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1.0   The Value of IBM and Interface Systems Relationship

Every company that uses SNA and TCP/IP has to create a connection between the two. Desktops throughout the organization have to have a reliable high-performance connection to the mainframe. These same users access documents on the mainframes and need to distribute them to a wide variety of destinations. Fax, E Mail, Web, and printing AFP documents on LAN printers are just a few of the choices.

The problem is…how can you accomplish both aims? Connecting to the mainframe from TCP/IP and yet making use of documents that have only been available from SNA seem to be incompatible goals.

The combination of Interface's Document Server and IBM eNetwork Communications Server for Windows NT makes these formerly unattainable goals attainable. The blend of these products makes any document on the mainframe available to any user on the network, whether they use SNA or TCP/IP.

Business value can be described as getting more return on existing investment. The combination of Document Server and CommServer gets you that increased return.

2.0   Overview of Business Issues

It is not uncommon for a corporation to have a very diverse population of counting equipment. For instance, a company might have two IBM mainframes, five Xerox printers, three IBM printers, 150 remote branches, 3,000 clients who want their documents faxed, 2,000 that prefer them to sent by e-mail and yet another 5,000 that still want them printed. The network is a mixture of NT, OS/2 and Unix. How can these print streams be integrated?

Managing disparate print streams has never been as complicated as it is today. Mergers and acquisitions, consolidations and systems upgrades, new technology and more information delivery options have combined to make document management more complex than ever before. In addition to the standards of AFP and Metacode, customers also need to print in-view information with Postscript, PCL and PDF.

And then there's the Internet. It's not enough to just print and mail documents – users now want them sent via e-mail or made available over the Web. Adapting your organization's legacy systems to accommodate these new modes of communication can present a very real challenge – especially when you consider that many of these systems were designed before the Internet even existed.

With so many different systems, implemented at different times, and designed to meet different business objectives, how can your organization ensure that all of its business information is available to all of its users, regardless of its format?

2.1 Business Value of Document Server

Mainframe systems store nearly 70% of today's business information – the information necessary to interact with remote offices, mail out orders and invoices, print monthly statements, and answer customer questions. But when business information is stored on systems that weren't designed with widespread accessibility in mind, servicing customers in the 24x7 world of today can be daunting.

And if making rigid mainframes more accessible weren't challenging enough, there are new requirements for delivering your vital business information. Rather than the standard print-and-mail methods, you can present monthly bills to consumers on-line, automatically fax requested information, and e-mail customer statements as PDF files via the Web.

But more options bring greater challenges. Is your data in the format required to accomplish your business goals? Whether your company's information is stored on a mainframe, mid-range system, or a client/server-based host, restructuring the data for the delivery method you've chosen is essential.

Interface Systems' **Document Server** bridges the gap between where your information *is,* where it needs to *go*, and how you've chosen it to get there. We're uniquely qualified to meet your electronic document needs. As experts in AFP, we understand the specific challenges that IBM-based businesses face. We also support Xerox print streams, PCL, and Postscript. And as leaders in document delivery options, we offer an array of output choices, such as AFP, Xerox Metacode, TIFF, PDF, Postscript, and PCL.

3.0 Overview of Technical Issues

3.1 What Interface Technologies Address the Technical Issues

Document Server is a Windows NT-based document delivery system. By converting AFP, Metacode, and several client/server-based print streams into an array of output formats, it offers you greater freedom for delivering the information vital to your business. You can view, print, archive, fax, and/or e-mail your documents regardless of origination – anywhere, at any time.

Document Server's flexibility allows you to meet specific application needs. You may have gigabytes of host-stored customer information that requires distribution to hundreds of branch offices, in several formats, across thousands of miles – quickly. Or maybe you require a solution that supports printing host documents to both Xerox and IBM printers. Then again, the Internet might be the vehicle you're looking for to provide greater access to your business documents. Document Server can solve your document delivery problems.

Operating Environment

Document Server runs on a Microsoft Windows NT Server. It can be attached to either a TCP/IP or an SNA network, depending on your particular application. To the application program, Document Server resembles another printer. As such, it accepts the incoming print job, processes the data (adding resources where applicable, and/or converting data formats), and directs the information to the appropriate output device (printer, e-mail address, fax number, Web, or archive system).

Communication Between Document Server and a Mainframe or an AS/400 Host

Document Server supports an SNA or a TCP/IP connection to your mainframe or AS/400 host. The type of connection you use depends on the type of print stream your application is sending:

If the print stream you are sending is:	Then connection between Document Server and the mainframe or AS/400 host is via:
IPDS	TCP/IP-brick or IBM Communications Server
SCS, DSC/DSE	IBM Communications Server
Metacode	TCP/IP

Data Output

Document Server can send print streams:

- NT print queues
- Novell print queues
- TCP/IP printers
- Xerox Metacode printers

Document Server accepts print streams for processing, translates them into other data types (where applicable), and delivers the information to output devices. The supported data types are shown in the following table:

Host type:	Document Server can accept these print streams:	Output Formats Supported:						
		PCL	TIFF	PDF	Postscript	ASCII	Metacode*	IPDS
Mainframe or AS/400	Non-IPDS (SCS, DSC, DSE)	X	X	X	X	X	X	
	AFPDS/IPDS	X	X	X	X		X	X
	Xerox Metacode	X	X	X	X		X	X
Client/Server-based PC	PCL		X	X	X		X	X
	Postscript	X	X	X	X		X	X
(either)	ASCII	X	X	X			X	

4.0   Document Server

4.1   Document Server Functionality

Document Server appears to the host as an SNA attached printer and receives print data from an existing application, parses that data and makes decisions on each individual page. If the required destination is a PCL printer, then Document Server will convert the incoming data to PCL add the TCP/IP address of the printer to its output file and automatically route the converted file to the printer.

If a fax gateway is the destination, then Document Server will extract an ID from the data, convert the file to CCITT3, add the fax number to the file and automatically pass it through to the fax gateway.

By adding the appropriate modules, Document Server can also automatically output to an e-mail system, a COLD system, CD-ROM device, Web Server or a workflow system. And because Document Server requires no host software changes, all of this is possible without changing the original application.

4.2   Document Server Architecture

Connectivity

Document Server supports all Mainframe and AS400 AFP and Xerox print environments. In SNA environments, it attaches via:
- Channel
- Token Ring
- Ethernet
- SDLC
- X-25

In host TCP/IP environments, Document Server emulates the IBM/I-Data TCP/IP "brick" protocol used by the I-Data 7913 and IBM 4033, NP 17, NP 24, and 3130, and supports FTP and LPR as well.

Data Streams Supported

Document Server accepts print streams for processing, translates them into other data types (where applicable), and delivers the information to output devices.

4.2.1 Data Stream Description

Mainframe and AS/400 Print Streams

This section covers the details of how Document Server supports the following mainframe or AS/400 print streams:

- SNA Character String (SCS/DSC/DSE)
- Advanced Function Printing (AFPDS/IPDS)
- Xerox Print Streams (Metacode/XLCDS/DJDE)

Refer to the following sections for information about the individual print streams.

SNA Character String

Important: *While we do not cover them in detail here, Document Server also supports two other non-IPDS print streams: DSC and DSE.*

SNA Character String (SCS) is an IBM protocol that defines control information for simple line print formatting. When an IBM mainframe or AS/400 host generates EBCDIC output, it uses SCS to transmit the data to a destination device. Document Server allows you to print your SCS mainframe documents on any printer within your Windows NT environment.

Through a host application program or DisplayWrite, a user generates an SCS print stream. These are text-only print streams, which are sent to Document Server via the IBM Communications Server. Document Server converts the print stream into the appropriate output format (if applicable), and sends the data to the destination device (figure 1).

Figure 1
How Document Server Handles SCS Print Streams

IBM Mainframe or AS/400

1. The mainframe or AS/400 host generates SCS print streams.

SNA

2. The print streams are sent to Document Server via an SNA connection.

IBM Communication Server

Document Server

3. Document Server converts the SCS print streams into the necessary format for delivery to the desired output device.

SCS

PCL

TIFF

PDF

PostScript

ASCII

Metacode
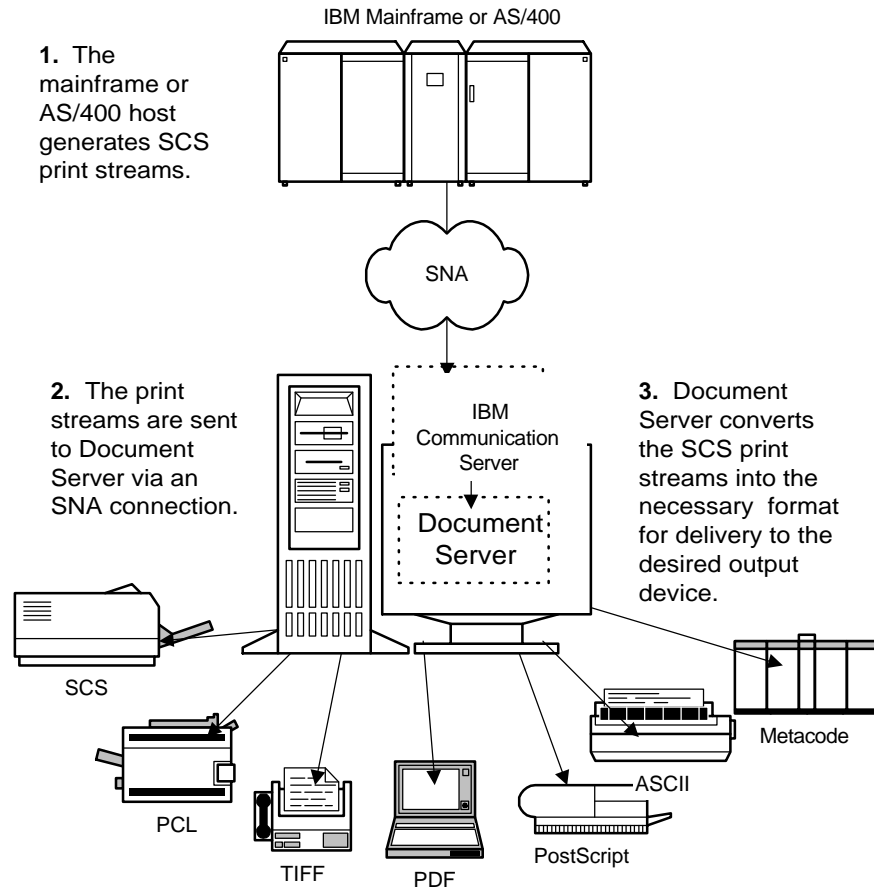
Document Server can accept SCS print streams and:	For:
pass them on unchanged	printing on SCS printers.
Convert them to PCL	printing on PCL laser printers.
Convert them to TIFF	faxing, viewing, or archiving.
Convert them to PDF	Viewing, emailing, or printing on non-PCL printers.
Convert them to Postscript	printing on postscript printers.
Convert them to ASCII	printing on an impact printer.
Convert them to Xerox Metacode	printing on Xerox Metacode printers.

IPDS/AFPDS

Document Server supports an Intelligent Print Data Stream (IPDS) and Advanced Function Printing Data Streams (AFPDS).

The architecture that controls the way in which IPDS print jobs are handled, from initial print request to final output, is called Advanced Function Printing (AFP).

AFP was originally designed by IBM for use on their mainframe and midrange systems to manage high-speed printers within a data center. AFP has expanded to include use with other platforms and is ideal for managing distributed printers across large enterprises. Because it allows the distribution of mainframe output to remote locations, AFP can help businesses become more efficient and competitive. Document Server brings AFP printing to the NT environment.

Through a host application program or DisplayWrite, a user generates an AFP print stream (AFPDS). This may include text, graphics, bar codes, or scanned images. This print stream is passed on to the Print Services Facility (PSF).

PSF is the AFP print driver. It manages the important functions for the printing process. One of its functions is to access the AFP resources. AFP resources are elements of a print job, such as fonts, images, overlays, signatures, and bar codes. They are pre-defined and re-used from one print job to the next.
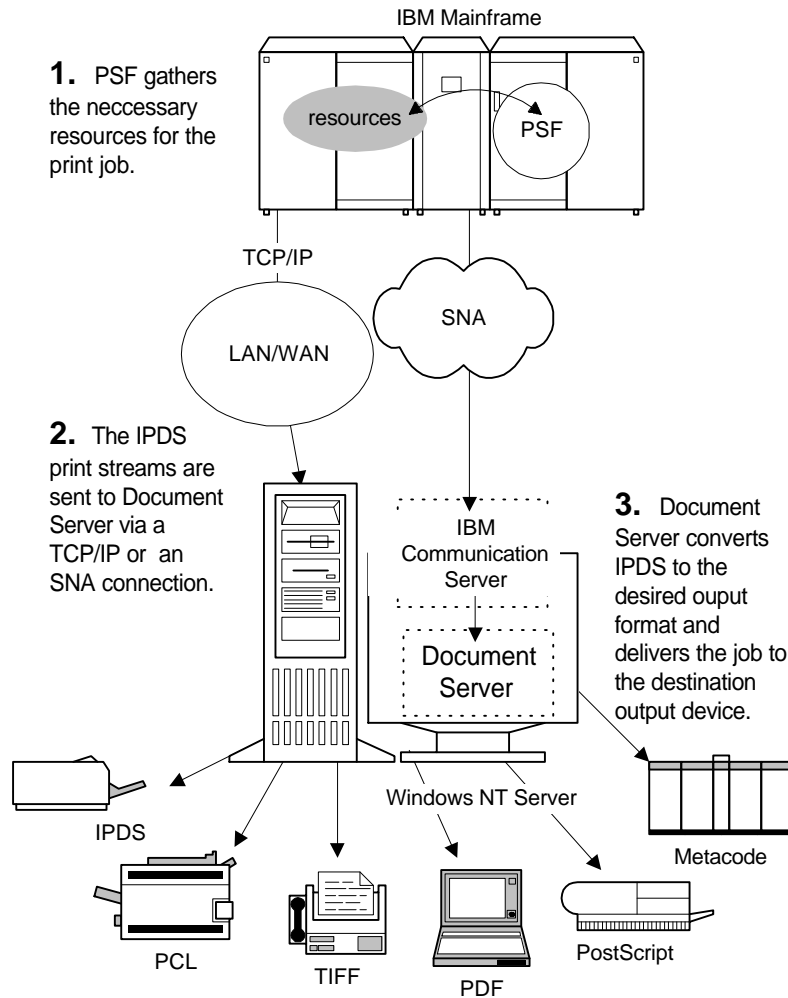
AFP resources are stored in libraries on the host, in databases at the server, or in the printer. Once PSF receives the appropriate resources for the job, it interacts with Document Server via a TCP/IP connection or the IBM Communications Server to verify its ability to handle the request. The PSF then:

- translates the AFPDS data into IPDS.
- manages and tracks resources, downloading all non-resident fonts and overlays to the target printer.
- tailors the IPDS print stream to the target printer (e.g. sends barcodes as IPDS or images).
- delivers the print stream to the printer and handles error recovery.

IPDS is a bi-directional SNA protocol that delivers print data and manages resources, handshaking, security, and error recovery. IPDS is both a page-description language and a printer-control protocol. When an IBM host (or AS/400) generates EBCDIC output, it uses IPDS to transmit the data to a destination device.

Document Server converts the print stream into the appropriate output format (if applicable), and sends the data to the destination device (figure 2).

Figure 2

1. PSF gathers the neccessary resources for the print job.

IBM Mainframe

resources → PSF

TCP/IP

LAN/WAN

SNA

2. The IPDS print streams are sent to Document Server via a TCP/IP or an SNA connection.

IBM Communication Server

Document Server

3. Document Server converts IPDS to the desired ouput format and delivers the job to the destination output device.

Windows NT Server

IPDS

PCL

TIFF

PDF

PostScript

Metacode

How Document Server Handles IPDS Print Streams

Document Server can accept IPDS/AFPDS print streams and:	For:
pass IPDS on unchanged	printing on IPDS printers.
convert them to PCL	printing on PCL laser printers.
convert them to TIFF	faxing, viewing, or archiving.
Convert them to PDF	Web viewing, emailing, or printing on non-PCL printers.
convert them to Postscript	printing on Postscript printers.
Convert them to Xerox Metacode	printing on Xerox Metacode printers.

AFP resources include:

Resource:	Description:
Form Definitions (FORMDEFS)	Defines the physical layout of the page. They specify: • the number of copies to be printed • whether the output is to be printed on both sides of the paper (duplex) or one side of the paper (simplex) • page orientation (portrait or landscape) • which overlays, if any, are to be used • the input bin from which the paper will be fed
Page Definitions (PAGE DEFS)	Control blocks that define the logical placement of data on a page. Line spacing and fonts can be specified.
Overlays	An electronic version of preprinted forms. An overlay consists of text and/or graphics and can be stored on the printer and re-used in different print jobs.
Page Segments	Pre-defined output that can be printed anywhere on the page. Typical uses of page segments include a company's logo and a user's signature. Most page segments are image. A page segment is similar to an overlay, except that it is stored without specified instructions for type style and position on the page. Instead, it is printed in the type style and location appropriate to the document at hand.
Fonts	Contain the raster patterns for all printable characters. A raster pattern is the way the printer puts dots on the paper in the same shape of a character.

When distributing host print jobs to remote locations, network performance is an important consideration. Host print jobs, especially their associated resources, clog up network throughput and create LAN and WAN congestion. Document Server alleviates much of this problem by caching AFP resources at the server.

Xerox Metacode

Document Server supports the Xerox Metacode print streams. Metacode is an All Points Addressable Xerox Print stream. An ASCII print language, Metacode allows electronic forms and images to be added to your documents for printing.

Important: *Note that while we do not cover them in detail here, Document Server also supports Xerox Line Conditioned Print Streams (LCDS) and Dynamic Job Descriptor Entries (DJDE). Document Server does **not** support XES print streams.*

Unlike AFP, which follows a host-based resource management scheme, the Xerox print model follows a printer-based resource management scheme. Therefore, it is necessary to copy the resources (fonts, forms, logos, images, and JSLs) from an existing Xerox printer to the Windows NT machine running Document Server in order to convert an incoming print stream to Metacode.

Xerox resources are elements of a print job, such as fonts, images, overlays, signatures, and bar codes. They are pre-defined and re-used from one print job to the next.

The following table lists the Xerox resources you must copy from the printer:

Resource:	Description:
JSL	Contains a set of commands that determine the aspects of the print job, including: • input hopper and the paper used • orientation port used • whether it is a simplex or duplex job • the fonts, forms, logos, and images that will be printed. **Important:** JSLs must be compiled on Document Server.
Fonts	Bitmap images that determine character size and font type.
Logos	Color (bitmap) images.
Images	Bitmaps.
Forms	An electronic version of preprinted forms. A form consists of text and/or graphics and can be stored on the printer and re-used in different print jobs.

To the host generating the Metacode print stream, Document Server looks and acts like a Xerox printer. It accepts the host output (via a TCP/IP connection) and processes the print streams for delivery to the destination device (figure 3).

Figure 3
How Document Server Handles Metacode Print Streams
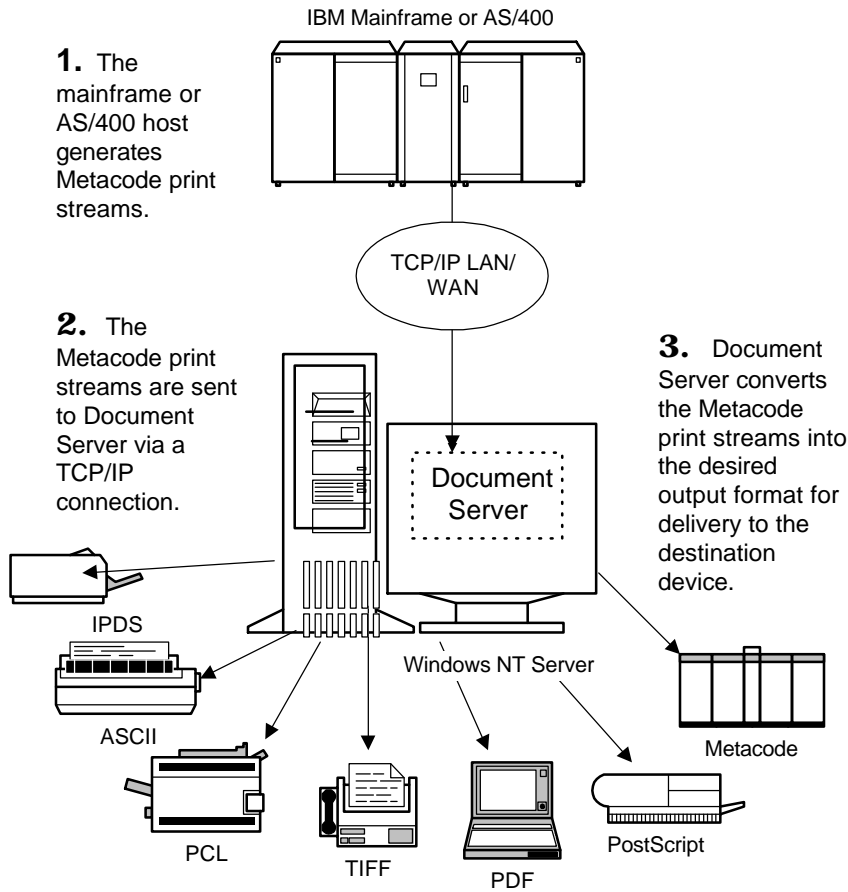
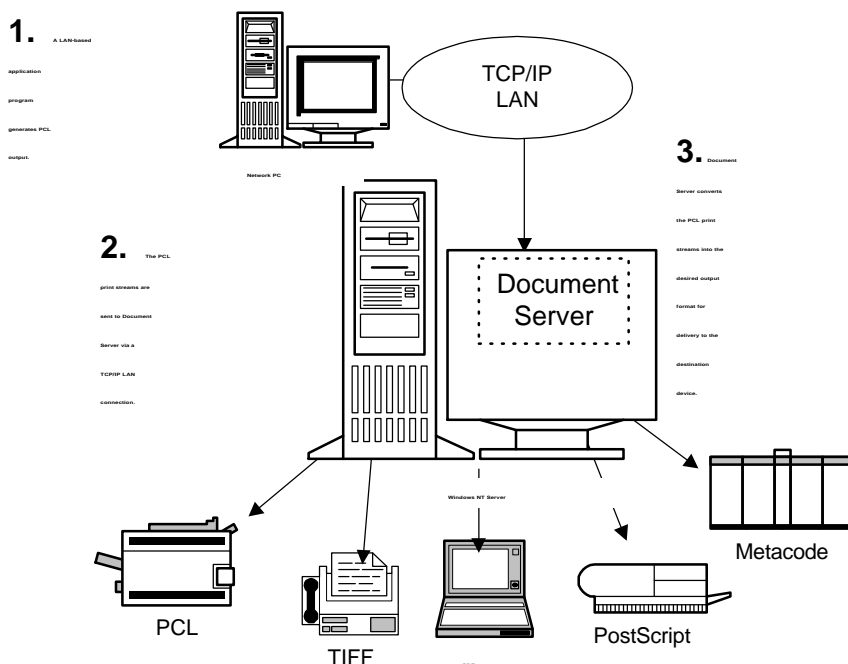| Document Server can accept Metacode print streams and:	For:
Pass them on unchanged	printing on Xerox Metacode printers.
Convert them to PCL	printing on PCL laser printers.
Convert them to TIFF	faxing, viewing, or archiving.
Convert them to PDF	Web viewing, emailing, or printing on non-PCL printers.
Convert them to Postscript	printing on Postscript printers.
Convert them to IPDS	printing on IPDS printers.
Convert them to ASCII	printing on an impact printer.

Client/Server Print Streams

This section covers the details of how Document Server supports PCL and Postscript.

PCL

Developed by Hewlett-Packard for printing on laser printers, PCL (Printer Control Language) consists of a set of commands that tell a printer (and print driver) how to print a document. PCL5e is the latest version, which is used on HP LaserJet printers. PCL5e supports advanced printing features, like vector graphics and scalable fonts; it is the first version of PCL that supports bi-directional communication between the printer and the computer.

PCL print streams can be routed to Document Server for processing and delivery to the destination device (figure 4).

Figure 4
How Document Server Handles PCL Print Streams

1. A LAN-based application program generates PCL output.

TCP/IP LAN

Network PC

3. Document Server converts the PCL print streams into the desired output format for delivery to the destination device.

2. The PCL print streams are sent to Document Server via a TCP/IP LAN connection.

Document Server

Windows NT Server
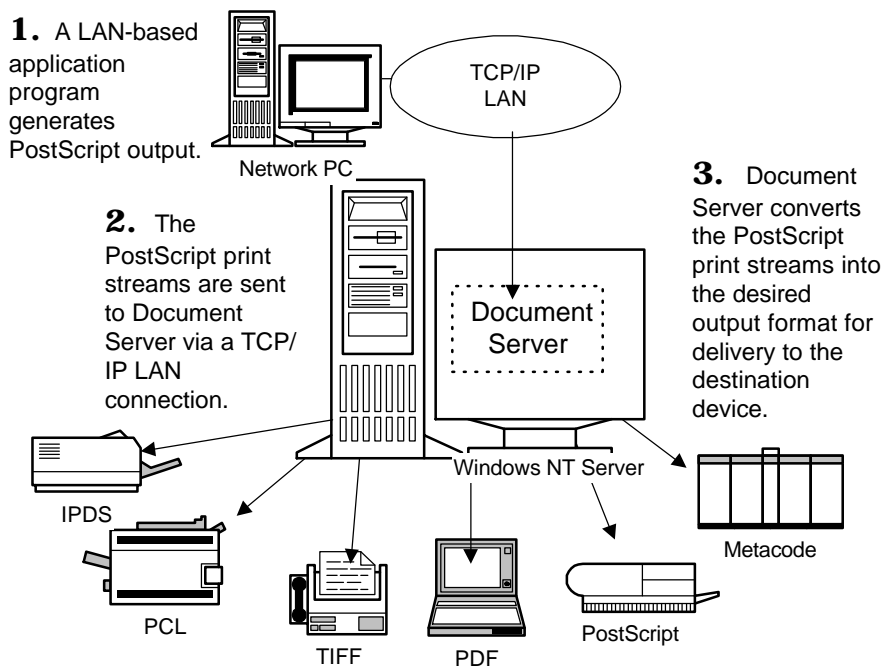
PCL

TIFF

PDF

PostScript

Metacode

Document Server can accept PCL print streams and:	For:
pass them on unchanged	printing on PCL laser printers.
Convert them to TIFF	faxing, viewing, or archiving.
Convert them to PDF	Web viewing, emailing, or printing on non-PCL printers.
Convert them to Postscript	printing on Postscript printers.
Convert them to IPDS	printing on an IPDS printer.
Convert them to Xerox Metacode	printing on Xerox Metacode printers

Postscript

Postscript is a sophisticated page description language developed by Adobe for high-quality printing on laser printers and other high-resolution output devices. Postscript is capable of describing the entire appearance of a richly formatted page, including layout, fonts, graphics, and scanned images.

Once a machine generates Postscript output, it can be routed to the Microsoft NT Server running Document Server, which processes it for delivery to the destination device (figure 5).

Figure 5
How Document Server Handles Postscript Print Streams

1. A LAN-based application program generates PostScript output.

Network PC

TCP/IP LAN

2. The PostScript print streams are sent to Document Server via a TCP/IP LAN connection.

Document Server

3. Document Server converts the PostScript print streams into the desired output format for delivery to the destination device.

Windows NT Server

IPDS

PCL

TIFF

PDF

PostScript

Metacode

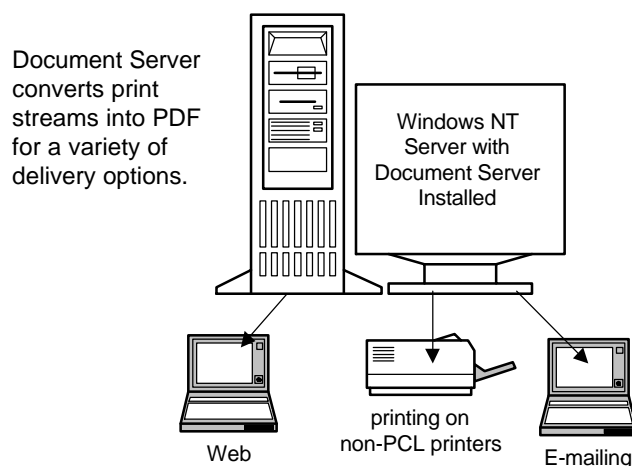| Document Server can accept Postscript print streams and:	For:
pass them on unchanged	printing on Postscript printers.
convert them to PCL	printing on PCL laser printers.
convert them to TIFF	faxing, viewing, or archiving.
convert them to PDF	Web viewing, emailing, or printing on non-PCL printers.
convert them to IPDS	printing on an IPDS printer.
convert them to Xerox Metacode	printing on Xerox Metacode printers.

PDF

In addition to the output formats covered earlier, Document Server also converts print streams into PDF.

PDF (Portable Data Format) is a file format created by Adobe systems. It allows you to transfer richly formatted documents (containing text and graphics) between different types of output devices, without losing the original formatting.

Document Server can convert the following print streams into PDF for delivery to any PDF-compatible output device (figure 6):

- SNA Character String (SCS)
- Advanced Function Printing Print streams (AFPDS and IPDS)
- Xerox Print streams (XLCDS and Metacode)
- Printer Control Language (PCL)
- Postscript
- ASCII

Figure 6
Document Server Can Convert Print Streams into PDF

Document Server converts print streams into PDF for a variety of delivery options.

Windows NT Server with Document Server Installed

Web

printing on non-PCL printers

E-mailing

Important: *The ability to convert to PDF enables you to route the output to any printer or device that has a Windowsâ print driver. Once the print stream is converted to PDF, it is routed transparently through the Acrobat Readerâ to the desired output device. While the Reader software is not opened during this process, it must be present. As long as the appropriate printer driver exists, you can direct Document Server's PDF output to dot matrix, line, and Postscript printers, as well as fax machines and other devices.*

## 4.2.2 Tailoring Document Server to Your Applications

Document Server can have a batch print job automatically sub-divided so that some documents are faxed or e-mailed, while others are printed. Or certain pages can be left out of a large print run altogether. What if you were able to automatically search each document's header page, associate it with the address of its intended recipient, and fax or e-mail it to him rather than printing it at all?

These are just a few examples in which you can further customize Document Server to meet the specific challenges you face in delivering your business documents. Document Server is designed with the ability to detect specific information in a given print stream, act upon it in the way in which you specify, and pass it on to be delivered as instructed. It watches over the entire process of ingesting the incoming print stream.

How It Works

The incoming print stream may contain "triggers". Triggers are typically specific character strings in specific locations on the page or test string following key words or located on non-printable boundaries or non-printable characters. If a trigger is found, Document Server checks the information against a list of events in the *configuration file*. Each event reported is verified, as a string, against all other event strings contained in the file. When a match is found, the matching configuration line's actions are invoked, and the events execute. An associated action might be "close previous print file and start a new one" (figure 7).

Figure 7
A page number might trigger to close current print file and start a new one.

To Dispatch Batch Job
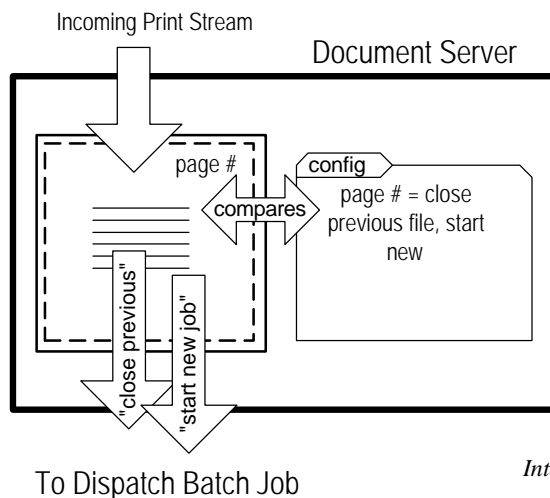
Another event might be "extract the next 7 digits and fax this out". Document Server can extract the appropriate information from the job (like an ID number, or an individual name), and pass it on to the Dispatch Batch Job with the notification to "associate this job with a fax number". The Dispatch Batch Job will then refer to its internal routing table to compare the extracted information to a list of possible fax numbers. When a match is found, the document is routed to the appropriate destination fax number (figure 8).

Figure 8
Document Server Notifies the Dispatch Batch Job to associate this Job with a Fax Machine
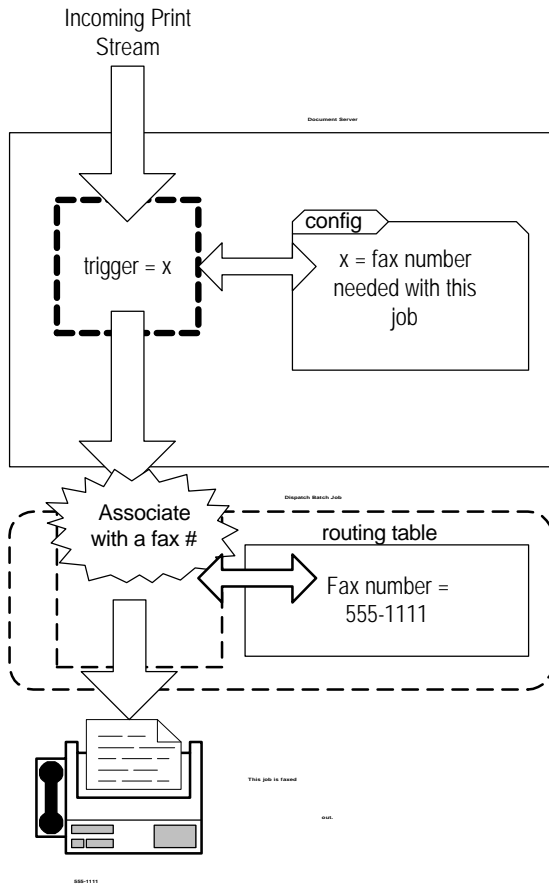
This feature can be used for variety of applications. You can split up single print jobs for a variety of destination devices, faxing some documents, while e-mailing or printing others. You can extract key information from print jobs destined for archival or some sort or information needed for later routing of printouts. You also have a variety of choices for the type of information extracted. Information like the page count, the user ID, or whether there are duplex pages.

4.3 IBM eNetwork Communications Server for Windows NT Product Architecture

4.3.1 Network Integration

Is your corporate network really a network? Do your users have access to applications, data, and people— regardless of where they reside? Probably not. Various local area networks (LANs), mergers, consolidations, and changes to organizational structure have resulted in diversified networks—creating chaos.

Do the demands of adding more people and more applications to your network also have you wondering about availability? If you can't access the application, when you need it, how can you remain competitive? You need a true network.

IBM eNetwork Communications Server for Windows NT integrates a variety of LANs and wide area networks (WANs) so you can add new applications without updating your network, disrupting your current network, or constructing parallel networks. You can focus on critical business issues, without being impeded by network design or application dependencies.

The eNetwork Communications Server for Windows NT meets the challenge of today's diverse network computing environment—intranet and Internet access, and collaborative computing. You can now connect people to the information they need, when they need it.

IBM Commserver/NT Network Architecture

4.3.2 Flexible Deployment Options

eNetwork Communications Server for Windows NT supports a wide variety of connectivity options. On the back-end, support is available for communications over 802.2, SDLC, X.25, Async and Auto Sync Com Port, Channel, DLSw, Frame Relay, and ATM LAN to IBM mainframes and AS/400 hosts. eNetwork Communications Server for Windows NT also incorporates the full APPN protocol, including end node and network node (for reduced configuration requirements), dynamic directory searches, route calculation capabilities, and intermediate session routing. Support for twinax connections to AS/400s is also included.

eNetwork Communications Server for Windows NT provides API support for the following types of SNA and TCP/IP applications:

> **SNA-based 3270 or 5250 emulators**, such as IBM Personal Communications products which run on OS/2, Windows 3.1, Windows 95 and Windows NT, as well as virtually any emulator product from other vendors

TCP/IP-based 3270 emulators, conforming to the TN3270 and TN3270E standards, are available in the IBM Personal Communications products and from many other vendors

SNA gateways, including any workstation gateway that uses SNA for its upstream connection, including all eNetwork Communication Servers, CS/AIX, CS/2, eNetwork Communications Server for Windows NT, CS/UnixWare 7, and NetWare for SAA, Communications Manager for OS/2 (CM/2), the IBM 3174 and other SNA terminal controllers

Any SNA client/server application, together with application servers such as the IBM Transaction Server and Database Servers, TCP/IP client/server applications, including Telnet, FTP, NFS, and many others

Host On-Demand for access to host information from a browser or intranet.

For SNA API clients (split-stack), eNetwork Communications Server for Windows NT for Windows NT allows TCP/IP and IPX/SPX clients to access SNA APIs, providing access to SNA applications without installing an SNA stack on the client. Almost all configuration and processing is done on the server; reducing DASD, memory, and processor demands on the client. SNA API clients provide support for CPI-C, APPC, EHNAPPC, and LUA request unit interface (RUI/SLI) API interfaces and are packaged with the eNetwork Communications Server for Windows NT. Limited API support is also provided for Network Operator Facility, Management Services, and Common Services.

The TN3270E server enables SNA/APPN connectivity to the host and TCP/IP connectivity to the clients. TCP/IP connections are mapped to SNA sessions and passed through the 3270 datastream. Since the TCP/IP connections are mapped to SNA sessions, SNA/APPN can be utilized on the host side of the network with no TCP/IP required on the mainframe. The 3270 datastream that comes out of the TN3270 client can be transported using Dependent LU Requester (DLUR). By using DLUR/DLUS, the full benefit of APPN networking is realized, even for emulator sessions. Also, High-Performance Routing (HPR) can be used from the eNetwork Communications Server for Windows NT for Windows NT TN3270E server all the way to the mainframe, delivering non-disruptive session routing. In addition, TN3270E server supports IP address filtering which enhances security, administration, and usability.

eNetwork Communications Server for Windows NT also supports the Host On-Demand emulator. This Java-based emulator solution provides fast and easy access to host data from the Internet or intranets. Host On-Demand incorporates industry standard Telnet 3270, Telnet 5250, and VT protocols and provides a low-cost solution for Web or intranet users who need occasional access to host information. Users of any Java-based browser can use the feature with the click of a mouse, without additional hardware or programming.

Deployment Options Summary

Customers will find that eNetwork Communications Server for Window NT, through the incorporation of Peer-to-Peer Networking (APPN), DLUR, High-Performance Routing (HPR), and SNA data compression technologies, delivers significant added value through increased performance, high network availability, improved bandwidth utilization, and enhanced network management for their SNA applications.

Furthermore, eNetwork Communications Server for Windows NT and its corresponding Personal Communications Family of clients simplifies the customer's purchasing decision by providing one-stop shopping their communications needs; reducing support requirements. It supports Internet and intranet access to host data with the Host On-Demand product, at no additional cost to the customer.

4.3.3   Multiprotocol Networking

eNetwork Communications Server for Windows NT's multiprotocol support is based on the industry standard Multiprotocol Transport Networking Technology (MPTN), which provides maximum flexibility for mixing communications applications and protocols. Both SNA over TCP/IP access node and gateway and Sockets over SNA access node and gateway are supported, which allows the following implementations:

- **SNA over TCP/IP access node** allows SNA applications residing on a TCP/IP network to communicate. This function supports independent LU 6.2 and dependent LU 0,1,2,3 or 6.2 with or without dependent LU requester (DLUR).

- **SNA over TCP/IP gateway** extends the reach of SNA applications by allowing SNA applications in an SNA network to communicate with SNA applications in a TCP/IP network. This feature supports independent LU 6.2 sessions.

- **Sockets over SNA access node** enables TCP/IP application programs using the WinSock 1.1 and WinSock 2.0 socket interface to communicate over an SNA network.

- **Sockets over SNA gateway** enables sockets applications in SNA and TCP/IP networks to communicate. This gateway is often deployed to connect isolated TCP/IP networks using an SNA backbone network.

A key distinguishing feature of these capabilities, exclusive to eNetwork Communications Server for Windows NT, is the ability to run Sockets applications over an SNA network using traffic prioritization. This feature, supported in LAN-LAN, LAN-host, and LAN-Internet implementations, ensures that high priority applications receive priority.

Multiprotocol Networking Summary

With eNetwork Communications Server for Windows NT, customers are afforded flexibility in the deployment of backbone networks, interconnected networks (including the Internet) and applications. eNetwork Communications Server for Windows NT eliminates the need for customers to run parallel networks by allowing Sockets applications to run over SNA networks and SNA applications to run over TCP/IP networks. SNA applications such as CICS, IMS, DB2, DDCS, emulator and printer programs can run over SNA and TCP/IP. TCP/IP sockets applications such as FTP, SAP R/3, SNMP, Lotus Notes, and Web browsers can run over an SNA backbone.

These implementations incorporate an open standard interface that is supported by client access vendors like WRQ, Eicon Technology, Wall Data and NetManage. The eNetwork Communications Server for Windows NT gateway can also connect two or more unlike networks and allow them to function as a single network.

This flexibility offers a number of advantages:

- A wider choice of new applications
- Reduced operational costs through network consolidation
- Easier application development and deployment via protocol independent API
- End-to-end network management

As a result, eNetwork Communications Server for Windows NT simplifies application selection, network design, and network operations while helping reduce overall network costs.

5.0 IBM and eNetwork Communications Server for Windows NT Statement on Business Computing Market

5.1 IBM's Vision of Business Computing

The challenge to business today is to develop an extensible and shareable Host Integration infrastructure that will integrate multiple products. The need is for one product set that will deliver access from any environment tailored to that environment: SNA, TCP/IP, Intranet, Extranet and the Internet.

IBM has solved that problem with the IBM Host Integration Solution! Enterprise access is now extended to new sources of information. We are redefining the host. A host now means any back-end system with applications or data (3270, 5250, VT, ODBC Databases, ActiveX and Java Apps). All products can now be tested, developed and integrated in the same software lab. Businesses need an Open System Architecture that

will provide support for all major client and server platforms. Host Integration Solution delivers that capability. It supports all major Servers - SCO UnixWare 7, AIX, OS/2, OS/390, NT, and all major Clients - Windows 3.1, 95, NT, OS/2 and UnixWare7. IBM has enabled network integration with Multiprotocol Transport Networking; SNA over IP and IP over SNA. All solutions are native to user needs.

Host Integration Solutions will maximize return on IT and business investments. It will enable new uses for existing applications and data. You can combine existing information sources into composite applications for new users and utilize existing information in new and exciting ways. This solution will enable you to move legacy data to a new front end like Lotus Notes and you will then be able to distribute that data to new locations. To achieve all of this requires no Application Rewrite! Existing applications and data sources remain untouched and now new applications can be created from old data stores. This will create immediate returns on your business applications! Your applications can be "Webified" in less then a week as there is no long development cycle. This solution has the lowest TCO (total cost of ownership) in the industry!

Another challenge today is to deliver to the Market, Integrated and Secure end to end solutions that are Security Enabled. IBM's Host Integration Solution provides Session level encryption (SLE) and is supported in both clients and servers. Access control and VPN is provided by the IBM Firewall product that works with all existing host security systems in the market today. Host Integration Solution helps you to establish a powerful Application Development Infrastructure with Cross Network Environment and an open industry API set that includes Host Access Class Library (HACL) and an object oriented API set across platforms. The use of "Java Beans" decreases development expense through re-use and makes the development of new applications easy.

The differentiators for IBM Host Integration Solution are that it is the only solution in the market that addresses all network environments: SNA, TCP/IP, Intranet, Extranet and Internet access with common development API's across all environments. This allows for the integration of all data sources into new applications, Web - HTML and Java emulation. IBM delivers both Web to Host technology with traditional network access technology in a single package and it is tested together to work across all network environments. This key differentiator allows customers to migrate without additional purchase. It also connects users to more Host applications and data then any other solution: 3270, 5250, VT, ODBC databases, ActiveX and Java applications.

6.0 IBM CS/NT's Complete Technology Solutions

6.1 Understanding eNetwork Family

eNetwork Software offers a full range of client and server networking software, providing the availability, scalability, security, performance, and open standards you need to support your information access, collaboration, and electronic commerce applications.

eNetwork Software is focused on giving you cost-effective solutions for:

Universal communication

IBM eNetwork Software offers end-to-end connectivity for accessing applications and data on your local or wide area network, host, corporate intranet and the Internet from any location. With eNetwork Software, you can leverage the value of information by more efficiently placing it in the hands of those who need it, when they need it. The eNetwork Software solution for host integration provides everything you need to enable secure access for every user, regardless of platform or network environment, to your mission-critical business systems.

Mobile communication

IBM eNetwork Software leverages your existing applications and data by connecting your mobile workforce to the enterprise. eNetwork Software addresses the unique requirements of mobile employees by supporting continuous and disconnected computing environments, making information available when and where it's needed. The eNetwork Software solution mobile enablement offers a platform to connect mobile workers to their company's network wirelessly using laptop computers.

Network computing

Through IBM eNetwork Software, you get a networking infrastructure that lets you realize the cost-saving benefits of network computing. As new demands are placed on networks by "thin clients" and Java-based applications, eNetwork Software solutions ensure effective use of your network resources. IBM eNetwork Host On-Demand gives you one-click secure access to your mission-critical data, and WorkSpace On-Demand is the first network computing operating system for the PC.

6.2 Other NT Suite products

The IBM Suite for Windows NT consists of:

Intel LANDesk Management Suite, Version 6.1: an integrated solution for managing Intel architecture-based networked PCs and servers. LANDesk provides remote control of all client PCs on a local-area network (LAN) from a single point of administration. LANDesk's management applications work together to help maximize information technology staff productivity and increase system uptime, even in mixed network environments.

Lotus Domino: an application and messaging server with an integrated set of services that enable users to easily create secure, interactive business solutions for the Internet, corporate intranets and extranets. With Domino, developers can rapidly build, deploy, and manage applications that help co-workers, partners, and customers collaborate and

coordinate critical business activities on-line. Domino supports a variety of clients and devices, including Web browsers and Lotus Notes clients.

IBM DB2 Universal Database: The industry's first multimedia, Web-ready relational database management system. It enables customers to:
- Access any amount of data without the traditional restraints on data sources and locations
- Perform a range of tasks, from decision support to business transactions
- Work with text, image, audio and video data types
- Start managing data quickly and easily
- Run the same software across desktops, workgroups and enterprises.

IBM eNetwork Communications Server for Windows NT: Helps businesses leverage current networking investments integrating I/T networks with new Internet and e-business applications. IBM eNetwork Communications Server for Windows NT connects users to applications, even when platforms and networks are diverse, with proven reliability, open standards, scalability and security.

IBM ADSTAR Distributed Storage Manager (ADSM): An enterprise storage management solution for safeguarding mission-critical data. ADSM automates the backup, restore and archive of critical data, and provides disaster recovery services for managing and protecting data across the network. A powerful installation program that speeds both express and custom installations. This integrated tool gives a consistent look and feel to installations; monitors disk space; checks for prerequisite software requirements; and enables component installations among multiple servers.

A sample Intranet Sales Manager application that shows how suite components, such as Domino and DB2, work together and provides the building blocks for creating e-business applications. This sample application, unique to the IBM Suite for Windows NT, uses an IBM VisualAge for Java application to retrieve sales data and chart the data using different views within a browser. The application also completes the sales process by generating invoices and storing updated information in the database.

The IBM Enterprise Suite for Windows NT augments the components in the IBM Suite for Windows NT with:

IBM TXSeries: Gives solution developers flexible environment for building highly secure, reliable transactional applications that are based on industry standards and incorporate leading technologies such as Java and distributed objects. TXSeries handles 50 percent of Web-based stock trades worldwide.

IBM MQSeries: An open, scaleable messaging and information backbone that enables organizations to transact complex business processes across heterogeneous hardware and more than 25 major operating system platforms, more than any other messaging software on the market. It provides a bridge between the Internet and core business applications.

IBM DB2 Connect: Provides extremely fast and robust connectivity between Windows

NT desktops and data stored in DB2 and other databases.

Tivoli LAN Access software: Ships with the IBM Enterprise Suite for Windows NT, integrates LAN management tools with Tivoli management software.

The IBM Small Business Suite for Windows NT consists of:

Lotus Domino Intranet Starter Pack: Provides a set of business solutions designed for any growing company looking to leverage an intranet to foster internal and external e-mail communication, internal project collaboration, and the Internet to attract and engage customers. It also includes a complete Internet e-mail system featuring group calendaring and scheduling, faxing, as well as a set of 12 ready-to-work business applications.

IBM DB2 Universal Database

A simple install program, which streamlines the setup and installation of server and client applications.

Product Differences

The IBM Suites for Windows NT bring together key middleware products from IBM to provide the essential application server platform on the Windows NT operating system. When comparing the individual IBM product offerings to the components in the IBM Suites for Windows NT the following are not included: Domino Go, Lotus Bean Machine, MicroSoft Internet Explorer, Domino Chat, DB2 Portfolio, Lotus Approach.

Technical and Marketing Support Services

The new IBM suites come with a full complement of technical, sales and marketing support and services, among them:

A licensing program that provides integrated product support, one source, one call for technical support for all suite components from IBM, Lotus, Intel and Tivoli.

Defect support and problem determination for the Windows NT operating system, as well as assistance with installation, usage and other operating-system needs.

Planning and installation services to assist customers and business partners with integrating the IBM suites into their existing environments.

7.0 World-Class Service and Support

IBM wants to ensure that it can deliver the technical assistance required to meet or exceed your expectations regarding software support. Our goal is to completely satisfy you each time you need to call on us for support.

Through our software support structure, IBM can provide:

- Information, tools, and fixes to prevent known software problems
- Timely responses to all of your software inquiries
- Resolutions to your software problems
- Answers to your software usage questions
- Consistent support options for all of your IBM software
- A wealth of software support at an equitable price
- A simple, consolidated support contract

Flexibility is the cornerstone of our portfolio, because we believe that you should be able to access the exact mix of services to fit your specific business needs. IBM Software Support is delivered in a consistent manner for all IBM software products based upon the way in which a product is charged (one time charge or monthly license charge basis). No matter what environment you are in, our support "looks" and works the same - a real benefit for mixed environments. IBM Software Support makes the wealth of IBM technical expertise available to you via a simple phone call or an electronic message, or, as you will see later, the Internet.

7.1 IBM Product Support

Support Line

Support Line gives you the ability to contact IBM and ask installation and usage related questions as well as make defect inquiries about eligible products. You have the option of voice or electronic (where available) access to a team of technical specialists. Support Line is available Monday through Friday, in the prevailing business hours, in your time zone, with the exception of national holidays. Support Line is also available 24 hours per day, 7 days per week in most countries, for an additional fee.

IBM Support Line enables you to reduce your own research time, increase productivity, and concentrate more on your core business.

Consult Line

IBM Consult Line provides you the ability to schedule telephone consultation with IBM technical specialists on the topic of your choice. Such topics could include application design, software configuration, database recovery/repair, and performance tuning.

Consult Line leverages your own technical skills and increases your productivity by providing fast access to IBM's technical specialists. IBM will assemble a group of specialists from various sources as required to meet the specific needs of your consultation.

Consult Line is available in Europe under different names in different countries.

7.2 IBM Consulting Services

eNetwork Software Services

IBM offers eNetwork Software Services to help you get ready for e-business. Examples include:

- On-site and remote consulting services
- Prototyping and proof of concept
- Complete solution design and implementation
- Custom programming services
- Installations and migrations
- Mobile and wireless implementations
- Custom education
- End-to-end performance analysis
- Project planning
- Networking design and consolidations
- Systems services

The eNetwork Software Consulting Group are experts in host integration, network design and security, and mobile and wireless implementations--all of the services you need to move toward network computing.

On-site and remote consulting services

IBM can design individualized consulting services to help solve your unique problems, provide your custom solution, and assist you in meeting your schedules, allowing you to focus on the running of your business.

IBM's skilled consultants will work with you to understand your requirements in detail and create the most effective services package to fulfill your needs.

This can include, but is not limited to:

- Total design solutions
- Design and architectural reviews
- Assistance with technical skill building
- Security reviews
- Installation and migration planning

IBM can provide the advice, recommendations, mentoring, analysis, and expertise you need from a team of highly skilled resources.

Let IBM put our team to work to maximize the cost effectiveness, security and performance of your unique network.

8.0 Summary and Contact Information

8.1 Summary

8.2 Interface Systems Inc. Contact Information

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