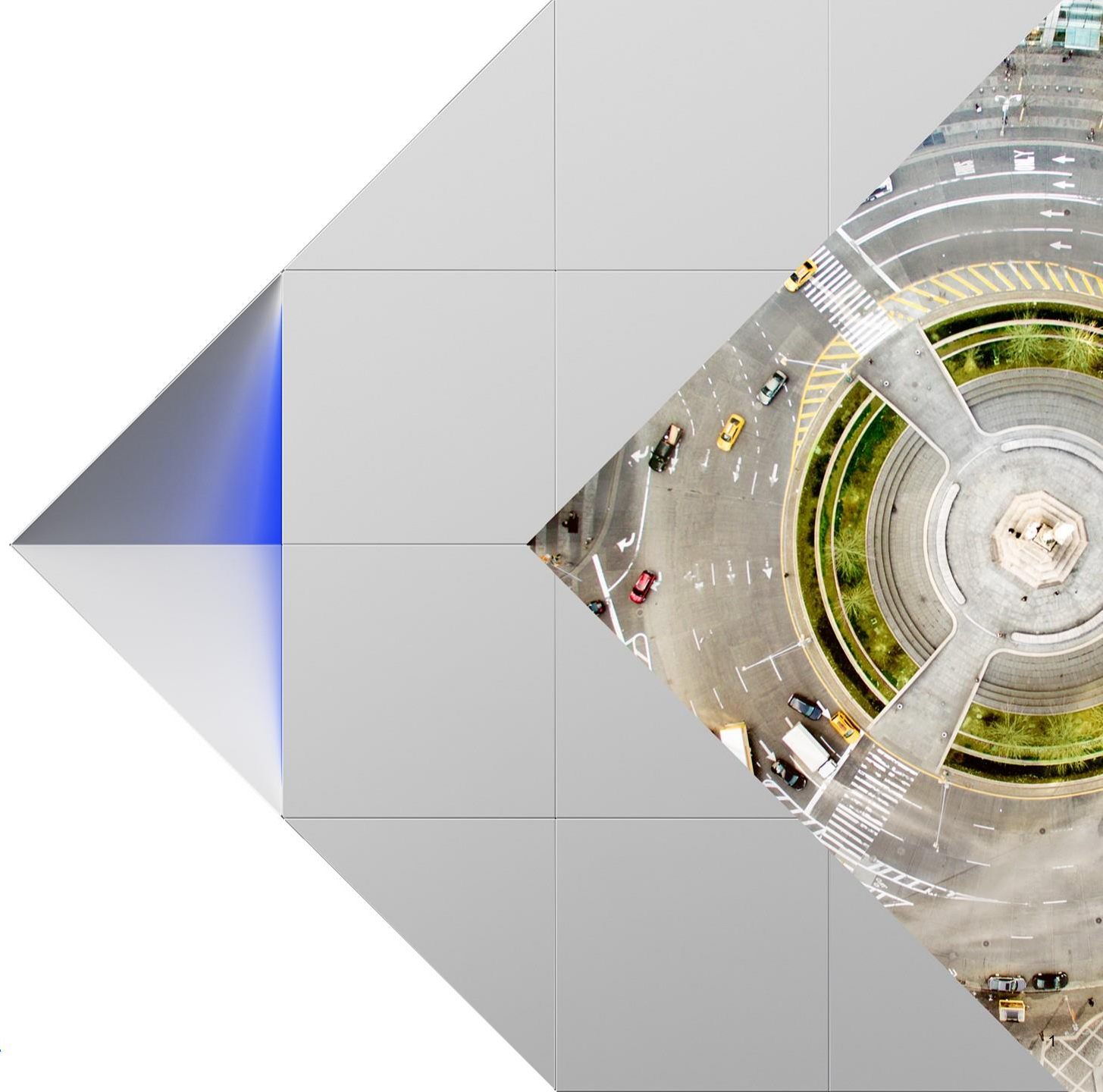# IBM z16 / LinuxONE Rockhopper 4 Single Frame and Rack Mount Introduction

zExpertenforum 5. April 2023

Announcement 4. April 2023
General Availability 17. May 2023

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IBM z16 Product Portfolio

IBM z16 Multi Frame
Designed to support the growth in IT requirements for multi-frame clients, with superior scalability & efficiency with up to 200 cores

IBM z16 Single Frame
Designed for roll-in, roll-out single-frame clients, providing enriched capabilities and improved performance per core
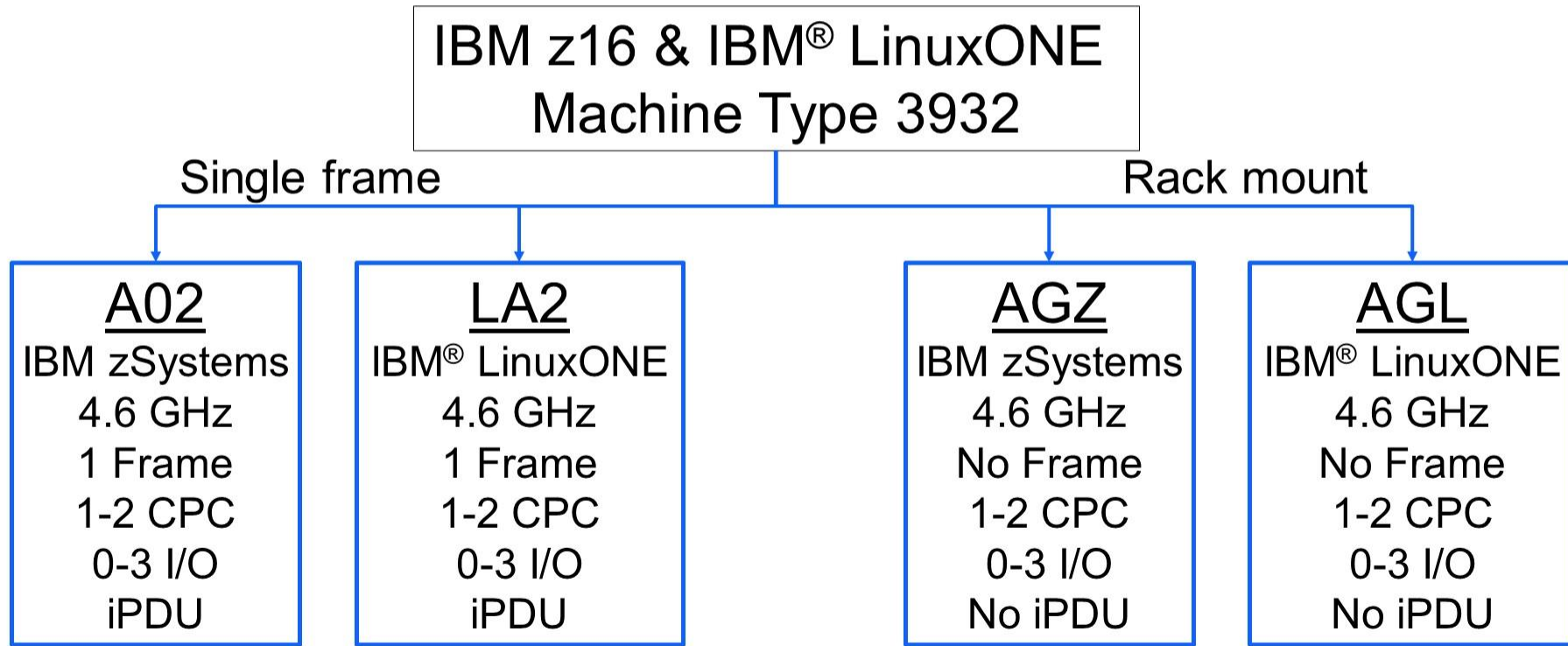
IBM z16 Rack Mount
New entry point rack mount option, components designed for colocation with other technologies IBM-installed in customer-supplied rack

IBM z16 single frame and rack mount: system design

- There are four new offerings being added to the z16 and IBM® LinuxONE families, all falling under MT 3932
- The four offerings are structured in pairs: one zSystems and one IBM® LinuxONE for both the single frame and rack mount options
- Processor, memory, and I/O features remain common, regardless of the offering selected

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          IBM z16 & IBM® LinuxONE
            Machine Type 3932
```

Single frame   Rack mount

A02	LA2	AGZ	AGL
IBM zSystems	IBM® LinuxONE	IBM zSystems	IBM® LinuxONE
4.6 GHz	4.6 GHz	4.6 GHz	4.6 GHz
1 Frame	1 Frame	No Frame	No Frame
1-2 CPC	1-2 CPC	1-2 CPC	1-2 CPC
0-3 I/O	0-3 I/O	0-3 I/O	0-3 I/O
iPDU	iPDU	No iPDU	No iPDU

IBM z16 Rack Mount
Flexibility across data center ecosystems

Why offer Rack Mount options?

- Flexibility for "system-in-a-box" footprints
  - Opportunities to include Storage, SAN, switches in converged solutions
  - Investment protection upgradeability

- Allows installation to structured racks aisles
  - Optimize colocation center sustainability & services experience
  - Integrate into existing Hot/Cold aisle thermal management data center configurations
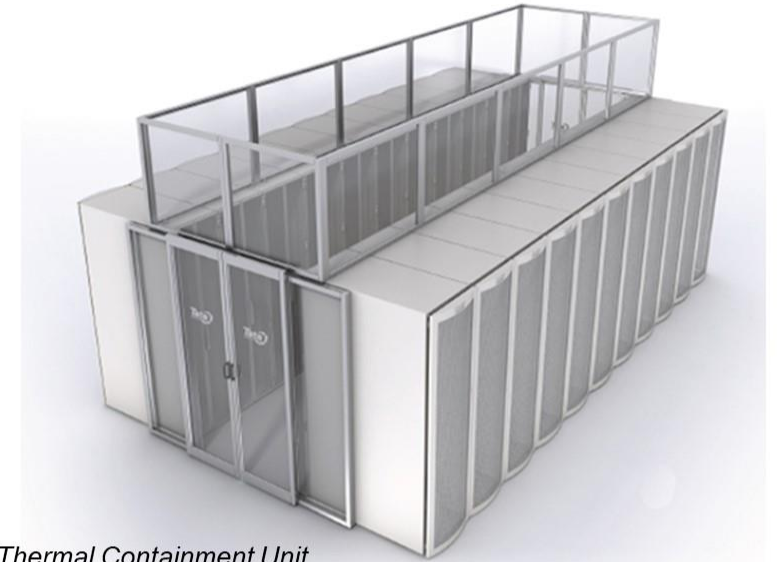
Thermal Containment Unit
with top air cap and standardized racks (image
from tateinc.com)

tateinc.com

IBM Cloud –50U tall racks   ibm.com

ibm.com

IBM z16 Rack Mount (AGZ)

SE / Switches / KMM (5U)

CPC drawer (5U)

I/O drawer (8U)

IBM z16 server capabilities

- Newly offered in a rack mount configuration

- For use with client-owned 19" racks & power distribution units

- Exploits the z16 highly scalable and resilient server base

- Range of scalability options

    - Up to 3 optional PCIe+ I/O expansion enclosures (up to 48 adapters)

    - Optional secondary server base expansion (up to 68 IBM Telum processor cores at 4.6GHz)

- Hardware management support is included with the server base, including secure remote access options

- Enterprise- level installation, warranty and 24x7 support included under warranty umbrella

IBM z16 Single Frame & Rack Mount w/ IBM Telum processor

IBM Telum™ Processor

- New Integrated AI Accelerator for high-speed inferencing, in addition to accelerators for encryption and compression
- 7nm technology @ 4.6GHz, up to 4 Dual Chip Modules (DCMs) per CPC drawer
- 8 cores/chip, 2 chips/DCM
- 13% single-thread performance improvement over z15 T02
- Quantum-Safe system, complemented by new Crypto Express8S HSMs

Flexible compute design

- Up to 68 customer-configurable cores
  - Up to 6 standard CPs
  - Up to 67 zIIPs, with zCX containerization options
  - Up to 68 IFLs for prime Linux on Z capacity
- Up to 14% max system capacity growth over z15 T02 with z/OS
- Up to 21% max system capacity growth over z15 T02 with Linux on Z
- Options that fit data center strategies: IBM-provided single frame for roll-in, roll-out ease, or rack mount configuration for customer-supplied rack infrastructure
- Power options – IBM iPDU (single frame) or customer-defined PDU (rack mount)
- Up to 3 I/O PCIe+ Drawers available for I/O expansion up to 48 adapters
- New FICON Express32S for enhanced speed and consolidation opportunities

Memory

- Up to 16 TB RAIM memory with physical memory encryption
- 2 TB Virtual Flash Memory

IBM z16 4.6GHz

Machine Type 3932
Single Frame Model A02*

Overall Sizing

CPC Drawer	Customer PUs	Max Memory
1	32	8 TB
2	68	16 TB

Feature-Based Sizing

CPC Feature	Customer PUs	Max Memory
Max 5	5	4 TB
Max 16	16	4 TB
Max 32	32	8 TB
Max 68	68	16 TB

*Rack mount configuration (FC #0515, AGZ)

System Design to Enable Growth
IBM® LinuxONE Rockhopper 4 With IBM Telum Processor

Flexible compute design

- Available as single frame, or as rack modular for customer data-center-defined racks for new location spaces
- Two power options – IBM iPDU or customer-defined PDU/power management with DCIM sustainability tool integrations
- Quantum-safe system with new Crypto Express8S card

IBM Telum Processor

- 7nm technology, 4.6GHz, 4 Dual Chip Modules (DCM) per CPC drawer, up to 2 drawers
- 8 Cores/Chip, 2 Chips/DCM
- Up to 68 Linux cores
- New integrated AI Accelerator for high-speed inferencing, in addition to accelerators for crypto, compression and sort

Memory

- Up to 16TB RAIM memory
- Transparent memory encryption
- 16TB memory per LPAR

To the Data

- Execute up to 14 million encrypted FCP read IOPS using the IBM Fibre Channel Endpoint Security solution
- IBM Adapter for NVMe allows SSD connection to IO subsystem
- Higher bandwidth and IO rates with FCP Express32S

CPC Drawers	Client PUs	Max Memory
2	68	16 TB

CPC Feature	Client PUs	Max Memory
Max 16	16	4 TB
Max 68	68	16 TB

7

Performance Drivers with z16 (3932)

- IBM Telum™ Processor
  - ➢ Improved IPC* with microarchitecture enhancements including but not limited to:
    - – Redesigned branch prediction w/o eDRAM
    - – Pipeline optimizations
    - – Improved prefetch
  - ➢ Up to 8 processor units (cores) per chip versus 12 on z15
  - ➢ Up to 68 configurable processor units (cores) versus 65 on z15 (8562)
  - ➢ (2) Telum chips packaged in Dual Chip Module (DCM)
  - ➢ (2 or 4) DCMs per CPC drawer with max of 12 cores per DCM

- Memory subsystem
  - ➢ Focused on keeping data "closer" to the processor unit
    - – Nest redesigned with (8) L2 caches in on-chip ring w/o eDRAM
    - – Larger semi-private L2 (32 MB) with virtual L3 and L4 caches (no SC chip)
    - – Contributes to improved IPC
  - ➢ High bandwidth, low latency links throughout system improve performance
  - ➢ Up to 16TB of configurable memory, same as z15 (8562)
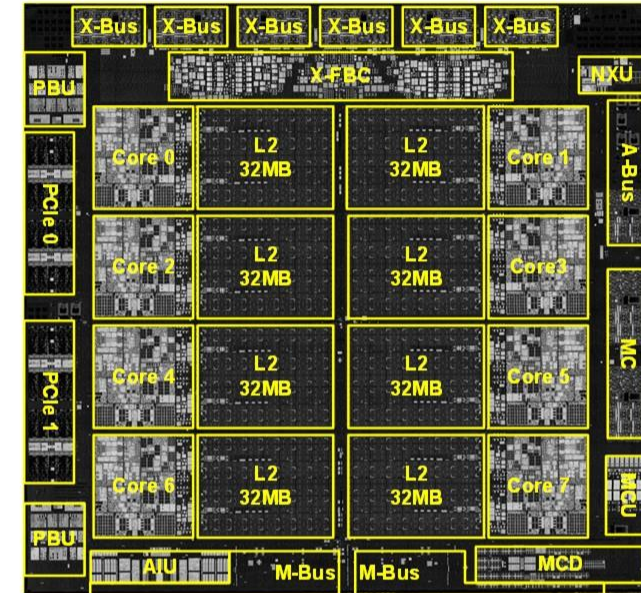
*Note: IPC = Instructions per Cycle

What's new with SRB on IBM z16
Performance benefits

40%
Up to 40% increased general CP processing capacity during Middleware Region Startup Boost and SVC Dump Boost.

35%
Up to 35% faster processing of transactional backlog during Middleware Region Startup Boost.

30%
Up to 30% faster catch-up on paused work during SVC Dump Boost.

IBM Specialty Engines For z/OS (zIIPs)

Modernize your application portfolio by taking advantage of new cost-effective technologies

Java and now Python!

IBM Java and now IBM Python are zIIP eligible programming languages. Skills that are often available with employees directly out of school. Workloads written in these languages can take advantage of the additional capacity of a zIIP engine without adding to your SW bill.

WebSphere® and z/OS® Connect

IBM WebSphere Application Server and z/OS Connect are two Java based solutions that can take advantage of zIIPs and also provide access to the re-knowned z/OS Qualities of Service (QoS).

AI and IBM Watson® Analytics

IBM AI solutions that leverage Python and Onyx models can take advantage of zIIPs. AI can be used for fraud detection, lead generation and other line of business functions. These workloads allow you to run real time AI within your existing applications.

zCX Foundation for Red Hat® OpenShift®

Co-locate containerized applications and workloads closer to your z/OS system of record assets. This allows applications accessing z/OS data to be as close as possible and can help minimize network latency and improve overall price performance.

IBM z16 servers can now be configured with more zIIPs (removing the 2:1 ratio of zIIPs to CPs)

IBM z16 3932 MES upgrades

IBM z15 T02

IBM z14 ZR1

IBM z16 3932

Max68

Max32

Max16

Max5

Upgrade Paths
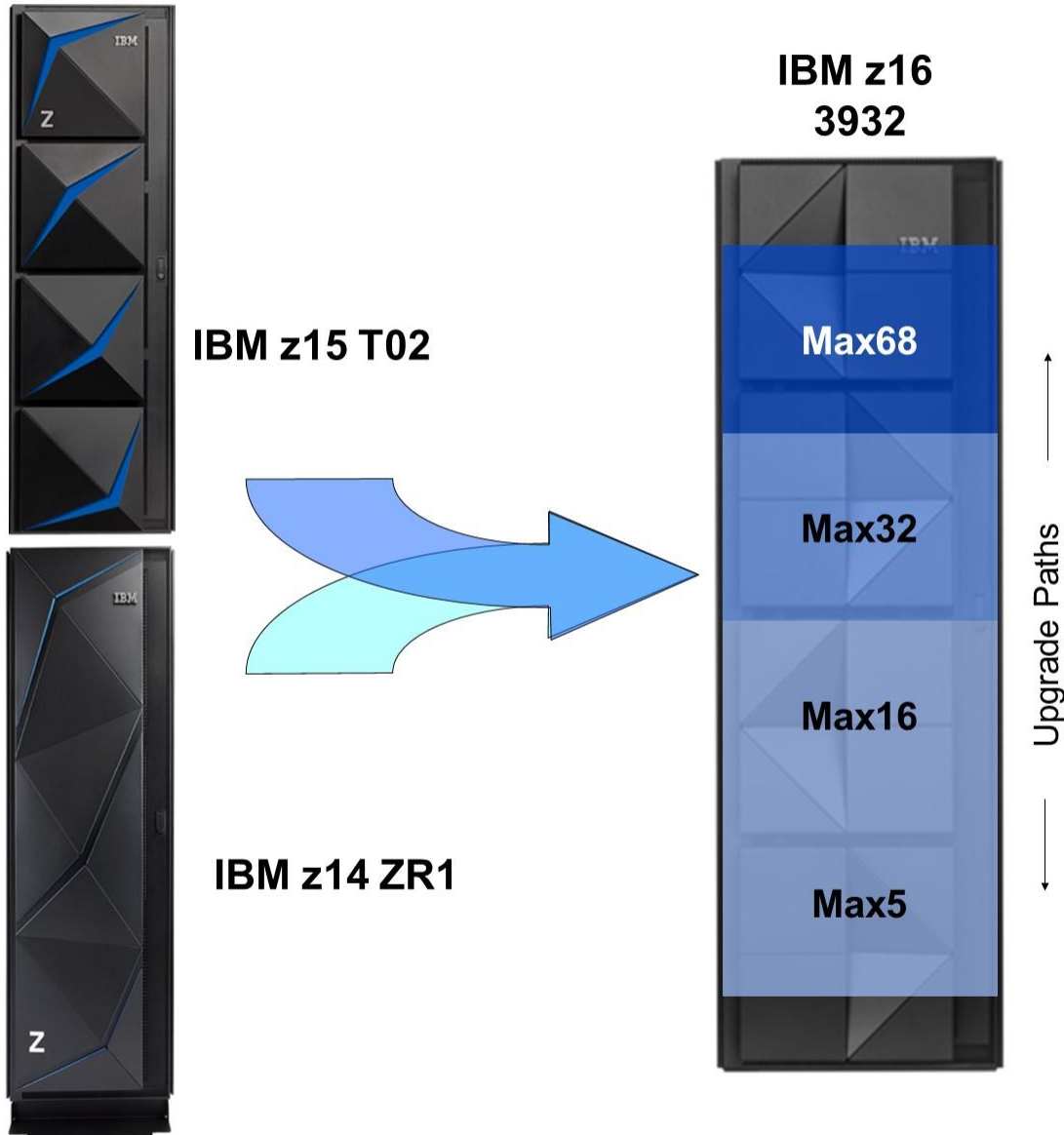
Within-family upgrades

- **Concurrent** upgrade from Max5 → Max16 (A02, AGZ)

- **Disruptive** upgrades from Max5 or Max16 → Max32 or Max68

- **Concurrent** upgrade from Max32 to Max68 (for AGZ, AGL: <u>only concurrent if client has Plan Ahead feature</u>)

    - Upgrades to Max68 models will add a 2nd CPC drawer

- Additional I/O Drawers can be added via MES based on available space in frame

    - AGZ/AGL additional equipment plan ahead is available to make non-disruptive upgrades

Any IBM z15 T02 to IBM z16 3932 (A02, AGZ models)

Any IBM z14 ZR1 to IBM z16 3932 (A02, AGZ models)

IBM Fibre Channel Endpoint Security

End-to-End Protection for Critical Data

Ensures all data flowing on FICON® and Fibre Channel (FCP) links from IBM Z to DS8K or between IBM Z servers over Channel-to-Channel connections (end-to-end) are encrypted and protected.

Provides data in flight protection for all file systems and access methods across operating systems

Non-disruptive: Can be utilized immediately after Power-on-Reset or CHIP off/on

No operating system changes needed for enablement

Components
FICON Express32S
DS8890 Storage R9 (w/ channel cards with encryption capability)
GKLM for key management (version 3.0.1 or newer)

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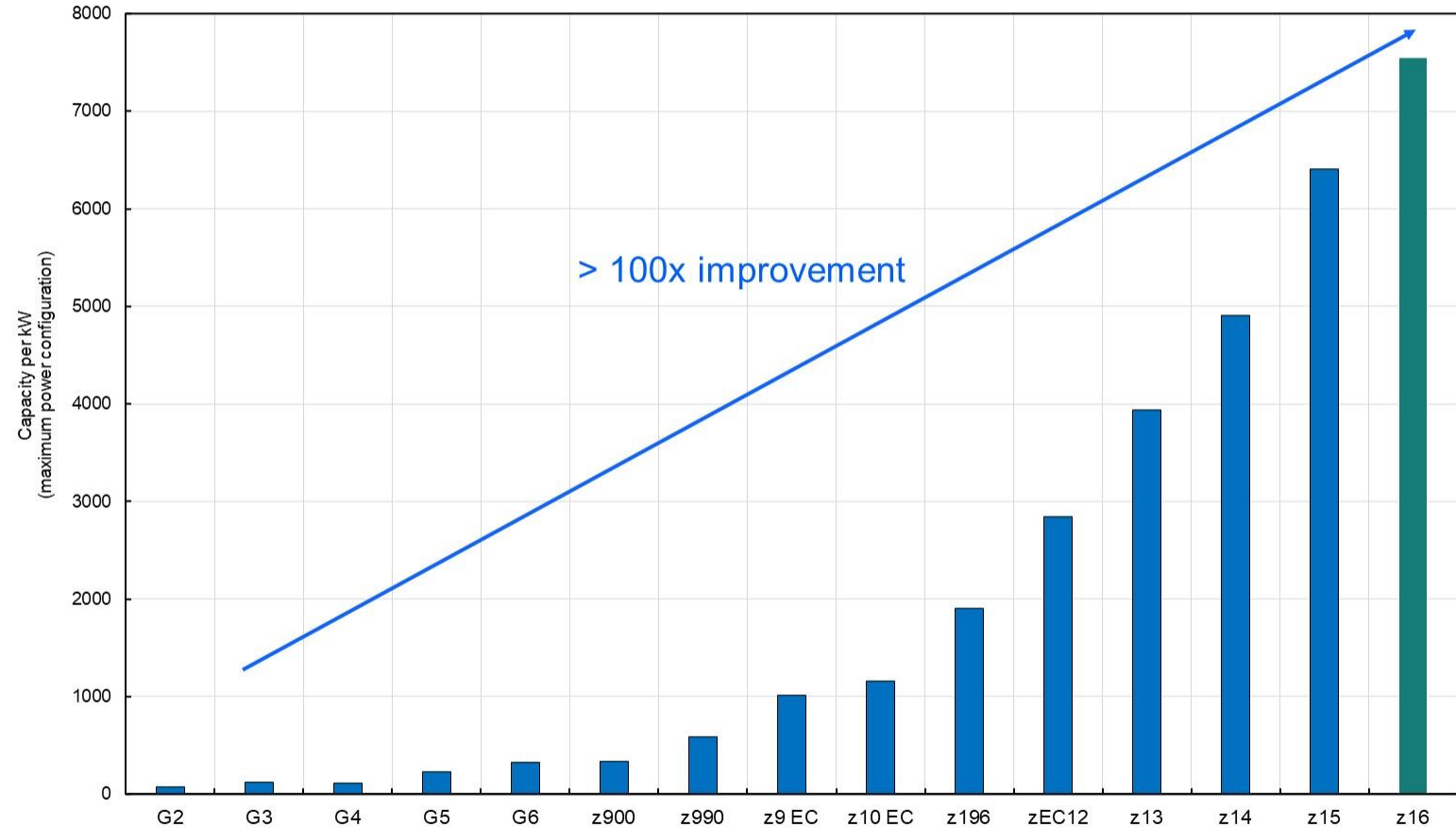GKLM for key management (version 3.0.1 or newer)

Reduce energy usage for your sustainability goals

Helping you turn your sustainability strategy into action

IBM zSystems has a 27-year history of improved energy efficiency

Increased the total maximum system capacity per kW by more than **100x** over the last **14** generations

IBM z16 A02/AGZ Redbooks

- Dec. 2022 – New Redpaper
  - IBM Z Flexible Capacity for Cyber Resiliency, REDP-5702

- April 4[th], 2023– New and Updated Redbooks
  - IBM z16 Technical Introduction, SG24-8950 - Update
  - IBM z16 A02 and AGZ Technical Guide, SG24-8952
  - IBM zSystems Connectivity Handbook, SG24-5444 - Update

- April 4[th], 2023– Updated Redpaper
  - IBM zSystems Functional Matrix, REDP-5157-07 - Update

- May 17[th], 2023 – New and updated Redbook materials:
  - IBM z16 Configuration Setup, SG24-8960 - Update
  - IBM zSystems STP Guide, SG24-8480 - Update

Thank you!