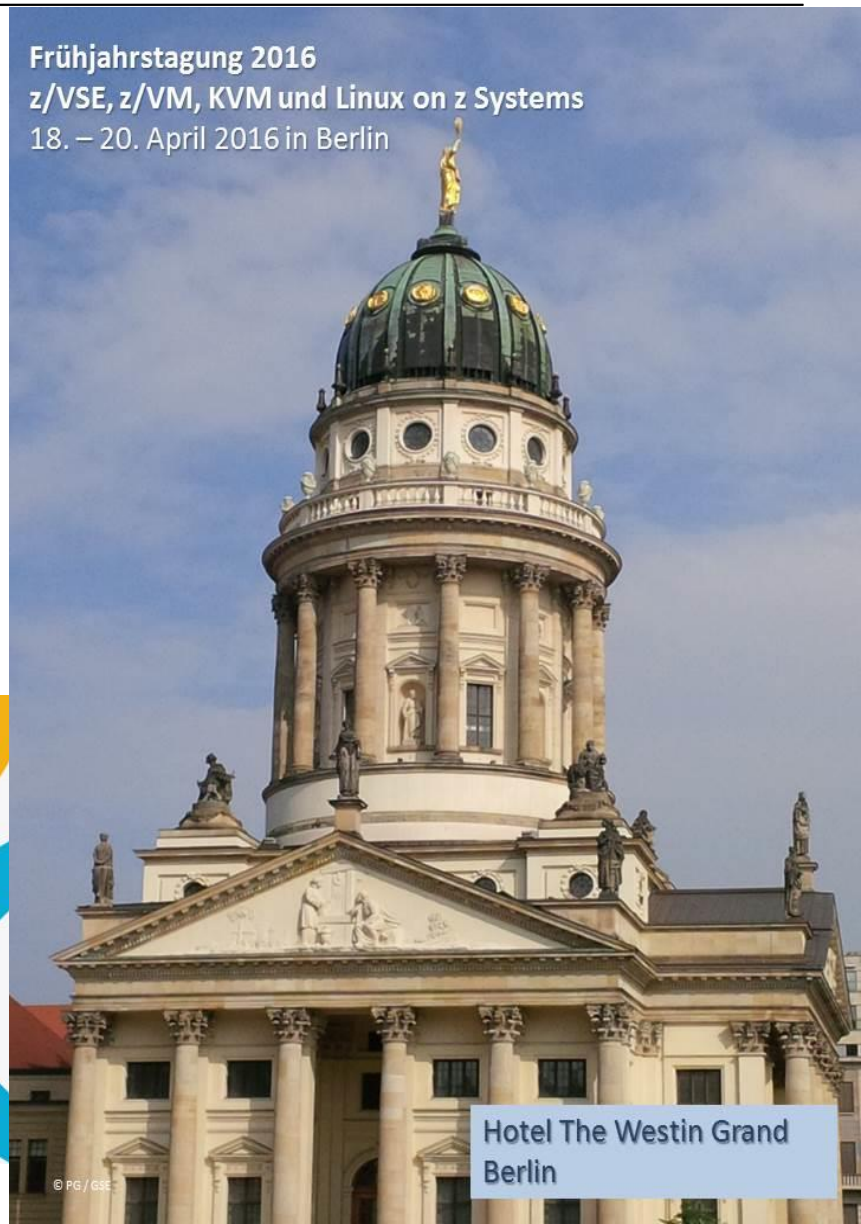
Elisabeth Puritscher – Elisabeth.puritscher@de.ibm.com
Dr. Manfred Gnirss – gnirss@de.ibm.com
IBM Client Center, Böblingen

GDPS Virtual Appliance

Überblick und Demo



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Agenda

- Background and Architecture
  - Appliance overview and architecture
  - xDR layout and architecture
  - Restrictions
- Initial Appliance Installation/Customization
  - Engagement desgin
  - Customer preparation
  - Initial Installation and Customization
- Operation
  - User interfaces
  - Support model
  - Service model
- Planning Considerations for Managed z/VM Systems
  - Where should xDR be running?
  - Disk/LSS sharing
  - Networking/OSA configuration for proxy guests
  - Dedicated dump volumes

Danksagung

Unser herzlichster Dank gehört

Oliver Andersen
Brian J Cooper
Anthony Morales
David Petersen
und
Joachim Weber

für all die Beiträge, Material und Diskussionen im Vorfeld zu dieser Veranstaltung.

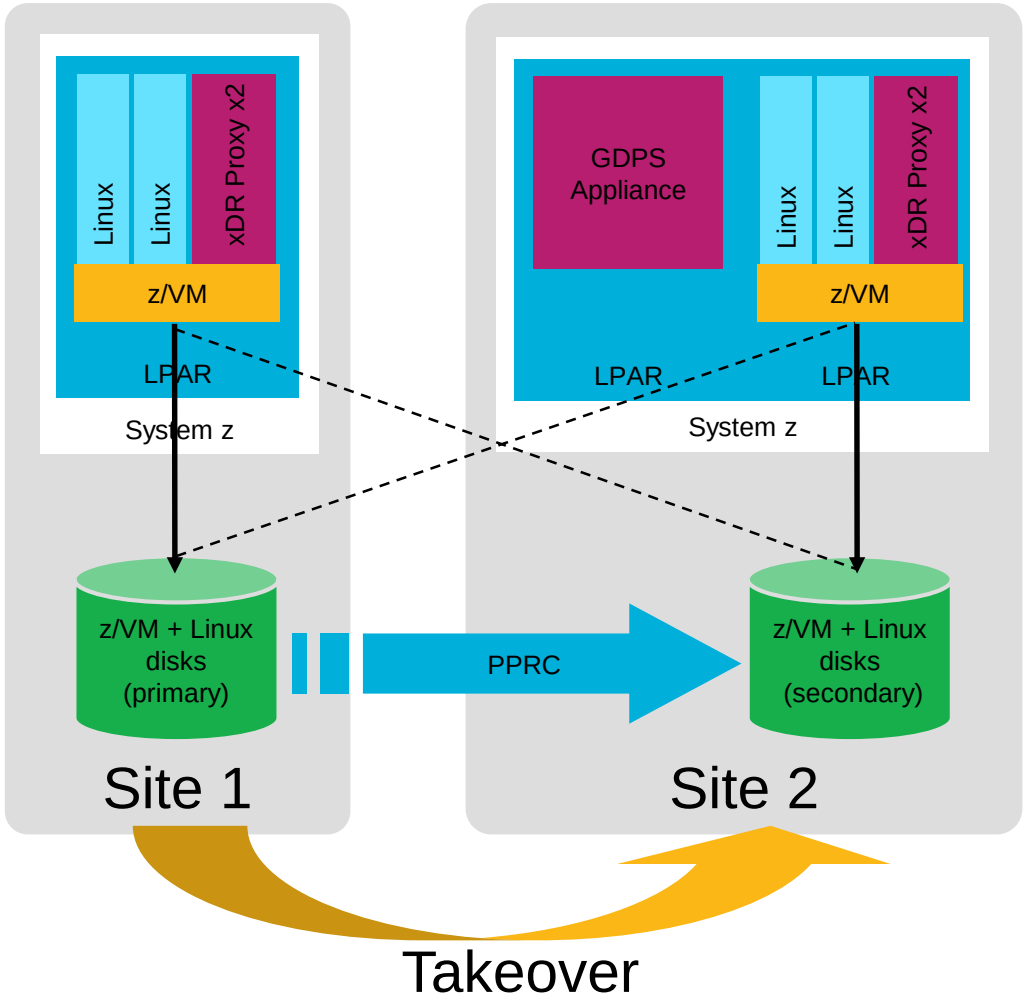
Background and Architecture

GDPS Virtual Appliance

GDPS Virtual Appliance extends GDPS capabilities into z/VM and Linux on System z® environments that do not have z/OS®.

GDPS Virtual Appliance features:

- Single point of control and automation reduces the need for highly specialized skills to handle recovery and planned site switches
- Manages remote copy environment and keeps data available and consistent for operating systems and applications.
- HyperSwap® function protects against failures to disk subsystems.
- Monitoring and automation to ensure reliable and rapid recovery via automated processes
- Virtual Appliance requires:
  - General purpose engine
  - z/VM® and Linux on System z
  - ECKD Disk



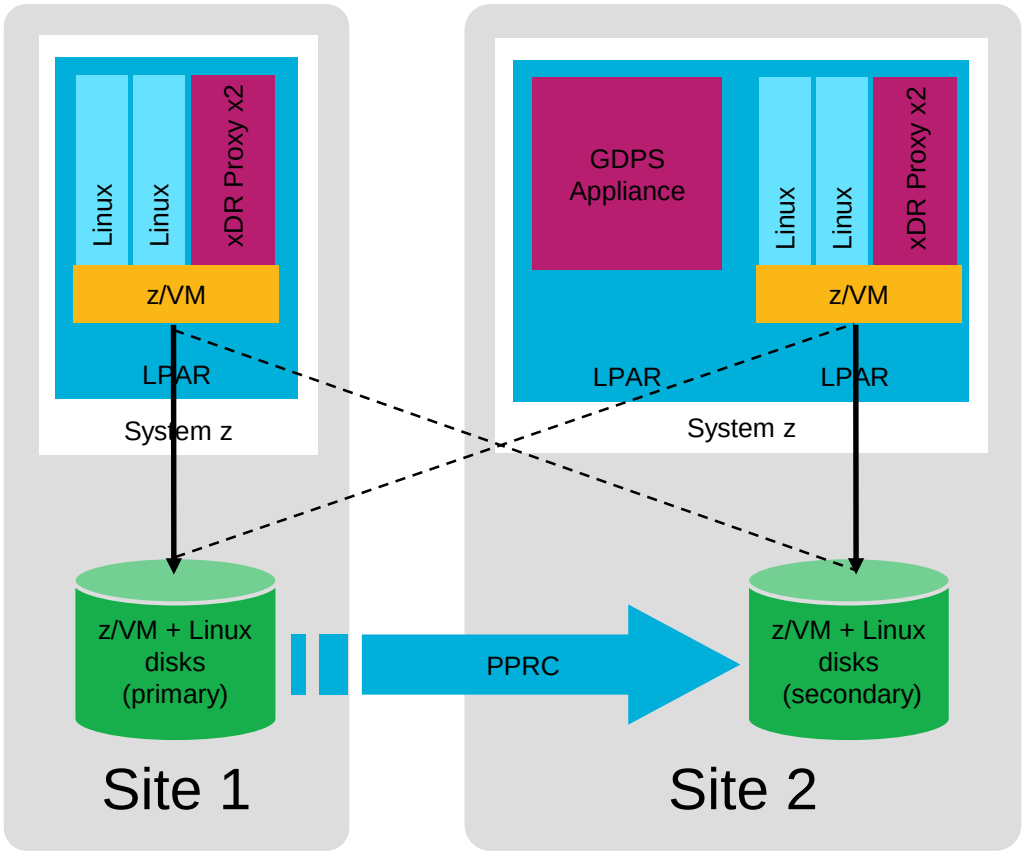
GDPS Virtual Appliance LPAR

- Runs the GDPS control code to manage the environment and coordinate HyperSwap
- Requires:
  - 1 dedicated GP Processor
  - 2 GB Central Storage
- 4 3390 mod 27 volumes
  - Fixed addresses 2030-2033
- Access to all PPRC volumes (primary and secondary)

Deployment Manager system

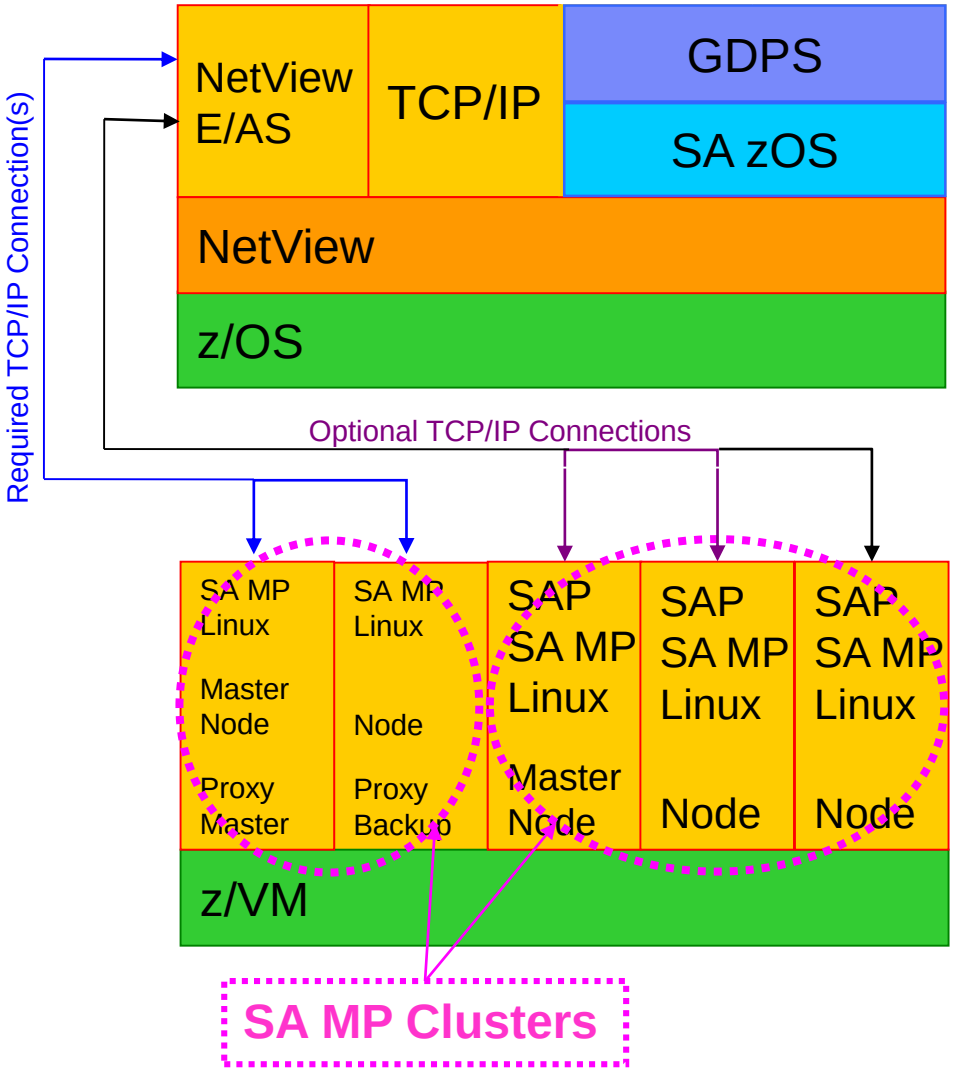
- Used to customize and deploy GDPS Virtual Appliance images
- Runs as a Linux guest on one of the managed systems
- Requires:
  - 1 GB Storage
  - 50 GB minimum size for root filesystem
  - Any supported Linux distribution
  - Additional rpm (gdps-appl-deployment-manager-1-0.s390x.rpm) available on GDPS secure FTP site with images
  - Access to GDPS Appliance LPAR 2030 and 2033 devices

z/VM Managed Systems



- Multiple z/VM systems supported
- Each z/VM system must contain at least two Linux guests running SA MP.
  - This is the GDPS “proxy” cluster
- Each z/VM may also contain:
  - One or more additional Linux guests running SA MP and some application workload.
  - One or more additional Linux guests without SA MP and some application workload.
  - One or more non-Linux guests (CMS, etc.)
- TCP/IP Connections from GDPS Virtual Appliance to:
  - Proxy guests (required)
  - Other Linux guests with SA MP (optional)
- SA MP Clusters:
  - Proxy guests must be separate cluster
  - Group other Linux nodes into clusters, as appropriate for efficient SA MP design.

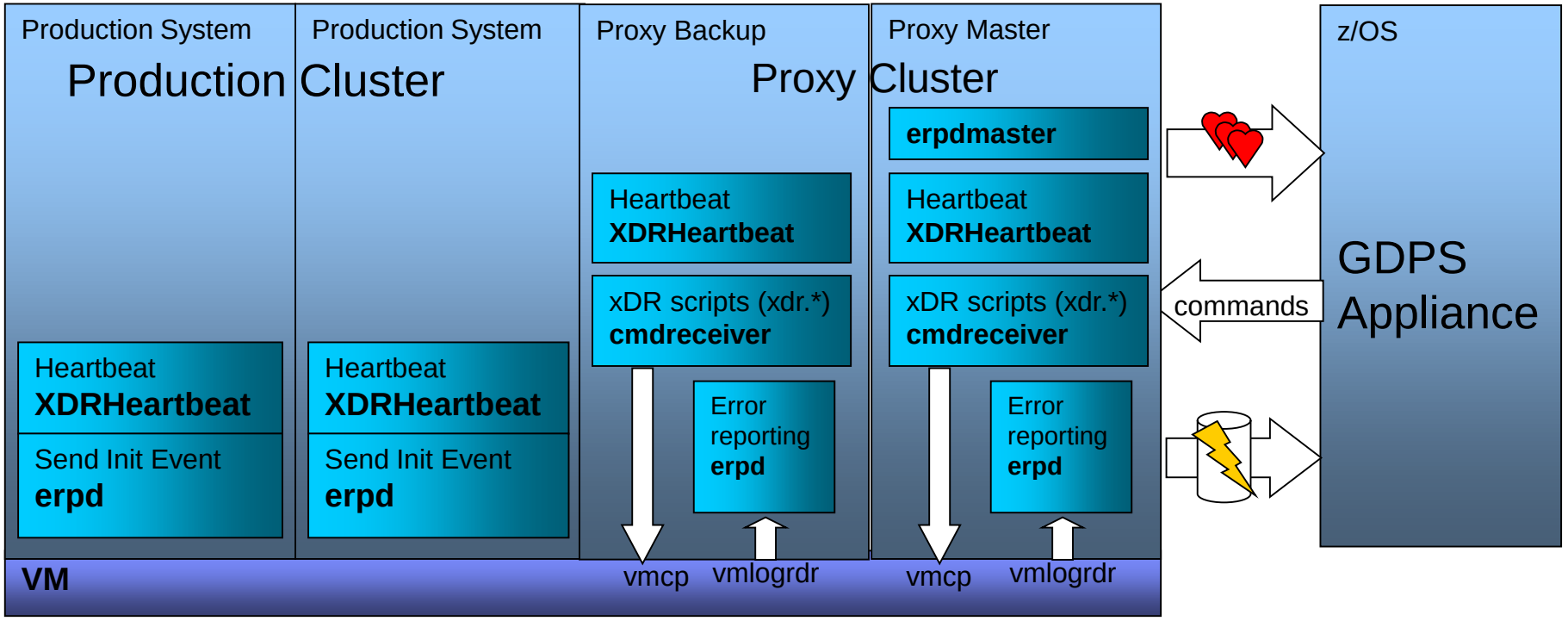
xDR Guest Linux SA MP Clusters



- Multiple z/VM systems supported
  - z/VM guests running Linux and SA MP
- Proxy Guest used by GDPS to communicate commands to z/VM and to monitor for disk errors
  - Is a cluster of just one node
- One or more application clusters made up of one or more nodes
  - One node will be the master
  - All guests run an application workload, e.g., SAP
- TCP/IP connections between the Linux guests and NetView Event/Automation Service Address Space (E/AS) are used to inform GDPS of
  - Their existence
  - Their ongoing presence, and
  - Any change in their status

xDR on z/VM

- Proxy Guests
  - Two Linux system is configured as Proxies for GDPS which have special configuration (Memory locked, Access rights to VM, Separate Cluster).
  - erpdmaster resource denotes Proxy Master guest role
  - Heartbeat for system availability check
  - erpd sends system information and reports disk errors to GDPS
  - CLI via rexec or cmdreceiver
- Production Nodes
  - Heartbeat from master node for system availability check
  - erpd sends system information
- The command interface to VM CP is vmcp
- The interface to retrieve disk errors from VM is vmlogrdr (Linux device)



Software Requirements for xDR for Linux on z/VM

- Supported Linux Distributions

Supported Linux Distributions	Version of System Automation
SUSE SLES 11	SA MP 4.1.0.1 (plus APAR) or higher
Red Hat 6	SA MP 4.1.0.1 (plus APAR) or higher

- **Separately priced SA MP feature xDR for Linux is required**
- **Latest fixpacks for Linux and SA MP**
- **Required VM Version**
  - V5.4, or V6.2 or higher
  - Check GDPS PSP bucklets for recommended maintenance
- **Supported Disk Types**
  - DASD ECKD

Restrictions

- No support for MSS1
- No support for SSI and Live Guest Relocation
- No support for GDPS managed FlashCopy

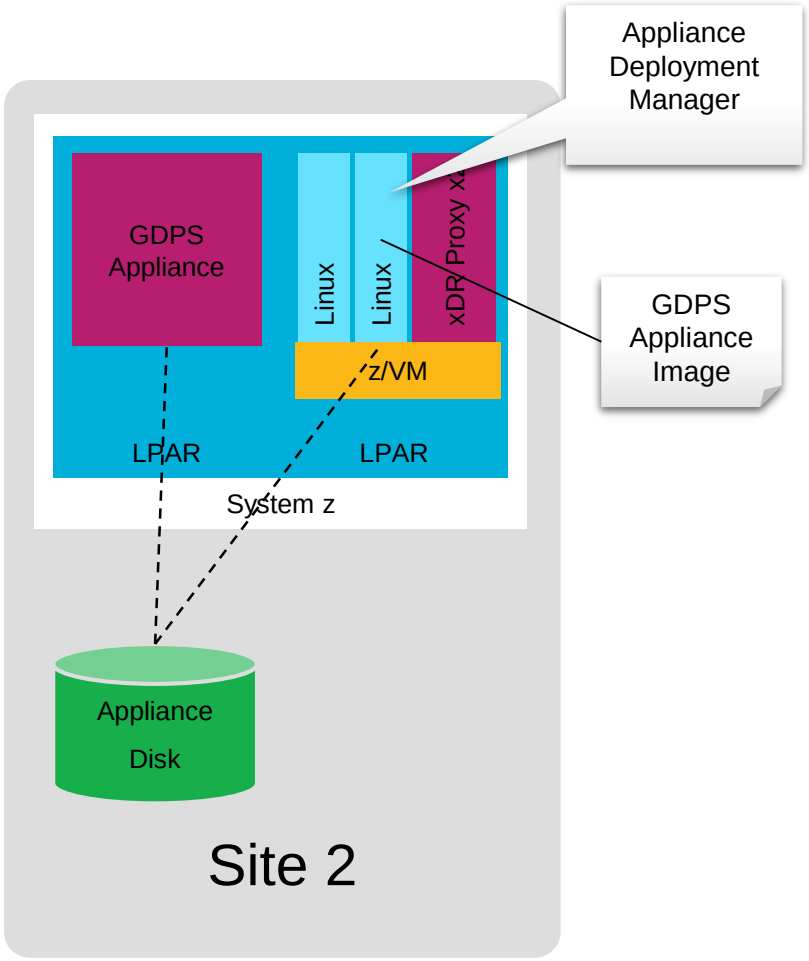
Installation

GDPS Virtual Appliance

Engagement Design

- Initial implementation engagement designed around four on site visits
  - Project kickoff and training
  - Initial install in Test environment
  - Testing in Test environment
  - Initial install in Production environment
- In order for this model to be successful, it is critical that the Customer successfully complete the z/VM and xDR customization on managed systems before each install visit.

Implementation Summary



1. Project kick off and technical training
2. Setup GDPS Appliance LPAR meeting appliance requirements
3. Define/Install Deployment Manager on z/Linux z/VM guest or native in LPAR meeting requirements
3. Copy appliance image to disk accessible by Deployment Manager
4. Implement and customize xDR on Managed z/VM systems
5. Run Deployment Manager to copy appliance image to one of its RES volumes
6. IPL LPAR from Appliance Disk
7. Complete customization of GDPS Appliance environment and policy including system, processor, mirroring configuration, and script definitions

Time to deploy: minutes vs days

Implementation Preparation

- Hardware installation
  - Install secondary disk
  - Install additional processor(s)?
  - Complete FICON and FCP cabling
- IOCP changes
  - Define PPRC secondary disk to all managed z/VM LPARs
  - Define LPAR and devices for GDPS Virtual Appliance
  - Define LPAR and devices for Deployment Manager system (optional)
- Install and customize the Deployment Manager system
  - Define Linux guest (if required)
  - Install Deployment Manager rpm
- Prepare GEOPARM

z/VM System Implementation Activities

- Network connectivity
- Set up z/VM SITEn CONFIGuration files.
  - Define mirrored devices.
  - Set up dump volumes.
- Modify z/VM User Directory entries
  - Use VOLID (instead of device number) for mirrored disk.
  - Define proxy guest(s).
- Modify AUTOLOG EXEC
  - Define z/VM command privilege classes
  - Customize LOGREC processing.
  - Enable auto-quiesce HyperSwap trigger.
  - Automate proxy guest startup.
- Set up service machine for prioritized VM shutdown (optional)

Initial Appliance Installation/Customization Activities

- Copy Appliance image to Deployment Manager system
- Customize Appliance image configuration file
- Install Appliance image onto GDPS Appliance SYSRES device
- IPL Appliance system
- Customize the required SA policy objects
  - Systems
  - Processors
  - GEOPLEX DOMAINS and GEOPLEX OPTIONS
- Upload and activate GEOPARM
- Define Automated Scripts
- Define Site Table entries for managed z/VM systems
- Set up Stand Alone Dump program

Linux Proxy Implementation Activities

- Install Linux.
- Page fix Proxy guest storage
- Set up channel bonding for Proxy guests
- Install System Automation for Multi Platforms (SA MP).
- Enable Tivoli Enterprise Integration Facility (EIF).
- Configure SA MP nodes and clusters.
- Install/Activate VM CP command facility for Linux
- Activate xDR processes
  - Command line interface (cmdreceiver).
  - XDRHeartbeat.
  - Error reporting daemon (erpd).
- Miscellaneous steps.

Operation

GDPS Virtual Appliance

User Ids and password management

- Two Operator ids (DROPER1 and DROPER2)
- Two Administrator ids (DRADMN1 and DRADMN2)
- IBM Service ids

User type	Able to change DROPERx passwords	Able to change DRADMNx passwords	Able to change SERVx passwords	Interfaces used
Operator	Yes	No	No	WebUI
Administrator	Yes	Yes	No	WebUI, CLI
IBM Service	Yes	Yes	Yes	WebUI, CLI, native TSO, native NetView

User Interface: CLI

- Runs under USS on the Appliance
- Accessed via PuTTY telnet session or WebUI Panel
- Used to perform administrative functions
  - Password changes
  - Manage GDPS Services (WebUI, CLI, NetView)
  - Shut down the Appliance system (must IPL from HMC)
  - Collect logs and/or dumps for problem determination
  - Work with user files stored on the Appliance
  - Apply hot fix maintenance

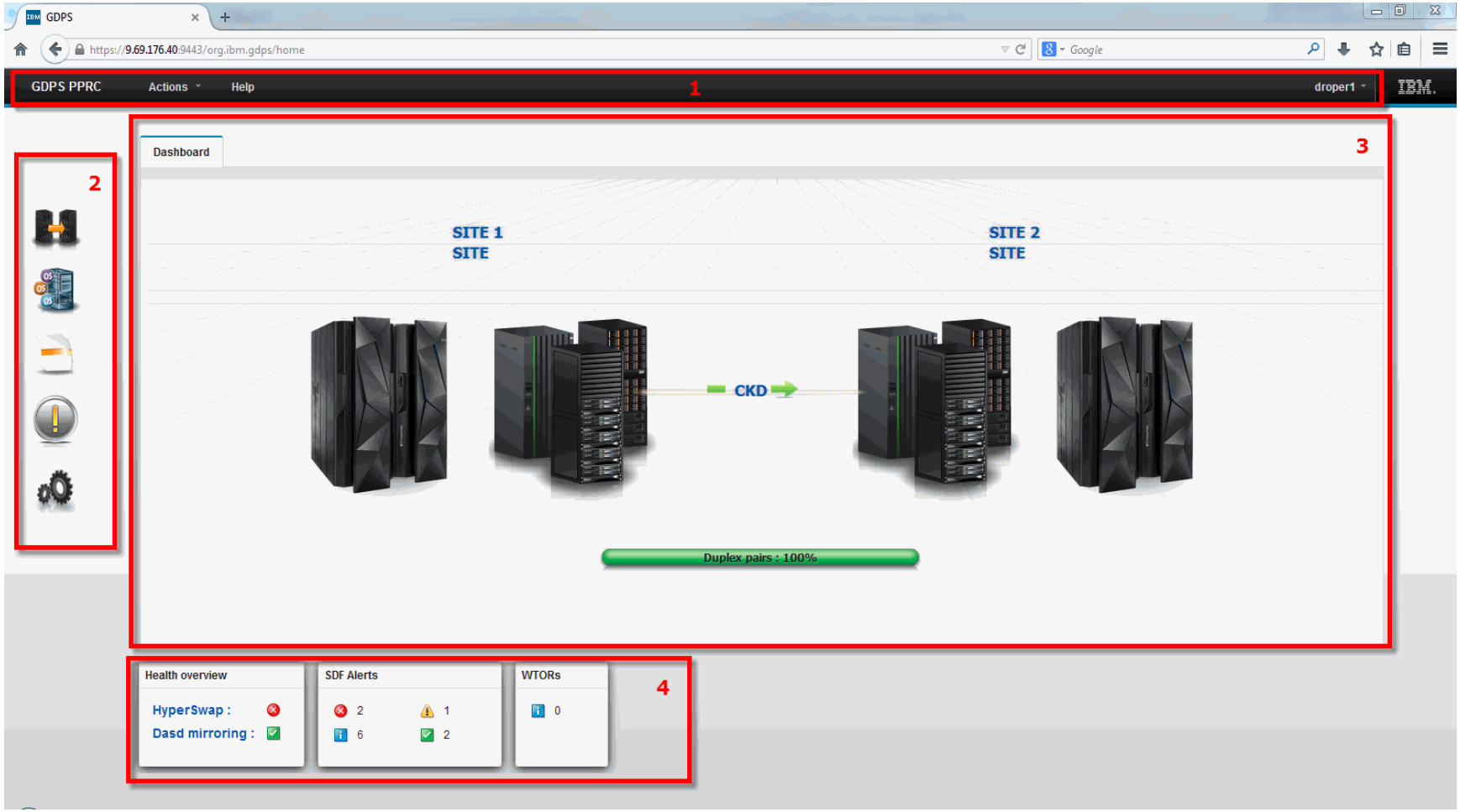
CLI commands

- gdps status|version
- gdps passwd [<user>]
- gdps show geoparm
- gdps scripts (list|del <script name>|show <script name>|add <filename>|update <filename>)
- gdps restart [webui|cli]
- gdps shutdown
- gdps update-io-config <filename>
- gdps prepare-upgrade
- gdps collect-logs [<charset>] [ftp PMR-number]
- gdps collect-dumps <dumpname> [ftp] PMR-number
- gdps hotfix <hotfix-package>
- gdps rescue <rescue-package> <output-file> [ftp pmr-number]

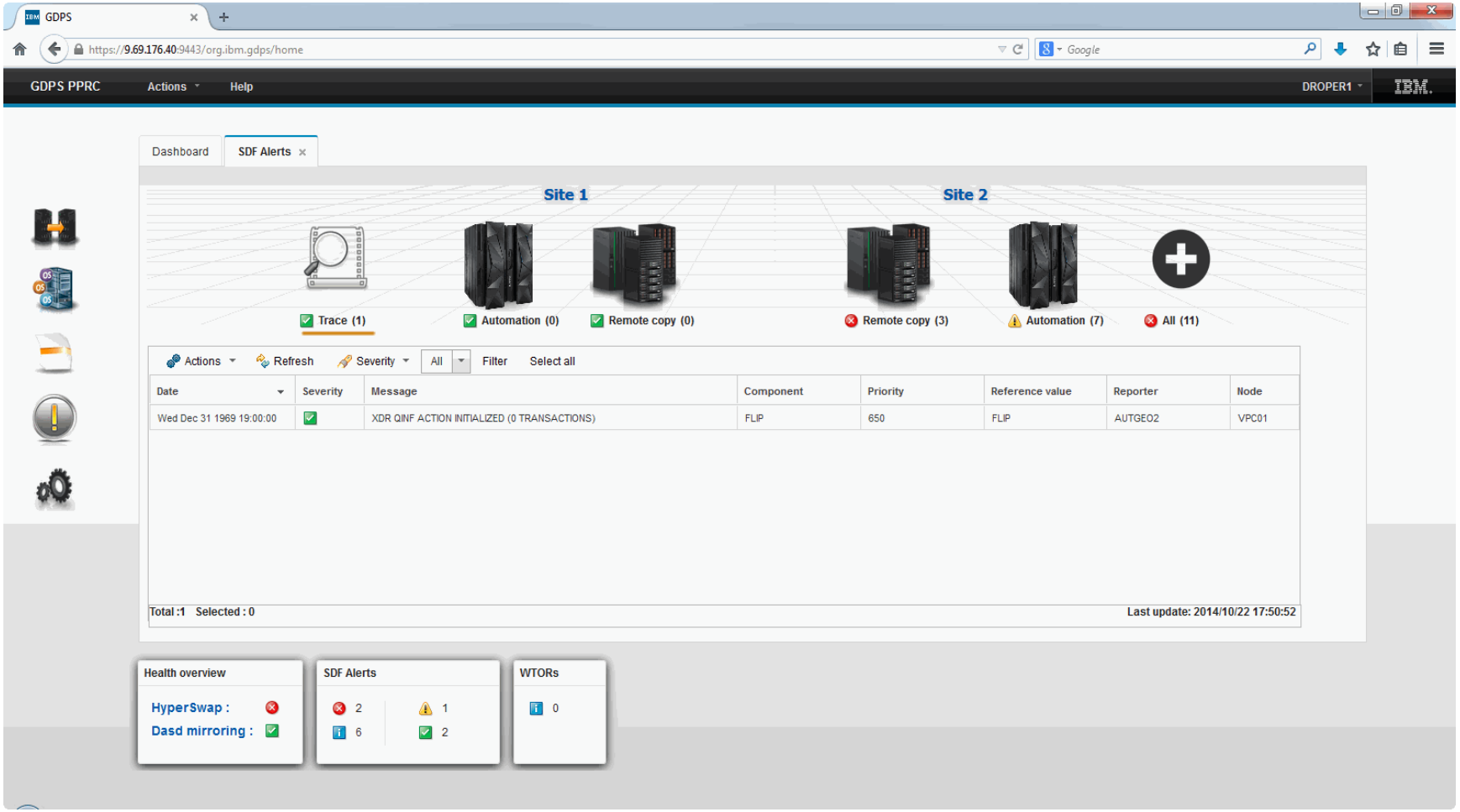
User Interface: WebUI

- New browser based GUI
- Runs as a WebSphere instance that interacts with the GDPS NetView
- Used to perform most day to day management functions
  - Planned Actions
  - Standard Actions
  - PPRC Management
  - Script invocation
  - Status monitoring

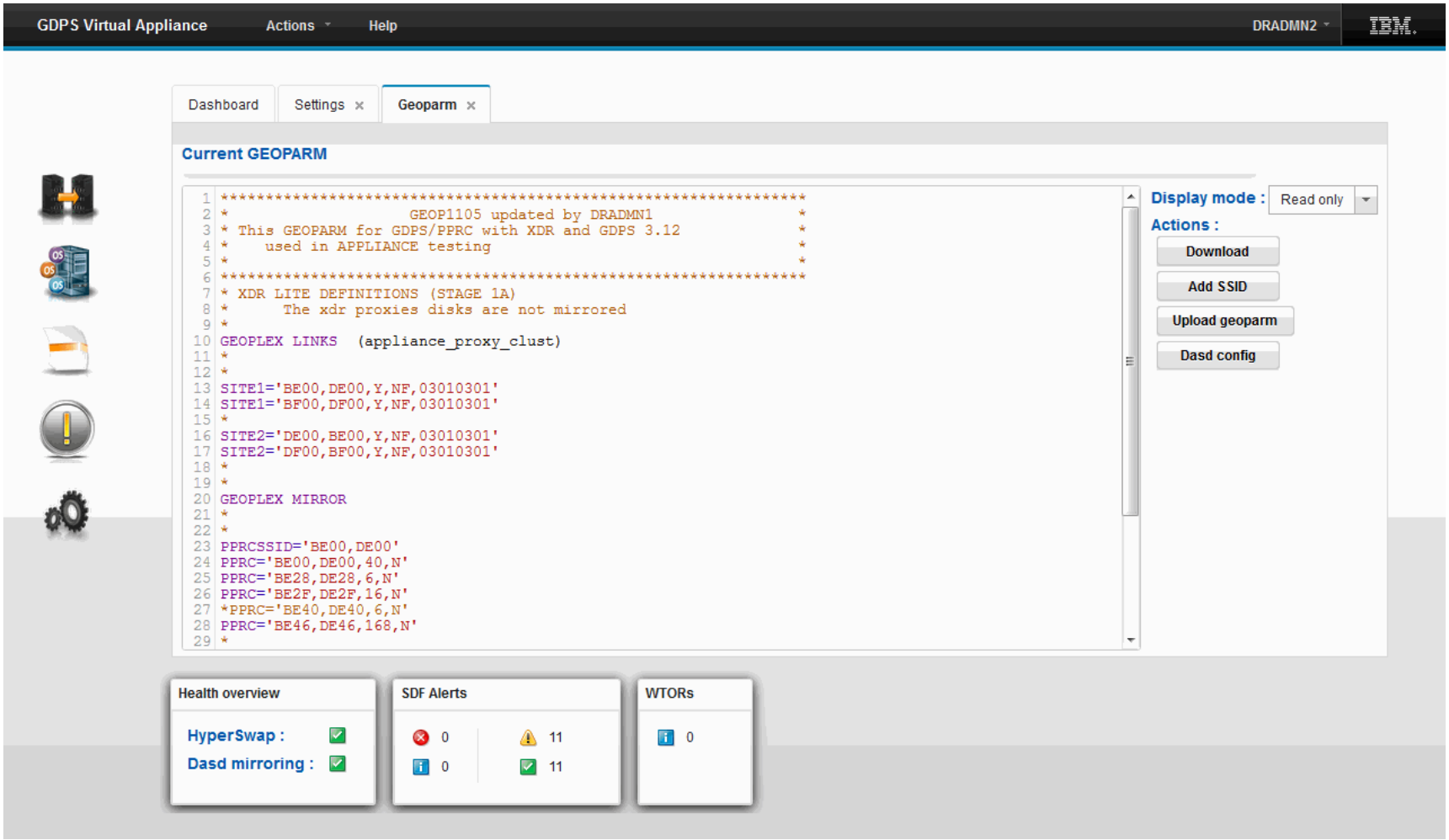
WebUI Dashboard



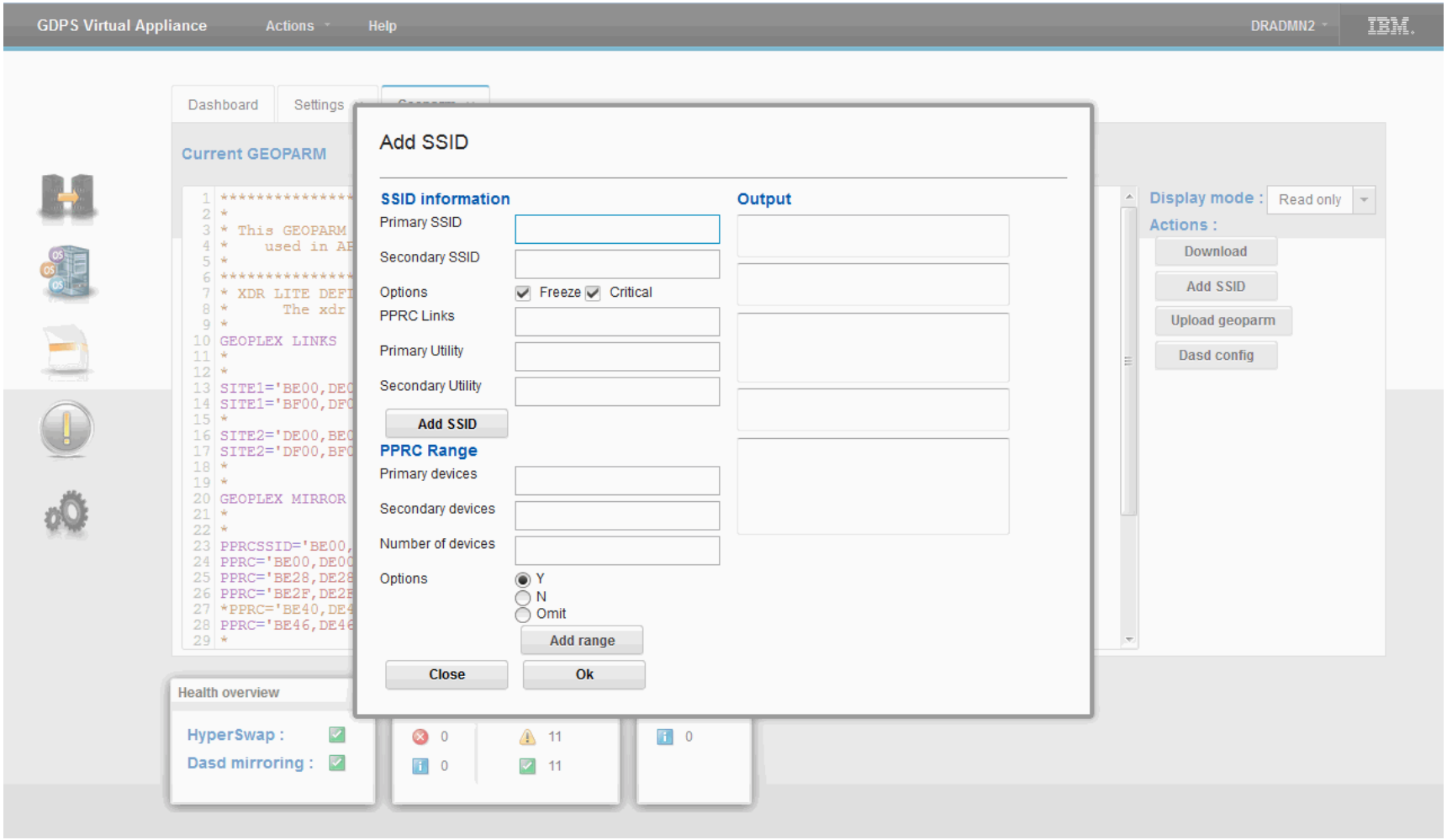
WebUI SDF Panel



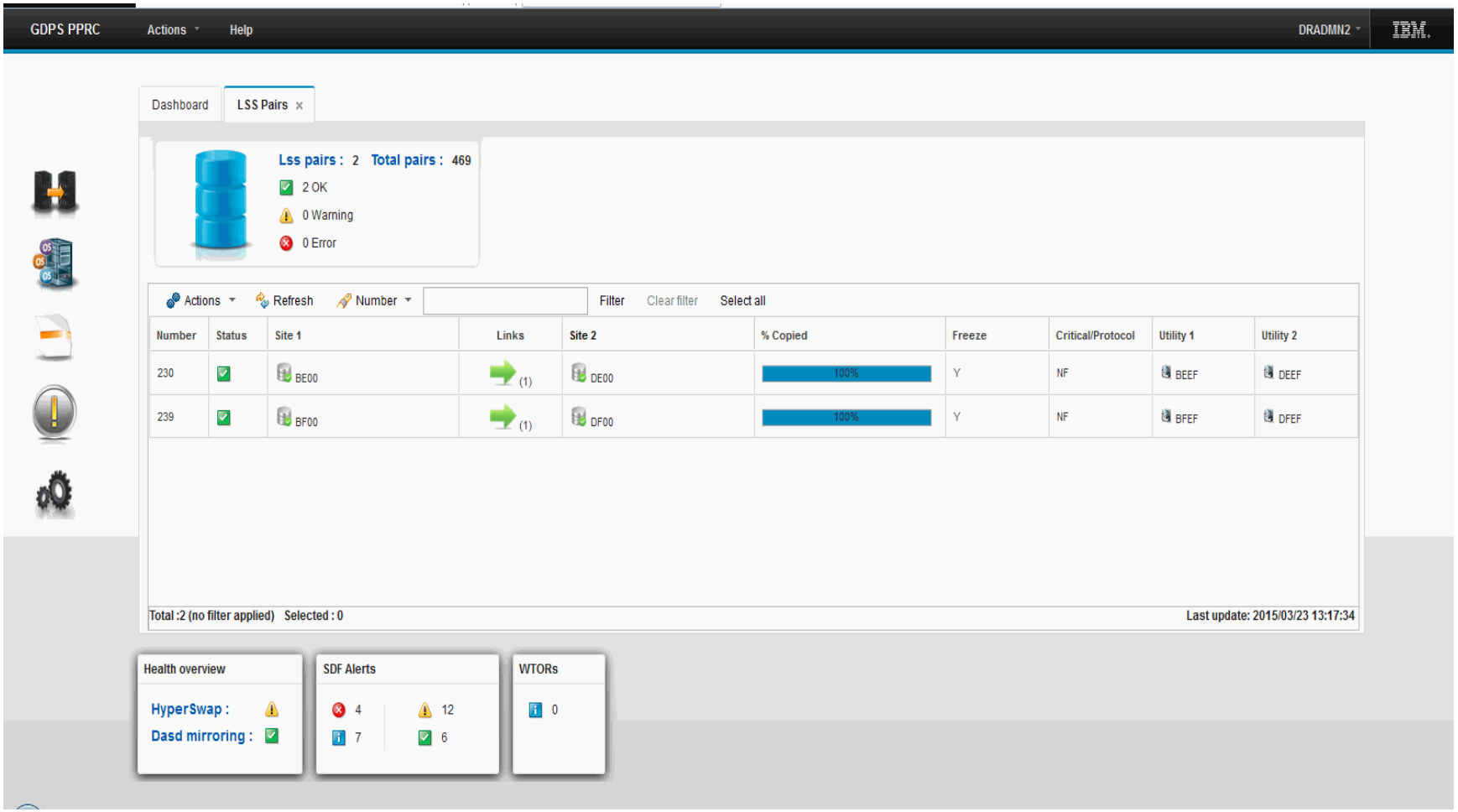
WebUI Manage Geoparm Panel



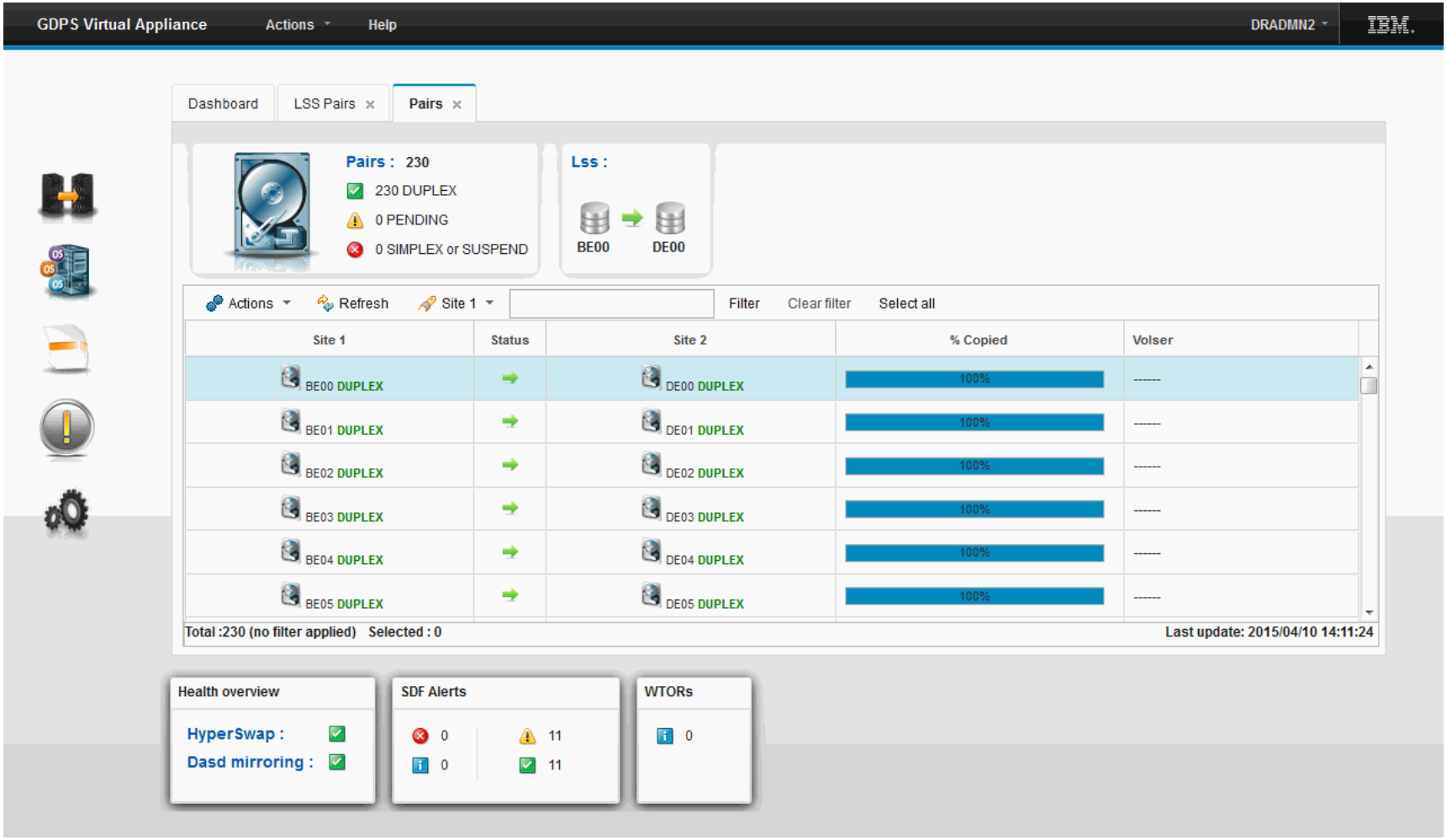
WebUI Manage Add SSID Wizard



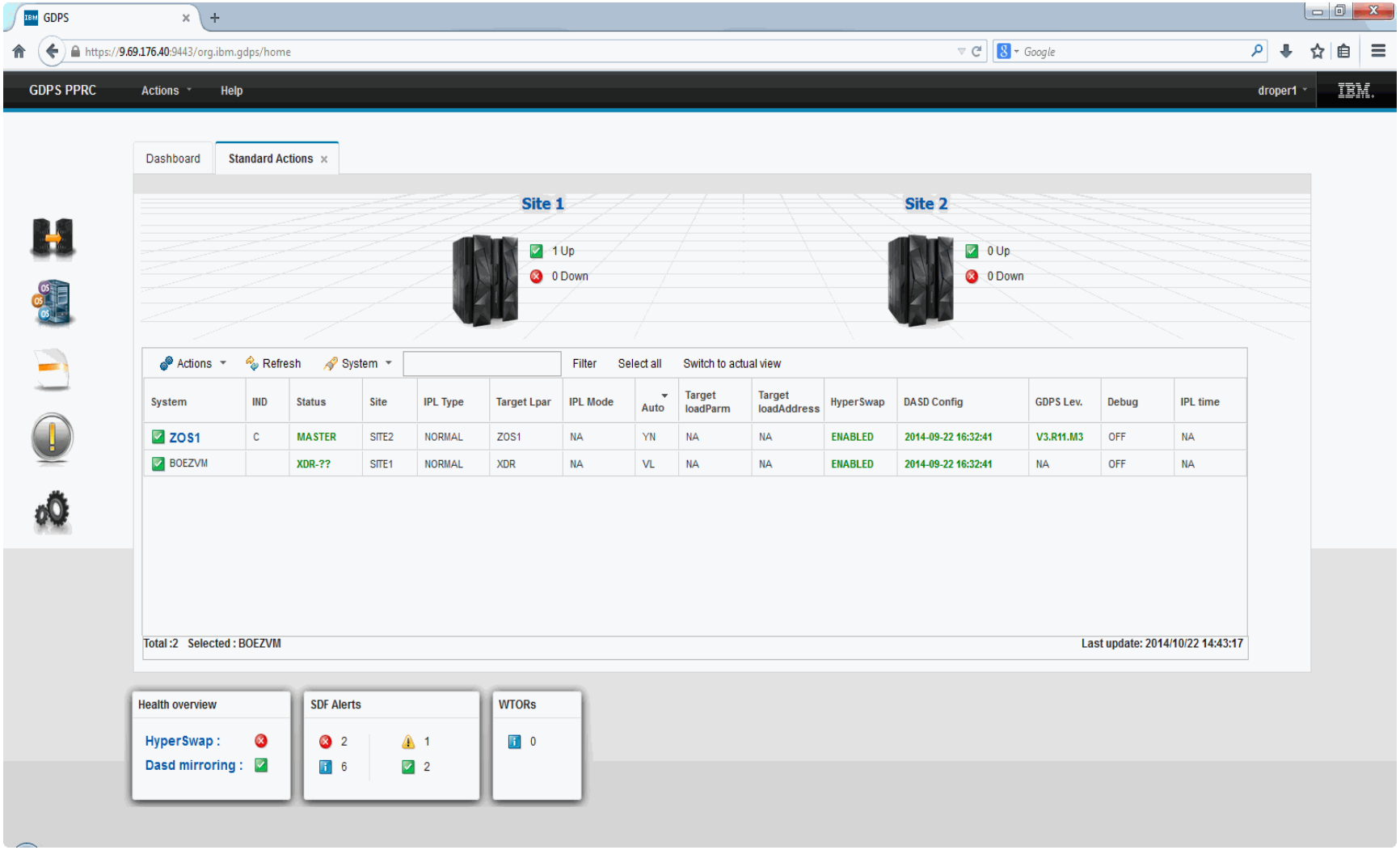
WebUI LSS Pairs Panel



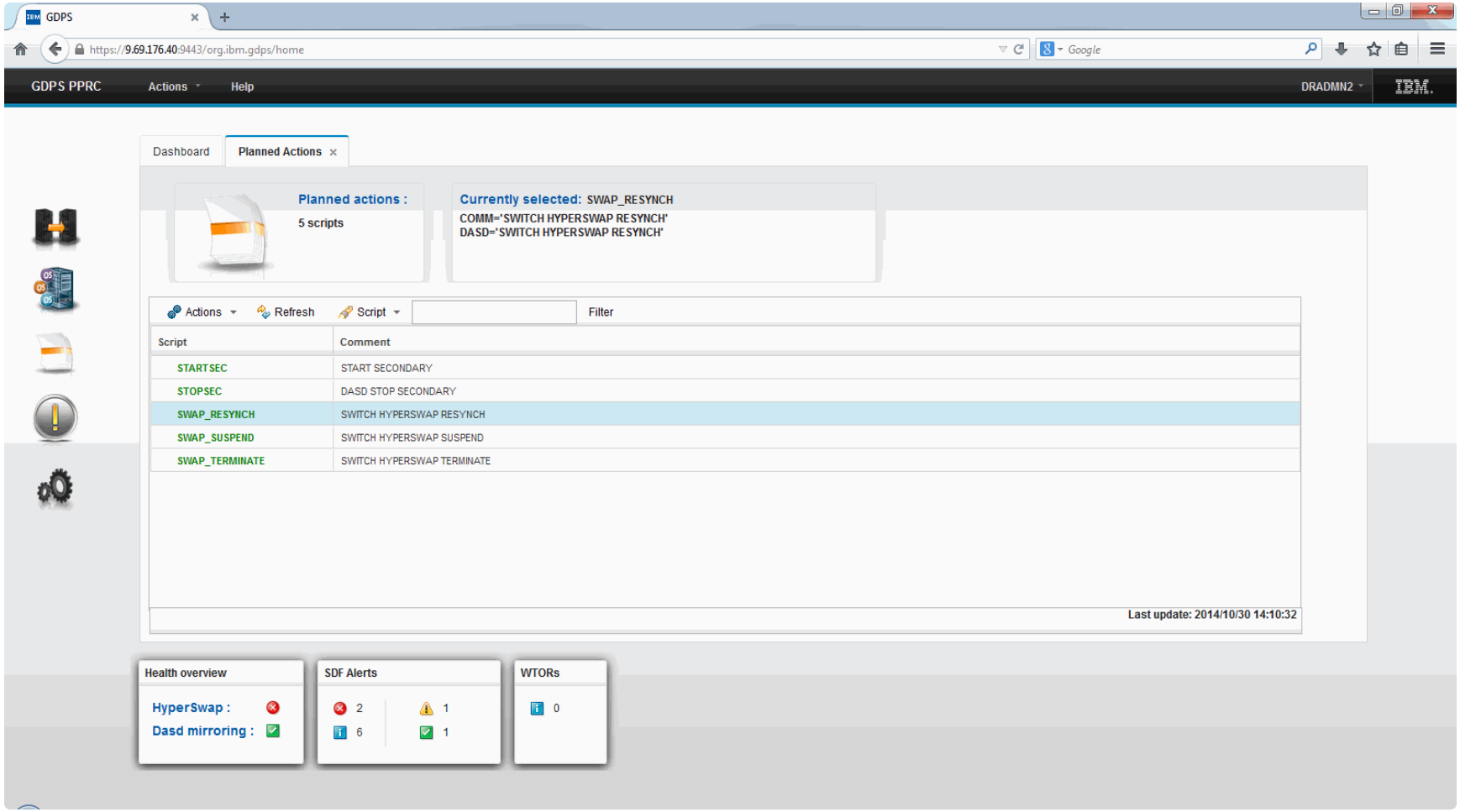
WebUI Pairs Panel



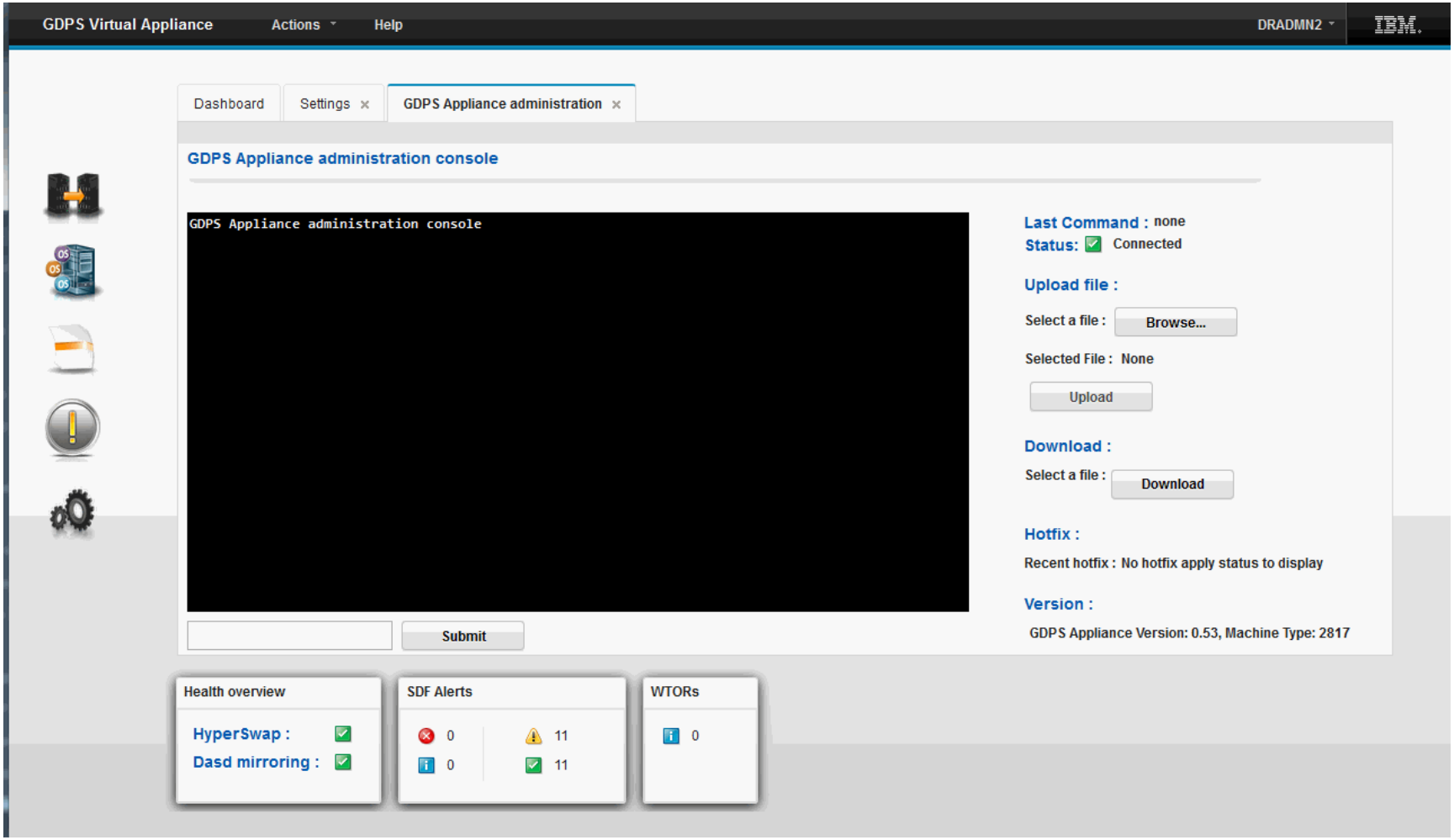
WebUI Standard Actions Panel



WebUI Planned Actions Panel



WebUI Administrative console Panel



User Interface: TSO/NetView

- Standard interfaces used only by IBM Service user ids.
- Accessed via TN3270 session.
- NetView TN3270 port must be activated through operator command in order to log on to NetView.
- Used for special customization tasks during initial Appliance installation and certain configuration changes .
  - Adding additional managed systems.
  - Processor swaps.

Support Model

- Support handled through normal Support Center PMR process.
- gdps collect-logs and gdps collect-dump CLI commands assist with diagnostic data collection
  - FTP parameter to optionally transmit the data driectly to ECUREP.
- Rescue packages for special needs.
  - Special automated jobs to perform whatever is required.
  - Built by Support/Development and sent via ECUREP.
- Avoid engaging IBM Service to diagnose and resolve problems.

Service/Maintenance Model

- Two GDPS Virtual Appliance images will be released per year.
  - April refresh - this refresh will pick up the N-1 GDPS/PPRC version/release along with maintenance.
  - October refresh - this refresh will pick up the N GDPS/PPRC version/release along with new function and maintenance.
  - Customers are advised to run on the N-1 release.
- Hotfix packages for fixes that can not wait for the next release
  - If required, a cumulative hotfix package will be maintained for each image release.
  - Availability will be announced via GDPS Newsletter.
  - Installed using CLI command.
  - Activated dynamically if possible.
- Maintenance refresh images
  - `Released if installation of maintenance via hotfix becomes more disruptive.

Planning Considerations for Managed z/VM Systems

GDPS Virtual Appliance

Restrictions Linux on z/VM

- HyperSwap is not supported in second level z/VM systems.
- Reserve/Release is only supported for minidisks and full pack minidisks defined with virtual reserve/release. Reserve/Release on dedicated disks will not be propagated during HyperSwap. Therefore, dedicated disks may only be used if you are positive that no Reserve/Release will be issued to these disks.
- Only DASD ECKD disks are supported (no SCSI disks)
- If two disks are shared by multiple VM systems, all systems must participate in xDR (to keep HyperSwap processing consistent)
- All guests belonging to one SA MP Cluster must be on the same VM system
- If GDPS is unable to communicate with all proxy guests on a VM system, it will disable planned HyperSwap across the whole GDPS.

GDPS Service Levels to z/VM Application Guests

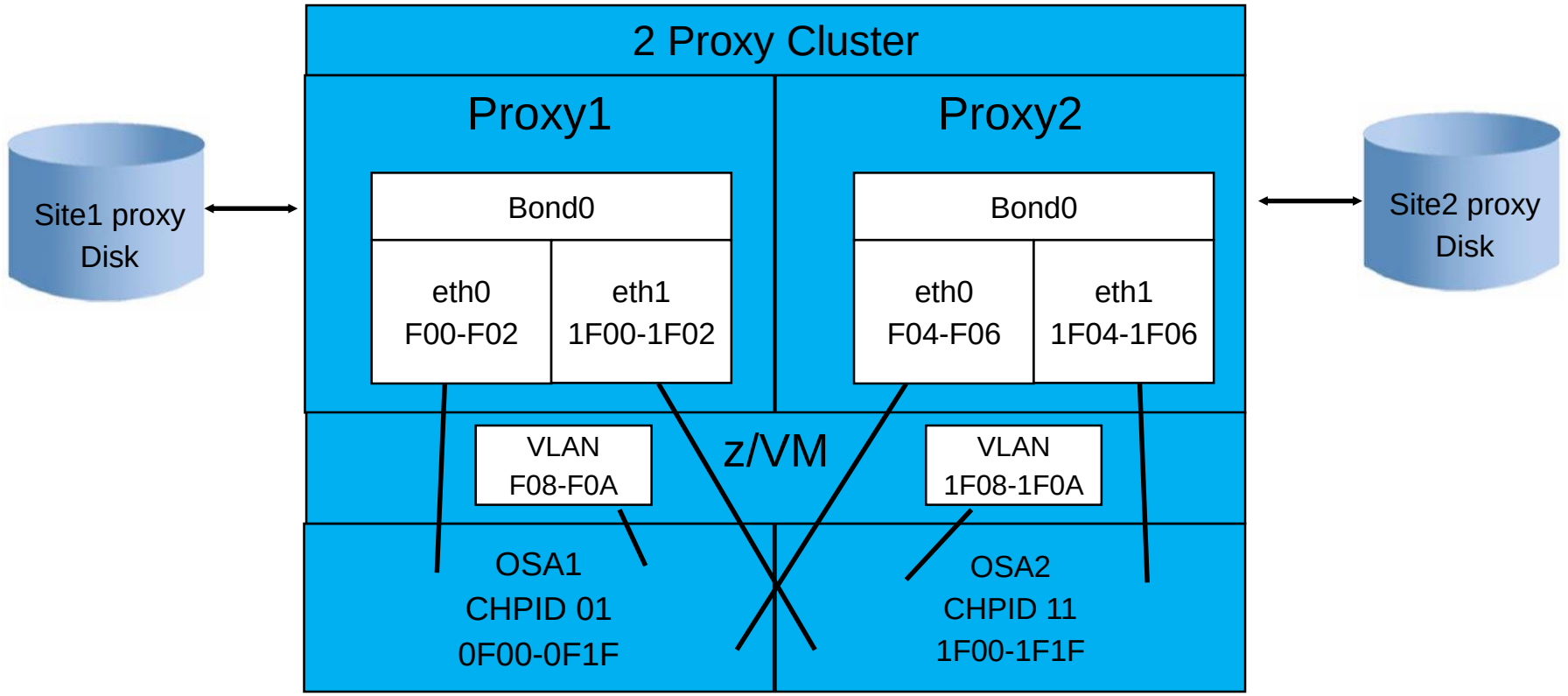
Type of Guest	HyperSwap	Guest System Automation	System Availability Checking	AUTO-GUESTIPL	AUTO-IPL
Linux Guest with SA MP with xDR Active [3]	✓	✓	✓	✓ 1	✓ 1
Linux Guest with SA MP without xDR Active [3]	✓	✓	✗	✗	✗ 2
Linux Guest without SA MP	✓	✗	✗	✗	✗ 2
Non-Linux Guest	✓	✗	✗	✗	✗ 2

1. **In a configuration where AUTOIPL and AUTOGUESTIPL can be used, either or both options can be deactivated through GEOPLEX OPTIONS.**
2. **AUTOIPL and heartbeat:**
   - AUTOIPL of a z/VM system is triggered when xDR heartbeat is lost from all guests on that z/VM system with xDR activated.
   - GDPS has no knowledge of the existence or status of any guests not running xDR.
   - If a single proxy is the only guest on a z/VM system with xDR activated, the loss of the proxy will cause the z/VM system to be IPLed (all guests - running or not - will be restarted).
3. **If one guest in an SA MP cluster has xDR active, all guests in the cluster must have xDR active.**

Disk/LSS sharing

- z/VM disks must be defined (offline at IPL) to all z/OS systems in the sysplex
- z/VM and z/OS disks can be located on the same LSS although we recommend that you isolate z/VM and z/OS disks on LSS boundaries
- z/VM systems managed by xDR and z/VM systems not managed by xDR must not share any GDPS-managed PPRCed disks
- GDPS-managed xDR LSS must not contain PPRCed disks managed by some other means (including disks managed by another GDPS instance).
- Any GDPS-managed z/VM disk can be shared by multiple xDR-managed z/VM systems. This requires that you also implement either z/VM CSE or z/VM SSI

z/VM Network Connectivity



- The problem:
  - The proxy guest Linux must maintain communications with the GDPS K-sys, even when z/VM has limited capabilities during a HyperSwap.
  - During a HyperSwap communications through dedicated OSA addresses can continue, but if access to the OSA is virtualized through a z/VM virtual machine, the TCP/IP communications required for xDR to complete a HyperSwap may not get through.
- The solution:
  - To prevent TCP/IP delays for the proxy guest(s), the guest(s) should use dedicated OSA addresses and not rely on connectivity through VSWITCH or Guest LAN.
  - Linux systems other than the proxy may continue to use VSWITCH or Guest LAN.

z/VM Dump Volume configuration

- The problem:
  - If z/VM fails to complete an unplanned HyperSwap, it will be reset by GDPS. A PSWRESTART dump may be the only diagnostic data available
  - If z/VM was using dump volumes which are PPRC mirrored, the PSWRESTART dump will be written to the old PPRC primary volumes
  - The dump data will be overwritten during PPRC resynchronization from the new primary volumes to the new secondary volumes
- The solution:
  - Use dedicated, unmirrored volumes in each site to receive dump data
  - Ensure that dumps are sent to the dump volume(s) in the PPRC secondary site
  - Switch the dump volume pointers to the new secondary site following a successful HyperSwap
  - The first PSWRESTART issued for a VM LPAR which failed a HyperSwap will detect that the HS was in progress and load a disabled wait state 9060. A second PSWRESTART issued for that LPAR will then collect the abend code WRP002 dump information and write it to the dump volumes

Prioritized VM shutdown

- Standard z/VM shutdown under GDPS control
  - Phase 1: Shutdown all GDPS aware application guests running xDR
    - Proxy guest(s) excluded
  - Phase 2: Shutdown all non-GDPS aware guests and service machines
  - Phase 3: Shutdown proxy guest(s) and VM CP
- Optional prioritized shutdown provides:
  - Ability to stagger shutdown of phase 2 in CPU constrained environments
  - Ability to trigger shutdown of guests or service machine that do not accept signal shutdown command

Fragen?

- Herzlichen Dank
- Demo