

October 15-17, 2013

COMPUTERWORLD SNIA<sup>®</sup>  
**SNW**

Intelligent Architecture for  
the Data-Driven Business

# **Analyst Perspective: *Using File Server Protocols for Block-Based Storage Workloads***

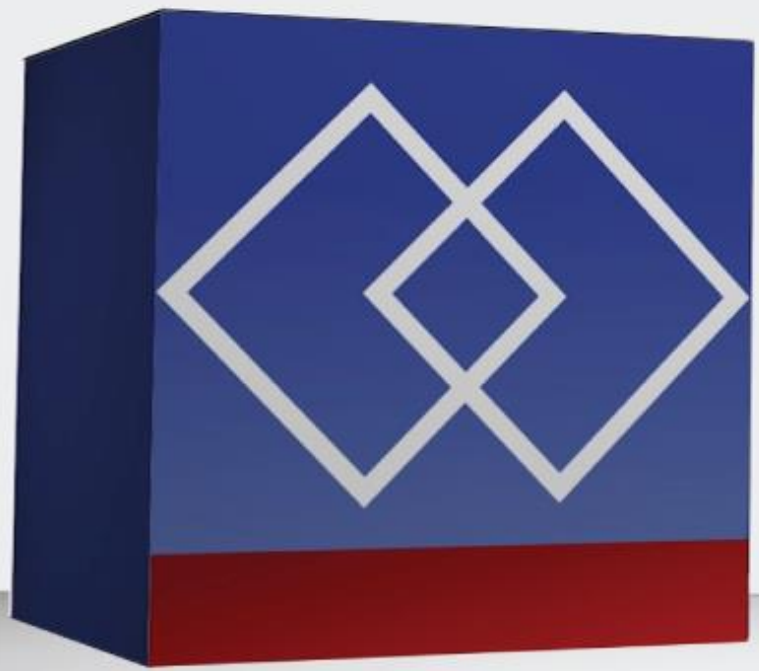
**Dennis Martin, President, Demartek**



# Agenda

- ◆ **Demartek – About Us**
- ◆ **File Protocols**
  - **NFS**
  - **SMB (formerly known as CIFS)**
- ◆ **SMB 3.0**
- ◆ **Performance Results**
- ◆ **References**





## About Demartek

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# File Server Protocols

## ◆ NFS

- Versions: v2, v3, v4 (which version do you use?)
- Available for UNIX, Linux and Windows

## ◆ SMB (formerly known as CIFS)

- Server Message Block protocol enhanced by Microsoft
- Adopted by others for file serving applications including software utilities, operating systems, storage vendors, etc.

# SMB Protocol History

- ◆ **1.x – Windows XP, Windows Server 2003 R2 and older**
- ◆ **2.0 – Windows Vista, Windows Server 2008**
- ◆ **2.1 – Windows 7, Windows Server 2008 R2**
- ◆ **3.0 – Windows 8, Windows Server 2012**
  - **Known as version SMB 2.2 during Windows 8 Beta**

# SMB Behavior

- ◆ **SMB steps down to lower (slower) version when servers and clients are not at the same level**
- ◆ **SMB is used by copy, xcopy and robocopy**
- ◆ **SMB is used by applications to perform file I/O**



# Powershell: Get-SmbConnection

```
Administrator: Windows PowerShell
PS C:\Users\Administrator> Get-SmbConnection
```

ServerName	ShareName	UserName	Credential	Dialect	NumOpens
10.0.7.11	smb-data	DMRTK-SRVR-I\Adm...	DMRTK-SRVR-I\Adm...	3.00	2
10.0.7.11	smb-logs	DMRTK-SRVR-I\Adm...	DMRTK-SRVR-I\Adm...	3.00	1
dmrtk-srvr-b	jbod RAID5	DMRTK-SRVR-I\Adm...	DMRTK-SRVR-I\Adm...	2.10	1

```
PS C:\Users\Administrator> _
```

**Dialect column indicates the SMB version**



# SMB in Other Products

## ◆ SAMBA

- Windows interoperability suite for Linux & UNIX
- Comments on SMB 3.0: “Wow, that’s cool.”
- SMB 2.0 supported in SAMBA 3.6
- SMB 2.1 supported in SAMBA 4.0
- SMB 3.0 clients supported in SAMBA 4.1

## ◆ Storage Vendors

- Various states of deployment
- Some have announced support for SMB 3.0

# SMB 2.x Features

## ◆ SMB 2.0

- Request compounding: multiple SMB2 requests sent as one network request
- Durable handles for temporary network disconnects

## ◆ SMB 2.1

- Large MTU support: Default 1MB
- Improved energy efficiency: allows clients to enter sleep power states with open file handles

# SMB 3.0 Features

- ◆ **SMB Multi-channel: aggregates multiple network paths**
- ◆ **Performance optimizations for small random read/write I/O**
- ◆ **SMB Direct: supports RDMA-capable adapters**
- ◆ **SMB Scale Out: simultaneous file share access through all cluster nodes**
- ◆ **SMB Encryption**

# SQL Server and SMB

## ◆ Microsoft SQL Server Support for SMB

- SMB is supported for SQL Server 2008 R2
- SMB is supported for SQL Server 2012
- SMB support is planned for future versions

## ◆ Hyper-V in Windows Server 2012

## ◆ Provides another connectivity choice for Ethernet-based storage

## ◆ File servers are very common and relatively simple to manage



# SQL Server SMB Details

## ◆ Command Syntax

CREATE

```
DATABASE xyz ON (NAME=xyz_data,  
FILENAME='\\DMRTK-SRVR-K\SQLDATA\xyz_DATA.MDF')
```

```
LOG ON (NAME=xyz_log,  
FILENAME='\\DMRTK-SRVR-K\SQLLOGS\xyz_LOG.LDF')
```

```
FOR ATTACH;
```

# SQL Server SMB Permissions

## ◆ File Permissions

- Insure that the SQL Server account has “full control” permissions to the file share and the folder
- If not in a domain, may require creating an account for SQL Server to use on the target server
- Be sure to set the share and NTFS permissions

# SQL Server Best Practices

- ◆ **Use the same storage guidelines as with block storage, such as different shares for databases and logs, etc.**

# Performance Examples





# SMB vs. iSCSI Performance Windows Server 2008 R2 and Windows Server 2012



**Database Server**  
SQL Server 2008 R2

**Server I - "Westmere"**  
2x Intel Xeon X5680 3.46 GHz  
(12 cores, 24 logical)  
144 GB RAM  
Boot drive: Internal SATA SSD  
PCI-Express 2.0  
Dual-port 10GbE NIC

**Test set 1:**  
**Windows Server 2008 R2**  
on both servers  
(SMB 2.1 and iSCSI)

**Test set 2:**  
**Windows Server 2012**  
on both servers  
(SMB 3.0 and iSCSI)

**Storage Target**  
File server  
iSCSI target

**Server K - "Sandy Bridge"**  
1x Intel Xeon E3-1280  
3.5 GHz (4 cores, 8 logical)  
32 GB RAM  
Boot drive: Internal SATA SSD  
Data storage:  
LSI MegaRAID 9265-8i  
7x SMART XceedStor  
6Gb SAS SSD - 1.2TB RAID0  
PCI-Express 2.0  
Dual-port 10GbE NIC

Server Manager

« Volumes ▶ Disks

Manage Tools View Help

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Servers

Volumes

**Disks**

Storage Pools

Shares

iSCSI

**DISKS** All disks | 2 total TASKS ▼

Filter

Number	Virtual Disk	Status	Capacity	Unallocated	Part...	Read Only	Clustered	Subsystem	Bus Type	Name
▲ DMRTK-SRVR-K (2)										
0		Online	112 GB	0.00 B	MBR				SATA	Corsair Force GT
1		Online	1.20 TB	201 GB	GPT				RAID	LSI MR9265-8i SCSI

Last refreshed on 10/17/2012 9:30:48 PM

**VOLUMES** Related Volumes | 4 total TASKS ▼

Filter

Volume	Status	Provisioning	Capacity	Free Space	De
▲ DMRTK-SRVR-K (4)					
D:	Fixed		257 GB	6.38 GB	
E:	Fixed		257 GB	6.38 GB	
F:	Fixed		257 GB	238 GB	
G:	Fixed		257 GB	248 GB	

Go to Volumes Overview >

**STORAGE POOL** LSI MR9265-8i SCSI Disk Device on DMRTK-SRVR-K TASKS ▼

No related storage pool exists.

Go to Storage Pools Overview >

### Server Manager

← → Volumes

↻ | 🚩
Manage Tools View Help

- Servers
- Volumes
- Disks
- Storage Pools
- Shares
- iSCSI

#### VOLUMES

All volumes | 6 total TASKS ▾

Volume	Status	File System Label	Provisioning	Capacity	Free Space	Deduplication Rate	Deduplicat
DMRTK-SRVR-K (6)							
\\?\Volume{1d...	System Reserved		Fixed	350 MB	109 MB		
D:	iscsi-data		Fixed	257 GB	6.38 GB		
E:	iscsi-logs		Fixed	257 GB	6.38 GB		
F:	smb-data		Fixed	257 GB	238 GB		
G:	smb-logs		Fixed	257 GB	248 GB		
C:			Fixed	111 GB	93.6 GB		

Last refreshed on 10/18/2012 7:32:18 AM

#### SHARES

F:\ on DMRTK-SRVR-K TASKS ▾

Share	Local Path	Protocol	Availability Type
smb-data	F:\	SMB	Not Clustered

Go to Shares Overview >

#### DISK

F:\ on DMRTK-SRVR-K TASKS ▾

LSI MR9265-8i SCSI Disk Device

Capacity: 1.20 TB

83.7% Allocated  1.00 TB Allocated

201 GB Unallocated

Status: Online

Bus Type: RAID

Go to Disks Overview >

Microsoft SQL Server Management Studio

File Edit View Query Project Debug Tools Window Community Help

New Query [Icons]

master [Execute] [Icons]

Object Explorer

- Connect [Icons]
- localhost (SQL Server 10.50.2500 - sa)
  - Databases
    - System Databases
    - Database Snapshots
    - tpch
      - Database Diagrams
      - Tables
        - System Tables
        - dbo.customer
        - dbo.lineitem
        - dbo.nation
        - dbo.orders
        - dbo.part
        - dbo.partsupp
        - dbo.region
        - dbo.supplier
      - Views
      - Synonyms
      - Programmability
      - Service Broker
      - Storage
      - Security
    - Security
    - Server Objects
    - Replication
    - Management
    - SQL Server Agent

SQLQuery1.sql - lo...t.master (sa (52))\*

```
create database tpch on
  (name=tpch, filename='\\10.0.7.11\smb-data\tpch.mdf')
  log on (name=tpch_log, filename='\\10.0.7.11\smb-logs\tpch_log.ldf')
  for attach;
```

Messages

Command(s) completed successfully.

Query executed successfully. localhost (10.50 SP1) sa (52) master 00:00:00 0 rows

Ready Ln 4 Col 15 Ch 15 INS



### Database Properties - tpch

Script ▾
Help

**Select a page**

- General**
- Files
- Filegroups
- Options
- Change Tracking
- Permissions
- Extended Properties
- Mirroring
- Transaction Log Shipping

**Backup**

Last Database Backup	10/17/2012 10:21:46 PM
Last Database Log Backup	None

**Database**

Name	tpch
Status	Normal
Owner	sa
Date Created	10/17/2012 10:12:58 PM
Size	28159.50 MB
Space Available	4754.94 MB
Number of Users	4

**Maintenance**

Collation	SQL_Latin1_General_CP1_CI_AS
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**Connection**

Server:  
localhost

Connection:  
sa

[View connection properties](#)

**Progress**

Ready

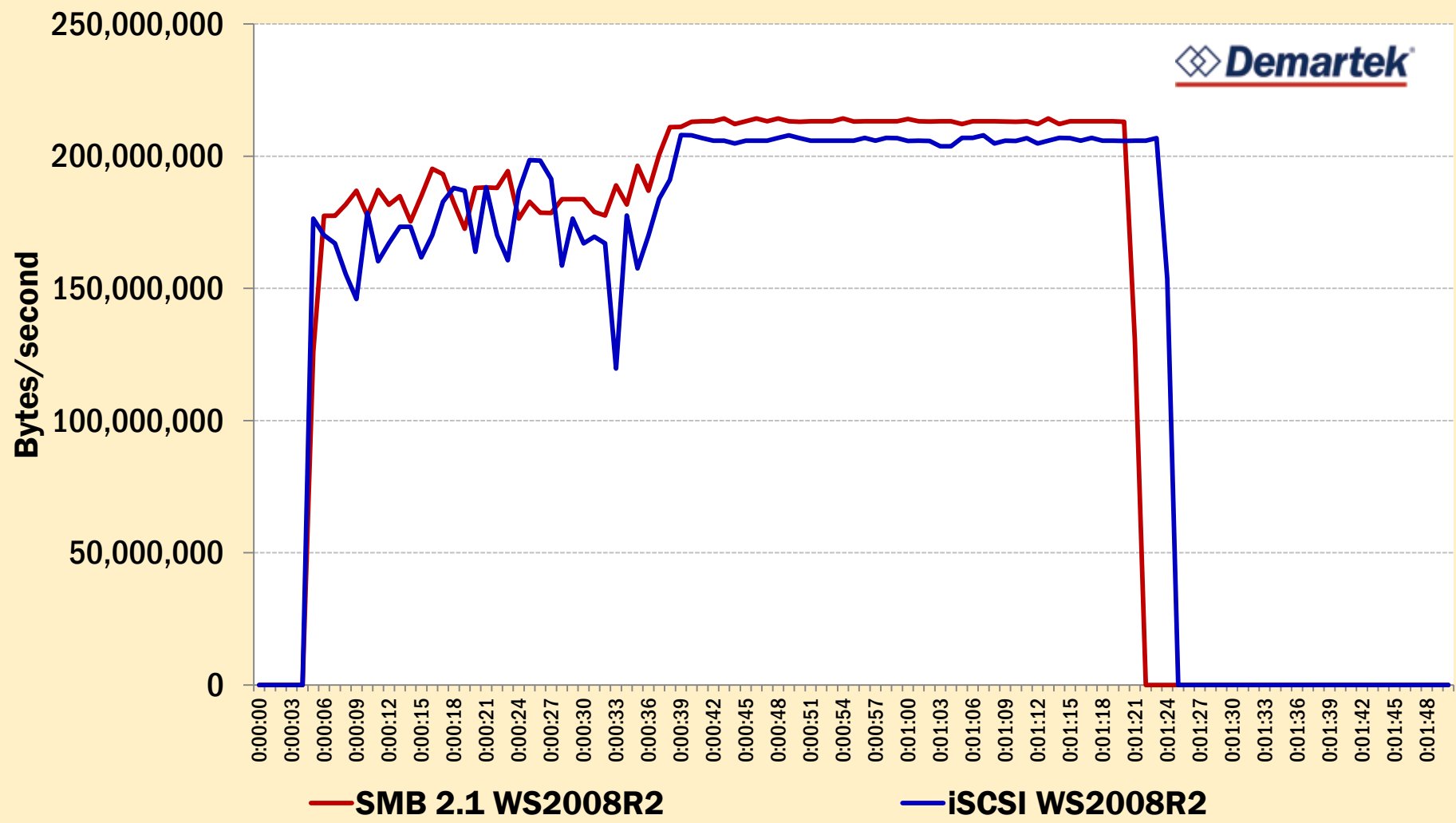
**Name**

The name of the database.

OK
Cancel

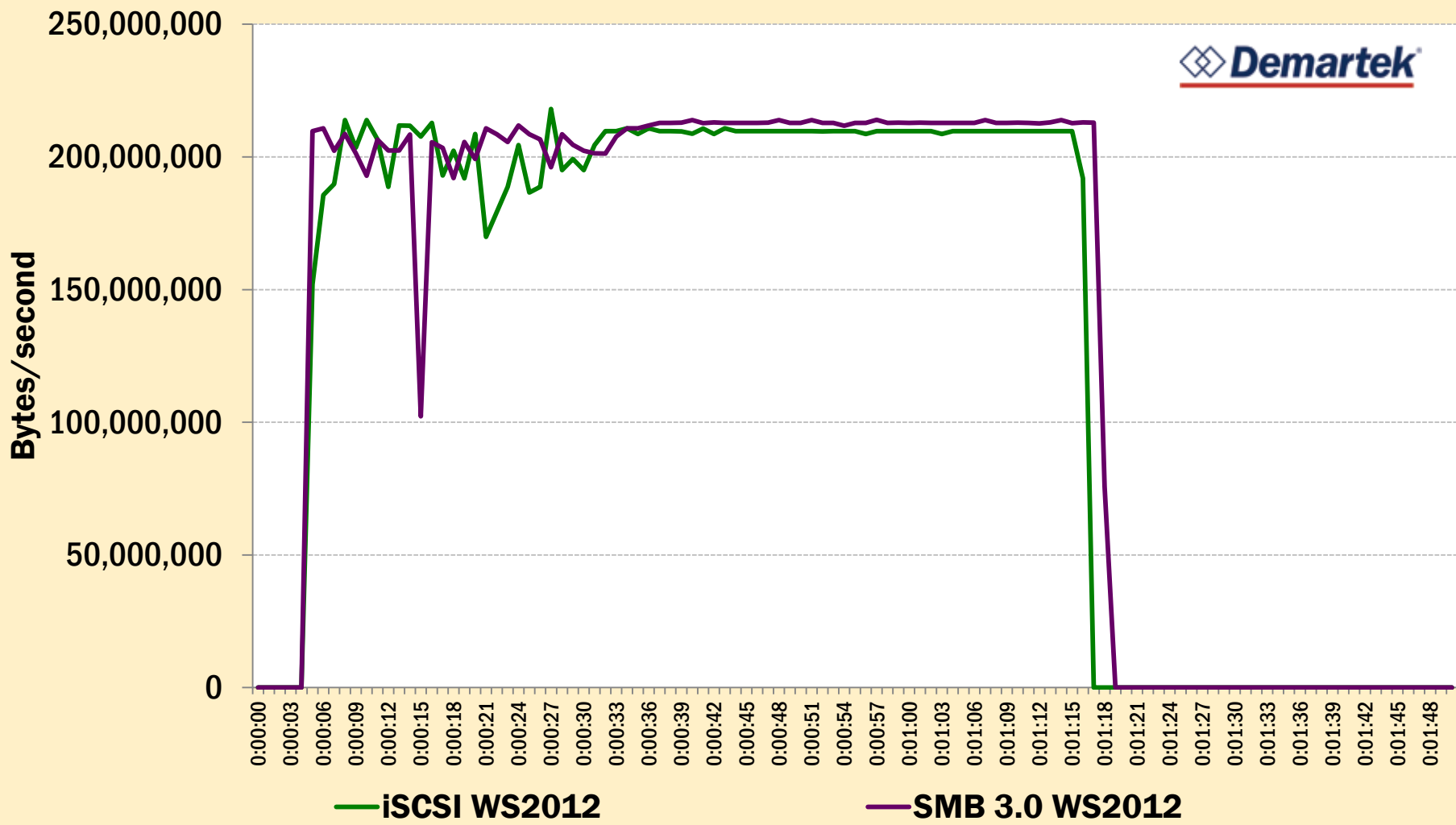
# SQL Server 2008 R2 Database Restore (20GB)

SQLServer:Databases(\_Total)\Backup/Restore Throughput/sec



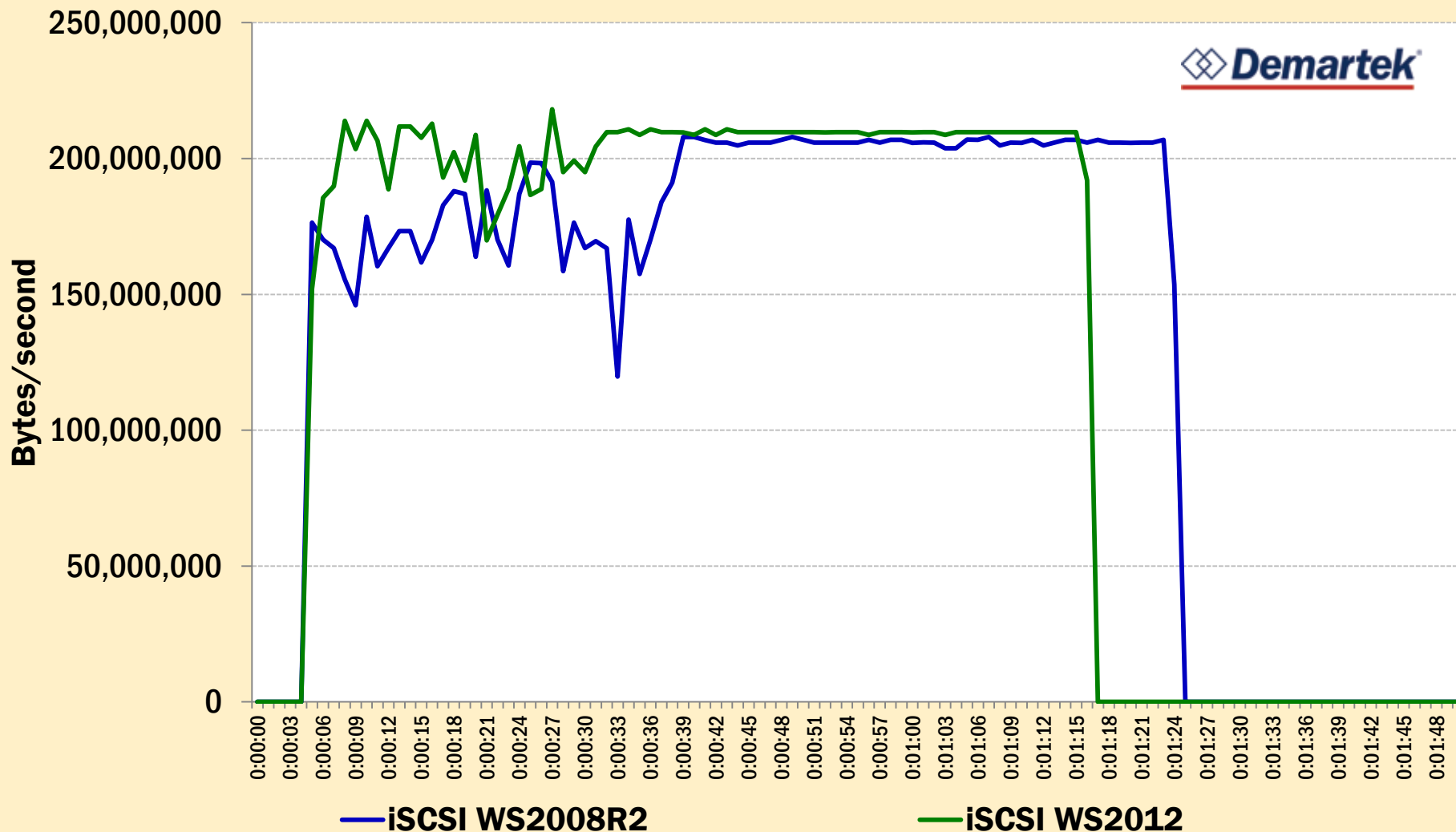
# SQL Server 2008 R2 Database Restore (20GB)

SQLServer:Databases(\_Total)\Backup/Restore Throughput/sec



# SQL Server 2008 R2 Database Restore (20GB)

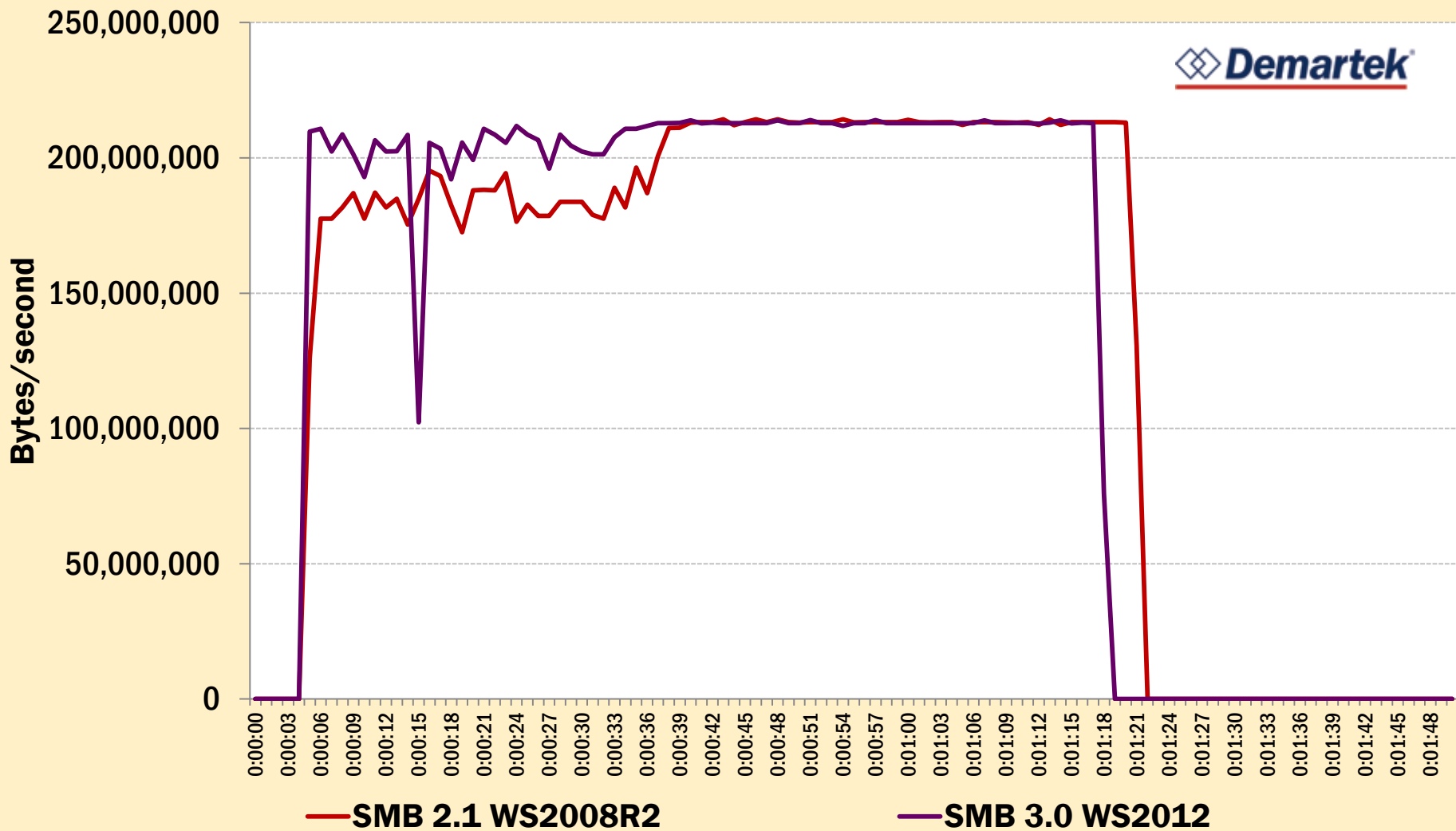
SQLServer:Databases(\_Total)\Backup/Restore Throughput/sec





# SQL Server 2008 R2 Database Restore (20GB)

SQLServer:Databases(\_Total)\Backup/Restore Throughput/sec



# Demartek References

- ◆ **Demartek ROBOCOPY Comparison (1GbE, 10GbE, etc.)**
  - [www.demartek.com/Demartek\\_Presenting\\_RMWTUG\\_March\\_2011-03.html](http://www.demartek.com/Demartek_Presenting_RMWTUG_March_2011-03.html)
- ◆ **Demartek Storage Interface Comparison**
  - [www.demartek.com/Demartek\\_Interface\\_Comparison.html](http://www.demartek.com/Demartek_Interface_Comparison.html)
- ◆ **Demartek SSD Deployment Guide**
  - [www.demartek.com/Demartek\\_SSD\\_Deployment\\_Guide.html](http://www.demartek.com/Demartek_SSD_Deployment_Guide.html)
- ◆ **Demartek Commentary – Horses, Buggies & SSDs**
  - [www.demartek.com/Demartek\\_Horses\\_Buggies\\_SSDs\\_Commentary.html](http://www.demartek.com/Demartek_Horses_Buggies_SSDs_Commentary.html)
- ◆ **Demartek Free Monthly Newsletter**
  - [www.demartek.com/Newsletter](http://www.demartek.com/Newsletter)



# Thank You!

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\*also on the back of Dennis' business card

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