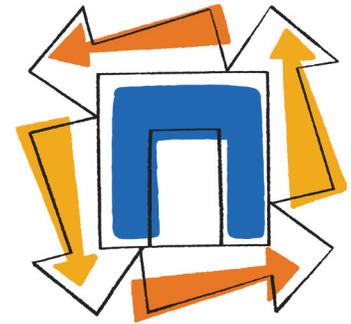




NetApp®



## Alliance Solution Brief

# High-Speed Data Protection with Infineta DMS and NetApp

### KEY FEATURES

- Speed up SnapMirror®-based replication by up to 10x
- Speed up SnapVault®-based backup and recovery by up to 10x
- Reduce bandwidth usage by up to 90%
- Enable reliable replication over cost-effective WAN alternatives (e.g. MPLS) for overall opex reduction

### The Challenge

Business continuity and disaster recovery are all about risk management, so it is essential to assure that the WAN does not pose a threat to the integrity of the business continuity and disaster recovery effort. Shared WANs such as MPLS and IP-VPN are cost-effective alternatives to private links (for example, SONET), especially in the face of rapidly growing storage. But a shared WAN is vulnerable to the vagaries of the provider network, which include:

- **Congestion**, which causes packet drops, forcing the packet(s) to be re-sent and the connection speed to drop dramatically
- **Out-of-order packet delivery**, which triggers resends and connection back off
- **Bandwidth contention**, which delays latency-sensitive traffic regardless of LAN-side QoS
- **High latency**, which reduces per-connection throughput

### The Solution

#### Accelerating data protection with Infineta and NetApp

Organizations use NetApp® SnapMirror and NetApp SnapVault to set and meet aggressive recovery time objectives and recovery point objectives. The Infineta Data Mobility Switch (DMS) performs high-speed WAN optimization, serving as a force multiplier for SnapMirror to prevent common WAN impediments from undermining performance and reliability.

Infineta DMS is a true networking solution, designed especially for inter-data center workflows. As a result, it introduces only about 50µs latency, even at speeds of 10Gbps and data reduction rates of 80%. This high-speed and low latency performance means that the DMS is able to accelerate and reduce all asynchronous SnapMirror and SnapVault traffic.

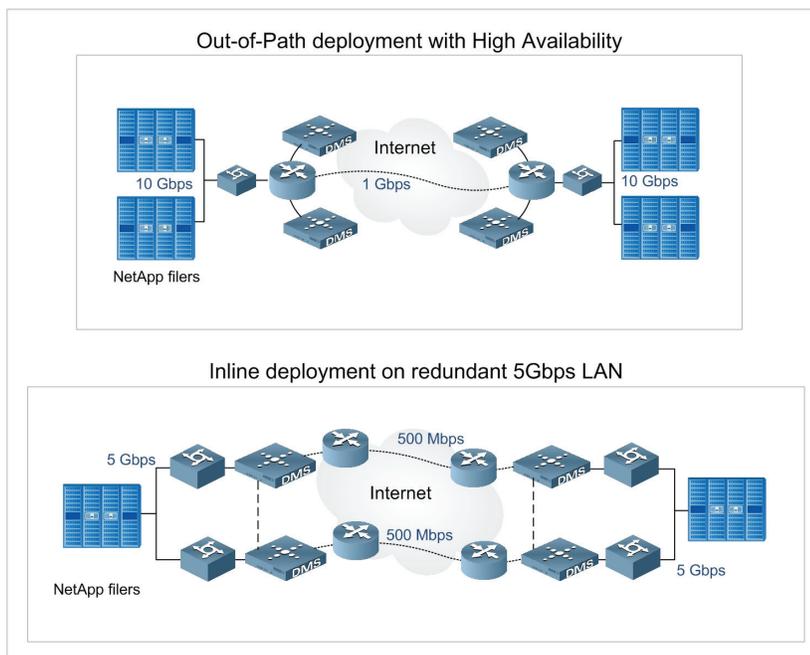


Figure 1) The DMS sits at the LAN/WAN edge to protect critical traffic from the effects of network congestion and high latency.

### Congestion Control

SnapMirror and SnapVault have been designed to aggressively propagate block-level changes across the WAN for replication and backup. The faster this data can be transmitted across the WAN, the more Snapshot copies can be moved to a remote location for data protection purposes. But if the transmission gets interrupted, replication cycles can back up, stall, and even break.

Congestion occurs when the link becomes oversubscribed, even for an instant. When this happens, devices on the network are designed to drop packets to prevent reverberations from spreading throughout the network. TCP is also designed to respond by halving its previous send rate for the same reason. Congestion is not common, but it can occur at any time and its effect on replication and backup flows can be serious. Using a technology called the Velocity Transport Engine (VTE), the DMS insulates SnapMirror and SnapVault traffic from congestion on the provider WAN.

### Packet loss prevention

To mitigate the effects of packet loss, VTE employs a number of aggressive packet recovery strategies, including:

- A proprietary, fast-retransmit algorithm to ramp up throughput immediately after packet loss
- Large receive windows so SnapMirror and SnapVault do not need to slow down their send rates
- TCP connection management, including packet re-sends, so SnapMirror and SnapVault do not need to retransmit lost packets and consequently suffer slowdowns
- Packet sequence tracking so out-of-order packets can be re-arranged on the DMS instead of being re-sent by SnapMirror or SnapVault

### The Problem with WAN Latency

High latency on a network link (or the distance between the two network endpoints) reduces the maximum achievable throughput for TCP traffic, which in turn creates a bottleneck for applications that can execute faster than what TCP allows. This is because with TCP, the sender must, at some point, stop sending

new packets until it has received acknowledgement that packets already sent have been received. As latency increases, so too does the frequency and length of the pauses, which means less data gets transferred during that time.

It should be noted that under these conditions, adding bandwidth does not increase per-flow throughput. Indeed, is not uncommon for high-speed links traversing 1,000 miles (~40ms RTT) to be only 20% to 30% saturated because of inefficient utilization. The WAN becomes a bottleneck, especially for high-speed flows, because performance is so strongly related to the achievable throughput of a small number of flows.

### Mitigating the impact of WAN latency and congestion

Asynchronous SnapMirror flows scale exceptionally well over high-RTT WANs. However, when the latency is very high, or when it occurs in conjunction with frequent network congestion, SnapMirror performance can be impacted. To optimize the WAN for SnapMirror, VTE

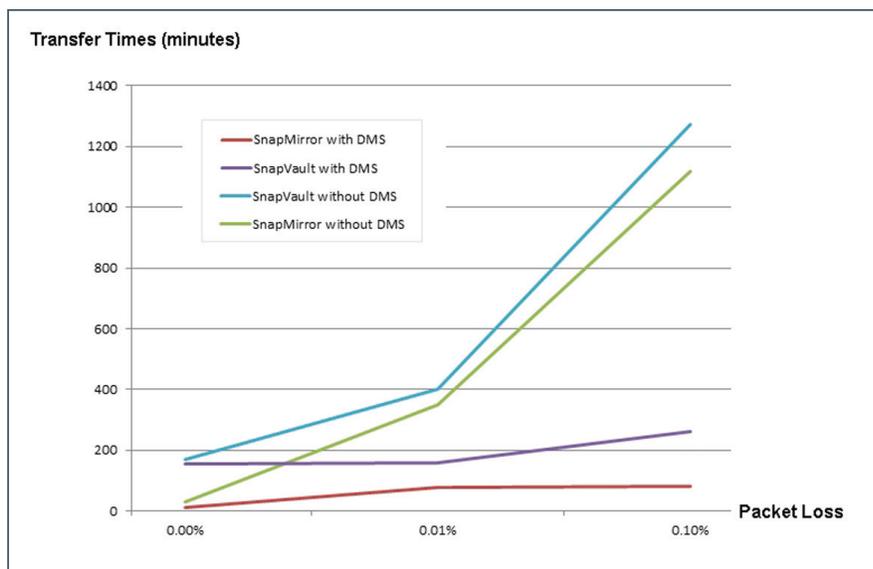


Figure 2) The impact of increasing packet loss on asynchronous SnapMirror and SnapVault transfers (normalized time scale).

continuously optimizes the size of the TCP congestion window and the frequency of pauses, which prevents latency-induced slow-downs from reducing the effective bit-rate. At the same time, VTE dynamically manages all active TCP connections so that high-priority SnapMirror flows receive the bandwidth they seek and the WAN is fully utilized.

SnapVault, much like asynchronous SnapMirror, can experience performance degradation due to WAN congestion. In addition, SnapVault may also see a performance drop with increasing WAN round-trip times. VTE can mitigate the impact of congestion and increasing latency on SnapVault flows, allowing them to scale in throughput to fill the WAN at any WAN latency, even in the face of WAN congestion.

### WAN Expansion

The other primary benefit of the DMS is network deduplication, which is performed by the Velocity Dedupe Engine, or VDE. This network-based dedupe works in real-time and delivers

high reduction ratios even at speeds of up to 10Gbps. For traffic such as SnapMirror, VDE can remove as much as 90% of the bits that would otherwise have to be sent across the WAN.

VDE complements the deduplication feature available with the NetApp Data ONTAP® operating architecture. Data ONTAP deduplication not only helps reduce the storage capacity on NetApp controllers but also helps reduce the footprint of replication traffic traversing the WAN by working at the block level. VDE further reduces the footprint of replication traffic by working at the byte level providing an additional reduction of up to 80%.

When a WAN link is oversubscribed, congestion and contention can cause all flows to slow down. Because VDE and Data ONTAP deduplication reduce the amount of traffic on the WAN, they are effectively creating capacity, which prevents congestion and contention and allows the flows to run faster. If

the WAN is not oversubscribed, VDE can then produce a bandwidth surplus. For example, an organization that previously required two OC-48 links (~5Gbps) to meet its replication goals found that, with the DMS, it could downgrade to a 1Gbps MPLS link (less bandwidth at significantly lower cost) without any loss in performance.

### Summary

The Infineta DMS prevents common WAN impediments such as congestion, high latency, and contention for resources from undermining the integrity of your business continuity and disaster recovery solution. It also reduces the absolute number of bits that must be sent across the WAN. The combined effect of increased throughput and reduced traffic makes it possible to push as much as 10Gbps of SnapMirror (replication) and SnapVault (backup) traffic over a 1Gbps WAN, even under the difficult network conditions that may arise when the link is shared.

## SERVICE COMPONENTS

### Infineta Products

Data Mobility Switch (DMS)

Data Migration Accelerator (DMA)

### NetApp Products

SnapVault®

SnapMirror

### About Infineta

Infineta Systems engineers the world's fastest WAN optimization solutions to accelerate Big Traffic workflows between data centers. Its flagship product, the Infineta Data Mobility Switch, delivers unprecedented levels of throughput, scalability, and bandwidth capacity.

#### Infineta products

- **Data Mobility Switch**—The DMS is the industry's fastest WAN optimization solution. It is designed to accelerate traffic between data centers and can be deployed inline or

out-of-path to accelerate replication and backup traffic at speeds of up to 10Gbps. Licenses are available for workflows of 1Gbps, 2Gbps, 5Gbps, and 10Gbps. Upgrades are by license key; adding capacity does not require updating the software or replacing hardware.

- **Data Migration Accelerator**—The DMA is a pay-as-you-go offering that has been built around the Data Mobility Switch. DMA is designed to cut the time, expense, and complexity of non-recurring data migrations such as data center consolidation, private cloud seeding and large file transfers including VMDKs.

### About NetApp

NetApp creates innovative storage and data management solutions that deliver outstanding cost efficiency and accelerate business breakthroughs. Discover our passion for helping companies around the world go further, faster at [www.netapp.com](http://www.netapp.com).

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