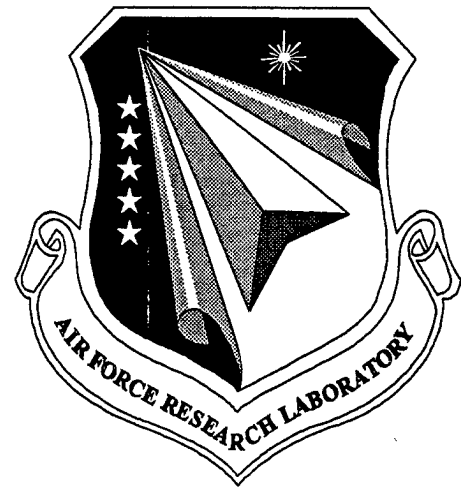


**AFRL-ML-WP-TR-1999-4147**

**COMMERCENET CONSORTIUM**



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**JULY 1999**

**FINAL REPORT FOR 04/15/1994 – 04/15/1997**

**APPROVED FOR PUBLIC RELEASE; DISTRIBUTION UNLIMITED**

**MATERIALS AND MANUFACTURING DIRECTORATE  
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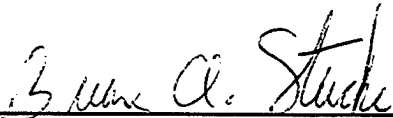
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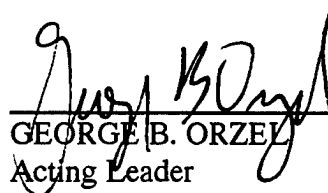
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This technical report has been reviewed and is approved for publication.



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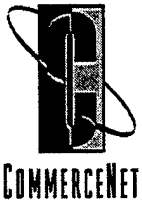
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CommerceNet

## **Together, We're Building the World's Electronic Marketplaces**

This report recaps the major activities and accomplishments of CommerceNet during the three years it operated under the TRP grant from April 1994 to April 1997.

During that period CommerceNet became the premier industry association for promoting and building electronic commerce solutions on the Internet. CommerceNet's mission is to make electronic commerce easy, trusted and ubiquitous. Launched in Silicon Valley, California, in April 1994 CommerceNet was formed as a non-profit 501C6 corporation with support from a United States government TRP grant. The membership grew to over 500 companies and organizations worldwide. They include the leading banks, telecommunications companies, VANs, ISPs, on-line services, software and services companies, as well as major end-users. Together with its members, CommerceNet is transforming the net into a global electronic marketplace.

The consortium focused on pre-competitive global and industry-wide issues so members could benefit from economies of scale and avoid competing on the wrong things. All issues are approached from a multi-disciplinary perspective encompassing technology, business processes and regulatory policies.

CommerceNet operated as a virtual organization, relying heavily on the expertise and resources of our members as well as other industry associations. CommerceNet created value by bringing vendors and end-users together, each of whom possessed key pieces of the Internet Commerce puzzle, and helped them jointly seize important market opportunities.

Today, CommerceNet continues to expand and flourish by providing its growing number of members innovative collaborative research into emerging business models enabled through the Internet, support for industry actions to expand the marketplace and trusted non-competitive services that enable inter-company commerce over the Internet.



## Section 1

### ***Executive Summary of CommerceNet's Accomplishments***

- ***Background and purpose***
- ***Original approach***
- ***Founding members***
- ***Objectives & scope***
- ***Summary of results***
- ***Member benefits***

**SUMMARY**

***The organization was established to bring to life a vision developed by EIT chairman, Marty Tenenbaum, that the Internet could effectively be used as a new commercial medium to spontaneously connect buyers and sellers together electronically***

***CommerceNet was originally formed to facilitate the use of an open Internet-based infrastructure for electronic commerce to allow efficient interactions among customers, suppliers and development partners to decrease delays and cost of goods sold***

In January of 1994, Enterprise Integration Technologies, BarNet, and Stanford University Center for Information Technology formed the CommerceNet consortium. The organization was established to bring to life a vision developed by EIT chairman, Marty Tenenbaum, that the Internet could effectively be used as a new commercial medium to spontaneously connect buyers and sellers together electronically.

This program was originally formed as a spin off of the Smart Valley Consortium in the Silicon Valley. Smart Valley was a non-profit corporation formed to promote interactive technologies for R&D, education and commerce.

CommerceNet was originally formed to facilitate the use of an open Internet-based infrastructure for electronic commerce to allow efficient interactions among customers, suppliers and development partners to decrease delays and cost of goods sold.

**Original approach**

CommerceNet was incorporated as a 501C6 non-profit corporation. There were three classes of membership; founding members, corporate members and associate members.

The initial approach called for active recruitment of corporate participants who would then establish a sponsors' steering committee to provide overall operational governance.

The members would organize into working groups to focus on key issues and opportunities presented by the current state of the Internet. CommerceNet activities focused on doing research into new business models and approaches, developing breakthrough core technologies, and educating the public and general business about the benefits of electronic commerce and the Internet.

**Founding members**

The original founding members of CommerceNet were:



Enterprise Integration Technologies, a software research and development company focused on new interactive media and its impact on various aspects of business.

Stanford Center for Information Technology, a group within Stanford University chartered to do research into new forms of knowledge management and representation.

BARRNet, The regional Internet backbone service provider. BARRNet became a division of BBN Corporation early in the CommerceNet project.

The board of directors was initially made up of 5 voting members and 3 non-voting members.

- Jay M. Tenenbaum (Enterprise Integration Technologies)
- William H. Yundt (BARRNet)

- Michael Genesereth (Stanford Center for Information Technology)
- William F. Miller (Smart Valley)
- Steve Jarvis (State of California Office of Strategic Technology)
- Randall C. Whiting (Sponsor's Steering Committee Chair/Hewlett-Packard)
- Thomas Skornia (Corporate Secretary), Skornia Law Firm – non voting
- Cathy Medich (CommerceNet Executive Director) – non voting

### **Initial Objectives**

The initial objectives of the consortium were to

- Operate an Internet-based server with directories and information that facilitate an open electronic marketplace for business-to-business

***The original founding members of CommerceNet were recruited from leading proponents of the early development and usage of the Internet as a commercial medium.***

***The board of directors was initially made up of 5 voting members and 3 non-voting members.***

***The objective of the original project included accelerating the mainstream application of electronic commerce on the Internet through fielding member-driven pilots***

***CommerceNet established three levels of membership. There were founding members, sponsors members and general members.***

***CommerceNet was originally governed by three fundamental components: a board of directors, an executive director and a sponsor's steering committee.***

transactions, where companies can do business spontaneously.

- Accelerate the mainstream application of electronic commerce on the Internet through fielding member-driven pilots
- Enhance existing Internet services and applications and stimulate the development of new services
- Provide a pro-competitive forum for the acquisition and exchange of technical and practical experience on Internet-based electronic commerce
- Encourage broad participation from small, medium and large companies and offer outreach programs to educate organizations about the resources and benefits available from CommerceNet
- Serve as a common information infrastructure for Northern California and

coordinate with national and international information infrastructure projects.

### **Membership**

CommerceNet established three levels of membership. There were founding members, sponsors members and general members.

### **Governance**

CommerceNet was originally governed by three fundamental components. First, the board of directors was chartered with the long-term direction of the consortium. Day-to-day operations were assigned to an executive director. The remaining activities, strategies, membership policies and positions in the market were managed by the sponsor's steering committee.

The sponsor steering committee operated on modified Robert's Rules of Order. They established a set of membership bylaws that specified the various rights and obligations of membership.

The Sponsors' Steering Committee elected a chair and vice chair each year. The chair and the vice chair had the responsibility for running all member meetings and ensuring that the views and interests of the members were represented in all other CommerceNet business matters.

### **Chairs and Vice Chairs**

Year 1: Randall Whiting, Hewlett Packard – SSC Chair

Year 2: Randall Whiting,  
Hewlett Packard – Chair  
Anita Schiller, Silicon  
Graphics Vice Chair

Year 3: Mack Hicks, Bank of  
America, Chair  
Bruce Lownthal, Tandem  
Computers - Vice Chair

In 1996, the board of directors approved a modification in the governance of membership activities. As part of an overall restructuring of the organization, the board authorized hiring a full-time CEO. The role of CEO was authorized to take over much of the Sponsor's Steering Committee

chair position's responsibilities and duties.

To ensure members continued to have input into the direction of the organization, the board structure was modified to provide board seats to executives of selected member companies. Additionally, a member advisory council was formed to assist the staff management team as well as provide input to the board of directors.

***The Sponsors' Steering Committee was led by a chair and vice chair elected from the general membership.***

***The chair had the responsibility to ensure the meeting and activities represented the general views and interests of the broader membership.***

***In 1996, the board of directors approved a modification in the governance of membership activities to streamline governance and management of the ongoing organization.***

## ACCOMPLISHMENTS

***“Over the first three years, we continually refocused CommerceNet to respond to continual changes in electronic commerce as well as the emerging needs of our members and the industry in general.”***

***“CommerceNet played a pivotal role in establishing Internet commerce and in moving the industry to the next level – to begin creation of Internet Marketplaces - iMarkets. Building the foundation for these iMarkets has taken and will continue to take the combined efforts of our members and will undoubtedly yield enormous long-term benefits for all.”***

***Marty Tenenbaum  
Chairman & Founder  
CommerceNet***

Like the Internet, CommerceNet went through a number of major changes during the three years of the TRP funding. The organization was highly successful in achieving its various objectives.

Due to its direct involvement, Internet commerce rapidly developed from an interesting concept to a multimillion-dollar industry. Many of CommerceNet’s original members (companies and individuals) have gone on to establish very successful eCommerce programs, products, services and even new companies.

In addition, CommerceNet created many new business and technical approaches for eCommerce. We made significant headway in a number of initiatives and helped propel the market closer to achieving our vision of the iMarket.

During 1996, CommerceNet became a self-sustaining stand-alone corporation. With the

acquisition of EIT by Verifone, it was felt that it was best for the consortium to become a standalone operation. We announced our move into a new location in the spring and hired our initial operating staff.

Some of the highlights of the program occurred in the programs that focused on new technologies and business models for electronic commerce. For example, our EDI program was able to demonstrate for the first time an interoperable environment to exchange EDI transactions over the Internet. We also established the Joint Electronic Payments Initiative in conjunction with the Worldwide Web Consortium. This project developed a way to negotiate and select which of the multiple available payment systems installed on the user/server platform should be used for a particular transaction over the Internet.

Our Business Models Task Force established the Very Innovative

Practices program that identified and recognized companies that utilized the Internet in ways that dramatically advance their business objectives. This program, in partnership with A.D. Little, announced the VIP winners at CommerceNet '96.

CommerceNet's Advocacy Program has continued to make a real difference for our members. We have provided real world input to government programs on various policy issues involved with electronic commerce. For example, we recommended positions on taxation, encryption exports and the development of Internet free-trade zones.

Additionally, we were asked to contribute to the White House for the development of their electronic commerce/Internet framework.

In 1996, CommerceNet expanded its activities and partnerships throughout the world. Due to TRP restrictions on foreign corporation membership, CommerceNet formed the Global

Partners Program to establish similar consortium in other countries around the world

These programs enabled us to engage many more end-user companies, creating new business and networking opportunities for our global membership. In 1996 we established five new global partners, started our first regional program in Atlanta and opened a Washington D.C. office.

A critical component to CommerceNet's future was the creation of our architectural framework for electronic commerce. To successfully create iMarkets and to achieve our long-term goal, we identified the need for a widely accepted architectural model for electronic commerce applications and marketplaces.

As we move forward, interoperability will be key to future applications and a framework defining the components, interfaces and

***"Establishing the Global Partners program enabled CommerceNet to engage many more end-user companies from around the world."***

***Steve Terry,  
Director - Int'l Operations  
CommerceNet***

***In 1996, we began development of eCo, CommerceNet's architectural framework for electronic commerce. This framework was designed as a fundamental component of CommerceNet's future programs.***

***We recognized that eCommerce interoperability will be essential to future applications and a framework defining the components, interfaces and processes must be embraced by the industry.***

***Understanding and leading the development of interoperability in eCommerce emerged as the clear long-term raison d'être for CommerceNet's ongoing mission.***

processes must be embraced by the industry.

This framework should be broad enough to gain wide acceptance and support within the industry. It should engage the user community and be conducive to the development of effective standards.

We continued to be excited about the success of CommerceNet. We look forward to continuing to work with our members and partners toward our shared mission of making Internet-based commerce a global reality.

## Section 2

### *Recap of CommerceNet activities by year*

- *Year 1*
- *Year 2*
- *Year 3*





## **YEAR 1 RESULTS**

### **Overview**

In the first year of CommerceNet's operations, its mission focused on establishing and accelerating Internet-based electronic commerce, by:

- Identifying and working to resolve industry issues.
- Providing a global, multi-industry forum for collaboration.
- Serving as an advocate through public policy and education.

During the first year, CommerceNet began a number of key projects primarily related to demonstration and education, held four major member meeting as well as numerous working group sessions, developed a demonstration/test bed for electronic shopping, and began development of security (SHTTP) and catalog applications.

In addition to the initial recruiting membership meeting, CommerceNet held 3 quarterly member meetings. While the first meeting attracted approximately

50 companies, meeting participation grew to over 100 attendees from member by the end of the first year.

During the year the working groups established the initial projects to test new concepts and ideas. By the end of the first year, members had initiated 20 projects.

CommerceNet was also very active in the first year in outreach and awareness programs. These included both public awareness and education as well as the initial development of a project in partnership with PacBell to make ISDN Internet access available to small business.

### **Research & Projects**

During the first year, CommerceNet established a number of focused research and development efforts. These R&D efforts were established based on major market deficiencies identified by members. In the first year projects were begun to

***During the first year, CommerceNet began a number of key projects primarily related to demonstration and education***

***We held four major member meeting as well as numerous working group sessions.***

***Member-led projects developed a demonstration/test bed for electronic shopping, and began development of security (SHTTP) and catalog applications.***

***During the first year, CommerceNet established a number of focused research and development efforts. These R&D efforts were established based on major market deficiencies identified by members***

***CommerceNet developed an initial test bed environment called ConnectorLand. This system was developed to test and demonstrate how a worldwide web site could emulate various business and marketing functions***

***CommerceNet recognized that one of the early barriers to doing business over the Internet was the lack of robust and usable security system to ensure integrity and privacy***

develop a eCommerce development system, transaction security environment and eCommerce services directory.

### **ConnectorLand demonstration system**

CommerceNet developed an initial test bed environment called ConnectorLand. This system was developed to test and demonstrate how a worldwide web site could emulate various business and marketing functions.

The ConnectorLand web site allowed users to access product information from a fictitious company to demonstrate a wide range of concepts that were believed could be feasibly supported over the Internet.

The system provided an on-line catalog of connector parts, a shopping cart, order entry capability, interface with back-end order and sales systems and a full security system using SHTTP to encrypt credit cards and order transactions.

Even though this system utilized a number of storyboard approaches, it allowed members to directly experience and test how shopping and procurement over the Internet could potentially evolve.

### **CN Directory**

One of the early barriers to eCommerce was the ability to find consultants and solutions providers that could deliver eCommerce products.

CommerceNet established a team to develop an initial directory of eCommerce providers. We established a new low-end membership level for directory entries. By the end of the year, there were over 200 entries into the CommerceNet directory.

### **SHTTP development**

CommerceNet recognized that one of the early barriers to doing business over the Internet was the lack of robust and usable security system to ensure the integrity and privacy of transactions, identification and confirmation of

signatures and to provide non-repudiation of transactions.

CommerceNet worked with RSA and Enterprise Integration Technologies to develop a browser embedded security system called SHTTP.

CommerceNet began a number of prototype projects to test out SHTTP and the related security concepts. 200 initial SHTTP licenses were provided to the members to prototype the functions within their organizations.

### **Working groups**

During the first year, CommerceNet formed an initial set of working groups that allowed members to collaborate on addressing key issues and opportunities in the market. These working groups were led by members and focused on 6 areas:

- Connectivity
- Network Services
- Payment Services
- Directories and Electronic Catalogs

- Internet EDI

### **Connectivity**

The Connectivity working group was established to examine issues related to developing adequate connectivity in target customers.

The working group began discussions with key Telecom providers and initial Internet Service Providers on how to expand overall market penetration of the Internet.

### **Network Services**

A working group was established related to the required network services related to eCommerce. It was recognized that eCommerce would place additional requirements on the Internet. This working group began efforts to define critical network service requirements for service levels, security, delivery, etc.

### **Payment Services**

CommerceNet identified that one of the key barriers to electronic commerce would be to provide an easy to use payment system for

***CommerceNet worked with RSA and Enterprise Integration Technologies to develop a browser embedded security system called SHTTP.***

***CommerceNet began a number of prototype projects to test out SHTTP and the related security concepts.***

***During the first year, CommerceNet formed an initial set of working groups that allowed members to collaborate on addressing key issues and opportunities in the market.***

**CommerceNet established a working partnership with Stanford University to focus on emerging Internet-based catalogs. This partnership helped lead to ongoing efforts at both Stanford and within CommerceNet to develop new concepts and approaches for building catalogs accessible over the Internet**

**A major effort in the first year focused on the relationship between the Internet and more traditional forms of electronic commerce accomplished via EDI.**

**A number of pilot projects were started investigating how EDI could be implemented over Internet connections.**

the Internet. A working group was formed with members representing banks, credit card companies and eCommerce applications companies to collaboratively address payment challenges.

#### **Catalogs and directories**

In partnership with Stanford University, CommerceNet established a working group to focus on catalog applications. This working group focused on working with Stanford University to develop and test their InfoMaster catalog technology. InfoMaster was a technology developed in the Knowledge Management Laboratory at Stanford. It allowed a company to define product information in a database that could be easily searched and accessed via the World Wide Web.

#### **Security**

A working group was established to work on issues related to security over the Internet. This working group established

programs to test the SHTTP security protocol developed by Enterprise Integration Technologies.

#### **Secure EDI Working group**

A working group was established in year one to investigate the Internet viability and reliability to support EDI payment services in a secure manner, implementing ASC X12 transactions with Internet standard PEM/MIME.

This working group developed the initial plans for developing an EDI test bed project for year two.

## YEAR 2 REVIEW

***In the second year of CommerceNet's operations, its mission focused (as a continuation from year 1) on accelerating Internet-based electronic commerce***

***During the second year, a number of key projects were completed and the results published and distributed to members.***

***A number of new projects and areas of investigation were established in the second year. By the end of the second year, there were 20 pilot projects underway.***

### **Overview**

In the second year of CommerceNet's operations, its mission focused (as a continuation from year 1) on accelerating Internet-based electronic commerce, by:

- Identifying and working to resolve industry issues.
- Providing a global, multi-industry forum for collaboration.
- Serving as an advocate through public policy and education.

During Year 2 CommerceNet completed a number of key projects, held four major member meeting as well as numerous working group sessions, started the Joint Electronic Payment Initiative in collaboration with the World Wide Web consortium, and started work on consortium collaboration tool pilots.

Each of the member meetings averaged between 150-200 attendees from member companies and TRP team attending. Consortium pilots and

projects were presented and demonstrated to the full membership.

During the year there were 20 pilot projects underway.

CommerceNet's first foray into international programs was established through a memorandum of understanding with WorldLinX Communications, Smart Toronto and CYBERManagement Inc. to form CommerceNet Canada.

A survey was conducted with sponsoring members to determine satisfaction with CommerceNet and identifying areas for improvement.

The CommerceNet Working Groups provided the primary means to define Consortium directions, field pilot applications, report on pilot results and propose new positions and best business practices. At the end of the year, there were nine approved working groups.

## **Working Groups**

CommerceNet's primary activities were managed within a series of working groups. These working groups were generally lead by member company representatives with assistance from the CommerceNet partners and staff. During the year the working groups met a least monthly to address various issues and challenges related to their charter.

The working groups also were responsible for establishing various pilot and research projects to test out new approaches to electronic commerce.

The Year 2 working groups were established in year one and included:

- Connectivity
- Network Services
- Payment Services
- Directories and Electronic Catalogs
- Internet EDI
- Collaboration Tools
- Internet Marketing
- Public Policy
- CALS

CommerceNet sponsoring and associate member and subscriber participation increased in Year 2 to 173 organizations.

## **Research Projects and Pilots**

### **End-to-end Commerce pilot:**

This project explored the issues involved in deployment of Internet commerce to small businesses. It examined the return on investment of such a deployment.

### **Business Value of Electronic**

**Commerce pilot:** Completed a measurement framework that will help businesses assess the return on investment in electronic commerce applications and the effectiveness of a given electronic commerce project. The initial focus was on electronic catalogs, with benchmarking and integration of metrics planned.

### **CommerceNet User**

**Demographics pilot:** Developed techniques and software tools to collect and analyze survey data on

***Based on emerging member interests, the working groups were expanded to cover 9 areas of investigation***

***A number of new research projects and pilots were begun with an increased focus on the emerging business issues and opportunities of electronic commerce.***

***Two key pilots were started to look at how electronic commerce could be broadly implemented in a small business and how to quantify the business value of the implementation.***

***Risk management of doing business over the Internet was also a major theme during the second year. As members began to examine and discuss various business models and applications, trust and security was a recurring theme.***

***In the second year, a number of pilots were begun that looked at the use of various security mechanisms as they applied to specific business applications.***

***The pilots looked at user authentication, distribution of software and dissemination of private/personal information***

CommerceNet users to determine preliminary information on behavior, attitudes, opinions, and demographics.

This pilot was completed and was presented a member meeting

**CommerceNet Server and Affiliated Individual Certification Authority (CA)**

**pilots:** This project was to implement a reference deployment of server and individual CA's for CommerceNet members and pilots.

The CA reference implementation began implementation in April 1995 and continued throughout the year. A report summarizing the lessons learned was published and distributed to the members.

**Trusted Software Distribution**

**pilot:** The organization began an investigation of the means for trusted software distribution by allowing a software manufacturer to obtain an electronic certificate of authenticity for its software.

This was intended to allow software purchasers to ascertain the origin and integrity of the software they are using.

**Secure Forms Administration**

**pilot:** This project was to demonstrate improvements in work processes involving government program administration and data exchange between a Federal agency and private employers by using secure Internet-based communications.

**Secure Information**

**Dissemination pilot:** This project was to demonstrate proof of concept for securely providing private information to over 1000 users using the Internet, using public key certificates and secure Web technology.

This pilot began in year 2 with initial discussion among members and the establishment of a task force. The project team examined the feasibility of using SHTTP as a secure browser technology for information distribution.

Subsequent changes in the market

and technology availability led to project completion in year 2.

**Smart Catalog pilots:** A pilot project was established in year 2 to demonstrate the efficiencies and added capabilities afforded by making catalogs accessible on the WWW. This project looked at establishing on-line catalogs in a form that would allow potential customers to locate products based on descriptions of their specifications and for data in the catalogs to include description of function as well as structure.

The pilot included a project to test, evaluate and document the challenges involved in implementing and using of an Internet-based electronic catalog of electronic components (connectors).

The pilot also evaluated the use of a distributed catalog system for Internet-based parts research within the Defense Logistics Agency, focusing on gathering information on components of

manufactured goods in the Defense Department.

**Corporate Purchasing pilot:**

This project was intended to assess qualitative impact that Internet access has on corporate purchasing behavior and determine obstacles that exist for new corporate purchasing users to effectively use the Internet. This project eventually helped lead to the establishment of the Open Buying on the Internet consortium to develop business process standards for purchasing on the Internet (now run by CommerceNet).

**Small business outreach programs**

A key set of projects during year 2 targeted small businesses and subsidized ISDN connectivity for participants, as required by the original TRP agreement. This program worked with local telecommunications providers to develop initiatives that provided Internet connectivity.

***Along with the catalog-working group, we established a number of pilots that examined the application of the Internet to procurement processes.***

***One project looked at establishing on-line catalogs in a form that would allow customers to locate products based on descriptions and specifications***

***A second pilot focused on the qualitative impact that Internet access would have on corporate purchasing behavior and determine obstacles that existed for new corporate purchasing users to effectively use the Internet***



***Since many of our members in year 2 were in the software business, an area of interest was how the Internet would impact the sales and marketing of software.***

***We identified that software and similar forms of content would be dramatically affected by the Internet over the next 2 years.***

***As part of a vertical industry approach, we continued a project established in year one to examine the use of the Internet to address a specific multi-company business process – requests and submissions of quotes.***

**Software Sales & Marketing**

**pilot:** A project was continued in year 2 that assessed the qualitative impact of Internet access on software companies' sales, marketing and software distribution activity and determine obstacles that exist to effective use of the Internet. Pilot targets small businesses and subsidizes ISDN connectivity for participants, as required. This program provide feedback to key Internet Service Providers on market needs and demands of small and medium sized businesses

**EDI Payments pilot:** A project team was established from a working group in year one that evaluated the Internet viability and reliability to support EDI payment services in a secure manner, implementing ASC X12 transactions with Internet standard PEM/MIME.

**Electronics Industry RFQ pilot:** A specific vertical market project that was begun in year one continued in year two examining

the potential use secure Internet technologies in the Request For Quotation process in the electronics industry supply chain, including both component and assembly RFQ's.

During the year, member companies collaborated on software development for this project and pilot participants' sites configuration. During 1Q96, software was installed at all participants' sites supporting secure RFQ distribution and response, pilot member test cases were run a final report was distributed to the participating members.

**CALS pilot:** Develop and test the architecture for an Intelligent Hub that supports formation and operation of ad hoc trading partnerships for an aerospace industry virtual enterprise supply chain with small and medium-sized enterprises, using collaborative engineering practices via the WWW.

**Payment pilot:** This pilot was intended to explore issues involved in the deployment of Internet payment systems, with focus on automated, secured, private credit card transactions.

The pilot was completed and a white paper documenting the results was published.

**CommerceNet/WHOIS++**

**Testbed pilot:** This was a short-term project to incorporate member and consultant directories into the WHOIS++ Internet Directory Service testbed. The project was intended to help a member company develop a new Internet service and to provide additional member services to expand access to member web sites.

**CommerceNet/Nielsen Internet Demographics Survey**

The first CommerceNet Internet Demographics Survey was completed in the U.S. and Canada, with results announced and final report completed in third

quarter. The objective of this project was to have representative, population predictable results describing the demographics, attitudes, and usage of current and potential Internet users. Over 4200 interviews were conducted by Nielsen Media Research (under subcontract to CommerceNet) using a random digit dial phone survey.

**Payments Project**

A significant payments project, the Joint Electronic Payment Initiative, was launched in collaboration with the World Wide Web Consortium (W3C) during the second year of the project.

This project included both W3C and CommerceNet members and was intended to develop the specification and implement a mechanism to negotiate the choice of Internet payment protocol and automate the selection of the payment protocol

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***During the second year, a number of key developments occurred in the market that might have negatively impacted the continued growth and development of the Internet.***

***During September 1995, CommerceNet took action to help resolve a potentially detrimental situation when MasterCard and Visa decided to take independent approaches to implementing Internet credit card payment protocols***

and transport by the client and browser.

A white paper was completed, titled: "Understanding the Effectiveness of Your WWW Site: Measurement Methods and Technology." This paper documented effective Web marketing strategies and key measurement parameters and techniques.

### **Advocacy**

During the second year, a number of key developments occurred in the market that might have negatively impacted the continued growth and development of the Internet. CommerceNet's members required the active involvement of CommerceNet on these issues to help ensure the continued development of a stable and conducive environment for electronic commerce.

During September 1995, MasterCard and Visa decided to take independent approaches to implementing Internet credit card

payment protocols. The Payment Services Working Group drafted a letter to both organizations encouraging them to work together to develop a common standards-based protocol and to use an open process for defining the protocol.

This letter was approved by the CommerceNet SSC and sent to MasterCard and Visa. We believe that this CommerceNet position was a factor in MasterCard and Visa announcing in 4Q95 that they would be collaborating to develop a common specification.

CommerceNet was asked to provide input to the U.S. Business Advisor concerning security requirements for government/business transactions. A recommendation was developed that discussed security requirements for the transactions identified as high priority by the U.S. Business Advisor team.

BBN Planet completed a white paper, "Security Assessment of Electronic Commerce Protocols,"

discussing security requirements for electronic commerce and assessing how SSL (Secure Sockets Layer) and SHTTP (Secure Hypertext Transport Protocol) meet these requirements. The final paper was made available to members.

### **Member Events**

During the second year, CommerceNet organized a number of events to support membership governance, communication and networking.

During the year, the organization held quarterly sponsor member meetings and monthly working group meetings. The sponsor meetings averaged 120 attendees. The meetings focused on review of consortium activities, governance and voting, discussion of new projects, and networking between members.

### **Outreach**

Additionally, there were a number of outreach events to help increase awareness of the Internet

as a new channel for business.

The objective of the outreach was also to help establish CommerceNet as the key authority for Internet-based electronic commerce. Specific outreach programs included:

- Presentations to organizations who can provide leverage for CommerceNet's activities (for example, to reach a broad audience of organizations).
- Presentations in conferences that reach CommerceNet's target audience.
- Participation at strategic trade shows to demonstrate the CommerceNet server and to discuss consortium activities.
- Targeted communications activity announcing new CommerceNet projects and programs or publicizing CommerceNet's accomplishments.
- Tutorials to help CommerceNet participants get started.

***The sponsor meetings averaged 120 attendees. The meetings focused on review of consortium activities, governance and voting, discussion of new projects, and networking between members***

***CommerceNet sponsored a number of outreach events throughout the United States to help increase awareness of the Internet as a new channel for business.***

***The objective of the outreach was also to help establish CommerceNet as the key authority for Internet-based electronic commerce.***

**CommerceNet actively participated in many of the new conferences and forums focusing on electronic commerce.**

**A new small business seminar, "Doing Business on the Internet," was developed and eventually turned over to private industry for ongoing operation**

During the year, a number of presentations on CommerceNet were presented at various industry events including:

- 4th International World Wide Web conference.
- Fortune CEO Internet/Web workshop.
- CIO seminar at Boeing.
- Info Tech '95
- First International Conference on Electronic Commerce
- Intelligent Information Agents workshop, (following CIKM '95)
- SIKS Symposium.
- EE-OR conference

program to a national training organization to continue the service.

CommerceNet had a 10'x20' exhibit at the October Internet World conference in Boston, MA.

A new small business seminar, "Doing Business on the Internet," was tested in Boston on Nov. 2.

The goal of this seminar is to show small businesses the value of Internet electronic commerce.

Based on the attendee feedback, CommerceNet turned over the

## YEAR 3 REVIEW

***During the third year of the program, CommerceNet's research programs became one of the fundamental components of the consortium***

***CommerceNet's research programs focused on the critical barriers to the widespread implementation of electronic commerce***

***CommerceNet began an ambition project to develop a comprehensive approach for building marketplaces and integrated electronic commerce environments. This yielded a long-term project called eCoSystem***

### **Overview**

During the third year of the program, CommerceNet's research programs became one of the fundamental components of the consortium. These programs established early in the consortium continued to evolve and gain emphasis based on input from members. We responded to the members' desire to see us focus on the major issues and barriers to the widespread adoption of electronic commerce.

Members identified a series of critical issues and barriers. These were determined based on the ability of a cross industry organization's ability to make positive headway toward a resolution.

Advocacy programs continued with an emphasis of sharing research and member views particularly related to major legal barriers to broad adoption to electronic commerce. Based on member driven working groups, the organization identified a

number of critical policy areas that could hinder the continued development of electronic commerce in the United States. Programs were established to help educate and work with key political bodies in the areas of standards, taxation, privacy and export restrictions.

A number of programs were established during the year to focus on new areas of endeavor. CommerceNet began an ambition project to develop a comprehensive approach for building marketplaces and integrated electronic commerce environments. This yielded a long-term project called eCoSystem which is described in the appendix.

### **Research Programs**

Six fundamental areas of work were identified that CommerceNet should focus on during 1996. Issue advocates from member companies were enlisted to determine each task force's objectives and project

plans. CommerceNet put program managers in place to assist in the ongoing management of these important projects.

During the year, these task force programs made measurable headway to resolving these fundamental issues and provided valuable knowledge to the participants

### **Payments**

The Payments Task Force focused on developing models and technologies to allow different payment systems to negotiate and interoperate. The objective was to enable the operation of a heterogeneous environment of payments systems where merchants and customers would not necessarily be required to have the same type of payment technology.

### **The Payments Task Force**

We established a key project called the joint electronic payments initiative (JEPI) to enable payment systems to negotiate and exchange payments.

This project was done in conjunction with the Worldwide Web Consortium.

Additionally, the Payments Task Force helped establish the Electronic Payments Forum in conjunction with the FSTC. This forum held two important meetings during 1996 where Internet technology issues critical to the banking and financial services industry were discussed.

The CommerceNet payments task force also worked with NACHA on the establishment of the eCheck project, an effort to develop new digital check payment systems. CommerceNet has continued to play an active role in supporting this key technology pilot project.

### **Electronic Data Interchange**

EDI has been a critical component of business-to-business electronic commerce. Many businesses are interested in utilizing EDI technologies in concert with the Internet.

***The Payments Task Force focused on developing models and technologies to allow different payment systems to negotiate and interoperate.***

***One of the key activities during the year was the establishment of an EDI interoperability testbed and pilot***

***The Payments Task Force helped establish the Electronic Payments Forum in conjunction with the FSTC.***

***“By spearheading the effort to demonstrate open EDI across a public network, CommerceNet is helping to accelerate the adoption of EDI. We are excited to be a part of this groundbreaking initiative.”***

***Stratton Sclavos,  
President and CEO of  
VeriSign, Inc.,***

***“Participation in this program helps keep us at the forefront of technological innovation to help our customers grow their businesses.”***

***Jim Daniell, Vice  
President - electronic  
messaging and new  
business development  
AT&T***

EDI is a fast and dependable way to exchange business documents using computer-to-computer communication between different companies. Early EDI systems were proprietary and expensive, establishing barriers to entry and to the open exchange of documents.

EDI has historically been used to improve only discrete processes such as automating the accounts payable function or the funds transfer process. Internet technologies enable a new paradigm for EDI.

Increased interoperability will make EDI easier and less expensive to implement. The new focus for EDI, using the Internet for electronic commerce, was bridging the external and internal business processes that would enable companies to improve their productivity beyond what had been possible previously.

Companies can now enter orders and purchases; do accounts payable; transfer funds; and link

seamlessly to suppliers, distributors, customers, banks and transportation carriers. An open, interactive EDI allows completion of the entire business transaction point-to-point.

The EDI Taskforce was set up to evaluate and develop approaches to implementing EDI over the Internet. One of the key activities during the year was the establishment of an EDI interoperability testbed and pilot.

This was an ongoing initiative to demonstrate and promote the interoperable exchange of EDI (Electronic Data Interchange) data over the Internet. This project is involving a number of CommerceNet’s members from both the user and the technology side of EDI.

### **Business Models**

A key aspect of expanding the use of electronic commerce is the ability to communicate the key business benefits in non technical terms. This task force focused on developing programs to educate



decision-makers about the opportunities, challenges, and best practices in adopting electronic commerce.

A key accomplishment of the task force was the identification of a number of highly successful business applications of electronic commerce. These “Very Innovative Practice” examples were documented by the team in partnership with A.D. Little. The results were announced with the first CommerceNet/AD Little VIP awards in October of 1996.

This task force provided expertise and guidance in the development of content to educate the mainstream business community about Internet commerce.

### **Catalogs**

By the end of the second year of the program, most of the CommerceNet members understood that the promise of electronic commerce could not be truly realized until suitable security and payment mechanisms are in place. What was

overlooked, however, was that electronic commerce depends every bit as much on the emergence of capabilities that allow buyers to quickly and easily obtain all the product data needed to make informed purchase decisions.

At one level, this suggested that measures were needed to make product information easy to locate and retrieve using universally accepted search mechanisms. But accessibility alone was not enough since, for the electronic marketplace to bustle with the sort of activity we envisioned, the information also must be available in a form that allowed buyers to group and compare products according to salient features and specifications.

What's more, buyers also wanted a convenient means for learning about the items and services that complement any given product - regardless of whether these come from the same supplier or from altogether different organizations.

***A key accomplishment of the Business Models Task Force was the 1996 VIP awards that recognized highly successful business applications of electronic commerce***

***CommerceNet's catalog task force identified four fundamental business models of how information will be accessed and shared across multiple catalogs.***

***A key project started in 1996 is a comprehensive survey to understand the critical business requirements for Internet connectivity services related to electronic commerce***

***There was a common concern, whether real or perceived, that ISPs generally were not able to provide the variety and quality of services required for the full-range of electronic commerce activities.***

Without question, emerging web-based electronic catalog capabilities offered the best hope for achieving each of these objectives. The CommerceNet task force worked toward various models that would allow catalogs to interoperate. Considerable work remained to be done to develop, test, and adopt the technologies, standards, services, and business practices required to enable a robust exchange between catalogs running in heterogeneous environments.

The catalog-working group established an effort to develop an early version of an architecture for catalog interoperability. This work looked at the various standards and technologies that would be required to interconnect multiple catalogs.

The working group also supported a pilot project with the Stanford University Center for Information Technology to develop a working interoperable catalog system for the National Housewares Manufacturers Association.

## **Infrastructure**

Network connectivity posed one of the fundamental infrastructure issues of the Internet. In 1996, CommerceNet chose Internet robustness as a critical issue to accelerate the use of the Internet for electronic commerce.

A key project started in 1996 was a comprehensive survey on the business needs for Internet connectivity and service. This survey was part of CommerceNet's ongoing efforts to understand the critical business requirements for connectivity services related to electronic commerce.

There was a common concern, whether real or perceived, that ISPs generally (then or in the future) were not able to provide the variety and quality of services required for the full-range of electronic commerce activities. Likewise, infrastructure providers were clearly not clear as to the potential requirements and expectations for broad

implementation of electronic commerce.

Additionally, there were also technical and operational limitations constraining the desired service offerings.

This survey was developed to help quantify electronic commerce connectivity requirements, assist our members and the broader industry in understanding infrastructure needs for electronic commerce, and identify key infrastructure issues and barriers.

This data was the foundation for CommerceNet's ongoing research, pilot projects, reports and recommendations in this area.

### **Public Key Infrastructure**

Public key technology would play an important role in the establishment of secure electronic commerce over the Internet.

While much of the technology existed, the business and legal infrastructure for procuring,

managing and verifying public key certificates was skeletal.

This task force was focused on identifying and facilitating solutions to the business and legal issues in the implementation of a public key infrastructure.

### **eTRUST**

Growing concerns about the security and privacy of telecommunications-related personal information were threatening to constrain the growth of electronic commerce. Effective action to increase the level of confidence in online privacy needed to include assurance and monitoring (through both active and passive means) of the business practices of entities that have the ability to collect, use and distribute personal information. Without such action, numerous violations of privacy were likely to occur, damaging public confidence and potentially precipitating government action.

***A key project started in 1996 is a comprehensive survey to understand the critical business requirements for Internet connectivity services related to electronic commerce***

***This survey was developed to help quantify electronic commerce connectivity requirements, assist our members and the broader industry in understanding infrastructure needs***

***Growing concerns about the security and privacy of telecommunications-related personal information were threatening to constrain the growth of electronic commerce and led to the development of eTrust***

***CommerceNet and the Electronic Frontier Foundation established the eTRUST program in 1996***

***The eTRUST model provided a mechanism for industry self-regulation that can provide public assurance of privacy***

***CommerceNet '96 was our annual conference held in October in San Francisco, California. This program attracted over 500 people from 12 countries.***

CommerceNet and the Electronic Frontier Foundation established the eTRUST program in 1996 to provide an infrastructure to encourage confidence in Internet commerce usage.

The eTRUST model provided a mechanism for industry self-regulation that can provide public assurance of privacy. It combined sustainability through industry financial support with consumer credibility through a process of independent assessment and monitoring of business practices.

In order to be successful in its mission, eTRUST needed to build consensus within the online business community that self-regulation represented by the eTRUST licensing program is worthwhile. It was established to build awareness and confidence with online consumers that the eTRUST logo would provide adequate assurance that their personal information was being protected.

## **Member Events**

A unique aspect of CommerceNet member meetings was the ability for its members to network among themselves. These allowed many of CommerceNet's members to build new business relationships, identify business opportunities and form new business ventures.

During 1996, CommerceNet held a variety of events and programs designed to keep members informed, reach new members and engage members in networking and collaborating.

## **CommerceNet '96**

CommerceNet '96 was our annual conference held in October in San Francisco, California. This program attracted over 500 people from 12 countries. The program included a variety of world class speakers in three tracks.

## **Global Summit**

CommerceNet, in conjunction with CommerceNet Japan, hosted a special program to address the global aspects of electronic

commerce. The Global Summit enabled over 200 International CommerceNet members to meet and discuss critical global barriers to electronic commerce.

### **Member meetings**

CommerceNet members meetings continued to be a mainstay of the organization's events. These meetings brought together many of the key members to hear updates on key CommerceNet projects as well as providing a venue to meet and discuss Internet commerce opportunities.

### **SIGs**

The CommerceNet special interest group meetings were opportunities for members to meet and discuss various aspects of a particular topic related to electronic commerce.

### **Advocacy**

The development of Electronic Commerce is closely linked with various laws and public policy. In order to engage in commerce over the Internet many laws and

regulations needed to be changed or created.

The CommerceNet Public Policy program was established in 1996 to advise CommerceNet members of current/upcoming regulatory and legislative activities. The program watched International, Federal, and State arenas, that could impede or enhance the growth of Internet Commerce.

Working in conjunction with appropriate CommerceNet resources (task forces, members, staff, etc.) and partners such as ITAA and the Silicon Valley Software Industry Coalition, positions were developed and actively presented to the members.

Through proactive advocacy and educational efforts, this program helps to communicate CommerceNet's positions to the appropriate government organizations.

Many CommerceNet members were especially interested in the

***The CommerceNet Global Summit held for the first time in 1996, enabled over 200 International CommerceNet members to meet and discuss critical global barriers to electronic commerce.***

***The CommerceNet Public Policy program was established in 1996 to advise CommerceNet members of current/upcoming regulatory and legislative activities***

***CommerceNet worked with the White House to provide support and input on the Administration's "Framework for Global Electronic Commerce."***

***In 1996, we began development of eCo, CommerceNet's architectural framework for electronic commerce. This framework will be a fundamental component of our programs into the future***

***CommerceNet worked with the National Conference of Commissioners on Uniform State Laws to initiate a project to draft a model tax law on electronic commerce.***

government's restrictions on export of special strong encryption products. CommerceNet researched and published reports on the potential negative impact of this policy, which limited export of encryption for bank-related financial data.

CommerceNet worked with the White House to provide support and input on the Administration's "Framework for Global Electronic Commerce." CommerceNet also met with Tom Kahlil at the White House to discuss the Clinton Administration's 2nd term electronic commerce agenda.

The CommerceNet and Silicon Valley Software Industry Coalition's joint working group on the California Digital Signatures Regulations provided significant input to the California Secretary of State's office as they drafted their digital signatures regulations.

CommerceNet made a proposal to the National Conference of

Commissioners on Uniform State Laws to initiate a project to draft a model tax law on electronic commerce. As a result NCCUSL formed a committee to study the request and make further recommendations.

CommerceNet sponsored, in conjunction with the Silicon Valley Software Industry Coalition, ITAA, Deloitte and Touche, and Upside Magazine, a two-day Internet Tax Policy Conference which drew participants and attendees of national and international stature in the tax field, including Ira Magaziner, Senior Advisor to President Clinton for Policy Development.

### **Global Programs**

The objective of the CommerceNet Global Partnership Program was to establish a worldwide network of organizations dedicated to the development of the global electronic marketplace and to help ensure the interoperability and

compatibility of its members' technology.

The two primary functions of the Global Partner program were to coordinate the development of regional electronic marketplaces, and provide a non-competitive forum for companies, academic institutions and government organizations to jointly address regional and global issues. These programs were to be done through education and technology deployment, and participation in global interoperability projects.

Each Global Partner was established as an independent organization. This meant that each Partner was free to decide its own policies and business directions, but still have access to the market information and technology available from every other Global Partner. This allowed each organization to focus on the issues unique to each region that cannot be addressed from outside that region. Examples are taxation and encryption policy.

As independent organizations, each Partner was responsible for its own staffing, budget, and business plan.

During the third year, CommerceNet established global partner operations in the following countries:

- CommerceNet Japan
- CommerceNet Canada
- CommerceNet Australia
- CommerceNet Korea
- CommerceNet Sweden
- CommerceNet German

### **Regional Programs**

To further influence and involvement within the U.S., CommerceNet opened its first regional program office in Atlanta during 1996. This program, developed in partnership with local and national companies, was designed to create communities of interest networks where electronic commerce can be developed on a community basis.

***The objective of the CommerceNet Global Partnership Program was to establish a worldwide network of organizations dedicated to the development of the global electronic marketplace and to help ensure the interoperability and compatibility of its members' technology.***

***A regional development program was established to work with local and national companies to create communities of interest networks where electronic commerce can be developed on a local or regional basis.***

***This allowed local and regional businesses to participate directly and develop approaches that will meet their unique regional needs and directly benefit them.***

***The Giga Group described the early focus of CommerceNet's regional chapters to be on education and Internet commerce readiness, but clearly education is a step on the way to the real goal: the creation of Community of Interest Networks (COINs), which will be Web-based vertical markets that include business trading partners.***

This allowed local and regional businesses to participate directly and develop approaches that will meet their unique regional needs and directly benefit them. This regional program was intended be the basis for similar programs in 1997.

The regional business development program is intended to provide regional and local access to Market Intelligence and education. It helped to create local Internet-based marketplaces and provide regional economic development and promotion of member services. This also provided a forum for developing member consensus regarding local legal and policy issues.

The Giga Group described the early focus of CommerceNet's regional chapters to be on education and Internet commerce readiness, but clearly education is a step on the way to the real goal: the creation of Community of Interest Networks (COINs), which will be Web-based vertical

markets that include business trading partners.

This program was expanded in late 1996 with the establishment of an office in Washington D.C.

### **CommerceNet Southeast Participants**

- Bell South Corporation
- Digital Companies
- Federal Express
- Harbinger Corporation
- Hewlett-Packard Corporation
- Sun-Sentinel/Tribune
- Wachovia
- Georgia Institute of Technology
- North Carolina State University
- Digital City, South Fla.
- IBM
- BBN Planet
- MSI
- GCI
- Jaye Communications
- CyberNet
- Balcom Technologies
- Rollins & Associates
- Software Builders Int'l
- Third Millennium
- PROSOFT Development Corp.

### **Market Research**

Within the first two years of CommerceNet, the Internet emerged as a fundamental information medium and had



created much enthusiasm, from Wall Street to Main Street. Our sociological and economic structure was being rewritten, the corporate world was dramatically realigning its strategies, and individuals were showing a long-inhibited eagerness to explore.

The Internet and the countless possibilities associated with the Internet were quickly reshaping the way we conduct business, and redefining the way we relate to one another. It however, left individuals, organizations and corporations with many more questions than answers.

CommerceNet and Nielsen Media Research teamed up in 1995 to answer many of these questions. The initiative called for an initial Internet Demographics Survey followed by a Recontact Survey 6 months later. The initial Survey was designed to assess the dimension of the new medium in terms of personal access and usage patterns, while the objective for the Recontact Survey was to

identify behavioral changes over time.

The first CommerceNet / Nielsen Internet Demographics Survey was conducted in August 1995. This research was a milestone in the measurement of the Internet and WWW usage, but was only a snapshot of the state of the medium in August 1995.

New questions arose such as what the growth rate of the medium is, whether the motivation for using it is different from before, and what shifts are identifiable in the characteristics of Internet users.

CommerceNet and Nielsen Media Research continued to provide answers to these questions and to measure the use of the Internet and Worldwide Web as vehicles for electronic commerce. The results of these studies were made available to our members as they were completed during the year.

### **Partnerships**

In order to expand the role of CommerceNet, we established

***CommerceNet and Nielsen Media Research teamed up in 1995 to answer questions about real usage of the Internet.***

***The first CommerceNet / Nielsen Internet Demographics Survey was conducted in August 1995. This research was a milestone in the measurement of the Internet and WWW usage***

***In order to expand the role of CommerceNet, we established and maintained a number of strategic partnerships with related consortia and research organizations***

***These partnerships helped to expand the breadth of CommerceNet programs as well as increasing the accessibility to related projects and research.***

and maintained a number of strategic partnerships with related consortia and research organizations. These relationships expanded the information available to CommerceNet members as well provided participation in related industry initiatives.

**G2 Research**

CommerceNet and G2 participated in joint research efforts on corporate usage of electronic commerce

**Nielsen Media Research**

Nielsen Media Research and CommerceNet provided continuing demographic studies of Internet usage.

**Giga Information Group**

We collaborated on tracking various emerging technologies and sponsoring a series of electronic commerce seminars.

**Worldwide Web Consortium**

We continued as co-sponsors with the W3C of the Joint Electronics Payments Initiative.

**Nacha**

We jointly participated with NACHA on a number of financial services pilot projects

**FSTC**

We jointly participated with the Financial Services Transactions Consortium in managing the Electronic Payments Forum

**ITAA**

CommerceNet partnered with the Information Technology Association of America on public policy programs, sharing of research information and co-sponsoring conferences.

**A.D. Little & Co.**

CommerceNet and A.D. Little co-sponsored electronic commerce conferences and the Very Innovative Practices awards program

## **Commercialization**

One of the broader objectives of CommerceNet was to develop commercial entities based on our research and related advocacy programs.

During the third year, a number of new business approaches and technologies developed within CommerceNet were commercialized. New business ventures were developed for:

- Transaction security systems based on the SHTTP work,
- catalogs application companies based on the InfoMaster technology as well as the more basic catalog interoperability concepts
- Agent-based systems for product identification and comparison
- eCommerce consulting and systems integration service companies
- On-line shopping services

- Internet collaboration tools and services

While CommerceNet helped establish a number of new commercial ventures, the organization was instrumental in developing one significant spin off during the last months of the TRP program. CommerceNet's research into interoperable frameworks (see the eCo framework report in the appendix) for eCommerce led to the creation of many new concepts and business models. It was decided by our board of directors to spin off a group of the CommerceNet engineers to pursue the development of these interoperable capabilities as a for-profit venture.

In the spring of 1997, a venture called CommerceNet Services was formed to work with members to commercialize some of CommerceNet's research using new semantic technologies based on XML. That venture later was renamed Veo Systems.

***One of the broader objectives of CommerceNet was to develop commercial entities based on our research and related advocacy programs..***

***During the third year, a number of new business approaches and technologies developed within CommerceNet were commercialized***

***The organization was instrumental in developing one significant spin off during the last months of the TRP program – CommerceNet Services was formed to work with members to commercialize new semantic technologies based on XML.***



## ***SECTION 3***

### **1996 Organizational Structure**

- **Member companies**
- **Board of directors**
- **Officers & management team**
- **Member teams**

## **INDEX OF MEMBERS (1996)**

ctra Business Systems  
Avery Dennison Corp.  
ARPA  
American Express  
Ameritech  
AMP, Incorporated  
Andersen Consulting  
Apple Computer  
Arthur D. Little  
Association of Bay Area Governments  
AT&T Western Technology Center  
Balcom Systems Technology  
Bank of America  
Bank One, Columbus  
BBN Planet  
Bellcore  
BellSouth  
Better Business Bureau  
Boomerang Information Services  
British Telecommunications PLC  
Cable & Wireless Innovations  
Cadis  
California Dept. of General Services  
California Office of Strategic Technology  
Citibank  
CITM, UC Berkeley, Haas  
CompuServe  
Concurrent Technologies Corporation  
CONNECT, Inc.  
Council of Better Business Bureaus  
CrossRoute Software Inc.  
CSIRO Div. of Information Technology  
Cyberbusiness Association Japan  
CyberCash  
Cyberpath  
Dacom Corp.  
Daimler Benz Research & Technology  
Defense Logistics Agency  
Department of Defense (DoD), Electronic  
Commerce Office  
Deloitte & Touche  
DigiCash  
Digital Equipment Corp.  
Document Center Inc.  
Dynamic Web  
EarthWeb Inc  
EDS  
Electric Power Research Institute  
EPIC - Electronic Purchasing Information  
Exchange  
Equifax  
E-Stamp Corporation  
Federal Express  
Firefly Creations  
First Data Corporation  
France Telecom  
Franz, Inc.  
FSTC  
Fujitsu Limited  
GC Tech  
The General Electric Company  
Genesys Software Systems, Inc.  
Global Network Navigator  
GolfWeb  
Gray, Cary, Ware & Friedenrich  
Groupe Bull  
GTE  
Harbinger Net Services  
Hewlett-Packard  
IBG - The Internet Business Group  
IBM  
ICAST  
iCAT Corporation  
IDEA Center Inc.  
Industry Canada  
Information Sciences Institute  
InfoSpace, Inc.  
Innovative Resources  
inReference, Inc (formerly Pangea)  
Institute for the Future  
InterCom, U. of Virginia  
Internet Profiles  
Internet Shopping Directory, Inc.  
Intuit Inc.  
ITAA  
The Japan Research Institute, Ltd.  
Justsystem, Inc.  
Kansai Institute of Information Systems  
Kokusai Denshin Denwa (KDD)  
Korea Info & Communications  
Lawrence Livermore National Laboratory  
Litlenet, LLC  
Lizard Communications  
Logistics Advantage  
Lockheed Missiles & Space Systems  
Loral Space & Range Systems  
Marshall Industries  
MasterCard International  
McDonnell Douglas  
Mecklermedia  
Mitsubishi Electric Corp.  
Mitsubishi International Corp.  
MPACT Immedia Systems Inc.

***We were truly fortunate to have such a diverse group of members. This allowed CommerceNet to represent a broad industry perspective of technology companies, service providers, financial institutions and end users.***

***CommerceNet continued to grow throughout the 3 years of the TRP. In 1996 alone, membership expanded by over 40%.***

**Another exciting aspect of membership was the number of small and medium-sized enterprises as well as start-ups that actively participated in the consortium.**

**Initially, the majority of CommerceNet's participants came from the high-tech industry in Silicon Valley**

**However, during the first three years, an increasing amount of the membership growth came from outside of the high-tech industry and outside of Silicon Valley.**

- |   |  |
|---|--|
| Natl Assn. of Purchasing Mgmt, Silicon Valley       | Software Forum                             |
| NACHA   | Soletron                                   |
| NASA  | St. Paul Software                          |
| National Housewares Manufacturers Assn.             | Stanford Center for Information Technology |
| NCR Corporation                                     | Stanford Research Institute (SRI)          |
| NEC Corporation                                     | StarPoint Software, Inc.                   |
| Netscape  | Sterling Software                          |
| Network Computing Devices                           | Sun Microsystems                           |
| News Datacom, Ltd.                                  | Surety Technologies                        |
| NIA   | Sybase                                     |
| Nippon Telegraph & Telephone                        | Synopsys                                   |
| NIST - National Institute Standards/Technologies    | 3Com Corporation                           |
| Nortel  | Tandem Computer                            |
| Novell  | Ten IO                                     |
| NTEC/PartNet  | Terisa Systems                             |
| NTT Data Communications                             | Tesserae Info Systems, Inc.                |
| Open Market, Inc.                                   | Toshiba Corporation                        |
| Oracle Corporation                                  | Trusted Information Systems                |
| Onward Technologies                                 | TSI, International                         |
| Pacific Bell/CalREN                                 | Underwriters Laboratories                  |
| Paylinx Corporation                                 | Union Bank                                 |
| Personal Agents                                     | Unix System Lab                            |
| Personal Library Software Pitney Bowes Incorporated | UPS:United Parcel Service                  |
| Pitney Bowes Incorporated                           | Urban Oasis LLC                            |
| Portland Software                                   | USC Information Sciences Institute         |
| Premier Industries (Newark Electronics)             | U S Postal Service                         |
| Premenos  | U S Web                                    |
| Primas, Inc.  | U S West                                   |
| RSA Data Security                                   | Vanderbilt University                      |
| Saqqara Systems                                     | VeriFone                                   |
| Seoul Web Society                                   | VeriSign                                   |
| Sholink Corporation                                 | Virtual Empoium, Inc.                      |
| Signal Internet                                     | Visigenic Software Inc.                    |
| Silicon Graphics                                    | Waltrip & Associates                       |
| Silicon Valley Internet Partners                    | Wave Systems Corp.                         |
| Skornia Law Firm, The                               | Wells Fargo                                |
| Smart Valley  | WIZNET WW Internet Solutions               |
| Social Security Administration                      | WorldPoint Interactive, Inc.               |
|   | xCert Software                             |
|   | Xerox                                      |
|   | YY Software                                |

## **BOARD OF DIRECTORS (1996)**

Jay M. Tenenbaum,  
Chairman and founder,  
CommerceNet

Dudley Nigg,  
Executive Vice President,  
Wells Fargo Bank

George Conrades,  
Chairman and CEO,  
BBN

Robert Rodin,  
CEO and President,  
Marshall Industries

Shikar Ghosh,  
Chairman and Co-Founder,  
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Barry Sullivan,  
Senior Vice President,  
EDS

Dan Lynch,  
Chairman,  
CyberCash

Laurie Tucker,  
Senior Vice President Logistics,  
Electronic Commerce &  
Catalogs,  
Federal Express

William Miller,  
Chairman, Borland, and  
Professor, Stanford Business  
School

**CommerceNet's board played an essential role in guiding our strategic direction as well as helping build effective alliances between business, government and industry to collectively help realize the CommerceNet vision.**

**CommerceNet was fortunate to have a board of directors representing such a wide spectrum of industries with a strategic interest in electronic commerce.**



## *OFFICERS & MANAGEMENT*

***Our management team had extensive experience in the operation of consortia as well as practical electronic commerce.***

***The majority of our officers had been involved in CommerceNet since its inception.***

### **Corporate Officers**

Randall Whiting,  
President & CEO

Marty Tenenbaum  
Founder & Chief Technical  
Officer

Stacey Bressler  
Vice President - Marketing &  
Member Services

Asim Abdullah  
President - CommerceNet  
Services

Tom Skornia  
Corporate Secretary and  
Corporate Council

### **Senior Management Staff**

Steve Terry  
Director - International  
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Cheri Leroy  
Director - Business  
Development

Jim Dills  
Director - Regional Business  
Development

Jim Galvin  
Director - Trust & Security  
Research

## ***MEMBER COMMITTEES***

### **Member Advisory Committee**

Mark Resch Xerox Corporation	John Sabo Social Security Administration U.S. Government
Mack Hicks Bank of America	Bob Edelman Marshall Industries
Michael Grandfield BBN Planet	Bruce Lowenthal Tandem
Bill Finkelstein Wells Fargo Bank	Gene Moscarel State of California
Russ Jones Digital Equipment Corp	Mitchell Levy Sun Microsystems

### **Global Electronic Commerce Board**

Eduardo Barrera, CN Spain	Stefan Lindholm, CN Sweden
Adolfo Cassari, CN Chile	Phil Moody, CN Australia
Graeme Coomber, CN Malaysia	Walid Mougayar, CN Canada
Georges Fischer, AFCEE	Ann-Marie Nilsson, CN Sweden
Wayne Friedman, CN South Africa	Noriyoshi Osumi, CN Japan
Danielle Gerondino, CN Italy	Jaechon Park, CN Korea
Zait Isa, CN Malaysia	Jean-Claude Pelissolo, AFCE
Rob Kennett, CN Australia	Heiko Schinzer, CN Germany
Hajime Kimura, CN Japan	Steve Terry, CN U.S.
Hohyoung Lee, CN Korea	Prof. Thome, CN Germany

***CommerceNet's Member Advisory Committee provided a way for members to directly participate in setting the directions and priorities of the consortium.***

***The Global Electronic Commerce Board was made up of the leading sponsor companies from each of the Global CommerceNet Partners.***

***This group helped CommerceNet to maintain a global perspective on electronic commerce barriers and opportunities***

## **Appendix A – The CommerceNet eCo Project Results**

### **Developing a Common Architectural Framework for Electronic Commerce**

The CommerceNet eCoSystem™

This is an overview of the eCoSystem™ work done by CommerceNet. This work has provided the foundation for a number of other initiatives undertaken by CommerceNet subsequent to the TRP.

This work was published in 1996 and distributed to CommerceNet's members. It served as the basis for a multiyear research from NIST/ATP, provided the motivation to form a for-profit spin off, defined the direction for numerous CommerceNet research studies as well as the foundation for a number of new CommerceNet services.

#### **Executive Summary**

The explosive growth of Internet commerce is being threatened by digital anarchy: closed markets and systems that cannot utilize each other's services, incompatible applications and platforms that cannot interoperate or build upon each other; a bewildering array of security and payment options that confuse and scare consumers.

We believe that for electronic commerce to move to the next stage of open and extensible electronic marketplaces, we will need to have a common architectural model or framework

CommerceNet believes that the industry needs a concerted effort to integrate the numerous

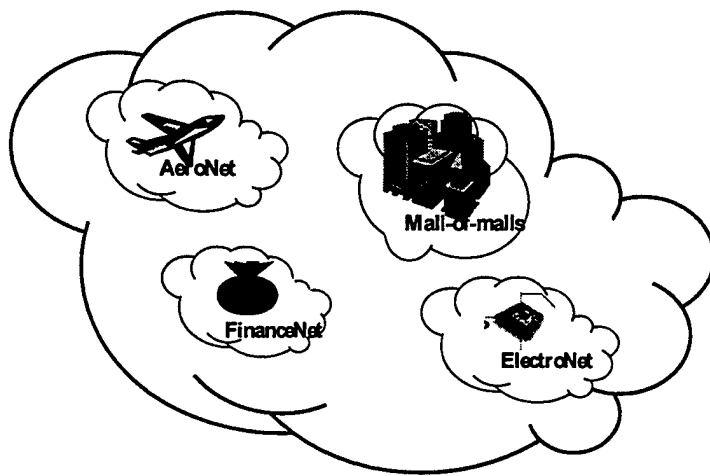
approaches and technologies currently being developed for major electronic commerce implementations:

- To establish an object-oriented architectural framework for Internet commerce that promotes the interoperation and reuse of applications and services.
- To establish an ongoing process for achieving broad industry consensus on issues of interoperability and reuse critical to open digital markets.

This research outlines the need for a common architectural model for various Internet-based electronic commerce applications. The existence of such an architectural framework will help unleash the full potential of the Internet as a fundamental basis for commerce.

## **The Marketplace Vision**

Picture a massive economy of online services, all linked through a common framework. The framework enables them to utilize and build on each others



These marketplaces would operate similarly to marketplaces existing in the physical world. Marketplaces are virtual sites made up of multiple servers where buyers and sellers can interact with one another for mutual commercial benefit. These marketplaces also share some common attributes regarding common business practices. In cyberspace, the marketplaces would need to emulate many of the aspects of physical space.

services. The result -- an incredible array of virtual businesses, markets, and trading communities that will revolutionize commerce.

For example, marketplaces are based on cooperation, a set of accepted rules and mutual trust. The linkages between various participants and services tend to be dynamic and change based on the needs of the participants. Relationships between various market participants are maintained at multiple levels. And, entry to the marketplace is not based on use of a specific technology or vendor but rather a set of business requirements specified by the market maker and/or participants.

*Digital marketplaces would operate similar to physical marketplaces.*

*Marketplaces are based on cooperation, a set of accepted rules and mutual trust.*

*Entry to the marketplace is not based on use of a specific technology or vendor but rather a set of business requirements*

*Businesses of all kinds will routinely out source functions such as fulfillment and shipping over the net to other businesses that specialize in such services.*

*The big wins would be in doing electronic commerce an industry at a time vs. a company at a time and replacing closed vertical hierarchies with open markets.*

*Entrepreneurs would be encouraged to add value to existing online enterprises through aggregation, brokering, referral and similar services.*

The current generation of "virtual superstores," such as Amazon.com and CDNow, hint at the possibilities. These stores can offer a wide selection of merchandise at rock bottom prices because fulfillment is outsourced directly to distributors. But they barely scratch the surface.

Businesses of all kinds will routinely out source functions such as fulfillment and shipping over the net to other businesses that specialize in such services. Distributors themselves will go virtual, outsourcing the physical warehousing and movement of goods to logistics specialists such as Federal Express. But why stop there? How about a virtual distribution company that outsources the heavy lifting to independent warehouse operators and truckers, in order to reduce costs and improve flexibility.

Buyers, sellers and intermediaries could form numerous industry-specific Internet-based marketplaces

(e.g., real estate, automobile parts, used construction equipment, financial services). These communities, in turn, will form extended communities. For example, aerospace companies belonging to an "AeroNet" might get privileges to purchase electronic components on "ElectroNet" and secure trade financing or working capital through FinanceNet.

Global manufacturing industries such as automobiles, computers and aerospace could integrate their multi-tiered supply chains through the net. The impact would be pervasive - far more than just migrating existing transaction processes to the net to save a few dollars. The big wins would be in doing electronic commerce an industry at a time vs. a company at a time and replacing closed vertical hierarchies with open markets.

Entrepreneurs would be encouraged to start creative virtual businesses that add value to existing online enterprises through aggregation, brokering,

referral and similar services.

Consider some possibilities:

- One stop shops that aggregate catalogs and ordering to provide a convenient way of purchasing products from several niche merchants.
- Virtual auto rows or garment districts where multiple merchants create domains of information and services that allow consumers to easily shop and transact business across competitive businesses.
- Financial service sites that let businesses and consumers manage their assets across multiple banks and brokerages.
- **Macro Markets** that integrate and tailor services from other **Internet markets** to serve the needs of specialized trading communities (e.g., an Internet market for international construction projects, that bridges web sites listing business opportunities, used construction equipment, financing and so forth.).
- Virtual-superstores that market and take orders for customized products and bid them out to *real* virtual-superstores and other brokers for final customization, assembly and distribution.
- Classified advertising super sites that offer single point access to scores of other sites carrying advertisements for used cars, apartments, and jobs.

This vision is fundamentally about leverage. Online businesses gain leverage by outsourcing, joining **Internet markets**, and letting others add value to them. This applies to businesses of any scale from a single company (a market of one) to extended trading communities. The fact that online businesses provide network services suggests an analogy with software reuse. This type of a broad industry framework would maximize leverage by promoting the reuse of services that represent entire companies and markets.

### The Reality

Internet commerce has grown explosively in the past year, but its in danger of hitting a wall.

- There are now thousands of consumer-oriented commercial sites actually selling things – books, software, CDs, food and wine, watches, travel, air and movie tickets, real estate, cars.
- Thousands of additional business-oriented sites selling industrial parts, office supplies, logistics and transport services, job shop services.

*This vision is fundamentally about leverage.*

*A broad industry framework would maximize leverage by promoting the reuse of services that represent entire companies and markets.*

*Internet commerce has grown explosively in the past year, but its in danger of hitting a wall.*

*While many of the essential building blocks of Internet markets appear to be in place, there's not much of a foundation to build upon.*

*Closed markets rely on exclusive vendors rather than an open system. These tend to be proprietary approaches that limit access based on technology rather than market dynamics.*

*The proliferation of such closed markets will hinder rather than promote global electronic commerce.*

- A small but rapidly growing number of industry-specific markets where one can buy and sell industrial parts (IndustryNet), memory chips (FastParts), used construction equipment (TradeX) and {Financial services, auto parts}.and more.
- Hundreds of technology vendors selling shrink wrapped and custom software (applications, services and platforms) to support these businesses.
- Each relies on a few exclusive vendors rather than the open market for services such as settlement and shipping. The vendors are locked in by proprietary interfaces that do not allow them to serve other marketplaces.
- Each is accessible only through browsers. There is no easy way for sellers to automatically post their goods, or for buyers to watch for new postings. Third parties cannot integrate the markets into their operations (e.g., a supply chain), or build value-added services on top of them (e.g., a brokering service that searches across markets for good deals; a quality assurance and referral service.)

Not surprisingly, all this rapid, uncontrolled growth has created some problems: markets tend to be closed; applications can't talk to or build on each other; platforms are proprietary; and security and payment are still largely ad hoc. So while many of the essential building blocks of the *Internet market* appear to be in place, there's not much of a foundation to build on.

### **Closed markets**

Although there are many eCommerce companies beginning to develop digital markets and related integrated applications, their futures may be limited without the ability to expand and cooperate with other markets.

CommerceNet believes that the proliferation of such closed markets will hinder rather than promote global electronic commerce.

### **Industry developed platforms**

Almost every major IT vendor has announced an Internet commerce platform based on some type of architecture that could be used to establish digital marketplaces.

- IBM CommercePoint
- Microsoft Internet Commerce Framework

- Netscape ONE (Open Network Environment)
- Oracle NCA (Network Computing Architecture)
- Sun/Javasoftware JECF (Java Electronic Commerce Framework)

These platforms specify architectures (protocols, data formats, APIs) for integrating core eCommerce services (e.g., security, payment, directories and catalogs) with legacy business systems, and the Web. The architectures are open in the sense that their specifications are published. But they still tend to be largely proprietary because other than basics such as HTTP, HTML, and SSL, there are few de facto standards.

Consequently, core eCommerce services still have to be customized to plug into a particular platform's API. Moreover, the protocols they speak may not be compatible across platforms. These are serious inhibitors to commerce.

Further complicating the picture, is a second tier of ISVs developing specialized merchant

and commerce platforms for retail and business-to-business transactions. These systems provide end-end support through well defined object interfaces and APIs with both eCommerce applications (payment, catalogs, EDI etc.), and business processes (real-time order processing, purchasing, order entry, fulfillment, etc.)

There is, nonetheless, cause for optimism. A consensus is emerging among the major vendors that a common architectural framework for Internet commerce should be based on distributed objects (in particular, CORBA/IIOP) and Java. Moreover, in areas where there is not yet consensus, each company's architecture appears to have some unique, largely complimentary strengths. For example:

- Netscape ONE (client-server communication; using distributed objects to transform browsers into universal clients)
- Oracle NCA (back end database integration and transaction processing; cartridge APIs that promote

*Almost every major IT vendor has announced an Internet commerce platform based on some type of architecture that could be used to establish digital marketplaces.*

*They tend to be largely proprietary because other than basics such as HTTP, HTML, and SSL, there are few de facto standards available today.*

*A consensus is emerging among the major vendors that a common architectural framework for Internet commerce is needed.*



*The proliferation of Internet commerce platforms pales in comparison to the proliferation of electronic commerce applications.*

*A universal security and payment framework will be one of the required components called for in an electronic commerce architecture.*

*Interoperability issues exist for every type of eCommerce application – directories, catalogs, collaboration tools, EDI protocols, etc.*

reusability and extensibility of application logic)

- Sun/Javasoftware JECF (platform independent support for digital wallets, ID's and payment, particularly on the client side)

### **Incompatible applications**

The proliferation of Internet commerce platforms pales in comparison to the proliferation of applications. Take security and payment for example. Nearly 20 CommerceNet members have developed payment solutions. A dozen or so more offer potentially incompatible security solutions. In addition to these commercial products, there'll soon be a host of experimental microcredential and micropayment products from industry and government-sponsored R&D programs in Japan and Europe.

Clearly, a universal security and payment framework will be one of the required components called for in an electronic commerce architecture.

Consumers will demand wallets that can hold a variety of payment instruments and digital

identity cards; merchants will want payment platforms that let them to do business with any consumer, using their preferred form of payment; payment solution providers will want a shrink wrapped API so their products can plug into any commerce platform. These were the objectives driving the Joint Electronic Payment Initiative, a joint project of CommerceNet and the World Wide Web Consortium (W3C).

Similar interoperability issues exist for every type of eCommerce application -- directories, catalogs, collaboration tools, EDI protocols, ...and in the future, shopping agents, shipping services ,, and markets. CommerceNet has interoperability task forces for security, directories & catalogs, and EDI, in addition to payments. More will be coming. Leading application and platform developers participate actively on these task forces precisely because interoperability is not an option.

## **Business Summary**

The Internet is revolutionizing commerce. It provides the first affordable and secure way to link people and computers spontaneously across organizational boundaries. This is spawning numerous innovative enterprises -- virtual companies, markets and trading communities.

As the Internet and electronic commerce becomes more sophisticated, the next logical step in its evolution is the establishment of marketplaces. In these marketplaces, multiple buyers and sellers will be able to cooperate through sharing of information, rules, transactions and common processes. The establishment of these markets will require a robust set of interoperable applications that spans both servers and browsers.

But the Internet's potential is being imperiled by the rising specter of digital anarchy: closed markets that cannot utilize each other's services, incompatible applications and

platforms that cannot interoperate or build upon each other; a bewildering array of security and payment options that confuse and scare consumers.

There is a growing consensus among CommerceNet members that the solution to these problems is an object-oriented architectural framework for Internet commerce. Indeed, virtually all major Internet platform vendors have announced proprietary versions of such a framework.

Unfortunately, incompatibilities among these frameworks will exacerbate the interoperability problem. Moreover, the focus of these commercial frameworks is on core services such as security and payment; interoperation of business applications and market services are largely ignored.

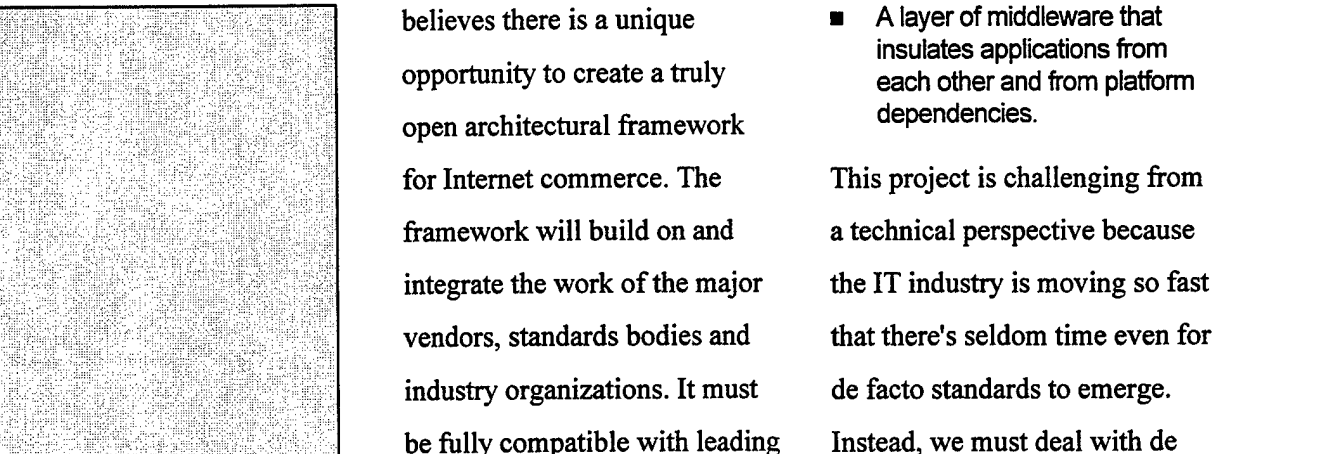
In response, there needs to be a major cross-industry Internet commerce framework initiative, involving both IT vendors and end-users. CommerceNet

*As the Internet and electronic commerce becomes more sophisticated, the next logical step in its evolution is the establishment of marketplaces.*

*The solution to these problems is an object-oriented architectural framework for Internet commerce.*

*The framework must build on and integrate the work of the major vendors, standards bodies and industry organizations.*

*It must also be fully compatible with leading proprietary platforms and incorporate their unique strengths.*



believes there is a unique opportunity to create a truly open architectural framework for Internet commerce. The framework will build on and integrate the work of the major vendors, standards bodies and industry organizations. It must be fully compatible with leading proprietary platforms and incorporate their unique strengths.

The resulting framework should be based on emerging industry standards for distributed objects and networking known as CORBA (Common Object Request Broker Architecture).

This framework should include:

- Applications and services that model real markets and business processes.
- A Common Business Language (CBL) so that applications can communicate using messages and objects analogous to those used in real commerce.
- An extensible set of interface specifications, class libraries and network services so that applications can be quickly assembled from existing components and subsequently reused themselves.

- A layer of middleware that insulates applications from each other and from platform dependencies.

This project is challenging from a technical perspective because the IT industry is moving so fast that there's seldom time even for de facto standards to emerge. Instead, we must deal with de facto interoperation -- getting incompatible products that are already in the marketplace somehow to communicate. This may be accomplished through negotiation protocols ("I don't care what standard you use, just tell me what it is and I'll speak it"), bridging gateways, and mediators (smart gateways). The philosophy is simple: protocols, formats and the like should not stand in the way of doing business.

This is not just about creating an architectural framework. It is more importantly about establishing an organizational framework and an ongoing process for achieving broad industry consensus on interoperability and reuse issues critical to open digital markets.

The industry should be encouraged to package their eCommerce applications and services as framework compliant objects.

Related applications could be organized around a set of CBL service requests to which all objects representing a given application class must be capable of responding. (These messages define literally what it means to be, for example, a payment service, a catalog service, a procurement service, a shipping service, or an

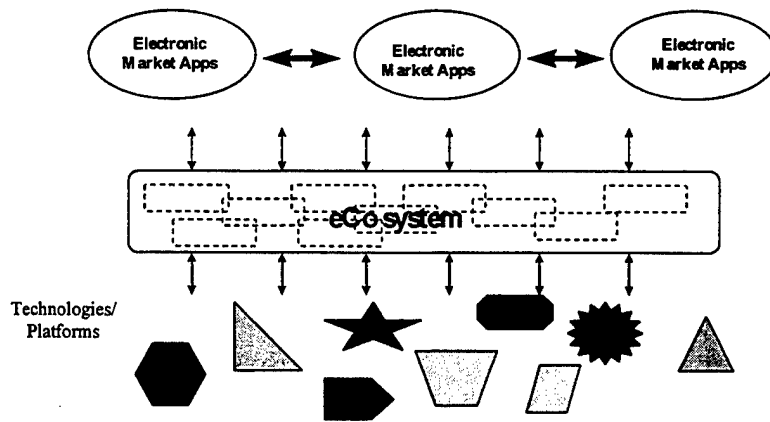
authorized vendor in a spot market for memory chips.)

The success of this process clearly depends on getting the market leaders in each area to participate actively on their respective task forces.

Admittedly, in past battles for market dominance (e.g., operating systems, desktops), it has often proved difficult to get the leading players to make substantial headway on common operating environments.

However, this has been accomplished in a number of

Figure 1 - eCo System Overview



technology areas and must be done in order to ensure the continued development of electronic commerce.

### eCo System Overview

eCo System is a proposed framework architectural (as shown in figure 1) for Internet commerce. It would consist of:

*The architecture would consist of an extensible object-oriented framework, a common business language and a network services architecture.*

*Functionally it would serve as a layer of middleware, an object-oriented development environment and an industry road map.*

*A framework is an almost complete application that can be customized or extended to address particular needs*

*The eCo System concept is a framework of frameworks that model key business processes and services*

*The framework would need to support network services, commerce services, business processes and specific vertical market needs*

- An extensible object-oriented framework (class libraries, APIs, shared services) wherein applications could be assembled quickly from existing components and subsequently reused themselves
- A Common Business Language that lets applications to communicate using messages and objects that model communications in the real business world.
- A network services architecture (protocols, APIs, data formats) that insulates applications from each other and from platform dependencies, while facilitating their interoperation.

Functionally, eCo System would fill three distinct and important roles. It is:

- A layer of middleware that facilitates interoperation.
- An object-oriented development environment that encourages the reuse of highly leveraged eCommerce modules (the modules may represent entire companies);
- An industry roadmap and interoperability showcase that promotes open standards and

helps technology vendors communicate with end users about product features.

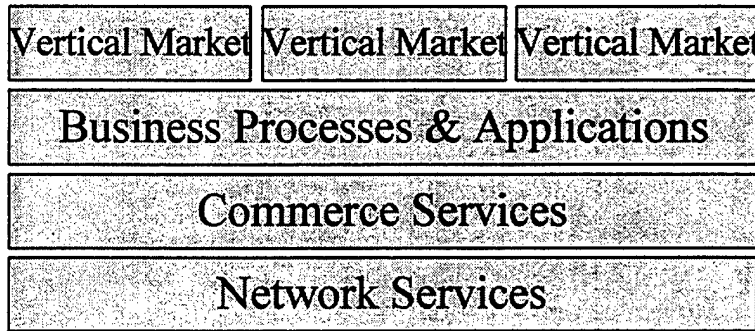
## **A framework of frameworks**

In O-O parlance, a framework is an almost complete application that can be customized or extended to address particular needs.

Accordingly, eCo System would be a framework for building *iMarkets*. More specifically, it's a framework of frameworks that model key business processes and services. Because the frameworks build on each other, the resulting applications would be tightly linked through an infrastructure of shared services.

eCo System's frameworks would fall into four general categories (see Figure 2)

Figure 2: *iMarket* framework of frameworks



- Vertical Markets - services specific to particular *iMarkets*. such as real estate (e.g., title search, escrow), securities trading (e.g., request quote, make bid) or manufacturing (e.g., schedule production, check order status).
  - Business Processes & Applications - generic business services common to multiple *iMarkets*. Includes both retail (e.g., shopping, order fulfillment, shipping) and business-business (e.g., procurement, order entry, inventory and supply-chain management, logistics) functions. Such services may have been developed initially for a specific *iMarket* and later generalized for reuse in others.
  - Commerce Services - basic eCommerce services, such as digital IDs and wallets, that allow individuals and companies to authenticate themselves, make payments, link catalogs, collaborate and otherwise participate in *iMarkets*. Also, advanced next generation services including secure multimedia mail, smart card-based security and payment, digital content delivery, application billing and accounting, transaction management, and agent management).
  - Network Services - services that enhance the performance, reliability and security of the net to accommodate mission-critical business needs. Examples include QOS management, IP-multicast, delivery receipts, authenticated packets, and smart firewalls (that pass packets from authorized business partners).
- Each framework would specify:**
- The core services that all application objects belonging to that class (e.g., payments, catalogs) must provide.
  - A network services interface (NPI) - a set of messages for requesting the core services.
  - The business objects on which the services operate – invoices, contracts, products, companies and the like.
  - The APIs for any software modules (or cartridges) involved in delivering services.

*Every application under an eCo System should be a fully network-accessible service*

*Vendors would differentiate their products by providing additional services beyond those specified in the framework*

*The defining characteristic of an object is its ability to respond to a minimal set of generic service requests specified in the relevant*

*A framework is an almost complete application that can be customized or extended to address particular needs*

*The eCo System concept is a framework of frameworks that model key business processes and services*

*The framework would need to support network services, commerce services, business processes and specific vertical market needs*

## **Services**

Every application under eCo System – whether a catalog or an entire *iMarket* -- would be a network-accessible service.

Table 1: illustrates a few of the core services provided by three representative frameworks (by paraphrasing the NSI messages used to request them.) It would be these core services that define literally what it means to be, for example, a payment

service, a shipping service or a catalog service. Vendors will of course differentiate their products by providing additional services beyond those specified in the framework. But the defining characteristic of a payment, shipping or catalog object is its ability to respond to the minimal set of generic service requests specified in the relevant (Payments, Shipping or Catalogs) framework.

Table 1: Examples of service request messages:

<b>Payments</b>	<ul style="list-style-type: none"> <li>• Make a payment</li> <li>• Get paid</li> <li>• Use my MasterCard</li> <li>• Have I been paid yet?</li> </ul>
<b>Shipping</b>	<ul style="list-style-type: none"> <li>• Schedule a shipment</li> <li>• Check the status</li> <li>• Get a quote</li> </ul>
<b>Catalogs</b>	<ul style="list-style-type: none"> <li>• Perform a search</li> <li>• Add, delete or modify a listing</li> </ul>



*The marketware framework supports these applications by providing a common set of structures and functions*

- *Standard profiles*
- *Standard taxonomies*
- *Standard CBL commands*
- *Authentication and authorization*
- *Accounting*
- *Notification*

services could be implemented.

For example:

- **Matchmaking** – a trading post where buyers and sellers could exchange any kind of good or service. Buyers and sellers are matched based on both product descriptions and profiles of the parties involved (e.g., Sun's Matchmaker).
- **Negotiation** - buyers and sellers could post offers specifying criteria such as price ranges, quantities, delivery dates, and other terms and conditions; parties are notified in real time or via email of close matches and could respond by modifying their offers if they so desire. (e.g., FastParts )
- **Buy-sell brokering** – buyers post requests for quotations (RFQ's), which are forwarded to registered sellers with appropriate interest profiles. Sellers could respond with bids, which would be collected, sorted and forwarded to the buyer. (Shopping agents such as Andersen Consulting's BargainFinder are a special case of this transaction type.)
- **Referrals and directories** – buyers could submit requests for referrals that would then be matched against profiles of registered sellers using criteria that the buyer supplies.
- **Aggregation** - buyers submit requests for goods and services, which could be pooled with similar requests to obtain quantity discounts from sellers.

The marketware framework supports these applications by providing a common set of structures and functions:

- **Standard profiles** for all market participants – buyers, sellers, and intermediaries.. The profiles provide all the information needed for a party to participate in market transactions. For example: size and type of business (e.g., large discount broker, small manufacturer), location and street address, terms, conditions, contracts supported, certificate information, credentials, credit rating and references.
- **Standard taxonomies** of goods and services that allow parties to target particular transactions and filter out others. Standard commercial classifications such as SIC codes could be used as well as custom ones. E.g., a three level hierarchy that classifies products by industry (e.g., computer), subarea (e.g., peripherals), and type (e.g., disk drives). Product taxonomies are also the basis for numerous value-added services, such as custom catalogs and vendor directories (i.e., *product Yahoos*) where human buyers or their computer agents could comparison shop and explore product alternatives.
- **Standard CBL commands** for invoking market actions such as buy, sell, bid, post RFQ, and locate interested buyers / qualified vendors.



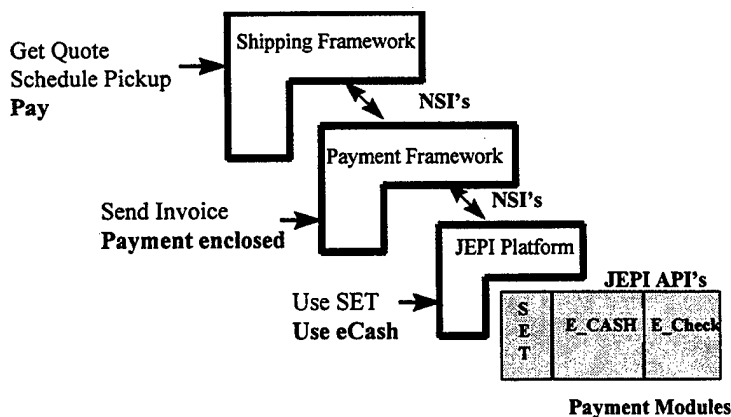
## Platforms

Frameworks that define APIs are known as platforms. Platforms function as middleware. They transform standalone and legacy applications (written before a relevant framework existed) into eCo services. Application modules (sometimes called cartridges) plug into the platform API and could then be accessed using standard NSI

requests. The JEPI framework is an example of a platform for payments. When fully developed, it will define standard APIs and protocols that will allow many of the incompatible payment solutions already in the market to interoperate.

Figure 3 illustrates the hierarchical relationship of frameworks, and the respective roles of NSIs and APIs.

Figure 3: Frameworks, platforms and applications communicating through NSI's and API's



## Marketware

Marketware is the generic name for a class of eCo applications and services that would bring together buyers and sellers. The

services are based on a common platform that would be customized by plugging in different application modules. Depending on the modules used, a variety of value-added market

*JEPI is an example of a platform for payments. It will define standard APIs and protocols that will allow many of the incompatible payment solutions already in the market to interoperate.*

*Marketware is a generic name for a class of eCo applications and services that would bring together buyers and sellers.*

- **Authentication and authorization** functions that use buyer and seller profiles to control what information a party may see or modify.
- **Accounting and reporting** of transactions for buyers, sellers and market administrators
- **Notification** service that lets buyers and sellers register their interest in selected market events (e.g., posting of a new bid) and receive a CBL notification message when they occur.

### Common Business Language

The NSI messages, business objects, and product taxonomies defined by eCo System frameworks constitute a *Common Business Language* for Internet commerce. CBL (playfully pronounced CoBoL) is a long overdue, object-oriented alternative to the ad hoc text strings currently used in EDI transactions. Each framework inherits the service requests and business objects of those frameworks on which it builds, specializing and extending them for its purposes.

### Architecture

The architecture must conform to emerging industry trends:

- **Network services** - every eCo System application should be a network-accessible service. The services are provided by distributed objects.
- **Object Web** - eCo System objects would respond both to CBL messages from agents and HTTP requests from browsers.
- **Industry compatibility** - the eCo System framework will leverage commercial Internet platforms such as IBM CommercePoint, Netscape ONE, Oracle NCA, and Sun JECF. It will also use emerging standards such as CORBA 2.0 ORB, IIOP, Java, and HTTP/HTML.
- **De facto interoperation** - eCo System will focus on interoperation rather than standards per se. Interoperation could be achieved in many ways including de facto standards like Java and IIOP, protocol negotiation, gateways, and mediators.
- **Scaleable, interchangeable building blocks** - the same CBL commands could be directed to a business, a virtual business (several businesses who have linked their catalogs or business processes), a market (comprised of many companies) or an intermediary.

*NSI messages, business objects, and product taxonomies defined by eCo System frameworks constitute a **Common Business Language** for Internet commerce*

*The architecture must conform to emerging industry trends*

*An eCo System should focus on interoperation rather than standards*

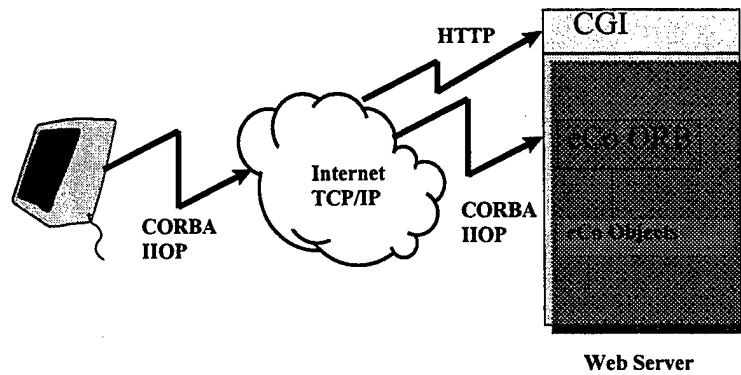
*Every eCo System service should be a network-accessible object.*

*Objects should respond both to agents using CBL commands delivered over IIOP, and to browsers using HTTP/HTML.*

- Transparent outsourcing – any and all business functions (e.g., fulfillment, shipping, payment processing) should be outsourceable.

The following sections describe, from various perspectives, a

Figure 4: Object Web



Every eCo System service should be a network-accessible object. Objects should respond both to agents using CBL commands delivered over IIOP, and to browsers using HTTP/HTML. This duality maintains compatibility with current websites and affords a

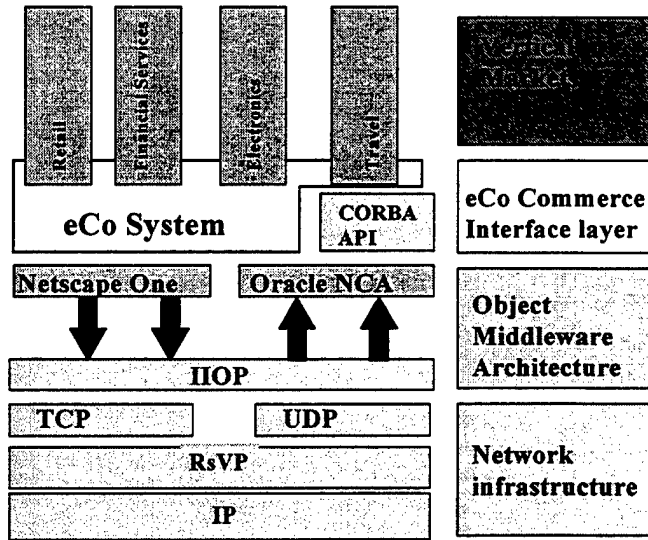
Figure 5: Protocol Stack

potential architectural design for an eCo System.

## **Object Web**

graceful migration path. It would also be compatible with emerging industry trends, and anticipates the possibility that HTTP-T-NG (Next Generation) and IIOP may someday merge.

## **Protocol stack perspective**

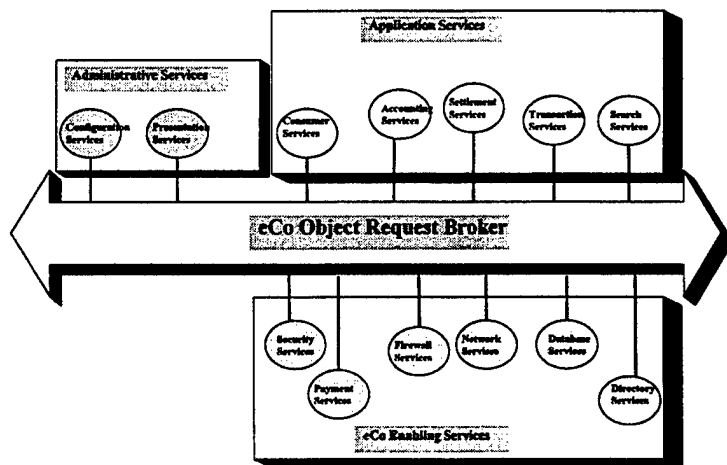


eCo System would impose a layer of middleware on top of leading Internet commerce platforms such as Netscape ONE and Oracle NCA. It could leverage the CORBA ORB/IIOP (Internet InterORB

Figure 6: Object bus perspective

Protocol) architecture (Figure 4) used by these platforms and extends it to accommodate CBL agents (Figure 7).

**Object bus perspective**



In the CORBA ORB architecture, all objects are connected to a common *object*

*bus*. Thus, although eCo System services are often depicted hierarchically (e.g.,

An eCo System would impose a layer of middleware on top of leading Internet commerce platforms such as Netscape ONE and Oracle NCA.

eCo System focuses on the goal of achieving interoperation, which is a *sine qua non* for eCommerce

*The CORBA IIOP architecture insulates application developers from most implementation and run-time details.*

*Legacy applications can be accommodated by encapsulating them in an object wrapper, and creating a corresponding IDL file*

*Interoperation and platform independence are built into the Java programming paradigm*

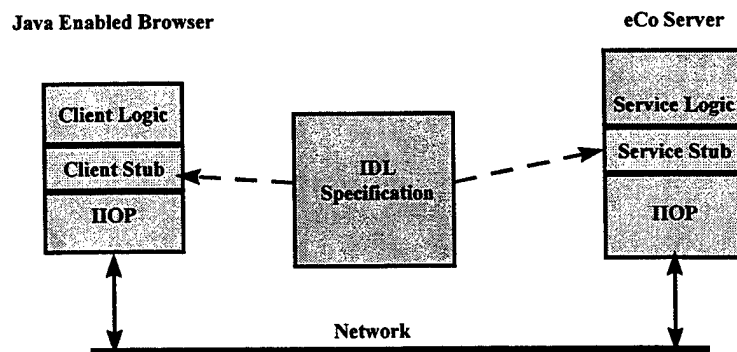
Figure 2), their actual implementation would be flat; any eCo object could request a service from any other. This would be convenient because situations do frequently arise where objects lower in the hierarchy require services from those higher up. For example, premium network services such as QOS management or IP Multicast may involve payments. Or a fulfillment service may need to avail itself of the services of a transportation *iMarket*.

## Interoperability perspective

eCo System focuses on the goal of achieving interoperation, which is a sine qua non for eCommerce. Standards are surely one means of achieving the goal. However, given the pace and competitiveness of the market, reaching a consensus about standards, or even de facto standards, has historically been problematic. An eCo System would therefore pursue a variety of strategies for achieving *de facto* interoperation, as outlined in Figure 5 and Figure 6.

## IDL Perspective

Figure 7: IDL Perspective



The CORBA IIOP architecture insulates application developers from most implementation and run-time details. APIs are

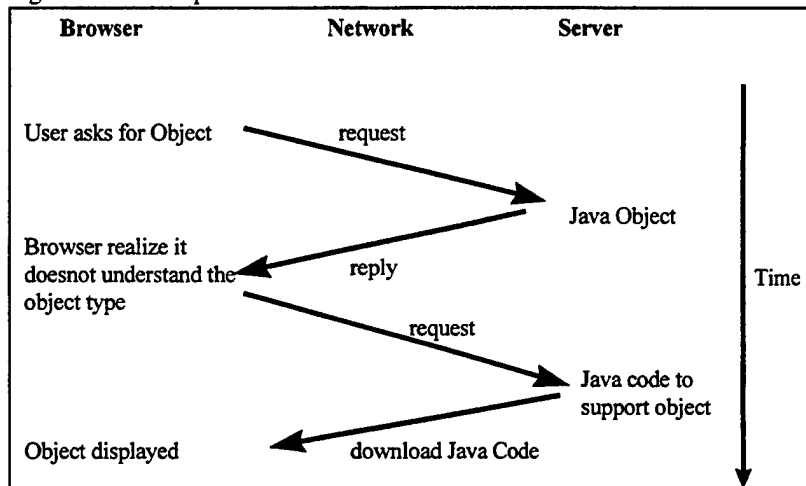
specified in IDL (Interface Definition Language), a neutral definition language not tied to any specific programming

language. The application object(s) that actually implement the specification could be provided by any vendor, written in any language, and resident on any Internet-

connected host. Legacy applications could be accommodated by encapsulating them in an object wrapper, and creating a corresponding IDL file.

### Java Perspective Java Perspective

Figure 8: Java Perspective



Interoperation and platform independence are built into the Java programming paradigm. Java-enabled browsers and applications execute on virtual machines and can load new

protocols dynamically as the need arises. This figure is a simplified illustration of Java's dynamic protocol handling process.

*An alternative to protocol negotiation could be to simply to translate between proprietary protocols using a gateway service.*

*Gateways can also complement protocol negotiation.*

*Mediators are smart gateways. They can negotiate a mutually acceptable protocol with each of several sites, then retrieve information from them and integrate it*

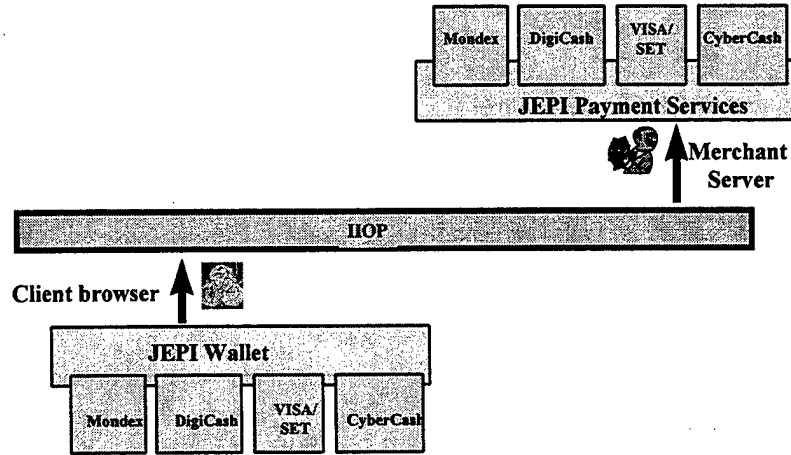
Often, an application may not care what protocol is used. This attitude might be paraphrased as: just tell me what protocol you prefer and I'll accommodate you if I can.

Typically application vendors are much more willing to agree on a meta-protocol than a standard.

Negotiation is a practical way of realizing de facto interoperation.

## Protocol negotiation perspective

Figure 9: JEPI negotiation protocol



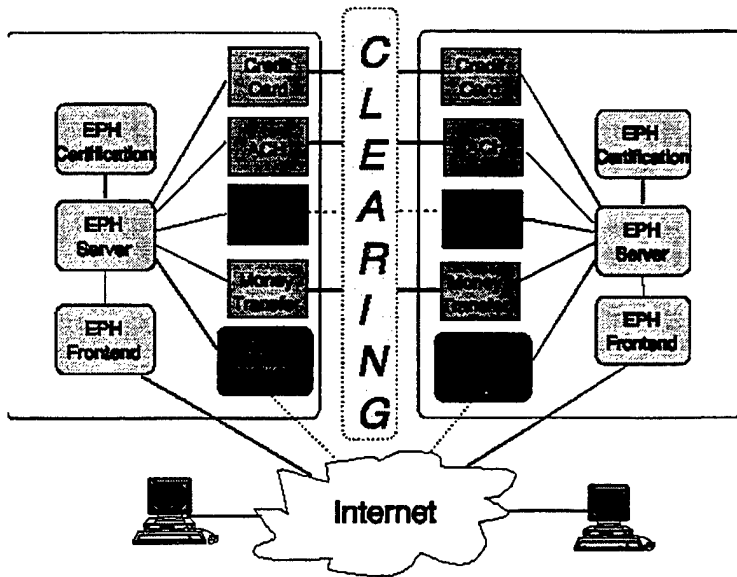
Often, an application may not care what protocol is used. This attitude might be paraphrased as: just tell me what protocol you prefer and I'll accommodate you if I can. This basically is the philosophy underlying the JEPI payments platform.

In JEPI, sellers provide buyers with a list of payment types they accept (analogous to physical merchants displaying credit card logos in their store windows). Buyers then select the form of payment they wish to use, which

implicitly selects the appropriate protocol (e.g., SET, Mondex).

If experience with JEPI is any guide, application vendors are much more willing to agree on a meta-protocol than a standard. That's because the standard will require most of them to abandon rival technologies in which they have a substantial investment. Given that today's computers are capable of supporting multiple protocols, negotiation is a practical way of realizing de facto interoperation

Figure 10: Gateway and mediator protocol



**Gateway and mediator perspective**

An alternative to protocol negotiation could be to simply translate between proprietary protocols using a gateway service. Gateways work well when the protocols involved are functionally similar but differ in their syntactic details. Thus, gateways are often a good way for legacy database applications to communicate (e.g., my SAP purchasing system talking to your Oracle order entry system) because the applications involved are reasonably well standardized at a functional level. Gateways could also complement protocol negotiation. Namely, one of the

alternatives could be for each party to stick with their own favorite protocol, and to employ the services of a gateway – in effect, the parties agree to disagree.

Mediators are *smart* gateways. They could negotiate a mutually acceptable protocol with each of several sites, then retrieve information from them and integrate it. Mediators were originally developed for advanced information retrieval tasks. But they are equally well suited to eCommerce tasks such as integrating the catalogs and business systems of firms participating in virtual companies.

*The eCo System concept would extend IIOF by adding two new levels of abstraction: agents and CBL messages.*

*Marketplaces are based on cooperation, a set of accepted rules and mutual trust.*

*Agents provide a baseline set of common services that all eCommerce applications could build on.*



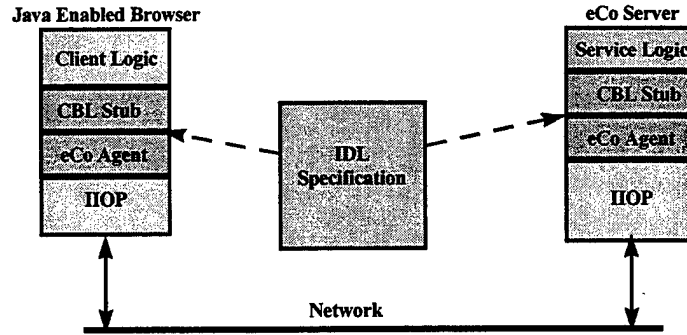
*An alternative to protocol negotiation could be to simply to translate between proprietary protocols using a gateway service.*

*Gateways can also complement protocol negotiation.*

*Mediators are smart gateways. They can negotiate a mutually acceptable protocol with each of several sites, then retrieve information from them and integrate it*

## **CBL Agent perspective**

Figure 11: CBL Agent Interaction



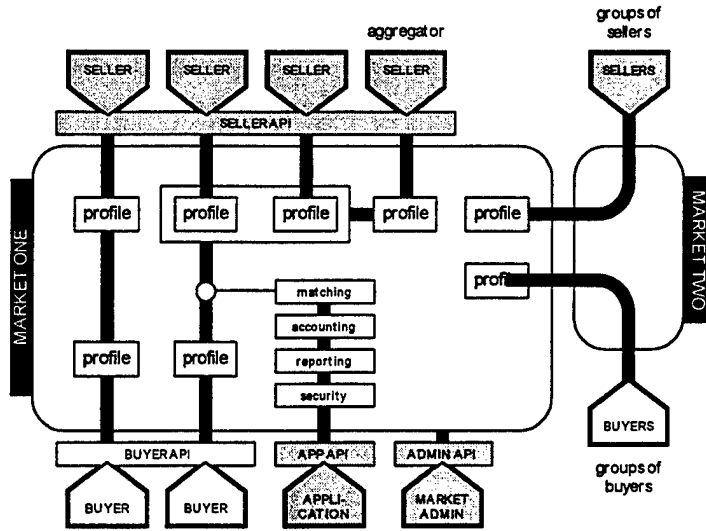
The eCo System concept would extend IIOP (Figure 4) by adding two new levels of abstraction: agents and CBL messages. Agents provide a baseline set of common (Telescript-like) services that all eCommerce applications could build on. They include basic authentication, authorization, billing and accounting, micropayment, and directory services. eCo System's agent platform, depicted in the figure, provides an agent transport protocol and associated

management and support services -- e.g, creating and destroying agents, subcontracting tasks, delegating permissions and resources, and administering offers to buy or sell services.

The advantages that applications gain by communicating at the CBL level have been previously discussed. The CBL stub translates CBL messages into IDL object requests, to leverage the interoperability services provided by IIOP.

## **Marketware perspective**

Figure 12: Marketware perspective



Marketware objects are the fundamental building blocks of iMarkets. They are modular components that could be rapidly customized and composed to synthesize a variety of market Functions.

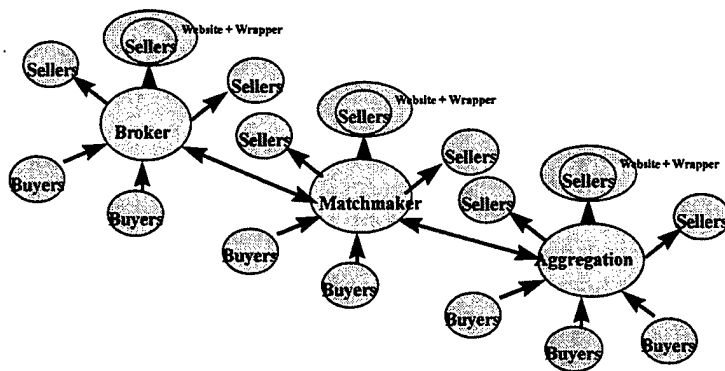
- **Modular** – the marketware platform could define four APIs: for buyers (clients), sellers (front end sales systems), administrative tools and application modules. By plugging in the appropriate applications, a standard platform could be customized to support a variety of market services (e.g., brokers, aggregators, referral agents). Toolkits could be given to application developers so they can create new marketware services and enhance existing ones.
- **Composeable** – marketware services build on each other. A buy-sell broker could deal directly or through a broker. a

broker could deal interchangeably with individual buyers or an aggregator representing a group of buyers; with individual sellers or another broker representing a group of sellers.

- Marketware services are accessed remotely through NSI calls that invoke CBL market actions (e.g., buy, sell, bid / ask). The architecture should be **scaleable** in the sense that the same CBL commands could be directed to a business, a virtual business (several businesses who have linked their catalogs or business processes), a market (comprised of many companies) or a market intermediary.
- Legacy websites could be encapsulated in Object Web wrappers, making them accessible to eCo system agents as well as to browsers. Toolkits should be available for free download, so that existing commerce sites could quickly join trading communities.

*The ability to rapidly design and experiment with new business concepts could spark an explosion of entrepreneurial activity rivaling that of the Web itself.*

Figure 13: Composing custom iMarkets using Marketware Objects



*The ability to rapidly design and experiment with new business concepts could spark an explosion of entrepreneurial activity rivaling that of the Web itself.*

*This could lay the foundation for next generation Web applications and information systems that fully integrate legacy systems.*

### **Summary**

An architectural framework established in this way would be able to expand the overall effectiveness of electronic commerce. A consistent, open architecture will enable web sites to fully interoperate and establish marketplaces, virtual corporations and trading cooperatives regardless of the types of servers, payments systems, search engines or security protocols implemented by each of the participating companies.

An environment built upon an open object-oriented architecture would enable businesses to build on each other's services. The ability to

rapidly design and experiment with new business concepts could spark an explosion of entrepreneurial activity rivaling that of the Web itself. This could lay the foundation for next generation Web applications and information systems that fully integrate legacy systems.

CommerceNet is continuing to extend the eCo framework through a series of pilot projects, NIST sponsored research efforts, partnerships with key technology companies as well as industry associations, and development of key enabling iMarket services.

In subsequent research endeavors, CommerceNet and key partners Veo Systems,

BusinessBots and Tesseract Systems have extended the concepts presented in this paper. Specifically, they have incorporated XML, an emerging technology that will dramatically accelerate the adoption of eCoSystems throughout the eCommerce industry. Additionally, CommerceNet has established an industry working group in conjunction with a number of industry standards bodies to

describe various standards in XML so they can be effectively integrated into an environment described in this document.

For additional information on CommerceNet's continuing efforts to extend the eCoSystem framework, please refer to additional research reports published by CommerceNet or the status reports created for NIST under the eCoSystem ATP grant – Interoperable Component-based Commerce

## **Appendix B – Index of CommerceNet Research Reports**

<b>Report Title/Subject</b>	<b>Date Published</b>
Copyright and the Internet: A Primer on Domestic and International Issues	1995
Designing Electronic Catalogs for Business Value: Results from the CommerceNet Pilot	July 26, 1996
CommerceNet CS2-D1 CommerceNet Case Study - Andersen Consulting	1996
CommerceNet CS7-D2 CyberSource Case Study - Software.net	January 1996
CommerceNet CS7-D2 CyberSource Case Study Software.net	January, 1996
CALIFORNIA SALES AND USE TAX ON SALES MADE OVER THE INTERNET By Hugh Goodwin	1995
Digital Signature Legislation by: Mark F. Radcliffe and Maureen S. Dorney	1995
Financial EDI over the Internet A pilot conducted by BankAmerica and Lawrence Livermore National Laboratory	1996
Electronics Industry Pilot Security Evaluation	July 8 1996
CommerceNet Electronics Industry Pilot (EIP) Electronic RFQs for the Electronics Industry Supply Chain	June 1995 to March 1996
EXPORT CONTROLS AND INTERNET COMMERCE	1996
Export of Cryptography	1996
CommerceNet Case Study: Internet Profiles	1996
CommerceNet Case Study: Internet Shopping Network	1996
What Are the Internet Based Advertising Models?	March 1996
"Who's on the Net and Who's Buying?"	Spring 1997
PRIVACY AND INTERNET COMMERCE	1996
Sales/Use Tax and Internet Commerce by Kaye Caldwell	1995
SELLING ON THE INTERNET: TERMS AND CONDITIONS FOR THE SALE OF GOODS By: Mark F. Radcliffe and Karen K. Willians	1995
SIG Presentations	May-June 1996

<b>Report Title/Subject</b>	<b>Date Published</b>
CommerceNet Smart Catalog Pilot Status Update Stanford's CIT and Hewlett-Packard's TMO Work Together on a Prototype For a Web-Based Virtual Catalog	1996
What is in Store for the Future of the Internet and Electronic Commerce	March 1996
Understanding the Effectiveness of Your WWW Site: Measurement Methods and Technology	1995
What Makes A World Class Business To Business Web Site	1995
Designing Electronic Catalogs for Business Value: Results of the CommerceNet Pilot	October 1995
Marketing Working Group Whitepapers and Case Studies	May-96
Creating interoperable catalogs from a wide variety of non-uniform suppliers of heterogeneous products CommerceNet Catalogs Research Portfolio Task Force	12-17-96
Interoperable Catalogs for the Digital Marketplace CommerceNet Catalogs Research Portfolio Task Force	12-17-96
Catalogs that build links between complimentary product suppliers CommerceNet Catalogs Research Portfolio Task Force	12-17-96
Creating interoperable catalogs from a wide variety of non-uniform suppliers of heterogeneous products CommerceNet and Patrick J. Gannon	12-17-96
Interoperable Catalogs Across Uniform Products from a variety of Suppliers CommerceNet Catalogs Research Portfolio Task Force	12-17-96
Government Procurement amendments to FAR 96-602 may hamper electronic commerce development	12-09-96
CommerceNet Position on the White House Framework for Global Electronic Commerce CommerceNet members and Kaye Caldwell	02-01-97
eTRUST: A Description of the eTRUST Model Andy Blackburn, Lori Fena and Susan Scott	02-07-97
Business Applications of Digital Authentication - Nine Business Strategies in Action CommerceNet	02-10-97
Selected Tax Policy Implications of Global Electronic Commerce - Overview Department of the Treasury Office of Tax Policy Department of the Treasury	02-10-97
Internet-Based Financial EDI: The Case of Bank of America and Lawrence Livermore National Laboratory Pilot	02-05-97
CommerceNet Sponsors EDI Over Internet Initiative; Digitally-Signed EDI Data is Exchanged Successfully for the First Time CommerceNet	01-27-97

<b>Report Title/Subject</b>	<b>Date Published</b>
The Value of Internet-Based Training for BBN Corporation Marian Bremer and Connie Cassarino	02-05-97
Public Key Infrastructures and "Digital Signature" Legislation: 10 Public Policy Questions Brad Biddle	March, 1997
Global Perspectives CommerceNet Global Partners	March 11, 1997
The Impact of IETF's EDI over Internet Recommendations on World- wide Electronic Commerce Rik Drummond	March 5, 1997
Update: Use Taxes and the Internet Kaye Caldwell	March 5, 1997
ANSI, Other Groups Working To Develop Standards For Information Superhighway - Today's BNA Kenneth Skilling	February 7, 1997
CommerceNet February Public Key Infrastructure Working Group CommerceNet	March, 1997
OECD Takes Stand Against Open Internet Commerce by Advocating New Tax Models for Transactions on the Internet CommerceNet	March, 1997
U.S. Companies Are Engaging in a Bidding War of High-Tech Talent	March 7, 1997
CommerceNet/Nielsen Reports Tremendous Increase in Internet Shopping CommerceNet	March 12, 1997
Catalogs for the Digital Marketplace CommerceNet	March, 1997
The Impact of Computers on the Global Economy Roxanne Googin	March 5, 1997