Bankway®
Network Standards Guide - Novell Environment

Service Level 8.14

www.fisglobal.com

Original Publication 2000

Revised 2006

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Bankway Network Standards Guide - Novell Environment

Bankway Overview

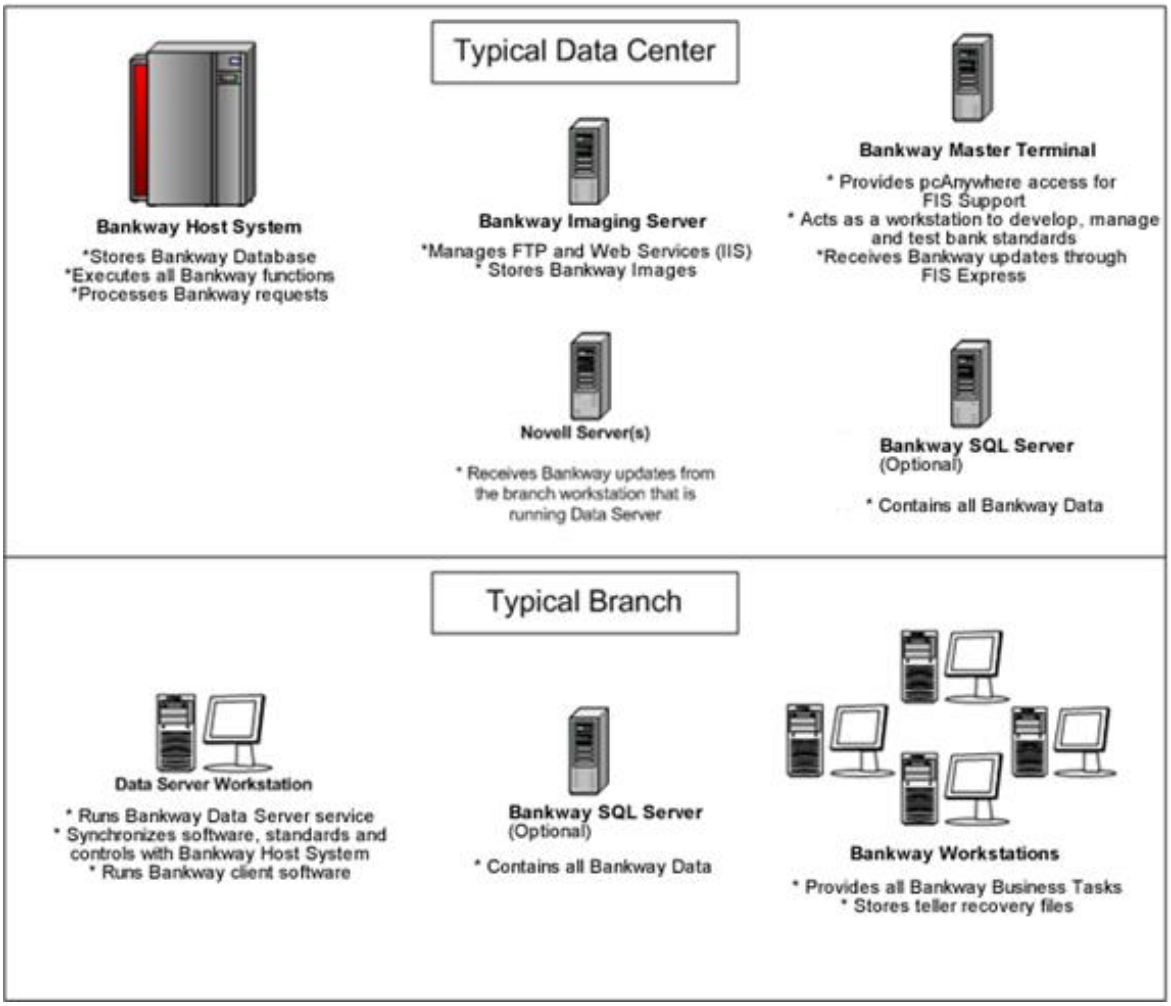
Introduction

The Windows®-based capabilities of Bankway provide your bank with streamlined customer service efficiencies. With these timesaving and easy-to-use capabilities, your bank's employees can perform their tasks quickly and efficiently as well as provide a superior level of customer service.

Bankway Environment

FIS Banking Solutions has enhanced the capabilities of Bankway to support Windows®-compliant access to the information in Bankway. These capabilities operate in a Windows® environment.

The high-level illustration below provides the basic components of the Bankway environment.



Purpose and Organization of the Guide

The purpose of the Bankway Network Standards Guide is to provide the network standards and specifications recommended by FIS Banking Solutions. Please contact FIS Banking Solutions Hardware and Network Services division for assistance with specific hardware requirements to ensure a successful implementation of Bankway at your bank.

The Bankway Network Standards Guide provides detailed information on the following topics:

- Bankway Master Terminal

- Bankway Branch Server
- Microsoft® SQL Server™ 2000
- Bankway Workstation
- Bankway Image Server
- Host Requirements (OS/390, AS/400 and UNIX)
- Telecommunications Network
- Printers
- Scanners
- Web Cams
- Sample Configurations
- Benefits and Challenges of the Novell environment
- Benefits and Challenges of the SQL Server™ environment
- Networking Solutions

Conformance to Network Standards

The network standards provided in this guide are required and must be certified prior to the implementation of Bankway at your bank. Included in the guide are the minimum and/or suggested configurations for this implementation. As individual bank networks and applications may vary, please review these standards with your bank's designated network vendor and FIS Banking Solutions. Your bank's network vendor is responsible for researching and implementing any additional requirements for your environment, such as new applications, security requirements, and etc.

> ***Note:*** *These standards are dynamic in nature and are subject to additions, changes, and deletions as both software and hardware technologies advance. Please contact your FIS Banking Solutions Strategic Account Manager to ensure that you have the most current information.*

Printer Support and Peripheral Devices

The versatile design of Bankway provides report-printing capabilities (using shared network printers) and receipt-printing capabilities (using receipt printers/peripheral computer devices). These devices allow your bank to take full advantage of the next-generation customer service capabilities of Bankway.

Service Level 8.14 Performance Considerations

Since Service Level 8.11, the installation package has grown from 94 MB for Service Level 8.10 to 116 MB.

Bankway Master Terminal

Introduction

The Bankway master terminal has several purposes:

- FIS Support access using pcAnywhere
- Test / Training Environment
- Bankway Express Server
- Configuration Console and Master Configuration
- Bank Standards Configuration and Distribution

By using pcAnywhere and an Internet connection, the Master Terminal allows FIS Banking Solutions to connect to your network. By allowing a connection to your network, FIS Banking Solutions is able to perform software installations, assist with updates, and provide technical support. The constant availability to dial in using pcAnywhere is required during the Network Certification process. Please consult the Remote Desktop Sharing guide for more information.

> ***Note:*** *A modem and a dedicated telephone line may be used in lieu of the Internet connection. Please consult your Network Certification Specialist for more information.*

The Master Terminal can be used as the server in a test / training environment. By only attaching test / training workstations to the Master Terminal, any changes made to this server will not affect your production environment.

Bankway Express automatically downloads updates from the Bankway Express Server. This service requires a constant, high-speed Internet connection.

The Master Terminal should be used to maintain a master configuration for all servers and workstations. By installing the Bankway Configuration Console on the Master Terminal, changes to Bankway dependent settings can be centrally managed for all of the branch servers and workstations.

The Master Terminal should be used to configure and distribute any Bank Standards changes. A teller receipt printer should be attached to the Master Terminal throughout the Implementation process.

> ***Note:*** *The Master Terminal must be in a physically accessible location and will be used extensively during the Implementation process.*

FIS Banking Solutions recommends that each bank in a data center environment have its own master terminal located at its central operations center in order to maintain control over the bank's standards.

Recommended Hardware Configuration

The following information summarizes the Recommended Hardware Configuration for the installation of Bankway.

- Pentium® 4 – 1.4 GHz Processor or higher
- 512 MB Random Access Memory (RAM)
- 15 GB free (usable) hard-drive space
- 1.44 MB Floppy drive
- CD-ROM Drive
- SVGA Monitor (required resolution of 800 x 600 pixels) with 256 color resolution
- 100 Mbps Ethernet Card
- 56K Modem and dedicated analog telephone line for FIS Banking Solutions support
- Uninterruptible Power Supply (UPS) with telephone-line surge protection
- Internal Tape Backup (Optional)
- Keyboard
- Mouse

Software Requirements

The following information summarizes the minimum software requirements for the installation of Bankway.

- Microsoft® Windows NT® Server 4.0 with Service Pack 6a, Microsoft® Windows® 2000 Server with Service Pack 4, or Microsoft® Windows® Server 2003
- Symantec™ pcAnywhere™ version 9.2 or higher
- Bankway Service Level CD
- Bankway Express Site Manager CD
- Microsoft® Office 97 (Service Release 2), Microsoft® Office 2000 with Service Pack 3, or Microsoft® Office XP with Service Pack 2 for document printing
- IBM® Personal Communications for Windows®, IBM Client Access, or equivalent terminal emulation (for the IBM AS/400 and MVS environments)
- UniKix-supplied terminal emulation (for UNIX environments)

> ***Note:*** *Terminal emulation software is not required for the operation of Bankway's Windows-based capabilities. It is used to access legacy Bankway functions, also known as Green Screens.*

To ensure that the test environment does not impact the production environment, MSDE must be installed on the Master Terminal. The MSDE installer is included on the Bankway CD in the Special Installation folder.

Software Recommendations

- Tape Backup Software
- Virus Scanning Software

> ***Note:*** *FIS Banking Solutions recommends Mcafee® VirusScan® or Norton AntiVirus™*

Bankway SQL Server

Introduction

Beginning with Service Level 8, all Bankway customers have the option to utilize a SQL database in lieu of MSDE and Microsoft® Access databases. A SQL server requires additional licenses, whereas MSDE and Access do not require additional licenses. Microsoft® SQL Server™ 2000 can be configured to automatically manage its disk usage, send notifications upon encountering error conditions, and etc. Bankway users will experience slightly improved performance with a properly configured SQL server, but otherwise will not notice any differences.

The databases that control the presentations and business tasks in Bankway are maintained by software installed on each Data Server. Each Data Server has a single data store that is either SQL or a combination of MSDE and Microsoft® Access. Since a workstation inherits the environment of the associated Data Server, these choices (reflected within the Configuration Console) can dramatically impact the cost of deployment and will influence the performance of Bankway.

Recommended Hardware Configuration

The following information summarizes the Recommended Hardware Configuration for the installation of Bankway.

> ***Note:*** *The Bankway SQL Server should be dedicated to the use and processing of Bankway only.*

- (2) Intel Xeon – 2.0 GHz Processors or higher
- 1.0 GB Random Access Memory (RAM)
- SCSI hard drive controller using RAID 5 (disk striping)
- 15 GB free (usable) hard drive space
- 1.44 MB Floppy drive
- CD-ROM Drive
- SVGA Monitor (required resolution of 800 x 600 pixels) with 256 color resolution
- 100 Mbps Ethernet Card
- Internal Tape Backup (Optional)
- Uninterruptible Power Supply (UPS) with surge protection
- Keyboard
- Mouse

Software Requirements

The following information summarizes the minimum software requirements for the installation of Bankway.

- Microsoft® Windows® 2000 Server with Service Pack 4 or Microsoft® Windows® Server 2003
- Microsoft® SQL Server™ 2000 with Service Pack 3
- Symantec™ pcAnywhere™ version 9.2 or higher

Software Recommendations

- Tape Backup Software
- Virus Scanning Software

> ***Note:*** *FIS Banking Solutions recommends McAfee® VirusScan® or Norton AntiVirus™*

- Uninterruptible Power Supply (UPS) safe shutdown software for power-loss management

Bankway Novell Server

Introduction

The Novell server is used to house the Microsoft Access databases. One workstation in each branch is used to update the databases located on the branch Novell Server.

Recommended Hardware Configuration

The following information summarizes the Recommended Hardware Configuration for the installation of Bankway.

- Pentium® III – 1.0 GHz Processor or higher
- 512 MB Random Access Memory (RAM)
- SCSI hard drive controller using RAID 5 (disk striping)
- 5 GB free (usable) hard drive space for each branch
- 1.44 MB Floppy drive
- CD-ROM Drive
- SVGA Monitor (required resolution of 800 x 600 pixels) with 256 color resolution
- 100 Mbps Ethernet Card
- 56K Modem and dedicated analog-dial telephone line for FIS Banking Solutions support
- Internal Tape Backup (Optional)
- Uninterruptible Power Supply (UPS) with surge protection
- Keyboard
- Mouse

Software Requirements

The following information summarizes the minimum software requirements for the installation of Bankway.

Novell Netware version 4.2 or later

Software Recommendations

- Tape Backup Software
- Virus Scanning Software

- Uninterruptible Power Supply (UPS) safe shutdown software for power-loss management

Bankway Branch Server

Introduction

The branch server, located at each branch, is a key component of the overall network configuration. This server continuously runs the Bankway Data Server service, which synchronizes the latest software releases, bank standards, and databases with the Bankway Express Server and the Bankway Host.

In the Novell environment, a branch server is actually a workstation located within each branch. This workstation runs the Data Server service and can also be used as a Bankway client workstation. The workstation can be used by branch personnel and does not have to be dedicated to running Data Server.

Recommended Hardware Configuration

The following information summarizes the Recommended Hardware Configuration for the installation of Bankway.

- Pentium® III – 1.0 GHz Processor or higher
- 256 MB Random Access Memory (RAM)
- 5 GB free (usable) hard drive space
- 1.44 MB Floppy drive
- CD-ROM Drive
- SVGA Monitor (required resolution of 800 x 600 pixels) with 256 color resolution
- 100 Mbps Ethernet Card
- Uninterruptible Power Supply (UPS) with surge protection
- Keyboard
- Mouse

Software Requirements

The following information summarizes the minimum software requirements for the installation of Bankway.

- Microsoft® Windows NT® Workstation 4.0 with Service Pack 6a or Microsoft® Windows® 2000 Professional with Service Pack 4
- Symantec™ pcAnywhere™ version 9.2 or higher
- Bankway Service Level CD

Note: *If not using the Bankway SQL Server configuration, MSDE must be installed on all branch servers. The MSDE installer is included on the Bankway CD in the Special Installation folder.*

Software Recommendations

- Tape Backup Software
- Virus Scanning Software

Note: *FIS Banking Solutions recommends McAfee® VirusScan® or Norton AntiVirus™*

- Uninterruptible Power Supply (UPS) safe shutdown software for power-loss management

Bankway Workstation

Introduction

The workstation allows your employees to take advantage of all of the current and future features of Bankway.

Recommended Hardware Configuration

The following information summarizes the Recommended Hardware Configuration for the installation of Bankway.

- Pentium® III – 1.0 GHz Processor or higher
- 256 MB Random Access Memory (RAM)
- 5 GB free (usable) hard-drive space
- 1.44 MB Floppy drive
- SVGA Monitor (required resolution of 800 x 600 pixels) with 256 color resolution
- 100 Mbps Ethernet Card
- Keyboard
- Mouse

Note: *Workstations connected to a cash dispenser and teller receipt printer require two RS-232 serial ports.*

Software Requirements

The following information summarizes the software requirements for the installation of Bankway

- Microsoft® Windows NT® Workstation 4.0 with Service Pack 6a or later, Windows® 2000 Professional with Service Pack 4 or later, or Windows® XP Professional with Service Pack 1a or later
- Novell NetWare Client
- Microsoft® Office 97 (Service Release 2), Microsoft® Office 2000 with Service Pack 3, or Microsoft® Office XP with Service Pack 2 for document printing and Financial Information and Loan Collection reports.

Note: *Microsoft® Office 97 cannot be used in a Microsoft® Windows® Active Directory environment.*

Software Recommendations

- Virus Scanning Software

> *Note: FIS Banking Solutions recommends McAfee® VirusScan® or Norton AntiVirus™*

- IBM® Personal Communications for Windows, IBM Client Access, or equivalent terminal emulation (for the IBM AS/400 and MVS environments)
- UniKix-supplied terminal emulation (for UNIX environments)

> *Note: Terminal emulation software is not required for the operation of Bankway's Windows-based capabilities. It is used to access legacy Bankway functions, also known as Green Screens.*

Bankway Image Server

Introduction

The Bankway Image Server is used to store your customer images. These images can be signature cards, photo identifications or any other image you wish to store. The Image Server will typically be located at the main Office or data center.

> ***Note:*** *The Image Server should be dedicated to the processing and storage of Bankway images for the entire Bank.*

Recommended Hardware Configuration

The following information summarizes the Recommended Hardware Configuration for the installation of Bankway's imaging capabilities.

- Pentium® III – 1.0 GHz Processor or higher
- 512 MB Random Access Memory (RAM)
- SCSI hard drive controller using RAID 5 (disk striping)
- 20 GB free (usable) hard drive space
- 1.44 MB Floppy drive
- CD-ROM Drive
- SVGA Monitor (required resolution of 800 x 600 pixels) with 256 color resolution
- 100 Mbps Ethernet Card
- Internal Tape Backup (Required)
- Uninterruptible Power Supply (UPS) with surge protection
- Keyboard
- Mouse

Software Requirements

The following information summarizes the software requirements for the installation of Bankway's imaging capabilities:

- Microsoft® Windows NT® Server 4.0 with Service Pack 6a, Microsoft® Windows® 2000 Server with Service Pack 4, or Microsoft® Windows® Server 2003

> ***Note:*** *Microsoft® Windows NT® Server 4.0 requires the Server Option Pack. Internet Information Services is included on the Windows® 2000 Server CD.*

- Symantec™ pcAnywhere™ version 9.2 or higher

Software Recommendations

- Tape Backup Software
- Virus Scanning Software

> ***Note:*** *FIS Banking Solutions recommends McAfee® VirusScan® or Norton AntiVirus™*

- Uninterruptible Power Supply (UPS) safe shutdown software for power-loss management.

Bankway Multi Statements Server

Introduction

The Bankway Multi Statements Server is used to create statement. The Server operates stand-alone, creating statements as a batch. Bankway has a business task to request viewing of an archived statement, as well as Business Tasks for administration and maintenance. It is recommended that a server be dedicated to the task. If other services operate on the server they should be scheduled so there is no conflict for resources.

Recommended Hardware Configuration

The hardware requirements vary based on size. Below are two configurations. The bank may opt to increase specifications if they have extra needs, for example more disk space, or CD-R/RW / DVD-R/RW drives.

Banks from $300 Million to $1.3 Billion in Assets

The following information summarizes the Recommended Hardware Configuration for the installation of Bankway Multi Statements Server for Banks between $300 Million in assets to $1.3 Billion in assets.

- Dual Intel Xeon 2.6 GHZ/512K Cache, or equivalent
- 3 GB DDR SDRAM Memory
- Standard Keyboard and mouse
- Optional monitor depending on server setup
- 4 – 128 GB high performance SCSI Hard drives
- PERC3-DC Card, 128MB,5-Internal,0-External Channels Primary Controller
- RAID 5 Configuration
- 3.5 inch, 1.44 MB Floppy Drive
- CD-R/RW or DVD-R/RW Drive
- 2x INTEL PRO 1000XT CU-Gigabit, NIC Network Adapters
- BroadCom, 56K PCI Internal Modem, V.92 or Ethernet Adapter for Cable or DSL
- DLT Tape 80/120 GB Tape Drive Unit
- Tower Casing or Rack mount configuration depending on server setup.
- 3 Yr – same day response onsite support (24x7)
- Non-Redundant Power Supply with Uninterrupted Power Supply

Banks up to $300 Million in Assets

The following information summarizes the Recommended Hardware Configuration for the installation of Bankway Multi Statements Server for Banks up to $300 Million in assets.

- Intel Xeon 2.4 GHZ/512K Cache, or equivalent
- Optional second Intel Xeon 2.4 GHZ/512 Cache, or equivalent
- 2 GB DDR SDRAM Memory
- Standard Keyboard and mouse
- Optional monitor depending on server setup
- 3 – 128 GB high performance SCSI Hard drives
- PERC3-DC Card, 128MB,5-Internal,0-External Channels Primary Controller
- RAID 5 Configuration
- 3.5 inch, 1.44 MB Floppy Drive
- CD-R/RW or DVD-R/RW Drive
- 2x INTEL PRO 1000XT CU-GB, NIC Network Adapters
- BroadCom, 56K PCI Internal Modem, V.92 or Ethernet Adapter for Cable or DSL
- DLT Tape 80/120 GB Tape Drive Unit
- Tower Casing or Rack mount configuration depending on server setup.
- 3 Yr – same day response onsite support (24x7)
- Non-Redundant Power Supply with Uninterrupted Power Supply

Note: *For banks above $1.3 billion in assets, please contact your Strategic Account Manager for a detailed configuration.*

Software Requirements

The following information summarizes the software requirements for the installation of Bankway imaging capabilities:

- Windows 2000 / Windows 2000 Advanced Server / Windows 2003 Server
- Symantec Antivirus SMB 8.0
- SQL Server 2000 (Service pack 3 or above)

Software Recommendations

- Optional Veritas Backup Executive Enhanced Power Suite (Open file option, SQL Agent)

- Uninterruptible Power Supply (UPS) safe shutdown software for power-loss management

Host Requirements

Introduction

The host is defined as the computer system (hardware and software) in which the central database for Bankway resides. This is where core bank processing occurs. All banks differ in the amount of hardware resources necessary to support the processing of the host computer.

This difference is due to many factors, including your bank's specific business requirements. Your bank needs to make a hardware capacity assessment to ensure that adequate capacity is available to support the increased capabilities of Bankway and your bank's specific business plan.

> ***Note:*** *FIS Automation Services (KAS), a subsidiary of FIS Banking Solutions, can assist your bank with hardware configuration planning.*

FIS Hardware and Networking Division can provide Enterprise wide storage management consulting, including sizing recommendations for disk and tape storage. Ask your Strategic Account Manager to contact the Hardware & Network Services for assistance

Bankway operates in three different Host environments:

- IBM i/Series also known as AS/400
- IBM z/OS also known as MVS
- SUN Solaris UNIX

The network requirements for each are described in the following sections.

i/Series

Hardware Requirements

The host requires Ethernet connectivity hardware to support TCP/IP communications. Configuration options will vary depending on the hardware platform and the model of the processor. 100baseTX Ethernet is the FIS LAN standard.

Software Requirements

- Bankway release K6100000
- TCP/IP with all maintenance (Version 5.2.0 or higher)
- TCP/IP Connectivity Utilities
- IBM® WebSphere® MQ with all maintenance (Version 5.3 or higher)

- Configuration options for the AS/400 platform will be customized by FIS Banking Solutions

SUN Solaris UNIX

Hardware Requirements

The host requires Ethernet connectivity hardware to support TCP/IP communications. Configuration options will vary depending on the hardware platform and the model of the processor. 100baseTX Ethernet is the FIS LAN standard.

Software Requirements

- Bankway release K6100000
- TCP/IP Connectivity (required)
- IBM® WebSphere® MQ (Version 5.3 or higher)
- Configuration options for the UNIX platform will be customized by FIS Banking Solutions

z/OS

Hardware Requirements

The host requires Ethernet connectivity hardware to support TCP/IP communications. Configuration options will vary depending on the hardware platform and the model of the processor. 100baseTX Ethernet is the FIS LAN standard.

Software Requirements

- Current release of Bankway
- z/OS (Version 1.04.0 or higher) with the following software:
  - IBM® TCP/IP support
  - IBM® ACF/VTAM
  - IBM® CICS Transaction Server (Version 1.3 or higher)
  - IBM® Language Environment
  - IBM® Websphere MQ for z/OS V5R3

Installation Considerations

The following information pertains to the z/OS environment:

- MQSeries® customization options – Contact FIS Banking Solutions for an in-depth review of these options.
- LE (IBM® z/OS Language Environment) – This set of common services and language-specific routines provides a single run-time environment for applications written in LE-conforming language.

Run-Time Options (Batch and CICS)

The default run-time options supplied with LE may not be suitable for the application requirements at your site; therefore, you may need to customize the run-time environments (both batch and CICS) to ensure the optimum performance of your applications. The following options are recommended:

- CICS Run-Time Environment (CEECOPT Member)
  - ABTERMENC=((ABEND),OVR) – This is the default value for this member, which means that the z/OS LE abend code is produced instead of the original abend code.
  - ALL31=((OFF),OVR) and STACK=((4K,4K,BELOW,KEEP),OVR) – These options indicate that one or more routines are AMODE24.
  - STORAGE=((OO,NONE,NONE,OK),OVR) – This option ensures that the value of any heap storage allocated by the storage member is initialized to x'00'.
- Batch Run-Time Environment (CEEDOPT Member)
  - TRAP=((OFF),OVR) – This is the default value for this member, which means that the z/OS LE abend code is produced instead of the original abend code.
  - TERMTHDACT=((UADUMP),OVR) – This option causes a system dump to be created in addition to the LE dump when an abend occurs

Telecommunications Network

Introduction

The topic of a telecommunications network is a large science and industry that is beyond the scope of this document. What follows are general guidelines. For a complete analysis of a Telecommunications Network by a qualified professional with expertise in the FIS environment, contact your FIS representative.

The Telecommunications Network is a generic term referring to the elements that allow computers to exchange data. In practice, the network allows Bankway to share your customers' database of information between users and branches.

> ***Note:*** *There are many options for networks. This document focuses on current best practices for the Bankway environment. To explore other options, contact your FIS representative.*

The Network is divided into two distinct sections: the LAN and the WAN. LAN stands for Local Area Network. This is part that resides inside the Bank's facilities. Typically the Bank owns, operates and maintains the LAN. WAN stands for Wide Area Network. This is the part that connects the different locations of the Bank. Typically the Bank contracts with a Common Carrier such as AT&T, Sprint or the Local Exchange Carrier (i.e. phone company) to provide this service.

A LAN begins with cabling to every location where a computer will be attached to the network. The cables terminate at a Patch Panel in a central location, usually a wiring closet or communications equipment room. The current industry standard is Category 5 (CAT-5) which is based on EIA/TIA 568 Commercial Building Telecommunications Wiring Standard. This standard specifies cables, connectors, wall outlets, and patch panels. CAT-5 cable should be installed by professional wiring contractor.

Operating over the cable is the data link protocol. The current industry standard, recommended by FIS, is 100baseTX Ethernet (IEEE 802.3) which operates at 100,000,000 bits per seconds. Each computer or printer connected to the network must be equipped with a Network Interface Card (NIC) capable of supporting 100baseTX Ethernet.

The computers connect to each other and the WAN via a 100Mbps Ethernet Switch, collocated with the Patch Panel.

> ***Note:*** *Some locations may be using 10Mbps Ethernet hubs. While providing similar functionality as 100Mbps, performance will be noticeably degraded.*

In larger installations switches may be deployed in a hierarchy with devices connected to access switches which are in turn up-linked to distribution/backbone switches.

To insure data reaches the proper destination, an addressing scheme must be developed and an address must be assigned to and configured on each device in the network. FIS supports TCP/IP, which is the Internet Protocol and is the dominant standard. An IP address must be assigned to each device. The addresses must be arranged in a hierarchical manner to facilitate proper routing.

Connecting LANs, either directly or over a WAN, requires a Router. The size and configuration of the router depends on the specific network configuration.

Connecting a router to a WAN requires an interface device called a DSU/CSU. This may be integrated into the router, supplied by the Common Carrier, or owned by the bank. Often a common carrier integrates data and voice traffic over a single link. In which case the DSU/CSU must have an interface to the phone system (PBX) and must be configurable.

WAN connections come in many varieties including wireless and satellite. For Bankway the current best practice is either dedicated links, or Frame Relay. Dedicated links and Frame Relay come in standard sizes: DS0 and T1. DS0 is 64Kbps, or 56 in some implementations. T1, also termed DS1, is 1.54Mbps. There is a third option in between called Fractional T1 with bandwidth anywhere between the two. Sometimes a carrier will provision a T1 circuit to a location and use part of the bandwidth for voice and the remainder for data.

Dedicated links are just that: a fixed amount of bandwidth between two points. Frame relay is data broken into fixed length groups, called packets, and transmitted through a common network.

> ***Note:*** *Some users have been concerned that their data is mixing with the data of other companies, posing a possible confidentiality issue. The reality is that all traffic, both voice and data, is mixed over the carrier's backbone. Proven multiplexing technology keeps it all separated. As in any case, encryption helps insure confidentiality.*

Generally Frame Relay is offered with two constraints: Committed Information Rate (CIR), which is the bandwidth the carrier guarantees, and Burst Rate which is the maximum speed of the link. Frame Relay offers lower costs, plus the ability to provision a connection to multiple endpoints. This means that a Bank with multiple branches and a backup site can provision a single circuit to each location and achieve the required connectivity.

LAN Requirements

The following information summarizes the minimum hardware requirements for the Local Area Network.

- **Cabling:** Category-5, 5e or 6 to each workstation or server

  > ***Note:*** *Wireless LANs (WiFi/802.11) may be an alternative if carefully designed and implemented.*

- **Switches:** 100baseTX

  > ***Note:*** *If Network Applications such as Voice over IP or Streaming Video are to be implemented, proper Quality of Service must be configured on the switches to insure Bankway performance.*

- **Addressing:** Subnet for each branch, and at least one for the data center. Addresses should be organized in a hierarchy for summarization. Private IP addresses in the private ranges (10.x.x.x, 172.16.x.x through 172.31.x.x, 192.168.x.x) are recommended.

WAN Requirements

The following information summarizes the minimum hardware requirements for the Wide Area Network.

- **Router:** Each location requires a manageable router with an Ethernet interface to the LAN, a serial interface to DSU/CSU (or integrated CSU/DSU); plus the appropriate interface(s) to a backup link, if implemented.

  Note: *The appropriate Routing Protocol depends on topology of the network and the available bandwidth of the network. In general, RIPv2 or OSPF is best.*

  Internet access requires a separate link. Best practice specifies a separate router, plus a firewall and Intrusion Detection System for security.

- **CSU/DSU** as specified by the common carrier. May be integrated into router, or may require interface to PBX.
- **Data Circuits:** The Speed of data circuits depends on traffic volume. Traffic other that Bankway transactions, such as e-mail, internet access, voice or video must be considered. The following guidelines address Bankway traffic only. It is important for you to evaluate your peak transaction volumes and to discuss this issue with your preferred carrier14 to establish line speeds.
- **Dedicated links:** 256K minimum.
- **Frame Relay:** 256K minimum CIR to each branch. In general, the CIR to the data center should approximate the sum of the CIRs to each branch. Modeling, monitoring and tuning will provide more precise figures.
- **Backup:** ISDN BRI will supply adequate performance. Dial-up 56kb may provide minimum performance if properly tuned. Redundant links forming a partially meshed topology provides the best backup, if it can be cost justified. Other forms of redundant links, such as Internet VPN may be explored.
- **Internet access bandwidth** and nature of this link depends on the Internet Service Provider.

Printers

Introduction

Printers can be used with Bankway to print customer documentation, statements, receipts, and etc. Teller printers, network printers, and check printers can be used to add to the functionality of Bankway.

Teller Printers

Bankway supports a number of industry standard teller printers. Teller printers provided specialized functions such as receipt and check printing that compliment the teller transactions without taking up the counter space of a larger general use printer.

Bankway has the ability to configure teller printers by functionality and define documents in Bank Standards to print only on certain printers. This flexibility allows banks to globally define the teller documents to be printed while permitting the workstations a wide range of printing configurations.

Teller Printer Functionality

- **Validation printing:** Ability to print a limited number of lines on a small document such as the back of a check or a cash-in ticket. All of the supported printers share this functionality. Some of the printers, such as the Epson TM-U675, provide a specialized mechanism to print just the receipts.
- **Journal printing:** Some printers provide the option to print on a small roll of paper. Most banks using this feature use it to keep a paper trail of the tellers' transactions.
- **Check printing:** Some of the teller printers support printing bank checks. These printers have the ability to print a multi-part check form.
- **Passbook printing:** Passbook printing permits the teller to print the individual lines on a passbook. These printers are normally shared between two (or more tellers) and are typically among the larger of the teller printers.

Windows Version Available

The chart below indicates printers where a Windows version is available. These printers now support the ability to drive the printers through the Windows operating system by building a printer device in the printer collection of the operating system. This was developed use these printers in a terminal services environment where the bank does not want to use Citrix to map the com ports. The setup procedure for this is discussed in another document.

Recommendations

- Validation/Journal/Check Printer
  - FIS recommends the Epson TM-U675.
- Validation/Journal Printer (where size is an issue)
  - FIS recommends the AddMaster IJ6080
- Passbook Printer/Validation
  - FIS recommends the Craden DP9

Note: *Receipt and passbook printer drivers are built into the Bankway software. Therefore, Windows® drivers are not required for the receipt printers.*

Refer to each manufacturer's User's Manual for paper and form requirements.

The chart on the following page provides a general overview of the teller printers that are currently supported by Bankway.

Bankway Support of Teller Receipt Printers

Printer Model	Validation	Journal	Pass Book	Printable Lines	Connection Type	Shareable	Checks or Money Orders	Multiple Fonts	Impact or Inkjet	Noise Level	Size
Epson TM-U675	Y	Y	N	8	Serial*	N	Pre-printed checks	Y	Impact	Medium	Medium
Epson TM-U375	Y	Y	N	8	Serial*	N	Pre-printed checks	Y	Impact	Medium	Medium
Epson TMH6000II	Y	Y	N	8	Serial*	N	Pre-printed checks	Y	Impact	Medium	Medium
Axiohm 7221	Y	Y	N	14	Serial	N	Pre-printed checks	Y	Impact	High	Medium
Axiohm DG4771	Y	Y	N	17	Serial / Parallel	N	N	Y	Inkjet	Medium	Medium
Addmaster IJ2040	Y	Y	N	1	Serial / Parallel	N	N	Y	Inkjet	Low	Medium
Addmaster IJ3160	Y	N	N	5	Serial	N	N	Y	Inkjet	Low	Small
NCR 5021	Y	Y	N	5	Serial	N	N	Y	Impact	Medium	Medium
NCR 5223	Y	N	Y	Unlimited	Serial*	Y	Pre-printed checks	Y	Impact	Medium	Medium
NCR 7141	Y	Y	N	14	Serial	N	Pre-printed checks	Y	Inkjet	Medium	Medium

Printer Model	Validation	Journal	Pass Book	Printable Lines	Connection Type	Shareable	Checks or Money Orders	Multiple Fonts	Impact or Inkjet	Noise Level	Size
Unisys EF4270	Y	Y	N	5	Serial	N	N	Y	Inkjet	Low	Medium
IBM® 4712	Y	Y	N	5	Parallel	N	N	Y	Impact	Medium	Medium
IBM® 4722	Y	N	Y	Unlimited	Parallel	N	Pre-printed checks	Y	Impact	Medium	Medium
IBM® 4770	Y	Y	N	5	Parallel	N	N	Y	Inkjet	Low	Small
Star SP300	Y	Y	N	1	Parallel	N	N	N	Inkjet	High	Medium
Craden DP6, 7, 8, 9	Y	N	Y	Unlimited	Serial	Y – DP9 N – DP8	N	Y	Impact	High	Medium

* The serial cable required is not a standard serial cable and should be ordered from the manufacturer.

Printer Model	Special Settings
Epson TM-U675	DSW1-3 On – Handshaking Mode (a good thing); DSW 1-7 On – 9600 Baud (Windows version only); Windows version available
Epson TM-U375	Windows version available
Epson TMH6000II	Windows version available
Axiohm 7221	Window version available; Not in production
Axiohm DG4771	BIOS – ECP; Not in production

Printer Model	Special Settings
Addmaster IJ2040	Model 864768 Rev.2
Addmaster IJ3160	
NCR 5021	Not in Production
NCR 5223	Flow Control Xon/Xoff; Not in production
NCR 7141	Not in production
Unisys EF4270	Flow Control Xon/Xoff; Not in production
IBM® 4712	Not in production
IBM® 4722	Not in production.
IBM® 4770	BIOS –Bidirectional; Not in production
Star SP300	Not in production
Craden DP6, 7, 8, 9	Emulation Mode*

* The printer has MICR-reader capabilities, but they are not implemented at this time.

Network Printers

Network printers are typically laser printers that would be used for printing documents such as forms, agreements, statements, cash balancing reports, and etc. These printers would be shared within a branch or department.

When using network printers with multiple trays, you will not be able to specify the tray or special setting for new account or product services documents. These documents will print from the default tray.

FIS recommends the Hewlett Packard LaserJet 4050N printer or greater. This printer comes with a network card, 16 MB of memory, and prints 17 pages per minute.

Check Printing

Standard Register provides a MICR check-printing system that Bankway supports. This printing system controls a secure printing environment with the ability to produce counter checks, deposit slips, cashier's checks, and money orders.

For information on the features and system requirements, contact Standard Register at 1-800-654-2949 or FIS Banking Solutions at 1-800-327-1892.

Scanners

Introduction

Scanners allow for the capture of customer documentation, such as signature cards, drivers' licenses, Social Security cards, and etc. Capturing images of these documents allows for the quick retrieval of customer information and reduces fraud. By installing a scanner at each workstation that is used to open new accounts, your employees will be able to quickly capture documents that will be incorporated into each customer's electronic profile. After a document has been captured, it may be displayed on any workstation in your bank.

Requirements

- TWAIN-compliant flatbed scanner with a USB connection (Not handheld)
- Optical Scan resolution of 300 x 600 or greater

Web Cams

Introduction

Web Cams allow for the capture of customer images. Capturing pictures of your customers allows for the quick identification of customers and reduces fraud. By installing a Web Cam at each workstation that is used to open new accounts, your employees will be able to quickly capture pictures that will be incorporated into each customer's electronic profile. After a customer image has been captured, it may be displayed on any workstation in your bank. Limits, such as a withdrawal over a designated amount, may also be set that will force the display of a customer image.

Requirements

- USB Interface
- Image capture capability

Sample Configurations

Introduction

The illustrations on the following pages represent sample configurations for the OS/390, AS/400 and UNIX host platforms.

Remote Network Communication

The illustrations depict a sample, minimal LAN/WAN communication network setup using frame relay to handle communication switching between the main bank and the remote branch locations. Your bank's configuration may differ, but should function similarly. It is important for you to evaluate your peak transaction volumes and to discuss this issue with your preferred network provider to establish line speeds.

You may use the following as a basic rule of measurement for WAN communications:

- **Frame Relay:** The data line speed requirement for the main location must be equal to or greater than the total data line speeds of all the Remote Branch Offices.

  Example

  If there are four branches and each branch has a 128 Kbps data line speed, the main location would need at least a 512 Kbps data line speed.

  4 Remote Branches x 128 Kbps = 512 Kbps

- **Frame Relay:** There are different measurements for data line speed. Please be aware of the following when contracting for data lines:

  Committed Information Rate (CIR) – The minimum bandwidth that can be provided by the Frame Relay network vendor. This is the most important rate when contracting for data lines.

  Burst Rate – The maximum bandwidth that may be provided by the Frame Relay network. The Burst Rate is not guaranteed and should not be used to measure the speed of the data lines.

- **Extensive Internet usage** on the network may adversely affect the operation of Bankway. Therefore, a separate line should be installed that is dedicated to Internet access.

Bankway Network Can Run in the Following Configurations

Servers

- Microsoft® Windows NT® 4.0 Server with Service Pack 6a
- Microsoft® Windows® 2000 Server with Service Pack 4 or later
- Microsoft® Windows® Server 2003

Novell

Novell Netware version 5.1 or greater

SQL Servers

Microsoft® SQL Server™ 2000 with Service Pack 3 or later

Workstations

- Microsoft® Windows NT® 4.0 Workstation with Service Pack 6a
- Microsoft® Windows® 2000 Professional with Service Pack 4 or later
- Microsoft® Windows® XP Professional with Service Pack 1a or later

Microsoft® Office Suites

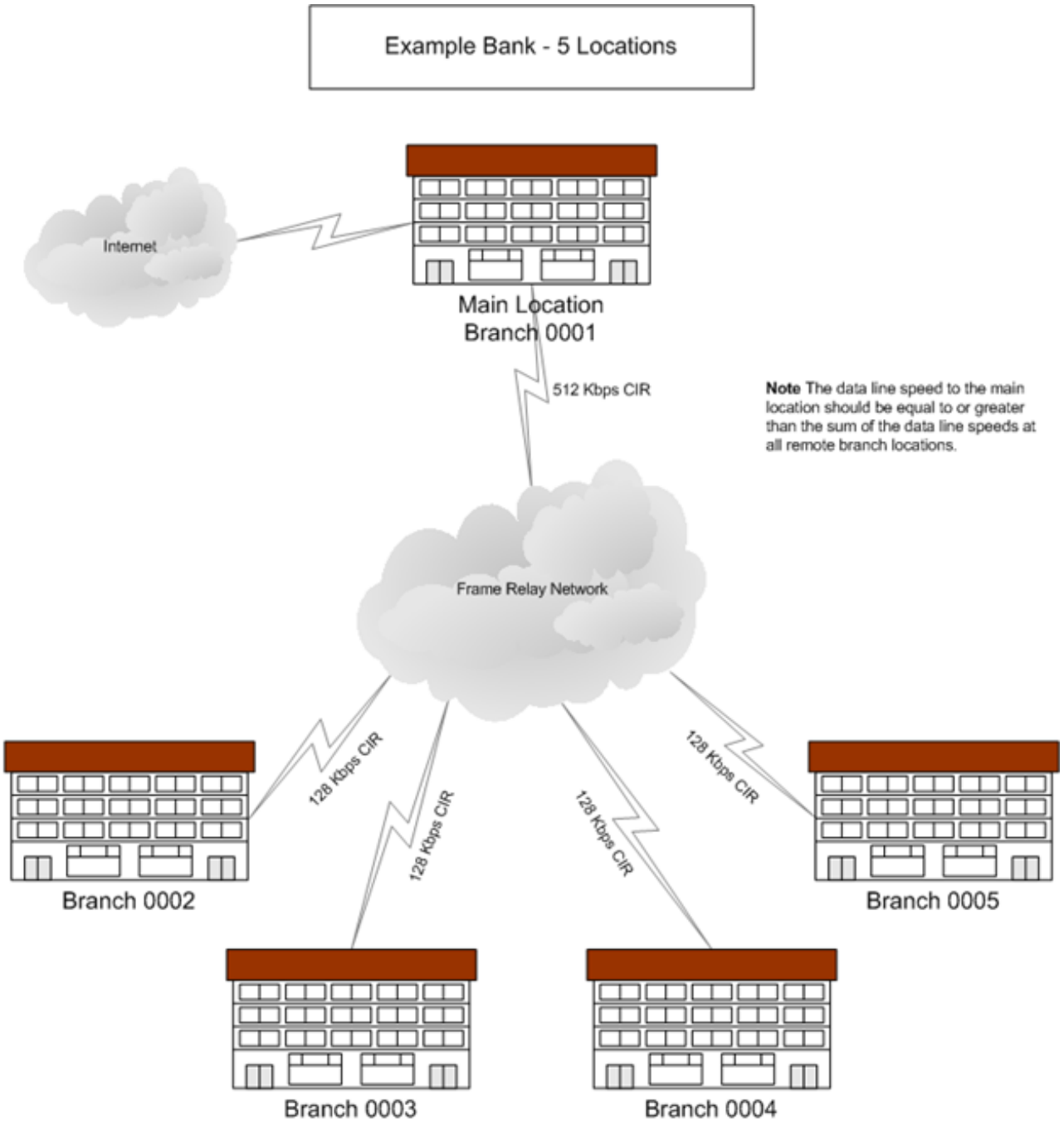
- Microsoft® Office 97 with Service Pack 2
- Microsoft® Office 2000 (standard or professional version)
- Microsoft® Office XP (standard or professional version)

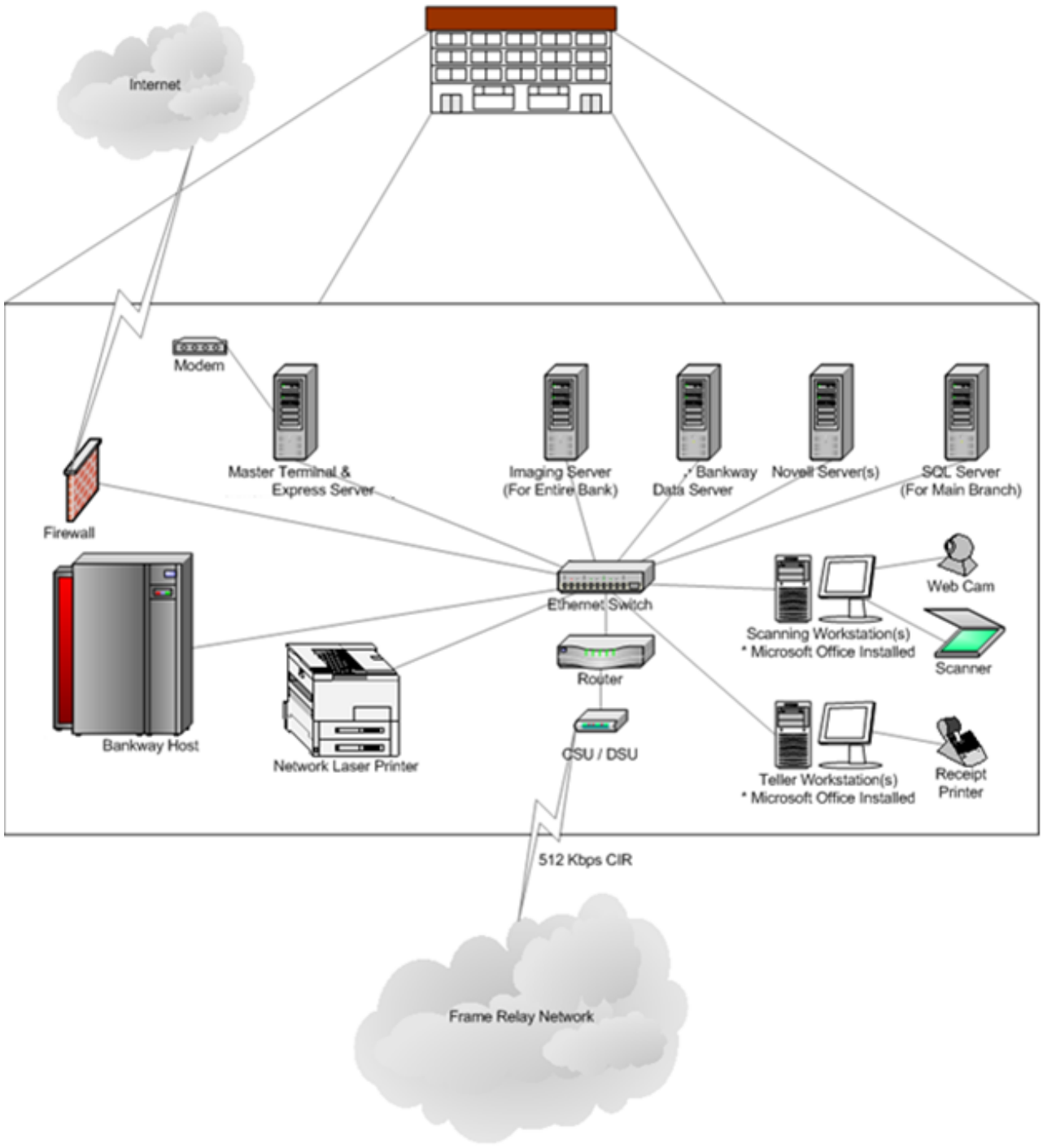
Note: *Microsoft® Internet Explorer 6.0 or higher is the certified Web Browser.*

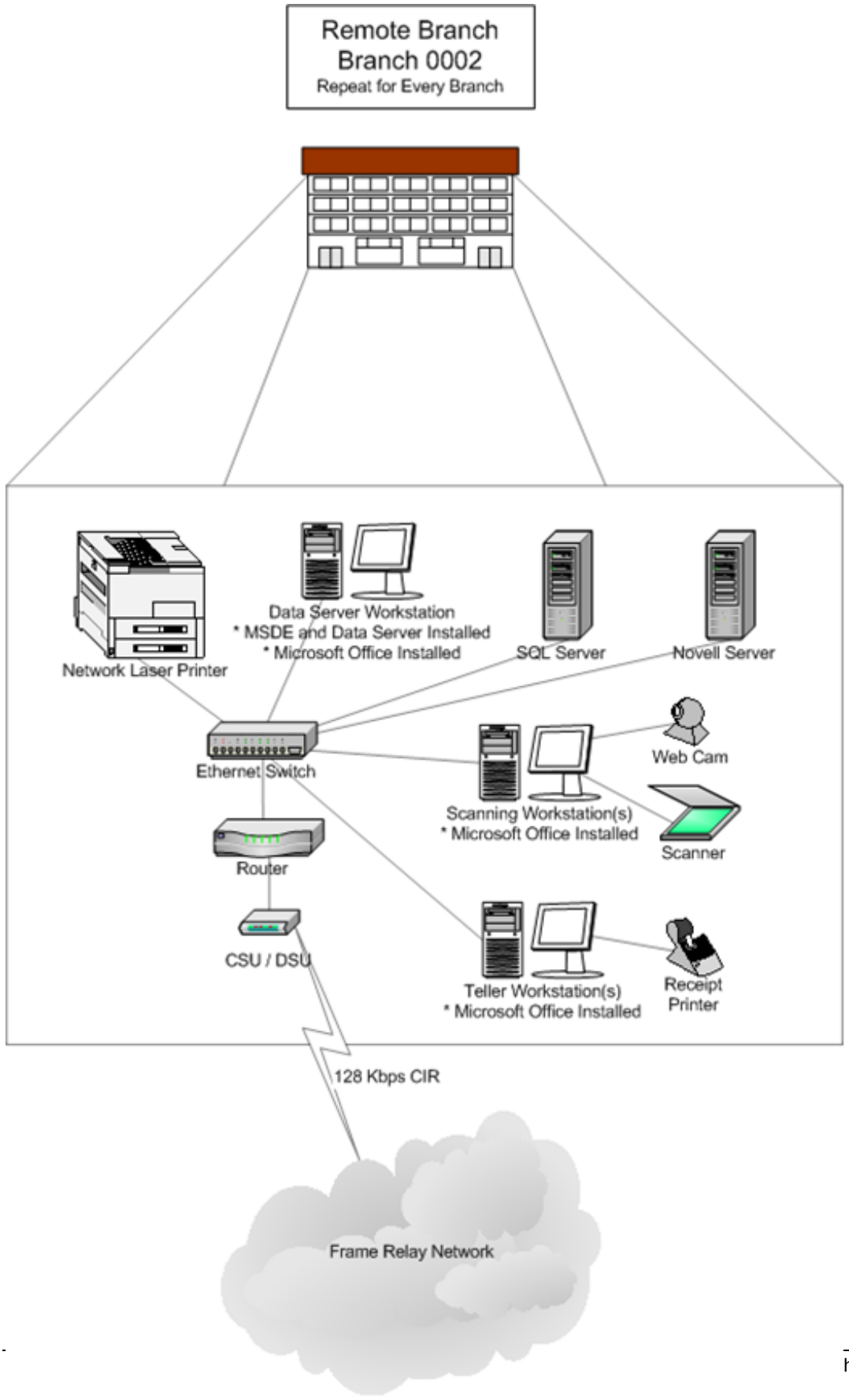
Microsoft® Office 97 cannot be used in an Active Directory environment.

A full install of Microsoft® Office is required on all workstations and the Master Terminal. To perform a full install, select Custom Install from the Office Installer Wizard. At the next screen, click the icon beside Microsoft Office and select Run all from My Computer.

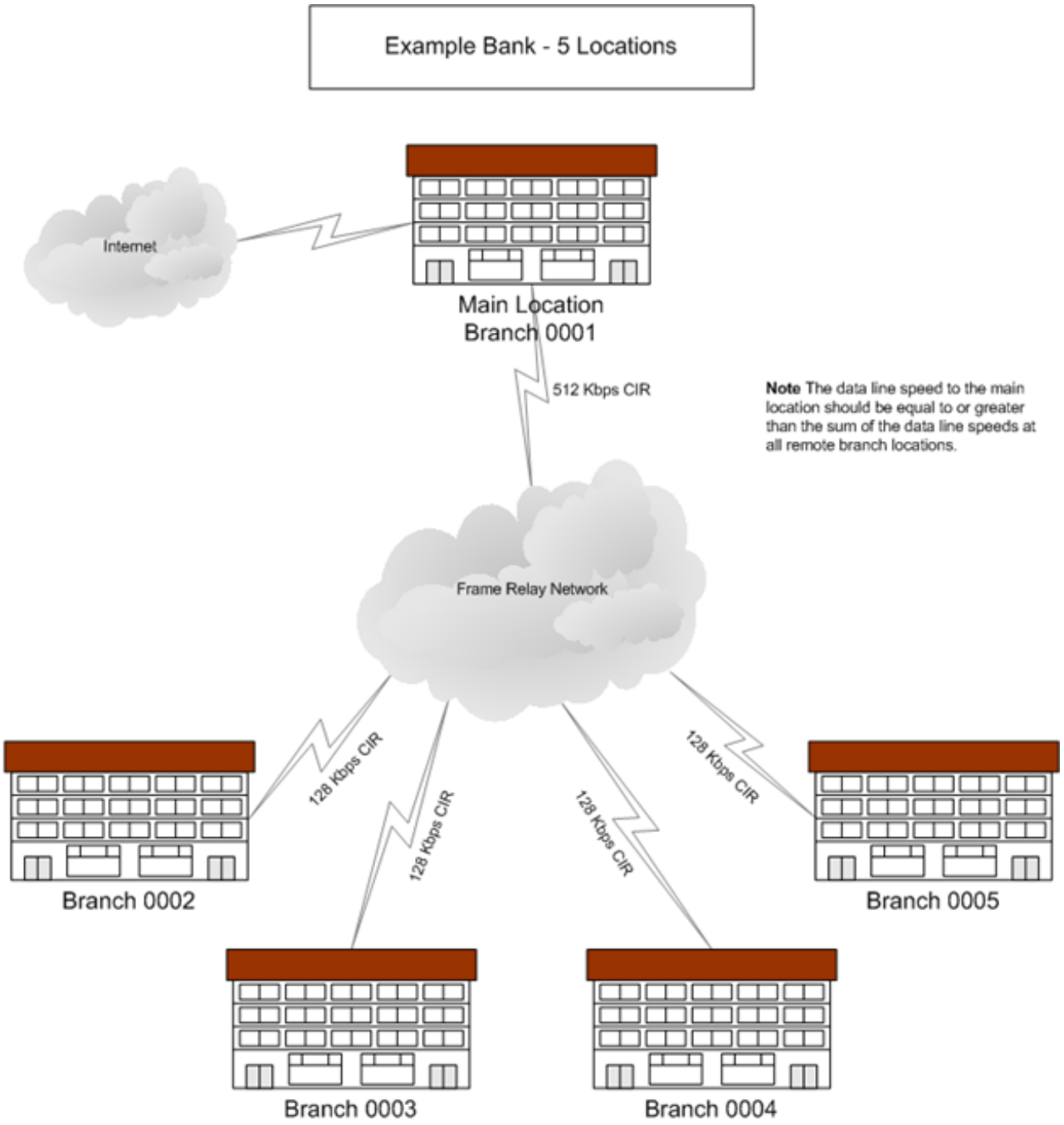
Sample of Client/Server Configuration (SQL)

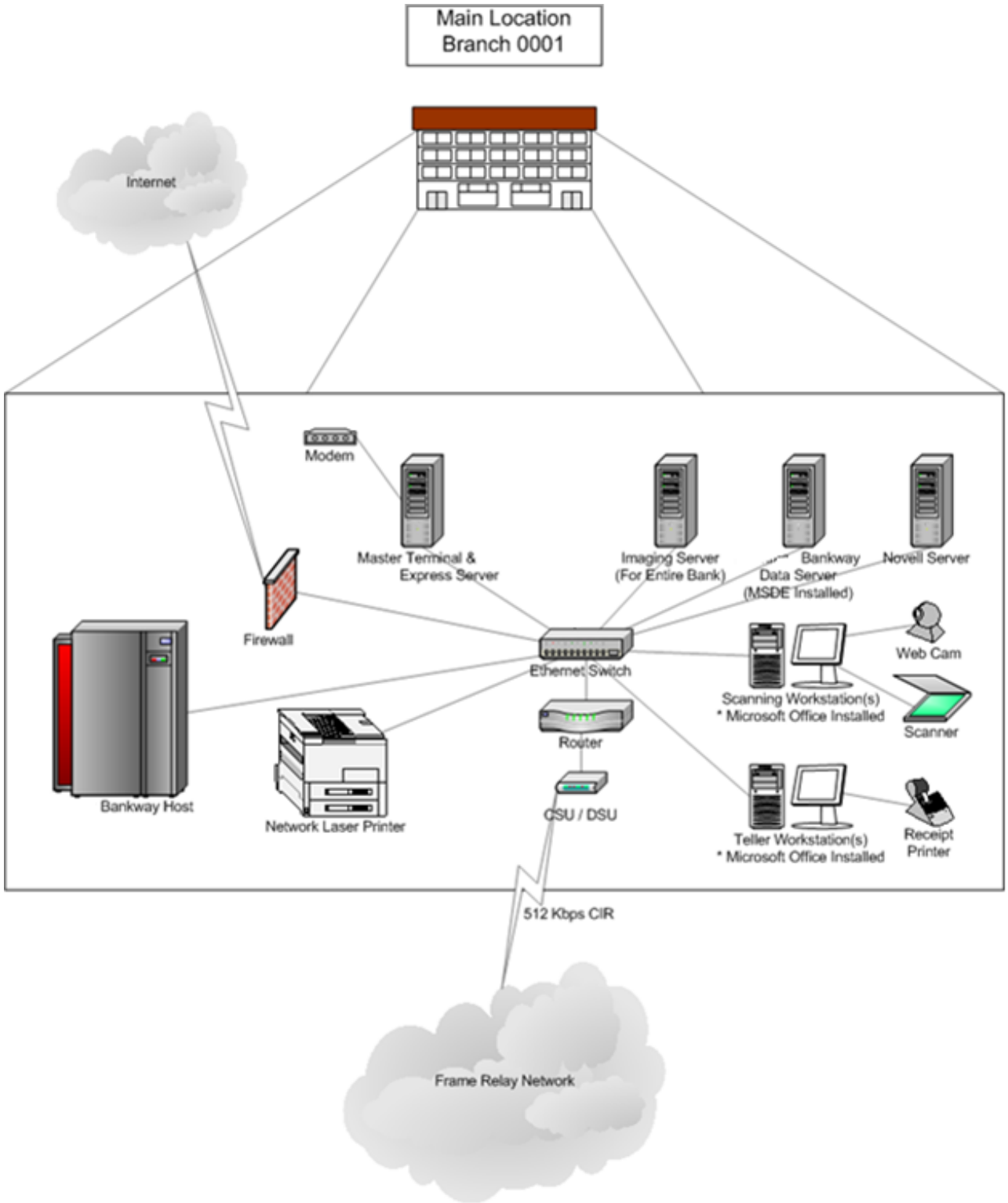



Internet
Modem
Master Terminal &
Express Server
Imaging Server
(For Entire Bank)
Bankway
Data Server
Novell Server(s)
SQL Server
(For Main Branch)
Firewall
Ethernet Switch
Web Cam
Scanning Workstation(s)
* Microsoft Office Installed
Scanner
Router
Bankway Host
Network Laser Printer
CSU / DSU
Teller Workstation(s)
* Microsoft Office Installed
Receipt
Printer
512 Kbps CIR
Frame Relay Network


Remote Branch
Branch 0002
Repeat for Every Branch
Network Laser Printer
Data Server Workstation
* MSDE and Data Server Installed
* Microsoft Office Installed
SQL Server
Novell Server
Ethernet Switch
Web Cam
Scanning Workstation(s)
* Microsoft Office Installed
Scanner
Router
CSU / DSU
Teller Workstation(s)
* Microsoft Office Installed
Receipt
Printer
128 Kbps CIR
Frame Relay Network

Sample of Client/Server Configuration (MSDE)

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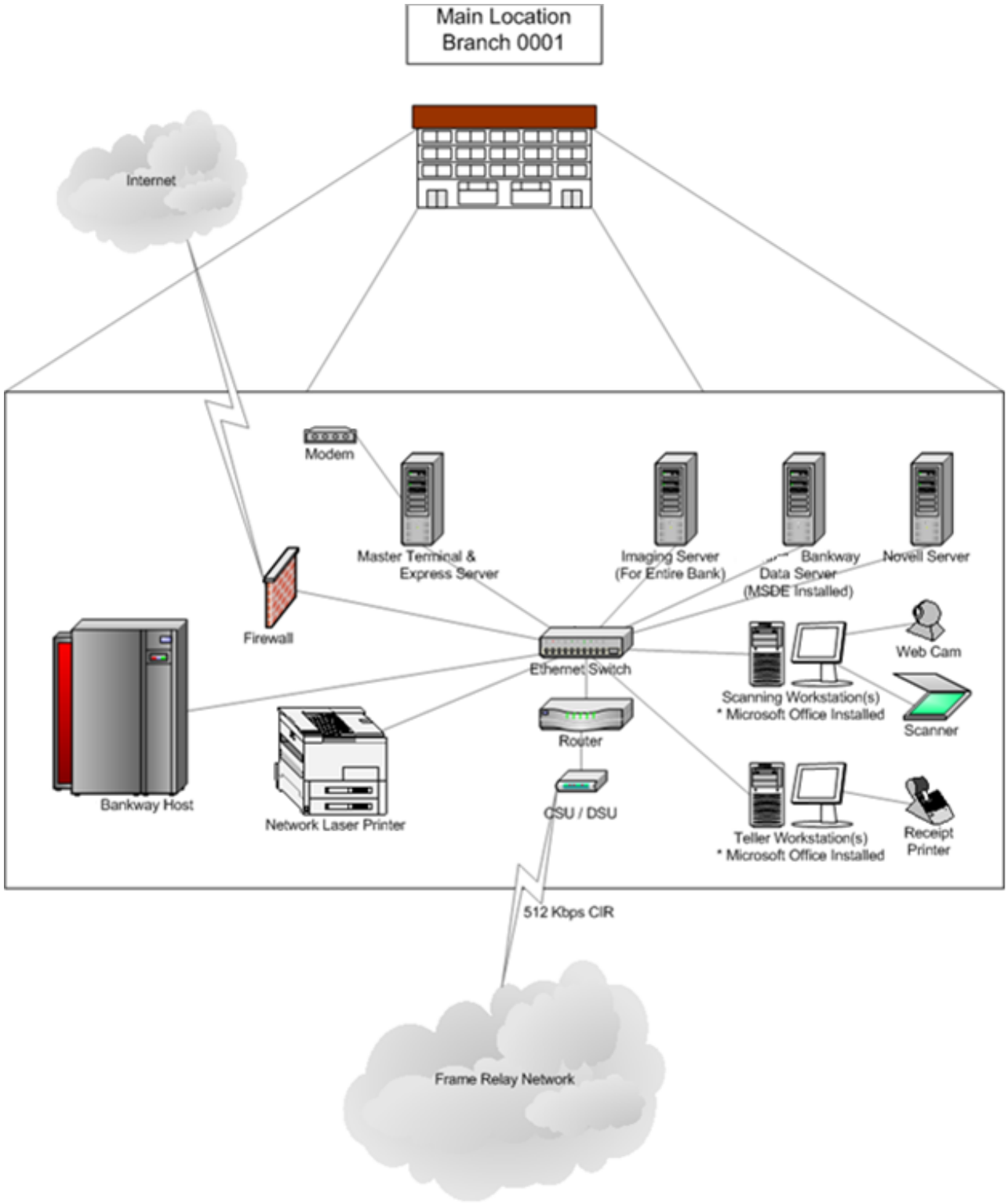
Receipt
Printer
512 Kbps CIR
Frame Relay Network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Receipt
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512 Kbps CIR
Frame Relay Network

Benefits and Challenges - Novell Environment

Benefits

- Retain current networking environment
- Do not need to replace current servers
- Do not need to replace current directory structure (NDS, eDirectory)
  - If one server fails, not all branches will be affected

Challenges

- More network management is required
- One workstation in each branch must run the Data Server service

Benefits and Challenges - SQL Server

Benefits

- Bankway native database format
- No dependence on Microsoft® Access databases
- Centralized management capabilities
- Database management tools
- SQL can be configured to inform IT personnel upon error

Challenges

- Continuous, reliable access to the SQL Server required at all times
  - Additional licenses required for the SQL Server
  - Additional training in a SQL Server required for IT personnel

Items to be Completed before the Installation of Bankway

Network

- Install Network Cabling at all locations / branches
- Create Novell domain directory / user structure
- Install WAN Data Lines to all locations / branches and data center
- Install routers and switches in all locations
- Firewall
  - Open port for Bankway Express - Check with your Network Certification Specialist for the port requirements.
  - Open ports for Symantec pcAnywhere - Check with your Network Certification Specialist for the port requirements.

Host

- Install IBM WebSphere MQ v5.2 or greater
- Install all require PLUs/PLMs
- Sun Solaris – Cornerstone Installation of Host Software by FIS Systems Programmer

DNS and/or WINS

- Add Bankway (Service Level 8 and later) - Host
- Add Dimension (pre-Service Level 8) - Host
- Add DimImageServer - Bankway Imaging Server

Bankway Servers

- Have the Bankway Service Level CD available
- Have the Bankway Express Site Manager CD available
- Install all Novell servers and configure security settings
- Verify that no servers are named ‘Dimension’ or ‘Kirchman’
- SQL Server
  - Install Microsoft SQL Server 2000 with Service Pack 3 or greater
- Master Terminal

  - Meets hardware requirements
  - Modem and telephone line
  - Install Windows 2000 Server or Windows NT 4.0 Server
  - Install most current Service Packs - Check with your Network Certification Specialist for the currently supported Service Packs for Microsoft Windows and Microsoft Office.
- Microsoft Office
  - Perform full-installation by selecting 'Complete' or 'Run all from my computer'
  - Install most current Service Packs
- Verify Internet Access
- Verify ability to print to a network printer
- Install Symantec pcAnywhere v9.2 or greater - Host and Remote version
- Verify ability to connect to Master Terminal via Symantec pcAnywhere
- Install Green Screen emulation software (required)
- Install MSDE
- Branch Servers
- Meets hardware requirements
- Install Windows 2000 Server or Windows NT 4.0 Server
- Install most current Service Packs - Check with your Network Certification Specialist for the currently supported Service Packs for Microsoft Windows and Microsoft Office.
- Install pcAnywhere v9.2 or greater
- Install MSDE (If not taking advantage of SQL)
- Imaging Server
  - Meets hardware requirements
  - Install Windows 2000 Server
  - Install most current Service Packs - Check with your Network Certification Specialist for the currently supported Service Packs for Microsoft Windows and Microsoft Office.
  - Install Symantec pcAnywhere v9.2 or greater
  - Copy 'I386' folder from Windows 2000 Server CD to local hard drive
- Create local imaging user account, 'DimImageUser'
  - Set server security policy to allow ‘DimImageUser’ to log on locally

Workstations

- Microsoft Windows 2000/XP
  - Add 'Domain Users' to the local 'Administrators' Group
  - Install most current Service Packs - Check with your Network Certification Specialist for the currently supported Service Packs for Microsoft Windows and Microsoft Office.
- Microsoft Office
  - Perform full-installation by selecting 'Complete' or 'Run all from my computer'
  - Install most current Service Packs - Check with your Network Certification Specialist for the currently supported Service Packs for Microsoft Windows and Microsoft Office.
- Install Green Screen emulation software (optional)
- Physically install teller printers - Do not install Windows printer driver
- Verify ability to print to a network printer

Networking Solutions

FIS Banking Solutions can provide your bank with the required network design, installation, and support for Bankway. We provide the following services:

- Analysis of your bank’s current environment
- Network design
- Hardware planning and acquisition
- Multi-hardware vendor flexibility
- Installation of network and associated software
- Security
- Single point of contact for network issues and equipment maintenance

Please contact your Strategic Account Manager for more information regarding the above listed services.