ESG WHITE PAPER

Delivering Efficient, Cost-effective, Data-resilient Storage and Networking for Mainframe

IBM and Broadcom Are Advancing a Mainframe Storage Solution to Help Organizations Support and Protect Their Vital Information

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The Market Landscape

According to ESG research, nearly all IT organizations (98%) are undertaking digital transformation activities or have them on their roadmaps.[1] That's because today, being a digital enterprise is highly important. Digital transformation fuels multiple business opportunities, including becoming more operationally efficient (reported by 55% of respondents), developing innovative new products and services (38%), and even developing entirely new business models (25%). In modern environments, the IT infrastructure ties directly to revenue creation, cost avoidance, and risk reduction.

The data within the IT infrastructure is especially crucial, of course. Seventy-one percent of surveyed organizations told ESG they consider the role that data storage technology plays in their organization to be strategic, and they believe that having an effective storage strategy is crucial to achieving a competitive advantage.[2]

Most important of all are the mission-critical applications that high-end enterprise organizations run on mainframes. Data security for these apps must be rock solid. Performance must be predictable and consistent. And the workloads need to run in a modernized environment to accelerate operations.

Broadcom and IBM have been working together to enhance their respective networking and storage technologies to the point where the performance, the level of data protection, and the capabilities around data resilience are more robust than ever before.

Understanding Data Resilience

Data resilience is the capability of a business to deliver the intended outcomes in accordance with predefined service-level agreements, despite system failures, natural disasters, human error, or adverse cyber events.

Source: IBM

Infrastructure 'Must-haves' for Today's Mission-critical Mainframe Applications

Whether they are supporting banking transactions, fraud detection, machine learning-based anomaly detection, billing systems, or other real-time mission-critical workloads, mainframe applications have distinctive needs. For those workloads, IT must deliver an environment that will:

- Never go down, providing maximum resilience and fault tolerance.

- Deliver assured low-latency application performance—consistently.

- Ensure the highest levels of data protection, security, and availability.

- Quickly scale applications safely, reliably, quickly, and predictably.

- Consolidate a massive quantity of applications (including traditional workloads, AI workloads, cloud-native workloads, and more) to achieve high rates of utilization.
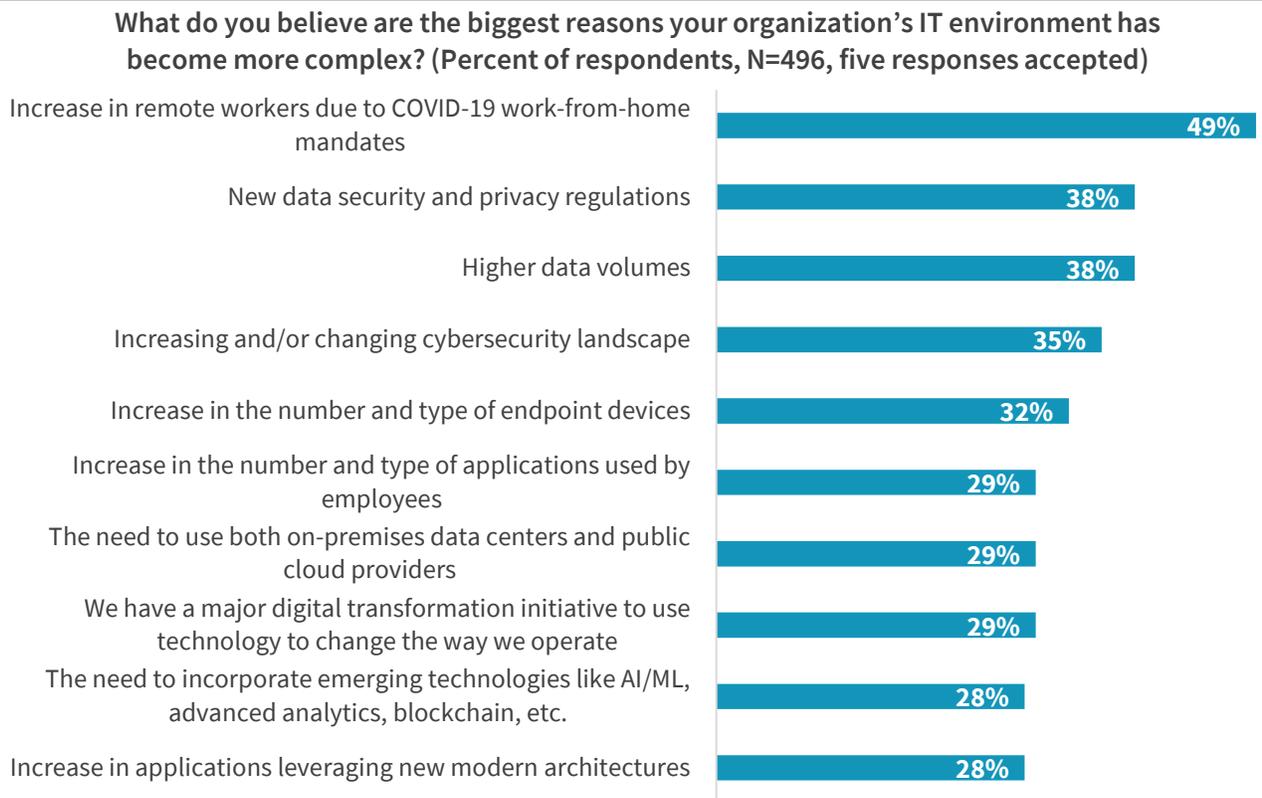
Achieving those objectives isn't easy, considering the many challenges that modern IT faces. A digital enterprise produces a considerable amount of IT complexity: 75% of respondents to an ESG research survey reported that their IT environments are more complex today than they were just two years ago.

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[1] Source: ESG Research Report, *2021 Technology Spending Intentions Survey*, January 2021.All ESG research references and charts in this white paper have been taken from this research report, unless otherwise noted.
[2] Source: ESG Master Survey Results, *2019 Data Storage Trends*, November 2019.

Figure 1 depicts the complexity drivers most frequently mentioned by respondents.

Figure 1. Top Ten Most Common Drivers of IT Complexity

What do you believe are the biggest reasons your organization's IT environment has become more complex? (Percent of respondents, N=496, five responses accepted)

Driver	Percent
Increase in remote workers due to COVID-19 work-from-home mandates	49%
New data security and privacy regulations	38%
Higher data volumes	38%
Increasing and/or changing cybersecurity landscape	35%
Increase in the number and type of endpoint devices	32%
Increase in the number and type of applications used by employees	29%
The need to use both on-premises data centers and public cloud providers	29%
We have a major digital transformation initiative to use technology to change the way we operate	29%
The need to incorporate emerging technologies like AI/ML, advanced analytics, blockchain, etc.	28%
Increase in applications leveraging new modern architectures	28%

Source: Enterprise Strategy Group

As the chart indicates, new security and privacy regulations (cited by 38%) and an ever-changing security landscape (cited by 35%) are both major sources of complexity. ESG research shows that strengthening cybersecurity was the top business initiative expected to drive IT spending in 2021; it was cited by 47% of the respondents. That is unsurprising, considering that in 2020 during the pandemic, 47% of IT organizations said they saw an increase in cyber-attacks.[3]

The complexity challenges are unfortunately exacerbated by problematic skill shortages. Forty-eight percent of IT decision makers identified having a shortage of cybersecurity expertise, and 34% are having trouble finding enough IT architecture and planning experts.[4]

What an Up-to-the-minute, Mission-critical Infrastructure Needs

Under those circumstances, it is important to find other ways to overcome complexity and keep everything running smoothly. That is especially important for mainframe environments, which are almost always the centerpiece supporting a company's most mission-critical workloads. Certain foundational capabilities have to be expected for a mainframe infrastructure:

- Availability.
- Performance.
- Data-resilient security.

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[3] Source: ESG Research Report, *The Impact of the COVID-19 Pandemic on Remote Work, 2020 IT Spending, and Future Tech Strategies*, June 2020.
[4] Source: ESG Master Survey Results, *2021 Technology Spending Intentions Survey*, December 2020.

But those are not the only capabilities that today's mainframe environments should possess. Additional integrated capabilities can address an evolving set of needs within modern environments—specifically, multi-app support (e.g., support for containers) and cloud integration.[5]

The IBM and Broadcom Solution

IBM has a well-deserved, long-time reputation as a leader in IT infrastructure, and Broadcom is a clear leader in enterprise networking. Broadcom has worked with IBM for about 30 years, providing switching technology for storage infrastructure and long-distance solutions. Recently, the two companies have been collaborating to simplify mission-critical IT infrastructure.
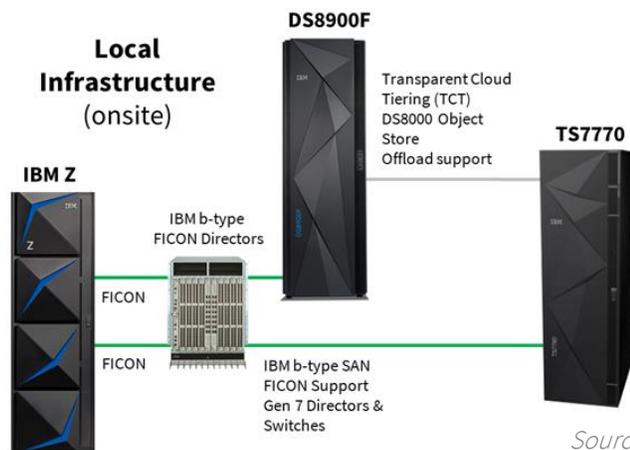
Figure 2. Single-rack Implementation

Source: IBM
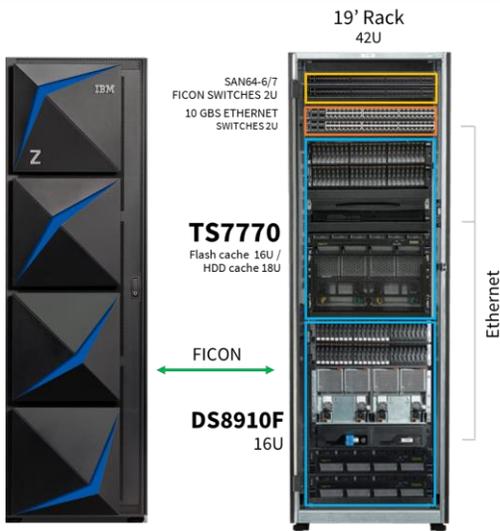
The overall solution from IBM and Broadcom combines leading technologies, such as:

- Primary Storage—IBM DS8900F.

- Data Protection—IBM TS7770 All-flash.

- High availability and disaster recovery solutions such as IBM Global/Metro Mirroring, Transparent Cloud Tiering, and GRID.[6]

- Storage Networking—IBM b-type Gen 7 Fibre Channel and Storage Extension.

Figure 3. Multi-rack Implementation

Source: IBM

Multiple deployment options are available—single-rack implementation for fast, easy deployment and multi-rack implementation for larger deployments.

IBM continues to provide high-end standalone storage systems for those enterprise clients that require the highest levels of scale, leveraging IBM b-type SAN switching to network multiple systems together. Figure 3 highlights how IBM z and IBM Storage systems support today's data resilient infrastructure configurations.

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[5] For more information on the addressing the challenges of cyber resilience for enterprise and mainframe environments, check out the following ESG white papers: *Solve Cyber Resilience Challenges with Storage Solutions* and *Enhancing End-to-end Cyber Resilience in IBM Z Environments with IBM Storage and Networking Solutions*.

[6] For more details on the benefits of Transparent Cloud Tiering and IBM b-type Networking for Mainframe Backup, refer to the following ESG technical validation: *Maximizing Performance and Security of IBM Z Replication Solutions*.

IBM DS8900F—Mission-critical, High-end Storage

The IBM DS8900F is able to deliver the foundational elements for mission-critical applications. It boasts truly impressive stats. This system can handle 50 million business transactions per day.[7] And its latency is ultra-low, with an 18-microsecond response time for the IBM Z.

It also offers the **availability and resilience features** that mission-critical workloads require:[8]

- Field proven 99.99999 (seven-nines) of availability, with an average of only 3 seconds downtime per year.

- Malware and ransomware protection with Safeguarded Copy.

- No-data-loss automatic failover for metro areas.

The Safeguarded Copy is a particularly notable aspect of this system. When a production environment is recovered from a Safeguarded Copy on a mirrored secondary, only data that has been modified since the last recovery point is sent back instead of the full volume. This incremental-copy approach greatly reduces recovery times—from hours to minutes per volume—while saving significant bandwidth.

Figure 4. Safeguarded Copy
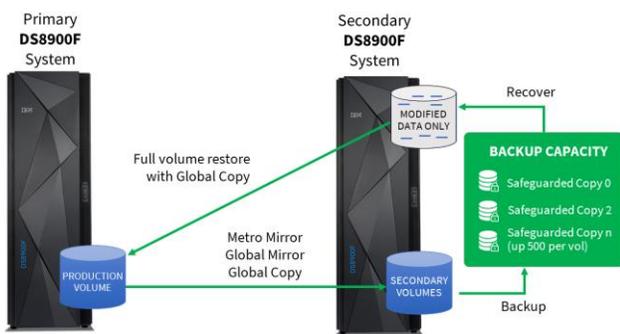
Source: IBM

In terms of **security and compliance features**, this solution offers encryption of data at rest and in flight (which is a foundational capability), as well as security for data that is moved to the cloud (which takes care of more modern IT requirements). Additionally, in combination with IBM Z, Safeguarded Copy helps organizations better protect themselves against malware and ransomware attacks with state-of-the-art analytical threat detection and recovery tools.

In general, the solution comes with innovations that extend established mission-critical capabilities to meet the needs of today's environments. The IBM DS8900F consolidates transactional, cloud-native, and AI workloads into a single system to control capital and operational costs. It simplifies IT. And it reduces risk to the business while increasing that business's agility to quickly adopt and scale a cloud-native environment.

Key Components for Data Protection and Systems Integration

The TS7770 virtual tape library introduced an all-flash model that offers superior performance, delivering similar or better performance with one flash drawer than 10 drawers of SAS HDDs[9], along with a 20U space reduction in your data center. That performance is essential to ensuring fast backup as well as fast data restoration for mission-critical applications. If interested in higher capacity, the HDD standard model will support up to 157 TB on an 18U configuration.

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[7] Source: IBM Case Study, _Bradesco_, 2020.
[8] Source: IBM Systems Hardware Data Sheet, _IBM DS8900F_, 2021.
[9] Performance improvement observed on various workloads in comparison of TS7770 VED 5.2 system with 1 SSD flash drawer with previous TS7770 VED 5.1 system with 10 HDD drawers with 12EH8/8x16Gb/2x10Gb configuration. Performance tested for standalone, two-way and four-way configuration with 5.35:1 ZSTD compression.

Connecting all the components is the IBM b-type SAN switch with Gen 7 technology for IBM Z. Broadcom's Fibre Channel and extension technology operates within the IBM b-type products. This networking technology plays an essential role in ensuring that the entire mission-critical environment continues to provide predictable performance, low latency, security, and resilience—even if that environment spans multiple locations across the globe.

It is hard to overstate the importance of the storage network. Data movement in modern environments is essential to reducing the risk of a mission-critical application environment going down, as well as to ensuring predictable performance and operation on a steady-state basis.

According to Broadcom, Gen 7 offers 50% lower latency than the previous Gen 6 technology. It offers 64Gb/s bandwidth, which ensures continued, predictable low-latency data movement as the environment grows—essential for business and application agility. It is also intelligent, able to monitor and manage actionable insights to ensure reliable, resilient data movement.

A Powerful Combination of Mission-critical Capabilities Delivered in a Single Frame

When combined, the IBM DS8900F, the IBM TS7700, and the IBM b-type Gen 7 SAN switch provide:

- Near-zero downtime for assured business continuity.

- A two-second RPO and less-than-sixty-second RTO at more than 1,000 miles.

- Data protection for up to eight IBM TS7770 systems across geographically dispersed locations.

- Immutability through the IBM DS8900F Safeguarded Copy and TS7770 Logical WORM with retention. This immutable data storage supports regulatory compliance and ransomware protection efforts.

Figure 5. Multi-site Protection with up to Eight IBM TS7770

- Modern features, including cloud integration.

- The option to export full production volumes to the cloud or physical tape to recover and enable a clean environment anywhere.

- Logical and physical airgap protection to retain a known-good copy of data.

- The ability to seamlessly integrate with 256 cloud object stores.
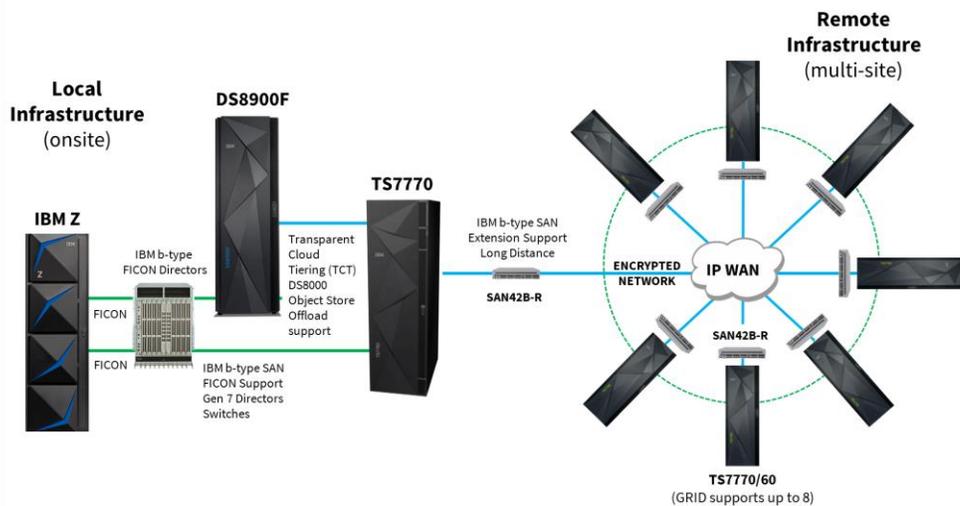
Source: IBM

- Encrypted data movement.

- The ability to transfer data directly without needing an additional server.

Collectively, this is a simple, fully validated solution for mission-critical environments from IBM and Broadcom—both leaders in mission-critical mainframe technologies. IBM takes responsibility for the solution, serving as the single support contact.

Organizations deploying the solution should expect to see reduced business risk … with improved performance, security, scalability, resilience, protection, and cloud integration. Each of those attributes is necessary to support the needs of a modern digital environment.

The Bigger Truth

Data is the "new natural resource." Protecting it properly is critical, especially to recover from ransomware. But the network that allows you to protect and access that data must be an important consideration as well. The Broadcom product provides more than just low latency. It offers a variety of high-availability features spanning across a globally networked grid and helping to reduce the cost of data storage, protection, and access. Broadcom makes accessing and protecting data a much more robust operation.

Any enterprise organization using IBM mainframe storage for mission-critical workloads should understand that this technology has been enhanced to the point where the level of data protection and the capabilities around cyber resilience are more robust than ever before. That is vitally important in today's world—where data itself is more valuable than ever, and more bad actors and cyber-threats exist than ever before, too.

IBM and Broadcom are working together to make deploying a solution such as this one as easy and fast as humanly possible. That's good news. Given the rate at which digital businesses continue to grow, they don't need this solution a year from now; they need it today.

Enterprise Strategy Group is an IT analyst, research, validation, and strategy firm that provides market intelligence and actionable insight to the global IT community.

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