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October 17, 2001

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JANICE OBUCHOWSKI  
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FEDERAL COMMUNICATIONS COMMISSION  
OFFICE OF THE SECRETARY

Ms. Magalie Roman Salas  
Secretary, Federal Communications Commission  
445 12<sup>th</sup> Street, S.W.  
Washington, DC 20554

Re: *Deployment of Wireline Services Offering Advanced  
Telecommunications Capability -- CC Docket No. 98-147*

Ex parte presentation pursuant to C.F.R. §1.1206(a)(1)

Dear Ms. Salas:

Catena Networks, Inc. ("Catena") met yesterday and distributed the attached materials to Commissioner Martin, along with Sam Feder and Monica Desai of the Commissioner's staff. Representing Catena were Doug Cooper and myself. Catena emphasized the need for prompt action by the Commission, because the current uncertainty was impeding investments by the carriers in remote terminal equipment such as Catena's. We explained how Catena's integrated line card technology provides a superior engineering solution to the problem of broadband deployment from certain legacy remote terminals. Moreover, Catena explained how its partitioned OSS capability might solve many of the regulatory problems confronting the Commission in this proceeding.

Please contact the undersigned if you have any questions with regard to this submission.

Respectfully submitted,

  
Stephen L. Goodman  
Counsel for Catena

cc: Commissioner Martin (w/o enc.)  
Sam Feder (w/o enc.)  
Monica Desai (w/o enc.)

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# Everyone wants Broadband™

Catena Profile

Revolutionizing the Delivery of  
High-Speed Voice, Data and Video  
Services to the Mass Market

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## Everyone wants Broadband

The explosive growth of the Internet over the past decade has been fueled by its potential to transform business, communications, education and entertainment.

As a result, service providers are experiencing unprecedented consumer demand for the greater bandwidth required to deliver voice, data and video services quickly, conveniently and affordably.

## Now, everyone can get it.

Catena Networks has developed groundbreaking solutions that integrate broadband Digital Subscriber Line (DSL) capability with Plain Old Telephone Service (POTS) on standard twisted-pair copper wiring, at costs approaching POTS-only solutions.

These solutions will enable the mass-market deployment of DSL and help carriers migrate to a converged, packet-based network that integrates their volume voice and DSL operations.

Catena Networks' solutions enable service providers to simplify the access network, solve deployment bottlenecks and dramatically reduce their capital and operational costs.

## The DSL Market

DSL deployments are expected to increase to nearly 8 million lines by the year 2002, according to Telechoice, an industry research firm. Market research firm RHK predicts that the DSL market will grow 128% per year through the year 2003. Further, RHK forecasts that more than 50% of residential subscribers will be served from remote terminals in three years.

Currently, 30% of subscribers are served by remote terminals, with more than 20 million residential subscribers connected to Lucent SLC<sup>®</sup> Series 5 (SLC-5) Digital Loop Carrier (DLC) Systems.

## The Challenge for Service Providers

Despite the unprecedented demand for residential broadband services, more than 40% of residential subscribers are unable to get DSL because they do not meet specific connection criteria or because deployment hasn't kept pace with demand in their area.

The challenge is that today's DSL data access network is being designed as a separate overlay to the voice network. This data overlay network is satisfactory for the deployment of niche, business-oriented services, but it is not scalable for price-sensitive consumer mass-market deployment.

For carriers to successfully deploy mass-market DSL, a fundamental simplification in the access network is required. Network elements in this architecture must satisfy the escalating demand for DSL service and handle growing numbers of users served from existing and future remote terminals.

Current solutions for delivering DSL from remote terminals — ranging from bolt-on mini Remote Access Multiplexer (mini-RAM) systems to remote Digital Subscriber Line Access Multiplexers (DSLAMs) and adjunct cabinets — are expensive, inefficient and don't scale to support large volumes of users. These solutions require additional space in a remote terminal cabinet, or worse, an incremental investment in additional concrete pads and cabinets. With today's overlay network, service providers also incur high operational costs. Carriers must complete expensive service visits, or truck rolls, to provision service to new customers or handle service-change requests. This hands-on modification of the access equipment can take days or weeks.

"To deploy mass-market DSL to residential subscribers, carriers must deliver DSL to the growing number of remote subscribers served by Digital Loop Carrier (DLC) systems," said Claude Romans, co-director of access networks for RHK. "Catena has developed an architecture that terminates the loop at the first access point and offers carriers a way to deliver high volume voice and DSL services to remote subscribers."

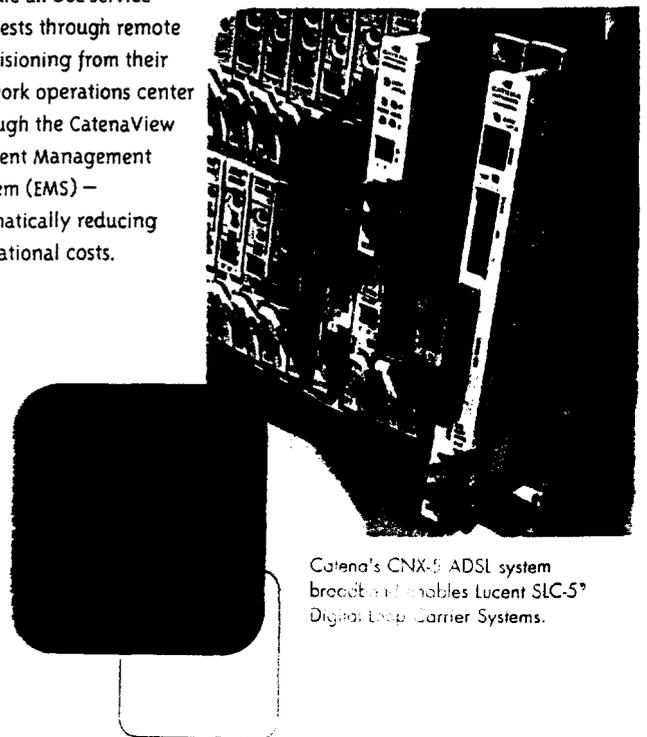
## Catena's Integrated Access Solutions

### CNX-5 Broadband ADSL System

The Catena CNX-5 is a simple, elegant and cost-effective Asymmetric Digital Subscriber Line (ADSL) system for upgrading Lucent SLC-5 Digital Loop Carrier Systems. It enables service providers to deliver POTS and ADSL services on any copper pair, without reducing the number of available POTS lines.

Installation of the CNX-5 involves little more than a simple card-for-card replacement that provides two lines of integrated POTS and ADSL.

The CNX-5 system performs all line functions associated with POTS and ADSL, as well as all multiplexing, ATM and uplink functions. It eliminates the need for POTS splitters, mini-RAMs, DSLAMs, external cabling and additional pads and cabinets. Once the CNX-5 is installed, service providers can handle all DSL service requests through remote provisioning from their network operations center through the CatenaView Element Management System (EMS) — dramatically reducing operational costs.



Catena's CNX-5 ADSL system broadly enables Lucent SLC-5<sup>®</sup> Digital Loop Carrier Systems.

## The World's First Broadband Loop Carrier

Catena Networks is developing a new class of access vehicle, the Broadband Loop Carrier (BLC), which will dramatically improve availability of DSL service and enable a seamless migration from today's circuit-switched network to a converged, packet-based network. With Catena's BLC, every subscriber line will support lifeline telephone service and will be "DSL ready" the moment it is installed. All operations, provisioning and maintenance can be performed remotely. No truck rolls will be required.

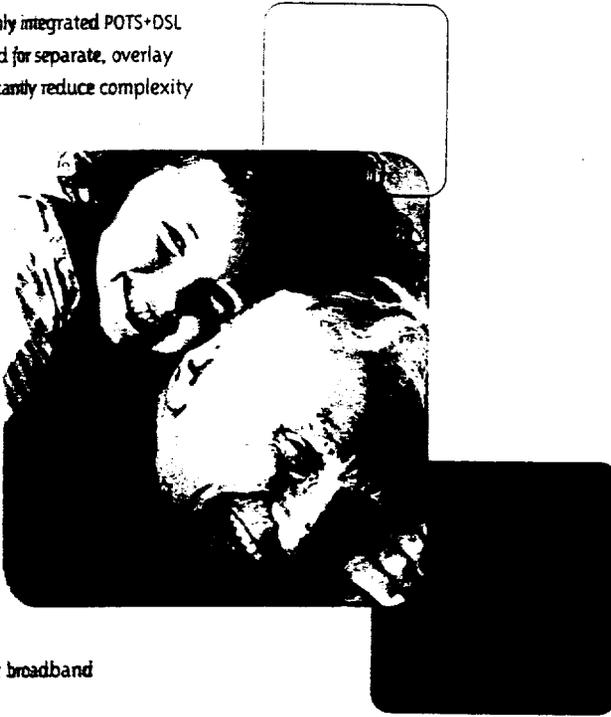
The Broadband Loop Carrier's highly integrated POTS+DSL architecture will eliminate the need for separate, overlay access equipment and will significantly reduce complexity and points of failure.

Service providers will have full spectrum connectivity to the subscriber loop, which will greatly simplify testing and loop qualification and enable future services such as higher-bandwidth ADSL.

## Catena Networks

"Catena" is the Latin word for "chain." Catena Networks was founded on the principle of helping service providers establish affordable and efficient broadband links to their subscribers.

Catena Networks was founded in 1998 by a seasoned team of senior executives that pioneered development of mass-market voice and data access solutions. Their solutions have been deployed in volumes exceeding 150 million lines. The company has developed more than 20 patented innovations enabling low cost, low power and high density POTS+DSL access system solutions. Catena is a privately held company, which has more than 240 employees and has secured U.S. \$105 million in venture financing. The company is headquartered in Redwood Shores, California, in the heart of Silicon Valley, and it maintains a state-of-the-art research and development center in Kanata, Ontario, Canada, near Ottawa.



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Redwood Shores, Calif. - Oct. 9, 2001 - Catena Networks today announced that CT Communications, Inc. (Nasdaq: CTCL) will deploy Catena's CNX-5 Broadband ADSL System to provide integrated voice and broadband data services to its residential and business customers in the Concord Telephone serving area in North Carolina.

CT Communications, a local and long distance service provider based in Concord, N.C., will use the CNX-5 system to broadband-enable its installed base of Lucent SLC(r) Series 5 (SLC-5) Digital Loop Carrier Systems (DLCs).

"Catena's innovative CNX-5 solution gives us a fast and efficient way to turn up broadband DSL service for our subscribers served from existing remote terminals," said Ken Underwood, director of network engineering and planning at CT Communications. "And with the CatenaView Element Management System, we easily can integrate this solution into our existing operations support systems."

Catena's CNX-5 system is a card-for-card upgrade solution for Lucent SLC-5 DLCs that provides two lines of integrated POTS+DSL, without reducing the number of available POTS lines. These SLC-5 remote terminals currently provide POTS to subscribers located beyond the reach of a carrier's central office.

Service providers have been challenged to offer high-speed Internet access services to customers served by remote terminals because of power and space limitations and the high costs associated with provisioning such services.

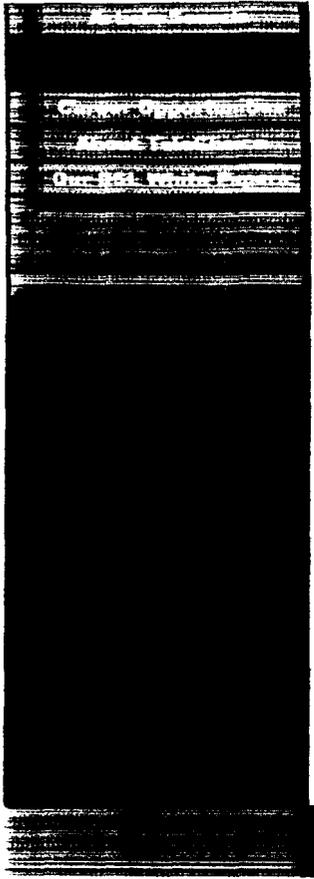
Catena's CNX-5 system addresses these issues, as it is inexpensive to purchase and install, expands in two-channel increments, and provides T1 and DS-3 trunk options to leverage available backhaul bandwidth. The system leverages CT Communications' investment in installed SLC-5 DLCs and eliminates the need for overlay access equipment such as POTS splitters and remote Digital Subscriber Line Access Multiplexers (DSLAMs).

"Next generation solutions like Catena's, which can leverage existing DLC installations and scale to provide converged DSL and POTS services on every port, may very well end up transforming the DSL marketplace by moving more functionality further out in the network - closer to the customer," said Patrick Hurley, DSL analyst for Telechoice, a communications industry consultancy and research firm. Catena's CNX-5 solution consists of an ATM multiplexer common card and a two-line POTS+DSL channel unit, which can be installed in five minutes, as well as the CatenaView Element Management System (EMS).

The CNX-5 uses the CatenaView EMS and Catena's complete Application Programming Interface (API) suite to support the provisioning and management of mass-market DSL services. CatenaView is expandable to tens of thousands of lines and can be distributed across client/server platforms. The full-featured API suite provides the interfaces necessary to electronically link the CNX-5 to upstream operations support systems for flow-through provisioning and reporting.

About Catena Networks Catena Networks, Inc. builds innovative broadband access solutions that are designed to enable incumbent and facilities-based telecommunications carriers to achieve mass-market deployment of plain old telephone service (POTS), and broadband digital subscriber line service (DSL), on a single access line, and to facilitate access network convergence. Headquartered in Redwood Shores, Calif., the company operates world-class research and development facilities in Ottawa, Ontario, Canada and has nearly 400 employees across North America. For more information, please access [www.catena.com](http://www.catena.com).

About CT Communications CT Communications, Inc., which is headquartered in Concord,



N.C., is a growing provider of integrated telecommunications services to residential and business customers located primarily in North and South Carolina. CT Communications, Inc. offers a comprehensive package of telecommunications services, including local and long distance telephone service, Internet and data services and digital wireless services. Additional information about CT Communications is available at [www.ctc.net](http://www.ctc.net).

This press release contains forward-looking statements as that term is defined in the Private Securities Litigation Reform Act of 1995. These and all forward-looking statements are only predictions or statements of current plans that are constantly under review by the company. Such statements are qualified by important factors that may cause actual results to differ from those contemplated, including changes in industry conditions, rapid changes in technology, and actions of our competitors. The company has no obligation to update or revise these forward-looking statements to reflect the occurrence of future events or circumstances.

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get DSL from a CO. Providers can forget about adding a 19-inch rack-mount DSLAM: There's no room to spare in the DLC remote terminals.

But instead of being stuck between a rock and a hard place, Frontier—which is part of Citizens Communications Co. (Stamford, Conn.)—has found a way to get around the roadblock. In August, the company began deploying DSL to rural customers served by DLCs. Frontier tapped DSL startup vendor Catena Networks Inc. (Redwood Shores, Calif.) to help, since Catena builds line cards designed to fit inside the most widely deployed legacy DLC box—the SLC-5 model from AT&T and Lucent Technologies Inc.

Frontier, which serves 1.1 million rural and suburban customers, wants to accelerate DSL deployment to its residential customers in the North Central and Northeast United States. The ability to roll out DSL within existing remote cabinets without sacrificing voice lines appeals to Mark Acker, manager of trunking and transmission engineering at Frontier. “It enables us to sell ADSL [asymmetric DSL] service where we previously weren't able to,” Acker says.

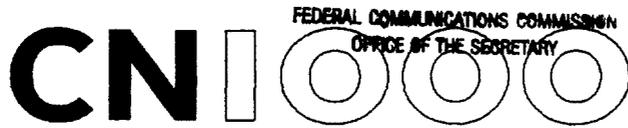
DLCs like the SLC-5 are set up as a chassis stocked with line cards. Catena's CNX-5 line cards are slide-in replacements for SLC-5 cards that layer DSL on top of plain old telephone service (POTS). Catena designed its own silicon in order to integrate both DSL and voice onto its SLC-5-compatible card. The advantage is that a provider can take SLC-5's 192 voice lines and add 192 DSL lines on top of the DLC backbone, says Catena vice president of marketing Gary Bolton. The backhaul to the CO uses up to four T1 (1.544 Mbit/s) lines. The price? Catena comes in at \$25,000 for cards supporting 50 DSL lines, which is competitive with or lower than the cost of a standalone 50-line DSLAM.

RHK senior analyst Ken Twist says Catena is onto something good. “The company uses an already installed base and allows service providers that have the SLC-5 to upgrade their legacy network,” he says. “I don't know of any other solution that allows you to upgrade a SLC-5 system with no reduction in POTS capacity.” If there's a downside to a solution that lets providers upgrade legacy SLC-5 systems with no reduction in voice telephone service, Twist says, he hasn't found it yet.

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## CN1000 Broadband Loop Carrier

The first of a new class of broadband access systems, the CN1000 Broadband Loop Carrier (BLC) offers service providers a cost-saving approach to broadband service delivery and prepares them to reap the full benefits of the emerging packet-based public network.

The CN1000 enables service providers to deploy integrated Plain Old Telephone Service (POTS) and Digital Subscriber Line (DSL) services to the mass market — from both remote terminals and central offices. And it enables providers to migrate gracefully from today's circuit-switched public network to a converged packet-based public network.

### CN1000 Highlights

#### Accelerates Volume Delivery of POTS and DSL

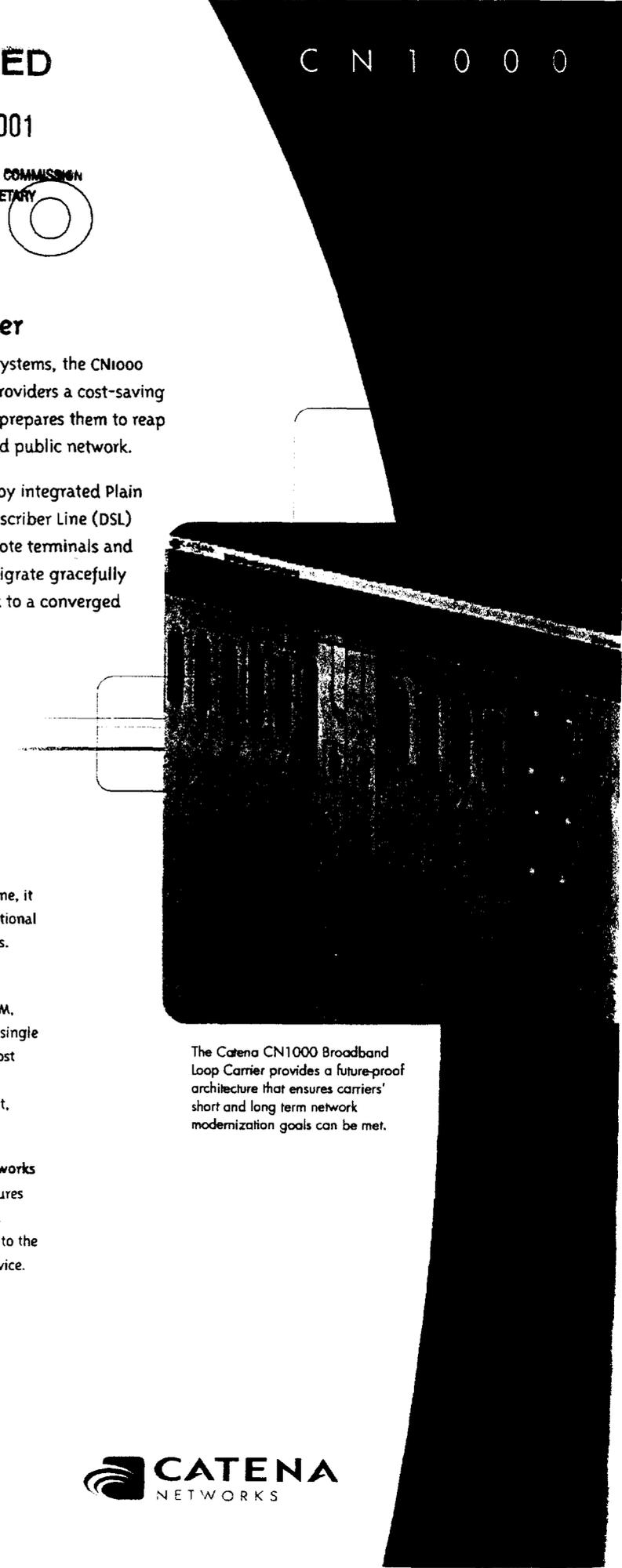
Because the CN1000 provides POTS and DSL on every line, it enables service providers to reduce capital and operational costs and accelerate DSL deployment to all subscribers.

#### Simplifies the Access Network

Because the CN1000 integrates the functions of a DSLAM, DLC and media gateway into a single platform with a single network management interface, it reduces both the cost and complexity of the access network. And its remote provisioning and management capabilities permit fast, cost-effective delivery of services.

#### Enables Smooth Migration to Converged Public Networks

With voice packetization on every line, the CN1000 ensures the seamless, line-by-line migration from today's TDM network to a converged public network — transparent to the end-user, and without compromising lifeline voice service.



The Catena CN1000 Broadband Loop Carrier provides a future-proof architecture that ensures carriers' short and long term network modernization goals can be met.

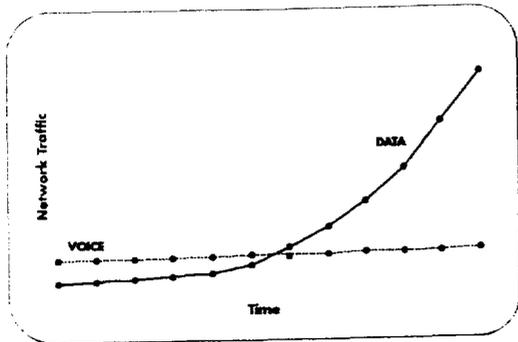


## CN1000 Benefits

### Accelerates Volume Delivery of POTS and DSL Services

While voice services currently account for the majority of service provider revenues, the largest growth opportunity in the telecom market resides with data. The CN1000 responds to this reality: it integrates voice and data into one architecture by implementing an innovative line termination technology, delivering POTS and DSL on every line. In this configuration, each subscriber line is DSL-ready upon installation so providers can expand services rapidly, in pace with demand. The CN1000 approach creates a future-proof platform optimized for high broadband penetration without compromising POTS capacity.

In contrast to the current DSL data overlay architecture, the CN1000 minimizes both capital and operational expenses, creating an access architecture that scales to meet subscriber demand. It eliminates the need for truck rolls to turn services up or down, and the need to change or add cards when a service mix changes. This enables service providers to realize the lowest possible service-activation and lifecycle costs.



Data traffic and high speed access to Internet services are increasing at a rate of more than 100% per year. In the year 2000, data traffic surpassed voice on the public network and continues to grow exponentially.

### Simplifies the Access Network

To reap the full economic benefits of volume mass-market broadband services and new packet-voice applications, service providers must evolve to a much simpler access network architecture. The proliferation of application-specific boxes in the access network — DLCs, DSLAMs, POTS splitters, IADs, gateways and others — has made the network complex. The CN1000 overcomes this burden by integrating the functions of a DSLAM, DLC and media gateway, reducing the number of elements in the network. The result is a simplified, single voice and data system with fewer points of failure and greater reliability.

The CN1000's integration capability is particularly relevant to remote terminals, which will soon serve more than half of all subscribers. Currently, these terminals present the most critical barrier to widespread DSL deployment. Digital Loop Carriers are fundamentally narrowband platforms and current DSL overlay options — from co-located DSLAMs to DSL plug-in cards — present cost and operational drawbacks that make remote DSL deployment impractical. Overlay remote DSLAM solutions are cost-prohibitive, requiring complex and resource-intensive installations. While newer NGDLCs use separate cards to provide DSL service, they typically sacrifice POTS capacity and exacerbate the need for expensive truck rolls — with manual technical involvement required to install a card, or wire to an existing card, each time a service request is processed.

The CN1000 removes all of these limitations and sets a new economic benchmark for the deployment of DSL from remote terminals. It provides POTS and DSL on every line, in a high-density, compact footprint ideal for space-constrained remote terminal sites. Most importantly, for volume POTS and DSL deployment, it eliminates the need for truck rolls and manual interventions. In conjunction with the CatenaView Element Management System, all operations and provisioning can be performed remotely, with DSL service requests handled through a completely hands-off, automated flow-through process from the network operations center.

## Access Convergence

### The Opportunity

As demand for bandwidth continues to grow at a staggering rate, so will the opportunity for service providers to provide a range of revenue-generating voice and data services. Ultimately, all voice, data and video traffic will travel over a single packet-based public network, with broadband connections into every household. This full integration of data networks and circuit-switched voice networks will enable service providers to reduce costs dramatically while increasing the speed of service delivery.

DSL is the favored residential broadband technology, given its ability to leverage prior investments made in copper plant infrastructure. Nevertheless, the cost and complexity associated with its deployment approach — which requires the overlay of data onto the narrowband voice network — is proving problematic. Service providers are being forced to manage two networks — one for voice, one for data. This architecture has impeded widespread and profitable DSL deployment.

### The Catena CN1000 Broadband Loop Carrier

The CN1000 Broadband Loop Carrier from Catena Networks changes the economics of broadband deployment, enabling high-volume delivery of POTS and DSL services to a provider's entire subscriber base. Revolutionary in its approach, the platform simplifies the access network by integrating voice and data services on every line, dramatically reducing DSL capital and operational costs. In addition, it opens the door to integrated service provisioning by permitting a smooth migration from today's TDM-based public network to a converged, packet-based public network.

**Everyone wants Broadband™**

**Now everyone can get it with the CN1000 Broadband Loop Carrier.**

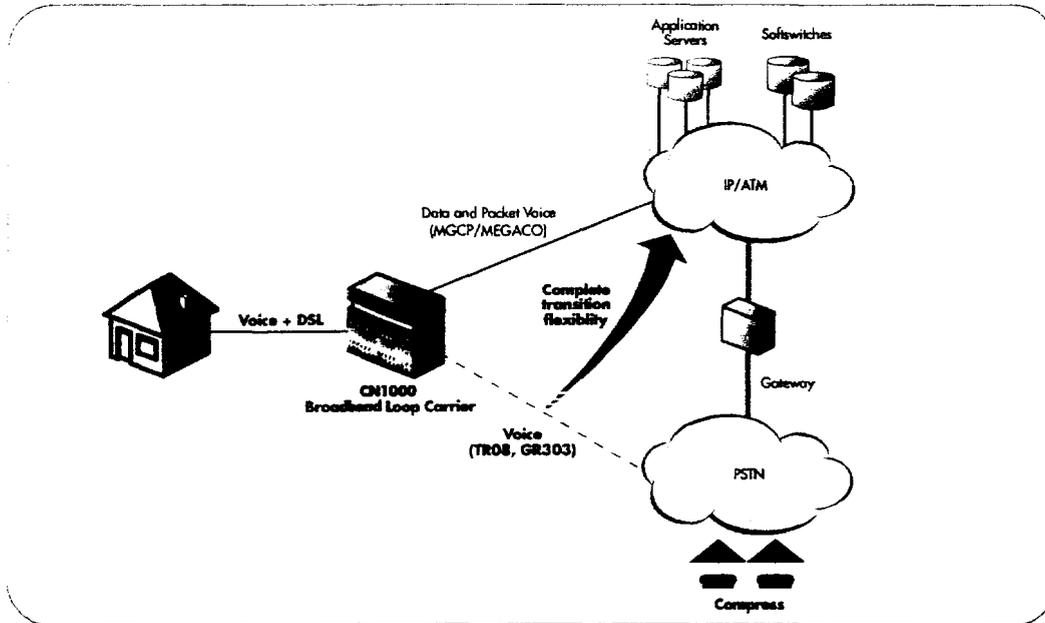
### What is a Broadband Loop Carrier?

The BLC is a new class of broadband access system, superior to traditional DSLAM and NGDLC alternatives.

- *Integrated, splitterless, software-provisionable POTS and DSL on every line, enabling profitable, high-volume broadband deployment to all subscribers.*
- *A packet-ready architecture, providing Lifeline Packet Voice™ — full media gateway functionality, and enabling line-by-line voice packetization transparent to the end-user.*
- *Support for both TDM network protocols (including TR-08 and GR-303) and packet call-control protocols (including MGCP and MEGACO) to enable seamless migration of voice services to a packet infrastructure.*
- *A single management interface, enabling automated flow-through provisioning and management of voice and data services.*
- *An optimized, high-density platform for both environmentally hardened outside-plant and central-office applications.*

## Smooth Migration to the Converged Public Network

The migration of voice and data to a common packet infrastructure has numerous benefits: reduced network expenses, improved bandwidth utilization, and accelerated new-service provisioning. But successful transition between networks also requires the minimization of risks, without disruptive changes or reduction in service quality.

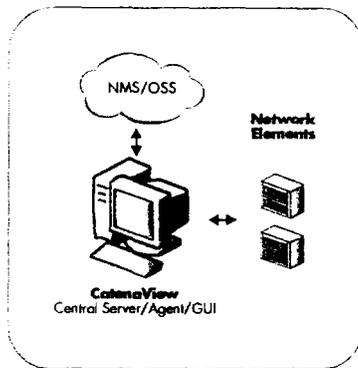


Catena's CN1000 BLC provides complete circuit-to-packet transition flexibility. This allows the TDM hierarchy to be dismantled to the provider's agenda and replaced by a new softswitch infrastructure that offers greater service opportunities at a fraction of the network operating costs.

The CN1000's packet-ready architecture has been designed to fit seamlessly into existing TDM network infrastructures, while providing the maximum flexibility for managed line-by-line migration to a converged packet-based public network. The CN1000 supports both TDM network protocols (including TR-08 and GR-303) and packet call control protocols such as MGCP and MEGACO/H.248, enabling the graceful migration of voice services to a packet infrastructure.

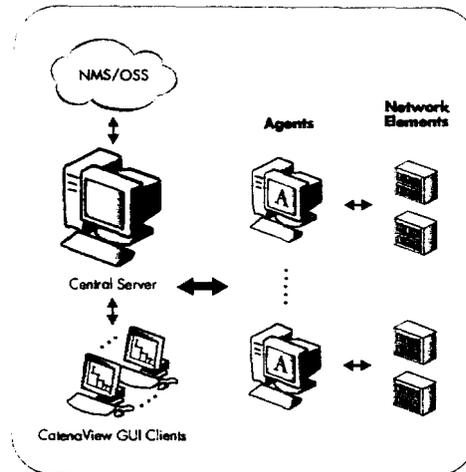
Every line supports voice packetization, so only software activation is required to commence softswitch interworking and operation. This approach provides tremendous flexibility, mitigating the risks associated with most other platforms that cut over in wholesale fashion from TDM to packet. From the end-user's perspective, the CN1000 allows a transition of voice

to packet that is completely transparent — an essential consideration for any residential network migration strategy. What's more, essential lifeline service remains intact throughout the transition process, and no residential Integrated Access Device (IAD), special packet/IP CPE, or change in subscribers' telephone sets are required. The BLC architecture remains fully compatible with VoDSL products that carry multiple derived voice channels in the DSL band and use IADs at the subscriber/business premise.



**Initial Roll-out:**

The CatenaView Central Server, Agent, and GUI Client can reside on the same platform.



**As You Grow:**

To scale the system, CatenaView Agents can be given control of multiple Catena devices. The Central Server provides the single point of access for OSS, NMS, Windows or Sun clients. Communications between all EMS components use CORBA interfaces.

**CatenaView Element Management System (EMS)**

The CN1000 Broadband Loop Carrier was developed recognizing robust provisioning and service management tools are critical for volume deployment of POTS and DSL. To ensure a high level of support, the CN1000 uses Catena Networks' highly scalable CatenaView Element Management System (EMS).

Features of the EMS include:

- Envelope-free EMS scalability
- Multi-node topology management and viewing
- Template-based voice and data service provisioning for hands-free service activation
- End-to-end voice-path and data-path diagnostics
- Real-time special studies of network traffic
- Hardware diagnostics management
- Simultaneous access to the system from numerous locations

CatenaView's distributed architecture enables unparalleled performance to meet the most demanding network needs. In addition, the EMS provides the interfaces necessary — including TL-1 — to link the CN1000 electronically with upstream operation support systems (OSSs) and network management systems (NMSs) for flow-through provisioning and reporting. The CatenaView CORBA interface enables natural northbound interoperability regardless of platform, operating system, programming language, network hardware or software.

## General Solution Specifications

### Line Interfaces

- Splitterless POTS/VoP/DSL (24 port)
  - POTS features
    - Loop start, CLASS, ADSI, 2500 set Centrex FAX, Modem passthrough
  - VoP features
    - Codecs: G.711 & G.726, optional G.723 & G.729A/B
    - Echo Cancellation: G.168
    - Fax : T.30 & T.38
    - Ability to provision TDM/VoP connectivity on a line by line basis
  - ADSL features
    - T1.413 & G992.1, interoperable with G992.2
    - Interoperable with all major modems and chipsets
    - Advanced power management capabilities
  - DS-1 (24 port)
  - Special Services support including legacy voice and data
  - G.SHDSL\*

### Network Interfaces

- Single or separate backhaul for voice and data
- 1+1 redundancy for all network interfaces
- OC-3 /DS-1/DS-3
- OC-12\*

### Voice and Media Gateway Interfaces

- Media Gateway functionality with MGCP or MEGACO/H.248 call control
- VoIP and VoATM capability
- GR-303, TR-08, or INA interface to Class 5 for traditional DLC interface
- DS-0 Time Switching and Concentration
- Unbundling at DS-1 level or DS-0 level
- Flexible deployment options (Star, Daisy Chain, Tree)

### ATM/IP Features

- UNI 3.0, 3.1, 4.0
- UBR, UBR+, CBR, VBRrt, VBRnrt & GFR
- Traffic Mgmt 4.0 & ILMI 4.0 Support
- Connection Admission Control
- 16 VCs per line
- PVC, SPVC & SVC
- Shaping & policing, EPD & PPD, EFCI
- F4/F5 OAM cells for Management
- VP Switching
- IP Service intelligence\*

### System Capacity

- Up to 1056 POTS/VoP/DSL ports per system
- Density up to 2112 POTS/VoP/DSL ports in a 7-foot frame

### Packaging and Dimensions

- All shelves:
  - Depth: 11.8", Width: 23" Rack Mount
  - Shelf Types
    - Core Shelf (288 line capacity)  
Height: 14" (8U)
    - Expansion Shelf (384 line capacity)  
Height: 14" (8U)
    - Triple Shelf (1056 line capacity)  
Height: 36.75" (21U)

### Operating Environment

- CO, CEV, or Remote Cabinets
- Compatible with leading OSP cabinets
- NEBS 3 / UL / CSA / Temperature Hardened
- FCC Part 15 Class A
- Temperature Ranges:
  - Operating: -40°C to +70°C; -40°F to 160°F
  - Storage: -40°C to +75°C; -40°F to 170°F
- Altitude: 4,000 m/12,000 ft
- Relative Humidity: 5% to 90% non-condensing

\* Future Release

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### TMC Labs' Second Annual INTERNET TELEPHONY® Innovation Awards

TMC LABS

Innovation is the soul of Internet telephony. And while we certainly recognize innovation as possessing the outward appearance of a new product employing a new technology, we've also recognized that it appears in other shapes as well. Sometimes being innovative isn't necessarily being "first" in the most literal sense, but instead looking at things from a slightly different perspective. Challenging the established "standards" and introducing different approaches to achieve distinctive results certainly helps to define innovation in our corner of the telecom world, and perhaps even well beyond.

TMC Labs recognizes the degree of wherewithal necessary to formulate a quality product that captures the essence of newer technologies. Building or re-engineering a product in a new way to enhance services, improve usability, and refine quality is also an exceptional and innovative practice. Ultimately, the industry as a whole stands to gain, as this further solidifies the stake and acceptance of Internet telephony as a viable means of communication, ensuring the provision of a valuable, necessary service.

It was initially the intent to examine our collective knowledge base (including vendor-submitted nomina-

tions) as Technology Editors for TMC Labs, and nominate products and (in some cases) product suites, which we felt demonstrated technological uniqueness with the promise of providing a viable service within the industry of Internet telephony. After collaboration, we researched each product further to not only confirm or deny initial nominations, but in certain cases to also corroborate products, which were not unanimously agreed upon by all editors. Though we examined several different methods of nomination, ultimately we felt that sharing knowledge and good old-fashioned democracy were the best ways to govern the award process.

Many, many quality products were discussed, and many of the ones that do not appear in this issue were innovative in their own right. In this case however, only the highest finishers are eligible for an award. And that's just what TMC Labs is responsible for doing. Choosing this year's 12 most innovative Internet-telephony products. These awards are the subject of extensive research and a large investment of time. We hope you find this exercise useful, and we hope you enjoy the result.



## Catena Networks

### Catena's CN1000 Broadband Loop Carrier

307 Legget Dr. Kanata, Ontario Canada K2K 3C8

Tel: 866-2CATENA; Fax: 613-599-0445; Web: www.catena.com

Catena Networks' vision "to create the new access architecture for the converged, packet-based public network" intrigued us, so we took a closer look at this innovative company.

Their CN1000 is a highly integrated broadband access system for efficiently provisioning and deploying residential DSLs while enabling the seamless migration from today's TDM network to a converged, packet-based softswitch environment on a line-by-line basis.

According to Catena, the challenge is that the DSL data access network was previously being deployed as a separate overlay to the voice network. This data overlay network was satisfactory for the deployment of niche, business-oriented services, but did not scale for consumer mass-market deployment, especially since remote DSL AMI cross connects, POTS splitters, and adjunct cabinets are required.

The CN1000 is based on a patented architecture developed by Catena that terminates the loop at the first access point and enables carriers to deploy DSL and converge voice and data in the access network. This unique line-termination technology integrates POTS and DSL on every line without requiring a DSLAM or POTS splitter at the customer premise.

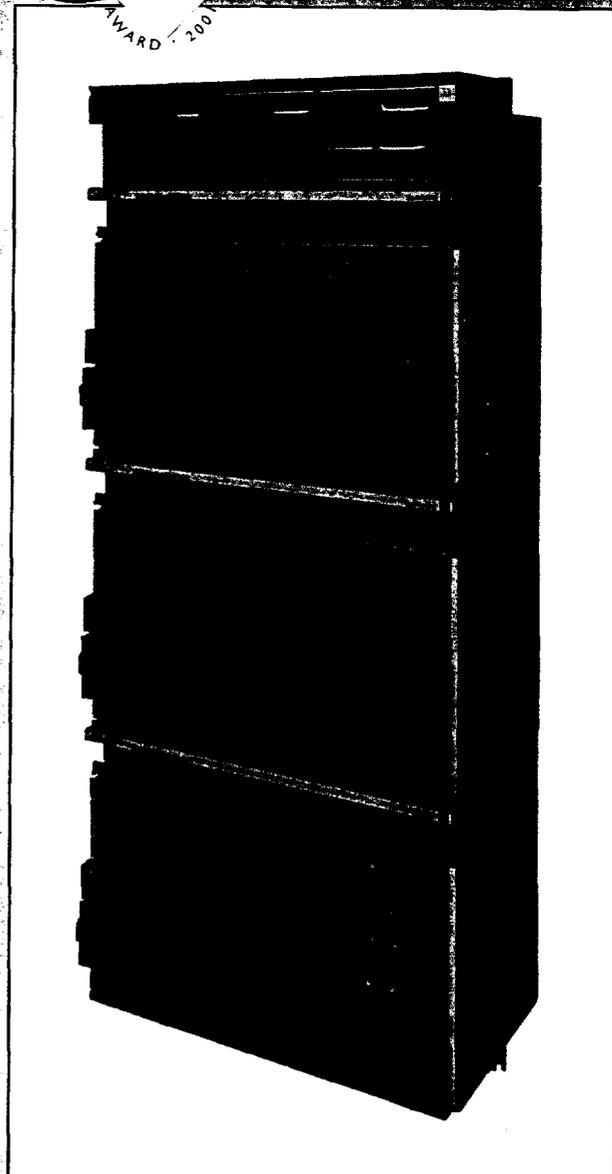
As a result, every subscriber is broadband-ready from day one and service can be provisioned remotely without field visits. This new access architecture enables a graceful line-by-line migration to voice over packet (VoP) and packet-based architectures, as carriers evolve their networks.

This innovative solution allows all subscribers to continue to enjoy lifeline voice services using their existing telephony, while enabling the deployment of next-generation services. By integrating POTS and DSL on the same line in the CN1000, Catena is able to accommodate the 300-4KHz voice spectrum and the 300-100KHz DSL spectrum. No integrated access devices (IADs) are needed at the home, because Catena's technology allows packetization of voice traffic at the line-termination point in the CN1000.

Utilizing the CN1000, a Broadband Loop Carrier (BLC) could have the following benefits:

- Eliminate DSLAM or POTS splitter and improve DSL service availability;
- Fully integrate POTS and DSL, obviating the need to roll trucks;
- Eliminate overlay access networks;
- Supports converged, packet-based network;
- Works in conjunction with packet Class 5 Switches and softswitches;
- Supports voice packetization, on per-line basis, at line-termination point; and
- There is no tradeoff of packet voice versus DSL ports.

According to Catena, their CN1000 broadband loop carrier scales to more than four times the port density of existing next-generation digital loop carrier systems (NGDLCs). Catena's highly integrated POTS+DSL silicon technology enables 288 integrated POTS/DSL lines on the first shelf; 672 integrated POTS/DSL lines per two-shelf system; 1,056 integrated POTS/DSL lines per three-shelf system; and 2,112 integrated POTS/DSL lines per seven-foot rack.



The CN1000 supports ADSL and will support the emerging G.SHDSL standard for high-speed symmetrical services. Catena's programmable silicon technology enables carriers to manage evolving ADSL standards by delivering new features via software downloads. The CN1000 is currently fully interoperable with leading providers of DSL customer premises equipment (CPE) and silicon and is fully compliant with the ANSI T1.413, ITU-T G.992.1 (G.dmt), ITU-T G.992.2 (G.lite), and ITU-T G.994.1 (G.handshake) DSL standards.

For remote terminal applications, the broadband loop carrier differs considerably from current next-generation digital loop carriers (DLCs). Next-generation DLCs are based on TDM backplanes and utilize DSL line cards that typically sacrifice POTS port capacity. In contrast, Catena's CN1000 is engineered from the ground up on a packet-based architecture, which utilizes integrated POTS+DSL line cards that do not sacrifice POTS density. For providing an integrated and innovative POTS+DSL solution, which is easier to deploy, we commend Catena Networks and bestow our TMC Labs Innovation Award.

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4th Annual

# SUPER Quest

*award*

**Once again, tele.com's choices for the best products, networks and services are more than just good. They're SuperQuest-worthy.**

**I**n the communications industry, products, network architectures and services fall into one of three categories: hope, hype or the real goods. The trick, of course, isn't discovering these three different groupings but knowing how to separate the great services, architectures and products from the bad and the undetermined. And it's not getting any easier: New offerings get spit out all the time, and the penalty for choosing incorrectly is now higher than ever.

The crossroads between hype, hope and delivery is exactly where tele.com's SuperQuest Awards are. Once again, these awards aim to pick the very best in a range of existing network services and products across 11 different categories, ranging from the best-built networks to the most promising technologies. This effort—the fourth annual—was especially challenging, given the intensity of the competition and the number of 250 entries, up 50 percent from 2000. The biggest difference between entries was their size. They came from the smallest emerging players as well as the largest vendors and providers. The common denominator was their underlying goal. All of them hoped to snag a coveted SuperQuest Award to justify their efforts—not only to the industry but to themselves as well.

The scope of the products and the impact of the related technologies involved were well noted at the presentation ceremonies. "Internet protocol, wireless, optical, broadband and digitally enabled services have become ingrained in our modern business culture and connected lifestyles. And indeed, there is no turning back. Each day our industry evolves while blurring global boundaries," says Jack Chalden, general manager

at SuperComm, which also sponsored the awards. "The SuperQuest Awards are a vital part of showcasing these very advancements that are moving the industry forward at breakneck speed."

Getting through the review process involved more than a simple read of the entries. It required an extended effort by the largest and deepest SuperQuest judging panel ever put together. The panel included 22 leading analysts and service providers as well as several senior **tele.com** staff members.

The end result goes a long way toward determining where the industry is now and where it's heading in the next few years as these bleeding-edge offerings take hold. Of course, delivering on a promise is the only true measure of a product's or a service's worth. So read on: It's just SuperQuest.

## **MOST PROMISING TECHNOLOGIES**

### **Access Networking Equipment**

**WINNER:** *Catena Networks Inc. (Redwood Shores, Calif.)*

**PRODUCT:** *CNI000 Broadband Loop Carrier*

**C**NI000 is a highly integrated broadband access system that helps carriers provision residential digital subscriber line (DSL) services and migrate from today's time-division multiplexing (TDM) to a softswitch environment on a line-by-line basis. This system lets customers deploy next-generation services while continuing to receive lifeline voice services using their existing telephones. Ultimately, Catena has addressed one major factor in slowing the deployment of broadband services to residential customers.



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# CNX-5

## CNX-5 — SLC Series 5 DSL Upgrade System

The CNX-5 is a simple, elegant, and inexpensive Asymmetric Digital Subscriber Line (ADSL) upgrade solution for the Lucent SLC® Series 5 Carrier System. This new deployment approach enables service providers to deliver both Plain Old Telephone Services (POTS) and ADSL services on any copper pair without compromising POTS density. The CNX-5 leverages the investment in installed Digital Loop Carrier (DLC) equipment making it the most cost effective solution for delivering DSL services from the DLC. The CNX-5 upgrade is inexpensive to purchase and install, expands in two channel increments, and provides T1, nXT1, and DS-3 trunk options to leverage available backhaul bandwidth.

Based on the SLC Series 5 chassis, the CNX-5 solution consists of three components: an integrated 2 POTS and 2 DSL port channel unit, an ATM multiplexer card and the CatenaView Element Management System (EMS).

Catena Networks' CNX-5 solution is ideal for service providers to quickly respond to DSL service demand served by their installed base of SLC Series 5 remote terminals.

### CNX-5 Highlights

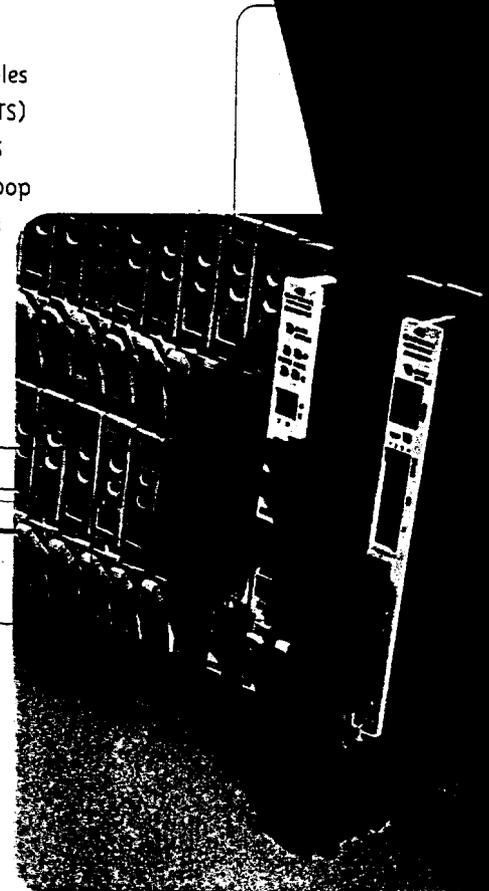
**Simple.** An ATM multiplexer common card and a two-line POTS/DSL channel unit card are all it takes to upgrade the SLC-5 to support DSL.

**Elegant.** The CNX-5 requires no external cabling, no "pizza boxes", no POTS splitters, and no additional pads and cabinets — just a simple card-for-card upgrade.

**Cost-effective.** Lower start costs, lower expansion costs, and lower inventory costs make the CNX-5 much less expensive than Mini-RAMs, and remote DSLAMs.

**Scalable.** The CNX-5 provides cost effective growth in two-line increments without reducing POTS port count. CatenaView EMS is expandable to tens of thousands of lines.

**Future Proof.** Catena's Programmable Full Spectrum Management silicon technology embraces ADSL standards evolution by not "stranding" spectrum behind hard-wired POTS splitters.



The CNX-5 DSL Upgrade System is applied to the installed base of SLC-5 Series 5 Digital Loop Carrier Systems. With the CNX-5 solution, the SLC Series 5 can be DSL equipped with simple card-for-card replacements — with no reduction in POTS capacity.

## The Simple, Elegant Solution for Delivering DSL from the SLC 5

### The Challenge

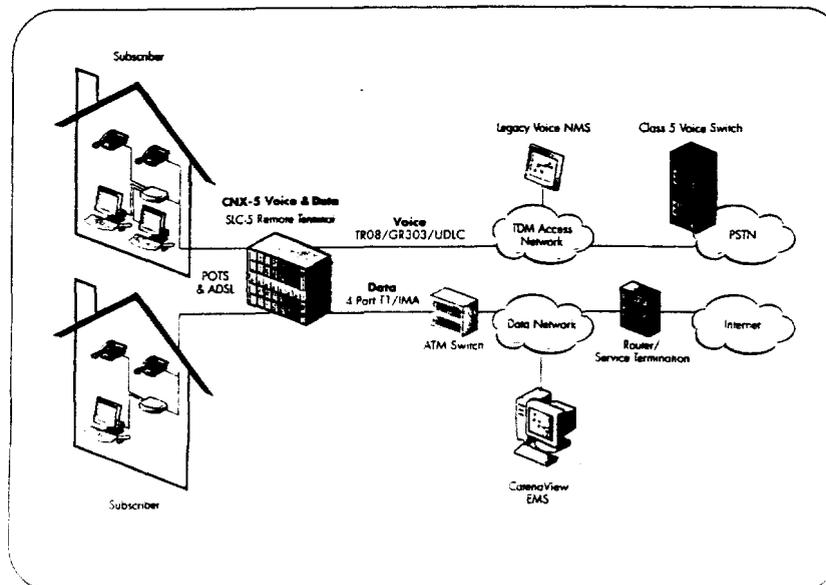
The exploding demand for residential broadband service, and rapidly expanding competition from cable providers has created an urgent need for service providers to deliver DSL to customers serviced by DLCs. However, current solutions for delivering DSL from remote terminals — ranging from remote DSLAMs to bolt-on Mini-RAM systems — are bulky, cumbersome and not cost-effective. These solutions require additional space in a remote terminal cabinet, or worse, an incremental investment in additional concrete pads and cabinets. What is needed is a solution that provides a quick, simple and reliable upgrade to the existing installed base of SLC Series 5 systems — one that is cost-effective yet provides considerable capacity for growth.

### The Catena CNX-5 Solution

To meet this need, Catena Networks introduces the CNX-5 SLC Series 5 DSL Upgrade System. It is a simple, elegant and cost-effective way to leverage an investment in SLC Series 5 DLC installations to easily introduce residential DSL. Part of its simplicity is owing to its three part make-up: an integrated 2 POTS plus 2 DSL port channel unit card, an ATM multiplexer card and the CatenaView Element Management System EMS.

### CNX-5 Within the Network

The CNX-5 is a simple card replacement ADSL upgrade solution that resides in the SLC Series 5 access platform located in a remote terminal. Standards-based and widely interoperable with all popular ADSL CPE, it provides the data transmission and voice interface between end users and the central office. Catena's CNX-5 upgrade is comprised of a common card called the Enhanced (ATM Mux) Channel Test Unit (ECTU) and the Enhanced Channel Unit (ECU). Together, these cards provide the added functionality of a DSLAM while preserving the functionality of POTS and legacy services on the SLC Series 5.

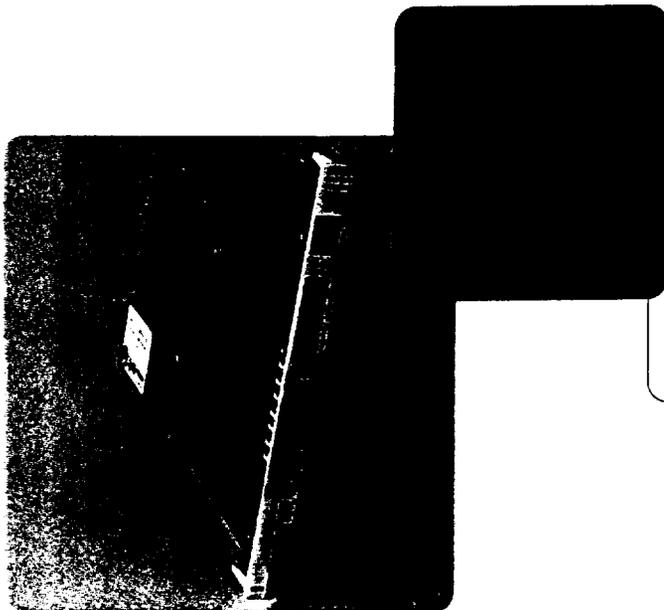


The CNX-5 Upgrade System provides a simple, elegant and cost-effective way to introduce DSL transmission to the remote SLC-5 DLC.

## Solution Elements

### Catena Enhanced (ATM Mux) Channel Test Unit (ECTU)

To support DSL services on the SLC Series 5, the existing CTU card is replaced with Catena's single common ECTU card. While the ECTU retains the legacy CTU functionality, it also provides the DSLAM functionality in the SLC-5. The CNX-5 utilizes existing system



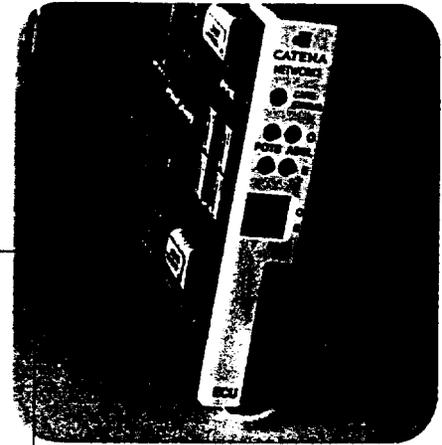
The Enhanced (ATM Mux) Channel Test Unit card performs all multiplexing, ATM and backhaul trunk functions

resources on the SLC Series 5 to communicate between the ECU cards and the ECTU.

This architecture avoids the requirement for any external cabling, whether between cards, or to an external POTS splitter. This greatly simplifies the installation process.

The ECTU provides a local craft configuration interface to manage and configure the DSL system with minimal effort, in addition to the CTU's existing craft interface for testing and configuring special services. LEDs are provided to reflect the status of the system. Once installed in the SLC-5 chassis and connected to backhaul facilities, the ECTU is ready to be provisioned for DSL services from the Network Operations Center.

Recognizing that backhaul resources available to a SLC Series 5 can be scarce, the CNX-5 upgrade offers three backhaul options - T1, 4xT1 IMA, and DS-3. These options enable the carrier to get started inexpensively and grow backhaul bandwidth as it is required and available.

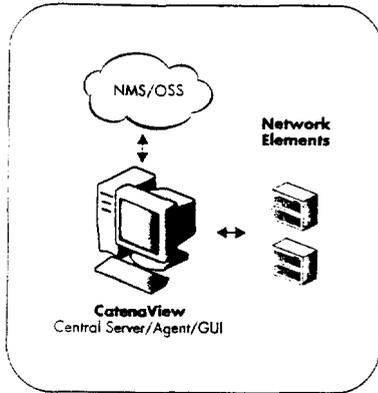


The Enhanced Channel Unit card combines POTS and data line transmission technology.

### Catena Enhanced Channel Unit (ECU)

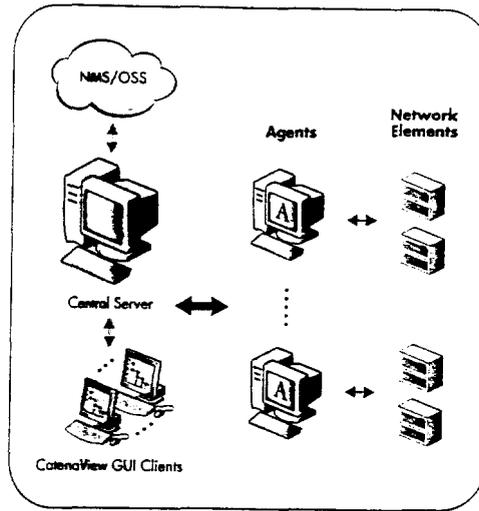
The ECU card uses Catena's industry leading integrated POTS/DSL line interface technology complying with relevant TR-TSY 57 voice, T1.413 and G.992.1 (G.dmt) and G.994.1 (G.handshake) data standards. For voice services, the ECU supports standard POTS functionality. When inserted into the SLC Series 5 chassis, the ECU operates as a standard SLC-5 POTS channel unit. To the service technician, the ECU installs the same way as a standard SLC-5 channel unit with familiar LED displays. For DSL services, the ECU is provisioned the same way as standard DSL services from a DSLAM.

*The Catena CNX-5 solution is a simple, elegant and cost-effective way to leverage SLC Series 5 DLC installations to generate new revenue by easily introducing mass market DSL services.*



**Initial Roll-out:**

The CatenaView Central Server, Agent, and Client GUI can reside on the same hardware platform.



**As You Grow:**

To scale the system, CatenaView Agents can be given control of multiple Catena devices. The Central Server provides the single point of access for OSS, NMS, Windows or Sun clients. Communications between all EMS components use CORBA interfaces.

**CatenaView Element Management System (EMS)**

The CNX-5 has been developed with a recognition that when integrating DSL into an existing SLC Series 5, it is important to provide robust tools for provisioning and managing the DSL service, while ensuring that the processes and procedures used to provision and manage the POTS service remain unaffected. Accordingly, POTS provisioning and management on the CNX-5 remains unchanged from the standard SLC Series 5 implementation. All POTS provisioning and trouble-shooting methods are the same for Catena ECUs as for standard channel units in the SLC Series 5.

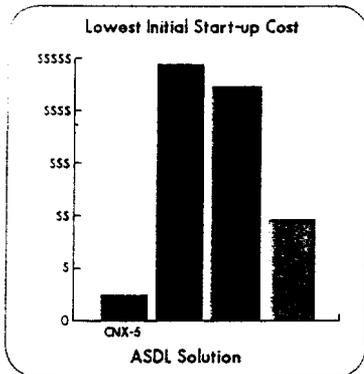
To support the provisioning and management of mass market DSL services, the CNX-5 utilizes Catena Networks' robust CatenaView EMS and complete Application Programming Interface (API) suite. CatenaView is expandable to tens of thousands of lines and can be distributed across client/server platforms for optimum performance and reliability. The full-featured API suite provides the interfaces necessary to electronically link the CNX-5 to upstream Operation Support Systems (OSSs) for flow-through provisioning and reporting.

CatenaView's CORBA API uses a TCP/IP-based protocol to enable natural northbound interoperability regardless of platform, operating system, programming language, network hardware or software. The CatenaView CORBA API facilitates seamless integration into northbound NMS and OSS legacy systems using industry standard technology. By utilizing Catena's CORBA API, service providers are able to achieve true ADSL flow-through provisioning right from the NOC.

## Benefits of the CNX-5 Solution

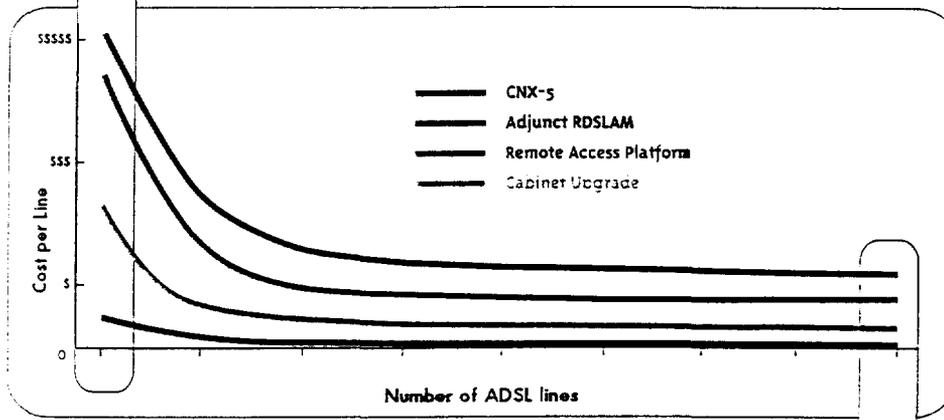
### Simple

The CNX-5 solution is a simple card-for-card replacement for the SLC Series 5 system, comprised of an Enhanced Channel Unit (ECU) card, an ATM Mux Enhanced Channel Test Unit (ECTU) card and the CatenaView EMS. The ECU card provides



### ADSL Per Line Cost Comparison

The CNX-5 provides an attractive cost curve when compared with alternatives.



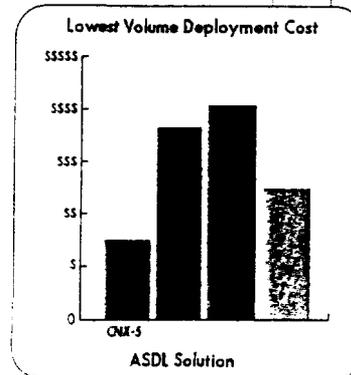
two lines of POTS and two lines of ADSL per card and performs all line functions associated with POTS and ADSL. The ECTU card performs all multiplexing, ATM, and uplink functions, in addition to the existing legacy functions.

### Elegant

Unlike other upgrade solutions, Catena's CNX-5 solution requires no external cabling, no wedging of Mini-RAMS into any available space, and no POTS splitters — just simple, elegant card insertions into the existing chassis. Elegant because an ECTU card replaces the existing Channel Test Unit (CTU) card to make the remote terminal DSL-ready, and because of the scalability that allows growth in accordance with demand through simple CU replacements. Voice services are provisioned in the same way as with legacy SLC CU cards, and data services are provisioned from the Network Operating Center (NOC), consistent with existing DSL service. As a result, there is minimal requirement to retrain technical personnel on the operation of legacy equipment.

### Cost-effective and Scalable

The CNX-5 provides an attractive price curve when compared with alternatives. It is inexpensive to introduce, expands in two-line increments, and achieves densities well beyond alternative solutions. Subtending support linking multi-cabinet sites enables additional flexibility to ensure truly effective WAN utilization. Equally important, the CNX-5 remains less expensive to maintain on a per line basis when compared to other available solutions, and provides significant operations savings when faced with service churn.



# General Solution Specifications

## ATM Support

The CNX-5 supports full ATM capabilities for the most advanced service requirements. Services include all AAL types with full per virtual channel (VC) quality of service (QoS) with overbooking and support for UNI3.0, UNI3.1, and UNI-based SPVC for reduced network operations. Full congestion management includes EPD/PPD. Both sub-channels per DSL line (high latency and low latency) are supported with up to 16 PVCs in any combination of QoS per subscriber line. Full OAM functionality is provided. The system is multicast ready and will migrate to support PNNI, UNI4.0, auto-configuration of ATU-R via ILMI, subtending services, subscriber side SVC services, and packet services.

## DSL Standards Compliance

- ITU 992.1 (G.dmt)
- ANSI T1.413 Issue 2

## Interoperability

- Fully Interoperable with all major ADSL chip sets
- Fully Interoperable with Full Rate and G.Lite CPE (ATU-Rs) including popular vendors such as Efficient, 3Com, Westell, Alcatel, and others

## Reliability and Serviceability

- Software and configuration downloads from CatenaView
- Full OAM suite including F5 loopbacks and performance statistics

## Power Requirements

- Derived from -48Vdc in SLC

## Robustness

- Easy Recovery — Relevant DSL provisioning data is stored in non-volatile memory to allow for ADSL service recovery from power outages without EMS intervention
- AC Monitor feature — Enables turn-down of DSL service in the event of power outages in order to preserve lifeline POTS battery life

## Operating Environment

- Operating Temperature Range: -40°C to +65°C; -40°F to 150°F
- Storage Temperature Range: -40°C to +65°C; -40°F to 150°F
- Altitude: 4,000 m/12,000 ft
- Relative Humidity: 5% to 90% non-condensing

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# CATENAVIEW

## Element Management System for the CNX-5 DSL Upgrade System

CatenaView is a carrier-class Element Management System (EMS) for all Catena Networks products. CatenaView provides element management for the CNX-5 DSL Upgrade System. The CNX-5 is a simple, elegant and cost-effective Asymmetric Digital Subscriber Line (ADSL) upgrade solution for the Lucent SLC® Series 5 (SLC-5) Digital Loop Carrier System. CatenaView EMS manages DSL and ATM features for this new deployment approach designed to enable service providers to deliver both Plain Old Telephone Service (POTS) and ADSL services on any SLC-5 copper pair without compromising POTS density.

CatenaView supports comprehensive Operations, Administration, Maintenance and Provisioning (OAM&P) Management of all Catena Networks products under a single management platform. Its highly scalable architecture and industry-standard interfaces make it possible to select a variety of deployment options — as a stand-alone product, or seamlessly integrated with existing and future Network Management Systems (NMS) and Operations Support Systems (OSS).

### Highlights

**Full OAM&P Support.** CatenaView supports remote and secure management of all Catena elements. A full suite of utilities is provided to simplify all aspects of configuration, performance, fault, and security management.

**Flexible Provisioning Options.** With CatenaView, users can choose between automatic, template-based and flow-through provisioning options, enabling the flexibility needed to ensure fast and simple deployment for a variety of volume DSL service offerings.

**Scalable Architecture.** CatenaView's versatile distributed architecture scales gracefully to tens of thousands of managed lines, with a multi-threaded implementation that allows concurrent processing of simultaneous network events.

## Solution Components



### **CATENA** **Central Server**

The Central Server acts as the primary point of contact for northbound systems, including GUIs, NMSs and OSSs. CatenaView stores all network level information in an industry-standard database and communicates using industry-standard protocols.



### **CATENA** **Agent**

The Agent is the workhorse of the system where processing and recording of all network events occurs. Agents may be added as required to scale the network. Each Agent contains a database of network element configuration, connection, trap and performance data for all the managed elements. It communicates with the CNX-5 elements using SNMP, FTP and Telnet over an IP connection.



### **CATENA** **GUI Client**

As the end-user terminal, the GUI Client application can be run on any Java capable platform (Windows or UNIX platform). Multiple users can choose to deploy an X-compatible client server architecture to eliminate the need for multiple application installations.

## Full OAM&P Support

Operations, Administration, Maintenance and Provisioning (OAM&P) provides necessary controls for service providers to provision and maintain high levels of service. CatenaView features a number of OAM&P utilities illustrating network operations and subscriber-specific information that allow for the provisioning and monitoring of Catena elements in the network. When service problems occur, Catena utilities will identify and trouble-shoot the item to quickly restore service.

CatenaView has developed and incorporated a series of user-friendly utilities to make the product intuitive, fast and easy to use. These views, including Smart Report, One Touch, Trend Analysis, and User Profiles are outlined in the sections below.

## User Friendly Utilities

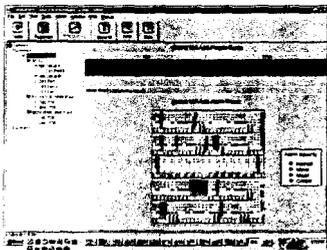
### Fault Management

Rapid detection, diagnosis and isolation of problems



CatenaView Fault Management supports real-time alarm display, troubleshooting and historical fault analysis. The Smart Report utility aggregates, stores, filters and correlates similar alarms.

- SNMP v1, v2c trap forwarding and display
- Generation of hardware, signal alarms
- QoS alarms based upon established performance thresholds
- F5 loopback testing



**SMART REPORT** fault correlation simplifies fault diagnosis and reduces alarm traffic. The Fault Log records and highlights traps as they occur.

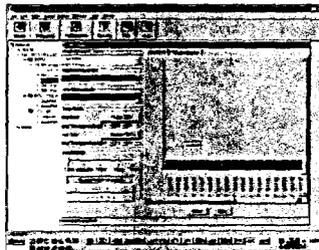
### Performance Management

Quality of service assurance, early problem detection and simplified network planning



CatenaView Performance Management supports both real-time and historical network performance data reporting. This data can be used to monitor service quality and provide early detection of potential problem areas. Collected statistics are available to assist with planning and managing for new subscriber growth.

- Scheduled, automated collection and storage of NE performance data
- Both historical performance (trend analysis) and real-time special studies are supported



**TREND ANALYSIS** helps with rapid detection of potential performance issues before they become problems. ATM cell through-put is shown on a PVC endpoint.

### Configuration Management

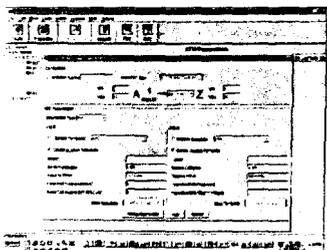
Simplified provisioning of services



CatenaView Configuration Management streamlines and automates the task of configuring Catena network elements (NEs) and subscribers, ensuring that new services

can be turned up quickly and efficiently.

- Autodiscovery of managed NEs and components
- Configuration templates and service profiles are prepared on a per-subscriber basis to enable flexibility of configuration set-up
- Maintain NE software revisions and automate download/update procedures



**ONE TOUCH** templates and **SERVICE PROFILES** enable services to be turned up quickly and easily. A PVC is provisioned between the ECTU and the ECU.

### Security Management

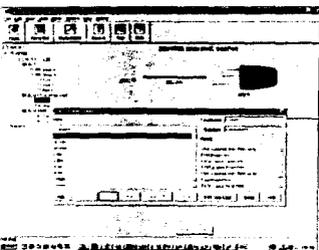
Secure network access



CatenaView Security Management supports both user functional profiles and network-partitioning security. The network administrator can configure user groups with password

authentication. Each group can be assigned access for specific tasks as required.

- Per-operator authentication
- User/group profiles mapping operators to EMS functions
- Supports customer management of selected NE partitions
- Usage audit logs



**USER PROFILES** map specific EMS functions to specific security access levels. The User Log Window tracks user actions

## Flexible Provisioning Options

CatenaView EMS facilitates seamless integration into northbound NMS and OSS systems, using an industry-standard CORBA interface for true DSL flow-through provisioning and reporting. With three types of provisioning to choose from, CatenaView offers a complete range of choices to meet different situational requirements.

### Flow-Through Provisioning for communications northbound to NMS/OSS from Central Server:

- CORBA IDL initially based on Joint Procurement Consortium (JPC) requirements
- SNMP v1, v2c trap forwarding/display (bi-lingual compatibility)
- Flat file export support:
  - schedule alarm, performance and configuration data
  - file management (age to delete, age to compress, directory choice)
  - configurable delimiters for flexible export
- Telcordia OSMINE certification for LFACS [Loop Assignment Control System]

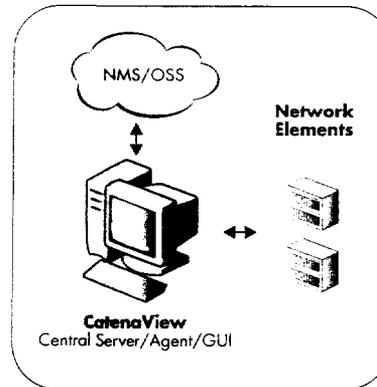
**Flow-Through Provisioning** — CatenaView's northbound interface allows for full flow-through provisioning of ADSL and ATM services, as well as network event and alarm monitoring using a standard CORBA Notification Service. This means that any NMS or OSS that uses industry-standard Object Request Brokers for southbound communications is capable of interfacing with CatenaView.

**Auto-provisioning** — Services can be automatically provisioned to default templates, triggering the setting of default service parameters to the newly installed line. This option can be used to ensure consistency of initial setup to a preferred service offering.

**One-Touch** — From a GUI Client, the network operations personnel can select from several pre-configured templates to provide the needed service, thereby eliminating repetition of tasks and further simplifying the provisioning process. This option can be used to enable simple and error-free configuration of multiple tariff service levels.

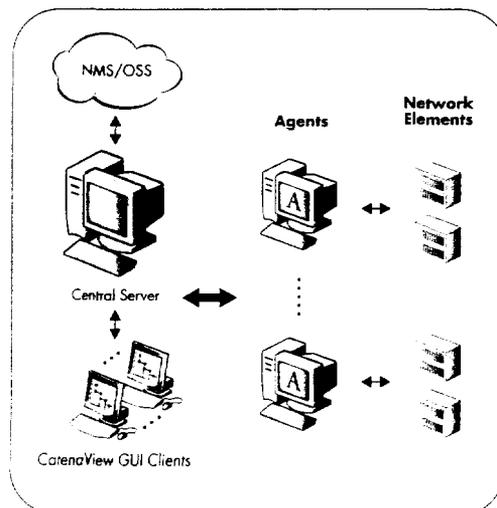
## Scalable Architecture

Catena Networks' robust CatenaView EMS is based on a distributed architecture that offers several deployment options. The CatenaView EMS has been designed to be intuitive and fully functional as a standalone product, or it can be distributed across client/server platforms for



**Initial Roll-out:**  
The CatenaView Central Server, Agent, and GUI Client can reside on the same hardware platform.

optimum performance and reliability. CatenaView is expandable to multiple unique users and tens of thousands of lines, with a distributed and multi-threaded architecture that scales in minimum block sizes of single users and 10,000 lines and allows concurrent processing of simultaneous network events. As a standards-based management system, CatenaView is easily integrated into existing OSSs through a CORBA interface.



### As You Grow:

To scale the system, CatenaView Agents can be given control of multiple Catena devices. The Central Server provides the single point of access for OSS, NMS, Windows or Sun clients. Communications between all EMS components use CORBA interfaces.

# CATENA: The Scalable, Flexible and Robust EMS

## The Challenge

As carriers strive to rapidly deploy mass market DSL service, they require an Element Management System that provides simple and scalable provisioning, and can be seamlessly integrated with existing and planned network management and operational support systems. Then, once the service is turned up, they must deploy an EMS to provide secure and effective operations management, so that customers can be assured a high quality of service, including rapid detection, diagnosis and isolation of any problems.

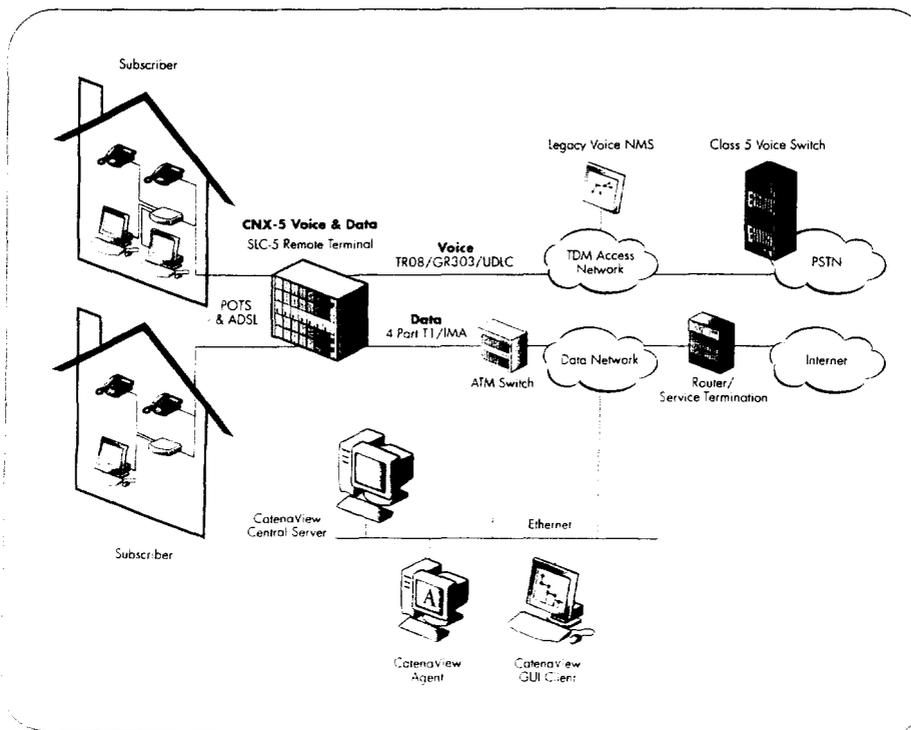
## The CatenaView Solution

CatenaView EMS provides a carrier-class solution for element management of remote SLC-5 terminals equipped with the Catena CNX-5 DSL Upgrade System. It enables telcos to deploy DSL service rapidly to satisfy the exploding demand for DSL service. Moreover, CatenaView is scalable and can expand to support many users and tens of thousands of managed lines. It offers flexible provisioning options and engages full OAM&P support for simple, secure, and effective maintenance, as well as industry standard interfaces for northbound communications with existing operational support systems.

## CatenaView in the Network

CatenaView is a Java-based application that operates on a single UNIX workstation or in a distributed fashion using multiple UNIX Agents to deliver flexible and scalable management. The CatenaView system requires a simple IP over ATM connection to transport standard SNMP V2c messaging to the CNX-5. CatenaView may be used via its GUI interface or in a flow-through fashion that utilizes Catena's standards-based CORBA interface. CatenaView is scalable, flexible and robust, offering an excellent way to manage the CNX-5.

Users of CatenaView need only commission basic IP and ATM information in the CNX-5 equipment which directs the EMS to enable network element communications (SNMP/FTP/Telnet over IP over ATM). Once this step has been completed, all CNX-5 OAM&P attributes can be configured from the EMS. Catena's Customer Network Management solves the problem of virtual unbundling in the local loop with a partitioning function that assigns OAM&P functionality according to defined parameters. ADSL service activation is further simplified using the CatenaView template provisioning option.



The CatenaView EMS utilizes IP connectivity to the CNX-5. Typically this will be implemented via an Ethernet connection routed across an IP network ultimately connecting to an ATM OAM PVC which terminates on the DS1 or IMA ATM interface of the CNX-5. Each CNX-5 uses a single OAM PVC for management by the EMS.

## Specifications

### Minimum System Requirements:

#### Central Server/Agent

- Solaris 2.7
- Sun Ultra (10(E); 256 MB RAM; 10 GB hard drive)

#### Client

- Sun Solaris 2.X (X-11 compatible)
- Unix — Solaris 2.7, Sun Ultra 5, 128 MB RAM
- PC — 350 MHz CPU; 128 MB RAM
- Windows 98; Windows NT (Version 4 and higher)

#### Communications Protocols

- SNMP v2
- Telnet
- FTP

#### NMS/OSS Integration

- CORBA IDL