



## **DICOM Conformance Statement**

# **Dicom2Media**

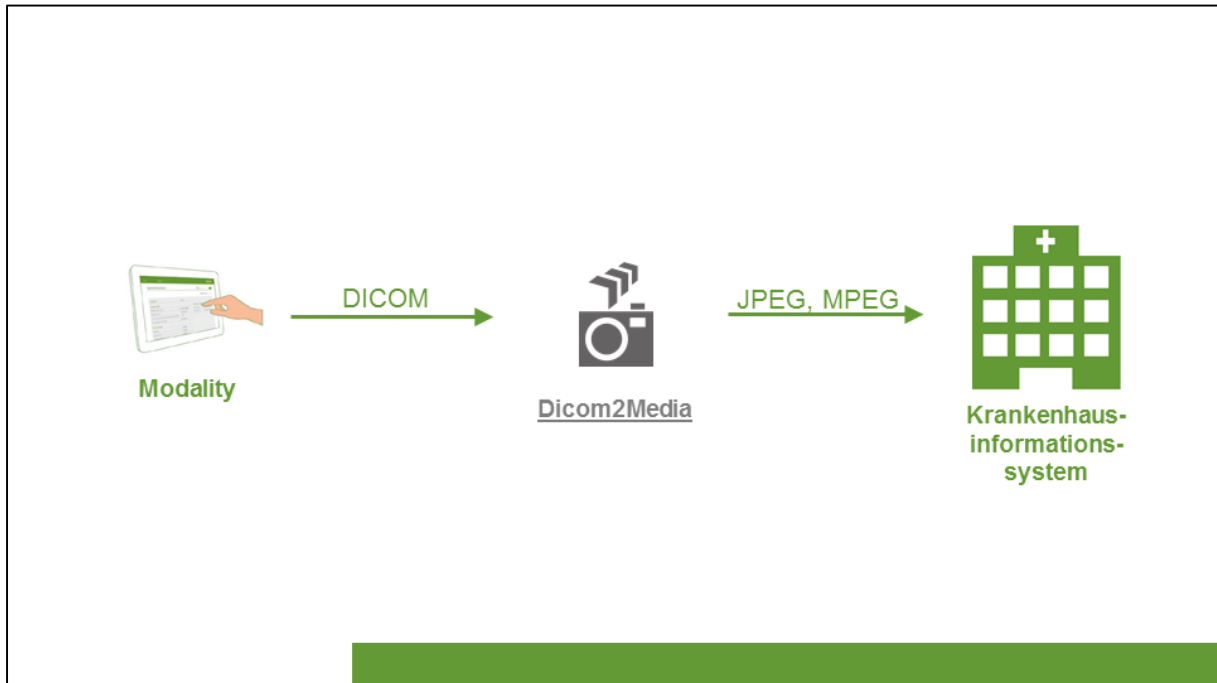
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# 1 Conformance Statement Overview

Dicom2Media is a software product running on Windows OS to receive DICOM Instances, convert them into Windows Media Files compliant format (JPEG/WMV) and store the files to a preconfigured folder with Patient data.

It provides the following DICOM features:

- Receive and store DICOM instances

Table 1 presents an overview of the DICOM network services supported by Dicom2Media.

**Table 1: Network Services**

SOP Classes	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
<b>General</b>			
Verification	1.2.840.10008.5.1.1	No	Yes
<b>Transfer</b>			
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	No	Yes
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	No	Yes
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	No	Yes

- **Note:**  
The above list contains the factory set of supported SOP Classes. Dicom2Media can be optional configured to support additional Storage SOP Classes on customer's request, e.g. specific Private Storage SOP Classes.

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## 3 Introduction

### 3.1 Revision History

The revision history provides dates and differences of the different releases Dicom2Media.

Version	Date	Autor	Chapter	Remarks
1	20.03.2019	Samuel Landree	All	Initial version for Dicom2Media

### 3.2 Audience

This Conformance Statement is intended for:

- (potential) customers,
- marketing staff interested in system and data exchange functionality,
- support engineers and system integrators of medical equipment,
- software designers and implementers of DICOM interfaces.
- It is assumed that the reader is familiar with the DICOM standard.

### 3.3 Remarks

This Conformance Statement by itself does not guarantee successful interoperability with other equipment. The user (or user's agent) should be aware of the following issues:

#### **Interoperability**

Integration of (networked) systems may require application functions that are not specified within the scope of DICOM.

It is the user's (or a user's agent) responsibility to analyse the application requirements and to specify a solution that integrates different vendor's equipment.

#### **Validation**

If the comparison of Conformance Statements indicate that the required information exchange should be possible, additional validation tests will be necessary.

It is the responsibility of the user (or user's agent) to specify the appropriate test suite and to carry out the additional validation tests.

### 3.4 Contents and structure

The DICOM Conformance Statement is contained in chapter 2 through 7 and follows the contents and structuring requirements of DICOM PS 3.2-2014.

### 3.5 Used definitions and terms

For a description of these, see NEMA PS 3.3-2014 and PS 3.4-2014.

### 3.6 Abbreviations

The following acronyms and abbreviations are used in the document.

ACR	American College of Radiology
AE	Application Entity
ANSI	American National Standard Institute
CD-R	Compact Disk Recorder
DICOM	Digital Imaging and Communication in Medicine
FSC	File Set Creator
GUI	Graphical User Interface
HIS	Hospital Information System
IOD	Image Object Definition
MWL	Modality Worklist Query/Retrieve
N.A.	Not applicable
NEMA	National Electric Manufacturers Association
NM	Nuclear Medicine
OS	Operating System
PACS	Picture Archiving and Communication System
PDU	Protocol Data Unit
RIS	Radiology Information System
RWA	Real World Activity
SC	Secondary Capture/Service Class
SCP	Service Class Provider
SCU	Service Class User
SOP	Service Object Pair
TCP/IP	Transmission Control Protocol/Internet protocol
UID	Unique Identifier
US	Ultra Sound
VR	Value Representation

### 3.7 References

[DICOM] The Digital Imaging and Communications in Medicine (DICOM) standard:  
NEMA PS 3.X.

National Electrical Manufacturers Association (NEMA) Publication Sales  
1300 N. 17th Street, Suite 1847  
Rosslyn, Va. 22209, United States of America

[DicomNet] DEKOM ENGINEERING DicomNet Systems Product Line  
DEKOM ENGINEERING GmbH (see address at page ii)

## 4 Networking

### 4.1 Implementation Model

Dicom2Media is a Software to receive DICOM Instances, convert them into Windows Media Files compliant format (JPEG/WMV). It is part of the DicomNet product line of DEKOM ENGINEERING, which provides storage, exchange and viewing network functionality on Windows based systems.

The Dicom2Media connectivity feature with the DICOM Module is to receive DICOM Instances and gather Patient / Study data from this store those Images/Movies to a preconfigured folder. The folder path is created according to the patient data.

The above DICOM functionality is described in this document.

#### 4.1.1 Application Data Flow

One Application Entities (AE) Store AE represent the Dicom2Media system. The related implementation model for the AEs is shown in the next figure.

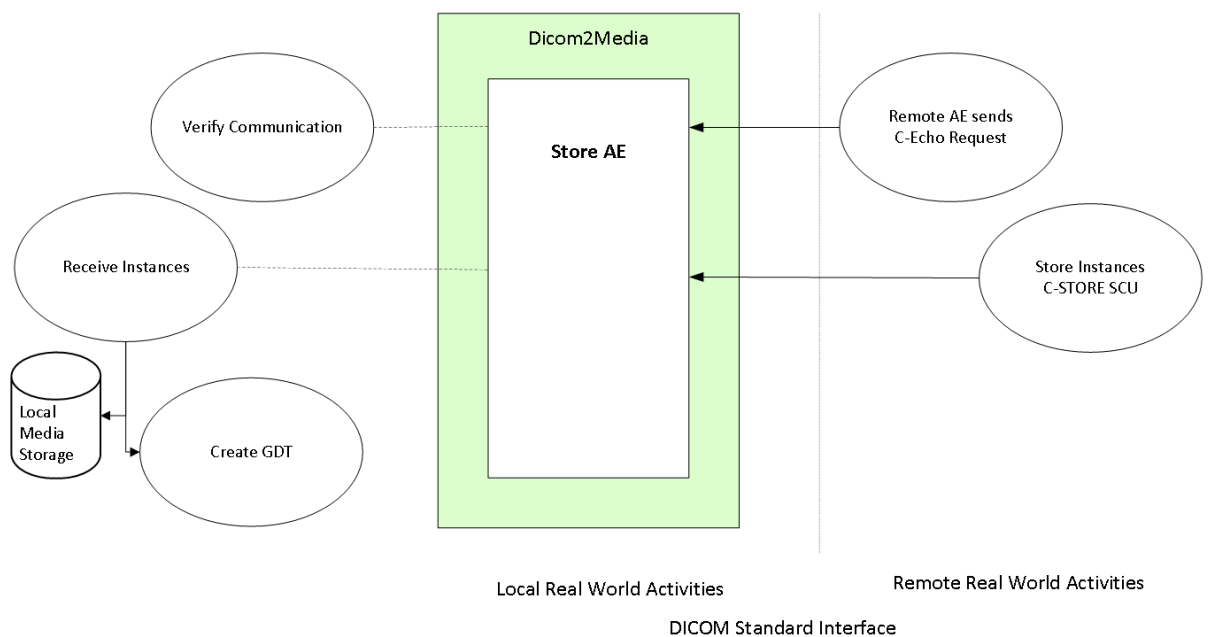


Figure 1: The Dicom2Media Application Data Flow Diagram

#### 4.1.2 Functional definition of Application Entities

This section describes in general terms the functions performed by Store AE.

##### 4.1.2.1 Functional Definition of Store AE

The Store AE is an integrated service of the Dicom2Media. The service starts as part of the Operation System. It will wait for connection attempts of other DICOM applications at the configured presentation address. It will accept associations for the following Service Classes and respond to request

#### 4.1.2.1.1 Verification Service Class

The Image Server AE will respond to C-ECHO request to verify the communication.

#### 4.1.2.1.2 Storage Service Class

The Store AE will accept C-STORE requests and store related instances to its instance storage space and convert it.

#### 4.1.3 Sequencing of Real-World Activities

The following sequence of Real-World Activities are supported by Dicom2Media:

- a user store instances to the Dicom2Media Store AE

#### 4.1.3.1 Workflow

The user initiates DICOM C-Store operations to Dicom2Media's Store AE. The Dicom2Media's Store AE stores the received instances in its local storage sorting the incoming instances by client and study (Study Instance UID).

After a configurable timeout a client's study transmission is stated completed and the Dicom2Media hands the received instances over to Media Compressor to create a media set with Windows Media Files compliant format.

Associations containing instances for the same study received after this timeout will result in the creation of another media set.

After compression, a subsystem can read in the media data in the transfer folder for further processing and optional a GDT file is provided.

## 4.2 AE Specifications

### 4.2.1 STORE AE

#### 4.2.1.1 SOP Classes

The Dicom2Media Store AE provides Standard Conformance to the following DICOM V3.0 SOP classes as an SCP.

**Table 2: Supported SOP Classes for Store AE**

SOP Classes	SOP Class UID	User of Service (SCU)	Provider of Service (SCP)
<b>General</b>			
Verification	1.2.840.10008.5.1.1	No	Yes
<b>Transfer</b>			
Ultrasound Multi-frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	No	Yes
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	No	Yes
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	No	Yes
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	No	Yes
VL Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	No	Yes
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	No	Yes

Dicom2Media may be configured to use other Image Storage SOP Classes on customer's request.

The conformance statements will be available as addendum when applicable.

The Dicom2Media Store AE does not support DICOM V 3.0 SOP Classes as an SCU.



#### 4.2.1.2 Association Policies

##### 4.2.1.2.1 General

The Dicom2Media Store AE will accept associations for DICOM Verification and Storage.

The DICOM standard application context name for DICOM 3.0 is always proposed as presented in Table 3.

**Table 3: DICOM Application Context**

Application Context Name	1.2.840.10008.3.1.1.1
--------------------------	-----------------------

##### 4.2.1.2.2 Number of Associations

**Table 4: Number of Associations as an Association Initiator for Image Server AE**

Maximum number of simultaneous associations	N.A
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Dicom2Media Store AE will not initiate associations.

**Table 5: Number of Associations as an Association Acceptor for Image Server AE**

Maximum number of simultaneous associations	Limited by the system or configuration
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##### 4.2.1.2.3 Asynchronous Nature

Dicom2Media Store AE does not support asynchronous operations and will not perform asynchronous window negotiation.

**Table 6: Asynchronous Nature as an Association Initiator for Image Serve AE**

Maximum number of outstanding asynchronous transactions	N.A.
---	------

##### 4.2.1.2.4 Implementation Identifying Information

The implementation information for Dicom2Media Store AE is:

**Table 7: DICOM Implementation Class and Version for Image Server AE**

Implementation Class UID	2.16.840.1.113669.632.16
Implementation Version Name	QDICNET_3X *

\* X identifies the version number of the DICOM module.

##### 4.2.1.3 Association Initiation Policy

Dicom2Media Store AE will not initiate associations.

##### 4.2.1.4 Association Acceptance Policy

The Dicom2Media Store AE accepts association attempts for the (Real-World) Activities Verification and Receive Instances

**4.2.1.4.1 (Real-World) Activity – Verification as SCP**

**4.2.1.4.1.1 Description and Sequencing of Activities**

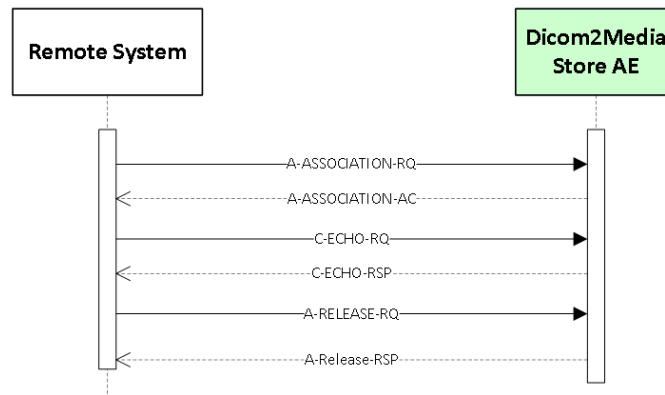


Figure 2: (Real-World) Activity – Verification as SCP

**4.2.1.4.1.2 Accepted Presentation Contexts**

**Table 8: Acceptable Presentation Contexts (Real-World) Activity – Verification as SCP**

Presentation Context table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Verification SOP Class	1.2.840.10008.1.1	ILE ELE EBE	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

**4.2.1.4.1.3 SOP Specific Conformance for Verification SOP Class**

The possible status responses and communication failures during a C-ECHO-RQ are described in this section

**4.2.1.4.1.3.1 Dataset Specific Conformance for (Real-World) Activity – Verification as SCP**

Possible status responses are shown in the following table:

**Table 9: Status Response (Real-World) Activity – Verification as SCP**

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	C-ECHO request accepted

**4.2.1.4.2 (Real World) Activity – Receive Instances**

**4.2.1.4.2.1 Description and Sequencing of Activities**

Remote systems can open associations with Dicom2Media: If presentation contexts match and the maximum number of associations has not been reached Dicom2Media will accept the association and the remote system may start sending its C-STORE requests. When the instance has been received and made persistent in the local file system Dicom2Media will send the C-STORE response.

The remote system may continue sending instances or release the association.

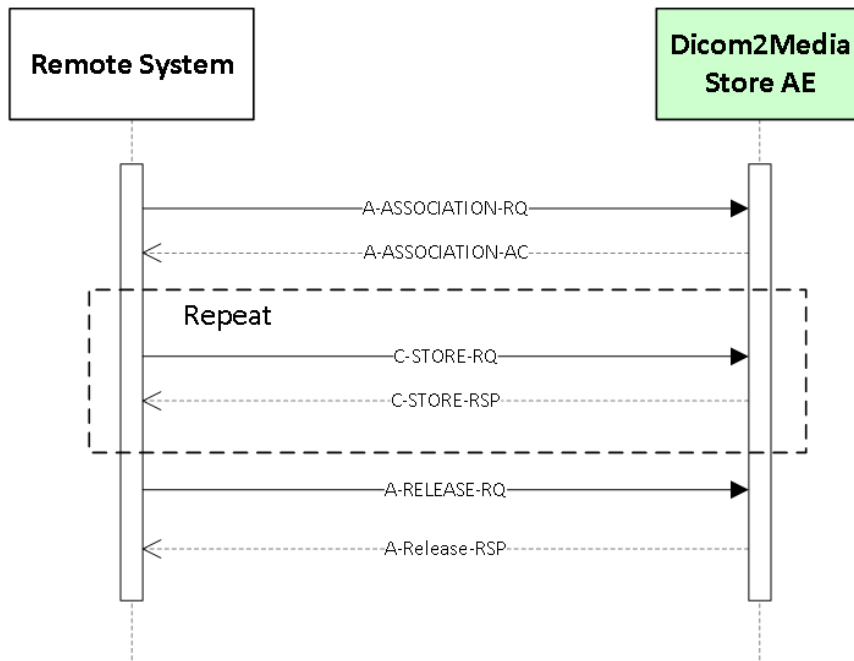


Figure 3: (Real-World) Activity – Receive Instances

4.2.1.4.2.2 Accepted Presentation Contexts

Table 10: Acceptable Presentation Contexts (Real-World) Activity – Receive Instances as SCP

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Multi-frame True Color Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7.4	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		
Visible Light Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Video Endoscopic Image Storage	1.2.840.10008.5.1.4.1.1.77.1.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		

Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
Ultrasound Multi-Frame Image Storage	1.2.840.10008.5.1.4.1.1.3.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None
		Explicit VR Little Endian	1.2.840.10008.1.2.1		
		JPEG Baseline (Process 1)	1.2.840.10008.1.2.4.50		

- **Note:**  
The above list contains the factory set of accepted Presentation Contexts. Dicom2Media can be optional configured to support e.g. specific Private Storage SOP Classes or modify the presentation contexts list.
- If data is sent to the SCPs that are not in the Acceptable Presentation Contexts list, they will be accepted but the compressor will delete the data because it can not be compressed.

#### 4.2.1.4.2.3 SOP Specific Conformance for Storage SOP Classes

Dicom2Media conforms to the SOP Classes of the Storage Service Class as a Level 2 (Full) SCP. No data elements are discarded or coerced.

During the DICOM C-STORE operation no value of any attribute is checked for its presence or value. Thus, the intended compression may fail although the C-STORE operation itself was stated successful.

In the case any of the following Type 1 attributes turn out to be missing or does not provide a value, the instance will not be archived, details will be logged.

- Study Instance UID
- Series Instance UID
- SOP Instance UID
- SOP Class UID

If any communication error occurs, network or DICOM related, all successful received instances within the association will be tried to be archived.

After an association has finished, successful received instances are sorted and merged by Study Instance UID and Series Instance UID. and moved into the final file system location.

If instances are not received or processed successfully they are placed in the error folder.

If the Dicom2Media is configured for "Cache - Mode", images will be deleted when the configured watermark is reached. The deletion process is based on a "last accessed study" strategy. Studies having the lowest probability will be deleted.

#### 4.2.1.4.2.3.1 Dataset Specific Conformance for C-STORE-RSP

Possible status responses are shown in the following table:

**Table 11: Status Response (Real-World) Activity – C-STORE as SCP**

Service Status	Error Code	Further Meaning	Behavior
Success	0000	Success	Continue, the instance has been successfully received.
Refused		SCP is not licensed	Details are logged, the association is aborted.
Error		Abort by remote system.	Details are logged.
		Time-out reached	Details are logged, the association is aborted.
	0110	Internal Error	Details are logged, the association is aborted.
	A700	Refused, out of resources	Insufficient storage. Details are logged, the association is aborted

### 4.3 Network Interfaces

#### 4.3.1 Physical Network Interface

The Dicom2Media provides DICOM V3.0 TCP/IP Network Communication. The TCP/IP stack is inherited from the Windows operating system.

The Dicom2Media supports a single network interface: Ethernet ISO.8802-3. Standard AUI, optional twisted pair 100/1000-BaseT.

#### 4.3.2 Additional Protocols

Additional protocols like DHCP, DNS, NTP may be present in the Windows operating system, its usage is transparent for Dicom2Media.

### 4.4 Configuration

The Dicom2Media Store AE are configured via the Service / Installation Tool. The Service / Installation Tool is intended to be used by DEKOM Service Engineers only. The configuration is stored in configuration repositories.

#### 4.4.1 AE Title/Presentation Address Mapping

##### 4.4.1.1 Local AE Titles

No default AE Titles are provided; they must be configured during installation.

##### 4.4.1.1.1 Store AE

The AE Title, host name / IP address and port number of the remote STORE SCP is configured using the Dicom2Media Service/Installation Tool. Only one remote STORE SCP can be defined.

## 5 Media Interchange

Dicom2Media does not support DICOM Media Storage.

## 6 Support of Character Sets

The following character sets are supported by Dicom2Medias DICOM applications:

ISO\_IR 100 (ISO 8859-1 Latin Alphabet No. 1 supplementary set)

## 7 Security

The DICOM applications of Dicom2Media do not support any specific security measures.

It is assumed that Dicom2Media is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or routers protections to ensure that only approved external hosts have network access to Dicom2Media.
- Firewall or router protections to ensure that Dicom2Media only has network access to approved external hosts and services.
- Any communication with external hosts and services outside the locally secured environment use appropriate secure network channels (e.g. such as Virtual Private Network (VPN)).

Other network security procedures such as automated intrusion detection may be appropriate in some environments. Additional security features may be established by the local security policy and are beyond the scope of this conformance statement.