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## Highlights

- Exceptional scale in a single frame footprint
  - Next generation 'network-in-a-box' technology Shared Memory Communications – Direct Access Method
  - More memory, cache enhancements and improved input/output (I/O) bandwidth to serve up more data to support exponential mobile transaction volumes
  - Real-time insights at the point of impact with integrated analytics and transaction processing
  - Simplified appliance implementation with z Appliance Container Infrastructure
  - Data and services securely delivered, with reduced risk
  - Enabled for open source innovation.
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## IBM z13s (z13s)

Businesses need to be flexible, dynamic and agile, while keeping an eye on escalating costs. It often falls on information technology teams to grapple with social and mobile trends and the challenges they create. This requires new insights and ways to integrate these trends into your existing processes and IT infrastructures. Incorporating these new insights and opportunities into your business and IT helps you grow and gain an edge on competition while reducing cost and increasing efficiencies. Exploitation of new information technology infrastructure such as the IBM® z13s (z13s) can help you identify and pinpoint areas of duplication or excess that may be repurposed or eliminated. The use of IT to change how you approach your basic core business models can help improve profits while increasing revenues.

The new IBM z13s is designed to help tackle your toughest real-time business challenges. It provides impressive scale in terms of memory, I/O and processing power on a single frame that can quickly respond to business fluctuations. The z13s also helps you meet your service level agreements by allowing you to deliver real-time information and insight from data that can give your business the advantage of more timely business decisions. IBM z/OS supports the new processor with significant enhancements to operating system (OS) design, optimised for scalability, cost saving, advanced compression capabilities, reliability, availability and scalability. Delivered with security and availability, the z13s provides enhancements to protect your users, your clients and your business.



## **Traditional data serving and transactional processing**

The z13s is powered by up to 20 configurable processor units along with improvement in performance per core compared to its predecessor, the IBM zEnterprise BC12 (zBC12).

Furthermore, the new multi-threaded processor design allows the z13s to deliver a record level of capacity for Linux virtual machines (VMs) over prior generations without requiring a change to footprint size or energy requirements.

Traditional data serving and transactional processing is at the core of mainframe capabilities:

- The ability to scale as needed and to support more work on a single frame footprint, helping eliminate the need for unbudgeted hardware purchases. The z13s contains up to 20 configurable processors (1.5 times more than the zBC12) and 40 LPARs (1.3 times more than the zBC12)
- An improvement for accessing databases within the same system, enhancing response time for mobile business with Shared Memory Communications – Direct Access Method (SMC-D). SMC-D can help decrease latency, increase throughput and decrease central processing unit (CPU) consumption<sup>1</sup> when compared with current Hipersockets technology
- New FICON Dynamic Routing can lower costs, improve performance and help ensure resilience by incorporating the pervasive storage area network (SAN) dynamic routing policies supported by switch vendors. Businesses can experience simplified configuration and capacity planning as it pertains to network performance and utilisation through the use of FICON Dynamic Routing
- The ability to share files and data with other vendors in a timely manner helps improve vendor relationships. The compression capability of the z13s is designed to deliver a reduction of up to 80 percent elapsed time<sup>2</sup> to transfer a file from one z/OS system to another.

The z13s supports up to 4 terabyte (TB) of memory – 8 times more than the zBC12 – so you can make business decisions at a faster pace and improve response times to your clients. Linux application servers, database servers, analytic and cloud workloads running native or under z/VM, may see performance benefits when taking advantage of large shared, virtualised memory. Large memory can reduce latency and CPU cost and improve operational efficiency for WebSphere Application Server and Java™ applications by allowing larger heaps without an increase in paging. Large memory for IBM MQ can help to cost effectively manage the increasing message volumes generated from today's mobile and cloud applications.

New memory packaging and pricing opens up opportunities such as in-memory data marts and in-memory analytics, giving you the necessary room to tune applications for optimal performance.

## **Operational efficiency**

The z13s offers many capabilities designed to improve efficiency in the data centre (DC). Specialty engines such as the Integrated Facility for Linux (IFL), IBM System z Integrated Information Processor (zIIP), Internal Coupling Facility (ICF) or additional System Assist Processors (SAPs) are designed to help optimise the capabilities of the platform to support a broad set of applications and workloads, while helping to dramatically improve mainframe economics. The specialty engines can be used independently or can complement each other to optimise workload execution and lower costs.

There is more to efficiency than specialty engines:

- With an enhanced 'share all' virtualisation environment for both cryptographic and networking features and LPARs, z13s helps improve resource sharing and may decrease the need to purchase additional hardware capacity

## IBM Systems Data Sheet

- The use of z Enterprise Data Compression (zEDC) can efficiently keep four times more data at hand that is easy to access<sup>3</sup> helping you reduce future direct access storage device (DASD) purchase by using better utilisation techniques so you can make more informed business decisions
- An optional rack-mounted hardware management console, previously unavailable in the zBC12, can help to save space in crowded DCs
- With simultaneous multi-threading (SMT) to execute two instruction streams (or threads) on a processor core, you get more throughput for Linux on IBM z Systems and IBM (zIIP) eligible workloads
- Single Instruction Multiple Data (SIMD), a vector processing model providing instruction level parallelism, can accelerate workloads such as analytics and mathematical modeling. For example, Common Business Oriented Language (COBOL) 5.2 and PL/I 4.5 exploit SIMD and improved floating point enhancements to deliver improved performance over and above that provided by the faster processor
- On chip cryptographic and compression coprocessors receive a performance boost improving both general processors and IFL cryptographic performance and allowing compression of more data, helping to save disk space and reducing data transfer time
- The z13s uses industry standard third generation peripheral component interconnect Express (PCIe) technology in the PCIe I/O drawer to support FICON, Crypto Express, OSA-Express and our Flash Express solid state disk (SSD). The PCIe I/O features allow better granularity and lower energy consumption along with the exploitation of industry standards
- Because faster link speed technologies, such as FICON Express16S, are more sensitive to the quality of the cabling infrastructure, z13s uses a standards-based approach for enabling Forward Error Correction (FEC) for a complete end-to-end (E2E) solution. FEC technology will allow FICON Express16S to operate at higher speeds, over longer distances, with reduced power and higher throughput, while retaining the same reliability and robustness that FICON has traditionally been known for

- IBM z HyperWrite, designed to improve DB2 log write performance with DS8870 and z/OS for Metro Mirror environment, is supported on z13s. IBM zHyperWrite can help to reduce up to 43 percent of the DB2 write operations and deliver up to 80 percent throughput improvement
- The z13s can provide lower overall mainframe costs through the ability to offload more workload onto larger z Integrated Information Processors (zIIPs).

### Trusted, secure and reliable for reduced business risk

The appeal of z Systems lies in large part in the reliability and security it provides your data and your business. Over generations, you've trusted and relied upon the z Systems family to bring 99.999 percent reliability to your DC. Although much has changed from the pre-internet era when systems were isolated and networks were small and well-defined, you can count on the z13s to continue to provide a reliable, trusted and securable environment for your DC:

- With the z13s enhanced cryptographic and partitioning offerings, you can protect data across an enterprise cloud environment. With the next generation cryptographic capabilities the z13s can also improve cryptographic performance
- The Crypto Express5S offers a state of the art (SOTA), tamper resistant cryptographic coprocessor for secure-key operations along with new hardware assists to encrypt data faster than Crypto Express4S, allowing for more data to transfer successfully across the internet to support public and private cloud and mobile workloads. The Crypto Express5S feature supports three configuration options - accelerator (SSL), secure CCA (Common Crypto Architecture) and Enterprise PKCS#11 modes

- The z13s and the Crypto Express5S offer enhanced public key support for constrained environments using hardware assisted Elliptic Curve Cryptography (ECC). ECC provides algorithms with much shorter key lengths than River Shamir Adleman (RSA) keys for similar cryptographic strength. This makes ECC cryptography ideal for mobile and smartcards where memory constraints may be a consideration
- VISA format preserving encryption (VFPE) for payment card account numbers helps provide additional security by enabling legacy databases and applications to contain encrypted data of sensitive fields without having to undertake a restructure of the database or applications. FPE is a valuable tool for payment card applications that helps to maintain the character length between input clear text and resulting cipher text
- Clients using z13s multi-site business continuity solutions can experience improved recovery times when writing data remotely allowing them to get back online faster and more efficiently
- IT staff is able to diagnose anomalies within their z/OS system more quickly so the business can encounter fewer interruptions using IBM Operational Analytics for z Systems version 3.1 or IBM zAware
- SAN Fabric Priority will help extend z/OS workload management policies into SAN fabric to manage congestion by prioritising important work to avoid congestion in the fabric and switches
- Integrated into each central processor (CP) microprocessor chip is a cryptographic coprocessor that provides CP Assist for Cryptographic Function (CPACF) to deliver cryptographic and hashing functions in support of clear-key operations. Exclusive to z Systems is the protected key CPACF which provides the speed of processor-based cryptography while helping to keep sensitive keys private from applications and the OS.

## **Enterprise Linux qualities of service**

IT organisations require a robust and effective workload deployment platform for consolidation, to help eliminate server sprawl and complexity, as well as re-deployment and new workload deployment. The z13s enables enterprise-grade Linux, one designed to be more robust and trusted for critical workloads, has higher performance and throughput at a lower cost per transaction and is integrated with new open capabilities that will lead to wider adoption of open source content. You need z Systems qualities of service for your Linux applications and the z13s, along with open source investments, delivers enhancements to availability, scale and security to meet these demands.

The z13s can support impressive growth for Linux on z Systems with up to 20 IFL specialty engines and 40 logical partitions (compared to 30 on the zBC12). Coupled with better utilisation of up to 4 terabytes (TB) of memory for Linux on z Systems, z13s can help improve response time for clients and support the ability to make faster business decisions. The memory increase opens opportunities such as in-memory data marts and in-memory analytics. Linux application servers, database servers, analytic and cloud workloads running native or under z/VM or KVM for z, may see performance benefits when taking advantage of large shared, virtualised memory.

The easy to use and implement GDPS Virtual Appliance for Linux on z Systems based on GDPS/PPRC Multiplatform Resiliency for z Systems (xDR) technology can help provide high availability (HA) in case of system, application, or network failure.

Another feature, IBM z Advanced Workload Analysis Reporter (IBM zAware), is designed to offer near real-time diagnostics to help you identify potential problems in your z Systems environment. It is an analytics solution executed in firmware,

which intelligently examines message logs for potential deviations, inconsistencies or anomalies. With rapid identification of message anomalies, organisations can accelerate their response to resolve problems, focus their efforts more precisely, address IT problems quickly, minimise availability lapses and intervene in IT problems before they become more severe. Previously available only for z/OS, with z13s, it is now supported on Linux on z Systems too.

IBM Spectrum Scale for Linux on z Systems V4.2, based on General Parallel File System (GPFS) technology is a fast and highly available/scalable cluster file system that is designed for high-performance parallel file access and parallel I/O to single or multiple files. It delivers proven reliability, scalability and performance with automated failure recovery and decentralised data management for simplifying administration. IBM Spectrum Scale V4.2 Standard Edition extends support of backup and restore functions to protect data in the file system and enables space management of data. The Advanced Edition supports asynchronous disaster recovery (DR), enabling establishment of a primary (action)/ secondary (passive) relationship at the fileset level.

The recently announced KVM for z Systems provides standardised virtualisation for the platform with support of an open source KVM hypervisor for Linux on z. A key benefit is the skills portability for clients with existing KVM implementations on alternative architectures. KVM for z Systems has the potential to create new possibilities for delivery of open source tools, databases and management software to further lower the cost of Linux on z Systems deployments. For those accustomed to non-IBM management tools, IBM plans to introduce IBM Dynamic Partition Manager to simplify z Systems hardware and virtual infrastructure management for KVM for z Systems including integrated dynamic I/O management.

## **z13s is the mainframe optimised for real-time business**

Built on z Systems core values and strengths, the z13s delivers innovations and technologies to enable real-time digital business. It is designed to handle the explosive growth of increasingly mobile clients and employees, able to leverage new and vast amounts of data and can provide deeper real-time insight at the point for greatest business impact. All this can be deployed within a secure and resilient cloud ready infrastructure.

### **Why IBM?**

IBM is your trusted partner to take your organisation to the next level.

- IBM understands your goal to gain competitive advantage while holding your IT budget steady
- IBM has the expertise – in systems, software and delivery – to help you optimise your IT with z13s.

IBM can deliver innovative technology, open standards, excellent performance and a broad portfolio of proven storage software, hardware and solutions offerings – all backed by IBM with its recognised leading-edge technology.

**IBM Systems**  
**Data Sheet**

**IBM z13s (2965) at a glance**

**Processor Core Types:**

	N10 min/max	N20 (1 drawer) min/max	N20 (2 drawer) min/max
CP	0/6	0/6	0/6
IFL	0/10	0/20	0/20
ICF	0/10	0/20	0/20
zIIP*	0/6	0/12	0/12
Std SAP	2/2	2/2	2/2
add'l SAP	0/2	3/3	3/3
Spares	0/0	2/2	2/2
IFP	1/1	1/1	1/1

**Coupling Links**

Internal Coupling Link maximum	32
ICA SR maximum	16 ports
12x HCA3-O InfiniBand maximum	16 ports
1x HCA3-O LR InfiniBand maximum	32 ports

**Channels**

FICON Express16S/FICON Express8S/FICON Express8 <sup>+</sup> /OSA-Express5S/OSA-Express4S <sup>+</sup>	Maximum: 128/128/32/96/96
Flash Express	8 (4 pairs – 8 PCIe adapters); offered in pairs
HiperSockets	Up to 32 high-speed 'virtual' Local Area Networks
Internal Shared Memory (ISM)	Up to 32 high-speed network segments

**Cryptography**

Crypto Express5S	Minimum order 2 features; Maximum order 16 features
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**Compression Acceleration**

zEDC Express	Minimum order 1 feature; Maximum order 8 features
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**RDMA over Converged Ethernet (RoCE)**

10 GbE RoCE Express	Maximum order of 8 features
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**IBM Systems**  
Data Sheet

**IBM z13s (2965) at a glance**

**Processor Memory**

Model	Minimum	Maximum
N10	64 GB	1 TB
N20 (1 drawer)	64 GB	2 TB
N20 (2 drawers)	64 GB	4 TB
Upgradeability	Upgradeable within the z13s family Upgrading to the N20 from N10 model will require a planned outage Upgradeable from IBM zEnterprise BC12 and IBM zEnterprise 114 Upgradeable from z13s N20 to z13 N30 air-cooled (radiator) only Upgradeable from IBM< LinuxONE Rockhopper L10 to z13s N10 or N20; or L20 to N20	

**Supported Operating Systems**

z/OS	z/OS V2.2 z/OS V2.1 z/OS V1.13 z/OS V1.12 (toleration) Available via IBM Software Support Services
z/VM	z/VM 6.3 z/VM 6.2 (toleration)
KVM for IBM z Systems	KVM for IBM z 1.1 with SUSE Linux Enterprise Server (SLES) SP1 guests
Linux on z Systems	Red Hat Enterprise Linux (RHEL) 6 and 7 SLES 11 and 12 For minimum or recommended levels please see IBM Tested platforms page <a href="http://ibm.com/systems/z/os/linux/resources/testedplatforms.html">ibm.com/systems/z/os/linux/resources/testedplatforms.html</a>
z/VSE	z/VSE 5.1, 5.2, 6.1 and subsequent releases
z/TPF	z/TPF 1.1
AIX on POWER7 blade located in zBX	AIX 5.3 (TL 12+ and up), AIX 6.1 (TL 5+ and up) and AIX 7.1 and subsequent releases
Linux on IBM System x on HX5 blade located in zBX Model 004	RHEL 5.5 and up, 6.0 and up, 7.0 and up and SLES 10 (SP4) and up, SLES 11 SP1 and up, SLES 12 and up – 64 bit only
Microsoft Windows on HX5 blade located in zBX Model 004	Microsoft Windows Server 2008 (SP2), Microsoft Windows Server 2008 R2, Microsoft Windows Server 2012, Microsoft Windows Server 2012 R2 (Datacentre Edition recommended) – 64 bit only

**Supported Hypervisors**

PS701 in zBX Model 004	PowerVM Enterprise Edition – VIOS 2.2.3
HX5 in zBX Model 004	KVM – Red Hat Enterprise Virtualisation Hypervisor (RHEV-H) 6.5

**IBM z BladeCenter Extension (zBX) Model 004**

WebSphere DataPower Integration Appliance XI50 for zEnterprise	Minimum: 0	Maximum: 28 <sup>†</sup>
IBM BladeCenter PS701 Express POWER7 blade	Minimum: 0	Maximum: 112 <sup>†</sup>
IBM BladeCenter HX5 blade	Minimum: 0	Maximum: 56 <sup>†</sup>

## For more information

To learn more about the z13s, please contact your IBM representative or IBM Business Partner (BP), or visit the following website: [ibm.com/systems/uk/z13s](http://ibm.com/systems/uk/z13s)

Additionally, IBM Global Financing provides numerous payment options to help you acquire the technology you need to grow your business. We provide full lifecycle management of IT products and services, from acquisition to disposition.

For more information, visit: [ibm.com/financing](http://ibm.com/financing)



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\* If ordering a zIIP, one or more general purpose processor (CP) per the specialty engine is required. IBM has modified the ratio of zIIP to CPs to be 2:1. Up to two zIIP processors may be purchased for every general purpose processor purchased on the server.

† The blades for BladeCenter PS701 Express blade, BladeCenter HX5 blade and DataPower XI50z can be shared in the same BladeCenter chassis – note that DataPower XI50z blades are 'doublewide' and use two slots. Total zBX capacity cannot exceed 112 total blades.

‡ Carry forward only

<sup>1</sup> SMC-D will initially be supported by z/OS only

<sup>2</sup> Results based on internal controlled measurements using IBM Encryption Facility for files containing public domain books. Results may vary by customer based on individual workload, data, configuration and software levels

<sup>3</sup> Based on projections and/or measurements completed in a controlled environment. Results may vary by customer based on individual workload, configuration and software levels.