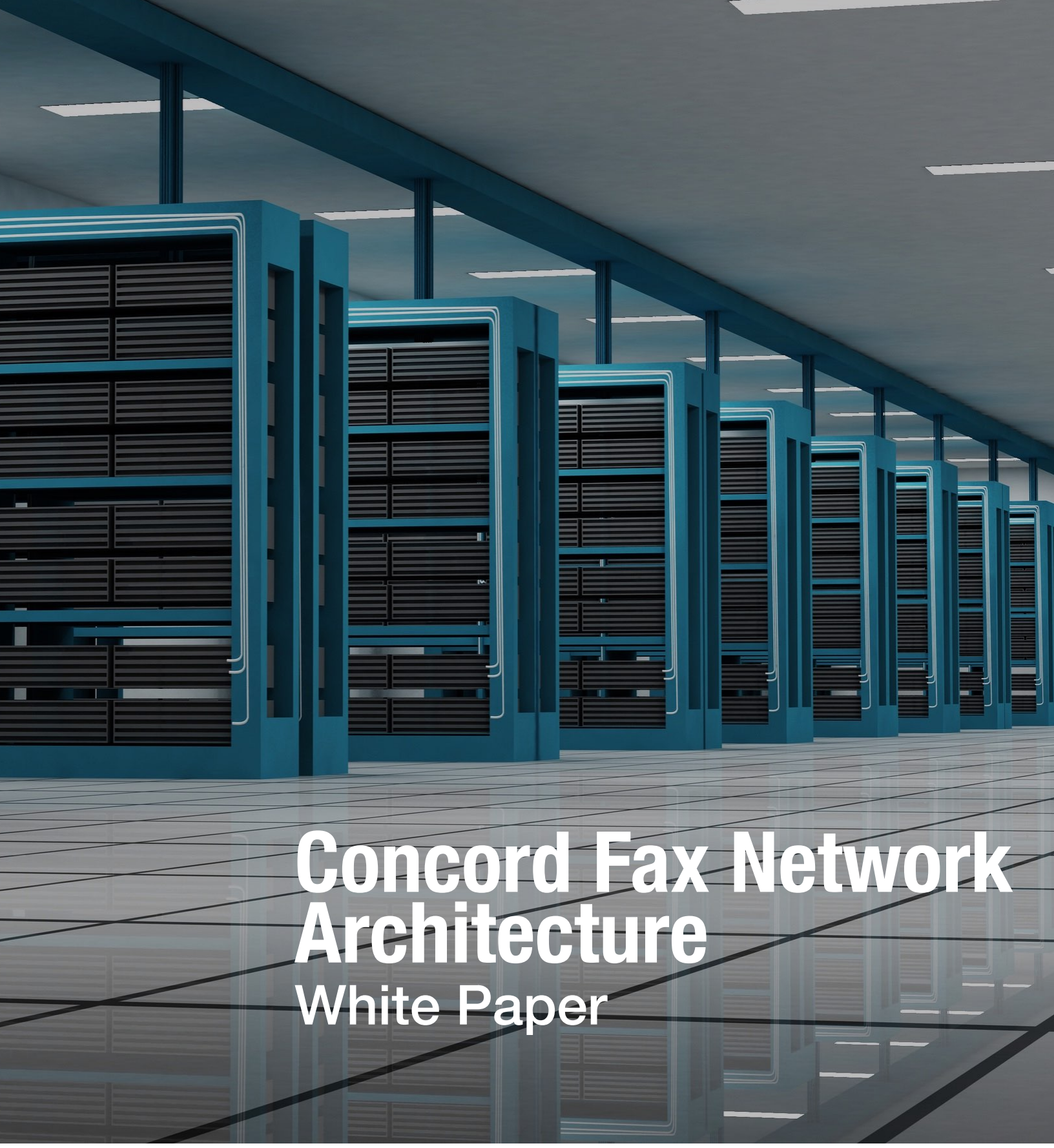


Concord Fax Network Architecture

White Paper

CONCORD
TECHNOLOGIES

Table of Contents

Introduction

Selecting an enterprise cloud service requires buyers to look at far more than just price or the platform's feature set. Ultimately, the vendor's ability to consistently deliver the service(s) will dictate the platform's viability in an enterprise environment.

For those in the market for an enterprise-grade fax service, service reliability, call completion performance, and transmission rates are directly impacted by the provider's network. Unfortunately, vendor messaging continues to make it challenging for buyers to determine if a given infrastructure is capable of meeting their long term needs.

In this paper, Concord provides a high level overview of its network architecture along with additional information designed to help buyers make an informed fax service provider selection.

The 99.99% Uptime Fax Network

Concord Fax is designed to meet the high volume faxing requirements of large enterprise and healthcare organizations. This means maintaining a network designed for over 99.99% uptime, a benchmark that is routinely exceeded.

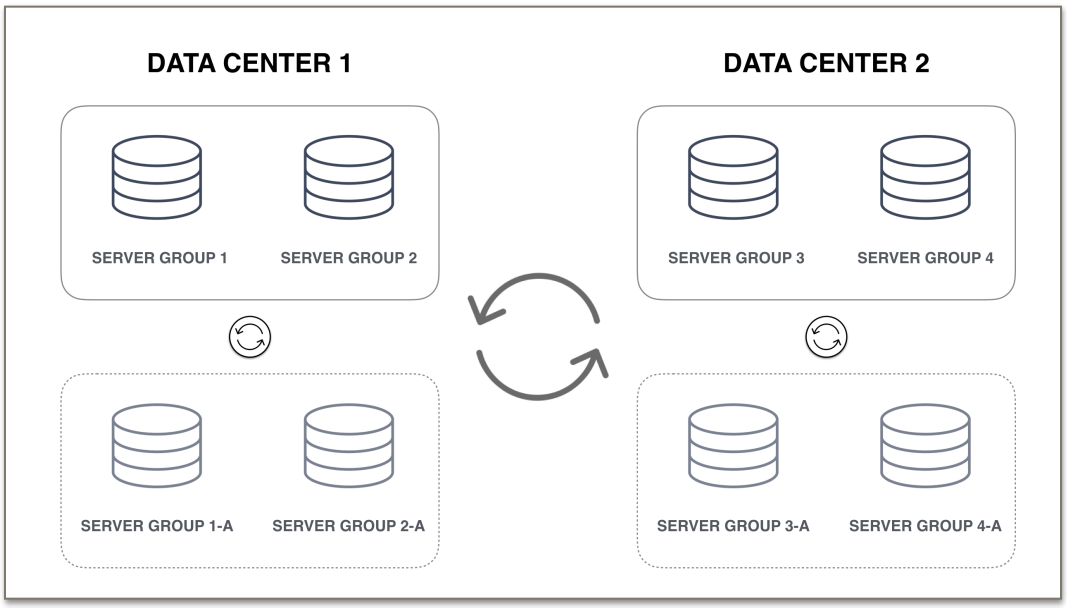
Concord blends multiple inbound and outbound call technologies to ensure the successful delivery of more pages, more of the time than other fax service vendors or any on-premise fax server solution.

The telecommunications network operates in an Active-Active architecture where each of the critical elements are redundant twice over in each data center (replicated a minimum of 4 times across a minimum of 2 different geographies). This unique design greatly simplifies the ongoing process of enhancing and upgrading the network, as well as performing routine maintenance with zero downtime.

The net result is a network which delivers a level of performance and reliability which exceeds the industry standard.

Reliability and High Availability

Concord's network is architected to function in a fully **active-active**, twice redundant model. Every logical element of the network is replicated within each datacenter and then also across datacenters providing two separate layers of redundancy.



Each datacenter is scaled to be capable of handling more than our total peak traffic for the entire network at any one time. This enables components (or even an entire datacenter) to be taken out of service with no service interruption, and means that the vast majority of maintenance is completed without any scheduled downtime.

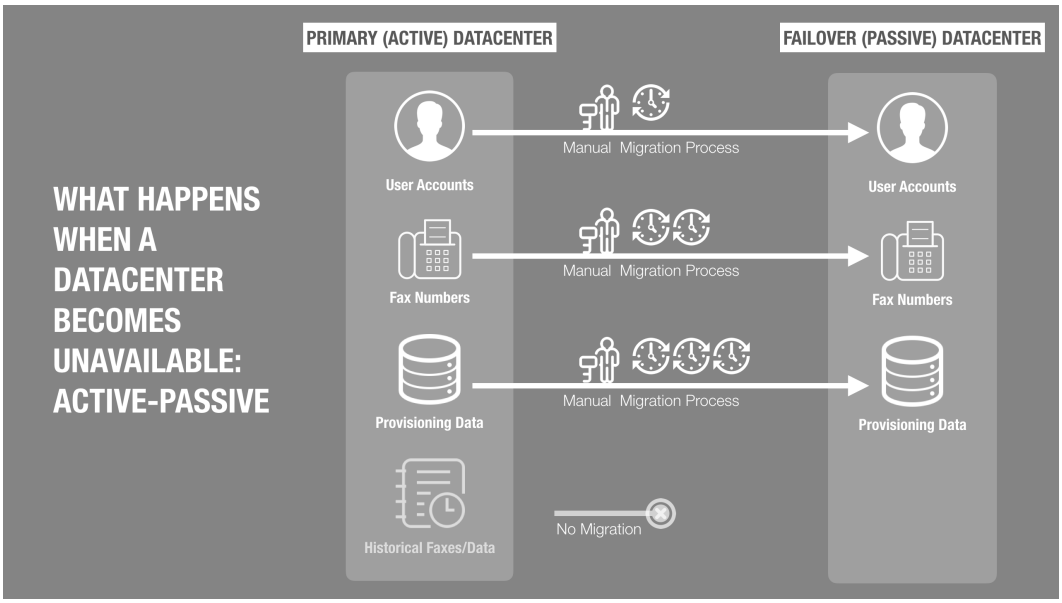
What is “Active-Active” architecture and why is it critical for high volume fax users?

An active-active architecture is comprised of two or more nodes (in this case datacenters) which actively operate the same service simultaneously.

The main purpose of an active-active architecture is to achieve high availability and load balancing. The Concord Fax network routes incoming and outgoing fax traffic to the target datacenter based on a set of rules designed to ensure maximum throughput and minimum response times. This model directly contributes to Concord’s industry-leading call completion rates.

In the event that a datacenter should be become unavailable, Concord’s active-active architecture enables it to automatically route all traffic through the sister datacenter without service interruption. In addition, it means that no manual or human intervention is required to migrate your account to a backup facility or to manually reroute your fax numbers. Your users would be unaware that anything occurred.

Given that each datacenter is capable of handling the total traffic for the ENTIRE network (with an additional 50% buffer for outbound traffic and a 20% buffer for inbound) there is no risk of service interruption even at peak periods.



Why fax buyers should avoid “Active-Passive” fax networks

Active-Passive networks are commonly used by fax service providers and end-user organizations maintaining on-premise fax servers. Active-Passive networks are less expensive to implement and maintain and enable providers to daisy chain countless datacenters together. This approach is particularly common amongst providers seeking cost-effective means to merge multiple disparate networks forced upon them through acquisitions.

Active-Passive fax networks differ from active-active in so much as they are incapable of realtime multi-datacenter load-balancing

and failover. Active-passive networks have only a single “live” instance operating at any one time.

In the event of a component becoming unavailable in an active-passive environment, a process is initiated by the service provider to move each fax customer’s data to the failover (backup) server. In many cases, this is largely a manual and frequently a time-consuming process. Users of these services have been known to go without access to their fax service for hours and even days.

When users are able to regain access to their service, they may well find that access to historical faxes and metadata may no longer be available to them as this data was not migrated as part of the failover process.

For organizations utilizing faxing within high volume workflows, even the smallest disruption can have a major negative impact on the operations.

Security

HIPAA
Health Insurance Portability and Accountability Act

PCI DSS
Payment Card Industry Data Security Standard

SSAE 16 SOC 2
Statement on Standards for Attestation Engagements Service Organization Control 2

Security and confidentiality of clients' documents is the cornerstone of the Concord business. This is why some of the world's most security-conscious organizations trust Concord with their most sensitive communications.

All data and fax content is encrypted in-transit (within the Concord network and in the communication with our clients' networks). Concord also encrypts data and fax content while at-rest. Concord utilizes Secure Socket Layer (SSL) encryption for all web traffic as well as Transport Layer Security (TLS) for all email communication (opportunistic or enforced). Enforced zero image retention policy is also available, which means that fax images can be immediately deleted from the Concord network as soon as the fax job is completed.

As a result of our intrinsic strategy to ensure security and compliance across the organization, Concord is able to exceed our customers' requirements with regards to HIPAA and Payment Card Industry Data Security Standards (PCIDSS), but also with other more stringent network and business process-centric security and privacy standards.

General Security and Compliance Measures

Physical Security

- 24x7 staff and CCTV surveillance with ID and Authorization required to enter building
- Concord Private Suite accessed via Dual Authentication (Biometric and PIN)
- Access (and attempts) logged offsite
- Live video feed stored offsite

Network Security

- Current and up-to-date firewalls (dual Cisco ASA)
- DMZs for logical components
- Intrusion Detection and Logging
- PCI-compliant levels of SSL and TLS security (AES 256 bit encryption)
- SSL encryption for internal communication between servers / data centers

Logical and Application Security

- Password controls
- Systems maintained with latest patches and anti-virus software
- SQL database encryption for data at rest (where applicable)
- Checksums to detect alterations in application code
- Logging and Log Reviews

HIPAA Compliance Measures

Physical Safeguards (45 CFR §164.310)

- Facility access control
- Workstation Use and Security
- Device and Media controls

Administrative Safeguards (45 CFR §164.308)

- Security management process and Risk Assessment / Management.
- Information Access Management to control appropriate access.
- Security training and awareness.
- Security incident procedures.
- Contingency plans including data backup and disaster recovery.
- Business Associate agreements in place.

Technical Safeguards (45 CFR §164.312)

- Access control
- Audit controls
- Data and storage integrity
- Person or entity authentication
- Transmission security

Other Security Controls (45 CFR §164.316)

- Documented policies and procedures with structured review and assessment
- Policy storage (6 years)
- Policy accessibility (Sharepoint)

Delivery

Concord has invested heavily in a mix of TDM and IP technologies to create a truly modern network architecture which provides significant call routing flexibility without sacrificing call reliability. Concord is able to achieve this level of call optimization through the use of Concord SureConnect. Concord's SureConnect technology intelligently routes both inbound and outbound calls between datacenters, alternative carriers and even different fax hardware providers to ensure that faxes are always delivered successfully. As a result of these call optimization measures, we are able to maintain a page completion rate that exceeds any of our competitors.

Concord Technologies was one of the early adopters of Fax over IP (FoIP) technology and we've been utilizing the technology extensively throughout our inbound fax network since 2006. FoIP enables Concord to deliver calls destined for any fax number seamlessly to any server in any location in the Concord network and combined with our Active-Active network architecture, largely abstracts clients from issues related to isolated telecommunications outages.

Concord's datacenters handle the fax protocol (T.30) directly, avoiding lesser quality 3rd party implementations in the carrier networks. G.711 and T.38 are both utilized for fax communications. Unlike other fax vendors who consistently struggle to maintain reliable IP infrastructures for inbound fax delivery, our ability to marry FOIP with SureConnect enables Concord to consistently deliver higher page completion rates than our competitors manage via TDM.

Concord utilizes TDM (T1s and DS3's) circuits for outbound faxing. TDM is a more expensive architecture to maintain for outbound calls, but quality is our number one priority. We continue to test and work with fax hardware developers and carriers to evolve the FoIP implementations for outbound fax, and are seeing significant gains being made in this area.

Optimizing Call Completion with SureConnect

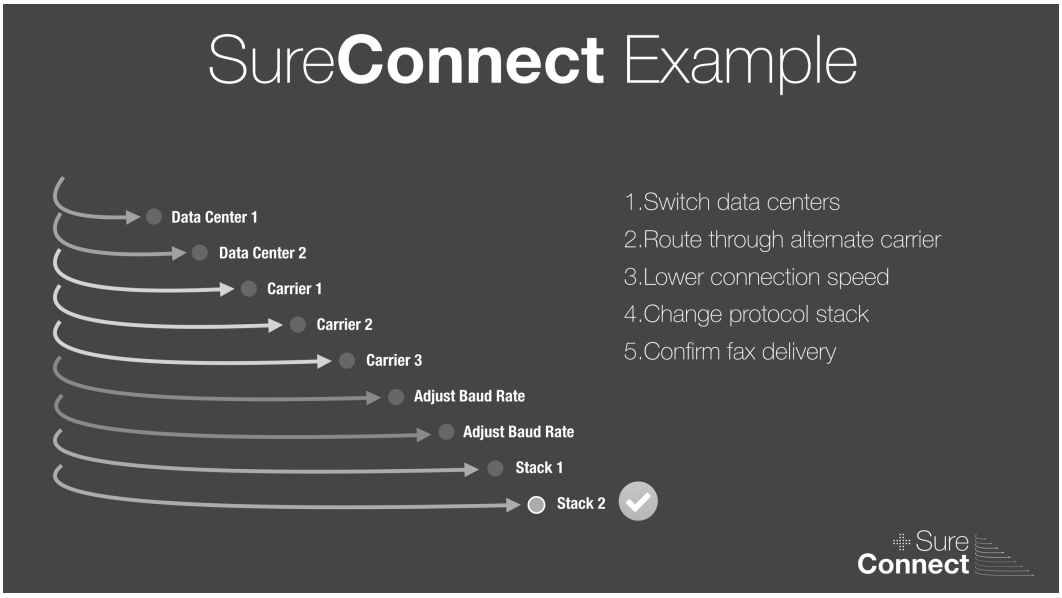
When a call is not completed, most fax networks adopt the same method: they retry. The problem is that retrying repeats the process in exactly the same way as the first failed attempt. As long as the choke point still exists between sender and receiver, the call will never complete. This can lead to a delay in delivery or a fax that will never be delivered to its destination.

Concord's SureConnect optimizes both inbound and outbound faxes and takes a vastly different approach to resolving call completion issues.

Optimizing Outbound Calls

When the initial call is identified as being unsuccessful, SureConnect alters the path between sender and receiver. Should the next call fail, SureConnect records the point of failure and reinitiates the call avoiding the point the last error occurred.

The next attempt will involve routing the call through a different data center, carrier or even fax hardware technology. SureConnect may also drop the speed of transmission in order to increase the likelihood of a successful call completion.



Optimizing Inbound Calls

SureConnect manages inbound calls as soon as they enter Concord's network. Should an inbound call not complete on the first attempt, SureConnect will route the call through an alternative server. SureConnect also tracks inbound call statistics in order to "learn" how to best route inbound calls based on how they were sent.

The combination of SureConnect and Concord's connectivity with multiple carriers consistently ensures the lowest partial pages results of any provider while maintaining a call completion rate exceeding 98.5%.

Network Monitoring

Concord Network Monitoring runs 24x7 capturing data on every aspect of the network. Rather than using this information to simply log past performance, the data is used extensively as part of Concord's predictive analytics. Predict analytics allows Concord to spot performance inconsistencies or abnormalities, enabling bottlenecks or potentially critical issues to be targeted and resolved before they impact the network.

In addition to predictive analytics, Concord utilizes a number of tools to proactively monitor every component of our system. We have more than 1,000 monitors running on every interaction point for a fax job. These monitors provide both visual displays and audible alerts in our NOC (Network Operations Center) for live monitoring and status alerting across the entire platform and also at an individual fax job level. An area we are particularly proud of is the Concord Service Monitor, which is an in-house application developed to do end-to-end traffic testing and monitor other functions such as account provisioning. This unique system not only tests individual servers in our redundant platform, it also tests general availability and load balancing with full processing of inbound and outbound fax traffic. The Concord Service Monitor is deployed in each data center and performs thousands of tests daily 24/7/365.

About Concord

Concord Technologies is a proven leader of cloud-based Fax Services for regulated industries. With over nineteen years in the business, Concord has established itself as one of the leading providers of online fax solutions.

Started as a spinoff of Delrina (WinFax Pro) in 1996, Concord was one of the first companies making technological advancements to cloud-based fax services.

In its early years, Concord focused on the delivery of internet-based fax and messaging solutions for small business. In the mid-2000s Concord reconfigured the business when they recognized an emerging need for enterprise-grade reliability and integration capabilities for large businesses who were making the transition from on-premise fax servers to a cloud-based solution. To serve these highly regulated businesses, Concord redesigned the network to provide the highest available standard of reliability and security. Knowing that any outages or network issues could result in significant losses to their customers, Concord committed to building a network with 2-layers of redundancy in an active-active architecture, between dual data centers. This has resulted in an industry leading uptime index.