

z/VM Security News and How-To's

with a focus on z/VM 6.3 content

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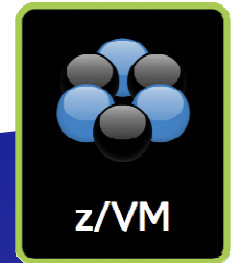
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z/VM Security Today



z/VM represents 40 years of virtualization security

- SIE virtualization and isolation of guest operating systems
- Virtual Switches and VLANs – separation of network traffic
- Virtualized hardware cryptography – abstraction, exploitation of CryptoExpress
- SSL / TLS for secure connectivity to the hypervisor layer
- LDAP for identity management
- Security policy management through *RACFVM* and *IBM Security zSecure*
 - Encryption of passwords and passphrases
 - Security Labels and Multi-Level Security
 - Isolation and multi-tenancy within the hypervisor
- Common Criteria and FIPS 140-2 certifications
- Formal Security and Integrity Statement



Agenda

- **z/VM Security Certifications and Statements of Direction**

- **z/VM 6.3 Security News and “How-To’s”**
 - CP Security Policy Updates
 - CryptoExpress 4S Support
 - TLS 1.2 Support in the z/VM SSL Server
 - Systems Management and xCAT Security
 - RACFVM Support for z/VM Single System Image Clusters

- **Discussion / Questions**

z/VM Security News:

Certifications and Statements of Direction



z/VM Security Certification Statements

- The last release to undergo security evaluations was **z/VM Version 6 Release 1**
 - Certified to Common Criteria’s Operating System Protection Profile (OSPP) at EAL 4+
 - *BSI-DSZ-CC-0752*
 - Labeled security, virtualization
 - Security-related service can be applied without invalidating the configuration
 - Validated to Federal Information Protection Standards (FIPS) 140-2 Level 1
 - <http://csrc.nist.gov/groups/STM/cmvp/documents/140-1/1401val2012.htm#1735>
 - Requires PM43382
- z/VM 6.2 is “**designed to conform to**” both the Common Criteria and to FIPS 140-2
 - Specific configuration requisites must be implemented to be considered “in compliance”
 - Refer to *z/VM Secure Configuration Guide*

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z/VM Security Certification: Statements of Direction

IBM intends to evaluate **z/VM V6.3** with the RACF Security Server feature, including labeled security, for conformance to the Operating System Protection Profile (OSPP) of the Common Criteria standard for IT security, ISO/IEC 15408, at Evaluation Assurance Level 4 (EAL4+).

- Common Criteria evaluation is listed as **In Certification** by Germany BSI
 - <https://www.bsi.bund.de/EN/Topics/Certification/incertification.html>
 - BSI-DSZ-CC-0903
- See <http://www.vm.ibm.com/security/> for the latest in z/VM Security information.

z/VM Security Certification: Statements of Direction

IBM intends to pursue an evaluation of the Federal Information Processing Standard (FIPS) 140-2 using National Institute of Standards and Technology's (NIST) Cryptographic Module Validation Program (CMVP) for [the System SSL implementation utilized by z/VM V6.3.](#)

- FIPS 140-2 evaluation is listed as **In Process** by USA NIST CMVP Group
 - <https://www.bsi.bund.de/EN/Topics/Certification/incertification.html>
 - <http://csrc.nist.gov/groups/STM/cmvp/inprocess.html>
- See <http://www.vm.ibm.com/security/> for the latest in z/VM Security information.

z/VM Security News:

CP Security Policy Updates



Security Policy Updates

- IBM Supplied User Directory:
Default passwords have been modified for new installs
 - Common string for easy search/replace
 - Remember to change your default passwords!

- User-Class Restructure (UCR) capability has been removed
 - per Statement of Direction, UCR and the OVERRIDE utility have been discontinued
 - CP MODIFY COMMAND and CP MODIFY DIAGNOSE available for decades
 - CVTOVRID.XEDIT macro available to translate UCR spool files to System Configuration statements

“How To:” Create a New Privilege Class

- Classes I-Z and 1-6 available for user-defined privilege classes
 - ABCDEFG defined by IBM; Class H reserved

- PRIV_CLASSES Statement in the System Configuration file
 - USER_DEFAULT from G to a new privilege class

- MODIFY CMD and MODIFY DIAGNOSE
 - Static definition in the System Configuration file
 - Dynamically redefine a command into a different privilege class.
 - MODIFY COMMAND SHUTDOWN PRIVCLASS S
 - MODIFY COM XAUTOLOG IBMCLASS A PRIVCLASS OUX
 - MODIFY CMD QUERY SUBCMD NAMES IBMCLASS G PRIVCLASS Z
 - MODIFY COMMAND XAUTOLOG RESET
 - MODIFY DIAG 94 PRIVCLASS V

“How To:” Create a New Privilege Class

Defining new privilege classes ... some quick thoughts:

- Can be associated with letters I-Z, and numbers 1-6
- Can contain both IBM commands and locally created commands
- Consider associating the new privclass with certain system roles
 - Helps to coordinate with regulations, certifications and laws
 - While redefining a command to Class Z (for example) can be an easy way to isolate a particular command, one could quickly lose track of what commands belong in which class and why
- User-defined privilege classes won't automatically gain new capabilities in a new release of z/VM



z/VM Security News:

Virtualizing the CryptoExpress 4S



z/VM Hardware Crypto Support Updates

z/VM Guest Support for the Crypto Express4S feature

- Guest support for Crypto Express4S (available on zEC12 and zBC12)
- Can be configured in one of three ways:
 - IBM Common Cryptographic Architecture (CCA) Coprocessor
 - z/VM supports dedicated and shared modes for CEX4C and CEX4A
 - IBM CCA Accelerator
 - z/VM supports dedicated and shared modes for CEX4C and CEX4A
 - IBM Enterprise Public Key Cryptographic Standards (PKCS) #11 (EP11) Coprocessor
 - Usable for dedicated cryptographic services for a virtual machine (APDED)
 - No sharing of CEX4P domains

- APAR VM65007 for z/VM 5.4, 6.1, and 6.2 support
- APAR VM65308 for CEX4C sharing (clear key)



“How to:” Virtualize Hardware Crypto Features for z/VM Guests

- **CPACF** – CP-Assisted Cryptographic Facility
 - Feature 3863 (disabled by default, but free to enable on the HMC/SE)
 - On-CPU cryptographic operational assistance
 - Clear key operations only
 - Symmetric algorithms only (DES, 3DES, AES, SHA, SHA-2)

- CPACF is available to any virtual machine if the feature is enabled
 - All modern System z hardware supports this feature
 - The z/VM SSL Server will use CPACF *automatically*

“How to:” Virtualize Hardware Crypto Features for z/VM Guests

The CRYPTO User Directory statement can associate domains/APs from the CryptoExpress features associated with the z/VM instance and assign them to a virtual machine for use:

```

                                v-----+
CRYPTO +- DOMAIN ---+domains +- APDEDicated +- aps ---+---><
      |
      +- APVIRTual-----+-----^
  
```

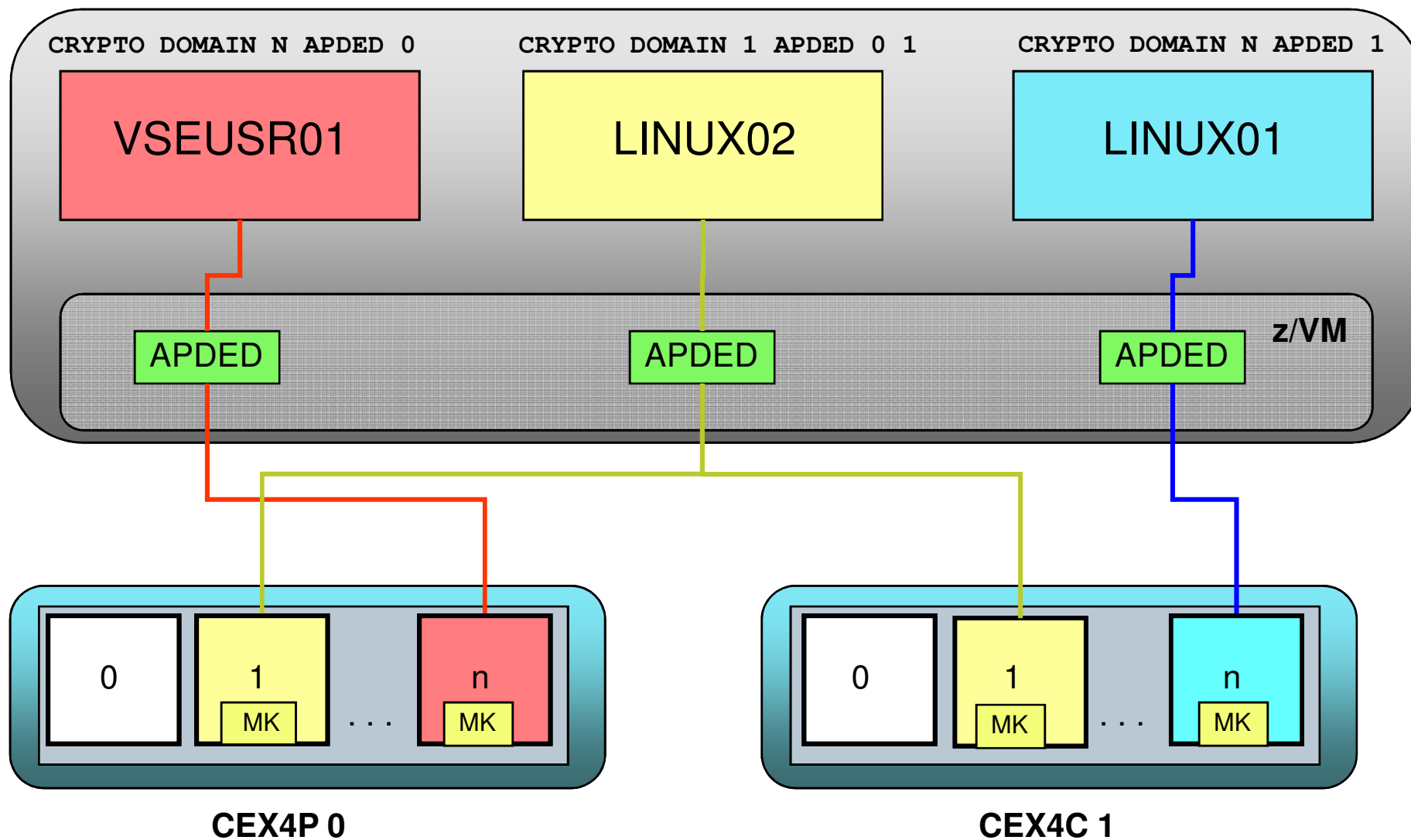
APDED

Domains granted in the directory are “reserved for dedication”; they are not actually in-use until the virtual machine logs on. Then, they are for exclusive use of a single virtual machine.

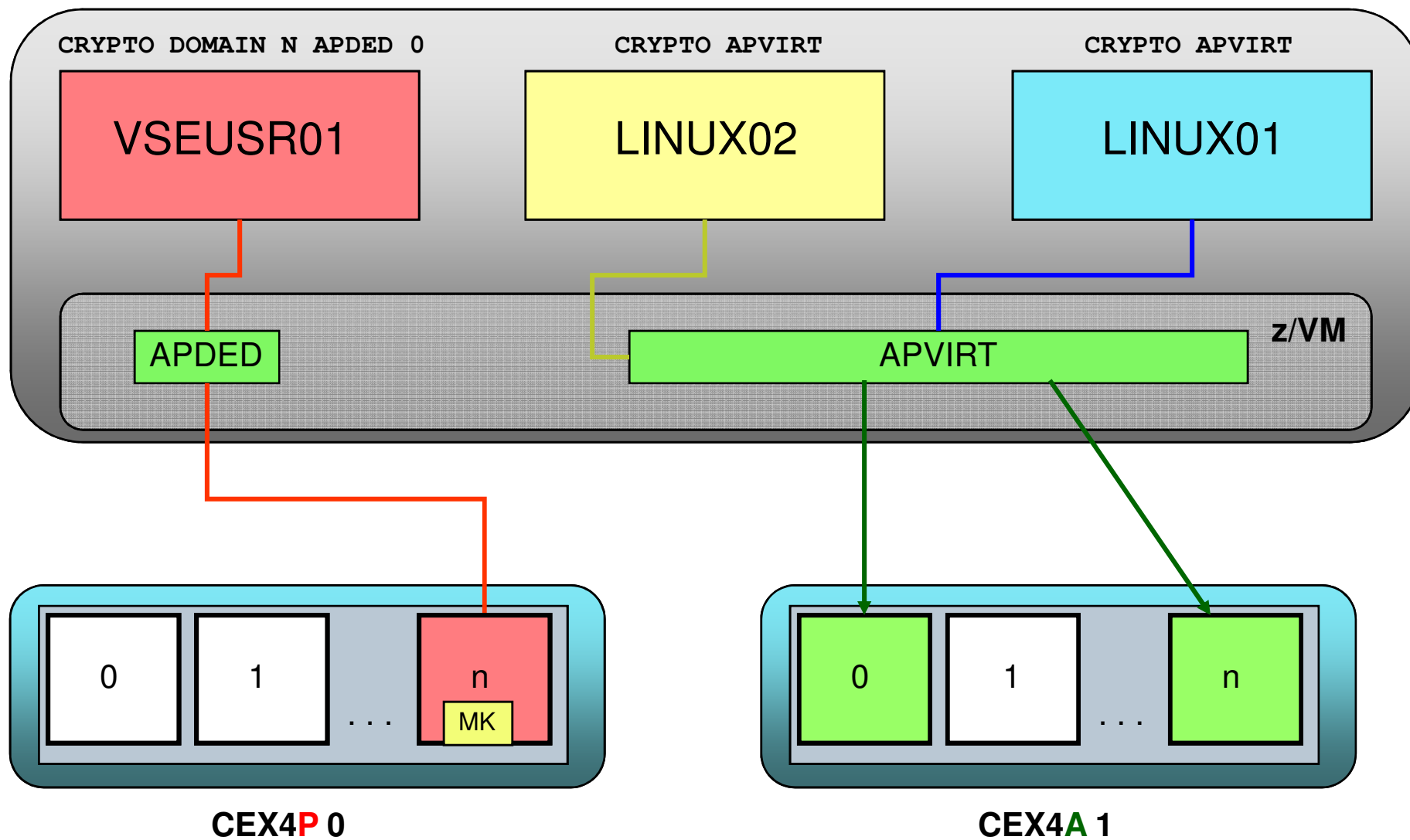
APVIRT

Access makes use of shared queues controlled by the system. These domains are controlled by the hypervisor, and do not support secure-key operations.

“How to:” Virtualize Hardware Crypto Features for z/VM Guests



“How to:” Virtualize Hardware Crypto Features for z/VM Guests



“How to:” Virtualize Hardware Crypto Features for z/VM Guests

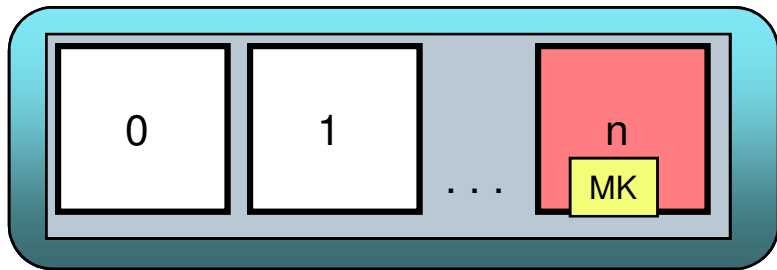
QUERY CRYPTO

(Class A, B, C, or E) will display which domains/APs are available. Note that this list will be limited to devices available to a z/VM instance.

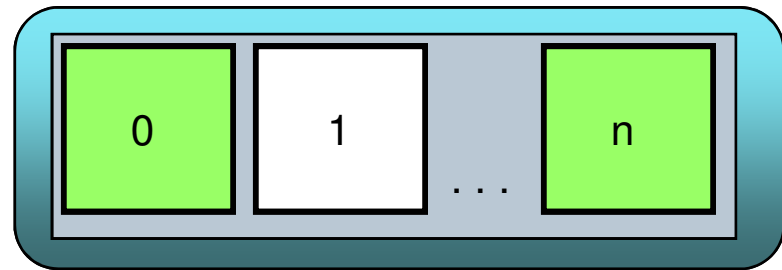
```

>>-Query--CRYPTo--+-----+-----+-----><
                    '-DOMains--+-+-----+-'
                        '-Users-'

```



CEX4P 0



CEX4A 1

“How to:” Virtualize Hardware Crypto Features for z/VM Guests

```
QUERY CRYPTO DOMAINS USERS
```

<u>AP</u>	<u>device</u>	<u>Domain nn</u>	<u>device status</u>	<u>system usage</u>	<u>planned usage</u>
01: AP 02	CEX3C	Domain 08	available	free	unspecified
01: AP 03	CEX3A	Domain 06	available	dedicated to BWHUGEN	dedication
01: AP 03	CEX3A	Domain 07	available	free	unspecified
01: AP 03	CEX3A	Domain 08	available	free	unspecified
01: AP 04	CEX4C	Domain 06	available	free	dedication
01: AP 04	CEX4C	Domain 07	available	free	dedication
01: AP 04	CEX4C	Domain 08	available	free	unspecified

There are no shared-crypto users.
Ready;

“How to:” Virtualize Hardware Crypto Features for z/VM Guests

QUERY VIRTUAL CRYPTO

(Class G) will display virtual crypto facilities **for your guest.**

Keyword “virtual” required for Guests with A, B, C, or E privileges.

```

,--Virtual---,
>>-Query--+-----+--CRYPTo-----><

```

QUERY VIRTUAL CRYPTO

```

AP 03 CEX3A Domain 06 dedicated
Ready;

```

“How to:” Virtualize Hardware Crypto Features for z/VM Guests

- **The Big Question: Which type of domain do I want to assign to my guest?**

- **It depends:**
 - Do you need secure key operations? (APDED)
 - Does your security policy require physical isolation? (APDED)
 - **New* Do your guests need to exploit EP11 mode? (APDED only)*
 - Do you need to relocate your guest? (APVIRT*)
 - Can you share your domains without impact to security or performance? (APVIRT)
 - Are you running out of domains attached to the LPAR?
 - Are your guests similar, cloned, or tied to HA solutions?

- Different guests will have different needs, based upon their drivers and configuration requirements.

*Note: some restrictions apply. Consult the *CP Planning and Administration Guide* or *Getting Started With Linux* manuals.

z/VM Security News:

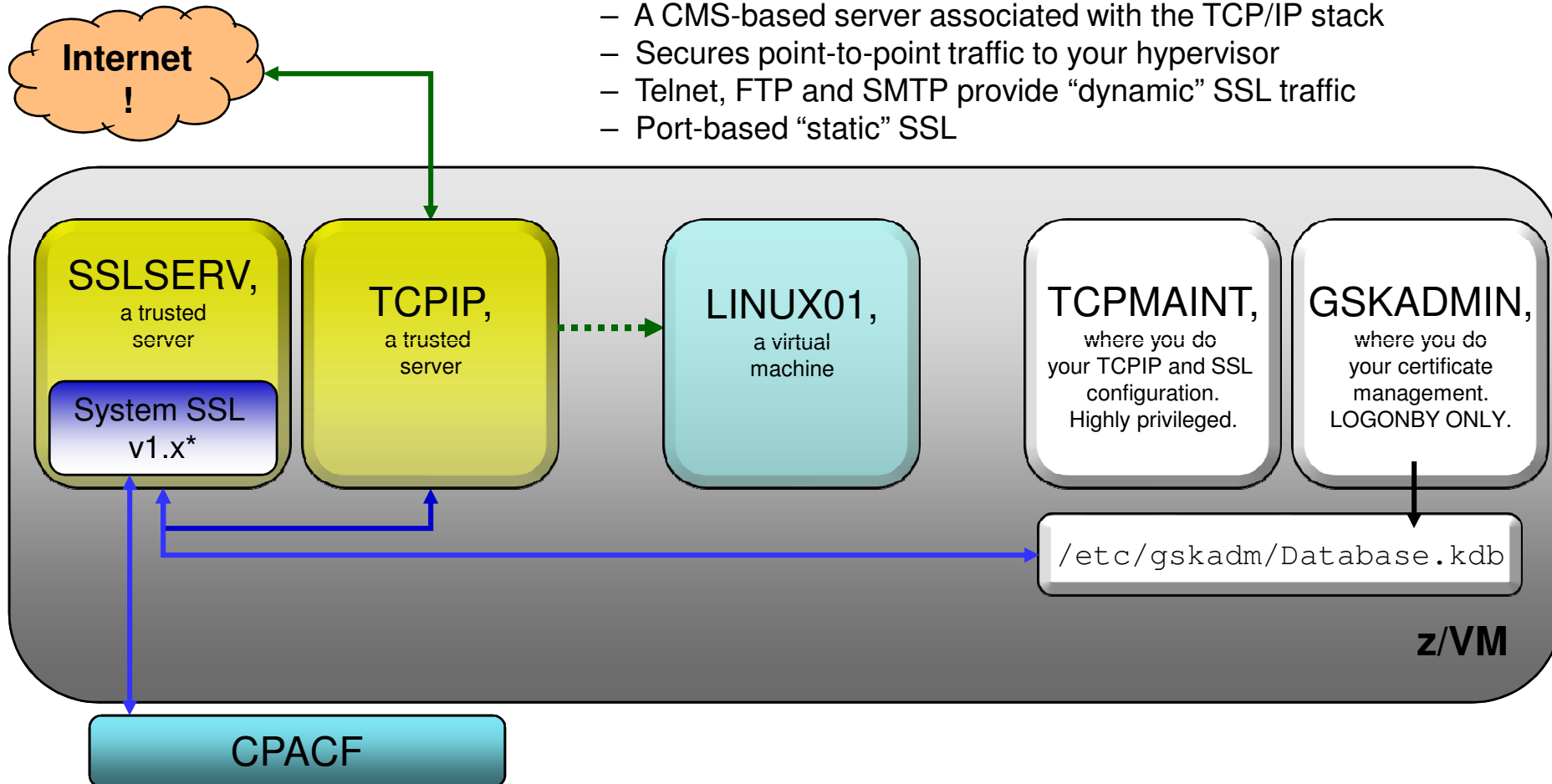
TLS 1.2 Support for the z/VM SSL Server



Introducing the z/VM SSL Server

The z/VM SSL Server:

- A CMS-based server associated with the TCP/IP stack
- Secures point-to-point traffic to your hypervisor
- Telnet, FTP and SMTP provide “dynamic” SSL traffic
- Port-based “static” SSL



z/VM SSL Server News: Version 6 Release 3.0

- *System SSL Update*
 - Port of **z/OS V1.13** equivalency plus z/OS APAR OA39422
 - Enables TLS 1.2 functionality, SHA2 hashing
 - **Support for SHA2 certificates** in *gskkyman*
 - HMAC-SHA256 integrity checking at start-up

- *SSL Server Upgrades*
 - Client Certificate Validation (**APAR PM52716** for z/VM 6.2)
 - New `CLIENTCERTCHECK` keyword on the `INTERNALCLIENTPARMS`
 - IPv6 Support for Secure Telnet, FTP, and SMTP
 - **Support for TLS 1.2 connections**
 - New 'PROTOCOL' keyword
 - **Select which versions** of SSL and TLS to enable/disable

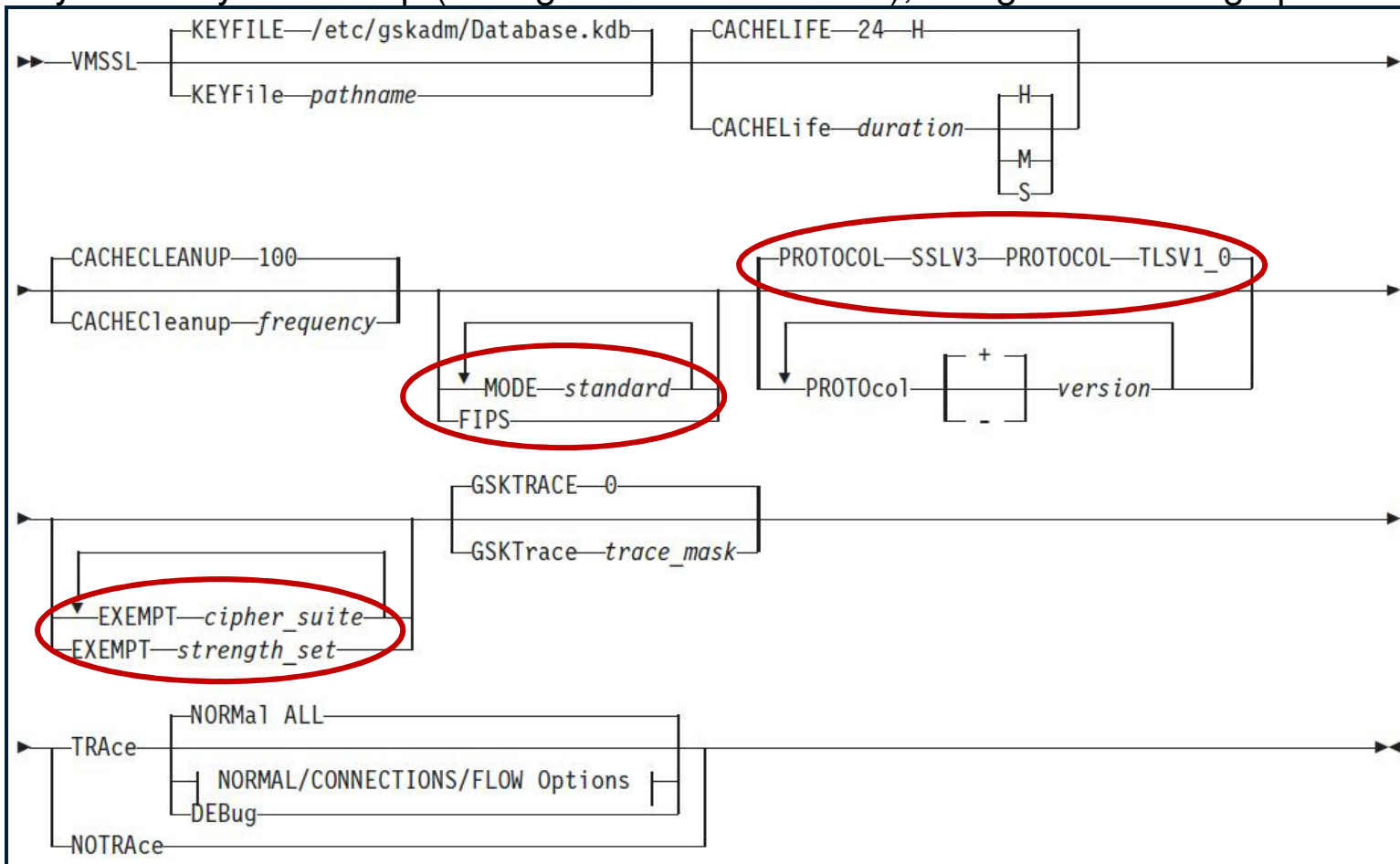
z/VM 6.3 Follow-On Service for the SSL Server

- *APAR PM95516 – Enablement of Pre-Initialization FIPS 140-2 Compliance*
 - Adaptation to meet new Implementation Guidance rules for FIPS
 - Support for an environmental variable GSK_DEFAULT_FIPS_MODE
 - Enables an “Always-On” FIPS
 - Refutes attempts to change FIPS state after initialization completes
 - SSL Server code changes to detect and obey this environmental variable

- *APAR PM93363 – z/VM 6.3 SSL Server ‘Mode’ Support*
 - New keyword ‘MODE’ enables a particular cryptographic standard mode
 - NIST SP 800-131a compliance mode
 - TLS 1.2 and SHA2 exclusive
 - Minimum key exchange size of 2048

z/VM SSL Server News – Protocol Selection

- Configuration can be done either statically (through the DTCPARMS file) or dynamically at start-up (through the VMSSL EXEC), using the following operands:



z/VM SSL Server Options

- Specified either on VMSSL (command-line exec) or DTCPARMS
- Persists for the run-time for a server or server pool. Must be consistent for all members of a server pool
- Options:
 - **KEYFILE** – BFS location of the certificate database
 - **CACHELIFE** – for secure connections, in hours, minutes, seconds
 - **CACHECLEANUP** – processed every n connections
 - **MODE** – sets a cryptographic compliance mode
 - **MODE FIPS-140-2**
 - **MODE NIST-800-131A**
 - **FIPS** – equivalent to **MODE FIPS-140-2**
 - **PROTOCOL** – enable or disable SSL/TLS levels.
 - **SSLV3** and **TLS 1.0** enabled by default
 - **Available protocols change based on MODE**
 - **EXEMPT** – disable particular cipher suites
 - **GSKTRACE** – enable System SSL tracing
 - **TRACE/NOTRACE** – enable SSL Server tracing
 - Can be dynamically manipulated via authorized commands

z/VM SSL Server News – TLS 1.2 Support

High	Medium	Low	None
3DES_168_SHA	RC4_128_SHA	RC2_40_MD5	NULL
DH_DSS_3DES	RC4_128_MD5	RC4_40_MD5	NULL_SHA
DH_RSA_3DES	RSA_AES_128	DES_56_SHA	NULL_MD5
DHE_DSS_3DES	RSA_AES_128_SHA256	DH_DSS_DES	NULL_SHA256
DHE_RSA_3DES	DH_DSS_AES_128	DH_RSA_DES	
RSA_AES_256	DH_DSS_AES_128_SHA256	DHE_DSS_DES	
RSA_AES_256_SHA256	DH_RSA_AES_128	DHE_RSA_DES	
DH_DSS_AES_256	DH_RSA_AES_128_SHA256		
DH_DSS_AES_256_SHA256	DHE_DSS_AES_128		
DH_RSA_AES_256	DHE_DSS_AES_128_SHA256		
DH_RSA_AES_256_SHA256	DHE_RSA_AES_128		
DHE_DSS_AES_256	DHE_RSA_AES_128_SHA256		
DHE_DSS_AES_256_SHA256			
DHE_RSA_AES_256			
DHE_RSA_AES_256_SHA256			

Legend:
 TLS 1.2 only
 Not in TLS 1.2
 Not in TLS 1.1 or 1.2

Note 1: Cipher suites can be exempted from processing based on either cipher name or by strength set, per the above (but not both).

Note 2: Exempting by strength automatically exempts a lower strength!

Note 3: Ciphers are negotiated on a per-handshake basis and are protocol-dependent.

z/VM SSL Server News – Mode Selection

- **MODE FIPS-140-2**
 - Replaces 'FIPS' keyword
 - Minimum Protocol of TLS 1.0
 - Export ciphers restricted
 - Minimum key exchange value of 1024
 - FIPS-compliant database required
 - Integrity checking (HMAC-SHA256)
 - Known Answer Tests

- z/VM has been FIPS-compliant since V6R1

- ***NEW* MODE NIST-800-131A**
 - Minimum Protocol of TLS 1.2
 - Minimum key exchange value of **2048**
 - **DSA certificate usage prohibited!**
 - Minimum hash of SHA2
 - No certificate database requirements
 - Integrity checking only (HMAC-SHA256)
 - Supersedes FIPS-140-2 where applicable

- Requires **PM93363** (z/VM 6.3 only)



“How To”: Select Protocols and Modes for your SSL Server

If we specify ...

[Default Settings]:
PROTOCOL +TLSV1_0
PROTOCOL +SSLV3

[New Protocols]:
PROTOCOL +TLSV1_1
PROTOCOL +TLSV1_2

MODE FIPS-140-2

MODE NIST-800-131A

EXEMPT MEDIUM

```
SSL00001  Enabled  TLSV1_2
SSL00001  Disabled  TLSV1_1  TLSV1_0  SSLV3  SSLV2

RSA_AES_256_SHA256  DH_RSA_AES_256_SHA256
DHE_RSA_AES_256_SHA256  RSA_AES_256  DH_RSA_AES_256
DHE_RSA_AES_256  DHE_RSA_3DES  DH_RSA_3DES
```

- MODE FIPS-140-2 and MODE NIST-800-131A have additional restrictions:
 - Certificate key minimum of 1024 for FIPS, and FIPS-mode database required
 - Certificate key minimum of 2048 for NIST, and SHA-2 only
- MODE overrides specified PROTOCOL statements
 - FIPS requires a minimum protocol level of TLS 1.0
 - NIST requires a minimum protocol level of TLS 1.2
- Plan ahead if MODE support is a requirement for your configuration!

z/VM Security News:

SMAPI and xCAT Security in z/VM



z/VM and the Art of Secure Provisioning

- The SMAPI virtual machines receive instructions from other mechanisms
 - xCAT (the eXtreme Cloud Administration Toolkit)
 - IBM Wave for z/VM
 - Other vendor products
- Virtual machines using SMAPI must be authorized in a SMAPI control file
 - Authorize **per requester**, **per target**, **per function**
- Connections to SMAPI can either be via TCP/IP or via IUCV
 - If using IUCV, use discretion in assigning IUCV statements to the directory
 - If using TCP/IP, consider using the SSL server, e.g.

PORT

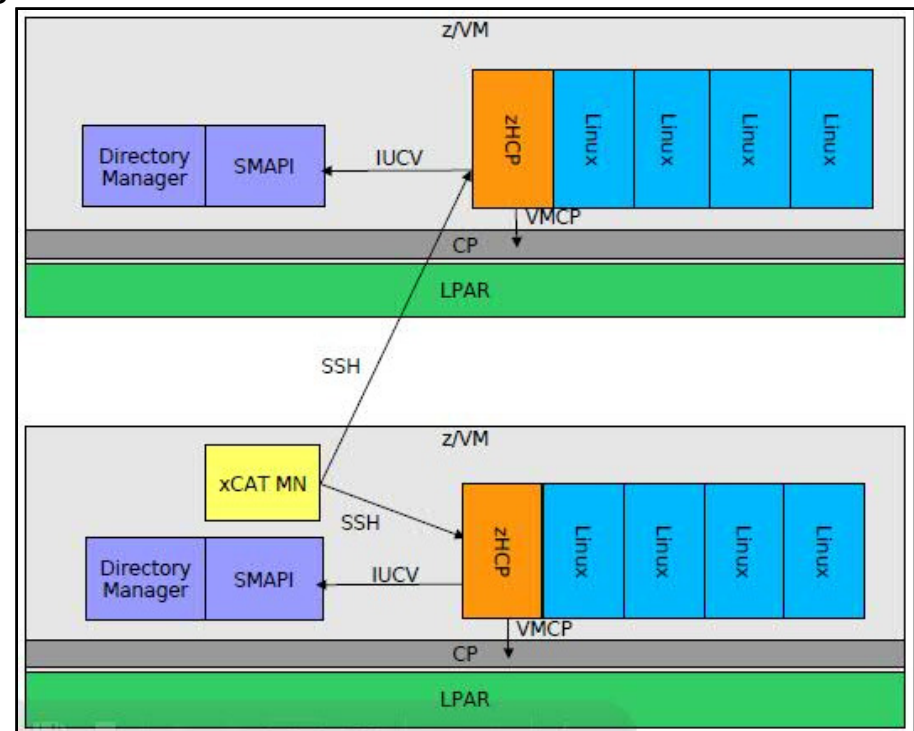
```
44444 TCP VSMREQIN      SECURE VSMCERT1
```

- **SMAPI will need RACF authorities to do its job**
 - *Audit SMAPI requests as appropriate!*
 - See “Appendix F” of the *z/VM Systems Management Application Programming Guide*

z/VM and the Art of Secure Provisioning

- xCAT support allows for the rapid provisioning of Linux guests running under z/VM
 - Bypass the “System z learning curve”
 - Interfaces in common with other systems

- **Note:** using xCAT **does not remove** the need for system security!
 - It wraps around *existing* z/VM function
 - It does *not* create security policy on the system
 - There is a difference between “securing the administrative interface” and “securing the hypervisor”



z/VM and the Art of Secure Provisioning

- **New virtual machines come preinstalled with z/VM 6.3 – understand what they do!**
 - Defined as Multiconfiguration Virtual Machines (one per SSI member)
 - Class G by default, but will need access to certain commands from Classes A, B, and C.
 - OPTION LNKNOPAS by default
 - Will use their own separate VSWITCH – isolated network traffic
 - If you're not using this support, convert them to NOLOG.
 - As you would with any other preinstalled virtual machine, right?

- **XCAT and Openstack do not obviate the need for an External Security Manager**
 - **Do** give the XCAT virtual machines appropriate RACF access to do their jobs
 - **Do not** let them exceed the scope of their responsibility

- For more information about xCAT on z/VM:
 - Visit <http://www.vm.ibm.com/sysman/>

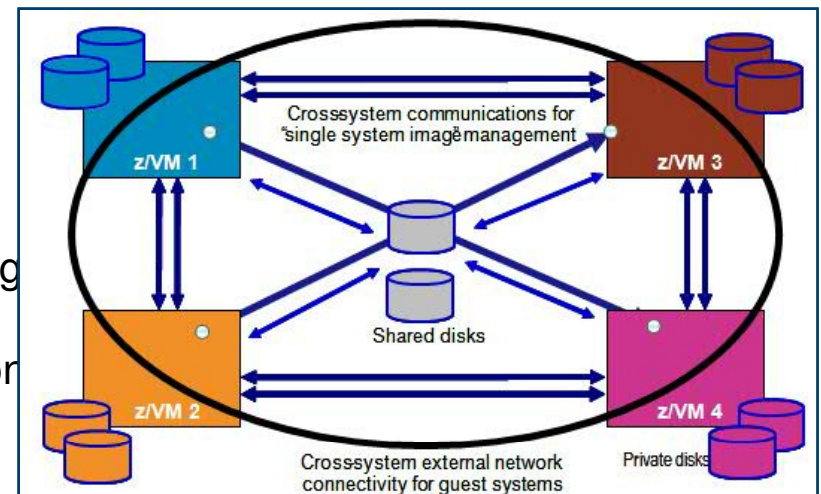
z/VM Security News:

RACFVM for Single System Image (SSI)



Security in an z/VM Single System Image Cluster

- A userid has the same password on all systems (Single- or Multi-Configuration)
- A Single Configuration Virtual Machine can only log onto one member of the cluster
 - Error message just like logging onto a userid on the same system



- A Multi-Configuration Virtual Machine is a distinct construct on each system
- A userid's privilege classes are the same on every system
 - A common source directory definition
- The cluster maintains a **single security context** for the entire system
 - And an ESM, as with stand-alone systems, extends these capabilities

RACF in a z/VM Single System Image Cluster

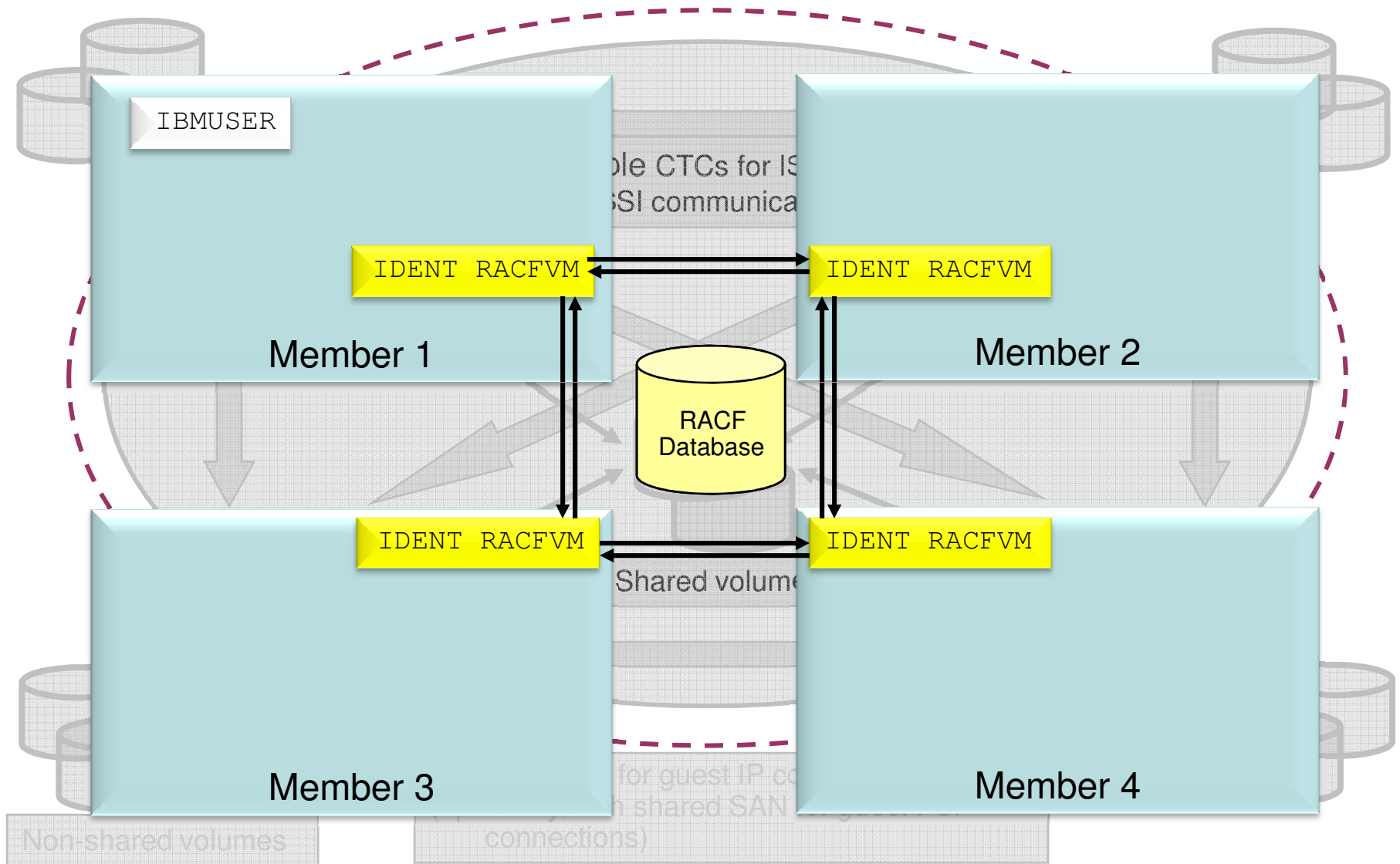
- When installed in an SSI, RACF creates *a single security context* for the cluster
 - Shared database and definitions
 - Handshaking of RACFVM instances
 - Cluster-aware auditing

- RACF for SSI is for the entire cluster, it's not something you can enable one step at a time.

- RPIDIRCT has been updated to handle both single-configuration and multi-configuration virtual machines
 - ****New*** In a mixed-level cluster, use the highest-level RPIDIRCT*

- The virtual machines have been modified to operate both in and out of an SSI ...

RACF in a z/VM Single System Image Cluster



RACF Virtual Machines in an SSI cluster

Handshaking and Command Propagation

- Locking done to ensure RVAR Y submissions are handled sequentially
- Commands that create broader changes need to be propagated across the cluster
 - SETROPTS
 - RVAR Y
 - SETEVENT
- RACF will suppress “extra” messages and marshal output when executing “remotely.”
- RAC command, ISPF panels, and R_Admin API (used by LDAP) are interfaces which support command propagation (not the RACF command sessions)
- The propagated commands output from each RACF server on each system is bracketed by the lines:
 - OUTPUT FROM <racfname> ON SYSTEM <ssinode>
 - END OF OUTPUT

The RACF Database in an SSI

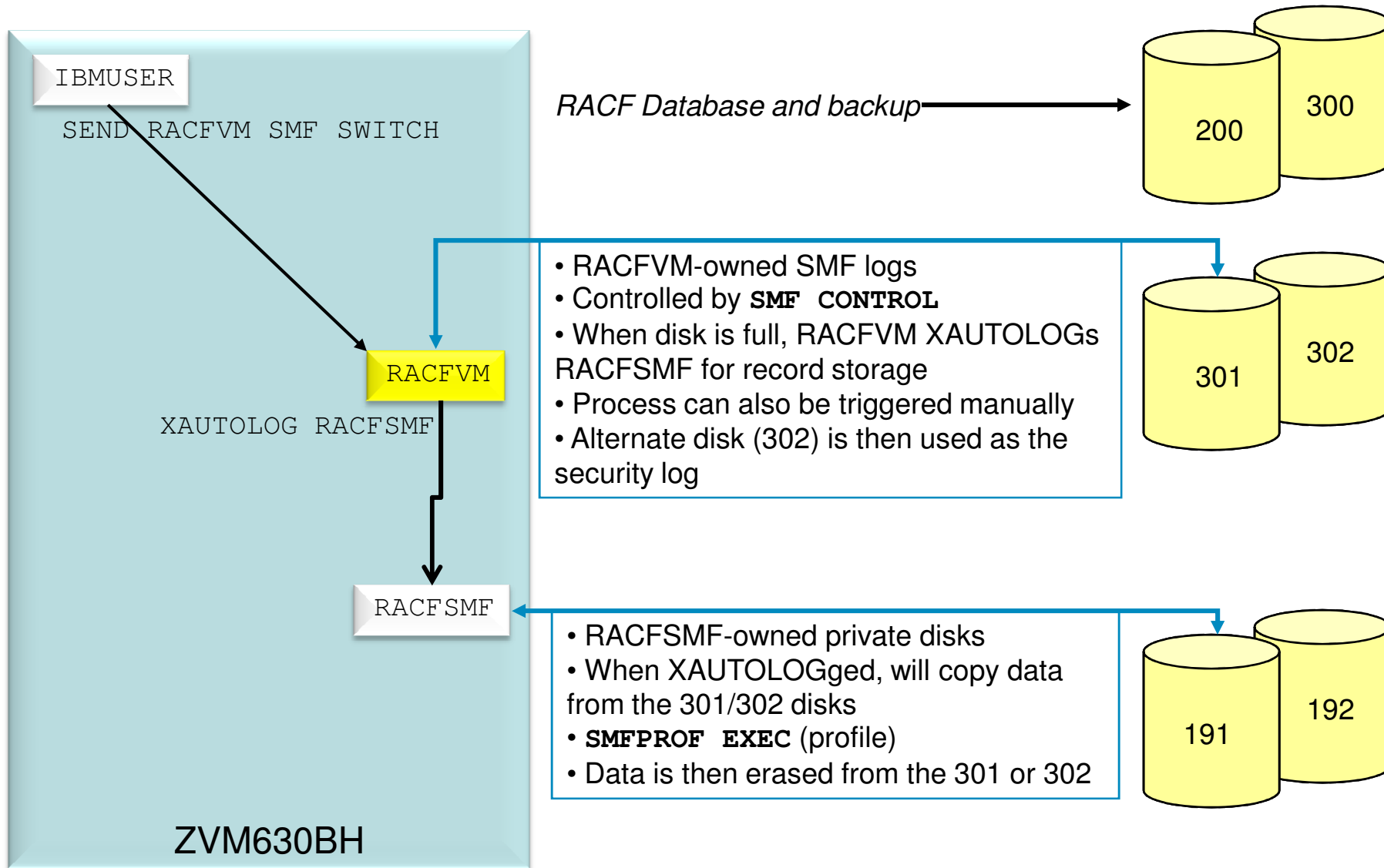
- All RACF servers in SSI must **share** the same RACF database
 - Databases are shareable today
 - Maintain a single security context; no confusion in security policy

- RACF database in SSI must be fullpack minidisk, must support reserve/release and can't be an FBA device
 - Full-pack 3390s for both the primary (200) and backup (300)
 - RDEVICE statements for each in the System Configuration file
 - Minidisk caching is automatically turned off

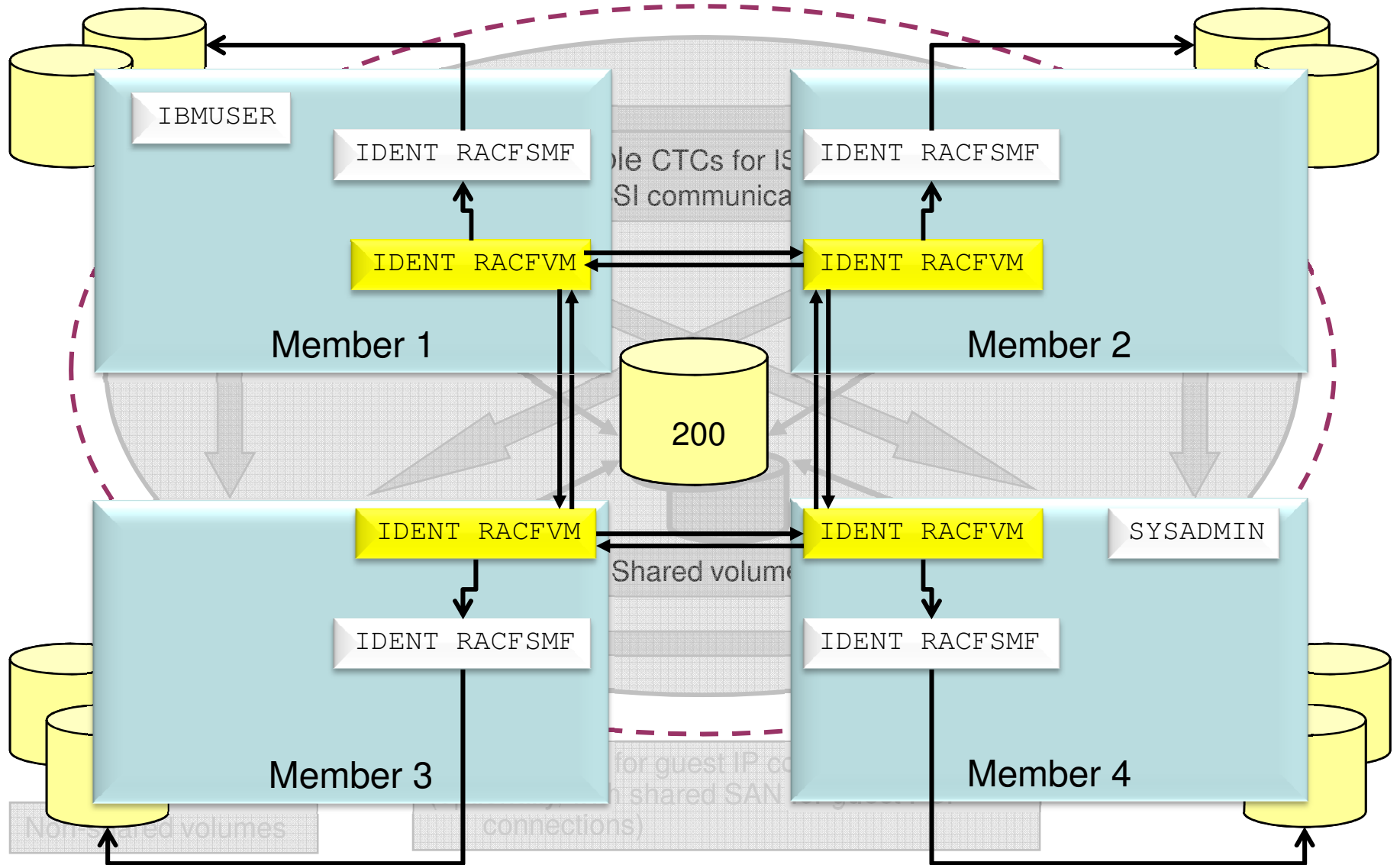
```
RDEVICE 200 TYPE DASD SHARED YES /* Default RACFVM db */  
RDEVICE 300 TYPE DASD SHARED YES /* Backup RACFVM db */
```

- Database synchronization
 - When a member joins, CP+RACF will ensure that the joining server has identical database datasets to those being used and active in the SSI
 - Automatic propagation of RVARY commands

Auditing RACFVM (An Overview)



Auditing RACFVM (Cluster View)



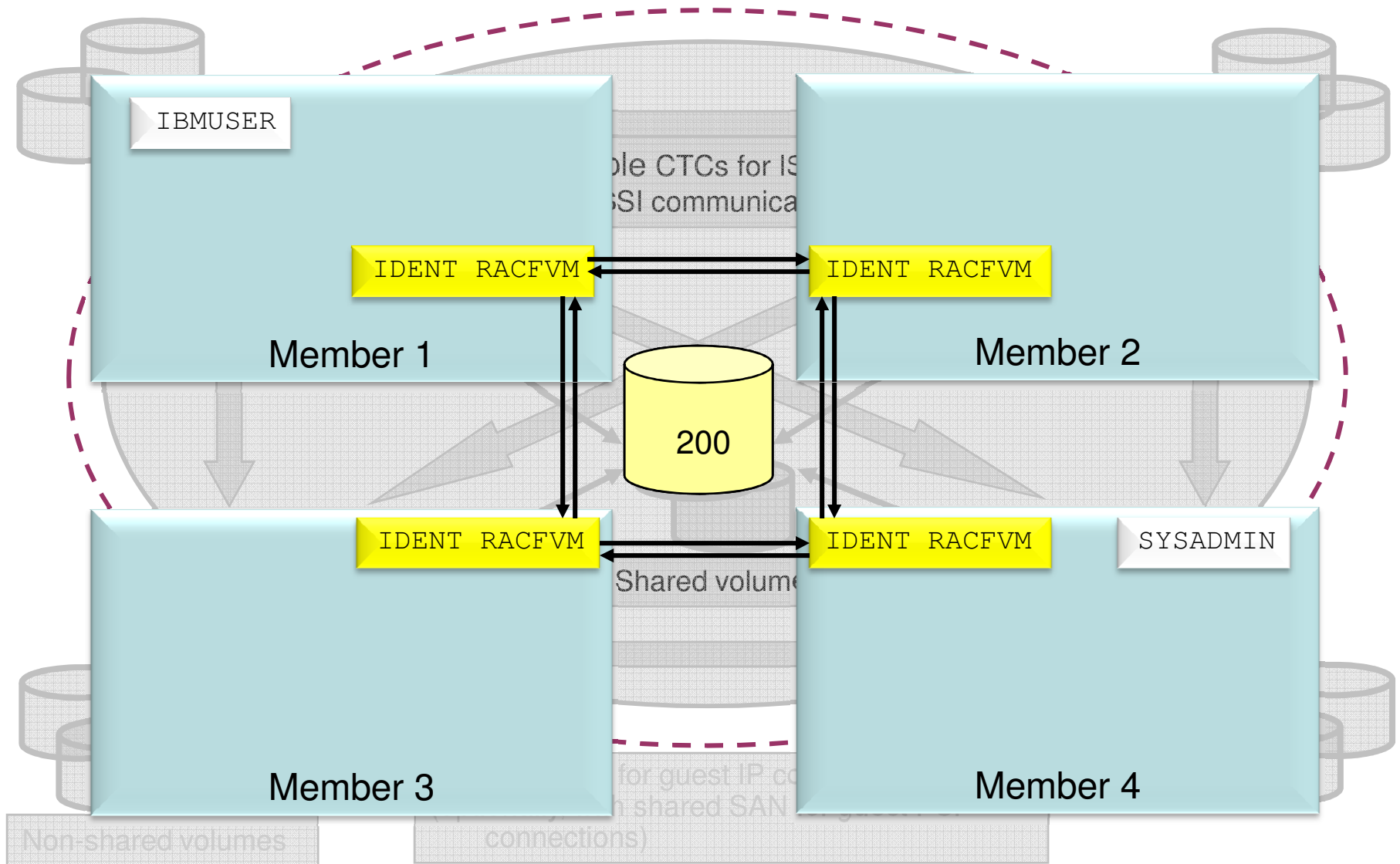
Auditing RACF in a Single System Image cluster

- RACFVM and RACFSMF are multi-configuration virtual machines
 - Shared RACF database
 - **All other disks are local** – including 301 and 302 for auditing
 - RACFVM: Separate SMF CONTROL files operating against a single security context
 - RACFSMF: Separate SMFPROF EXEC files, 191 and 192 disks

- In the case of some commands – the AT command in particular – auditing records will appear on the destination system
 - AT_LOGON, AT_FROM, AT_LOGOFF

- Auditing automation should account for this disparity to gather all pertinent audit records
 - Make sure all SMF CONTROL files are modified as appropriate
 - Make sure auditing policy and SMF records are managed accordingly

RACF and Live Guest Relocation



RACF and Live Guest Relocation

Live Guest Relocation

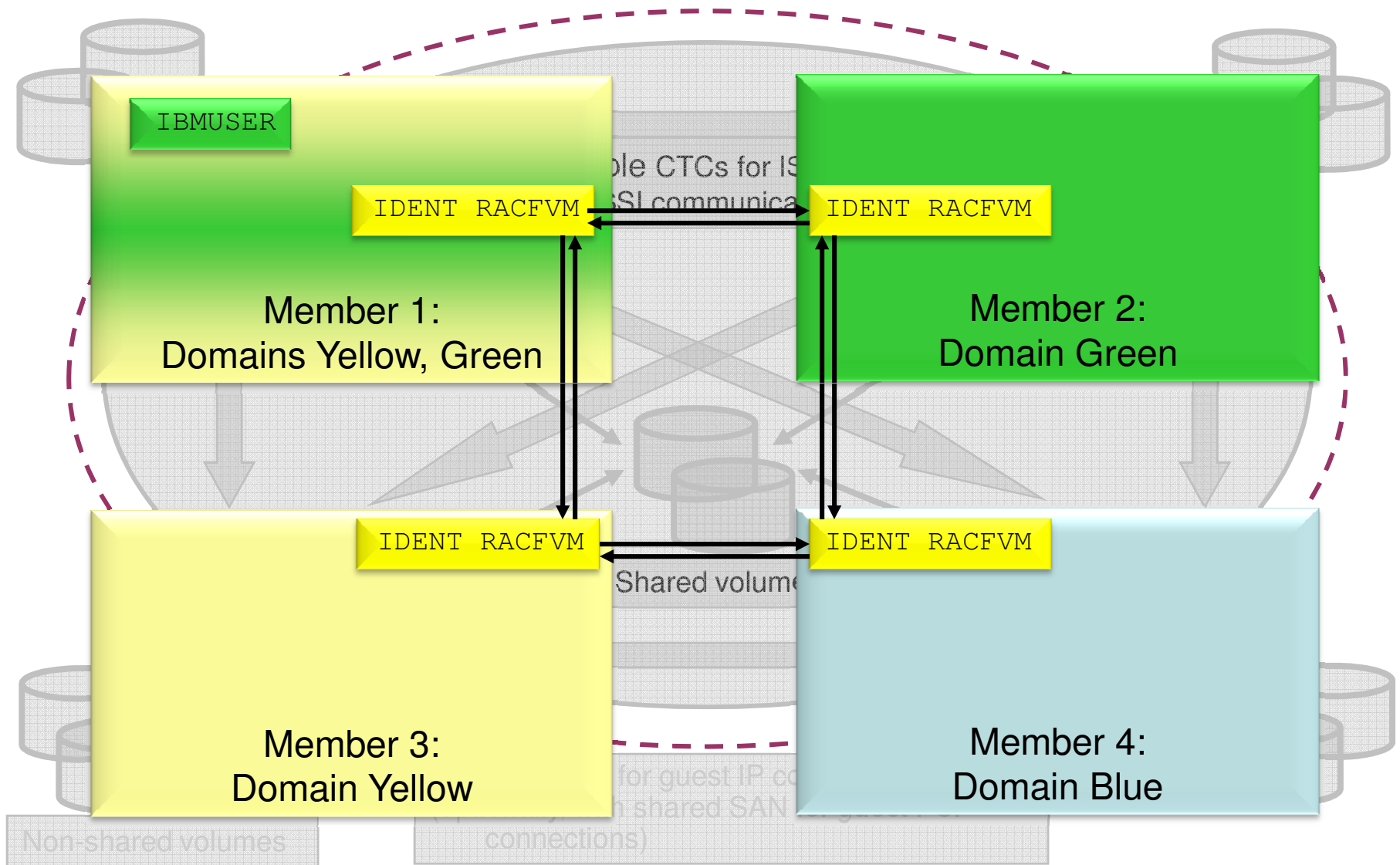
- VMRELOCATE MOVE USER *userid* TO *sysid*
 - Class A command

- RACF cleans up a user's presence on the source system, and prepares for the target system for the relocate-logon of the user

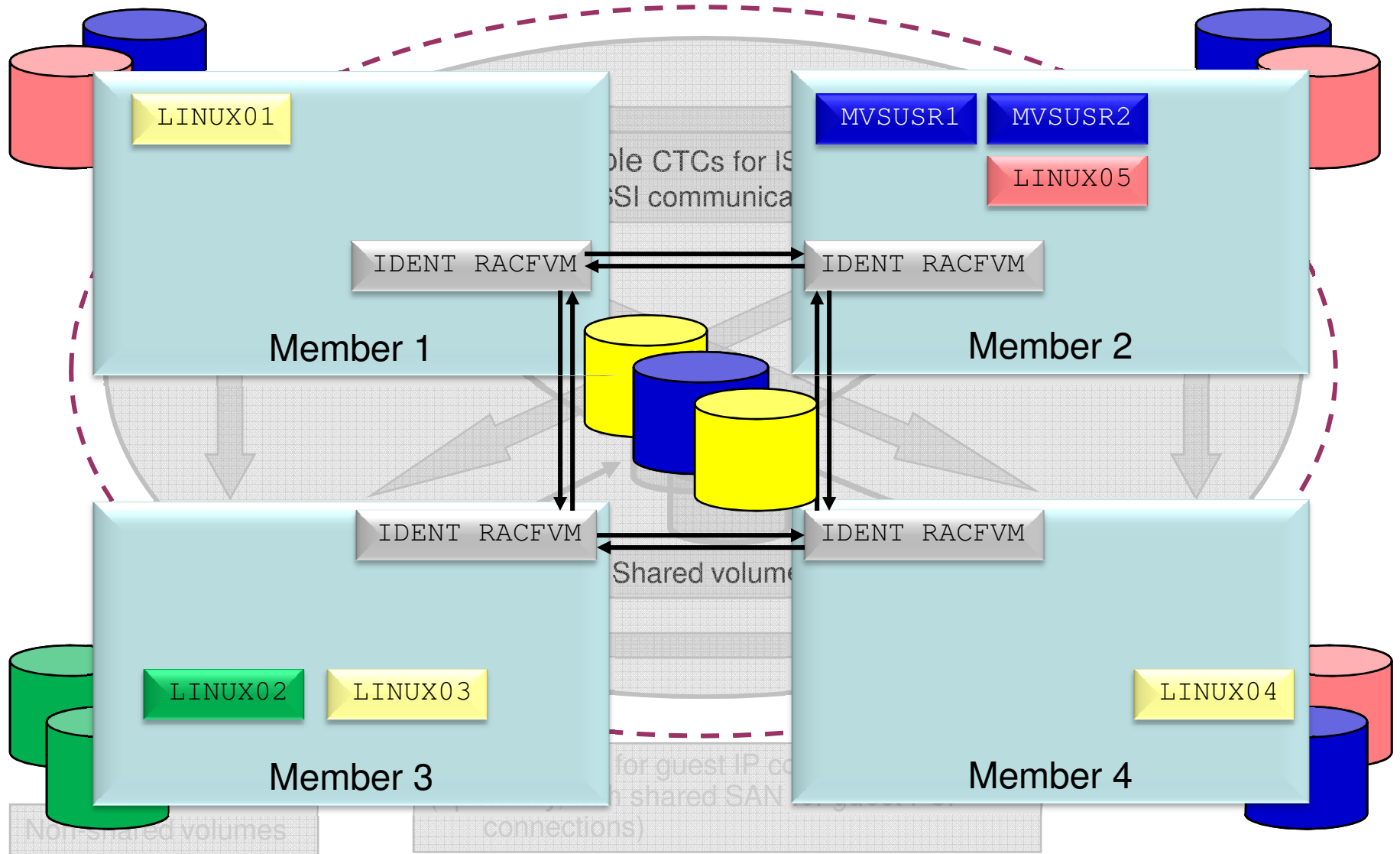
- Generate LOGOFF/LOGON auditing events on source/target system, to note the transition

- RACF perspective of relocate events:
 - User data is created for *userid* on *sysid* with all the above
 - User resources are allocated on *sysid*
 - Associated authorization calls are approved without a RACF check
 - Relocate-logon is requested for *userid* on *sysid* when the inbound relocation is complete

Security Zones and Labeling (Cluster View)



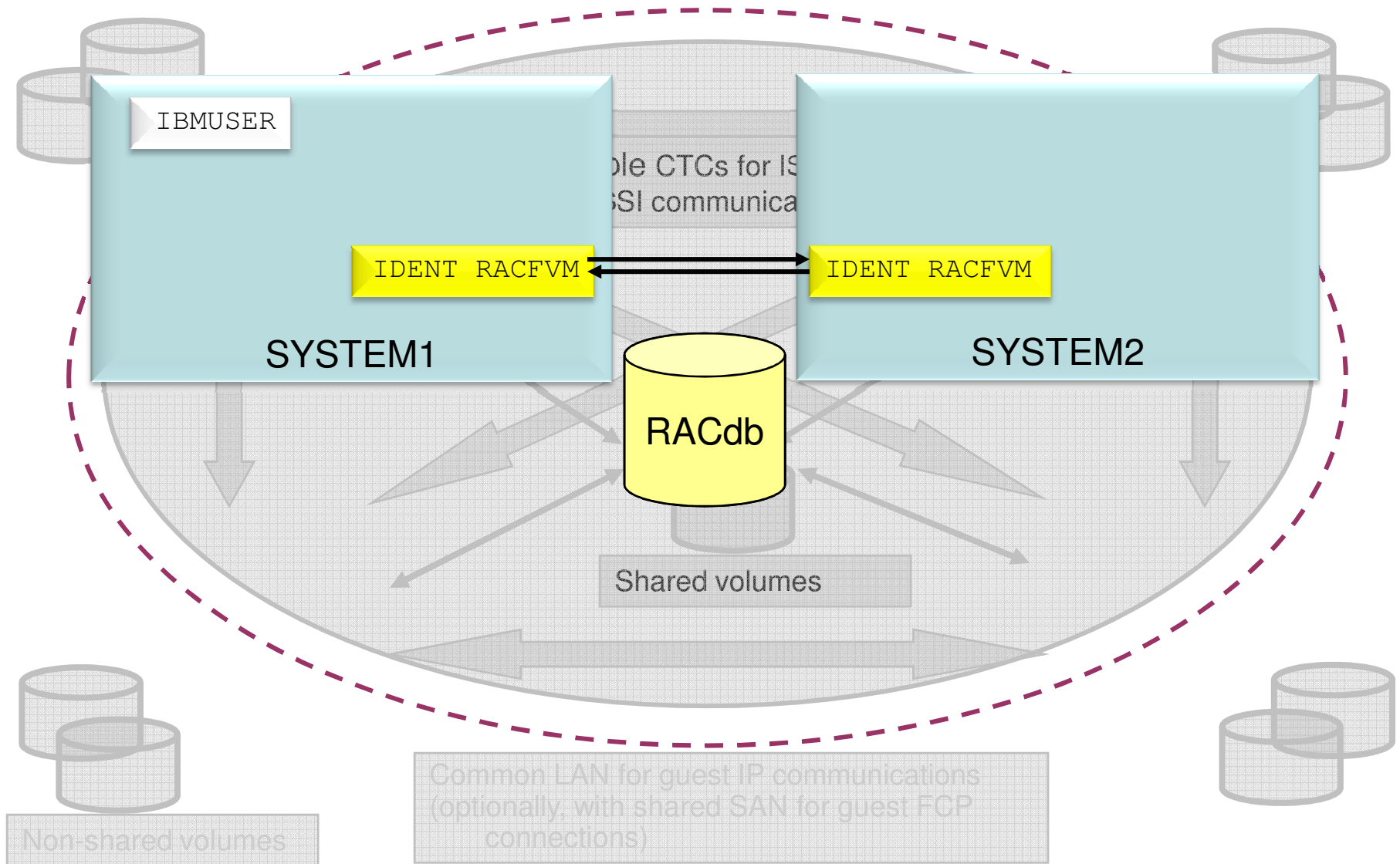
Security Zones and Labeling (Cluster View)



Migrating to RACF in an SSI

- **You can have an ESM and still migrate to SSI!**
 - Step 1: If you don't have an ESM, get one.
 - Line up the shared DASD required for the database; remember that this needs to be a fullpack minidisk!
 - If you're converting one or more ESM-controlled systems into an SSI:

Migrating to RACF in an SSI



Migrating to RACF in an SSI

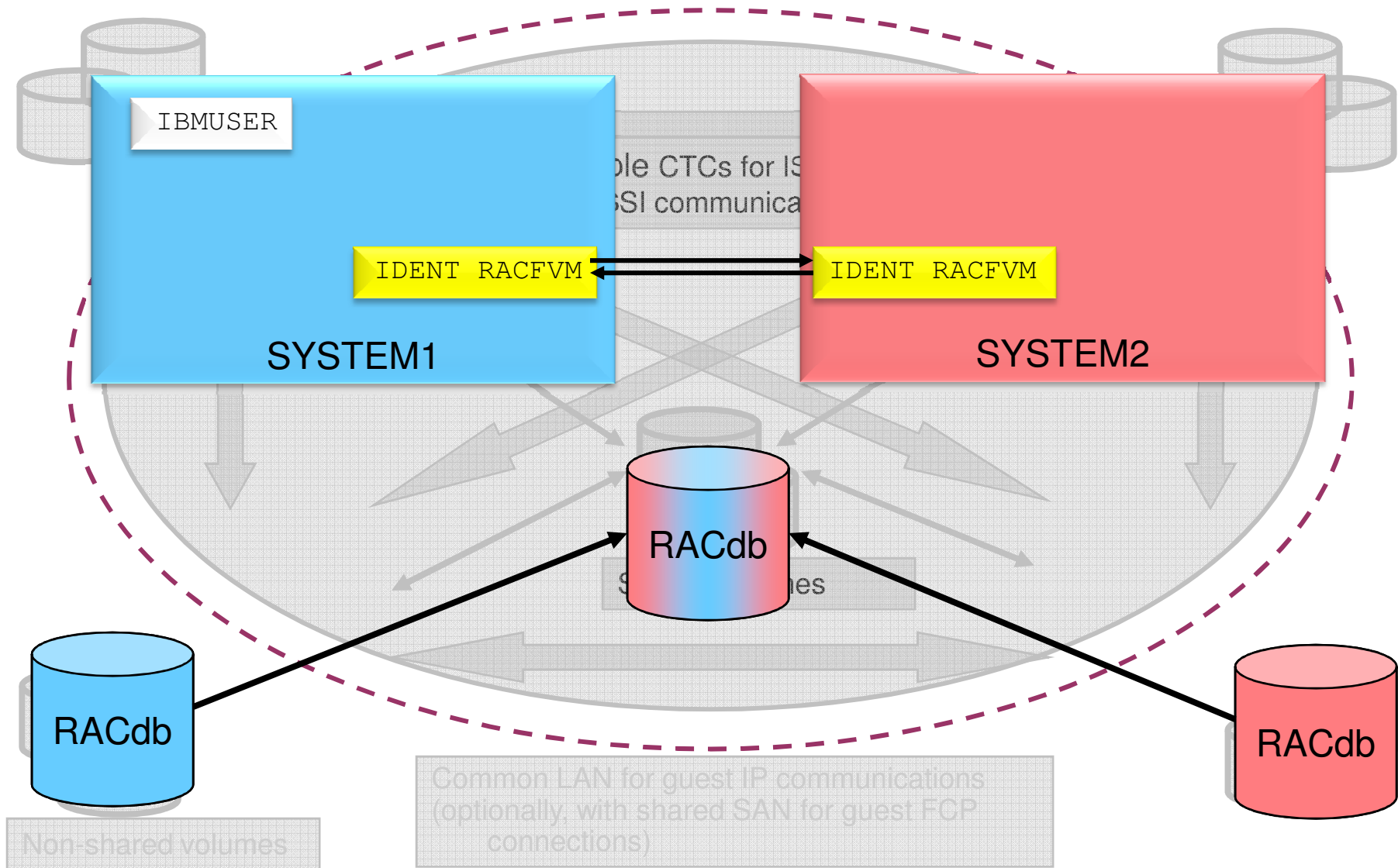
- **You can have an ESM and still migrate to SSI!**
 - Step 1: If you don't have an ESM, get one.
 - Line up the shared DASD required for the database; remember that this needs to be a fullpack minidisk!
 - If you're converting one ESM-controlled systems into an SSI:
 - Migrate to 6.2 in a **non-SSI format**
 - Convert associated resource profiles to 6.2 format, using RPIDIRCT as necessary
 - Take the steps to enable SSI; turn on RACFVM as part of the outlined process
 - Note for z/VM 6.3: RPIDIRCT is now located on the PMAINT.551 minidisk
 - For mixed-release z/VM clusters
 - Change to existing RACFVM machine definitions

Notes on Using a Fullpack Minidisk for the RACFVM Database

- If you're migrating from a non-SSI RACF-secured system, you may need to **convert your database** to reside on a Fullpack Minidisk
 - DDR the Database (and backup) to the Fullpack minidisk
 - Increase database allocation if pertinent (e.g., merging multiple systems)
 - Remember to issue RACFCONV to upgrade if installing new support at the same time
- Refer to the *RACF System Programmer's Guide* (SC24-6219-02) for more information
 - Chapter 4: "Operating Considerations Unique to z/VM"
 - Subheading: "RACF Database on Fullpack Minidisk"



Migrating to RACF in an SSI



Migrating to RACF in an SSI

- **You can have an ESM and still migrate to SSI!**
 - Step 1: If you don't have an ESM, get one.
 - Line up the shared DASD required for the database; remember that this needs to be a fullpack minidisk!
 - If you're converting one or more ESM-controlled systems into an SSI:
 - Migrate to 6.2 in a non-SSI format
 - Convert associated resource profiles to 6.2 format, using RPIDIRECT as necessary
 - Take the steps to enable SSI; turn on RACFVM as part of the outlined process
 - If you're converting two (or more) distinct ESM-controlled systems to an SSI
 - **You will need to merge the databases**
 - You may want to consider which of your 2+ systems has the most complex security context before choosing which one is the "master" system
 - After one system is enabled, make directory and RACF database updates for the secondary system

z/VM Security News:

Any questions?





Compliance

Certifications validate the high standard of z/VM security. z/VM intends to pursue a rating of EAL 4+ to the OSPP of the Common Criteria, and is evaluating System SSL for FIPS 140-2 and NIST SP 800-131a compliance.



Confidentiality

z/VM continues to deliver functional updates to keep pace with modern security requirements, via support for new cryptographic developments and the maintenance of security policy in a Single System Image environment.



Confidence

With over forty years of security design, delivery and evaluation experience, z/VM continues to secure the road to Smarter Computing.


For More Information ...

On the web:

- z/VM Security: <http://www.VM.ibm.com/security>
- System z Security: <http://www.ibm.com/systems/z/advantages/security/>
- **Security for Linux on System z** (SG24-7728), IBM RedBooks
- z/VM Secure Configuration Guide:
<http://publibz.boulder.ibm.com/epubs/pdf/hcss0b30.pdf>



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Dank u

Dutch

Merci

French

Спасибо

Russian

Gracias

Spanish

شكراً

Arabic

감사합니다

Korean

Tack så mycket

Swedish

धन्यवाद

Hindi

תודה רבה

Hebrew

Obrigado

Brazilian
Portuguese

谢谢

Chinese

Dankon

Esperanto

Thank You

ありがとうございます

Japanese

Trugarez

Breton

Danke

German

Tak

Danish

Grazie

Italian

நன்றி

Tamil

děkuji

Czech

ขอบคุณ

Thai

go raibh maith agat

Gaelic