

Siemens PLM Connection

What's new in Classic Multi-Site

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2008

Siemens
PLM Connection



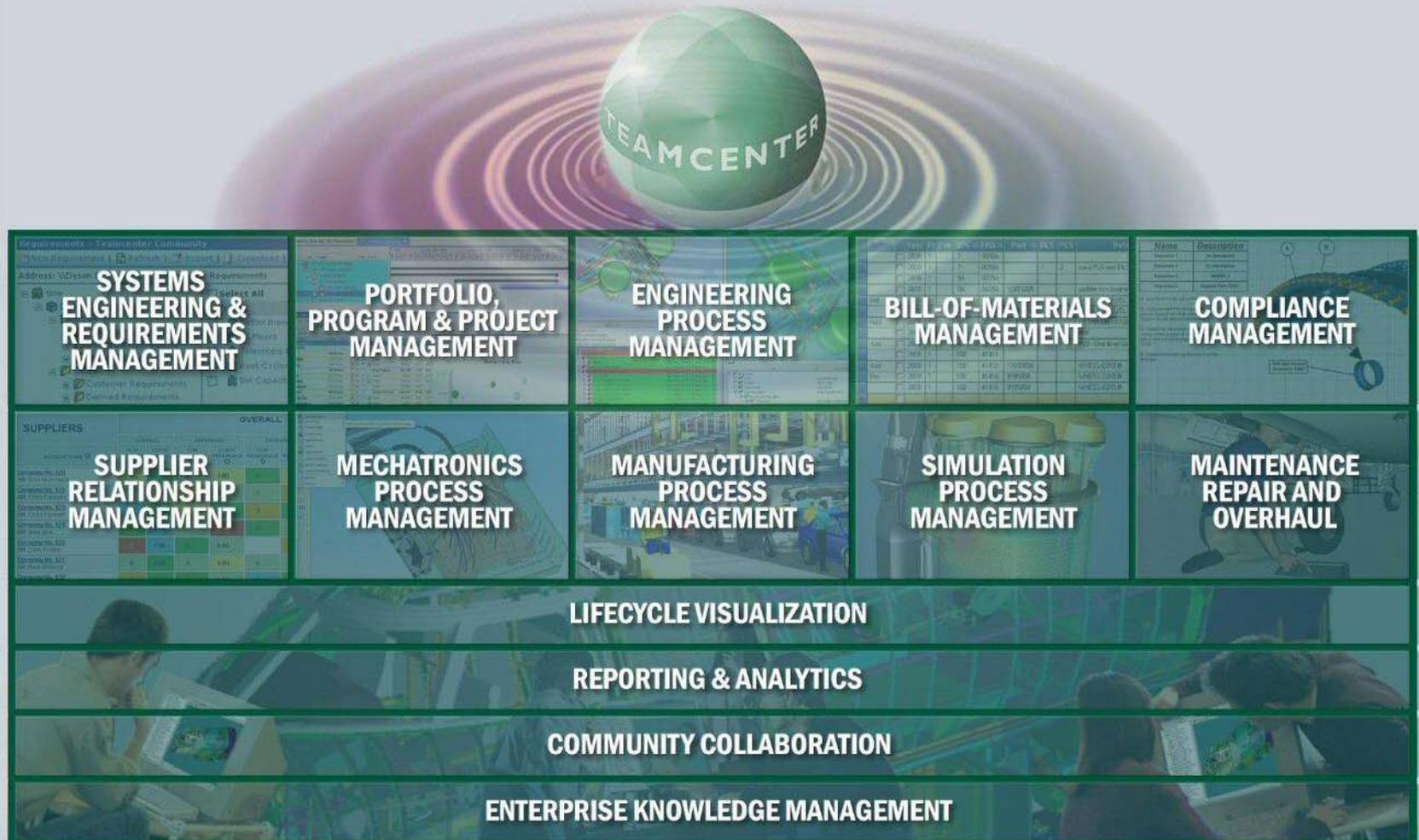
Americas 2008

PLM Software

Answers for industry.

SIEMENS

Teamcenter Digital Lifecycle Management Solutions



Enterprise Knowledge Management

Agenda

- Review of major changes in Teamcenter 2005
- Review of major changes in Teamcenter 2007
- Site Synchronous Transfer (SST)
- Recent File Management System (FMS) changes to enhance Multi-Site operations



Terminology Guide

Classic Multi-Site

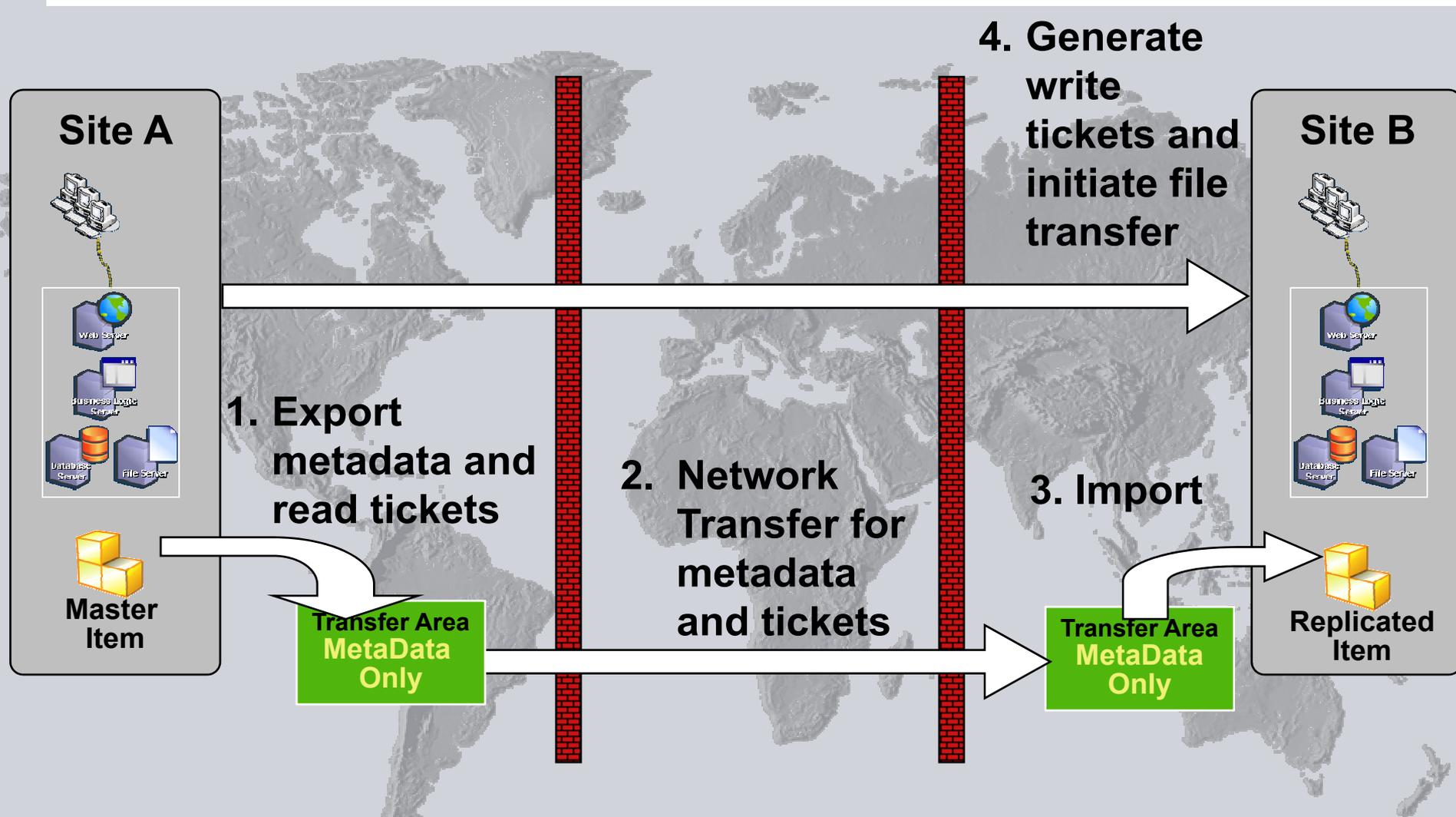
Low level object based replication technology used by Teamcenter for sharing data across like sites of Teamcenter

Global Multi-Site

XML based data exchange for moving data between dissimilar systems. Either Teamcenter Enterprise and Teamcenter or for disconnected sites of Teamcenter with dissimilar schemas

Teamcenter 2005 Review

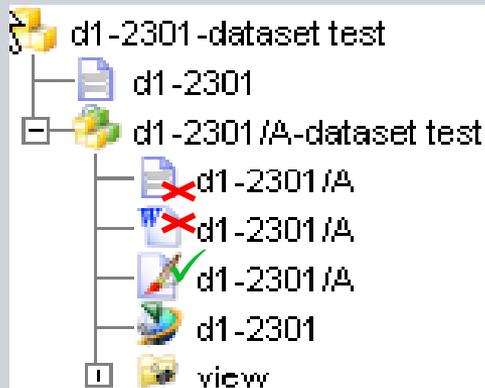
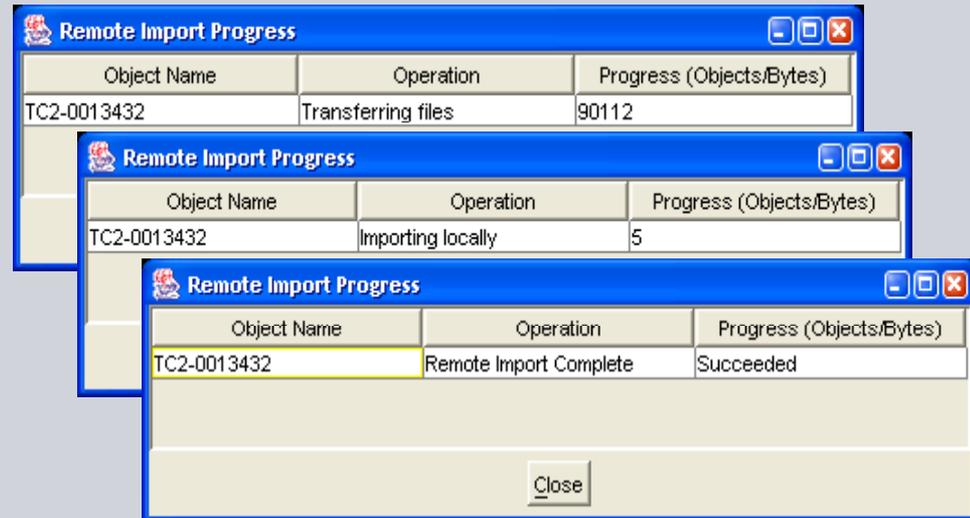
2005 Multi-Site Collaboration Transfer Mechanism with FMS



Teamcenter Engineering 2005 SR1

Multi-Site progress indicators

- Enables the Multi-Site progress indicators to function in a 4 tier deployment



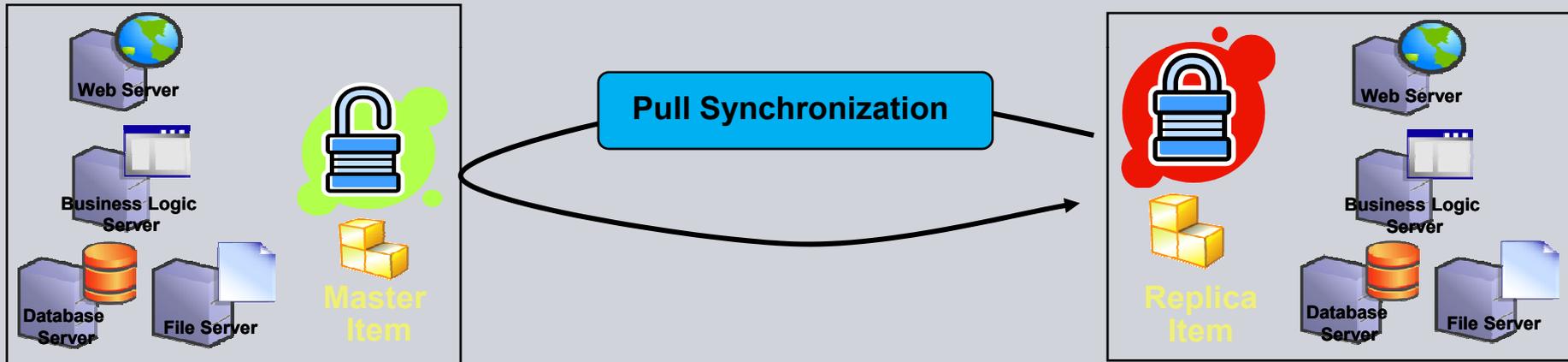
Remove forced synchronization of Requirements and Specification relations in Multi-Site

- Allows sites to configure whether they want to synchronize requirements and specification relationships
- Previously these relationships were always synchronized

Teamcenter Engineering 2005 SR1

Multi-Site pull synchronization

- Allow the `data_sync` utility to be run as a pull operation
- Allows replica sites to control the synchronization process



On-demand synchronization

- Allow additional reporting and query capabilities on replica objects and BoM structures in a Multi-Site deployment

Multi-Site Security Enhancement Overview

Prior:

- The Integrated Distributed Services Manager (IDSM) process typically enforces site to site security
 - Access Manager (AM) rules are evaluated on the master site for the site where an import request originates before the request is honored
- AM rules on the master site are not evaluated for the user ID making the import request
 - There is no requirement that the user ID of the requestor be defined on the master site

Multi-Site Security Enhancement Overview

New:

- The IDSM process will enforce site to site security as it does now

Plus:

- The IDSM process will optionally evaluate AM rules on the master site for the user ID making the import request
 - Requires that the user ID of the requestor be defined on the master site
 - If the user ID is not defined the import request is denied
 - Remote [infodba](#) user is blocked from doing IDSM pull requests by default

Multi-Site Security Enhancement Details

This enhancement can be enabled/disabled per remote site via configuration

BoM processing on import

- AM rules will be applied recursively to child objects if **Include BoM** is specified on import/export dialog

- AM rules will be evaluated at actual owning site when **Include BoM** and **Include Distributed Components** are specified on import/export dialog

- As a general rule, items must be retrieved from their owning site
- Example:
 - Import assembly X from site A to site C
 - The assembly contains component Y from Site B
 - Rules on X will be checked at A and
 - rules on Y will be checked at B

Multi-Site Security Enhancement Details

- Behavior when access to child objects is denied does not change
 - Behavior is controlled by **Continue On Error** on the import/export dialog
 - If set, import will continue
 - If not set, import will stop with error
 - **Export Protected** behavior does not change

Hub

- When a remote import request is received by a hub, the AM rules will be applied at the hub rather than actual master site
- Consistent with Multi-Site principle that hub **owns** its data for replication purposes

Permissions

At the item's owning site, both site and user privileges will be evaluated

Permissions are needed as shown below:

PERMISSION REQUIRED

Action From Remote Site	Transfer Out	Change Ownership	Export	Read	Write	Import	Transfer In
Import			User			Site	
Import with Transfer of Ownership	User						Site
Remote Checkout					Site and User		

Additional Changes

Capability	Abstract
Remote Check-in/ Check-out II	Support check-in of special objects such as variants, Eng Change, etc.
ODS Extensions for NXMI-Ideas	Extend ODS to support NXMI-Ideas item GUID requirements

Teamcenter 2007 Review

Capability

Capability	Abstract
Delayed Synchronization of Bulk Data	Allows bulk data and metadata to be synchronized independently of each other. On demand delivery of bulk data.
Include_bom switch behavior change data_sync	Sends new components of an item even if not sending a BoM (sync operation)
Data Partitioning	Computes size of transfer, then divides up into batches of specified size, then exports batches and changes ownership of items per batch
Pull Synchronization Enhancement*	Allows PSE or Navigator to show which replicated items are out of synchronization, then allows the user to perform a pull sync operation on those items

* Further clarification slides available

Capability Continued

Capability	Abstract
Extensible ODS	Extends publication record to contain additional attributes from item/item rev, and subsequent searching on these additional attributes
FMS Import/Export*	Transmits metadata and bulk data via FMS
http(s)	Supports Multi-Site communication via http(s) rather than RPC in order to better support company firewall requirements. Both protocols are supported

* Further clarification slides available

Pull Synchronization Enhancement

The screenshot displays the PSE - Teamcenter 2007 interface. On the left, a BOM tree shows a hierarchy of components. On the right, a table lists synchronization data for these components. Red circles highlight specific entries in both views that are marked as 'out of date'.

Object String	Owning Site	Sync State	Master Last Modified...	Replica Last Modified...
TestAssm2_1_e17/A;1 (view)	IMC-10002		20-May-2008 19:50	20-May-2008 19:50
Comp2_1_e17/A;1 (view)	IMC-10002		20-May-2008 19:49	20-May-2008 19:49
TestComp2a_1_e17/A;1 (view)	IMC-10002		20-May-2008 19:49	20-May-2008 19:49
TestComp2aa_1_e17/A;1	IMC-10002	out of date	20-May-2008 19:51	20-May-2008 19:49
TestComp2ab_1_e17/A;1	IMC-10002	out of date	20-May-2008 19:51	20-May-2008 19:49
TestComp2b_1_e17/A;1	IMC-10002		20-May-2008 19:49	20-May-2008 19:49
Comp3_1_e17/A;1 (view)	IMC-10003		20-May-2008 19:49	20-May-2008 19:49
TestComp3a_1_e17/A;1 (view)	IMC-10003		20-May-2008 19:49	20-May-2008 19:49
TestComp3aa_1_e17/A;1	IMC-10003		20-May-2008 19:49	20-May-2008 19:49
TestComp3ab_1_e17/A;1	IMC-10003		20-May-2008 19:49	20-May-2008 19:49
TestComp3b_1_e17/A;1	IMC-10003	out of date	20-May-2008 19:51	20-May-2008 19:49

Multi-Site Enhancements

Throughput, Reliability and Restart (MP3)

- Checkpoint feature supporting transaction restart
 - Ability to restart a transaction at the point of failure instead of requiring the whole transaction to be repeated
 - If a transaction involves multiple sites, it is possible to restart for specific sites at the point of failure for that site independent of the other sites
- Prevent the timeout of firewall flow control timers during Multi-Site operations

Multi-Site Enhancements

Enhancements To Manage GRDV complex objects (MP3)

- Enhanced memory management in Multi-Site utilities by **chunking** large object sets into manageable sets
- Supports GRDV classes – VariantExpression, Relation, Form, NamedVariantExpression, PSOccurrence, Dataset and Folder

MultiSite Enhancements

Controlled On Demand Sync Report Generation (MP3)

- The broadcast mode of On Demand Synchronization tools can be controlled via 2 new preferences
 - **TC_on_demand_sync_broadcast_mode**
If set to **FALSE**, this will prevent On Demand Sync Report mode to go into **broadcast** mode where it queries all known sites to find out the owner of a replica
 - **TC_follow_ownership_chain_max_site_count**
This preference specifies the maximum number of sites that will be sequentially queried as to ownership of a replica before the replica's sync state is declared to be **unknown** (Follow the chain, bread crumbs)

MultiSite Enhancements

■ Troubleshooting Utilities

■ **Item_report**

- Using this utility, a site can investigate item consistency and dual ownership issues
- Generates detail reports of an item or multiple items at the site level. The site level reports can be merged to generate a combined status output

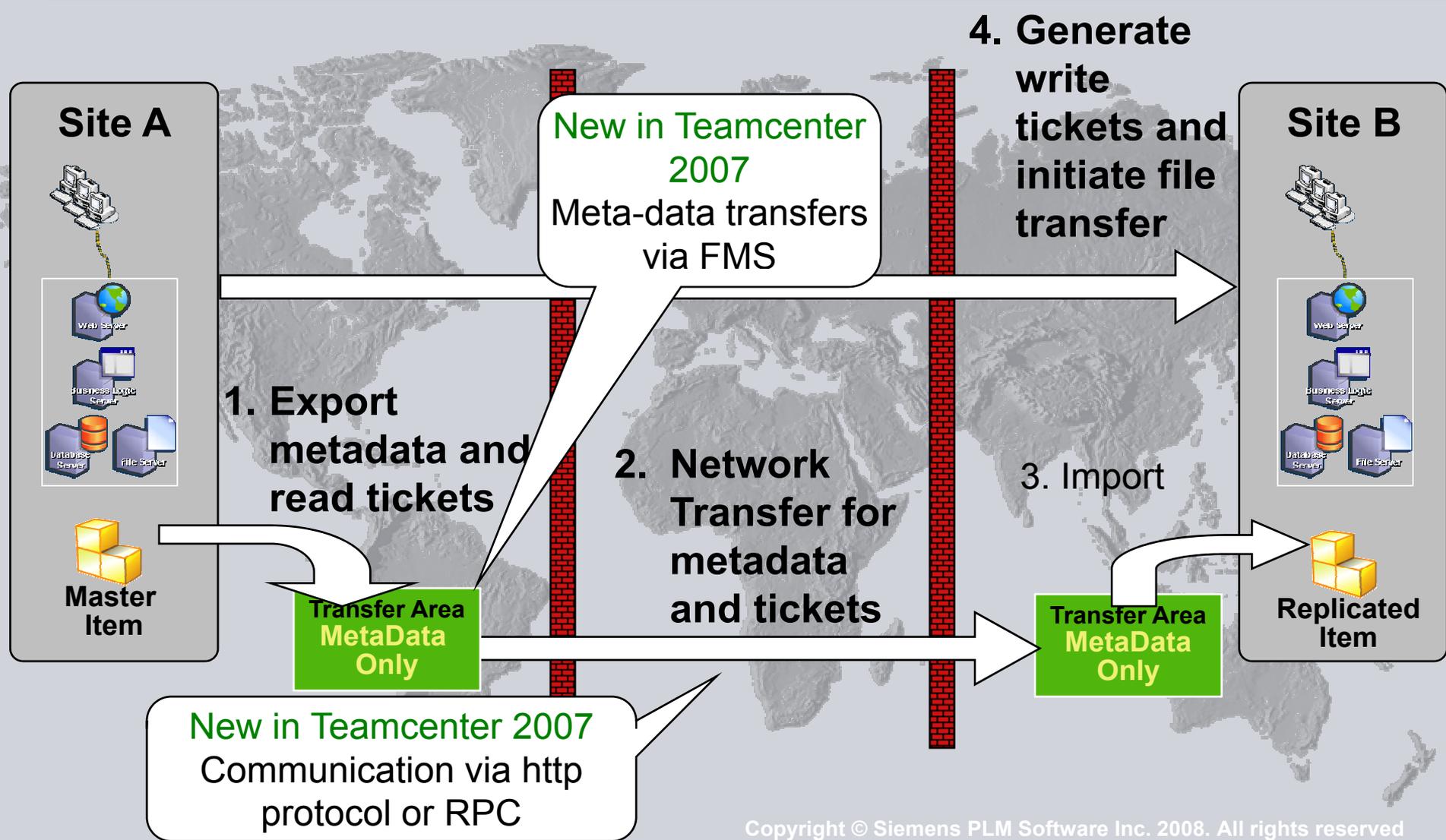
■ **Distributed_execute**

- Executes the **item_report** utility both locally and remotely and generates reports of all traversed items from all specified sites

■ **Ensure_site_consistency**

- Tool for fixing conditions that arise whilst using SST. Can use the output of **item_report** as input data

Teamcenter 2007 Multi-Site Transfer Mechanism with FMS



Synchronous Site Transfer (SST)

What is Synchronous Site Transfer (SST)?

It is the new algorithm used by Multi-Site to orchestrate the transfer of site ownership from one site to another

- Primary goal is to improve transaction integrity when transferring site ownership
- Set of well-coordinated steps between exporting and importing sites
- Similar in concept to commonly used 2-phase commit algorithm

Scope

Online Transfer of Ownership

- Pull or Push (end user driven transfer of ownership)
- Push (`data_share` utility initiated transfer of ownership)
- Remote Check-out/Check-in

Offline Transfer of Ownership

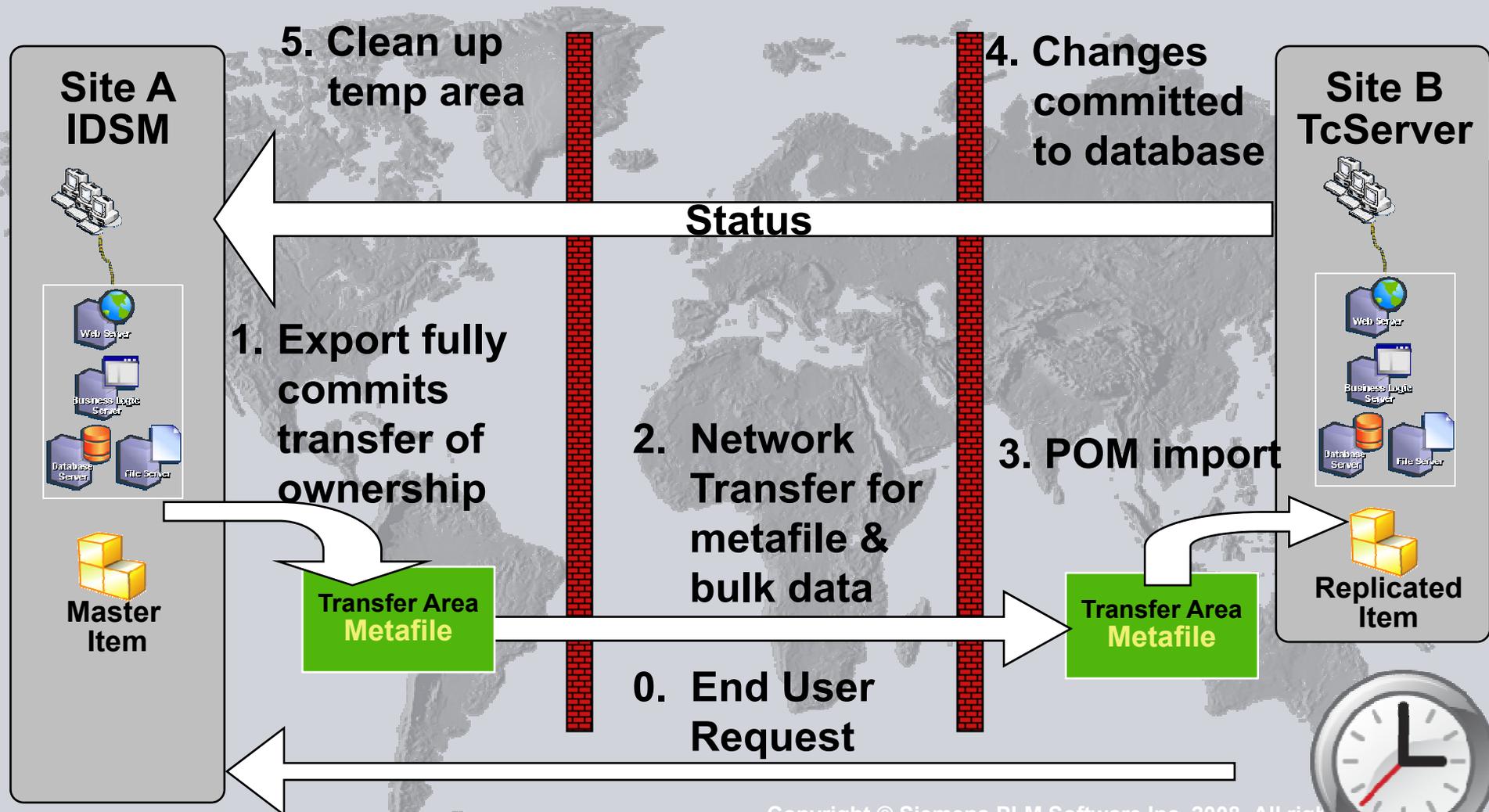
- Algorithm is required to remain unchanged

Principles for Multi-Site Operations

Operations between sites will fail occasionally due to end user intervention as well as hardware, software or network faults

- All such possible failures must be detectable during and after the event
- Operations should be easy to resume (after correcting any network or hardware fault such as cleaning up /TEMP space)
- The chances that data can be left in an inconsistent state between sites must be minimized
- If data is left in an inconsistent state between sites:
 - It must not be modifiable by more than one site
 - It must be repairable with a reliable and automated utility

How Existing Multi-Site Code Deals with Ownership Transfer (Pull) without SST



What Can Go Wrong without SST?

5. If step 4 fails, rollback of Ownership can also fail

4. Failure before database change

Site A
IDSM

Site B
TcServer



Status

1. Process Terminates

Problems at any step can leave some or all objects with no owner

3. User Interrupt or Process Failure

2. Delivery Failure

0. End User Request

Transfer Area
Metafile

Transfer Area
Metafile

Replicated
Item

Master
Item



Current Repair Recovery Process

Preferred

The importing site (Site B) can re-start the import from it's **Transfer Area** if Step 2 **Delivery** completed

- Initiated from end user's UI
- Completes intended action

Export_Recovery utility is provided to allow exporting site (Site A) to rollback ownership transfer using data in its **Transfer Area** (min or full modes)

- Rolls back intended action
- Action can be re-started

Export_Recovery utility can attempt to rollback ownership transfer at exporting site without the **Transfer Area** (Automode)

- **Find** mode looks for inconsistent items between sites

Last Resort

- **Auto-NoExport** (force) mode – can be misused
- Rolls back intended action

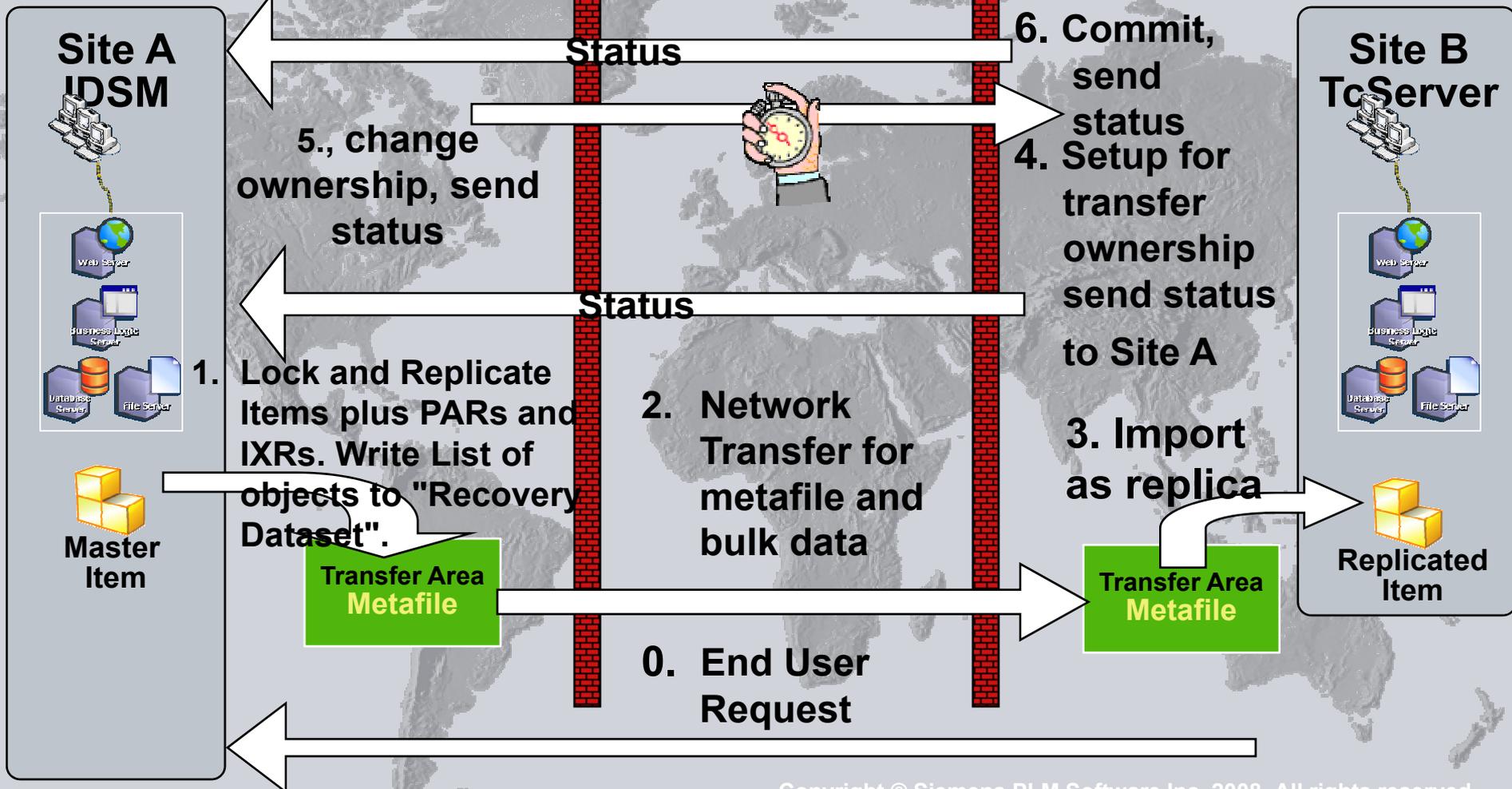


SST Basics

- Data transfer starts out as a pure replication operation
- Export records remain at exporting site up to the last possible moment so there is no danger of losing this important data if transaction fails
- Exporting site applies a persistent POM Transfer Lock (T-lock) on exported objects so they cannot be modified during transaction
- Actual ownership transfer occurs only at the very end of the transaction after the data has been successfully copied as a replica.
 1. Exporting site first gives up site ownership using a single POM call
 2. Importing site then claims site ownership (including those of export records) using a single POM call
 3. Exporting site deletes export records
- The 3 steps above occur in a very narrow time frame **critical window**

New Ownership Transfer (Pull) with SST

7. Unlock Items, Delete Recovery Dataset, IXRs and PARs



What can go wrong when using SST?

7. Failure in RollBack of ownership

Status

6. Failure to Commit

4. User interrupt or process failure

5. Failure to Commit

Status

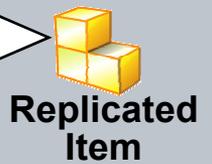
1. Process Termination after objects are locked

2. Delivery Failure

3. User interrupt or process Failure

Site A IDSM

Site B ToServer



Any failure before Step 6 leaves state unchanged

Simultaneous failure at step 6 and 7 necessary to leave data in inconsistent state

Other Features

Transaction state and information are recorded in the database for use in corrective actions

- For non-crash error conditions (e.g. duplicate item id), transaction info is used to **roll back** side effects such restoring back site ownership, removing locks, cleaning up temporary files, etc
- For crash conditions (e.g. system crash or user terminates client process via task manager), transaction info is used by smart and easy-to-use **ensure_site_consistency** utility for corrective actions
- New type of POM lock called **Transfer Lock** which persists even if locking process dies
- Enhanced handling of check out conditions for Remote Check-out/Check-in operations

Benefits of SST

Greatly reduced vulnerability to site inconsistency and other data integrity problems:

- If transaction is interrupted prior to the very narrow **critical window**,
 - no ownership transfer has occurred; worst case scenario is that the imported data is a replica
 - no export record is lost
- If transaction is interrupted during **critical window**,
 - Worst case scenario is neither site owns data; easily corrected by **ensure_site_consistency** utility
- Will not result in inconsistent site ownership within an item (because ownership transfer of all objects is done in single POM operation)
- Persistent lock enhances data integrity because master object cannot be modified once transaction starts

Benefits of SST (Cont'd)

- Greatly reduced vulnerability to unbalanced remote check out condition
- More robust **roll back** mechanism under non-crash error conditions
- Easy-to-use **ensure_site_consistency** utility that can be used to search for data that needs correction and to perform the corrective action with minimal user intervention

FMS File Compression

File Compression

Prior to Teamcenter Engineering 2005

- Transmission of export data was performed by IDSM
- Use of a dedicated file transfer port and a data compression option

Data compression option

- Multi-Site export compression of the export data prior to transmission
- Decompression prior to data importing at receiving site

File Compression

With Teamcenter Engineering 2005

- Transmission of bulk data is performed by FMS
- Transmission of the metadata is performed by IDSM
- Data compression option only applies to metadata
 - Not to bulk data
- FMS provides WAN acceleration of bulk data

File Compression

With Teamcenter 2007

- All transmissions (meta-data and bulk data) is performed by FMS
- No Data compression
- FMS provides WAN acceleration of both bulk and meta-data
- FMS did not include a file compression option
 - Planned for a future Teamcenter Unified release

File Compression

Enhance FMS to provide compression between Cache volumes

- Enabled at link level for FSC to FSC data transfers
- Supports FSC caching of transported data
- Data in cache is not compressed
- Compression scheme is be based on GZIP
- Streaming compression/decompression

Configuration driven

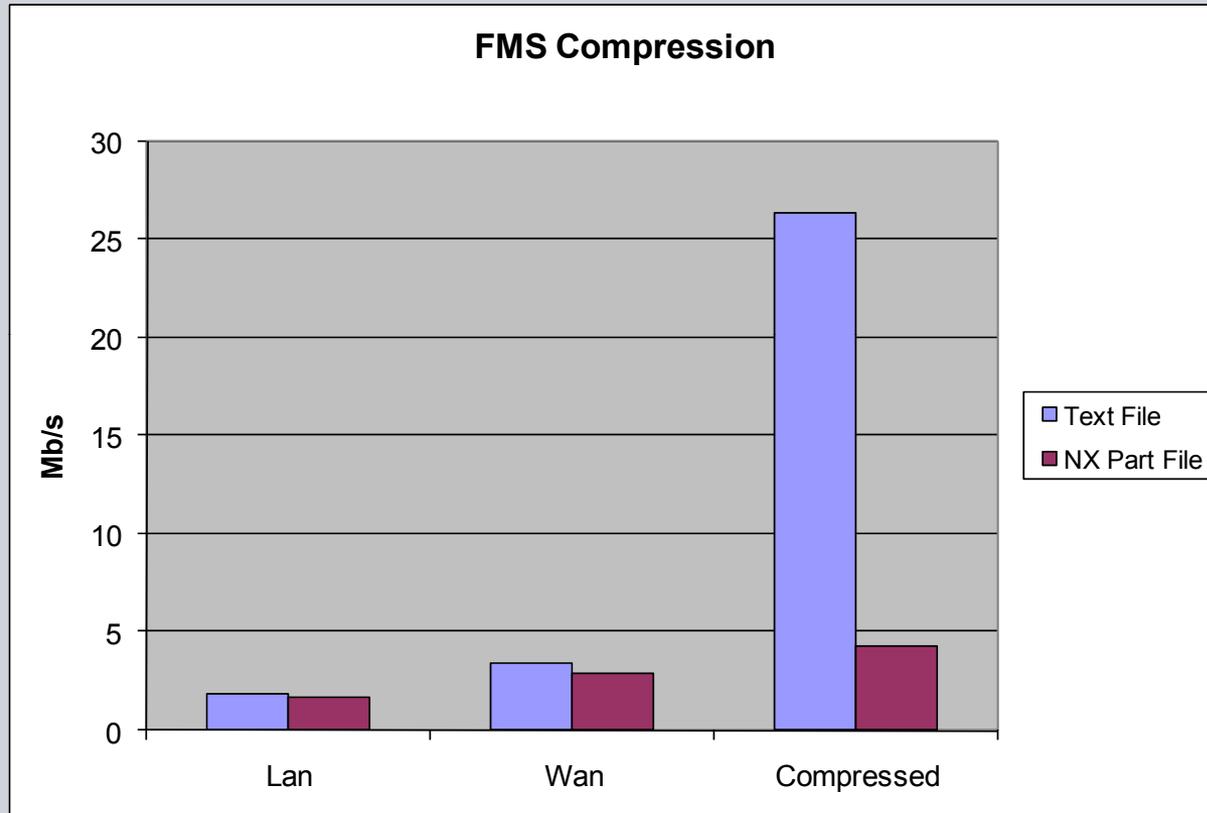
- No XML schema or client interface changes required
- No changes to client integrations

Delivery

- Teamcenter 2005 SR1 MP6
- Teamcenter 2007.1.3b

Aligns to future Teamcenter FMS compression strategy design

Compression Comparison



7-8x
faster for
Text

1.5x
faster for
NX

Tests performed on 2 files:
Text File 64MB, compresses 98%
NX File 24MB, compresses 59%

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