z/VM V6.4: Customer Driven Release

November 8, 2016 Version 3

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z/VM Version 6 Release 4

Designed for Clients of Today and Tomorrow

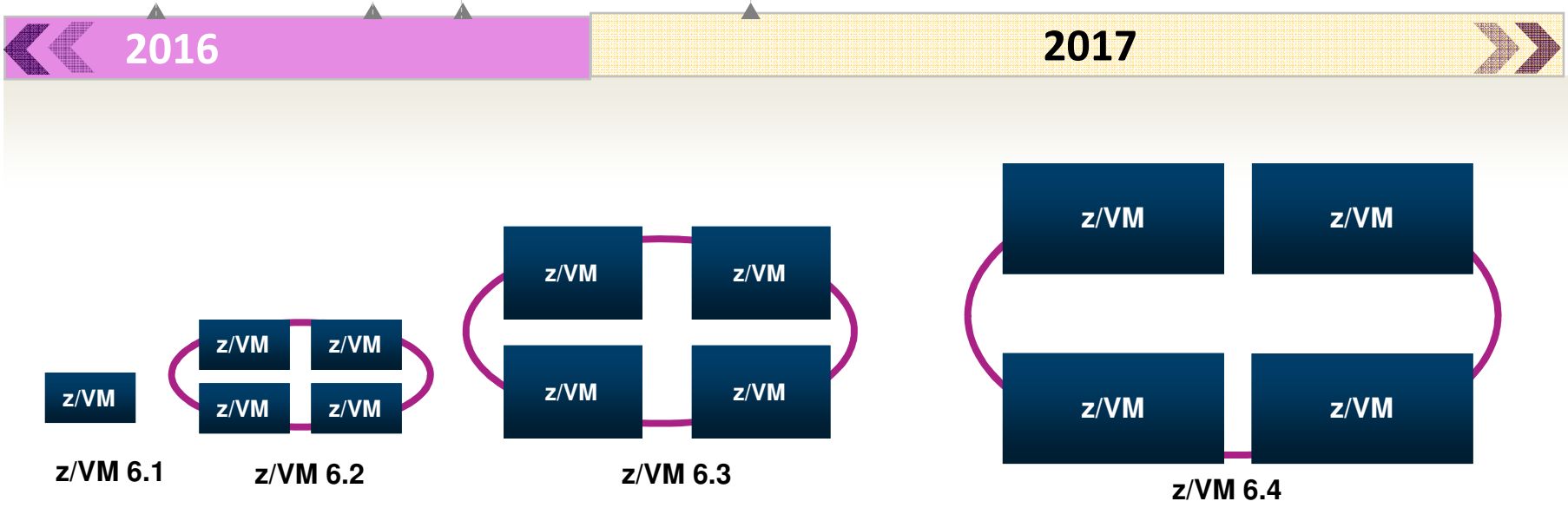
Feb 16, 2016
Preview announcement

Oct 25, 2016
Announcement

Nov 11, 2016
General availability

1st Quarter 2017
Newton-Based OpenStack Update

See http://www.vm.ibm.com/zvm640/



IBM z/VM 6.4

- A release born from customer feedback
  - z Systems Business Leaders Council (zBLC)
  - SHARE dialogues
  - IBM internal T3s (Teach the Teacher)
- Prioritizations set by customers and adjusted by IBM resources and skills
- Two major areas:
  - Technical enhancements that continue to improve TCO and bring direct value
  - Improved quality of life for z/VM system programmers
- New Architecture Level Set (ALS)
  - z196 and z114 or newer
  - Drops z10 EC and BC support

Value Areas of z/VM 6.4

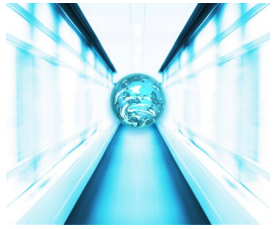
- Increases the virtual servers supported by a z/VM footprint
  - Scaling & Efficiency
- Improves the management for large diverse workloads
  - Fair and accurate resource control
  - Guest exploitation of z Systems and LinuxONE hardware
- Shortens road to installation and migration
  - New customers
  - Existing customers
- Adds capabilities for automation and system programmer effectiveness
  - Scripting and automation frameworks
  - Problem determination
  - Self service cloud
- Enhances security framework
- Many other smaller enhancements to improve various aspects of supporting z/VM
  - Network
  - Performance
  - Systems Management

TCO and Scaling Improvements

- z/VM continues to be able to support more virtual machines in a single footprint with reasonable service levels than any other solution
  - Major component to the TCO story
  - Capacity increases that do not result in additional support personnel

- Real memory support increased from 1 TB to 2 TB with same degree of overcommitment of real memory
  - Individual virtual machine limit remains at 1 TB

- Dynamic SMT added to change the number of active threads per core without a system outage
  - Potential capacity gains going from SMT-1 to SMT-2 (one to two threads per core) can now be achieved dynamically
  - Can go from SMT-2 to SMT-1 in rare case that it is not optimal for workload (response time concerns greater than capacity gains)
  - Requires running in SMT enabled, but can vary active threads per core

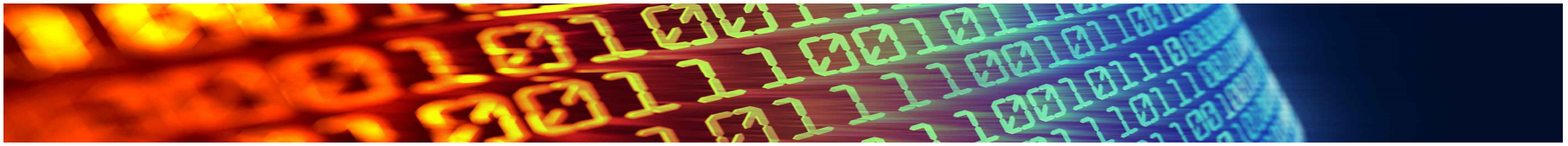


Increased Paging Capability

- Memory overcommitment helps keep TCO values low. Paging effectively allows for better overcommitment ratios.

- z/VM paging to ECKD (DS8000) improved significantly
  - Use of HyperPAV allows:
    - Greater paging bandwidth with parallel I/O
    - Fewer, but larger page volumes
  - Use of High Performance Ficon (zHPF)
    - More efficient I/O processing for z/VM system I/O

- z/VM system volume usage (including paging) with FCP SCSI attached FlashSystems Storage Servers
  - Removes requirement for SAN Volume Controller (SVC) as intermediary for z/VM volumes; lowers latency and removes and expense



Handling Diverse Workloads

- Various algorithms changed to remove large systems effects and manage memory even more effectively
  - Better and more consistent performance

- Scheduler changes to further improve the accuracy and fairness of access to resources across various configurations
  - Removes surplus share problem seen on earlier releases
  - Eliminates eligible list to avoid complexity of tuning

- RAS improvements for FCP SCSI Disk environments
  - SCSI driver has additional path recovery
  - Concurrent SVC code loads supported
  - And much more

- New ability to free up paging disk space used (KEEPSLOT = NO)
  - Helpful in environments where memory overcommitment is low
  - Reduces the disk paging space used in a z/VM environment by trading off potential for additional paging I/O.

Greater Guest Efficiencies

- Support for Guests to use Large Page (1 MB pages)
  - Allows guests to use the Enhanced DAT architecture
  - Reduces the amount of memory used for guest DAT structures and pathlength to manage that memory
  - z/VM continues to manage on a 4KB basis, retaining the full benefit of overcommitment

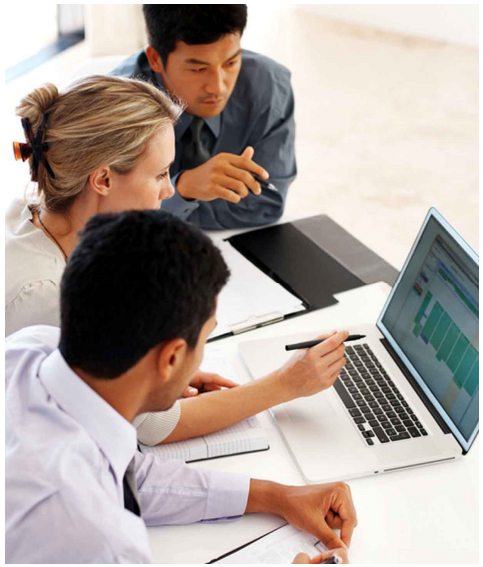
- Support for Guests to use Transactional Execution Facility (TX Facility)
  - Guests now informed that TX facility is available for use in z/VM environment
  - TX facility provides instructions that are an efficient alternative for synchronization
  - Performance improvement in processor requirements
  - Requires guest to be at supported level

- Support for Guests to use SIMD (Single Instruction Multiple Data)
  - Guests now informed SIMD is available for use in z/VM environment
  - Performance improvement in processor requirements
  - Requires guest to be at supported level
  - Requires z13, z13s, or LinuxONE
  - Also available on z/VM 6.3 with PTF UM34752

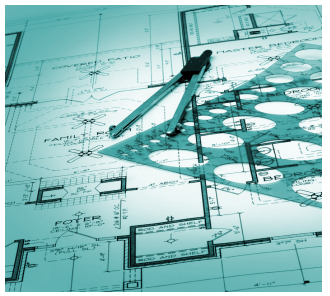
Getting Up and Running

- Upgrade In Place – For existing z/VM 6.2 and 6.3 customers
  - Allows moving to z/VM 6.4 from existing systems rather than a new install
  - Support for vendor products, local mods, and backing out if necessary

- Dynamic Partition Mode (DPM) – For new customers
  - Support added to allow z/VM 6.4 logical partitions to be configured through new DPM interface rather than traditional PR/SM
  - I/O configuration much easier than older IOCDS approach
  - Limited to FCP SCSI only, no FICON at this time
  - Must be at recent level of DPM



Frameworks for Automation



- CP Environment Variables
  - Allows z/VM meta data to be managed in a structured way
    - Variables set by system programmers
    - Variables read by programs for scripting
  - Replaces homegrown approaches for passing information around, and adds control to the environment
  - One special variable can be set on the IPL screen
    - Example: set as to whether Production, Test DR, or Actual DR

- New information available on z/VM Shutdown processing
  - Better determination of what is shutting down
  - Allows more robust automation to gracefully shutdown the z/VM system and virtual machines

- Significant upgrade to CMS Pipelines
  - Objective is to make available, with the product, many of the advances made to Pipelines since it was last updated in the product
  - Lots of new function
  - Avoids customers having to download and install on their own
  - Renews commitment to this powerful programming environment of Pipelines

Problem Determination Aids

- New CP command to determine which PTFs or Local Mods are in the running z/VM system
  - Data is also provided in the z/VM monitor data stream

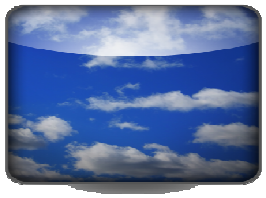
- New information on disk configurations
  - CP QUERY commands extended for both ECKD and EDEVs
    - Serial numbers, geometry information, features, etc.
    - Some data provided as 'block of hex' for vendor specific interpretation
  - New IOEXPLOR exec to format new information and make readable
    - Applies to IBM devices

- New utility EXPLORE FCP allows for testing
  - ADD: adds FCP subchannel and WWPN to list of devices to be tested
  - START: activates FCP subchannels and opens WWPN ports in list of SCSI devices to be tested
  - Aids in problem determination when setting up FCP devices

Enhanced Security Items

- VLAN access security improvement
  - With an ESM, user access to the default VLAN ID not permitted unless permissions has been granted explicitly through the ESM
- Default TLS protocol settings changed when using TLS/SSL Server
  - TLS 1.2 and TLS 1.1 are enabled by default, older versions disabled by default
- DirMaint to RACF Connector
  - Modernizes the Connector with a collection of functional enhancements
  - Brings processing in line with modern z/VM practices
  - Allows better passing of directory information to RACF
  - Facilitates proper security policy in environment managed by IBM Wave for z/VM or OpenStack
- RSCS TCPNJE traffic can be encrypted

OpenStack in z/VM 6.4 & Futures



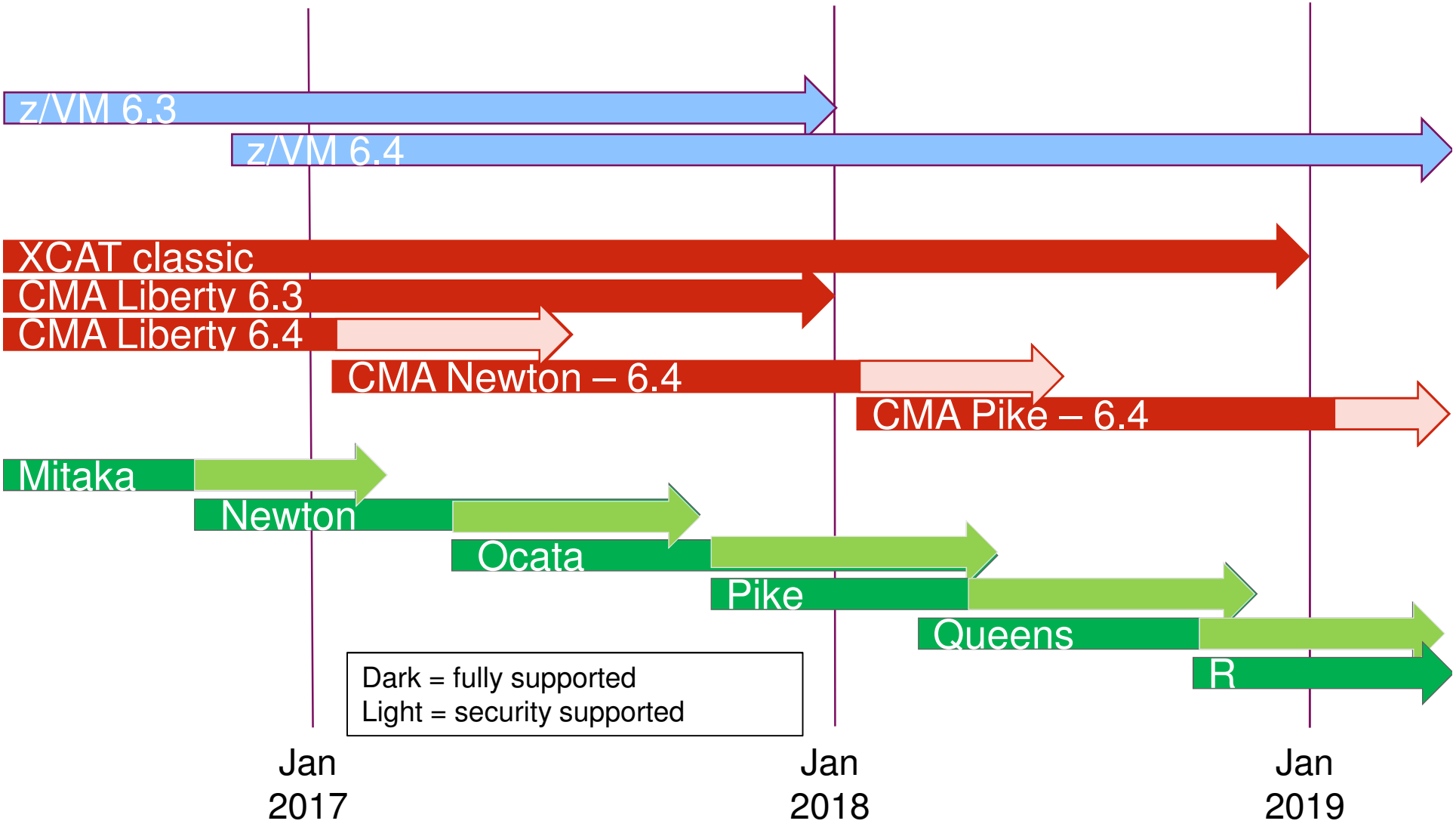
- In z/VM 6.4 GA
  - Virtual machine name changed from XCAT to OPNCLOUD
  - Switches to using straight editing of the DMSSIC* COPY files instead of LOCALMOD process

- In 1st Quarter 2017 – the Newton level of OpenStack in CMA (APAR VM65893)
  - Support for deploying/managing Ubuntu guests via OpenStack and xCAT
  - Develop xCAT MN and zHCP fully in the open
  - Enhance our Continuous Integration system with publicly available logs
  - Enable use of IUCV to communicate between the zHCP and guests as an alternative to SSH, which eliminates many key exchange issues
  - Enhancements for logging
  - Install simplification
    - xCAT GUI for the Installation Verification Program
    - Config wizard (similar to the ipwizard tool) for configuring the DMSSIC* COPY files
    - SMAPI/DirMaint config exec
  - Removal of the chef client

Cloud Management Appliance Service Model

- IBM intends to go to a new level of OpenStack for its CMA approximately once a year
  - Skip some levels of OpenStack
- IBM intends to make the new level of OpenStack for its CMA only available on the most recent release of z/VM
- When a new level of CMA (OpenStack) is made available, the old level will stay in service for an additional 6 months for security patches
- For example:
  - When the OpenStack Newton-based CMA becomes available, it will be on z/VM 6.4 only, not z/VM 6.3
  - At that time, on z/VM 6.4, Liberty-based CMA will only receive security patches, and only for 6 months
  - The Liberty-base CMA on z/VM 6.3 will continue to be supported until the End of Service for the z/VM 6.3 release

Release Plans: z/VM, CMA, and Community



Other Enhancements to Highlight

- Ability to reset counters for a Virtual Switch
  - Clear counts for data, discarded, and error
  - Makes it easier to recognize conditions
- Systems Management APIs (SMAPI) updated with supported for z/VM 6.4
- New SET DIALDROP command establishes whether devices dialed to your virtual machine are dropped or stay connected when a virtual machine reset occurs
- Following upgraded to a level equivalent to z/OS 2.2:
  - LDAP server and client utilities
  - MPROUTE
  - System SSL and utilities
  - Program management Binder

Priced Feature Highlights

- Performance Toolkit for z/VM now runs in z/CMS
  - Allows exploitation of z/Architecture instructions and more memory

- IBM Wave as a priced feature of z/VM 6.4
  - To facilitate ordering of IBM Wave, it can be ordered as a feature of z/VM when ordering z/VM 6.4
  - Install media will be same as separate product, but included with z/VM order
  - Service calls will continue to be handled by the IBM Wave service team
  - PTFs will be shipped as IBM Wave service and not included in z/VM service stream or RSU
  - IBM Wave will still be available via
    - Separate product
    - Part of the IBM Infrastructure Suite for z/VM and Linux
  - More information about IBM Wave: http://www-03.ibm.com/systems/z/solutions/virtualization/wave/

z/VM 6.4 Supported Hardware

- Following z Systems servers:
  - z13
  - z13s
  - LinuxONE Emperor
  - LinuxONE Rockhopper
  - IBM zEnterprise EC12
  - IBM zEnterprise BC12
  - IBM zEnterprise 196
  - IBM zEnterprise 114

- Electronic and DVD install
  - No tapes

z/VM Release Status Summary

z/VM Level	GA	End of Service	End of Marketing	Minimum Processor Level	Maximum Processor Level	Security Level
6.4	11/2016			IBM System z196 & z114®	-	
6.3	7/2013	12/2017[1]	11/2017	IBM System z10®	-	EAL 4+ OSPP-LS
6.2	12/2011	07/2017[2]	7/2013	IBM System z10®	z13	-
5.4	9/2008	12/2017[3]	3/2012	IBM eServer zSeries 800& 900	zEC12	-

[1] Announced February 3, 2015
[2] Announced February 2, 2016
[3] Announced August 2, 2016

Marketed & Serviced

Serviced, but not Marketed

End of Service & Marketing

Statements of Direction
July 23, 2013
January 14, 2015
February 16, 2016
October 25, 2016

- Subset of IBM Statements of General Direction that are most important to the z/VM environment. See announcement materials for additional statements.
- Subject to change or withdrawal without notice, representing IBM goals and objectives only.

Removal of ESA/390 Architecture Mode

January 14, 2015

The IBM z13 will be the last z Systems server to support running an operating system in ESA/390 architecture mode; all future systems will only support operating systems running in z/Architecture mode. This applies to operating systems running native on PR/SM as well as operating systems running as second level guests. IBM operating systems that run in ESA/390 mode are either no longer in service or only currently available with extended service contracts, and they will not be usable on systems beyond IBM z13. However, all 24-bit and 31-bit problem-state application programs originally written to run on the ESA/390 architecture will be unaffected by this change.

- While a hardware statement, there are potentially changes required for z/VM.
- Note implication of older operating systems.

Stabilization of z/VM 6.2 Support

January 14, 2015

The IBM z13 server family is planned to be the last z Systems server supported by z/VM V6.2 and the last z systems server that will be supported where z/VM V6.2 is running as a guest (second level). This is in conjunction with the statement of direction that the IBM z13 server family will be the last to support ESA/390 architecture mode, which z/VM V6.2 requires. z/VM V6.2 will continue to be supported until December 31, 2016, as announced in Withdrawal Announcement 914-012, dated February 04, 2014.

- z/VM 6.2 will be supported until July 2017 (February 2016 announcement extended it to July 2017 from this original December 2016.
- There will **not** be z/VM 6.2 support for the next server family.
- Similar to the statement of direction with z/VM 5.4 not supported on z13.

Removal of Support for IEEE 802.3 Ethernet Frame Types

October 25, 2016 Announcement

Removal of support for IEEE 802.3 Ethernet frame types:
z/VM V6.4 is planned to be the last z/VM release to support IEEE 802.3 Ethernet frame types. All future z/VM releases are planned to support DIX Version 2 (DIX V2) exclusively. This includes the z/VM Virtual Switch (VSwitch) and the z/VM TCP/IP server.

Removal of Support for the IMAP Server

October 25, 2016 Announcement

Removal of support for the IMAP server

z/VM V6.4 is planned to be the last z/VM release to support IMAP.

Removal of Support for Certain TCP/IP Functions

October 25, 2016 Announcement

Removal of support for certain TCP/IP functions

z/VM V6.4 is planned to be the last z/VM release to support the Graphics Data Display Manager Interface for X Window System (GDDMXD/VM).

Install to 3390 Model 3 DASD

October 25, 2016 Announcement

Install to 3390 Model 3 DASD

z/VM V6.4 will be the last release to allow installation using Model 3 3390 DASD (Direct Access Storage Device) volumes. Future z/VM releases will support 3390 installation using only model 9 or model 27 DASD. Installation onto SCSI volumes will not be affected.

FIPS Certification of z/VM V6.4

October 25, 2016 Announcement

FIPS Certification of z/VM V6.4

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 V6.4.

Security Evaluation of z/VM V6.4

October 25, 2016 Announcement

Security Evaluation of z/VM V6.4

IBM intends to evaluate z/VM V6.4 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+).

Completed Statements of Direction

Statement of Direction	From Announce Letter
z/VM Support for Single Instruction Multiple Data (SIMD)	January 2015
Enhanced RACF® password encryption algorithm for z/VM	January 2015
KVM Offering for z Systems	January 2015
GDPS/PPRC Multiplatform Resiliency Capability	January 2015
Security Evaluation of z/VM 6.3	July 2013
FIPS 140-2 Validation of z/VM 6.3	July 2013
Support of 10 GbE RoCE Express Feature	July 2013
Support of zEDC Express Feature	July 2013
Stabilization of z/VM 5.4 Support	July 2013

- Requires support from hardware and/or guests operating systems as appropriate
- Refer to www.vm.ibm.com or www.vm.ibm.com/security for more information

Completed Statements of Direction

Statement of Direction	From Announce Letter
Product Delivery of z/VM on DVD/Electronic Only	January 2015
Dynamically Managed Thread Activation Levels	February 2016
Stabilization of z/VM Support for the z10 Server Family	February 2016
Removal of Support for Expanded Storage	January 2015
Withdrawal of Support for Expanded Storage	July 2013

- Requires support from hardware and/or guests operating systems as appropriate
- Refer to www.vm.ibm.com or www.vm.ibm.com/security for more information

Summary

z/VM 6.4