CICS Transaction Server for z/OS
5.6

What's New

IBM

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Contents

About this PDF

"What's New" is a summary of the new features and capabilities of the latest version of CICS Transaction Server for z/OS. Details of how to use these features is provided in the rest of the product documentation. It also summarizes any changes to CICS externals, such as the application programming interface, for this version of CICS TS. "What's New" is primarily aimed at application programmers and system programmers who need to understand the scope of the new release.

For details of the terms and notation used in this book, see Conventions and terminology used in CICS documentation in IBM Documentation.

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Chapter 1. What's new?

CICS Transaction Server for z/OS, Version 5 Release 6 enables development teams to create powerful, mixed-language, applications while allowing the operational teams to manage these applications from a single point of control.

While IBM values the use of inclusive language, terms that are outside of IBM's direct influence are sometimes required for the sake of maintaining user understanding. As other industry leaders join IBM in embracing the use of inclusive language, IBM will continue to update the documentation to reflect those changes.

You might also like to refer to the CICS Transaction Server for z/OS V5.6 announcement letter. New features in CICS Explorer® are described in the CICS Explorer product documentation.

The following features and enhancements are delivered as part of CICS Transaction Server for z/OS, Version 5 Release 6 , and cover the following areas:

- Java™ support features
- System management
- Security
- Performance
- Resilience
- Continuous delivery APARs
- "CICS documentation and other information" on page 18

The features in the following tables are not exclusive to each of the job roles shown; several are of interest across roles.

Java support features

Table 1. Language support features provided with CICS TS for z/OS, Version 5.6

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Service Easier system management, efficient application development, and advanced client authentication available in single CICS regions with CMCI JVM server
Service Prepare for a future release of CICS TS
Service Enabling multiple client URIMAPs that point to the same endpoint

Security features

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Table 3. Security features provided with CICS TS for z/OS, Version 5.6 (continued)

For application developers	For system programmers
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	Service Minimum key size can be set during TLS handshakes for increased key strength
	Service HTTP strict transport security (HSTS) is supported

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For application developers	For system programmers
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For application developers	For system programmers
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Table 6. Features that are available as continuous delivery updates to other releases through APARs, and also provided with CICS TS for z/OS, Version 5.6 (continued)

For application developers	For system programmers
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	Service Key rings can be shared between regions in an easier way
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Ansible IBM z/OS CICS collection to automate CICS resource and region actions

Red Hat® Ansible® is a popular open source tool to automate configuration management and deployments on IBM z/OS and many other platforms with a consistent approach, architecture, and set of skills. It supports automation tasks through Ansible playbooks, which you can run from command line interfaces (CLI), browser dashboards, within editors, or DevOps pipelines.

The IBM z/OS CICS collection collection uses the CMCI REST API to automate tasks in either a CICSPlex System Manager environment or a single CICS region that is not part of a CICSPlex SM. The automation tasks can define, install, and perform actions on CICS definitions and resources such as creating a PROGRAM definition, installing and updating it, and then deleting the definition.

To use this collection, a CICS management client interface (CMCI) (CMCI) connection is required in the CICSPlex SM or the single CICS region.

The IBM z/OS CICS collection collection is developed as an open source project at IBM z/OS CICS collection GitHub and is available on Ansible Galaxy and Ansible Automation Hub.

Enhancements to CICS policies

Support for CICS policies is continuously expanded with new rule types, new actions, and other enhancements.

New policy system rule types
Support for the following new policy system rule types is introduced:

DBCTL connection status
Use this rule to monitor and react to the change in status of a connection between CICS and DBCTL.

IBM MQ connection status
Use this rule to monitor and react to the change in status of a connection between CICS and IBM MQ.

Pipeline enable status
Use this rule to monitor and react to the change in the enable status of a CICS PIPELINE resource.

These system rules are also available on CICS TS 5.5 with APAR PH07632.

Service Transaction dump threshold
Available with APAR PH34348. Use this rule type to set a maximum threshold for the total number of transaction dumps in a CICS region and take an automatic action when the threshold is exceeded.

With this system rule, you can monitor transaction dumps and prevent excessive dumping in a CICS region.

Learn more ...

New policy task rule types

Support for the following new policy task rule types is introduced:

Service Container storage

Available with APAR PH29187. Use this rule type to define a threshold for the amount of container storage that is allocated to a user task, and take an automatic action if the threshold is exceeded. This rule does not apply to EXCI containers or BTS containers.

Learn more ...

New z/OS WLM health action for policy system rules

Support for a new policy action for system rules to increase or decrease the z/OS WLM health value of a CICS region when all the rules conditions are met. The new action is not supported for task rules.

Learn more ...

Service Specify Transaction ID and User ID conditions for policy task rules

Available with APAR PH26145. When defining a policy task rule, you can now limit this rule to be triggered when status changes are made in relation to a specific transaction or a range of transactions, in relation to a specific user ID or a range of user IDs, or in relation to a combination of both, by setting **Transaction ID** and **User ID** filters in the Condition section in the Rules tab of the Policy definition editor.

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New replication log record

Replication logging in support of GDPS® Continuous Availability is enhanced to log a REDO record when an application issues an UNLOCK command after a read-update command, or a series of write-massinsert commands. It allows replication products to cater more efficiently for non-RLS applications, which, in the absence of browse for update support, issue read-update requests against all records in a file, but update very few and unlock most records.

This capability is also available on CICS TS 5.2, 5.3, 5.4 and 5.5 with APARs PH09381 and PH13200.

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GMTRAN option DISCONNECT extended to CESF

The DISCONNECT option of the **GMTRAN** system initialization parameter is extended to the CICS-supplied sign-off transaction CESF, forcing the terminal session to be disconnected upon sign-off.

This enhancement increases your control over terminal session security by preventing access to CICS at the terminal when it is running only with the default user ID.

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Service Minimum key size can be set during TLS handshakes for increased key strength

APAR PH50175 required

With the new feature toggle com.ibm.cics.tls.minimumkeystrength you can set a minimum key size for ECC, RSA, DSA, and Diffie-Hellman keys during TLS handshakes to increase your key strength.

This feature is also available in CICS TS 5.4 and 5.5 with APAR PH50175.

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Monitoring capability introduced for the security domain

CICS supports many different types of authentication. Some of these involve other components in addition to the external security manager (ESM). To make it easier to diagnose authentication problems, monitoring is now introduced for the security domain. This enhancement includes the following functional updates:

- The performance data in group DFHTASK provides two new fields that indicate the total elapsed time that a user task spent verifying authentication credentials.
- The user domain statistics provide new global statistics, giving a more comprehensive view of user instances.
- CICS now collects global statistics on the security domain, providing a comprehensive view of authentication requests. For a full listing, see Security domain statistics.

New options USER and SECURITY are introduced in **EXEC CICS EXTRACT STATISTICS**, **EXEC CICS PERFORM STATISTICS RECORD**, and **CEMT PERFORM STATISTICS** for retrieving and requesting user domain statistics and security domain statistics.

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Capability to format recent trace entries for tasks

In addition to auxiliary trace and internal trace, CICS stores data about the most recent trace entries for each task in a separate table. To format the trace for a particular task, use the TRS parameter and specify the KE_NUM of the task of interest.

The most recent trace entries contain basic information and are primarily intended for use in diagnosing problems with stalled tasks, where the data concerning the tasks might have been overwritten in the internal trace table.

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VERIFY TOKEN support for JWT

The **VERIFY TOKEN** command is enhanced to support JSON Web Tokens (JWTs) provided by RACF®. With this capability, basic authentication credentials of a user can be converted to a time-limited secure token. This is useful where applications currently using passwords are being converted to use MFA tokens.

This support requires RACF APAR OA55926 and SAF APAR OA55927.

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New feature toggle to help you with RLS migration

A new feature toggle `com.ibm.cics.rls.delete.ridfld` has been introduced to help you with RLS migration. When this feature is enabled, you can issue a **DELETE** command with the RIDFLD option for a single record without causing AFCG abends.

This capability is also available on CICS TS 5.4 and 5.5 with APAR PH07596.

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Ability of CICS-MQ bridge to write SMF type 110 records

A new parameter **SMFMQGET** has been introduced to the CICS-MQ bridge, CKBR, which instructs the bridge to write SMF type 110 records for the number of MQGET requests it issued. These records are useful for performance analysis.

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Resource definition online enhanced to support definition of DUMPCODEs

The standard Resource definition online (RDO) interface, CEDA, DFHCSDUP, **EXEC CICS CREATE** and **EXEC CICS CSD**, has been enhanced to support the definition of transaction dump codes and system dump codes through the new DUMPCODE resources. This allows DUMPCODEs for a CICS region to be installed at startup, removing the need to write a PLT program that uses the **SET TRANDUMPCODE ADD** and **SET SYSDUMPCODE ADD** system programming commands to add dump codes. These commands are still supported. DUMPCODEs now have a resource signature returned on the SPI commands to denote how they were created and installed.

In addition, the **DUMP** system initialization parameter has been extended to support a third option TABLEONLY. The new option allows for all system dumps to be suppressed except for those dump codes that have an entry in the dump table added by CEDA or the SPI. This allows, for example, for an SDUMP to be taken for a specific dump code that happens in production while suppressing all other sdumps.

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Java build toolchain support

Java build toolchains such as Gradle and Apache Maven are extremely popular for developing, building, and testing applications. To provide a natural experience for Java developers who are using such tools, CICS now offers JCICS and related artifacts that can be used as dependencies of Java applications on Maven Central, and Gradle Maven plug-ins for bundle packaging and deployment that are built on the CICS bundle deployment API.

With the Maven Central artifacts, you can manage Java dependencies in a simplified way, develop the applications in an integrated development environment (IDE) of your choice, and deploy CICS bundles at development in a faster and confident way.

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New API makes CICS bundle deployment faster

CICS now supports deploying CICS bundles through the CICS bundle deployment API. It is a REST API that receives a CICS bundle as a zip file over HTTP. The bundle is unzipped, installed into, and enabled in the appropriate CICS region automatically.

The CICS bundle deployment API can increase Java developers' productivity by enabling them to see their application changes reflected in a running CICS region within seconds. Developers can also use the CICS-provided Gradle or Maven plug-in (`cics-bundle-maven-plugin` or `com.ibm.cics.bundle`) that leverages the API, to integrate CICS bundle build and deployment into a toolchain.

The API also enables Java developers to deploy bundles whilst the system programmer retains control. A functional ID or another user ID with sufficient access deals with the bundle lifecycle and interacts with zFS on behalf of developers.

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Enhanced administration commands for JVM server

JVM server administration is enhanced with the addition of three new commands:

- PERFORM JVMSERVER offers facilities to take JVM server dumps, refresh JVM resources and gather JVM diagnostics.
- INQUIRE JVMENDPOINT enables you to monitor JVM server endpoints.
- SET JVMENDPOINT enables you to enable or disable JVM server endpoints.

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Support for Java EE 8 Full Platform

By using the embedded version of IBM WebSphere® Liberty (Liberty), CICS supports applications that are written to the Java Enterprise Edition (EE) 8 Full Platform specification. Java EE 8 includes many new and enhanced APIs, such as: JSON processing, RESTful web services, and JavaMail™.

A new Java security API (JSR 375) introduces a portable, flexible, and standardized security model for Web applications.

Java EE 8 also provides new versions of features for: JavaBean validation, servlet, JavaServer Faces and Contexts and Dependency Injection (CDI).

Java applications that are hosted in CICS TS are integrated with a CICS task by default and can use the JCICS API to call other CICS programs and services. This provides a powerful mechanism to modernize CICS applications by using the latest Java EE 8 features and capabilities.

This capability is also available on CICS TS 5.5 with APAR PH15017.

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Support for Jakarta EE 8 Platform

The CICS Liberty JVM server supports now supports the Jakarta Enterprise Edition (EE) 8. The Jakarta EE 8 full platform technologies and specifications are an evolution of Java EE 8, allowing developers and applications to transition more easily from Java EE to Jakarta EE. The promise of Jakarta EE is a community-driven open source model, enjoying more frequent releases than Java EE, and evolving more quickly to address the needs of modern applications.

This capability is also available on CICS TS 5.5.

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Enhanced CICS Java API (JCICSX) allows easy mocking and remote development

The JCICSX API classes support a subset of CICS functionality with a more natural, modern, Java style that is easier to understand for Java developers new to CICS. JCICSX is also remoteable, and easier to mock and stub than the existing Java classes of JCICS. Code written using the JCICSX API classes will execute without change, both in remote development mode and when deployed to run in CICS.

The JCICSX API classes can be used together with the JCICS API, but only the commands that use JCICSX can benefit from the enhanced features.

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Support for Spring Boot

The CICS Liberty JVM server supports Spring Boot applications using the Spring application programming model. Spring was originally designed to simplify Java Enterprise Edition (EE), using plain old Java objects (POJOs) and dependency injection. It has since grown to extend and encompass many aspects of Java EE development.

Spring Boot builds on Spring by adding components to avoid complex configuration, reduce development time, and offer a simpler startup experience. Support is added for the Liberty features springBoot-1.5 and springBoot-2.0, allowing Spring Boot JARs to be deployed directly to a Liberty JVM server. Spring Boot applications can run on CICS without modification. It also is possible to configure Spring Boot applications for integration with CICS transactions and security, and to call the CICS API using JCICS.

When built as a web application archive (WAR), a Spring Boot application can be deployed and managed using CICS bundles in the same way as can other CICS Liberty applications.

A Spring Boot application can use the annotation @CICSProgram to define a method as the target of a CICS program. This can be linked from COBOL or other non-Java CICS programs through the channel and container interface.

This capability is available also for CICS TS 5.5 for Spring Boot applications that are packaged as WAR and JAR files, and for Spring Boot applications packaged as WAR files in CICS TS 5.4 and 5.3.

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Support for EXEC CICS LINK to a Spring Boot application running in a Liberty JVM server

You can add the @CICSProgram annotation to a method on a Spring bean. When the application is started in Liberty, a CICS program definition is dynamically created. Then, the Spring Boot application can be invoked by any CICS program through an **EXEC CICS LINK** call.

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Performance and storage improvements

Default storage settings in CICS and through example JVM profiles are updated for performance and storage optimization.

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Users product extension capability

New CICS JVM profile option LIBERTY_PRODUCT_EXTENSIONS supports installation of user product extensions into a Liberty server.

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GATHER SPI function

The PERFORM JVMSERVER JVM GATHER DIAGNOSTICS command (the GATHER SPI) collects useful JVM server diagnostic information, aggregating multiple existing trace, dump, log and configuration files into a single tar file. On request, you can send this file to IBM Service teams when they are helping you with JVM server problems.

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`<applicationManager autoExpand="true">` applied by default to Liberty configuration settings

This setting causes application file archives to expand automatically into the `${server.config.dir}/apps` directory on first use. This avoids expansion of file archives into the Liberty work area on server startup, reducing zFS file I/O, and making more efficient use of the Java shared class cache.

This capability is available also on CICS TS 5.3 through 5.6 with APAR PH28793.

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Changes to feature toggle configuration and processing

You can now apply feature toggle configurations to a specific CICS region by using a region-level feature toggle configuration file in a subdirectory of the USSCONFIG, with a directory name equal to the CICS region's APPLID. This allows region-level feature toggles to override the common set of feature toggles in the USSCONFIG.

The group-level feature toggle configuration files that are described in previous releases are deprecated. Their use will be removed in a future release of CICS TS. No messages will refer to the group-level feature toggles unless they are specified.

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COMMAREAs greater than 24 KB now supported for DPLs over MRO connections

The restriction on the COMMAREA that its length cannot be greater than 24 KB for DPLs over MRO connections between CICS TS regions is removed. If both regions are at the level of CICS TS 5.6 or above, then a COMMAREA that is greater than 24 KB is shipped by using the DFHTRANSACTION channel. If the transaction that issues the LINK command does not have a DFHTRANSACTION channel, one is created.

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Changes to CICSPlex SM resource tables

To aid application developers, the key fields now appear in key order at the top of the attributes table. The non key attributes follow, in ascending alphabetical order.

The CICSPlex SM security class information for each resource table listed after the Copybook identifier. Where applicable the CICS commands that require security access are also listed.

The DSECT offset for resource table attributes is also added.

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SNI now supported in CICS TS communications with an HTTP server over TLS connections

CICS now supports the use of the Server Name Indication (SNI) extension as defined in Internet Engineering Task Force RFC 6066. With this enhancement, CICS TS, when acting as an HTTP client, can use a TLS connection to a virtual host where the server supports multiple virtual hosts using a single IP address.

No configuration change is required in CICS TS. CICS TS supports SNI if it is supported by the HTTP server.

This capability is available also on CICS TS 5.3, 5.4, and 5.5 with APAR PH20063.

Enforced protection for CICSPlex SM API program data space usage

CICSPlex SM API commands now returns an appropriate response instead of terminating a CMAS if a request causes CICSPlex SM to exceed the available data space storage.

CICSPlex SM high data space utilization warnings

EYUXC0028 warning messages are now issued when the data space usage for a CICSPlex SM component such as WLM, BAS and so on exceeds any of the allocation tiers of 70%, 80%, 90%, and 95%, alerting you to potential CICSPlex SM auxiliary storage issues before they become problematic.

CICS-MQ trigger monitor and CICS-MQ bridge improvements

The CICS-MQ trigger monitor transaction CKTI now handles abends produced when starting user transactions. If an abend occurs when the CKTI transaction attempts to start the user transaction, rather than terminating, CKTI will now send the trigger message to the dead-letter queue, and trigger monitor processing continues.

Additionally, both the CICS-MQ trigger monitor transaction CKTI and the CICS-MQ bridge monitor transaction CKBR now handle temporary errors that occur when issuing MQOPEN and MQGET requests. Rather than terminating, CKTI and CKBR retries every minute for up to an hour. If the error is not resolved after an hour, the monitor transactions terminate. This caters for errors that are caused by the loss of a coupling facility when the monitor transactions are processing shared queues. The IBM MQ queue manager can recover from a coupling facility failure, and when the connection is restored, bridge and trigger monitor processing resumes.

This enhancement is available also on CICS TS 5.4 and 5.5 with APAR PH22136.

More 64-bit storage exploitation

The TSICDATA subpool is moved above the bar to provide greater resilience when a large number of tasks are started with data and queue on TCLASS limits. It avoids short on storage conditions in the 31-bit ECDSA in this situation.

Improvement to CICS exception handling when a JVM server encounters a TCB failure

CICS exception handling when a JVM server encounters a TCB failure is changed to ensure that the JVM server is recycled. The following process takes place:

1. CICS disables the JVMSERVER resource with the PHASEOUT option to allow existing work in the JVM to complete where possible and prevent new work from using the JVM.

2. If the PHASEOUT operation fails to disable the JVMSERVER within the interval specified by the PURGE_ESCALATION_TIMEOUT JVM server option, CICS escalates to the next disable action PURGE until the JVMSERVER is disabled.

3. If the PURGE operation fails to disable the JVMSERVER within the interval, CICS escalates to the next disable action FORCEPURGE.

4. If the FORCEPURGE operation fails to disable the JVMSERVER within the interval, CICS escalates to KILL.

5. After the JVMSERVER is successfully disabled, message DFHSJ1008 is issued.

6. CICS attempts to re-enable the resource to create a new JVM.

You can control the interval between the disable actions that CICS performs by setting the PURGE_ESCALATION_TIMEOUT JVM server option.

This capability is available also on CICS TS 5.3, 5.4, and 5.5 with APAR PH12280.

Learn more about JVM server option PURGE_ESCALATION_TIMEOUT

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Changes to default user ID security definitions

It is no longer necessary for users of any Category 3 transactions including CESN, CESL and CESF, to be given command authority. As a result, the default user ID should not need command authority for any CICS transactions.

In previous releases of CICS, if you used **CMDSEC=ALWAYS**, you had to define all users of CESN, CESL and CESF with authority to issue **INQUIRE TERMINAL**, **SET TERMINAL**, and **INQUIRE SYSTEM** commands. This included giving this authority to the CICS default user ID.

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Improved usage of BAS data space storage for large CICSplex environments

The CICSPlex SM BAS component can now use all available BAS data space storage by spreading large resource deployment lists for BAS across multiple data spaces instead of being constrained to a single data space. This is controlled by the feature toggle com.ibm.cics.cpsm.bas.largecicsplex.

Service If APAR PH26781 is applied, this feature is disabled, but you can opt into this feature by setting the feature toggle com.ibm.cics.cpsm.bas.largecicsplex=true.

This capability is available also on CICS TS 5.4 and 5.5 with APAR PH19761.

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Enhanced SOS protection and monitoring of 24-bit and 31-bit MVS storage

CICS has long provided monitoring and short on storage (SOS) support for CICS-managed storage in dynamic storage areas (DSAs). The use of z/OS address space storage that is not managed by CICS (MVS™ storage) is not covered by this mechanism. Out of storage conditions can cause the region to terminate.

This release of CICS introduces the capability to monitor user region (24-bit) MVS storage and extended user region (31-bit) MVS storage. By default, CICS periodically monitors the state of unallocated user region and extended user region storage, and issues console messages to notify you of SOS conditions or significant changes in unallocated MVS storage.

In addition, CICS provides a new SOS wait feature. By default, this feature suspends tasks to stop the allocation of new TCBs, which are a major user of 24-bit storage, when the MVS user region or extended user region is short on storage, thereby minimizing the likelihood of an out of storage region abend.

You can use SOS messages that are issued when MVS storage is under stress in system policy rules with an action to set the z/OS WLM health value to 0, thus limiting new work coming to the affected region.

New statistics are available in Storage manager: Global statistics to provide information about the use of 24-bit and 31-bit MVS storage and to help you track fluctuations in the storage usage over time and take actions to prevent SOS conditions.

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CICS capability of exploiting IBM z/OS Workload Interaction Correlator

IBM z/OS Workload Interaction Correlator (Correlator) is a priced feature that provides infrastructure for z/OS software to generate synchronized, standardized, concise, content-rich data with common context for automated analysis by an analytics engine such as the IBM z/OS Workload Interaction Navigator. You can use Correlator to generate standardized SMF records for CICS, making it easier to identify and correlate workload across your mainframe environment.

CICS uses the WIC IFAWIC service to register CICS regions for collecting data about transaction activities, and provides a WIC exit routine that SMF calls for WIC processing. The WIC exit routine aggregates and summarizes transaction activities from all registered CICS regions and records exceptional CICS regions into SMF type 98 subtype 1024 records.

Service Available with APAR PH30291, CICS-supplied Assembler copybook DFHWICCD is updated to enable IBM z/OS Workload Interaction Navigator with PTF UJ04388 to analyze multiple SMF files that are collected from multiple systems respectively and display the correlated anomalies across multiple systems for a single interval in one screen.

Hardware and system requirements: IBM z/OS Workload Interaction Correlator requires IBM z14® or z15® hardware and is provided in PTFs for APAR OA57165 for z/OS in V2R3 and V2R4.

This capability is provided also to CICS TS 5.4 and 5.5 through APAR PH16392.

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Service Support for resource definition overrides

With APAR PH30590, you can provide a consistent approach to the creation of certain resources by applying environment-specific overrides through a resource overrides file. You can override the resource definition for any currently supported resource type that can be defined by using resource definition online (RDO). You specify the required overrides in a resource overrides file that is loaded during CICS startup. The overrides are applied when CICS resources are installed.

This support is intended to make infrequent system-wide changes to tailor the resources for a specific CICS environment.

If this support is in use and the resource overrides file includes override rules for specified resource types, resource overrides are applied to the relevant resources when they are installed. Therefore, you must consider the effects of resource overrides when you install resources.

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Service Enhanced capability for monitoring use of shared pool TS queues

Available with APAR PH28145, this enhancement makes it easier for you to monitor the change in capacity usage for shared pool TS queues. When the percentage of entries or elements in use in a pool structure reaches a specified threshold, DFHXQ0422 or DFHXQ0423 is issued. When the percentage of entries or elements in use drops below a threshold, DFHXQ0420 or DFHXQ0421 is issued.

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Service Monitoring auxiliary temporary storage usage

Available with APAR PH28145, you are now alerted when auxiliary temporary storage data set usage is approaching a high percentage of its capacity so that you have time to free up storage before the auxiliary temporary storage becomes full.

CICS issues message DFHTS1316 when 75% or more of the maximum auxiliary temporary storage is in use, and message DFHTS1317 when storage usage falls below 70% of the maximum auxiliary temporary storage.

Learn more ...

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Service Support for passing XID to Db2

Available with APAR PH39766, a new feature toggle, `com.ibm.cics.db2.sharelocks={true|false}`, is provided to enable CICS to pass an XID to Db2 and instruct Db2 to share locks between threads that pass the same XID. Using the same XID, other threads that originate from other CICS regions or from other transaction managers such as IMS TM can access Db2 in the same global unit of work (UOW). The XID token is not used for recovery between CICS and Db2. Passing an XID avoids having to deal with UOW affinities.

For CICS to pass an XID to Db2, CICS first queries MVS RRS to determine if there is a global UOW with a matching LU6.2 UOWID. The query for a global UOW involves issuing an ATRQUERY request with a sysplex scope for systems within the same RRS logging group. This has a performance impact in terms of CPU consumption. You should ensure READ access for the CICS user ID to the MVSADMIN.RRS.COMMANDS.gname.sysname resource or the MVSADMIN.RRS.COMMANDS resource in the FACILITY class. You should also ensure that auditing of successful access to RRS system management functions is not enabled; otherwise, an excessive number of SMF 80 records will be produced. For more information, see ATRQUERY — Obtain RRS Information in z/OS MVS Programming: Resource Recovery.

If the global UOW was initiated from outside CICS and is coordinated by MVS RRS, CICS obtains the XID associated with the RRS Unit of Recovery and passes it to Db2.

If RRS is not involved in the UOW, CICS generates an XID based on the data from the LU6.2 UOWID that is associated with the UOW. All CICS regions participating in the same UOW generate the same XID from the same LU6.2 UOWID.

The passing of an XID involves a partial signon to Db2 for each UOW. The number of partial signons increases if partial signons for each UOW were not previously necessary. If a partial signon for each UOW is already required as in the case of using ACCOUNTREC(UOW), the number of partial signons does not increase. A signon at the start of each UOW closes any cursors, so held cursors across syncpoints are not supported when the passing of an XID is enabled. Applications have to reposition cursors after a syncpoint.

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Service Enhanced adapter tracking for CICS Db2 applications

Available with APAR PH30252, the CICS Db2 attachment facility is enhanced to pass adapter data to Db2. If a CICS task that is accessing Db2 has adapter data in the CICS origin data, the adapter ID is passed as **appl-longname** and the adapter data is passed as an **accounting-string**. Db2 writes the data in its SMF accounting records and the data is also available online through the Db2 special registers CURRENT CLIENT_APPLNAME and CURRENT CLIENT_ACCTNG. This capability also requires Db2 12 with APAR PH31447 or higher.

With APAR PH49408, you can disable the passing of adapter origin data to Db2 by specifying the following feature toggle:

```
com.ibm.cics.db2.origindata=false
```

Learn more ...

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Service Alternative Liberty install available

Available with APAR PH33149. If you choose, you can now specify a new WLP_INSTALL_DIR setting in your JVM profile to use an alternative version of Liberty: one that is not supplied with CICS.

Learn more ...

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Service Default cipher file for outbound web requests

With APAR PH38091, a new feature toggle, `com.ibm.cics.web.defaultcipherfile={true|`
`false}`, is provided to enable CICS to use a default set of ciphers from a cipher file called
`defaultciphers.xml`, instead of the current default list of 2-digit ciphers (3538392F3233). This allows a greater set of ciphers to be used for outbound requests without having to create a URIMAP for each potential endpoint.

The use of a default cipher file applies to outbound HTTPS requests that are made using EXEC CICS WEB OPEN or EXEC CICS INVOKE SERVICE commands, where those commands do not already specify a set of ciphers to use through the CIPHERS or URIMAP parameter.

To use this capability, the feature toggle must be set to true and the `defaultciphers.xml` file must exist in the `USSCONFIG/security/ciphers` directory. A sample `defaultciphers.xml` file is supplied in the `USSHOME/security/ciphers` directory. Copy this file to the `USSCONFIG/security/ciphers` directory and customize it for your security requirements.

If the feature toggle is enabled but there is a problem with the `defaultciphers.xml` file, message DFHWB0112 is issued and CICS reverts to using the default list of 2-digit ciphers.

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Service Changes to CICSPlex SM sysplex optimized workload routing behavior

With APAR PH30768, the default behavior of CICSPlex SM workload management routing algorithms has been updated to increase the likelihood that work is routed to healthy, local target regions. This change applies only to the QUEUE and GOAL algorithms, not to the link neutral variants (LNQUEUE and LNGOAL).

Where a routing region might be subject to surges of extremely high frequency, short duration transactions, workload batching might occur. A new feature toggle, `com.ibm.cics.cpsm.wlm.surgeresist={true|false}`, has been introduced to mitigate these surges by reducing the likelihood that recently selected target regions are reselected. Enabling this feature toggle increases the average routing cost per transaction, but restores the routing behavior of CICSPlex SM at CICS TS 5.6 before APAR PH30768 is applied.

Learn more ...

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Service Messages reporting changes to APPC and IRC log names

Available with APAR PH03691.

DFHRS2112 messages are issued when log name mismatches are detected for connections using the APPC and IRC protocols. The message explanation provides advice about how to resynchronize any outstanding units of work but it can be difficult to work out what caused the mismatch and how to prevent a recurrence. To help you diagnose log name mismatches, the following three new messages that report changes to log names are introduced:

- DFHRM0240 reports the local log name that is set during CICS initialization and sent to a remote system when CICS establishes an APPC or IRC connection.
- DFHRM0241 reports a log name that has been set for an APPC or IRC connection.
- DFHRM0242 reports a log name that has been deleted for an APPC or IRC connection.

Service Easier system management, efficient application development, and advanced client authentication available in single CICS regions with CMCI JVM server

The CICS Management Client Interface (CMCI) is a set of APIs that enable management of your CICS regions using tools such as CICS Explorer. When served from a JVM server, the CMCI provides additional capabilities such as multi-factor authentication (MFA), the GraphQL API, and the CICS bundle deployment API.

Available with APAR PH35122, the CMCI JVM server can be configured in a single CICS region outside of a CICSPlex SM environment to create an SMSS, enabling the following features:

- Enhanced security offered by multi-factor authentication (MFA), even in SMSS environments. Users can sign on to an SMSS with MFA credentials in CICS Explorer for Aqua 3.2 (Fix Pack 5.5.20).
- Easier system management with the CMCI GraphQL API, which supports queries about multiple CICS resources and inter-resource relationships in a single request. CICS Explorer as of Fix Pack 5.5.20 also uses the GraphQL API to provide the aggregation function when connected to SMSS regions at CICS TS 5.6 with APAR PH35122, or a later release.
- Efficient application development with the CICS bundle deployment API, which allows Java developers to use the CICS-provided Gradle or Maven plug-ins to deploy bundles into single CICS development environment. This way, developers can see their application changes reflected in a running CICS region within seconds, and integrate the CICS bundle build and deployment into a toolchain to increase productivity, whilst the system programmer retains control.

Learn more ...

Service Prepare for a future release of CICS TS

Available with APAR PH54814 (supercedes APAR PH39798).

The DFHCSVC and DFHIRP modules for future CICS TS releases have been shipped as modules DFHNCSVC and DFHNIRP on current releases ahead of the general availability of the newest CICS TS release. If you wish to install the future release modules DFHCSVC and DFHIRP to fit in with your scheduled z/OS IPLs, follow the instruction here.

Service Improved Temporary storage expiry processing

Available with APAR PH40863 and PH40409.

The processing of expired temporary storage queues has been improved as follows:

- Firstly, the processing of main and auxiliary tsqueues is separated from the processing of shared tsqueues so that they use separate calculated intervals.
- Secondly, for shared tsqueues, an internal queue is used to hold when the last scan was performed. The internal queue is used to prevent a CICS region from scanning shared TS queues if another CICS region has performed such a scan within the previous minute. This means that even if multiple CICS regions are using a shared TS pool, each with TS models installed that specify short expiry intervals, the shared queues are never scanned more frequently than once per minute.
- Thirdly, the CICS-MQ interface has been improved to only employ a DFHCKBR tsmodel with a nonzero expiry interval when the MQ bridge has been started; otherwise, it has a zero expiry interval. This avoids unwanted tsqueue scans.

Service Enabling multiple client URIMAPs that point to the same endpoint

Available with APAR PH44683, multiple client URIMAPs that point to the same host, port and path can be installed and enabled in a CICS region. This enhancement removes the limitation that only one client URIMAP for an endpoint could be enabled in a CICS region. As best practice, always use a URIMAP by name.

Learn more ...

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Service Support for Java 11

APAR PH47221 adds support for Java 11 using IBM Semeru Runtime Certified Edition for z/OS. A minimum version of 11.0.17.0 is required. The CICS documentation will be updated to describe considerations for using Java 11.

Java 8 continues to be supported.

Learn more ...

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Service Support for Java 17

APAR PH55278 adds support for Java 17 using IBM Semeru Runtime Certified Edition for z/OS. A minimum version of 17.0.7.0 is required.

Java 17 is not supported for use with:

• SAML JVM servers at all CICS releases.

To enable Db2 type 2 connectivity when you are running Java 17, add `LIBPATH_SUFFIX=/usr/lpp/db2v12/jdbc/lib` to the JVM profile.

Java 8 and Java 11 continues to be supported.

Learn more ...

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Service Key rings can be shared between regions in an easier way

Available with APAR PH49253, with the support of more acceptable formats of key ring names on the KEYRING system initialization parameter, you can now use key rings that are not owned by the current region user ID. To share a key ring owned by one region user ID with another region, you need to grant that other region authority to use the key ring.

This capability is also available on CICS TS 5.5 with APAR PH49253.

Learn more ...

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Service HTTP strict transport security (HSTS) is supported

Available with APAR PH55369.

HTTP strict transport security (HSTS) helps servers prevent man-in-the-middle attacks by instructing compliant user agents to only interact with the server through secure connections (HTTPS).

You can now configure a CICS server to use HSTS with a set of `com.ibm.cics.web.hsts` feature toggles.

This feature is also available in CICS TS 5.5 with APAR PH55369.

Learn more...

CICS documentation and other information

There are enhancements to the CICS content:

- CICS online documentation and IBM Documentation Offline are now automatically translated in various languages other than English: Brazilian Portuguese, French, German, Italian, Japanese, Korean, Simplified Chinese, and Spanish. PDF documentation is not currently translated.

- CICSPlex SM system parameters is moved to the **Reference** > **System management** section in IBM Documentation.

- A summary of changes to security, including changes to RACF classes, through CICS releases is added to the Upgrading information: Changes to security and Changes to RACF classes.The CICS TS Version 5 Performance Report was added to IBM Documentation and as PDF: CICS TS V5 Performance Report. This report was previously published as an IBM Redbook: *IBM CICS Performance Series: CICS TS for z/OS V5 Performance Report*, (SG24-8298). This report will be extended with performance test results for CICS TS 5.6 when those results are made available.

Chapter 2. Changes to externals in this release

CICS Transaction Server for z/OS, Version 5 Release 6 changes a number of externals, including commands, transactions, resources, system initialization parameters, messages, trace, and user exits.

For a summary of changes across all supported releases, see Changes between releases in the Upgrading information.

Changes in CICS Transaction Server for z/OS, Version 5 Release 6

Changes to externals are presented by functional area. The links in the summary tables take you to each section that describes the external changes in detail. These changes are not exclusive to each of the roles shown; some will be of interest across roles. The **Any changes in this release** column indicates whether any external changes have been introduced in a specific functional area in this release.

Installing CICS TS	Any changes in this release?	For application programmers	For system programmers
"Changes to installing" on page 21	Yes		✓
"Changes to samples" on page 21	Yes		✓

Developing and deploying applications	Any changes in this release?	For application programmers	For system programmers
"Changes to CICS API" on page 21	Yes	✓	
"Changes to CICS EXCI" on page 22	No	✓	
"Changes to JCICS API" on page 22	No	✓	
"Changes to Liberty features" on page 22	No		✓
"Changes to JVM server profile options" on page 22	Yes	✓	
"Changes to JVM system properties" on page 22	Yes	✓	
"Changes to context containers" on page 23	Yes	✓	
"Changes to the CICS assistants" on page 23	Yes	✓	
"Changes to compiler and translator support" on page 23	No	✓	

Configuring and administering CICS	Any changes in this release?	For application programmers	For system programmers
"Changes to CICS storage" on page 24	No		✓
"Changes to toggle-enabled features" on page 24	Yes		✓
"Changes to resource definitions" on page 25	Yes	✓	✓

Configuring and administering CICS	Any changes in this release?	For application programmers	For system programmers
"Changes to SIT parameters" on page 25	Yes		√
"Changes to CICS transactions" on page 26	Yes		√
"Changes to CEMT" on page 26	Yes		√
"Changes to CICS SPI" on page 27	Yes		√
"Changes to JVM profiles" on page 28	Yes		√
"Changes to CICS utilities" on page 28	Yes	√	√
"Changes to GLUEs and TRUEs" on page 29	Yes		√
"Changes to XPI functions" on page 29	No		√
"Changes to user-replaceable programs" on page 30	Yes		√
"Changes to control tables" on page 30	Yes		√
"Changes to CICS policies" on page 30	Yes		√
"Changes to event processing adapters and formats" on page 30	No		√

CICSPlex System Manager	Any changes in this release?	For application programmers	For system programmers
"Changes to installation and definition of CICSPlex SM" on page 30	Yes		√
"Changes to configuration and initialization of CICSPlex SM" on page 31	Yes		√
"Changes to CICSPlex SM behavior and operation" on page 31	Yes		√
"Changes to CICSPlex SM resource tables" on page 31	Yes		√

Security	Any changes in this release?	For application programmers	For system programmers
"Changes to security" on page 32	Yes		√
"Changes to RACF classes" on page 33	Yes		√

Monitoring	Any changes in this release?	For application programmers	For system programmers
"Changes to CICS monitoring" on page 33	Yes		√
"Changes to statistics" on page 34	Yes		√

Troubleshooting	Any changes in this release?	For application programmers	For system programmers
"Changes to messages" on page 35	Yes		√
"Changes to abend codes" on page 40	Yes		√

Installing CICS TS

Changes to installing

System programmers

- SDFHDLL1 has been removed.
- Service **APAR PH29332**: DFHEITAB and DFHEITBS modules are not LPA eligible.
- Service **APAR PH39798**: Support for installing maintenance-supplied newest release CICS Type 3 SVC and DFHIRP modules. See Installing newest release CICS Type 3 SVC and DFHIRP modules supplied through maintenance.

Changes to samples

System programmers

Table 7. Changes to the samples provided with CICS in this release	
Sample	**This release**
DFH$DB2T	**CHANGED:** The TYPE within JOURNALMODEL is now specified as a CHAR(5) attribute.
DFH$FORA	**CHANGED:** Resources are now alphabetically ordered.
DFH$FORC	**CHANGED:** Resources are now alphabetically ordered and resource attributes that are COBOL reserved words are prefixed with RD0-.
DFH$FORP	**CHANGED:** Resources are now alphabetically ordered. Compiled version now supplied.
DFH0QRCP	**NEW:** Associated with transaction QRCP. This sample program demonstrates how to obtain and calculate the QR TCB CPU / Dispatch ratio and display a message when the ratio is less than a specified percentage.

Developing and deploying applications

Changes to CICS API

Application programmers

Table 8. Changes to **EXEC CICS** commands in this release	
API	**This release**
CHANGE PASSWORD	Service **CHANGED with APAR:** • **APAR PH23078:** New NOTAUTH with RESP2 value of 1, indicating that the PASSWORD field, the NEWPASSWORD field, or both are blank. • **APAR PH31270:** New NOTAUTH with RESP2 value of 17, indicating that the USERID is not authorized to use the application. • **APAR PH51378:** New INVREQ with RESP2 value of 32, indicating that the user ID field contains a blank character in an invalid position.
CHANGE PHRASE	Service **CHANGED with APAR:** • **APAR PH23078:** New NOTAUTH with RESP2 value of 1, indicating that the PHRASE field, the NEWPHRASE field, or both are blank. • **APAR PH31270:** New NOTAUTH with RESP2 value of 17, indicating that the USERID is not authorized to use the application. • **APAR PH51378:** New INVREQ with RESP2 value of 32, indicating that the user ID field contains a blank character in an invalid position.

API	This release
*Table 8. Changes to **EXEC CICS** commands in this release (continued)*	
VERIFY PASSWORD	Service **CHANGED with APAR:** • **APAR PH23078:** New NOTAUTH with RESP2 value of 1, indicating that the PASSWORD field is blank. • **APAR PH31270:** New NOTAUTH with RESP2 value of 17, indicating that the USERID is not authorized to use the application.
VERIFY PHRASE	Service **CHANGED with APAR:** • **APAR PH23078:** New NOTAUTH with RESP2 value of 1, indicating that the PHRASE field is blank. • **APAR PH31270:** New NOTAUTH with RESP2 value of 17, indicating that the USERID is not authorized to use the application.
VERIFY TOKEN	**CHANGED:** Enhanced to support JSON Web Tokens (JWTs) provided by RACF.
WEB CONVERSE	**CHANGED:** Enhanced to support the PATCH method.
WEB SEND (Client)	**CHANGED:** Enhanced to support the PATCH method.

Changes to CICS EXCI

Application programmers

No changes in this release.

Changes to JCICS API

Application programmers

No changes in this release.

Changes to Liberty features

System programmers

No changes in this release.

Changes to JVM server profile options

Application programmers

Table 9. Changes to JVM server profile options in this release

Option	This release
`PURGE_ESCALATION_TIMEOUT`	**NEW compatible with:** All JVM Environments New JVM server option to specify the interval between the disable actions that CICS performs when a JVM server encounters a TCB failure.
`WLP_ZOS_PLATFORM`	**OBSOLETE:** Multiple fully configured Liberty servers can be in the same address space.

Changes to JVM system properties

Application programmers

Table 10. Changes to JVM system properties in this release	
Property	**This release**
`-Dcom.ibm.cics.jvmserver.cmci.bundles.dir=<bundles_directory>`	**NEW:** Only for the CICS bundle deployment API in the CMCI JVM server. Specifies the bundles directory on zFS that stores the CICS bundles pushed to the API.
`-Dcom.ibm.cics.jvmserver.cmci.deploy.timeout={120000|timeout_limit}`	**NEW:** Only for the CICS bundle deployment APIin the CMCI JVM server. Specifies the timeout limit for deploying a CICS bundle, in milliseconds. This includes the time for all bundle lifecycle actions, including disable, discard, install and enable.
`-Dcom.ibm.cics.jvmserver.cmci.max.file.size={52428800|max_file_size}`	**NEW:** Only for the CICS bundle deployment API in the CMCI JVM server. Specifies the maximum size allowed for the uploaded CICS bundle, in bytes.
`-Dcom.ibm.cics.jvmserver.cmci.max.request.size={104857600|max_request_size}`	**NEW:** Only for the CICS bundle deployment API in the CMCI JVM server. Specifies the maximum size allowed for a multipart or form-data request, in bytes.
`-Dcom.ibm.cics.jvmserver.trace.specification={filter_text}`	**NEW compatible with:** All JVM Environments. Specifies a JVM server trace filter string allowing finer grained control over package and class trace from the JVM server.
`-Dcom.ibm.cics.jvmserver.wlp.saf.profilePrefix=<my_prefix>`	**NEW:** Only for the CMCI JVM server. Specify the prefix for SAF profiles in the EJBROLE class.
`-Dcom.ibm.cics.jvmserver.wlp.security.subject.create={true|false}`	Service **NEW:** Allows the user to turn off Java Subject creation when performing a LINK to Liberty.
`-Dcom.ibm.ws.zos.core.angelRequiredServices`	Service **NEW (APAR PH41256):** This new property specifies which z/OS authorized services should be checked to see if they are available to the Liberty server being started.

Changes to context containers

Application programmers

Table 11. Changes to the context containers used in a PIPELINE	
Container	**This release**
DFHWS-DPLTRANID	**NEW:** A new container, DFHWS-DPLTRANID, can be created in a PIPELINE by a handler program. The container can contain the name of a transaction identifier under which remote web services are to be executed. If the container does not exist, the default transaction identifier, CSMI, will be used.

Changes to the CICS assistants

Application programmers

Table 12. Changes to the CICS web services assistants, XML assistants, and JSON assistants in this release	
Assistant	**This release**
ALL	**NEW:** A new symbolic parameter, PATHMAIN, has been added to all of the assistants. This parameter specifies the main part of the name of the CICS TS directory in the UNIX system services file system. The default is /usr/lpp/cicsts
DFHWS2LS	Service **CHANGED (APAR PH21097):** This web services assistant has been updated to set the required Java properties to support use of SAF keyrings. See this information for guidance on how to use SSL parameters **SSL-KEYSTORE** and **SSL-TRUSTSTORE** for DFHWS2LS.

Changes to compiler and translator support

Application programmers

No changes in this release.

<u>Configuring and administering CICS</u>

Changes to CICS storage

System programmers

No changes in this release.

Changes to toggle-enabled features

System programmers

Table 13. Changes to toggle-enabled features in this release	
Feature toggle	**This release**
`com.ibm.cics.cmci.jvmserver={`<u>`true`</u>`|false}`	**CHANGED** The default is changed to true. If you have not upgraded to the CMCI JVM server, follow the upgrade instruction in <u>Upgrading CICSPlex SM</u>.
`com.ibm.cics.rls.delete.ridfld={true|`<u>`false`</u>`}`	**NEW** Avoid AFCG abends when migrating from non-RLS to RLS access mode.
`com.ibm.cics.http.options.handler={program_name}`	**REMOVED** You can specify the name of the HTTP Options handler program in the OPTIONSPGM attribute of the TCPIPSERVICE resource definition.
`com.ibm.cics.cpsm.bas.largecicsplex={true|`<u>`false`</u>`}`	**NEW** Improved use of BAS data space storage for large CICSplex environments. Service **CHANGED (APAR PH26781):** The default is changed from true to false.
`com.ibm.cics.cpsm.wlm.botrsupd.enabled={`<u>`true`</u>`|false}`	Service **NEW (APAR PH14812):** Disable coupling facility updates when the task load is below the threshold set by the **BOTRSUPD** parameter.
`com.ibm.cics.cpsm.wlm.surgeresist={true|`<u>`false`</u>`}`	Service **NEW (APAR PH30768):** When applied to CICSPlex SM WLM routing regions, this feature toggle takes effect for the QUEUE and GOAL WLM algorithms when using CICSPlex SM sysplex optimized workload routing. It has no effect when applied to target regions. When the feature toggle is set to true, surges of extremely high frequency, short duration transactions can be mitigated by reducing the likelihood that recently selected target regions are reselected. Enabling this feature toggle increases the average routing cost per transaction, but restores the routing behavior of CICSPlex SM at CICS TS 5.6 before APAR PH30768 is applied. See <u>Changes to CICSPlex SM sysplex optimized workload routing behavior</u>.
`com.ibm.cics.db2.origindata={`<u>`true`</u>`|false}`	Service **NEW (APAR PH49408):** Gives you the option to disable the passing of adapter origin data to Db2 for adapter tracking.
`com.ibm.cics.dpl.32kcommarea={`<u>`true`</u>`|false}`	**NEW** Disable the capability to use COMMAREAs greater than 24 KB for DPL requests over an MRO connection.
`com.ibm.cics.ds.freeussprocesses={`<u>`true`</u>`|false}`	Service **NEW (APAR PH27111):** Handling of USS processes. Intended for use only under guidance from IBM service personnel.
`com.ibm.cics.resourceoverrides.file={name.yaml}`	Service **NEW (APAR PH30590)** Resource definition overrides support. See <u>Overriding resource definitions</u>.
`com.ibm.cics.web.defaultcipherfile={true|`<u>`false`</u>`}`	Service **NEW (APAR PH38091):** Use defaultciphers.xml as a default set of ciphers for outbound web requests. See <u>Default cipher file for outbound web requests</u>.
`com.ibm.cics.tls.minimumkeystrength={`<u>`1024`</u>`|2048}`	Service **NEW (APAR PH50175):** Sets the minimum key size allowed during TLS handshakes.
`com.ibm.cics.mvssm.mon.interval={0|`<u>`60`</u>`,1-60}`	**NEW** MVS storage monitoring and SOS wait support.
`com.ibm.cics.mvssm.sos24.minavailable.contiguous={`<u>`32`</u>`,1-1024}`	**NEW** MVS storage monitoring and SOS wait support.

Table 13. Changes to toggle-enabled features in this release (continued)	
Feature toggle	**This release**
`com.ibm.cics.mvssm.sos24.minavailable.total={`<u>`64`</u>`,1-1024}`	**NEW** MVS storage monitoring and SOS wait support.
`com.ibm.cics.mvssm.sos31.minavailable.contiguous={`<u>`64`</u>`,1-163 84}`	**NEW** MVS storage monitoring and SOS wait support.
`com.ibm.cics.mvssm.sos31.minavailable.total={`<u>`128`</u>`,1-16384}`	**NEW** MVS storage monitoring and SOS wait support.
`com.ibm.cics.mvssm.sos.wait={`<u>`true`</u>`|false}`	**NEW** MVS storage monitoring and SOS wait support.
`com.ibm.cics.web.hsts.includesubdomains.TCPIPS={true|false}`	Service **NEW (APAR PH55369):** Controls whether to extend HTTP strict transport security (HSTS) to sub-domains of the specified TCPIPSERVICE.
`com.ibm.cics.web.hsts.max-age.TCPIPS={seconds|-1}`	Service **NEW (APAR PH55369):** Sets HSTS for an individual TCPIPSERVICE to override the region wide setting.
`com.ibm.cics.web.hsts.includesubdomains={true|false}`	Service **NEW (APAR PH55369):** Controls whether to extend HSTS to the sub-domains of the CICS server.
`com.ibm.cics.web.hsts.max-age=seconds`	Service **NEW (APAR PH55369):** Activates and sets HSTS for a CICS region.

Changes to resource definitions

Application programmers System programmers

Table 14. Changes to resource definitions in this release	
Resource	**This release**
DUMPCODE	**NEW:** To define attributes for transaction dump codes and system dump codes.
MQMONITOR	**CHANGED:** You can use one or more symbolic parameters, *&applid.* or *&APPLID.*, anywhere in the **QNAME** value to identify the APPLID of a CICS region. Any user-defined character strings *&applid.* or *&APPLID.* will be replaced by the APPLID of the local region when the MQMONITOR is installed. This will facilitate generic use of this resource.
TCPIPSERVICE	**CHANGED:** The OPTIONSPGM parameter has been added. Use this parameter to specify the name of a program that is invoked to handle an HTTP OPTIONS request.
URIMAP	Service **CHANGED (APAR PH44683):** Added support for enabling multiple client URIMAPs that point to the same endpoint (that is, the same host, port and path) in a CICS region.

Changes to SIT parameters

System programmers

Table 15. Changes to system initialization parameters in this release	
SIT	**This release**
CMDSEC	**CHANGED:** The ALWAYS option no longer affects category 3 transactions.
CONFDATA	**CHANGED:** The default is changed to HIDE. The HIDE option replaces HIDETC, which means that all transport data, not just terminal control data, is subject to **CONFDATA**. If the deprecated CONFDATA=HIDETC is specified in the SIT or in an override, CONFDATA=HIDE is assumed, and no message will be issued. If you use CONFDATA=SHOW, you should review if this is necessary. See Removing sensitive data from CICS trace using CONFDATA for details.
CPSMCONN	Service **CHANGED with APAR PH35122:** New option SMSSJ. **CPSMCONN**=SMSSJ initializes a single CICS region that is not part of a CICSplex as a CICS System Management Single Server (SMSS) and automatically creates a Liberty JVM server named EYUCMCIJ as the CMCI JVM server of the region.
DUMP	**CHANGED:** The TABLEONLY option has been added to allow all sdumps to be suppressed except those that have an entry in the dump table that allows sdumps.
DUMPSW	**CHANGED:** The ALL option has been added to allow continuous switching between the two transaction dump data sets DFHDMPA and DFHDMPB.

Table 15. Changes to system initialization parameters in this release (continued)	
SIT	**This release**
GMTRAN	**CHANGED:** The DISCONNECT option is extended to the CICS-supplied sign-off transaction CESF, forcing the terminal session to be disconnected upon sign-off.
KEYRING	Service **CHANGED with APAR PH49253:** The parameter accepts more formats of key ring names, which allows you to specify key rings that are not owned by the region user ID.
TRTABSZ	**CHANGED:** The minimum value which can be specified has been increased from 16 KB to 1024 KB.
TRTRANSZ	**CHANGED:** The minimum value which can be specified has been increased from 16 KB to 1024 KB.

Changes to CICS transactions

System programmers

Table 16. Changes to CICStransactions in this release	
Transaction	**This release**
CEDA CEDB CEDC	**CHANGED:** The dataset associated with the CSD for the local region is now displayed on the panel in format DSN=*<dataset name>*.
CESF	**CHANGED:** Now subject to the control of **GMTRAN=(,DISCONNECT)**. When this system initialization parameter is in effect, the terminal session is disconnected upon sign-off.
CJSS	**NEW:** JVM server SPI service transaction (category 1).
CJXA	**NEW:** JVM server JCICSX request processor transaction (category 2).
CKBR	**CHANGED:** • New parameter SMFMQGET, instructing CICS to write SMF type 110 records for MQGET requests issued by the CICS-MQ bridge. • CKBR now handles temporary errors that occur when issuing MQOPEN and MQGET requests. Rather than terminating, CKBR will retry every minute for up to an hour. If the error is not resolved after an hour, the monitor transaction will then terminate.
CKTI	**CHANGED:** CKTI now handles abends produced when starting user transactions. If an abend occurs when the CKTI transaction attempts to start the user transaction, rather than terminating, CKTI will now send the trigger message to the dead-letter queue, and trigger monitor processing continues. CKTI now handles temporary errors that occur when issuing MQOPEN and MQGET requests. Rather than terminating, CKTI will retry every minute for up to an hour. If the error is not resolved after an hour, the monitor transaction will then terminate.
CQRC	**NEW:** QR TCB CPU/Disp ratio transaction (category 1).
CSFE	**CHANGED:** CSFE has been enhanced to allow authorized users to change the CONFDATA settings. For more information, see Using CSFE to change the CONFDATA setting.
CWDP	**NEW:** Web support alias transaction for the CMCI CICS bundle deployment API (category 2).

Changes to CEMT

System programmers

Table 17. Changes to CEMT in this release	
Command	**This release**
CEMT INQUIRE DUMPDS	**CHANGED:** New value ALL returned for SWITCHSTATUS keyword.
CEMT INQUIRE SYDUMPCODE	**CHANGED:** Resource signature keywords CHANGEAGENT, CHANGEAGREL, CHANGETIME, CHANGEUSRID, DEFINESOURCE, DEFINETIME, INSTALLAGENT, INSTALLTIME, and INSTALLUSRID added.
CEMT INQUIRE SYSTEM	**CHANGED:** New value TABLEONLY returned for DUMPING keyword.
CEMT INQUIRE TCPIPSERVICE	**CHANGED:** New option OPTIONSPGM, returning the name of the HTTP OPTIONS handler program used for this TCPIPSERVICE.

Table 17. Changes to CEMT in this release (continued)	
Command	**This release**
CEMT INQUIRE TRDUMPCODE	**CHANGED:** Resource signature keywords CHANGEAGENT, CHANGEAGREL, CHANGETIME, CHANGEUSRID, DEFINESOURCE, DEFINETIME, INSTALLAGENT, INSTALLTIME, and INSTALLUSRID added.
CEMT INQUIRE TSQUEUE / TSQNAME	**CHANGED:** New option TSMODEL, returning the name of the temporary storage model that was used when the temporary storage queue was created.
CEMT PERFORM STATISTICS	**CHANGED:** New option SECURITY to write security domain statistics and new option USER to write user domain statistics.
CEMT SET DUMPDS	**CHANGED:** New value ALL supported for SWITCHSTATUS keyword to allow switching of transaction dump data sets every time one fills.
CEMT SET SYSTEM	**CHANGED:** New cvda value TABLEONLY supported for DUMPING keyword to allow suppression of all sdumps except those that have an entry in the dump table that allows sdumps.

Changes to CICS SPI

System programmers

Table 18. Changes to the system programming interface commands in this release	
Command	**This release**
CREATE DUMPCODE	**NEW:** To create a DUMPCODE resource definition in the CICS region.
DISCARD TRANSACTION	**CHANGED:** • Transactions beginning with C can now be discarded as long as the name of the initial program does not begin with DFH, EYU, or CJ*x* (where *x* is A through J).
EXTRACT STATISTICS	**CHANGED:** • New option SECURITY for requesting security domain statistics • New option USER for requesting user domain statistics
INQUIRE ASSOCIATION	Service **CHANGED (APAR PH42306):** Enhanced support for Liberty. The association data user ID value now reflects the final user ID value used in secure Liberty transactions, instead of the initial user ID.
INQUIRE DUMPDS	**CHANGED:** New cvda SWITCHALL returned for SWITCHSTATUS keyword.
INQUIRE JVMENDPOINT	**NEW:** Retrieves information about a JVM server endpoint.
INQUIRE SYSDUMPCODE	**CHANGED:** Resource signature keywords CHANGEAGENT, CHANGEAGREL, CHANGETIME, CHANGEUSRID, DEFINESOURCE, DEFINETIME, INSTALLAGENT, INSTALLTIME, and INSTALLUSRID added.
INQUIRE SYSTEM	**CHANGED:** New cvda TABLEONLY returned for DUMPING keyword.
INQUIRE TCPIPSERVICE	**CHANGED:** New optional output parameter, OPTIONSPGM, returning the name of the HTTP OPTIONS handler program used for this TCPIPSERVICE.
INQUIRE TRANDUMPCODE	**CHANGED:** Resource signature keywords CHANGEAGENT, CHANGEAGREL, CHANGETIME, CHANGEUSRID, DEFINESOURCE, DEFINETIME, INSTALLAGENT, INSTALLTIME, and INSTALLUSRID added.
INQUIRE TSQUEUE / TSQNAME	**CHANGED:** New option TSMODEL, returning the name of the temporary storage model that was used when the temporary storage queue was created.
PERFORM JVMSERVER	**NEW:** Improved JVM server administration.
PERFORM STATISTICS	**CHANGED:** • New option SECURITY to record global statistics on the security domain • New option USER to record global statistics on the user domain
SET DUMPDS	**CHANGED:** New cvda value SWITCHALL supported for SWITCHSTATUS keyword to allow switching of transaction dump data sets every time one fills.
SET JVMENDPOINT	**NEW:** Enable or disable a Liberty JVM server endpoint.
SET SYSTEM	**CHANGED:** New cvda value TABLEONLY supported for DUMPING keyword to allow suppression of all sdumps except those that have an entry in the dump table that allows sdumps.
SET TRANSACTION	**CHANGED:** • Transactions beginning with C can now be set disabled as long as the name of the initial program does not begin with DFH, EYU, or CJ*x* (where *x* is A through J).

Changes to JVM profiles

System programmers

Table 19. Changes to JVM profiles in this release	
JVM profile	**This release**
EYUCMCIJ.jvmprofile	Service **CHANGED (APAR PH41256):** The supplied sample profile for a CMCI JVM server in a WUI region is changed to add `-Dcom.ibm.ws.zos.core.angelRequiredServices=SAFCRED,PRODMGR,ZOSAIO`.
EYUSMSSJ.jvmprofile	Service **NEW (APAR PH35122):** A new supplied sample profile for a CMCI JVM server in a single CICS region.
	This new supplied sample profile for a CMCI JVM server in a single CICS region also has the angelRequiredServices property set as follows: `-Dcom.ibm.ws.zos.core.angelRequiredServices=SAFCRED,PRODMGR,ZOSAIO`.

Changes to CICS utilities

Application programmers System programmers

Table 20. Changes to CICS utilities in this release	
Utility	**This release**
DFH0STAT	**CHANGED:**
	• New reports provided:
	User report
	Security report
	MVS user region and extended user region storage report
	• The System Status report includes new fields **Frequency** and **MCT program name** in the Monitoring section.
	• The following fields are now removed from the Storage above 16 MB report:
	MVS storage request waits (SMSMVSSTGREQWAITS)
	Total time waiting for MVS storage (SMSTIMEWAITMVS)
	• The TCP/IP services report includes a new field TCPIPSERVICE OPTIONSPGM, showing the name of the HTTP OPTIONS handler program used for this service.

Table 20. Changes to CICS utilities in this release (continued)	
Utility	**This release**

DFHSTUP	**CHANGED:**
	
	• New fields added to user domain statistics:
	
	    Delete count due to sign off (USGDESOF)
	    Delete count due to ENF (USGDEENF)
	    Current instances in directory (USGDRCUR)
	    Peak instances in directory (USGDRPK)
	    Current instances in timeout (USGTOCUR)
	    Peak instances in timeout (USGTOPK)
	    ENF events matched (USGENFK)
	    ENF events not matched (USGENFUN)
	
	• Now provides security domain statistics.
	• New option SECURITY added to **SELECT TYPE** and **IGNORE TYPE** control parameters.
	• New fields added to monitoring domain statistics:
	
	    RMI Option (MNGRMI)
	    Application naming (MNGAPPNS)
	    MCT program name (MNGMCTNM)
	    Frequency (MNGFREQ)
	
	• The Dispatcher Statistics - CICS TCB Mode Statistics report has been enhanced to print the QR **TCB CPU Dispatch Ratio**.
	• New field added to TCP/IP resource statistics:
	
	    Name of the HTTP OPTIONS handler program (OPTIONSPGM)
	
	• New fields reflecting MVS user region and extended user region storage added to Storage manager: Global statistics, indicating:
	
	    The time the MVS monitor system task last sampled MVS storage
	    State of the user region or extended user region
	    The current total amount of unallocated user region or extended user region storage
	    Low water mark of the total amount of unallocated user region or extended user region storage
	    The size of the current largest contiguous storage area available in unallocated user region or extended user region storage
	    Low water mark of the size of the largest contiguous storage area available in unallocated user region or extended user region storage
	    The time the last SOS condition was detected
	    The time tasks waited because of the SOS or constrained state
	    The current, peak, and total number of tasks that are waiting because of the SOS or constrained state

DFHPD730	**CHANGED:** • The TRS KE_NUM parameter has been enhanced to format out the most recent trace entries information for the specified task. The new output is in addition to any entries for the task in the internal trace table.

Changes to GLUEs and TRUEs

System programmers

Table 21. Changes to global user exits and task-related user exits in this release	
Exit	**This release**
XDUCLSE	**CHANGED:** UERCSWCH return code has no effect if DUMPSW=ALL is already set. DUMPSW=ALL means that dump data sets will always switch.
XRSINDI	**CHANGED:** New value UEIDDMPC returned for parameter UEPIDTYP when a DUMPCODE is installed or discarded.

Changes to XPI functions

System programmers

No changes in this release.

Changes to user-replaceable programs

System programmers

Program	This release
Table 22. Changes to the user-replaceable programs in this release	
DFHWBOPT	**NEW:** Handler program that can be invoked to process HTTP OPTIONS requests.

Changes to control tables

System programmers

Control table	This release
Table 23. Changes to control tables in this release	
DFHXCOPT	**CHANGED:** • The EXCI SURROGCHK parameter has been removed. Surrogate checking is always done. Specifying SURROGCHK=YES in the EXCI options table, DFHXCOPT, is accepted for compatibility. • The default for the **CONFDATA** parameter has changed to HIDE. The HIDE option replaces HIDETC, which means that all transport data is subject to **CONFDATA**. If the deprecated CONFDATA=HIDETC is specified in DFHXCOPT, CONFDATA=HIDE is assumed, and no message will be issued.

Changes to CICS policies

System programmers

System rule	This release
Table 24. Changes to policy system rules in this release	
All	**NEW ACTION:** Set z/OS WLM health open status
DBCTL connection status	**NEW**
IBM MQ connection status	**NEW**
Pipeline enable status	**NEW**
Transaction dump threshold	Service **NEW (APAR PH34348)**

Task rule	This release
Table 25. Changes to policy task rules in this release	
All	Service **CHANGED (APAR PH26145):** Introduced support for setting Transaction ID and User ID conditions for task rules.
Container storage	Service **NEW (APAR PH29187)**

Changes to event processing adapters and formats

System programmers

No changes in this release.

CICSPlex System Manager

Changes to installation and definition of CICSPlex SM

System programmers

- The record size of EYUHIST* data sets is increased from RECORDSIZE(3620 3624) to RECORDSIZE(3680 3684). The EYUJHIST sample is updated to reflect this change.

Changes to configuration and initialization of CICSPlex SM

System programmers

Table 26. Changes to CICSPlex SM system parameters (EYUPARM) in this release	
EYUPARM parameter	**This release**
	No changes in this release.

Table 27. Changes to CICSPlex SM WUI server initialization parameters (WUIPARM) in this release	
WUIPARM parameter	**This release**
TCPIPHOSTNAME	Service **DEPRECATED (APAR PH47103):**
	The hostname of the WUI server is the name of the host where the WUI is executing. It is no longer set by the **TCPIPHOSTNAME** WUI initialization parameter. The WUI uses relative URLs, and not embedded host names.
	TCPIPHOSTNAME is still required, but the value is ignored. This parameter is retrained for compatibility and will be removed in a later release.
TCPIPHTTPHOST	Service **DEPRECATED (APAR PH47103):**
	The hostname of the WUI server is the name of the host where the WUI is executing. The WUI uses relative URLs, and not embedded host names.
	If a value is specified on **TCPIPHTTPHOST**, it is ignored. This parameter is retrained for compatibility and will be removed in a later release.

Table 28. Changes to CMCI in this release	
Change	**This release**
Default enablement of the CMCI JVM server	**CHANGED:**
	The CMCI interface now uses the CMCI JVM server by default. This means that if you don't specify the feature toggle com.ibm.cics.cmci.jvmserver=false in your feature toggle configuration, the CMCI JVM server is enabled. The feature toggle com.ibm.cics.cmci.jvmserver will be removed in a future release of CICS TS. If you have not upgraded the CMCI interface in the CICSPlex SM WUI regions to the CMCI JVM server, follow the upgrade instruction in Upgrading CICSPlex SM.
	See Setting up CMCI with CICSPlex SM for detailed CMCI setup instructions.

Changes to CICSPlex SM behavior and operation

System programmers

Table 29. Changes to CICSPlex SM behavior and operation in this release	
CICSPlex SM feature	**This release**
CICSPlex SM BAS	**CHANGED:** Improved usage of BAS data space storage for large CICSplex environments
	The CICSPlex SM BAS component can now use all available BAS data space storage by spreading large resource deployment lists for BAS across multiple data spaces instead of being constrained to a single data space. This is controlled by the feature toggle com.ibm.cics.cpsm.bas.largecicsplex.
CICSPlex SM workload management	Service **CHANGED (APAR PH30768):** CICSPlex SM sysplex optimized workload routing behavior
	The default behavior of CICSPlex SM workload management routing algorithms has been updated to increase the likelihood that work is routed to healthy, local target regions. This change applies only to the QUEUE and GOAL algorithms, not to the link neutral variants (LNQUEUE and LNGOAL). See Changes to CICSPlex SM sysplex optimized workload routing behavior for details.

Changes to CICSPlex SM resource tables

System programmers

Enhancements to CICSPlex SM resource tables are typically populated to related CICSPlex SM views. In , where applicable, the changed CICSPlex SM views are also listed.

Table 30. Changes to the resource tables provided by CICSPlex SM in this release		
Resource table	**Related view**	**This release**
CICSRGN	CICS region (CICSRGN) view	**CHANGED:** • New cvda value SWITCHALL for DDSSSTAT field. • New cvda value TABLEONLY for SYSDUMP field.
HTASK	Completed tasks (history) (HTASK) view	**CHANGED:** New field SMMVSSWT.
RULE	Not applicable	**CHANGED:** • New field OPENSTATUS. • New value WLMHEALTH added to ACTION field. • New values dbctlConnection, mqConnection and pipelineEnable added to RULETYPE field. **CHANGED with APAR:** • Service **APAR PH29187:** New values containerstorage added to RULETYPE field • Service **APAR PH34348:** New values transactionDump added to RULETYPE field • Service **APAR PH45119:** Attributes COUNT and TIME are changed to indicate the values since the region started instead of within the current statistics interval. New resource table attributes COUNTSTAT and TIMESTAT are added to indicate the values within the current statistics interval.
SYSDUMP	CICS system dump code (SYSDUMP) view	**CHANGED:** • New resource signature fields CHANGEAGENT, CHANGEAGREL, CHANGETIME, CHANGEUSRID, DEFINESOURCE, DEFINETIME, INSTALLAGENT, INSTALLTIME, and INSTALLUSRID added.
TASK	Active tasks (TASK) view	**CHANGED:** New field SMMVSSWT.
TCPDEF	TCP/IP service definitions (TCPDEF) view	**CHANGED:** New field OPTIONSPGM.
TRANDUMP	CICS transaction dump codes (TRANDUMP) view	**CHANGED:** • New resource signature fields CHANGEAGENT, CHANGEAGREL, CHANGETIME, CHANGEUSRID, DEFINESOURCE, DEFINETIME, INSTALLAGENT, INSTALLTIME, and INSTALLUSRID added.

Security

Changes to security

System programmers

Table 31. Changes to security in this release	
Area	**This release**
Auditing	**NEW:** Monitoring capability introduced for the security domain
Authentication	**NEW:** • VERIFY TOKEN support for JWT • Java EE 8 Security-1.0 API with JSR 375 **CHANGED:** • CICS Explorer support for MFA is ON by default. • New DISCONNECT option on **GMTRANT** for terminal sign-on security control. Support extended to CESF.

Table 31. Changes to security in this release (continued)	

Area	This release
Confidentiality	**NEW:** • SNI support in CICS TS communications with an HTTP server over TLS connections • Service **(APAR PH38091)** Default cipher file for outbound web requests • Service **(APAR PH50175)** The feature toggle `com.ibm.cics.tls.minimumkeystrength` allows CICS to set the minimum key size during TLS handshakes for increased key strength. **CHANGED:** • **CONFDATA** system initialization parameter: The default is changed from SHOW to HIDE. The HIDE option replaces HIDETC. • Service **(APAR PH49253) KEYRING** system initialization parameter: Accepts more formats of key ring names to allow use of key rings that are not owned by the region user ID.
Integrity	Service **NEW (APAR PH55369):** HTTP strict transport security (HSTS) is supported when CICS acts as a server.
EXCI SURROGCHK option	**REMOVED:**Surrogate checking is always done. Specifying SURROGCHK=YES in the EXCI options table, DFHXCOPT, is accepted for compatibility.

Changes to RACF classes

System programmers

Table 32. Changes to RACF classes related to command security. These changes are new resource identifiers for SPI commands. See CICS resources subject to command security checking and Resource and command check cross-reference for a list of all of the SPI commands and the RACF ACCESS required for each one.	

Command	This release
CREATE DUMPCODE	**NEW**: resource identifier DUMPCODE
INQUIRE JVMENDPOINT SET JVMENDPOINT	**NEW**: resource identifier JVMENDPOINT
PERFORM JVMSERVER	**NEW**: resource identifier JVMSERVER ACCESS(UPDATE) is required for the command. ACCESS(UPDATE) is required for the named JVMSERVER resource identifier.

Table 33. Changes to RACF classes related to CICS user IDs	

User ID	This release
Default user ID	Default user no longer needs command authority for any CAT 3 CICS transactions.

Table 34. Changes to other RACF classes		

Class	Profile	This release
IDTDATA	JWT.applid.userid.SAF	**NEW:** support for JWT with RACF
SURROGAT	userid.DFHEXCI	**NEW:** surrogate user checking for EXCI

Monitoring

Changes to CICS monitoring

System programmers

Table 35. Changes to monitoring data in this release	

Data	This release
Performance data in group DFHCICS	Service **CHANGED (APAR PH42306):** Field 089 (USERID) is changed for Liberty such that the user ID value now reflects the final user ID value used in secure Liberty transactions, instead of the initial user ID.

Table 35. Changes to monitoring data in this release (continued)	
Data	**This release**
Performance data in group DFHTASK	**NEW FIELDS:** • New field SMMVSSWT, containing the time that the user task waited because MVS user region or extended user region was short on storage and the number of times the task waited. • New field XSVFYPWD, displaying the total elapsed time that the user task spent verifying passwords, password phrases, PassTickets and MFA tokens. • New field XSVFYBAS, displaying the total elapsed time that the user task spent verifying basic authentication tokens. • New field XSVFYJWT, displaying the total elapsed time that the user task spent verifying JSON web tokens. • New field XSVFYKER, displaying the total elapsed time that the user task spent verifying Kerberos tokens.
Exception class data	Service **CHANGED with APAR:** • **APAR PH29187:** New exception resource type CONTAINR, which means that the threshold of a container storage policy task rule has been exceeded. • **APAR PH34348:** New exception resource type TRANDUMP, which means that the threshold of a transaction dump threshold policy system rule has been exceeded.

Changes to statistics

System programmers

In , the field name is a unique identifier for each statistic field, and where applicable, the DFHSTUP name is also given.

Table 36. Changes to statistics in this release	
Statistics	**This release**
Monitoring domain	**CHANGED:** New fields: • RMI Option (MNGRMI) • Application naming (MNGAPPNS) • MCT program name (MNGMCTNM) • Frequency (MNGFREQ)
Security domain	**NEW**
Sockets domain	**CHANGED:** New field: Name of the HTTP OPTIONS handler program (OPTIONSPGM)
Storage manager	**CHANGED:** Statistics are provided respectively for MVS user region and extended user region storage, indicating: • The time the MVS monitor system task last sampled MVS storage • State of the user region or extended user region • The current total amount of unallocated user region or extended user region storage • Low water mark of the total amount of unallocated user region or extended user region storage • The size of the current largest contiguous storage area available in unallocated user region or extended user region storage • Low water mark of the size of the largest contiguous storage area available in unallocated user region or extended user region storage • The time the last SOS condition was detected • The time tasks waited because of the SOS or constrained state • The current, peak, and total number of tasks that are waiting because of the SOS or constrained state

Table 36. Changes to statistics in this release (continued)	
Statistics	**This release**
User domain	**CHANGED:** New fields:
	• Delete count due to sign off (USGDESOF)
	• Delete count due to ENF (USGDEENF)
	• Current instances in directory (USGDRCUR)
	• Peak instances in directory (USGDRPK)
	• Current instances in timeout (USGTOCUR)
	• Peak instances in timeout (USGTOPK)
	• ENF events matched (USGENFK)
	• ENF events not matched (USGENFUN)

Troubleshooting

Changes to messages

System programmers

Table 37. Changes to messages in this release		
New messages	**Changed messages**	**Removed messages**
• DFHAM4968 indicates that one or more attributes of a resource were overridden.		
• DFHAM4969 indicates that a resource failed to install because overrides resulted in an invalid resource definition.		
• DFHAM4970 indicates that an override was applied to a resource definition attribute.		
• DFHAM4971 indicates that resource overrides applied during GRPLIST installation resulted in invalid resource definitions.		
• DFHAM4972 indicates that a resource override action is not valid because an attribute is null.		
• DFHAM4973 indicates that a resource override action makes an attribute too long.		
• DFHAP0605 indicates that a Db2 cancel thread request has been issued as part of CICS purge or forcepurge processing.		
• DFHCA4968 indicates that one or more attributes of a resource were overridden.		
• DFHCA4969 indicates that a resource failed to install because overrides resulted in an invalid resource definition.		
• DFHCA4970 indicates that an override was applied to a resource attribute.		
• DFHCA4972 indicates that a resource override action is not valid because an attribute is null.		
• DFHCA4973 indicates that a resource override action makes an attribute too long.		
• DFHDS0102 indicates the current CPU / dispatch ratio for the QR TCB.	• DFHDB8111 now shows an *rs* reason code to more accurately identify the reason for the IMS connection failure.	
• DFHDS0103 indicates an invalid **INITPARM** setting that specifies how often the DFHDS0102 message is to be issued.	• DFHDB8222 now shows an *rs* reason code to more accurately identify the reason for the IMS connection failure.	
• DFHDU0311 indicates automatic switching of dump data sets specified by DUMPSW=ALL has been overridden because the dump data sets are too small.		
• Service DFHIS2013 (APAR PH52870) indicates the server APPLID that is used in a High Availability (HA) IPCONN connection.		

Table 37. Changes to messages in this release (continued)		
New messages	**Changed messages**	**Removed messages**
• DFHMP3015 indicates that a system rule defined in a policy that is installed in a stand-alone region is triggered and the z/OS WLM health open status is set. • DFHMP3016 indicates that a system rule defined in a policy that is installed on a platform is triggered and the z/OS WLM health open status is set. • DFHMP3017 indicates that a system rule defined in a policy that is installed in a stand-alone region is triggered but the z/OS WLM health open status could not be set because WLMHEALTH=OFF is specified as a system initialization parameter. • DFHMP3018 indicates that a system rule defined in a policy that is installed on a platform is triggered but the z/OS WLM health open status could not be set because WLMHEALTH=OFF is specified as a system initialization parameter. • DFHMQ0126 indicates that a temporary error occurred when a CKTI trigger monitor attempted to issue an MQOPEN of an initiation queue. The trigger monitor will retry in one minute. • DFHMQ0127 indicates that a temporary error occurred when a CKTI trigger monitor attempted to issue an MQGET from an initiation queue. The trigger monitor will retry in one minute. • DFHMQ0128 indicates that following a temporary error, a CKTI trigger monitor has resumed normal processing. • DFHMQ0393 indicates that an abend occurred when CICS attempted to start the transaction defined in a trigger message. • DFHMQ0794 indicates the SMFMQGET start option of the CICS-MQ bridge. • DFHMQ0795 indicates that the CICS-MQ bridge has retrieved a message that has been previously marked and the mark browse interval has expired. • DFHMQ0796 indicates that following a temporary error, a CKBR bridge monitor has resumed normal processing. • Service DFHMQ0797E (APAR PH42282) is issued when temporary storage queue DFHCKBR is required but its TSMODEL definition has not been defined or installed in the system. • DFHPA2001 indicates insufficient 64-bit storage to process resource overrides. • DFHPA2002 indicates that the resource overrides file is being read. • DFHPA2003 indicates that resource overrides file could not be found. • DFHPA2004 indicates that the resource overrides file could not be opened. • DFHPA2005 indicates that the resource overrides file could not be read. • DFHPA2007 indicates that the USSCONFIG value cannot be determined. • DFHPA2008 indicates that the resource overrides file is too large. • DFHPA2009 indicates insufficient 31-bit storage to process resource overrides. • DFHPA2010 indicates that the feature toggle specifies an invalid resource overrides file name		

Table 37. Changes to messages in this release (continued)		
New messages	**Changed messages**	**Removed messages**
• Service DFHRM0240 (APAR PH03691) indicates the local log name that is set during CICS initialization and sent to a remote system when CICS establishes an APPC or IRC connection.		
• Service DFHRM0241 (APAR PH03691) indicates a log name that has been set for an APPC or IRC connection.		
• Service DFHRM0242 (APAR PH03691) indicates a log name that has been deleted for an APPC or IRC connection.		
• DFHRV0002 indicates that a severe error (code X'code') occurred in a module.		
• DFHRV1000 indicates that the resource overrides file failed to parse.		
• DFHRV1001 indicates that an override rule is for an obsolete resource type.		
• DFHRV1002 indicates that an override rule specifies an invalid resource name.		
• DFHRV1003 indicates that an override rule specifies an invalid attribute.		
• DFHRV1004 indicates that an override rule specifies an invalid attribute value.		
• DFHRV1005 indicates that an override rule specifies an invalid value for an integer attribute.		
• DFHRV1006 indicates that an override rule specifies an integer attribute value outside its valid range.		
• DFHRV1007 indicates that an override rule specifies an invalid CVDA attribute value.		
• DFHRV1008 indicates that an override rule specifies an invalid override action.		
• DFHRV1009 indicates that an override rule specifies an unsupported resource type.		
• DFHRV1010 indicates that an override rule specifies an invalid symbol format in the attribute value.		
• DFHRV1011 indicates that an override rule specifies an unsupported symbol name in the attribute value.		
• DFHRV1012 indicates that an override rule specifies an invalid symbol substring in the attribute value.		
• DFHRV1013 indicates that an override rule specifies an unsupported escape character in the attribute value.		
• DFHRV1014 indicates that an override rule specifies an invalid null string in the attribute value.		
• DFHRV1015 indicates that an override rule specifies an obsolete attribute.		
• DFHRV1016 indicates that a resource overrides file with updated content was loaded during CICS restart.		
• DFHRV1017 indicates that a resource overrides file is empty.		
• DFHSI1610 indicates that DFHAMIO is not on the load library and resource overrides cannot be processed.	• DFHSJ1007 is updated to reflect changed system action when CICS detects that an abend has left a JVM in an inconsistent state.	
• DFHSI1611 indicates an error in DFHAMIO during resource override processing.		
• DFHSI1612 indicates errors in the resource overrides file during resource override processing.		
• DFHSJ0007 indicates that an unexpected signal has been received by the JVM server.		
• DFHSJ0008 indicates that the JVM server has unexpectedly terminated and is now in an unusable state.		

Table 37. Changes to messages in this release (continued)		
New messages	**Changed messages**	**Removed messages**
• DFHSM0144 indicates that the CICS region is short on 24-bit MVS unallocated storage. • DFHSM0145 indicates that the CICS region is no longer short on 24-bit MVS unallocated storage. • DFHSM0146 indicates that the 24-bit MVS unallocated storage of the CICS region is constrained. • DFHSM0147 indicates that the 24-bit MVS unallocated storage of the CICS region is no longer constrained. • DFHSM0148 displays the total amount of unallocated storage and the amount of the largest contiguous unallocated storage area within the MVS user region. • DFHSM0149 indicates that the CICS region is short on 31-bit MVS unallocated storage. • DFHSM0150 indicates that the CICS region is no longer short on 31-bit MVS unallocated storage. • DFHSM0151 indicates that the 31-bit MVS unallocated storage of the CICS region is constrained. • DFHSM0152 indicates that the 31-bit MVS unallocated storage of the CICS region is no longer constrained. • DFHSM0153 displays the total amount of unallocated storage and the amount of the largest contiguous unallocated storage area within the MVS extended user region. • Service DFHSO0200I (APAR PH40930) is issued when the CICS sockets listener task starts accepting inbound TCP/IP connections. • Service DFHSO0201I (APAR PH40930) is issued when the CICS sockets listener task stops accepting new inbound HTTP connections. • Service DFHSO0202I (APAR PH40930) is issued when the CICS sockets listener task stops accepting all inbound TCP/IP connections. • Service DFHTP4175 (APAR PH43431) indicates a message routing failure due to an invalid or unlocatable remote system ID. • DFHTR0125 indicates that the getmain for storage to use for a trace table failed during CICS initialization. The CICS initialization is terminated. • Service DFHTS1316 (APAR PH28145) indicates that auxiliary temporary storage data set usage has reached 75% or more of the capacity. • Service DFHTS1317 (APAR PH28145) indicates that auxiliary temporary storage data set usage has fallen below 70% of the capacity. • Service DFHTS1610 (APAR PH40863) indicates that a scan of shared temporary storage queues has completed. The message shows the numbers of shared temporary storage queues scanned and deleted. • Service DFHWB0112 (APAR PH38091) indicates that there was a problem processing the defaultciphers.xml file. • DFHWB0770 indicates that an HTTP OPTIONS handler program has abended. • DFHWB0771 indicates that a program named as an HTTP OPTIONS handler could not be linked to.	• DFHTF0200 now shows the row number and column number to indicate the position of a field on the screen, replacing the *field* insert used in earlier releases.	

Table 37. Changes to messages in this release (continued)		
New messages	**Changed messages**	**Removed messages**
- Service DFHXQ0420 (APAR PH28145) indicates that the percentage of entries in use in the pool structure dropped below a specified threshold. - Service DFHXQ0421 (APAR PH28145) indicates that the percentage of elements in use in the pool structure dropped below a specified threshold. - Service DFHXQ0422 (APAR PH28145) indicates that the percentage of entries in use in the pool structure reached a specified threshold. - Service DFHXQ0423 (APAR PH28145) indicates that the percentage of elements in use in the pool structure reached a specified threshold. - DFHYM1000 indicates that a resource type in the resource overrides file is too long or missing a delimiter. - DFHYM1001 indicates that an override rule in the resource overrides file is missing the selector or overrides value. - DFHYM1002 indicates that an attribute name in the resource overrides file is too long or missing a delimiter. - DFHYM1003 indicates that an override action in the resource overrides file must start on a new line. - DFHYM1004 indicates that a find override action in the resource overrides file is missing an associated replace action. - DFHYM1005 indicates that an overrides mapping in the resource overrides file does not specify any attributes. - DFHYM1006 indicates an invalid selector condition or override action for an attribute in the resource overrides file. - DFHYM1007 indicates that a line delimiter is missing from the resource overrides file. - DFHYM1008 indicates incorrect indentation in the resource overrides file. - DFHYM1009 indicates that an attribute value must be enclosed in quotes in the resource overrides file. - DFHYM1010 indicates a missing space before a comment in the resource overrides file. - DFHYM1011 indicates unexpected data in the resource overrides file. - DFHYM1012 indicates an invalid character because of a character encoding error in the resource overrides file. - DFHYM1013 indicates an unsupported escape character in the resource overrides file. - DFHYM1014 indicates an invalid override action-operator in a selector mapping in the resource overrides file. - DFHYM1015 indicates an invalid selector condition-operator in an overrides mapping in the resource overrides file. - DFHYM1016 indicates a duplicate attribute in a selector or overrides mapping in the resource overrides file. - DFHYM1017 indicates that a resource override find action is missing a value in the resource overrides file. - DFHYM1018 indicates an unsupported multiline indicator in the resource overrides file. - DFHYM1019 indicates that the schemaVersion mapping is missing from the resource overrides file. - DFHYM1020 indicates that the resourceOverrides mapping is missing from the resource overrides file. - DFHYM1021 indicates that the schemaVersion mapping specifies an invalid schema name or version in the resource overrides file. - DFHYM1022 indicates that a resource overrides schema version in the resource overrides file is not supported. - DFHYM1023 indicates that the resource overrides file uses an unsupported code page.		

Table 37. Changes to messages in this release (continued)		
New messages	**Changed messages**	**Removed messages**
• EYUCP0208E indicates that the delete and re-add of a CMAS failed. • Service EYUNX0110W (APAR PH35122) indicates that resources to be installed conflicted with existing URIMAP or TCPIPSERVICE resources. • EYUXC0028 indicates that the data space usage for a CICSPlex SM component exceeds 70%, 80%, 90% or 95%.	• Service EYUNX0013E (APAR PH35122) is changed to also indicate invalid definition options for resources in a single CICS region configured with the CMCI JVM server (SMSS).	

Changes to abend codes

System programmers

Table 38. Changes to abend codes in this release		
New abend codes	**Changed abend codes**	**Removed abend codes**
• Service AITQ (APAR PH51503) occurs when a transaction is purged, during the processing of a request, while waiting for a response from a connected subsystem over an IPIC connection.		
• Service AMQT (APAR PH42282) occurs when temporary storage queue DFHCKBR is required but the TSMODEL definition for it does not exist.		
• AXG1 • AXG2 • AXG3 • AXG4		
• Service ARZR (APAR PH30791) occurs when a request stream task encountered a failure while trying to join with an existing target request stream task.		

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- Developing applications
- Developing system programs
- CICS TS security
- Developing for external interfaces
- Application development reference
- Reference: system programming
- Reference: connectivity

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- Application Programming Guide and Application Programming Reference
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