

# Assure MIMIX HA: Easy, scalable, Assured Availability for IBM i

## Executive Overview

### The Availability Imperative

The pace and competitive landscape of global commerce today necessitates a flexible, resilient and available IT infrastructure that delivers 24x7 access to business-critical data and applications for customers, business partners and employees.

Any disruption to the availability of your business systems and data poses a threat to your business. Downtime not only impairs employee productivity. It impacts both short-term revenue through lost business and long-term revenue due to customer dissatisfaction. Moreover, it can tarnish your company's reputation and harm its ability to win the trust of new partners and customers. Interruptions to business continuity for even a short period of time can seriously reduce your company's profitability and possibly jeopardize its viability.

You need a solution that delivers high availability and protection from disaster. This paper provides an overview of seven key criteria to keep in mind when searching for the solution that is right for you. Along the way it will describe how Assure MIMIX HA, the industry leader in high availability and disaster recovery for IBM i, addresses each of these criteria to help meet your availability challenges today and position yourself meet the needs of your future.

### Seven Key Criteria for High Availability Solutions

When evaluating any high availability solution for IBM i, there are a handful of critical functions that must be considered in order to ensure that you can meet your organization's recovery point objective (RPO – or the amount of data you can afford to lose) and recovery time objective (RTO – or the amount of time your systems can be down). This white paper provides an overview of the most essential functions of a high availability solution, and it describes how Assure MIMIX HA addresses each requirement.



The seven vital functions of a high availability solution include:

1. Scalable, flexible replication technology
2. Easy installation, configuration and control
3. Convenient, secure monitoring
4. Customizable, automated procedures
5. Audits for data integrity
6. Ability to grow with your needs
7. Automated optimization.

## 1. Scalable, Flexible Replication Technology

To ensure zero or near-zero data loss, changes to the data and objects on your production server must be replicated instantaneously to a recovery server for safekeeping. The recovery server must be capable of applying these changes to its copy of the data just as quickly as they are received. Otherwise, a backlog of data accumulates on the recovery server. If a backlog exists when an outage occurs, it must be processed before you can switch operations to the recovery server – delaying your ability to resume operations.

It is crucial that your high availability solution both capture every change as it is made and send those changes to a recovery server capable of keeping up with the volume of transactions your business can generate at its highest peak.

Assure MIMIX HA's replication capabilities are built on the remote journaling technology native to the IBM i operating system. For each transaction performed on a production server, IBM i journals the changed data and sends it to a recovery server where Assure MIMIX HA applies the changes to an active copy of the database. Remote journaling ensures transaction integrity and minimizes bandwidth usage. In addition, Assure MIMIX HA uses additional change data capture mechanisms to replicate all essential system objects required to switch your business to the recovery server.

For over 25 years, Assure MIMIX HA has been tuned to achieve the highest possible levels of replication and recovery performance. For example, Assure MIMIX HA maximizes replication speed and scalability by intelligently applying changed data to the recovery server using a true multi-threaded, multi-apply process. By leveraging the multi-threading capabilities of IBM Power Systems and dynamically adjusting to spikes in the volume of replicated data, Assure MIMIX HA can rapidly apply data to the recovery system while eliminating the need for manual tuning.

As a result, Assure MIMIX HA can scale from entry-level servers with minimum processing power to the largest enterprise-class servers tasked with the most demanding workloads. Even the most aggressive recovery time objectives (RTOs) found in service level agreements and industry regulations are achievable with Assure MIMIX HA.



Flexibility is also key in a high availability solution. You want your IBM i infrastructure decisions to be driven by the needs of your business – not the needs of your HA solution. Requiring identical servers, even identical storage, can be costly. You need a solution that can work with your existing systems – and that can work with your current network infrastructure.

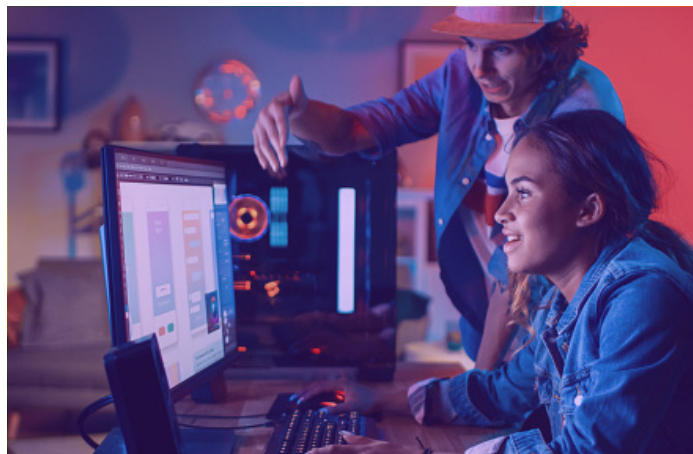
Because Assure MIMIX HA relies on remote journaling to replicate at the transaction level, rather than at the storage level, it is independent of the underlying hardware, storage and operating system version. As a result, the production and recovery servers in an Assure MIMIX HA replication environment can have different Power Systems hardware, different CPU and memory configurations, different IBM i operating system levels, and different storage hardware, including a mix of internal and external storage. Assure MIMIX HA's hardware-independence allows for complete flexibility when designing a unique solution fit for your business.

Because remote journaling sends the minimum amount of changed data to the recovery server, minimal bandwidth is required for replication. This gives you the freedom to locate servers locally and/or remotely, across any geographic distance.

Support for multiple replication topologies also enables flexibility when configuring a high availability solution to meet your RPO and RTO requirements, infrastructure needs, and data access requirements. Whether you need a basic one-to-one replication configuration, or you have more complex needs to broadcast one-to-many, consolidate many-to-one, replicate within the same server, or replicate bi-directionally between two active databases, Assure MIMIX HA delivers that flexibility. For applications requiring virtually no downtime, bi-directional replication, also referred to as active-active replication, balances workloads and supports an RTO in seconds by replicating data between two or more active servers, all of which can run production workloads simultaneously.

The flexibility afforded by Assure MIMIX HA's hardware-agnostic and bandwidth-friendly replication also supports a choice of physical, virtual or cloud-hosted server environments. Production and recovery servers can replicate from the ground to the cloud, between cloud-hosted servers, or from the cloud to the ground. Your business can choose the platforms that best meet your scalability, financial and security needs.

Assure MIMIX HA's focus on flexibility and performance delivers scalability that allows businesses of all sizes to achieve high availability and disaster recovery protection that meets their recovery time and recovery point objectives – whether for low-powered, entry-level servers or large-scale enterprise systems.



## 2. Ease of Installation, Configuration and Control

Another key criterion to consider when evaluating high availability solutions is the amount of time and the level of skill required to manage the system on an ongoing basis. Your return on investment will be diminished if the solution is overly difficult or costly to administer.

Assure MIMIX HA provides both 5250 (green screen) and browser-based, graphical user interface options. For administrators with deep IBM i skills and experience, the 5250 interface is familiar and efficient. Many also gravitate toward the Assure Unified Interface, a browser-based, graphical interface. It is preferred for staff with a limited green screen background.

The Assure Unified Interface is easy to use and highly configurable. Built on an industry-standard portal architecture, the Assure Unified Interface enables user-selected “portlets” to be arranged visually to provide a custom view of your Assure MIMIX HA environment.

A simple, two-node implementation of Assure MIMIX HA can be completed quickly and easily using the streamlined install process that guides you through the installation wizard, configuration and the start of replication.

Data protection reports provide a view of replication status for libraries, directories, and folders and are the basis for easy configuration of Assure MIMIX replication. Data protection reports are exportable in PDF or Excel formats so that they can be shared and reviewed with stakeholders. After libraries, directories and folders containing critical data and applications have been identified, action can be taken from the data protection reports to configure replication using wizards that follow best practice to determine the optimal configuration. Data protection reports can be run at any time for continued reporting and review with stakeholders.

Assure MIMIX HA provides unique value in that it can also be managed at the application level in the Assure Unified Interface, providing higher-level control of multiple remote journal paths, multi-threaded apply processes, and configurations of multiple HA/DR servers. Management at the application level also facilitates single-button operations for starting, stopping and switching the Assure MIMIX HA environment.

The Assure Unified Interface is intuitive to use, and its high performance, push technology keeps information in the interface up to date. Status information is sorted by severity with smart prompting to assist in addressing the steps necessary for resolution of any issues. An extensive context-sensitive help system with fly-over help text puts information at administrators’ fingertips and allows them to use Assure MIMIX HA to its fullest.



### 3. Convenient, Secure Monitoring

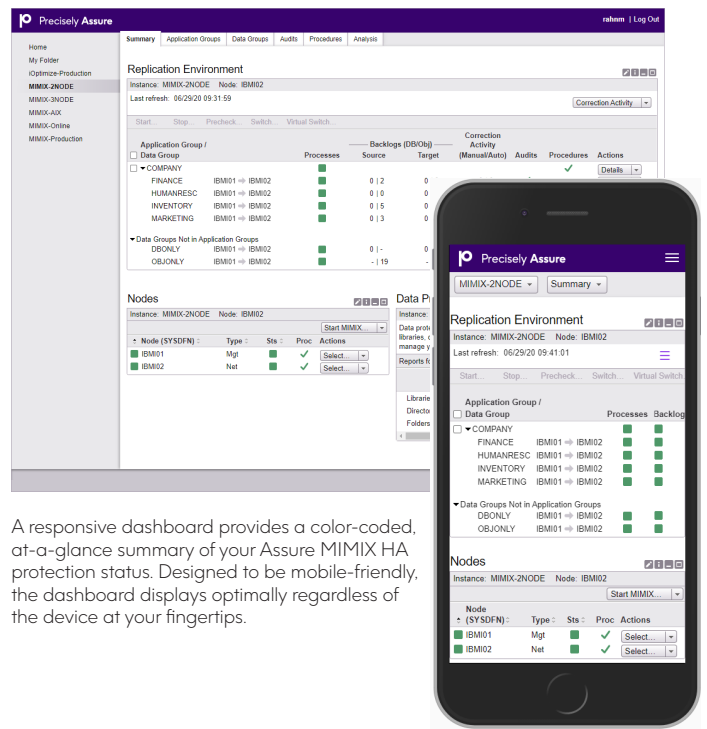
Convenient and secure monitoring is another factor to consider when evaluating high availability solutions. Can you easily identify key status information? Are you able to monitor remotely? Better yet, can you configure alerts to notify you of issues? Can you send those notifications to your company's IT infrastructure monitor so it can be rolled up with status from other applications? How much control do you have over enabling operators to monitor your HA system for you without having access to configuration settings?

The responsive dashboard for Assure MIMIX HA summarizes all key aspects of the Assure MIMIX environment on a single screen, including replication throughput, audit status, switch procedure results and data protection reports. The mobile-friendly dashboard displays optimally whether on a full-size monitor, tablet or smart phone for easy visibility into your Assure MIMIX HA environment, no matter where you are or what device you have at your fingertips.

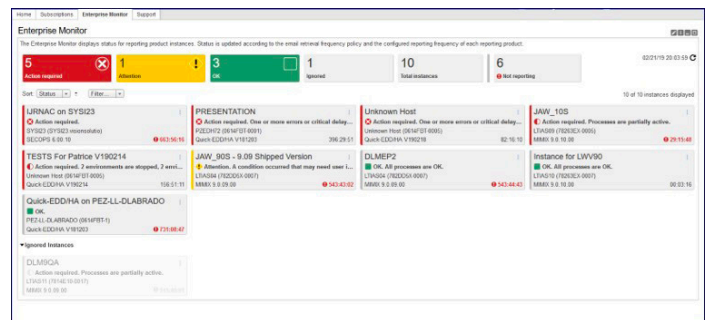
A key metrics view is also provided for monitoring your ability to meet high availability SLAs under current conditions. The view provides the estimated recovery time (RTO) and recovery point (RPO) that can be achieved at the present time, as well as information on past switch performance to give visibility into RTO trends.

For unattended monitoring, notifications can be configured for a wide variety of conditions that may require administrative attention. Alerts can be sent via email or through SNMP to integrate Assure MIMIX HA with your enterprise monitoring console of choice.

For those who use any combination of Assure MIMIX HA, Assure Security and Assure QuickEDD HA products, an enterprise monitor provides an easy, color-coded status view. Although delivered as an Assure Unified Interface portlet, the enterprise monitor communicates outside of normal Assure Unified Interface communication channels, making it ideal for anyone to monitor Assure MIMIX HA status.



A responsive dashboard provides a color-coded, at-a-glance summary of your Assure MIMIX HA protection status. Designed to be mobile-friendly, the dashboard displays optimally regardless of the device at your fingertips.



## 4. Customizable Automated Procedures

The primary purpose of your high availability solution is to provide you with a recovery server that can assume the production role at a moment's notice. When you experience an unplanned outage and declare the need to switch, the pressure is on. Manually typing in the many steps required to switch to your recovery server while under stress is risky, and it is definitely not the time to remember that you haven't tested a switch lately. That is why it is important to look for procedures that automate common HA tasks in your high availability solution, and those procedures should be customizable to reflect the unique needs of your applications and environment.

Assure MIMIX HA comes with pre-defined, automated HA procedures that can be run with a single click from the Assure Unified Interface. Pre-defined procedures are provided for performing a planned switch, unplanned switch, switch pre-check, virtual switch and more. You can customize these pre-defined procedures, create new procedures, or create new steps within a procedure. Templates are included to support the creation of new procedures or new steps in a procedure.

Assure MIMIX HA's automated switch procedures, when customized for your applications and environment and fully tested, give you a reliable, repeatable process that increases confidence that your switch will go smoothly whenever it is needed.

One of the most powerful aspects of Assure MIMIX HA's built-in automation framework is its ability to run steps in parallel whenever possible to speed the process to completion. That is simply not possible when typing in the commands manually.

Assure MIMIX HA provides tracking and logging of each procedure and step, giving you the ability to track a procedure's progress at a fine level of granularity and obtain logs of past procedure performance.

One of the most critical automated procedures is Assure MIMIX HA's virtual switch procedure that allows you to validate switch readiness without disrupting the production server. When a virtual switch procedure runs, the application of changes to the recovery server is temporarily halted so that your business application can be tested on the backup server while operations continue without interruption on the production server.

When the test is completed, changes made on the backup server are backed out, and buffered changes are applied prior to resuming normal replication. A virtual switch procedure allows you to regularly test your switch, a common regulatory requirement, and increases your switching confidence

The automation capabilities of Assure MIMIX HA are very powerful, allowing you to increase reliability and predictability of critical HA tasks. The use of standardized procedures eliminates human error and accelerates completion, while the flexibility to modify and extend them as needed provides the power to tailor the process to meet the needs of your unique environment.

“Assure MIMIX HA enables us to switch our live machines on a regular basis. The business can regularly be running on a different physical system without the users being aware of the switch.”

- Nick Osborne,  
Senior IT Manager, Tradetam

## 5. Audits for Data Integrity

Regularly monitoring replicated data and objects to identify anything that has become out of sync with the production system and “healing” those out-of-sync conditions is a critical feature of high availability solutions. Disk sectors go bad; users accidentally connect to your recovery server and make changes; malicious users damage your files. There are numerous circumstances that could seriously impair the outcome of a switch. When evaluating your high availability options, it is important to look for auditing features that check and recheck synchronization to ensure a successful switch.

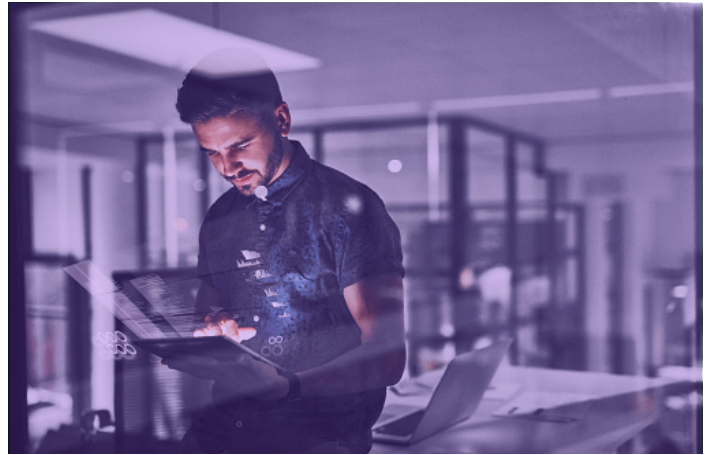
Assure MIMIX HA performs layers of audits to ensure the integrity of the objects on your recovery server and give you confidence that switches will be a success.

Assure MIMIX HA provides both scheduled audits and on-demand audits. Audits perform comprehensive, object-level checks on your replicated data. Eight individually-scheduled audits are performed on each data group for thorough coverage. Any objects that have become out of sync on the recovery server are automatically repaired.

Administrators have the ability to customize audit frequency for new objects, changed objects, unchanged objects, and objects that have been audited in the past without differences. Priority-based auditing enables faster and more efficient completion, an important consideration for very large environments.

Assure MIMIX HA also continuously monitors the data on the recovery server and notifies administrators of unauthorized changes and the identity of the user that made each change. Because Assure MIMIX HA detects object changes on the recovery server in real time, it gives you the option of automatically repairing objects based on policy, rather than waiting for the next scheduled audit.

With self-healing audits and real-time monitoring, Assure MIMIX HA gives you total confidence that your recovery server is in sync and ready to switch.



## 6. Ability to Grow With Your Needs

A simple two-node environment you implement today may not be sufficient for your needs tomorrow. You might start with two nodes in the same data center for high availability, but decide to add a node 600-miles away for protection from regional disasters. Or you may be asked to replicate data from the production server to another server for reporting without production impact. The need for greater protection and the drive to find new ways to serve the business may require you to use your high availability solution in ways you didn't originally imagine. Look for an HA solution that can grow with you.

With a single production server and a single recovery server located in the same datacenter, Assure MIMIX HA provides superior high availability for your business. However, a third server located in a different geographical region adds true disaster recovery protection. This is the most common scenario for expanding an Assure MIMIX HA implementation to multiple nodes.

Third servers are also desirable for an additional level of protection from downtime. With an added HA/DR server, your production server can be taken down for maintenance while maintaining high availability and disaster recovery protection with the other two nodes. It's protection from the unexpected, but sometimes the unexpected happens.

Additional servers can also be desirable to offload processing from the production server for data warehousing, queries, reports, month-end processing, saves to tape and more. You can even distribute data for read-write processing by other applications. This is a great way to expand the value of your Assure MIMIX HA investment by serving the needs of the business.

The broadcast capability built into remote journaling allows Assure MIMIX HA to support replication to multiple nodes, each with a real-time copy of production data. These servers can be used to increase HA/DR protection, or they can be used as data distribution nodes.

The Assure MIMIX Global add-on for Assure MIMIX HA simplifies the management of multi-node implementations. With Assure MIMIX Global, a switch or failover operation to any of a number of recovery servers will automatically adjust replication to all other HA/DR servers and data distribution servers, keeping them in sync with the new production server.

The complexity involved is hidden by seamless integration with the Assure Unified Interface for easy switch management in multi-node environments.

You may not know today all the ways your high availability solution will be used in the coming years. Assure MIMIX HA and Assure MIMIX Global give you the flexibility to grow to multiple HA and DR servers that offer an even higher level of protection for your business, while also enabling multiple data distribution servers to provide access to real-time data.

“Our true capital is tied up in knowledge and unique production machines. In the event of a calamity, Assure MIMIX HA would save the day, if it ever came to that. The ROI for Assure MIMIX HA is so tremendous, it cannot be estimated in terms of money only.”

- Peeter Mastenbroek, IT Manager, Nelipak



## 7. Integrated, Automated IBM i Server Optimization

An optimized, healthy production server is the building block of an efficient, reliable HA environment. Assure MIMIX HA is the only HA/DR solution that, through its Assure iOptimize feature, includes broad platform optimization as a core part of the solution. Assure iOptimize is an innovative, automated optimization tool that maximizes storage utilization, accelerates performance and enhances system resilience.

Assure iOptimize continuously optimizes IBM i servers for improved efficiency and resource utilization to help improve disk, CPU and memory utilization; defer hardware upgrades and maximize your return on investment in hardware expenditures; improve interactive response times; shorten batch job run times; shrink nightly backup run times; improve high availability mirroring; and reduce or eliminate manual effort and downtime during optimization.

A comprehensive set of over 70 localizable, graphical health reports are also generated by Assure iOptimize to assist administrators and management with making critical infrastructure decisions. When metrics are viewed in the browser-based Assure Unified Interface, actions can be initiated directly from those metrics. When exported, the reports can be used to identify trends and demonstrate compliance with CPU and disk SLAs.

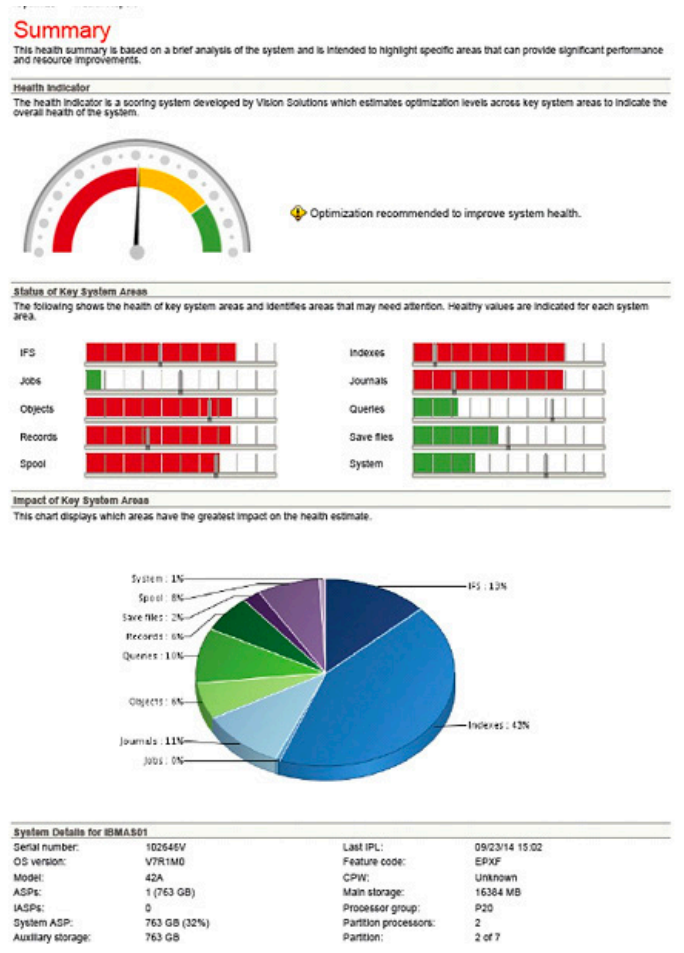
Improving server health and accelerating performance with Assure iOptimize results in less replication latency and better storage utilization for a more efficient availability environment.

### Assure MIMIX HA: Easy, Scalable, Assured Availability for IBM i

Achieving the levels of high availability required to support mission-critical systems puts increasing demands on IT professionals like you. Assure MIMIX HA help you meet those demands head-on.

Assure MIMIX HA is the leader in IBM i high availability and disaster recovery. Purpose-built to keep mission-critical applications running continuously and protect data from loss, Assure MIMIX HA can scale to even the most demanding enterprise workloads. Its hardware-independent replication technology gives you the flexibility to integrate it into your existing IBM i and network infrastructure while adapting to the changes that will come. It is also capable of expanding to meet your business' increasing HA/DR requirements or to serve its need for access to real-time data.

Beyond its ability to meet your recovery point and recovery time objectives, Assure MIMIX HA is designed to be easy to install, configure, monitor and manage, and it offers both 5250 and browser-based graphical interface options. The responsive, graphical dashboard in the Assure Unified Interface is colorcoded for at-a-glance monitoring, provides a summary



Assure iOptimize also runs in the Assure Unified Interface. Flexible sorting and display capabilities for optimization and monitoring make Assure iOptimize simple to use. In addition, Assure iOptimize provides more than 70 localizable, printable health reports that can be used to demonstrate compliance with SLAs.

view of all key aspects of your Assure MIMIX HA environment and allows you to drill down as low as you want to go into the details of your status and configuration. Email and SNMP alerts enable you to configure the system for unattended monitoring, knowing you'll be alerted if your attention is required.

With over two decades of proven experience, Assure MIMIX HA pioneered the way in IBM i high availability and continues to deliver new and innovative ways to meet the data and application availability needs of thousands of businesses across the globe. Assure MIMIX HA is the ultimate in easy, scalable, assured availability for IBM i.



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Precisely's data integration, data quality, location intelligence, and data enrichment products power better business decisions to create better outcomes.

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