three administrative buildings. A Honeywell Excel security manager (XSM) would provide system monitors and produce alarms for fire, burglary, access control and industrial processing. We also needed a full step-by-step documentation within the system as well as contact information for the NOC staff and closed-circuit camera surveillance.

> **"We sell reliability, and the NOC helps make this a reality."**

2) System and plant monitoring: We planned for monitoring of headend video, audio and digital music services, in addition to 24-hour HFC plant monitoring. Our custom on-line "Yellow Pages" would allow NOC staff to look up various standby personnel lists, vendor and broadcaster phone numbers as well as construction companies that support our system for emergency restoration. Ad insertion, commercial programming verification, correct channel switching confirmation and system outage detection all fall under this category.

3) Dispatch/communications: A

dispatch function was needed for all plant maintenance, headend and information services and the support staff to service all revenue-producing operations, as well as local area networking (LAN). The system had to be capable of notifying appropriate personnel to respond to all security system alarms. The contact personnel include police, fire department, plant maintenance and headend technicians on standby, as well as system management. There would be a 24-hour communication center for system personnel, broadcasters, equipment suppliers, and the public.

4) Ad insertion/commercial programming/switching: We planned for a compressed digital commercial insertion system with 500 MB insertion unit storage. We would need an equipment turnaround within 24 hours. Programming and channel switching would be required for up to 128 video sources. We planned for commercial advertising insertion, commercial programming encoding/playback and automatic program tuning, and recording via agile antenna. Also, we would want to communicate with all essential system operations and support personnel while communicating, minute-by-minute, the status of all business operations including addressability, billing system, phone switch, audio response unit (ARU) and business radio.

In considering the structural requirements for the NOC building, we decided on 2,200 square feet for the NOC, 2,620 square feet for the headend and 450 square feet for the battery/power room.

The NOC would be staffed by no fewer than two trained employees at any time (the usual staff on duty is five).

We designed for earthquake construction and bracing to meet AT&T standards (8.0 on the Richter scale).

We elevated the computer floor to accommodate wiring trays to meet fire code and allow air conditioning circulation. We avoided the need for plenum cables.

We decided on a two-level emergency power backup system— batteries and diesel generators.

As noted earlier, because of monitoring requirements, we would need signal distribution throughout three administrative buildings as well as the NOC and headend. A.F. Associates of Northvale, NJ, specialists in design, engineering and fabrication of broadcast communications facilities, was chosen as video services integrator.

Time Base Console, Northvale, NJ, was hired to design and build the monitor wall and NOC consoles.

San Diego Lighting provided glare-free, ergonomically sound lighting and Electrical Contracting Inc. (ECI) of Escondido, CA, performed the lighting installation. Acoustical Standards, Inc. of Chino, CA, provided and installed acoustical treatment on the walls with a "floating" ceiling.

SeaChange provided digital ad and tape-based commercial ad insertion equipment racks and an encoding station on the lower level.

Current staff is 16 to fill our needs 24 hours a day on full and part time shifts.

The structural integrity of the NOC/headend building was re-engineered to meet construction specifications for essential communications facilities. These improvements included:

- Construction of a structural two-hour shear fire wall and foundation.
- Installation of a roofing joist system, making the roof an integral part of the building wall structure.
- Injection of epoxy compounds into the structural wall seams and cracks.
- Installation of a raised computer flooring system (12 inches) throughout the headend and NOC. Under-floor cabling to be enclosed with a plenum system. Custom-made steel trays with lids provided by ECI.
- Installation within the headend space of redundant 20-ton Deluxe System-3 Liebert air conditioning units capable of controlling both temperature and humidity.
- Installation of a new electrical service with a Seimens 2000 amp switchboard.
- Installation of an International Power Machine, model BP+75, 75 KVA uninterruptible power supply (UPS).
- Installation of redundant (two each) 750 kW Onan generators on seismic foundation pads. The system would include Automatic Transfer Switches and a manual Tie-Breaker for shifting entire building power loads from one generator to the other, in case of failures.
- Installation of a Lucent Technologies Lineage 2000 A2 (three 400 amp rectifiers, two 200 amp rectifiers) DC Power Plant with ECS 12 Universal controller (capacity of 1600 amps), connecting to two battery strings.
- Installation of a building ground system conforming to AT&T specifications. (Seven satellite antennas, 800 feet away, are tied to the headend ground grid.)
- Installation of an Energen fire suppression system with an Ansul controller in the battery/power room.
- Installation of a Honeywell Excel Security Manager (XSM) System for controlling access to buildings, building spaces, monitoring fire and burglary systems, building operating systems (such as incoming power quality), generator operations and alarms, air conditioning systems and fire suppression systems.

NOC FUNCTIONS EQUIPMENT

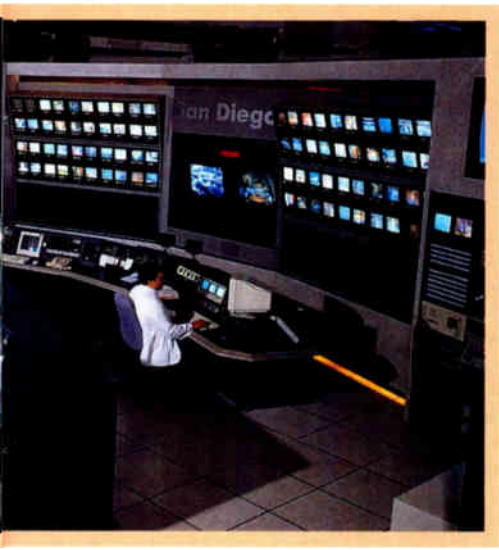
- Chyron Codi character generators: video bulletin boards, black out channels accomplished via 8 generators, test and graphic message creation, ability to

BOTTOM LINE

THE MAKING OF A NOC

Time Warner San Diego's network operations center (NOC) was conceived as a headend/hub monitor and communications control center the system's soon-to-be upgraded hybrid fiber/coax (HFC) plant in 1994. The NOC was to provide a centralized location from which the health of all system operations could be monitored and from which resources could be immediately dispatched to provide reliable service to 190,000 cable customers.

This article details equipment used to build that NOC.



display messages on all channels.

• Surround-Sound audio monitoring system accomplished by Dolby Pro-Logic decoder.

• Monitor wall with separate visual and audio monitoring all channels. System uses 120 9-inch JVC color monitors and LED audio meters.

• Commercial insertion, community programming playback, three channels of commercial program playback controlled by Channelmatic Adcart system with off-line edit suite, dub rack and tape room.

• Adcart automation system used to run four channels of infommercials using 12 decks, four decks per channel.

• Leitch digital time/date display unit dials up weekly to set NOC clock accuracy to NIST (National Institute of Standards and Technology, Boulder, CO).

• Two each 40-inch Mitsubishi RGB monitors slaved to Honeywell XSM security and HP Openview system.

• PCS and Nextel Digital Dispatch two-way communications system.

• Superior Satellite Engineers, Columbia Falls, MT, controller, remote steerable 5 meter satellite antenna with Ku-band capabilities for recording promos and training videos.

• News off-line edit system using Sony 3/4-inch Umatic decks with Sony edit controller, Tektronix test signal generator and Sony 8 channel mixer with mic and line inputs.

• SeaChange compressed digital commercial insertion system runs on Windows NT platform. Master Video Library stores 40 GB of information with insertion units storing 500 MB.

• Dubbing bay supports SVHS, Beta, 3/4- and 1-inch tape formats.

• Programming control direct access of Grass Valley Group routing switcher.

• Waveform monitoring availability of pre and post video and audio.

• Addressability control Zenith ZTAC for Music Choice ACC 4000 (Jerrold).

• Public viewing area created behind plexiglass display hall.

• Racks braced and anchored to AT&T specs in NOC, headend and distribution hubs.

• Road Runner network monitoring (added in 1997).

• Trilithic 9580 Return plant display capability (added in 1998).

HEADEND EQUIPMENT

• One primary Headend/Primary Transport Hub to service the entire San Diego and Coronado, CA, plant—centrally located adjacent to the 8949 Ware Court operations building.

• 128X128 SMS 7000 Grass Valley Switcher, switching baseband video and 4.5 MHz audio.

• 78-channel Nexus II-2000 headend—SA/Nexus-2000 modulators (78 channel analog headend).

• Headend and hub color-coded cables to aid troubleshooting and identification (blue-Belden 8281 video, red-Belden 8241 4.5 MHz audio and white-Belden RG-59 reverse, in hubs).

• All RG-59 is quad-shield and uses LRC Snap 'n Seal connectors. Video connectors are exclusively Trompeter.

• Cables and equipment are labeled using a Brady LS2000 labelmaker, black lettering on white background.

• General Instrument 70-channel Music Choice Headend.

• Ipitek optical couplers and attenuators.

• All electronics DC powered (with exception of Nexus II-2000) by AT&T.

• -48 VDC Lineage power plants at the headend and hubs.

OPTICAL TRANSPORT/FIBER DISTRIBUTION HUBS

• 78 analog signals to 15 distribution hubs on a Synchronous 1,550 AM fiber super trunking system, 40 channels each on two fibers and allows for the future addition of 1,550 nm EDFA optical amplifiers.

• 80-channel supertrunk backup ring that automatically switches at the DLH receiver upon loss of the primary RF output.

• The distribution hubs serve 40 nodes, 20,000 passings or 500 average passings per node.

• We use Siecor SMF-28 Single-Mode Mini-bundle loose tube, dielectric, armored fiber cable and Preformed Line Products outdoor splicing enclosures.

• ALS/ADC DV6000 and Ipitek CQ8 10-bit digital equipment is used to transport studio broadcast feeds to the headend and it also provides for a 16-channel interconnect.

• The fiber feeder system uses 20 mW Ipitek/Ortel and ADC HX-7501 DFB lasers feeding Augat Miniflex nodes.

• The link budget averages 3 to 4 db with a maximum of 13 db.

• Our minimum optical link performance is 50 C/N, 65 CTB, 65 CSO and XMOD.

• We use a Trilithic 9580 maintenance system transmitter to provide return path ingress monitoring for all node groups at each hub.

• A Wavetek stealth 38R transmitter is used for forward and reverse plant set-up and sweep at each hub.

• Ipitek 1,310 nm RPRD return path receivers, per node, are -24 VDC backup-powered.

• All distribution hub electronics are -48 VDC powered.

• We use Siecor fiber distribution panels and enclosures.

• We use 84-inch Nexus and Siecor equipment racks.

• ADC Telecommunications fiber management systems are mounted above the racks.

RF DISTRIBUTION

• RF distribution utilizes Augat SDA distribution amplifiers, types 1, 2, 3 and 4.

• Forward bandwidth is 54 to 750 MHz, reverse 5 to 40 MHz. The maximum cascade is (two) type 1/4 amps (one) type 2 amps and (three) type 3 amps.

• Minimum end of line performance is 47 C/N, 53 CTB, 53 XMOD and 55 CSO.

• Alpha XM9015 and Lectro ZTT standby power supplies are used. They can be configured with three or six batteries and tapped for 60, 75 or 90 volts. They all can be upgraded with status monitoring capabilities.

• All passives are specified to 1 GHz.

The NOC has proven over 2-1/2 years of operation to identify problems and to ensure that they are repaired, in most cases, before customers even know about them. We sell reliability, and the NOC helps make this a reality. ■

Roger Kramer is vice president of engineering at Time Warner in San Diego. If you want more information on the NOC, contact Patricia Norwood via e-mail at tnorwood@dir-mail.san.rr.com.

BARCO

BARCO Provides Comprehensive Network Monitoring

BARCO Group, headquartered in Kortrijk, Belgium, operates four major lines of business: Visualization, Automation, Communication Systems and Graphics. With five U.S. subsidiaries and North American headquarters in Kennesaw, GA, BARCO Communication Systems has over 30 years' experience in providing high quality, high performance broadband communication systems worldwide. In addition to its analog and digital headend products, its complete headend and network management systems, and its broadcast display products, the company offers digital compression and transmission products to the cable TV, broadcast and telecom industries.

KEY PRODUCTS

ROSA

BARCO's ROSA 2.0 is a new generation software version of its widely known ROSA cable TV management system. ROSA 2.0 is the first operations support system (OSS) to provide real headend automation. In addition, ROSA can communicate with other servers in a sophisticated CATV/Telco system. Its open architecture even allows for easy integration of third-party equipment into the monitoring system. In combination with BARCO's "Copernicus" headend server, the new ROSA 2.0 software provides local intelligence to control main headends, hubs and networks from various client computer sites. This makes ROSA the first OSS to enable full headend automation.

Copernicus headend server

BARCO's Copernicus is an open architecture "headend server" which provides element management of both BARCO and non-BARCO equipment and software. Copernicus becomes the heart of the headend, providing CATV systems with the same advanced system control, automation and high-performance features found in today's telephony operations including automatic alignment, source backup, destination backup, filtering of alarm messages as well as sophisticated system reporting and security provisions.

Based on standard PC components in a 19-inch rack-mounted chassis (four units high), Copernicus is installed in the headend and acts in much the same manner as a server in a WAN or LAN. Copernicus hosts not only BARCO's ROSA software but also third-party software and can communicate with other servers in a sophisticated CATV/Telco system. These combined software modules can interlink information concerning network performance, headend performance, billing operations and an array of other applications. The system uses Windows NT/Windows 95 operating systems, standard SNMP interfaces and common TCP/IP protocol.

NetSense end-of-line monitor

BARCO's NetSense is a cost-effective monitoring device for monitoring CATV network availability and performance. Located at various points in the network, NetSense reports network signal quality based on a number of critical parameters. This information provides an instant view of the network performance, reducing out-of-service time and eliminating much of the guesswork and resulting costs associated with network maintenance and repair. NetSense can be installed in a large number of locations to supervise the network, the power supply voltage, bit error rate on forward and return path and up to six digital inputs, for monitoring of power supplies, etc. Each NetSense typically monitors two programmable RF carriers and reports the results, via the return path, to the Central Control Unit (CCU) in the Copernicus element manager located at the headend. The CCU provides the interface for polling, logging of measurement results and alarm correlation. The measured values are compared to programmed alarm thresholds. Alarms coming from the various monitoring devices in the network can then be correlated into one alarm to the management system, indicating which path of the network is affected. ■

For more information:

BARCO • 3240 Town Point Drive • Kennesaw, GA 30144
Phone: (770) 218-3200 • Fax: (770) 218-3250
Web address: HYPERLINK http://www.barco.com www.barco.com
Chief Sales Contact: David Wright
Phone and fax same as above.

Your Subscribers are Monitoring Your Network Performance.

- **Complete Headend Monitoring and Control**
- **Increase Subscriber Satisfaction**
- **Reduce Out of Service Time**
- **Self-healing Capabilities**
- **Automatic Service Restoral**
- **Reduce Maintenance/ Troubleshooting Costs**

Are You?

ROSA software keeps an eye on your network. It can see problems before they are noticeable to your subscribers, reducing service outages and maintaining high levels of customer satisfaction.

ROSA also simplifies maintenance and troubleshooting, pinpointing problems, switching in backup equipment, and reducing service dispatch calls.

ROSA is short for Remote Control and Diagnostic System Open System Architecture. But it's long on promoting the highest quality of service and keeping subscribers happy.

BARCO

For more information, call (770) 218-3200 or write:

BARCO
3240 Town Point Drive
Kennesaw, GA 30144
Tel: (770) 218-3200
Fax: (770) 218-3250
www.barco.com

Reader Service Number 168

network operations center

Harris Network Management—Providing Solutions for Your Network

Harris Corp., with worldwide sales of more than $3.3 billion, is an international communications and electronics company that provides a wide range of products and services, such as wireless and personal communications, digital TV (HDTV), health care information, multimedia communications, automotive electronics, transportation, business information, defense communications and information, and Lanier office products. Headquartered in Melbourne, FL, Harris has more than 27,000 employees worldwide and has provided advanced technologies and solutions in more than 150 countries.

Harris Network Management

Harris is a leading provider of advanced network management systems and services for large, multimedia telecommunication networks. Harris Network Management (HNM) is scalable software, with dynamic customizable graphics, that allows network operators to quickly make real-time evaluations and respond to changing network conditions. HNM combines a powerful management system with a common user interface for total heterogeneous network integration.

The expandable HNM tool provides network performance analysis and faster problem detection, often before problems ever occur. HNM features include multiprotocol element management, SNMP and CMIP alert correlation, performance reporting, central-site or distributed management, and support for legacy equipment.

HNM benefits:

- Improves carrier service by reducing repair time

HNM provides users with real-time management capabilities.

NetSIMPLE provides SNMP-based management for legacy equipment.

- Reduces staffing requirements and training levels
- Monitors multi-vendor, multi-function networks
- Monitors both telecom and datacomm protocols
- A value-added differentiator for other Comm Sector systems

HNM discriminators:

- Based on open systems standards
- Supports geographically distributed heterogeneous networks
- Supports both legacy and emerging standards
- Based on scalable/distributed architecture
- Customer modification capability
- Superior graphics interface
- Best price/performance in the industry

NetSIMPLE

NetSIMPLE is an exciting new product providing SNMP-based management for ASCII-based "legacy" systems. NetSIMPLE provides easy-to-use SNMP-capable interfaces between ASCII ports on legacy devices and TCP/IP-based networks. This will allow today's SNMP-based management stations, such as Harris Network Manager (HNM), SunNet Manager and HP OpenView, to easily manage legacy systems using one standardized protocol.

The NetSIMPLE product consists of a graphical interface builder for click-and-go MIB support. It also provides the ability to define the interface to the equipment using standard (TL1, TBOS, TABS, etc.) and non-standard protocols. The graphical interface allows for the custom configuration of the transmit data and the receive data to/from the legacy equipment. This data is then interpreted and dynamically placed in MIB variables or sent out as SNMP traps. Once the scripted device interface definition is complete, simply download it to the remote Windows NT PC or run it locally. Just define the interface to the equipment and you will have an instant Legacy to SNMP proxy agent that you can distribute to each of your remote locations with that equipment interface. ■

CT's Technology Profiles

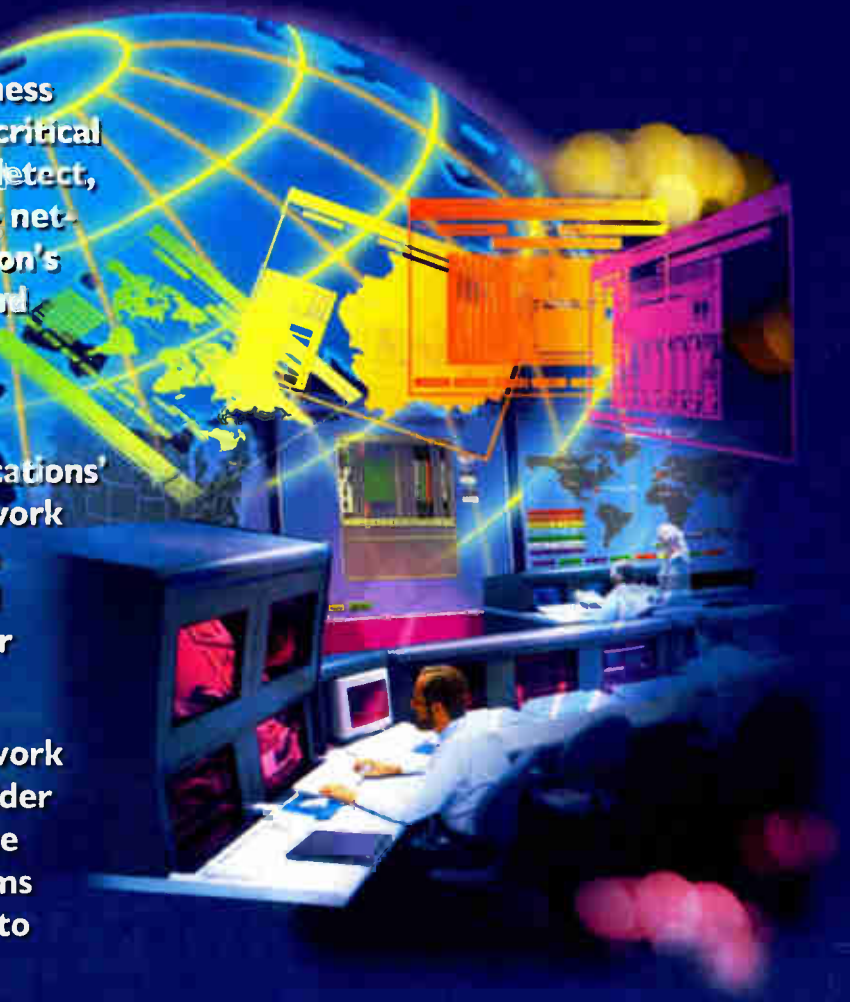
For more information:

Harris Corp. • 1025 W. Nasa Blvd. • Melbourne, FL 32919
Phone: (407) 724-3828 • Fax: (407) 724-3947
www.harris.com/telecom
Chief sales contact: Jim Odom, vice president, Network Products & Services
Phone: (407) 724-3183; Fax: (407) 724-3627
jodom@harris.com

HARRIS

Your Source for Network Management Solutions

Ensuring uninterrupted network performance is crucial in any business these days—especially yours. It is critical for network managers to quickly detect, evaluate, and respond to changing network conditions. Harris Corporation's response to the need for a fast and efficient system to monitor and troubleshoot networks is Harris Network Management—HNM. HNM manages your telecommunications' infrastructure. Whether your network includes fiber, microwave, satellite communications or environmental equipment, HNM is your source for network management solutions.



Harris is the only enterprise Network Management System (NMS) provider who is a telecommunication service provider, manufacturer, and systems integrator who uses its own NMS to manage its global network.

- Turnkey solutions
- The most cost-effective interface to support equipment
- Proven systems engineering
- Multiprotocol environment
- Distributed architecture, scalable, multiplatform environment
- Open systems
- Customer modifiable tools

HARRIS

HNM

HARRIS NETWORK MANAGEMENT

1-800-4-HARRIS ext. 4703
407-727-9207
www.harris.com/telecom

Member of the Network Management Forum (NMF)

Reader Service Number 170

World Access, Inc.

World Access Develops Products That Make the Most of Your Cable Network Operations

World Access, Inc. offers a range of products and related services enabling cable operators to establish and maintain a competitive position in the global marketplace as full-service networks. As a developer and manufacturer of advanced communications equipment, World Access provides an innovative array of support services to our customers.

KEY PRODUCTS

CablePLEX 6100-IM

The CablePLEX 6100-IM multiplexing system is designed to multiplex voice, compressed video files and data within existing networked cable headends, thus eliminating the local exchange telephony costs incurred when sending voice and data to and from remote sites.

The CablePLEX 6100-IM saves the cable operator the cost of toll calls to remote headends and also decreases the time it takes to send data updates to the customer equipment via the set-top box converter addressable computer. CablePLEX provides infrastructure equipment to send pay per view (PPV) from the master headend to remote sites over existing fiber or coax lines. With the World Access solution, the process of sending telephony and data is made more efficient, resulting in lower operating costs.

CablePLEX Ultra-45

The CablePLEX Ultra-45 digital multiplexing system allows cable operators to efficiently mix a variety of signals, including HDTV, MPEG-2, DVB, Internet and telephony, into one stream.

CablePLEX 6100-IM—An integrated video, data and telephony solution for cable headend operations

CablePLEX Ultra-45—Digital video transport solution for cable operations

This solution eliminates the need to reserve enough bandwidth for each individual signal as well as the need to purchase multiple transport systems for each service, thus minimizing capital investment in hardware and increasing bandwidth availability.

The CablePLEX Ultra-45 system is designed to be easily integrated into a variety of cable networks. The system has a wide assortment of interfaces, including 10BaseT, Ethernet, HSSI and RS-442, making it an easy fit into any existing cable operation. The Ultra-45 also features programmable data rates, making it ideally suited for digital video transport.

Product positioning and future deployment solutions

The company delivers a combination of high-performance telephony and data communications products coupled with customer service features such as engineering, installation, on-site and remote maintenance, asset management and equipment repair. Based on a comprehensive approach that covers all phases of the network/technology life cycle, the World Access Life Cycle Support™ service offers significant cost and performance advantages to the cable industry.

In particular, World Access markets and manufactures products that better the process of delivering video, audio and data from business to business and business to the home. Based on years of experience in the telecommunications industry, World Access is able to offer unique solutions such as the CablePLEX product line, to streamline communication systems in today's cable headend environment.

The goal of World Access is to add to the CablePLEX family of products by researching and developing new technologies that will help you make the most of your cable network operations. As new standards emerge and new systems are formed, World Access is committed to evaluating and improving the process of sending video, telephony and Internet services from cable networks to homes and businesses. ■

For more information:

World Access, Inc. • 5934 Gibraltar Dr., • Suite 101 • Pleasanton, CA 94588
Phone: (510)730-0060 • Fax: (510) 730-0072
www.waxs.com
Chief Sales Contact: Dan Rubin • (888) 690-9297 • Fax: (510) 730-0072
danr@waxs.com

solutions

for communities

on the move...

...and networks

that serve communities

World Access can help you make the most of your cable network operations. Our turn-key solutions will enable you to efficiently transport video, audio and data to the home as well as to your remote offices. To save money and streamline your communications infrastructure, consider network solutions from World Access. Call us to discuss how our CablePLEX™ line of products can be used to solve your network operations center problems.

World Access, Inc.™

Progress Begins With Communication

To learn more, call 1-888-690-WAXS; or visit www.waxs.com

Reader Service Number 171

Where to Go to Get What You Need

What follows is a listing of vendors, distributors and categories provided by the Society of Cable Telecommunications Engineers and the National Cable Television Association in their 1997 show floor guides. Vendors, if you have changes or additions to submit to this listing, please see the accompanying sidebar.

Amplifiers

Adams Global Communications
15140 South Keeler #D
Olathe, KS 66062
(913) 764-7280

ANTEC
2850 West Golf Rd.
Rolling Meadows, IL 60008
(770) 441-0007

Avcom of Virginia Inc.
500 Southlake Blvd.
Richmond, VA 23236
(804) 794-2500

Blonder-Tongue Laboratories Inc.
One Jake Brown Rd.
Old Bridge, NJ 08857
(908) 679-4000

CADD Services Group Inc.
405 North Reo St., Suite 240
Tampa, FL 33609
(813) 289-4119

Can-Am Services Inc.
12903 Agency
San Antonio, TX 78247
(210) 496-2288

C-COR Electronics Inc.
60 Decibel Rd.
State College, PA 16801
(814) 231-4460

Cable Constructors Inc.
105 Kent St., P.O. Box 190
Iron Mountain, MI 49801
(906) 774-6621

Cable Converter Service Corp.
54 East Market St.
Spencer, IN 47460
(812) 829-4833

Cable Shoppe Inc.
One Prospect Ave.
Albany, NY 12206
(518) 489-2100

Cable Source International
5172 Sinclair Rd.
Columbus, OH 43229
(614) 268-3700

Cable Technologies International
2500 Office Center, Suite 300
Willow Grove, PA 19090
(215) 657-3300

Coast CATV Supply Inc.
314 Elizabeth Rd.
Corona, CA 91720
(909) 272-2360

Commercial Electronics Inc.
209 East Jackson St.
Gate City, VA 24251
(540) 386-7451

Comtech Services
2675 East 28th St.
Sedalia, MO 65301
(816) 826-3011

Contec
1023 State St.
Schenectady, NY 12307
(518) 382-8000

DB-Tronics
145 Tradd St.
Spartanburg, SC 29301
(864) 574-0155

Dawn Satellite Inc.
3340 South Lapeer Rd.
P.O. Box 9
Lake Orion, MI 48361
(248) 391-9200

Electroline Equipment Inc.
8265 St. Michel Blvd.
Montreal, PQ H1Z 3E4 Canada
(514) 374-6335

Furukawa Electric
Lafayette St., #401
Santa Clara, CA 95050
(408) 248-4884

General Instrument Corp.
2200 Byberry Rd.
Hatboro, PA 19040
(215) 674-4800

Graybar Electric Co. Inc.
34 N. Meramec Ave.
Clayton, MO 63105
(314) 512-9288

Harmonic Lightwaves Inc.
549 Baltic Way
Sunnyvale, CA 94089
(408) 542-2500

iCS Inc.
1143 Newport Center Dr. West
Deerfield Beach, FL 33442
(954) 427-5000

Integrated Photonic Technology (IPITEK)
2330 Faraday Ave.
Carlsbad, CA 92008
(619) 438-8362

Jebsee Electronics Co. Inc.
24-3 Sin-La Rd.
Tainan, Taiwan

Jerry Conn Associates Inc.
130 Industrial Dr.
Chambersburg, PA 17201-6006
(717) 263-8258

John Weeks Enterprises Inc.
75 Grayson Industrial Pkwy.
P.O. Box 189
Grayson, GA 30221
(770) 963-7870

Jones Broadband International Inc.
4120 Avenido de la Plata
Oceanside, CA 92056
(760) 631-2324

Lindsay Electronics
50 Mary St. West
Lindsay, ON K9V 4S7 Canada
(705) 324-2196

Lucent Technologies
600 Mountain Ave.
Pomfret,, CT 06258
(508) 960-2950

Main Line Equipment Inc.
837 Sandhill Ave.
Carson, CA 90746
(310) 715-6518

Mega Hertz
6940 South Holly Cir., Suite 200
Englewood, CO 80112
(800) 525-8386

Multicom Inc.
1076 Florida Central Pkwy.
Longwood, FL 32750
(407) 331-7012

NCS Industries Inc.
2255 E. Wyandotte Rd.
Willow Grove, PA 19090
(215) 657-4690

Non-Stop CATV Services Inc.
795 North Ave., Suite D
Vista, CA 92083
(760) 630-3566

Optigain Inc.
1174 Kingstown Rd.
Peace Dale, RI 02883
(401) 783-9224

PDI
6353 West Rogers Cir.
Boca Raton, FL 33487
(561) 998-0600

Peregrine Communications Inc.
14818 West 6th Ave., Suite 16A
Golden, Ca 80401
(303) 278-9660

Philips Broadband Networks Inc.
100 Fairgrounds Dr.
Manlius, NY 13104
(315) 682-9105

Pica Products/Pica Macom Inc.
12500 Foothill Blvd.
Lakeview Terrace, CA 91342
(818) 897-0028

Pirelli Cable Corp.
700 Industrial Dr.
Lexington, SC 29072
(803) 951-4885 or 4046

Power & Telephone Supply
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Qintar Inc.
699 Mistletoe Rd.
Ashland, OR 97520
(541) 488-5500

Quality RF Services Inc.
850 Pkwy. St.
Jupiter, FL 33477
(800) 327-9767

Quintech Electronics & Communications Inc.
Box 235, Route 286 North
Indiana, PA 15701
(800) 839-3658

R.L. Drake Co.
230 Industrial Dr.
Franklin, OH 45005
(513) 746-4556

Satellite Engineering Group Inc.
6050 Connecticut Ave.
P.O. Box 33475
Kansas City, MO 64120
(816) 231-8080

Satellite Export & Engineering
1007 Industrial Ave.
Albion, MI 49224
(517) 629-5990

Scientific-Atlanta Inc.
4261 Communications Dr.
Norcross, GA 30093
(770) 903-6306

Scott Cable Communications Inc.
42 Toledo St.
Farmingdale, NY 11735
(516) 694-7157

Signal Vision Inc.
27002 Vista Terrace
Lake Forest, CA 92630
(714) 586-3196

Silicon Valley
931 Benecia Ave.
Sunnyvale, CA 94806
(408) 739-8800

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000

TVC Inc.
1746 East Chocolate Ave.
Hershey, PA 17033
(717) 838-3306

TeleWire Supply
94 Inverness Terrace E.
Englewood, CO 80112
(847) 439-4444

Thomas & Betts Corp.
(formerly Augat Communication Products Division)
1555 Lynnfield Rd.
Memphis, TN 38119
(607) 796-5630

Toner Cable Equipment Inc.
969 Horsham Rd.
Horsham, PA 19044
(215) 675-2053

Tulsat
1605 East Iola
Broken Arrow, OK 75012
(800) 331-5997

Videotek Inc.
243 Shoemaker Rd.
Pottstown, PA 19464
(610) 327-2292

Viewsonics Inc.
6454 East Rogers Cir.
Boca Raton, FL 33487
(561) 998-9594

Westec Communications Inc.
13402 N. Scottsdale Rd.
Scottsdale, AZ 85254
(800) 666-4441

ATM Switching

ADC TeleCommunications Inc.
999 Research Pkwy.
Meriden, CT 06450-8323
(203) 630-5700

Fujitsu Network Communications
2801 Telecom Pkwy.
Richardson, TX 75082
(972) 690-6000

Lucent Technologies
600 Mountain Ave.
Pomfret, CT 06258
(508) 960-2950

Mil 3 Inc.
3400 International Dr. NW
Washington, D.C. 20008
(202) 364-4700

Ryan Hankin Kent Inc.
601 Gateway Blvd., Suite 550
San Francisca, CA 94080-7005
(415) 737-9600

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000
Vyvx Inc.
Williams Vyvx Services
Tulsa Union Depot
111 E. First St.
Tulsa, OK 74103
(918) 588-4909 or 3550

Batteries

Adams Global Communications
15140 South Keeler #D
Olathe, KS 66062
(913) 764-7280

Alpha Technologies
3767 Alpha Way
Bellingham, WA 98226
(360) 647-2360

ANTEC
2850 West Golf Rd.
Rolling Meadows, IL 60008
(770) 441-0007

Cable Constructors Inc.
105 Kent St., P.O. Box 190
Iron Mountain, MI 49801
(906) 774-6621

Coast CATV Supply Inc.
314 Elizabeth Rd.
Corona, CA 91720
(909) 272-2360

Commercial Electronics Inc.
209 East Jackson St.
Gate City, VA 24251
(540) 386-7451

Comtech Services
2675 East 28th St.
Sedalia, MO 65301
(816) 826-3011

Lectro (Exide Electronics)
8380 Capital Blvd.
Raleigh, NC 27616
(919) 713-5300

Graybar Electric Co. Inc.
34 N. Meramec Ave.
Clayton, MO 63105
(314) 512-9288

Herman Electronics
7350 Herman Way
Miami, FL 33122
(305) 477-0063
Mega Hertz
6940 South Holly Cir., Suite 200
Englewood, CO 80112
(800) 525-8386

Multilink Inc.
580 Ternes Ave.
Elyria, OH 44035
(440) 366-6966

NCS Industries Inc.
2255 E. Wyandotte Rd.
Willow Grove, PA 19090
(215) 657-4690

O.G. Hughes & Sons Inc.
4816 Rutledge Pike
Knoxville, TN 37914
(423) 524-7525

PDI
6353 West Rogers Cir.
Boca Raton, FL 33487
(561) 998-0600

Performance Power Technologies
P.O. Box 947
Roswell, GA 30077
(770) 475-3192

Power & Telephone Supply
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Powertronics Equipment Co. Inc.
2010 Industrial Blvd., Suite 611
Rockwall, TX 75087
(972) 722-2310

Satcon Technology Corp.
161 First St.
Cambridge, MA 02142
(617) 661-0540

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000

TeleWire Supply
94 Inverness Terrace E.
Englewood, CO 80112
(847) 439-4444

Time Manufacturing-Versalift
7601 Imperial Dr.
Waco, TX 76710
(817) 776-0900

Toner Cable Equipment Inc.
969 Horsham Rd.
Horsham, PA 19044
(215) 675-2053

Voltex Batteries Inc.
14 Steve Dr.
Atlanta, GA 30340
(770) 448-6021

Cable

AMP Inc.
1116 West Enclave Cir.
Louisville, CO 80027
(800) 220-5489

Alcatel Telecommunications Inc.
2512 Penny Rd.
Claremont, NC 28610
(800) 729-3737

Alcoa Fujikura Ltd.
P.O. Box 3127

Spartanburg, SC 29304
(864) 433-0333

Amphenol Fiber Optic Products
1925 A Ohio St.
Lisle, IL 60532
(630) 960-1010

Bekaert Corp.
1395 South Marietta, Bldg. 500, Suite 100
Marietta, GA 30067
(770) 421-8520

Belden Wire & Cable Co.
2200 U.S. Hwy. 27 South
Richmond, IN 47374
(317) 983-5200

CADD Services Group Inc.
405 North Reo St., Suite 240
Tampa, FL 33609
(813) 289-4119

Cable Constructors Inc.
P.O. BOX 190; 105 Kent St.
Iron Mountain, MI 49801
(906) 774-6621

Coast CATV Supply Inc.
314 Elizabeth Rd.
Corona, CA 91720
(909) 272-2360

Commercial Electronics Inc.
209 E. Jackson St.
Gate City, VA 24251
(540) 386-7451

CommScope
P.O. Box 1729
Hickory, NC 28602
(800) 599-9265

Comtech Services
2675 East 28th St.
Sedalia, MO 65301
(816) 826-3011

Fiber Instrument Sales Inc.
161 Clear Rd.
Oriskany, NY 13424
(315) 736-2206

Graybar Electric Co. Inc.
34 N. Meramec Ave.
Clayton, MO 63105
(314) 512-9288

Herman Electronics
7350 NW 35th Terrace
Miami, FL 33122-1241
(305) 477-0063

iCS Inc.
1143 W. Newport Center Dr.
Deerfield Beach, FL 33442
(954) 427-5000

Jackmoon U.S.A. Inc.
550 South Melrose St.
Placentia, CA 92670
(714) 572-8866

Jebsee Electronics Co. Ltd.
24-3 Sin-La Rd.
Tainan, Taiwan

Jerry Conn Associates Inc.
130 Industrial Dr.
Chambersburg, PA 17201-6006
(717) 263-8258

John Weeks Enterprises Inc.
75 Grayson Industrial Pkwy.
P.O. Box 189
Grayson, GA 30221
(770) 963-7870

Loos & Co. Inc.
Route 101
Pomfret, CT 06258
(860) 928-7981

Multicom Inc.
1076 Florida Central Pkwy.
Longwood, FL 32750-7579
(407) 331-7012

NCS Industries Inc.
2255 East Wyandotte Rd.
Willow Grove, PA 19090
(215) 657-4690

Neptco
P.O. Box 2323
Pawtucket, RI 02861
(401) 722-5500

Ortronics Inc.
595 Greenhaven Rd.
Pawcatuck, CT 06379
(860) 599-1760

PDI
6353 West Rogers Cir. #6
Boca Raton, FL 33487
(561) 998-0600

Pico Macom Inc.
12500 Foothill Blvd.
Lakeview Terrace, CA 91342
(818) 897-0028

Power & Telephone Supply Co.
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Satellite Engineering Group Inc.
6050 Connecticut Ave.
Kansas, City, MO 64120
(816) 231-8080

Satellite Export & Engineering
1007 Industrial
Albion, MI 49224
(517) 629-5990

Scientific-Atlanta Inc.
4261 Communications Dr.
Norcross, GA 30093
(770) 903-6306

Scott Cable Communications
P.O. Box 562
Farmingdale, NY 11735
(516) 694-7157

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000

Sumitomo Electric Lightwave Corp.
78 Alexander Dr.
Research Triangle Park, NC 27709
(919) 541-8100

TVC Inc.
800 Airport Rd.
Annville, PA 17003
(717) 838-3306

TW Comcorp
81 Executive Blvd.
Farmingdale, NY 11785
(516) 753-0900

TeleWire Supply
94 Inverness Terrace East
Englewood, CO 80012
(303) 799-4343

Times Fiber Communications Inc.
358 Hall Ave.
Wallingford, CT 06492
(203) 265-8500

Toner Cable Equipment Inc.
969 Horsham Rd.
Horsham, PA 19044
(215) 675-2053

Trilogy Communications Inc.
2910 Hwy. 80 E.
Pearl, MS 39208
(601) 932-4461

Tulsat
1605 East Iola
Broken Arrow, OK 75012
(800) 331-5997

Westec Communications Inc.
13402 N. Scottsdale Rd.
Scottsdale, AZ 85254
(800) 666-4441

Cable Installation Equipment

American Polywater Corp.
11222 North 60th St.
P.O. Box 53
Stillwater, MN 55082
(612) 430-2270

Arnco Corp.
860 Garden St.
Elyria, OH 44035
(216) 323-7111

Arrow Fastener Co.
271 Mayhill St.
Saddle Brook, NJ 07663
(201) 843-6900

Budco
P.O. Box 3065
Tulsa, OK 74137
(918) 252-3420

Cable Spinning Equip
100 West Central, Ba
New London, MN 56273
(320) 354-2081

Channell Commercial Corp.
26040 Ynez Rd., P.O. Box 9022
Temecula, CA 92589-9022
(800) 423-1863

Coast CATV Supply Inc.
314 Elizabeth Rd.
Corona, CA 91720
(909) 272-2360

ComSonics, Inc.
1350 Port Republic Rd.
Harrisonburg, VA 22801
(540) 434-5965

Comtech Services
2675 East 28th St.
Sedalia, MO 65301
(816) 826-3011

Condux International Inc.
P.O. Box 247
Mankato, MN 56002
(507) 387-6576

Eagle Comtronics
P.O. Box 2457
Syracusae,NY 13220
(315) 622-3402

Fiber Instrument Sales
161 Clear Rd.
Oriskany, NY 13424
(315) 736-2206

Fibertek Inc.
510 Herndon Pkwy.
Herndon, VA 20170
(703) 471-7671

GMP
3111 Old Lincoln Hwy.
Trevose, PA 19053
(215) 357-5500

Graybar Electric Co. Inc.
34 N. Meramec Ave.
Clayton, MO 63105
(314) 512-9288

Herman Electronics
7350 Herman Way
Miami, FL 33122
(305) 477-0063

iCS Inc.
1143 Newport Center Dr. West
Deerfield Beach, FL 33442
(954) 427-5000

Insulation Systems Inc.
1170 Martin Ave.
Santa Clara, CA 95050
(408) 986-8444

Jackmoon U.S.A. Inc.
550 South Melrose St.
Placentia, CA 92670
(714) 572-8866

Jameson Corp.
P.O. Box 240277
Charlotte, NC 28224
(704) 525-5191

Jerry Conn Associates Inc.
130 Industrial Dr.
Chambersburg, PA 17201-6006
(717) 263-8258

J.L. Matthews Co. Inc.
620 West Felix
Fort Worth, TX 76115
(817) 924-3360

John Weeks Enterprises Inc.
75 Grayson Industrial Pkwy.
P.O. Box 189
Grayson, GA 30221
(770) 963-7870

Lemco Tool Corp.
PM2 Box 330A
Cogan Station, PA 17728
(717) 494-0620

Line-Ward Corp.
157 Seneca Creek Rd.
Buffalo, NY 14224
(716) 675-7373

Mobile Tool International Inc.
5600 West 88th Ave.
Westminster, CO 80030
(303) 427-3700

Moore Diversified Products
1441 Sunshine Ln.
Lexington, KY 40505
(606) 299-6288

Multicom Inc.
1076 Florida Central Pkwy.
Longwood, FL 32750-7579
(407) 331-7012

Multilink Inc.
580 Ternes Ave.
Elyria, OH 44035
(440) 366-6966

NCS Industries Inc.
2255 E. Wyandotte Rd.
Willow Grove, PA 19090
(215) 657-4690

Neptco
P.O. Box 2323
Pawtucket, RI 02861
(401) 722-5500

Ortronics Inc.
595 Greenhaven Rd.
Pawcatuck, CT 06379
(860) 599-1760

Osburn Associates Inc.
P.O. Box 912
Logan, OH 43138
(740) 385-6869

PCI Technologies Inc.
520 Westney Rd.
South Ajax, ON L15 6W6
Canada

PDI
6353 West Rogers Cir.
Boca Raton, FL 33487
(561) 998-0600

Pico Macom Inc.
12500 Foothill Blvd.
Lakeview Terrace, CA 91342
(818) 897-0028

Power & Telephone Supply
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Progressive Electronics
325 South El Dorado
Mesa, AZ 85202
(800) 528-8224

Qintar Inc.
699 Mistletoe Rd.
Ashland, OR 97520
(541) 488-5500

Quazite
3621 Industrial Park Dr.
Lenoir City, TN 37922
(423) 986-5533

Ripley Co.
46 Nooks Hill Rd.
Cromwell, CT 06416
(860) 635-2200

Riser-Bond Instruments
5101 North 57th St.
Lincoln, NE 68507
(402) 466-0933

Rox System/NMP Corp.
12402 East 60th
Tulsa, OK 74146-0593
(918) 252-0481

Satcon Technology Co
161 First St.
Cambridge, MA 02142
(617) 661-0540

Scientific-Atlanta Inc.
4261 Communications Dr.
Norcross, GA 30093
(770) 903-6306

Scott Cable Communicati
42 Toledo St.
Farmingdale, NY 11735
(516) 694-7157

Sherman & Reilly Inc.
400 West 33rd St.
Chattanooga, TN 37401
(423) 756-5300

Signal Vision Inc.
27002 Vista Terrace
Lake Forest, CA 92630
(714) 586-3196

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000

Sumitomo Electric Lightwave Corp.
78 Alexander Dr.
Research Triangle Park, NC 27709
(919) 541-8100

TVC Inc.
1746 East Chocolate Ave.
Hershey, PA 17033
(717) 838-3306

TW Comcorp
81 Executive Blvd.
Farmingdale, NY 11785
(516) 753-0900

Telecrafter Products
12687 W. Cedar Dr., Suite 100
Lakewood, CO 80228
(800) 257-2448

TeleWire Supply
94 Inverness Terrace E.
Englewood, CO 80112
(847) 439-4444

Thomas & Betts Corp.
(formerly Augat Communication Products Division)
1555 Lynnfield Rd.
Memphis, TN 38119
(607) 796-5630

Toner Cable Equipment Inc.
969 Horsham Rd.
Horsham, PA 19044
(215) 675-2053

Trilithic
9202 E. 33rd St.
Indianapolis, IN 46236
(317) 895-3600

Trilogy Communications Inc.
2910 Hwy. 80 E.
Pearl, MS 39208
(601) 932-4461

Tulsat
1605 East Iola
Broken Arrow, OK 75012
(800) 331-5997

Tyton Hellerman
7930 North Faulkner Rd.
Milwaukee, WI 53224
(800) 537-1512

Unicor Inc.
151 Gold Star Dr., Southwest
Cleveland, TN 37323
(423) 559-9407

U.S. Electronics
P.O. Drawer 1008

Attention Vendors!

This guide was culled from exhibit hall information provided at last year's SCTE Cable-Tec Expo as well as the '97 NCTA National Show.

If any information has changed or is incorrect, please let us know. (E-mail rhendrickson@phillips.com or write: Technology Profiles Vendor Guide Editor, 1900 Grant St., Suite 720, Denver, CO 80203.) This listing will soon appear on our Web site (ctinfosite.com), and we will make corrections as necessary.

Harmonic Lightwaves Inc.
549 Baltic Way
Sunnyvale, CA 94089
(408) 542-2500

Hewlett-Packard
P.O. Box 50637
Palo Alto, CA 94303-9511
(800) 452-4844

Integrated Photonic Technology (IPITEK)
2330 Faraday Ave.
Carlsbad, CA 92008
(619) 438-8362

Lucent Technologies
600 Mountain Ave.
Pomfret, CT 06258
(508) 960-2950

Macrovision Corp.
1341 Orleans Dr.
Sunnyvale, CA 94089
(408) 743-8600

Mitsubishi Electronics America Inc.
1050 E. Arquez Ave.
Sunnyvale, CA 94086
(408) 730-5900

Motorola
3850 Wilke Rd.
Arlington Heights, IL 60004
(800) 292-9432

PanAmSat Corp.
1 Pickwick Plaza
Greenwich, CT 06830
(203) 622-6664

Pioneer New Media Technologies
2265 East 220th St.
Long Beach, CA 90810
(310) 952-2111

Ryan Hankin Kent Inc.
601 Gateway Blvd., Suite 550
San Francisca, CA 94080-7005
(415) 737-9600

Scientific-Atlanta Inc.
4261 Communications Dr.
Norcross, GA 30093
(770) 903-6306

SeaChange International Inc.
124 Acton St.
Maynard, MA 01754
(508) 897-0100

Sencore Inc.
3200 Sencore Dr.
Sioux Falls, SD 57106
(605) 339-0100

Sony Electronics Inc.
1 Sony Dr.
Montvale, NJ 07656-8002
(201) 930-1000

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000

StarNet
1332 Enterprise, Suite 200
West Chester, PA 19380
(610) 692-5900

STB Systems Inc.
1651 N. Glenville Dr.
Richardson, TX
(972) 234-8750

Synchronous Group Inc.
77 Las Colinas Ln.
San Jose, CA 95119
(408) 362-4800

Titan Information Systems
3033 Science Park Rd.
San Diego, CA 92121
(619) 552-9729

Tri-Vision Electronics Inc.
41 Pullman Ct.
Scarborough, ON M1X 1E4
CANADA
(416) 298-8551

TV/COM International Inc.
17066 Goldentop Rd.
San Diego, CA 92127
(888) 998-8266

TVN Entertainment/Digital Cable Television (DCTV)
2901 W. Alameda Ave., 7th Floor
Burbank, CA 91505
(818) 846-4886

Vela Research Inc.
2501 118th Ave. North
Saint Petersburg, FL 33716
(813) 572-1230

Viewer's Chaice
909 Third Ave., Floor 21
New York, NY 10022
(212) 486-6600

Vyvx Inc.
Williams Vyvx Services
Tulsa Union Depot
111 E. First St.
Tulsa, OK 74103
(918) 588-4909 or 3550

WaveCom Electronics Inc.
222 Cardinal Crescent
Saskatoon SK S7L 6H8 CANADA
(306) 955-7075

Wegener Communications Inc.
11350 Technology Cir.
Duluth, GA 30097
(770) 814-4000

Distribution Equipment

ADC Telecommunications Inc.
999 Research Pkwy.
Meriden, CT 06450-8323
(203) 630-5700

Amphenol Communications and Network Products Division
One Kennedy Ave.
Danbury, CT 06810
(800) 881-9913

ANTEC
2850 West Golf Rd.
Rolling Meadows, IL 60008
(770) 441-0007

Blonder-Tongue Laboratories Inc.
1 Jake Brown Rd.
Old Bridge, NJ 08857
(732) 679-4000

C-COR Electronics Inc.
60 Decibel Rd.
State College, PA 16801
(814) 238-2461

Eagle Comtronics
4562 Waterhouse Rd.
Clay, NY 13041
(315) 622-3402

Electroline Equipment Inc.
8265 St. Michel Blvd.
Montreal, PQ H1Z 3E4 Canada
(514) 374-6335

General Instrument Corp.
2200 Byberry Rd.
Hatboro, PA 19040
(215) 674-4800

Harmonic Lightwaves Inc.
549 Baltic Way
Sunnyvale, CA 94089
(408) 542-2500

iCS Inc.
1143 Newport Center Dr. West
Deerfield Beach, FL 33442
(954) 427-5000

Ikusi Telecommunications Inc.
3000 NW 82nd Ave.
Miami, FL 33122
(305) 470-9944

Lectra (Exide Electronics)
8380 Capital Blvd.
Raleigh, NC 27616
(919) 713-5300

Lindsay Electronics
50 Mary St. West
Lindsay, ON K9V 4S7 CANADA
(705) 324-2196

Lucent Technologies
600 Mountain Ave.
Pomfret, CT 06258
(508) 960-2950

PDI
6353 West Rogers Cir.
Boca Raton, FL 33487
(561) 998-0600

Phasecom Inc.
20700 Valley Green Dr. #B
Cupertino, CA 95014-1704
(408) 777-7799

Phillips Broadband Networks Inc.
100 Fairgrounds Dr.
Manlius, NY 13104
(315) 682-9105

Pico Products/Pica Macom Inc.
12500 Foothill Blvd.
Lakeview Terrace, CA 91342
(818) 897-0028

Pirelli
700 Industrial Dr.
Lexington, SC 29072
(803) 951-4885 or 4046

Power & Telephone Supply
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Qualop Systems Corp.
931 Benecia Ave.
Sunnyvale, CA 94086
(408) 739-9900
STB Systems Inc.
1651 N. Glenville Dr.
Richardson, TX
(972) 234-8750

STB Systems Inc.
1651 N. Glenville Dr.
Richardson, TX
(972) 234-8750

Scientific-Atlanta Inc.
4261 Communications Dr.
Norcross, GA 30093
(770) 903-6306

Silicon Valley
931 Benecia Ave.
Sunnyvale, CA 94806
(408) 739-8800

SeaChange International Inc.
124 Acton St.
Maynard, MA 01754
(508) 897-0100

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000

TeleWire Supply
94 Inverness Terrace East
Englewood, CO 80012
(303) 799-4343

Terayon Corp.
2952 Bunker Hill Ln.
Santa Clara, CA 95054
(408) 486-5273

Texscan Corp.
P.O. Box 981006
El Paso, TX 79998
(905) 533-4600

Thomas & Betts Corp.
(formerly Augat Communication Products Division)
1555 Lynnfield Rd.
Memphis, TN 38119
(607) 796-5630

Times Fiber Communications Inc.
358 Hall Ave.
Wallingford, CT 06492
(203) 265-8500

Toner Cable Equipment Inc.
969 Horsham Rd.
Horsham, PA 19044
(215) 675-2053

Tri-Vision Electronics Inc.
41 Pullman Ct.
Scarborough, ON M1X 1E4
CANADA
(416) 298-8551

Tulsat
1605 E. Iola
Broken Arrow, OK 75012
(800) 331-5997

TV/COM International Inc.
17066 Goldentop Rd.
San Diego, CA 92127
(888) 998-8266

Viewsonics Inc.
6454 E. Rogers Cir.
Boca Raton, FL 33487
(561) 998-9594

VueScan Inc.
1143 West Newport Center Dr.
Deerfield Beach, FL 33442
(954) 427-5000

Emergency Alert Systems

Arrowsmith Technologies Inc.
8920 Business Park Dr.
Austin, TX 78759
(512) 349-8287

CADCO Systems Inc.
2363 Merritt Dr.
Garland, TX 75041-6174
(972) 271-3651

FM Systems Inc.
3877 South Main St.
Santa Ana, CA 992707
(714) 979-3355

Frontline Communications
404 W. Ironwood Dr.
Salt Lake City, UT 84115
(801) 947-9981

GN Nettest-Laser Precision Division
109 North Genesee St.
Utica, NY 13502
(315) 797-4449

Idea/onics
P.O. Box 369
Mayville, ND 58257
(701) 786-3904

John Weeks Enterprises Inc.
75 Grayson Industrial Pkwy.
P.O. Box 189
Grayson, GA 30221
(770) 963-7870

Mega Hertz
6940 South Holly Cir., Suite 200
Englewood, CO 80112
(800) 525-8386

R.L. Drake Co.
230 Industrial Dr.
Franklin, OH 45005
(513) 746-4556

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000

Spectrum
1791 Hurstview Dr.
Hurst, TX 76054

Trilithic
9202 E. 33rd St.
Indianopolis, IN 46236
(317) 895-3600

Tulsat
1605 E. Iola
Broken Arrow, OK 75012
(800) 331-5997

Fiber-optic Cable, Equipment and Systems

ABC Cable Products LLC
8250 East Park Meadows Dr.
Suite 150
Littleton, CO 80124
(303) 792-2552

ACP International
1010 Oakmead
Arlington, TX 76011
(817) 640-0992

ACT Communications Inc.
P.O. Box 375
Ector, TX 75439
(903) 961-2300

ADC Telecommunications Inc.
P.O. Box 1101
Minneapolis, MN 55440-1101
(612) 938-8080

AMP Inc.
1116 West Enclave Cir.
Louisville, CO 80027
(800) 220-5489

Adams Global Communications
15140 South Keeler #D
Olathe, KS 66062
(913) 764-7280

Adirondack Wire & Cable
160 Hamlet Ave.
Woonsocket, RI 02895
(401) 769-1600

Advanced Custom Applications
G-I Ilene Ct.
Belle Mead, NJ 08502-1914
(908) 281-0353

Alcatel Telecommunications Cable
2512 Penny Rd.
Claremont, NC 28610-0039
(800) 729-3737

Alcoa Fujikura Ltd.
P.O. Box 3127
Spartanburg, SC 29304
(864) 433-0333

American Polywater Corp.
11222 North 60th St.
P.O. Box 53
Stillwater, MN 55082
(612) 430-2270

Amphenol Fiber Optic Products
1925 A Ohia St.
Lisle, IL 60532
(630) 960-1010

ANTEC
2850 West Golf Rd.
Rolling Meadows, IL 60008
(770) 441-0007

Aria Technologies Inc.
5309 Randall Pl.
Fremont, CA 94538
(510) 226-6222

Aurora Instruments Inc.
1777 Blue Bell Pkwy. West
Blue Bell, PA 19422
(800) 510-6318

Bay Networks/LANcity Cable Modem Division
1 Federal St.
Billerica, MA 01821
(508) 682-1600

Belden Wire & Cable Co.
2200 U.S. Hwy. 27 South
Richmond, IN 47374
(317) 983-5200

CADD Services Group Inc.
405 North Reo St., Suite 240
Tampa, FL 33609
(813) 289-4119

C-COR Electronics Inc.
60 Decibel Rd.
State College, PA 16801
(814) 238-2461

CIS Inc.
6855 Jimmy Carter Blvd., Suite 200
Norcross, GA 30071
(770) 448-0977

Cable Constructors Inc.
P.O. BOX 190; 105 Kent St.
Iron Mountain, MI 49801
(906) 774-6621

Cable Technologies International
460 Oakdale St.
Hatboro, PA 19040
(215) 657-3300

CommScope Inc.
P.O. Box 1729
Hickory, NC 28602
(800) 599-9265

Comtech Services
2675 East 28th St.
Sedalia, MO 65301
(816) 826-3011

Contech Systems Inc.
2130 Hwy. 35, Suite 121-A
Sea Girt, NJ 08750
(908) 449-7979

DSC Communications Corp.
1000 Coit Rd.
Plano, TX 75075
(214) 519-3000

Dawn Satellite Inc.
3340 South Lapeer Rd.
P.O. Box 9
Lake Orion, MI 48361
(248) 391-9200

Diamond Communication Products Inc.
500 North Ave.
Garwood, NJ 07027
(908) 789-1400

Epitaxx
7 Graphics Dr.
West Trenton, NJ 08628
(609) 538-1800

EXFO E.O. Engineering
465 Godin
Vanier, PQ G1M-3G7
Canada
(418) 683-0211

Fiber Instrument Sales Inc.
161 Clear Rd.
Oriskany, NY 13424
(315) 736-2206

Fujitsu Network Communications
2801 Telecom Pkwy.
Richardson, TX 75082
(972) 690-6000

Furukawa Electric
Lafayette St., #401
Santa Clara, CA 95050
(408) 248-4884

General Instrument Corp.
101 Tournament Dr.
Horsham, PA 19044
(215) 323-1000

Gould Inc.
1121 Benfield Blvd.
Millersville, MD 21108
(410) 987-5600

Graybar Electric Co. Inc.
34 N. Meramec Ave.
Clayton, MO 63105
(314) 512-9288

CABLE TELECOMMUNICATIONS VENDOR GUIDE

Harmonic Lightwaves Inc.
549 Baltic Way
Sunnyvale, CA 94089
(408) 542-2500

iCS Inc.
1143 W. Newport Center Dr.
Deerfield Beach, FL 33442
(954) 427-5000

Ikusi Telecommunications Inc.
3000 NW 82nd Ave.
Miami, FL 33122
(305) 470-9944

Insulation Systems Inc.
1170 Martin Ave.
Santa Clara, CA 95050
(408) 986-8444

Integrated Photonic Technology (IPITEK)
2330 Faraday Ave.
Carlsbad, CA 92008
(619) 438-8362

Jackmoon U.S.A. Inc.
550 South Melrose St.
Placentia, CA 92670
(714) 572-8866

Jerry Conn Associates Inc.
130 Industrial Dr.
Chambersburg, PA 17201
(717) 263-8258

John Weeks Enterprises Inc.
75 Grayson Industrial Pkwy.
P.O. Box 189
Grayson, GA 30221
(770) 963-7870

Kennedy Cable Construction
Hwy. 280 West P.O. Box 760
Reidsville, GA 30453
(912) 557-4751

Lectro (Exide Electronics)
8380 Capitol Blvd.
Raleigh, NC 27616
(919) 713-5300

Leitch Inc.
920 Corporate Ln.
Chesapeake, VA 23320
(757) 465-5062

Lucent Technologies
600 Mountain Ave.
Pomfret, CT 06258
(508) 960-2950

Main Line Equipment Inc.
837 Sandhill Ave.
Carson, CA 90746
(310)-715 6518

Mega Hertz
6940 South Holly Cir., Suite 2000
Englewood, CO 80112
(800) 525-8386

Mil 3 Inc.
3400 International Dr. NW
Washington, D.C. 20008
(202) 364-4700

Mitsubishi Chemical America Inc.
99 West Tasman Dr., Suite I
San Jose, CA 95134-1712
(408) 954-8484

Molex Fiber Optics Inc.
5224 Katrine Ave.
Downers Grove, IL 60514
(630) 512-8750

Multicom Inc.
1076 Florida Central Pkwy.
Longwood, FL 32750-7579
(407) 331-7012

Multilink Inc.
580 Ternes Ave.
Elyria, OH 44035
(440) 366-6966

NCS Industries Inc.
2255 East Wyandotte Rd.
Willow Grove, PA 19090
(215) 657-4690

Neptco
P.O. Box 2323
Pawtucket, RI 02861
(401) 722-5500

Neptec LLC
1085 Martha Glass Dr.
Jefferson City, TN 37760
(423) 475-4660

Norscan Inc.
301-F3 10th St.
Conover, NC 28
(704) 464-1148

Noyes Fiber Systems
P.O. Box 398
Laconia, NH 03247
(603) 528-7780

O.G. Hughes & Sons Inc.
4816 Rutledge Pike
Knoxville, TN 37914
(423) 524-7525

Optigain Inc.
1174 Kingstown Rd.
Peace Dale, RI 02883
(401) 783-9224

OptiVideo Corp.
5311 Western Ave.
Boulder, CO 80301
(303) 444-2160

Ortel Corp.
2015 West Chestnut St.
Alhambra, CA 91803
(818) 281-3636

Ortronics Inc.
595 Greenhaven Rd.
Pawcatuck, CT 06379
(860) 599-1760

PCI Technologies Inc.
520 Westney Rd.
South Ajax, ON L1S 6W6
Canada

PDI
6353 West Rogers Cir. #6
Boca Raton, FL 33487
(561) 998-0600

PPC
6176 E. Molloy Rd.
P.O. Box 278
East Syracuse, NY 13057-0278
(315) 431-7200

Pelsue Co.
2500 South Tejon
Englewood, CO 80110
(303) 936-7432

Peregrine Communications Inc.
14818 West 6th Ave., Suite 16A
Golden, Co 80401
(303) 278-9660

Philips Broadband Networks
100 Fairgrounds Dr.
Manlius, NY 13104
(800) 448-5171
Fax: (315) 682-9006
www.be.philips.com/pbn

Photonic Components Inc.
1934 Junction Ave.
San Jose, CA 95131
(408) 436-2380

Pirelli Coble Corp.
700 Industrial Dr.
Lexington, SC 29702-3799
(803) 951-4800

Power & Telephone Supply Co.
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Precision Valley Communications Corp.
100 River St. #301
Springfield, VT 05156
(802) 885-9317

Pyramid Industries
1422 Irwin Dr., P.O. Box 8439
Erie, PA 16505-0439
(814) 455-7587

Qualop Systems Corp.
931 Benecia Ave.
Sunnyvale, CA 94086
(408) 739-9900

Quazite
3621 Industrial Park Dr.
Lenoir City, TN 37922
(423) 986-5533

Quintech Electronics and Communications Inc.
Airport Office Center
Route 286 North
Indiana, PA 15701
(800) 839-3658

Racal-Datacom Inc.
1601 Harrison Pkwy.
Sunrise, FL 33323
(954) 846-1601

Raychem Corp.
8000 Purfoy Rd.
Fuquay, NC 27526-9349
(919) 557-84

Rifocs Corp.
833 Flynn Rd.
Camarillo, CA 93012
(805) 389-9800

Ripley Co.
46 Nooks Hill Rd.
Cromwell, CT 06416
(800) 528-8665

Rite Cable Construction Inc.
1207 South Woodland Blvd.
Suite 1
Deland, FL 32720
(904) 736-8844

Ryan Hankin Kent Inc.
601 Gateway Blvd., Suite 550
San Francisco, CA 94080-7005
(415) 737-9600

Satellite Engineering Group Inc.
6050 Connecticut Ave.
Kansas, City, MO 64120
(816) 231-8080

Scientific-Atlanta Inc.
4261 Communications Dr.
Norcross, GA 30093
(770) 903-6306

Scott Cable Communications
P.O. Box 562
Farmingdale, NY 11735
(516) 694-7157

Siecor Corp.
P.O. Box 489
Hickory, NC 28603-0489
(704) 327-5000

Signal Vision Inc.
27002 Vista Terrace
Lake Forest, CA 92630
(714) 586-3196

Silicon Valley
931 Benecia Ave.
Sunnyvale, CA 94806
(408) 739-8800

Spectronics Corp.
3190 NE Expressway,
Suite 100-200
Atlanta, GA 30341
(770) 455-9750

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000

Sumitomo Electric Lightwave Corp.
78 Alexander Dr.
Research Triangle Park, NC
27709
(919) 541-8100

Synchronous Group Inc.
77 Las Colinas Lane
San Jose, CA 95119
(800) 659-6750

TVC Inc.
800 Airport Rd.
Annville, PA 17003
(717) 838-3306

TW Comcorp
81 Executive Blvd.
Farmingdale, NY 11785
(516) 753-0900

TeleWire Supply
94 Inverness Terrace East
Englewood, CO 80012
(303) 799-4343

Texscan Corp.
P.O. Box 981006
El Paso, TX 79998
(905) 533-4600

Thomas & Betts Corp.
(formerly Augat Communication Products Division)
1555 Lynnfield Rd.
Memphis, TN 38119
(607) 796-5630

Toner Cable Equipment Inc.
969 Horsham Rd.
Horsham, PA 19044
(215) 675-2053

Trilithic
9202 E. 33rd St.
Indianapolis, IN 46236
(317) 895-3600

Tulsat
1605 E. Iola
Broken Arrow, OK 75012
(800) 331-5997

Tyton Hellermann
7930 North Faulkner Rd.
Milwaukee, WI 53224
(800) 537-1512
Vyvx Inc.
Williams Vyvx Services
Tulsa Union Depot
111 E. First St.
Tulsa, OK 74103
(918) 588-4909 or 3550

WaveCom Electronics Inc.
222 Cardinal Crescent
Saskatoon SK S7L 6H8 CANADA
(306) 955-7075

Westec Communications Inc.
13402 N. Scottsdale Rd.
Scottsdale, AZ 85254
(800) 666-4441

Headend Equipment

3 Com Corp.
5400 Bayfront Plaza, MS-2203
Santa Clara, CA 95052
(408) 764-5000

ADC Telecommunications Inc.
999 Research Pkwy.
Meriden, CT 06450-8323
(203) 630-5700

Alpha Technologies
3767 Alpha Way
Bellingham, WA 98226
(360) 647-2360

AM Communications Inc.
P.O.Box 9004
Quakertown, PA 18951-9004
(215) 538-8700

AMP Inc.
1116 West Enclave Cir.
Louisville, CO 80027
(800) 220-5489

Adams Global Communications
15140 South Keeler #D
Olathe, KS 66062
(913) 764-7280

Adirondack Wire & Cable
160 Hamlet Ave.
Woonsocket, RI 02895
(401) 769-1600

Adtec Inc.
408 Russell St.
Nashville, TN 37206
(615) 256-6619

Advanced Custom Applications
G-I Ilene Ct.
Belle Mead, NJ 08502-1914
(908) 281-0353

Alcoa Fujikura Ltd.
P.O. Box 3127
Spartanburg, SC 29304
(864) 433-0333

Alcatel Telecommunications Cable
2512 Penny Rd.
Claremont, NC 28610-0039
(800) 729-3737

Amphenol Communications and Network Products Division
One Kennedy Ave.
Danbury, CT 06810
(800) 881-9913

ANTEC
2850 West Golf Rd.
Rolling Meadows, IL 60008
(770) 441-0007

Applied Instruments Inc.
5234 Elmwood Ave.
Indianapolis, IN 46203
(317) 782-4331
Arcom
P.O. Box 6729
Syracuse, NY 13217
(315) 426-1455

Axicom
8401 Old Courthouse Rd.#150
Vienna, VA 22182-3820
(703) 821-1600

Barco
3240 Town Point Dr.
Kennesaw, GA 30144
(770) 218-3200

Bay Networks/LANcity Cable Modem Division
1 Federal St.
Billerica, MA 01821
(508) 682-1600

Belden Wire & Cable Co.
2200 U.S. Hwy. 27 South
Richmond, IN 47374
(317) 983-5200

Blonder-Tongue Laboratories Inc.
1 Jake Brown Rd.
Old Bridge, NJ 08857
(732) 679-4000

CADCO Systems Inc.
2363 Merritt Dr.
Garland, TX 75041-6174
(972) 271-3651

CAGE Services Group Inc.
105 North Reo St., Suite 240
Tampa, FL 33609
(813) 289-4119

C-COR Electronics Inc.
60 Decibel Rd.
State College, PA 16801
(814) 238-2461

Cable Constructors Inc.
P.O. BOX 190; 105 Kent St.
Iron Mountain, MI 49801
(906) 774-6621

Cable Converter Service Corp.
54 East Market St.
Spencer, IN 47460
(812) 829-4833

Cable Shoppe Inc.
One Prospect Ave.
Albany, NY 12206
(518) 489-2100
Cable Source International
5172 Sinclair Rd.
Columbus, OH 43229
(614) 268-3700

Cable Technologies International
460 Oakdale St.
Hatboro, PA 19040
(215) 657-3300

Attention Vendors!

This guide was culled from exhibit hall information provided at last year's SCTE Cable-Tec Expo as well as the '97 NCTA National Show.

If any information has changed or is incorrect, please let us know. (E-mail rhendrickson@phillips.com or write: Technology Profiles Vendor Guide Editor, 1900 Grant St., Suite 720, Denver, CO 80203.) This listing will soon appear on our Web site (ctinfosite.com), and we will make corrections as necessary.

Canal+
Paris, France
33-1-4425-7469

Can-Am Services Inc.
12903 Agency
San Antonio, TX 78247
(210) 496-2288

Channelmatic Inc.
821 Tavern Rd.
Alpine, CA 91901
(619) 445-2691

Coast CATV Supply Inc.
314 Elizabeth Rd.
Corona, CA 91720
(909) 272-2360

COM21, Inc.
750 Tasman Dr.
Milpitas, CA 95035
(408) 953-9100

Commercial Electronics Inc.
209 E. Jackson St.
Gate City, VA 24251
(540) 386-7451

ComStream
6350 Sequence Dr.
San Diego, CA 92121
(619) 657-5250

Comtech Services
2675 East 28th St.
Sedalia, MO 65301
(816) 826-3011

Dawn Satellite Inc.
3340 South Lapeer Rd.
P.O. Box 9
Lake Orion, MI 48361
(248) 391-9200

Digital Video
5720 Peachtree Pkwy. NW
Norcross, GA 30092
(770) 622-8400

DX Communications
A Division of Itochu Cable Services Inc.
1143 W. Newport Center Dr.
Deerfield Beach, FL 33442
(888) 293-5856

Eagle Comtronics
4562 Waterhouse Rd.
Clay, NY 13041
(315) 622-3402

FM Systems Inc.
3877 South Main St.
Santa Ana, CA 992707
(714) 979-3355

Fujitsu Network Communications
2801 Telecom Pkwy.
Richardson, TX 75082
(972) 690-6000

Furukawa Electric
Lafayette St., #401
Santa Clara, CA 95050
(408) 248-4884

GAD Line Ltd.
Jerusalem, Israel
972-2-586-8316

General Instrument Corp.
2200 Byberry Rd.
Hatboro, PA 19040
(215) 674-4800

Graybar Electric Co. Inc.
34 N. Meramec Ave.
Clayton, MO 63105
(314) 512-9288

Harmonic Lightwaves Inc.
549 Baltic Way
Sunnyvale, CA 94089
(408) 542-2500

Hayes Microcomputer Products
P.O. Box 105203
Atlanta, GA 30348
(770) 840-9200

Herman Electronics
7350 NW 35th Terrace
Miami, FL 33122-1241
(305) 477-0063

Hewlett-Packard
P.O. Box 50637
Palo Alto, CA 94303-9511
(800) 452-4844

Hybrid Networks Inc.
10161 Bubb Rd.
Cupertino, CA 95014
(408) 725-3250

iCS Inc.
1143 Newport Center Dr. West
Deerfield Beach, FL 33442
(954) 427-5000

ICTV Inc.
14600 Winchester Blvd.
Los Gatos, CA
(408) 364-9200

Ikusi Telecommunications Inc.
3000 NW 82nd Ave.
Miami, FL 33122
(305) 470-9944
Integrated Photonic Technology (IPITEK)
2330 Faraday Ave.
Carlsbad, CA 92008
(619) 438-8362

Iris Technologies
Westmoreland Industrial Park
RR #12, Box 36
Greensburg, PA 15601
(724) 832-8999

Jerry Conn Associates Inc.
130 Industrial Dr.
Chambersburg, PA 17201
(717) 263-8258

John Weeks Enterprises Inc.
75 Grayson Industrial Pkwy.
P.O. Box 189
Grayson, GA 30221
(770) 963-7870

Jones Broadband International Inc.
4120 Avenida de lo Plata
Oceanside, CA 92056
(760) 631-2324

Leaming Industries
15339 Barranca Pkwy.
Irvine, CA 92618
(714) 727-4144

Lectro (Exide Electronics)
8380 Capital Blvd.
Raleigh, NC 27616
(919) 713-5300

LEL Computer Systems
33 SE 8th St., Suite 200
Boca Raton, FL 33432
(561) 347-2242

Lindsay Electronics
50 Mary St. West
Lindsay, ON K9V 4S7 CANADA
(705) 324-2196

Mega Hertz
6940 South Holly Cir., Suite 2000
Englewood, CO 80112
(800) 525-8386

Microwave Filter Co. Inc.
6743 Kinne St.
East Syracuse, NY 13057
(315) 438-4700

Monroe Electronics
100 Housel Ave.
Lyndonville, NY 14098
(800) 821-6001

Multicom Inc.
1076 Florida Central Pkwy.
Longwood, FL 32750-7579
(407) 331-7012

NCA Microelectronics
520 Somerset St.
St. Johns, NB E2K 2Y7 Canada

NCS Industries Inc.
2255 East Wyandotte Rd.
Willow Grove, PA 19090
(215) 657-4690

Newton Instrument Co. Inc.
111 East "A" St.
Burner, NC 27509
(919) 575-6426

Non-Stop CATV Services Inc.
795 North Ave., Suite D
Vista, CA 92083
(760) 630-3566

O.G. Hughes & Sons Inc.
4816 Rutledge Pike
Knoxville, TN 37914
(423) 524-7525

Ortel Corp.
2015 West Chestnut St.
Alhambra, CA 91803
(818) 281-3636

PCI Technologies Inc.
520 Westney Rd.
South Ajax, ON L1S 6W6
Canada

PDI
6353 West Rogers Cir. #6
Boca Raton, FL 33487
(561) 998-0600

Peregrine Communications Inc.
14818 West 6th Ave., Suite 16A
Golden, Co 80401
(303) 278-9660

Phillips Broadband Networks Inc.
100 Fairgrounds Dr.
Manlius, NY 13104
(315) 682-9105

Photonic Components Inc.
1934 Junction Ave.
San Jose, CA 95131
(408) 436-2380

Pica Products/Pica Macom Inc.
12500 Foothill Blvd.
Lakeview Terrace, CA 91342
(818) 897-0028

Pioneer New Media Technologies
2265 East 220th St.
Long Beach, CA 90810
(310) 952-2111

Pirelli
700 Industrial Dr.
Lexington, SC 29072
(803) 951-4885 or 4046

Power & Telephone Supply Co.
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Precision Valley Communications Corp.
100 River St. #301
Springfield, VT 05156
(802) 885-9317

Quintech Electronics and Communications Inc.
Airport Office Center
Route 286 North

Indiana, PA 15701
(800) 839-3658

R.L. Drake Co.
230 Industrial Dr.
Franklin, OH 45005
(513) 746-4556

Raychem Corp.
1945 Greenwood Rd.
Charlotte, TN 37036-5102
(919) 557-8447

Reltec Corp.
5875 Landerbrook Dr., Suite 250
Cleveland, OH 44124
(216) 266-5300

Rifocs Corp.
833 Flynn Rd.
Camarillo, CA 93012
(805) 389-9800

Riser-Bond Instruments
5101 N. 57th St.
Lincoln, NE 68507
(800) 688-8377

Rohn
P.O. Box 2000
Peoria, IL 61656
(309) 697-4400

Satellite Engineering Group Inc.
6050 Connecticut Ave.
Kansas City, MO 64120
(816) 231-8080

Satellite Export & Engineering
1007 Industrial
Albion, MI 49224
(517) 629-5990

Scientific-Atlanta Inc.
4261 Communications Dr.
Norcross, GA 30093
(770) 903-6306

SeaChange International Inc.
124 Acton St.
Maynard, MA 01754
(508) 897-0100

Sigma Electronics Inc.
1184 Enterprise Rd., P.O. Box 448
East Petersburg, PA 17520-0448
(717) 569-2681

Signal Vision Inc.
27002 Vista Terrace
Lake Forest, CA 92630
(714) 586-3196

Sony Electronics Inc.
1 Sony Dr.
Montvale, NJ 07656-8002
(201) 930-1000

Standard Communications Corp.
P.O. Box 92151
Los Angeles, CA 90009-2151
(310) 532-5300

Stanford Telecom, Telecom Component Products
480 Java Dr.
Sunnyvale, CA 94089
(408) 745-2685

STB Systems Inc.
1651 N. Glenville Dr.
Richardson, TX
(972) 234-8750

Superior Electronics Group Inc.
6432 Parkland Dr.
Sarasota, FL 34243
(941) 756-6000

Tektronix Inc.
P.O. Box 500
M/South 50-216
Beaverton, OR 97077
(503) 627-2779

TeleWire Supply
94 Inverness Terrace East
Englewood, CO 80012
(303) 799-4343
Tellabs
4951 Indiana Ave.
Lisle, IL 60532
(800) 443-5555

Terayon Corp.
2952 Bunker Hill Ln.
Santa Clara, CA 95054
(408) 486-5273

Texscan Corp.
P.O. Box 981006
El Paso, TX 79998
(905) 533-4600

TFT Inc.
3090 Oakmead Village Dr.
Santa Clara, CA 95051-0862
(408) 727-7272

Thomas & Betts Corp.
(formerly Augat Communication Products Division)
1555 Lynnfield Rd.
Memphis, TN 38119
(607) 796-5630

Times Fiber Communications Inc.
358 Hall Ave.
Wallingford, CT 06492
(203) 265-8477

Titan Information Systems
3033 Science Park Rd.
San Diego, CA 92121
(619) 552-9729

Toner Cable Equipment Inc.
969 Horsham Rd.
Horsham, PA 19044
(215) 675-2053

Transtector Systems Inc.
10701 Airport Dr.
Hayden Lake, ID 83835
(800) 882-9110

Trilithic Inc.
9202 East 33rd St.
(800) 344-2412

Tri-Vision Electronics Inc.
41 Pullman Ct.
Scarborough, ON M1X 1E4
CANADA
(416) 298-8551

Tulsat
1605 E. Iola
Broken Arrow, OK 75012
(800) 331-5997

TVC Inc.
800 Airport Rd.
Annville, PA 17003
(717) 838-3306

TV/COM International Inc.
17066 Goldentop Rd.
San Diego, CA 92127
(888) 998-8266

TW Comcorp
81 Executive Blvd.
Farmingdale, NY 11785
(516) 753-0900

U.S. Robotics
8100 North McCormick Blvd.
Skokie, IL 60076
(847) 982-5055

Video Data Systems Inc.
40-2 Oser Ave.
Hauppage, NY 11788
(516) 231-4400

Videotek Inc.
243 Shoemaker Rd.
Pottstown, PA 19464
(610) 327-2292

Viewsonics Inc.
6454 East Rogers Cir.
Boca Raton, FL 33487
(561) 998-9594
VueScan Inc.
1143 West Newport Center Dr.
Deerfield Beach, FL 33442
(954) 427-5000

WaveCom Electronics Inc.
222 Cardinal Crescent
Saskatoon SK S7L 6H8 CANADA
(306) 955-7075

Wavetek Corp.
5808 Churchman Bypass
Indianapolis, Indiana 46203
(317) 788-9351

Wegener Communications Inc.
11350 Technology Cir.
Duluth, GA 30097
(770) 814-4000

West End Systems Corporation
39 Winner's Cir. Dr.
Arnprior Ontario Canada
K7S2G9
(613) 623-9600

Zenith Electronics Corp.
1000 Milwaukee Ave.
Glenview, IL 60025
(847) 391-7459

Heat-shrink Tubing

Cable Constructors Inc.
P.O. BOX 190; 105 Kent St.
Iron Mountain, MI 49801
(906) 774-6621

Canuso-EMI
25 Bethridge Rd.
Toronto, Ontario M9W 1M7
(416) 743-1111

Coast CATV Supply Inc.
314 Elizabeth Rd.
Corona, CA 91720
(909) 272-2360

Commercial Electronics Inc.
209 E. Jackson St.
Gate City, VA 24251
(540) 386-7451

Comtech Services
2675 East 28th St.
Sedalia, MO 65301
(816) 826-3011

Contech Systems Inc.
2130 Hwy. 35, Suite 121-A
Sea Girt, NJ 08750
(908) 449-7979

Herman Electronics
7350 NW 35th Terrace
Miami, FL 33122-1241
(305) 477-0063

iCS Inc.
1143 W. Newport Center Dr.
Deerfield Beach, FL 33442
(954) 427-5000

Insulation Systems Inc.
1170 Martin Ave.
Santa Clara, CA 95050
(408) 986-8444

Jerry Conn Associates Inc.
130 Industrial Dr.
Chambersburg, PA 17201
(717) 263-8258

John Weeks Enterprises Inc.
75 Grayson Industrial Pkwy.
P.O. Box 189
Grayson, GA 30221
(770) 963-7870

Multicom Inc.
1076 Florida Central Pkwy.
Longwood, FL 32750-7579
(407) 331-7012

Multilink Inc.
580 Ternes Ave.
Elyria, OH 44035
(440) 366-6966

Neptec LLC
1085 Martha Glass Dr.
Jefferson City, TN 37760
(423) 475-4680

PDI
6353 West Rogers Cir. #6
Boca Raton, FL 33487
(561) 998-0600

Power & Telephone Supply Co.
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Primus-Sievert Inc.
1462 U.S. Route 20, P.O. Box 186
Cherry Valley, IL 61016
(815) 332-5504

Raychem Corp.
1945 Greenwood Rd.
Charlotte, TN 37036-5102
(919) 557-8447

Scott Cable Communications
P.O. Box 562
Farmingdale, NY 11735
(516) 694-7157

Siecor Corp.
P.O. Box 489
Hickory, NC 28603-0489
(704) 327-5000

Signal Vision Inc.
27002 Vista Terrace
Lake Forest, CA 92630
(714) 586-3196

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000

TVC Inc.
800 Airport Rd.
Annville, PA 17003
(717) 838-3306

TW Comcorp
81 Executive Blvd.
Farmingdale, NY 11785
(516) 753-0900

Thomas & Betts Corp.
(formerly Augat Communication Products Division)
1555 Lynnfield Rd.
Memphis, TN 38119
(607) 796-5630

TeleWire Supply
94 Inverness Terrace E.
Englewood, CO 80112
(847) 439-4444

Toner Cable Equipment Inc.
969 Horsham Rd.
Horsham, PA 19044
(215) 675-2053

Tulsat
1605 E. Iola
Broken Arrow, OK 75012
(800) 331-5997

Multiplexers

AMP Inc.
1116 West Enclave Cir.
Louisville, CO 80027
(800) 220-5489

Amphenol Fiber Optic Products
1925 A Ohio St.
Lisle, IL 60532
(630) 960-1010

C-COR Electronics Inc.
60 Decibel Rd.
State College, PA 16801
(814) 238-2461

Ericsson
1525 O'Brien Dr.
Menlo Park, CA 94052
463-6000
Fiber Instrument Sales Inc.
161 Clear Rd.
Oriskany, NY 13424
(315) 736-2206

General Instrument Corp.
101 Tournament Dr.
Horsham, PA 19044
(215) 323-1000

Graybar Electric Co. Inc.
34 N. Meramec Ave.
Clayton, MO 63105
(314) 512-9288

Integrated Photonic Technology (IPITEK)
2330 Faraday Ave.
Carlsbad, CA 92008
(619) 438-8362

Microwave Filter Co. Inc.
6743 Kinne St.
East Syracuse, NY 13057
(315) 438-4700

PDI
6353 West Rogers Cir.
Boca Raton, FL 33487
(561) 998-0600

Power & Telephone Supply Co.
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Quintech Electronics and Communications Inc.
Airport Office Center
Route 286 North
Indiana, PA 15701
(800) 839-3658

TeleWire Supply
94 Inverness Terrace E.
Englewood, CO 80112
(847) 439-4444

Tellabs
4951 Indiana Ave.
Lisle, IL 60532
(800) 443-5555

Toner Cable Equipment Inc.
969 Horsham Rd.
Horsham, PA 19044
(215) 675-2053

Trilithic
9202 E. 33rd St.
Indianapolis, IN 46236
(317) 895-3600

Viewsonics Inc.
6454 East Rogers Cir.
Boca Raton, FL 33487
(561) 998-9594

Westec Communications Inc.
13402 N. Scottsdale Rd.
Scottsdale, AZ 85254
(800) 666-4441

World Access
5934 Gilbraltar Dr., Suite 101
Pleasonton, CA 94588
(510) 730-0060

Network Management

3 Com Corp.
5400 Bayfront Plaza, MS-2203
Santa Clara, CA 95052
(408) 764-5000

ADC Telecommunications Inc.
P.O. Box 1101
Minneapolis, MN 55440-1101
(612) 938-8080

Alcatel Telecommunications Cable
2512 Penny Rd.
Claremont, NC 28610-0039
(800) 729-3737

ANTEC
5720 Peachtree Pkwy., NW
Norcross,GA 30092
(770) 441-0007
Arrowsmith Technologies Inc.
8920 Business Park Dr.
Austin, TX 78759
(512) 349-8287

Borca
3240 Town Point Dr.
Kennesaw, GA 30144
(770) 218-3200

Bellcore
3 Corporate Pl.
Piscataway, NJ 08854
(908) 699-5800

Blonder-Tongue Laboratories Inc.
1 Jake Brown Rd.
Old Bridge, NJ 08857
(732) 679-4000

Broadband Networks Inc.
2820 East College Ave., Suite B
State College, PA 16801
(814) 237-4073

Business Systems Inc.
1 Marcus Dr., #101
Greenville, SC 29616
(864) 297-9290

CADD Services Group Inc.
405 North Reo St., Suite 240
Tampa, FL 33609
(813) 289-4119

C-COR Electronics Inc.
60 Decibel Rd.
State College, PA 16801
(814) 238-2461

CSG Systems
6855 Jimmy Carter Blvd., Suite 200
Norcross, GA 30071
(770) 448-0977

CSG Systems Inc.
5251 DTC Parkway, Suite 625
Denver, CO 80111
(303) 804-4065

CableData
11020 Sun Center Dr.
Rancho Cordova, CA 95670
(800) 835-8389

Cable Constructors Inc.
P.O. BOX 190; 105 Kent St.
Iron Mountain, MI 49801
(906) 774-6621

Cadix International Inc.
1200 Ashwood Pkwy., Suite 135
Atlanta,GA 30338
(714) 223-8881

ComPath Inc.
1 Williams Dr.
Fairfax, VA 22031
(703) 207-0500

Ericsson
1525 O'Brien Dr.
Menlo Park, CA 94052
463-6000

General Instrument Corp.
101 Tournament Dr.
Horsham, PA 19044
(215) 323-1000

Harmonic Lightwaves Inc.
549 Baltic Way
Sunnyvale, CA 94089
(408) 542-2500

Harmonic Lightwaves Inc.
549 Baltic Way
Sunnyvale, CA 94089
(408) 542-2500

Hybrid Networks Inc.
10161 Bubb Rd.
Cupertino, CA 95014
(408) 725-3250

iCS Inc.
1143 Newport Center Dr. West
Deerfield Beach, FL 33442
(954) 427-5000
Integrated Photonic Technology (IPITEK)
2330 Faraday Ave.
Carlsbad, CA 92008
(619) 438-8362

Integration Technologies
94 Inverness Terrace East, Suite 300
Englewood, CO 80012
(303) 846-4600

Jones Cyber Solutions (JCS)
183 Inverness Dr. West
Englewood, CO 80112
(800) 944-2923

Lucent Technologies
600 Mountain Ave.
Pomfret, CT 06258
(508) 960-2950

MDSI Mobile Data Solutions Inc.
Suite 135, 10551 Shellbridge Wy.
Richmond, British Columbia V6X 2W9 Canada
(604) 270-9939

Mil 3 Inc.
3400 International Dr. NW
Washington, D.C. 20008
(202) 364-4700

Mintek Barcode Technologies
2196 Main St., Suite 1
Dunedin, FL 34698
(813) 734-9175

Moore Diversified Products Inc.
1441 Sunshine Ln.
Lexington, KY 40505
(606) 299-6288
Norscan Inc.
301-F3 10th St. Northwest
Conover, NC 28613
(704) 464-1148

Norscan Inc.
301-F3 10th St. Northwest
Conover, NC 28613
(704) 464-1148

Objective Systems Integrators
100 Blue Ravine Rd.
Folsom, CA 95630
(916) 353-2400

PCI Technologies Inc.
520 Westney Rd.
South Ajax, ON L1S 6W6
Canada

Peregrine Communications Inc.
14818 West 6th Ave., Suite 16A
Golden, Co 80401
(303) 278-9660

Philips Broadband Networks
100 Fairgrounds Dr.
Manlius, NY 13104
(800) 448-5171

Praxima Systems Ltd.
Montreal, Quebec, Canada
(514) 875-5403

Qualop Systems Corp.
931 Benecia Ave.
Sunnyvale, CA 94086
(408) 739-9900
Quintech Electronics and Communications Inc.
Airport Office Center
Route 286 North
Indiana, PA 15701
(800) 839-3658

RR Enterprises Ltd.
7145 W. Credit Ave., Suite 101
Mississauga, ON L5N 6J7 Canada
(905) 542-1013

Ryan Hankin Kent Inc.
601 Gateway Blvd., Suite 550
San Francisco, CA 94080-7005
(415) 737-9600

Scientific-Atlanta
4261 Communications Dr.
Box 6850
Norcross, GA 30091-6850
(800) 433-6222

SeaChange International Inc.
124 Acton St.
Maynard, MA 01754
(508) 897-0100

SecoGraphics Inc.
350 Indiana St., Suite 200
Golden, CO 80401
(303) 279-7322

Siecor Corp.
P.O. Box 489
Hickory, NC 28603-0489
(704) 327-5000

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000

Superior Electronics Group Inc.
6432 Parkland Dr.
Sarasota, FL 34243
(941) 756-6000

Synchronous Group Inc.
77 Las Colinas Lane
San Jose, CA 95119
(800) 659-6750

TV/COM International Inc.
17066 Goldentop Rd.
San Diego, CA 92127
(888) 998-8266

Tellabs
4951 Indiana Ave.
Lisle, IL 60532
(800) 443-5555

Terayon Corp.
2952 Bunker Hill Ln.
Santa Clara, CA 95054
(408) 486-5273

Tollgrade Communications Inc.
493 Nixon Rd.
Cheswick, PA 15024
(412) 274-2156

Viewsonics Inc.
6454 East Rogers Cir.
Boca Raton, FL 33487
(561) 998-9594

Vyvx Inc.
Williams Vyvx Services
Tulsa Union Depot
111 E. First St.
Tulsa, OK 74103
(918) 588-4909 or 3550

West End Systems Corporation
39 Winner's Cir. Dr.
Arnprior Ontario Canada
K7S2G9
(613) 623-9600

Wiztec Solutions Ltd.
8 Maskit St.
Herzlia 46766 Israel
972-9-959-8740

World Access
5934 Gilbraltar Dr., Suite 101
Pleasonton, CA 94588
(510) 730-0060

Pay-Per-View Equipment

Applied Digital Technology
3622 Northeast 4th St.
Gainesville, FL 32609
(352) 338-0516

Axicom
8401 Old Courthouse Rd.#150
Vienna, VA 22182-3820
(703) 821-1600

Blonder-Tongue Laboratories Inc.
1 Jake Brown Rd.
Old Bridge, NJ 08857
(732) 679-4000

Canal+
Paris, France
33-1-4425-7469

Channelmatic Inc.
821 Tavern Rd.
Alpine, CA 91901
(619) 445-2691

Data Vaice Systems Inc.
1150 Logan St.
Louisville, KY 40204
(502) 636-2700

Digital Video
5720 Peachtree Pkwy. NW
Norcross, GA 30092
(770) 622-8400

Eagle Comtronics
4562 Waterhouse Rd.
Clay, NY 13041
(315) 622-3402

Electroline Equipment Inc.
8265 St. Michel Blvd.
Montreal, PQ H1Z 3E4 Canada
(514) 374-6335

Attention Vendors!

This guide was culled from exhibit hall information provided at last year's SCTE Cable-Tec Expo as well as the '97 NCTA National Show.

If any information has changed or is incorrect, please let us know. (E-mail rhendrickson@phillips.com or write: Technology Profiles Vendor Guide Editor, 1900 Grant St., Suite 720, Denver, CO 80203.) This listing will soon appear on our Web site (ctinfosite.com), and we will make corrections as necessary.

GAD Line Ltd.
Jerusalem, Israel
972-2-586-8316

General Instrument Corp.
2200 Byberry Rd.
Hatboro, PA 19040
(215) 674-4800

iCS Inc.
1143 Newport Center Dr. West
Deerfield Beach, FL 33442
(954) 427-5000

Macrovision Corp.
1341 Orleans Dr.
Sunnyvale, CA 94089
(408) 743-8600

Mitsubishi Electronics America Inc.
1050 E. Arquez Ave.
Sunnyvale, CA 94086
(408) 730-5900

Panasonic Video Communications
1 Panasonic Wy.
Secaucus, NJ 07094-4B7
(201) 392-4430

Power & Telephone Supply
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Scientific-Atlanta Inc.
4261 Communications Dr.
Norcrass, GA 30093
(770) 903-6306

SeaChange International Inc.
124 Acton St.
Maynard, MA 01754
(508) 897-0100

StarNet
1332 Enterprise, Suite 200
West Chester, PA 19380
(610) 692-5900

STB Systems Inc.
1651 N. Glenville Dr.
Richardson, TX
(972) 234-8750

Telecorp Systems, A Syntellect Company
1000 Holcomb Woods pkwy.,
Bldg. 4104
Roswell, GA 30076-2585
(770) 587-0700

Titan Information Systems
3033 Science Park Rd.
San Diego, CA 92121
(619) 552-9729

Tri-Vision Electronics Inc.
41 Pullman Ct.
Scarborough, ON M1X 1E4
CANADA
(416) 298-8551

Tulsat
1605 E. Iola
Broken Arrow, OK 75012
(800) 331-5997

TV/COM International Inc.
17066 Goldentop Rd.
San Diego, CA 92127
(888) 998-8266

Video Data Systems
40-2 Oser Ave.
Hauppage, NY 11788
(516) 231-4400

VueScan Inc.
1143 West Newport Center Dr.
Deerfield Beach, FL 33442
(954) 427-5000

WaveCom Electronics Inc.
222 Cardinal Crescent
Saskatoon SK S7L 6H8 CANADA
(306) 955-7075

Zenith Electronics Corp.
1000 Milwaukee Ave.
Glenview, IL 60025
(847) 391-7459

Pole Line Equipment

A.B. Chance Co.
210 North Allen
Centralia, MO 65240
(573) 682-5521

Cable Constructors Inc.
P.O. BOX 190; 105 Kent St.
Iron Mountain, MI 49801
(906) 774-6621

Cable Shoppe Inc.
One Prospect Ave.
Albany, NY 12206
(518) 489-2100

Cable Source International
5172 Sinclair Rd.
Columbus, OH 43229
(614) 268-3700

Cable Spinning Equipment Co.
100 West Central, Box 308
New London, MN 56273
(320) 354-2081

Coast CATV Supply Inc.
314 Elizabeth Rd.
Corona, CA 91720
(909) 272-2360

Electroline Equipment Inc.
8265 St. Michel Blvd.
Montreal, PQ H1Z 3E4 Canada
(514) 374-6335

Equipment Technology Inc.
341 Northwest 122nd St.
Oklahoma City, OK 73114
(405) 748-3841

GMP
3111 Old Lincoln Hwy.
Trevose, PA 19053
(215) 357-5500

General Instrument Corp.
101 Tournament Dr.
Horsham, PA 19044
(215) 323-1000

Graybar Electric Co. Inc.
34 N. Meramec Ave.
Clayton, MO 63105
(314) 512-9288

iCS Inc.
1143 W. Newport Center Dr.
Deerfield Beach, FL 33442
(954) 427-5000

J.L. Matthews Co. Inc.
620 West Felix
Fort Worth, TX 76115
(817) 924-3360

John Weeks Enterprises Inc.
75 Grayson Industrial Pkwy.
P.O. Box 189
Grayson, GA 30221
(770) 963-7870

Lemca Tool Corp.
RR2 Box 330A
Cogon Station, PA 17728
(800) 233-8713

Mobile Tool International Inc.
5600 West 88th Ave.
Westminster, CO 80030
(303) 427-3700

Moore Diversified Products Inc.
1441 Sunshine Ln.
Lexington, KY 40505
(606) 299-6288

Multicom Inc.
1076 Florida Central Pkwy.
Longwood, FL 32750-7579
(407) 331-7012

PDI
6353 West Rogers Cir. #6
Boca Raton, FL 33487
(561) 998-0600

Power & Telephone Supply Co.
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Reliable Power Products
11411 Addison St.
Franklin Park, IL 60131
(847) 455-0014

Rax System/NMP Corp.
12402 East 60th
Tulsa, OK 74146-0593
(918) 252-0481

Satellite Engineering Group Inc.
6050 Connecticut Ave.
Kansas, City, MO 64120
(816) 231-8080

Scott Cable Communications
P.O. Box 562
Farmingdale, NY 11735
(516) 694-7157

Senior Industries Inc.
610 Pond
Wood Dale, IL 60195
(630) 350-1600

Signal Vision Inc.
27002 Vista Terrace
Lake Forest, CA 92630
(714) 586-3196

Sprint/North Supply
600 New Century Pkw.
New Century, KS 66301
(913) 791-7000

TVC Inc.
800 Airport Rd.
Annville, PA 17003
(717) 838-3306

TW Comcorp
81 Executive Blvd.
Farmingdale, NY 11785
(516) 753-0900

TeleWire Supply
94 Inverness Terrace East
Englewood, CO 80012
(303) 799-4343

Thomas & Betts Corp.
(formerly Augat Communication Products Division)
1555 Lynnfield Rd.
Memphis, TN 38119
(607) 796-5630

Tulsat
1605 E. Iola
Broken Arrow, OK 75012
(800) 331-5997

Tyton Hellermann
7930 North Faulkner Rd.
Milwaukee, WI 53224
(800) 537-1512

Viewsonics Inc.
6454 E. Rogers Cir.
Boca Raton, FL 33487
(561) 998-9594

Powering Products

Alpha Technologies
3767 Alpha Way
Bellingham, WA 98226
(360) 647-2360

AMP Inc.
1116 West Enclave Cir.
Louisville, CO 80027
(800) 220-5489

ANTEC
5720 Peachtree Pkwy., NW
Norcrass,GA 30092
(770) 441-0007

CADD Services Group Inc.
405 North Reo St., Suite 240
Tampa, FL 33609
(813) 289-4119

Cable Constructors Inc.
P.O. BOX 190; 105 Kent St.
Iron Mountain, MI 49801
(906) 774-6621

Cable Converter Service Corp.
54 East Market St.
Spencer, IN 47460
(812) 829-4833

Cable Innovations Inc.
130 Stanley Court
Lawrenceville, GA 30245
(800) 952-5146

Coast CATV Supply Inc.
314 Elizabeth Rd.
Corona, CA 91720
(909) 272-2360

Commercial Electronics Inc.
209 E. Jackson St.
Gate City, VA 24251
(540) 386-7451

Comtech Services
2675 East 28th St.
Sedalia, MO 65301
(816) 826-3011

Contec
1023 State St.
Schenectady, NY 12307
(518) 382-8000

General Instrument Corp.
101 Tournament Dr.
Horsham, PA 19044
(215) 323-1000

Graybar Electric Co. Inc.
34 N. Meramec Ave.
Clayton, MO 63105
(314) 512-9288

GiCS Inc.
1143 W. Newport Center Dr.
Deerfield Beach, FL 33442
(954) 427-5000

Lectro (Exide Electronics)
8380 Capital Blvd.
Raleigh, NC 27616
(919) 713-5300

Lindsay Electronics
50 Mary St. West
Lindsay, ON K9V 4S7
(705) 324-2196

Moore Diversified Products Inc.
1441 Sunshine Ln.
Lexington, KY 40505
(606) 299-6288

Multicom Inc.
1076 Florida Central Pkwy.
Longwood, FL 32750-7579
(407) 331-7012

NCS Industries Inc.
2255 East Wyandotte Rd.
Willow Grove, PA 19090
(215) 657-4690

Norscan Inc.
301-F3 10th St. Northwest
Conover, NC 28613
(704) 464-1148

PDI
6353 West Rogers Cir. #6
Boca Raton, FL 33487
(561) 998-0600

Pelsue Co.
2500 South Tejon
Englewood, CO 80110
(303) 936-7432

Performance Power Technologies
P.O. Box 947
Raswell, GA 30077
(770) 475-3192

Philips Broadband Networks
100 Fairgrounds Dr.
Manlius, NY 13104
(800) 448-5171

Power Conversion Products Inc.
P.O. Box 380
Crystal Lake, IL 60039-0380
(815) 459-9100

Power & Telephone Supply Co.
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Powertronics Equipment Co. Inc.
2010 Industrial Blvd., Suite 611
Rockwall, TX 75087
(972) 722-2310

Quintech Electronics and Communications Inc.
Airport Office Center
Route 286 North
Indiana, PA 15701
(800) 839-3658

Reltec Corp.
5875 Landerbrook Dr., Suite 250
Cleveland, OH 44124
(216) 266-5300

Satcon Technology Corp.
161 First St.
Cambridge, MA 02142
(617) 661-0540

Satellite Engineering Group Inc.
6050 Connecticut Ave.
Kansas, City, MO 64120
(816) 231-8080

Satellite Export & Engineering
1007 Industrial
Albion, MI 49224
(517) 629-5990

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000

TVC Inc.
800 Airport Rd.
Annville, PA 17003
(717) 838-3306

TW Comcorp
81 Executive Blvd.
Farmingdale, NY 11785
(516) 753-0900

TeleWire Supply
94 Inverness Terrace East
Englewood, CO 80012
(303) 799-4343

Toner Cable Equipment Inc.
969 Horsham Rd.
Horsham, PA 19044
(215) 675-2053

Tulsat
1605 E. Iola
Broken Arrow, OK 75012
(800) 331-5997

Vanner Power Group
4282 Reynolds Dr.
Hilliard, OH 43026
(614) 771-2718

Valtex Batteries Inc.
14 Steve Dr.
Atlanta, GA 30340
(770) 448-6021

Westec Communications Inc.
13402 N. Scottsdale Rd.
Scottsdale, AZ 85254
(800) 666-4441

Safety Equipment

ACP International
1010 Oakmead
Arlington, TX 76011
(817) 640-0992

Graybar Electric Co. Inc.
34 N. Meramec Ave.
Clayton, MO 63105
(314) 512-9288

iCS Inc.
1143 W. Newport Center Dr.
Deerfield Beach, FL 33442
(800) 327-4966

J.L. Matthews Co. Inc.
620 West Felix
Fort Worth, TX 76115
(817) 924-3360

Jerry Conn Associates Inc.
130 Industrial Dr.
Chambersburg, PA 17201
(717) 263-8258

Klein Tools Inc.
7200 McCormick Blvd.
P.O. Box 599033
Chicago, IL 60659-9033
(847) 677-9500

Logogram
2250 Lee Rd., Suite 201
Winter Park, FL 32789
(407) 740-5511

NCS Industries Inc.
2255 East Wyandotte Rd.
Willow Grove, PA 19090
(215) 657-4690

PDI
6353 West Rogers Cir. #6
Boca Raton, FL 33487
(561) 998-0600

Pelsue Co.
2500 South Tejon
Englewood, CO 80110
(303) 936-7432

Power & Telephone Supply
2673 Yale Ave.
Memphis, TN 38112
(901) 320-3080

Reliable High Performance Products
1721 South Chesterfield
Arlington Heights, IL 60005
(847) 437-2149

Scott Cable Communications
P.O. Box 562
Farmingdale, NY 11735
(516) 694-7157

Sprint/North Supply
600 New Century Pkwy.
New Century, KS 66301
(913) 791-7000

TVC Inc.
800 Airport Rd.
Annville, PA 17003
(717) 838-3306

TW Comcorp
81 Executive Blvd.
Farmingdale, NY 11785
(516) 753-0900

TeleWire Supply
94 Inverness Terrace East
Englewood, CO 80012
(303) 799-4343

Satellite Communications Equipment

Avcom of Virginia Inc.
500 Southlake Blvd.
Richmond, VA 23236
(804) 794-2500

Borca
3240 Town Point Dr.
Kennesaw, GA 30144
(770) 218-3200

Blonder-Tongue Laboratories Inc.
1 Jake Brown Rd.
Old Bridge, NJ 08857
(732) 679-4000

Cable Constructors Inc.
P.O. BOX 190; 105 Kent St.
Iron Mountain, MI 49801
(906) 774-6621

Comtech Services
2675 East 28th St.
Sedalia, MO 65301
(816) 826-3011

Dawn Satellite Inc.
3340 South Lapeer Rd.
P.O. Box 9
Lake Orion, MI 48361
(248) 391-9200

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Santa Ana, CA 992707
(714) 979-3355

General Instrument Corp.
101 Tournament Dr.
Horsham, PA 19044
(215) 323-1000

Harmonic Lightwaves Inc.
549 Baltic Way
Sunnyvale, CA 94089
(408) 542-2500

Jebsee Electronics Co. Ltd.
24-3 Sin-Lo Rd.
Tainan, Taiwan

Jerry Conn Associates Inc.
130 Industrial Dr.
Chambersburg, PA 17201
(717) 263-8258

John Weeks Enterprises Inc.
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(770) 963-7870

Jones Broadband International Inc.
4120 Avenida de la Plata
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(760) 631-2324

LEL Computer Systems
33 SE 8th St., Suite 200
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(407) 331-7012

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P.O. Box 2000
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(309) 697-4400

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(816) 231-8080

Satellite Export & Engineering
1007 Industrial
Albion, MI 49224
(517) 629-5990

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4261 Communications Dr.
Box 6850
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(800) 433-6222

SeaChange International Inc.
124 Acton St.
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Los Angeles, CA 90009-2151
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TeleWire Supply
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460 Oakdale St.
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Comtech Services
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Spartanburg, SC 29301
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1143 Newport Center Dr. West
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(954) 427-5000
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(717) 838-3306

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Quakertown, PA 18951-9004
(215) 538-8700

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Austin, TX 78759
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3240 Town Point Dr.
Kennesaw, GA 30144
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Raleigh, NC 27616
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Deerfield Beach, FL 33442
(954) 427-5000

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Rancho Cordova, CA 95670
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Palo Alto, CA 94303-9511
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Montreal, Quebec H1Z 4G2
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Richardson, TX 75081
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(540) 434-5965

Attention Vendors!

This guide was culled from exhibit hall information provided at last year's SCTE Cable-Tec Expo as well as the '97 NCTA National Show.

If any information has changed or is incorrect, please let us know. (E-mail rhendrickson@phillips.com or write: Technology Profiles Vendor Guide Editor, 1900 Grant St., Suite 720, Denver, CO 80203.) This listing will soon appear on our Web site (ctinfosite.com), and we will make corrections as necessary.

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Herndon, VA 20170
(703) 471-7671

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(714) 979-3355

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(703) 471-7671

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RDL Inc.
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(717) 838-3306

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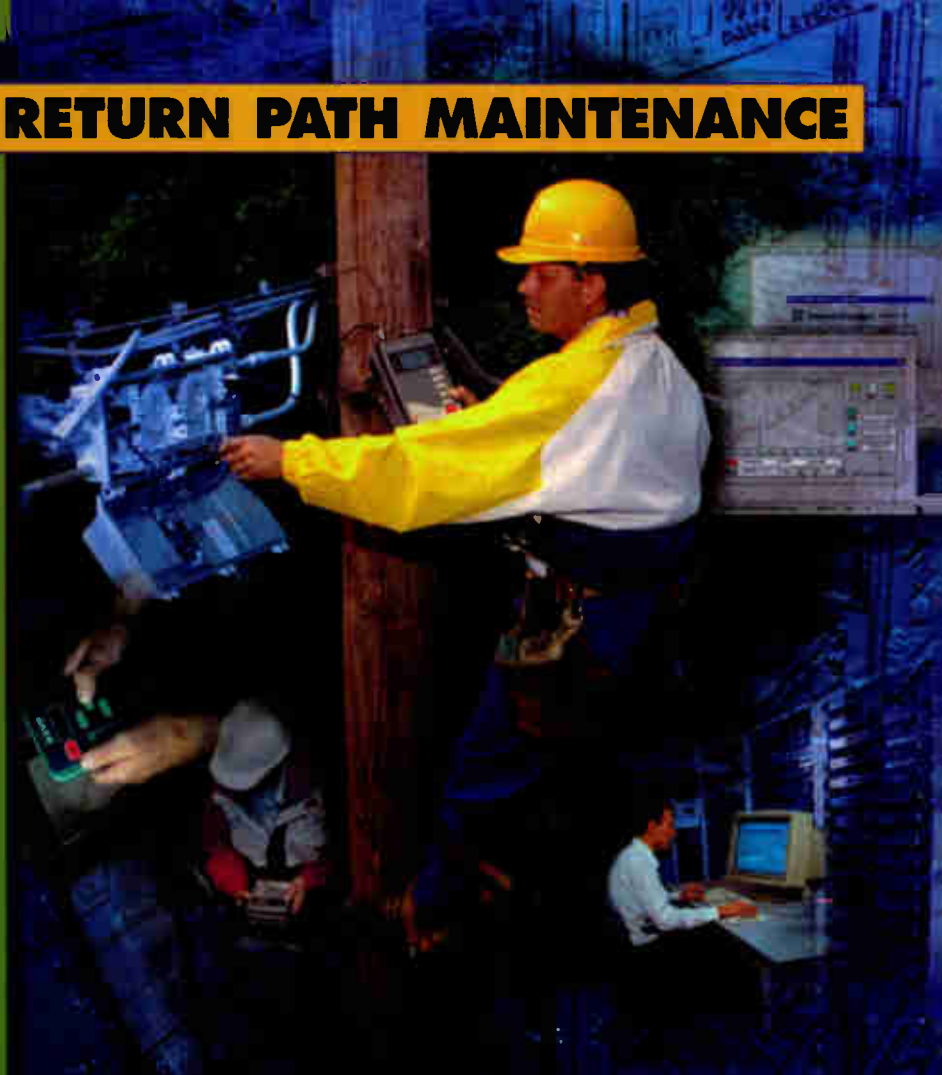

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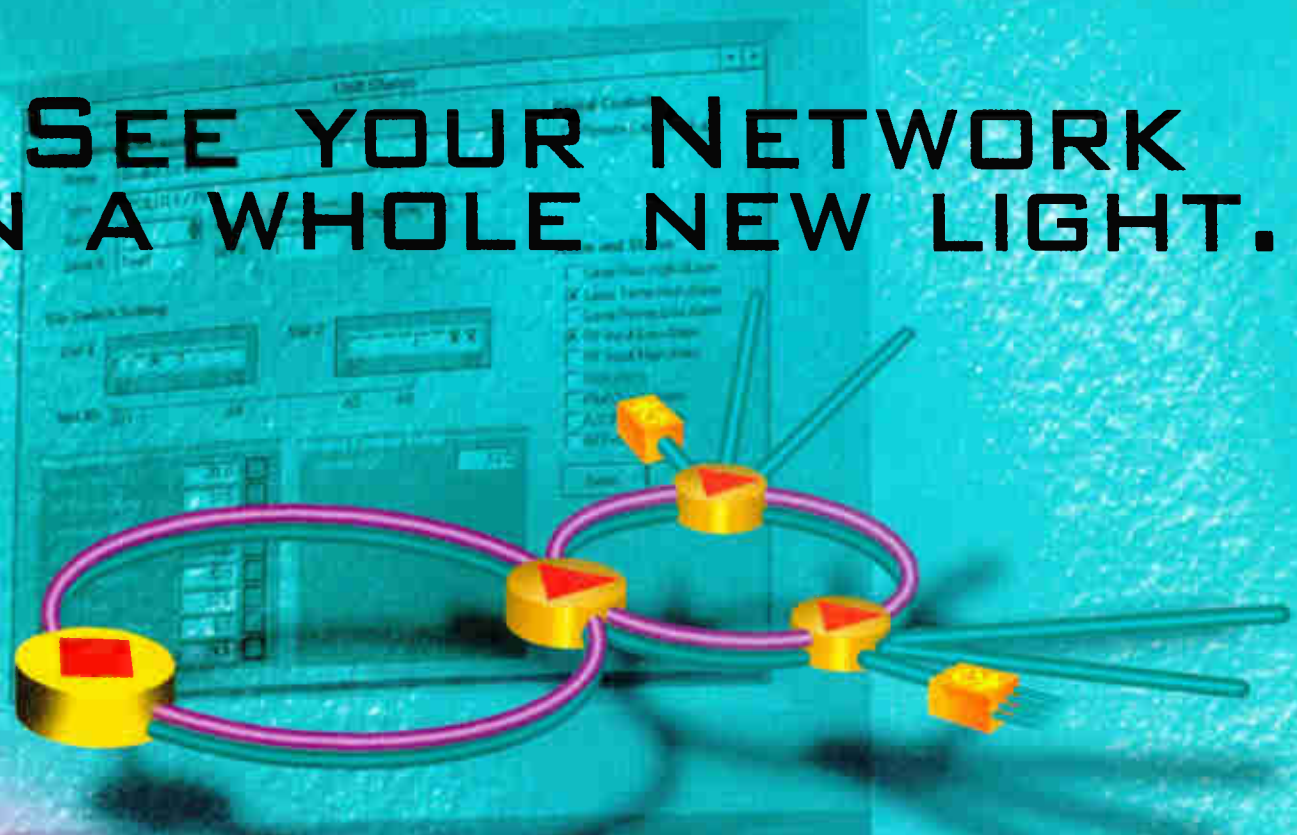

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1310nm

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- Cost effective single output with data/video return
- Scalable and compact 4 output node with data/video return
- State of the art Gallium-Arsenide (GaAs) technology

NETWORK MANAGEMENT SYSTEM

- SNMP compliant
- Single point and click user interface
- 32 bit Windows® based
- Remote access capability

See our Profile on page 43

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