



Electronic Fax Services for Enterprise Messaging at Dell

By Lisa Larson

Electronic fax capabilities provide important services for both mission-critical and business-critical functions within organizations. This article describes the Dell experience in rolling out electronic fax capabilities throughout the corporation.

Dell Computer migrated to the Microsoft Exchange platform for its corporate messaging services during 1998. To complement the messaging capabilities within Microsoft Exchange, Dell needed to incorporate an electronic fax solution to enhance customer support. In addition, Dell had an increased need for development of custom sales and workflow applications that utilize the messaging and fax server transport.

Dell's search for an electronic fax solution considered several key business requirements:

- The ability to receive faxes in electronic format in preparation for workflow applications
- The ability to support telecommunications protocols of Direct Inward Dialing (DID) and Dialed Number Identification System (DNIS) for routing of incoming electronic faxes
- Client/server application interface functionality
- Ability to proactively monitor Windows NT services
- Scalable platform that could keep pace with Dell's rapid growth worldwide

Integrating with Microsoft Exchange

Dell searched for a single electronic fax solution that could solve a variety of business problems, but it was also important to identify a platform that could be easily integrated with the existing Microsoft Exchange messaging environment.

Seamless integration allows users to send and receive faxes through the Microsoft Outlook® client without installing software on the desktop or providing extensive training for users to begin using the electronic fax service.

The Dell Fax Solution

Dell chose Fax Sr. from Omtool Inc. (www.omtool.com) to provide inbound and outbound fax services to Microsoft Exchange users and application development teams. Fax Sr. met all of the key business requirements including integration with the Exchange messaging platform.

Electronic fax services use several infrastructure components, including telecommunications technology, digital modem cards, a fax server, and the Microsoft Exchange messaging platform that work together to produce an electronic fax service. This infrastructure makes sending and receiving faxes transparent to Dell customers. Customers continue to send their purchase order faxes to the same telephone number, but they get better customer support because the fax is now stored electronically and can be retrieved by any department as needed. In addition, the time required to prepare a fax and send it through the electronic fax service is significantly less than using a traditional fax machine. Therefore, this process reduces the amount of time from requesting an order to receiving a shipment from Dell.

Inbound Faxes

Inbound faxes are initiated by a customer sending a fax to a telephone number that is part of the electronic fax service. The user goes to the fax machine, dials a fax telephone number, sends the fax, and waits for a fax confirmation. If the telephone number that receives the fax is part of the electronic fax service, the fax is routed via the telephone carrier to a special T1 telecommunications line connected to a fax digital modem card. The digital modem card picks up the call, recognizes a fax signal, makes the interchange, and begins accepting the fax.

After the fax has been received by the digital modem, a confirmation is sent back to the user's fax machine and the fax is handed to the fax server for processing. The fax server links the telephone number dialed to a particular Simple Mail Transfer Protocol (SMTP) address by using a combination of Lightweight Directory Access Protocol (LDAP) lookup within the Exchange Directory and the Fax Sr. user database.

The fax is saved as a .tiff file attachment within an e-mail message and sent via the fax server gateway on a Microsoft Exchange server to the fax recipient using the SMTP address obtained during the telephone number/Exchange directory or Fax Sr. user database lookup. The fax recipient can be either an Exchange mailbox or an Exchange public folder. An image viewer, such as the Wang Image Viewer, allows the fax to be viewed and printed. Figure 1 shows how a fax is routed once it enters Dell.

Outbound Faxes

Outbound faxes are initiated by a user within Dell by creating a business fax contact within Microsoft Outlook. After creating

a Microsoft Outlook contact for the customer, the sender starts a new e-mail message in Outlook and addresses it to the business fax address. Like any e-mail message, the sender completes the fax by filling in the subject line, attaching any documents that need to be faxed, then clicking the Send button.

The message is intercepted by a dedicated fax server gateway on a Microsoft Exchange server and routed to the fax server. Fax Sr. opens each attachment and converts the attachment to a .tiff image. After this conversion takes place, a cover page is added and the fax is handed off to the digital modem. The modem dials the recipient fax telephone number, listens for a fax signal, and sends the fax to the recipient's fax machine. After the fax has been sent successfully, the fax server sends a confirmation to the sender via e-mail.

If the fax transmission fails after three attempts, a failure notification is routed to the sender via e-mail. This failure notification indicates whether the fax failed because of a busy signal, no answer, or the telephone number dialed was not a fax telephone number. Figure 2 shows the route of a fax from the Outlook client to the customer fax machine.

The Dell Fax Architecture

The architecture for Dell's fax infrastructure supports two main business functions: electronic fax to support sales, and electronic fax via e-mail to replace the use of traditional fax machines.

Fax Service Design: Mission Critical vs. Business Critical

The portion of Dell's e-fax service that supports the sales segment is critical to Dell's business. Therefore, the fax infrastructure architecture must provide a high level of

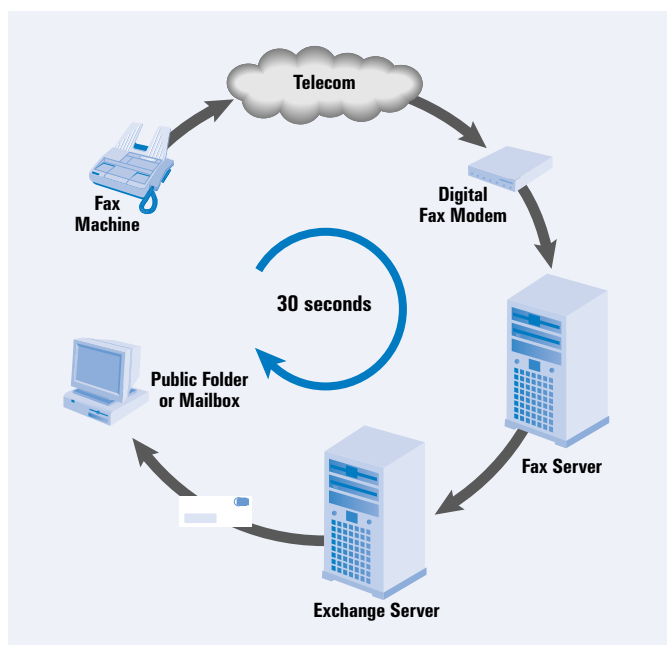


Figure 1. Inbound Routing

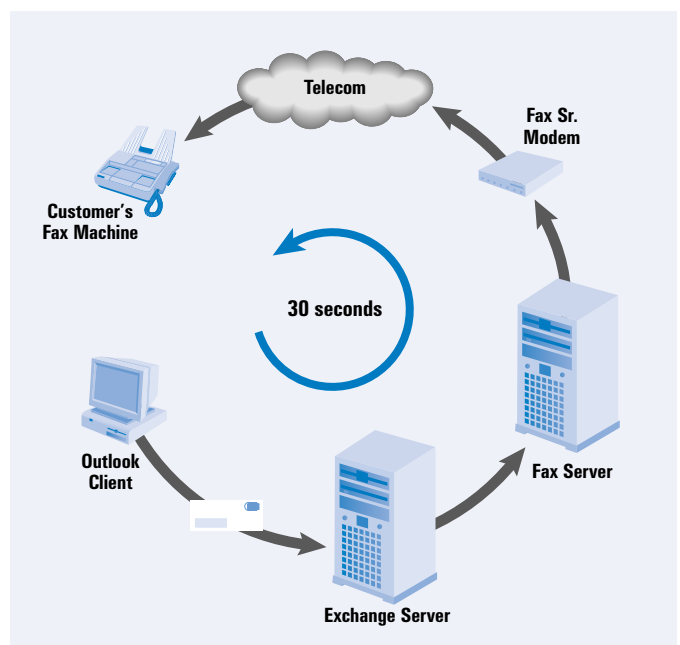


Figure 2. Outbound Routing

redundancy and availability. Key considerations for this architecture design include:

- Modem capacity to accept incoming fax calls at peak hours of utilization so that even during peak hours, Dell customers do not encounter a busy signal
- High level of redundancy and failover capabilities within the infrastructure
- Toll-free telephone number support using the telecommunications DNIS for routing of inbound faxes
- An available repository for electronic fax documents for design of workflow applications
- Ability to automatically print fax documents on a network printer as needed

Dell's e-mail fax service is a business-critical application; therefore, it does not have the same high level of redundancy and availability requirements as the architecture to support the sales segment. Key considerations for the e-mail architecture design include:

- Adequate modem capacity to handle incoming and outgoing fax calls
- Ability to support least-cost long-distance routing to other Dell regions for international calls
- Local telephone number support using DID for routing the inbound faxes

Figure 3 shows Dell's fax architecture for the Austin facility.

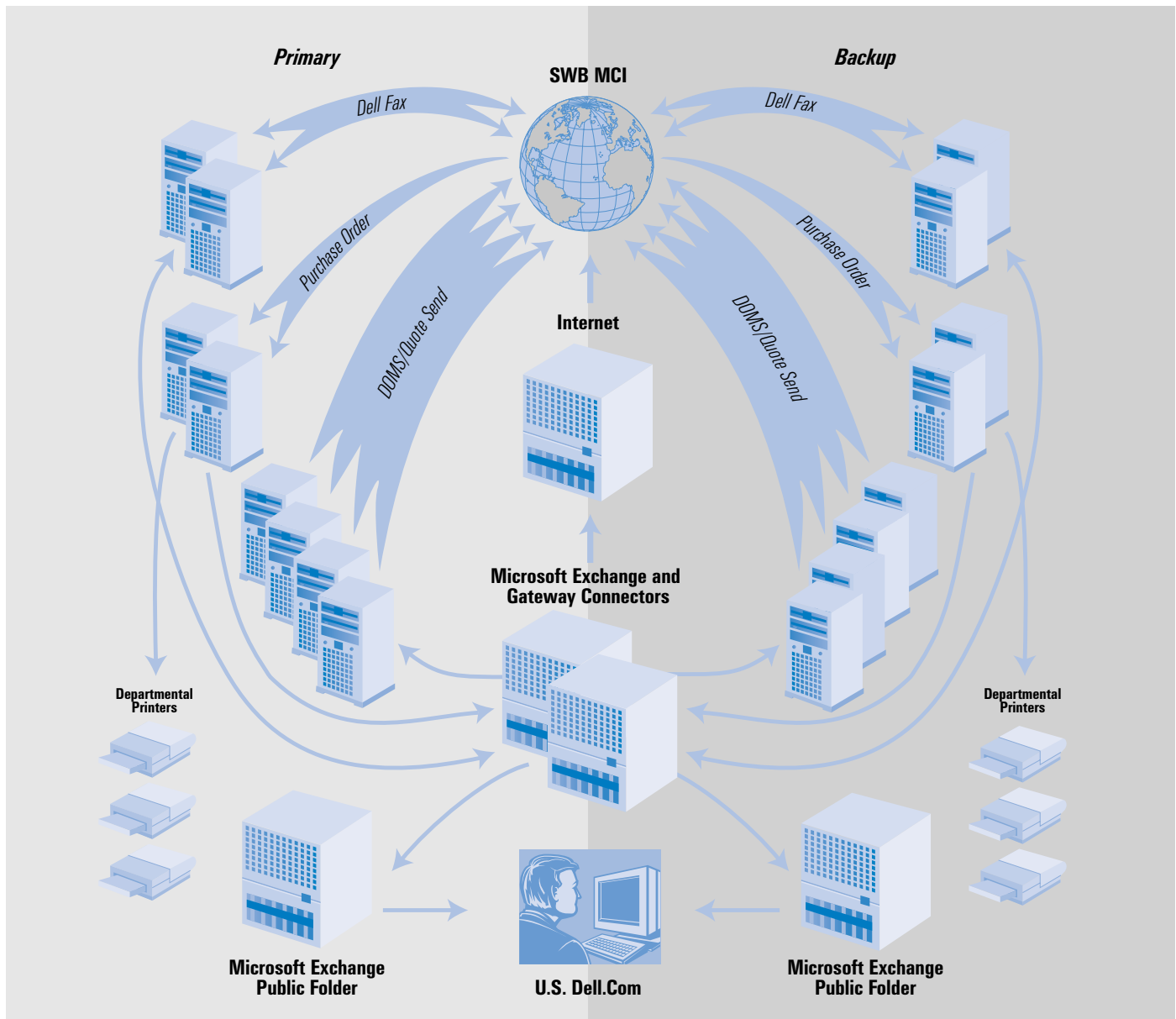


Figure 3. The Dell Fax Architecture

Monitoring the Environment

AppManager[®]3.1 from NetIQ[®] Corporation (www.netiq.com) provided the necessary proactive platform management. AppManager knowledge scripts were written to proactively monitor the Fax Sr. Windows NT services, including:

- Digital modems
- Fax Sr. inbound/outbound directories
- Core Fax Sr. services
- Fax Sr. gateway for Microsoft Exchange
- Public folder messaging queues
- Server hardware, such as disk space

Proactive platform management of the fax server environment allows diagnosis and correction of problems within the core infrastructure components before they impact mission-critical sales applications.

An AppManager knowledge script is structured code that executes when a particular event occurs. Knowledge scripts can be configured to automatically restart Windows NT services or notify support teams of Windows NT services that are not functioning properly. For example, a knowledge script to monitor the Fax Sr. gateway service for Exchange queries the inbound and outbound directory folders on a periodic basis. If the number of files within those folders reaches a certain threshold, the knowledge script sends a page to notify the messaging support team of a potential problem with the service. The support team can then work to quickly resolve the issue before it impacts the sales organization.

Capacity Planning

The Dell team, including the application development team, worked closely in defining the infrastructure requirements for the Dell fax platform and periodically reviews these requirements. This helps the team anticipate increased use of the fax servers for new workflow and sales applications.

Additionally, Fax Sr. provides reporting tools to monitor modem use and identify peak periods of utilization. This enables Dell to add capacity before peak periods of utilization become unacceptable. Figure 4 shows modem utilization for various times of day.

Streamlining for Future Growth

Today, Fax Sr. has been deployed globally in all major Dell regions to provide e-fax services. By deploying a single fax product worldwide, Dell can take advantage of least-cost routing capabilities within the product to route faxes via the network, which minimizes long-distance telephone costs when sending the fax.

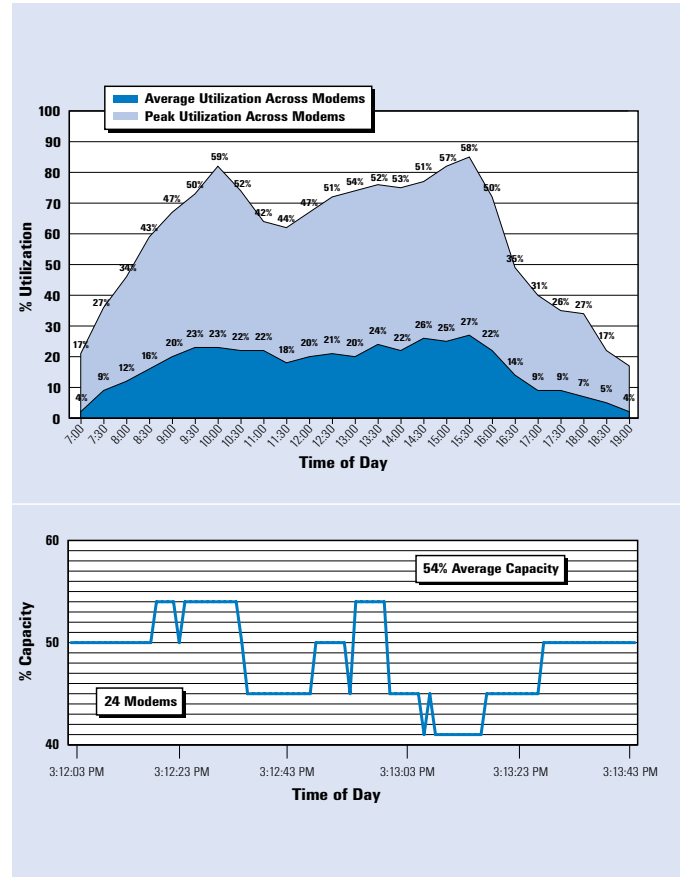


Figure 4. Modem Utilization

In Dell Austin alone, a total of 16 Fax Sr. servers support sales and e-mail fax users. These 16 servers send and receive 486,000 fax pages per month.

For application development, an electronic fax service is the first step in creating a workflow application to automatically route customer purchase orders sent via fax through Dell's order-entry process. This is done by combining electronic fax with Exchange public folders and workflow software.

Another development area is the ability to fax electronic quotes to customers via a Web interface, then have the quote sent via the messaging transport to the Fax Sr. server. This service is available now to the Dell sales force. It has significantly reduced the amount of time required to send outgoing faxes and for Dell customers to receive fax quotes. ♦

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