

Business Continuity and Open Text Fax Server

Open Text Fax & Document Delivery Group
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Abstract

In this white paper, you will learn how to configure your Open Text Fax Server to handle any kind of system fault. These faults often take the form of failed hard drives and power supplies, broken network links, or third-party service outages. Understanding how to recover from these problems in advance will ensure that you can continue to send and receive business-critical faxes regardless of the unforeseen issues that everyone experiences.

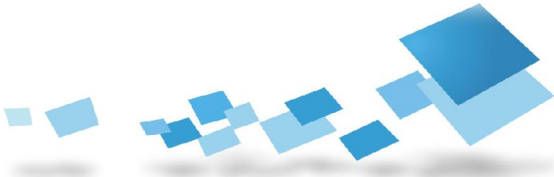
Highlights:

- Understanding the Terminology of Redundancy
- Providing Redundancy at the Component Level
- Providing Redundancy at the Systems Level



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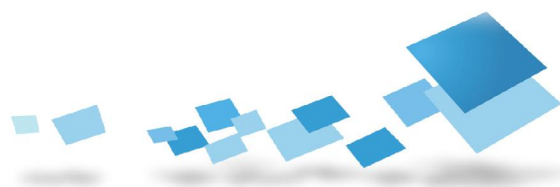
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Introduction

An organization's document-based communications infrastructure is a critical component of its ability to do business as efficiently and effectively as possible. The consequences of having those communications disrupted for even a short amount of time can have a significant impact from customer service, regulatory, or financial perspectives. Designing a communications system that allows for the inevitable failure of individual components ensures that your business will not suffer when that time comes.

Any communications system configuration designed to accommodate for failover and redundancy can be complicated and potentially confusing. This document will help you gain a more complete understanding of the options available to you when building out your faxing infrastructure. It will also discuss the various points of failure and the appropriate process for recovery.



Business Interruptions

Business interruptions can be caused by a variety of incidents. Corrupted databases, network failures, and equipment downtime can all bring an organization to a complete halt. Additionally, disruptions can be caused by disasters such as floods, storms, fire, or even terrorist attacks. The risks are real. That's why organizations must consider disaster recovery measures and ensure that all mission-critical applications are redundant in some way.

For many organizations, the fax server is an essential component of their business. The fax server typically performs the crucial task of distributing time-sensitive documents as well as initiating business processes and conducting transactions. As businesses increasingly depend on document-based communications, the need to implement fax server redundancy becomes more apparent.

Business continuity terminology

Any discussion of business continuity quickly descends into a collection of confusing jargon. You may hear terms like fault tolerance, redundancy, load balancing, replication, and more. To make things more confusing, many companies define these terms differently and even make up new terms in their place. The following shows how Open Text defines these terms:

Business Continuity Plan: A plan defines how an organization recovers from partial or complete disruptions of business-critical services.

Fault Tolerance: A fault-tolerant system will continue to function even if a component of that system fails.

Load Balancing: Distributing a workload across two or more resources to minimize response time while not overloading any single system.

NAS/SAN: A Storage Area Network (SAN) allows for attaching remote computer storage to servers so that they appear to be local. Network Attached Storage (NAS) uses file-based protocols such as SMB, making it obvious that the storage is remotely connected. Both SAN and NAS can support clustering, fault tolerance, and redundancy.

Redundancy: A redundant system has back-up components in place in case of a component failure.

Replication: Replication is the process of duplicating information between redundant systems to ensure data consistency.

Scalability: A scalable system can take advantage of additional resources as they are implemented to handle additional load or increased fault tolerance.

Virtualization: Virtualization refers to the abstraction of computer resources, usually through virtual machine services provided by companies such as VMware.



Fax Server Continuity Configurations

Organizations can take several approaches to protect fax communications and maintain availability of faxing services in the event of a server failure. Open Text Fax Server is designed to be fault tolerant and redundant both at the level of its own internal components and as a whole across multiple similarly configured systems. It is not just a matter of choosing one of the options below and claiming to have a fault-tolerant system. Instead, organizations should implement redundancy using a mixture of options that make the most sense for them.

Component redundancy

Component redundancy takes advantage of Open Text Fax Server's multi-layer architecture to help mitigate system failures. Components at the different layers can be made redundant, allowing any single piece to fail while continuing to allow faxes to be sent and received with effectively no downtime.

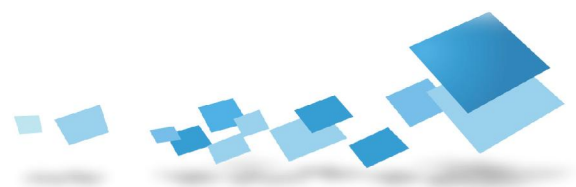
Redundancy with data storage components

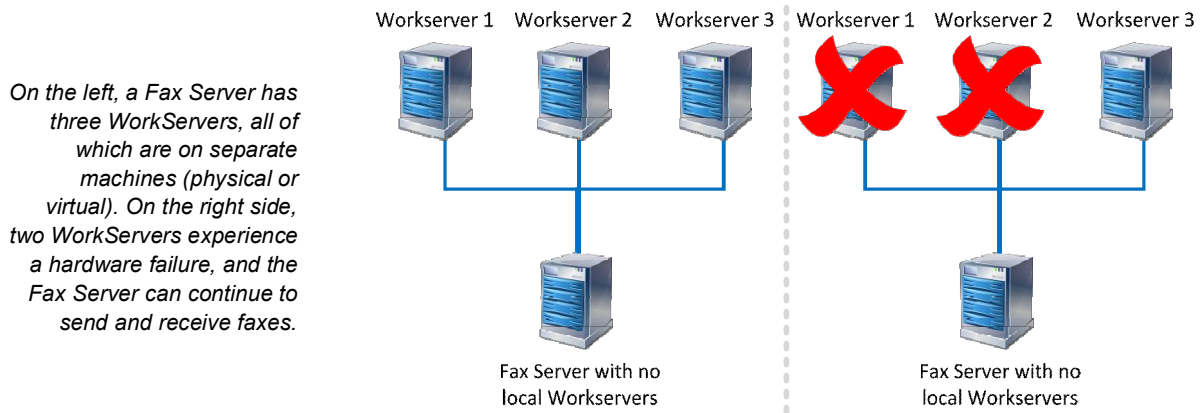
The first layer where many customers choose to implement redundancy is the data storage layer. This is where Fax Server stores image files, metadata, and configuration information about its users and their faxes. This information is stored in two primary locations: on the file system and in the tables of the database. While they are not components that are supplied by Open Text, they are absolutely essential to the health of the fax server.

Redundancy for the file system comes in the use of technologies such as Storage Area Networks, Network Attached Storage, or some of the features provided by the Microsoft Windows Server family of products, such as the Distributed File System. This capability has usually already been implemented by an organization, allowing Fax Server to leverage that infrastructure. The database used by Fax Server is Microsoft SQL Server, and that too has fault-tolerant configurations that Fax Server can take advantage of. However, if the SQL Server ever completely goes down, faxes cannot be sent or received.

Redundancy with processing components

One of the primary tasks at the heart of Open Text Fax Server is the conversion of documents. While faxes are always sent from the server as TIFF images, the users who send them often are working with more common desktop formats, such as Microsoft Word, Excel, PowerPoint, and others. It is the job of the WorkServer services inside of Fax Server to manage the conversion from hundreds of different document types to TIFF. Depending on how a business uses Fax Server, the WorkServers could become the most power-hungry component or the largest bottleneck of the entire system. For that reason, the WorkServer process can be spread across up to 15 physical or virtual machines accessible on the network.





Each WorkServer can be individually configured to only process coversheets, attachments, or perform optical character recognition on incoming and outgoing faxes. They can also be configured to perform the same functions, providing an extremely fault-tolerant implementation; even the unlikely event of 14 simultaneous hardware failures wouldn't halt the processing of any documents. Although Fax Server supports up to 15 WorkServers, most customers will only implement 3–6 WorkServers per installation.

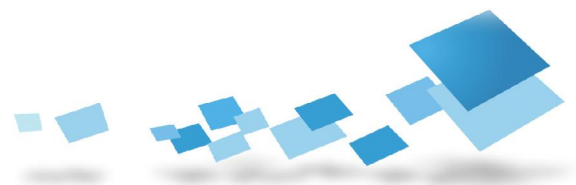
Process for failover

WorkServers generally have no visibility in the overall process of sending and receiving faxes. They simply complete tasks as they are assigned. These tasks include managing the conversion of documents, performing optical character recognition, and archiving and deleting older faxes. When a WorkServer is available, it makes a request to the Fax Server for a new job. Based on its service configuration, the WorkServer will be assigned a task. Each WorkServer works on its task until completion, at which point the Fax Server is notified, and the next task can be assigned.

Out of the box, three WorkServers are configured. The most important types of tasks are configured to be executed from two of the WorkServers, with some of the other, less important tasks being performed by the third WorkServer. When a WorkServer fails, it no longer makes new requests for tasks. If a WorkServer is midway through a task when it fails, that task will end up in a failed state. If that task happens to be a conversion, the fax will need to be recreated, but this happens very rarely.

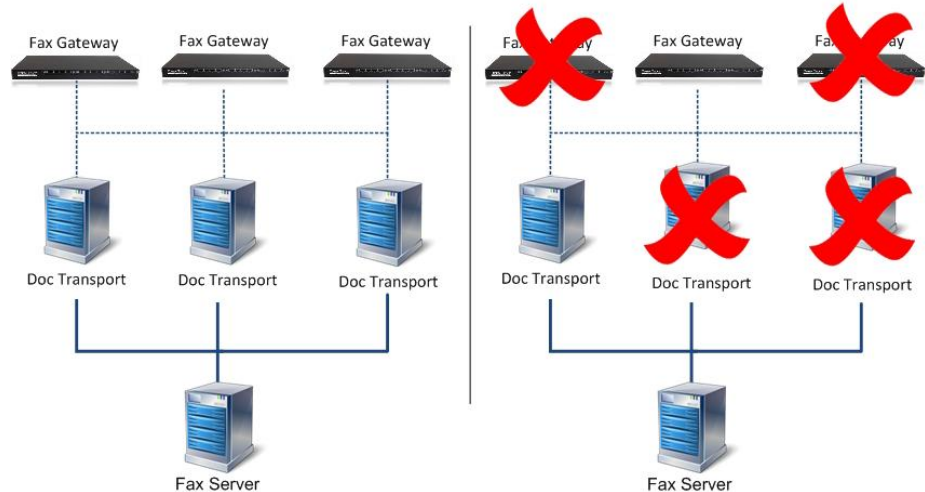
Redundancy with transport components

When it comes to the Fax Server, the word “transport” is used to describe all of the components that directly work with the public switched telephone network (PSTN) or your Fax over IP/Voice over IP infrastructure. The primary transport component is the DocTransport module, which, which manages the connection with the fax boards provided by Dialogic (also known as Brooktrout or Cantata), but in a Fax over IP



(FoIP) environment this could also extend out to multiple fax gateways. This extension provides additional redundancy at the PSTN connection since the fax gateway is the device that converts information from your data network to something that the phone company can transmit.

The Fax Server on the left has been implemented with three Remote DocTransports (physical or virtual), each of which connects to a preferred Fax Gateway. On the right, two DocTransports experienced a hardware failure, but fax transmission continues as normal.



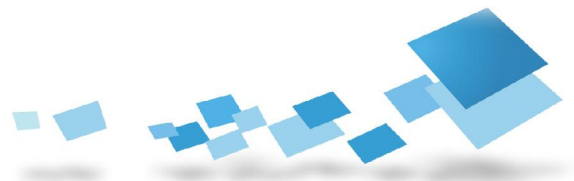
Up to 16 Remote DocTransport (RDT) servers can be configured to work with a single Fax Server, supporting a maximum of 1024 channels per Fax Server. As faxes are prepared for transmission by the WorkServers, DocTransports look for newly converted documents to send. If one Remote DocTransport server fails, the other RDT server will handle the additional load. When sending faxes in a FoIP environment, new levels of redundancy are introduced. In fact, several DocTransports and gateways could fail and all faxes would continue to be sent and received with little or no disruption.

Process for failover

Outgoing faxes

When a fax is ready to be sent from the Fax Server, it is sent to a DocTransport server for delivery. This DocTransport could be local to the Fax Server, or it could be a Remote DocTransport server (sometimes referred to as a Remote BoardServer, based on the name of the legacy module for this function). If only a single local DocTransport is configured, there is a single point of failure. If the machine running the Fax Server with DocTransport fails, all faxing stops. To avoid this, multiple DocTransports are usually configured. This configuration could be a local DocTransport combined with RDTs, or a collection of multiple RDTs with no local DocTransport. The process at failover is identical regardless of whether the DocTransport is local or remote.

For outgoing faxes, the DocTransport performs in a very similar way to the WorkServers. When the DocTransport is not sending or receiving information, it makes a request to the Fax Server for new faxes to be sent. It makes this request every 10-15 seconds. If the DocTransport fails, it simply does not make any more



requests to the Fax Server. If it is the only DocTransport, then no more faxes will be sent. However, if there are other DocTransports, they will continue to make requests, and faxes will be sent.

In the FaxUtil client, there are two status messages that are related to sending a fax. “Scheduled to be Sent” occurs when the fax has been assigned to a DocTransport, but transmission has not yet begun. “Sending” comes next when the fax actually is being sent. If the failure occurs when the fax is “Scheduled to be Sent”, the Fax Server will see that the DocTransport is no longer available and change the status to “Waiting”. When another DocTransport becomes available, it is “Scheduled to be Sent” on the second DocTransport. If the failure occurs during the actual transmission, the fax will attempt to send again on a new DocTransport after the retry period, which defaults to every five minutes.

If the DocTransport is using a Brooktrout board connected directly to the PSTN, a failure at the PSTN would result in a retry five minutes later. Similarly, if the Dialogic drivers have an issue, the fax will retry in five minutes.

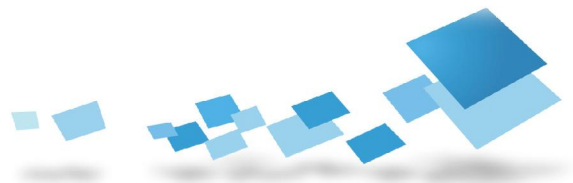
If the DocTransport is configured to use Fax over IP (FoIP), either with a hardware board or the SR140, it will need to communicate with a fax gateway over the IP network. The easiest way to configure the Dialogic drivers is to communicate with a single gateway, but multiple gateways can also be configured through the use of dialing rules. When gateway failover is configured and one of the gateways fails, the DocTransport will attempt to contact the default gateway. When it does not complete, the first dialing rule will be disabled, and the second gateway will be used. When the first gateway is recovered, it is up to the administrator to re-enable the first dialing rule.

There are other methods of enabling failover for gateways based on the tools available from the gateway manufacturer. Configuring those methods is outside the scope of this document.

Incoming faxes

The first point of entry for an incoming fax is the gateway when using FoIP, or the DocTransport. If the line the fax is coming in on is connected to a failed gateway or DocTransport, it will encounter a busy signal. When those initial points of entry fail, it is important to replace them as quickly as possible. Replacing a fax gateway, such as Open Text’s own line of fax gateways, is simple and, if it has been preconfigured, is only a matter of plugging in all the cables and letting the device work.

If the DocTransport fails in a FoIP scenario, the fax gateway needs to be configured for failover so that it tries different DocTransports before eventually disconnecting the call. The various supported gateway manufacturers all have different options for configuring this, so it is thus outside the scope of this document. Open Text’s line of fax gateways can be configured through proxy sets. Multiple DocTransports can be added to a proxy set and then enable the gateway for proxy hot swap. When a DocTransport fails, the gateway will try to connect to it three times (this is configurable). When it cannot reach the first DocTransport, the gateway will try the next DocTransport. If the gateway cannot find a working DocTransport, the call will fail.



It may be surprising, but the Fax Server could fail, and faxes will continue to be received, assuming there is at least one Remote DocTransport. When a fax is received without a Fax Server to process it, the Dialogic drivers create a series of IPK files in the driver's directory. When the Fax Server comes back online, the IPK files will be transferred to the Fax Server, and the fax can be processed. Although the Fax Server can be down, the SQL Server must be running. Otherwise, the sender will simply get a busy signal.

System redundancy

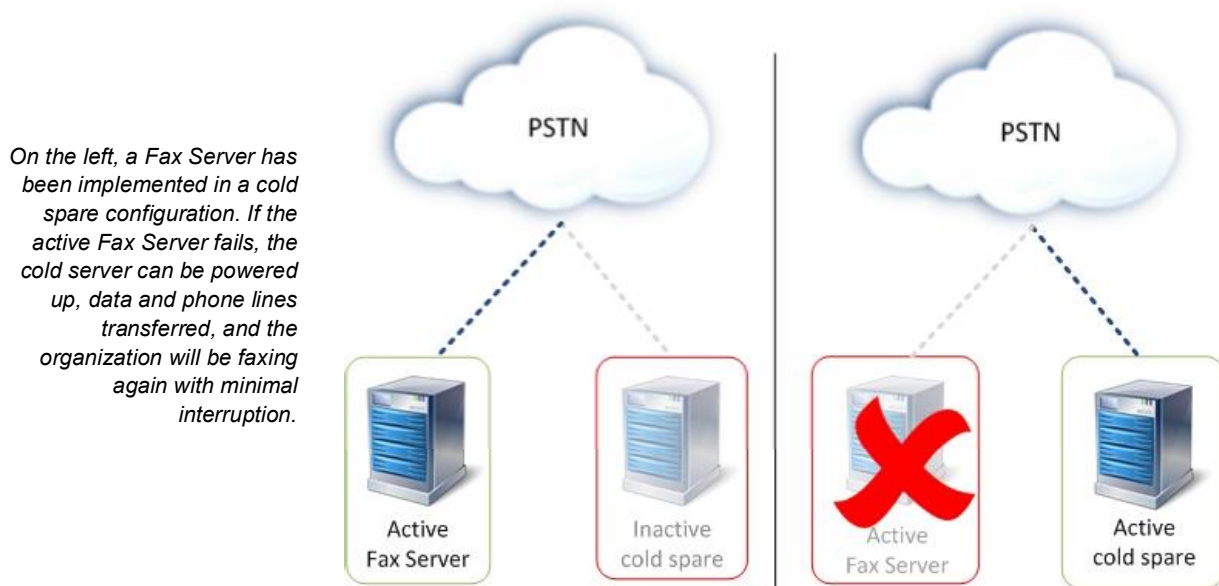
Implementing component redundancy is sometimes not enough. Managing all of the components is a single Fax Server. That server thus becomes a potential single point of failure bringing the transmission of new faxes to a complete halt. That said, all incoming faxes would continue to be received even if the fax server is down. The Remote DocTransport server would cache those received faxes until the Fax Server is restored. To mitigate this risk of failure, many companies choose to also implement system redundancy. All of the previously discussed component redundancy options perform identically regardless of whether they are configured on a single Fax Server or in any of the implementations below.

In order to completely eliminate all possible chances of systems failure, it is necessary to implement one of the following three system redundancy scenarios: Cold Spare, Clustering, or Shared Services.

Cold spare

The cold spare configuration is exactly what it sounds like: a second, identically configured server that can be powered up in the event of a primary server failure. This configuration requires manual intervention and would involve downtime, but it allows for some level of redundancy at minimal additional cost. This configuration is usually implemented as two fax servers on two hardware servers (physical or virtual) acting as a primary server and a secondary server. One Fax Server system is pre-installed on a secondary server system intended for use in the event of a disaster, a shutdown, or the failure of the primary Fax Server.





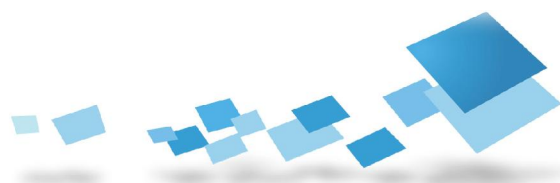
A cold spare system is typically stored in an isolated or remote location and is considered to be “offline”. It can then be activated in the event of a primary system failure. This is intended for use in the event of a long-term system shutdown or any other system interruption that may take time to repair. It is important to note that a cold spare is not used in production but is available so that it will expedite recovery. There are some risks in this scenario, such as significant downtime and loss of fax capabilities as well as a potential loss of data. As mentioned earlier, some manual intervention is necessary, and a process rundown is required (for DNS redirect, cable switching, and data porting). Additionally, there is no load balancing in the cold spare configuration.

Process for failover

As described above, this is a completely manual configuration. When a Fax Server fails, a replacement Fax Server is implemented. Ideally, this is a pre-configured Fax Server taken out of storage. In order to be up and running as quickly as possible, it is important to have implemented data storage components that are not on the same machine as the Fax Server. Any faxes that are being sent or received at the time of failure will also fail.

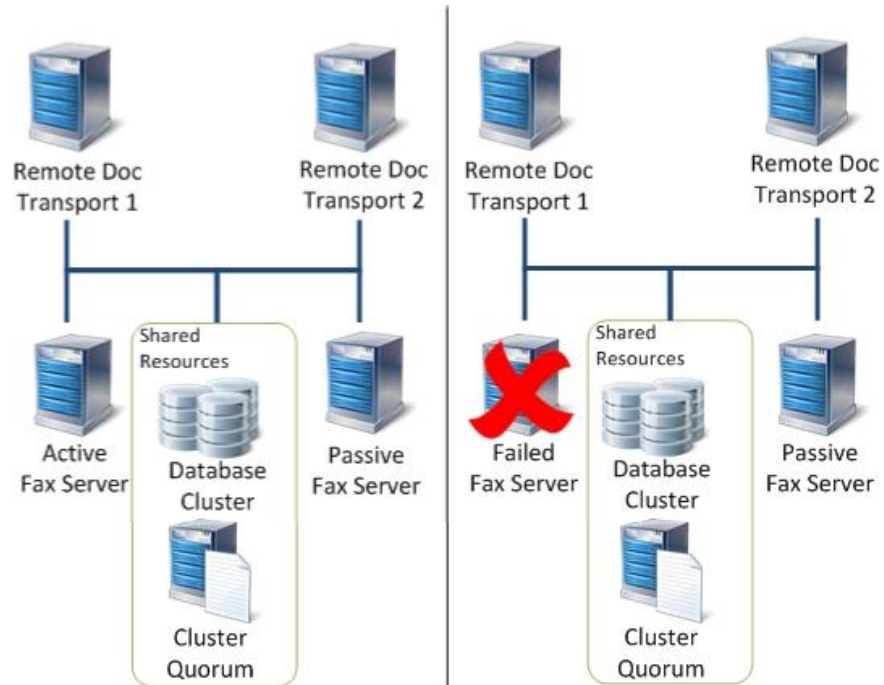
Active-passive clustering

Customers who need the secondary system provided by the cold spare configuration but do not like the level of manual intervention required may prefer an active-passive clustering configuration. The clustering capabilities of Open Text Fax Server are provided by Microsoft Cluster Service on Windows Server 2003 and renamed to Failover Clustering on Windows Server 2008. The active-passive portion of the configuration description refers to a single server actively running, with a secondary



server in an offline state waiting for system failure, at which time the secondary system will take over the load. Depending on the configuration, there could still be some seconds or minutes of downtime.

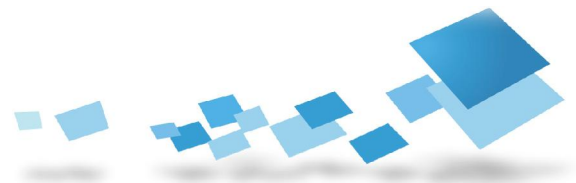
When Fax Server is implemented in a Microsoft Clustering Services environment, a second passive server is configured to take over when the first active server encounters problems. The available channels are split across two DocTransports so that all channels are usable regardless of whether the active or passive server is online.



Typically, in a clustered Fax Server environment, a DocTransport would not be configured on the Fax Server itself but rather implemented as Remote DocTransports. The reason for this configuration is that if the active server fails, the E1 or T1 phone line connected to it would have to be physically unplugged and reconnected to the formerly passive server. Instead, at least two Remote DocTransport servers would also be configured. The available channels would be spread across the Remote DocTransports, allowing for faxes to continue being sent and received on the new server as if nothing had happened.

Process for failover

In order to configure Fax Server in an active-passive cluster, Microsoft Cluster Server needs to be set up and configured in advance, which often proves to be a complicated task. When everything is configured, the Fax Server installation can be processed. Fax Server is installed to both nodes in the cluster. Most of the major modules are then implemented as resources in the cluster. If the resources fail, the Microsoft Cluster Server will failover to the passive server, allowing faxing to continue. Although it is a supported scenario, Fax Server is not fully cluster-aware with replayable transaction logs. If there are any faxes being sent, received, or converted when failover happens, they may become lost and unrecoverable. Those faxes would need to be recreated. Also, there will be a few seconds when the Fax Server is unavailable while it is failing over. Any incoming faxes would continue to be received as discussed above in the Transport Redundancy section.



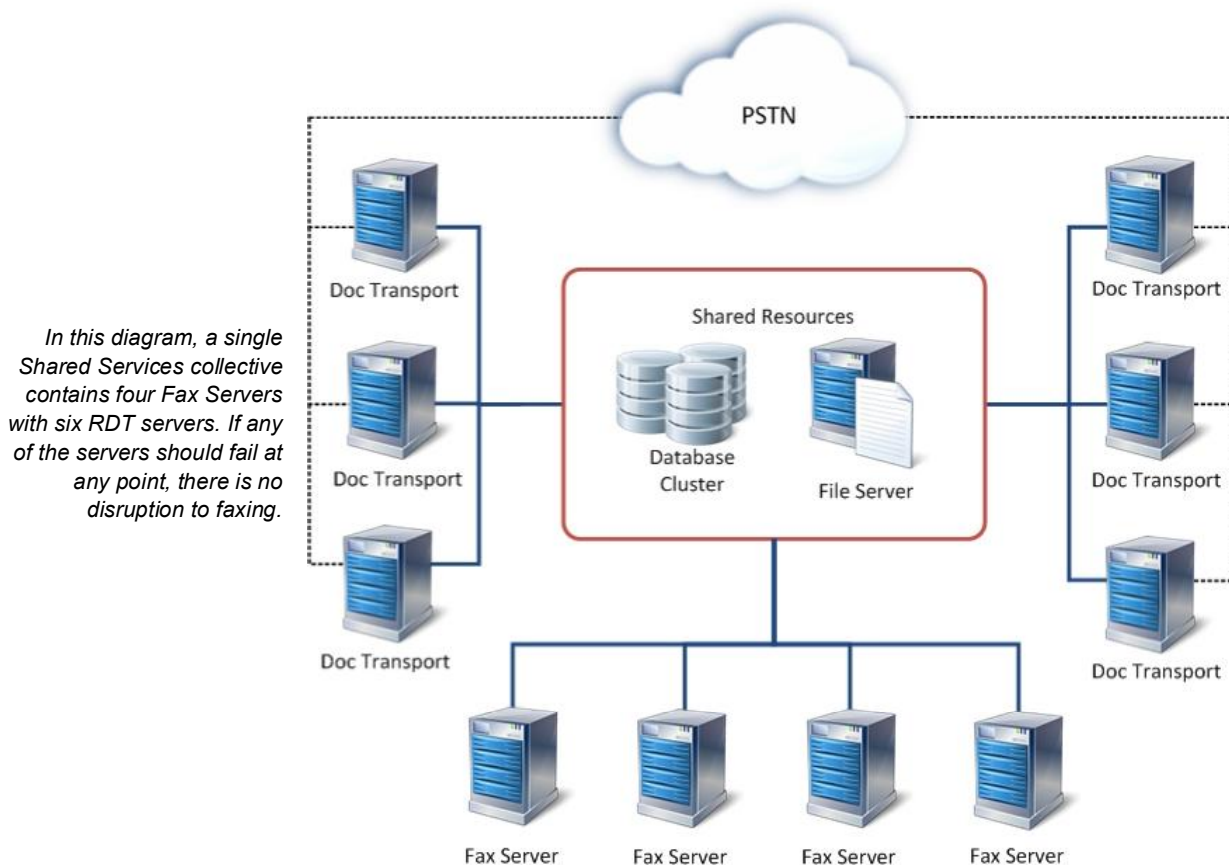
Multiple Remote DocTransport servers should always be configured in a clustering environment. DocTransports should not be installed locally to the Fax Server. When installing the Remote DocTransport, enter the name of the cluster rather than any individual node in the cluster.

Shared Services

Although it provides a more fault-tolerant solution, active-passive clustering has its drawbacks. One server is always in a passive state, so you never experience enhanced performance when everything is performing as it should. Also, Microsoft Clustering Services can be awkward to configure. Open Text provides a more complete fault-tolerant configuration that is both easy to configure and able to provide additional performance. Shared Services provides all of those functionalities and more.

A single Shared Services collective can include two, three, or four individual Fax Servers. Each Fax Server is simultaneously connected to the same SQL Server and file server resources, ensuring that any configuration changes or received faxes on one server instantaneously appear on all the other servers in the collective. When a new fax is sent or received, the most available server in the collective will process it as needed. Unlike clustering, each machine in the collective does not have to be identical, and the services can all be configured differently. One server could have two Remote DocTransport servers with 30 fax channels each, another could have one Remote DocTransport with 90 fax channels, and a third could have just a single local DocTransport with 10 channels. Also, new servers can be added to the collective at any time, allowing the Shared Services infrastructure to grow with the needs of the business.

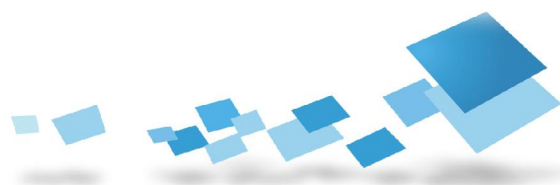




Process for failover

Some of the biggest weaknesses of clustering with Fax Server have all been addressed in Shared Services. The prerequisite of a working Microsoft Cluster Server is not required in Shared Services. Also, if a Fax Server goes down while the fax is being sent out, it will not be lost, but rather rescheduled on an alternate Fax Server. When a Fax Server goes down, there is zero downtime for the Shared Services collective. The other servers in the collective continue to function and process the load. All DocTransports are shared across all Fax Servers in the Shared Services collective, even though they appear to be paired with a specific server during installation.

Since all Fax Servers store their faxes and configuration information in the file system and the database, all Fax Servers instantly have access to the same information. Even if one server goes down, all the other servers in the collective will continue to process all of the faxes. The only consideration to keep in mind is that each Fax Server's collection of WorkServers must be able to provide the same functionality. They do not need to have the same number of WorkServers, but if one Fax Server has a WorkServer performing OCR, then all Fax Servers must have at least one

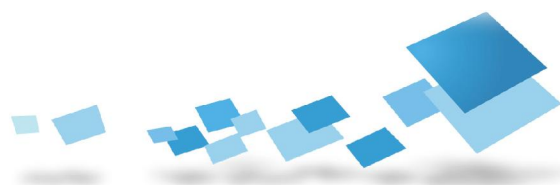


WorkServer that can perform OCR. This is because there is no way to limit which tasks get assigned to a server based on the type of work that needs to be done.

If one Fax Server goes down, a received fax will simply be received by one of the DocTransports and then processed by one of the other Fax Servers in the collective. All component redundancy options discussed above continue to function in exactly the same way that they did in a cluster environment.

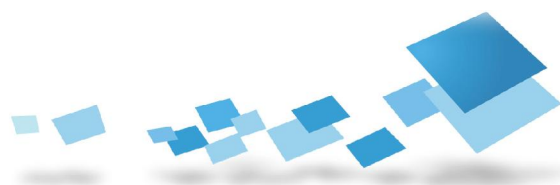
Taking it virtual

While most of this document focuses on delivering redundancy at the physical machine level, each configuration can also be done virtually. Virtualized servers can be used for Remote DocTransport Servers or WorkServers. A Shared Services collective can even be configured with a mixture of physical and virtual Fax Servers with further mixtures of physical and virtual remote DocTransport servers. The only limiting factor is how customers choose to provide redundancy for their faxing needs.



Conclusion

From a business perspective, your fax services must have high availability and continuity. The consequences of interruptions to document-based communications can put your business at risk. Developing a business continuity strategy that encompasses best practices of shared services, high availability, and a fault-tolerant topology can help safeguard your business. Fax server redundancy options with Open Text Fax Server provide reliable solutions that ensure business process continuity, improve record keeping, and support compliance goals.



About Open Text

Open Text is a leader in Enterprise Content Management (ECM). With two decades of experience helping organizations overcome the challenges associated with managing and gaining the true value of their business content, Open Text stands unmatched in the market.

Together with our customers and partners, we are truly The Content Experts,™ supporting 46,000 organizations and millions of users in 114 countries around the globe. We know how organizations work. We have a keen understanding of how content flows throughout an enterprise, and of the business challenges that organizations face today.

It is this knowledge that gives us our unique ability to develop the richest array of tailored content management applications and solutions in the industry. Our unique and collaborative approach helps us provide guidance so that our customers can effectively address business challenges and leverage content to drive growth, mitigate risk, increase brand equity, automate processes, manage compliance, and generate competitive advantage. Organizations can trust the management of their vital business content to Open Text, The Content Experts.



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