



# Using ProtecTIER Replication for Disaster Recovery with Tivoli Storage Manager

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**Pulse**





# Agenda

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- ProtecTIER Overview
  
- TSM with Virtual Tape Libraries
  
- TSM / ProtecTIER Disaster Recovery Strategy



# ProtecTIER Overview

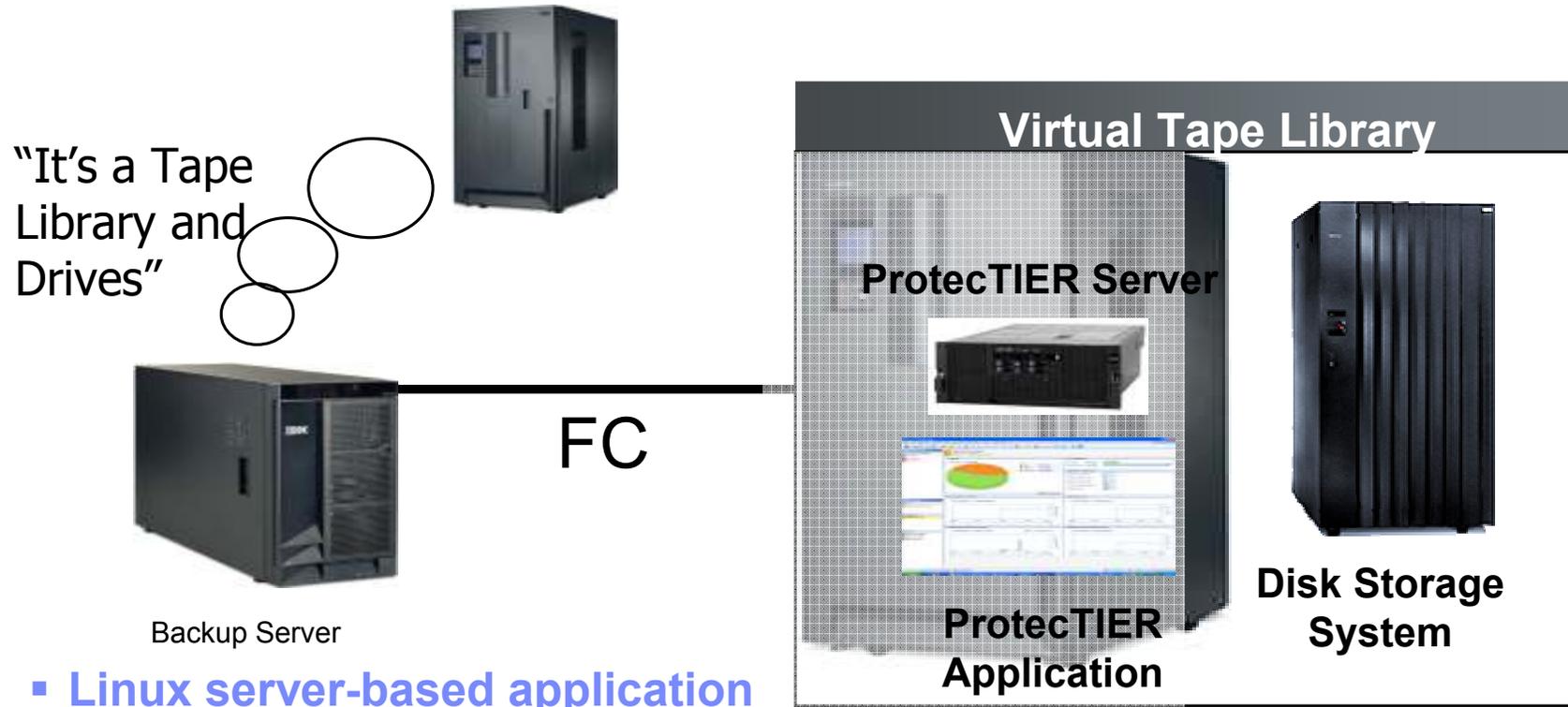


## What is ProtecTIER?

- ProtecTIER is the first virtual tape product to contain patent-pending data factoring technology that IBM calls HyperFactor™ for data deduplication. ProtecTIER also now supports the Symantec Netbackup OST interface, CIFS and NFS...
- In-line deduplication vs. Post Processing
- UP TO 25:1 deduplication factoring
- High Performance (BU=2500MBs; Restore (3200MBs)
- Highly Scalable (UP TO 1PB physical storage)
- 100% Data Integrity
- Clustering (Two (2) Node Cluster for High Availability)
- Global Dedupe
- Native replication
- VTL, OST & CIFS Capable



# ProtecTIER Architecture Overview

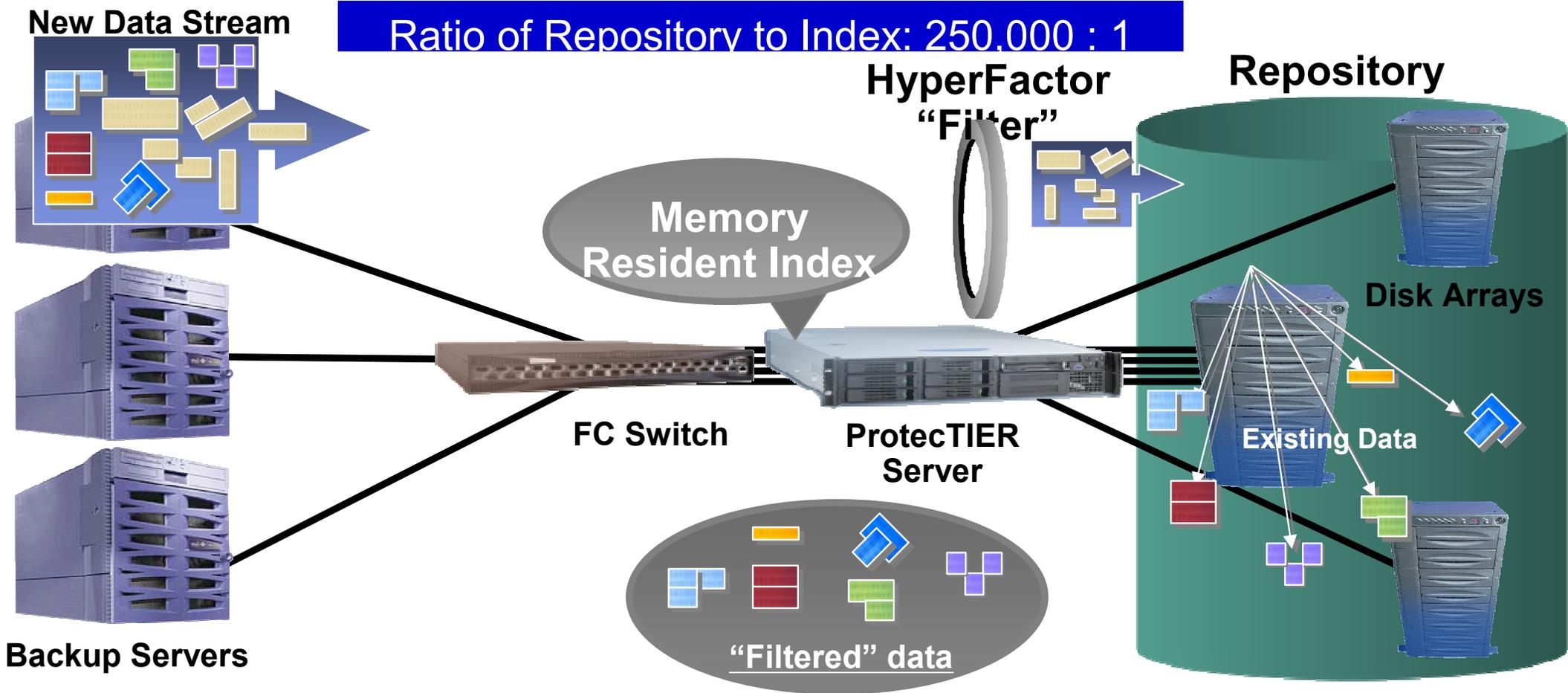


- **Linux server-based application**
- **Emulates a tape library unit, including drives, cartridges, and robotics**
- **Uses Fibre Channel (FC) or SATA attached disk**



# IBM ProtecTIER, Powered by HyperFactor®

Ratio of Repository to Index: 250,000 : 1





# ProtecTIER Advantage

## Performance

Sustainable 2500 MB/s backup and 3200 MB/s restore (two node cluster), performing inline de-duplication)

## Highest Level of Data Integrity

Non-hash & Binary diff process during de-dupe designed for the highest data integrity

## Clustering

Two (2) node, high availability

## Capacity

Up to 1 PB physical capacity per node

## Non-Disruption

Daily Operations  
Inline de-duplication eliminates need for significant secondary

Implementation  
Integrates well with existing backup environment and

## Global Deduplication

Deduplicates ALL data



## Sample Customer Results

- **Mileage will vary based on the type of data, the data change rate and the data retention period**

Customer Scenarios	Nominal Capacity	Physical Capacity	Factoring Ratio (Average)
Leading US Cancer Research Hospital	250TBs	22TBs	~12:1
Largest US Wireless Carrier	300TBs	30TBs	~10-30:1
Large International M&E Company	350TBs	36TBs	~15:1
F100 Worldwide Oil & Gas Corporation	900TBs	60TBs	~40-52:1

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# TSM with Virtual Tape Libraries



## Virtual Tape Libraries (VTLs)

- VTLs use software to emulate an automated tape library
  - Usually emulate a SCSI library with LTO or some similar type of drives
  - Used in the open systems environment (unix, linux and Windows)
- VTLs have no physical tape drives
  - All data is stored on disk
- Flexible configuration:
  - Can have many virtual libraries, drives, cartridges and slots
- Not the same as IBM Virtual Tape System (VTS)
  - For the z/OS environment



## Using Space Efficiently in a VTL

- VTLs are unaware of TSM's expired data on tape.
- Writing at BOT (Beginning Of Tape) frees space taken by virtual tape cartridge
- TSM can be directed to rewrite the tape label immediately after the volume is returned to scratch
  - Define/Update libr ... RELABELSCRATCH=yes
  - “Specifies whether the server re-labels volumes that have been deleted and returned to scratch. When this parameter is set to YES, a LABEL LIBVOLUME operation is started and the existing volume label is overwritten. This parameter is optional and intended for use with a Virtual Tape Library (VTL).”



## Configuring VTLs with a Large Number of Drives

- APAR IC66116 LARGE NUMBER OF TAPE DRIVES CAN CAUSE VOLUME MOUNTS TO PERFORM SLOWLY
  - Recommendation: Define 80 or fewer tape drives in the Tivoli Storage Manager library
- If necessary, create multiple libraries with up to 80 drives until fix is applied
- Interim fixes have raised this ‘recommendation’ to 120
- See Technote:  
<http://www-01.ibm.com/support/docview.wss?uid=swg21425849>
- In TSM V6.3, configure the ProtecTIER as LIBTYPE=VTL and the drive number restrictions are removed
  - Part of “VTL Awareness”



## Changes in TSM to Support VTLs

- New LIBTYPE of 'VTL'
  - Same as LIBTYPE SCSI
  - But with new function
  
- Internal processing changes for drive allocation
  - Bypass mixed media analysis
    - Reasonable to assume VTL's do not mix media
  - Bypass some drive analysis
    - Expect all VTL drives have paths to all servers
  - If either of these characteristics are not true, the overall performance can degrade to the same levels as the SCSI library type; especially during times of high stress when most drives are in use concurrently



## Changes in TSM to Support VTLs

- **DEFine LIBRary lib\_name LIBType=VTL**
  - Must be a library which would otherwise be LIBT=SCSI
  - RELABELSCRATCH defaults to YES for LIBT=VTL
  - Other parameters are same as SCSI libraries
  
- **UPDate LIBRary lib\_name LIBType=VTL or SCSI**
  - New update command
  - Can switch between VTL and SCSI library types
  
- **Define paths for all servers to all drives**
  - This is already 'best practice' for libraries
  - Use device class MOUNTLIMIT setting to limit allocation by individual server sharing this library



## TSM/ProtecTIER Performance Considerations

- Document created by Dan Riedel of ATS team:
  - [www.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP102008](http://www.ibm.com/support/techdocs/atmastr.nsf/WebIndex/WP102008)
- Large scale test of TSM backup and restore performance of filesystem data stored on a ProtecTIER
- Key findings:
  - Parallelism increases performance – use the TSM RESOURCEUTILIZATION client parameter
  - Grouping a larger set of files into a single backup transaction increases performance – use the TSM TXNGROUPMAX and TXNBYTELIMIT parameters
  - Tune the HBAs and disk devices for maximum queue length and maximum transfer size
  - On the client systems, increase the number of LUNs and spread the data onto an additional subsystem



## TSM Storage Pool Selection

- When selecting storage pools to restore or to retrieve data, the server evaluates the number of volumes required for the operation and selects the storage pool with the fewest volumes
- A VTL that is set up with small logical volumes often has data that is spread out over more volumes than the data in a physical tape library
- As a result, the server selects the physical tape storage pool, which has fewer volumes, rather than the faster VTL storage pool.
- To force the server to ignore the number of volumes when selecting a storage pool to restore or to retrieve data, use the IGNORENUMVOLSCHECK TSM server option
  - For more information about this option, see the following Technote:
  - <http://www-01.ibm.com/support/docview.wss?uid=swg21417248>
- The IGNORENUMVOLSCHECK option is available with the following TSM server levels:
  - V5.5.4.2 and later
  - V6.1.3.2 and later
  - All V6.2, V6.3 and V6.4 levels



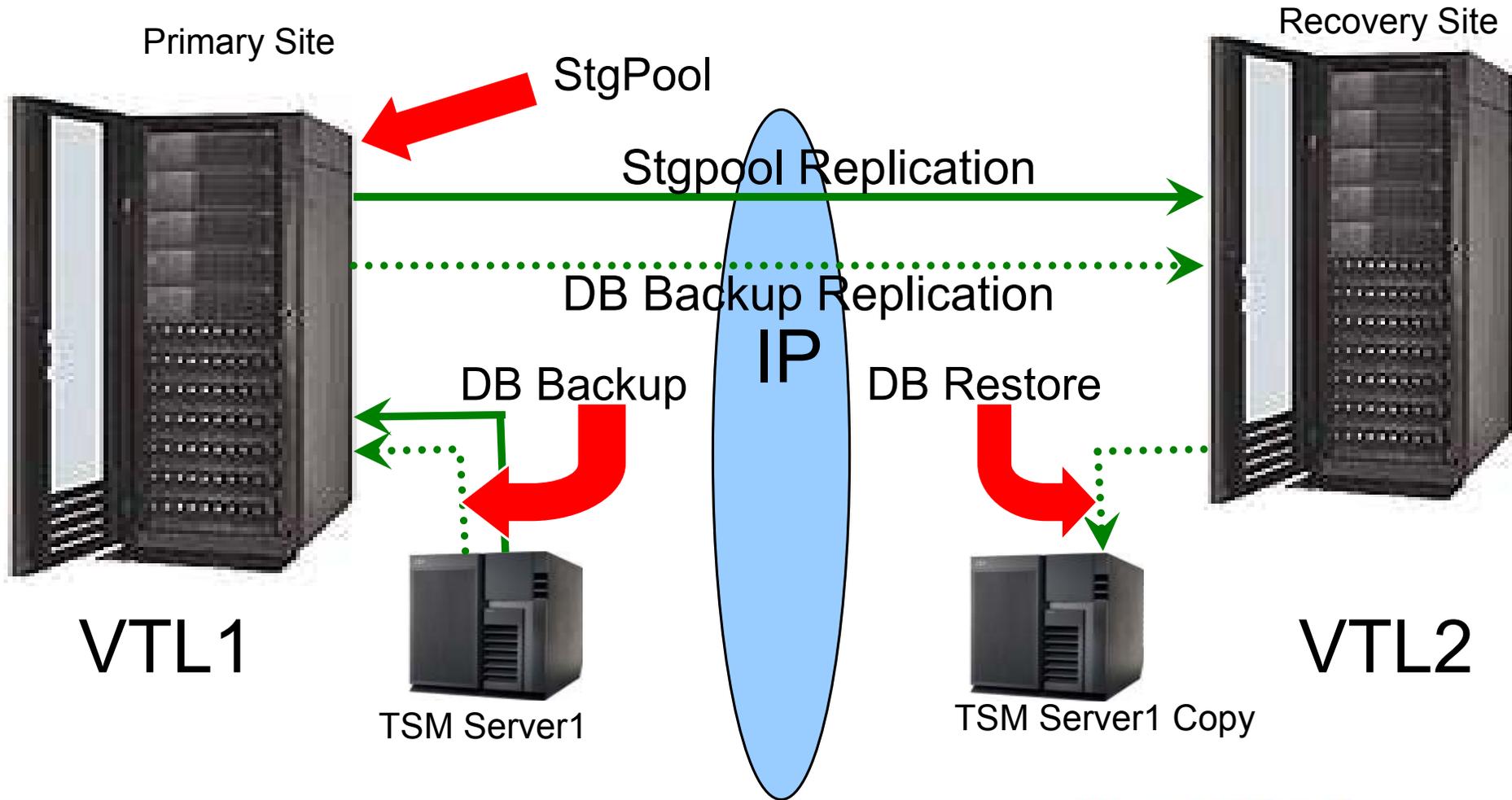
# TSM and ProtecTIER Replication Disaster Recovery Strategy



## Goal of TSM / PT DR Strategy

- Demonstrate viability of using TSM in conjunction with ProtecTIER replication to provide a warm-site disaster recovery scenario
- Daily activities can be completely automated
  - Backup DB on Primary
  - Restore DB on Secondary
- Failover / Failback require some ProtecTIER GUI interaction
- This methodology is just one way to exploit ProtecTIER replication

# VTL Replication – High Level Process



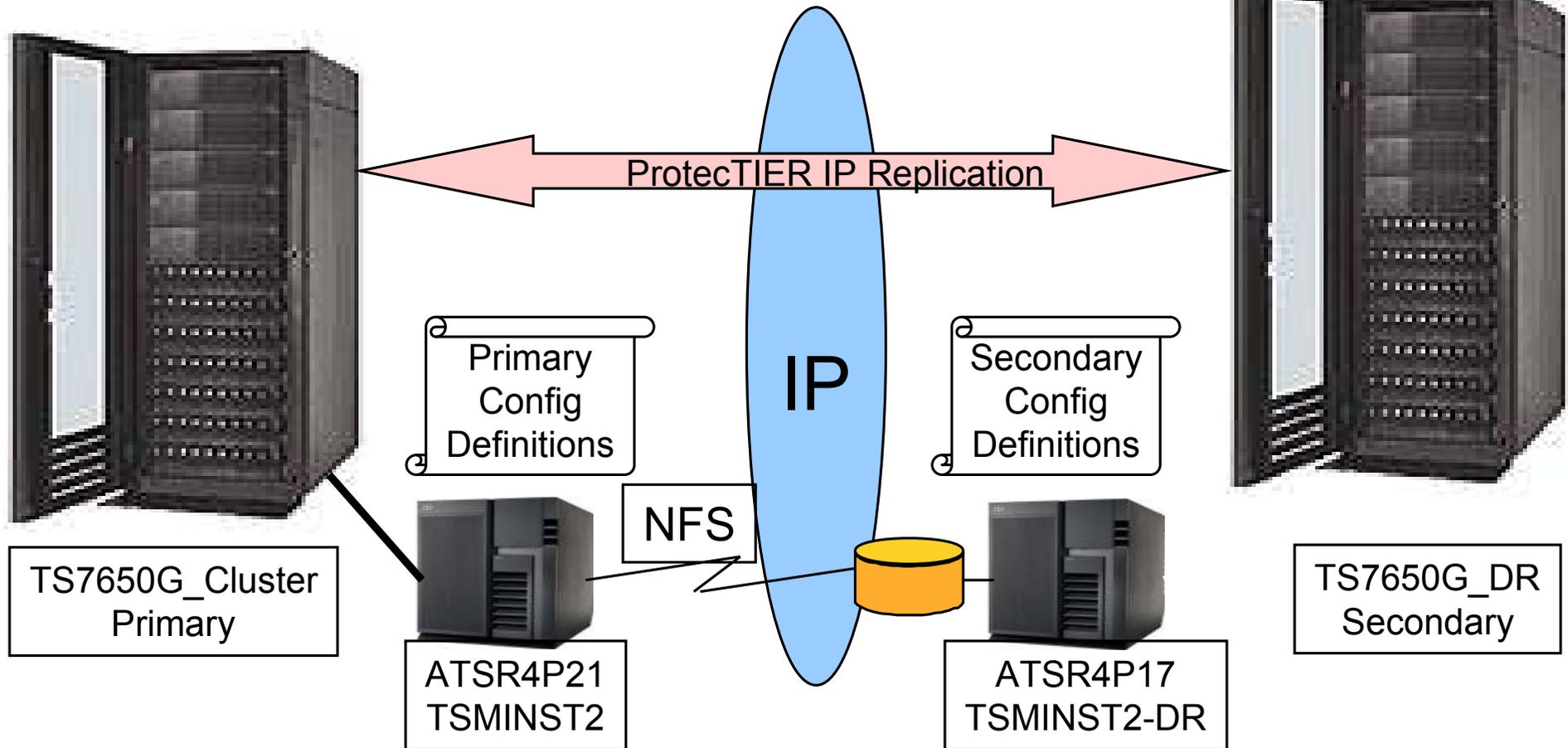


# Disaster Recovery - Setup

## Setup Complete

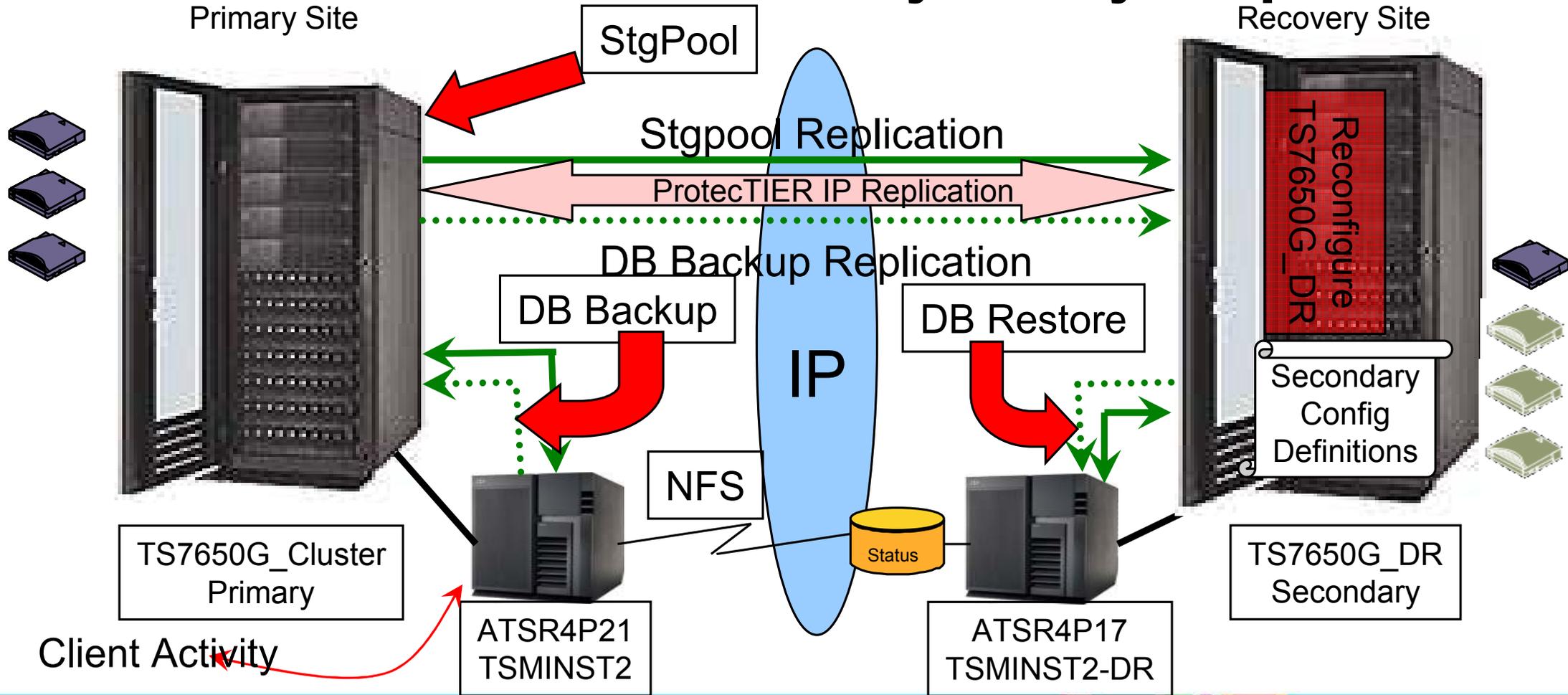
Primary Site

Recovery Site



# Disaster Recovery – Daily Activity

## Daily Activity Complete



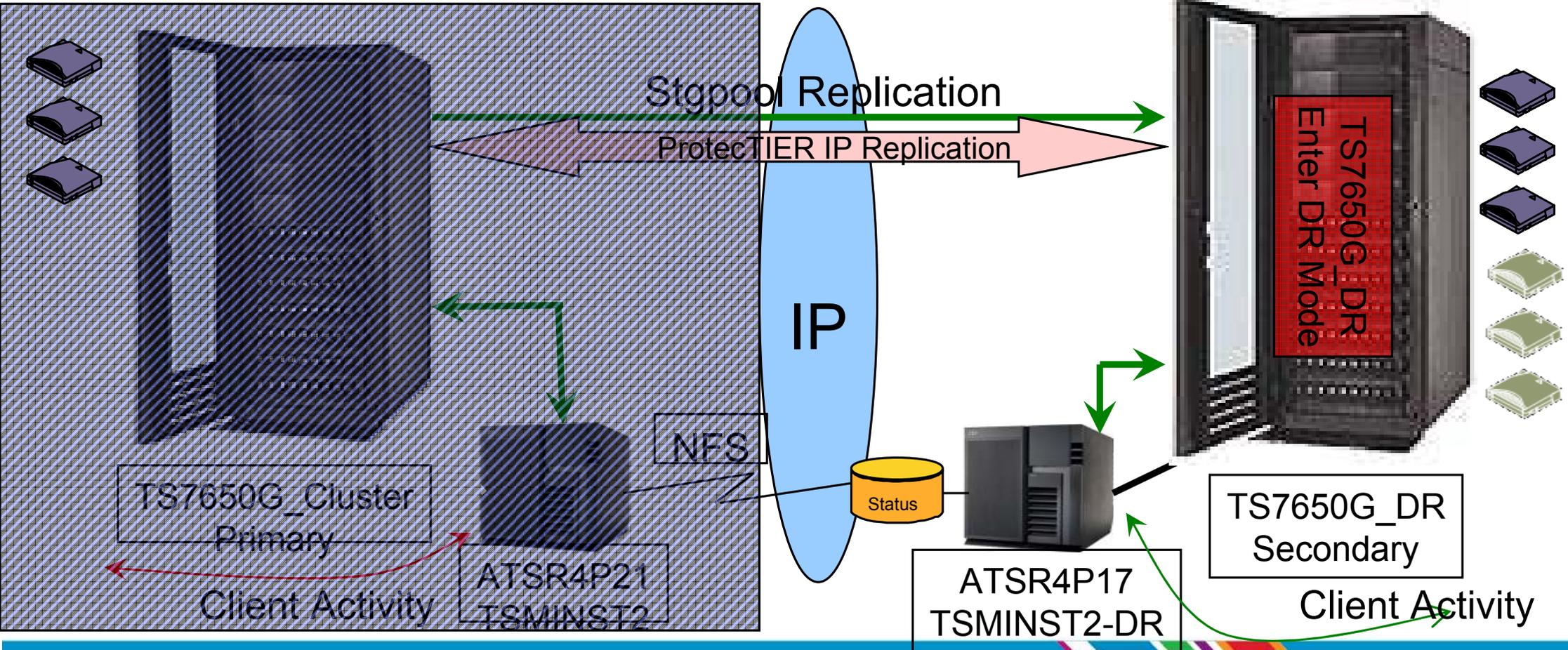


# Disaster Recovery - Failover

## Failover Complete

Primary Site

Recovery Site

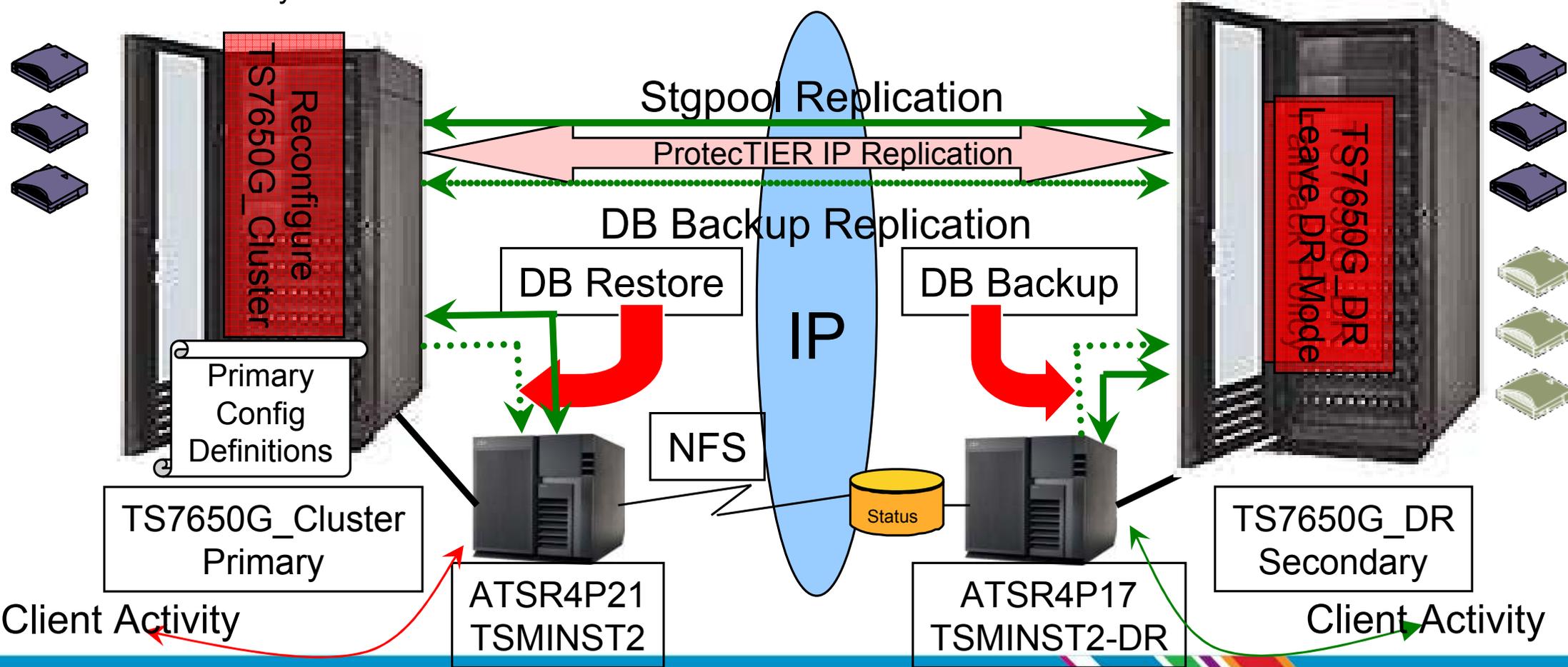


# Disaster Recovery - Failback

## Failback Complete

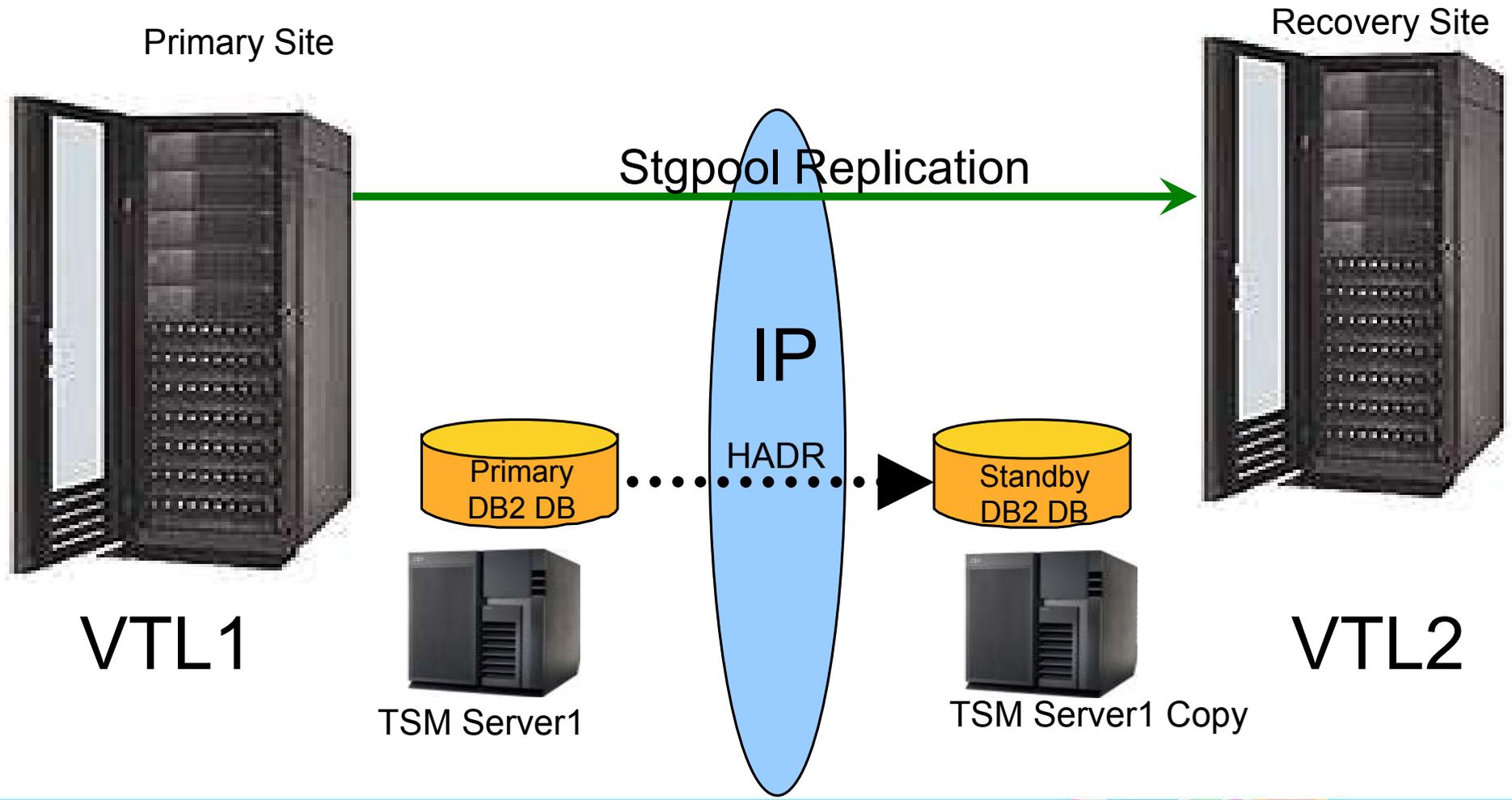
Primary Site

Recovery Site





# DR with TSM V6 and DB2 HADR





## Summary

- Why ProtecTIER rather than TSM De-dup/node replication?
  - Pros for ProtecTIER
    - Throughput
    - Scalability
    - Offload functions from TSM Server
  - Pros for TSM
    - Client-side dedup
    - Cost?
- Considerations for VTLs
  - RELABELSCRATCH
  - Large number of drives
  - New VTL Awareness for TSM
- Considerations for Deduplication
  - Source data has an impact
- PT Replication can be used for a DR Strategy
  - IP Replication of only unique chunks