Z13

What's New with GDPS

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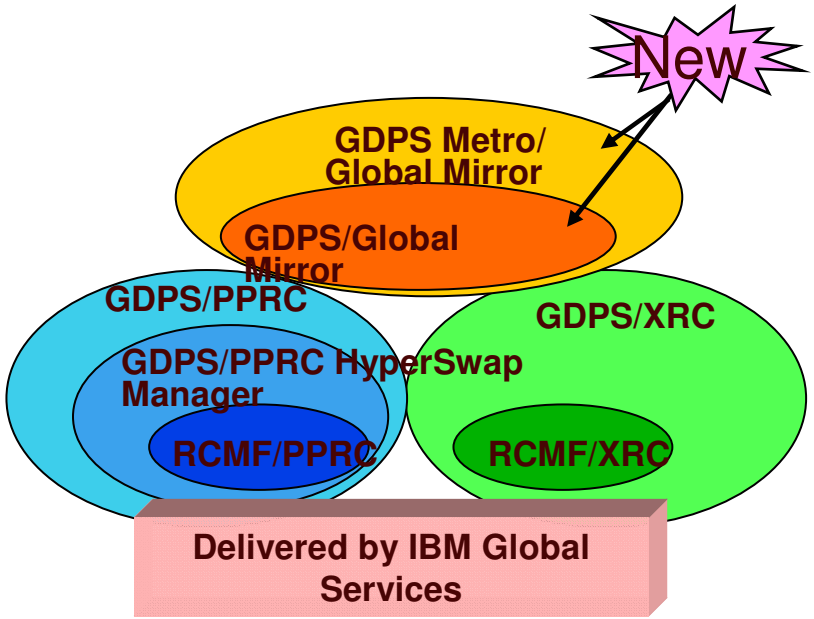
Agenda

- **Business Continuity Overview**
  - Business Continuity Objectives
  - Need for Data Consistency
  - GDPS overview
- **Continuous Availability (CA) of Data within a Single Site**
  - Disk Maintenance and Disk Failures with HyperSwap Manager
- **Metropolitan Distance CA/Disaster Recovery (D/R) Solution (2 sites)**
  - Configuration Options
  - Planned and Unplanned Site Reconfiguration with HyperSwap
  - Open LUN Management
- **Unlimited Distance D/R Solution (2 sites)**
  - GDPS/XRC
  - GDPS/Global Mirror
- **CA/DR Solution (3 sites)**
  - z/OS® data only
  - z/OS® and Open data
- **What's New / Futures**
- **Summary**
  - Reference Customer Experiences

GDPS Overview



- ✓What is GDPS

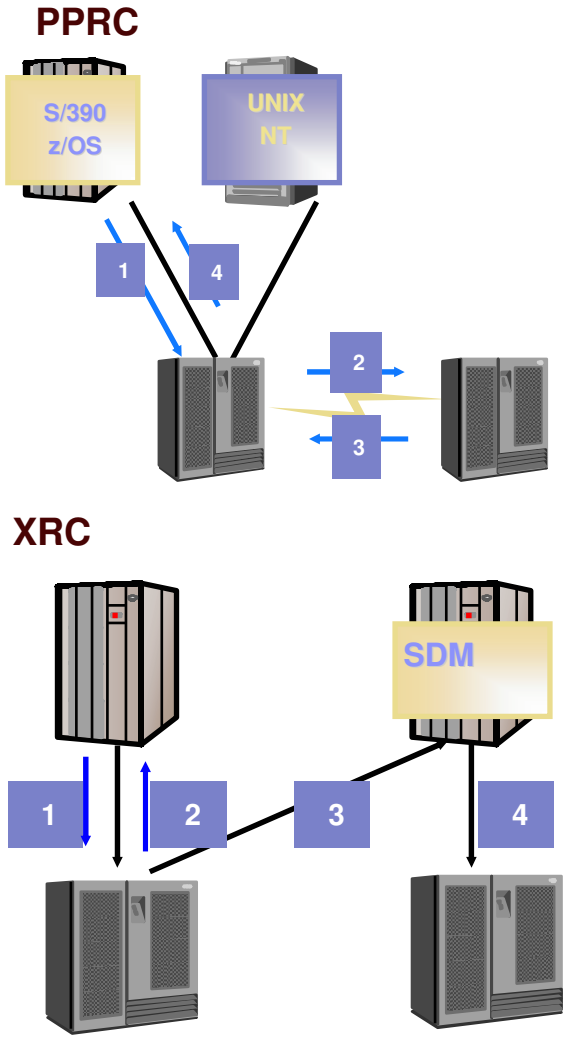
PPRC and XRC Overview

PPRC (Metro Mirror)

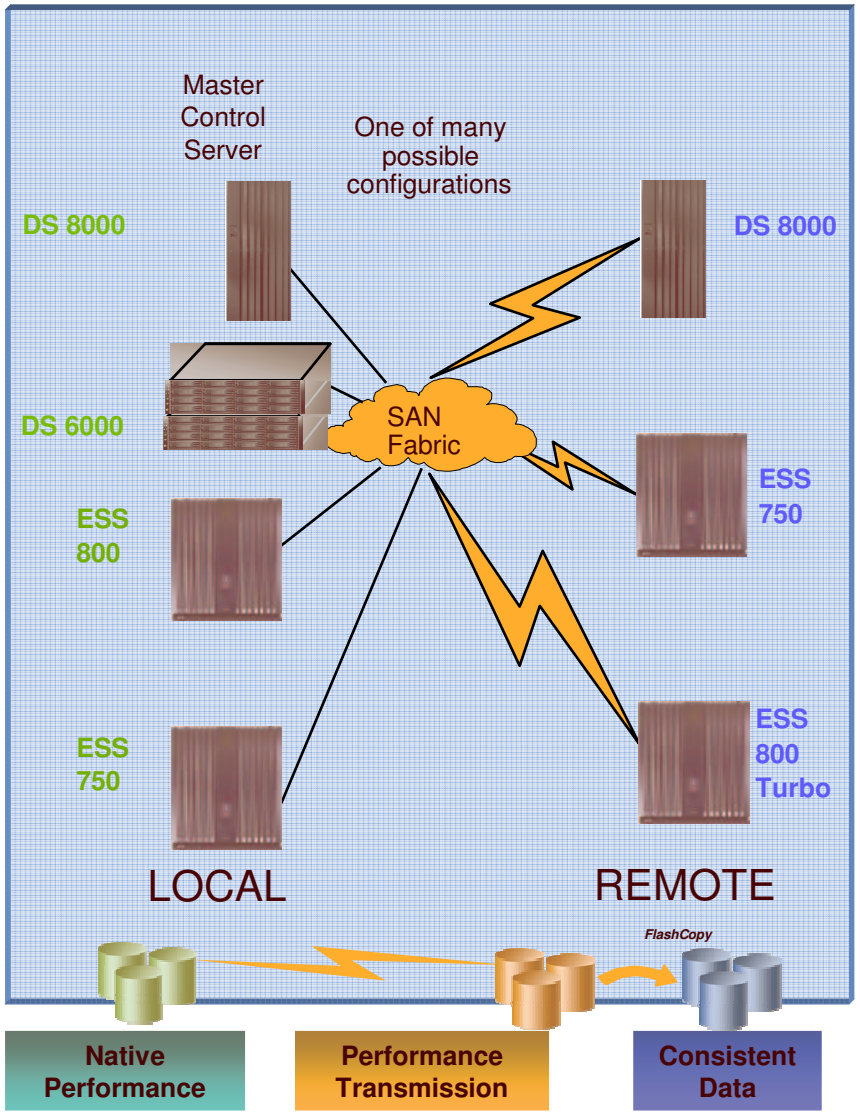
- Synchronous remote data mirroring
  - –Application receives "I/O complete" when both primary and secondary disks are updated
- Typically supports metropolitan distance
- Performance impact must be considered
  - –Latency of 10 us/km

XRC (z/OS Global Mirror)

- Asynchronous remote data mirroring
  - –Application receives "I/O complete" as soon as primary disk is updated
- Unlimited distance support
- Performance impact negligible
- System Data Mover (SDM) provides
  - –Data consistency of secondary data
  - –Central point of control

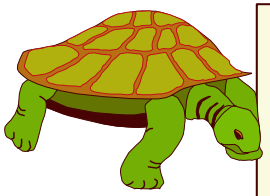


Global Mirror Overview



- Designed to Provide:
  - **Global Distance:** Two-site, unlimited distance, data consistent asynchronous disk mirroring
  - **Heterogeneous:** Data can span zSeries® and open systems data, and can contain a mix of zSeries and open systems data
  - **Scalability:** Consistency Group supported across up to 17 total ESSs in Global Mirror session (with RPQ)
  - **Flexibility:** Many possible configurations
  - **Application Performance:** Native
  - **Mirroring Performance:** Two ESS Fibre Channel disk mirroring links per ESS sufficient for almost all workloads
- Intended Benefits
  - **Autonomic:** No active external controlling software required to form consistency groups
  - **Saves cost:** No server cycles required to manage consistency groups
  - **Lowers TCO:** designed to provide improved performance, global distances, and lower costs

Need for Time Consistency



Recovery

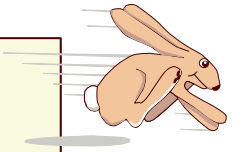
Process measured in hours or days

Restore last set of Image Copy tapes
Apply log changes to bring database up to point of failure

Restart

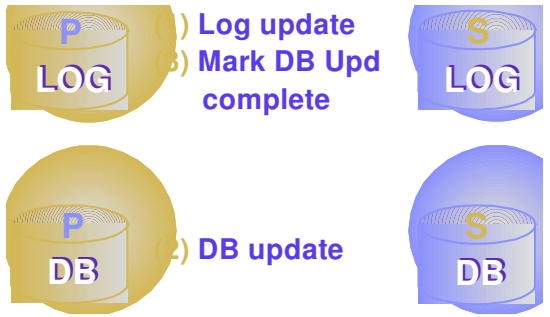
Process measured in minutes

To start a DB application following an outage without having to restore the database



Protection against mirroring failures

- Many examples where the start of one write is time dependent on the completion of a previous write
  - Database & log
  - Index & data components
  - Time sequence could be exposed
- GDPS automation ensures consistency
  - Across any number of primary subsystems
- Consistency enables Restart instead of Recovery
- *Even if second copy can be trusted, disk switch is disruptive for the entire workload*

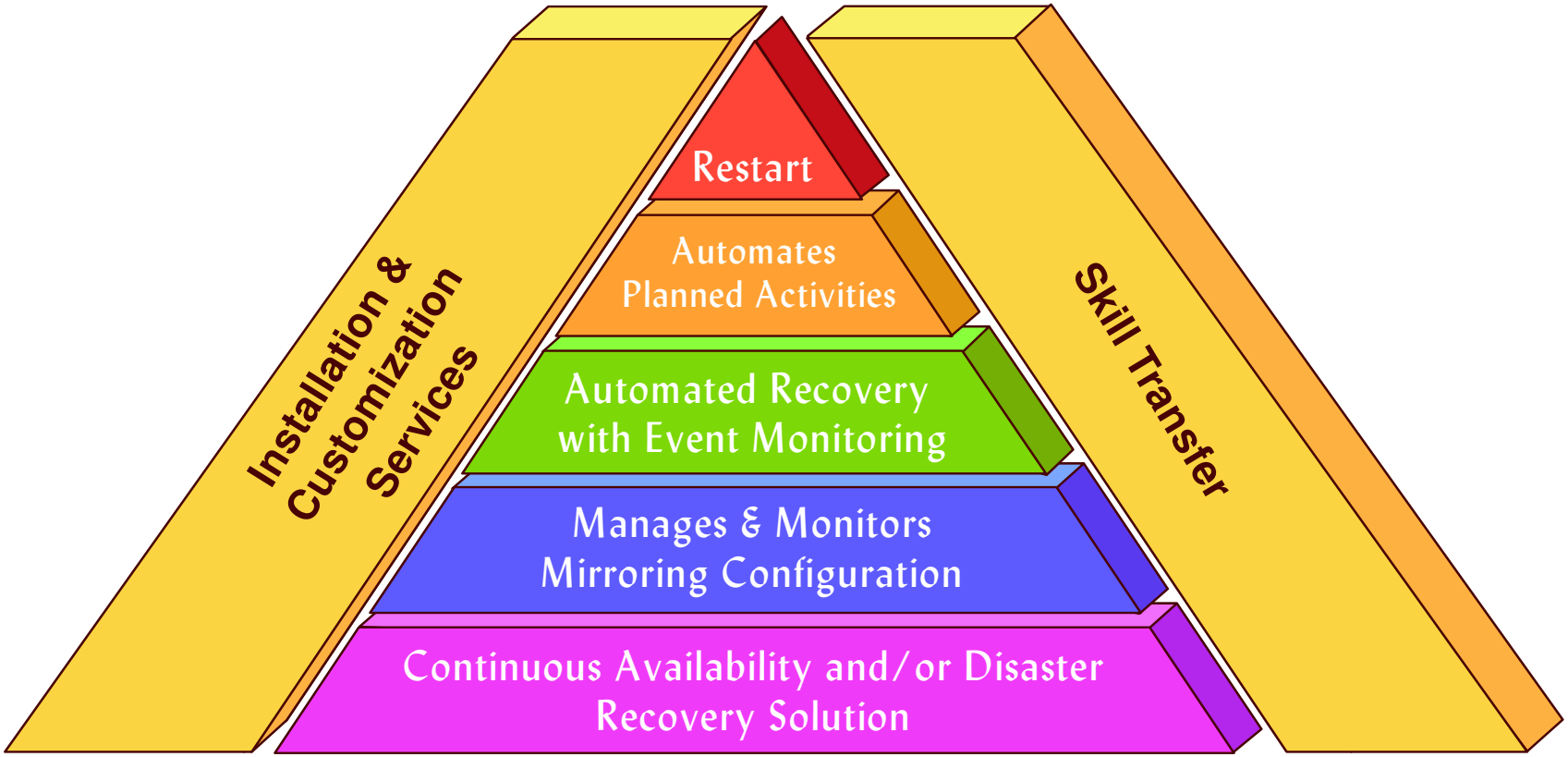


✓1 is OK
✓1 ,2 is OK
✓1,2,3 is OK
✓1,3 is NOT OK

GDPS Automation

- **Allows business continuity processes to be built upon a reliable, consistent recovery time**
  - No need to keep updating recovery procedures
  - Assured Scalable
  - Affordable testing
- **Manage and Monitor remote copy environment**
  - Establish and delete Paths and Pairs,
  - Issues commands to Recover, Queries, Suspend, Resynchronize …
  - Alerts
- **Manage day to day activities**
  - Coupling Facilities, Couple Data Sets
  - Shut down, Start up, Recycle systems
  - Responds to messages at IPL time
- **Manage Resources**
  - CBU, FlashCopy, PtP VTS

GDPS offers a comprehensive solution, not just remote copy technology



Vendor Independent

GDPS Maintenance / Testing

- Same processes as other z/OS products
  - Installed via SMP/E through Shopz
  - Fixes go through RSU process
- Stress and saturation testing, failure and recovery testing, and rolling IPL maintenance testing
  - z/OS at 3 levels (e.g., z/OS R4, z/OS R5, & z/OS R6)
  - subsystems at 2 levels (e.g., 'n' and 'n-1')
- PPRC Scenarios
  - Planned / Unplanned HyperSwaps,
  - Simulated site disaster (CF, zOS failures)
  - Break communication links
  - Manages IPL

- Monthly RSUs:
  - HIPERs, PE fixes, Security, Integrity APARs
- Quarterly RSU:
  - Severity 1, 2, 3 & 4 APARs

EOS and Future GDPS Releases

Release	GA	EOS
GDPS V3.1	February 2004	January, 2006
GDPS V3.2	March, 2005	March, 2007 *
GDPS V3.3	January, 2006	March, 2008 *

- * Indicates projected date. Actual end of marketing or end of service date has not been announced yet.
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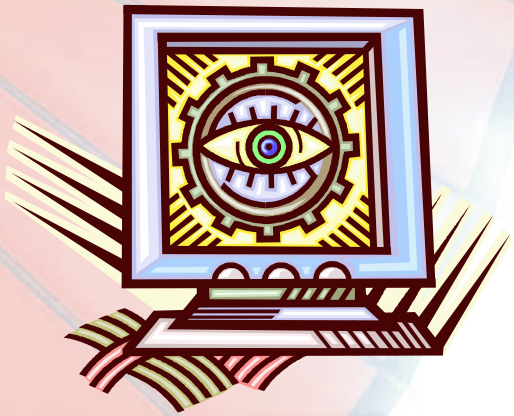
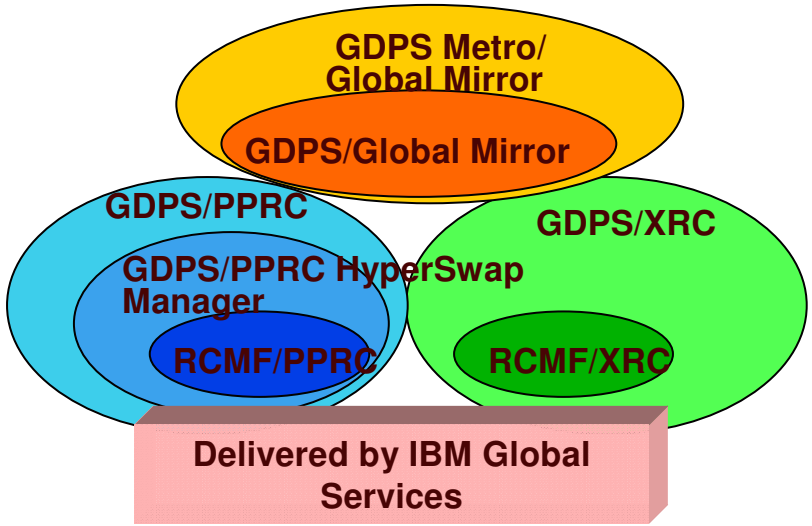
Coming Soon ...

- GUI Interface
  - Not limited to ISPF-like NetView Console panels

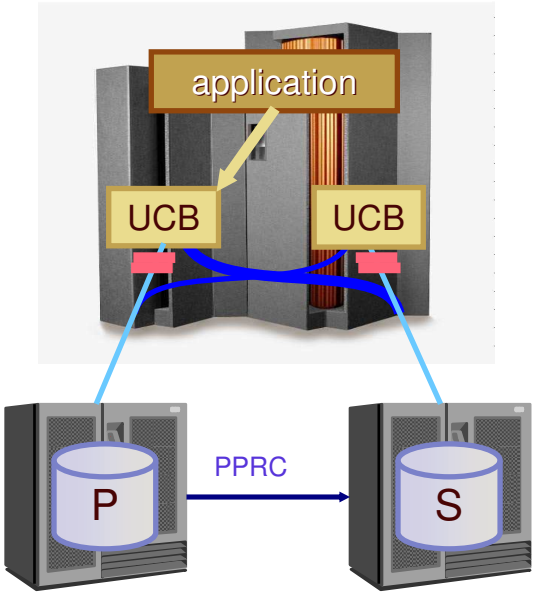


Continuous Availability of data within a single site



- ✓HyperSwap technology
- ✓GDPS/PPRC HyperSwap Manager
- ✓Unplanned and Planned disk reconfiguration w/ HyperSwap

GDPS/PPRC HyperSwap



- **Substitutes PPRC secondary for primary device**
  - No operator interaction - GDPS-managed
  - Can swap large number of devices - fast
  - Includes volumes with Sysres, page DS, catalogs
  - Non-disruptive - applications keep running

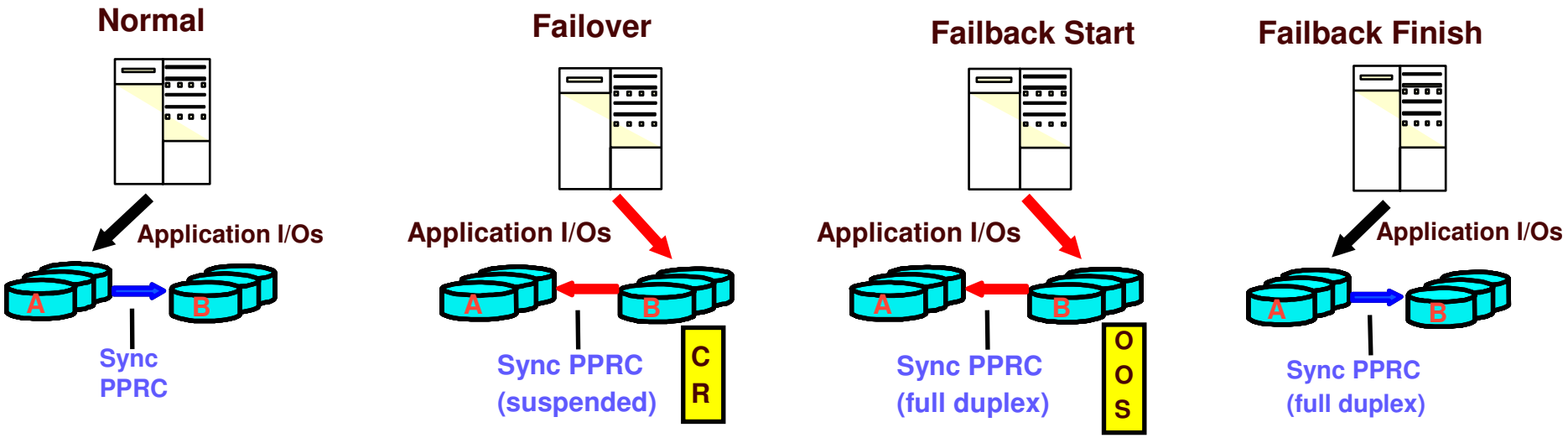
With HyperSwap and FO/FB →

13 Seconds! (6545 volume pairs, 19.6 TB, 46 LSSs)
Only changed data needs to be copied to restore to original configuration

PPRC Failover, swap the primary & secondary PPRC UCBs, systems continue

PPRC Failover / Failback (GDPS V3.2)

- The new primary volumes (at the remote site) record changes while in failover mode.
- The original mode of the volumes at the local site is preserved as it was when the failover was initiated.
- Only need to resynchronize from time of failover, not entire data set



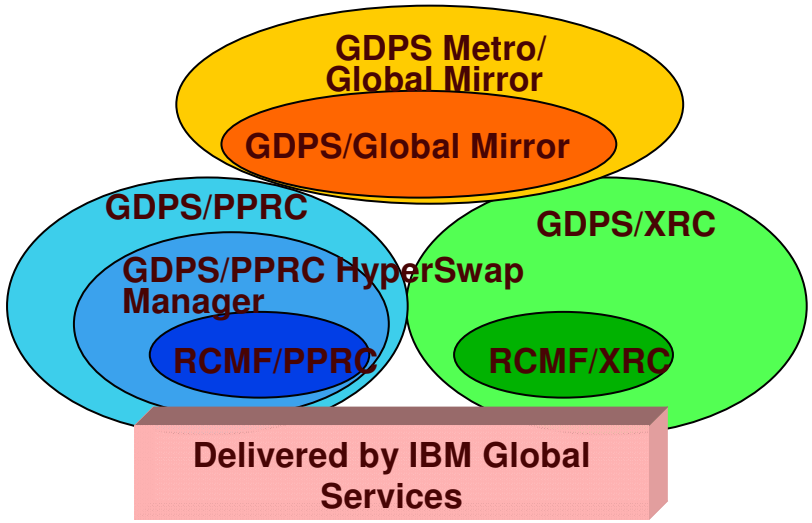
- **Faster Resynchronization**
- **Less resource consuming**

HyperSwap Extensions (GDPS V3.3)

- **Existing HyperSwap Triggers**
  - I/O errors
  - Boxed devices
  - Control Unit failures
- **IOS Timing Trigger**
  - Availability
    - Autonomic detection of "**Soft Failures**" to trigger HyperSwap
    - Based upon customer defined I/O timing thresholds
- **Dual site and single site environments**
  - GDPS/PPRC
  - GDPS/PPRC HyperSwap Manager

Metropolitan Distance Continuous Availability / Disaster Recovery Solution (2 sites)

- ✓GDPS/PPRC
- ✓Distance Testing
- ✓CF Duplexing supporet
- ✓Management of Open Systems LUNs
- ✓Multi-Platform Resiliency



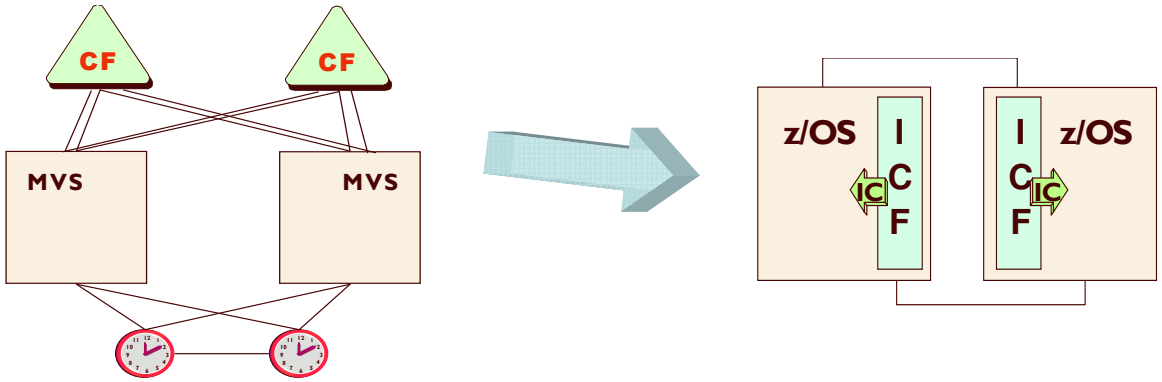
Server Time Protocol (STP) Announcement – Today (Oct 10)

- Designed to provide capability for multiple System z9 and zSeries platforms to maintain time synchronization with each other
  - Does not require the 9037 Sysplex Timer if all servers STP capable
- Timing information transmitted over ISC-3 links (Peer mode), ICB-3 and ICB-4 links
- Supports a multi-site timing network of up to **100 km** (62 miles)
  - Allows a Parallel Sysplex cluster to span up to 100 km
- May reduce the cross-site connectivity required for a multi-site Parallel Sysplex clusters
- Can coexist with an External Time Reference (ETR) network (9037 based)
  - Mixed Timing Network
- Designed to allow use of dial-out time services to set the time to international time standard (UTC) as well as adjust to UTC
- Planned to be available as a feature on z9 EC, z9 BC, z990, and z890
- Prerequisites
  - HMC 2.9.1
  - z/OS V1.7

Server Time Protocol Value

STP may provide the following additional value:

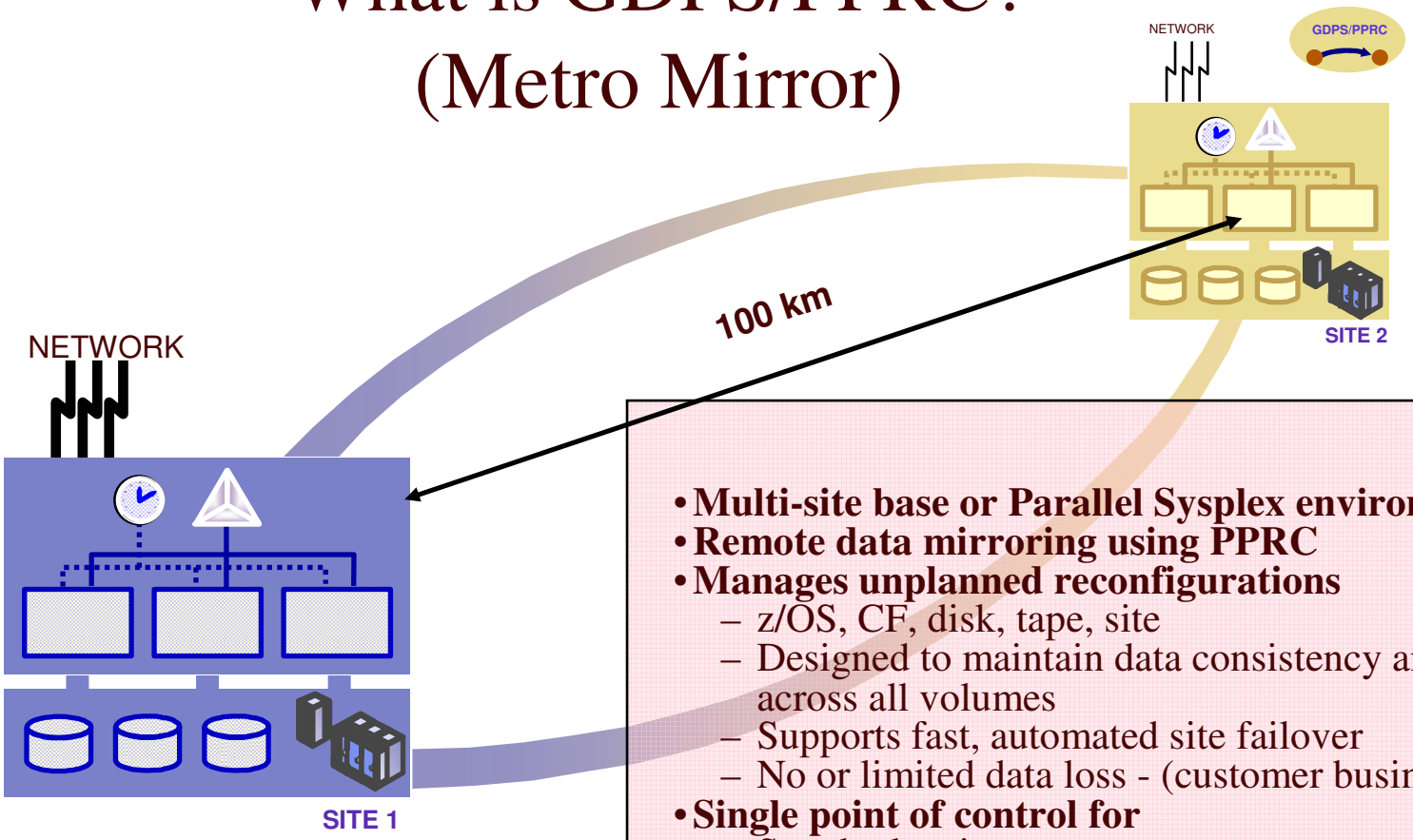
- Eliminating a "third site" required to house a Sysplex Timer to avoid a single point of failure for parallel sysplex distances longer than 40 km.
- Eliminates infrastructure requirements (space, power, etc) to support Sysplex Timers
- Eliminates Sysplex Timer maintenance costs.
- Eliminates/reduces fiber optic infrastructure requirements for:
  - DWDM ports
  - patch/trunk cables
  - dark fiber between sites for ETR and CLO links



STP Sessions

- Z15 – Wed 4:10 Intro to STP
- Z16 – Thu 1:35 STP Migration / Recovery

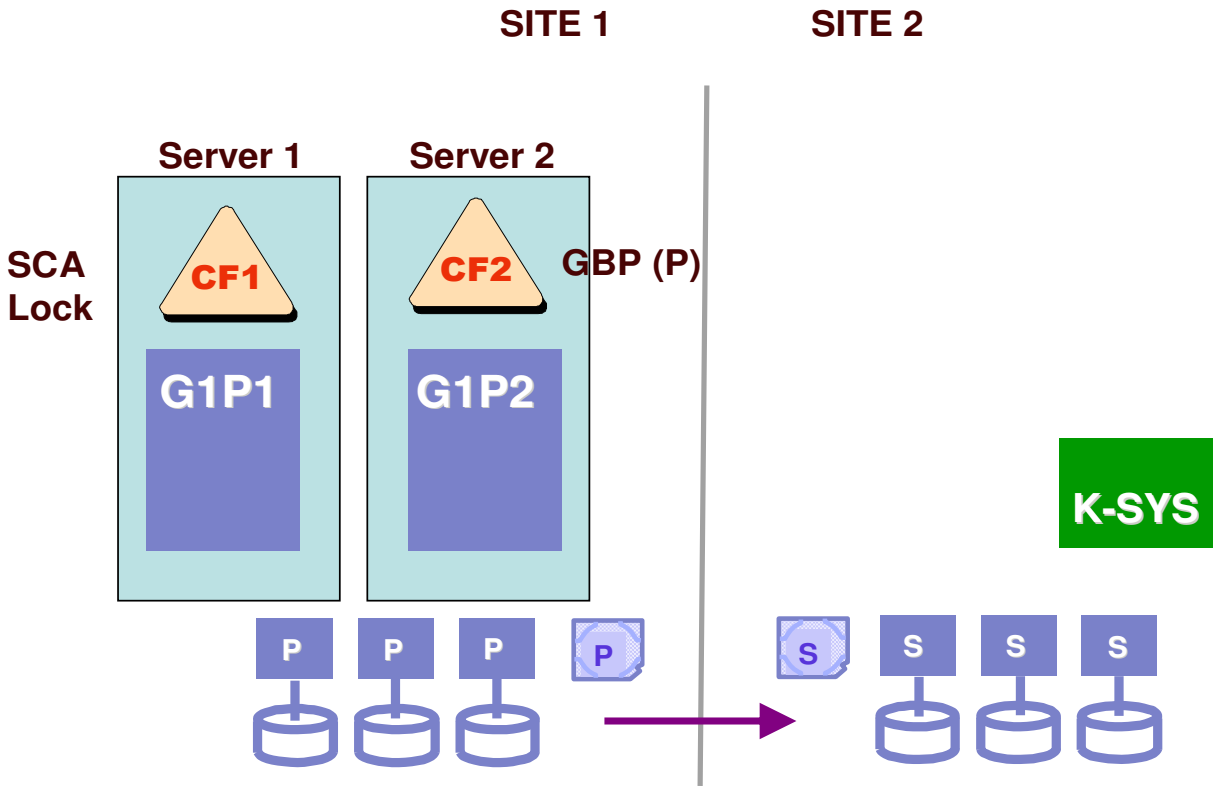
What is GDPS/PPRC? (Metro Mirror)



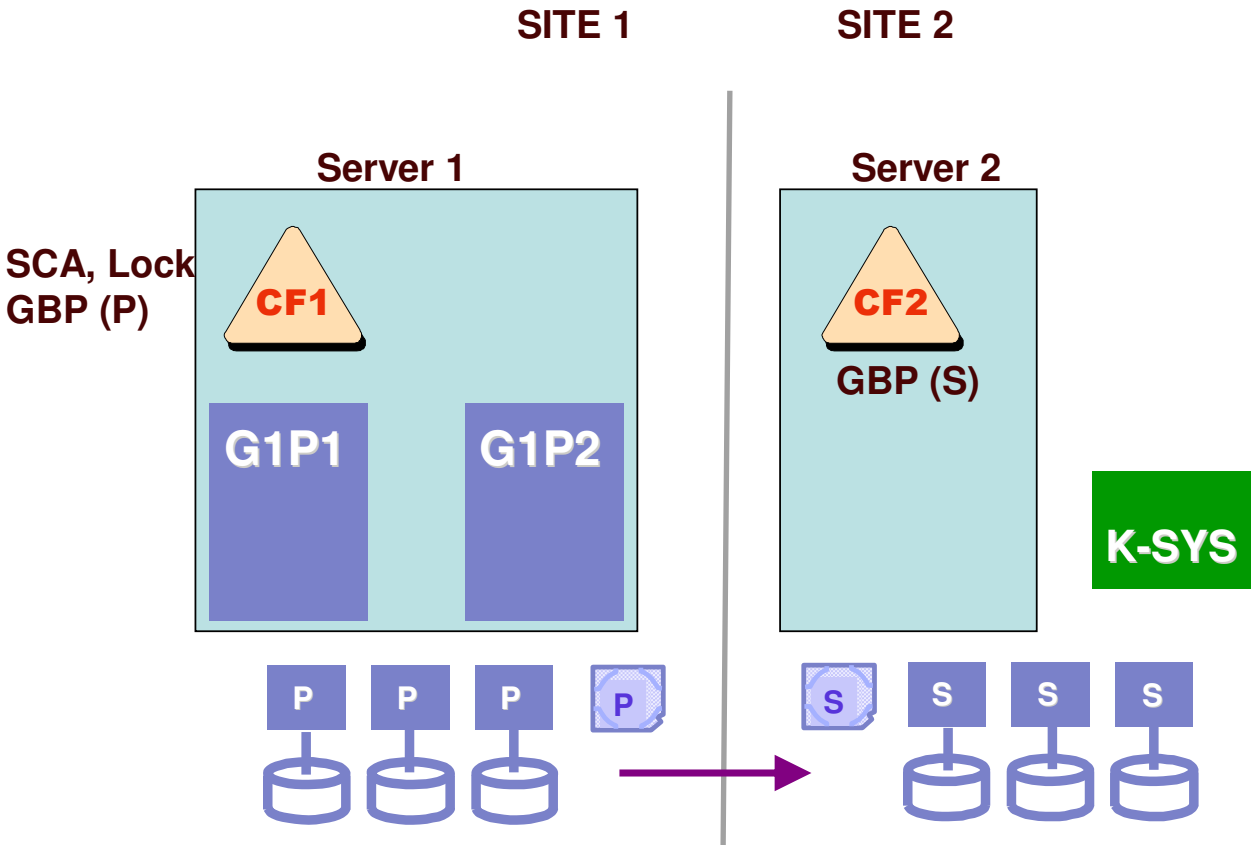
- **Multi-site base or Parallel Sysplex environment**
- **Remote data mirroring using PPRC**
- **Manages unplanned reconfigurations**
  - z/OS, CF, disk, tape, site
  - Designed to maintain data consistency and integrity across all volumes
  - Supports fast, automated site failover
  - No or limited data loss - (customer business policies)
- **Single point of control for**
  - Standard actions
    - Stop, Remove, IPL system(s)
  - Parallel Sysplex Configuration management
    - Couple data set (CDS), Coupling Facility (CF) management
  - User defined script (e.g. Planned Site Switch)
  - PPRC Configuration management

Planned and Unplanned exception conditions

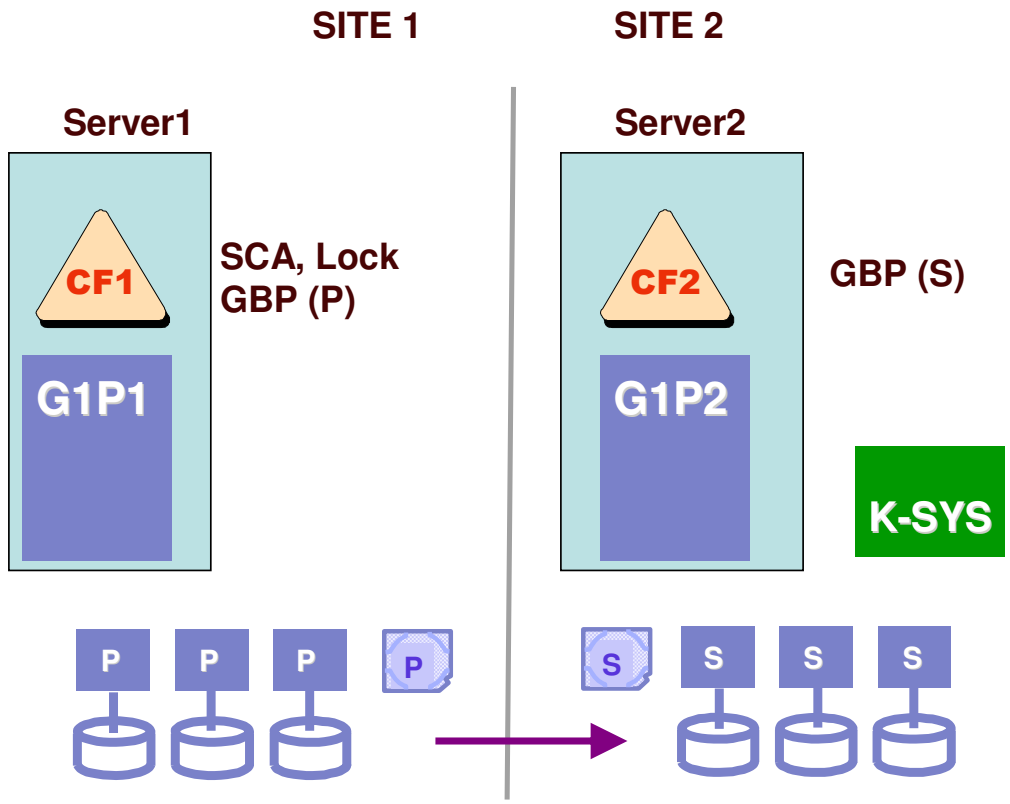
Environment 1 Single Site Environment



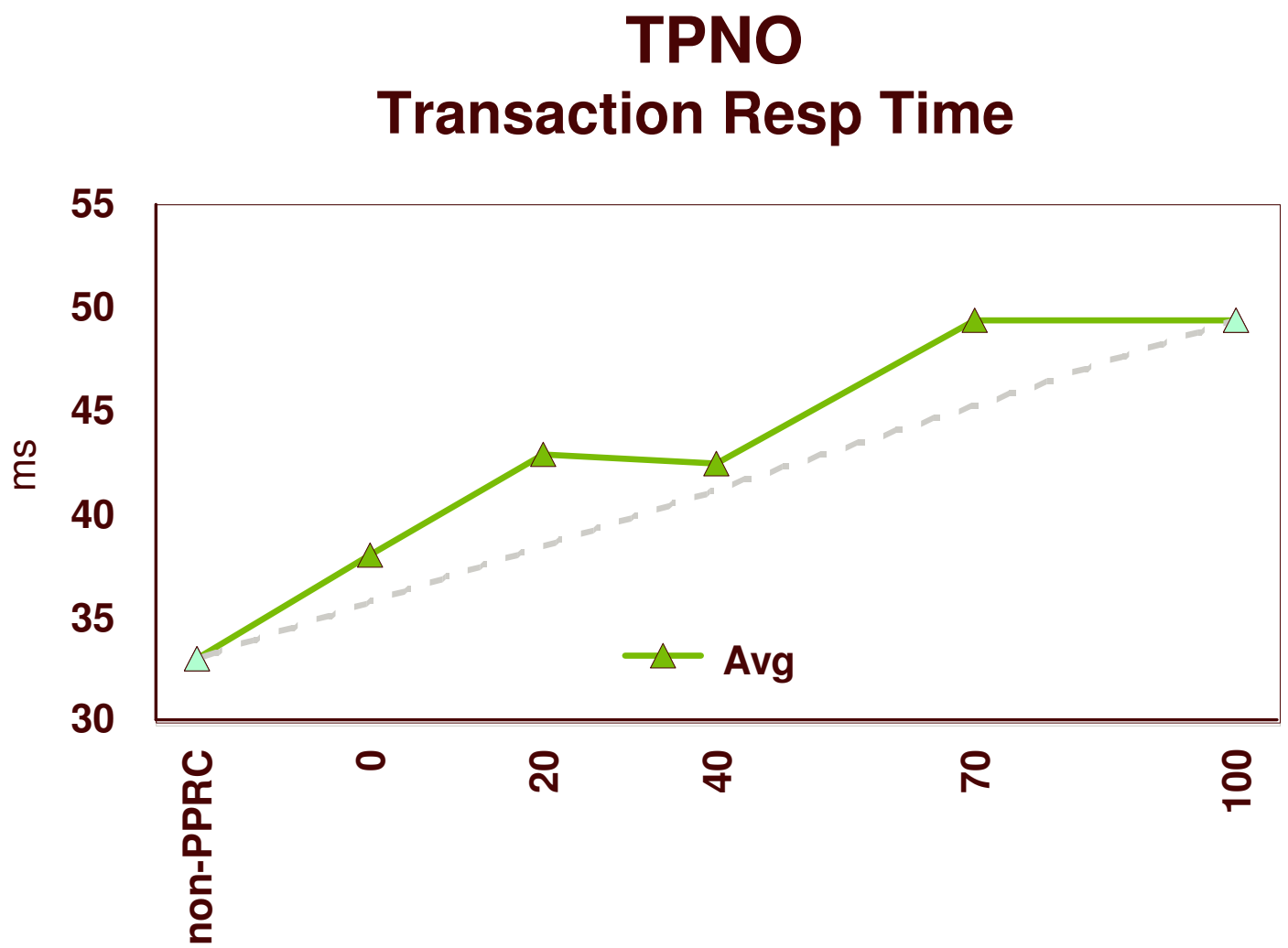
Environment 2: CF on Site 2



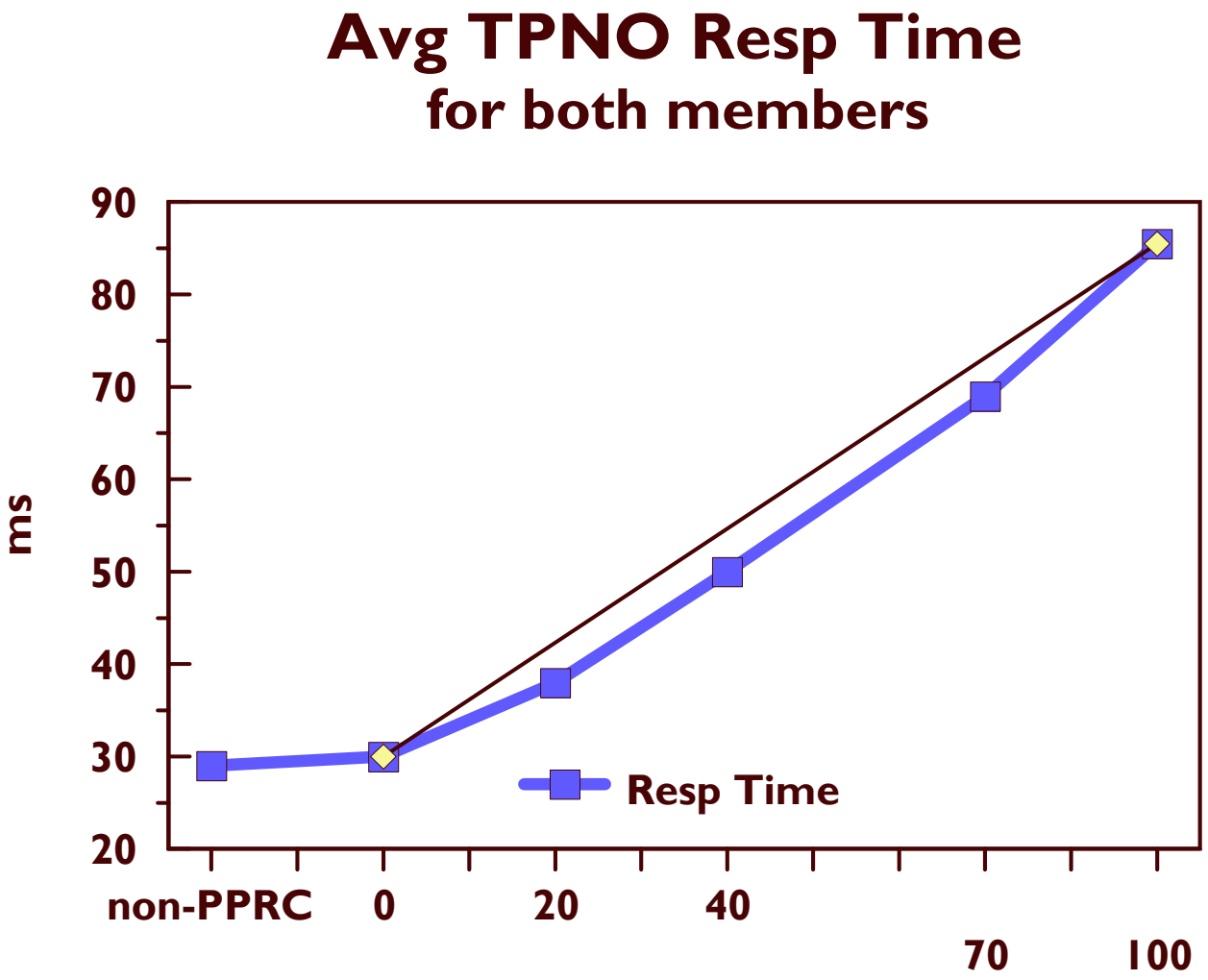
Environment 3: Multi-Site Workload



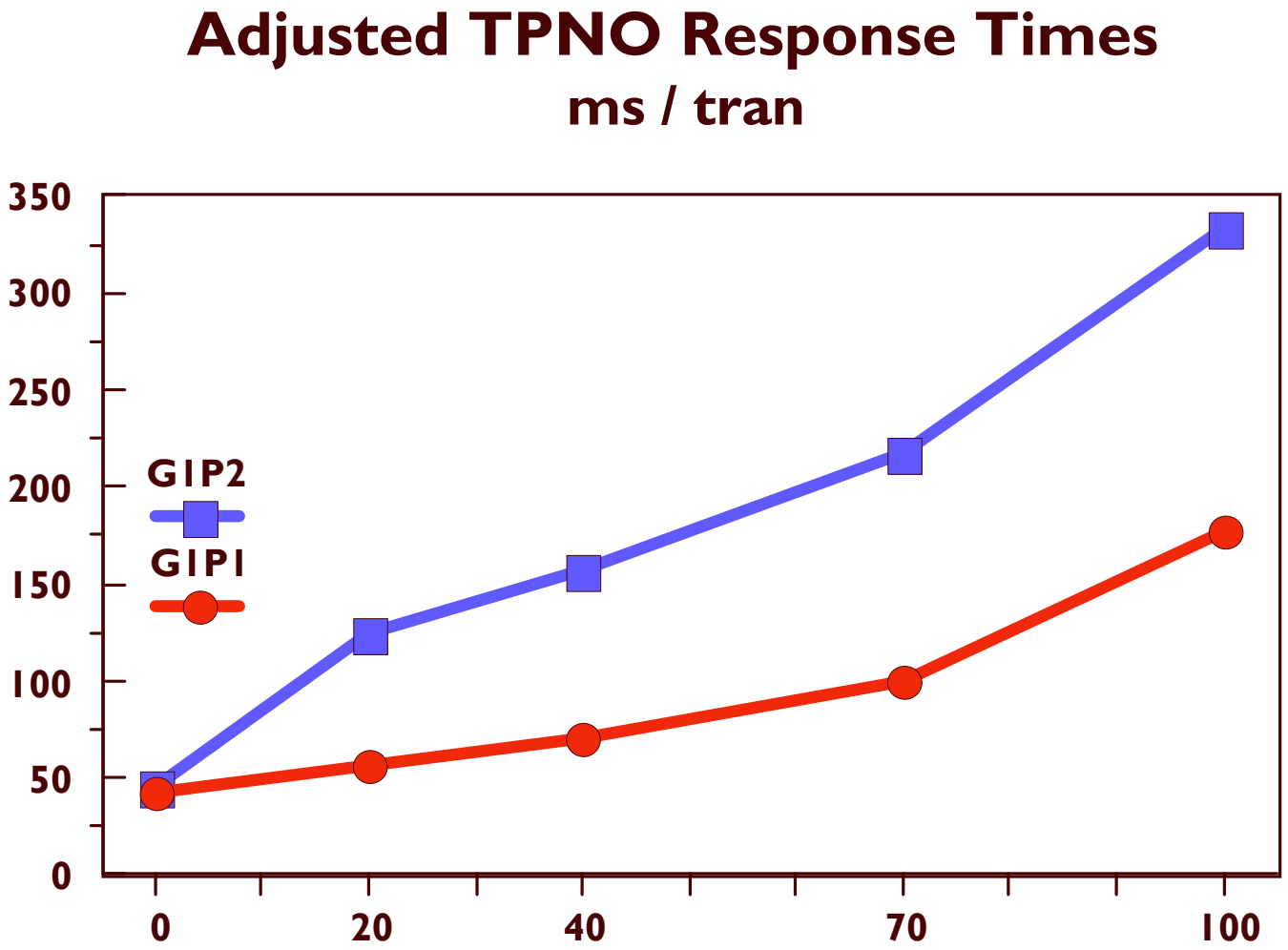
Environment 1: Single Site Workload
Just PPRC



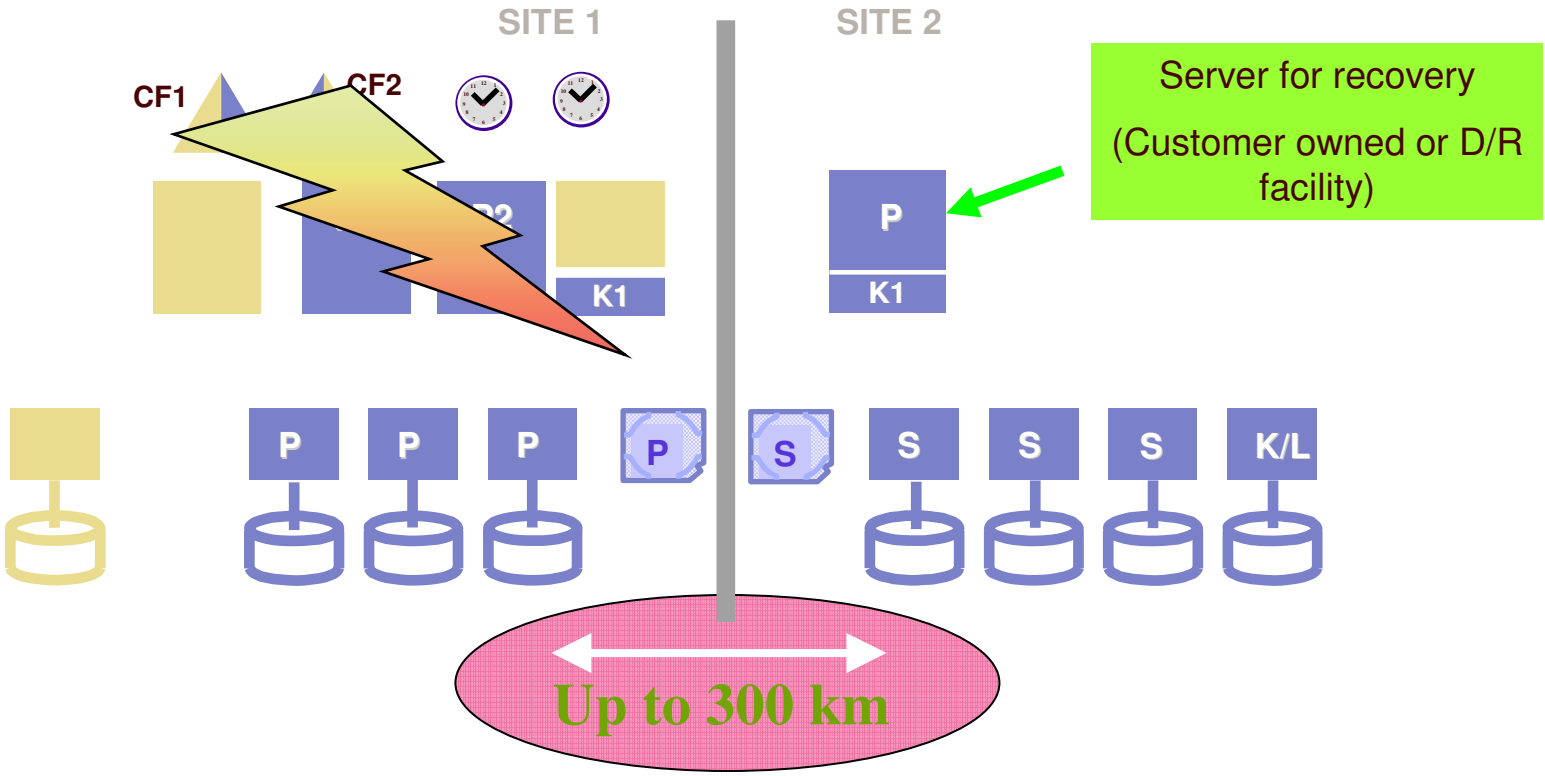
Environment 2:
+ DB2 GBP Duplexing



Environment 3:
+ Multi-site Parallel Sysplex

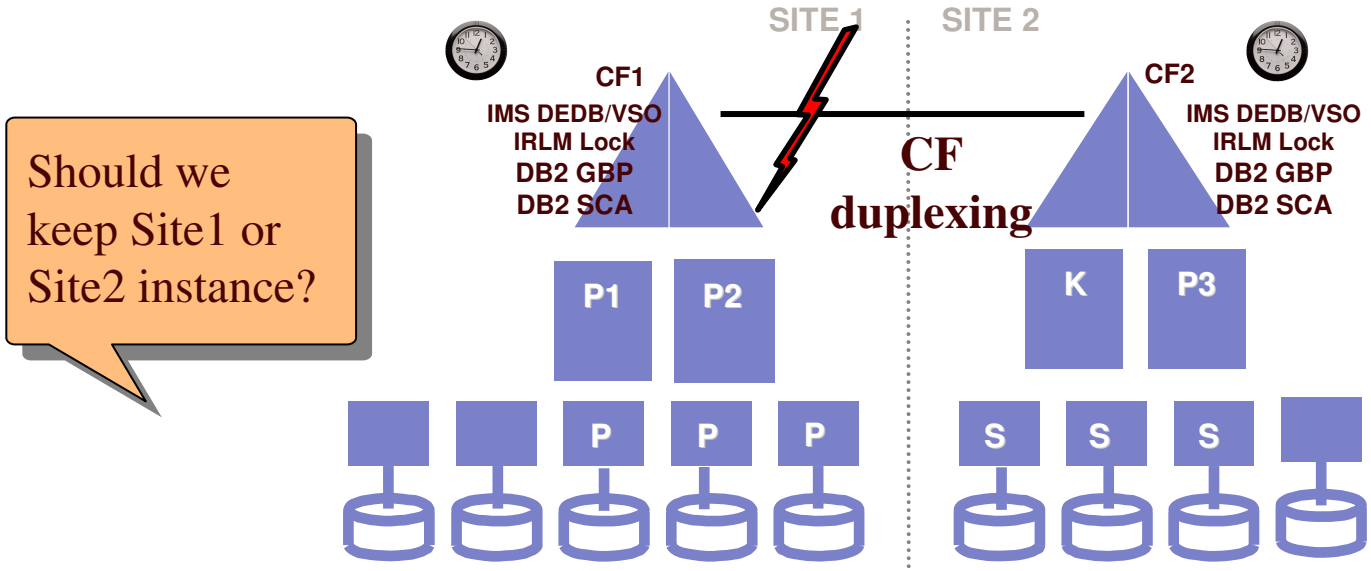


Sysplex in a single site
(aka BRS configuration) PPRC across sites



IPL K system in Site 2
GDPS automation restarts Production systems and applications
No Data Loss. Full data consistency

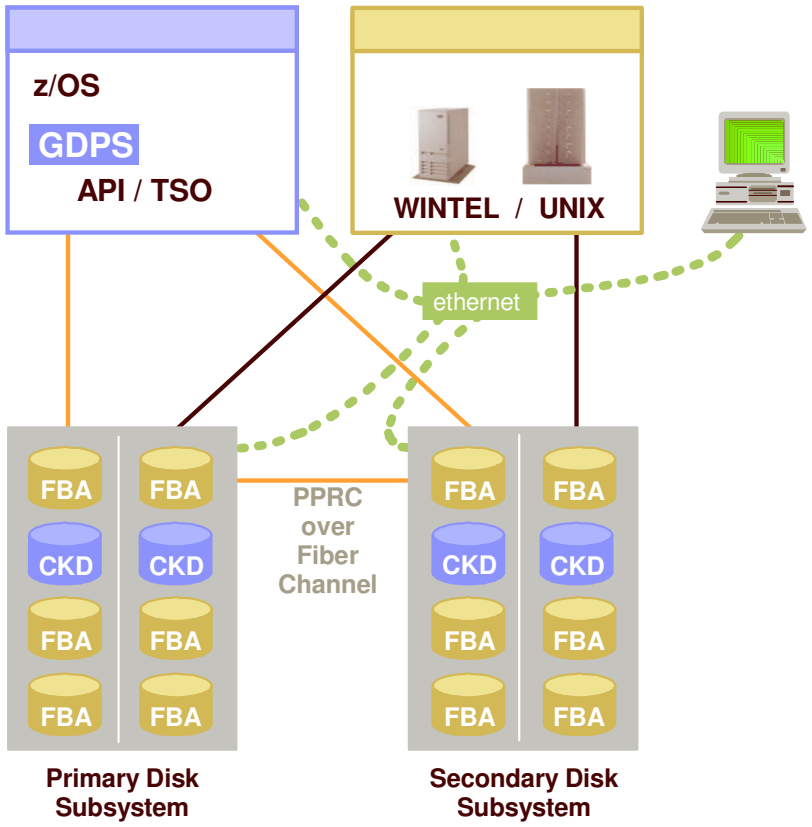
Enhanced Recovery Support for CF Duplexing GDPS V3.3



- Requires Freeze=STOP policy
- GDPS will recommend that structure instances in CF in same site as secondary disks be retained and used

No special recovery actions (e.g. GRECP) required
Facilitates faster application restart (improved RTO)
Provides consistent recovery time

GDPS/PPRC management of Open Systems LUNs "Single Site" or 2 sites



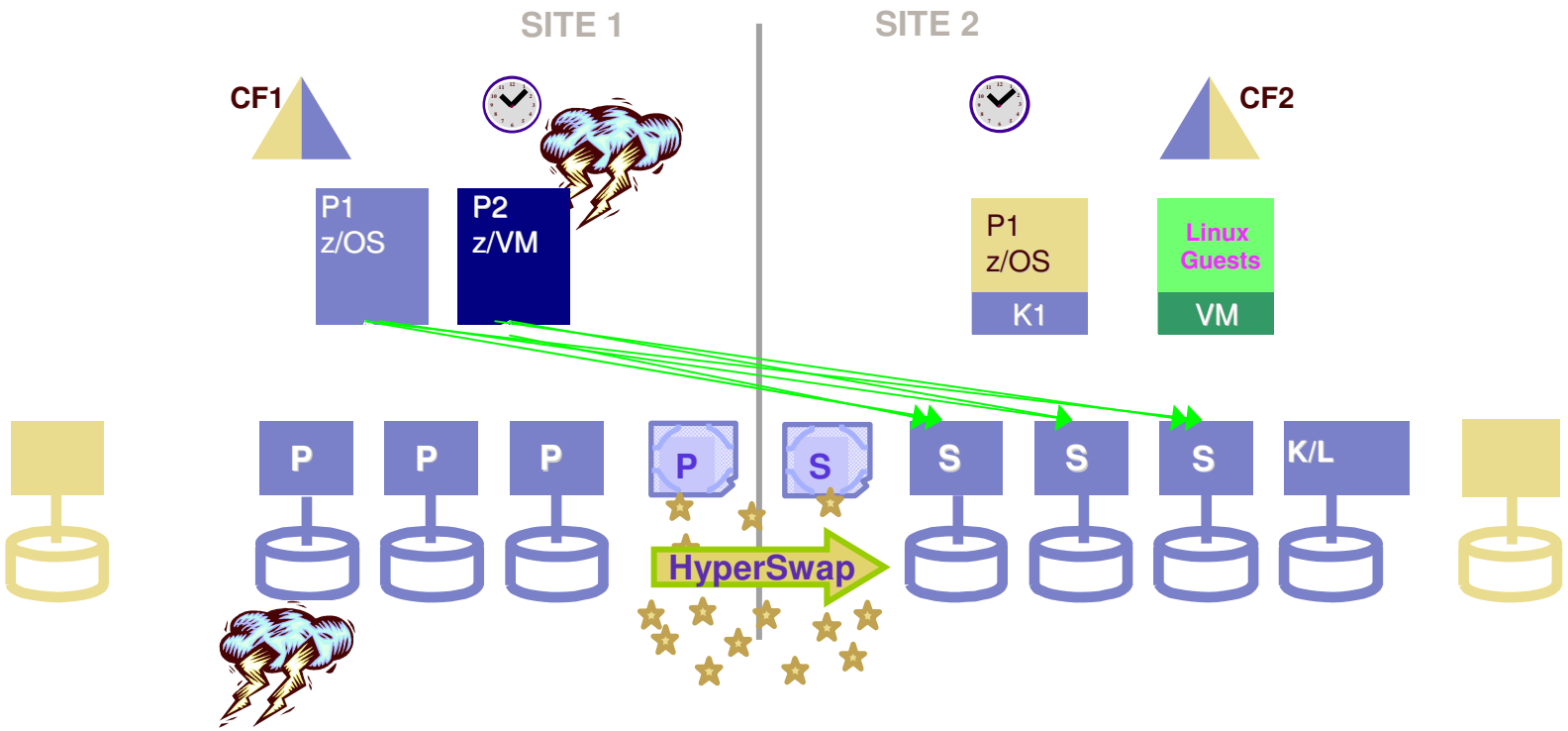
- Extends GDPS/PPRC technology to manage distributed applications across multiple platforms
  - z/OS and open systems data (Unix, NT, Linux)
- GDPS/PPRC running in a z/OS system manages the PPRC status of devices that belong to the other platforms
- Provides data consistency across both z/OS and/or open systems data when failures occur
- Support details
  - Supports x-platform or platform level Freeze
  - No GDPS Code running on open systems host – suspends reported through SNMP alert

Helps provide enterprise-wide Disaster Recovery with data consistency!

Coming Soon…

- GDPS interface to **any** Unix platforms
  - Work with other cluster manager products
  - Help manage any HW (and SW!) remote copy technology
  - Phased approach

GDPS/PPRC Multi Platform Resiliency for zSeries



✓**Coordinated near-continuous availability and DR solution for z/OS and Linux guests running under z/VM**

- ***Valuable for customers with distributed applications***
  - *SAP application server running on Linux for zSeries*
  - *SAP DB sever running on z/OS*

✓**Planned and Unplanned Reconfigurations**

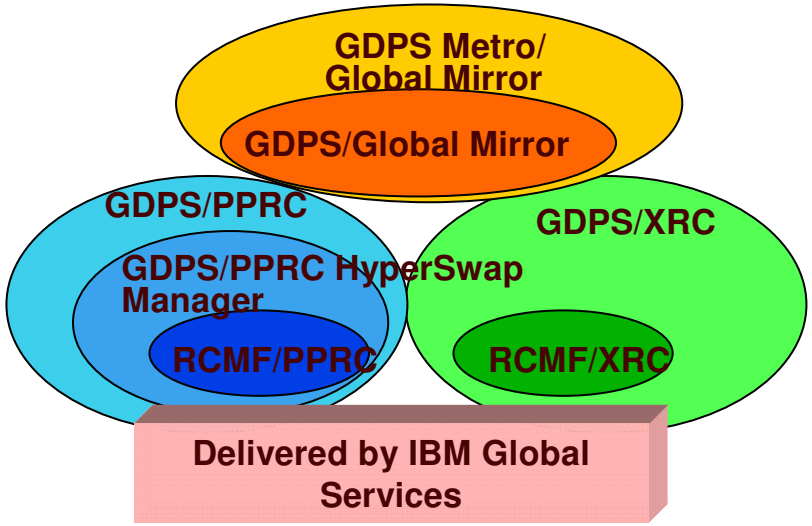
Multi-Platform Resiliency for ...

- If we can support Linux on zSeries…
  - Why not native Linux on zSeries?
  - Why not (native) Linux on other platforms?

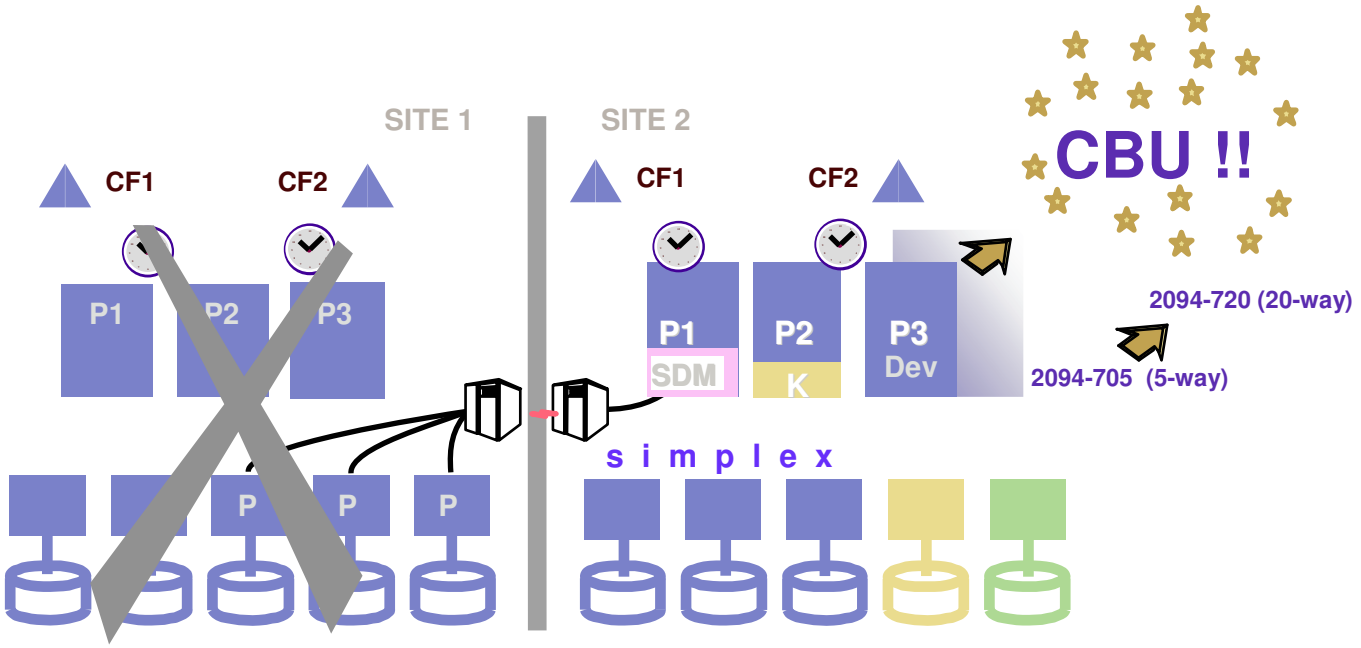
- Requires SCSI support

Unlimited Distance Disaster Recovery (2 sites)

- ✓GDPS/XRC
- ✓GDPS/Global Mirror



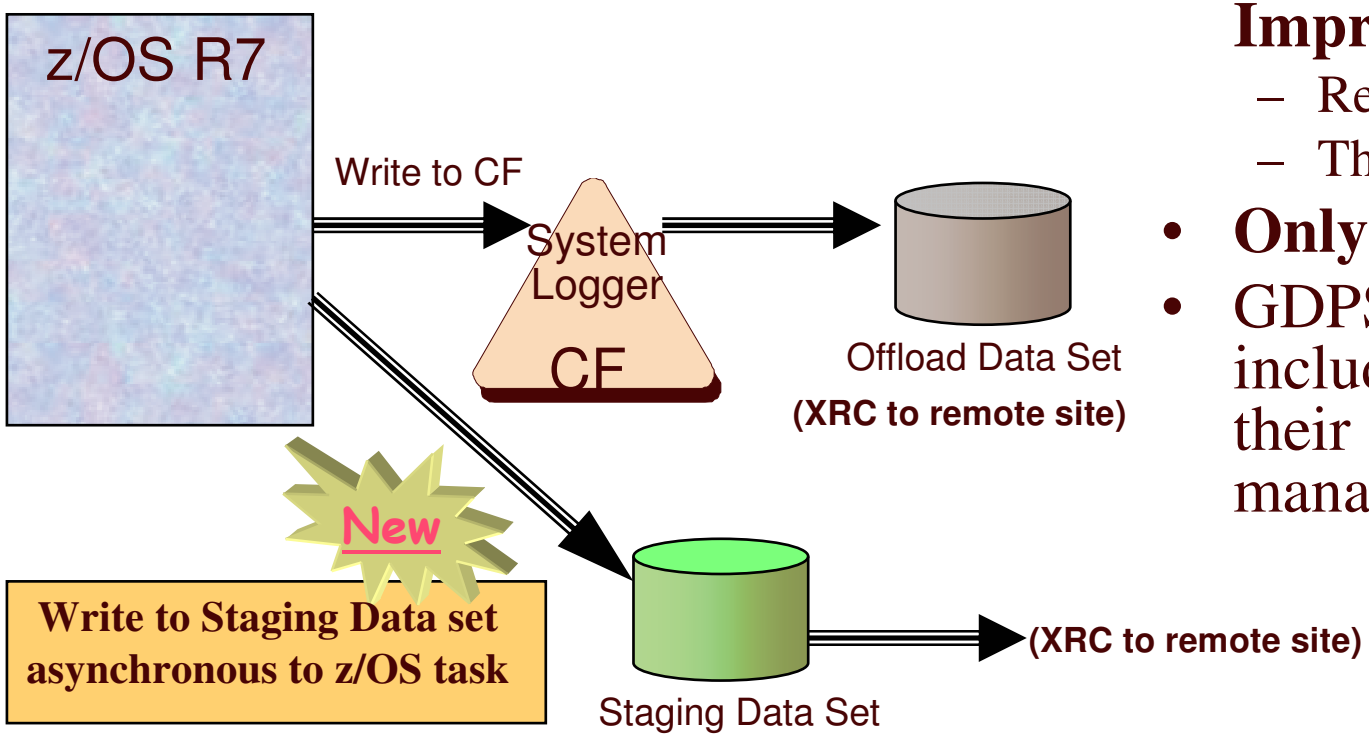
GDPS/XRC - Primary Site Failure



- Production system can be
  - No, Base, or Parallel Sysplex environment
  - SUSE Linux Enterprise Server (SLES) 8
- System Data Mover(s) must run in Base or Parallel Sysplex

Automates recovery of production environment
Automates invocation of CBU

GDPS Support for "XRC+"
GDPS V3.3 & z/OS R7



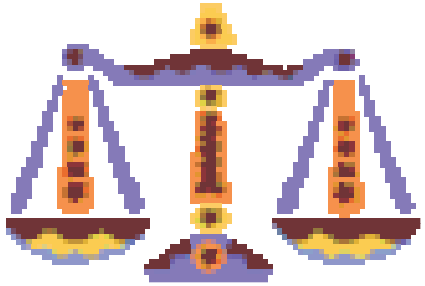
- **Performance Improvements**
  - Response Time
  - Throughput
- **Only with XRC**
- GDPS support will include the options in their setup for volume management.

Improved throughput for high volume logging applications

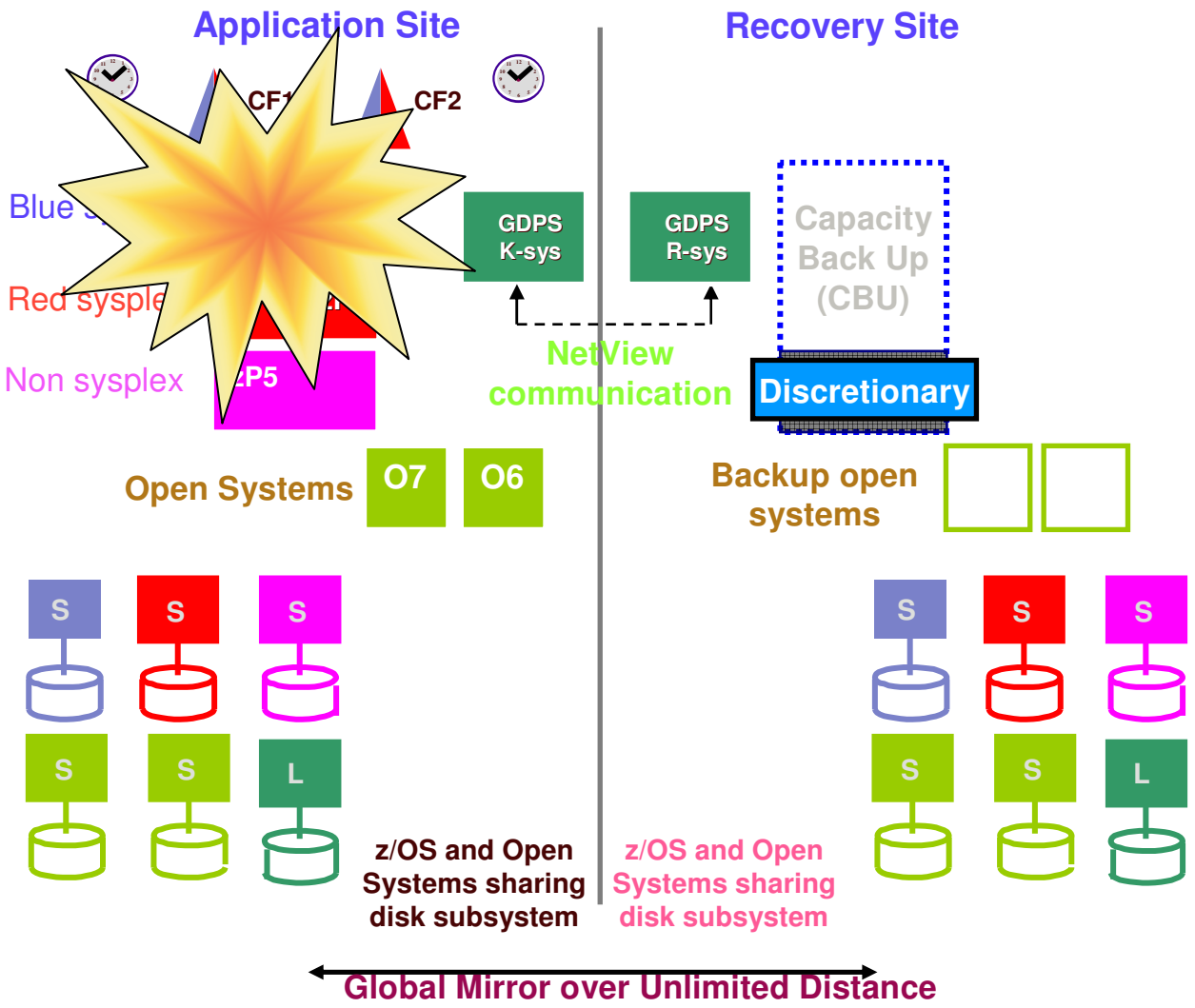
XRC Scalability support
GDPS V3.3+

- Increases the number of SDMs per LPAR from 5 to 20
- Adds a new concept called clustering for SDMs on the same LPAR
  - Up to 13 SDMs on the same LPAR can be clustered together
  - Up to 14 clusters can then be coupled together using the coupling mechanism
  - Increases architecture limit from 14 to 182 SDMs
- GDPS also performs SDM related actions in parallel within an SDM LPAR
  - For example XSTART and XRECOVER processing

XRC Scales

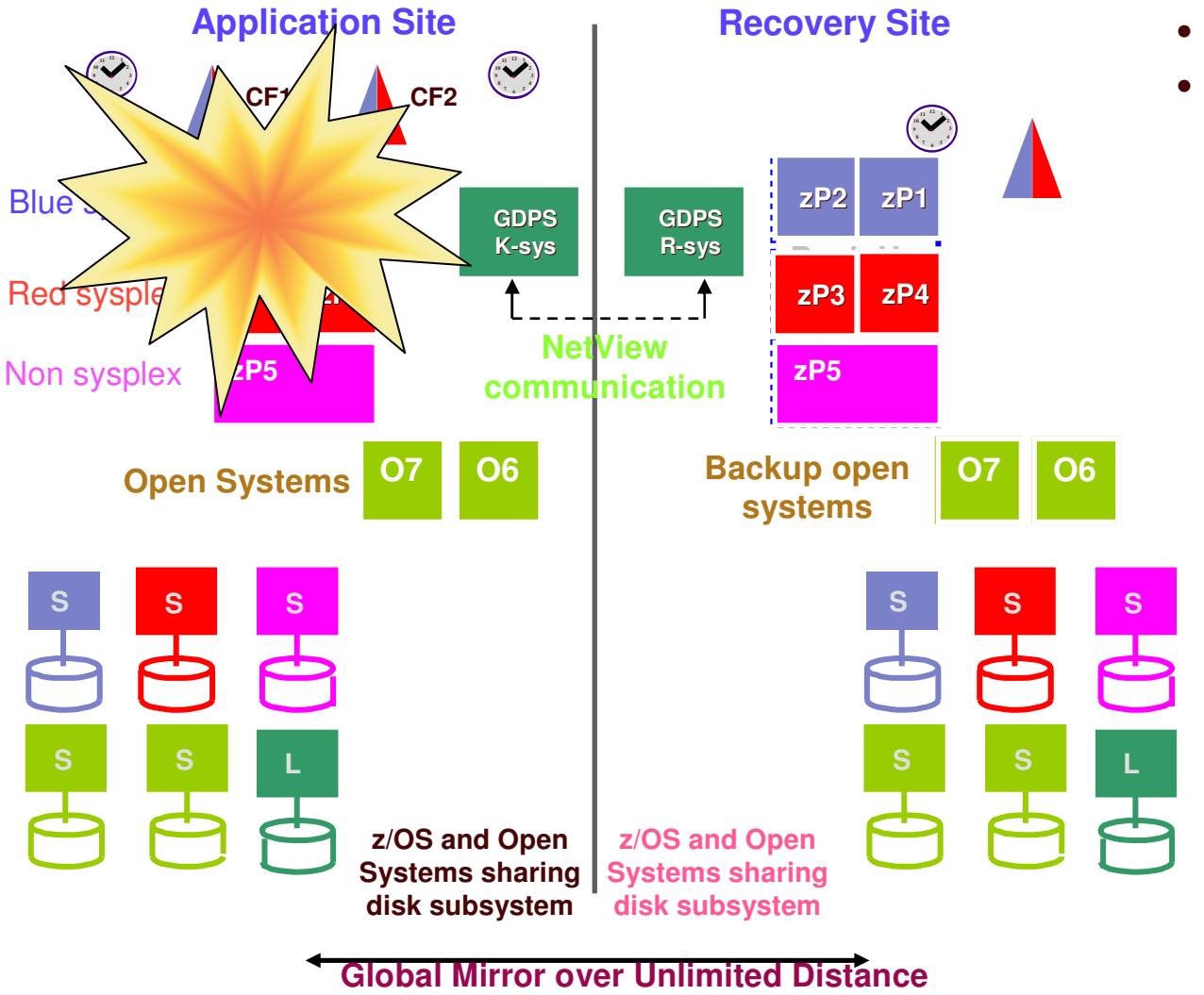


GDPS/Global Mirror – Site 1 Failure



- **Application site can have single z/OS Systems, Open Systems, Systems in a Sysplex**
- **All data (z/OS and Open Systems) can be mirrored using Global Mirror**
- **K-sys activities**
  - Manages multiple Global Mirror sessions
  - Sends device info, scripts, alterts to R-sys
- **R-sys activities:**
  - Secondary disk recovery, CBU activation, activate backup LPARs, IPLs systems.

GDPS/Global Mirror – Site 1 Failure

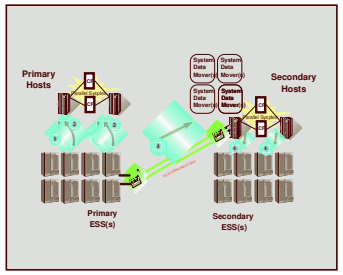


- **RTO < 1 hour**
- **RPO < 1 minute**
  - (depends on bandwidth)

XRC & Global Mirror: Which One?

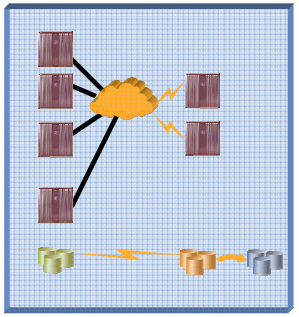
XRC	Global Mirror
Asynchronous. No app. impact	Asynchronous. No app. impact
Virtually unlimited distance	Virtually unlimited distance
zSeries Data •z/OS •Linux on zSeries LPAR or Guest •VM, VSE (consistent data if 1 CU)	zSeries & Open Data
Requires additional MIPS on secondary site to support SDMs	Requires additional disk for additional FlashCopy version
Highly Scalable. Up to 285 coupled SDMs	Max 8 subsystems (w/o RPQ) 17 subsystems (with RPQ)
Supported by multiple vendors	Currently supported on IBM disk
Many customers and references. Many tools	Newer technology

GDPS/XRC & GDPS/Global Mirror: SOD

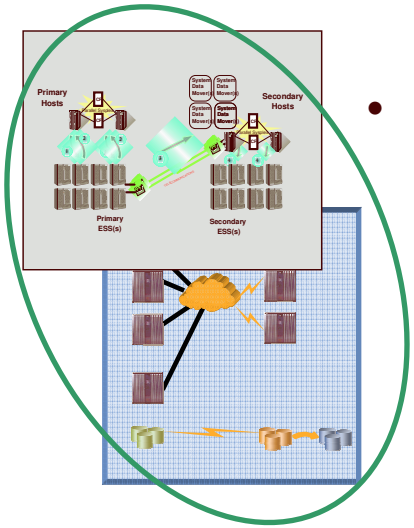


XRC

Why choose? Do both!

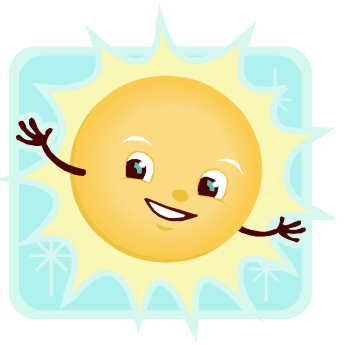


Global Mirror



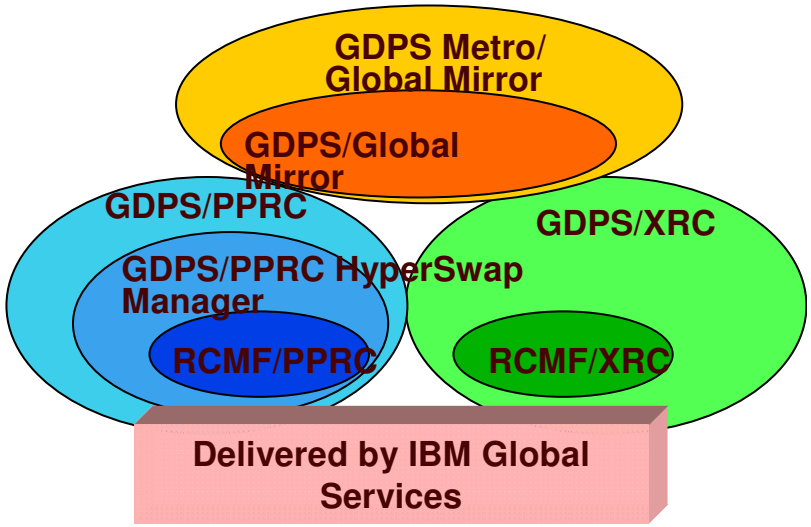
Common Restart Point

- **Statement of Direction: Ability to form consistency groups from Global Mirror together with z/OS Global Mirror**
- **Combine strengths of both:**
  - **z/OS Global Mirror:**
    - **z/OS and Linux on zSeries**
  - **Global Mirror for other open data**



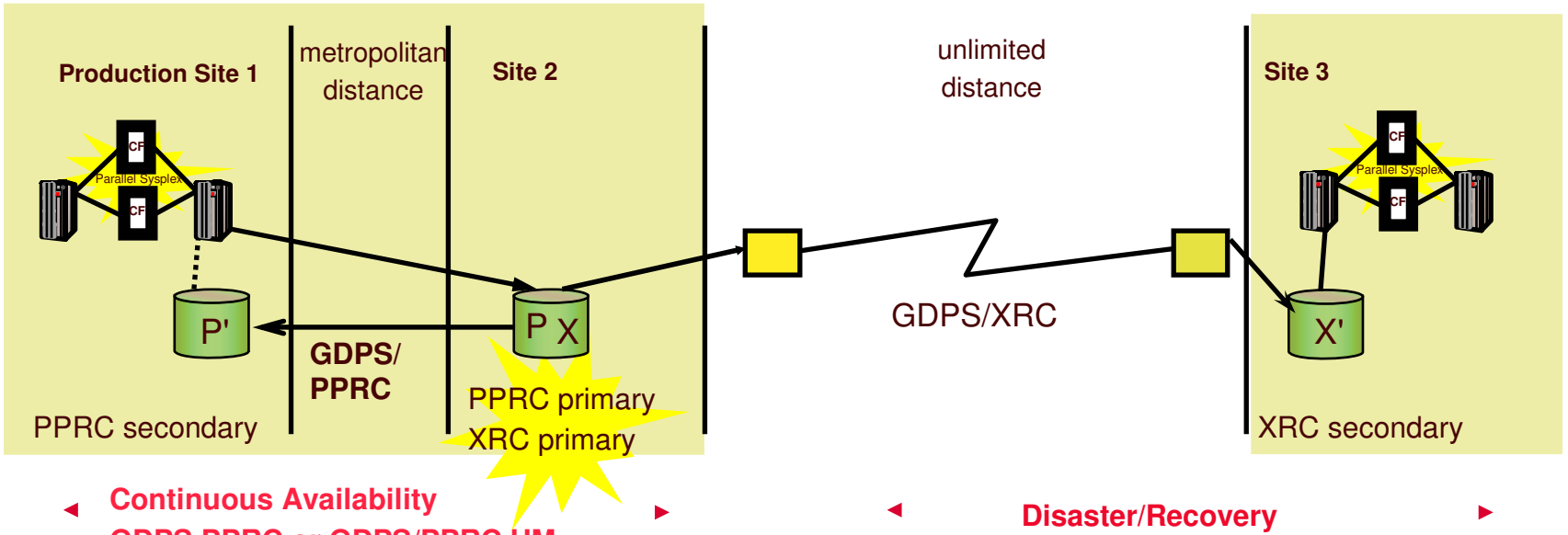
Continuous Availability and Disaster Recovery Solutions (3 site)

- ✓Continuous Availability – Metro distance
- ✓Disaster Recovery at unlimited distances



Continuous Availability and Disaster Recovery at unlimited distance (GDPS/PPRC & GDPS/XRC)

zSeries Solution



Continuous Availability
GDPS PPRC or GDPS/PPRC HM

- Designed to provide continuous availability and no data loss between sites 1 and 2
- Sites 1 and 2 can be same building or campus distance to minimize performance impact
  - Site 2 servers optional

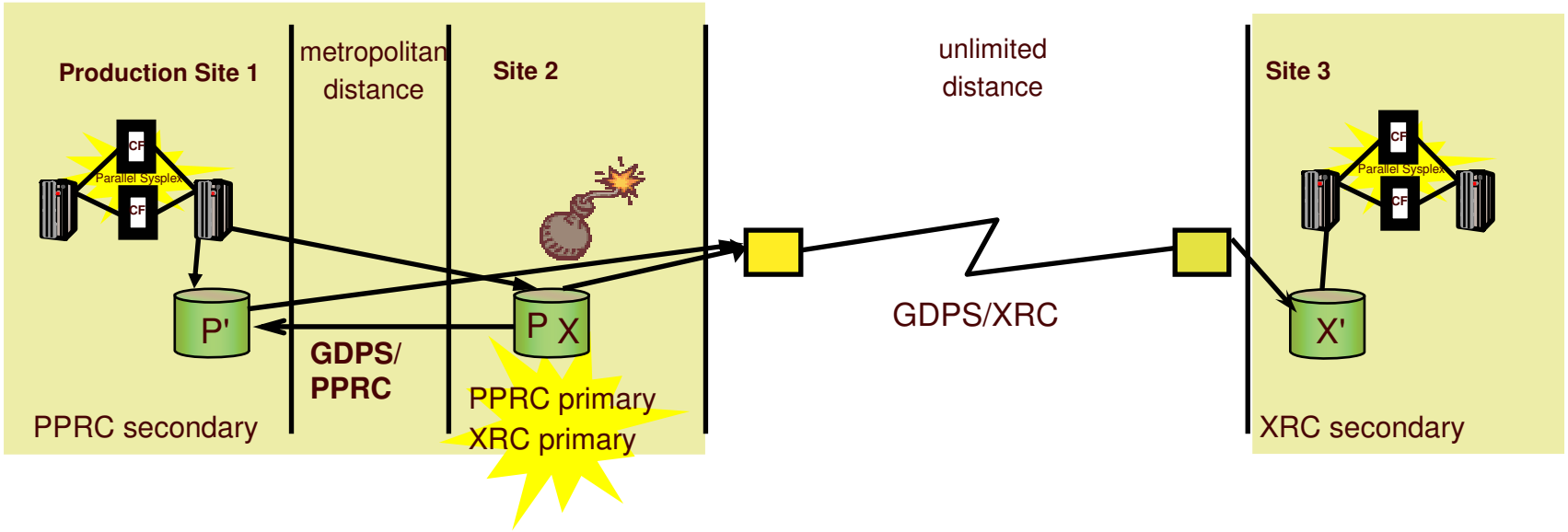
Disaster/Recovery

- Site 1 failure
  - Switch to Site 2 disk (if server exists on Site 2)
  - Site 3 can recover with no data loss in most instances
- Site 2 failure
  - Production continues in Site 1
- Site 1 and 2 failure
  - Failover to Site 3 with minimal data loss

Continuous Availability, No data loss, Unlimited Distance

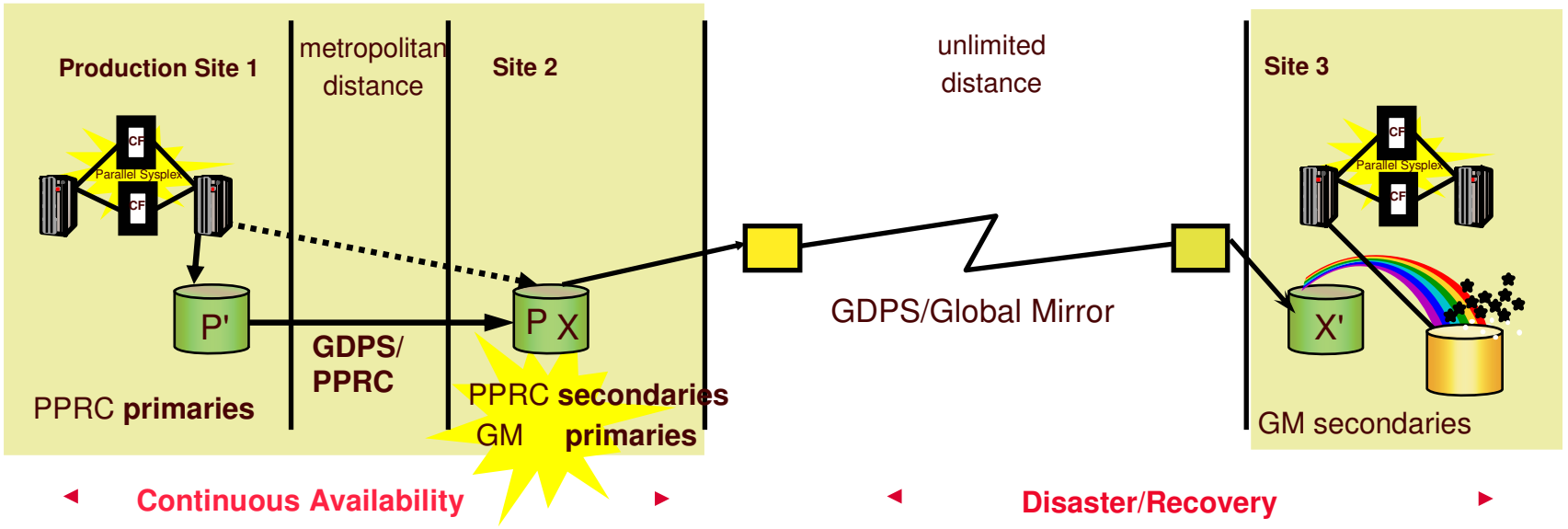
GDPS PPRC / XRC (Future)

- If “Site 2” copy lost or Hyperswap, z/OS Global Mirror (XRC) is established with “Site 1” copy
  - D/R capability is maintained
- When “Site 2” disk available, resynchronize just updates
  - No need for full volume copy
  - Similar to PPRC Failover / Failback support



Continuous Availability and Disaster Recovery at unlimited distance (GDPS/Metro & Global Mirror)

zSeries and Open Solution



◄ Continuous Availability GDPS/PPRC ►

- Designed to provide continuous availability and no data loss between sites 1 and 2
- Sites 1 and 2 can be same building or campus distance to minimize performance impact
  - Site 2 servers optional

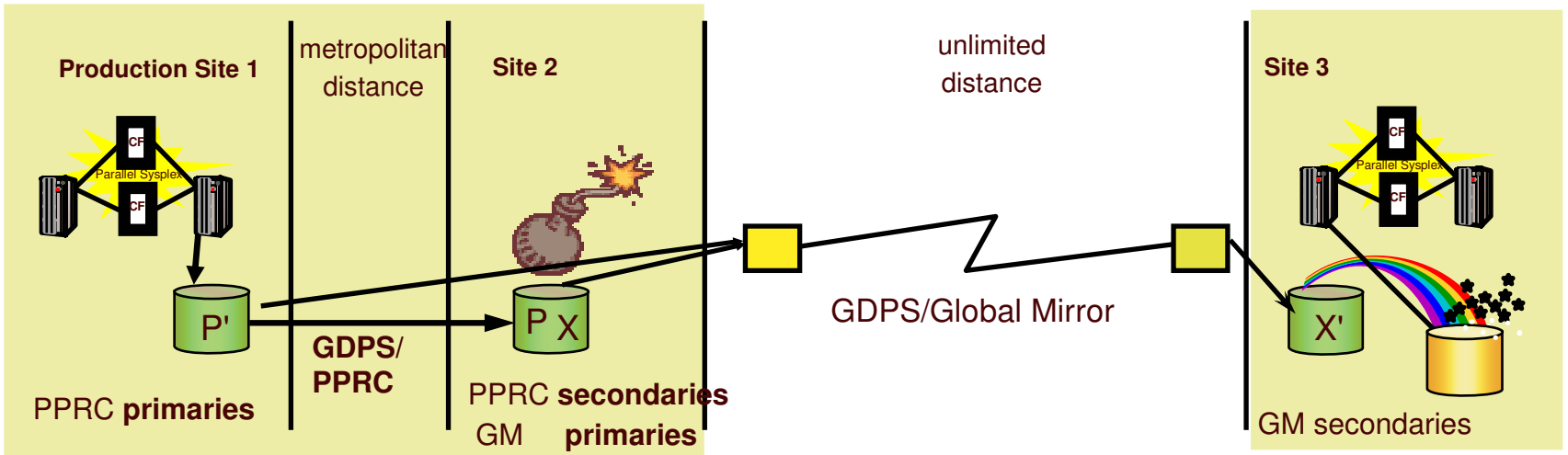
◄ Disaster/Recovery ►

- Site 1 failure
  - Switch to Site 2 disk (if server exists on Site 2)
  - Site 3 can recover with no data loss in most instances
- Site 2 failure
  - Production continues in Site 1
- Site 1 and 2 failure
  - Failover to Site 3 with minimal data loss

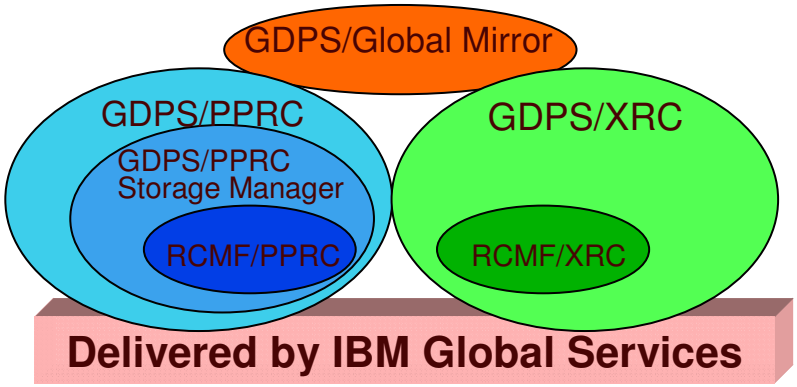
GDPS Managed coordinated solution for zSeries and open systems

Metro / Global Mirror (Future)

- If “Site 2” copy lost, Global Mirror established with “Site 1” copy
  - D/R capability maintained
- When “Site 2” disk available, resynchronize with just updates made
  - No need for full volume copy
  - Similar to PPRC Failover / Failback support



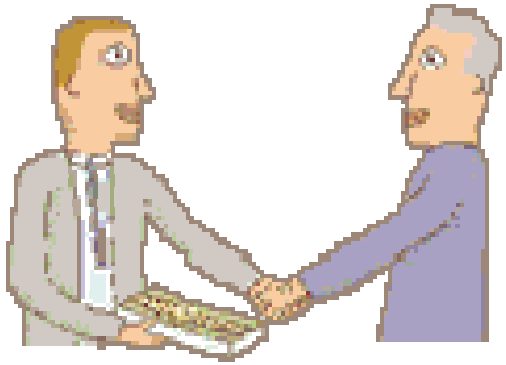
Future



- ✓GDPS/PPRC
- ✓GDPS/XRC
- ✓GDPS/Global Mirror
- ✓3-Site Solutions

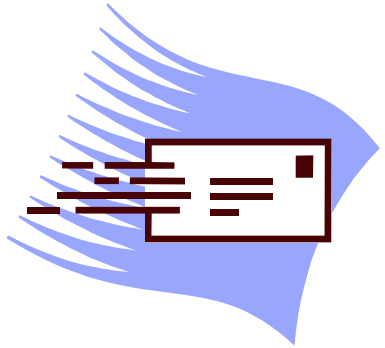
IMS XRF Coexistence (GDPS V3.3 SPE)

- GDPS HyperSwap Support
  - GDPS disables HyperSwap before IMS/XRF performs **HW reserve**
  - When IMS releases Reserves, it tells GDPS to re-enable HyperSwap again
- IMS code supporting functionality: APAR PK22473.
  - IMS uses the z/OS RESERVE service.
  - Coordinates products sensitive to hardware reserves



Zero Suspend FlashCopy…

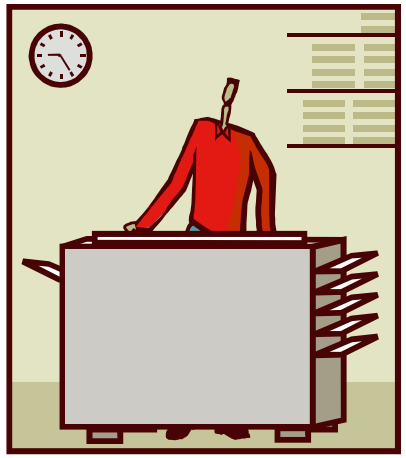
- Before
  - Suspend XRC all volumes
  - FlashCopy secondary volumes (COPY/NOCOPY)
  - Resync XRC sessions (after 10's of minutes or longer)
    - Resync w/ FC active slows both FC and XRC. Under some conditions, can cause SDM delay and device blocking
- After
  - No XRC suspend, rather FREEZE on XRC control data set (20-30 seconds)
  - Logically establish FC
  - Remove constraint on CDS and allow XRC to continue
- Benefit
  - 10x, 20x or more faster
  - XRC is not suspended, no Resync needed
  - XRC continues as if nothing had happened



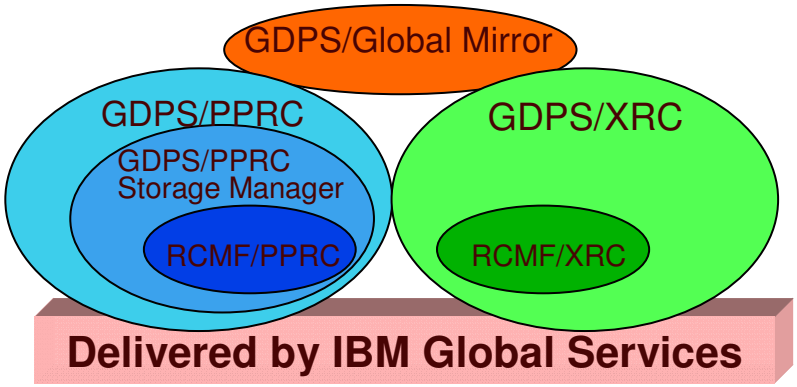
GDPS Global Mirror (Future)

- GDPS managed FlashCopy devices for testing purposes

- Remove the requirement to keep the R-Sys running continually in the remote location
  - Still required for recovery purposes and must be restarted to recover the environment



To Summarize



- ✓GDPS V3.3
- ✓Future planned items
- ✓ Future direction
- ✓For More Information…

GDPS Enhancements (GDPS v3.3)

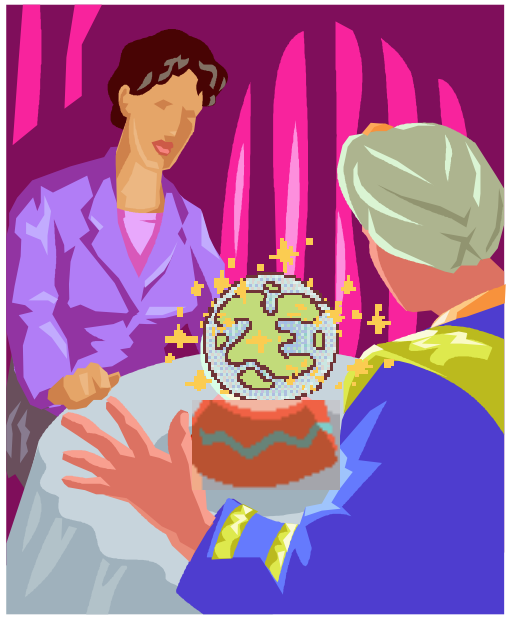
- **GDPS/PPRC HyperSwap Manager**
  - IOS Timing Trigger
- **GDPS/PPRC**
  - Enhanced Recovery Support (CF Duplexing)
  - Multi-Platform Resiliency for zSeries enhancements
- **GDPS/XRC**
  - XRC+ Support
  - Greater SDM Parallelism
  - Support for >14 SDMs
- **GDPS/Global Mirror**
  - Global Mirror Support
  - Metro/Global Mirror RPQ

GDPS Enhancements (post V3.3)

- **GDPS/PPRC HyperSwap Manager**
  - IMS/XRF Support (Coordinate Reserve / Release processing)
  - Subsystem granularity
- **GDPS/PPRC**
  - GDPS/PPRC Multi Platform Resiliency for zSeries
    - Phase 2: Stand-alone Linux on zSeries
- **GDPS/XRC**
  - Zero Suspend FlashCopy for GDPS/XRC
  - Multi-Reader (scalability)
- **GDPS/Global Mirror**
  - Incremental Resynchronization
  - “D” disk management
  - Optional “R-sys”
- **z/OS Metro / Global Mirror**
  - Incremental resynchronisation
- **STP (Sysplex Time Protocol)**

GDPS Directions

- **Common functions**
  - GUI Interface
- **CA / DR Extensions**
  - 3-site extensions
  - Expanding scalability
  - z/OS Healthchecker
- **Enterprise Data, Server, Workload Manager**
  - Active / Active
  - Coordinate with D/R tools for non-z platforms
    - AIX, HP-UX, MS, etc.
- **eBOD**
  - Policy driven configuration



Additional Information

- **Detailed GDPS Presentation and Information e-mail:**
  - gdps@us.ibm.com
- **White Papers:**
  - *Business Continuity Considerations and the IBM eServer zSeries*
  - *GDPS - The Ultimate e-business Availability Solution* – GF22-5114
- **Publications:**
  - **(new)** GDPS Family of Offerings Introduction to Concepts and Capabilities - SG24-6374
  - *TotalStorage Disaster Recovery Solutions Redbook* – SG24-6547
  - *z/OS Advanced Copy Services* – SC35-0428
  - ESS Copy Services on zSeries Redpiece - SG24-5680
  - ESS Copy Services on Open Redpiece – SG24-5757
- **GDPS Services Offerings**
  - GDPS Announcement
  - GDPS/XRC Announcement

- **www.ibm.com/systems/z/gdps**

Additional Information …

- **Attack of the clones: GDPS solutions for your heterogeneous environment**
  - **NOSHIR DHONDY, DAVID PETERSEN, AND DAVID RAFTEN**
- www.ibm.com/servers/eserver/zseries/zos/bkserv/hot_topics.html
- **GDPS Family - An Introduction to Concepts and Capabilities (SG24-6374)**
  - www.redbooks.ibm.com/redbooks/pdfs/sg246374.pdf

Business Continuity Services Offerings

- GDPS Technical Consulting Workshop (TCW)
  - **Designed to ensure the GDPS Availability & Recovery solution will meet the Client's business requirements as they relate to continuous availability and recovery. The workshop will look at the site-to-site connectivity necessary to implement GDPS and identify the high level tasks that will be needed to implement.**
- Business Continuity Solution Workshop
  - **This program is designed to introduce the elements of IBM's products and services that form a Business Continuity Solution. Your time will be divided between interactive presentations tailored to your specific requirements and "hands on labs" that allow you to actually experience the capabilities of each element. Over the course of three days at our Washington System Center you will explore topics such as: Disk and Tape Copy Services, Network Options, Server Considerations, System Performance Planning, and Implementation Services.**
- BCRS Business Continuity Health Check
  - **The Health Check is an independent review that creates an action plan addressing continuity issues such as existing capabilities, costs, future technology, and resource requirements.**
- I/O Bandwidth Analysis
  - **IBM will use trace data collected from the customer environment to determine the requirements to configure and implement Remote Copy. IBM will create a written report of the I/O Sizing and Bandwidth Analysis of your existing environment. The report will include an analysis of your full mainframe DASD environment, as well as an analysis of a subset of that environment representing the minimum DASD required to support Remote Copy.**

Additional Information

- **Questions?**