



Merge DICOM Toolkit™

5.9.0

RELEASE NOTES

Merge Healthcare Incorporated
900 Walnut Ridge Drive,
Hartland, WI 53029
USA

MERGE
An IBM® Company

877.44.MERGE • merge.com

 [@MergeHealthcare](https://twitter.com/MergeHealthcare)

 linkedin.com/company/merge-healthcare

 facebook.com/MergeHealthcare

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The symbols glossary is provided electronically at <http://www.merge.com/Support/Resources.aspx>.

CAUTION: U.S. federal law restricts this device to sale by, or on the order of, a physician.



Manufacturer's Address

Merge Healthcare Incorporated
900 Walnut Ridge Drive
Hartland, WI 53029

For assistance, please contact Merge Healthcare Customer Support.

- In North America, call toll free 1-800-668-7990, then select option 2.
- International, call Merge Healthcare (in Canada) +1-905-672-7990, then select option 2.
- Email: MDTSupport@merge.com or MC3Support@ca.ibm.com

Part	Date	Revision	Description
COM-3676	April 2019	1.0	Updated bi-annually

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Chapter 1 About the Application

The Merge DICOM Toolkit provides a powerful and simplified interface to DICOM. It allows you to focus on the important details of your application and the immediate needs of your end users, rather than the complex details of the DICOM standard.

WARNING: If using the log feature to log information to a file, Personal Health Information (PHI) may be exposed. Client application and system should be aware of this risk and take necessary procedures to prevent and identify unauthorized use or access to PHI.

This release includes the following toolkits:

Merge DICOM Toolkits	Target Development Environment
Merge DICOM Toolkit - C/C++ Toolkit V5.9.0	32-Bit Windows - Visual C++
	64-Bit Windows - Visual C++
	32-Bit Windows - Borland
	32-Bit - Linux on x86
	64-Bit - Linux on x86
	64-Bit - Linux on ARMv8
	32-Bit - Solaris 10 Intel - GCC Compiler
	64-Bit - Solaris 10 Intel - GCC Compiler
	32-Bit - Solaris 8 Sparc - Sun Compiler
	32-Bit - Solaris 8 Sparc - GCC Compiler
	32-Bit - MAC OS (Intel and Power PC)
	64-Bit - MAC OS (Intel)
	32-Bit Android on Armv7
	64-Bit Android on Armv8
	64-Bit iOS
Merge DICOM Toolkit - .NET/C# Toolkit V5.9.0	32-Bit Windows
	64-Bit Windows
Merge DICOM Toolkit - Java Toolkit V5.9.0	Windows, Solaris, Linux, Android, Mac OS X

This release includes the following:

- [“Enhancements” on page 6](#)
- [“Fixed Issues” on page 10](#)
- [“Known Issues” on page 12](#)

Chapter 2 Enhancements

NOTE: Supplements and change proposals apply to all toolkits.

This release adds support for the following DICOM supplements:

Supplement	Title
147	Second Generation Radiotherapy - Prescription and Segment Annotation
164	Contrast Agent Administration Reporting
183	PS3.18 Web Services Re-Documentation
188	Multi-Energy CT Images
203	Thumbnail Resources for DICOMweb
206	Extended BCP195 TLS Profile

This release also contains updates to the DICOM standard. It addresses the following correction proposals (CP):

CP#	Issue
991	Clarify Handling of Private Data in the Retrieve Without Bulk Data Service
1626	Correct Attribute Types in Text Style
1663	Add Attribute to convey OPT Scan Patterns in OPT IOD
1674	Add Dermatology Anatomic Site Context Group and NYU Numbering System Coding Scheme
1714	Add last release to PS 3.6 Data Dictionary
1736	Add Visible Light Photography Attributes corresponding to EXIF 2.31 and TIFF/EP
1746	Add a new code to CID 4270 OCT-A Algorithm Families for ratio analysis

CP#	Issue
1747	Update DICOM to reflect changes in IHTSDO SNOMED CT-DICOM Subset for JAN 2018 INT Release
1764	More quantitative image features
1779	Update AIM to DICOM SR TID 1500 mapping with model revisions
1787	Consistency of Attributes added in Standard Extended SOP Classes
1788	Remove unnecessary use of no Baseline CID in templates and clarify conventions
1789	Allow categorical observations without measurements for ROIs in TID 1500
1790	Correct relationship of Reconstruction Algorithm in TID 10013 CT Irradiation Event Data
1791	Clarify Transfer Syntax for STOW-RS of PS3.10 files
1792	Clarify that elements defined in part 6 as GGxx,EEEE only apply where xx is even
1793	Harmonize the description of the DICOM Communication Model across the parts
1794	Correct SOP versus Service Class in Titles in PS3.4 annexes Y, Z, and AA
1795	Retire section I.4.1 of PS3.4
1796	DIMSE Service Element and DIMSE Service Group table caption
1797	Update definition of SOP Class, inclusion of Media Storage Service and Web Services
1798	Fix partly inconsistent list of VRs affected by certain types of Attribute Matching
1799	Fix list of VRs having a VM of 1
1801	Update to the Application Level Confidentiality Profile Attributes table
1802	Add refractive surgery type SMILE to CID 4234 Refractive Surgery Types
1803	Add "Source of Data" details for Corneal Size measurement values used in Intraocular Lens Calculations IOD
1804	Clarify handling of ICC profiles in WADO-RS for encapsulated images such as JPEG
1807	Corrections of Performed Storage Module
1809	Add Coded form of Institutional Department
1810	Make the sections on definitions consistent and complete

CP#	Issue
1811	Key measurements in Encapsulated PDF
1812	Add calculation comments for intraocular lens calculations to Intraocular Lens Calculations IOD
1813	Add concept of Toric Intraocular Lenses to Intraocular Lens Calculations IOD
1814	Add corneal measurement values sequence to Intraocular Lens Calculations IOD (IOL)
1815	Add new Intraocular Lens Formulas and Lens Constants to DICOM Content Mapping Resource
1816	Update JPEG-LS and RLE Media Types for web services to use registered rather than experimental media types
1817	Replace uses of "data set" that do not refer to the PS3.5 defined meaning
1820	InConcatenationTotalNumber must be greater than one if present
1821	AcquisitionDuration need not be mandatory for WSI
1822	Remove Dimension Index Sequence requirement for WSI when Dimensions implicitly defined by TILED_FULL
1823	Add more PET Radiopharmaceuticals for Alzheimer's Disease
1824	Add more PMSA Targeting Radiopharmaceuticals
1825	Decision result context groups should not be extensible
1826	Specimen De-identification
1827	Correct code meaning for Formalin
1828	Add Barcode Value to Modality Worklist for WSI
1829	Clarify what slide label images contain and add overview image type
1830	Use of Segmentation and Parametric Maps with Whole Slide Imaging
1833	CP 1304 accidentally introduced restriction on PS format for MPEG-2
1834	Add RT Dose Measurement Devices to CID 7193
1836	Remove instance attributes from QIDO series include all
1837	Add Reason For Visit
1838	Additions to Breast Imaging Report
1840	Make Code Meaning for Bilateral consistent

In addition to updating the toolkit to reflect changes to the DICOM standard, this release also contains the following enhancements:

NOTE: Issue numbers can be used to request additional information from your account representative.

Issue	Description
COM-3591	<p>The toolkit incorporates source code from the Zlib data compression/decompression library. A number of well-known vulnerabilities registered against Zlib – CVE-2016-9840, CVE-2016-9841, CVE-2016-9842, CVE-2016-9843 – for versions up to 1.2.8 were resolved by upgrading the library to version 1.2.11.</p> <p>This enhancement applies to the Merge DICOM C/C++ Toolkit.</p>
COM-3599	<p>The toolkit library leverages Zlib inflate/deflate functionality by embedding some of the Zlib source code. This may cause applications wanting to link with an external instance of the library to face potential name clashes that can cause the link to fail. The solution recommended by Zlib is to use the Z_PREFIX compile option, which shifts the names of all the functions in the library (by prepending 'z_'), thus avoiding the name clashes when linking with a second instance of the library. Unless that second instance itself uses the Z_PREFIX, in which case the name clashes are brought back. In the case of the toolkit, the issue was solved by introducing our own specific prefix and reducing the chances of name clashes to extremely improbable.</p> <p>This enhancement applies to the Merge DICOM C/C++ Toolkit.</p>

Chapter 3 Fixed Issues

The following table lists the issues that have been fixed in this release.

NOTE: Issue numbers can be used to request additional information from your account representative.

Issue	Description
COM-3569	<p>The DICOM standard data dictionary specifies dual VR, e.g. US or SS for a number of data elements. In contrast, the toolkit data dictionary defines a single VR for all supported attributes, with the provision that the user can change it at run-time.</p> <p>The issue that was fixed was that <code>MCdimseMessage.copyTo()</code> operation would throw an exception on copying a dual VR attribute where the actual VR of the source attribute did not match the VR specified in the toolkit data dictionary.</p> <p>This update applies to the Merge DICOM Java Toolkit.</p>
COM-3600	<p>Updated a number of directory record definitions in the message information database that were outdated.</p> <p>This update applies to the Merge DICOM C/C++ Toolkit.</p>
COM-3639	<p>Fixed regression where the toolkit would discard an otherwise valid (accepted) association if the A-ASSOCIATE-AC PDU contained a Presentation Context Item corresponding to a presentation context that was rejected and this Presentation Context Item did not contain a Transfer Syntax sub-item, even an empty one. The issue, now fixed, was that the toolkit would insist that the Transfer Syntax sub-item be present, a condition that is not mandated by the DICOM standard, which just states that the Transfer Syntax sub-item for a rejected presentation context should simply be ignored.</p> <p>The defect affects versions 5.7.0 and 5.8.0.</p> <p>This update applies to all Merge DICOM Toolkits.</p>

Issue	Description
COM-3643	<p>Fixed issue where calling MC_Write_File() or MC_Write_File_By_Callback() would cause a crash if the Part 10 file to be written out contained DICOM directory structuring elements from group (0004).</p> <p>This update applies to the Merge DICOM C/C++ Toolkit.</p>
COM-3648	<p>Fixed multiple issues related to string type attributes of value representation UR and UT. According to the DICOM standard, the value for these attributes can be very large, up to $2^{32} - 2$, but the value multiplicity is always 1. Issues fixed:</p> <ul style="list-style-type: none"> • The MC_Get_Value_Length() and MC_Get_pValue_Length() functions would erroneously account for separator characters ('\') between the internal values (chunks) in which the UR or UT value was stored. • The MC_Get_Stream_Length() function would erroneously account for separator characters ('\') between the internal values (chunks) in which the UR or UT value was stored. • Media functions such as MC_Write_File() and MC_Write_File_By_Callback() would incorrectly insert value separators ('\') between the internal values (chunks) in which the UR or UT value was stored, when writing the Part 10 file to the media. • Message sending and receiving functions such as MC_Send_Request(), MC_Send_Request_For_Service(), MC_Send_Request_Message(), MC_Send_Request_Message_For_Service(), MC_Send_Response(), MC_Send_Response_Message() would incorrectly insert value separators ('\') between the internal values (chunks) in which the UR or UT value was stored, when sending the request or response message over the association. • The MC_Set_Next_Value_From_String() and MC_Set_Next_pValue_From_String() functions would succeed for attributes with a VR of UR or UT despite the DICOM standard stating that these VRs have a VM of 1. • The MC_Get_Next_Value_To_String() and MC_Get_Next_pValue_To_String() functions would succeed for attributes with a VR of UR or UT although the DICOM standard states that these VRs have a VM of 1. <p>This update applies to the Merge DICOM C/C++ Toolkit.</p>

Chapter 4 Known Issues

The following table lists an issue that has been identified but not fixed in this release.

NOTE: Issue numbers can be used to request additional information from your account representative.

Issue #	Description	Impact	Workaround
COM-3724	DICOM .NET: Zlib error on inflating data set from stream data source.	The impact should be low, as in most cases a stream data source, which has the problem, can be replaced by a file or a memory data source, which are not affected. This defect applies to the Merge DICOM .NET Toolkit.	File or memory stream can be used instead.