IMS15 IMS and VTAM, an Update (VGR, RNR, and MNPS XRF)

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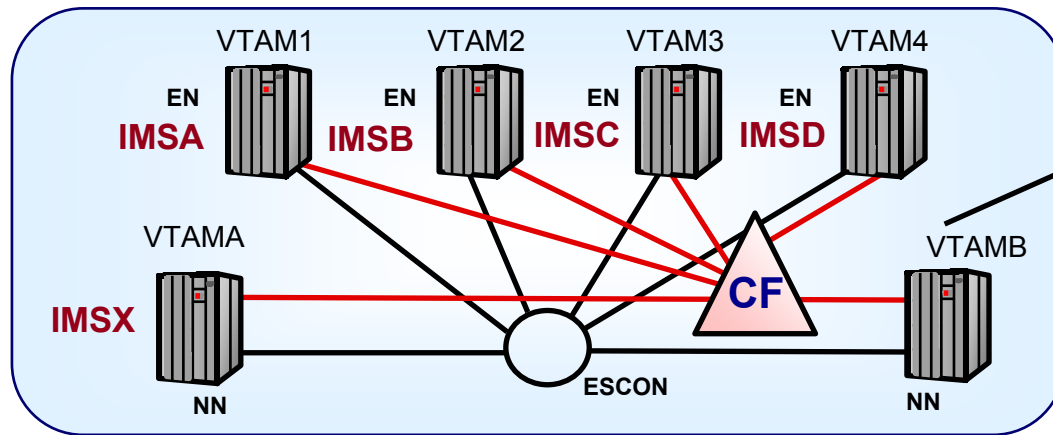# IMS and VTAM, an Update (VGR, RNR and MNPS XRF)

- VTAM Generic Resources (VGR)
  - IMS V7
  - IMS V8
  - IMS V8 and z/OS 1.2

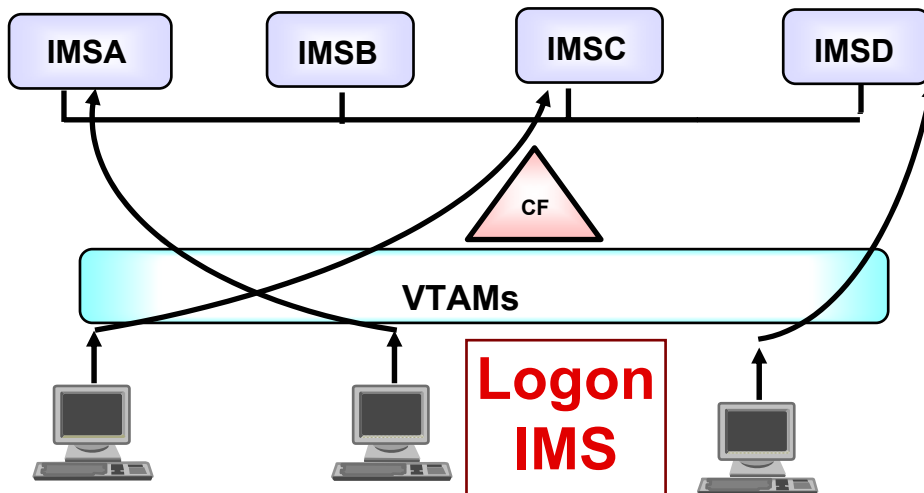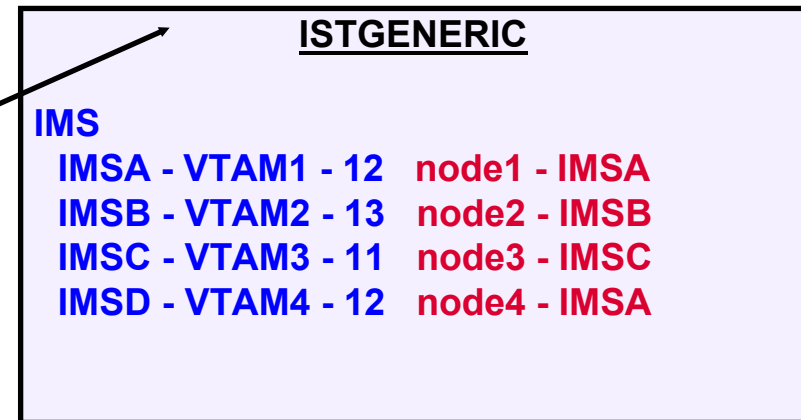- Rapid Network Reconnect (RNR)

- MNPS XRF in IMS V9

VTAM Generic Resources (VGR)

Background - VGR

CF STRUCTURE

VTAM1   VTAM2   VTAM3   VTAM4

EN   EN   EN   EN

IMSA   IMSB   IMSC   IMSD

VTAMA

VTAMB

IMSX

CF

ESCON

NN   NN

ISTGENERIC

IMS
- **IMSA - VTAM1 - 12   node1 - IMSA**
- **IMSB - VTAM2 - 13   node2 - IMSB**
- **IMSC - VTAM3 - 11   node3 - IMSC**
- **IMSD - VTAM4 - 12   node4 - IMSA**

IMSA   IMSB   IMSC   IMSD

CF

VTAMs

**Logon
IMS**

★**Single system image for multiple IMSs**

★**Enhanced application availability**

★**Load balancing**

★**Easy expansion of application capacity**

★**Enables subsystems to be easily moved**

★**Requires VTAM V4R2 and**

Coupling Facility

★**Requires APPN within the Sysplex**

Terminology

- Generic Resource Group (GRG)
  - A group of VTAM applications with a common name

- Generic Resource Member (Instance)
  - A single VTAM application which has joined a generic resource group

- Generic Resource Name (GRSNAME)
  - Common name for all members of VTAM Generic Resource Group (e.g. IMS)
  - Must be different from any VTAM application's APPLID

Terminology …

- VTAM APPLID

  – Name for specific VTAM application (e.g. IMSA)

- Affinity

  – The mapping of an LU to a specific Instance

  – Established through resource resolution

Background – VGR …

- /START DC
  - IMS joins the Generic Resource Group (GRSNAME=IMS)

- When the first IMS (IMSA) joins a generic resource group
  - VTAM creates the GRG (IMS)
    - Adds IMSA to the Member List in ISTGENERIC

Background – VGR …

- As new members (IMSB, ...) join the group
  - VTAM adds them to the list

```
I S T G E N E R I C
IMS

 IMSA  -  VTAMA  -  0
 IMSB  -  VTAMB  -  0
 ....
```

Background – VGR …

- User (node3) logs on with generic name (LOGON IMS)
  - VTAM connects node3 to any available member
    - Updates affinity table to indicate node3 affinity for the selected member (IMSD)

- User (node4) logs on with specific APPLID (LOGON IMSA)

  - VTAM connects user to specific IMS (IMSA)

ISTGENERIC	
IMS	
IMSA - 550	**node1 - IMSA**
IMSB - 549	**node2 - IMSB**
IMSC - 552	
IMSD - 0	

| ISTGENERIC	
IMS	
IMSA - 551	**node1 - IMSA**
IMSB - 549	**node2 - IMSB**
IMSC - 552	**node3 - IMSD**
IMSD - 1	**node4 - IMSA**

Note: VGR does not apply to MSC connections

Background – VGR …

AFFINITY: A mapping of a node to a specific member (IMS)

- Affinity is set when a session is first established
  - VTAM maintains the affinity table in ISTGENERIC
    - When a node requests a session using the GRSNAME, VTAM checks to see if an affinity exists

    - Special considerations for ISC parallel sessions

Member List ⇒	ISTGENERIC	⇐ Affinity Table ★
	IMS	
	IMSA - 551 node1 - IMSA	
	IMSB - 549 node2 - IMSB	
	IMSC - 552 node3 - IMSD	
	IMSD - 1 node4 - IMSA	
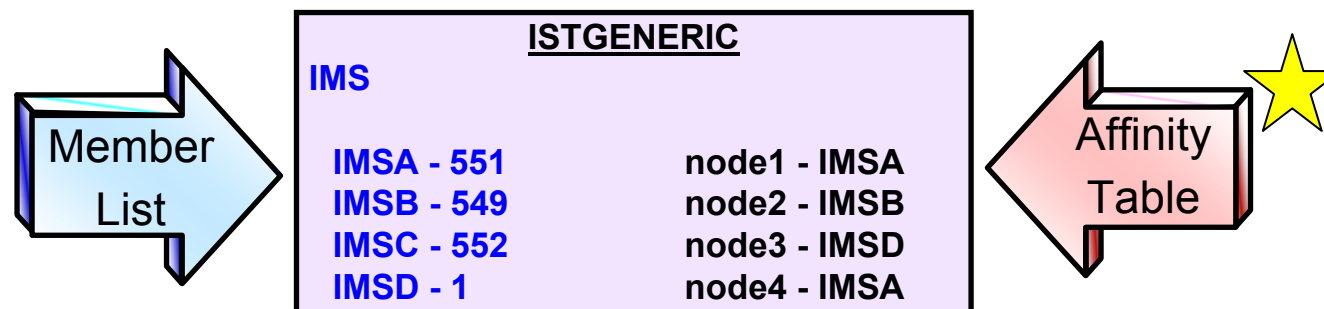
IMS Considerations

- VGR-related IMS status conditions (significant status)

  - Maintained in control blocks of local IMS
  - Not known to other IMS's in the generic resource group (GRG)
  - Has no significance to VTAM

IMS Considerations …

- VGR-related IMS status conditions (significant status)
  - Significant status:
    - Conversation mode
    - Full function response mode
    - Fast Path response mode (new)
    - Exclusive mode
    - Test or MFS mode
    - Preset mode
    - STSN sequence number

IMS Options

- IMS V7 execution options: GRAFFIN and GRESTAE

  - GRAFFIN = <u>IMS</u> / VTAM
    - System option that specifies which component is to manage the Generic Resource affinities and the handling of significant status

  - GRESTAE = <u>Y</u> / N
    - System option that defines whether or not IMS should reset affinities (CLSDSTs) during ESTAE processing

IMS V7 - GRAFFIN = IMS

- IMS controls the deletion of affinities

- Affinity deletion may occur at session term (logoff)

  – Special treatment for ISC, SLUP/Finance, ETO, nodes that have a VGR-related status or condition

- Affinities are not deleted for MVS/VTAM/CEC failures

  – IMS ESTAE not driven

- If affinity is not deleted at session termination

  – Next logon to generic name establishes session with existing affinity - may need to wait for an IMS restart

IMS V7 - GRAFFIN = VTAM

- VTAM manages non-ISC affinities at session termination
  – ISC affinity still managed by IMS

- Allow VTAM to reset affinity at failure:
  – IMS, MVS, CEC, VTAM, network/session terminations

- Re-establish the terminal session immediately with any surviving IMS in group

VGR-Related IMS Status

- GRAFFIN=IMS (includes ISC regardless of GRAFFIN)
  - Significant status is not automatically reset by IMS
    - restored when user logs back on to same IMS
    - Existing status can prevent deleting the affinity
    - Can be reset by Signoff Exit (DFSSGFX0) for ETO and by Logoff Exit (DFSLGFX0) for static terminals

- GRAFFIN=VTAM
  - Significant status deleted in original IMS
    - For ETO: at signoff, prior to calling DFSSGFX0 exit
    - For Static: at logoff, prior to calling DFSLGFX0 exit
    - Or, if not reset at signoff/logoff due to failures (IMS, MVS, CEC): at logon/signon after restart

GRESTAE

- DFSDCxxx option: GRESTAE= <u>Y</u> | N
  - Only applicable when GRAFFIN=IMS
    - Addresses whether IMS ESTAE uses (synchronous) CLSDSTs to release VGR affinity where appropriate
  - GRESTAE=Y (default) continues CLSDSTs for affinity deletion during IMS ESTAE
  - GRESTAE=N bypasses CLSDSTs during IMS ESTAE

- Consideration
  - Possible slow IMS termination versus continued terminal affinity to failed IMS

APPC and Generic Resources

- APPC Generic Resource support within APPC/MVS
  - Session is with APPC/MVS, not with IMS
  - GRNAME= parameter in the LUADD statement of APPCPMxx parmlib member
    - Specifies the APPC/IMS generic resource name
    - Must be different from IMS GRSNAME
  - APPC/MVS registers IMS's generic resource name (GRNAME) with VTAM
    - When the APPC/IMS LU is activated

Affinities and ISC Parallel Sessions

- The first request for a parallel session establishes the guidelines for any subsequent parallel session requests
  - If the first parallel session request specifies the GRSNAME
    - Subsequent requests using the GRSNAME will be routed to the same member IMS
  - If the first parallel session request is for a specific IMS APPLID
    - A subsequent request using a generic name is interpreted by VTAM as a request for a session different from the specific IMS
    - VTAM will select an IMS from the Generic Resource Group excluding the specific IMS

Affinities and ISC Parallel Sessions …

- For all parallel sessions to be established with the same IMS

  – All must request the generic resource name, or …
  – All must request the specific APPLID

IMS V8 Enhancements for VGR

IMS V8 VTAM Generic Resources Affinity

- Takes into consideration the implementation of the Resource Manager (RM)
  - Global resource and process management
  - Terminal and user status recovery between IMSs
- Global resource management uses a resource structure in the Coupling Facility
  - IMSplex global and local member information
  - Resource names and types
  - Terminal and user status
  - Global process status
- Resource structure is optional
  - If resource structure not defined
    - Terminal/user resource status is saved locally and cannot be shared

IMS V8 VTAM Generic Resources Affinity …

- ## Status recovery mode (SRM) – DFSDCxxx parameter
  - Determines where end-user significant status is maintained
    - GLOBAL - in the resource structure (default if structure exists)
    - LOCAL - in local control blocks (default if no structure)
    - NONE - deleted when resource becomes inactive

- ## VGR affinity
  - Routes terminal logon requests to a particular IMS which holds significant status for a resource

VGR and IMS V8

- Pre z/OS V1.2
    - GRAFFIN= keyword continues to determine whether VTAM or IMS manages non-ISC terminal affinity
        - IMS still manages VGR affinity for ISC

- Z/OS V1.2
    - VTAM supports session-level affinity
        - IMS sets the affinity level (IMS or VTAM) during session initiation for every session, including ISC
            - VTAM now supports ISC affinity management
        - GRAFFIN= keyword is ignored

VGR and IMS V8 …

- z/OS V1.2 …

  - VTAM-managed is set for ...
    - Static terminals with SRM=GLOBAL|NONE
    - Static and dynamic STSN terminals (ISC, SLUP, FINANCE) with SRM=GLOBAL|NONE
    - Dynamic non-STSN terminals with any SRM

  - IMS-managed is set for ...
    - Static terminals with SRM=LOCAL
    - STSN terminals with SRM=LOCAL

VGR and IMS V8 …

- z/OS V1.2 …
  - ISC Parallel Sessions
    - VTAM routes all generic logon requests to the same IMS
    - If VGR affinity managed by VTAM (SRM=GLOBAL | NONE)
      - VTAM will not delete affinity until all parallel sessions have been terminated (warm or cold)
    - If VGR affinity managed by IMS (SRM=LOCAL)
      - IMS will not delete affinity until all parallel sessions
        » Are cold terminated
        » Are warm or cold terminated and RCVYSTSN=NO
      - Note: unless session is cold terminated, it will always have end-user significant status (STSN)

VGR Affinity Management Table

TERMINAL	SRM	Managed By
Static	Global, None	VTAM
Dynamic STSN	Global, None	VTAM
Dynamic non-STSN	Any	VTAM
Static	Local	IMS
Dynamic STSN	Local	IMS

When running on z/OS 1.2 or later

- At session initiation, IMS determines whether VTAM or IMS will manage VGR affinity

  – VTAM managed - VTAM deletes affinity at session termination

  – IMS managed - IMS decides at session termination

- Node or user will retain *RM affinity* at session termination

  – If SRM=LOCAL and resource has significant status

    • IMS will not delete VGR affinity, resource, or ownership

IMS V7 to IMS V8 VGR – Bottom Line

- Assumption
  - If you are not running with the Common Service Layer (RM and a resource structure) and Shared Queues in IMS V8
    - SRM=GLOBAL is not supported
  - If you are
    - SRM=GLOBAL is supported

Rapid Network Reconnect (RNR)

Rapid Network Reconnect (RNR)

- DFSDCxxx IMS option RNR = NRNR | ARNR | NONE

  – Implements VTAM persistent session support

- IMS option PSTIMER

  – Specifies time VTAM waits for recovery of the persistent session before terminating sessions

- Goal

  – Higher availability and reduced overhead

    - Quickly re-establishes VTAM sessions following system outages (IMS, MVS, CEC or VTAM)

  – Eliminates session cleanup/restart

Background

- PERSISTENT SESSIONS

    - VTAM Single-Node Persistent Session (SNPS)

        - Reconnect must be on same CEC as original IMS

        - Supports only application (IMS) failure/reconnect

    - VTAM Multi-Node Persistent Session (MNPS)

        - Reconnect may be on another CEC in a sysplex

        - Supports failures/reconnects, including IMS, VTAM, MVS and CEC failures

    - Applies to VTAM nodes supported except MSC

        - Persistent session support for APPC is provided by APPC/MVS

Background ...

Single Node Persistent Session Scenario

IMSA

V
T
A
M

2.   IMSA

1.

terminal a

3.
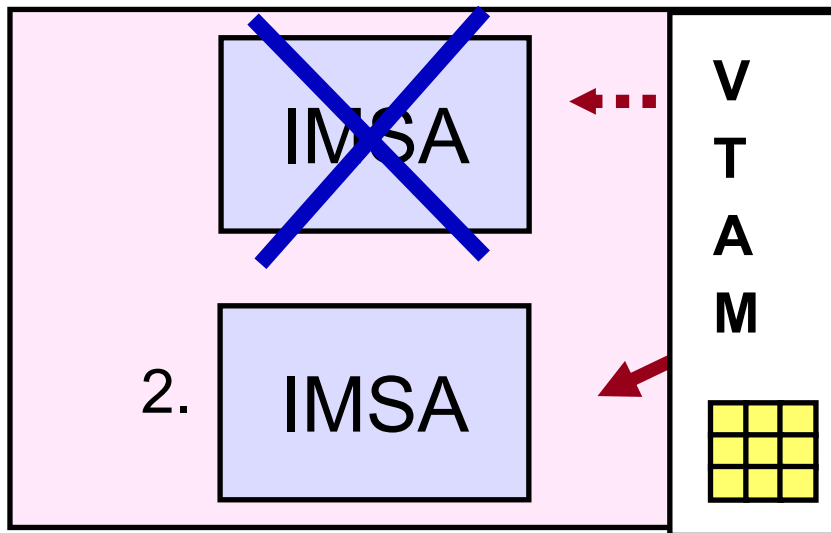
1. IMSA fails - the session to "terminal a" is pending recovery

2. IMSA restarts

3. Auto reconnect of "terminal a" to restarted IMS

  - initial state of logon/signon

Signon required after reconnect for:
SLU0 - 3270 non-SNA
SLU1 - non-printer only
SLU2
NTO

Signon automatically re-established for:
SLU0 - FINANCE/3600, SLUP
LU6.1 - ISC
SLU1 - Printer only

Background …

Multi-node Persistent Session Scenario
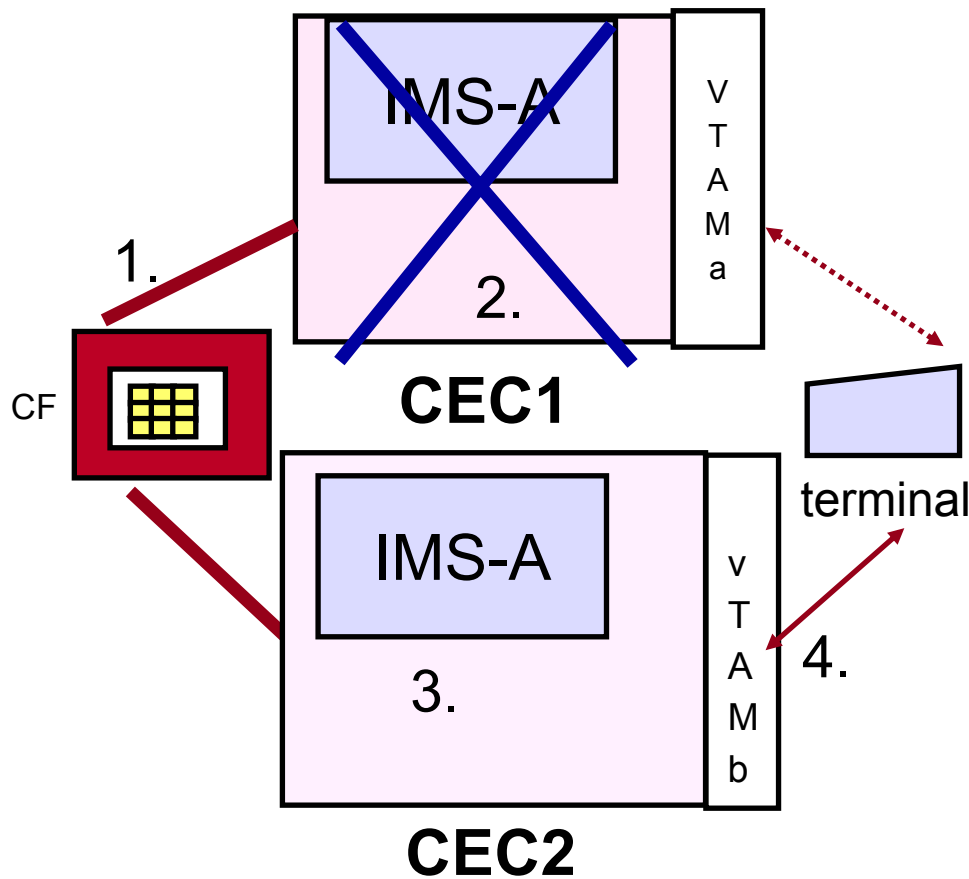
1. VTAM stores session data in the CF

2. CEC1 fails
   - Another VTAM in the Parallel sysplex detects the error
   - Each VTAM connected to the CF structure starts a PSTIMER

3. Through operator intervention or ARM IMS is restarted on CEC2

4. The sessions are restarted using info saved in the CF structure

Terminal is reset to initial state of logon/signon

RNR – Highlights …

- IMS Rapid Network Reconnect (RNR)

  – If specified, always establishes persistent sessions

  – /START DC following IMS restart initiates RNR action

  – Levels of RNR support:

    - RNR=NRNR

      – CLSDST scheduled

      – Always true for MSC, regardless of which RNR option is specified

    - RNR=ARNR

      – Automatic session reconnect

    - RNR=NONE

      – Turns the function off

  – Performance impact minimized - SNA data traffic is not tracked in the coupling facility

IMS V9
MNPS Replacement of XRF USERVAR

MNPS Replacement of XRF USERVAR

- Enhancement to use VTAM Multi-node Persistent Session support for XRF takeover of VTAM terminals

- Provides an alternative for XRF users
  - Withdrawal from marketing of 3745 controller and 3746 multi-protocol controller

MNPS Enhancement

- IMS V9 supports
  - Traditional XRF with VTAM USERVAR
  - New XRF with VTAM MNPS

  Class 1,2,3 terminal users can expect the same end result when using either the USERVAR or MNPS capabilities

- MNPS capability
  - Eliminates XRF USERVAR requirement
  - Requires two VTAM ACBs
    - MNPS ACB - Common name for XRF active/alternate systems
    - APPLID ACB - Different names on the active versus alternate
  - Supports network recovery to a different LPAR, different CPC

MNPS Enhancement …

- MNPS ACB
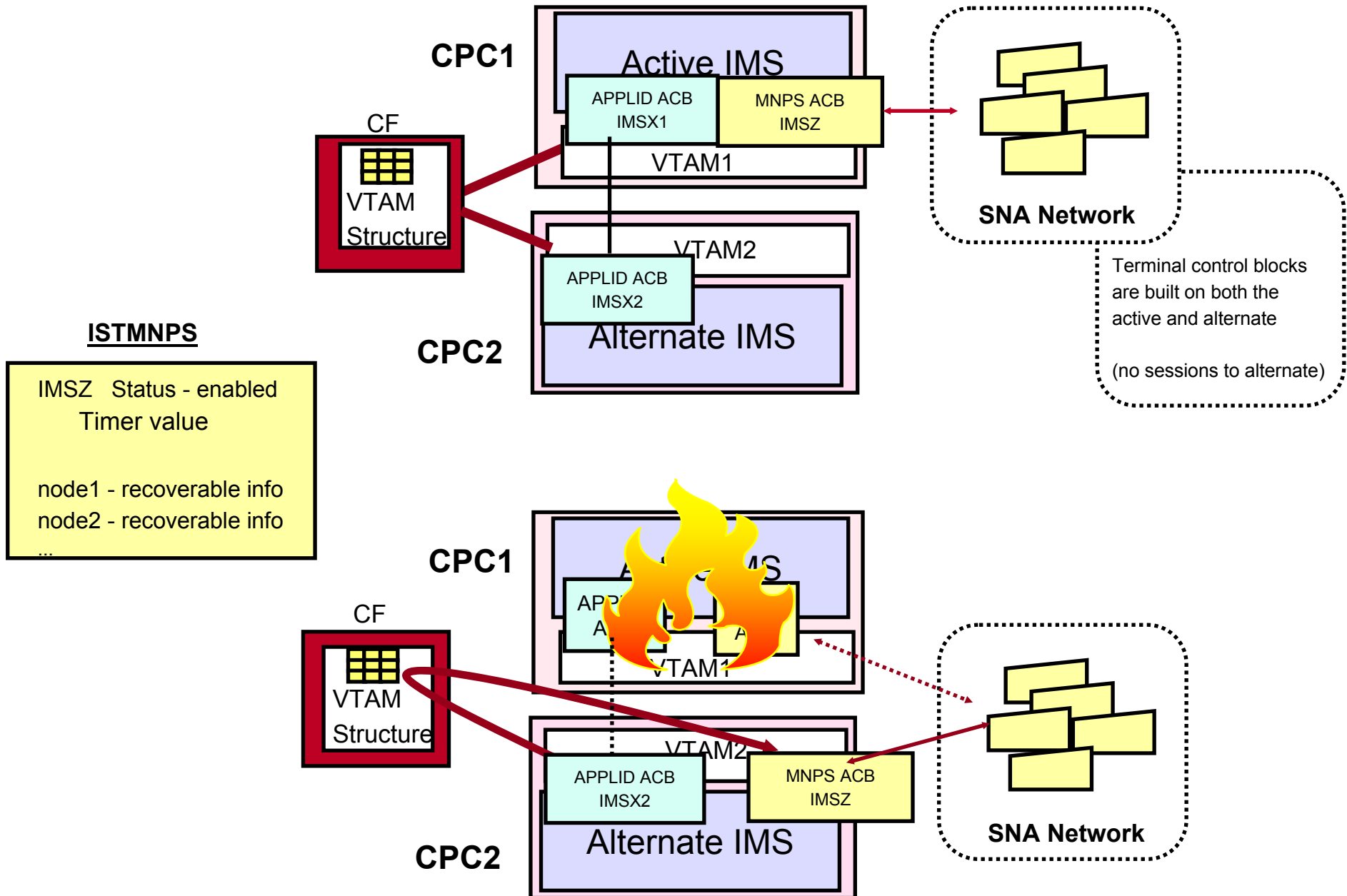 - New ACB for IMS
    - MNPS= , MNPSPW= (IMS proc, DFSPBxxx or DFSHSBxx)
    - VTAM APPL statement with PERSIST=MULTI
  - Supports persistent sessions
  - Provides a common name for the XRF pair
  - Opened by
    - XRF active following /STA DC
    - XRF alternate following takeover
  - Uses the receive any buffers defined
    - RECANY= on COMM macro
    - RECA= on the IMS proc or DFSPBxxx

MNPS Enhancement …

- APPLID ACB
  - Identified by existing definitions
    - COMM macro
      - APPLID= (applid1, applid2)
  - IMS procedure or DFSPBxxx
    - APPLID1= and APPLID2=
  - Used only by MTO and the XRF surveillance link
    - No session persistence
    - Not valid for any other terminal
  - Opened on both Active and Alternate
    - During IMS initialization or /STA DC

Scenario

CPC1

Active IMS

APPLID ACB
IMSX1

MNPS ACB
IMSZ

VTAM1

CF

VTAM
Structure

SNA Network

VTAM2

APPLID ACB
IMSX2

Alternate IMS

CPC2

Terminal control blocks are built on both the active and alternate

(no sessions to alternate)

ISTMNPS

IMSZ   Status - enabled
Timer value

node1 - recoverable info
node2 - recoverable info
...

CPC1

APPLID
A

A

VTAM1

CF

VTAM
Structure

SNA Network

VTAM2

APPLID ACB
IMSX2

MNPS ACB
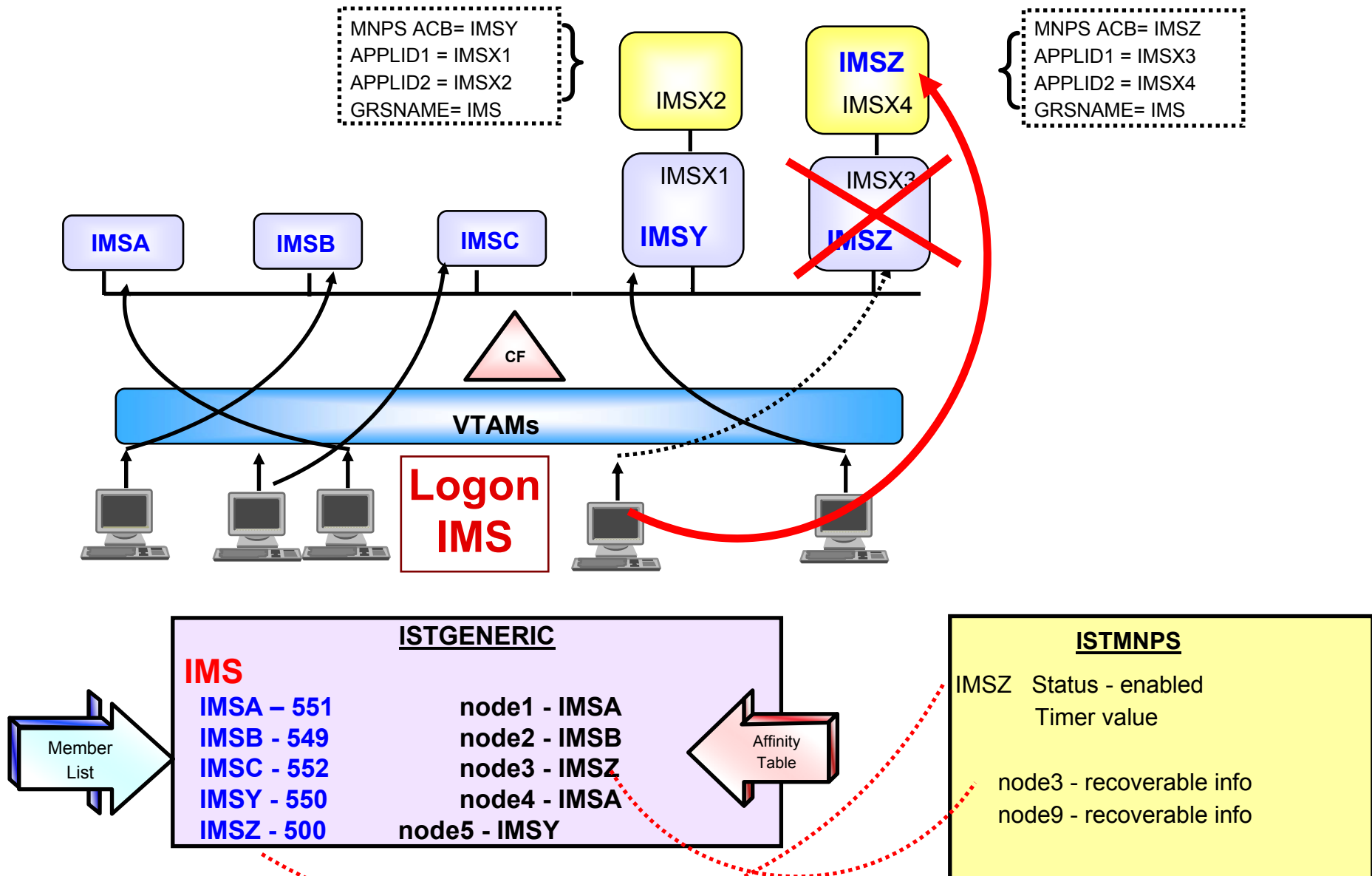IMSZ

Alternate IMS

CPC2

VGR Capability

- VGR
  - Not applicable in an XRF USERVAR environment
    - USERVAR and VGR names are both generic
      - Only one generic name can be used on a session

  - New capability with MNPS XRF
    - IMS associates VGR generic name with MNPS ACB name
      - Allows generic logon requests to be routed to the MNPS ACB name

VGR with MNPS XRF

MNPS ACB= IMSY
APPLID1 = IMSX1
APPLID2 = IMSX2
GRSNAME= IMS

MNPS ACB= IMSZ
APPLID1 = IMSX3
APPLID2 = IMSX4
GRSNAME= IMS

IMSX2

IMSZ
IMSX4

IMSX1
IMSY

IMSX3
IMSZ

IMSA

IMSB

IMSC

CF

VTAMs

Logon IMS

ISTGENERIC

IMS

IMSA – 551	node1 - IMSA
IMSB - 549	node2 - IMSB
IMSC - 552	node3 - IMSZ
IMSY - 550	node4 - IMSA
IMSZ - 500	node5 - IMSY

Member List

Affinity Table

ISTMNPS

IMSZ   Status - enabled
          Timer value

node3 - recoverable info
node9 - recoverable info

Summary

- VTAM Generic Resources (VGR)
  - Enhancements
    - V8
    - z/OS V1.2
- Rapid Network Reconnect (RNR)
  - Quickly re-establishes VTAM sessions following system outages (IMS, MVS, CEC or VTAM)
- MNPS XRF
  - Provides an alternative to XRF USERVAR capability