

# GammaXP

## DICOM Conformance Statement

Version 4.0

All rights reserved

Inter Medical Medizintechnik GmbH

32312 Lübbecke

## Table of Contents

1	INTRODUCTION	5
1.1	Purpose	5
1.2	Scope	5
1.3	Abbreviations	5
1.4	References	5
PART A DICOM STORAGE .....		6
A.1	IMPLEMENTATION MODEL	6
A.1.1	Application data flow diagram	6
A.1.2	Functional definition of Application Entities (AE's)	6
A.1.3	Sequencing of real-world activities	7
A.2	AE SPECIFICATIONS	7
A.2.1	AE specification for GammaXP	7
A.2.1.1	<i>Association establishment policies</i>	7
A.2.1.2	<i>Association initiation Policy</i>	7
A.2.1.3	<i>Association acceptance Policy</i>	8
A.3	COMMUNICATION PROFILES	9
A.3.1	Supported Communication Stacks	9
A.3.2	TCP/IP Stack	9
A.3.3	Physical Media Support	9
A.3.4	Point-to-Point Stack	9
A.4	EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS	9
A.4.1	Standard Extended/Specialized/Private SOPs	9
A.5	CONFIGURATION	9
A.5.1	AE Title/Presentation Address Mapping	9
A.5.2	Configurable Parameters	9
A.6	SUPPORT OF EXTENDED CHARACTER SETS	10
PART B DICOM QUERY RETRIEVE .....		11
B.1	IMPLEMENTATION MODEL	11
B.1.1	Application data flow diagram	11
B.1.2	Functional definition of Application Entities (AE's)	12
B.1.3	Sequencing of real-world activities	12
B.2	AE SPECIFICATIONS	13
B.2.1	Query/Retrieve Service AE specification for GammaXP_administrator	13
B.2.1.1	<i>Association establishment policies</i>	13
B.2.1.2	<i>Association initiation Policy</i>	14
B.2.1.3	<i>Association acceptance Policy</i>	15
B.3	COMMUNICATION PROFILES	16
B.3.1	Supported Communication Stacks	16
B.3.2	TCP/IP Stack	16
B.3.3	Physical Media Support	16
B.3.4	Point-to-Point Stack	17

B.4	EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS	17
B.4.1	Standard Extended/Specialized/Private SOPs	17
B.5	CONFIGURATION	17
B.5.1	AE Title/Presentation Address Mapping	17
B.5.2	Configurable Parameters	17
B.6	SUPPORT OF EXTENDED CHARACTER SETS	17
<b>PART C DICOM BASIC PRINT .....</b>		<b>18</b>
C.1	IMPLEMENTATION MODEL	18
C.1.1	Application data flow diagram	18
C.1.2	Functional definition of Application Entities (AE's)	18
C.1.3	Sequencing of real-world activities	18
C.2	AE SPECIFICATIONS	18
C.2.1	AE specification for GammaXP	18
C.2.1.1	<i>Association establishment policies</i>	19
C.2.1.2	<i>Association initiation Policy</i>	19
C.3	COMMUNICATION PROFILES	20
C.3.1	Supported Communication Stacks	20
C.3.2	TCP/IP Stack	20
C.3.3	Physical Media Support	20
C.3.4	Point-to-Point Stack	20
C.4	EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS	20
C.4.1	Standard Extended/Specialized/Private SOPs	20
C.5	CONFIGURATION	21
C.5.1	AE Title/Presentation Address Mapping	21
C.5.2	Configurable Parameters	21
C.6	SUPPORT OF EXTENDED CHARACTER SETS	21
<b>PART D DICOM MODALITY WORKLIST AND MODALITY PERFORMED PROCEDURE STEP .....</b>		<b>22</b>
D.1	IMPLEMENTATION MODEL	22
D.1.1	Application data flow diagram	22
D.1.2	Functional definition of Application Entities (AE's)	22
D.1.3	Sequencing of real-world activities	23
D.2	AE SPECIFICATIONS	23
D.2.1	AE specification for GammaXP	23
D.2.1.1	<i>Association establishment policies</i>	23
D.2.1.2	<i>Association initiation Policy</i>	23
D.2.2.1	<i>Association establishment policies</i>	24
D.2.2.2	<i>Association initiation Policy</i>	24
D.3	COMMUNICATION PROFILES	25
D.3.1	Supported Communication Stacks	25
D.3.2	TCP/IP Stack	25
D.3.3	Physical Media Support	25
D.3.4	Point-to-Point Stack	25

D.4	EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS	25
D.4.1	Standard Extended/Specialized/Private SOPs	25
D.5	CONFIGURATION	26
D.5.1	AE Title/Presentation Address Mapping	26
D.5.2	Configurable Parameters	26
D.6	SUPPORT OF EXTENDED CHARACTER SETS	26

## 1 INTRODUCTION

### 1.1 Purpose

This DICOM conformance statement describes CompArt Medical Systems' implementation of DICOM 3.0 standard in GammaXP. This conformance statement adheres to the specifications detailed in DICOM PS 3.2-1993.

The GammaXP DICOM network implementation acts as:

SCU and SCP for the C-Store DICOM network service

SCP and SCU for the DICOM Query/Retrieve network service

SCU for the Basic Print Management network service

SCU for the Modality Worklist Management network service

SCU for the Modality Performed Procedure Step network service

### 1.2 Scope

The scope and format of this document are defined by the Part 2 of the DICOM V3.0 standard.

### 1.3 Abbreviations

ACR	American College of Radiology
AE	DICOM Application Entity
DICOM	Digital Imaging and Communications in Medicine
PDU	DICOM Protocol Data Unit
SCU	DICOM Service Class User (DICOM client)
SCP	DICOM Service Class Provider (DICOM server)
SOP	DICOM Service-Object Pair
UID	Unique Identifier

### 1.4 References

[1] Digital Imaging and Communications in Medicine DICOM 3.0 PS 3.1-13-1993

## **PART A DICOM Storage**

### ***A.1 IMPLEMENTATION MODEL***

The GammaXP\_administrator system utilizes the Storage and Verification services of DICOM.

#### **A.1.1 Application data flow diagram**

In Manual Transfer the operator selects the studies from GammaXP\_administrator database console interface for transfer to a selected destination. The GammaXP\_administrator network implementation is a Windows® XP/2000/NT™ application and acts as SCU for the C-STORE network service. The GammaXP\_administrator initiates association negotiation with a storage server over the network. If the association is accepted by the server, images are then transferred from the storage client to the storage server over the association. When the transfer is completed, the GammaXP\_administrator closes the association.

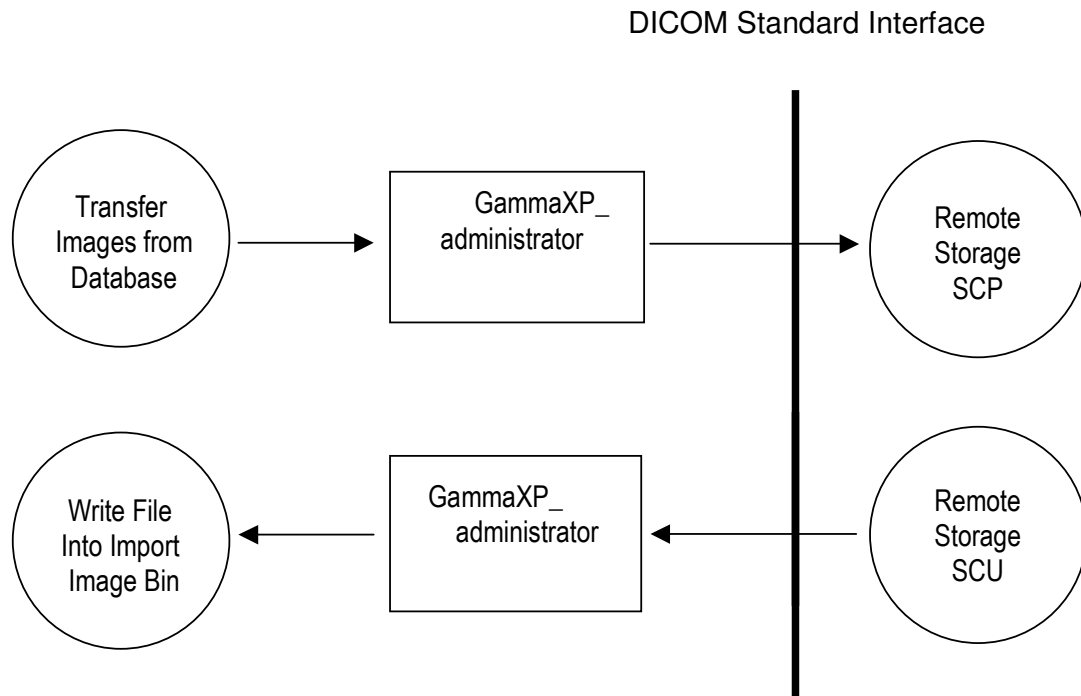


Figure 1: Application data flow diagram

#### **A.1.2 Functional definition of Application Entities (AE's)**

All communication with remote applications is accomplished using the DICOM protocol over an Ethernet network running the TCP/IP protocol stack.

The GammaXP\_administrator application is a Service Class Provider (SCP) and a Service Class User (SCU) for the GammaXP product.

**Storage SCP:** when an association request is received with valid connection criteria (taken from the local configuration) GammaXP\_administrator waits for an C-ECHO or C-STORE request. When an ECHO is received an appropriate ECHO response is sent back to the initiator. If a STORE request is received all incoming objects are imported to the database specified by the system administrator.

**Storage SCU:** upon request the selected images from the local database may be transferred to a predetermined DICOM-compliant image storage device. The GammaXP\_administrator DICOM application initiates an association at the remote DICOM network node AE title, TCP/IP address and port number are

taken from the local configuration. When initiating an association with a requested DICOM network node the GammaXP\_administrator provides a list of SOP Class UIDs that it will send.

### A.1.3 Sequencing of real-world activities

Not applicable.

## A.2 AE SPECIFICATIONS

### A.2.1 AE specification for GammaXP

This application Entity provides Standard Conformance to the following DICOM V.3.0 SOP Classes as a SCU and as a SCP.

SOP Class Name	SOP Class UID
Verification	1.2.840.10008.1.1
NM Image Information Storage	1.2.840.10008.5.1.4.1.1.20

#### A.2.1.1 Association establishment policies

##### A.2.1.1.1 General

The GammaXP\_administrator will act as an SCU of Storage Services when an image transfer request to a remote DICOM network node has been invoked.

The GammaXP\_administrator stores its AE title and TCP/IP listening port in the configuration file. The GammaXP\_administrator uses a DICOM application profile files (Dnodes) which contains a list of all client nodes. Their respective configuration files contain the AEs, their TCP/IP addresses (or their host names), listening ports and additional configuration information. The PDU size proposed in an association request by the GammaXP\_administrator will default to 32K bytes.

##### A.2.1.1.2 Number of associations

The GammaXP\_administrator will open and maintain single associations. If a valid association is open, it must first be closed before a new association can be opened.

##### A.2.1.1.3 Asynchronous nature

The GammaXP\_administrator does not support asynchronous communication (multiple outstanding transactions over a single association).

##### A.2.1.1.4 Implementation identifying information for GammaXP Application Entity

The Implementation Class Unique Identifier (UID) for the GammaXP is obtained from the Gvs.ini file. The Implementation Version Name will correspond to the software revision number.

#### A.2.1.2 Association initiation Policy

GammaXP\_administrator attempts to initiate a new association due to the Manual Transfer initiated by the operator,

If a previous association is still open when a new input session is begun, that association will be closed before a new association is initiated. The GammaXP\_administrator applies a configurable time-out to determine the acceptance of the association negotiation. The time-out value is configurable the CommunicationProfile section of Gvs.ini file.

A.2.1.2.1. Real-world activity – Send ImageObject

A.2.1.2.1.1 Associated real-world activity for Send Image operations

Once the association has been established, an image store message (C\_STORE request) is sent by the GammaXP\_administrator over the network. The remote server must either accept or reject the request. If the GammaXP\_administrator receives a C-STORE response with a success or warning status, it will initiate the next C-STORE operation over the association if required, or close the association (A-RELEASE\_RQ) if all images have been transferred. The GammaXP\_administrator will log any warnings to the DICOM\_OUT.LOG file. This log file resides in the directory .../Tmp The association will be aborted (A-ABORT-RQ) if a failure is detected by the GammaXP\_administrator during transfer. Failures can occur due to various reasons including: time-out, input failures or operator intervention.

If the application receives an unsuccessful C-STORE response status, the association is immediately closed. The GammaXP\_administrator will log the error status to the DICOM\_OUT.LOG file.

A.2.1.2.1.2 Proposed presentation contexts

The presentation contexts that can be proposed by GammaXP\_administrator for the send image operation are specified in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
NM Image Storage Service Class	1.2.840.10008.5.1.4.1.1.20	DICOM Implicit VR Little Endian	1.2.840.10008.1.2.	SCU	None

All of these SOP classes conform to the Standard Storage Services as specified in the DICOM Standard

A.2.1.2.1.2.1 SOP specific conformance for all storage SOP Classes

The GammaXP\_administrator provides Standard Conformance to the contexts listed above. The GammaXP\_administrator Storage SCP Application Entity conforms to the SOP's of the Storage Service Class at Level 2 (Full).

Extended negotiation is not supported.

A.2.1.3 Association acceptance Policy

The GammaXP\_administrator DICOM application accept a new association for DIMSE-C-ECHO and DIMSE-C-STORE service operations.

A.2.1.3.1. Real-world activity – Receive Image Object

A.2.1.3.1.1 Associated real-world activity

The Storage SCP will accept an association and will receive any objects transmitted on that association are imported to the database specified by the system administrator.

If the application receives an unsuccessful response status, the association is immediately closed. The GammaXP\_administrator will log the error status to the DCM\_IMP.LOG file.

A.2.1.3.1.2 Proposed presentation contexts

The presentation contexts that can be proposed by GammaXP\_administrator for the send image operation are specified in the following table:

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
NM Image Storage Service Class	1.2.840.10008.5.1.4.1.1.20	DICOM Implicit VR Little Endian	1.2.840.10008.1.2.	SCP	None

All of these SOP classes conform to the Standard Storage Services as specified in the DICOM Standard

#### A.2.1.3.1.2.1 SOP specific conformance for all storage SOP Classes

The GammaXP\_administrator provides Standard Conformance to the contexts listed above. The GammaXP\_administrator Storage SCP Application Entity conforms to the SOP's of the Storage Service Class at Level 2 (Full). No elements are discarded or coerced. In the event of successful C\_STORE operation, the DICOM object has successfully been written to disk as a file; the GammaXP\_administrator will never delete a file that it has received; the user of GammaXP determines the duration of the storage of the object.

Extended negotiation is not supported.

### A.3 COMMUNICATION PROFILES

#### A.3.1 Supported Communication Stacks

GammaXP\_administrator supports the DICOM upper layer using TCP/IP.

#### A.3.2 TCP/IP Stack

The TCP/IP stack is inherited from the Windows® XP/2000/NT™ operating system upon which it executes.

#### A.3.3 Physical Media Support

The GammaXP DICOM application is indifferent to the physical medium through which TCP/IP executes.

#### A.3.4 Point-to-Point Stack

The 50 pin ACR-NEMA connection is not applicable to this product.

### A.4 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS

#### A.4.1 Standard Extended/Specialized/Private SOPs

Not applicable

### A.5 CONFIGURATION

#### A.5.1 AE Title/Presentation Address Mapping

The Local AE Title is configurable in the Gvs.ini file during an installation. If absent the default "NT\_GVS" is used.

#### A.5.2 Configurable Parameters

Time-out for accepting/rejecting an association request

Time-out for responding to an association open/close request

Time out for accepting a message over network

The following fields are configurable for every remote DICOM node:

Remote AE Title

Remote IP Address

Responding TCP/IP Port

## **A.6 SUPPORT OF EXTENDED CHARACTER SETS**

No extended character sets are supported

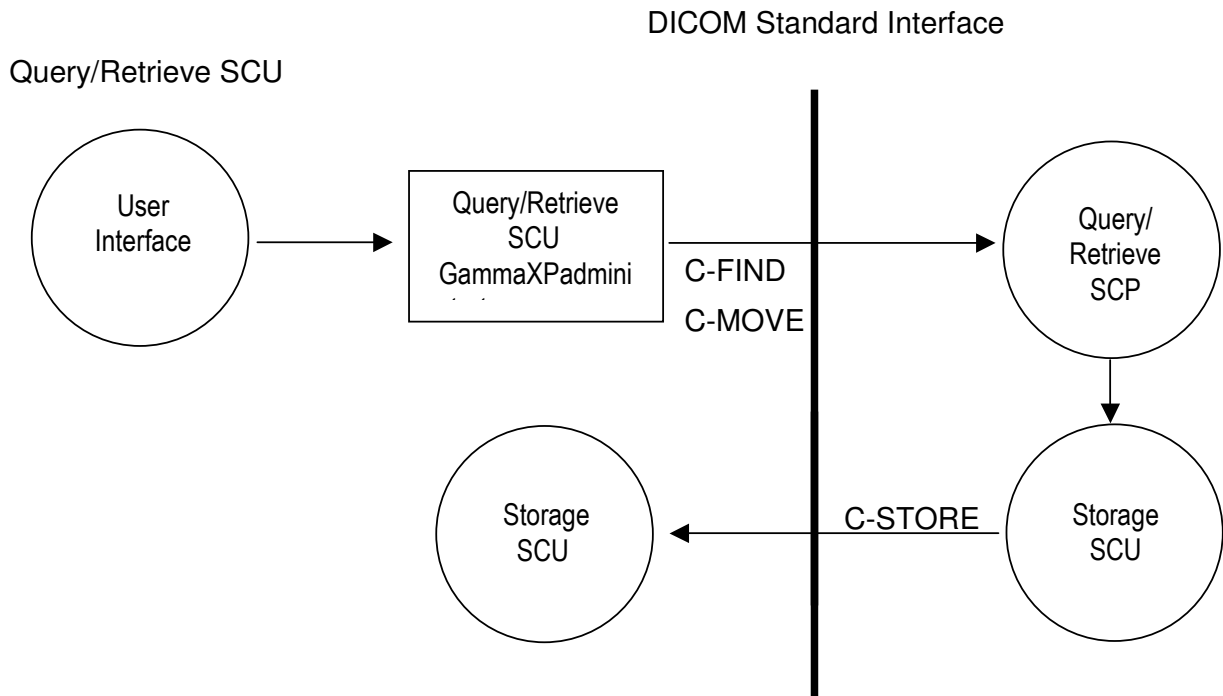
## **PART B DICOM Query Retrieve**

### **B.1 IMPLEMENTATION MODEL**

The query/retrieve service class defines an application-level class of services which enables the management of patient and image data incorporated within the DICOM information model and enable a DICOM AE to retrieve images from a remote DICOM node. The GammaXP\_administrator DICOM query/retrieve application support the query/retrieve services to act as SCU and SCP.

#### **B.1.1 Application data flow diagram**

The GammaXP\_administrator network implementation is a Windows® XP/2000/NT™ application and acts as SCU and SCP for the query/retrieve network service.



DICOM Standard Interface

Query/Retrieve SCP

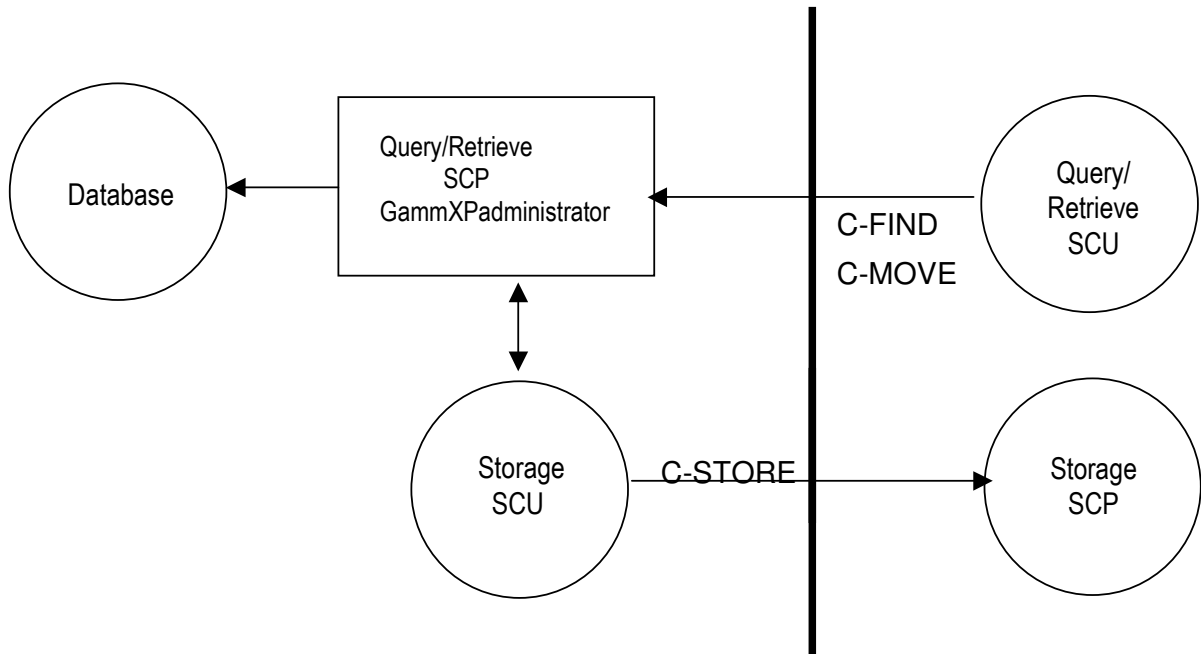


Figure 1: Application data flow diagram

**B.1.2 Functional definition of Application Entities (AE's)**

The query/retrieve SCU request the query/retrieve SCP to perform a match to the keys specified in the request and a C-Move DIMSE service initiates a C\_Store operation to transfer an image from a storage SCU to a Storage SCP.

The query/retrieve SCP responses to C-Find DIMSE services and C-Move involves the GammaXP\_administrator DICOM query/retrieve SCP application to initiate a C-Store operation to a Storage SCP. The GammaXP\_administrator query/retrieve SCP application operate as background daemon process which exists whenever the computer is switched on and responds to queries based on the records stored in its database.

**B.1.3 Sequencing of real-world activities**

Not applicable.

## B.2 AE SPECIFICATIONS

### B.2.1 Query/Retrieve Service AE specification for GammaXP\_administrator

This application Entity provides Standard Conformance to the following DICOM V.3.0 SOP Classes as a SCU.

SOP Class Name	SOP Class UID
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2

This application Entity provides Standard Conformance to the following DICOM V.3.0 SOP Classes as a SCP.

SOP Class Name	SOP Class UID
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1
Patient Root Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.1.2
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1
Patient/Study Only Query/Retrieve Information Model - MOVE	1.2.840.10008.5.1.4.1.2.3.2

#### B.2.1.1 Association establishment policies

##### B.2.1.1.1 General

The GammaXP\_administrator stores its AE title and TCP/IP listening port in the GammaXP.ini configuration file. The GammaXP\_administrator uses a DICOM application profile files (Qnodes) which contains a list of all client nodes which respond to Query/Retrieve services. Their respective configuration files contain the AEs, their TCP/IP addresses (or their host names), listening ports and additional configuration information. The PDU size proposed in an association request by the GammaXP\_administrator will default to 32K bytes.

##### B.2.1.1.2 Number of associations

The GammaXP\_administrator will open and maintain single associations. If a valid association is open, it must first be closed before a new association can be opened.

##### B.2.1.1.3 Asynchronous nature

The GammaXP\_administrator does not support asynchronous communication (multiple outstanding transactions over a single association).

##### B.2.1.1.4 Implementation identifying information for GammaXP Application Entity

The Implementation Class Unique Identifier (UID) for the GammaXP is obtained from the GammaXP.ini file. The Implementation Version Name will correspond to the software revision number.

### B.2.1.2 Association initiation Policy

The Query/Retrieve SCU and SCP establish an association by using the DICOM association services. During association establishment the Query/Retrieve Application Entities negotiate the supported SOP classes to exchange information on capabilities of the SCP and SCU.

The following DIMSE-C operations are supported as SCU:

C-FIND

C-MOVE

#### B.2.1.2.1. Real-world activity – Find SCU

##### B.2.1.2.1.1 Associated real-world activity for Send Image operations

The associated Real-World activity is to initiate query request to a SCP with the query model Patient Root.

##### B.2.1.2.1.2 Proposed presentation contexts

The presentation contexts that can be proposed by GammaXP\_administrator are specified in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCU	No

All of these SOP classes conform to the Standard Storage Services as specified in the DICOM Standard

##### *B.2.1.2.1.2.1 SOP specific conformance for all storage SOP Classes*

#### B.2.1.2.2. Real-world activity – MOVE SCU

##### B.2.1.2.2.1 Associated real-world activity for MOVE SCU operation

The associated Real-World activity is to generate retrievals to a SCP using the C-MOVE operation with the query model Patient Root.

##### B.2.1.2.2.2 Proposed presentation contexts

The presentation contexts that can be proposed by GammaXP\_administrator are specified in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		

Patient 1.2.840.10008.5.1.4.1.2.1.2 DICOM 1.2.840.10008.1.2 SCU No  
 Root Implicit VR  
 Query/ Little Endian  
 Retrieve  
 Information  
 Model -  
 MOVE

All of these SOP classes conform to the Standard Storage Services as specified in the DICOM Standard

**B.2.1.2.2.1 SOP specific conformance for all storage SOP Classes**

If the DICOM software is unable to open an association with the selected destination AE, an error message is printed in the station window.

**B.2.1.3 Association acceptance Policy**

The Query/Retrieve SCU and SCP establish an association by using the DICOM association services. During association establishment the Query/Retrieve Application Entities negotiate the supported SOP classes to exchange information on capabilities of the SCP and SCU.

The following DIMSE-C operations are supported as SCP:

- C-FIND
- C-MOVE

**B.2.1.3.1. Real-world activity – Find SCP**

**B.2.1.3.1.1 Associated real-world activity for FIND SCP**

The associated Real-World activity is to respond to query request to a ACU with the query model Patient Root and Patient/Study Only.

**B.2.1.3.1.2 Proposed presentation contexts**

The presentation contexts that can be proposed by GammaXP\_administrator are specified in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	No
Patient/Study Only Query/Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.1	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	No

All of these SOP classes conform to the Standard Storage Services as specified in the DICOM Standard

B.2.1.3.1.2.1 SOP specific conformance for all storage SOP Classes

No optional keys or relational queries are implemented.

Selectable fields for building queries are: patient name, Patient ID (patient level) and study data range (study level). It is possible to use wildcards (\*) and '?'.

B.2.1.3.2. Real-world activity – MOVE SCP

B.2.1.3.2.1 Associated real-world activity for Send Image operations

The associated Real-World activity is to respond to retrieve requested to a SCU. The SCP supports the query model Patient Root and Patient/Study Only. The Storage Service Class Conformance Statement describes the C-STORE service which is generated by the C-MOVE service

B.2.1.3.2.2 Proposed presentation contexts

The presentation contexts that can be proposed by GammaXP\_administrator are specified in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Patient Root Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.1.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	No
Patient/Study Only Query/ Retrieve Information Model - FIND	1.2.840.10008.5.1.4.1.2.3.2	DICOM Implicit VR Little Endian	1.2.840.10008.1.2	SCP	No

All of these SOP classes conform to the Standard Storage Services as specified in the DICOM Standard

B.2.1.3.2.2.1 SOP specific conformance for all storage SOP Classes

## B.3 COMMUNICATION PROFILES

### B.3.1 Supported Communication Stacks

GammaXP\_administrator supports the DICOM upper layer using TCP/IP.

### B.3.2 TCP/IP Stack

The TCP/IP stack is inherited from the Windows® XP/2000/NT™ operating system upon which it executes.

### B.3.3 Physical Media Support

The GammaXP DICOM application is indifferent to the physical medium through which TCP/IP executes.

#### B.3.4 Point-to-Point Stack

The 50 pin ACR-NEMA connection is not applicable to this product.

### **B.4 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS**

#### B.4.1 Standard Extended/Specialized/Private SOPs

Not applicable

### **B.5 CONFIGURATION**

#### B.5.1 AE Title/Presentation Address Mapping

The Local AE Title is configurable in the Gvs.ini file during an installation. If absent the default "NT\_GVS" is used.

#### B.5.2 Configurable Parameters

Time-out for accepting/rejecting an association request

Time-out for responding to an association open/close request

Time out for accepting a message over network

The following fields are configurable for every remote DICOM node:

Remote AE Title

Remote IP Address

Responding TCP/IP Port

### **B.6 SUPPORT OF EXTENDED CHARACTER SETS**

No extended character sets are supported

## **PART C DICOM Basic Print**

### **C.1 IMPLEMENTATION MODEL**

The print management service classes define an application-level class of services which enable the printing of images on a hardcopy medium. The GammaXP clinical application program DICOM basic print application support the print management DIMSE services to act as SCU.

#### C.1.1 Application data flow diagram

The GammaXP clinical application program DICOM Print implementation is a Windows® XP/2000/NT™ application and acts as SCU for the print management network service. GVCON requests image storage services of a DICOM server over an association.

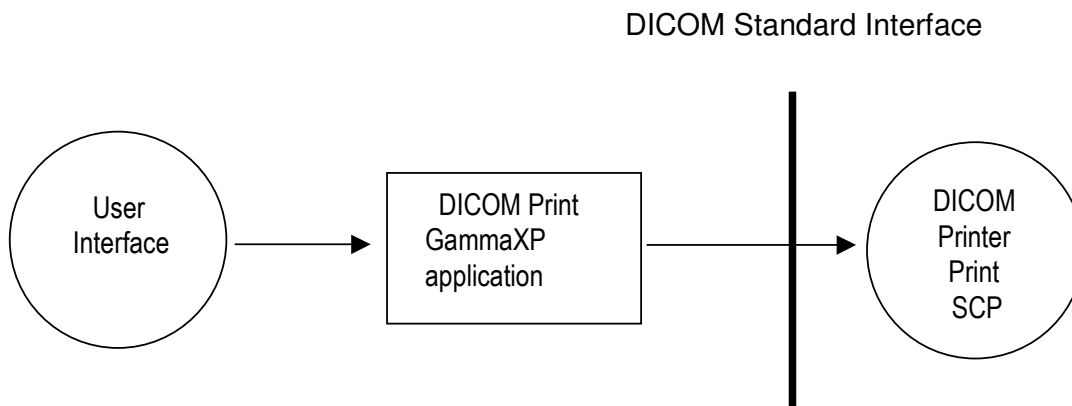


Figure 1: Application data flow diagram

#### C.1.2 Functional definition of Application Entities (AE's)

All communication with remote applications is accomplished using the DICOM protocol over an Ethernet network running the TCP/IP protocol stack.

The GammaXP clinical application program application is a Service Class User (SCU) for the GammaXP DICOM printing.

Upon request the selected reports may be transferred to a predetermined DICOM-compliant printer. The GammaXP clinical application program DICOM application initiates an association at the remote DICOM network node AE title, TCP/IP address and port number are taken from the local configuration. When initiating an association with a requested DICOM printer node the GammaXP clinical application program provides a list of SOP Class UIDs that it will send.

#### C.1.3 Sequencing of real-world activities

Not applicable.

## **C.2 AE SPECIFICATIONS**

### C.2.1 AE specification for GammaXP

This application Entity provides Standard Conformance to the following DICOM V.3.0 Basic Print Management SOP Classes as a SCU.

META SOP Classes

SOP Class Name	SOP Class UID
----------------	---------------

Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18

Grayscale Print Management SOP Classes

SOP Class Name	SOP Class UID
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Grayscale Image Box SOP Class	1.2.840.10008.5.1.1.4
Printer SOP Class	1.2.840.10008.5.1.1.16

Color Print Management SOP Classes

SOP Class Name	SOP Class UID
Basic Film Session SOP Class	1.2.840.10008.5.1.1.1
Basic Film Box SOP Class	1.2.840.10008.5.1.1.2
Basic Color Image Box SOP Class	1.2.840.10008.5.1.1.4.1
Printer SOP Class	1.2.840.10008.5.1.1.16

*C.2.1.1 Association establishment policies*

C.2.1.1.1 General

The GammaXP clinical application program will act as an SCU when an image printout transfer request to a remote DICOM printer has been invoked.

The GammaXP clinical application program stores its AE title and TCP/IP listening port in the configuration file. The GammaXP clinical application program uses a DICOM application profile files (DPrinters) which contains a list of all printer nodes. Their respective configuration files contain the AEs, their TCP/IP addresses (or their host names), listening ports and additional configuration information. The PDU size proposed in an association request by the GammaXP clinical application program will default to 32K bytes.

C.2.1.1.2 Number of associations

The GammaXP clinical application program will open and maintain single associations. If a valid association is open, it must first be closed before a new association can be opened.

C.2.1.1.3 Asynchronous nature

The GammaXP clinical application program does not support asynchronous communication (multiple outstanding transactions over a single association).

C.2.1.1.4 Implementation identifying information for GammaXP Application Entity

The Implementation Class Unique Identifier (UID) for the GammaXP is obtained from the Gvs.ini file. The Implementation Version Name will correspond to the software revision number.

*C.2.1.2 Association initiation Policy*

GammaXP clinical application program attempts to initiate a new association due to the DICOM Print option initiated by the operator.

If a previous association is still open when a new input session is begun, that association will be closed before a new association is initiated. The GammaXP applies a configurable time-out to determine the acceptance of the association negotiation. The time-out value is configurable the CommunicationProfile section of Gvs.ini file.

**C.2.1.2.1.1 Associated real-world activity**

The associated Real-Word activity is to print over a network a set of images on a paper or film.

If the application receives an unsuccessful response status, the association is immediately closed. The GammaXP clinical application program will log the error status to the DCM\_EXP.LOG file.

**C.2.1.2.1.2 Proposed presentation contexts**

The presentation contexts that can be proposed by GammaXP clinical application program for the print operation are specified in the following table:

Presentation Context Table

Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian	1.2.840.10008.1.2.	SCU	None
Basic Color Print Management Meta SOP Class	1.2.840.10008.5.1.1.18	DICOM Implicit VR Little Endian	1.2.840.10008.1.2.	SCU	None

**C.2.1.2.1.2.1 SOP specific conformance statement**

If the GammaXP print software is unable to open an association with the selected destination AE, an error message is printed in the station window.

**C.3 COMMUNICATION PROFILES**

**C.3.1 Supported Communication Stacks**

GammaXP clinical application program supports the DICOM upper layer using TCP/IP.

**C.3.2 TCP/IP Stack**

The TCP/IP stack is inherited from the Windows® XP/2000/NT™ operating system upon which it executes.

**C.3.3 Physical Media Support**

The GammaXP clinical application program DICOM Print application is indifferent to the physical medium through which TCP/IP executes.

**C.3.4 Point-to-Point Stack**

The 50 pin ACR-NEMA connection is not applicable to this product.

**C.4 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS**

**C.4.1 Standard Extended/Specialized/Private SOPs**

Not applicable

## **C.5 CONFIGURATION**

### **C.5.1 AE Title/Presentation Address Mapping**

The Local AE Title is configurable in the Gvs.ini file during an installation. If absent the default "NT\_GVS\_PRINT" is used.

### **C.5.2 Configurable Parameters**

Time-out for accepting/rejecting an association request

Time-out for responding to an association open/close request

Time out for accepting a message over network

The following fields are configurable for every remote DICOM node:

Remote AE Title

Remote IP Address

Responding TCP/IP Port

## **C.6 SUPPORT OF EXTENDED CHARACTER SETS**

No extended character sets are supported

## PART D DICOM Modality Worklist and Modality Performed Procedure Step

### D.1 IMPLEMENTATION MODEL

This implementation provides for simple transfer of patient demographic and procedure information using the DICOM Basic Modality Worklist SOP Class as a Service Class User (SCU).

#### D.1.1 Application data flow diagram

The GammaXP\_Scheduler DICOM Modality Worklist implementation a Windows® XP/2000/NT™ application and acts as SCU for the worklist management network service. GVCONN requests image storage services of a DICOM server over an association.

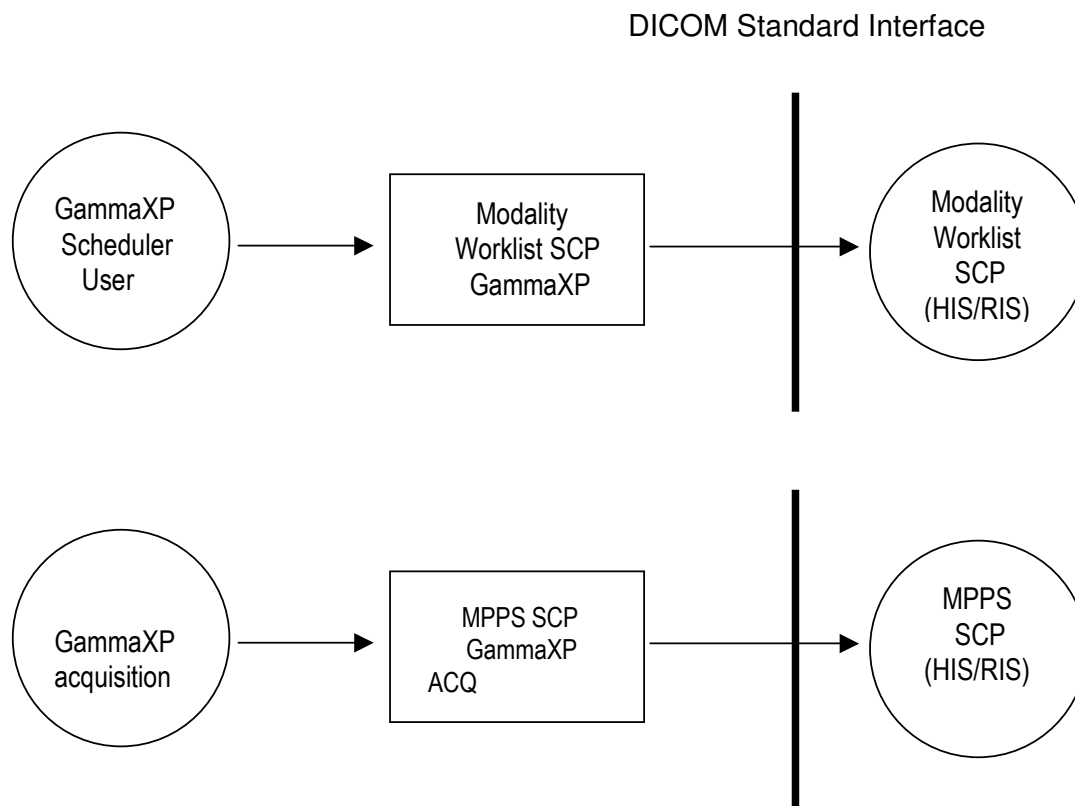


Figure 1: Application data flow diagram

#### D.1.2 Functional definition of Application Entities (AE's)

##### GammaXPscheduler Worklist AE

The GammaXPscheduler AE initiates an Association with a user selected remote AE and acts as a SCU of the Basic Worklist Management Service Class. The operator can initiate the Worklist Query operation, for the purpose of getting an immediate update of the patient schedule, by clicking on the "Get worklist from" button on the *Modality Worklist Management* section. The GammaXPscheduler program sends a C-FIND request based on parameters set by the user. The user can configure the Worklist AE to query for any/all modalities supported by the GammaXP system. The user can configure the Worklist to query for exams scheduled for any AE configured in the system as a Worklist SCU.

##### GammaXPacquisition Modality Performed Procedure Step AE:

The GammaXPacquisition MPPS AE initiates an Association with the Worklist AE that provided the procedure information and acts as a SCU of the Modality Performed Procedure Step Service Class. The GammaXPacquisition program creates a MPPS object when a patient file is opened for acquisition of images and updates the MPPS object (Completed or Discontinued) when the patient file is closed.

### D.1.3 Sequencing of real-world activities

When the operator clicks on the “Get worklist from” button on the *Modality Worklist Management* section, an association is established with the appropriate Worklist SCP, and a Query is generated for all NM procedures satisfied the query table. All of the responses are recorded in a database

## D.2 AE SPECIFICATIONS

### D.2.1 AE specification for GammaXP

This application Entity provides Standard Conformance to the following DICOM V.3. Management SOP Classes as a SCU.

#### Management SOP Classes

SOP Class Name	SOP Class UID
Modality Worklist Management Query Find	1.2.840.10008.5.1.4.31

#### D.2.1.1 Association establishment policies

##### D.2.1.1.1 General

The GammaXP\_Scheduler will act as an SCU when an query request to a remote DICOM worklist node has been invoked.

The GammaXP\_Scheduler stores its AE title and TCP/IP listening port in the configuration file. The GammaXP\_Scheduler uses a DICOM application profile files (Wnodes) which contains a list of all worklist nodes. Their respective configuration files contain the AEs, their TCP/IP addresses (or their host names), listening ports and additional configuration information. The PDU size proposed in an association request by the GammaXP\_Scheduler will default to 32K bytes.

##### D.2.1.1.2 Number of associations

The GammaXP\_Scheduler will open and maintain single associations. If a valid association is open, it must first be closed before a new association can be opened.

##### D.2.1.1.3 Asynchronous nature

The GammaXP\_Scheduler does not support asynchronous communication (multiple outstanding transactions over a single association).

##### D.2.1.1.4 Implementation identifying information for GammaXP Application Entity

The Implementation Class Unique Identifier (UID) for the GammaXP is obtained from the GammaXP.ini file. The Implementation Version Name will correspond to the software revision number.

#### D.2.1.2 Association initiation Policy

GammaXP\_Scheduler attempts to initiate a new association due to the DICOM Print option initiated by the operator.

If a previous association is still open when a new input session is begun, that association will be closed before a new association is initiated. The GammaXP applies a configurable time-out to determine the acceptance of the association negotiation. The time-out value is configurable the CommunicationProfile section of Gvs.ini file.

##### D.2.1.2.1.1 Associated real-world activity

The associated Real-Word activity is to print over a network a set of images on a paper or film.

If the application receives an unsuccessful response status, the association is immediately closed. The GammaXP\_Scheduler will log the error status to the DCM\_EXP.LOG file.

D.2.1.2.1.2 Proposed presentation contexts

The presentation contexts that can be proposed by GammaXP\_Scheduler for the print operation are specified in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Worklist Query Find SOP Class	1.2.840.10008.5.1.4.31	DICOM Implicit VR Little Endian	1.2.840.10008.1.2.	SCU	None

D.2.1.2.1.2.1 SOP specific conformance statement

If the GammaXP worklist software is unable to open an association with the selected destination AE, an error message is printed in the station window.

D.2.2 GammaXP\_acquisition AE specification for Modality Performed Procedure Step

The GammaXP\_acquisition MPPS AE provides Standard Conformance to the following DICOM V3.0 SOP Classes as a SCU:

SOP Classes

SOP Class Name	SOP Class UID
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3

D.2.2.1 Association establishment policies

D.2.2.1.1 General

GammaXP\_acquisition MPPS AE establishes an association under the following conditions:

1. When the system creates an MPPS object.
2. When the system updates an MPPS object.

GammaXP\_acquisition MPPS AE uses a DICOM application profile files (Wnodes) which contains a list of all MPPS SCPunits. Their respective configuration files contain the AEs, their TCP/IP addresses (or their host names), listening ports and additional configuration information.

The PDU size proposed in an association request by the GammaXPScheduler will default to 32K bytes.

D.2.2.1.2 Number of associations

The GammaXP\_acquisition will open and maintain single associations. If a valid association is open, it must first be closed before a new association can be opened.

D.2.2.1.3 Asynchronous nature

The GammaXP\_acquisition does not support asynchronous communication (multiple outstanding transactions over a single association).

D.2.2.1.4 Implementation identifying information for GammaXP Application Entity

The Implementation Class Unique Identifier (UID) for the GammaXP is obtained from the GVS.ini file. The Implementation Version Name will correspond to the software revision number.

D.2.2.2 Association initiation Policy

GammaXP\_acquisition MPPS AE attempts to initiate a new association when a MPPS object is created and when a MPPS object is updated. The Association is closed after the N-CREATE-RSP or N-SET-RSP messages are received.

**D.2.2.2.1.1 Associated real-world activity**

GammaXP\_acquisition MPPS AE initiates associations when a patient image acquisition is started and when the patient image acquisition file is terminated.

At the acquisition start system creates an MPPS object from the information that was provided by a Worklist SCP. Once the MPPS association has been established, the GammaXP\_acquisition MPPS AE sends a N-CREATE-RQ message to the MPPS SCP. When the N-CREATE-RSP message is received the association is closed.

**D.2.2.2.1.2 Proposed presentation contexts**

The presentation contexts that can be proposed by GammaXPacquisition for the MPPS operation are specified in the following table:

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3	DICOM Implicit VR Little Endian	1.2.840.10008.1.2.	SCU	None

**D.2.2.2.1.2.1 SOP specific conformance statement**

If any GammaXP AE software is unable to open an association with the selected destination AE, an error message is printed in the station window.

**D.3 COMMUNICATION PROFILES**

**D.3.1 Supported Communication Stacks**

GammaXP\_Scheduler/ GammaXPacquisition support the DICOM upper layer using TCP/IP.

**D.3.2 TCP/IP Stack**

The TCP/IP stack is inherited from the Windows® XP/2000/NT™ operating system upon which it executes.

**D.3.3 Physical Media Support**

The GammaXP\_Scheduler DICOM Modality Worklist and GammaXPacquisition application are indifferent to the physical medium through which TCP/IP executes.

**D.3.4 Point-to-Point Stack**

The 50 pin ACR-NEMA connection is not applicable to this product.

**D.4 EXTENSIONS / SPECIALIZATIONS / PRIVATIZATIONS**

**D.4.1 Standard Extended/Specialized/Private SOPs**

Not applicable

## **D.5 CONFIGURATION**

### **D.5.1 AE Title/Presentation Address Mapping**

The Local AE Title is configurable in the Gvs.ini file during an installation. If absent the default "NT\_GVS" is used.

### **D.5.2 Configurable Parameters**

Time-out for accepting/rejecting an association request

Time-out for responding to an association open/close request

Time out for accepting a message over network

The following fields are configurable for every remote DICOM node:

Remote AE Title

Remote IP Address

Responding TCP/IP Port

## **D.6 SUPPORT OF EXTENDED CHARACTER SETS**

No extended character sets are supported