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A **Broadcom** Company

Disaster Recovery: Storage Replication between Data Centers

Highlights

- Move more storage data between data centers to meet disaster recovery objectives with industry-leading performance and scalability.

- Encrypt in-flight data flows without a performance penalty to safeguard data from threats over the WAN.

- Provide load balancing and network resilience with Brocade® Extension Trunking to optimize WAN utilization and protect against path failures.

- Consolidate Fibre Channel, FICON, and IP storage traffic from heterogeneous devices for high-speed, high-availability, and secure transport between data centers.

- Deliver holistic management across distance for greater control and insight.

- Extend proactive monitoring between data centers to detect WAN anomalies and avoid unplanned downtime automatically.

Local Performance over Long Distance with Brocade® Extension

With the world's embrace of digital business, data has become more valuable than ever. Expectations for that data to be accessible from anywhere, at any time, and on any device are pushing infrastructures to the limit. IT organizations are under pressure to keep pace with the growing avalanche of data and ensure that their valuable information is protected from a disaster. The loss of any crucial data could lead directly to lost revenue or damage to the company's brand reputation. To safeguard data from a disaster, storage administrators need a way to achieve sufficient replication performance over distance, keep data flowing over unreliable WAN connections, and secure data-in-flight while containing costs for equipment and long-distance connections.

Brocade Extension provides cyber-resilient replication connectivity for enterprise storage that securely moves more data, faster over distance for continuous data protection. Brocade Extension is a purpose-built solution for both FCIP and IP Extension. It delivers local performance over long distances with strong encryption and provides a comprehensive disaster recovery solution. Brocade Extension leverages Brocade WAN-optimized TCP with high-efficiency encapsulation to accelerate TCP, achieving the fastest replication speeds possible from storage devices and ensuring in-order lossless transmission of data.

Ensure that Valuable Information is Protected from Disruptions and Outages

This enterprise-class solution enables storage and mainframe administrators to perform the following tasks:

- Secure data over distance
- Protect data from WAN disruptions and outages
- Move more data faster over distance
- Drive maximum replication throughput
- Optimize and manage the use of WAN bandwidth
- Maintain service-level agreements

Brocade Extension technology is constructed on four foundational pillars: robust security, continuous availability, outstanding performance, and operational excellence. These pillars are paramount to every IT organization.

Robust security: It is essential to protect data leaving a secure data center; however, with traditional solutions there has often been a trade-off between performance and security. The Brocade Extension hardware-based encryption engine (IPsec) ensures security and regulatory compliance to safeguard data from threats over the WAN. The implementation encrypts data flows with strong AES-256 encryption without a performance penalty and with ultra-low added latency at full line rate.

When using Brocade IPsec, there is no need for intermediate firewalls which tend to provide less than equivalent performance. Intermediate firewalls negatively affect throughput, do not improve overall security, increase complexity, add a point of failure, increase total cost of ownership (TCO), and reduce return on investment (ROI). Brocade IPsec protects data from end-to-end, minimizes exposure to data breaches, avoids unwanted publicity, reduces TCO, and improves ROI.

In addition, Brocade Gen 7 technology delivers innovative security features, hardens Fabric OS® (FOS) software, and validates hardware components to protect against malicious cyber-attack exposure.

Continuous availability: Brocade Extension switches provide a suite of features from predeployment validation to advanced network failure recovery technologies to protect data from WAN disruptions and outages for continuous availability.

Brocade Extension Trunking shields end devices from IP network disruptions, makes network path failures transparent, and protects replication traffic from most network device failures. Brocade Extension Trunking combines multiple WAN connections into a single, logical, high-bandwidth trunk, providing load balancing and resilience to protect against WAN link failures. For redundancy, circuits can span multiple data center switches, routers, and service providers.

With the Brocade Adaptive Rate Limiting (ARL) feature, organizations can optimize bandwidth utilization and maintain replication performance during WAN outages by using alternate WAN paths or adapting rate limiting to the existing conditions. ARL dynamically adjusts bandwidth sharing between minimum and maximum rate limits to optimize bandwidth utilization and maintain maximum WAN performance during disruptions.

Brocade Fabric Vision® technology extends proactive monitoring between data centers to detect WAN anomalies automatically and avoid unplanned downtime. This automated detection simplifies troubleshooting. Administrators can quickly identify issues and ownership, resulting in quicker resolution. Brocade Extension provides a built-in traffic generator and WAN test tool to prevalidate and troubleshoot infrastructure, streamline deployments, and preempt issues.

Outstanding performance: The advanced performance and network optimization features of Brocade Extension enables replication and backup applications to send more data over metro and WAN links in less time and optimize available WAN bandwidth. Brocade Extension significantly increases the performance of storage replication between data centers, even with encryption enabled. The more latency and packet loss between the data centers, the greater the benefit. Brocade Extension boosts throughput, providing local-like performance over long distances. Such performance gains enable use cases that at one time were not feasible.

Benefits of a Single-Managed Tunnel between Data Centers

Extension can significantly benefit many typical TCP/IP-based replication applications and data migration between data centers. Consolidating these applications into a single managed tunnel between data centers provides real benefits: visibility, acceleration, security, prioritization, bandwidth management, and bandwidth pooling.

Visibility: Utilizing Brocade SANnav™ makes TCP flows visible across the network, enables comprehensive visibility into disaster recovery, and business continuity network health and performance conditions. Through a modern graphical user interface (GUI) with investigative capabilities, information about specific flows and TCP statistics are contextualized into visual dashboards, enabling administrators to quickly detect and isolate points of interest for both troubleshooting and performance optimization.

Acceleration: Acceleration of flows across the WAN improves performance dramatically. Longer distances increase round-trip time and are more prone to packet loss. With Brocade Extension, applications demonstrate performance improvement and the ability to drive maximum replication throughput by handling the latency and packet loss that occurs over imperfect WAN connections. This performance improvement is unrelated to compression; any achievable compression is in addition to flow acceleration. Flow acceleration is a function of enhanced protocol efficiency across the network.

Security: IPsec secures data end-to-end, ensuring that flows entering a service provider's infrastructure are private and secure. A service provider's WAN infrastructure in itself is not secure. A common mistake is to assume that a *private* WAN connection is secure and will not be eavesdropped on or attacked. Data encryption, such as Brocade IPsec, prevents eavesdropping, masquerading, man-in-the-middle, data altering, replaying, and other attacks, all without impacting performance.

Prioritization: Using Quality of Service (QoS), there are various ways to achieve flow prioritization. The first and most straightforward method is to use the Traffic Optimizer feature, which sets flow priorities across Extension tunnels based on Performance Groups. Another method is to configure protocol distribution and bandwidth priority percentages. Brocade Extension optimizes the throughput of every flow by managing bandwidth using flow control.

Bandwidth management and pooling: Bandwidth management and pooling form a feature set that aggregates bandwidth from multiple WAN connections, which could be from multiple service providers. This feature set also provides high availability and manages the minimum and maximum bandwidth rates. Exclusive to Brocade, bandwidth management and pooling use Brocade Extension Trunking. Bandwidth is managed so that if a data center LAN switch goes offline or encounters any disruption along the path, the bandwidth of the remaining paths adjust to compensate for the offline path. A proper design maintains bandwidth during outages of various devices in the path.

Deployment Use Cases

Several high-return use cases apply when deploying Brocade Extension, including the following examples:

- **High-performance Extension:** Similar to FCIP across the WAN, IP Extension provides high performance, high availability, strong encryption, and operational excellence to IP-based storage flows. These pillars are the same as those expected locally, just over distance.

- **Tape replacement:** IP Extension opens opportunities to replace tape with offsite storage solutions that leverage practical and efficient replication between data centers using Brocade Extension. The high performance and reliability of replication, data security, and availability over distance enable this use case.

- **Private cloud storage (PCS):** PCS is an architecture where customers have arrays in data centers adjacent to leading cloud providers such as IBM, Rackspace, Amazon, and Azure. Replication is performed from the customer's primary data center to the remote site. Customers benefit from data replication to a secondary site without having to own and operate a disaster recovery facility. Moreover, VMs can be spun-up at the adjacent cloud provider while accessing the private cloud storage. These VMs can be used to add interim capacity or for business continuance during a disaster.

Summary

Enterprises continue to demand innovation in disaster recovery solutions to address their growing and dynamic data protection needs. Increased security, maximized availability, high performance, and simplified management are all essential to address the challenges of storage replication between data centers. Native end-device TCP/IP replication is not well suited to meet these challenges. Brocade Extension addresses disaster recovery challenges with a solution that, when a catastrophe occurs, enables preparedness toward always-on operations and ensure a fast recovery.