



RBC Financial Group  
TSM – Going LAN Free

TSM Symposium 2003

Oxford University

September 2003



## Agenda

- ▼ RBC Financial Group Corporate Overview
- ▼ High-level SAN configuration overview
  - Enterprise Disk Storage
  - Enterprise Tape Storage
- ▼ TSM Directions
- ▼ LAN-Free vision for our environment
- ▼ LAN-Free Timelines
- ▼ Implementation details and challenges
- ▼ Comparisons LAN vs. LAN-Free
- ▼ Futures



## Attendees

- ▼ Kevin Mercer  
Sr. Enterprise Storage Network Manager
  
- ▼ Wesley Mofford  
Storage Network Analyst

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## RBC Financial Group

Royal Bank of Canada (TSE, NYSE: RY) uses the initials RBC as a prefix for its businesses and operating subsidiaries, which operate under the master brand name of RBC Financial Group.

**RBC Financial Group** is Canada's largest financial institution as measured by market capitalization and assets, and is one of North America's leading diversified financial services companies. It provides personal and commercial banking, wealth management services, insurance, corporate and investment banking, and transaction processing services on a global basis. RBC employs 60,000 people who serve more than 12 million personal, business and public sector customers in North America and in some 30 countries around the world.

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## RBC Financial Group

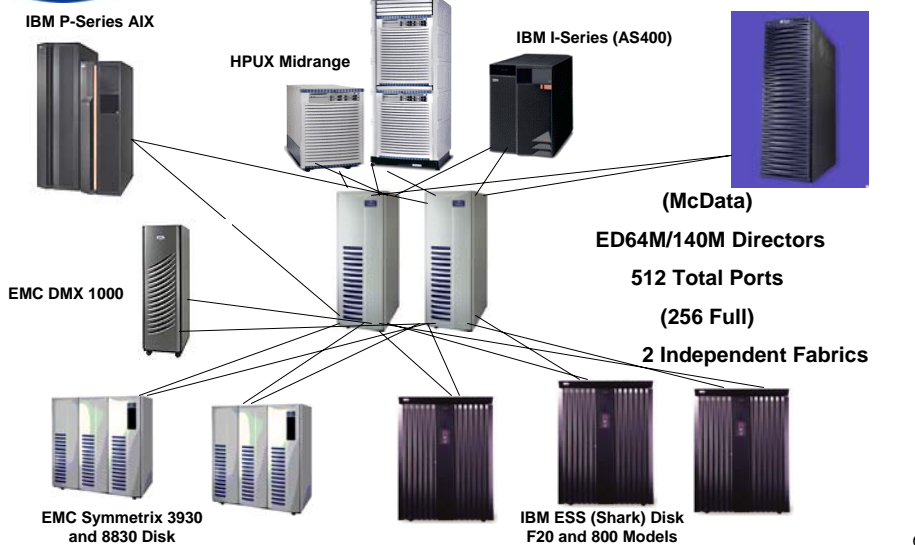
### ▼ Main Business Units

- RBC Investments (Wealth Management)
- RBC Capital Markets (Corporate and Investment Banking)
- RBC Insurance (Insurance)
- RBC Global Services (Securities custody and transaction processing)
- RBC Banking (Personal and Commercial Banking)

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## RBC SAN Enterprise Disk Configuration - Sept 2003



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## RBC SAN Enterprise TAPE Configuration - Sept 2003



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## General SAN Update

- ▼ Enterprise SAN has allowed extensive disk consolidation within midrange space.
- ▼ 85% of all external midrange Storage SAN
- ▼ Increased performance, connectivity and improved Storage Management for Open Systems, on both disk and tape.
- ▼ Provides 'disk on demand' and provisioning via internal Charge-Back. (\$\$/GB/month)
- ▼ **Provides infrastructure supporting TSM LAN-Free Rollout**

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## TSM Update and Directions

- ▼ Single Server (P660 4 Way) architecture
  - 20 9840A/B drives
  - 6 TB ESS Disk Pool
  - 2 STK 9310 Powder Horn Libraries
  - 14,000 9840 Tape Media Cartridges

**Key 2002/2003 strategy: improve overall Recovery and Backup processes by utilizing existing SAN infrastructure.**

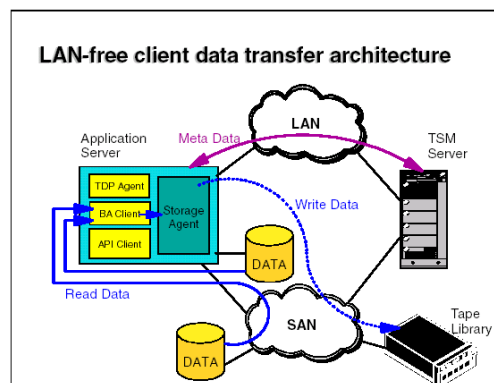
**SLA Agreements with Business Units to now include Recovery and Backup windows**

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## TSM LAN-Free Vision

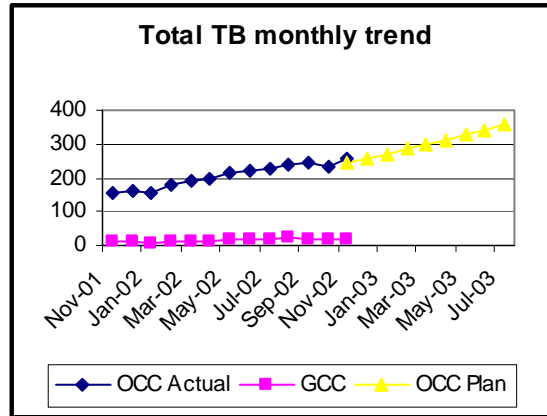
LAN-free client data transfer architecture



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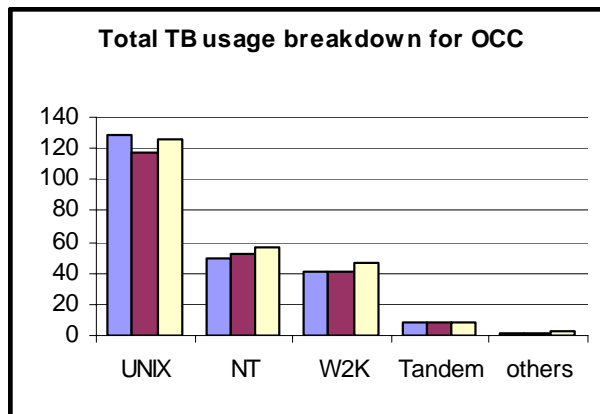
## TSM Capacity and Growth



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## TSM Capacity and Growth



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## LAN-Free Timelines

- ▼ April 2002 - Initiated trial of TSM LAN-Free using Enterprise DistribuTape from Gresham (6 months of extensive testing)
  - ▼ Testing conducted on:
    - AIX – Universal Database
    - SUN – Oracle (RMAN)
    - WIN2K - Exchange 2000
  - \* Backup/Archive Client File level tested on ALL platforms as well
- ▼ November 2002 - Successful completion of trial/testing/validation in RBC environment.
- ▼ December 2002 - Proposal to Management and successful sign-off on LAN-Free Business case/rollout with software from both IBM/Tivoli and Gresham
- ▼ January 2003 - Rebuild of TAPE SAN : additional switches/ports
- ▼ February 2003 - Successfully implemented Gresham's EDT in production and converted TSM Server to external Library management  
(\* many internal script modifications, specifically around offsite tape – DRM – processes)
- ▼ April 2003 - Production rollout to first client : SAP/UDB/AIX HRIS

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## LAN-Free Results and Recommendation to RBC

- ▼ Benefits in **performance** for Recovery and Backup ranged from **2X to 6X**
- ▼ Reduction in client CPU usage ranged from **10-30%**
- ▼ Improvement in overall Tape drive utilization
- ▼ Provided some relief for existing single TSM server, though growth of file-level LAN clients still exceed LAN-Free rollout.
- ▼ EDT Software and Support very reliable. Key to LAN-Free rollout in our STK environment with TSM. Provides drive sharing for both LAN-Free clients and future TSM servers.
  - \* existing P660 TSM server/CPU became primary bottleneck

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## LAN-Free Results and Recommendation to RBC

- ▼ Refresh ALL TSM Server Operations documentation to include new procedures for troubleshooting LAN-Free clients
- ▼ Rollout LAN-Free to largest Database clients currently 'direct to tape' via LAN. High priority on Exchange 2000
- ▼ Design a dedicated 'Fabric' for Tape and keep separate from disk
  - \* requires dedicated Fibre card for LAN-Free

Testing completed on both dedicated SAN and integrated (disk/tape – same HBA). Primary issues around configuration and "LUN 0" conflicts in a shared disk/tape SAN HBA/Switch configuration.

\* COST another major factor.

(Able to use smaller Brocade switches for Tape SAN). Keep larger Director ports for mission critical disk access.

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## Our LAN-Free Challenges

- ▼ Configuration and "Drive Matching" in a WIN2K environment (with 20 tape drives and growing, this issue is currently our highest priority and being investigated with IBM/Tivoli and Gresham). In both initial set-up and "DR" mode of a given WIN2K environment, a very intensive manual process is required to setup and map all Tape drives in a 'busy' production site. Issue is magnified when an existing WIN2K LAN-Free server is rebuilt and requires immediate Data Restore initiation.
  - (\* non-issue in a UNIX configuration).

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- ▼ Inability for TSM LAN-Free client to 'Synch-Write'. Copy processing still required on TSM server.
- ▼ Accounting Log collection is not consolidated to "TSM Server". Currently, accounting log available on LAN-Free client only.
- ▼ Require easier use of Shared Memory option (I:E: as a non root user) Currently, file permission changes need to be managed to allow non-root users to use DSMTCA

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## Sample LAN vs. LAN-Free Comparisons

	GB	LAN	LAN-FREE
SAP/UDB/HRIS/AIX (P660 4 Way)	350	6MB/s	28MB/s
Exchange 2000 (X360 4 Way)	140	5MB/s	33MB/s
UDB/AIX/Fraud System (P680 12 Way)	750	11MB/s	36MB/s
Oracle/RMAN/SUN (Sun 6800 24 Way)	600	8MB/s	38MB/s

\* bottleneck typically in the type/model of disk subsystem the client is allocated to.

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## TSM and LAN-Free Futures

- ▼ Additional TSM server (P630 – 4 Way) September 2003.  
(\* able to run on single server design for 3 ½ years)
- ▼ LAN-Free over Dark Fibre September 2003  
(\*SAN expanding outside Data Centre to smaller sites within 5KM range)
- ▼ ATA Disk for TSM ? Evaluation mode
- ▼ Expanding of TSM server on WIN2K platform to RBC subsidiaries
- ▼ Future evaluations to include SERVER-Free
- ▼ TSM TeraData Client evaluation

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Questions ?