Storcom Response to City of Republic – Storage Area Network (SAN) Device and Ongoing Support

Storcom Inc.
360 E 22nd St
Lombard, IL 60148
Trent James
Account Manager
(312)-532-6629
Trent.James@storcom.net

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Table of Contents

Background and Experience **3**
- Project Approach, Methodology, and Professional Services 4
- Introduction to IBM FlashSystem 5045 5
  - Features 5
  - Specifications 5
- Introduction to IBM FlashSystem 5300 6
  - Features 6
- Comparing IBM Storage FlashSystem Options 7
  - Storage Capacity 7
  - Connectivity 7
  - Performance and Scalability 8
  - Data Management 10
  - Data Security 10
- Cost Proposal 11
- Support and Maintenance 11
- References and Work Samples 13
  - Case Studies 13
  - Reference Clients 13

Background and Experience

Storcom is a 24 year Chicago-based IT solutions provider specializing in all projects involving the management, movement, and protection of data which include, but are not limited to servers, storage, networking, backup, disaster recovery, cloud, and security. Our agile and close-knit company allows for a collaborative and personalized approach to serving our clients. Storcom's personnel includes a team of 15-20 service engineers and sales professionals who assist clients in the assessment, design, implementation, and support of solutions.

Storcom prides itself on its personalized, customer-centric approach, working closely with clients to understand their unique challenges and provide customized solutions that align with their specific needs. Leveraging a deep expertise in both traditional and cutting-edge storage technologies, Storcom empowers organizations to optimize their data storage strategies, ensuring reliability, cost-effectiveness, and future-proof growth.

With a dedicated team of experienced professionals, Storcom is committed to delivering the highest standards of service and support, ensuring that clients' IT infrastructures are robust, scalable, and aligned with the latest industry trends.

Storcom's personnel assigned to this project include:

Trent James - Account Manager
As a 15 Year IT Veteran with a proven track record in sales, Trent has a focus on storage products and solutions with a deep understanding of various storage technologies, including SAN (Storage Area Network), NAS (Network Attached Storage), cloud storage, backup and disaster recovery systems, and hybrid storage solutions. Trent has strong interpersonal and communication skills which help build and maintain lasting relationships with potential and existing clients. Trent will assist in identifying customer pain points and recommending the most appropriate solutions to address the client's needs, all while maintaining a focus on long-term customer satisfaction.

Trent has up-to-date knowledge of the latest trends and advancements in the IT storage market, including emerging technologies like cloud storage, software-defined storage (SDS), and storage virtualization. Familiarity with key vendors in the industry such as IBM, Dell, HPE, and Pure.

With the ability and authority to negotiate pricing, terms and contracts with clients, Trent will be the primary point of contact to ensure mutually beneficial agreements between Storcom and the City.

Derek Kulp - Implementation Engineer

Derek will be the primary implementation engineer and will assist in the management of

the solutions Storcom recommends. Derek has extensive proficiency in managing various types of storage systems, such as SAN (Storage Area Network), NAS (Network Attached Storage), DAS (Direct Attached Storage), and cloud-based storage solutions as well as deep knowledge of virtualization platforms (e.g., VMware, Hyper-V), as storage solutions must integrate seamlessly with these environments. In addition Derek is skilled with data backup, restoration, and disaster recovery processes.

Justin Starcher - Project Manager

Justin has proven experience in managing IT projects, from initiation to completion, and will assist in defining project scope, goals, deliverables, and track progress through key milestones. He will also be responsible for addressing unforeseen challenges and obstacles that arise during the course of a project and to make timely decisions that keep the project moving forward.

Project Approach, Methodology, and Professional Services

The timeline will be determined after the discovery phase of the project. Depending on the amount of data, network connection and end-user related restrictions, migration time will vary. Storcom will work to minimize the disruption to the City operations. Based on the information gathered during discovery, a plan will be developed that meets the City's requirements.

As part of the included services, Storcom will test and validate the solution to ensure the system performs at the expected levels of performance. Post-installation and project sign-off, Storcom will provide further assistance and support based on T&M charges detailed later in this proposal.

Project: The missouri city

Storcom Inc.

Workplan for Project Storcom Inc.

Description		Status	Budget	Estimated			Scheduled			Actual			Products	Resources
				Start	Due Date	Duration	Start	Finish	Hours	First	Last	Hours	Shipped/Total	
The missouri city		**3. On-Hold**	**0**			**0**			**0**			**0**		
Discovery	**Phase 1**	**Open**	**0**			**0**			**0**			**0**		
Investigate Existing Network and Hypervisor environment	6730	Open	0			0			0			0		
Deployment	**Phase 2**	**Open**	**0**			**0**			**0**			**0**		
Rack IBM Flashsystem	6731	Open	0			0			0			0		
Configure Flashsystem	6732	Open	0			0			0			0		
Testing and Validation	**Phase 3**	**Open**	**0**			**0**			**0**			**0**		
Put data onto system for testing and validation	6733	Open	0			0			0			0		
Migration	**Phase 4**	**Open**	**0**			**0**			**0**			**0**		
Migrate data and VMS	6734	Open	0			0			0			0		
Testing and Validation	**Phase 5**	**Open**	**0**			**0**			**0**			**0**		
Monitor migration and performance	6735	Open	0			0			0			0		
Post Deployment and Monitoring	**Phase 6**	**Open**	**0**			**0**			**0**			**0**		
Train responsible parties on SAN														
Create documentation														
Get sign-off from responsible parties														
Monitor the status of the SAN with Storage Insights	6736	Open	0			0			0			0		

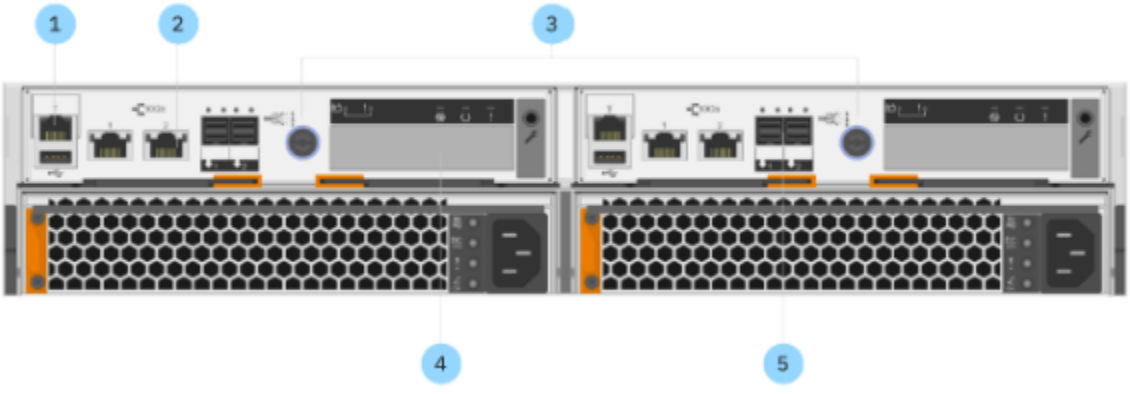
Introduction to IBM FlashSystem 5045

IBM Storage FlashSystem 5045 is a SAS-based storage solution for mid size businesses in need of simple, flexible storage. Part of the FlashSystem family, this entry-level Enterprise system taps into advanced storage capabilities and scales up as needed. It's easy to implement, easy to use and easy to grow.

Features

- High performance redundancy. 12/24 SAS HDD/ flash devices in a 2U storage enclosure with fully redundant chassis components avoid a single point of failure.
- Scalable for environments of any size.
- Smart, self-optimizing solution is easily managed, enabling organizations with all-flash or hybrid configurations to overcome storage challenges as they grow.
- Affordable, high-value solution. High-density tiers of flash storage in an affordable package includes compression, deduplication and AI-powered predictive analytics.
- Agile integration. Migrate data with fully integrated system management, application-aware data services and high-value features such as AES encryption, and deduplication and compression.
- Hybrid cloud enabled. Benefit from hybrid cloud storage capabilities to increase business agility.
- Easily add more storage. Evolve as your business requires with easy-to-use, amazingly quick IBM Storage FlashSystem entry-level storage.

Specifications



1. RJ45 Management Port
2. 10 Gb RJ45
3. 2 Controller modules

4. 16 Gb FC, 25 Gb Ethernet, and 10 Gb Ethernet ports are available for FC and iSCSI connectivity
5. 12Gb SAS ports for host attachment and expansion enclosure attachments

Introduction to IBM FlashSystem 5300

IBM Storage FlashSystem 5300 is an NVMe storage option for entry-level enterprises that need compact, powerful storage. It unifies data management across the core, cloud and edge, and is designed in a revolutionary 1U form factor. The result is blazing speeds, robust density and numerous scale-up and scale-out options.

An ultra-performant cyber resilient, and flexible all-flash storage platform that enables organizations to consolidate and protect more workloads onto a smaller footprint with a larger performance and capacity envelope.

Features

- High performance redundancy. 12 NVMe high-availability flash devices in a 1U storage enclosure drawer with fully redundant canister components prevent a single point of failure.
- Scalable for any environment of any size.
- Smart, self-optimizing solution is easily managed, enabling organizations to overcome storage challenges as they grow.
- Affordable, high-value solution. High-density tiers of flash storage in an affordable package includes compression and AI-powered predictive analytics.
- Agile integration. Migrate data with fully integrated system management, application-aware data services and high-value features such as AES encryption, deduplication and inline **hardware compression** (Doesn't impact performance).
- Hybrid cloud enabled. Benefit from hybrid cloud storage capabilities to increase business agility.
- Cyber resilient to the core. The new technology enabled by FlashCore Module 4 (FCM4) is designed to continuously monitor statistics gathered from every single I/O using machine learning models to detect anomalies like ransomware in less than a minute.

Comparing IBM Storage FlashSystem Options

Product specifications	IBM Storage FlashSystem 5000	IBM Storage FlashSystem 5300
Maximum bandwidth (reads)	12 GB per second	28.6 GB per second
Response times (reads)	< 70 microseconds	< 50 microseconds
Effective maximum capacity within single enclosure[3]	570 TBs (2U enclosure)	1.8 PBe (1U enclosure)[2]
Processor/PCIe Gen	Intel Broadwell DE	Intel Ice Lake, Gen 4 PCIs
Maximum front-end host ports	8	16

Connectivity

IBM FlashSystem 5045:

- Offers connectivity via **iSCSI (10GbE)**.
- Built with a **dual-controller architecture** for high availability, ensuring no single point of failure.
- Includes **fully redundant power supplies**, **hot-swappable components**, and support for **RAID configurations** (Distributed RAID 1, 5 and 6). Sizing has been based on IBM Distributed RAID 6.
- Features **automated failover and load balancing**, ensuring continuous data access during component failures.
- Additional optics or cables may be required depending on existing environment.
- There are 2 onboard 10GbE Ports and we've included an additional 10GbE Card providing an additional 4x10GbE Ports. This will give you 6x10GbE Ports with an additional 6x10GbE Ports for redundancy. The total port count for the solution is 12x10GbE Ports. There is also a redundant 1GbE management Port.

IBM FlashSystem 5300:

- This system has been configured with **iSCSI (10 GbE)**
- Utilizes **dual controllers**, ensuring high availability through redundancy and failover support.
- Includes **hot-swappable components**, **redundant power supplies**, and robust **RAID configurations** (Distributed RAID 1, 5 and 6). Sizing has been based on IBM Distributed RAID 6.
- There are 2 onboard 10/25GbE Ports and we've included an additional 10GbE Card providing an additional 4x10GbE Ports. This will give you 6x10GbE Ports with an additional 6x10GbE Ports for redundancy. The total port count for the solution is 12x10GbE Ports. With this solution, there is an additional slot where we could add another 10GbE Card with 4 more 10GbE Ports which would be redundant, so a total of 8x10GbE Ports could be added. There is also a redundant 1GbE management Port.

Both Flashsystem 5300 nd 5045:

- Both IBM FlashSystem 5300 and 5045 support hot spare drives through IBM Distributed RAID (DRAID), which automatically reallocates data in case of drive failure. They also feature hot-swappable components, allowing drive replacements without downtime.
- A "dRAID 6 with hot spare" refers to a distributed RAID 6 array where an additional drive is designated as a "hot spare," meaning it sits idle until a drive within the RAID array fails, at which point the hot spare automatically takes over and rebuilds the data from the failed drive, providing increased fault tolerance and minimizing data loss during a drive failure; unlike traditional RAID setups, in dRAID 6, the spare capacity is distributed across all drives within the array, allowing for faster rebuilds compared to a single dedicated hot spare

Performance and Scalability

IBM FlashSystem 5045:

- Delivers up to **1.2M IOPS** with consistent latency under **70µs** for read/write operations.
- Supports future scalability with expansion shelves, accommodating up to **504 drives**.
- Configured with **13 x 7.68TB drives**, this solution provides approximately **71 TB usable capacity** before compression and deduplication.
- Data reduction features, such as IBM's **Data Reduction Pools** (Compression, DeDuplication, Thin Provisioning, UNMAP), typically achieve a 2:1 or higher reduction ratio, further increasing effective capacity.
- Maximum of 504 drives per system and 1,008 drives in two-way clusters

- Maximum Standard Expansion Enclosure Capacity - Up to 20 standard expansion enclosures per controller
- Maximum High Density Expansion Enclosure Capacity - Up to 8 high-density expansion enclosures per controller
- The specific configuration quoted has 11 remaining drive slots available for expansion before requiring an upgrade or additional enclosure. If so interested, this solution could be reconfigured with larger drives to open up additional slots for future expansion within the existing chassis.
- Capacity can be increased 1 drive at a time
- The IBM FlashSystem is fully equipped to support virtual servers, including file & print, SQL, and application servers, as well as other critical workloads.

IBM FlashSystem 5300:

- Configured with **11 x 9.6TB drives**, this solution provides approximately **70 TB usable capacity** before compression and deduplication.
- Includes data reduction features, such as IBM's **Data Reduction Pools** (Compression, DeDuplication, Thin Provisioning, UNMAP).
- IBM 2:1 Out-of-the-Box Data Reduction Commitment (attached) provides a 2:1 data reduction guarantee sight unseen without an assessment which will further increase the effective capacity of this system. Furthermore, the Flash Core Modules quoted in the solution handle all Compression without any impact to performance.
- Maximum of 428 drives per control enclosure; 856 per clustered system
- Maximum Standard Expansion Enclosure Capacity - Up to 12 standard expansion enclosures per controller
- Maximum High Density Expansion Enclosure Capacity - Up to 4 high-density expansion enclosures
- Provides higher performance, reaching up to **2.2M IOPS** and latency under **50µs** for read/write operations, making it suitable for workloads requiring ultra-low latency.
- Scales further, supporting up to **428 drives**, ideal for demanding enterprise environments.
- The specific configuration quoted has 1 remaining drive slot available for expansion before requiring an upgrade or additional enclosure. If so interested, this could be reconfigured with larger drives to open up additional slots for future expansion within the existing chassis.
- Capacity can be increased 1 drive at a time.
- The IBM FlashSystem is fully equipped to support virtual servers, including file & print, SQL, and application servers, as well as other critical workloads.

Data Management

Both Systems:

- Include IBM's **Data Reduction Pools (DRP)** with thin provisioning, compression, and deduplication to optimize storage efficiency.
- Support **snapshots, cloning, and replication** for robust data protection and disaster recovery.
- Built-in tools enable streamlined backup and recovery processes, enhancing operational resilience.

Data Security

Both Systems:

- Provide **AES-256 encryption** for data at rest and in transit, ensuring robust protection against unauthorized access.
- Include **role-based access control (RBAC)** and support for secure authentication methods to safeguard sensitive data.
- For an additional $6,000, Spectrum Control Select could be added to the configurations which would provide advanced analytics, performance monitoring, capacity planning, centralized management, and support for immutable snapshotting, further strengthening data protection and compliance efforts.
- The system supports two methods of configuring encryption.
    - You can use a centralized key server that simplifies creating and managing encryption keys on the system. This method of encryption key management is preferred for security and simplification of key management.
    - In addition, the system also supports storing encryption keys on USB flash drives. USB flash drive-based encryption requires physical access to the systems and is effective in environments with a minimal number of systems. For organizations that require strict security policies regarding USB flash drives, the system supports disabling these ports to prevent unauthorized transfer of system data to portable media devices. If you have such security requirements, use key servers to manage encryption keys.
- MFA is supported on the IBM Flashsystem arrays through Azure AD, DUO, IBM Verify, or SSO providers that require MFA. Though best practices and recommendations is that you leverage MFA through LDAP/AD to be able to get onto the network/domain that the Array resides on. Single sign-on providers are often used to provide multifactor authentication in addition to single sign-on. For example, Microsoft AD FS supports a range of third-party authentication providers for additional multifactor authentication capability such as Duo Security, RSA and Okta Workforce Identity Cloud.
- An additional security measure that we would like to mention is the optional use of two person integrity (TPI) to prohibit critical and risky tasks in the system from being executed by a single security administrator and by requiring the involvement of two security administrators. TPI requires two security administrators to work together to complete certain tasks. Protecting data is an important part of IBM®

Storage Virtualize, and TPI helps mitigate the chance of data loss, prevent inadvertent mistakes on operations, and enhance security.
- For additional information: https://www.ibm.com/docs/en/flashsystem-5x00/8.6.x?topic=security-overview

Virtualization Support

- The IBM FlashSystem 5300 and 5045 natively integrate with VMware vSphere, vCenter, and Microsoft Hyper-V, ensuring seamless virtualization support.
- They provide thin provisioning, QoS controls, automated storage tiering (IBM Easy Tier), and snapshots/cloning for dynamic VM storage allocation.
- For additional information:
    - https://www.ibm.com/docs/en/flashsystem-7x00/8.7.0?topic=sfcha-hosts-that-run-microsoft-hyper-v-operating-system
    - https://mediacenter.ibm.com/media/Managing+IBM+FlashSystem+in+your+VMware+environment/1_eh7925kc/22693772

Cost Proposal

- Please see quotes for detailed 3YR and 5YR proposals of each storage solution
- Storcom's hourly rate is $235/Hr for normal-business hours, 1.5x for After-Hours/Weekend, and 2x for Holidays for any additional services beyond the scope of the initial installation and migration
- Managed Service Agreements are available at the clients request and for an additional yet-to-be-determined fee

Support and Maintenance

- **IBM Expert Care Advanced:** (included in quote)
    - **Hardware Maintenance Support:** Provides 24x7 same-day onsite repair
        - Can be upgraded for additional cost to expert care premium for Enhanced 30-minute response time for Severity 1 and 2 issues and Dedicated support from a Technical Account Manager.
    - **Support Line:** Offers 24/7 technical assistance for usage, installation, and technical questions, as well as addressing product compatibility and interoperability concerns. Initial contact target response time objective for all severity levels is 4 hours.
- **Service Level Agreements (SLAs):**
    - **Response Time:** 24x7x365 4-hour onsite repair, ensuring critical issues are addressed as quickly as possible, any time of day, including weekends and holidays.
    - **Process for Handling Issues:** IBM's support infrastructure ensures efficient handling of hardware failures, software issues, and system updates, minimizing downtime and maintaining system performance.

Professional Services: With deployment, the following professional services will be required:

- Installation and configuration of the SAN device to ensure full integration with the City's existing infrastructure.
- Data migration services to facilitate transition of data from the current storage system to the new SAN, designed to minimize interruptions
- Post-installation testing to validate the performance, redundancy, and high availability of the SAN device.

Documentation & Training:

The IBM FlashSystem 5300 and 5045 solutions include comprehensive documentation and training resources to support City IT staff in the ongoing management and troubleshooting of the SAN infrastructure.

Technical Documentation

- IBM provides technical documentation to assist with setup, configuration, and troubleshooting of the FlashSystem SAN. The following resources will be made available Online including setup guides, user manuals, and troubleshooting guides
- Technical documentation can be accessed through IBM's support portal and knowledge base, ensuring IT staff has up-to-date information on system capabilities and management.
- https://www.ibm.com/docs/en/flashsystem-5x00/8.6.0

Training Resources

- IBM offers a variety of online, at cost, training options, through its IBM Training Portal (https://www.ibm.com/training/), including courses specific to IBM FlashSystem storage solutions (https://www.ibm.com/training/search?query=flash%20storage).
- These training materials cover essential topics such as on managing the SAN device, best practices for data storage, and handling system maintenance tasks:
- IBM's training catalog also includes self-paced e-learning modules, interactive labs, and certification courses to help IT teams develop expertise in managing IBM storage solutions.
- For organizations looking for structured training programs, IBM offers subscription-based training bundles that provide access to multiple courses at a cost-effective rate. This enables IT staff to access a wide range of learning materials tailored to their specific operational needs.
- By leveraging IBM's extensive documentation and online training, City IT staff will have the necessary resources to successfully manage and maintain the FlashSystem SAN environment.

References and Work Samples

Case Studies

https://www.ibm.com/case-studies/city-of-tyler-digital-transformation

https://www.ibm.com/case-studies/arizona-state-land-department

https://www.ibm.com/case-studies/promos-systems-hardware-sap

Reference Clients

Noble Network of Charter Schools
Noble Schools is an open enrollment, public charter network of high schools and middle schools serving students throughout Chicago. There are currently 18 schools in the charter school network: 1 middle school and 17 high schools. The student population for Noble Network schools is 98% minority and 89% low-income. It currently serves 12,543 students from more than 70 Chicago communities

Contact: Julian Kidd
Title: Network Operations Manager
Phone: (312) 521-5287
Email: jkidd@noblenetwork.org

Village of Carpentersville
is a village in Kane County, Illinois, United States. The population was 37,983 at the 2020 census. It is part of the Chicago metropolitan area.

Contact: Kevin Roberts
Title: IT Director
Phone: (224)293-1601
Email: KRoberts@cville.org

Elgin School District U46
Covering 90 square miles, the district serves portions of eleven communities in the northwest suburbs of Chicago in Cook, DuPage and Kane Counties.School District U-46 serves over 40,000 children in grades preK-12. The district ranks as the second largest in Illinois with forty elementary schools, eight middle schools and five high schools.

Contact: Brad Bilut
Title: IT Lead
Phone: 847-888-5000
Email: bradbilut@u-46.org