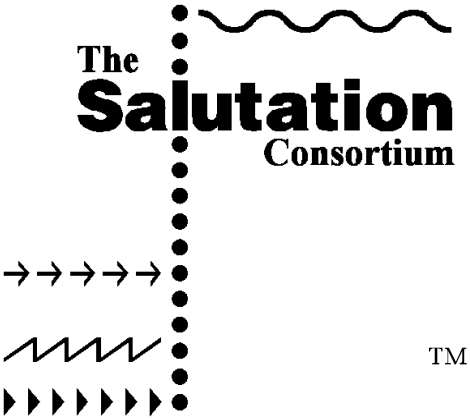
Market Trends and Salutation Opportunities Review



TM

It is recognized that customer demands and technology advances are creating an environment for dynamic networks. Networks will no longer be closed environments with controlled access. Wireless, Infrared, Internet, Intranet, extranet and expanded network interconnectivity will allow devices, applications, and services to enter and leave multiple networks at will. This creates the promise of broader information access for end users while increasing management and support concerns for the network administrator. A new business opportunity exists to exploit the untaped area of information interworking. **This paper discusses the market trends in networking and the roll that the Salutation Architecture plays in meeting these opportunities.**

Prepared by:

Robert A. Pascoe
Senior Technical Staff Consulting
10702 North 5240 West
Highland, UT 84003
801763-8216
rapper@ix.netcom.com

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Senior Technical Staff Consulting

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Overview

It is recognized that customer demands and technology advances are creating an environment for *dynamic networks*. Networks will no longer be closed environments with controlled access. Wireless, Infrared, Internet, Intranet, extranet and expanded network interconnectivity will allow devices, applications, and services to enter and leave multiple networks at will. This creates the promise of broader information access for end users while increasing management and support concerns for the network administrator. **The universal acceptance of TCP/IP, web browsers and other Internet technologies necessitates the automated discovery of the characteristics and capabilities of the networked devices, applications and services. Although this environment creates new access and control opportunities, OEM developers, application providers and VARs indicate there are several barriers to successfully exploiting network access within their product line.**

1. **Code Size and Complexity**: Current solutions, such as Novell's(tm) NEST(tm) SDK produces code sizes which strain OEM developer's environments. Additionally, developers specialize in their product focus, and are not familiar with networking concepts or the code required to gain access to it.
2. **Proprietary Prerequisites**: Although developers recognize value in providing solutions for Novell, IBM(tm) and other 'name brand' networks, they realize that this is only a segment of their total opportunity. Providing solutions which span proprietary environments broadens product marketability.
3. **Portability**: In a heterogeneous network, multiple operating systems may be encountered. Customers want applications and services that run in all the environments they encounter in their network. Customers what to tailor their system's structure and components to their needs, and not be limited to selection based on vendor requirements.
4. **Lack of Solutions**: While technologies like NEST, Salutation(tm) and HP's(tm) JetSend(tm) provide for low level connectivity and network management, there are few services and applications which take advantage of the broadening network environment.
5. **Lack of Resource Management**: Interconnection of resources is now possible. However, finding, registering, and utilizing these resources has not yet been achieved. Customers want a single interface to these management facilities, hiding the complexity of the underlying network management, service location and directory management.

No one is currently building products and solutions which overcome these barriers and exploit dynamic networks. New business opportunities exist which focus on these development issues by building solutions which:

- Exploit the fullness of interworking technologies by supporting the industry leaders, defacto standards, and industry standards
- Manage the diversity of networked device, applications and services encountered in dynamic network environments by brokering necessary data transforms, routing techniques, and user visualizations
- Build on an open, non-aligned resource management protocol architecture to interface to the array of interworking technologies
- Protect original investments and ensures partner participation through a non-proprietary, open environment supporting easy integration of third party solutions

Opportunity

A new business opportunity exists to exploit the untaped area of information interworking. This opportunity is focused on furthering information interchange in dynamic network environments through:

- **Exploiting existing and emerging network access and discovery technologies,**
- **Developing resource management facilities with open access for unique third party solutions, and**
- **Providing enabling components for the embedded and legacy markets.**

Vision

Ubiquitous network computing will provide knowledge workers access to information from the device-at-hand, eliminating the barriers imposed by pre-requisite devices, specific operating systems, and unique data type classifications. This allows the knowledge worker to select an information appliance based on personal preference, current location, and quality/quantity requirements. It uncouples the knowledge worker from specific applications and services that work in limited environments. The power of providing access to information from the device-at-hand will enable the knowledge worker immediate access to the information needed for business and personal decisions.

Mission

Provide information access and resource management from an array of networked devices, applications and services through support of open interworking technologies and standards such as Salutation.

Network-enable the worlds information base by exploiting innovative interworking technologies to manage networked resources and by building strategic relationships among industry leading OEMs, VARs and software developers.

Goals

Produce products that deliver real value to the knowledge worker

- Removing barriers imposed by proprietary implementations
- Providing information access from the device-at-hand

Product Direction and Control

Technology Overview

Several technologies are available to assist in 'harnessing' network dynamics. These include:

a. **Salutation**
- Open industry protocol for *network and operating system independent capabilities discovery, message management and job control*

b. JetSend
- HP owned device-to-device protocol that allows two devices to connect, negotiate data types, provide status updates, and exchange information.

c. **Autoroute**
- Novell owned protocol for *specifying routing and control information from 10 key key-pad*

d. **NEST**
- Novell technology for *embedding NetWare Client in devices*

e. **NDPS** (IDPS, Novell initiative)
- Novell initiative for a *distributed, application-layer print service for networked environments.*

f. **SNMP**
- Industry standard protocol designed to give a user the capability to *remotely manage a computer network* by polling and setting terminal values and monitoring network events management in a method that poses little stress on an existing network.

g. **DMI** (Intel initiative)
- Industry standard allowing *desktop computers, and their hardware and software products, and peripherals* to be manageable and intelligent, providing ability to communicate their system resource requirements and to coexist in a manageable

PC system.

h. **Java**(tm)
- a computing platform, upon which *applications stored in network server may be deployed without modification* to any computing platform contained in the network

j **Jini**(tm)
- a technology exploiting the Java platform, providing discover and device access through unique directory-like structure

i. **Other**
- Additionally, Standards bodies such as IETF and W3C are attempting to standardize interworking technologies.

Of these, Salutation is key to providing global, non-proprietary approaches to interworking.

Salutation Architecture

The Salutation Architecture is an emerging standard, providing a platform and network independent means for determining the capabilities of networked devices, applications and services. The Salutation Architecture also supports basic message management and job control techniques to support information transfer in heterogeneous environments. The Salutation Architecture defines a management facility called the Salutation Manager (SLM), which shields the application and service developer from direct manipulation of the Salutation protocols through a unique set of APIs. With a Salutation base, solution providers can offer users access to information from the device-at-hand, rather than from specialized devices designed for a specific data protocol. A Salutation base provides information to applications and services allowing adjustment of interactions for differing information access appliances. Optional components of the Salutation Architecture provide a common denominator for controlling the flow of information between uncommon networking protocols.

OEM Office Equipment and Handheld PC (HPC) manufacturers will enable their products with Salutation Architecture as it provides a single network-independent and platform-independent means for determining capabilities and managing data interchange. Today, the device manufacture is faced with several platform-specific means for doing this task, resulting in different releases of products for each of these environments, or creation of a single product to support all environments. Each of these options adds development cost. Device manufacturers see Salutation Architecture as a means to level the playing field in the emerging interworking environment.

Summary of Product Opportunities

Products exploiting the Salutation technologies are depicted in Figure 1 and are summarized below.

Interworking Enablers — *providing portable or proprietary, embeddable implementations of the Salutation Architecture for OEM device manufactures, network infrastructure providers and workstation environments.* Several untapped opportunities exists; providing a Java based implementation, expanding the current platform support (i.e., Windows CE) and defining/providing a minimum, 'server-only' or 'Lite' Salutation implementation.

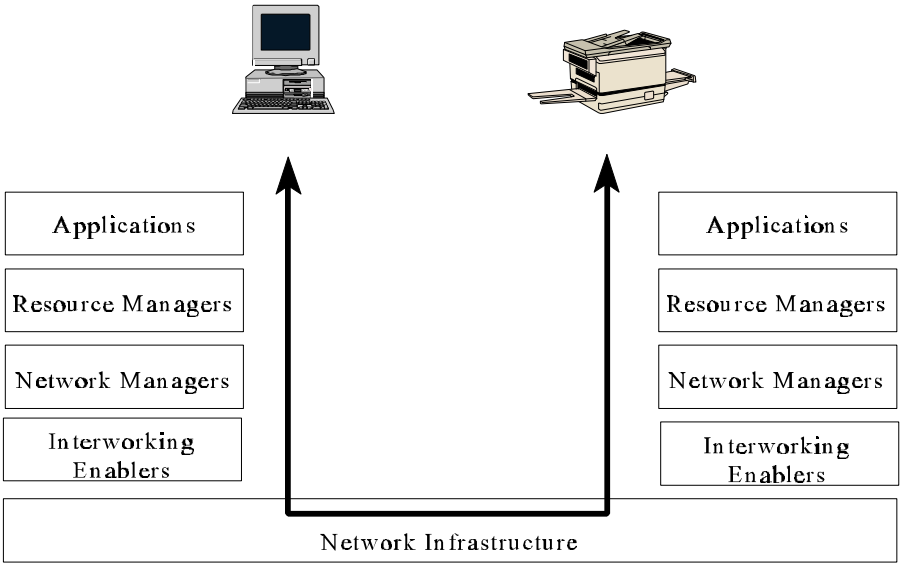

Figure 1: Areas of Opportunity

Network Managers — *providing discovery and network management facilities for embedded solutions such as Salutation enabled devices, applications, and services through existing network management facilities or new independent management facilities.* A significant opportunity exists in managing dynamic networks enabled by Internet, Intranet and Extranet infrastructures. Software products such as Port-of-Entry, Salutation directory bridges, e-mail couplers and routers may be developed for this segment.

Resource Managers — *manage networked resources by providing automated customization facilities to associate system services with network enabled devices,*

applications and services. Salutation provides only capability discovery technology and data format arbitration. There are currently no competitive or complimentary initiatives for using the information discovered. Brokering transform services is a primary opportunity in this segment. Designing open architected interfaces at this level provides third parties the ability to snap-in unique resources.

Applications — *providing automated modification of end user and application interactions based on the capabilities of available equipment, services and inter-networking characteristics.* An opportunity exists to enhance existing applications with emerging technologies, however a greater opportunity exists to create new application spaces which exploit these technologies.

Market Definition

Market Trends

Researchers at Xerox Corporation's Palo Alto Research Center describe the future office environment as one in which virtually all office tools have embedded computers. There will be intelligent notebooks, badges and badge readers, telephones, black/white boards, and so on. All devices will be able to communicate with each other and the corporate data base over a wireless link.

There is a growing mobile work force. The Yankee Group estimated that 25 million Americans already work away from their offices and another 13 million are away from their offices at least 20% of the time. Additionally, 9.2 million Americans work from the home today. The meaning of the term "at work" is shifting from where you are, to what you are doing.

Technology advancements are a driving force in the changing information environment. Technologies such as video conferencing, voice recognition, text-to-speech transforms, handheld personal computers, and wireless communications are already enabling a more productive and intelligent mobile work force. Future advances, such as the information super highway, interactive voice response systems, natural language interfaces, and expanding telephone functionality will continue to advance the linkage of the traditional office environment with the outside world, thus enhancing the productivity of the mobile information worker. The information worker desires direct, real-time contact between anybody, anytime, anywhere.

Proliferation of PCs, mass production of shrink-wrapped software, geometrical growth in types of computing and data sharing resources — all these converging forces mean that people are generating, receiving and manipulating unprecedented

amounts of information and products. And they want that information delivered faster and better than ever before, with ever more capable — and diversified — PCs as the tool of choice.

The overwhelming majority of business computer users are on the PC platform, with more than 170 million PCs installed around the world. An additional 10 million people are expected to start using PCs this year alone. By the end of this decade, 100 million PC units are expected to ship world-wide each year — more shipments than cars, radios and TVs.

Most significantly, few of these computing resources remain standalone. Information is meaningless unless connected and shared and the explosion in growth of networks, including online information networks, home users, small offices and remote connectivity by mobile PC users, stands testament to the compelling trend. Networks, growing at the rate of 10 million new PCs a year, are an indispensable aspect of doing business in the 1990s.

PCs are not the only online devices. Traditional stand alone devices such as copiers and fax machines are now available with network connections. A new class of device — called Multifunction Peripheral or MFPs — combine copying, faxing, scanning, printing, voice messaging and more. ARS, Inc., a marketing research firm specializing in PC and peripheral channels, estimates that the MFP market will triple by 2001.

Wireless and infrared technologies are enabling mobile communications with a new breed of handheld devices coming online. Here too, the multifunction trend is evident — phone, pager, and personal information manager are converging.

Michael Dertouzos, Director of the MIT Laboratory of Computer Sciences observes in his 1997 book, ***What Will Be***, "People value greatly the ability to form a community bound by the sharing of information and are willing to readily integrate new information-driven activities into their daily lives.

"Major players of the 1990s who keep extolling fiber optics, real-time video, virtual reality, multimedia, and electronic commerce will discover that none of this awesome stuff will be useful unless computers and software at diverse sites can 'understand' one another, ... so they can carry out the desired transactions among them."

Salutation Consortium Attempts to Addresses Market Trends

Recognizing the business opportunity presented by these shifts in customer markets, consumer expectations, and technology advances, industry leaders in the information technology field have developed the Salutation Architecture to provide a level playing field

for heterogeneous interoperability. The architecture is owned by the Salutation Consortium The Consortium's members are:

Adobe, Systems, Inc.,
Advanced Peripherals Technologies,
Axis Communications,
Brother Industries Ltd.,
Canon Inc.,
Cisco Systems, Inc.,
Eastman Kodak Company,
Fuji Xerox Co., Ltd.,
Fujitsu Limited,
Hewlett-Packard,
Hitachi, Ltd.,
Integrated Systems, Inc.,
International Business Machines,
Kobe Steel, Ltd.,
Komatsu, Ltd.,
Konica Corp.,
Matsushita Electric Industrial Co.,
Mita Industrial Co., Ltd.,
Mitsubishi Electric Corp.,
Murata Machinery, Ltd.,
Okamura Corp.,
Oki Data Corp.,
Ricoh Company, Ltd.,
RIOS Systems Co. Ltd.,
Sanyo Electric Co., Ltd. ,
Seiko Epson Corp.,
Sun Microsystems, Inc.
Sharp Corporation,
Toshiba Corporation,
Xerox Corporation

The lack of application and services supporting Salutation is an inhibitor to OEM product availability. Manufacturers see no value in exchanging capabilities between devices. Salutation's value is derived from having applications and services adjust to meet the capabilities of the device. To facilitate announcement, IBM formed a pilot system in their Yamato, Japan location, developing extensions to Lotus(tm) Notes(tm) and Tivioli's(tm) NetFinity(tm). To participate, OEMers were required to provide a shippable product.

This action has stimulated the OEM market leaders. Canon, Fuji-Xerox, IBM_Lotus, Mita, Murata, and Ricoh announced Salutation enabled product on May 6, 1997, with product upgrades announced in October of that same year. Traditionally, the smaller OEM manufacturers will follow these leaders in short order.

This environment provides an optimum market for a Salutation-based Resource Manager. The Resource Manager capitalizes on the Salutation technologies to locate, manage and communicate with networked devices, applications and services. Opportunities for partnering with the Consortium members for embeddable solutions and complimentary resource management exist.

Market Segmentation

Opportunities exist in three market segments as depicted in Figure 2. These segments are:

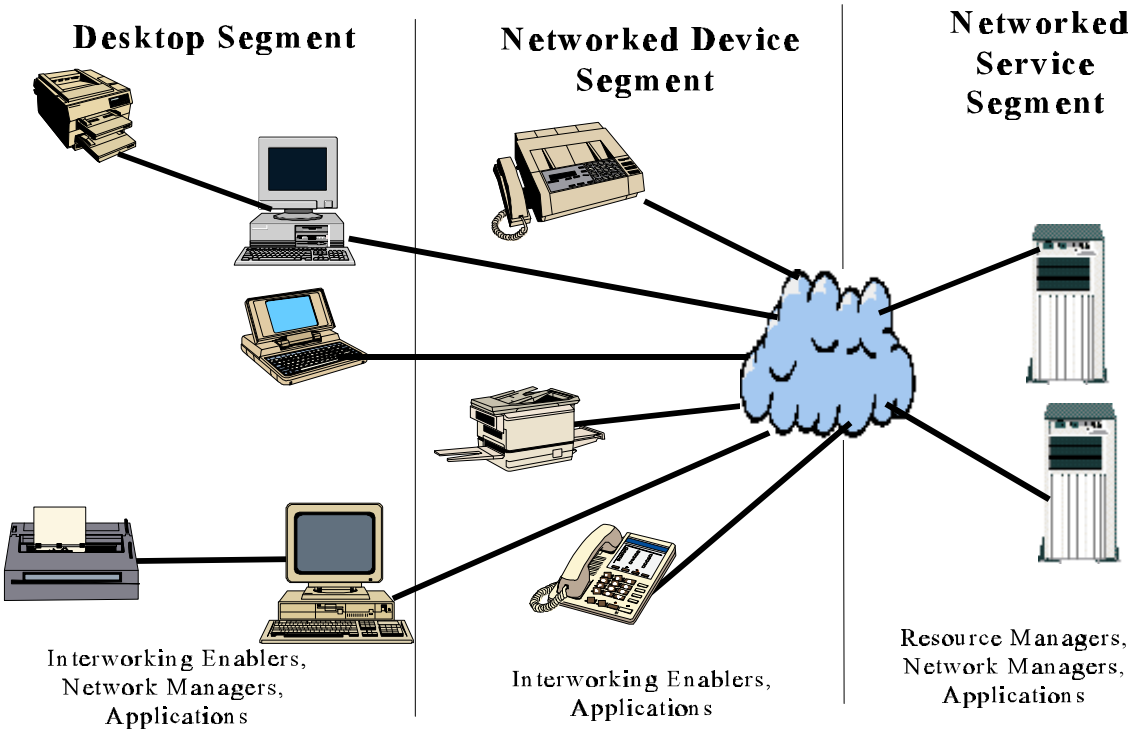

Figure 2: Market Segmentation

- **DeskTop Segment**: **This segment includes the PC (or Workstation) and its directly connected peripherals attached to a network through a Network Interface Card (NIC) or modem.** To be accessed by the network, the devices attached to the PC and the applications, and services installed on the PC , must be represented to the network through the PC's network connection. This segment provides an opportunity for the Port-of-Entry product. This product provides the interworking enablers and network managers necessary to represent the desktop and its resources the network. This segment also provides an opportunity for application developers to draw on the advantages of a Salutation enabled environment.

- **Networked Devices Segment**: **This segment includes office equipment and information appliances that are directly attached to the network without an intervening PC.** To be network attached, these devices must contain their own NIC card, modem, IR port, or other communication means. These devices represent themselves to the network . This segment provides an opportunity for embedded interworking enablers as well as applications supporting device management.

- **Networked Services Segment**: **This segment contains the network**

management, information servers and distributed applications, service brokers, and other applications which maintain, manipulate and distribute information among the desk tops and networked devices. This segment provides an opportunity for the network managers, resource managers, and application interface modules.

Market Entrants

Desk Top Segment

IBM

IBM provides an implementation of the Salutation Architecture called the IBM Salutation Manager. It is a complete instance of the architecture including both client and server support at the protocol and API levels. It is available on OS/2 v 2.1 (120K bytes, Windows v 3.1 (96K bytes), Windows 95 (400K bytes) and Windows NT (400K bytes). The target market for this product is workstations and network/application servers. The product was initially developed as a prototyping tool, allowing device manufacturers to emulate Salutation functionality by attaching to a workstation containing the IBM Salutation Manager. IBM now offers the product as an SDK.

IBM is a potential business partner, through joint development of the Salutation Manager Netware Loadable Module, user interfaces for their SLM, and Resource Manager integration with IBM's network products..

XtraWorX, LLC(tm)

The Salutation Consortium has contracted with XtraWorX, LLC to provide a XtraWorX Port-of-Entry product. This Windows-based product is developed on the IBM Salutation Manager. It is intended to represent your Windows 95 and NT environments to a network in Salutation architected terms. Complete with graphical user interface, the XtraWorX Port-of-Entry provides the developer with a total end-user control environment for specifying which local resources are assessable to other Salutation enabled devices, applications and services. The resulting software provides application developers a Window configurator for representing their products and other devices and services installed on the local platform in a Salutation network.

The XtraWorX Port-of-Entry runs on a Windows desktop and represent the capabilities of that environment to other applications, devices, and services via the Salutation Protocols. The Port-of-Entry provides a consistent user interface and

basic set of interactions with network peripherals, allowing software manufacturers to concentrate on their application without diverting resources to develop Salutation-specific technology.

XtraWorX, LLC is a potential business partner for extending the Port-of-Entry to meet specific application and platform requirements.

Network Device Segment

Interworking Enablers: Each of the following solutions provides a low level interface for determining device, application and service characteristics. None of these solutions provide resource management through a standards-based open application interface across multiple networking protocols.

IBM

IBM has prepared a version of the IBM Salutation Manager Toolkit targeted for the embedded operating System market. This usages is intended to be market differentiators for embedded product market. The Salutation Manager product is written in ANSI-C, which improves its portability.

IBM is a potential business partner, through joint development of the Salutation Manager Netware Loadable Module (NLM), user interfaces for their SLM, and Resource Manager integration with IBM's network products..

Kobe Steel

Kobelco Systems Corporation has announced a Salutation Manager and Software Developer's Toolkit, new developer tools for Windriver Systems' Tornado real-time operating system.

The Kobelco Salutation Manager conforms to the 2.0 version of the Salutation Architecture. The Toolkit contains a Basic Encoding Rule (BER) Tool, as well as a library of Functional Units. The Library provides Functional Units for Print, FaxDataSend, FaxData, DocStorage, Voice MessageStorage, and AddressBook.

Roll-your-own

As the Salutation Architecture is an open standard, any and all interested parties can obtain the specification and develop their own implementations. Being first to market with volume-based pricing and developer support will de-value the roll-your-own opportunity.

Salutation Enabled Devices: The following devices have been introduced supporting the Salutation protocol.

Canon, Inc. GP30F Salutation System
Canon has announced the Salutation System which combines a Canon GP30F digital copier (known as MEDIO 30F) with Salutation-enabled print control and scanning applications to create new network features for a corporate intranet environment based on Lotus Notes.

The scanning application, MEDIO OfficeScan for Salutation, stores documents scanned by the copier directly into Lotus Notes Server. The user can then view the documents from a Notes client or with a web browser. This function works in combination with IBM. (See below.) The print control application, MEDIO OfficeTerminal for Salutation, automatically notifies the user when a printing job is complete and ready for pickup. From a web browser, the user can determine what features and optional equipment are installed on the copier.

Fuji Xerox Network Able for Salutation
Fiji-Xerox has announced Network Able which combines the four functions of copying, faxing, printing and scanning on a network into one machine. The Network Able for Salutation makes full use of the Salutation Architecture for its network functions.

Mita Network Connection Kit for Notes
Mita has announced the Network Connection Kit for Notes as an option for the Antico 30 plain paper fax and the Antico 10 multifunction machine. With the kit installed, documents received from other Salutation-enabled devices can be distributed as email automatically to Notes clients on the network. This fax distributing function is also available from the fax using the Subaddress (SUB) signal as defined in ITU-T Recommendation T.30. Furthermore, users can use the Antico 30 as a network scanner/FAX/printer from a Notes DeskTop.

Muratec Fax Server V-710S
Muratec has announced the upcoming development of Fax Server System V-710S, which will conform to the Salutation Architecture. Fax server F-120/F-150 acts as a network fax modem, faxing documents created on a PC. A document received as a fax can be forwarded without an interim printing step, preserving document quality. Users can query the status of a sent fax and determine whether the document has been opened by the recipient.

Ricoh Imagio MF-P series digital copiers
Ricoh has announced a Salutation software package which allows the Imagio MF-P

digital copiers to be used as network printers/scanners in a Lotus Notes intranet environment. With Salutation support, each function of the Imagio copier (copy, fax, print, scan) can be addressed individually for maximum user convenience. A Lotus Notes user can, for instance, have the copier send a document or scanned image as Lotus Notes mail directly to another user's DeskTop. Ricoh provides supporting print server software and scanner server software.

Network Services Segment

IBM NuOffice V1.1.
A complete office environment based on Lotus Notes, NuOffice uses the Salutation Architecture to make copiers, facsimile machines, scanners and printers active players on a company network. IBM NuOffice adds intelligence to the scanning function of copiers and fax machines, permitting these devices to input information from paper documents into Lotus Notes. Using NuOffice, a user can email a scanned document directly from a fax machine or copier. This product also allows a user to receive fax information as email and to send email to fax machines

NuOffice enables users to operate office equipment from Lotus Notes, confirming device status and controlling such functions such as high speed printing, sorting and collating.

As the Lotus Notes environment is known to be third party friendly, NewOffice presents an excellent opportunity for application development.

IBM Japan NetCube for TME10 NetFinity V1.0.
Salutation-enabled software expands the functions of TME10 NetFinity to provide users with additional control of printers in a PC LAN environment. Users can confirm and change printer settings, control print jobs, and monitor paper supply.

Conclusion

The Salutation Architecture is a key technology needed to exploit the new business opportunities of information interchange in dynamic network environments. Opportunities exist is several segments, and although several important device and service manufacturers have introduced products exploiting Salutation, there is room for new information appliances and content providers to build the infrastructure for a community bound by the sharing of information.