

Introducing the IBM LinuxONE III, the highly secure Linux server hardware that combines scalable and reliable data serving with an enterprise platform for hybrid cloud

Table of contents

2 Overview	16 Product number
2 Key requirements	24 Publications
2 Planned availability date	27 Technical information
3 Description	36 Terms and conditions
13 Product positioning	38 Prices
15 Statement of general direction	38 AP distribution
	39 Corrections

At a glance

The IBM[®] LinuxONE III offers a highly secure, flexible, scalable, and reliable enterprise platform for hybrid cloud, data serving, and other mission-critical Linux[®] workloads. LinuxONE III builds on the capabilities of the IBM LinuxONE Emperor II, while incorporating technology from the IBM z15 to add new features such as advanced security, flexibility, scalability, and reliability.

• **Protect the future**

LinuxONE III future-proofs business. With the high-level security both on premises and in the cloud, LinuxONE III protects your business.

- Easy encryption for your data at rest requires no changes to your applications and minimal impact to Service Level Agreements (SLAs).
- IBM Z[®] Data Privacy Passports on IBM LinuxONE III allows you protect all of your data after it leaves the system of record. For more information about IBM Data Privacy Passports V1.0 beta program, see Software Announcement [AP19-0429](#), dated September 12, 2019.
- IBM Secure Boot for Linux allows booting only from previously signed bootloaders and therefore is intended to prevent malware or other unwanted programs from starting.
- Secure Service Container (SSC) framework with industry-leading orchestration enables you to easily integrate your LinuxONE with your enterprise-wide DevOps container strategy. This provides:
 - Industry-leading isolation options to insulate from peers as well as outside threats
 - Vertical isolation and protection of data from even privileged administrators who do not need access
 - Automatic encryption, both at rest and in flight, of data and code
 - Validation of application code to detect tampering or malware

• **Build with flexibility**

LinuxONE III enables agile deployment of containerized applications. It also supports your choice of Linux distributions, tools, languages, and databases, easily integrating hybrid multicloud platforms and workloads into the stack.

- Delivery in industry-standard 19-inch racks, with configuration flexibility from one to four frames.
 - Support from all three leading enterprise Linux distributions -- Canonical Ubuntu LTS, Red Hat Enterprise Linux, and SUSE Linux Enterprise Server.
 - Support for hybrid multicloud enterprise platform for cloud native applications and services to provide agility, flexibility, and control within corporate firewalls.
 - Blockchain Platform for IBM Cloud™ Private support, enabling development of new blockchain applications in a highly secure and scalable environment.
 - IBM Cloud Hyper Protect offerings, providing key as-a-service offerings hosted on IBM LinuxONE in the IBM Cloud.
 - Application support from a broad ecosystem of open source projects and Independent Software Vendors (ISVs), including:
 - Relational and NoSQL databases
 - Development languages and runtimes
 - Systems management tools
 - Platform-as-a-service (PaaS) cloud software components
- **Deliver with confidence**

LinuxONE III gives you the highest levels of stability and availability, resulting in unparalleled uptime and scalability for your business-critical workloads.

 - New on-chip file compression that can reduce data storage requirements and costs, as well as increase data transfer rates to boost throughput above comparable x86 CPUs -- without adversely impacting response times.
 - Vertical scale to 190 cores and 40 TB of memory with the ability to consolidate over 2,000 x86 data serving cores.
 - Built-in reliability with redundant components and no single point of failure.

Overview

Businesses and organizations around the world are facing the challenge of digital transformation: the move to hybrid cloud, support for next-generation and mobile applications, and the escalating competition to be the first to respond to new business opportunities. At the same time, clients need to ensure that their business and customer data is secure, customer-facing and internal systems are available 24x7, and business growth is supported and enabled by the IT infrastructure.

LinuxONE III is able to integrate both mission-critical data serving and next-generation hybrid cloud applications on a single server. By hosting these on the same system, LinuxONE III speeds time-to-value, shares resources efficiently, and helps businesses make decisions on data in real time.

Prominent among the new capabilities of LinuxONE III are the extension of enterprise security beyond the LinuxONE system with Data Privacy Passports, reducing storage space and accelerating batch jobs through on-chip data compression, and enablement of next-generation applications built and deployed using containers.

With new industry first capabilities, IBM LinuxONE III delivers the cloud you want -- with the privacy and security you need.

Key requirements

Refer to the [Hardware requirements](#) and [Software requirements](#) sections of this announcement.

Planned availability date

September 23, 2019

New build systems:

- IBM LinuxONE III Model LT1
- Features and functions for the LinuxONE III

MES orders for LinuxONE III that include the following features:

- Field-installed features and conversions on LinuxONE III that are delivered solely through a modification to the machine's Licensed Internal Code (LIC)
- HMC Table Top KMM (#0148) on LinuxONE III
- HMC Rack Mount KMM (#0154) on LinuxONE III
- Customer Supplied HMC KMM (#0188) on LinuxONE III
- HMC Tower (#0062) on LinuxONE III
- HMC Rack Mount (#0063) on LinuxONE III
- TKE Rack Mount (#0087) on LinuxONE III
- TKE (#0088) on LinuxONE III
- TKE 9.2 LIC (#0881) on LinuxONE III
- TKE Rack Mount KMM (#0156) on LinuxONE III
- TKE Table Top KMM (#0157) on LinuxONE III
- Customer Supplied TKE KMM (#0190) on LinuxONE III
- Smart Card Reader (#0891) on LinuxONE III
- Additional Smart Cards (#0900) on LinuxONE III

October 1, 2019 - orders cannot be placed until October 1, 2019

- HMC Tower (#0062) on IBM Emperor II and IBM Rockhopper II
- HMC Rack Mount (#0063) on IBM Emperor II and IBM Rockhopper II
- TKE Rack Mount (#0087) on IBM Emperor II and IBM Rockhopper II
- TKE (#0088) on IBM Emperor II and IBM Rockhopper II
- TKE 9.2 LIC (#0881) on IBM Emperor II and IBM Rockhopper II

November 14, 2019 - orders cannot be placed until November 14, 2019

- IBM Z Hardware Management Appliance (#0100): HMC/SE housed in one physical server inside CPC frame
- Dynamic Partition Manager (DPM) on LinuxONE III (#0016)
- IBM Adapter for NVMe (#0448)

December 31, 2019 - orders cannot be placed until December 31, 2019

- OoCoD for the People's Republic of China for LinuxONE III, IBM Emperor II, and IBM Rockhopper II

January 29, 2020

- All remaining MES orders for LinuxONE III Model LT1

Description

The newest member of the LinuxONE family, the LinuxONE III, uses 19-inch packaging, and industry-standardized power and networking hardware. The system is configurable as a one to four 19-inch frame system, which easily aligns with modern data centers.

Today's announcement extends IBM Z leadership with LinuxONE III, offering:

- 25% more total system capacity as compared to the LinuxONE Emperor II for exceptional scale in a single footprint.
- Flexible configuration with an industry-standardized 19-inch frame taking up only two floor tiles of space. The system expands from one to four frames based on your need and potential growth.
- 190 cores to configure (versus 170 on Emperor II).
- Up to 40 terabytes (TB) of available Redundant Array of Independent Memory (RAIM) real memory per server to help improve transaction response times, lower CPU costs, simplify capacity planning, enlarge in-memory buffer pools, cache sysplex shared data and controls, and ease deploying memory-intensive workloads.
- IBM Z Data Privacy Passports which will protect data not only on IBM Z, but across multicloud environments without application changes. For more information about IBM Z Data Privacy Passports V1.0 beta program, see Software Announcement [AP19-0429](#), dated September 12, 2019.
- Crypto Express7S adapter and cryptographic enhancements.
- More on-chip cache per core, compared to Emperor II, to minimize memory waits while maximizing the throughput of concurrent workloads -- perfectly optimized for data serving.
- A design for data protection and privacy allowing you to encrypt many new data sets transparently, which can help you to provide an envelope of protection around data placed on IBM LinuxONE. This includes cryptographic performance improvements with the Crypto Express7S (#0898 or #0899) and the IBM Z processor based cryptography with the Central Processor Assist for Cryptographic Functions (CPACF) that helps enable the protection of data in flight or at rest.
- Hardware-accelerated encryption on every core with the CPACF feature.
- Economies of scale with next-generation multithreading (SMT) for Linux workloads.
- Instructions in Single Instruction, Multiple Data (SIMD) that are designed to give a performance boost for traditional workloads using COBOL and new applications like analytics.
- OSA-Express7S GbE, 10GbE, 1000Base-T, and 25GbE SR1.1.
- FICON Express16SA (#0436, 0437) and FCP Express 32S (#0438, 0439) to help absorb large application and transaction spikes driven by large unpredictable analytic and mobile workloads.
- IBM Hardware Management Console (HMC) 2.15 with simplification updates to improve workspace and manage system time.
- IBM Z Hardware Management Appliance, which can be used to create isolated partitions to help protect data and applications from cybercriminals.
- Trusted Key Entry (TKE) 9.2 License Internal Code (LIC).
- IBM Dynamic Partition Manager enhancements that provide a simplified, consumable, enhanced IBM Z experience, reducing the barriers of adoption for new and existing Linux on IBM Z and z/VM^(R) clients.
- Non-raised floor option, offering flexible possibilities for the data center.
- Optional top exit power and I/O cabling designed to provide increased flexibility.
- ASHRAE class A3 for robustness, data center flexibility, and energy savings.
- Ability to upgrade within the LinuxONE III family and into the IBM z15 .
- Non-Volatile Memory Express^(R) (NVMe), which offers a better price-performance advantage compared to externally attached storage servers.

The performance advantage

LinuxONE III is available with up to 190 configurable cores using commercial processors running at 5.2 GHz, for impressive performance and massive scaling.

Next-generation availability

The LinuxONE III merges the reliability, availability, and serviceability (RAS) characteristics from the performance-optimized z14 family with the 19-inch frame from the z14 Model ZR1. LinuxONE III introduces:

- Processor and memory PU refresh, RAIM memory, and cache symbol ECC are designed to provide a robust computing platform.
- PU sparing, array macro sparing, micro-array masking integrated sparing, and expanded optics as a FRU are used to reduce repair actions.
- The wide use of redundancy in the power, cooling, and service network continues with the LinuxONE III family. A "power redundancy test" is provided so you can verify the server is power redundant before servicing power feeds.
- The LinuxONE III family improves hot plug tolerance of optics and improves diagnostic logging of I/O.

A flexible and standardized configuration

LinuxONE III provides offering simplification and allows you to flexibly scale up to four frames in a single system and integrate additional hardware appliances into an industry-standard form factor. This will benefit existing clients through potential consolidation down to fewer frames and allows an easier scale-up path for growth.

Enterprise data protection

LinuxONE III extends the capabilities of Emperor II pervasive encryption throughout the enterprise to protect data not only on IBM Z, but across multicloud environments without application changes. You can control access to data shared with business partners and your ecosystem and begin the journey to pervasive encryption of your data. This includes crypto enhancements and IBM Z Data Privacy Passports (requires additional software).

Cloud transformation

LinuxONE III enables your digital transformation through cloud-native application development, deployment, and management using containers and Kubernetes, supported by the underlying scalability, security, and reliability of LinuxONE.

Common Criteria Evaluation Assurance Level 5+ (EAL5+) certification

The LinuxONE III is designed for Common Criteria Evaluation Assurance Level 5+ (EAL5+) certification for security of logical partitions. This means that the LinuxONE III is designed to prevent an application running on one operating system image on one LPAR from accessing application data running on a different operating system image on another LPAR on the server.

Common Cryptographic Architecture (CCA) enhancements

Enhancements with the LinuxONE III continue to deliver critical cryptographic capabilities which address the ever-changing security requirements across the globe around key management and distribution, data management and compliance, and protecting enterprise data. The Crypto Express7S is designed to meet the Federal Information Processing Standard (FIPS) 140-2 at Level 4 for cryptographic modules. IBM's Common Cryptographic Architecture Release 7.0 (CCA 7.0) is designed to be certified to meet the HSM requirements from the Payment Card Industry Security Standards Council (PCI-SSC). Its unique design eases migration of applications and keys and expands to add new cryptographic algorithm support. CCA 6.3 also meets the PCI-HSM requirements. CCA 7.0 includes the enhancements from the limited availability release CCA 6.3. The release adds an additional key distribution method by including callable services in support of ASC X9 Technical Report 34. TR-34 outlines an interoperable protocol for secure distribution of symmetric keys using asymmetric techniques. This protocol can be used to distribute symmetric keys from host systems to key receiving devices such as ATMs or POS terminals. Using the protocol will allow clients to eliminate costs associated with manual key loading by two separate employees who must physically load keys into the ATM or other key-receiving device. This feature facilitates a secure and cost-effective method for remote-managed rotation of encryption keys.

The release enhancements include complete native support for X.509 certificates for RSA or ECC public keys. All CCA services that accept public keys have been enhanced to accept an X.509 certificate. The X.509 certificate is validated and may be optionally authenticated against the Public Key Infrastructure (PKI) managed internally to the CEX6S / CEX7S. The trust anchors that underpin the PKI are loaded using security from a Trusted Key Entry (TKE) workstation to help enable a secured management path. This expansion of X.509 certificate support includes the new X9 TR-34 services mentioned above.

The release has also been enhanced to create PCI-HSM compliant-tagged RSA and AES key tokens. A compliant-tagged key token is managed by CCA firmware according to the requirements of PCI-HSM compliance mode. A coprocessor in compliance mode must be available to use compliant-tagged key tokens. Also, compliance-based methods to check master keys have been added to CCA. The Key Test2 callable service can now be used to verify the value of a master key as defined in ANS X9.24 Part 1, using either the NIST SP 800-38B block cipher-based MAC algorithm, called CMAC, or the encrypt zeros method. This will prove useful during compliance audits.

Processor improvements include Message-Security-Assist extension 9 providing support for elliptic curve cryptography authentication of messages, the generation of elliptic curve keys, and scalar multiplication. This is accomplished through a new instruction (Compute Digital Signature Authentication (KDSA)) which supports the ECDSA and EdDSA algorithms using curves P-256, P-384, P-521, Ed25519, and Ed448 and is in compliance with the Digital Signature Standard (DSS), National Institute of Standards and Technology (NIST) July 2013.

In addition, features that support the use of the AES algorithm in banking applications have been enhanced. This includes a new method for formatting the PAN data for authenticated PAN change requests based on the ISO 9564-1 standard. The new method includes an AES-based key management feature that enforces special usage for authentication keys for translation of PINs in ISO-4 PIN blocks. This increases the protection over this sensitive operation by adding an additional measure of control.

Finally, two new callable services are added in support of the German Banking Industry Committee *Die Deutsche Kreditwirtschaft* (DK) financial services requirements.

IBM continues to add enhancements as finance industry standards are released or updated with support for AES-based methods and protocols.

Enterprise PKCS #11 enhancements

EP11 is specifically designed for clients seeking support for open standards and enhanced security.

The EP11 library provides an interface very similar to the industry-standard PKCS #11 API. Existing applications using PKCS #11 will benefit from using EP11 as they can be migrated easily to IBM Z and as a result benefit from enhanced security using secure key cryptography.

EP11 provides many interesting additions to the PKCS #11 with login sessions, attribute bound keys, and different operational modes.

EP11 (BSI-DSZ-CC-1094) is designed to meet the requirements of the BSI (Federal Office for Information Security in Germany) for conformance with common criteria in version 3.1 (rev. 4) with Evaluation Assurance Level (EAL) 4.

EP11 4.7 adds support for the Crypto Express7S adapter as well as support of the PKCS #11 v2.4 standard.

New functionality consists of support for SHA3, EdDSA (sign/verify with Ed25519 and Ed448), and EdDH (derive with C25519 and C448).

In addition, EP11 4.7 introduces support for EP11 key blobs (AES, TDES, and selected ECC) exportable to Central Processor Assist for Cryptographic Functions (CPACF) for use in protected mode encryption, authorized with respective key attributes. With protected mode WrapKey the secure EP11 key is returned to the host caller reenciphered under the CPACF wrapping key for direct usage in a CPACF encryption instruction. The clear key value of the operational key is never available in host storage.

Furthermore, it adds support for a first quantum safe algorithm, Dilithium, an EUF-CMA secure digital signature scheme (sign and verify) based on Lattices.

Trusted Key Entry (TKE) 9.2 Licensed Internal Code (LIC) - The TKE 9.2 level of LIC is designed to support the following functions:

- TKE 9.2 is required to manage the Crypto Express7S running in Common Cryptographic Architecture (CCA) or IBM Enterprise PKCS #11 (EP11) mode if you manage your modules from the TKE. Remember, TKE is required to manage modules that run in EP11 mode or CCA domains in PCI-compliant mode.
- With TKE 9.2, you can use AT-TLS connections between the TKE workstation and the host that is running the TKE host transaction program. If you configure the TCP/IP port in the host transaction program to use AT-TLS, you must select the new check box in your TKE workstation host definition to specify you are using a TLS connection.
- TKE 9.2 can be used to exploit the following enhancements available in various releases of Common Cryptographic Architecture (CCA) firmware levels:
 - TKE 9.2 will allow you to create AES operational key parts with the PCI-compliant tag turned on. You can use these parts when you load your AES operational keys, if the CCA level supports the tag.
 - When you display Access Control Point (ACP) tracking information, tracking interval information will be included if the CCA firmware level returns the information. You will be able to tell when tracking was turned on, if and when tracking was turned off, and the number of times tracking was turned off and back on from the last time tracking data was cleared.
 - When you display master key information, you will have new options for selecting how the verification pattern is calculated if the CCA firmware supports the ENC-0 and CMAC calculations.
- With TKE 9.2, you can now select the IBM Enterprise PKCS #11 Transport Wrapping Key Policy. This policy is used to select the EP11 transport wrapping key strength. Select this policy if you require the EP11 transport wrapping key to be a true 256-bit AES key. If the policy is selected, the transport wrapping key is derived using Diffie-Hellman Key Exchange of 521-bit Elliptic Curve (EC) public keys between the TKE and the host crypto module running IBM Enterprise PKCS #11 (EP11). You can select this policy only when:
 - All your EP11 smart cards are at the minimum part level 00RY790 (Blue smart cards).
 - All your EP11 smart cards are at the minimum applet version V0.6. (The minimum applet support first appeared in TKE 9.2.)
 - All your host IBM Enterprise PKCS #11 modules are at API version 6.02 or later.
- TKE 9.2 has new features that simplify existing management tasks:
 - You can configure your host definition so that it will automatically accept modules that are successfully authenticated. You can select the option to automatically accept modules when you create a host definition or add the option to existing host definitions through the change host function.
 - The utility that allows you to copy key parts in binary files onto smart cards will allow you to select more than one file at a time. This will simplify the process of moving from binary key part files to smart card key part management.
 - With any attempt to delete a role or authority from a Common Cryptographic Architecture (CCA) mode host crypto module from inside of a TKE domain group, the delete will be attempted on every module included in the group. Previously the operation would stop the first time the role or authority was not found on a module in the group.

- When TKE 9.2 detects that a Linux host supports long user IDs you will be able to enter user IDs with up to 32 characters.
- The TKE Workstation Logon Wizard includes a new step that encourages you remove excess authority from the DEFAULT role after your TKE Workstation administrator profiles have been created.
- The following are important notes about upgrading existing TKE workstations to TKE 9.2:
 - TKE workstations with feature numbers 0847 and 0849 cannot be upgraded to TKE 9.2 LIC.
 - TKE workstations with feature number 0080, 0081, 0085, or 0086 can be upgraded to TKE 9.2 LIC only if the TKE Workstation feature is assigned to a z14 server or later.
 - You will have to buy a new local adapter crypto feature for the TKE if your TKE is at a pre-TKE 9.0 LIC level.

FICON[®] Express16SA

FICON Express16SA supports a link data rate of 16 gigabits per second (Gbps) and autonegotiation to 8 Gbps for synergy with current generation switches, directors, and storage devices. With support for native FICON, High Performance FICON for z Systems[®] (zHPF), and Fibre Channel Protocol (FCP), the LinuxONE III server is designed to help you to prepare for an end-to-end 16 Gbps infrastructure to meet the lower latency and increased bandwidth demands of your applications.

The new FICON Express16SA adapter will work with your existing fiber optic cabling environment, both single-mode and multimode optical cables.

The zHPF protocol:

In laboratory measurements, using FICON Express16SA in a LinuxONE III with the zHPF protocol and small data transfer I/O operations, FICON Express16SA performs the same as FICON Express 16S+.

In laboratory measurements, using FICON Express16SA in a LinuxONE III with the zHPF protocol and a mix of large sequential read and write data transfer I/O operations, FICON Express16SA operating at 16 Gbps performs the same as FICON Express 16S+.

This performance data was measured in a controlled environment running an I/O driver program. The actual throughput or performance that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed.

The FCP protocol:

In laboratory measurements, using FICON Express16SA in a LinuxONE III with the FCP protocol for small data transfer I/O operations, FICON Express16SA operating at 16 Gbps performs the same as FICON Express 16S+.

In laboratory measurements, using FICON Express16SA in a LinuxONE III with the FCP protocol and FICON Express16SA operating at 16 Gbps, FICON Express16SA performs the same as FICON Express 16S+.

The actual throughput or performance that any user will experience will vary depending upon considerations such as the amount of multiprogramming in the user's job stream, the I/O configuration, the storage configuration, and the workload processed.

The FCP protocol is supported by z/VM, and Linux on IBM Z. See the [Software requirements](#) section.

Cleaning discipline for FICON Express16SA fiber optic cabling: With the introduction of 16 Gbps link data rates, it is even more critical to ensure your fiber optic cabling infrastructure performs as expected. Proper fiber optic inspection,

cleaning, and maintenance is required to help ensure that the "data gets through." With 16 Gbps link data rates over multimode fiber optic cabling, link loss budgets and distances are reduced. Single-mode fiber optic cabling is more "reflection sensitive." With high link data rates and single-mode fiber optic cabling there is also less margin for error. The cabling is no longer scratch-tolerant and contaminants such as dust and oil can present a problem. To keep the data flowing, proper handling of fiber trunks and jumper cables is critical as well as thorough cleaning of fiber optic connectors. Work with your data center personnel or IBM personnel to ensure you have fiber optic inspection and cleaning procedures in place.

Channel subsystem (CSS) scalability: The LinuxONE III server, like the IBM LinuxONE Emperor II and IBM LinuxONE Emperor servers, has support for six logical channel subsystems (LCSSs) which are required to support the 85 LPARs for LinuxONE III and four subchannel sets.

OSA-Express7S - an Ethernet technology refresh

The OSA-Express7S 25 Gigabit Ethernet (25GbE) feature was introduced on Emperor II and with LinuxONE III additional features to complete the full family of the OSA-Express7S generation of adapters are being introduced: a new version of the 25GbE feature, 1000BASE-T Ethernet for copper environments, in addition to 10 Gigabit Ethernet (10GbE) and Gigabit Ethernet (GbE) for single-mode and multimode fiber optic environments. The performance characteristics of the new features are comparable to their predecessor OSA-Express6S (for 1000BASE-T, GbE, and 10GbE) and 7S (for 25GbE) features. They also retain the same form factor and port granularity -- two ports per feature for the 1000BASE-T Ethernet and Gigabit Ethernet features, and one port per feature for the 10 Gigabit Ethernet and 25 Gigabit Ethernet features.

The new members of the OSA-Express7S family of features (#0442, #0443, #0444, #0445, #0446, #0449) are exclusive to the LinuxONE III and IBM z15. They are supported by Linux on IBM Z and KVM hypervisor. Refer to the [Software requirements](#) section.

IBM Z Hardware Management Appliance

New with LinuxONE III, the Hardware Management Console (HMC) hardware will no longer have CD/DVD drives as part the HMC server hardware. A new optional IBM Z Hardware Management Appliance can be ordered with the LinuxONE III to provide HMC/SE functions within the CPC frame, eliminating the need for separate HMCs outside of the frame. Multiple new capabilities will be available on HMC 2.15.0, including:

- New user management controls for both HMC and SE tasks, resulting in a better user experience and providing the desired user task/object protection across the HMC/SE.
- A new option for audit support for remote syslog/Splunk support.
- An improved dashboard status overview visible when viewing tasks on all tabs, not just when viewing the home tab.

z/VM support for the LinuxONE III

With the PTF for APAR VM66248, planned to be available September 23, 2019, z/VM V6.4 and V7.1 will provide support to enable guests to utilize function on LinuxONE III, which includes:

- Synchronous execution support for on-chip data compression and DEFLATE conversion.
- Enhanced Vector and Vector packed decimal.
- Crypto Express7S adapter and cryptographic enhancements.
- FICON Express16 adapter on LinuxONE III.
- Dynamic I/O enhancements: Dynamic I/O support is provided for managing the configuration of Crypto Express7S, OSA-Express7S OSD CHPIDs, and FICON Express16 FC and FCP CHPIDs.

With the available PTF for APAR PI99085, the z/VM V6.4 and V7.1 TCP/IP stack and NETSTAT OSAINFO command have been updated to provide support for:

- OSA-Express7S GbE
- OSA-Express7S 10GbE
- OSA-Express7S 25GbE
- OSA-Express7S 1000BASE-T

For further details, review the [z/VM web site](#) and the hardware PSP bucket 8561DEVICE z/VM subset.

z/VM new function portal:

The z/VM Continuous Delivery News [web page](#) will be the primary vehicle used by IBM to describe [new functions](#) that are planned for z/VM. It is the recommended way to keep track of future development and support plans for the z/VM product. z/VM clients should consider subscribing to this page. IBM recommends subscribing to this page to be notified of changes by clicking the "Notify me" link in the left-side navigation bar. Additional instructions are included on the [VM Site File Change Notification](#) web page.

Additional z/VM V7.1 enhancements during 2019:

The following enhancements for z/VM V7.1 are available or are planned to be available during 2019:

- **Dynamic Crypto:** With the PTF for APAR VM66266, planned to be available September 23, 2019, z/VM will provide Dynamic Crypto support, which enables dynamic changes to the AP Cryptographic (crypto) environment on a z/VM system, allowing the addition or removal of crypto hardware to be less disruptive to the system and its guests.
- **VSwitch Priority Queuing support:** With the available PTFs for APARs VM66219, VM66223, and PH04703, z/VM exploits OSA-Express Priority Queuing when it is available on a VSwitch's uplink port; currently all VSwitch outbound traffic to the external network is transmitted at the same priority. When VSwitch Priority Queuing is enabled, z/VM will establish multiple OSA QDIO output queues, and transmit data to the external network at different priorities.
- **Support for 80 logical processors:** With the available PTFs for APAR VM66265 and VM66296, z/VM supports 80 logical processors on LinuxONE III, relieving the previous limitation of 64 logical processors per LPAR. This will allow clients to run more workload on z/VM by increasing the number of supported logical processors, which is especially important when multithreading is enabled. From a client's perspective, this will allow defining more logical processors for running workload on each LPAR, possibly requiring fewer LPARs to support the same workload. 80 logical processors are supported on LinuxONE III, LinuxONE Emperor II, and LinuxONE Rockhopper II.
- **EAV paging:** With the available PTFs for APARs VM66263 and VM66297, z/VM supports paging space that is located anywhere on Extended Address Volumes, allowing clients to define sufficient paging capacity for z/VM partitions with large memory sizes while reducing the burden of managing a larger number of smaller paging devices. As systems continue to grow, the need for paging space has increased. This z/VM support allows allocation and use of paging space on ECKD devices above cylinder 65520 up to the 1 TB (1,182,006 cylinder) limit.
- **Fast minidisk erase:** With the PTFs for APARs VM65784, VM66288, and PH14249, planned to be available December 15, 2019, z/VM provides a means to erase the data from an ECKD minidisk in a more efficient and quicker manner when a user is deleted.

STP - Time synchronization

Server Time Protocol (STP) is a server-wide facility that is implemented in the Licensed Internal Code (LIC), presenting a single view of time to Processor Resource/Systems Manager (PR/SM). STP uses a message based protocol in which timekeeping information is passed between servers. The STP design introduced a

concept called Coordinated Timing Network (CTN), a collection of servers that are time-synchronized to a time value called Coordinated Server Time.

STP enhancements - As announced in Hardware Announcement [AG17-0065](#), dated September 12, 2017, IBM LinuxONE Emperor II introduced a new Graphical User Display for the STP network and configuration called "Manage System Time" task on the Hardware Management Console 2.14.0 release. As a result, with LinuxONE III the previous generation of STP configuration panels will be removed from the SE.

In order to match the new hardware changes, STP has been updated to make use of the Oscillators in Drawers 1 and 2 (up to a total of 4). Pulse Per Second connections on the first two Drawers can be selected from among the four oscillator cards in the first two drawers.

Hardware Management Console and Support Element (HMC/SE): The LinuxONE III Hardware Management Console and Support Element will support:

September 23, 2019 deliverables:

• **HMC Security Audit Enhancement: Remote Syslog/Splunk Support**

- The HMC 2.15.0 release will provide a new option for audit support. Previously, the HMC users could use the Audit and Log Management task or Scheduled Operations to offload xml and html formatted logs. New HMC support will now be available to offload Security Logs, Audit Logs, Console Events, Hardware Messages, and SNMP and WebServices Automation Logs using a Remote SysLog Consolidation Server (for example, Splunk). In addition, SNMP API support was also added for offloading Audit Logs and Console Events while previously supporting Security Logs.

• **HMC Dashboard/Status Overview**

- The HMC 2.15.0 has been enhanced to address the viewing of the Status Overview, Exceptions, Operating System Messages, and Hardware Messages indicator area in the Tabbed Workspace environment. That indicator area is now presented so that it is visible when viewing tasks on all tabs, not just when viewing the home tab. There will now be a Compact Masthead Status Bar display along with "Docked" and "Expanded" display areas.

• **HMC Remote Browser Window Sizing**

- When using a remote browser connection into the HMC, there are now controls to persist the window size for subsequent browser connections into the HMC. Prior to HMC 2.15.0, the HMC browser connection into the HMC always launched a full-screen window, and while this could be resized, any subsequent initial HMC invocations would be a full-screen window size.

• **HMC/SE No DVD Support**

- New-build HMCs shipped with the HMC 2.15.0 level will no longer have CD/DVD drives as part of the HMC server hardware. The HMC will now provide two main options for functional and service operations: USB media or electronic. Solutions will be provided for both for:
 - Firmware required for the HMC or Support Element/CPC
 - eBusiness on Demand (eBoD) records (for example, On Off Capacity on Demand, Capacity Backup Unit (Disaster Recovery))
 - Operating system code (used for Load from Removable Media or Server task)
- USB Flash Memory Drive solutions are available, but if USB Flash Memory Drive is not acceptable for a client environment, there will be electronic network options to address those client environments.
- If the client requires a non-USB solution, that client should order feature number 0846 (No Physical Media Option). This will then provide instructions on how to electronically deliver the required content via the network using various options: Z Remote Support Facility (zRSF), IBM Resource Link^(R), FTP/SFTP/FTPS Server connections from the HMC. Note that for an electronic-only delivery environment, there is a requirement that there are two HMCs on

every unique network subnet where a Hardware Management Console, Support Element, or Trusted Key Entry workstation is connected.

- If USB is acceptable, generally the appropriate USB Flash Memory Drive media will be shipped with whatever feature is being delivered. There are also two feature numbers available for USB Flash Memory Drive Media, which can be ordered if required:
 - feature number 0843: USB Load media which can be used for IBM Z operating system code
 - feature number 0848: USB Backup media which can be used for HMC or SE Critical Data Backup task
- **HMC User Management Controls to Include HMC and SE Tasks**
 - Prior to HMC 2.15.0, there were a moderate number of client tasks that were available directly on the HMC, but were available only by using the Single Object Operations task to launch those tasks indirectly from the SE (Support Element). In addition, most clients don't create unique users for the SE environment, but only create users for the HMC. When SE-only tasks are launched via Single Object Operations, the user authority from User Management is inherited from default user roles on the SE (for example, SYSPROG, OPERATOR, and so on) rather than based on user controls for unique user roles on the HMC.
 - With HMC 2.15.0, most SE-only client tasks (for example, Channel Problem Determination, Crypto Configuration/Management, Advanced Facilities, Perform Model Conversion (On/Off Capacity on Demand, Capacity Backup Unit, and so on)) are now available directly on the HMC without having to utilize Single Object Operations. This also includes physical channel objects (PCHIDs) being available directly on the HMC.
 - HMC 2.15.0 will also provide user management controls for both HMC and SE tasks based on HMC User Management definitions, and those HMC/SE user and object access controls can be replicated across all HMCs using the HMC Data Replication task. These two major enhancements will result in a better user experience as well as provide the desired user task/object protection across the HMC/SE that the clients require for all their uniquely defined users.
- **HMC Integrated 3270 Console Performance Enhancements**
 - For security reasons it is recommended to use the HMC Integrated 3270 Console rather than HMC Operating System Messages when managing IBM Z operating system environments via an HMC console window. This is a strong consideration when managing because Integrated 3270 Console requires HMC users to log into their RACF[®] user IDs, but HMC Operating System Messages provides system console RACF user authority.
 - In HMC 2.15.0 further enhancements were made for the HMC Integrated 3270 Console which provide significant performance responsiveness for that task. These enhancements are present in the HMC 2.15.0 and will be effective not only when managing LinuxONE III CPC LPARs, but also for LinuxONE Emperor, Emperor II, LinuxONE Rockhopper, and LinuxONE Rockhopper II LPARs.
- **Removal of zBX Support**
 - HMC 2.15.0 no longer supports IBM z BladeCenter Extension (zBX). The HMC 2.15.0 removed the zEnterprise[®] Unified Resource Manager and Ensemble support, and the LinuxONE III system no longer supports connections to zBX. If there is still a need for zBX support, the z14 HMC 2.14.1 or earlier levels can be used, and the zBX can have connections only to z14 CPCs or earlier.
- **HMC n-2 Legacy System Support**
 - HMC 2.15.0 supports only two previous generations of systems (Emperor, Emperor II, Rockhopper, and Rockhopper II) while also supporting LinuxONE III. This change will improve the number and extent of new features and functions that are able to be pretested and maintained in a given release with IBM's continued high-reliability qualification procedures.
 - z14 HMC level 2.14.1 or earlier levels will continue to maintain support for n-4 systems, and can be used to support systems prior to z13[®].
- **Removal of System (Sysplex) Time Task**

- The HMC 2.15.0 no longer supports the System (Sysplex) Time task on the Support Element. The System (Sysplex) Time task was replaced by the "Manage System Time" task on the Hardware Management Console 2.14.0 release as announced in Hardware Announcement [AG17-0044](#), dated July 17, 2017. There are significant enhancements in the Manage System Time task which clients should utilize as part of their time management activities. More information on Manage System Time can be found in z14 publications as well as in YouTube video education modules on the [HMC YouTube launching page](#).

November 14, 2019 deliverable:

- **IBM Z Hardware Management Appliance**

- Starting with IBM LinuxONE III, the IBM Z Hardware Management Appliance feature number 0100 can be ordered to provide the HMC/SE functionality to be contained within redundant physical servers inside the CPC frame. When you order the IBM Z Hardware Management Appliance feature, this will provide logically a Primary and Alternate Support Element and two peer Hardware Management Consoles on two physical servers in the CPC frame. This eliminates the need for having to manage a separate physical server or servers for one or more HMCs outside of the frame. For the User Interface experience you must use remote browsing controls from your own workstation into HMC within the IBM Z Hardware Management Appliance.
- If you have multiple systems, you don't need to order the Hardware Management Appliance feature for all systems. The recommendation is that you consider having the IBM Z Hardware Management Appliance features on one or two CPCs, but the rest of the CPCs don't need to include Hardware Management Appliance features. (Those CPCs would have redundant Support Elements.)
- The IBM Z Hardware Management Appliance feature is optional. Physical HMCs (both Mini Tower and rack mounted) are still available features to be used.

The Internal Battery Feature (IBF) available with LinuxONE III contains Lithium ion batteries greater than 300 Wh. They are fully regulated Dangerous Goods which means that you will incur premium costs associated with owning the IBF. The need for an IBF would be redundant if your location provides uninterruptible power. The IBF can be ordered only in conjunction with BPA bulk power, not iPDU.

LinuxONE III machines shipped with IBFs and IBF FRUs could be delayed due to availability of freight carriers rated for Dangerous Goods. IGF and any lessor may not get IBFs back. IBFs must be removed if the machine is moved in any fashion. If you, the client, are shipping the IBF, you will have to use a logistics provider that is certified in Dangerous Goods transportation to ship the IBFs. You are responsible to handle the IBF properly in accordance with all local, legal, and environmental requirements, for all removed IBFs from repair actions, relocations, or machine returns.

Where IBM has Extended Producer Product Take Back Responsibilities, the client should refer to the [IBM Product Take Back Programs](#) website.

The IBM 2819 model IBF feature number (#3211) makes a replacement Internal Battery Feature battery pack available to those clients who want to relocate their IBM 8561 and had to remove their IBF battery packs because they couldn't be shipped.

Product positioning

While the cloud brings the promise of flexibility, agility and openness, only 20% of all workloads have been migrated. Cloud vendors push cloud versus mainframe as a choice, but you do not have to choose. You can capture new opportunities and still protect your business-critical processes and data.

By integrating LinuxONE with your hybrid cloud strategy, you add next-level security and stability to your cloud infrastructure, meeting the most demanding needs of customers and taking your potential on the cloud to new heights.

The security capabilities of LinuxONE III are exceptional. The LinuxONE III platform provides the hardware infrastructure, in a balanced system design, with the encryption capabilities that now make it possible to create a fortified perimeter around critical business data. Security is built into the LinuxONE III hardware, enabling fast hardware encryption of all data, whether it is in use, in flight, or at rest. This is achieved without having to make changes to applications. Ultimate workload isolation and encryption through the IBM-unique Secure Service Container technology provide a virtual lock box for each workload. This protects client data from both internal and external threats using FIPS 140-2 Level 4 protected key management. The use of protected keys secures data, in many cases, with minimal impact to performance. Instead of protecting only a selective 5% of data as is common with x86 clouds, LinuxONE III's pervasive encryption protects 100% of data with zero application changes, minimal operational overhead, and improved regulatory compliance. LinuxONE III allows developers to focus on innovation rather than on application-level encryption. This is why the 10 largest global insurers, 70% of the world's largest retailers, 23 of the 25 largest airlines, and 92 of the top 100 banks worldwide have placed their trust in IBM and are leveraging this technology.

The LinuxONE III provides the infrastructure to meet the demands of a digital business. With up to 190 configurable cores, LinuxONE III has performance and scaling advantages over prior generations, and more capacity than the Emperor II. With capacity to do the work of hundreds or in many cases thousands of x86 servers in a single footprint, LinuxONE III has a 3-year running cost below x86. Massive memory and I/O bandwidth have been built into the system to support fast in-memory workloads and real-time analytics that bring more insights and new business value.

The LinuxONE III provides remarkable performance and vertical scale necessary to support larger workloads with less latency and less admin complexity. Vertical scale allows LinuxONE III to scale up to 2 million Docker containers in a single system. As a system engineered for data-serving workloads, LinuxONE III can move data faster than alternative platforms. It can serve up to 1 trillion HTTPS web data requests a day. There are a number of processors, not part of the general processor count, that are dedicated to I/O processing as compared to the general processor base having to provide the I/O processing on other platforms. This massively reduces the processing costs from the general processors. On x86 this work is done with standard processors that drive incremental hardware, software, and administrative costs. LinuxONE is the only system that offers this built-in fast I/O subsystem capable of over 4k block IOPS.

The LinuxONE III integrates new file compression capabilities with an on-chip compression coprocessor. The processor chip provides a new hardware accelerated approach using a new coprocessor designed to reduce elapsed and CPU times for workloads. Note: Results may vary by client based on individual workload, configuration, and software levels.

IBM Data Privacy Passports is planned to be available to set up low-level data privacy protection throughout the lifecycle of the data. As a result, only the authorized application or user can view subsections of the data. This technology intended to be implemented on the IBM LinuxONE III enables data protection that can span hybrid and multiparty computing environments, including data stored in public cloud deployments or shared with third parties. For more information about IBM Data Privacy Passports V1.0 beta program, see [Software Announcement AP19-0429](#), dated September 12, 2019.

With up to 40 TB of real memory, the LinuxONE III can open opportunities such as in-memory data marts, large buffer pools for data access, and in-memory analytics while giving you the necessary room to tune applications for optimal performance. More data in memory means more efficient, cost-effective vertical scaling while maintaining a real-time single source of the truth. The use of crypto acceleration will

deliver additional improvements in throughput per core, which gives a natural boost to Java™ processes.

As a shared, immutable ledger for recording the history of transactions, blockchain is a revolutionary technology that is transforming business around the globe. It allows all members of a supply chain to share a digital ledger that is updated every time a transaction occurs. Members can view ledger progress in a common, transparent, and accessible record. Cryptographic privacy ensures that members see only the parts of the ledger relevant to them, and that transactions are secure, authenticated, and verifiable. Businesses and customers around the globe need to interface with each other to exchange assets such as currency, services, and information. Experts believe that blockchain will do for transactions what the internet did for information. As a highly engineered platform for secure, data-serving workloads, IBM chose the IBM LinuxONE platform to run the Blockchain High Security Business Network (HSBN). Blockchain will radically improve the operational effectiveness of businesses around the globe by enabling more data points, quicker responses, increased trust, and tamper-proof records. LinuxONE III is the cornerstone of the Blockchain offering.

IBM has been committed to Linux for decades and continues to invest in the Linux ecosystem. LinuxONE III provides a unique platform for any Linux solution requiring high availability, security, or scalability and supports a wealth of new open source products such as Go, Python, Scala, Node.js, Docker, Spark, MongoDB, PostgreSQL, MariaDB, and many more. LinuxONE III adds to the IBM commitment by allowing clients to take advantage of transformative technologies like blockchain, gain cognitive insights through the use of Spark analytics, scale vertically with unmatched speed, provide highly secure data-serving capabilities, and leverage the use of APIs to help create and deliver innovative, new customer services.

Statement of general direction

Removal of the z/VM^(R) PAGING63 IPL parameter: z/VM V7.1 will be the last z/VM release to support use of the PAGING63 IPL parameter. This parameter directed the paging subsystem to perform as it had in releases prior to z/VM V6.4. It also prevented use of z/VM V6.4 and V7.1 paging subsystem improvements, which include support for High Performance FICON^(R), HyperPAV, encryption, and Extended Address Volumes (EAV).

Prepaid OoCoD tokens: Beginning with LinuxONE III, new prepaid OoCoD tokens purchased will not carry forward to future systems.

IEEE 1588 Precision Time Protocol (PTP): In the future IBM plans to introduce PTP as an external time source for IBM Z Server Time Protocol (STP) for an IBM Z Coordinated Timing Network (CTN). The initial implementation would be for PTP connectivity via the IBM Z HMC/SE. At that time there would be no change to the use of STP CTNs for time coordination, other than the potential to use a PTP-based external time source. Future implementation is planned to include full connectivity of an external PTP time source directly to the IBM Z CPC, and re-introduction of the concept of a mixed CTN, with support for traditional STP and native PTP implementations. Beyond that, the goal would be to enhance the role of IBM Z machines in a PTP environment that would address the many governmental regulations and security concerns that our clients are facing.

Fibre Channel Endpoint Security: In the future IBM intends to provide Fibre Channel Endpoint Security to extend pervasive encryption on IBM Z, providing additional data protection and helping to achieve compliance mandates.

Statements by IBM regarding its plans, directions, and intent are subject to change or withdrawal without notice at the sole discretion of IBM. Information regarding potential future products is intended to outline general product direction and should not be relied on in making a purchasing decision. The information mentioned regarding potential future products is not a commitment, promise, or legal obligation to deliver any material, code, or functionality. Information about potential future products may not be incorporated into any contract. The development, release, and

timing of any future features or functionality described for IBM products remain at the sole discretion of IBM.

Reference information

For more information about the IBM z13^(R), see Hardware Announcement [AG15-0001](#), dated January 14, 2015.

For more information about "Software withdrawal and support discontinuance: IBM z Systems^(R) platform selected products," see Withdrawal Announcement [WP15-0016](#), dated February 03, 2015.

For more information on the IBM z13s^(R) and IBM LinuxONE, see Hardware Announcement [AG16-0002](#), dated February 16, 2016.

For more information about z/VM 6.4, see Software Announcement [AP16-0073](#), dated October 25, 2016.

For more information about sub-capacity pricing terms for z/VM and z/VM-based programs, see Software Announcement [AP17-0259](#), dated July 17, 2017.

For more information about the IBM Emperor II, see Hardware Announcement [AG17-0065](#), dated September 12, 2017.

For more information about the IBM LinuxONE Rockhopper II, see Hardware Announcement [AG18-0019](#), dated April 10, 2018.

For more information about "z/VM V7.1 ushers in the z/VM Continuous Delivery era", see Software Announcement [AP18-0295](#), dated August 07, 2018.

For more information about the IBM z14TM, see Hardware Announcement [AG17-0044](#), dated July 17, 2017.

For more information about the IBM z14 Model ZR1, see Hardware Announcement [AG18-0018](#), dated April 10, 2018.

For more information about "IBM z14 features enhance performance, encryption, and flexibility to accelerate your digital transformation", see Hardware Announcement [AG18-0074](#), dated October 02, 2018.

For more information about the IBM z15, see Hardware Announcement [AG19-0032](#), dated September 12, 2019.

For more information about IBM Data Privacy Passports, see Software Announcement [AP19-0429](#), dated September 12, 2019.

For more information about IBM Wave for z/VM V1.2, see Software Announcement [AP19-0392](#), dated September 12, 2019.

Product number

Description	Machine type	Model	Feature number
IBM LinuxONE III	8561	LT1	
HMC Table Top KMM			0148
TKE Table Top KMM			0157

China Only

Description	Machine type	Model	Feature number
IBM LinuxONE III	8561	LT1	

Description	Machine type	Model	Feature number
MSS Sales Flag C			3667
Description	Machine type	Model	Feature number
LinuxONE III	8561	LT1	
MTU 1 - D			0001
MTU 100 -D			0002
MTU 1 -V			0003
MTU 100 -V			0004
GTU 1 - D			0005
GTU 100 - D			0006
GTU 1 -V			0007
GTU 100 -V			0008
GTU 1000 - D			0009
GTU 1000 - V			0010
Migration Offering Machine			0014
HW for DPM			0016
Non RSF On/Off CoD			0032
Serv Docs Optional Print			0033
RFID Tag			0035
RFID Tag			0036
HMC			0062
HMC Rack Mount			0063
TKE Rack Mount			0087
TKE			0088
WWPN Persist			0099
IBM Z HW Mgmt Appliance			0100
Linux Hosting Found			0103
Container Hosting Found			0104
2964 Air w/o TEIO & w/o HtrR			0105
2964 Air w/o TEIO & w/HtR			0106
2964 Air w/TEIO & w/o HtrR			0107
2964 Air w/TEIO & w/HtR			0108
2964 Wat w/o TEIO & w/o HtrR			0109
2964 Wat w/o TEIO & w/HtR			0110
2964 Wat w/TEIO & w/o HtrR			0111
2964 Wat w/TEIO & w/HtR			0112
1 CPE Capacity Unit-IFL			0119
100 CPE Capacity Unit-IFL			0120
1 CPE Capacity Unit-SAP			0127
100 CPE Capacity Unit-SAP			0128
HMC Table Top KMM			0148

Description	Machine type	Model	Feature number
HMC Rack Keybd/ Monitor/Mouse			0154
TKE Rack Keybd/ Monitor/Mouse			0156
TKE Table Top KMM			0157
Fanout Airflow PCIe			0174
PCIe+ Fanout			0175
Client Must Provide HMC KMM			0188
Client Must Provide TKE KMM			0190
3906 w/o TEIO & w/o HtR			0201
3906 w/TEIO & w/ o HtR			0202
3906 w/o TEIO & w/HtR			0203
3906 w/TEIO & w/ HtR			0204
US English			0235
France			0236
German/Austrian			0237
LA Spanish			0238
Spain			0239
Italian			0240
French Canadian			0241
Portuguese			0242
UK English			0243
Norwegian			0244
Sweden Finland			0245
Netherlands			0246
Belgian French			0247
Denmark			0248
Swiss French/ German			0249
PCIe+ Interconnect Gen4			0421
10 GbE RoCE Express2.1			0432
FICON Express16SA LX			0436
FICON Express16SA SX			0437
FCP Express 32S LX			0438
FCP Express 32S SX			0439
OSA-Express7S GbE LX			0442
OSA-Express7S GbE SX			0443
OSA-Express7S 10 GbE LR			0444
OSA-Express7S 10 GbE SR			0445
OSA-Express7S 1000BASE-T			0446

Description	Machine type	Model	Feature number
IBM Adapter for NVMe1.1			0448
OSA-Express7S 25 GbE SR1.1			0449
25 GbE RoCE Express2.1			0450
Model LT1			0504
200-208V 30/60A, 3 Ph PDU			0629
380- 415V 32A, 3 Ph WYE PDU			0630
Ethernet Switch			0631
Bulk Power Assembly			0640
IBM Virtual Flash Memory			0643
Max34			0655
Max71			0656
Max108			0657
Max145			0658
Max190			0659
CPC PSU			0666
32GB USB Load Media			0843
No Physical Media			0846
32GB USB Backup Media			0848
TKE 9.2 LIC			0881
TKE Smart Card Reader			0891
Crypto Express7S (2 port)			0898
Crypto Express7S (1 port)			0899
TKE addl smart cards			0900
UID Label for DoD			0998
STP Enablement			1021
EMEA Special Operations			1022
512 GB Memory			1515
576 GB Memory			1516
640 GB Memory			1517
704 GB Memory			1518
768 GB Memory			1519
896 GB Memory			1520
1024 GB Memory			1521
1152 GB Memory			1522
1280 GB Memory			1523
1408 GB Memory			1524
1536 GB Memory			1525
1664 GB Memory			1526
1792 GB Memory			1527
1920 GB Memory			1528
2048 GB Memory			1529
2304 GB Memory			1530
2560 GB Memory			1531
2816 GB Memory			1532

Description	Machine type	Model	Feature number
3072 GB Memory			1533
3328 GB Memory			1534
3584 GB Memory			1535
3840 GB Memory			1536
4352 GB Memory			1537
4864 GB Memory			1538
5376 GB Memory			1539
5888 GB Memory			1540
6400 GB Memory			1541
6912 GB Memory			1542
7424 GB Memory			1543
7936 GB Memory			1544
8448 GB Memory			1545
8960 GB Memory			1546
9472 GB Memory			1547
9984 GB Memory			1548
10496GB Memory			1549
11008 GB Memory			1550
11520 GB Memory			1551
12032 GB Memory			1552
12544 GB Memory			1553
13056 GB Memory			1554
13568 GB Memory			1555
14080 GB Memory			1556
14592 GB Memory			1557
15104 GB Memory			1558
15616 GB Memory			1559
16128 GB Memory			1560
16640 GB Memory			1561
17152 GB Memory			1562
18176 GB Memory			1563
19200 GB Memory			1564
20224 GB Memory			1565
21248 GB Memory			1566
22272 GB Memory			1567
23296 GB Memory			1568
24320 GB Memory			1569
25344 GB Memory			1570
26368 GB Memory			1571
27392 GB Memory			1572
28416 GB Memory			1573
29440 GB Memory			1574
30464 GB Memory			1575
31488 GB Memory			1576
32512 GB Memory			1577
34560 GB Memory			1578
36608 GB Memory			1579
38656 GB Memory			1580
40704 GB Memory			1581
32 GB Mem DIMM (5/feat)			1642
64 GB Mem DIMM (5/feat)			1643
128 GB Mem DIMM (5/feat)			1644

Description	Machine type	Model	Feature number
256 GB Mem DIMM (5/feat)			1645
512 GB Mem DIMM (5/feat)			1631
LICCC Ship Via Net Ind			1750
CP4			1941
IFL			1945
Unassigned IFL			1948
SAP (optional)			1949
32GB Flex Memory			1951
64GB Flex Memory			1952
256GB Flex Memory			1953
64GB VFM Flex Memory			1954
32GB Memory Cap Incr			1984
64GB Memory Cap Incr			1985
256GB Memory Cap Incr			1986
CPC1 Reserve			2271
CPC2 Reserve			2272
Balanced Power Plan Ahead			3003
BPR Pair			3016
Lift Tool Kit			3100
Extension Ladder			3101
Internal Battery IBF			3217
Fill and Drain Kit			3393
CPACF Enablement			3863
PCIe+ I/O Drawer			4021
B Frame			4031
A Frame Radiator			4033
B Frame Radiator			4035
Z Frame			4037
C Frame			4038
Zero-Way Processor CP4			4188
1-Way Processor CP4			4189
400 Capacity Marker			4481
401 Capacity Marker			4482
PRC Tokens			6803
PRC Tokens Alteration			6804
Additional CBU Test			6805
PRC 1 MSU day			6806
PRC 100 MSU days			6807
PRC 10000 MSU days			6808
PRC 1 IFL day			6809
PRC 100 IFL days			6810
PRC 1 SAP day			6815

Description	Machine type	Model	Feature number
PRC 100 SAP days			6816
Total CBU Years Ordered			6817
CBU Records Ordered			6818
Single CBU IFL Year			6822
25 CBU IFL Year			6823
Single CBU SAP Year			6830
25 CBU SAP Year			6831
CBU Replenishment			6832
Capacity for Planned Event			6833
OPO Sales Flag			6835
OPO Sales Flag- Alteration			6836
Top Exit Cabling			7917
Bottom Exit Cabling			7919
Top Exit Cabling w/o Tophat			7928
30A/400V 3Ph Wye w/Hubbell			7946
32A/380-415V 3Ph Wye			7947
32A/380-415V 3Ph Wye LSZH			7948
60A/250V 3Ph w/ Hubbell			7950
60A/250V 3Ph w/ Cut End			7951
60A/250V w/ Hubbell			7954
60A/250V w/Cut End			7955
30A/400V Hubbell			7956
32A/380-415V Cut End			7957
32A/380-415V Cut End LSZH			7958
30A/480V Hubbell			7959
FQC Bracket & Mounting Hdw			7960
LC Duplex 6.6 ft Harness			7961
60A/250V 3P w/ Cut End LSZH			7962
60A/250V w/Cut End LSZH			7965
Non Raised Floor Support			7998
19in Earthquake Kit, RF			8010
19in Earthquake Kit, NRF			8011
Multi Order Ship Flag			9000
PRC Tokens Authorization			9904

Description	Machine type	Model	Feature number
Multi Order Rec Only Flag NB			9001
Multi Order Rec Only Flag MES			9002
RPO Action Flag			9003
Downgraded PUs Per Request			9004
On Off CoD Act 100 IFL Days			9874
On Off CoD Act 100 SAP Days			9878
On Off CoD Act IFL Days			9888
On Off COD authorization			9896
Perm upgr authorization			9898
CIU Activation (Flag)			9899
On-Line CoD Buying (Flag)			9900
On Off CoD Act SAP Days			9909
CBU authorization			9910
CPE authorization			9912
OPO Sales authorization			9913
1 MSU day			9917
100 MSU days			9918
10000 MSU days			9919
1 IFL day			9920
100 IFL days			9921
Height Reduce Ship			9975

Description	Machine type	Model	Feature number
IBM z14	3906	LM1	
		LM2	
		LM3	
		LM4	
		LM5	
IBM z14 ZR1	3907	LR1	
PRC Tokens Authorization			9904
PRC Tokens			6803
PRC Tokens Alteration			6804
PRC 1 MSU day			6806
PRC 100 MSU days			6807
PRC 10000 MSU days			6808
PRC 1 IFL day			6809
PRC 100 IFL days			6810
PRC 1 SAP day			6815
PRC 100 SAP days			6816
HMC Tower			0062
HMC Rack Mount			0063
TKE Rack Mount			0087
TKE Rack Mount			0088

Description	Machine type	Model	Feature number
32GB USB Load Media			0843
TKE 9.2 LIC			0881

China Only

Description	Machine type	Model	Feature number
IBM LinuxONE Rockhopper II	3907	LR1	
MSS Sales Flag C			3667

Features that may carry forward:

LinuxONE III does not support carry forward from older models.

Model conversions

From machine type	From model	To machine type	To model
8561	LT1	8561	T01

Parts removed as a result of a model conversion become the property of IBM.

Feature conversions

From MT	From Feature	To MT	To Feature	Description
8561	1945	8561	1949	IFL to SAP (opt)
8561	1945	8561	1948	IFL to uIFL
8561	1949	8561	1945	SAP (opt) to IFL
8561	1949	8561	1948	SAP (opt) to uIFL
8561	1948	8561	1945	uIFL to IFL
8561	1948	8561	1949	uIFL to SAP (opt)
8561	0504	8561	0503	LT1 to T01
8561	0655	8561	0656	Max34 to Max71
8561	0655	8561	0657	Max34 to Max108
8561	0656	8561	0657	Max71 to Max108
8561	4188	8561	4189	400 to 401
8561	4189	8561	4188	401 to 400
8561	0103	8561	0104	Linux Hst Fndtn to Cont Hst Fndtn

Parts removed as a result of a conversion become the property of IBM.

Publications

The following publications are available now in the "Library" section of Resource Link^(R):

Title	Order number
IBM 8561 Installation Manual for Physical Planning (IMPP)	GC28-7002
IBM 8561 Installation Manual for Physical Planning (IMPP) -- Russian version	GC28-7004

Title	Order number
PR/SM Planning Guide	SB10-7175
IOCP User's Guide for ICP IOCP	SB10-7172
Planning for Fiber Optic Links (FICON/FCP, Coupling Links, OSA, and zHyperLink Express ^(R))	GA23-1408

The following publications are shipped with the product and will be available at planned availability in the "Library" section of Resource Link:

Title	Order number
IBM 8561 Installation Manual	GC28-6997
IBM 8561 Service Guide	GC28-6998
IBM 8561 Safety Inspection	GC28-6996
Service Guide for TKE Workstations (Version 7.0)	GC28-6980
Systems Safety Notices	G229-9054
IBM Important Notices	G229-9056
IBM Z Statement of Limited Warranty	GC28-6979
License Agreement for Machine Code	SC28-6872
License Agreement for Machine Code Addendum for Cryptography	GC27-2635
Systems Environmental Notices and User Guide	Z125-5823

The following publications will be available at planned availability in the "Library" section of Resource Link:

Title	Order number
IBM 8561 Parts Catalog	GC28-7003
Service Guide for 2461 Hardware Management Console	GC28-6990
Service Guide for 2461 Support Element	GC28-6991
SNMP Application Programming Interfaces	SB10-7171
Capacity on Demand User's Guide	SC28-6985
CHPID Mapping Tool User's Guide	GC28-6984
Hardware Management Console Web Services API (V2.15.0)	SC27-2638
IBM Dynamic Partition Manager (DPM) Guide	SB10-7176
Secure Service Container User's Guide	SC28-7005
Stand-Alone IOCP User's Guide	SB10-7173
FICON CTC Reference	SB10-7174
Maintenance Information for Fiber Optics (FICON/FCP, Coupling Links, OSA, and zHyperLink Express)	SY27-7696
Integrating the HMC's Broadband RSF into your Enterprise	SC28-6986
Hardware Management Console Security	SC28-6987
SCSI IPL -- Machine Loader Messages	SC28-7006
OSA-Express Customer's Guide and Reference	SA22-7935
OSA/SF on the Hardware Management Console	SC14-7580
OSA Integrated Console Controller User's Guide	SC27-9003

Resource Link: Publications for IBM Z ® can be obtained at the [Resource Link](#) website.

Using the instructions on the Resource Link panels, obtain a user ID and password. Resource Link has been designed for easy access and navigation.

HMC and SE console documentation

At planned availability, the Hardware Management Console (HMC) and Support Element (SE) console documentation (Version 2.15.0) will be available from IBM Resource Link and the consoles.

You can also find HMC videos at the [IBM Z Hardware Management Console Videos](#) website.

To access the IBM Publications Center Portal, go to the [IBM Publications Center](#) website.

The following Redbooks^(R) publications are available now. To order, contact your IBM representative.

Topic	Redbook publication number
Technical Introduction	SG24-8850-00
Technical Guide	SG24-8851-00
Configuration Setup	SG24-8860-00
Connectivity Handbook	SG24-5444-20
IBM Z Functional Matrix	REDP-5157-04

To download these Redbooks publications, go to the [IBM Z Redbooks](#) website.

For other IBM Redbooks publications, go to the main [IBM Redbooks](#) website.

IBM Knowledge Center provides you with a single information center where you can access product documentation for IBM systems hardware, operating systems, and server software. Through a consistent framework, you can efficiently find information and personalize your access. See [IBM Knowledge Center](#).

To access the IBM Publications Center Portal, go to the [IBM Publications Center](#) website.

The Publications Center is a worldwide central repository for IBM product publications and marketing material with a catalog of 70,000 items. Extensive search facilities are provided. A large number of publications are available online in various file formats, which can currently be downloaded.

Services

IBM Systems Lab Services

IBM Systems Lab Services offers a wide array of services available for your enterprise. It brings expertise on the latest technologies from the IBM development community and can help with your most difficult technical challenges.

IBM Systems Lab Services exists to help you successfully implement emerging technologies so as to accelerate your return on investment and improve your satisfaction with your IBM systems and solutions. Services examples include initial implementation, integration, migration, and skills transfer on IBM systems solution capabilities and recommended practices. IBM Systems Lab Services is one of the service organizations of IBM's world-renowned IBM Systems Group development labs.

For details on available services, contact your IBM representative or go to the [Lab Services](#) website.

Global Technology Services

IBM services include business consulting, outsourcing, hosting services, applications, and other technology management.

These services help you learn about, plan, install, manage, or optimize your IT infrastructure to be an on-demand business. They can help you integrate your high-speed networks, storage systems, application servers, wireless protocols, and an array of platforms, middleware, and communications software for IBM and many non-IBM offerings. IBM is your one-stop shop for IT support needs.

For details on available services, contact your IBM representative or go to the [IBM Global Technology Services^{\(R\)}](#) website.

For details on available IBM Business Continuity and Recovery Services, contact your IBM representative or go to the [Resiliency Services](#) website.

Details on education offerings related to specific products can be found on the [IBM authorized training](#) website.

Technical information

EMC conformance

- ANSI C63.4 (2014) with FCC Method 47 CFR Part 15, Subpart B (USA)
- ICES-003 Issue 6 (2016) (Canada)
- EN55032:2012/AC:2013 and EN 55024 (CE Mark Compliance for European Union Countries)
- Korean KN32 and KN35 (Korean EMC Standards)
- VCCI V-3 EMI Regulations (Japan)
- Taiwan BSMI CNS13438 (Taiwan EMC Standard)
- AS/NZS CISPR 32:2013 (Australia and New Zealand)
- GB 9254 & GB 17625.1 if applicable (People's Republic of China EMC Standards)
- SASO ICCP Document No. EMC.CVG (Saudi Arabia)
- TCVN 7189 (Vietnam)
- GOST 30805.22, GOST CISPR 24, GOST R 51317.3.X Series (Eurasian Economic Union EMC Standards)

Specified operating environment

Physical specifications

The physical specifications for IBM LinuxONE III Model LT1 are now available in the "Library" section of Resource Link in the *Installation Manual for Physical Planning* (IMPP).

This information can be obtained at [Resource Link](#) .

Using the instructions on the Resource Link panels, obtain a user ID and password. Resource Link has been designed for easy access and navigation.

Operating environment

The operating environment information for IBM LinuxONE III Model LT1 is now available in the "Library" section of Resource Link in the *Installation Manual for Physical Planning* (IMPP).

This information can be obtained at [Resource Link](#) .

Using the instructions on the Resource Link panels, obtain a user ID and password.

Resource Link has been designed for easy access and navigation.

Hardware requirements

The hardware requirements for the IBM Z servers, features, and functions are identified. A new driver level is required.

HMC (V2.15.0) plus MCLs and the Support Element (V2.15.0) are planned to be available on September 23, 2019. You should review the PSP buckets for minimum Machine Change Levels (MCLs) and software PTF levels before IPLing operating systems.

The new functions available on the Hardware Management Console (HMC) version 2.15.0, as described, apply exclusively to LinuxONE III. However, the HMC version 2.15.0 will also support the systems listed in the table below.

Machine family	Machine type	Firmware driver	SE version
z14 and Emperor II	3906	36	2.14.1
z14 and Emperor II	3906	32	2.14.0
z14 ZR1 and Rockhopper II	3907	36	2.14.1
z14 ZR1 and Rockhopper II	3907	32	2.14.0
z13 ^(R) and Emperor	2964	27	2.13.1
z13s ^(R) and Rockhopper	2965	27	2.13.1

Software requirements

IBM LinuxONE III requires at a minimum:

- z/VM V7.1 with PTFs.
- z/VM V6.4 with PTFs.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.
 - The support statements for LinuxONE III also cover the KVM hypervisor on distribution levels that have KVM support.

For minimum required and recommended distribution levels refer to the IBM Z website.

Note: The IBM product "KVM for IBM Z " is out of service and no longer available from IBM. KVM technology is now provided as part of the distributions.

The following software requirements are listed for features and capabilities supported on LinuxONE III:

FICON Express16SA (CHPID type FC) when utilizing FICON or Channel-To-Channel (CTC) requires at a minimum:

- z/VM V7.1.
- z/VM V6.4.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

FICON Express16SA (CHPID type FC) for support of **zHPF single track** operations requires at a minimum:

- z/VM V7.1.
- z/VM V6.4.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

FICON Express16SA (CHPID type FC) for support of **zHPF multitrack** operations requires at a minimum:

- z/VM V7.1.
- z/VM V6.4.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

FICON Express16SA (CHPID type FCP) for support of **SCSI** devices requires at a minimum:

- z/VM V7.1.
- z/VM V6.4.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

FICON Express16SA (CHPID type FCP) support of **hardware data router** requires at a minimum:

- z/VM V7.1 for guest exploitation.
- z/VM V6.4 for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

T10-DIF support by the FICON Express16SA features when defined as CHPID type FCP requires at a minimum:

- z/VM V7.1 for guest exploitation.
- z/VM V6.4 for guest exploitation.

- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

OSA-Express7S GbE LX (#0442) and GbE SX (#0443) require at a minimum:

CHPID type OSC:

- z/VM V7.1 with PTFs.
- z/VM V6.4 with PTFs.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

CHPID type OSD:

- z/VM V7.1 with PTFs.
- z/VM V6.4 with PTFs.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

CHPID type OSD without maximum port exploitation (one port on the PCIe adapter is available for use):

- z/VM V7.1 with PTFs.
- z/VM V6.4 with PTFs.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

OSA-Express7S 10 GbE LR (#0444) and 10 GbE SR (#0445) require at a minimum:

CHPID type OSD:

- z/VM V7.1 with PTFs.
- z/VM V6.4 with PTFs.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.

- Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
- Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

OSA-Express7S 25 GbE SR (#0449) requires at a minimum:

CHPID type OSD:

- z/VM V7.1 with PTFs.
- z/VM V6.4 with PTFs.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

OSA-Express7S 100BASE-T Ethernet (#0446) requires at a minimum:

CHPID type OSC supporting TN3270E and non-SNA DFT:

- z/VM V7.1 with PTFs.
- z/VM V6.4 with PTFs.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

CHPID type OSD with exploitation of two ports per CHPID:

- z/VM V7.1 with PTFs.
- z/VM V6.4 with PTFs.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

CHPID type OSD without maximum port exploitation (one port on the PCIe adapter is available for use):

- z/VM V7.1 with PTFs.
- z/VM V6.4 with PTFs.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

Checksum offload for IPv6 packets (CHPID type OSD):

- z/VM V7.1 for guest exploitation.
- z/VM V6.4 for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service.
 - Red Hat RHEL 8.0 with service.
 - Ubuntu 18.04.1 LTS with service.

Checksum offload for LPAR-to-LPAR traffic for IPv4 and IPv6 packets (CHPID type OSD):

- z/VM V7.1 for guest exploitation.
- z/VM V6.4 for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service.
 - Red Hat RHEL 8.0 with service.
 - Ubuntu 18.04.1 LTS with service.

Large Send for IPv6 packets (CHPID type OSD):

- z/VM V7.1 for guest exploitation.
- z/VM V6.4 for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service.
 - Red Hat RHEL 8.0 with service.
 - Ubuntu 18.04.1 LTS with service.

Crypto Express7S (2 port) (#0898) Toleration, which treats Crypto Express7S cryptographic coprocessors and accelerators as Crypto Express6 coprocessors and accelerators, requires at a minimum:

- z/VM V7.1 with PTFs for guest exploitation.
- z/VM V6.4 with PTFs for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

Crypto Express7S (1 port) (#0899) Toleration requires at a minimum:

- z/VM V7.1 with PTFs for guest exploitation.
- z/VM V6.4 with PTFs for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

Crypto Express7S (1 port) (#0899) support of **greater than 16 Domains** requires at a minimum:

- z/VM V7.1 with PTFs for guest exploitation and exploitation within the z/VM TLS/SSL server.
- z/VM V6.4 with PTFs for guest exploitation and exploitation within the z/VM TLS/SSL server.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service, SUSE SLES 12 SP4 with service, and SUSE SLES 11 SP4 with service.
 - Red Hat RHEL 8.0 with service, Red Hat RHEL 7.7 with service, and Red Hat RHEL 6.10 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

Crypto Express7S (1 port) (#0899) Exploitation requires at a minimum:

- z/VM V7.1 with PTFs for guest exploitation and exploitation within the z/VM TLS/SSL server.
- z/VM V6.4 with PTFs for guest exploitation and exploitation within the z/VM TLS/SSL server.
- Linux on IBM Z-IBM is working with its Linux distribution partners to provide support in future distribution releases.

10 GbE RoCE Express2 (#0432) for Shared Memory Communications - Remote Direct Memory Access (SMC-R) requires at a minimum:

- z/VM V7.1 with PTFs for guest exploitation.
- z/VM V6.4 with PTFs for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service.
 - Red Hat RHEL 8.0 with service.
 - Ubuntu 18.04.5 LTS with service.

10 GbE RoCE Express2 (#0432) for Ethernet communications (which does not require a peer OSA) including **Single Root I/O Virtualization (SR-IOV)** requires at a minimum:

- z/VM V7.1 with PTFs for guest exploitation.
- z/VM V6.4 with PTFs for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service.
 - Red Hat RHEL 8.0 with service.
 - Ubuntu 18.04.1 LTS with service.

10 GbE RoCE Express2 (#0432) for TCP/IP requires at a minimum:

- z/VM V7.1 with PTFs for guest exploitation.
- z/VM V6.4 with PTFs for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service and SUSE SLES 12 SP4 with service.
 - Red Hat RHEL 8.0 with service and Red Hat RHEL 7.7 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

25 GbE RoCE Express2 (#0450) for Shared Memory Communications - Remote Direct Memory Access (SMC-R) requires at a minimum:

- z/VM V7.1 with PTFs for guest exploitation.
- z/VM V6.4 with PTFs for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service.
 - Red Hat RHEL 8.0 with service.
 - Ubuntu 18.04.5 LTS with service.

25 GbE RoCE Express2 (#0450) for Ethernet communications (which does not require a peer OSA) including Single Root I/O Virtualization (SR-IOV) requires at a minimum:

- z/VM V7.1 with PTFs for guest exploitation.
- z/VM V6.4 with PTFs for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service.
 - Red Hat RHEL 8.0 with service.
 - Ubuntu 18.04.1 LTS with service.

25 GbE RoCE Express2 (#0450) for TCP/IP requires at a minimum:

- z/VM V7.1 with PTFs for guest exploitation.
- z/VM V6.4 with PTFs for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service and SUSE SLES 12 SP4 with service.
 - Red Hat RHEL 8.0 with service and Red Hat RHEL 7.7 with service.
 - Ubuntu 18.04.1 LTS with service and Ubuntu 16.04.6 LTS with service.

Integrated Accelerator for zEnterprise Data Compression requires at a minimum:

- z/VM V7.1 with PTFs for guest exploitation.
- z/VM V6.4 with PTFs for guest exploitation.
- Linux on IBM Z-IBM plans to support running the following Linux on IBM Z distributions on LinuxONE III:
 - SUSE SLES 15 SP1 with service.
 - Red Hat RHEL 8.0 with service.
 - Ubuntu 18.04.1 LTS with service.

Planning information

Client responsibilities

Information on customer responsibilities for site preparation can be found in the [Library](#) section of Resource Link.

Installability

The average installation time for an LinuxONE III is approximately 22 installer hours. This does not include planning hours. This assumes a full System Assurance Product

Review and implementation of the cable services have been performed. See your IBM representative for details on these services.

Security, auditability, and control

The LinuxONE III uses the security and auditability features and functions of host hardware, host software, and application software.

The client is responsible for evaluation, selection, and implementation of security features, administrative procedures, and appropriate controls in application systems and communications facilities.

IBM Systems Lab Services

For details on available services, contact your IBM representative or go to the [Lab Services](#) website.

IBM Electronic Services

IBM has transformed its delivery of hardware and software support services to help you achieve higher system availability. Electronic Services is a web-enabled solution that offers an exclusive, no-additional-charge enhancement to the service and support available for IBM servers. These services are designed to provide the opportunity for greater system availability with faster problem resolution and preemptive monitoring. Electronic Services comprises two separate, but complementary, elements: Electronic Services news page and Electronic Services Agent.

The Electronic Services news page is a single internet entry point that replaces the multiple entry points traditionally used to access IBM Internet services and support. The news page enables you to gain easier access to IBM resources for assistance in resolving technical problems.

The Electronic Service Agent is no-additional-charge software that resides on your server. It monitors events and transmits system inventory information to IBM on a periodic, client-defined timetable. The Electronic Service Agent automatically reports hardware problems to IBM. Early knowledge about potential problems enables IBM to deliver proactive service that may result in higher system availability and performance. In addition, information collected through the Service Agent is made available to IBM service support representatives when they help answer your questions or diagnose problems. Installation and use of IBM Electronic Service Agent for problem reporting enables IBM to provide better support and service for your IBM server.

To learn how Electronic Services can work for you, go to the [IBM Electronic Service Agent](#) website.

Terms and conditions

Products - terms and conditions

Warranty period

One year

To obtain copies of the IBM Statement of Limited Warranty, contact your reseller or IBM. An IBM part or feature installed during the initial installation of an IBM machine is subject to the full warranty period specified by IBM. An IBM part or feature that replaces a previously installed part or feature assumes the remainder of the warranty period for the replaced part or feature. An IBM part or feature added to a machine without replacing a previously installed part or feature is subject to a full warranty. Unless specified otherwise, the warranty period, type of warranty service, and service level of a part or feature are the same as those for the machine in which it is installed.

Warranty service

The specified level of maintenance service may not be available in all worldwide locations. Additional charges may apply outside IBM's normal service area. Contact your local IBM representative or your reseller for country- and location-specific information. IBM will repair the failing machine at your location and verify its operation. You must provide a suitable working area to allow disassembly and reassembly of the IBM machine. The area must be clean, well lit, and suitable for the purpose. The following service is available as warranty for your machine type.

- 24 hours per day, 7 days a week, same-day response

International Warranty Service

International Warranty Service allows you to relocate any machine that is eligible for International Warranty Service and receive continued warranty service in any country where the IBM machine is serviced. If you move your machine to a different country, you are required to report the machine information to your Business Partner or IBM representative.

The warranty service type and the service level provided in the servicing country may be different from that provided in the country in which the machine was purchased. Warranty service will be provided with the prevailing warranty service type and service level available for the eligible machine type in the servicing country, and the warranty period observed will be that of the country in which the machine was purchased.

The following types of information can be found on the [International Warranty Service](#) website

- Machine warranty entitlement and eligibility
- Directory of contacts by country with technical support contact information
- Announcement Letters

Warranty service upgrades

If required, IBM will provide repair service depending on the types of maintenance service specified for the machine. Contact your local IBM representative.

The following service is provided.

- 24 hours per day, 7 days a week, same-day response.

Usage plan machine

No

IBM hourly service rate classification

Three

When a type of service involves the exchange of a machine part, the replacement may not be new, but will be in good working order.

General terms and conditions

Field-installable features

Yes

Model conversions

Yes

Machine installation

Installation is performed by IBM. IBM will install the machine in accordance with the IBM installation procedures for the machine.

In the United States, contact IBM at 1-800-IBM-SERV (426-7378). In other countries, contact the local IBM office.

Graduated program license charges apply

No

Licensed Internal Code

IBM Licensed Internal Code (LIC) is licensed for use by a customer on a specific machine, designated by serial number, under the terms and conditions of the IBM License Agreement for Machine Code, to enable a specific machine to function in accordance with its specifications, and only for the capacity authorized by IBM and acquired by the customer. You can obtain the agreement by contacting your IBM representative or visiting the [License Agreement for Machine Code and Licensed Internal Code](#) website.

Specific Machine Type Model:

- 8561-LT1

Other Installed Licensed Code

None

Prices

For all local charges, contact your IBM representative.

IBM Global Financing

IBM Global Financing offers competitive financing to credit-qualified clients to assist them in acquiring IT solutions. Offerings include financing for IT acquisition, including hardware, software, and services, from both IBM and other manufacturers or vendors. Offerings (for all client segments: small, medium, and large enterprise), rates, terms, and availability can vary by country. Contact your local IBM Global Financing organization or go to the [IBM Global Financing](#) website for more information.

IBM Global Financing offerings are provided through IBM Credit LLC in the United States and other IBM subsidiaries and divisions worldwide to qualified commercial and government clients. Rates are based on a client's credit rating, financing terms, offering type, equipment type and options, and may vary by country. Other restrictions may apply. Rates and offerings are subject to change, extension, or withdrawal without notice.

AP distribution

Country/Region	Announced
AP	
ASEAN *	Yes
India/South Asia **	Yes
Australia	Yes
Hong Kong	Yes
Macao SAR of the PRC	Yes
Mongolia	Yes

Country/Region	Announced
New Zealand	Yes
People's Republic of China	Yes
South Korea	Yes
Taiwan	Yes

* Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic, Malaysia, Myanmar, Philippines, Singapore, Thailand, Timor-Leste, and Vietnam

** Bangladesh, Bhutan, India, Maldives, Nepal, and Sri Lanka

Trademarks

IBM Cloud and IBM z14 are trademarks of IBM Corporation in the United States, other countries, or both.

IBM, IBM Z, Resource Link, Power, Global Technology Services, z/VM, Express, FICON, z Systems, RACF, zEnterprise, z13, IBM z13, IBM z Systems, IBM z13s, Interconnect, Redbooks and z13s are registered trademarks of IBM Corporation in the United States, other countries, or both.

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

Oracle and Java are trademarks of Oracle and/or its affiliates in the United States, other countries, or both.

Other company, product, and service names may be trademarks or service marks of others.

Terms of use

IBM products and services which are announced and available in your country can be ordered under the applicable standard agreements, terms, conditions, and prices in effect at the time. IBM reserves the right to modify or withdraw this announcement at any time without notice. This announcement is provided for your information only. Reference to other products in this announcement does not necessarily imply those products are announced, or intend to be announced, in your country. Additional terms of use are located at

[Terms of use](#)

For the most current information regarding IBM products, consult your IBM representative or reseller, or go to the IBM worldwide contacts page

[IBM Directory of worldwide contacts](#)

Corrections

(Corrected on May 8, 2020)

The "Product number" and "Description" sections were revised.

(Corrected on February 19, 2020)

The "Product number" section was revised.