GE HEALTHCARE

Technical Publications

Discovery 710/610 and Optima 560

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Important Precautions

Language

ПРЕДУПРЕЖДЕНИЕ
(BG)

- ТОВА УПЪТВАНЕ ЗА РАБОТА Е НАЛИЧНО САМО НА АНГЛИЙСКИ ЕЗИК.
- АКО ДОСТАВЧИКЪТ НА УСЛУГАТА НА КЛИЕНТА ИЗИСКА ЕЗИК, РАЗЛИЧЕН ОТ АНГЛИЙСКИ, ЗАДЪЛЖЕНИЕ НА КЛИЕНТА Е ДА ОСИГУРИ ПРЕВОД.
- НЕ ИЗПОЛЗВАЙТЕ ОБОРУДВАНЕТО ПРЕДИ ДА СТЕ СЕ КОНСУЛТИРАЛИ И РАЗБРАЛИ УПЪТВАНЕТО ЗА РАБОТА.
- НЕСПАЗВАНЕТО НА ТОВА ПРЕДУПРЕЖДЕНИЕ МОЖЕ ДА ДОВЕДЕ ДО НАРАНЯВАНЕ НА ДОСТАВЧИКА НА УСЛУГАТА, ОПЕРАТОРА ИЛИ ПАЦИЕНТ В РЕЗУЛТАТ НА ТОКОВ УДАР ИЛИ МЕХАНИЧНА ИЛИ ДРУГА ОПАСНОСТ.

警告
(ZH-CN)

- 本维修手册仅提供英文版本。
- 如果维修服务提供商需要非英文版本，客户需自行提供翻译服务。
- 未详细阅读和完全理解本维修手册之前，不得进行维修。
- 忽略本警告可能对维修人员，操作员或患者造成触电、机械伤害或其他形式的伤害。

VÝSTRAHA
(CS)

- TENTO PROVOZNÍ NÁVOD EXISTUJE POUZE V ANGLICKÉM JAZYCE.
- V PŘÍPADĚ, ŽE EXTERNÍ SLUŽBA ZÁKAZNÍKŮM POTŘEBUJE NÁVOD V JINÉM JAZYCE, JE ZAJIŠTĚNÍ PŘEKLADU DO ODPOVÍDAJÍCÍHO JAZYKA ÚKOLEM ZÁKAZNÍKA.
- NESNAŽTE SE O ÚDRŽBU TOHOTO ZAŘÍZENÍ, ANIŽ BYSTE SI PŘEČETLI TENTO PROVOZNÍ NÁVOD A POCHOPILI JEHO OBSAH.
- V PŘÍPADĚ NEDODRŽOVÁNÍ TÉTO VÝSTRAHY MŮŽE DOJÍT K PORANĚNÍ PRACOVNÍKA PRODEJNÍHO SERVISU, OBSLUŽNÉHO PERSONÁLU NEBO PACIENTŮ VLIVEM ELEKTRICKÉHOP PROUDU, RESPEKTIVE VLIVEM MECHANICKÝCH ČI JINÝCH RIZIK.

ADVARSEL
(DA)

- DENNE SERVICEMANUAL FINDES KUN PÅ ENGELSK.
- HVIS EN KUNDES TEKNIKER HAR BRUG FOR ET ANDET SPROG END ENGELSK, ER DET KUNDENS ANSVAR AT SØRGE FOR OVERSÆTTELSE.
- FORSØG IKKE AT SERVICERE UDSTYRET MEDMINDRE DENNE SERVICEMANUAL HAR VÆRET KONSULTERET OG ER FORSTÅET.
- MANGLENDE OVERHOLDELSE AF DENNE ADVARSEL KAN MEDFØRE SKADE PÅ GRUND AF ELEKTRISK, MEKANISK ELLER ANDEN FARE FOR TEKNIKEREN, OPERATØREN ELLER PATIENTEN.

WAARSCHUWING

(NL)

- DEZE ONDERHOUDSHANDLEIDING IS ENKEL IN HET ENGELS VERKRIJGBAAR.
- ALS HET ONDERHOUDSPERSONEEL EEN ANDERE TAAL VEREIST, DAN IS DE KLANT VERANTWOORDELIJK VOOR DE VERTALING ERVAN.
- PROBEER DE APPARATUUR NIET TE ONDERHOUDEN VOORDAT DEZE ONDERHOUDSHANDLEIDING WERD GERAADPLEEGD EN BEGREPEN IS.
- INDIEN DEZE WAARSCHUWING NIET WORDT OPGEVOLGD, ZOU HET ONDERHOUDSPERSONEEL, DE OPERATOR OF EEN PATIËNT GEWOND KUNNEN RAKEN ALS GEVOLG VAN EEN ELEKTRISCHE SCHOK, MECHANISCHE OF ANDERE GEVAREN.

WARNING

(EN)

- THIS SERVICE MANUAL IS AVAILABLE IN ENGLISH ONLY.
- IF A CUSTOMER'S SERVICE PROVIDER REQUIRES A LANGUAGE OTHER THAN ENGLISH, IT IS THE CUSTOMER'S RESPONSIBILITY TO PROVIDE TRANSLATION SERVICES.
- DO NOT ATTEMPT TO SERVICE THE EQUIPMENT UNLESS THIS SERVICE MANUAL HAS BEEN CONSULTED AND IS UNDERSTOOD.
- FAILURE TO HEED THIS WARNING MAY RESULT IN INJURY TO THE SERVICE PROVIDER, OPERATOR, OR PATIENT FROM ELECTRIC SHOCK, OR FROM MECHANICAL OR OTHER HAZARDS.

HOIATUS

(ET)

- KÄESOLEV TEENINDUSJUHEND ON SAADAVAL AINULT INGLISE KEELES.
- KUI KLIENDITEENINDUSE OSUTAJA NÕUAB JUHENDIT INGLISE KEELEST ERINEVAS KEELES, VASTUTAB KLIENT TÕLKETEENUSE OSUTAMISE EEST.
- ÄRGE ÜRITAGE SEADMEID TEENINDADA ENNE EELNEVALT KÄESOLEVA TEENINDUSJUHENDIGA TUTVUMIST JA SELLEST ARU SAAMIST.
- KÄESOLEVA HOIATUSE EIRAMINE VÕIB PÕHJUSTADA TEENUSEOSUTAJA, OPERAATORI VÕI PATSIENDI VIGASTAMIST ELEKTRILÖÖGI, MEHAANILISE VÕI MUU OHU TAGAJÄRJEL.

VAROITUS

(FI)

- TÄMÄ HUOLTO-OHJE ON SAATAVILLA VAIN ENGLANNIKSI.
- JOS ASIAKKAAN HUOLTOHENKILÖSTÖ VAATII MUUTA KUIN ENGLANNINKIELISTÄ MATERIAALIA, TARVITTAVAN KÄÄNNÖKSEN HANKKIMINEN ON ASIAKKAAN VASTUULLA.
- ÄLÄ YRITÄ KORJATA LAITTEISTOA ENNEN KUIN OLET VARMASTI LUKENUT JA YMMÄRTÄNYT TÄMÄN HUOLTO-OHJEEN.
- MIKÄLI TÄTÄ VAROITUSTA EI NOUDATETA, SEURAUKSENA VOI OLLA HUOLTOHENKILÖSTÖN, LAITTEISTON KÄYTTÄJÄN TAI POTILAAN VAHINGOITTUMINEN SÄHKÖISKUN, MEKAANISEN VIAN TAI MUUN VAARATILANTEEN VUOKSI.

ATTENTION

(FR)

- CE MANUEL DE SERVICE N'EST DISPONIBLE QU'EN ANGLAIS.
- SI LE TECHNICIEN DU CLIENT A BESOIN DE CE MANUEL DANS UNE AUTRE LANGUE QUE L'ANGLAIS, C'EST AU CLIENT QU'IL INCOMBE DE LE FAIRE TRADUIRE.
- NE PAS TENTER D'INTERVENIR SUR LES EQUIPEMENTS TANT QUE LE MANUEL SERVICE N'A PAS ETE CONSULTE ET COMPRIS
- LE NON-RESPECT DE CET AVERTISSEMENT PEUT ENTRAÎNER CHEZ LE TECHNICIEN, L'OPÉRATEUR OU LE PATIENT DES BLESSURES DUES À DES DANGERS ÉLECTRIQUES, MÉCANIQUES OU AUTRES.

WARNUNG

(DE)

- DIESE SERVICEANLEITUNG EXISTIERT NUR IN ENGLISCHER SPRACHE.
- FALLS EIN FREMDER KUNDENDIENST EINE ANDERE SPRACHE BENÖTIGT, IST ES AUFGABE DES KUNDEN FÜR EINE ENTSPRECHENDE ÜBERSETZUNG ZU SORGEN.
- VERSUCHEN SIE NICHT DIESE ANLAGE ZU WARTEN, OHNE DIESE SERVICEANLEITUNG GELESEN UND VERSTANDEN ZU HABEN.
- WIRD DIESE WARNUNG NICHT BEACHTET, SO KANN ES ZU VERLETZUNGEN DES KUNDENDIENSTTECHNIKERS, DES BEDIENERS ODER DES PATIENTEN DURCH STROMSCHLÄGE, MECHANISCHE ODER SONSTIGE GEFAHREN KOMMEN.

ΠΡΟΕΙΔΟΠΟΙΗΣΗ

(EL)

- ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕΡΒΙΣ ΔΙΑΤΙΘΕΤΑΙ ΣΤΑ ΑΓΓΛΙΚΑ ΜΟΝΟ.
- ΕΑΝ ΤΟ ΑΤΟΜΟ ΠΑΡΟΧΗΣ ΣΕΡΒΙΣ ΕΝΟΣ ΠΕΛΑΤΗ ΑΠΑΙΤΕΙ ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕ ΓΛΩΣΣΑ ΕΚΤΟΣ ΤΩΝ ΑΓΓΛΙΚΩΝ, ΑΠΟΤΕΛΕΙ ΕΥΘΥΝΗ ΤΟΥ ΠΕΛΑΤΗ ΝΑ ΠΑΡΕΧΕΙ ΥΠΗΡΕΣΙΕΣ ΜΕΤΑΦΡΑΣΗΣ.
- ΜΗΝ ΕΠΙΧΕΙΡΗΣΕΤΕ ΤΗΝ ΕΚΤΕΛΕΣΗ ΕΡΓΑΣΙΩΝ ΣΕΡΒΙΣ ΣΤΟΝ ΕΞΟΠΛΙΣΜΟ ΕΚΤΟΣ ΕΑΝ ΕΧΕΤΕ ΣΥΜΒΟΥΛΕΥΤΕΙ ΚΑΙ ΕΧΕΤΕ ΚΑΤΑΝΟΗΣΕΙ ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΣΕΡΒΙΣ.
- ΕΑΝ ΔΕ ΛΑΒΕΤΕ ΥΠΟΨΗ ΤΗΝ ΠΡΟΕΙΔΟΠΟΙΗΣΗ ΑΥΤΗ, ΕΝΔΕΧΕΤΑΙ ΝΑ ΠΡΟΚΛΗΘΕΙ ΤΡΑΥΜΑΤΙΣΜΟΣ ΣΤΟ ΑΤΟΜΟ ΠΑΡΟΧΗΣ ΣΕΡΒΙΣ, ΣΤΟ ΧΕΙΡΙΣΤΗ Ή ΣΤΟΝ ΑΣΘΕΝΗ ΑΠΟ ΗΛΕΚΤΡΟΠΛΗΞΙΑ, ΜΗΧΑΝΙΚΟΥΣ Ή ΑΛΛΟΥΣ ΚΙΝΔΥΝΟΥΣ.

FIGYELMEZTETÉS

(HU)

- EZEN KARBANTARTÁSI KÉZIKÖNYV KIZÁRÓLAG ANGOL NYELVEN ÉRHETŐ EL.
- HA A VEVŐ SZOLGÁLTATÓJA ANGOLTÓL ELTÉRŐ NYELVRE TART IGÉNYT, AKKOR A VEVŐ FELELŐSSÉGE A FORDÍTÁS ELKÉSZÍTTETÉSE.
- NE PRÓBÁLJA ELKEZDENI HASZNÁLNI A BERENDEZÉST, AMÍG A KARBANTARTÁSI KÉZIKÖNYVBEN LEÍRTAKAT NEM ÉRTELMEZTÉK.
- EZEN FIGYELMEZTETÉS FIGYELMEN KÍVÜL HAGYÁSA A SZOLGÁLTATÓ, MŰKÖDTETŐ VAGY A BETEG ÁRAMÜTÉS, MECHANIKAI VAGY EGYÉB VESZÉLYHELYZET MIATTI SÉRÜLÉSÉT EREDMÉNYEZHETI.

AÐVÖRUN

(IS)

- ÞESSI ÞJÓNUSTUHANDBÓK ER EINGÖNGU FÁANLEG Á ENSKU.
- EF AÐ ÞJÓNUSTUVEITANDI VIÐSKIPTAMANNS ÞARFNAST ANNAS TUNGUMÁLS EN ENSKU, ER ÞAÐ SKYLDA VIÐSKIPTAMANNS AÐ SKAFFA TUNGUMÁLAÞJÓNUSTU.
- REYNIÐ EKKI AÐ AFGREIÐA TÆKIÐ NEMA AÐ ÞESSI ÞJÓNUSTUHANDBÓK HEFUR VERIÐ SKOÐUÐ OG SKILIN.
- BROT Á SINNA ÞESSARI AÐVÖRUN GETUR LEITT TIL MEIÐSLA Á ÞJÓNUSTUVEITANDA, STJÓRNANDA EÐA SJÚKLINGS FRÁ RAFLOSTI, VÉLRÆNU EÐA ÖÐRUM ÁHÆTTUM.

AVVERTENZA

(IT)

- IL PRESENTE MANUALE DI MANUTENZIONE E DISPONIBILE SOLTANTO IN INGLESE.
- SE UN ADDETTO ALLA MANUTENZIONE ESTERNO ALLA GEHC RICHIEDE IL MANUALE IN UNA LINGUA DIVERSA, IL CLIENTE E TENUTO A PROVVEDERE DIRETTAMENTE ALLA TRADUZIONE.
- SI PROCEDA ALLA MANUTENZIONE DELL'APPARECCHIATURA SOLO DOPO AVER CONSULTATO IL PRESENTE MANUALE ED AVERNE COMPRESO IL CONTENUTO
- IL NON RISPETTO DELLA PRESENTE AVVERTENZA POTREBBE FAR COMPIERE OPERAZIONI DA CUI DERIVINO LESIONI ALL'ADDETTO ALLA MANUTENZIONE, ALL'UTILIZZATORE ED AL PAZIENTE PER FOLGORAZIONE ELETTRICA, PER URTI MECCANICI OD ALTRI RISCHI.

警告

(JA)

- このサービスマニュアルには英語版しかありません。
- サービスを担当される業者が英語以外の言語を要求される場合、翻訳作業はその業者の責任で行うものとさせていただきます。
- このサービスマニュアルを熟読し理解せずに、装置のサービスを行わないでください。
- この警告に従わない場合、サービスを担当される方、操作員あるいは患者さんが、感電や機械的又はその他の危険により負傷する可能性があります。

경고

(KO)

- 본 서비스 지침서는 영어로만 이용하실 수 있습니다.
- 고객의 서비스 제공자가 영어 이외의 언어를 요구할 경우, 번역 서비스를 제공하는 것은 고객의 책임입니다.
- 본 서비스 지침서를 참고했고 이해하지 않는 한은 해당 장비를 수리하려고 시도하지 마십시오.
- 이 경고에 유의하지 않으면 전기 쇼크, 기계상의 혹은 다른 위험으로부터 서비스 제공자, 운영자 혹은 환자에게 위해를 가할 수 있습니다.

BRĪDINĀJUMS (LV)

- ŠĪ APKALPES ROKASGRĀMATA IR PIEEJAMA TIKAI ANGĻU VALODĀ.
- JA KLIENTA APKALPES SNIEDZĒJAM NEPIECIEŠAMA INFORMĀCIJA CITĀ VALODĀ, NEVIS ANGĻU, KLIENTA PIENĀKUMS IR NODROŠINĀT TULKOŠANU.
- NEVEICIET APRĪKOJUMA APKALPI BEZ APKALPES ROKASGRĀMATAS IZLASĪŠANAS UN SAPRAŠANAS.
- ŠĪ BRĪDINĀJUMA NEIEVĒROŠANA VAR RADĪT ELEKTRISKĀS STRĀVAS TRIECIENA, MEHĀNISKU VAI CITU RISKU IZRAISĪTU TRAUMU APKALPES SNIEDZĒJAM, OPERATORAM VAI PACIENTAM.

ĮSPĖJIMAS (LT)

- ŠIS EKSPLOATAVIMO VADOVAS YRA PRIEINAMAS TIK ANGLŲ KALBA.
- JEI KLIENTO PASLAUGŲ TIEKĖJAS REIKALAUJA VADOVO KITA KALBA – NE ANGLŲ, NUMATYTI VERTIMO PASLAUGAS YRA KLIENTO ATSAKOMYBĖ.
- NEMĖGINKITE ATLIKTI ĮRANGOS TECHNINĖS PRIEŽIŪROS, NEBENT ATSIŽVELGĖTE Į ŠĮ EKSPLOATAVIMO VADOVĄ IR JĮ SUPRATOTE.
- JEI NEATKREIPSITE DĖMESIO Į ŠĮ PERSPĖJIMĄ, GALIMI SUŽALOJIMAI DĖL ELEKTROS ŠOKO,
- MECHANINIŲ AR KITŲ PAVOJŲ PASLAUGŲ TIEKĖJUI, OPERATORIUI AR PACIENTUI.

ADVARSEL (NO)

- DENNE SERVICEHÅNDBOKEN FINNES BARE PÅ ENGELSK.
- HVIS KUNDENS SERVICELEVERANDØR TRENGER ET ANNET SPRÅK, ER DET KUNDENS ANSVAR Å SØRGE FOR OVERSETTELSE.
- IKKE FORSØK Å REPARERE UTSTYRET UTEN AT DENNE SERVICEHÅNDBOKEN ER LEST OG FORSTÅTT.
- MANGLENDE HENSYN TIL DENNE ADVARSELEN KAN FØRE TIL AT SERVICELEVERANDØREN, OPERATØREN ELLER PASIENTEN SKADES PÅ GRUNN AV ELEKTRISK STØT, MEKANISKE ELLER ANDRE FARER.

OSTRZEŻENIE (PL)

- NINIEJSZY PODRĘCZNIK SERWISOWY DOSTĘPNY JEST JEDYNIE W JĘZYKU ANGIELSKIM.
- JEŚLI DOSTAWCA USŁUG KLIENTA WYMAGA JĘZYKA INNEGO NIŻ ANGIELSKI, ZAPEWNIENIE USŁUGI TŁUMACZENIA JEST OBOWIĄZKIEM KLIENTA.
- NIE PRÓBOWAĆ SERWISOWAĆ WYPOSAŻENIA BEZ ZAPOZNANIA SIĘ I ZROZUMIENIA NINIEJSZEGO PODRĘCZNIKA SERWISOWEGO.
- NIEZASTOSOWANIE SIĘ DO TEGO OSTRZEŻENIA MOŻE SPOWODOWAĆ URAZY DOSTAWCY USŁUG, OPERATORA LUB PACJENTA W WYNIKU PORAŻENIA ELEKTRYCZNEGO, ZAGROŻENIA MECHANICZNEGO BĄDŹ INNEGO.

ATENÇÃO (PT-BR)

- ESTE MANUAL DE ASSISTENCIA TECNICA SO SE ENCONTRA DISPONIVEL EM INGLES.
- SE QUALQUER OUTRO SERVIÇO DE ASSISTENCIA TECNICA, QUE NÃO A GEHC, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, E DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.
- NÃO TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA
- O NÃO CUMPRIMENTO DESTE AVISO PODE POR EM PERIGO A SEGURANÇA DO TÉCNICO, OPERADOR OU PACIENTE DEVIDO A CHOQUES ELÉTRICOS, MECÂNICOS OU OUTROS.

ATENÇÃO

(PT-PT)

- ESTE MANUAL DE ASSISTENCIA TECNICA SO SE ENCONTRA DISPONIVEL EM INGLES.
- SE QUALQUER OUTRO SERVIÇO DE ASSISTENCIA TECNICA, QUE NÃO A GEHC, SOLICITAR ESTES MANUAIS NOUTRO IDIOMA, E DA RESPONSABILIDADE DO CLIENTE FORNECER OS SERVIÇOS DE TRADUÇÃO.
- NÃO TENTE REPARAR O EQUIPAMENTO SEM TER CONSULTADO E COMPREENDIDO ESTE MANUAL DE ASSISTÊNCIA TÉCNICA
- O NÃO CUMPRIMENTO DESTE AVISO PODE COLOCAR EM PERIGO A SEGURANÇA DO TÉCNICO, DO OPERADOR OU DO PACIENTE DEVIDO A CHOQUES ELÉCTRICOS, MECÂNICOS OU OUTROS.

ATENȚIE

(RO)

- ACEST MANUAL DE SERVICE ESTE DISPONIBIL NUMAI ÎN LIMBA ENGLEZĂ.
- DACĂ UN FURNIZOR DE SERVICII PENTRU CLIENȚI NECESITĂ O ALTĂ LIMBĂ DECÂT CEA ENGLEZĂ, ESTE DE DATORIA CLIENTULUI SĂ FURNIZEZE O TRADUCERE.
- NU ÎNCERCAȚI SĂ REPARAȚI ECHIPAMENTUL DECÂT ULTERIOR CONSULTĂRII ŞI ÎNȚELEGERII ACESTUI MANUAL DE SERVICE.
- IGNORAREA ACESTUI AVERTISMENT AR PUTEA DUCE LA RĂNIREA DEPANATORULUI, OPERATORULUI SAU PACIENTULUI ÎN URMA PERICOLELOR DE ELECTROCUTARE, MECANICE SAU DE ALTĂ NATURĂ.

ОСТОРОЖНО!

(RU)

- ДАННОЕ РУКОВОДСТВО ПО ОБСЛУЖИВАНИЮ ПРЕДЛАГАЕТСЯ ТОЛЬКО НА АНГЛИЙСКОМ ЯЗЫКЕ.
- ЕСЛИ СЕРВИСНОМУ ПЕРСОНАЛУ КЛИЕНТА НЕОБХОДИМО РУКОВОДСТВО НЕ НА АНГЛИЙСКОМ, А НА КАКОМ-ТО ДРУГОМ ЯЗЫКЕ, КЛИЕНТУ СЛЕДУЕТ САМОСТОЯТЕЛЬНО ОБЕСПЕЧИТЬ ПЕРЕВОД.
- ПЕРЕД ОБСЛУЖИВАНИЕМ ОБОРУДОВАНИЯ ОБЯЗАТЕЛЬНО ОБРАТИТЕСЬ К ДАННОМУ РУКОВОДСТВУ И ПОЙМИТЕ ИЗЛОЖЕННЫЕ В НЕМ СВЕДЕНИЯ.
- НЕСОБЛЮДЕНИЕ ТРЕБОВАНИЙ ДАННОГО ПРЕДУПРЕЖДЕНИЯ МОЖЕТ ПРИВЕСТИ К ТОМУ, ЧТО СПЕЦИАЛИСТ ПО ОБСЛУЖИВАНИЮ, ОПЕРАТОР ИЛИ ПАЦИЕНТ ПОЛУЧАТ УДАР ЭЛЕКТРИЧЕСКИМ ТОКОМ, МЕХАНИЧЕСКУЮ ТРАВМУ ИЛИ ДРУГОЕ ПОВРЕЖДЕНИЕ.

UPOZORENJE

(SR)

- OVO SERVISNO UPUTSTVO JE DOSTUPNO SAMO NA ENGLESKOM JEZIKU.
- AKO KLIJENTOV SERVISER ZAHTEVA NEKI DRUGI JEZIK, KLIJENT JE DUŽAN DA OBEZBEDI PREVODILAČKE USLUGE.
- NE POKUŠAVAJTE DA OPRAVITE UREĐAJ AKO NISTE PROČITALI I RAZUMELI OVO SERVISNO UPUTSTVO.
- ZANEMARIVANJE OVOG UPOZORENJA MOŽE DOVESTI DO POVREĐIVANJA SERVISERA, RUKOVAOCA ILI PACIJENTA USLED STRUJNOG UDARA ILI MEHANIČKIH I DRUGIH OPASNOSTI.

UPOZORNENIE
(SK)

- TENTO NÁVOD NA OBSLUHU JE K DISPOZÍCII LEN V ANGLIČTINE.
- AK ZÁKAZNÍKOV POSKYTOVATEĽ SLUŽIEB VYŽADUJE INÝ JAZYK AKO ANGLIČTINU, POSKYTNUTIE PREKLADATEĽSKÝCH SLUŽIEB JE ZODPOVEDNOSŤOU ZÁKAZNÍKA.
- NEPOKÚŠAJTE SA O OBSLUHU ZARIADENIA SKÔR, AKO SI NEPREČÍTATE NÁVOD NA OBLUHU A NEPOROZUMIETE MU.
- ZANEDBANIE TOHTO UPOZORNENIA MÔŽE VYÚSTIŤ DO ZRANENIA POSKYTOVATEĽA SLUŽIEB, OBSLUHUJÚCEJ OSOBY ALEBO PACIENTA ELEKTRICKÝM PRÚDOM, DO MECHANICKÉHO ALEBO INÉHO NEBEZPEČENSTVA.

ATENCION
(ES)

- ESTE MANUAL DE SERVICIO SOLO EXISTE EN INGLES.
- SI ALGUN PROVEEDOR DE SERVICIOS AJENO A GEHC SOLICITA UN IDIOMA QUE NO SEA EL INGLES, ES RESPONSABILIDAD DEL CLIENTE OFRECER UN SERVICIO DE TRADUCCION
- NO SE DEBERA DAR SERVICIO TECNICO AL EQUIPO, SIN HABER CONSULTADO Y COMPRENDIDO ESTE MANUAL DE SERVICIO
- LA NO OBSERVANCIA DEL PRESENTE AVISO PUEDE DAR LUGAR A QUE EL PROVEEDOR DE SERVICIOS, EL OPERADOR O EL PACIENTE SUFRAN LESIONES PROVOCADAS POR CAUSAS ELÉCTRICAS, MECÁNICAS O DE OTRA NATURALEZA.

VARNING
(SV)

- DEN HÄR SERVICEHANDBOKEN FINNS BARA TILLGÄNGLIG PÅ ENGELSKA.
- OM EN KUNDS SERVICETEKNIKER HAR BEHOV AV ETT ANNAT SPRÅK ÄN ENGELSKA ANSVARAR KUNDEN FÖR ATT TILLHANDAHÅLLA ÖVERSÄTTNINGSTJÄNSTER.
- FÖRSÖK INTE UTFÖRA SERVICE PÅ UTRUSTNINGEN OM DU INTE HAR LÄST OCH FÖRSTÅR DEN HÄR SERVICEHANDBOKEN.
- OM DU INTE TAR HÄNSYN TILL DEN HÄR VARNINGEN KAN DET RESULTERA I SKADOR PÅ SERVICETEKNIKERN, OPERATÖREN ELLER PATIENTEN TILL FÖLJD AV ELEKTRISKA STÖTAR, MEKANISKA FAROR ELLER ANDRA FAROR.

DİKKAT
(TR)

- BU SERVİS KILAVUZUNUN SADECE İNGİLİZCESİ MEVCUTTUR.
- EĞER MÜŞTERİ TEKNİSYENİ BU KILAVUZU İNGİLİZCE DIŞINDA BİR BAŞKA LİSANDAN TALEP EDERSE, BUNU TERCÜME ETTİRMEK MÜŞTERİYE DÜŞER.
- SERVİS KILAVUZUNU OKUYUP ANLAMADAN EKİPMANLARA MÜDAHALE ETMEYİNİZ.
- BU UYARIYA UYULMAMASI, ELEKTRİK, MEKANİK VEYA DİĞER TEHLİKELERDEN DOLAYI TEKNİSYEN, OPERATÖR VEYA HASTANIN YARALANMASINA YOL AÇABİLİR.

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REVISON HISTORY

Rev	Date	Author(s)	Change History
1	May 29, 2009	Toan T. Le	Initial release.
2	May 29, 2009	Toan T. Le	Update for KH PPR1
3	May 29, 2009	Toan T. Le	Update per review comments
4	May 29, 2009	Toan T. Le	Update per review comments
5	Aug 17, 2009	Joe Muth	Update for KH PPR2 Software Release.
6	Sep 16, 2009	Joe Muth	Update for KH PPR2 Software Release.
7	Oct 06, 2010	C Rajasekaran	Update for Dayton Release
9	Dec 20, 2011	C Rajasekaran/ Joe Muth	Update for Optima 560 Release and CSE review comments
10	July 2, 2012	C Rajasekaran	Update for Eagle Release Section 2: Network Conformance Statement is modified for coreload release RWA Section 3: Media Conformance modified to include CD-RW/DVD-RW/USB profiles DVD-RAM and MOD Profiles are removed Section 10 is added for Security Conformance Section 8 is updated for Save State (8.3) Appendix Section of CT is updated for 8,8 Image Type(A3.7 and A4.4) HCSDM00112251: SPR is addressed for PET Tags(Q Static)
11	Sep 18, 2012	Joe Muth	Update for Eagle per GEHC internal review comments. See document sheet for specific details.
11 R2	Oct 3, 2012	Joe Muth	Update for Eagle per GEHC internal review comments. See document sheet for specific details.
11 R3	Oct 9, 2012	Joe Muth	Update for Eagle per GEHC internal review comments. See document sheet for specific details.
12	March 20,2014	Mousumi Hazarika	Update for Eagle QR 1.2 release.

CONFORMANCE STATEMENT OVERVIEW

This DICOM Conformance Statement captures the DICOM capabilities of the GEHC PET-CT scanners identified below. This document applies to the following software releases for each product:

Discovery 710	pet_coreload.xx, pet_mfk.xx
Discovery 610	pet_coreload.xx, pet_mfk.xx
Optima 560	pet_mfk.xx

Table 0.1 provides an overview of the network services supported by GEHC PET-CT products identified above

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Table 0.1 – NETWORK SERVICES

SOP Classes	User of Service (SCU)	Provider of Service (SCP)
Transfer		
CT Image Storage	Yes	Yes
MR Image Storage	Yes	Yes
Secondary Capture Image Storage	Yes	Yes
Grayscale Softcopy Presentation State Storage	Yes	Yes
Enhanced SR	Yes	Yes
X-Ray Radiation Dose SR	Yes	Yes
RT Structure Set Storage	Yes	Yes
Positron Emission Tomography Image Storage	Yes	Yes
GE Private PET Raw Data Storage	Yes	Yes
GE Private PET List Data Storage	No	No
Query/Retrieve		
Study Root Query/Retrieve Information Model – FIND	Yes	Yes
Study Root Query/Retrieve Information Model – MOVE	Yes	Yes
Print Management		
Basic Grayscale Print Management Meta SOP Class	Yes	No
Basic Color Print Management Meta SOP Class	Yes	No
Printer SOP Class	Yes	No
Workflow Management		
Storage Commitment Push Model SOP Class	Yes	No
Modality Performed Procedure Step SOP Class*	Yes	No
Modality Worklist Information Model – FIND SOP Class*	Yes	No

Option*: This means that this service can be purchased separately

Table 0.2 provides an overview of the Media Storage Application Profiles supported by the PET-CT products identified above.

Table 0.2 - MEDIA SERVICES

Media Storage Application Profile	Write Files (FSC or FSU)	Read Files (FSR)
Compact Disk – Recordable		
STD-GEN-CD	Yes/No	Yes
	DVD	
General Purpose JPEG DVD	Yes (FSC)	No
USB		
General Purpose JPEG USB	Yes (FSC)	Yes

1 TABLE OF CONTENTS

1 INTRODUCTION

Note: Throughout this entire document the term "Discovery" refers to the following Discovery products:

Discovery 710/610 64 Slice: Software Version pet_coreload.XX
Discovery 710/610 16 Slice: Software Version pet_mfk.XX
Optima 560/560FX: Software Version pet_mfk.XX

Note: The Discovery product lines present an Image Works desktop, which contains advanced applications offered on the Advantage Workstation. The DICOM Conformance Statements related to these applications can be found at the following website:
http://www.ge.com/dicom

Advanced Application	DICOM Conformance Statement Reference on website
CardIQ Physio	CardIQ Physio DOC0267787 Rev 5
Dynamic Vue	Dynamic VUE 5248182-100 Rev 1
MotionVUE 2	MotionVUE 2 DOC0611467 Rev 4
Cardiac (CardIQ Plus, CardEP)	Volume Viewer 9.x Applications 2087557 Rev 1
CT Perfusion 4 Multi-organ and Neuro	CT Perfusion V4.0 2329613-100 Rev 0
Reformat	Volume Viewer 9.x Applications 2087557 Rev 1
Volume Viewer	Volume Viewer 9.x Applications 2087557 Rev 1
Advantage CT Colonography Pro	Volume Viewer 9.x Applications 2087557 Rev 1
Advanced Vessel Analysis	Volume Viewer 9.x Applications 2087557 Rev 1
Advantage 4D	DOC0685777 Rev 1 Ver 3
IOS/Nuevo	DOC0924600 Rev 3

1.1 Overview

This DICOM Conformance Statement is divided into Sections as described below:

Section 1 – *Introduction,* which describes the overall structure, intent, and references for this Conformance Statement.

Section 2 - *Network Conformance Statement***,** which specifies GEHC PET compliance to the DICOM requirements for the implementation of networking features.

Section 3 - *Media Storage Conformance Statement*, which specifies GEHC PET compliance to the DICOM requirements for the implementation of Media Storage features.

Section 4 – *Print Management Implementation,* which specifies GEHC PET compliance to DICOM requirements for the implementation of the Print management service.

Section 5 - *Storage Commitment Push Model Implementation*, which specifies the GEHC PET compliance to DICOM requirements for the implementation of the Storage Commitment service, to store the images using remote DICOM entity, which is Storage Commitment SCP.

Section 6 -*Modality Worklist Query Implementation* - which specifies GEHC PET compliance to DICOM requirements for the implementation of the Modality Worklist service. ModalityWorklist is providing the DICOM C-FIND service as a service class user (SCU).

Section 7 – *Modality Performed Procedure Step Implementation* - which specifies GEHC PET compliance to DICOM requirements for the implementation of the Modality Performed Procedure Step service. The PPS option allows a Modality Performed Procedure Step to be communicated to the Hospital/Radiology information system. The PPS feature is providing the DICOM Modality Performed Procedure Step service as a service class user (SCU).

Section 8 - *Gray Scale Softcopy Presentation State Implementation* - which specifies GEHC PET compliance to DICOM requirements for the implementation of the Grayscale Softcopy Presentation State IOD.

Section 9 - *Structured Report Information Object Implementation* - which specifies the GEHC PET compliance to DICOM requirements for the implementation of the CT X-ray Radiation Dose / Enhanced Structured Report.

Appendix A specifies the CT/PET/MR IOD information object.

Appendix B specifies the private data element definition for CT/PET/MR IOD.

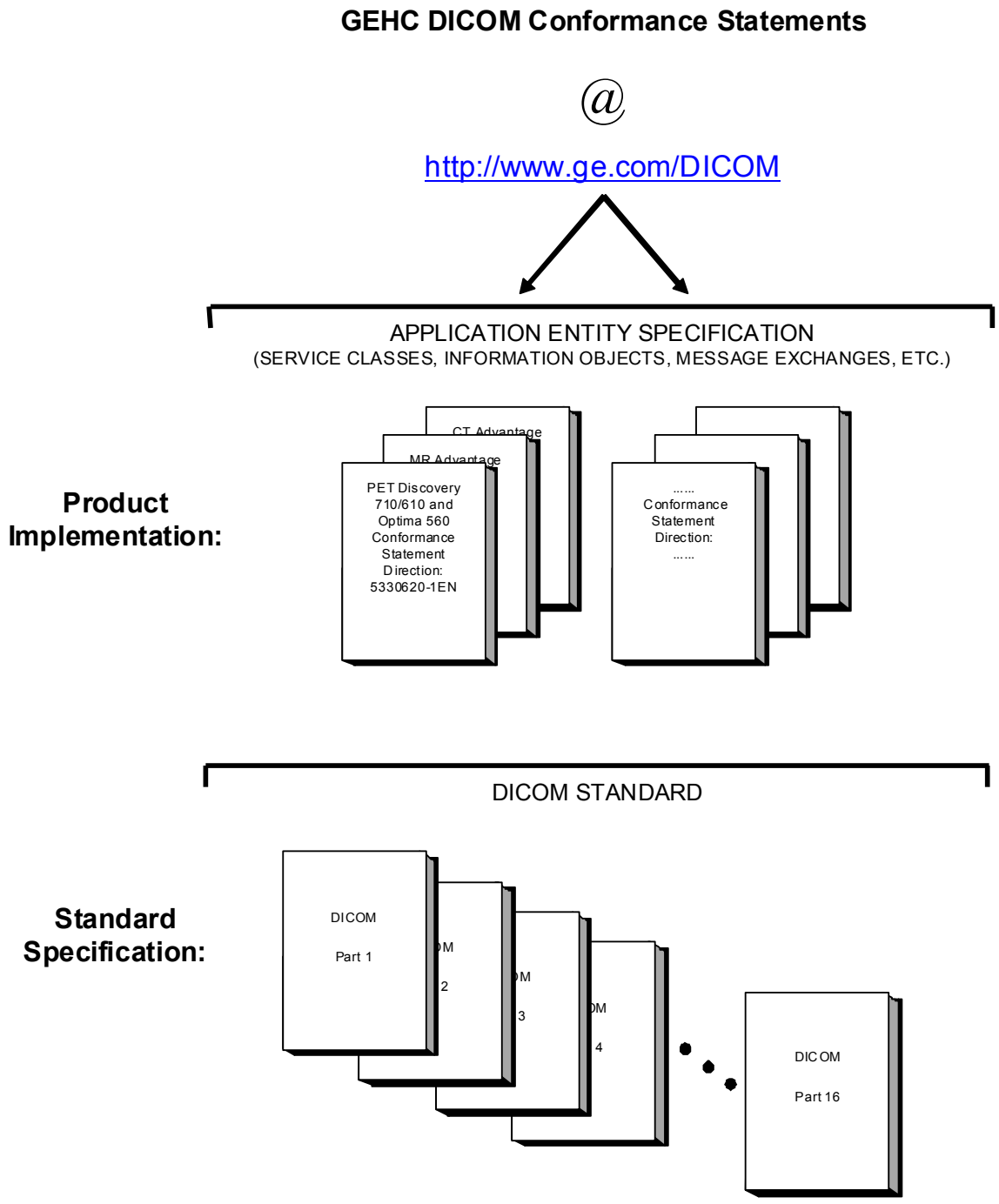
Appendix C specifies the DICOMDIR directory information.

Appendix D specifies the private data element definition for PET Raw and List Data.

Appendix E specifies Implementation UIDs for different product versions.

1.2 Overall Conformance Statement Documentation Structure

The Documentation Structure of the GEHC DICOM Conformance Statements is shown in the Illustration below.



This DICOM Conformance Statement documents the DICOM Conformance Statement and Technical Specification required to interoperate with the GEHC network interface.

The GEHC Conformance Statement, contained in this document, also specifies the Lower Layer communications, which it supports (e.g., TCP/IP). However, the Technical Specifications are defined in the DICOM Part 8 standard.

For more information regarding DICOM, copies of the Standard may be obtained on the Internet at http://medical.nema.org. Comments on the Standard may be addressed to:

DICOM Secretariat
NEMA
1300 N. 17th Street, Suite 1742
Rosslyn, VA 22209
USA
Phone: +1.703.841.3200

1.3 Intended Audience

The reader of this document is concerned with software design and/or system integration issues. It is assumed that the reader of this document is familiar with the DICOM Standard and with the terminology and concepts which are used in that Standard.

1.4 Scope and Field of Application

It is the intent of this document to provide an unambiguous specification for GEHC implementations. This specification, called a Conformance Statement, includes a DICOM Conformance Statement and is necessary to ensure proper processing and interpretation of GEHC medical data exchanged using DICOM. The GEHC Conformance Statements are available to the public.

The reader of this DICOM Conformance Statement should be aware that different GEHC devices are capable of using different Information Object Definitions. For example, a GEHC CT Scanner may send images using the CT Information Object, MR Information Object, Secondary Capture Object, etc.

Included in this DICOM Conformance Statement are the Module Definitions which define all data elements used by this GEHC implementation. If the user encounters unspecified private data elements while parsing a GEHC Data Set, the user is well advised to ignore those data elements (per the DICOM standard). Unspecified private data element information is subject to change without notice. If, however, the device is acting as a "full fidelity storage device", it should retain and re-transmit all of the private data elements which are sent by GEHC devices.

1.5 Important Remarks

The use of these DICOM Conformance Statements, in conjunction with the DICOM Standards, is intended to facilitate communication with GE imaging equipment. However, **by itself, it is not**

sufficient to ensure that inter-operation will be successful. The **user (or user's agent)** needs to proceed with caution and address at least four issues:

- **Integration**

  The integration of any device into an overall system of interconnected devices goes beyond the scope of standards (DICOM), and of this introduction and associated DICOM Conformance Statements when interoperability with non-GE equipment is desired. The responsibility to analyze the applications requirements and to design a solution that integrates GE imaging equipment with non–GE systems is the **user's** responsibility and should not be underestimated. The **user** is strongly advised to ensure that such an integration analysis is correctly performed.

- **Validation**

  Testing the complete range of possible interactions between any GE device and non–GE devices, before the connection is declared operational, should not be overlooked. Therefore, the user should ensure that any non–GE provider accepts full responsibility for all validation required for their connection with GE devices. This includes the accuracy of the image data once it has crossed the interface between the GE imaging equipment and the non–GE device and the stability of the image data for the intended applications. Such a validation is required before any clinical use (diagnosis and/or treatment) is performed. It applies when images acquired on GE imaging equipment are processed/displayed on a non-GE device, as well as when images acquired on non-GE equipment is processed/displayed on a GE console or workstation.

- **Future Evolution**

  GE understands that the DICOM Standard will evolve to meet the user's growing requirements. GE is actively involved in the development of the DICOM Standard. DICOM will incorporate new features and technologies and GE may follow the evolution of the Standard. The GEHC protocol is based on DICOM as specified in each DICOM Conformance Statement. Evolution of the Standard may require changes to devices which have implemented DICOM. In addition, GE reserves the right to discontinue or make changes to the support of communications features (on its products) described by these DICOM Conformance Statements. The user should ensure that any non–GE provider, which connects with GE devices, also plans for the future evolution of the DICOM Standard. Failure to do so will likely result in the loss of function and/or connectivity as the DICOM Standard changes and GE Products are enhanced to support these changes.

- **Interaction**

  It is the sole responsibility of the non–GE provider to ensure that communication with the interfaced equipment does not cause degradation of GE imaging equipment performance and/or function.

1.6 References

NEMA PS3 Digital Imaging and Communications in Medicine (DICOM) Standard, available free at http://medical.nema.org/

1.7 Definitions

Informal definitions are provided for the following terms used in this Conformance Statement. The DICOM Standard is the authoritative source for formal definitions of these terms.

Abstract Syntax – the information agreed to be exchanged between applications, generally equivalent to a Service/Object Pair (SOP) Class. Examples: Verification SOP Class, Modality Worklist Information Model Find SOP Class, Computed Radiography Image Storage SOP Class.

Application Entity (AE) – an end point of a DICOM information exchange, including the DICOM network or media interface software; i.e., the software that sends or receives DICOM information objects or messages. A single device may have multiple Application Entities.

Application Entity Title – the externally known name of an *Application Entity*, used to identify a DICOM application to other DICOM applications on the network.

Application Context – the specification of the type of communication used between *Application Entities*. Example: DICOM network protocol.

Association – a network communication channel set up between *Application Entities*.

Attribute – – a unit of information in an object definition; a data element identified by a *tag*. The information may be a complex data structure (Sequence), itself composed of lower level data elements. Examples: Patient ID (0010, 0020), Accession Number (0008, 0050), Photometric Interpretation (0028, 0004), Procedure Code Sequence (0008, 1032).

Information Object Definition (IOD) – the specified set of *Attributes* that comprise a type of data object; does not represent a specific instance of the data object, but rather a class of similar data objects that have the same properties. The *Attributes* may be specified as Mandatory (Type 1), Required but possibly unknown (Type 2), or Optional (Type 3), and there may be conditions associated with the use of an Attribute (Types 1C and 2C). Examples: MR Image IOD, CT Image IOD, Print Job IOD.

Joint Photographic Experts Group (JPEG) – a set of standardized image compression techniques, available for use by DICOM applications.

Media Application Profile – the specification of DICOM information objects and encoding exchanged on removable media (e.g., CDs)

Module – a set of *Attributes* within an *Information Object Definition* that are logically related to each other. Example: Patient Module includes Patient Name, Patient ID, Patient Birth Date, and Patient Sex.

Negotiation – first phase of *Association* establishment that allows *Application Entities* to agree on the types of data to be exchanged and how that data will be encoded.

Presentation Context – the set of DICOM network services used over an *Association*, as negotiated between *Application Entities*; includes *Abstract Syntaxes* and *Transfer Syntaxes*.

Protocol Data Unit (PDU) – a packet (piece) of a DICOM message sent across the network. Devices must specify the maximum size packet they can receive for DICOM messages.

Security Profile – a set of mechanisms, such as encryption, user authentication, or digital signatures, used by an *Application Entity* to ensure confidentiality, integrity, and/or availability of exchanged DICOM data

Service Class Provider (SCP) – role of an *Application Entity* that provides a DICOM network service; typically, a server that performs operations requested by another *Application Entity* (*Service Class User*). Examples: Picture Archiving and Communication System (image storage SCP, and image query/retrieve SCP), Radiology Information System (modality worklist SCP).

Service Class User (SCU) – role of an *Application Entity* that uses a DICOM network service; typically, a client. Examples: imaging modality (image storage SCU, and modality worklist SCU), imaging workstation (image query/retrieve SCU)

Service/Object Pair (SOP) Class – the specification of the network or media transfer (service) of a particular type of data (object); the fundamental unit of DICOM interoperability specification. Examples: Ultrasound Image Storage Service, Basic Grayscale Print Management.

Service/Object Pair (SOP) Instance – information object; a specific occurrence of information exchanged in a *SOP Class*. Examples: a specific x-ray image.

Tag – a 32-bit identifier for a data element, represented as a pair of four digit hexadecimal numbers, the "group" and the "element". If the "group" number is odd, the tag is for a private (manufacturer-specific) data element. Examples: (0010, 0020) [Patient ID], (07FE, 0010) [Pixel Data], (0019,0210) [private data element]

Transfer Syntax – the encoding used for exchange of DICOM information objects and messages. Examples: *JPEG* compressed (images), little endian explicit value representation.

Unique Identifier (UID) – a globally unique "dotted decimal" string that identifies a specific object or a class of objects; an ISO-8824 Object Identifier. Examples: Study Instance UID, SOP Class UID, SOP Instance UID.

Value Representation (VR) – the format type of an individual DICOM data element, such as text, an integer, a person's name, or a code. DICOM information objects can be transmitted with either explicit identification of the type of each data element (Explicit VR), or without explicit identification (Implicit VR); with Implicit VR, the receiving application must use a DICOM data dictionary to look up the format of each data

1.8 Symbols and Abbreviations

AE	Application Entity
CD-R	Compact Disk Recordable
CT	Computed Tomography
DICOM	Digital Imaging and Communications in Medicine
FSC	File-Set Creator
FSU	File-Set Updater
FSR	File-Set Reader
GSPS	Grayscale Softcopy Presentation State
HIS	Hospital Information System
IHE	Integrating the Healthcare Enterprise
IOD	Information Object Definition
JPEG	Joint Photographic Experts Group
MPPS	Modality Performed Procedure Step
MSPS	Modality Scheduled Procedure Step
MTU	Maximum Transmission Unit (IP)
MWL	Modality Worklist
NTP	Network Time Protocol
O	Optional (Key Attribute)
PACS	Picture Archiving and Communication System
PET	Positron Emission Tomography
R	Required (Key Attribute)
RIS	Radiology Information System
SC	Secondary Capture
SCP	Service Class Provider
SCU	Service Class User
SOP	Service-Object Pair
SR	Structured Reporting
TCP/IP	Transmission Control Protocol/Internet Protocol
U	Unique (Key Attribute)
VR	Value Representation

2 NETWORK CONFORMANCE STATEMENT

2.1 Introduction

This Conformance Statement (CS) specifies the Discovery and Optima compliance to DICOM. It details the DICOM Service Classes and roles that are supported by this product. For the remainder of this document, the term Discovery will also include the Optima product configurations unless specifically noted.

The GEHC Discovery product uses DICOM services to support the following functionalities:

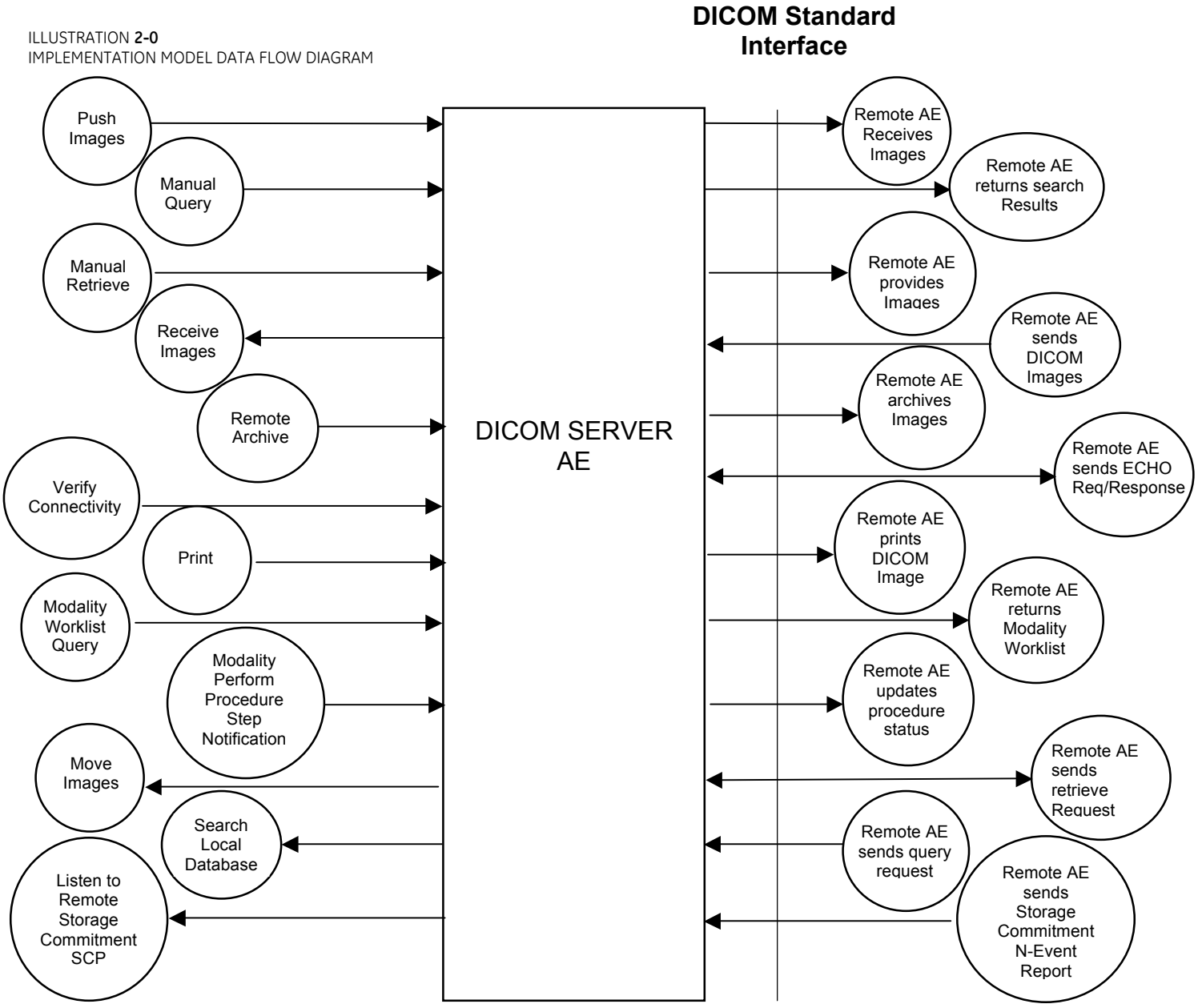
- Import images for possible further analysis and/or processing
- Export images to other DICOM-compliant machines
- Confirm that a DICOM image has been permanently stored (archived) by a device
- Query for and display DICOM modality worklist information from a remote hospital or radiology department information systems
- Communicate Modality Performed Procedure Step to the Hospital/Radiology information systems
- Print images on DICOM Compliant Printers

2.2 Implementation Model

All DICOM functionality on the Discovery product is handled by the DICOM Server Application Entity (AE). The DICOM Server AE is commanded to perform DICOM services through the buttons and menu selections on the main user interface panel. The DICOM Server AE is also listening to a pre-defined port for incoming connections.

2.2.1 Application Data Flow Diagram

ILLUSTRATION **2-0**
IMPLEMENTATION MODEL DATA FLOW DIAGRAM



There are several Real-World Activities that will cause the DICOM Server Application Entity (DICOM Server AE) to initiate a DICOM association to a remote DICOM Application Entity.

Real world Activities for Discovery 710, Discovery 610 and Optima 560 (SW Version: pet_mfk.xx)

Push Images

This Real-World activity consists of an operator selecting one or more study, series or image in the local database manager and choosing either “Push Examination”, “Push Series” or

"Push Image from the "Network" pull-down menu on the local database manager to send the image(s) to a selected destination.

Manual Query

This Real-World Activity causes the DICOM Server AE to initiate an association to the Remote DICOM AE and request the list of all studies. Once the DICOM Server AE receives the list of studies, it will select the first study (as determined through the local database manager list sort criterion) and request the list of series for that study. After receiving the list of series the DICOM Server AE will ask for the list of images for the first series in the list. The operator can then select any study in the study list to retrieve the list of series and images.

Manual Retrieve

This Real-World Activity will be available once the *Manual Query* activity is performed. The operator can now select one or more study (series or image) and ask the DICOM Server AE to retrieve the selected image(s) from the Remote DICOM AE by choosing "Get Examination", "Get Series", or "Get Images".

Verify Connectivity

This Real-World Activity consists of an operator selecting "Ping DICOM host" from the "Network" pull down menu. This will cause the DICOM Server AE to initiate a "DICOM Verification Request" to the remote AE, to verify the remote system activeness.

Remote Archive

This Real-World activity consists of an operator choosing a remote DICOM AE that supports Storage Commitment as provider as the archive device and selecting one or more exam or series from the local database and choosing either *Save Exam* or *Save Series* from the archive menu. The images to be committed are sent to the remote provider entity first. The Commitment request for the transferred image instances is sent after the complete image transfer. The Commitment response must come on a different association.

Modality Worklist Query

The operator or the system initiates a modality worklist query to the modality worklist SCP with a given set of query parameters. The modality worklist SCP returns responses matching the query parameters. Worklist items from the returned worklist query responses are presented to the user. The user then chooses the desired worklist item and begins the image acquisition process.

Modality Performed Procedure Step Notification

When the user begins the image acquisition process and generates the first image, the DICOM SERVER AE sends N-CREATE message to the configured MPPS SCP to indicate that the image acquisition process has been started for the requested procedure. The operator can close the acquisition session either by completing the acquisition process or discontinuing the ongoing scan. On closing the acquisition session, the DICOM SERVER AE sends N-SET

message to the configured MPPS SCP to indicate the acquisition state of the requested procedure, with appropriate MPPS status (COMPLETED/DISCONTINUED).

Print

The Film Composer allows the operator to select printers and it also allows the user to drag and drop the images (from viewer application) into the film. When user presses the "Print" Button, the DICOM SERVER AE tries to establish the association with requested printer and sends the images for printing.

Receive Images

When remote DICOM hosts send DICOM images to DICOM SERVER AE, images are installed in the local database. The browser displays the content of the local database.

Search Local Database *(Query Request from Remote AE)*

For this operation, a remote DICOM AE asks to obtain the list of data at study/Series/Image level. Once a Query request is received, the DICOM Server AE will search the local database for all entries that match the keys requested by the Remote DICOM AE and send back the list of matches.

Move Images *(*Retrieve Request from Remote AE)

For this operation, a remote DICOM AE asks to send data at Study/Series/Image level from the local AE to another DICOM Remote AE. The Remote DICOM AE shall be declared locally on the system.

Listen to remote Storage Commitment SCP

The DICOM SERVER AE is indefinitely listening for association requests. No operator action is required to receive a Storage Commitment notification (N-EVENT-REPORT).

Real world Activities for Discovery 710 and Discovery 610 (SW Version: pet_coreload.xx)

Push Images

This Real-World Activity consists of an operator selecting one or more studies, series, or images in the local database browser. The operator then clicks on the destination button in the network panel at the bottom of the local database browser. Real-World Activity, Query Remote, causes the DICOM Server AE to initiate an association to the Remote DICOM AE and request the list of all studies. Once the DICOM Server AE receives the list of studies, the operator will have to choose the study and the local database browser will list the series of the study chosen. After receiving the list of series the DICOM Server AE will ask for the list of

images for the series chosen by the operator.

Manual Query

The operator queries one or a set of remote DICOM databases to obtain a list of data at Study/Series/Image level by clicking on the icon that represents the wanted remote DICOM AE.

Manual Retrieve

This Real-World activity will be available once the *Manual Query* activity is performed. The operator can now select one or more studies (series or images) and ask the DICOM Server AE to retrieve the selected image(s) from the Remote DICOM AE by clicking on the “Local DB” button at the bottom of the local database browser

Verify Connectivity

This Real-World activity consists of an operator selecting a Remote DICOM AE from the “Network Configuration” window and clicking on “Ping” on the right side-bar. This is to check the status of the selected remote DICOM AE.

Remote Archive

This Real-World activity consists of an operator choosing a remote DICOM AE that supports Storage Commitment as provider from the archive panel at the bottom of the local database browser. The operator chooses the exam or series in the local database browser and clicks on the archival destination from the archive list at the bottom of the local database browser.

Modality Worklist Query

The operator or the system initiates a modality worklist query to the modality worklist SCP with a given set of query parameters. The modality worklist SCP returns responses matching the query parameters. Worklist items from the returned worklist query responses are presented to the user. The user then chooses the desired worklist item and begins the image acquisition process.

Modality Performed Procedure Step Notification

When the user begins the image acquisition process and generates the first image, the DICOM SERVER AE sends N-CREATE message to the configured MPPS SCP to indicate that the image acquisition process has been started for the requested procedure. The operator can close the acquisition session either by completing the acquisition process or discontinuing the ongoing scan. On closing the acquisition session, the DICOM SERVER AE sends N-SET message to the configured MPPS SCP to indicate the acquisition state of the requested procedure, with appropriate MPPS status (COMPLETED/DISCONTINUED).

Print

The Film Composer allows the operator to select printers and it also allows the user to drag and drop the images (from viewer application) into the film. When user presses the "Print"

Button, the DICOM SERVER AE tries to establish the association with requested printer and sends the images for printing.

Receive Images

When remote DICOM hosts send DICOM images to DICOM SERVER AE, images are installed in the local database. The browser displays the content of the local database.

Search Local Database *(Query Request from Remote AE)*

For this operation, a remote DICOM AE asks to obtain the list of data at study/Series/Image level. Once a Query request is received, the DICOM Server AE will search the local database for all entries that match the keys requested by the Remote DICOM AE and send back the list of matches.

Move Images (Retrieve Request from Remote AE)

For this operation, a remote DICOM AE asks to send data at Study/Series/Image level from the local AE to another DICOM Remote AE. The Remote DICOM AE shall be declared locally on the system.

Listen to remote Storage Commitment SCP

The DICOM SERVER AE is indefinitely listening for association requests. No operator action is required to receive a Storage Commitment notification (N-EVENT-REPORT).

2.2.2 Functional Definition of AE's

DICOM Server Application Entity initiates the following operations:

- The DICOM Server initiates an association and sends a C-ECHO-RQ message to the remote DICOM AE; the remote DICOM Server will send back its status in a C-ECHO-RSP.
- Initiate an association to a Remote AE to send image(s). If the Remote AE accepts the presentation context applicable to the image(s) being sent, the DICOM Server AE will send the image(s) by invoking C-STORE-RQ operation for each image on the same association.
- Initiate an association with a Remote AE to query for images on the remote host. A Study-Root Study-Level C-FIND-RQ request will be sent to the Remote AE once an association has been established. After all responses are received, DICOM Server AE will issue a Series-Level C-FIND-RQ request to get the series for a study in the list. An Image-Level C-FIND-RQ will be issued for the first series in the series list.

- Initiate an association to a Remote AE for the purpose of committing images previously sent successfully to the Remote AE for the purpose of the remote AE to commit to the storage of those images. If the Remote AE accepts the presentation context, a storage commitment will be established with the Remote AE with the DICOM Server AE sending the N-ACTION Request. The Remote AE completes the commitment by sending the N-EVENT REPORT. The DICOM Server AE updates the archive flag in the image browser for successful instances.

- Send a C-MOVE-RQ request to a Remote AE after successful association establishment. The DICOM Server AE's Storage SCP will receive the images over a separate association.

- Initiate an association with a Remote AE to query for and display DICOM modality worklist information. Once the remote AE accepts the presentation context, system will issue a modality worklist query request using the C-FIND service

- Initiate an association with a Remote AE to create and update DICOM Modality Performed Procedure Step SOP instance in the remote AE. Once the remote AE accepts the presentation context, SOP instance is created using N-CREATE service and updated using N-SET service.

- Initiates as association with a remote printer for printing the images. If the Remote AE accepts the presentation context applicable to the print job, Discovery system will send the print job to the receiving remote AE.

The DICOM Server AE waits for association requests from Remote AEs that wish to perform the following operations:

- *Verification*: If a C-ECHO-RQ message is received, the DICOM Server AE will send back a C-ECHO-RSP message with a status of "success".

- *Image Storage*: If a C-STORE-RQ message is received, the DICOM Server AE will receive the image and try to update the local database. If the image is stored successfully on storage media and the database updated a status of "success" will be returned in a C-STORE-RSP message.

- *Query*: If a C-FIND-RQ message is received the DICOM Server AE will search the database for the requested attributes and send back a C-FIND-RSP message containing a match and a status of "pending". After all matching records have been sent, a status of "success" will be returned in a C-FIND-RSP message. The Remote AE can terminate the query by sending a C-CANCEL-FIND-RQ message.

- *Retrieve*: If a C-MOVE-RQ message is received the DICOM Server AE will look up its list of configured Remote AEs for the Destination AE. If the Destination AE is configured, the DICOM Server AE will open a new association to the Destination AE and use C-STORE-RQ to send the image(s). The DICOM Server AE will send a C-MOVE-RSP message with a status of "pending" after every five images are sent. When all images are sent or if DICOM Server AE receives a C-CANCEL-MOVE-RQ a final C-STORE-RSP will be sent back with an appropriate status.

- *Storage Commitment Response*: If a N-EVENT-REPORT request is received from the Remote Storage Commitment SCP the DICOM Server AE will update the Archive flag information for successful instances.

2.2.3 Sequencing of Real-World Activities

Real-World Activity *Manual Query* must be performed before *Manual Retrieve* can be performed.

2.3 AE Specifications

2.3.1 DICOM Server AE Specification

This Application Entity provides Standard Conformance to the following DICOM SOP Classes as an SCU:

SOP Class Name (SCU)	SOP Class UID
Verification (Echo)	1.2.840.10008.1.1
CT Image Information Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Information Storage	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Study Root Query/Retrieve – FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve – MOVE	1.2.840.10008.5.1.4.1.2.2.2
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22
Storage Commitment Push Model	1.2.840.10008.1.20.1
PET Image Information Storage	1.2.840.10008.5.1.4.1.1.128
GE Private PET Raw data Storage	1.2.840.113619.4.30
Modality Performed Procedure Step SOP Class	1.2.840.10008.3.1.2.3.3
Modality Worklist Information Model - FIND	1.2.840.10008.5.1.4.31
Grayscale Softcopy Presentation State	1.2.840.10008.5.1.4.1.1.11.1
Basic Color Print Management meta SOP Class	1.2.840.10008.5.1.1.18
Printer SOP Class	1.2.840.10008.5.1.1.16

Note: As to GSPS as an SCU, refer to Section 8: **Grayscale Softcopy Presentation State Implementation** for further details.

The Discovery 710/610 and Optima 560 use the GE PET Raw SOP Class for local storage and management of "list" data. Unlike other types of GE PET Raw (such as sinogram and spectra data), list data is not supported in network operations such as send and receive, and the list data objects will not be visible via Remote AE DICOM Servers (Remote hosts). List data objects are labeled as "List" on the database browser, and can be identified by tag (0008, 0060) (see Section D.2)

This Application Entity provides Standard Conformance to the following DICOM SOP classes as an SCP:

SOP Class Name (SCP)	SOP Class UID
Verification (Echo)	1.2.840.10008.1.1
CT Image Information Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Information Storage	1.2.840.10008.5.1.4.1.1.4
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Study Root Query/Retrieve – FIND	1.2.840.10008.5.1.4.1.2.2.1
Study Root Query/Retrieve – MOVE	1.2.840.10008.5.1.4.1.2.2.2
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22
PET Image Information Storage	1.2.840.10008.5.1.4.1.1.128
GE Private PET Raw data Storage	1.2.840.113619.4.30

2.3.1.1 Association Establishment Policy

2.3.1.1.1 General

The DICOM Application Context Name (ACN), which is always proposed, is:

Application Context Name	1.2.840.10008.3.1.1.1

The Maximum Length PDU negotiation is included in all association establishment requests. The maximum length PDU for association initiated by the DICOM Server AE is:

Maximum Length PDU	64 Kbytes

SOP class Extended Negotiation is not supported.

The maximum number of Presentation Context Items that is supported is 60. Note that the same Abstract Syntax may be offered multiple times with different Transfer Syntax.

The user information items sent by this product are:

- Maximum PDU Length
- Implementation Class UID
- SCP/SCU Role Selection

2.3.1.1.2 Number of Associations

The DICOM Server AE (SCU) will initiate only one DICOM association at a time to perform an image store to a remote host or retrieve image(s) from a Remote AE.

The DICOM Server AE (SCP) can have a maximum of four DICOM associations open simultaneously to receive and store image store, N-EVENT-REPORT of Storage Commitment or respond to an echo.

2.3.1.1.3 Asynchronous Nature

Asynchronous mode is not supported. All operations will be performed synchronously.

2.3.1.1.4 Implementation Identifying Information

The table in Appendix E identifies the Implementation UID for this product version.

2.3.1.2 Association Initiation by Real-World Activity

2.3.1.2.1 Push Images

2.3.1.2.1.1 Associated Real-World Activity

Behavior for Discovery 710/610 and Optima 560 Products (SW Version: pet_mfk.xx)
The operator must first select a destination by choosing "Select Remote Host" from the "Network" pull-down menu on the local database manager and then choose a hostname.

The "Push" operation will cause the DICOM server AE to initiate an Association when the operator selects one or more study, series, or images in the local database manager and then chooses either "Push Examination", "Push Series", or "Push Image" from the "Network" pull-down menu on the local database manager.

Behavior for Discovery 710/610 products (SW Version: pet_coreload.xx)

The operator must first select the exam/series/image on the local database browser and click on the Remote DICOM AE in the network panel at the bottom of the local database browser to which the operator desires to send the exam/series/image to.

Note: If multiple study, series, or images are chosen to be pushed, one association will be established for each of the studies, series, or images. Some GE PET Raw SOP instances stored locally in the scanner database are not supported in network operations. Refer to Appendix D.2

2.3.1.2.1.2 Proposed Presentation Contexts

The following table shows the proposed presentation contexts for the DICOM Server AE after Real-World Activity "Push Images" Operation has been performed.

Table 2.3.1.2.1.2-1 Proposed Presentation Contexts for DICOM Server AE and Real-World activities Push, Query, Pull (Get Images) and Verification (DICOM Ping)

Presentation Context Table – Proposal					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian Implicit VR Big Endian (GE Private) Explicit VR Little	1.2.840.10008.1.2 1.2.840.113619.5.2	SCU	None

Presentation Context Table – Proposal					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
		Endian Explicit VR Big Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2		
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian Implicit VR Big Endian (GE Private) Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.113619.5.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian Implicit VR Big Endian (GE Private) Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.113619.5.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Study Root Query/Retrieve FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Study Root Query/Retrieve MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
Verification SOP Class	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCU	None
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

Presentation Context Table – Proposal					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
		Explicit VR Big Endian	1.2.840.10008.1.2.2		
GE Private PET Raw data SOP class	1.2.840.113619.4.30	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCU	None

2.3.1.2.1.2.1 SOP Specific Conformance Statement for All Storage SOP Classes

This implementation can perform multiple C-STORE operations over a single association.

Upon receiving a C-STORE confirmation containing a successful status, this implementation will perform the next C-STORE operation. The association will be maintained if possible.

Upon receiving a C-STORE confirmation containing a Refused status, this implementation will terminate the association.

Upon receiving a C-STORE confirmation containing any status that is not Success or Refused, this implementation will consider the current request to be a failure but will continue to attempt to send the remaining images in the request on the same association.

Each C-STORE operation supports an “Association Timer”. This timer starts when the association request is sent or received and stops when the association is established. The time-out is 60 seconds.

Each C-STORE operation also supports an “Operation Inactivity Timer”. This time-out starts once the first C-STORE request has been issued (on association) or received and is reset each time a C-STORE response has been received or when subsequent C-STORES are sent. This time-out is 300 seconds.

Each C-STORE operation also supports a “Session Timer”. This timer starts when the association is established and stops when the association is ended. This time-out is 60 minutes.

If any of the three timers mentioned above expires, the connection is closed and the operation in progress is considered failed.

Note: The time-outs are configurable.

When DICOM Server AE initiates an association to issue a C-STORE, the following will occur:

The image will be transmitted by the DICOM Server AE with the same elements as was originally received or created locally (for the standard elements only).

2.3.1.2.1.2.2 SOP Specific Conformance Statement for Grayscale Softcopy Presentation State Storage SOP Class

To create Grayscale Softcopy Presentation State, there are 2 sequences in GEHC CT, Exam Split and Save State

2.3.1.2.1.2.2.1 Exam Split

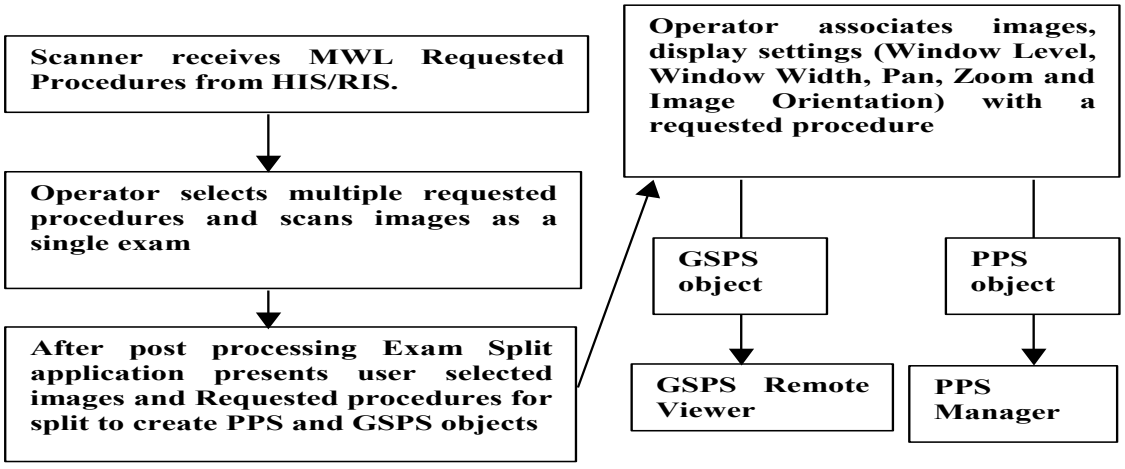
Exam Split option have the two options i.e. Virtual Exam Split and Hard Exam Split.

- Virtual Exam Split will create Gray Scale Presentation State and Performed Presentation State.
- In Hard Exam Split, application will send the user selected images from grouped Images that acquired during acquisition. PPS will not be sent along with these images.

The DICOM Modality 'Gray Scale Presentation State' service is provided by the Exam Split. The CT DICOM AE is commanded to perform transmission of Gray Scale Presentation State object through the user interface. The CT DICOM AE is commanded to perform transmission of Hard Split Images through the user interface.

2.3.1.2.1.2.2.1.1 Application Data Flow Diagram

The basic Application models for the feature are shown in the following illustration:



2.3.1.2.1.2.2.1.1 GSPS Acquisition System with MWL data

The system has a Modality Work-list Server AE installed. Work-List information is obtained from HIS/RIS system through the use of Basic Work-list Management Service. Use of the information retrieved in the creation of Image SOP instance is described in the Modality Work-list Conformance statement. Use of the information retrieved in MPPS SOP instances is described later in this document.

- After Post processing Exam Split application presents associated requested Procedure(s) along with selected acquired Images.
- Exam Split application includes the necessary information related to Requested Procedure, scheduled Procedure Steps and the Performed Procedure Step of the images acquired during acquisition.
- After User modifications on Image(s), user has to click on Send button to create Gray Scale Presentation State and Performed Procedure Step objects to transmit to remote host. If there is any Image Orientation, user will be notified about the orientation before sending to Remote Host.
- Exam Split will provide Host Selection user interface to select remote host to transmit of Gray Scale Presentation State object. Performed Procedure Step object will be sent to default Performed Procedure Step host.
- After successful transmission of Gray Scale Presentation State and Performed Procedure Step objects to remote host, user will be notified with success.

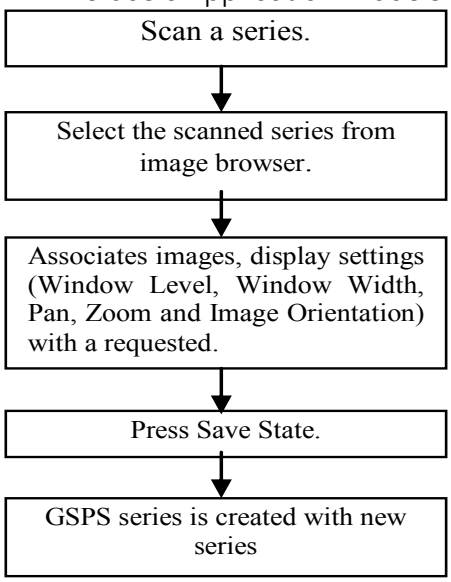
2.3.1.2.1.2.2.2 Save State

2.3.1.2.1.2.2.2.1 Implementation Model

Save State will create Grayscale Presentation State (GSPS) including user annotation.

2.3.1.2.1.2.2.2.2 Application Data Flow Diagram

The basic Application models for the feature are shown in the following illustration:



2.3.1.2.1.2.2.2.3 GSPS Acquisition System with MWL data

- Operator takes some scans. After the scan finished, images shall be selected from image browser and select Viewer.
- Operator adds annotation or ROI on images, change WW or WL, zoom or roam images.

- After changing settings, operator shall select "Save State" on Viewer menu. Then, GSPS object shall be created with a new series number.

2.3.1.2.2 Manual Query

2.3.1.2.2.1 Associated Real-World Activity

Behavior for Discovery 710/610 and Optima 560 Products (SW Version: pet_mfk.xx)
The operator must first select a destination by choosing *"Select Remote Host"* from "*Network"* pull-down menu on the local database manager and then choose a hostname. To do custom queries select "***Yes***" for "***Custom search***" option.

Note: Custom queries can be done on the following fields *"Last Name contains", "Exam Number", "Patient Id" or "Accession Number".*

To initiate a Query select "***Receive***" from "***Network***" pull-down menu.

Note: If "Custom Search" option is set then a small GUI will show up. Operator will be able to enter custom query fields. Entering values in "Last Name contains" field will initiate wild card query for patient name.

The *"Query"* operation will cause the DICOM Server AE to initiate an association to the selected Remote AE when the *"Query Remote Host"* entry is selected from the *"Network"* pull-down menu. Once a list of Study/Series/Image is retrieved, the operator can invoke the *"Get"* operation by choosing *"Get Exam"* or *"Get Series"* or *"Get Image"* from the *"Network"* pull-down menu.

Note:

- Get Exam will not pull the PET List Series (list objects) if the remote exam contains the same.
- Remote Host Exam containing PET List Series will not show the same during the Network Pull and search operations.

Behavior for Discovery 710/610 Products (SW Version: pet_coreload.xx)
The operator must select the Remote DICOM AE from the "Source" pull-down on the local database browser and select the hostname of the source from where the images are to be retrieved.

Provided that the operator had set "*Custom search*" to "*Off*" when setting the Remote host parameters, the *"Query"* operation will cause the DICOM Server AE to initiate an association (with zero length Patient name, Patient id, Study date, Accession number, and Study id) to the selected Remote AE when the *"Hostname"* entry is selected from the *"Source"* pull-down menu.

Otherwise, if the operator had set "*Custom search*" to "*On*" when setting the Remote host parameters, the *"Query"* operation will cause a *Customize search parameters* menu to appear. The operator can enter values for Patient name, Patient id, Study date, Accession number, and Study id. Not entering a value means match on any value for that field. Patient name will match on any patient name that contains what the operator entered. Patient id, Study id, and Accession number will match on what the operator enters.

For Study date, the operator selects a range type from the "Exam Date" pull down menu, where the choices are “Equals“, “Before“, “Between“, or “After“. Once a range type is selected, the correct number of fields appears and the operator enters dates into those fields. Once the desired parameters are entered the operator chooses "*OK*" and that will cause the DICOM Server AE to initiate an association to the selected Remote AE.

Once a list of Study/Series/Image is retrieved, the operator can invoke the *“Pull”* operation by clicking on the “Local DB” button at the bottom of the local database browser.

2.3.1.2.2.2 Proposed Presentation Contexts

When the Real-World activity *“Manual Query”* is initiated all presentation contexts shown in table 2.2.1.2.1.2-1 are proposed during association establishment, but only the Query/Retrieve-FIND related contexts are applicable to this activity.

2.3.1.2.2.2.1 SOP Specific Conformance Statement for C-FIND SCU

After the *Query* operation is initiated, the DICOM Server AE will perform a study-root C-FIND-RQ request at each of the three levels (Study, Series, and Image) in succession. The Initial Study-Level request will ask for all studies in the Remote database.

The C-FIND SCU will not perform any extended negotiation and so will only perform hierarchical query. Relational Queries are not supported. C-CANCEL-FIND-RQ is not supported.

Each C-FIND SCU operation supports an “Association Timer”, “Operation Inactivity Timer” and “Session Timer” with time out values of 60 seconds, 300 seconds and 60 minutes respectively.

If a “Cancel” or “Refused” status is returned from the Remote AE the association is closed and the operation terminated.

The DICOM Server AE will parse each matching C-FIND-RSP reply and ignore the entries it fails to parse. Tables 2.2.1.2.2.2.1-1 - 2.2.1.2.2.2.1-3 shows the various fields that are requested at the Study, Series, and Image levels of the C-FIND request.

Query results are filtered based on the Modality field. Only CT/MR/PET Screen Save images are supported.

Table 2.3.1.2.2.2.1-1: Requested Study Level Keys

Description	Type	Tag	Value
Study date	R	0008,0020	Zero length
Study time	R	0008,0030	Zero length
Patient’s name	R	0010,0010	Zero length
Patient ID	R	0010,0020	Zero length
Study id	R	0020,0010	Zero length
Study Instance UID	U	0020,000D	Zero length
Study description	O	0008,1030	Zero length

Description	Type	Tag	Value
Private Creator Identification	P	0009,00xx	GEMS_IDEN_01
Suite Id	P	0009,xx02	Zero Length

Table 2.3.1.2.2.2.1-2: Requested Series Level Keys

Description	Type	Tag	Value
Modality	R	0008,0060	Zero length
Series number	R	0020,0011	Zero length
Series Instance UID	U	0020,000E	Series UID
Series description	O	0008,103E	Zero length
Manufacturer	O	0008,0070	Zero length
Images in series	O	0020,1002	Zero length

Table 2.3.1.2.2.2.1-3: Requested Image Level Keys

Description	Type	Tag	Value
Image number	R	0020,0013	Zero length
Image Instance UID	U	0008,0018	Image UID
Image type	O	0008,0008	Zero length
Rows	O	0028,0010	Zero length
Columns	O	0028,0011	Zero length
Image position	O	0020,0032	Zero length
Image orientation	O	0020,0037	Zero length
Slice thickness	O	0018,0050	Zero length
Slice spacing	O	0018,0088	Zero length
Gantry tilt	O	0018,1120	Zero length
Convolution kernel	O	0018,1210	Zero length
Reconstruction diameter	O	0018,1100	Zero length
Data collection diameter	O	0018,0090	Zero length
Flip angle	O	0018,1314	Zero length
Echo Number	O	0018,0086	Zero length
Echo time	O	0018,0081	Zero length
Inversion time	O	0018,0082	Zero length
Repetition time	O	0018,0080	Zero length
Private Creator Identification	P	0019,00xx	GEMS_ACQU_01
Dfov Rect	P	0019,xx1E	Zero Length
Midscan Time	P	0019,xx24	Zero Length
Azimuth	P	0019,xx26	Zero Length
Number of Echo	P	0019,xx7E	Zero Length
Private Creator Identification	P	0021,00xx	GEMS_RELA_01
Scout Anref	P	0021,xx4A	Zero Length

Description	Type	Tag	Value
Private Creator Identification	P	0027,00xx	GEMS_IMAG_01
Location RAS	P	0027,xx40	Zero Length
Location	P	0027,xx41	Zero Length
Center R Coordinate	P	0027,xx42	Zero Length
Center A Coordinate	P	0027,xx43	Zero Length
Table Start Location	P	0027,xx50	Zero Length
Table End Location	P	0027,xx51	Zero Length
RAS Letter for Side of Image	P	0027,xx52	Zero Length
RAS Letter for Anterior/Posterior	P	0027,xx53	Zero Length
RAS Letter for Scout Start Location	P	0027,xx54	Zero Length
RAS Letter for Scout End Location	P	0027,xx55	Zero Length
Image Dimension X	P	0027,xx60	Zero Length
Image Dimension Y	P	0027,xx61	Zero Length

Note1: Refer to section 2.3.1.2.2.1 for Custom Search/Query option.

Note2: Type P refers to a private DICOM element.

2.3.1.2.3 Real World Activity: Manual Retrieve

2.3.1.2.3.1 Associated Real-World Activity

Behavior for Discovery 710/610 and Optima 560 Products (SW Version: pet_mfk.xx)
The operator must first select a destination by choosing *"Select Remote Host"* from "*Network"* pull-down menu on the local database manager and then choose a hostname. The operator then has to perform the Real-World activity *"Query"* to get a list of Study/Series/Image. Once the list of Study/Series/Image is retrieved, the operator can invoke the *"Get"* operation by choosing *"Get Exam"* or *"Get Series"* or *"Get Image"* from the *"Network"* pull-down menu.

Behavior for Discovery 710/610 Products (SW Version pet_coreload.xx)
The operator must select the Remote DICOM AE from the "Source" pull-down on the local database browser and select the hostname of the source from where the images are to be retrieved. Once a list of Study/Series/Image is retrieved, the operator can invoke the *"Retrieve"* operation by clicking on the "Local DB" button at the bottom of the local database browser.

2.3.1.2.3.2 Proposed Presentation Contexts

When the Real-World activity *"Manual Retrieve"* is initiated all presentation contexts shown in table 2.2.1.2.1.2-1 are proposed during association establishment, but only the Query/Retrieve-MOVE related contexts are applicable to this activity.

2.3.1.2.3.2.1 SOP Specific Conformance Statement for C-MOVE SCU

When the operator starts a *Get* operation at any level (Study, Series, Image) the DICOM Server AE will initiate a C-MOVE-RQ request to the Remote AE with the DICOM Server AE as the Destination AE.

The Storage SCP will handle the incoming images as described in section 2.3.1.3.1. A user attention pop-up will be posted if a failure status is received. The specific error message for the failure will be logged.

Each C-MOVE SCU operation supports an "Association Timer", "Operation Inactivity Timer" and "Session Timer" with time out values of 60 seconds, 300 seconds and 60 minutes respectively.

The DICOM Server AE will send a C-CANCEL-MOVE-RQ to the Remote AE if the operator *"Pauses"* or *"Clears"* the job from the local database manager Network queue.

2.3.1.2.4 Real-World Activity: Verify Connectivity

2.3.1.2.4.1 Associated Real-World Activity

Behavior for Discovery 710/610 and Optima 560 Products (SW Version: pet_mfk.xx)

The operator must first select a destination by choosing *"Select Remote Host"* from "*Network"* pull-down menu on the local database manager and then choose a hostname.

The operator must then select the "*Ping DICOM host*" from "*Network*" pull-down menu.

The DICOM server will initiate an association with the remote DICOM AE in order to verify communication at the application level. The success or failure of the verification process is displayed to the user.

Behavior for Discovery 710/610 Products (SW Version: pet_coreload.xx)

The operator shall select a Remote DICOM AE from the "Network Configuration" window and click on "Ping" on the right side-bar. The DICOM server will initiate an association with the remote DICOM AE in order to verify communication at the application level. The success or failure of the verification process is displayed to the user.

If the C-ECHO response is received with a success, the DICOM Server will post a pop-up to the operator indicating that the remote device is alive.

2.3.1.2.4.2 Proposed Presentation Context Table

Refer to the Table 2.2.1.2.1.2-1 for the Proposed Presentation Contexts for DICOM Server AE and Real-World activity Verification

2.3.1.2.4.2.1 SOP Specific DICOM Conformance C_ECHO SCU

The Discovery DICOM Server AE provides standard conformance to the DICOM Verification Service Class.

Each ECHO operation supports an "Association Timer", "Operation Inactivity Timer" and "Session Timer" with time out values of 60 seconds, 15 seconds and 60 minutes respectively

2.3.1.2.5 Real World Activity: Remote Archive

2.3.1.2.5.1 Associated Real World Activity: "Choose Archive Save Option"

Behavior for Discovery 710/610 and Optima 560 Products (SW Version: pet_mfk.xx)

The operator must first select a destination by choosing "Select Remote Host" from "Network" pull-down menu on the local database manager and then choose a hostname. Select the "Update" option, if the hostname is already present. Set the "Archive Node" option to "Yes". If the remote host is not present add the remote host in the local database with "Archive Node" option set to "Yes".
Note: The remote node should be a Storage Commitment SCP.
The operator must then select "Archive "pull-down menu on the local database manager. Select "Select Media" option menu. Select "Remote Node" in the menu.
Note: Only if you configure the remote node as an "archive node" will you see the remote node option in the archive menu.

The user selects the exam/series to be committed.

Behavior for Discovery 710/610 Products (SW Version: pet_coreload.xx)

The operator must first set remote hosts from Network Configuration from *"Tools" pull*-down menu. If the remote node is already present, select one remote host, click *"Edit" on* the right side-bar and make a check on *"Archive Node"* check box. If the remote host is not present, add the remote host with check on "*Archive Node*" check box.

Note: The remote node should be a Storage Commitment SCP. STC AE Title can be different from STORE AE title. The user selects the exam/series to be committed and click on the archival destination from the archive list at the bottom of the local database browser.

All the images currently in the selected exam/series will be sent to the selected remote archive node (which is also the Storage commitment SCP) using DICOM C-STORE operations. Once all the images are transferred the commitment request will be sent on a separate association.

2.3.1.2.5.2 Associated Real World Activity: "Auto Archive Exam/Series"

The Auto archive API's are used to archive the exams/series onto local archive media or the remote archive node (which shall be a Storage Commitment SCP) without manual interface. If the default device selected for Auto Archive is a remote Storage Commitment SCP then all the images currently in the specified exam/series will be sent to the selected Storage commitment SCP using C-STORE operations. On successful transfer of all the images the Storage Commitment request will be sent.

2.3.1.2.5.3 Proposed Presentation Context

The Proposed Presentation Context table for the DICOM Storage Commitment SCU is as shown in following Table.

Presentation Context Table			
Abstract Syntax	Transfer Syntax	Role	Extended

Name	UID	Name	UID		Negotiation
Storage Commitment Push Model SOP Class	1.2.840.10008.1.20.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

2.3.1.2.5.3.1 SOP Specific DICOM Conformance Statement for the Storage Commitment Push Model SOP Class SCU (N-ACTION)

The Storage Commitment SCU can send the commitment request for following DICOM SOP classes.

NAME	UID
CT Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.2
PET Image Storage SOP Class	1.2.840.10008.5.1.4.1.1.128
MR Image storage SOP Class	1.2.840.10008.5.1.4.1.1.4
GE Private PET Raw data Storage	1.2.840.113619.4.30
Secondary Capture Storage SOP Class	1.2.840.10008.5.1.4.1.1.7
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22
RT Structure Set Storage	1.2.840.10008.5.1.4.1.1.481.3
Grayscale Softcopy Presentation State Storage SOP Class	1.2.840.10008.5.1.4.1.1.11.1

Note: The Discovery product supports type of raw data format called **"PET List Data"** with SOP class name GE Private PET List data and SOP class UID 1.2.840.113619.4.30.Though it is having same SOP class UID as PET Raw data; PET List data won't be supporting any Archive/Restore operations. Exam containing the PET List Series will skip the same during "Save by Exam". The Storage Commitment SCU is not supported for GE Private PET List Data.

- Save by Series on PET List series not supported
- Save by Image on PET List frame not supported

The images in the selected exam/series are sent to the remote commitment provider entity using DICOM C-STORE operations. If there are any failures in the image transfers the Storage commitment request will not be sent. The corresponding job will be marked as failed and user will be notified of the status of job.

If all the images are successfully transferred then the commitment request will be sent on a different association with the list of sop instances.

If the N-ACTION request fails, the job will be marked as failed otherwise following sequence of actions will take place.

The SCU waits for N-ACTION-RSP from provider on the same association for a configurable amount of time. If it does not receive N-ACTION-RSP during this time it will close the association. It changes the Job state to "Wait" indicating the job is waiting for the response from commitment provider. The job will be marked as failed if the response is not received by stop job time. Stop job time is the maximum duration the job can wait for responses.

The DICOM SERVER AE can receive N-EVENT-REPORT from the Storage Commitment Provider at any time.

A New transaction UID will be created for each retry by user. The old transaction UID is not applicable for these requests

Following are the status codes that are more specifically processed when receiving N-Action responses from **Storage Commitment** SCP equipment:

Status Codes Received by DICOM SERVER AE for Activity *Remote Archive*

Service Status	Status Code	Further Meaning	Application Behavior When Receiving Status Code
Failure	0119	Class-instance conflict	System displays the appropriate error message in job manager user interface
	0115	Invalid argument value	System displays the appropriate error message in job manager user interface
	0117	Invalid SOP Instance	System displays the appropriate error message in job manager user interface
	0212	Mistyped argument	System displays the appropriate error message in job manager user interface
	0114	No such argument	System displays the appropriate error message in job manager user interface
	0118	No such SOP Class	System displays the appropriate error message in job manager user interface
	0110	Processing failure	System displays the appropriate error message in job manager user interface
	0213	Resource limitation	System logs the appropriate error message and retries the operation after the configured time is elapsed.
	0211	Unrecognized operation	System displays the appropriate error message in job manager user interface
Success	0000		The request for storage comment is considered successfully sent. System displays "waiting" message in job manager user interface.
*	*	Any other status code.	System displays the appropriate error message in job manager user interface.

2.3.1.2.5.3.2 Storage Commitment Push Model SOP Class Request Processing

The Following DIMSE service Elements are supported for the Storage Commitment request and processing.

N-ACTION – Requests the remote Storage Commitment SCP to commit to storing the image instances.

The following attributes are sent as part of the **DATA Set** for the **N-ACTION request**.

Attribute	**Tag**	**Value**
Transaction UID	(0008,1195)	Transaction UID
Referenced SOP Sequence	(0008,1199)	
SOP Class UID	(0008,1150)	
SOP Instance UID	(0008,1155)	

- Referenced Study Component sequence attribute is not sent.
- Storage Media File-Set ID and Storage Media File-Set UID attributes are not supported.

2.3.1.2.5.3.3 Storage Commitment Push Model SOP Class Response Processing

The following DIMSE Service Elements are supported for the Storage Commitment response processing

N-EVENT-REPORT – The Response sent by the remote Storage Commitment SCP.

Once the N-EVENT REPORT is received, the following actions will be taken depending on the

status of the response.

2.3.1.2.5.3.3.1 Commit response with SUCCESS status

The Archive flag information in the browser for all the successful instances will be updated. The status will be changed to "Y".

The job queue entry will be removed

The following attributes are expected as part of **DATA Set** for **N-Event-REPORT** from SCP

Attribute	**Tag**	**Value**
Transaction UID	(0008,1195)	Value received from SCP
Referenced SOP Sequence	(0008,1199)	Value received from SCP
SOP Class UID	(0008,1150)	Value received from SCP
SOP Instance UID	(0008,1155)	Value received from SCP

N-EVENT-REPORT-RSP will be sent on the same association itself. No DATA Set will be sent along with the response.

2.3.1.2.5.3.3.2 Commit response with FAILURE status

The following attributes are expected as part of **DATA Set** for **N-EVENT-REPORT** from SCP:

Attribute	Tag	Value
Transaction UID	(0008,1195)	Value received from SCP
Failed SOP Sequence	(0008,1198)	Value received from SCP
> SOP Class UID	(0008,1150)	Value received from SCP
> SOP Instance UID	(0008,1155)	Value received from SCP
>Failure Reason	(0008,1197)	Value received from SCP

In case of complete/partial failure the user will be notified about the status and the job entry will be paused. There is no attempt made to retry automatically the failed sop instances. However the user can manually retry the failed jobs. Such requests will be treated as new requests. This will go through the whole sequence of operations once again.

The failure reason is ignored.

Failed SOP instances will have their archive flag information unaltered.

Note: The archive status flag in the browser is a shared flag with local archive. When the status is "Y", it means that the images are archived but doesn't specify whether on local archive device or remote archive device. It is left to the user's discretion whether the local sop instances (with their archive flag set to "Y") are to be deleted.

N-EVENT-REPORT-RSP will be sent on the same association itself. No DATA Set will be sent along with the response.

Note: (0008, 1199) Reference SOP Sequence is not handled.

Refer **Section - 5 Storage Commitment Push Model Implementation**.

2.3.1.2.6 Real-World Activity: Modality Worklist Query

2.3.1.2.6.1 Associated Real-World Activity

The operator of the system initiates a query for a modality worklist by either opening the Schedule screen or by opening the Schedule screen and pressing the Update button. The choice of which of these two behaviors occurs is user configurable. The Worklist Server will then initiate an association with the remote AE in order to query for the worklist

A user can configure a number of parameters that directly control the worklist query request. The user can request worklist items that are intended for the scanner the user is working at, all items that apply to the modality of the scanner the user is working at or all worklist items available. These selections and their effects on worklist query parameters are given below:

Note: Only single MWL entry available in MWL for PET-CT exam, user can select the entry for PET-CT procedure.

This Scanner: (CT)	• Modality, (0008,0060) – set to CT • Scheduled Station AE Title, (0040,0001) – set to local AE title
All CT Systems:	• Modality, (0008,0060) - set to CT • Scheduled Station AE Title, (0040,0001) - zero-length (universal matching)
This PET System	• Modality, (0008,0060) – set to PT • Scheduled Station AE Title, (0040,0001) – set to local AE title
All PET Systems	• Modality, (0008,0060) – set to PT • Scheduled Station AE Title, (0040,0001) – zero-length (universal matching)
All NM System	• Modality, (0008,0060) – set to NM • Scheduled Station AE Title, (0040,0001) – zero-length (universal matching)
All Scanners	• Modality, (0008,0060) - zero-length (universal matching) • Scheduled Station AE Title, (0040,0001) - zero-length (universal matching)

The scheduled dates of procedures of interest can be specified for query by selecting a specific date range. The date ranges available are Today, Days Before Today, Days After Today and All Days. These selections and their effects on worklist query parameters are given below:

Today:	Scheduled Procedure Step Start Date (0040,0002) - set to YYYYMMDD, where this date is the current date.
Days Before Today and Days After Today:	Scheduled Procedure Step Start Date (0040,0002) - set to YYYYMMDD-YYYYMMDD, where this date range represents the specified number of days before today and/or after today. Note that number of days both before and after can be specified in the same query and that each always includes today.
All Days:	Scheduled Procedure Step Start Date (0040,0002) - zero-length (universal matching)

2.3.1.2.6.2 Proposed Presentation Context Table

The following table shows the proposed presentation contexts for the Worklist Server AE after real-world activity "Worklist Query" has been initiated:

Presentation Context Table – Proposed					
Abstract Syntax		**Transfer Syntax**		**Role**	**Extended Negotiation**
Name	**UID**	**Name List**	**UID List**		
Modality Worklist	1.2.840.10008.5.1.4.	Implicit VR Little	1.2.840.10008.1.	SCU	None

Information Model – FIND	31	Endian	2		

2.3.1.2.6.2.1 SOP Specific DICOM Conformance Statement for the Modality Worklist Information Model FIND SOP Class

If the remote AE does not support the proposed Presentation Context, an appropriate error is logged and the operator is notified.

This implementation can receive multiple C-FIND results over a single association. Only one association is opened at a time.

Each C-FIND response received from the remote AE is parsed to verify the length/type of the items in the response). Upon detecting any error in the response data, the Worklist Server AE will save worklist entry in binary format for investigative purposes and the Worklist Server AE will continue receiving worklist entries. Note: All worklist entries, valid and invalid, can be configured to be saved in binary format.

On receipt of any error from the remote AE, the Worklist Server will issue a C-FIND-CANCEL and, upon receipt of a C-FIND-RSP (or if an applicable timer expires), will abort the association. All previously received worklist items are retained. Warnings received from the remote AE are ignored.

Each C-FIND operation supports a configurable "Association Timer." This timer starts when the association request is sent or received and stops when the association is established. The default time-out value is 30 seconds.

Each C-FIND operation supports a configurable "Session Timer." This timer starts when an association is established and stops when the association is ended. The default time-out value is 3600 seconds.

If any of the above timers expires, the association is aborted (A-ABORT) and the operation in progress is considered to be failed. Any previously received worklist items are discarded.

2.3.1.2.6.2.2 Record Acceptance Policy

The Discovery implementation adheres to strict value checking of incoming query responses from the remote AE. Each response received is examined to verify that all Type 1 attributes are present with non-zero length, that all Type 2 attributes are present (possibly with zero length) and that the data for all attributes is consistent with respect to the attributes' value representation (VR).

Any inconsistencies in the response data, with respect to the categories described above are considered errors. Upon detecting any such errors in the response data, the Worklist Server AE will issue a C-FIND-CANCEL and, upon receipt of a C-FIND-RSP (or if an applicable timer expires), will abort the association. All previously received worklist items are retained. Note that the absence of requested Type 3 attributes is not considered an error.

Fields considered Type 1 by the Worklist Server include:

- (0010,0010), Patient Name
- (0010,0020), Patient ID

- (0020,000D), Study Instance UID
- (0040,0001), Scheduled Station AE Title
- (0040,0002), Scheduled Procedure Step Start Date [1]
- (0040,0003), Scheduled Procedure Step Start Time [1]
- (0040,0009), Scheduled Procedure Step ID
- (0040,1001), Requested Procedure ID

Start Date must be of the form YYYYMMDD, exactly eight numeric characters, and Start Time must be of the form HHMMSS, exactly six numeric characters.

Fields considered Type 2 by Worklist Server include:

- (0008,0050), Accession Number
- (0008,0060), Modality
- (0008,0090), Referring Physician Name
- (0010,0030), Patient Date of Birth
- (0010,0040), Patient Sex
- (0010,1030), Patient Weight in kg
- (0010,2000), Medical Alerts
- (0010,2110), Contrast Allergies
- (0010,21C0), Pregnancy Status
- (0032,1032), Requesting Physician
- (0032,1070), Requested Contrast Agent
- (0038,0010), Admission ID
- (0038,0050), Special Needs
- (0038,0300), Current Patient Location
- (0038,0500), Patient State
- (0040,0006), Performing Physician
- (0040,0010), Scheduled Station Name
- (0040,0011), Scheduled Procedure Step Location
- (0040,0012), Pre-order Medication
- (0040,1003), Requested Procedure Priority
- (0040,1004), Patient Transport Arrangements
- (0040,3001), Confidentiality Constraint

Refer **Section.6 Modality Worklist Query Implementation.**

2.3.1.2.7 Real-World Activity: Modality Performed Procedure Step Notification

The PPS Server AE is implemented as an application process on the scanner host computer. It runs as a daemon serving requests from other applications to send the PPS information to the remote AE and return the results to the requesting application.

The PPS Server AE initiates the following functions.

- *Start PPS*: Initiates a DICOM association in order to create a DICOM Modality Performed Procedure Step SOP instance in the remote AE. If the remote AE accepts a presentation context applicable to Modality performed Procedure Step, the PPS Server AE will issue a request to create the SOP instance in the remote AE via the N-CREATE service.

- *Complete PPS*: Initiates a DICOM association in order to update a DICOM Modality Performed Step instance that is already created with the remote AE. If the remote AE accepts a presentation context applicable to Modality performed Procedure Step, the PPS Server AE will issue a request to update the SOP instance in the remote AE via the N-SET service. The PPS Status is set to 'COMPLETED'.

- *Discontinue PPS*: Initiates a DICOM association in order to update a DICOM Modality Performed Step instance that is already created with the remote AE. If the remote AE accepts a presentation context applicable to Modality performed Procedure Step, the PPS Server AE will issue a request to update the SOP instance in the remote AE via the N-SET service. The PPS Status is set to 'DISCONTINUED'.

2.3.1.2.7.1 Sequencing of Real-World Activities

2.3.1.2.7.1.1 PPS from Acquisition System with MWL data

Note: In the Discovery Scanner Products, PPS Feature is available. Any reference to PPS below and/or throughout this Conformance Statement Document are specific both CT and PET Images from the Discovery systems.

The system has a Modality Work-list Server AE installed. Work-List information is obtained from HIS/RIS system through the use of Basic Work-list Management Service. Use of the information retrieved in the creation of Image SOP instance is described in the Modality Work-list Conformance statement. Use of the information retrieved in MPPS SOP instances is described later in this document.

- The system initiates a 'Start PPS' before starting a scan, i.e. when the image acquisition is started. The system retrieves necessary information related to the Scheduled Procedure Step from Modality Work-list Server. PPS Server AE initiates a MPPS (Modality Performed Procedure Step) N-CREATE request to the remote AE (MPPS SCP), in-order to create a MPPS SOP instance at the remote AE.

- The MPPS SCP returns response indicating the success/failure of the request execution. The PPS state information is updated in the system based on the response data, and is presented to the user. ***The DICOM association is closed.***

- System includes the necessary information related to Scheduled Procedure Steps and the Performed procedure Step in the image instances created.

- At the end of image acquisition, system initiates a 'Complete PPS' or 'Discontinue PPS' based on the choice selected by the user using the user interface provided. The user is also given a choice 'Defer PPS' which is described below. PPS Server AE initiates a MPPS N-SET request to the remote AE, in-order to update the MPPS SOP instance that is already created**. The N-SET is sent over a new DICOM association**

- The remote AE returns response indicating the success/failure of the request execution. The PPS state information is updated in the system based on the response data, and is presented to the user.

- At the end of image acquisition, if the user has chosen 'Defer PPS', the user is provided with an interface to 'Complete PPS' or 'Discontinue PPS' at any later time. The user might wish to alter the image set generated through acquisition, before invoking these operations. Note that the user explicitly uses the user interface provided to invoke this operation, as in the case of PPS generated for post-processing, which is described in the following section. **PPS messages N-CREATE (if applicable) and N-SET will be sent over the same DICOM association**

- The remote AE returns response indicating the success/failure of the request execution. The PPS state information is updated in the system based on the response data, and is presented to the user.

2.3.1.2.7.1.2 PPS from acquisition system without MWL data

The system either does not have a Modality Work-list Server AE installed or a Modality Work-list Server AE installed but no Work-List information is obtained from HIS/RIS system for the current procedure that is being performed. The information required for performing the procedure is supplied through the user interface of the system. The use of this information in MPPS SOP instances is described later in this document.

- The system initiates a 'Start PPS' before starting a scan, i.e. when the image acquisition is started. PPS Server AE initiates a MPPS (Modality Performed Procedure Step) N-CREATE request to the remote AE (MPPS SCP), in-order to create a MPPS SOP instance at the remote AE.

- The MPPS SCP returns response indicating the success/failure of the request execution. The PPS state information is updated in the system based on the response data, and is presented to the user.

- System includes the necessary information related to Scheduled Procedure Steps and the Performed procedure Step in the image instances created.

- At the end of image acquisition, system initiates a 'Complete PPS' or 'Discontinue PPS' based on the choice selected by the user using the user interface provided. The user is also given a choice 'Defer PPS' which is described below. PPS Server AE initiates a MPPS N-SET request to the remote AE, in-order to update the MPPS SOP instance that is already created.

- The remote AE returns response indicating the success/failure of the request execution. The PPS state information is updated in the system based on the response data, and is presented to the user.

- At the end of image acquisition, if the user has chosen 'Defer PPS', the user is provided with an interface to 'Complete PPS' or 'Discontinue PPS' at any later time. The user might wish to alter the image set generated through acquisition, before invoking these operations. Note that the user explicitly uses the user interface provided to invoke this operation, as in the case of PPS generated for post-processing, which is described in the following section.

- The remote AE returns response indicating the success/failure of the request execution. The PPS state information is updated in the system based on the response data, and is presented to the user.

2.3.1.2.7.1.3 PPS from post-processing system

- The user initiates post-processing on the images generated through acquisition.
- The system creates a Modality performed Procedure Step instance locally in the system. If the source image instance has the Scheduled Procedure Step information, it is copied into the image instances created. Also the system includes the necessary information related to the Modality Performed Procedure Step into the image instance.
- At the end of (one or more) post-processing, the user initiates 'Complete PPS' or 'Discontinue PPS' through the user interface provided. PPS Server AE initiates a MPPS (Modality Performed Procedure Step) N-CREATE request to the remote AE (MPPS SCP), in-order to create a MPPS SOP instance at the remote AE (which is actually a replica of the locally created MPPS SOP instance).
- The remote AE returns response indicating the success/failure of the request execution. If the response indicates success, PPS Server AE initiates a MPPS N-SET request to the remote AE, in-order to update the MPPS SOP instance that is already created, with the additional information.
- The remote AE returns response indicating the success/failure of the request execution. The PPS state information is updated in the system based on the response data, and is presented to the user.

2.3.1.2.7.2 Proposed Presentation Context Table

The following table shows the proposed presentation contexts for the PPS Server AE after any of the real-world activity listed in section *2.3.1.6.1 Sequencing of Real-World Activities*, is initiated.

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

2.3.1.2.7.2.1 SOP Specific DICOM Conformance Statement for MPPS SOP class

If the remote AE does not support the proposed Presentation context, an appropriate error message logged. Only one association is opened at a time.

All the operations used by this SOP class support an association timer, which is configurable. The timer is started when a request (association request, N-CREATE request or N-SET request) is send and stopped when the respective response is received. The default time-out value is 300 seconds.

All the operations used by this SOP class support a "Session Timer". This timer is started when the association is established and stopped when association is ended. The default time-out value is 3000 seconds.

If any of the above timers expires the association is aborted and the operation in-progress is considered FAILED.

In any case an operation (N-CREATE or N-SET) fails, system updates the state to enable operator to manually invoke the operation at any later time.

2.3.1.2.8 Real World Activity: Print

2.3.1.2.8.1 Associated Real World Activity

The Film Composer is the User interface and this is used to initiate the local real world activity. The user issues the print request using Film Composer. Film composer allows printer selection and it composes the pre-formatted film file. This film file is interpreted by Print SCU and it sends the appropriate messages to DICOM print SCP running on a DICOM printer.

2.3.1.2.8.1.1 Sequencing of Real World Activities

- The DICOM printer is installed through a camera installation process. The DICOM printer is selected from the Film Composer Interface for Manual Filming. Auto filming is enabled using the camera setup via the camera installation process.

- Images may be acquired for printing in the following manner:
  - Images to be printed may be manually dropped from Viewing applications into the manual film composer slots.
  - Images to be printed may be automatically dropped from Viewing applications into the manual film composer slots.
  - Images to be printed may be manually dropped from Viewing applications into the auto film composer slots.
  - Image series to be printed may be automatically dropped from the PrintSeries application into the manual film composer slots.
  - Images to be printed may be automatically dropped from the Scanning Application into the auto film composer slots.

- Based upon the filming mode (and the attributes) used to acquire images into the film composer, films will be automatically printed when the film session is full, or the user must press the Print Button to print the images.

- The Print SCU retrieves the Print SCP status by using the N-GET service of Printer SOP Class. If the printer returns a FAILURE status the print session will be terminated. The printer status is not read.

- The film session is created using the N-CREATE service. The print session will be terminated if the printer fails to create the film session.

- The film box is created using the N-CREATE service. The print session will be terminated if the printer fails to create the film box.
- The images are placed on the film box by using the N-SET. If the printer fails to place the image on the film box, the print session will be terminated.
- The film will be printed using the N-ACTION. Only film box printing is supported. If the printer fails to print the film, the print session will be terminated.
- After the successful N-ACTION, the film box will be deleted using the N-DELETE. Any N-EVENT-REPORTS given to the PRINT SCU will be received but the data is ignored. After the film box is deleted, the association will be closed.
- Upon the successful completion of the above sequencing and the association is closed, the user will be notified of the successful print session.

2.3.1.2.8.2 Proposed Presentation Contexts

The Proposed Presentation Context Table for the Print SCU is as shown in following Table.

Presentation Context Table – Proposed					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name	UID		
Basic Grayscale Print Management Meta SOP Class	1.2.840.10008.5.1.1.9	DICOM Implicit VR Little Endian Transfer Syntax	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 Transfer Syntax	1.2.840.10008.1.2	SCU	None
Verification SOP Class	1.2.840.10008.1.1	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Printer SOP Class	1.2.840.10008.5.1.1.16	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None
Print Job SOP Class	1.2.840.10008.5.1.1.14	DICOM Implicit VR Little Endian Transfer Syntax	1.2.840.10008.1.2	SCU	None

Note: Certain Presentation Contexts may be negotiated that are not used during the association. See the following sections for the DICOM Print services performed by the Discovery.

2.3.1.2.8.2.1 SOP Specific DICOM Conformance Statement for Basic Grayscale and Color Print Management SOP Classes

The DICOM SERVER AE uses the following DIMSE services of the supported SOP Classes for Activity print:

SOP Class	SOP Class UID	DIMSE Service Element	SCU Usage
Basic Film Session	1.2.840.10008.5.1.1.1	N-CREATE	Used(Mandatory)
		N-SET	Not used
		N-DELETE	Not Used
		N- ACTION	Not Used
Basic Film Box	1.2.840.10008.5.1.1.2	N-CREATE	Used(Mandatory)
		N- ACTION	Used(Mandatory)
		N-DELETE	Used
		N-SET	Not Used
Basic Grayscale Image Box	1.2.840.10008.5.1.1.4	N-SET	Used(Mandatory)
Basic Color Image Box	1.2.840.10008.5.1.1.4.1	N-SET	Used(Mandatory)
Printer	1.2.840.10008.5.11.16	N-EVENT-REPORT	Used(Mandatory)
		N-GET	Used
Print Job SOP Class	1.2.840.10008.5.1.1.14	N-EVENT-REPORT	Used(Mandatory)
		N-GET	Used

2.3.1.2.8.2.1.1 Basic Film Session SOP Class

The Print SCU supports the following DIMSE Service Elements for the Basic Film Session SOP Class.

N-CREATE – Requests the Print SCP to create an instance of Basic Film Session.

The following Attribute values are supported by the N-CREATE:

Attribute	DICOM Tag	Valid Range	Default Value
* Number of Copies	(2000, 0010)	1-99	Set by user
* Print Priority	(2000, 0020)	HIGH / MED / LOW	Set in Configuration file (Default value is HIGH)
* Medium Type	(2000, 0030)	CLEAR FILM BLUE FILM PAPER	Set in Configuration File
* Film Destination	(2000, 0040)	MAGAZINE PROCESSOR	Set in Configuration File

Note: ***** denotes that the attribute is optional for the SCU. However, we do provide values for all of these optional attributes and if the SCP does not support the requested value it may choose to either return a failure status or ignore the value provided and use its default value.

If Failure status is returned during N-CREATE operation of Film session the following action will be taken by Print SCU:

0x213 “Resource Limitation” message will be logged.

All other status “Failure” message will be logged.

In all the cases the print session will be terminated.

2.3.1.2.8.2.1.2 Basic Film Box SOP Class

The Print SCU supports the following DIMSE Service Elements for the Basic Film Box SOP Class.

- N-CREATE – Requests the Print SCP to create an instance of Film Box.
- N-ACTION – Requests the Print SCP to print the Film Box onto Printer.
- N-DELETE – Requests the Print SCP to delete the Film Box Instance.

The Following Attribute values are supported:

Attribute	DICOM Tag	Valid Range	Default Value
Image Display Format	(2010, 0010)	STANDARD/C,R Printer Dependent	Set in User Interface
Reference Film Session Sequence	(2010, 0500)		
Referenced Image Box Sequence	(2010,0510)	NA	NA
*Film Orientation	(2010, 0040)	PORTRAIT	Set in Configuration File
Film Size ID	(2010, 0050)	Sent zero length	Sent zero length
*Magnification type	(2010, 0060)	BILINEAR CUBIC REPLICATE NONE	Set in Configuration File
*Max Density	(2010, 0130)	0-4095	Set in Configuration File
Configuration Information	(2010, 0150)	Printer Dependent	Set in Configuration File
*Smoothing type	(2010, 0080)	Printer Dependent	Set in Configuration File
*Border density	(2010, 0100)	BLACK WHITE	Set in Configuration File
*Empty image density	(2010, 0110)	BLACK WHITE	Set in Configuration File
*Min density	(2010, 0120)	0-4094	Set in Configuration File
*Trim	(2010, 0140)	NO	NO

Note: Attributes “sent zero length” use the camera default values.

Note: ***** denotes that the attribute is optional for the SCU. However, we do provide values for all of these optional attributes and if the SCP does not support the requested value it may choose to either return a failure status or ignore the value provided and use its default value.

If Failure status is returned during N-CREATE operation of Film box following action will be taken by Print SCU.

0x213: "Resource Limitation" message will be sent.

0x106: "Unsupported Film Format" message will be sent.

All other status: "Failure" message will be sent

In all the cases the print session will be terminated.

If Failure status is returned during N-ACTION operation of Film box following action will be taken by Print SCU.

0xC602: "Unable to Create Print Job" message will be sent.

All other status: "Failure" message will be sent.

In all the cases the print session will be terminated.

If Failure status is returned during N-DELETE operation of Film box following action will be taken by Print SCU.

All the return status: "Failure" message will be sent and the print session will be terminated.

2.3.1.2.8.2.1.3 Basic Grayscale Image Box SOP Class

The Print SCU supports the following DIMSE Service Elements for Grayscale Image Box SOP Class.

N-SET – Requests the Printer to set the image box attributes.

The Following Attribute values are supported:

Attribute Name	Tag	Use
Image Position	(2020,0010)	Based on Image Display Format
Basic Grayscale Image Sequence	(2020,0110)	Sent in the request
>Samples Per Pixel	(0028,0002)	1
>Photometric Interpretation	(0028,0004)	MONOCHROME2
>Rows	(0028,0010)	Image Dependent
>Columns	(0028,0011)	Image Dependent
>Pixel Aspect Ratio	(0028,0034)	1\1
>Bits Allocated	(0028,0100)	8 (if Bits Stored=8) or 16 (if Bits Stored=12)
>Bits Stored	(0028,0101)	8 or 12

>High Bit	(0028,0102)	7 (if Bits Stored=8) or 11 (if Bits Stored=12)
>Pixel Representation	(0028,0103)	0 (unsigned integer)
>Pixel Data	(7FE0,0010)	Pixel data
Polarity	(2020,0020)	NORMAL
Magnification Type	(2010,0060)	BILINEAR CUBIC REPLICATE NONE
Smoothing Type	(2010,0080)	Printer Dependent
Min Density	(2010,0120)	0-4095, Not Sent
Max Density	(2010,0130)	0-4095
Configuration Information	(2010,0150)	Printer Dependent
Requested Image Size	(2020,0030)	Not used
Requested Decimate/Crop Behavior	(2020,0040)	Not used
Referenced Presentation LUT Sequence	(2050,0500)	Not supported.
> Referenced SOP Class UID	(0008,1150)	Not supported.
> Referenced SOP Instance UID	(0008,1155)	Not supported.

Note: ***** denotes that the attribute is optional for the SCU. However, we do provide values for all of these optional attributes and if the SCP does not support the requested value it may choose to either return a failure status or ignore the value provided and use its default value.

If Failure status is returned during N-SET operation of Image Box following action will be taken by Print SCU.

0xC605: “Resources temporarily not available” message will be sent.

All other status: “Failure” message will be sent.

In all the cases the print session will be terminated.

2.3.1.2.8.2.1.4 Basic Color Image Box SOP Class

The Print SCU supports the following DIMSE Service Elements for Basic Color Image Box SOP Class.

N-SET – Requests the Printer to set the image box attributes.

The Following Attribute values are supported:

Attribute Name	Tag	Use
Image Position	(2020,0010)	Based on Image Display Format

Basic Color Image Sequence	(2020,0111)	
>Samples Per Pixel	(0028,0002)	3
>Photometric Interpretation	(0028,0004)	RGB
>Planar Configuration	(0028,0006)	1
>Rows	(0028,0010)	Image Dependent
>Columns	(0028,0011)	Image Dependent
>Pixel Aspect Ratio	(0028,0034)	1/1
>Bits Allocated	(0028,0100)	8
>Bits Stored	(0028,0101)	8
>High Bit	(0028,0102)	7
>Pixel Representation	(0028,0103)	0 (unsigned integer)
>Pixel Data	(7FE0,0010)	Pixel data
Polarity	(2020,0020)	NORMAL
Magnification Type	(2010,0060)	BILINEAR CUBIC REPLICATE NONE
Smoothing Type	(2010,0080)	Printer Dependent
Requested Image Size	(2020,0030)	Not used
Requested Decimate/Crop Behavior	(2020,0040)	Not used

Note: ***** denotes that the attribute is optional for the SCU. However, we do provide values for all of these optional attributes and if the SCP does not support the requested value it may choose to either return a failure status or ignore the value provided and use its default value.

If a Normal status is returned during the N-SET operation of Image Box, a Film Session N-Create request is sent.

If a Failure status is returned during the N-SET operation of Image Box, the association will be terminated.

If a Warning status is returned during the N-SET operation of the Image Box, the association will be terminated.

The status values which are specific for this SOP Class are defined as follows

Status	Meaning	Error Code
Warning	Image size larger than image box size, the image has been	B604

	demagnified.	
	Image size is larger than the Image Box size. The Image has been cropped to fit.	B609
	Image size or Combined Print Image size is larger than the Image Box size. The Image or combined Print Image has been decimated to fit.	B60A
Failure	Image size is larger than image box size	C603
	Insufficient memory in printer to store the image	C605
	Combined Print Image size is larger than the Image Box size.	C613

2.3.1.2.8.2.1.5 Printer SOP Class

N-GET DIMSE service is supported for the Printer SOP Class. If an N-EVENT-REPORT DIMSE service is received when the association is active, Print SCU handles the relevant states but the data received is ignored.

Print SCU issues the request to retrieve the following attributes:

Optional Attribute	DICOM Tag	Default Value
Printer Status	(2110, 0010)	Printer shall return Value
Printer Status Info	(2110, 0020)	Printer shall return Value
Printer Name	(2110, 0030)	Printer may return Value
Manufacturer	(0008, 0070)	Printer may return Value
Manufacturer Model Name	(0008, 1090)	Printer may return Value
Device Serial No.	(0018, 1000)	Printer may return Value
Software Versions	(0018, 1020)	Printer may return Value
Date Last Calibrated	(0018, 1200)	Printer may return Value
Time Last Calibrated	(0018, 1201)	Printer may return Value

The Print SCU issues the N-GET service to retrieve the printer status. The status is processed as follows:

- If Printer status (2110, 0010) is NORMAL, the film is printed.
- If Printer status (2110, 0010) is FAILURE, the print job is terminated. The Printer Status Info (2110, 0020) attribute is not processed.
- If Printer status (2110, 0010) is WARNING, one of three things will happen:

    a) If the Printer Status Info (2110, 0020) is “SUPPLY LOW” the status is displayed to the user and the print job continues.

b) If the Printer Status Info (2110, 0020) is "RECEIVER FULL" or "SUPPLY EMPTY" or "FILM JAM" the status is displayed to the user and the print job is aborted.

For all other Printer Status Info (2110, 0020) values, the status is ignored and the print job continues.

2.3.1.2.8.2.1.6 Print Job SOP Class

Print SCU looks for following attributes in N-EVENT REPORT data received from Print SCP. If Print SCU does not receive N-EVENT_REPORT it requests the Print SCP to retrieve the following set of attributes using N-GET.

Attribute Name	DICOM Tag	Default Value
Execution Status	(2100, 0020)	Value returned by Print SCP
Execution Status info	(2100, 0030)	Value returned by Print SCP
Print Priority	(2000, 0020)	Value returned by Print SCP
Creation Date	(2100, 0040)	Value returned by Print SCP
Creation Time	(2100, 0050)	Value returned by Print SCP
Printer Name	(2110, 0030)	Value returned by Print SCP
Originator	(2100, 0070)	Value returned by Print SCP

2.3.1.3 Association Acceptance Policy

The DICOM Server AE places limitations on who may connect to it.

If the Remote AE needs to "Push Images" or "Query/Retrieve Images", to the local system then it has to be configured in the Local system to do the same.

When the DICOM Server AE accepts an association for image storage, it will receive any images transmitted on that association and store the images on disk.

It will also respond to queries from Remote AEs by sending matching entries. Any Remote AE can request and receive a list of images on the local database. The Remote AE must be configured in the local database manager's list of Remote AE for it to be able to retrieve images from DICOM Server AE.

Any remote AE can open an association to the DICOM Server AE for the purpose of verification.

It will also listen for and receive Storage Commitment notification (N-EVENT-REPORT) from a Remote Storage commitment SCP.

2.3.1.3.1 Receive Image(s)

This AE is indefinitely listening for associations. No operator action is required to receive an image.

2.3.1.3.1.1 Associated Real-World Activity

The Real-World Activity associated with the Receive Image(s) operation is the storage of the image on the disk drive of the Discovery.

2.3.1.3.1.2 Presentation Context Table

Table 2.3.1.3.1.2-1: Accepted Presentation Contexts for DICOM Server AE and Real-World Activity Receive Image(s)

Presentation Context Table – Accepted					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
CT Image Storage	1.2.840.10008.5.1.4.1.1.2	Implicit VR Little Endian Implicit VR Big Endian (GE Private) Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.113619.5.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
MR Image Storage	1.2.840.10008.5.1.4.1.1.4	Implicit VR Little Endian Implicit VR Big Endian (GE Private) Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.113619.5.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7	Implicit VR Little Endian Implicit VR Big Endian (GE Private) Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.113619.5.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
X-ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

		Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2.1 1.2.840.10008.1.2.2		
PET Image Storage	1.2.840.10008.5.1.4.1.1.128	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None
GE Private PET raw data	1.2.840.113619.4.30	Implicit VR Little Endian Explicit VR Little Endian Explicit VR Big Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1 1.2.840.10008.1.2.2	SCP	None

2.3.1.3.1.2.1 SOP Specific DICOM Conformance Statement for all Storage SOP Classes

The DICOM Server AE conforms to the SOP's of the Storage Service Class at level 1 (base). Private elements will be discarded from the image when receiving images containing non-GE private data elements. All of the **standard** type elements (1,1c,2,2c,3) will be retained.

Each C-STORE SCP operation supports an "Association Timer", "Operation Inactivity Timer" and "Session Timer" with time out values of 60 seconds, 900 seconds and 60 minutes respectively.

Association Timer – duration for SCP to respond to an association request.

Session Timer – duration from association to first command sent by SCU.

Inactivity Timer – duration between two commands after the association.

Image Reception

If the DICOM Server AE returns one of the following status codes, then the C-STORE operation was unsuccessful and no image will be installed:

- 0110 (Processing Failure) Indicates that an internal system call has failed while processing an image.
- A711 (Out of Resources) Indicates that probably there was not enough disk space to store the image. The user should attempt recovery by removing some images from the Discovery system.
- A712 (Out of Resources) Indicates that there was not enough resource (such as memory) to store the image.
- A800 (SOP Class not supported)

In the event of a successful C-STORE operation, the image has successfully been written to disk. The image will then be accessed in the same manner as any other image by the applications on the Discovery system.

Images may be deleted when instructed to do so by the user. Thus the duration of the storage of the image is determined by the users of the Discovery system.

Attention: This Discovery/Optima system does not support previous non-Discovery based PET/CT Raw Data. Receiving/Pulling Raw Data series acquired from a non-Discovery based product onto the Discovery/Optima will cause the network process to fail. Furthermore, Discovery 710/610 and Optima 560 Raw Data format has changed and is no longer backward compatible with previous PET/CT systems. Sending/Pushing Discovery 710/610 and Optima 560 Raw Data Series onto a non-Discovery 710/610 or Optima 560 system will also cause the network process to fail. This applies to the GE proprietary PET Raw Data IOD.

Image Installation

If the image installation is unsuccessful, a message will appear in the Message Log informing the user of the failure and the image will be removed.

If the image installation process finds that an element is not encoded according to the DICOM standard, it will fail to install the image and the file will be removed.

Image Installation of non-GE Created CT, MR or PET Images

Images received from non-GE products are installed as appropriate image object without any of their private data elements. Also if some critical fields (mandatory) are missing, then the image will not be installed.

2.3.1.3.2 Verification Request from Remote AE

This AE is indefinitely listening for associations. No operator action is required to respond to a *verification* message.

2.3.1.3.2.1 Associated Real-World Activity

The Real-World Activity associated with the verification request is to send a C-ECHO response message with a status of “success” to the requesting AE.

2.3.1.3.2.2 Presentation Context Table

Table 2.3.1.3.2.2-1: Acceptable Presentation Contexts for DICOM Server AE and Real-World Activity Verification Request

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

Verification	1.2.840.10008.1.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.3.1.3.2.2.1 SOP Specific Conformance to DICOM Verification Service Class

The DICOM Server AE provides standard conformance to the DICOM Verification Service Class.

Each ECHO operation supports an "Operation Inactivity Timer" with time out value of 15 seconds.

2.3.1.3.3 Search Local Database (Query Request from Remote AE)

This AE is indefinitely listening for associations. No operator action is required to respond to a *query* request.

2.3.1.3.3.1 Associated Real-World Activity

The Real-World Activity associated with the query request is to search the local database for entries that match the request and send a C-FIND response message with a status of "pending" for each matching entry.

2.3.1.3.3.2 Presentation Context Table

Table 2.3.1.3.3.2-1: Acceptable Presentation Contexts for DICOM Server AE and Real-World Activity Query Request

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Study Root Query/Retrieve FIND	1.2.840.10008.5.1.4.1.2.2.1	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.3.1.3.3.2.1 SOP Specific Conformance to C-FIND SCP

All Required (R) and Unique (U) study, series, and image level keys for the Study-Root Query/Retrieve information model are supported. Some optional (O) keys are also supported as described in the following tables.

Table 2.3.1.3.3.2.1-1 Supported study level keys

Description	Type	Tag	Usage
Study date	R	0008,0020	Matched
Study time	R	0008,0030	Matched
Accession number	R	0008,0050	Matched
Patient's name	R	0010,0010	Matched

Description	Type	Tag	Usage
Patient id	R	0010,0020	Matched
Study id	R	0020,0010	Matched
Study Instance UID	U	0020,000D	Matched
Study description	O	0008,1030	Returned
Suite Id	P	0009,0002	Returned

Table 2.3.1.3.3.2.1-2 Supported series level keys

Description	Type	Tag	Usage
Modality	R	0008,0060	Matched
Series number	R	0020,0011	Matched
Series Instance UID	U	0020,000E	Matched
Series description	O	0008,103E	Returned
Manufacturer	O	0008,0070	Returned
Images in series	O	0020,1002	Returned

Table 2.3.1.3.3.2.1-3 Supported image level keys

Description	Type	Tag	Usage
Image number	R	0020,0013	Matched
Image Instance UID	U	0008,0018	Matched
Image type	O	0008,0008	Returned
Rows	O	0028,0010	Returned
Columns	O	0028,0011	Returned
Image position	O	0020,0032	Returned
Image orientation	O	0020,0037	Returned
Slice thickness	O	0018,0050	Returned
Slice spacing	O	0018,0088	Returned
Gantry tilt	O	0018,1120	Returned
Convolution kernel	O	0018,1210	Returned
Reconstruction diameter	O	0018,1100	Returned
Data collection diameter	O	0018,0090	Returned
Flip angle	O	0018,1314	Returned
Echo number	O	0018,0086	Returned
Echo time	O	0018,0081	Returned
Inversion time	O	0018,0082	Returned
Repetition time	O	0018,0080	Returned
Trigger time	O	0018,1060	Returned
Dfov Rect	P	0019,001E	Returned
Midscan Time	P	0019,0024	Returned
Azimuth	P	0019,0026	Returned
Number of Echo	P	0019,007E	Returned
Scout Anref	P	0021,004A	Returned

Description	Type	Tag	Usage
Location RAS	P	0027,0040	Returned
Location	P	0027,0041	Returned
Center R Coordinate	P	0027,0042	Returned
Center A Coordinate	P	0027,0043	Returned
Table Start Location	P	0027,0050	Returned
Table End Location	P	0027,0051	Returned
RAS Letter for Side of Image	P	0027,0052	Returned
RAS Letter for Anterior/Posterior	P	0027,0053	Returned
RAS Letter for Scout Start Location	P	0027,0054	Returned
RAS Letter for Scout End Location	P	0027,0055	Returned
Image Dimension X	P	0027,0060	Returned
Image Dimension Y	P	0027,0061	Returned

Note: In the above tables the type field has the following meaning:
R = Required **U** = Unique **O** = Optional **P** = Private

Only keys with Usage type *Matched* will be matched against values in the database.

Values in keys of type Returned will be ignored and will be filled in with data from the database.

If an optional key is requested that does not appear in any of the tables above, that key will be ignored and no corresponding element will be returned.

If the database does not have a value corresponding to any requested optional key a zero-length element will be returned.

Sequence matching is not supported.

Range matching is supported for attributes of type date and time.

Only hierarchical query is supported.

Special character ? can be used to match any single character and special character * can be used to match any character or set of characters for (0008, 0050) Accession Number, (0010, 0010) Patient's Name, (0010, 0020) Patient ID and (0020, 0010) Study ID.

2.3.1.3.4 Move Images (Retrieve Request from Remote AE)

This AE is indefinitely listening for associations. No operator action is required to respond to a *retrieve* request.

2.3.1.3.4.1 Associated Real-World Activity

The Real-World Activity associated with the Retrieve Request is to send all images corresponding to the C-MOVE request to the destination AE through a separate association.

2.3.1.3.4.2 Presentation Context Table

Table 2.3.1.3.4.2-1: Acceptable Presentation Contexts for DICOM Server AE and Real-World Activity Retrieve Request.

Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Study Root Query/Retrieve MOVE	1.2.840.10008.5.1.4.1.2.2.2	Implicit VR Little Endian	1.2.840.10008.1.2	SCP	None

2.3.1.3.4.2.1 SOP Specific Conformance to C-MOVE SCP

The DICOM Server AE provides standard conformance to the baseline Study-root C-MOVE Service Class SCP.

Each C-MOVE SCP operation supports an “Association Timer”, “Operation Inactivity Timer” and “Session Timer” with time out values of 60 seconds, 300 seconds and 60 minutes respectively. These time-outs are configurable in dcs.cfg as *bi_assoc_tio*, *bi_move_tio* and *bi_session*_tio respectively

All images requested in a C-MOVE-RQ will be sent over a single association. A C-MOVE-RSP with a “pending” status will be returned to the requester every five images.

The C-MOVE SCP will invoke C-STORE requests for the following SOP classes:

SOP Class Name	SOP Class UID
CT Image Information Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Information Storage	1.2.840.10008.5.1.4.1.1.4
Secondary Capture image storage	1.2.840.10008.5.1.4.1.1.7
X-Ray Radiation Dose SR	1.2.840.10008.5.1.4.1.1.88.67
Enhanced SR	1.2.840.10008.5.1.4.1.1.88.22
PET Image Information Storage	1.2.840.10008.5.1.4.1.1.128

In addition to the C-MOVE response status values defined in DICOM part 4 the following status values will be returned:

- C000 - Indicates that an error occurred while retrieving records from the local database.
- C001- Indicates all other processing error.
- C011 - If the Destination AE returns a “Storage Full” condition this status will be returned. This status will only be sent if the Destination AE returns a status of A711 and is only applicable if the Destination AE is another GE Healthcare product.

2.3.1.3.5 Listen to remote Storage Commitment SCP

The DICOM SERVER AE is indefinitely listening for associations. No operator action is required to receive a Storage Commitment notification (N-EVENT-REPORT).

2.3.1.3.5.1 Associated Real World Activity

- Flag the exams/series that have been committed (transfer of ownership) in the database
- Display the error when some images of a patient existing in the database have not been committed

2.3.1.3.5.2 Accepted Presentation Context Table

The Accepted Presentation Context table for the DICOM Storage Commitment SCU is shown in the following table.

Accepted Presentation Context Table					
Abstract Syntax		Transfer Syntax		Role	Extended Negotiation
Name	UID	Name List	UID List		
Storage Commitment Push Model	1.2.840.10008.1.20.1	Implicit VR Little Endian Explicit VR Little Endian	1.2.840.10008.1.2 1.2.840.10008.1.2.1	SCU	None

2.3.1.3.5.2.1 SOP Specific DICOM Conformance Statement for the Storage Commitment Push Model SOP Class (N-EVENT-REPORT)

Once the N-EVENT REPORT is received, the following actions will be taken depending on the status of the response.

2.3.1.3.5.2.1.1 Commit response with SUCCESS status

The Archive flag information in the browser for all the successful instances will be updated. The status will be changed to "Y". The job queue entry will be removed. N-EVENT-REPORT-RSP will be sent on the same association itself. No DATA Set will be sent along with the response.
Following are the status codes the Application may send back to the SCP after receiving the N-EVENT-REPORT:

Status Codes Returned by DICOM SERVER AE for Activity *Listen to remote Storage Commitment SCP* with SUCCESS Status

Service Status	Status Codes	Further Meaning	Status Code sending explanation	Related Fields sent back to the SCU

Error	0110	Processing Failure	Indicates that an internal error occured while processing.	None
Success	0000	Success	The storage commitment result received successfully.	None

2.3.1.3.5.2.1.2 Commit response with FAILURE status

In case of complete/partial failure the user will be notified about the status and the job entry will be paused. There is no attempt made to retry automatically the failed sop instances. However the user can manually retry the failed jobs. Such requests will be treated as new requests. This will go through the whole sequence of operations once again.

The failure reason is ignored.

Failed SOP instances will have their archive flag information unaltered.

Note: The archive status flag in the browser is a shared flag with local archive. When the status is "Y", it means that the images are archived but doesn't specify whether on local archive device or remote archive device. It is left to the user's discretion whether the local sop instances (with their archive flag set to "Y") are to be deleted.

N-EVENT-REPORT-RSP will be sent on the same association itself. No DATA Set will be sent along with the response.

Please see section 5.1.2.1 for the complete list of N_EVENT_REPORT failure statuses processed by the system and section 2.3.1.2.5.3.1 for the complete list of status codes the application may send back in the **N-Event-Report** response command to the **Storage Commitment** SCP equipment that sent the N-Event- Report request.

Following are the status codes the Application may send back to the SCP Equipment after receiving the N-EVENT-REPORT:

Status Codes Returned by DICOM SERVER AE for Activity *Listen to remote Storage Commitment SCP* with FAILURE Status

Service Status	Status Codes	Further Meaning	Status Code sending explanation	Related Fields sent back to the SCU
Error	0110	Processing Failure	Indicates that an internal error occurred while processing.	None
Success	0000	Success	The storage commitment result received successfully.	None

2.3.1.4 Presentation Context Acceptance Criterion

The DICOM SERVER AE evaluates each Presentation Context independently, and accepts any Presentation Context that matches an Abstract Syntax for any Real-World Activity.

2.3.1.5 Transfer Syntax Selection Policies

Within each Presentation Context, the DICOM SERVER AE will select Transfer Syntaxes according to the following priority (highest priority first):

1. Explicit VR Little Endian
2. Implicit VR Little Endian
3. Explicit VR Big Endian

2.4 Communication Profiles

2.4.1 Supported Communication Stacks (part 8)

DICOM Upper Layer (Part 8) is supported using TCP/IP.

2.4.2 TCP/IP Stack

The TCP/IP stack is inherited from a UNIX Operating System.

2.4.2.1 Physical Media Support

Ethernet v2.0, IEEE 802.3. Auto senses 10/100 Base T Ethernet connection.

2.4.3 Additional Protocols

DHCP is not supported in this product.

2.4.4 IPv4 and IPv6 Support

IPv4 and IPv6 are supported by this product.

2.5 Extensions / Specializations / Privatizations

2.5.1 Standard Extended / Specialized / Private SOP Classes

The product provides Standard Extended Conformance to all supported SOP Classes, through the inclusion of additional Type 3 Standard Elements and Private Data Elements. The extensions are defined in Sections. Please refer section A 4.4 for CT IOD

2.5.2 Private SOP Class GE PET Raw

Refer to ***Appendix B& Appendix D*** for a complete listing of private data elements used with this implementation.

2.6 Configuration

2.6.1 AE Title/Presentation Address Mapping

The Discovery system allows the user to “add”, “Remove”, or “Update the mapping of remote AE Titles to IP Addresses and Ports.

In **Discovery 710, Discovery 610 and Optima 560 (SW Version: pet_mfk.xx) -**

These options can be selected from the “Remote Host Selection” menu displayed by choosing “Select Remote Host” from the “Network” pull-down menu from the local database manager.

In **Discovery 710 and Discovery 610 (SW Version: pet_coreload.xx) –**

These options can be selected from “Network Configuration” dialog box displayed by choosing “Network Configuration” from the “Tools” pull-down menu from the local database browser.

2.6.2 Configurable Parameters

The following fields are configurable for the DICOM Server AE:

- Local AE Title (the machine hostname)
- Local IP Address
- Local IP Netmask
- Local Listening Port Number

Note: The local port on which the GEHC PET system receives DICOM incoming TCP connections is port **4006**.

The following fields are configurable for every Remote DICOM AE:

- Remote AE Title
- Remote IP Address
- Listening TCP/IP Port Number
- Max PDU length

For the Discovery 710/610 and Optima 560 product (SW Version pet_mfk.xx), time-outs, which are set for all hosts, are configurable in dcs.cfg:

*Association time-out - *bi_assoc_tio*
*Session timeout - *bi_session_tio*
*Create timeout - *bi_ncreate_tio*

- For the Discovery 710/610 and Optima 560 products (SW Version pet_coreload.xx) timeouts are set in network-cfg.xml and mergecom.pro files

Note: All configurations should be performed by a GE Field Service Engineer.

2.6.2.1 PPS Configuration

PPS allows for the configuration of the following parameters that pertain to the remote AE.

- Remote MPPS AE IP Address: IP Address used to contact the remote MPPS AE
- Remote AE (HIS/RIS) IP Port: IP Port used to contact the remote MPPS AE
- Remote MPPS AE Title: Application Entity Title used to contact the remote MPPS AE

These parameters define where the MPPS requests will be directed. Configuration of these parameters is performed by GEHC Field Service engineers, using the installation facilities.

The following are configurable for the PPS Server AE:

- Local (PPS Server AE) AE Title (The default is host name of the scanner appended with string "_PPS". If the length exceeds 16 characters the AE Title is truncated to a length of 16.)
- Local IP Address
- Local IP net-mask
- Local IP gateway
- The following parameters are configurable, but need change only in case of a system software upgrade:
- Implementation UID
- PDU size
- Association time-out period
- Session time-out period

The following DICOM sequences are currently defaulted to be automatically sent in the PPS N-CREATE and PPS N-SET however PPS can be configured to not send them:

- (0008, 1032) Procedure Code Sequence – sent in the PPS N-CREATE. If not sent, the PPS N-CREATE will contain an empty Procedure Code Sequence.
- (0040, 0260) Performed Protocol Code Sequence – sent in the PPS N_SET. If not sent, the PPS N-SET will not contain a Performed Protocol Code Sequence.

2.6.2.2 Modality Worklist Query Configuration

HIS/RIS is configured as a remote AE. These parameters define where worklist queries will be directed. Configuration of these parameters is performed by GEHC Field Service engineers using the ModalityWorklist installation facilities.

The following parameters are configurable for the DICOM Worklist Server AE:

- Local (Worklist Server) AE Title (automatically set to host name of scanner)
- Local IP address
- Local IP netmask
- Local IP gateway

The following parameters are configurable by changing their values in the configuration file **/usr/g/config/WLdcm.cfg**. Note that these parameters typically need not be changed. Furthermore, no support is provided for retaining changed settings: the values will require changing again after a system software upgrade.

- Implementation UID
- PDU size
- Association time-out period
- Session time-out period
- C-FIND time-out period

2.6.2.3 GSPS Configuration

Exam Split allows for the configuration of the following parameters that pertain to the remote AE.

• Remote GSPS AE IP Address	IP Address used to contact the remote GSPS AE
• Remote GSPS IP Port:	IP Port used to contact the remote GSPS AE
• Remote GSPS AE Title	Application Entity Title used to contact the remote GSPS AE
• Remote HES AE IP Address	IP Address used to contact the remote HES AE
• Remote HES IP Port:	IP Port used to contact the remote HES AE
• Remote HES AE Title	Application Entity Title used to contact the remote HES AE

The Following are configurable for the GSPS.

- Remote Host IP address
- Remote Host port

- Remote AE Title
- VES_ORIENTATION (environment variable for enable/disable Flip/Rotate functionality in VES)
- Changesplit_mode <HES/VES>

2.6.2.4 Print Configuration

The following DICOM print parameters are configurable.

Attribute Name	DICOM Tag
Medium Type	(2000, 0030)
Film Destination	(2000, 0040)
Magnification Type	(2010, 0060)
Min Density	(2010, 0120)
Max Density	(2010, 0130)
Empty Image Density	(2010, 0110)
Border Density	(2010, 0100)
Configuration Information	(2010, 0150)
Smoothing Type	(2010, 0080)

The following network timers are supported and are configurable. When these timers expire the association is terminated. The default values are:

Timeout Description	Default Value
Association Time out	120 seconds
Session Time out	1200 seconds
N-SET Time out	300 seconds
N-ACTION Time out	300 seconds
N-CREATE Time out	300 seconds
N-DELETE Time out	300 seconds
N-GET Time out	100 seconds

Time-outs, which are set for all hosts, are configurable in dprint.cfg:

*Association time-out - *bi_assoc_tio*
*Session timeout - *bi_session_tio*
*Create timeout - *bi_ncreate_tio*

Note: All configurations are performed by a GE Field Service Engineer

2.7 Support of Extended Character Sets

In addition to the DICOM default character set, Discovery supports the ISO IR 100 Latin alphabet #1 supplementary set for the purpose of interchange.

As a Storage SCP, the product will accept SOP Instances with any value of Specific Character Set (0008,0005).

As a Query SCU, it will similarly accept response items with any value of Specific Character Set. However, it will display in the user interface only characters specified as within ISO_IR 6 (ASCII) or the configured extended character set.

The product user interface will allow the user to enter characters from the console keyboard that is within ASCII or the configured extended character set. If any such extended characters are included in SOP Instances or in query identifier matching fields, the product will appropriately specify the extended character set in Specific Character Set (0008,0005).

The generated MPPS messages will also specify the character set in (0008,0005) if the referenced images contain extended characters.

As a Modality Worklist SCU, it only uses ISO_IR 100 Specific Character Set in the worklist query requests.

2.8 CODES AND CONTROLLED TERMINOLOGY

The product uses coded terminology as defined below.

2.8.1 Mapped Coded Terminology

The product maps, without change, coded terminology values supplied in Modality Worklist Scheduled Procedure Steps into Image SOP Instance and Modality Performed Procedure Step attributes, as described in Sections 6 and 7.

2.8.2 PET Isotope and Patient Orientation Module

The encodings used in formatting the sequences in the PET isotope and patient orientation module, which are supplied into the Image SOP Instance, are described in Appendix A.

2.9 SECURITY PROFILES

The product does not conform to any defined DICOM Security Profiles.
It is assumed that the product is used within a secured environment. It is assumed that a secured environment includes at a minimum:

- Firewall or router protections to ensure that only approved external hosts have network access to the product.
- Firewall or router protections to ensure that the product only has network access to approved external hosts and services.

- Any communications with external hosts and services outside the locally secured environment use appropriate secure network channels (such as a Virtual Private Network (VPN))

3 MEDIA STORAGE CONFORMANCE STATEMENT

3.1 Introduction

This conformance statement specifies the Discovery conformance to the DICOM Media Interchange. It details the DICOM Media Storage Application Profiles and roles that are supported by this product.

The GEHC PET-CT system provides capabilities to DICOM Media Interchange on CD (Compact Disc), DVD (Digital Video Disc –Recordable) and USB Storage device with VFAT file system. The system works with most of the IOD's like Computed Tomography (CT), Magnetic Resonance (MR), Positron Emission Tomography (PET), and Digital X-Ray images.

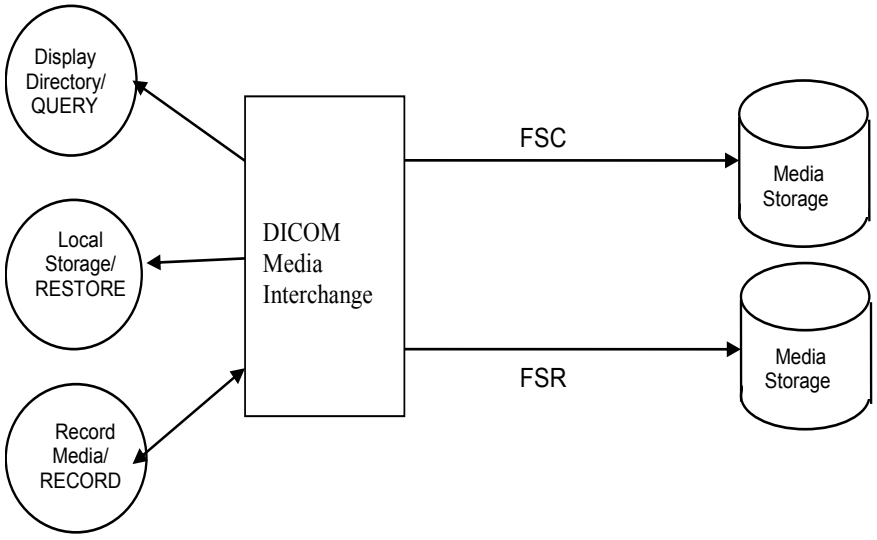
3.2 Implementation Model: Media Server

All DICOM functionality on the Discovery and Optima products is handled by the DICOM Server Application Entity (AE). The DICOM Server AE is commanded to perform DICOM services through the buttons and menu selections on the main user interface panel.

3.2.1 Application Data Flow Diagram

The media interchange application model for the Discovery and Optima systems is shown in the following Illustration :

Illustration 3-2: SYSTEM MEDIA INTERCHANGE APPLICATION MODEL AND DATA FLOW DIAGRAM



The DICOM Media Interchange Application Entity (AE) handles the DICOM CREATE/RESTORE functionality for the CD/DVD and USB storage media. The DICOM Media Interchange AE is commanded by the user to perform DICOM services operating on the DICOM media through the use of buttons and menu selections on the graphical user interface of the platform.

The DICOM Media Interchange AE has a local storage that may contain various SOP instances. These may have been obtained by original creation, network (DICOM or proprietary) or by removable media using other application entities. These instances are external to this conformance claim and the origin of SOP instances is outside the scope of this claim.

The Media Creator initializes Media by acting as an FSC to create a new DICOM File-set on a 700MB CD/4.7GB DVD/USB Storage(no size limit) blank Interchange Media. It initializes the DICOM File-set and writes all the specified SOP instances onto the Interchange Media at once. The SOP instances written will be limited to instances that match the criteria of one of the Application Profiles that is supported. Updating the media is not supported.

The DICOM Media Interchange AE acts as an FSR when requested to browse the Interchange Media such that user can select the SOP instances that he wants the DICOM Media Interchange AE to copy on the local database by selecting appropriate Study/Series/Image instances.

The supported file system during creation and restore are listed below:

File System	Supported during Media Create (FSC)	Supported during Media Restore (FSR)
ISO 9660	YES	YES
UDF	NO	YES
VFAT	YES	YES

The supported media during creation and restore are listed below:

Media	Supported during Media Create (FSC)	File System supported (FSC)	Supported during Media Restore (FSR)	File System supported (FSR)
CD -R	YES	ISO 9660	YES	ISO 9660
CD -RW	YES	ISO 9660	YES	ISO 9660
DVD -R	YES	ISO 9660	YES	ISO 9660 & UDF
DVD -RW	YES	ISO 9660	YES	ISO 9660 & UDF
DVD+R	NO	ISO 9660	YES	ISO 9660 & UDF
DVD+RW	NO	ISO 9660	YES	ISO 9660 & UDF
DVD-ROM	NO	ISO 9660	YES	ISO 9660 & UDF
USB Storage (VFAT	YES	VFAT	YES	VFAT

file system)				

3.2.2 Functional Definitions of AE's

The DICOM Media Interchange AE supports the following functions:

- Generate and write a DICOM File Set (FSC) in a one shot activity. (SAVE).
- Read a DICOM File Set (FSR) on an Interchange Media (QUERY).
- It can copy SOP instances from the media onto local storage. (RESTORE).

3.2.3 Sequencing of Real World Activities

Sequencing of DICOM Media Interchange AE Real World Activities

The display function (QUERY) can only be performed on a piece of media that already has a DICOM File set created. With no SOP instances having been added, the directory will be displayed empty.

The save function can only be performed on a blank (unused) Interchange Media. Updates to an already recorded Interchange Medium are not supported.

There are no other sequencing requirements.

3.2.4 File Meta Information for Implementation Class and Version

The File Meta-Information for this implementation is:

- File Meta-Information Version 1
- Implementation Version Name .....Software Revision (See Appendix E)

The table in Appendix E identifies the Implementation UID for this product version.

3.3 AE Specifications

3.3.1 DICOM Storage Media (CD /DVD /USB Storage) Interchange AE Specification

The DICOM CD/DVD/USB Storage Media AE provides standard conformance to DICOM Media Interchange Option of the Media Storage Service Class. The supported Application Profiles and roles are listed below.

Table 3.3.1-1: Application Profile, Activities and Roles for CD/DVD-R/CD-RW /DVD-RW/USB Update

Supported Application Profile	Real World Activity	Role	Option
STD-GEN-CD	CREATE CD	FSC	Interchange
STD-GEN-CD	QUERY CD	FSR	Interchange
STD-GEN-CD	RESTORE CD	FSR	Interchange
STD-GEN-DVD-JPEG	CREATE DVD	FSC	Interchange
STD-GEN-DVD-JPEG	QUERY DVD	FSR	Interchange
STD-GEN-DVD-JPEG	RESTORE DVD	FSR	Interchange
STD-GEN-USB-JPEG	CREATE USB	FSC	Interchange
STD-GEN-USB-JPEG	QUERY USB	FSR	Interchange
STD-GEN-USB-JPEG	RESTORE USB	FSR	Interchange

3.3.1.1 File Meta Information for Implementation Class and Version

The File Meta-Information for this implementation is:

- File Meta-Information Version.....1
- Implementation Version Name.....Software Revision (See Appendix E)

The table in Appendix E identifies the Implementation UID for this product version.

3.3.1.2 Real-World Activities for the DICOM Media Interchange AE

3.3.1.2.1 Real-World Activity (RWA) Create (Generate and Write) CD/DVD/USB

The DICOM Media Interchange AE acts as an FSC using the interchange option when requested to copy SOP Instances from the local database to a CD-R/DVD-R/CD-RW/DVD-RW/USB

The user selects the entries in the local database that he/she wants the DICOM Media Interchange AE to copy onto Interchange Media.

The graphic interface allows the user to select the entries (patients, studies, series or images) in the local database to be copied onto to the selected Interchange Media.

The DICOM Media Interchange AE creates one File Set per generated Interchange Media.

- A user can only create one copy of CD/DVD image for a drive at a time; any other attempt of creation will wait until the first one is complete.
- A user cannot create CD/DVD/USB while restore CD/DVD/USB is in process.
    - A DICOM Media Viewer is provided along with the selected object instances on the interchange media. This viewer can be loaded on a standard PC running Windows XP, Windows Vista or Windows 7.

Before writing on the Interchange Medium, the DICOM Media Interchange AE checks for the following condition:

- The inserted media is blank and write-able. If the condition is not met, an error is displayed and the user needs to replace it with a blank media.

3.3.1.2.1.1 Application Profiles for the RWA: Create CD/DVD/USB

For the AE Conforms to the Application Profile, see the Table 3.3.1-1 in section 3.3 for Create CD/DVD/USB

3.3.1.2.1.1.1 Options for STD-GEN-CD STD-GEN-DVD-JPEG and STD-GEN-USB-JPEG Application Profile:

Following are the SOP Classes supported by the RWA "Create CD/DVD/USB". All SOP Instances use the Explicit VR Little Endian Uncompressed Transfer Syntax, UID 1.2.840.10008.1.2.1. for creating CD/DVD/USB.

TABLE 3.3.1.2-1

SOP Class	SOP Class UID
CT Image Storage	1.2.840.10008.5.1.4.1.1.2
MR Image Storage	1.2.840.10008.5.1.4.1.1.4
Positron Emission Tomography Image Storage	1.2.840.10008.5.1.4.1.1.128
Nuclear Medicine Image Storage	1.2.840.10008.5.1.4.1.1.20
Ultrasound Image Storage	1.2.840.10008.5.1.4.1.1.6
X-Ray Angiographic Image Storage	1.2.840.10008.5.1.4.1.1.12.1
Secondary Capture Image Storage	1.2.840.10008.5.1.4.1.1.7
Grayscale Softcopy Presentation State Storage	1.2.840.10008.5.1.4.1.1.11.1
Enhanced SR Storage	1.2.840.10008.5.1.4.1.1.88.22
GEMS PET Raw Information Storage	1.2.840.113619.4.30

3.3.1.2.1.1.2 FSC Directory Options

Refer to Appendix C for a complete listing of all modules and attributes used in the DICOMDIR definition.

NOTE:
Modality attribute (0008,0060) in the DICOMDIR Series records should be "CT" for Secondary Capture SOP Class Images. Otherwise the GEHC CT system's DICOM media display browser will not list-up the series for contents rendering the retrieval to local storage impossible.

For USB, only one DICOM file set shall be stored in the first partition of a partitioned device. If the device is not partitioned, only one DICOM file set shall be stored on the device.

Attention:

The Discovery 710/610 supports type of raw data format called **"PET List Data"** with SOP class name GE Private PET List data and SOP class UID 1.2.840.113619.4.30. Though it is having same SOP class UID as PET Raw data, PET List data won't be supporting any Archive/Restore operations. Exam containing the PET List Series will skip the same during "Save by Exam".

The Discovery 710/610 uses the GE PET Raw SOP Class for local storage and management of "list" data. Unlike other types of GE PET Raw (such as sinogram and spectra data), list data is not supported in archive operations such as save and restore, and the list data objects will not be visible via Archive browsers. List data objects are labeled as "List" on the database browser, and can be identified by tag (0008, 0060) (see Section D.2)

- Save by Series on PET List series not supported
- Save by Image on PET List frame not supported

PET List Data behavior on PET Applications

On saving exams (contains PET List Series) generated from Anonymous Patient data or Edit Patient Data or Edit Tracer application, the exam level archive flag set to Yes after skipping the PET List Series during save.

Note: The Optima 560 product does not support PET List Data.

3.3.1.2.2 Real World Activity: QUERY

The DICOM Media Interchange AE acts as an FSR using the interchange option when requested to browse the Interchange Media.

When Media Application is requested to provide a directory listing it will read the File-set and display the DICOMDIR directory entries for those SOP instances in the File-set that correspond to the user selected Application Profile.

If the media is not blank, then Interchange Media gets mounted. To remove the media, the user has to select the eject button on user interface for the appropriate drive.

A user cannot display the directory when create CD/DVD/USB or restore CD/USB are in progress

3.3.1.2.2.1 Application Profiles for the RWA: Display Directory

For the list of Application Profiles that invoke this AE for the Display Directory CD/USB RWA,, see Table 3.3.1-1.

There are no extensions or specializations.

3.3.1.2.2.2 Media Storage Application Profile for the RWA: Display Directory:

Following are the SOP Classes supported by the RWA "Display Directory of CD/USB":

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1

3.3.1.2.3 Real World Activity: RESTORE

The DICOM Media (CD/DVD /USB Storage) Interchange AE acts as an FSR using the interchange option when requested to copy SOP instances from the CD/DVD/USB to the local database.

The user selects the SOP instances that he wants the DICOM Media Interchange AE to copy on the local database by selecting appropriate Study/Series/Image instances and clicking on the suitable restore buttons. Once selected, the SOP instances are copied from the media to the local database.

If the media is not blank, then the Interchange Media gets mounted. To remove the media, the user has to select the eject button on the User Interface for the appropriate drive.

A user cannot restore CD/DVD/USB while create CD/DVD/USB is in process.

A user can only restore selected composite objects at a time from a media; any other attempt of selections to restore CD/DVD/USB on media in same drive will wait until the first one is completed.

3.3.1.2.3.1 Application Profiles for the RWA: Local Storage – RESTORE (CD/USB)

For the list of Application Profiles that invoke this AE for the Restore RWA, see Table 3.3.1-1. For extensions and specialization's see section 3.5.

3.3.1.2.3.1.1 Options for STD-GEN-CD and STD-GEN-USB-JPEG Application Profile:

Following are the SOP Classes supported by the RWA "Local Storage – RESTORE (CD/USB)".

Information Object Definition	SOP Class UID	Transfer Syntax	Transfer Syntax UID
Media Storage Directory Storage	1.2.840.10008.1.3.10	Explicit VR Little Endian	1.2.840.10008.1.2.1
See Table 3.3.1.2.1.1.1-1	See Table 3.3.1.2.1.1.1-1	Explicit VR Little Endian	1.2.840.10008.1.2.1
See Table 3.3.1.2.1.1.1-1	See Table 3.3.1.2.1.1.1-1	JPEG Lossless Process 14 (selection value 1) (STD-GEN-USB-JPEG only)	1.2.840.10008.1.2.4.70

See Table 3.3.1.2.1.1.1-1	See Table 3.3.1.2.1.1.1-1	JPEG Lossy, Baseline Sequential with Huffman Coding (Process 1) (STD-GEN-USB-JPEG only)	1.2.840.10008.1.2.4.50
See Table 3.3.1.2.1.1.1-1	See Table 3.3.1.2.1.1.1-1	JPEG Extended (Process 2 & 4): Default Transfer Syntax for Lossy JPEG 12 Bit Image Compression (Process 4 only) (STD-GEN-USB-JPEG only)	1.2.840.10008.1.2.4.51

3.4 Augmented and Private Application Profiles

3.4.1 Augmented Application Profiles

The CD/DVD/USB Media Archive Interchange AE does not support any augmented Application Profiles.

3.4.2 Private Application Profiles

The CD/DVD/USB Media Interchange AE does not support any private Application Profiles.

3.5 Extensions, Specializations and Privatization of SOP Classes and Transfer Syntax

3.5.1 Extensions, Specializations and Privatizations of SOP Classes

The CT/MR/PET SOP Class Images have definitions extended for Defined Terms and include GE specific Private Data elements. The following sections describe the details for these SOP classes.

3.5.1.1 SOP Specific Conformance Statement for CT SOP Class

Refer to ***section 2.5*** for standard extensions and ***Appendix B*** for private data elements.

3.5.1.2 SOP Specific Conformance Statement for MR SOP Class

Refer to ***section 2.5*** for standard extensions and ***Appendix B*** for private data elements.

3.5.1.3 SOP Specific Conformance Statement for PET SOP Class

Refer to ***section 2.5*** for standard extensions and ***Appendix B*** for private data elements.

3.5.2 Private Transfer Syntax Specification

None specified

3.6 Configuration

For the CD/DVD/USB Interchange Media Application, the source AE Title encoded in the File Meta-Information cannot be modified.

3.7 Support of Extended Character Sets

The DICOM Media Interchange AE will support copy of SOP instances containing the ISO IR 100 (Latin alphabet No. 1, supplementary set) and DICOM default character sets as defined in PS3.5.

Any incoming SOP instances encoded using another extended character set will not be installed in the GEHC PET-CT system database.

4 PRINT Management Implementation

4.1 Introduction

This section of the DICOM Conformance Statement specifies the implementation for the specific SOP Classes supported in the Basic Grayscale and Color Print Management Meta SOP Classes, the attributes supported for both IODs and services, and the valid range of values for mandatory and optional attributes.

4.2 Basic Film Session SOP Class

The Print SCU supports the following DIMSE Service Elements for the Basic Film Session SOP Class.

• N-CREATE – Requests the Print SCP to create an instance of Basic Film Session.

4.2.1 Basic Film Session N-Create Attributes

The following Attribute values are supported by the N-CREATE:

Attribute	DICOM Tag	Valid Range	Default Value
* Number of Copies	(2000, 0010)	1-99	Set by user
* Print Priority	(2000, 0020)	HIGH / MED / LOW	Set in Configuration file (Default value is HIGH)
* Medium Type	(2000, 0030)	CLEAR FILM BLUE FILM PAPER	Set in Configuration File
* Film Destination	(2000, 0040)	MAGAZINE PROCESSOR	Set in Configuration File

Note: * denotes that the attribute is optional for the SCU. However, we do provide values for all of these optional attributes and if the SCP does not support the requested value it may choose to either return a failure status or ignore the value provided and use its default value.

4.3 Basic Film Box SOP Class

The Print SCU supports the following DIMSE Service Elements for the Basic Film Box SOP Class.

- N-CREATE – Requests the Print SCP to create an instance of Film Box.
- N-ACTION – Requests the Print SCP to print the Film Box onto Printer.
- N-DELETE – Requests the Print SCP to delete the Film Box Instance.

4.3.1 Basic Film Box N-Create Attributes

This table lists the attributes that are sent to the SCP in the Basic Film Box N-Create Request, and that are received in the Basic Film Box N-Create Response from the SCP

Attribute Name	DICOM Tag	Use
Image Display Format	(2010, 0010)	Set in User Interface Valid Range -STANDARD/C,R
Reference Film Session Sequence	(2010, 0500)	Sent in the request
Referenced Image Box Sequence	(2010,0510)	NA
*Film Orientation	(2010, 0040)	Set when a printer device is added using the Film Composer Tool. Set in Configuration File. Valid value is: PORTRAIT
Film Size ID	(2010, 0050)	Set when a printer device is added using the Film Composer Tool. Valid values are : 14INX17IN, A3, A4, 8INX10IN, 8.5INX11IN, 10INX12IN, 10INX14IN, 11INX14IN, 11INX17IN, 14INX14IN, 24CMX24CM, 24CMX30CM.
*Magnification type	(2010, 0060)	Set when a printer device is added using the Film Composer Tool. Set in Configuration File. Valid values are: REPLICATE BILINEAR CUBIC NONE
*Max Density	(2010, 0130)	Set when a printer device is added using the Film Composer Tool. Set in Configuration File. Valid range is: 0-4095.
Configuration Information	(2010, 0150)	Set when a printer device is added using the Film Composer Tool
*Smoothing type	(2010, 0080)	Set when a printer device is added using the Film Composer Tool. Set in Configuration File.
*Border density	(2010, 0100)	Set when a printer device is added using the

		Film Composer Tool. Set in Configuration File. Valid values are: BLACK or WHITE or Not sent
*Empty image density	(2010, 0110)	Set when a printer device is added using the Film Composer Tool. Set in Configuration File. Valid values are: BLACK or WHITE or Not sent
*Min density	(2010, 0120)	Set when a printer device is added using the Film Composer Tool. Set in Configuration File. Valid values are: 0-4095 or Not sent
*Trim	(2010, 0140)	Valid values are: YES or NO or Not Sent Default value : NO

4.4 Basic Grayscale Image Box SOP Class

The Print SCU supports the following DIMSE Service Elements for Grayscale Image Box SOP Class.

• N-SET – Requests the Printer to set the image box attributes.

This table lists the attributes that are sent in the Basic Grayscale Image Box N-Set Request:

Attribute Name	Tag	Use
Image Position	(2020,0010)	Based on Image Display Format
Basic Grayscale Image Sequence	(2020,0110)	Sent in the request
>Samples Per Pixel	(0028,0002)	1
>Photometric Interpretation	(0028,0004)	MONOCHROME2
>Rows	(0028,0010)	Image Dependent
>Columns	(0028,0011)	Image Dependent
>Pixel Aspect Ratio	(0028,0034)	1\1
>Bits Allocated	(0028,0100)	8 (if Bits Stored=8) or 16 (if Bits Stored=12)
>Bits Stored	(0028,0101)	8 or 12. Default value: 8
>High Bit	(0028,0102)	7 (if Bits Stored=8) or 11 (if Bits Stored=12)
>Pixel Representation	(0028,0103)	0 (unsigned integer)
>Pixel Data	(7FE0,0010)	Pixel data
Polarity	(2020,0020)	NORMAL
Magnification Type	(2010,0060)	BILINEAR

		CUBIC REPLICATE NONE
Smoothing Type	(2010,0080)	Printer Dependent
Min Density	(2010,0120)	0-4095, Not Sent
Max Density	(2010,0130)	0-4095
Configuration Information	(2010,0150)	Printer Dependent
Requested Image Size	(2020,0030)	Not used
Requested Decimate/Crop Behavior	(2020,0040)	Not used
Referenced Presentation LUT Sequence	(2050,0500)	Not supported.
> Referenced SOP Class UID	(0008,1150)	Not supported.
> Referenced SOP Instance UID	(0008,1155)	Not supported.

Note: * denotes that the attribute is optional for the SCU. However, we do provide values for all of these optional attributes and if the SCP does not support the requested value it may choose to either return a failure status or ignore the value provided and use its default value

4.5 Basic Color Image Box SOP Class

The Print SCU supports the following DIMSE Service Elements for Basic Color Image Box SOP Class.

- N-SET - Requests the Printer to set the image box attributes.

This table lists the attributes that are sent in the Basic Color Image Box N-Set Request:

Attribute Name	Tag	Use
Image Position	(2020,0010)	Based on Image Display Format
Basic Color Image Sequence	(2020,0111)	
>Samples Per Pixel	(0028,0002)	3
>Photometric Interpretation	(0028,0004)	RGB
>Planar Configuration	(0028,0006)	1
>Rows	(0028,0010)	Image Dependent
>Columns	(0028,0011)	Image Dependent
>Pixel Aspect Ratio	(0028,0034)	1/1
>Bits Allocated	(0028,0100)	8
>Bits Stored	(0028,0101)	8
>High Bit	(0028,0102)	7
>Pixel Representation	(0028,0103)	0 (unsigned integer)
>Pixel Data	(7FE0,0010)	Pixel data

Polarity	(2020,0020)	NORMAL
Magnification Type	(2010,0060)	BILINEAR CUBIC REPLICATE NONE
Smoothing Type	(2010,0080)	Printer Dependent
Requested Image Size	(2020,0030)	Not used
Requested Decimate/Crop Behavior	(2020,0040)	Not used

4.6 Printer SOP Class

N-GET DIMSE service is supported for the Printer SOP Class. If an N-EVENT-REPORT DIMSE service is received when the association is active, Print SCU handles the relevant states but the data received.

This table defines the set of attributes that this product may request using the Printer N-Get service. It also describes the product behavior when receiving the N-Get response from the Printer SCP:

Attribute Name	Tag	Use
Printer Status	(2110, 0010)	NORMAL: Status is logged and sends Film Session N-CREATE request. WARNING: Status is logged. Pauses the print job and displays status code on the film composer UI. FAILURE: Status is logged. Pauses the print job and displays print failure message on the film composer UI.
Printer Status Info	(2110, 0020)	SUPPLY LOW: Logs the message and continues printing. SUPPLY EMPTY: print job is paused and the message is logged. RECEIVER FULL: print job is paused and the message is logged. FILM JAM: print job is paused and the message is logged.
Printer Name	(2110, 0030)	Logged if sent by SCP
Manufacturer	(0008, 0070)	Logged if sent by SCP
Manufacturer Model Name	(0008, 1090)	Logged if sent by SCP
Device Serial No.	(0018, 1000)	Logged if sent by SCP
Software Versions	(0018, 1020)	Logged if sent by SCP

Date Last Calibrated	(0018, 1200)	Ignored
Time Last Calibrated	(0018, 1201)	Ignored

5 Storage Commitment Push Model Implementation

5.1 Storage Commitment Push Model Information Object Definition

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the attributes contained within the Storage Commitment Information Object.
The Storage Commitment Information Object is used both for N-ACTION Storage Commitment Requests and N-EVENT-REPORT Storage Commitment Notifications by the SCU.

5.1.1 Storage Commitment Module for N-ACTION

Table – 5.1.1-1- Storage Commitment Module for N-ACTION.

Attribute Name	Tag	SCU Use
Transaction UID	(0008,1195)	Generated for each retry
Storage Media File-Set ID	(0088,0130)	Not Supported
Storage Media File-Set UID	(0088,0140)	Not Supported
Referenced SOP Sequence	(0008,1199)	
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
Storage Media File-Set ID	(0088,0130)	Not Supported
Storage Media File-Set UID	(0088,0140)	Not Supported

5.1.2 Storage Commitment Module for N-EVENT-REPORT

Table – 5.1.2-1 Storage Commitment Module for N-EVENT-REPORT

Attribute Name	Tag	SCU Use
Transaction UID	(0008,1195)	Value received from SCP
Retrieve AE Title	(0008,0054)	Not used
Storage Media File-Set ID	(0088,0130)	Not used
Storage Media File-Set UID	(0088,0140)	Not used
Referenced SOP Sequence	(0008,1199)	When status is SUCCESS, the "Archived" flag value for the referenced SOP instances is changed to "Y" in the browser.
> Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
>Retrieve AE Title	(0008,0054)	Not used

>Storage Media File-Set ID	(0088,0130)	Not used
>Storage Media File-Set UID	(0088,0140)	Not used
Failed SOP Sequence	(0008,1198)	"Archived" flag value for the failed SOP instance is unaltered. Failed SOP instances are logged.
>Referenced SOP Class UID	(0008,1150)	
>Referenced SOP Instance UID	(0008,1155)	
>Failure Reason	(0008,1197)	Not used

5.1.2.1 Processing of Failure Reason when received in a N-Event-Report

When receiving a N-Event-Report request with a Event Type ID equal to 2, meaning that Storage Commitment is complete, but failure exists, following is the set of value that this Storage Commitment SCU AE is able to process.

Failure Reason	Meaning	Application Behavior When Receiving Reason Code
0110H	Processing failure	Log file updated: Processing Failure. Job failed.
0112H	No such object instance	Log file updated: No such object instance. Job failed.
0213H	Resource limitation	Log file updated: resource limitation. Job failed.
0122H	Referenced SOP Class not supported	Log file updated: reference SOP class not supported. Job failed.
0119H	Class / Instance conflict	Log file updated: class/instance conflict. Job failed.
0131H	Duplicate transaction UID	Log file updated: duplicate transaction UID. Job failed.
*	Other Failure Reason code values	Log file updated: unknown failure. Job failed.

6 Modality Work List Query Implementation

6.1 Modality Worklist Information Model Definition

6.1.1 Introduction

This section specifies the use of the DICOM Modality Worklist Information Model used to organize data and against which a Modality Worklist Query will be performed.

6.1.1 Modality Worklist Information Model Description

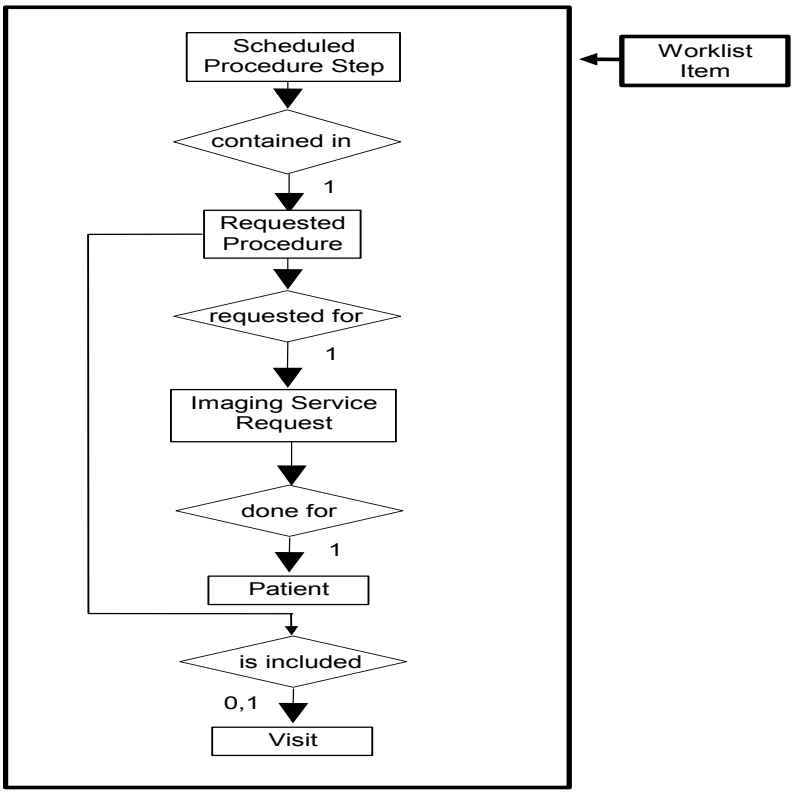
In order to serve as a Service Class Provider (SCP) of the Modality Worklist Service Class, a DICOM Application Entity (AE) possesses information about the attributes of a number of managed worklist items. These items are organized into Modality Worklist Information Modules. In this Service Class, the Information Model plays a role similar to an Information Object Definition of most other DICOM Service Classes.

6.1.2 Modality Worklist Information Model Entity-Relationship Model

The Entity-Relationship diagram for the Modality Worklist Information Model schema is shown in Illustration 6.1.2-1. It represents the information that composes a Worklist Item. In this figure, the following diagrammatic convention is established to represent the information organization:

- Each entity is represented by a rectangular box
- Each relationship is represented by a diamond shaped box.
- The fact that a relationship exists between two entities is depicted by lines connecting the corresponding entity boxes to the relationship boxes.

Illustration 6.1.2-1 – Modality Worklist Information Model E/R DIAGRAM



6.1.3 Entity Descriptions

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) and PS 3.4 (Service Class Specifications) for a description of each of the Entities contained within the Modality Worklist Information Model.

6.1.3.1 Scheduled Procedure Step

A Scheduled Procedure Step is an arbitrarily defined scheduled unit of service that is specified by the Procedure Plan for a Requested Procedure. It specifies one or more Action Items (events) involving equipment (i.e. imaging modality equipment), human resources, location and time (i.e. start time, stop time, duration).

6.1.3.2 Requested Procedure Entity Description

A Requested Procedure is an instance of a Procedure of a given Procedure Type. An instance of a Requested Procedure includes all of the items of information that are specified by an instance of a Procedure Plan that is selected for the Requested Procedure by the imaging service provider.

6.1.3.3 Imaging Service Request Entity Description

An Imaging Service Request is a set of one or more Requested Procedures selected from a list of Procedure Types. An Imaging Service Request is submitted by one authorized imaging service requester to one authorized imaging service provider in the context of one Service Episode.

6.1.3.4 Visit Entity Description

A Visit is the context in which the treatment or management of an arbitrary subset of a Patient's medical conditions occurs. A Visit is limited to the description of a Patient's activities at a single facility.

6.1.3.5 Patient Entity Description

A Patient is a person receiving, or registered to receive healthcare services.

6.1.4 Modality Worklist Mapping of DICOM Entities

Table 6.1.4-1 —Mapping of DICOM Entities to Modality Worklist Entities

DICOM	Modality Worklist Entity
Scheduled Procedure Step	Exam
Requested Procedure	Exam
Imaging Service Request	Exam
Visit	Exam
Patient	Patient

6.1.5 Information Model Module Table

Within an entity of the DICOM Modality Worklist Information Model, attributes are grouped together into related set of attributes called modules. A module facilitates the understanding of the semantics concerning the attributes and how the attributes relate to one another. A module grouping does not infer any encoding of information into datasets.

Table 6.1.5-1 identifies the defined modules within the entities that comprise the DICOM Modality Worklist Information Model. Modules are identified by Module Name.

See DICOM PS 3.3 and PS 3.4 for a complete definition of the entities, modules, and attributes.

Table 6.1.5-1 – Modality Worklist Information Model Modules

Entity Name	Module Name	Reference
Scheduled Procedure Step	SOP Common	6.8.9.1
	Scheduled Procedure Step	6.8.9.2
Requested Procedure	Requested Procedure	6.8.10.1
Imaging Service Request	Imaging Service Request	6.8.11.1
Visit	Visit Identification	6.8.12.1
	Visit Status	6.8.12.2
	Visit Relationship	6.8.12.3
	Visit Admission	6.8.12.4
Patient	Patient Relationship	6.8.13.1
	Patient Identification	6.8.13.2
	Patient Demographic	6.8.13.3
	Patient Medical	6.8.13.4

6.1.6 Information Model Keys

Please refer to DICOM Standard PS 3.3. (Information Object Definitions) and PS 3.4 (Service Class Specifications) for a description of each of the Entities contained within the Modality Worklist Information Model.

The following Module descriptions contain the attributes that are present in a C-FIND request message sent by the Worklist Server AE to a remote AE. It should be noted that they are the same as those defined in the DICOM Standard, PS 3.4 (Service Class Specifications) and include:

- Name
- Tag group and element numbers
- Expected Matching Key Type: R-required, O-optional

- Expected Return Key Type:
  - 1 - non-zero value required
  - 1C - conditionally of type 1
  - 2 - required to be present, possibly with zero-length value
  - 3 - optional
- Mapped into The Image - whether this data is mapped into subsequently acquired images
- Notes - clarification of this implementation's use/treatment of this attribute

All data elements in the following Module descriptions are requested by the Worklist Server AE. Values of data elements that are not mapped into images, and are not otherwise dealt with (displayed on the user interface, etc.), are not used and are, thus, discarded upon receipt. See Table B-1 for further information.

Data elements for which values can be sent for matching purposes are described as such. Data elements for which values are not sent are sent with zero length and universal matching will apply. This is the default case if no other description to the contrary is provided.

6.1.7 Supported Matching

The following are the types of matching that can be request by the implementation:

- Single Value matching
- Universal Matching
- Range of date/time

6.1.8 Scheduled Procedure Step Entity

6.1.8.1 SOP Common Module

Table 6.1.8.1-1 – SOP Common Module Attributes

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Specific Character Set	(0008,0005)	O	1C	No	Matching for this item is supported only for the character set ISO_IR 100. SCP is not required to return (0008,0005) if there are no non-ASCII characters in the response.

6.1.8.2 Scheduled Procedure Step Module

Table 6.1.8.2-1 – Scheduled Procedure Step Module Attributes

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Scheduled Procedure Step Sequence	(0040,0100)	R	1	No	
Scheduled Station AE Title	(0040,0001)	R	1	No	Matching is supported as follows: either no AE title is supplied (universal matching), or the scanner's Worklist Server AE title is supplied for matching; this is user selectable.

Scheduled Procedure Step Start Date	(0040,0002)	R	1	No	Matching is supported as one of the following; this is user selectable: • all days, • today only, • today and a number of days before today, • today and a number of days after today, • today and a number of days before today and a number of days after today. Number of days before/after is specified by the user. Returned values must be exactly 8 numeric characters in YYYYMMDD format.
Scheduled Procedure Step Start Time	(0040,0003)	R	1	No	This attribute is sent with zero-length. Returned values must be exactly 6 numeric characters in HHMMSS format.
Modality	(0008,0060)	R	1	Yes	Matching is supported as follows: either no Modality is supplied (universal matching), or the scanner's Modality is supplied for matching; this is user selectable.
Scheduled Performing Physician's Name	(0040,0006)	R	2	No	This attribute is sent with zero-length.
Scheduled Procedure Step Description	(0040,0007)	O	1C	Yes	
Scheduled Station Name	(0040,0010)	O	2	No	
Scheduled Procedure Step Location	(0040,0011)	O	2	No	
Scheduled Protocol Code Sequence	(0040,0008)	O	1C	Yes	Up to 5 Scheduled Action Item Code Sequence Items are mapped into the image if they system is configured to support GSPS.
Code Value	(0008,0100)	O	1C	Yes	
Coding Scheme Designator	(0008,0102)	O	1C	Yes	
Code Meaning	(0008,0104)	O	3	Yes	
Pre-Medication	(0040,0012)	O	2C	No	

Scheduled Procedure Step ID	(0040,0009)	O	1	Yes	
Requested Contrast Agent	(0032,1070)	O	2C	No	Displayed on "More Info..." screen.

6.1.9 Requested Procedure Entity

6.1.9.1 Requested Procedure Module

Table 6.1.9.1-1 Requested Procedure Module Attributes

Attribute Name	**Tag**	**Expected Matching Key Type**	**Expected Returned Key Type**	**Mapped into the Image**	**Note**
Requested Procedure ID	(0040,1001)	O	1	Yes	User can enter the value for Requested Procedure Id prior to query. If user has entered the value then that value will be sent as part of the query. The value returned in the response shall be mapped to the image. Default value is "ReqProcID GE"
Requested Procedure Description	(0032,1060)	O	1C	Yes	Truncated to 22 characters.
Requested Procedure Code Sequence	(0032,1064)	O	1C	No	
Code Value	(0008,0100)	O	1C	No	
Coding Scheme Designator	(0008,0102)	O	1C	No	
Code Meaning	(0008,0104)	O	3	No	

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Study Instance UID	(0020,000D)	O	1	Yes (Based on User option)	User (Modality) will be able to configure the following. If the user has set the option to "Use MWL Study UID", then study Instance UID will be copied into the final DICOM image header. If this option is not set then a new Study instance UID is generated locally on the scanner. The default setting is to generate a new study instance uid if a worklist entry is re-used however it can be configured to reuse the same study instance uid.
Referenced Study Sequence	(0008,1110)	O	2	Yes	Only 1 Referenced Study Sequence is mapped into the image.
Referenced SOP Class UID	(0008,1150)	O	1C	Yes	
Referenced SOP Instance UID	(0008,1155)	O	1C	Yes	
Requested Procedure Priority	(0040,1003)	O	2	No	
Patient Transport Arrangements	(0040,1004)	O	2	No	
Requested Procedure Location	(0040,1005)	O	3	No	
Confidentiality Code	(0040,1008)	O	3	No	

6.1.10 Imaging Service Request Entity

6.1.10.1 Imaging Service Request Module

Table 6.1.10.1-1 – Imaging Service Request Module Attributes

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note

Accession Number	(0008,0050)	O	2	Yes	User will be able to enter value for Accession Number prior to query to be sent as part of C-FIND request. Supports maximum of 16 characters.
Requesting Physician	(0032,1032)	O	2	No	
Referring Physician's Name	(0008,0090)	O	2	Yes	Truncated to 32 characters.
Requesting Service	(0032,1033)	O	3	No	

6.1.11 Visit Entity

6.1.11.1 Visit Identification

Table 6.1.11.1-1 – Visit Identification Module Attributes

Attribute Name	**Tag**	**Expected Matching Key Type**	**Expected Returned Key Type**	**Mapped into the Image**	**Note**
Admission ID	(0038,0010)	O	2	No	
Institution Name	(0008.0080)	O	3	No	

6.1.11.2 Visit Status

Table 6.1.11.2.-1 – Visit Status Module Attributes

Attribute Name	**Tag**	**Expected Matching Key Type**	**Expected Returned Key Type**	**Mapped into the Image**	**Note**
Current Patient Location	(0038,0300)	O	2	No	Displayed on "More Info..." screen.

6.1.11.3 Visit Relationship

Table 6.1.11.3-1 – Relationship Module Attributes

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Referenced Patient Sequence	(0008,1120)	O	2	No	
Referenced SOP Class UID	(0008,1150)	O	2	No	
Referenced SOP Instance UID	(0008,1155)	O	2	No	

6.1.11.4 Visit Admission

No data elements are requested from the Visit Admission Module.

6.1.12 Patient Entity

6.1.12.1 Patient Relationship

No data elements are requested from the Patient Relationship Module.

6.1.12.2 Patient Identification

Table 6.1.12.2-1 – Patient Identification Module Attributes

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Patient's Name	(0010,0010)	R	1	Yes	Supports up to 32 characters by default however this is configurable to allow 64 characters. See also **Note1**.
Patient ID	(0010,0020)	R	1	Yes	Supports up to 16 characters by default however this is configurable to 64 characters.
Other Patient ID	(0010, 1000)	O	3	Yes	Supports 64 characters.

Note 1 :

- *Modality Worklist server supports 32 characters for patient Name*
- *Supports DICOM format for patient Name (with "^" as delimiters)*
- *If patient name in worklist has more than 32 characters then*
  - *Worklist will be accepted by the server*
  - *Worklist Browser will display only the first 32 characters*
  - *"More Info" screen will display the full patient name*
  - ***Only the FIRST 32** characters is copied into the final DICOM image header by default however this is configurable to allow 64 characters.*

6.1.12.3 Patient Demographic

Table 6.1.12.3-1 – Patient Demographic Module Attributes

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Patient's Birth Date	(0010,0030)	O	2	Yes	This value is also used to calculate the Patient's Age.
Patient's Sex	(0010,0040)	O	2	Yes	
Patient's Weight	(0010,1030)	O	2	Yes	Limited to maximum value of 999 kg.
Confidentiality constraint on patient data	(0040,3001)	O	2	No	
Patient's Size	(0010,1020)	O	3	No	
Patient's Address	(0010,1040)	O	3	No	
Patient's Telephone Numbers	(0010,2154)	O	3	No	

6.1.12.4 Patient Medical

Table 6.1.12.4-1 – Patient Medical Module Attributes

Attribute Name	Tag	Expected Matching Key Type	Expected Returned Key Type	Mapped into the Image	Note
Patient State	(0038,0500)	O	2	No	
Pregnancy Status	(0010,21C0)	O	2	No	Displayed on "More Info..." screen.
Medical Alerts	(0010,2000)	O	2	No	Displayed on "More Info..." screen.
Contrast Allergies	(0010,2110)	O	2	No	Displayed on "More Info..." screen.
Special Needs	(0038,0050)	O	2	No	Displayed on "More Info..." screen.
Additional Patient History	(0010,21B0)	O	3	No	Displayed on "More Info..." screen.

6.2 Private Data Dictionary

The Modality Worklist implementation does not define any Private Attributes within the Modality Worklist Information Model.

6.3 C-FIND Request Message

This section provides a detailed description of the C-FIND request message data that is provided to the remote AE during a worklist query operation. The dump in Table 6.10-1 below lists, in exact message order, the fields transferred as part of the C-FIND request message for a typical query.

In this particular dump, no values are specified for the Scheduled Procedure Step Start and End Dates (the attributes are sent with zero length). In DICOM this is interpreted as meaning all dates (i.e. universal matching). The Modality is also not specified in this particular dump, meaning all modalities. Note that the user, through the use of the Discovery user interface, can submit a worklist query that will cause non-zero values to be sent for these attributes.

Table 6.3-1 – C-FIND Request Message Dump

```
(0008,0000) UL   108               #    4,  1  IdentifyingGroupLength
(0008,0005) CS   [ISO_IR 100]      #   12,  1  SpecificCharacterSet
(0008,0050) SH   (no value available)  #    0,  0  AccessionNumber
(0008,0080) LO   (no value available)  #    0,  0  InstitutionName
(0008,0090) PN   (no value available)  #    0,  0  ReferringPhysicianName
(0008,1110) SQ   (Sequence with explicit Length #=1) #   24,  1  ReferencedStudySequence
 (fffe,e000) na   (Item with explicit Length  #=2)  #   16,  1  Item
  (0008,1150) UI   (no value available)  #    0,  0  ReferencedSOPClassUID
  (0008,1155) UI   (no value available)  #    0,  0  ReferencedSOPInstanceUID
 (fffe,e00d) na   (ItemDelimitationItem for re-encoding) #    0,  1  ItemDelimitationItem
(fffe,e0dd) na   (SequenceDelimitationItem for re-enc.) #    0,  1  SequenceDelimitationItem
(0008,1120) SQ   (Sequence with explicit Length #=1)  #   24,  1  ReferencedPatientSequence
 (fffe,e000) na   (Item with explicit Length  #=2)  #   16,  1  Item
  (0008,1150) UI   (no value available)  #    0,  0  ReferencedSOPClassUID
  (0008,1155) UI   (no value available)  #    0,  0  ReferencedSOPInstanceUID
 (fffe,e00d) na   (ItemDelimitationItem for re-encoding) #    0,  1  ItemDelimitationItem
(fffe,e0dd) na   (SequenceDelimitationItem for re-enc.) #    0,  1  SequenceDelimitationItem
(0010,0000) UL   96                #    4,  1  PatientGroupLength
(0010,0010) PN   (no value available)  #    0,  0  PatientName
(0010,0020) LO   (no value available)  #    0,  0  PatientID
(0010,0030) DA   (no value available)  #    0,  0  PatientBirthDate
(0010,0040) CS   (no value available)  #    0,  0  PatientSex
(0010,1000) LO   (no value available)  #    0,  0  Other Patient IDs
(0010,1020) DS   (no value available)  #    0,  0  PatientSize
(0010,1030) DS   (no value available)  #    0,  0  PatientWeight
(0010,1040) LO   (no value available)  #    0,  0  PatientAddress
(0010,2000) LO   (no value available)  #    0,  0  MedicalAlerts
(0010,2110) LO   (no value available)  #    0,  0  ContrastAllergies
(0010,2154) SH   (no value available)  #    0,  0  PatientTelephoneNumber
(0010,2160) SH   (no value available)  #    0,  0  Ethinc Group
(0010,21b0) LT   (no value available)  #    0,  1  AdditionalPatientHistory
(0010,21c0) US   (no value available)  #    0,  0  PregnancyStatus
(0010,4000) LT   (no value available)  #    0,  0  Patient Comments
(0020,0000) UL   8                 #    4,  1  ImageGroupLength
(0020,000d) UI   (no value available)  #    0,  0  StudyInstanceUID
(0032,0000) UL   64                #    4,  1  StudyGroupLength
(0032,1032) PN   (no value available)  #    0,  0  RequestingPhysician
(0032,1033) LO   (no value available)  #    0,  0  RequestingService
(0032,1060) LO   (no value available)  #    0,  0  RequestedProcedureDescription
(0032,1064) SQ   (Sequence with explicit Length #=1) #   32,  1  RequestedProcedureCodeSequence
 (fffe,e000) na   (Item with explicit Length  #=3)  #   24,  1  Item
  (0008,0100) SH   (no value available)  #    0,  0  CodeValue
  (0008,0102) SH   (no value available)  #    0,  0  CodingSchemeDesignator
```

(0008,0104) LO (no value available) # 0, 0 CodeMeaning
(fffe,e00d) na (ItemDelimitationItem for re-encoding) # 0, 1 ItemDelimitationItem
(fffe,e0dd) na (SequenceDelimitationItem for re-enc.) # 0, 1 SequenceDelimitationItem
(0038,0000) UL 32 # 4, 1 VisitGroupLength
(0038,0010) LO (no value available) # 0, 0 AdmissionID
(0038,0050) LO (no value available) # 0, 0 SpecialNeeds
(0038,0300) LO (no value available) # 0, 0 CurrentPatientLocation
(0038,0500) LO (no value available) # 0, 0 PatientState
(0040,0000) UL 192 # 4, 1 ModalityWorklistGroupLength
(0040,0100) SQ (Sequence with explicit Length #=1) # 136, 1 ScheduledProcedureStepSequence
(fffe,e000) na (Item with explicit Length #=12) # 128, 1 Item
(0008,0060) CS (no value available) # 0, 0 Modality
(0032,1070) LO (no value available) # 0, 0 RequestedContrastAgent
(0040,0001) AE (no value available) # 0, 0 ScheduledStationAETitle
(0040,0002) DA (no value available) # 0, 0 ScheduledProcedureStepStartDate
(0040,0003) TM (no value available) # 0, 0 ScheduledProcedureStepStartTime
(0040,0006) PN (no value available) # 0, 0 ScheduledPerformingPhysiciansName
(0040,0007) LO (no value available) # 0, 0 ScheduledProcedureStepDescription
(0040,0008) SQ (Seq with explicit Length #=1) # 32, 1 ScheduledActionItemCodeSequence
(fffe,e000) na (Item with explicit Length #=3) # 24, 1 Item
(0008,0100) SH (no value available) # 0, 0 CodeValue
(0008,0102) SH (no value available) # 0, 0 CodingSchemeDesignator
(0008,0104) LO (no value available) # 0, 0 CodeMeaning
(fffe,e00d) na (ItemDelimitationItem for re-encoding) # 0, 1 ItemDelimitationItem
(fffe,e0dd) na (SequenceDelimitationItem for re-enc.) # 0, 1 SequenceDelimitationItem
(0040,0009) SH (no value available) # 0, 0 ScheduledProcedureStepID
(0040,0010) SH (no value available) # 0, 0 ScheduledStationName
(0040,0011) SH (no value available) # 0, 0 ScheduledProcedureStepLocation
(0040,0012) LO (no value available) # 0, 0 PreMedication
(fffe,e00d) na (ItemDelimitationItem for re-encoding) # 0, 1 ItemDelimitationItem
(fffe,e0dd) na (SequenceDelimitationItem for re-enc.) # 0, 1 SequenceDelimitationItem
(0040,1001) SH (no value available) # 0, 0 RequestedProcedureID
(0040,1003) SH (no value available) # 0, 0 RequestedProcedurePriority
(0040,1004) LO (no value available) # 0, 0 PatientTransportArrangements
(0040,1005) LO (no value available) # 0, 0 RequestedProcedureLocation
(0040,1008) LO (no value available) # 0, 0 ConfidentialityCode
(0040,1010) PN (no value available) # 0, 0 Names of Intended Recipients
(0040,1400) LT (no value available) # 0, 0 Requested Procedure Comments
(0040,2400) LT (no value available) # 0, 0 Imaging Service Request Comm.
(0040,3001) LO (no value available) # 0, 0 ConfidentialityConstraintOnPatientData

If the query is for a particular date range, the ScheduledProcedureStepStartDate will be filled with a valid date range. If either the start or end date are left blank by the user, they will simply be blank in the query.

Below is an example of a date range for August 30, 1997 through October 12, 1997.
(0040,0002) DA [19970830-19971012] # 18, 1 ScheduledProcedureStepStartDate

Below is an example of a date range for August 30, 1997 through the end of time.
(0040,0002) DA [19970830-] # 18, 1 ScheduledProcedureStepStartDate

Below is an example of a date range from the beginning of time through August 30, 1997.
(0040,0002) DA [-19970830] # 18, 1 ScheduledProcedureStepStartDate

If the query is for records for this modality, the Modality will be filled in as follows:
(0008,0060) CS [CT] # 2, 1 Modality

If the query is for records for this Scanner, the Modality will be filled in with CT as above and the Scheduled Station AE Title will be filled in with the value configured for this system. For example, this station was configured as CTRoom1.
(0040,0001) AE [CTRoom1] # 8, 1 ScheduledStationAETitle

User will be able to enter the values for "Accession Number" prior to the query. If value is entered then that value will be sent as part of the query. For example, if "1234" is entered then
(0008,0050) SH [1234] # 4, 1 AccessionNumber

User will be able to enter the values for "Requested Procedure Id" prior to the query. If value is entered then that value will be sent as part of the query. For example, if "3456" is entered then
(0040,1001) SH [3456] # 4, 1 RequestedProcedureID

User will be able to enter the values for "Patient Id" prior to the query. If value is entered then that value will be sent as part of the query. For example, if "6789" is entered then
(0010,0020) LO [6789] # 4, 1 PatientID

User will be able to enter the values for "Patient Name" prior to the query. If value is entered then that value will be sent as part of the query. For example, if "Lastname^Firstname" is entered then
(0010,0010) PN [Lastname^Firstname] # 18, 1 PatientName

6.3 Use of Specific DICOM Data

This section details the use of the DICOM data returned by remote AEs during worklist queries. The Discovery user interface fields that display the data, along with the data's mapping into resulting acquired and transferred DICOM images, are presented in following table 6.11-1.

Table 6.11-1 – Specific Data Usage

DICOM Worklist Data Element	Patient Schedule Screen Field	Discovery DICOM Image Data Element
Accession Number (0008,0050)	Req Number	Accession Number Supports maximum of 16 characters.
Patient ID (0010,0020)	Patient ID	Patient ID Supports maximum of 16 characters. Can be configured to allow 64 characters.
Patient Name (0010,0010)	Patient Name	Patient Name Supports maximum of 32 characters. Can be configured to allow 64 characters.
Patient's Birth Date (0010,0030)	Patient Age (Patient Birth Date user to calculate age)	Patient Birth Date
Patient's Sex (0010,0040)	Sex	Patient's Sex
Patient's Weight (0010,1030)	Weight in Kg	Patient's Weight
Referring Physician's Name (0008,0090)	Referring Physician	Referring Physician's Name
Requested Procedure Description (0032,1060)	Exam Description	Study Description.
Scheduled Procedure Step Start Date (0040,0002)	Date	Not available.
Scheduled Procedure Step Start Time (0040,0003)	Time	Not available.
Study Instance UID (0020,000d)	Study instance UID (only displayed on the "More Info..." screen)	Study Instance UID, **if User has set the preference to "Use MWL Study UID".**
Requested Procedure Id (0040,1001)	Requested Proc ID	Requested Procedure Id.
Pregnancy Status (0010,21C0)	Pregnancy Status (only displayed on the "More Info..." screen)	Not available.
Medical Alerts (0010,2000)	Medical Alerts (only displayed on the "More Info..." screen)	Not available.

Contrast Allergies (0010,2110)	Contrast Allergies (only displayed on the "More Info..." screen)	Not available.
Special Needs (0038,0050)	Special Needs (only displayed on the "More Info..." screen)	Not available.
Requested Contrast Agent (0032,1070)	Requested Contrast Agent (only displayed on the "More Info..." screen)	Not available.
Current Patient Location (0038,0300)	Current Patient Location (only displayed on the "More Info..." screen)	Not available.
Additional Patient History (0010,21B0)	Additional Patient History (only displayed on the "More Info..." screen)	Patient History.

Note that the display of a specific data item on the "More Info..." screen is contingent on the item being enabled for display. Depending on the preferences of each specific site, data can either be displayed or not. A GE field service engineer can assist in setting these site preferences.

6.4 Setting User Preferences

6.4.1 Setting "Use MWL Study UID" Option

Setting this option to "**Yes**" copy the **Study Instance UID** from work-list into the final **DICOM Image header**. If this option is set to "**No**" then a new study instance uid will be generated locally.

1.Click on "Patient Schedule"

2.Click on "Preferences" button

3.Set the option "Use Study Instance UID", to either "Yes" or "No"

6.4.2 Setting Custom Query Option

This option allows the user to enter values for "Accession Number" and / or " Requested Procedure Id" , which are used for Custom Query.

1.Click on "Patient Schedule"

2.Click on "Preferences" button

3.Set the option "**Show Update Parameters** ", to "**Yes"**

4. To do a query click on "Update" button.
   A User Interface appears, with provision to enter values for:

   a) Accession Number

   b) Requested Procedure Id

7 Modality Performed Procedure Step Implementation

7.1 Introduction

This section of the DICOM Conformance Statement specifies the compliance to DICOM conformance requirements for the Modality Performed Procedure Step feature on this GEHC product. Note that the format of this section strictly follows the format defined in DICOM Standard PS 3.2 (Conformance). Please refer to that part of

the standard while reading this section. The PPS option for GEHC PET allows a Modality Performed Procedure Step to be communicated to the Hospital/Radiology information system. The PPS feature is providing the DICOM Modality Performed Procedure Step service as a service class user (SCU).

This feature works in conjunction with DICOM Modality Worklist feature, if installed. However the conformance of this feature is independent of Modality Worklist feature. For information on conformance of Modality Worklist feature to DICOM standard

7.2 N-CREATE & N-SET REQUEST MESSAGE

PPS Feature for Discovery supports all named attributes listed in Table F.7.2.1 in PS3.4 of DICOM standard. That is, attributes that are not explicitly referenced by name in the table are not supported. (Example is last row in the table reads “All other attributes from Radiation Dose Module and Billing and Material Code Module”. The attributes referenced here are not supported).

For the MPPS associated with an acquisition, the following attributes are copied from the Modality Work-list SCU into the MPPS request Message, if procedure performed corresponds to the SPS information retrieved through the Modality Work-list.

Discovery supports the selection of single or multiple SPS for a scan. The following are applicable.

- Single SPS selection results in single PPS message
- Multiple SPS selection results in single PPS message
- Multiple SPS selection is allowed **only if they all correspond to same patient id**
- A maximum of 15 SPS’s can be selected
- Referenced Study Sequence - a maximum of ten Item’s is supported. *This attribute will be present only if SPS information is available from Modality Work-list SCU.*
- At the end of acquisition the user might choose to ‘Defer PPS’ and later choose to ‘Complete PPS’ or ‘Discontinue PPS’ from the user interface provided in the system. In this case, the date and time when user chooses to ‘Complete PPS’ or ‘Discontinue PPS’ is taken as the Performed Procedure Step End Date and Performed Procedure Step End Time respectively (Not the actual end date and end time of acquisition)
- Mapping of SPS data to **MPPS SOP instance** is explained in section 7.3

- Mapping of specific SPS data to **CT DICOM IMAGE HEADER** , for PPS is explained in section 7.4

For the MPPS associated with a post-processing the following restrictions apply on the attributes listed below.

- Referenced Study Sequence – The sequence is not sent in the MPPS message
- Scheduled Step Attribute Sequence – a maximum of ONE item is supported. The attribute will be send only if SPS information is available in the image instance.
- Referenced Patient Sequence – This sequence is not added
- Scheduled Protocol Code Sequence – The sequence is not send in the MPPS message
- Performed Procedure Step Start date & Performed Procedure Step start time – The exam date and exam time that is the Start date and Start Time of the associated Study Component (Exam) is used, not the actual time when post-processing started.
- Performed Procedure Step end date & Performed Procedure Step end time - The date and time when user chooses to 'Complete PPS' or 'Discontinue PPS' is taken as the Performed Procedure Step End Date and Performed Procedure Step End Time respectively (Not the actual end date and end time of post-processing).
- Procedure Code Sequence – This sequence is sent with ZERO items in the MPPS message
- Performed Protocol Code Sequence – This sequence is sent with ZERO items in the MPPS message.
- Referenced Standalone SOP Instance Sequence – The sequence is sent with ZERO items in the MPPS message.

7.3 MODALITY PERFORMED PROCEDURE STEP MODULE DEFINITIONS

The following table gives specific usage of some of attributes in the MPPS SOP instance created with reference to each of the real-world scenarios.

Attribute Name	**Tag**	**Usage in MPPS Instance**		
		Acquisition with MWL data	**Acquisition without MWL data**	**Post-Processing**
Specific Character Set	(0008,0005)	Not used, but copied into image header	Not used	Not used, but copied into image header
Scheduled Step Attribute Sequence	(0040,0270)	Up to 15 items		Up to 15 items
>Study Instance UID	(0020,000D)	Copied from SPS, if option to copy is selected or else created at the scanner	Created at the scanner	Copied from source image
>Referenced Study Sequence	(0008,1110)	Copied from SPS, if selected	Not sent as part of image header	Not sent as part of image header
>Accession Number	(0008,0050)	Copied from SPS, if selected	User input on the scanner	Copied from source image

Attribute Name	Tag	Usage in MPPS Instance		
		Acquisition with MWL data	**Acquisition without MWL data**	**Post-Processing**
>Placer Order Number/Imaging Service Request	(0040,2016)	Not sent as part of image header	Not sent as part of image header	Not sent as part of image header
>Filler Order Number/Imaging Service Request	(0040,2017)	Not sent as part of image header	Not sent as part of image header	Not sent as part of image header
>Requested Procedure ID	(0040,1001)	Copied from SPS, if selected	User input on the scanner	Copied from source image
>Requested Procedure Description	(0032,1060)	Copied from SPS, if selected	Not used	Not sent as part of image header
>Placer Order Number/Procedure	(0040,1006)	Not sent as part of image header	Not used	Not sent as part of image header
>Filler Order Number/Procedure	(0040,1007)	Not sent as part of image header	Not used	Not sent as part of image header
>Scheduled Procedure ID	(0040,0009)	Copied from SPS, if selected	Not used	Copied from source image
>Scheduled Procedure Step Description	(0040,0007)	Copied from SPS, if selected	Not used	Copied from source image
>Scheduled Protocol Code Sequence	(0040,0008)	Copied from SPS, if selected	Not used	Not sent as part of image header
Patient's Name	(0010,0010)	Copied from SPS, if selected	User input on the scanner	Copied from source image
Patient ID	(0010,0020)	Copied from SPS, if selected	User input on the scanner	Copied from source image
Patient's Birth Date	(0010,0030)	Copied from SPS, if selected	User input on the scanner	Copied from source image
Patient's Sex	(0010,0040)	Copied from SPS, if selected	User input on the scanner	Copied from source image
Referenced Patient Sequence	(0008,1120)	Copied from SPS, if selected	Not used	No item
Performed Procedure Step ID	(0040,0253)	Created at the scanner. Will have the following ***"PPS_ID_<exam number"***	Created at the scanner. Will have the following ***"PPS_ID_<exam number"***	New generated, may not be unique
Performed Station AE Title	(0040,0241)	Local system host-name	Local system host-name	Local system host-name
Performed Station Name	(0040,0242)	Local system suite id	Local system suite id	Local system host-name
Performed Location	(0040,0243)	Local system suite id	Local system suite id	Not used
Performed Procedure Step Start Date	(0040,0244)	Same as exam start date	Same as exam date	Same as exam date
Performed Procedure Step Start Time	(0040,0245)	Same as exam start time	Same as exam time	Same as exam time
Performed Procedure Step Description	(0040,0254)	Copied from SPS, if selected	Not sent as part of image header	Not sent as part of image header

Attribute Name	Tag	Usage in MPPS Instance		
		Acquisition with MWL data	**Acquisition without MWL data**	**Post-Processing**
Performed Procedure Step status	(0040,0252)	See Note 1.	See Note 1.	See Note 1.
Performed Procedure Type Description	(0040,0255)	Not sent as part of image header	Not sent as part of image header	Not sent as part of image header
Procedure Code Sequence	(0008,1032)	Not sent as part of image header. Not sent in MPPS N-Create.	Not sent as part of image header. Not sent in MPPS N-Create.	Not sent as part of image header. Not sent in MPPS N-Create.
Performed Procedure Step End Date	(0040,0250)	Date when all images got installed	Date when all images got installed	The date "Complete PPS" or "Discontinue PPS" is invoked, not the actual end of post-processing
Performed Procedure Step End Time	(0040,0251)	Time when all images got installed	Time when all images got installed	The time "Complete PPS" or "Discontinue PPS" is invoked, not the actual end of post-processing
Modality	(0008,0060)	Value "CT", "PT or "NM" is stored in the image header depending on the original value of the Modality Tag in the worklist entry or entries. Please see note 2 below for details.	Value "PT" is stored in image header	Value "CT", "PT or "NM" is stored in the image header depending on the original value of the Modality Tag in the worklist entry or entries. Please see note 2 below for details.
Study ID	(0020,0010)	Same as exam number	Same as exam number	Copied from source image
Performed Protocol Code sequence	(0040,0260)	Derived from (0040, 0008)	Not used	Not used
Performed Series Sequence	(0040,0340)	One item for each series created	One item for each series created	One item for each series created with post-processing
>Performing Physician's Name	(0008,1050)	Copied from SPS, if selected	User input on the scanner	Not sent as part of image header
>Protocol Name	(0018,1030)	The name of the protocol selected on the scanner	The name of the protocol selected on the scanner	Copied from source image
>Operator's Name	(0008,1070)	Copied from SPS	User input on the	Not sent as part of

Attribute Name	Tag	Usage in MPPS Instance		
		Acquisition with MWL data	**Acquisition without MWL data**	**Post-Processing**
		if selected and present otherwise from user input on the scanner	scanner	image header
>Retrieve AE Title	(0008,0054)	Local system host-name	Local system host-name	host-name of the system
>Referenced Image Sequence	(0008,1140)	One item for each image created within the series	One item for each image created within the series	One item for each image generated by post-processing
>Referenced Standalone SOP Instance Sequence	(0040,0220)	Not sent as part of image header	Not sent as part of image header	Not sent as part of image header
>All other attributes from Performed Series Sequence (which Table F.7.2.1 of DICOM standard PS3.4 does not explicitly list)		Not sent as part of image header	Not sent as part of image header	Not sent as part of image header
All other attributes from Radiation Dose Module and Billing and Material Code Module (which Table F.7.2.1 of DICOM standard PS3.4 does not explicitly list)		Not sent as part of image header	Not sent as part of image header	Not sent as part of image header

Note 1:

- When PPS start (N-CREATE) message is sent, this element will have the value “IN PROGRESS”
- When PPS end (N-SET) message is sent, this element will have either “COMPLETED” or “DISCONTINUED” based on user selection

Note 2

- The Value for the Modality tag depends on the original Modality value from the MWL entries as follow:

Single MWL item selected:

MWL Order Original Modality	*Modality in the MPPS SOP*
CT	CT
PT	PT
NM	NM
Others	PT

Multiples MWL items selected:

MWL Order Original Modality	*Modality in the MPPS SOP*
1/ All orders have the same Modality (CT or PT or NM)	Selected Modality value (CT or PT or NM)
2/ All orders have the same Modality which is not CT nor PT or NM	PT
3/ Different Modalities found in orders	PT

7.4 Use of Specific DICOM Data

7.4.1 Patient Level

Attribute Name	Tag	Usage in CT/PET DICOM Image Header
Patient Name	(0010,0010)	Copied from SPS, if selected
Patient ID	(0010,0020)	Copied from SPS, if selected
Patient Birthdate	(0010,0030)	Copied from SPS, if selected
Patient Sex	(0010,0040)	Copied from SPS, if selected
Referenced Patient Sequence	(0008,1120)	Copied from SPS, if selected
Ref. SOP class uid	(0008,1150)	
Ref. SOP Instance uid	(0008,1155)	

7.4.2 Study Level

Attribute Name	Tag	Usage in CT/PET DICOM Image Header
Study Instance UID	(0020,000D)	Copied from SPS, if selected
Study ID	(0020,0010)	Scanner generated study ID
Referring Physicians name	(0008,0090)	Copied from SPS, if selected
Accession Number	(0008,0050)	If multiple SPS's are selected, then accession number from the first selection (determined by the user) is used.
Referenced Study Sequence	(0008,1110)	Copied from SPS, if selected
Ref. SOP class uid	(0008,1150)	
Ref. SOP Instance uid	(0008,1155)	

7.4.3 Series Level

Attribute Name	Tag	Usage in CT/PET DICOM Image Header
Modality	(0008,0060)	Value "CT", "PT or "NM" is stored in the image

Attribute Name	Tag	Usage in CT/PET DICOM Image Header
		header depending on the original value of the Modality Tag in the worklist entry or entries. Please see note above for details.
Protocol Name	(0018,1030)	Name of the selected protocol is copied
Operator Name	(0008,1070)	Copied from SPS if selected and present otherwise generated from user input on scanner
Referenced Performed Procedure Step Sequence	(0008,1111)	Will be present only if SPS, obtained from HIS/RIS is selected for scanning
Ref. SOP class uid	(0008,1150)	Value of MPPS SOP class UID
Ref. SOP Instance uid	(0008,1155)	Scanner generated unique UID
Requested Attribute Sequence	(0040,0275)	Will be present only if SPS, obtained from HIS/RIS is selected for scanning. If multiple SPS's are selected then this will contain multiple items one for each SPS. For all other cases this element will not be present
Requested Procedure Id	(0040,1001)	Copied from SPS, if selected. Default value is "ReqProcID GE"
Scheduled Procedure Step Id	(0040,0009)	Copied from SPS, if selected. Default value is "SchProcID GE"
Scheduled Procedure Step description	(0040,0007)	Copied from SPS, if selected
Scheduled Protocol Code Sequence	(0040,0008)	Copied from SPS, if selected
Performed Procedure Step Id	(0040,0253)	Created at the scanner. The string "***PPS_ID_<examnumber>"*** is used.
Performed Procedure Step start date	(0040,0244)	Same as exam start date
Performed Procedure Step start time	(0040,0245)	Same as exam start time
Performed Procedure Step description	(0040,0254)	Exam description is used

8 Grayscale Softcopy Presentation State Implementation

8.1 Introduction

This section specifies the use of the DICOM Grayscale Softcopy Presentation State (GSPS) IOD to represent the information included in GSPSs produced by this product.

8.2 PET Mapping of DICOM entities

The PET system maps DICOM information Entities to local information entities in the product's database and interface.

DICOM	PET Entity
Patient	Patient
Study	Exam
Series	Series
Presentation State	Presentation State

8.3 IOD Module Table

The Grayscale Softcopy Presentation State Information Object Definition comprises the modules of the following table.

Entity Name	Module Name	Reference	Usage
Patient	Patient	8.4.1.1	M
Study	General Study	8.4.2.1	M
	Patient Study	8.4.2.2	U
Series	General Series	8.4.3.1	M
	Presentation Series	8.4.3.2	M
Equipment	General Equipment	8.4.4.1	M
Presentation State	Presentation State Identification	8.4.5.1	M
	Presentation State Relationship	8.4.5.2	M
	Displayed Area	8.4.5.3	M
	Modality LUT	8.4.5.4	C
	Softcopy VOI LUT	8.4.5.5	C
	Softcopy Presentation LUT	8.4.5.6	C
	SOP Common	8.4.5.7	C

8.4 Information Module Definition

Please refer to DICOM Part 3 (Information Object Definitions) for a description of each of the entities, modules, and attributes contained within the GSPS Information Object. The following modules are included to convey Enumerated Values, Defined Terms, and Optional Attributes supported. Type 1 & Type 2 Attributes are also included for completeness and to define what values they may take and where these values are obtained from when generating the instance. It should be noted that they are the same ones as defined in the DICOM Standard Part 3 (Information Object Definitions). Also note that attributes that are not present in tables are not supported.

8.4.1 Patient Entity Module

8.4.1.1 Patient Module

Attribute Name	Tag	Type	Notes
Patient's Name	(0010,0010)	2	Copied from acquired image(s)
Patient ID	(0010,0020)	2	Copied from acquired image(s)
Patient's Birth Date	(0010,0030)	2	Copied from acquired image(s)
Patient's Sex	(0010,0040)	2	Copied from acquired image(s)

8.4.2 Study Entity Module

8.4.2.1 General Study Module

Attribute Name	Tag	Type	Notes
Study Instance UID	(0020,000D)	2	Copied from acquired image(s)
Study Date	(0008,0020)	2	Copied from acquired image(s)
Study Time	(0008,0030)	2	Copied from acquired image(s)
Accession Number	(0008,0050)	2	Copied from acquired image(s)
Referring Physician's Name	(0008,0090)	2	Copied from acquired image(s)
Study ID	(0020,0010)	2	Copied from acquired image(s)
Study Description	(0008,1030)	3	This will be set as Requested Procedure Code Meaning. If Code Meaning absent, it will be Requested Procedure Description
Referenced Study Sequence	(0008,1110)	3	Copied from acquired image(s)
> Referenced SOP Class UID	(0008,1150)	1	Value copied from original Images corresponding to the Requested Procedure this GSPS is responding to.
> Referenced SOP Instance UID	(0008,1155)	1	Value copied from original Images corresponding to the Requested Procedure this GSPS is responding

			to

8.4.2.2 Patient Study Module

Attribute Name	Tag	Type	Notes
Patient's Age	(0010,1010)	3	Copied from original images
Patient's Size	(0010,1020)	3	Copied from original images
Patient's Weight	(0010,1030)	3	Copied from original images
Additional Patient's History	(0010,21b0)	3	Not sent

8.4.3 Series Entity Module

8.4.3.1 General Series Module

Attribute Name	Tag	Type	Notes
Series Number	(0020,0011)	2	Copied from original images
Laterality	(0020,0060)	2C	Always sent zero-length.
Series Date	(0008,0021)	3	Not Sent.
Series Time	(0008,0031)	3	Not Sent.
Modality	(0008,0060)	1	"PR"
Performing Physician's Name	(0008,1050)	3	Not Sent
Protocol Name	(0018,1030)	3	Not Sent.
Series Description	(0008,103E)	3	This will be set as Requested Procedure Code Meaning. If Code Meaning absent, it will be Requested Procedure Description
Operators Name	(0008,1070)	3	Not sent
Series Instance UID	(0020,000E)	1	Generated new number for each series and always sent.
Performed Procedure Step Start Date	(0040,0244)	3	Exam Split Application will calculate and send
Performed Procedure Step Start Time	(0040,0245)	3	Exam Split Application will calculate and send
Performed Procedure Step ID	(0040,0253)	3	Will be set as Requested Procedure ID (0040,1001) from (0040,0275)
Performed Procedure Step Description	(0040,0254)	3	This will be set as Requested Procedure Code Meaning. If Code Meaning absent, it will be Requested Procedure Description
Requested Attribute Sequence	(0040,0275)	3	Sent when MPPS option is enabled and filled in based on what RIS provides to scanner. Number of

			items relates to number of items selected from Patient Schedule.
> Requested Procedure ID	(0040,1001)	1C	Always sent, copied from RIS
> Accession Number	(0008,0050)	3	Value from worklist sent
>Referenced Study Sequence	(0008,1110)	3	Value from worklist sent
>Study Instance UID	(0020,000D)	3	Value from worklist sent
> Requested Procedure Desc	(0032,1060)	3	Value from worklist sent
> Requested Procedure Code Sequence	(0032,1064)	3	Value from worklist sent.
> Scheduled Procedure Step Desc	(0040,0007)	3	Value from worklist sent.
> Scheduled Protocol Code Sequence	(0040,0008)	3	Value from worklist sent.
> Scheduled Procedure Step ID	(0040,0009)	3	Value from worklist sent.
> Reason for Requested Procedure	(0040,1002)	3	Value from worklist sent.
> Reason for Requested Procedure Code sequence	(0040,1004)	3	Value from worklist sent.
Referenced Performed Procedure Step Sequence	(0008,1111)	3	Value used for performed procedure step
>Referenced SOP Class UID	(0008,1150)	1C	Copied from original images
>Referenced SOP Instance UID	(0008,1155)	1C	Generated for each series and always sent.

8.4.3.2 Presentation Series Module

Attribute Name	Tag	Type	Notes
Modality	(0008,0060)	1	"PR"

8.4.4 General Equipment Module

8.4.4.1 General Equipment

Attribute Name	Tag	Type	Notes
Manufacturer	(0008,0070)	2	Always sent as "GE MEDICAL SYSTEMS"
Institution Name	(0008,0080)	3	Copied from original images
Station Name	(0008,1010)	3	Copied from original images
Manufacturers Model Name	(0008,1090)	3	Copied from original images
Software Versions	(0018,1020)	3	Copied from original images

8.4.5 Presentation State Entity Module

8.4.5.1 Presentation State Identification Module

Attribute Name	Tag	Type	Notes
Presentation Creation Date	(0070,0082)	1	Calculated and sent.
Presentation Create Time	(0070,0083)	1	Calculated and sent.
Instance Number	(0020,0013)	1	Exam Split Application will set as "24"

8.4.5.2 Presentation State Relationship

Attribute Name	Tag	Type	Notes
Referenced Series Sequence	(0008,1115)	1	Calculated and sent.
> Referenced Image Sequence	(0008,1140)	1	Always sent
>> Reference SOP Class UID	(0008,1150)	1	Always sent
>> Reference SOP Instance UID	(0008,1155)	1	Always sent
> Series Instance UID	(0020,000E)	1	Always sent

8.4.5.3 Displayed Area

Attribute Name	Tag	Type	Notes
Displayed area selection sequence	(0070,005A)	1	Exam Split Application will calculate values for Window Width, Window Level, pan and zoom

8.4.5.4 Modality LUT Module

Attribute Name	Tag	Type	Notes
Rescale slope Intercept	(0028,1052)	1C	Always sent
Rescale Slope	(0028,1053)	1C	Always sent
Rescale type	(0028,1054)	1C	Exam Split Application will set this value.

8.4.5.5 Softcopy VOI LUT Module

Attribute Name	Tag	Type	Notes
Softcopy VOI LUT Sequence	(0028,3110)	1	Always sent
> Reference Image Sequence	(0008,1140)	1C	Always sent

> Window Center	(0028,1050)	1C	Always sent
> Window Width	(0028,1051)	1C	Always sent
> Window Center & Width Explanation	(0028,1055)	3	Always sent

8.4.5.6 Softcopy Presentation LUT Module

Attribute Name	Tag	Type	Notes
Presentation LUT shape	(2050,0020)	1C	Always sent as "IDENTITY"

8.4.5.7 SOP Common Module

Attribute Name	Tag	Type	Notes
SOP Class UID	(0008,0016)	1	Always sent.
SOP Instance UID	(0008,0018)	1	Always sent.
Specific Character Set	(0008,0005)	1C	"ISO_IR 100"
Instance Creation Date	(0008,0012)	3	Always sent.
Instance Creation Time	(0008,0013)	3	Always sent.
Instance Number	(0020,0013)	1	Set to 24 and sent.

8.5 Image Header Changes Supporting GSPS

8.5.1 Request Attributes Sequence

The (0040, 0275) Request Attributes Sequence has been expanded to include dicom tags that the VES application requires to complete the VES GSPS and PPS. This sequence now contains the following elements:

(0040, 0275) Request Attributes Sequence
>(0008, 0050) Accession Number
>(0008, 1110) Reference Study Sequence
>>(0008, 1150) Referenced SOP Class UID
>>(0008, 1155) Referenced SOP Instance UID
>(0020, 000D) Study Instance UID
>(0032, 1060) Requested Procedure Description
>(0032, 1064) Requested Procedure Code Sequence
>>(0008, 0100) Code Value
>>(0008, 0102) Coding Scheme Designator
>>(0008, 0104) Code Meaning
>(0040, 0007) Scheduled Procedure Description
>(0040, 0008) Scheduled Action Item Code Sequence
>>(0008, 0100) Code Value
>>(0008, 0102) Coding Scheme Designator

>>(0008, 0104) Code Meaning
>(0040, 0009) Scheduled Procedure Step ID
>(0040, 1001) Requested Procedure ID

The Requested Attributes Sequence may contain a maximum of 15 sequence items.
This sequence will only appear in the image header if the VES/HES option is installed or PPS is enabled.

8.5.2 Accession Number

If scheduled procedures are grouped, the accession number for each procedure is stored in the Request Attributes Sequence (0040, 0275) in the image header.

If two or more of the accession numbers in the grouped case are different, the top level Accession Number (0008, 0050) shall contain 1 of the accession numbers.

9 Structured Report Information Object Implementation

9.1 IOD Module Table

Entity Name	Module Name	Reference	Usage
Patient	Patient	A.3.1	M
Study	General Study	A.3.2	M
	Patient Study	A.3.3	U
Series	SR Document Series	9.2	M
Equipment	General Equipment	A.3.5	M
Document	SR Document General	9.3	M
	SR Document Content	9.4	M
	SOP Common	A.3.9	M

9.2 SR Document Series Module

Attribute Name	Tag	Type	Notes
Modality	(0008,0060)	1	Sent as “SR”
Series Instance UID	(0020,000E)	1	Sent.
Series Number	(0020,0011)	1	Sent as “997”
Referenced Performed Procedure Step Sequence	(0008,1111)	2	Sent

9.3 SR Document General Module

Attribute Name	Tag	Type	Notes
Instance Number	(0020,0013)	1	Sent
Completion Flag	(0040,A491)	1	COMPLETE sent
Completion Flag Description	(0040,A492)	3	Sent empty
Verification Flag	(0040,A493)	1	UNVERIFIED sent
Content Date	(0008,0023)	1	Sent
Content Time	(0008,0033)	1	Sent
Verifying Observer Sequence	(0040,A073)	1C	Not sent per conditional
>Verifying Observer Name	(0040,A075)	1	Not sent
>Verifying Observer Identification Code Sequence	(0040,A088)	2	Not sent
>>Include 'Code Sequence Macro' Table 8.8-1			Not sent
>Verifying Organization	(0040,A027)	1	Not sent

>Verification DateTime	(0040,A030)	1	Not sent
Author Observer Sequence	(0040,A078)	3	Not sent
>Include 'Identified Person or Device Macro' Table C.17-3b			
Participant Sequence	(0040,A07A)	3	Not sent
>Participation Type	(0040,A080)	1	Not sent
>Participation DateTime	(0040,A082)	2	Not sent
>Include 'Identified Person or Device Macro' Table C.17-3b			
Custodial Organization Sequence	(0040,A07C)	3	Not sent
>Institution Name	(0008,0080)	2	Not sent
>Institution Code Sequence	(0008,0082)	2	Not sent
>>Include 'Code Sequence Macro' Table 8.8-1			
Predecessor Documents Sequence	(0040,A360)	1C	Not sent per condition
>Include ' Hierarchical SOP Instance Reference Macro' Table C.17-3			
Identical Documents Sequence	(0040,A525)	1C	Not sent per condition
>Include ' Hierarchical SOP Instance Reference Macro' Table C.17-3			
Referenced Request Sequence	(0040,A370)	1C	Not sent per condition
>Study Instance UID	(0020,000D)	1	Not Sent
>Referenced Study Sequence	(0008,1110)	2	Not Sent
>> Include 'SOP Instance Reference Macro' Table 10-11			
>Accession Number	(0008,0050)	2	Not Sent
>Placer Order Number/Imaging Service Request	(0040,2016)	2	Not Sent
>Filler Order Number/Imaging Service Request	(0040,2017)	2	Not Sent
>Requested Procedure ID	(0040,1001)	2	Not Sent
>Requested Procedure Description	(0032,1060)	2	Not Sent
>Requested Procedure Code Sequence	(0032,1064)	2	Not Sent
>>Include 'Code Sequence Macro' Table 8.8-1		*No Baseline Context ID Number is specified.*	
>Reason for the Requested Procedure	(0040,1002)	3	Not Sent
>Reason for Requested Procedure Code Sequence	(0040,100A)	3	Not Sent
>>Include 'Code Sequence Macro' Table 8.8-1		*No Baseline Context ID Number is specified.*	
Performed Procedure Code Sequence	(0040,A372)	2	Sent empty

>Include 'Code Sequence Macro' Table 8.8-1		*No Baseline Context ID Number is specified.*	
Current Requested Procedure Evidence Sequence	(0040,A375)	1C	Not Sent
>Include ' Hierarchical SOP Instance Reference Macro' Table C.17-3			
Pertinent Other Evidence Sequence	(0040,A385)	1C	Not sent
>Include ' Hierarchical SOP Instance Reference Macro' Table C.17-3			
Referenced Instance Sequence	(0008,114A)	1C	Not sent
>Include 'SOP Instance Reference Macro' Table 10-11			
>Purpose of Reference Code Sequence	(0040,A170)	1	Not sent
>>Include 'Code Sequence Macro' Table 8.8-1			

9.4 SR Document Content Module

The tables below capture notes concerning the values stored.

9.4.1 TID 10011 – CT Radiation Dose

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Notes
1			CONTAINER	EV (113701, DCM, "X-ray Radiation Dose Report")	1	M	Sent
2	>	HAS CONCEPT MOD	CODE	EV (121058, DCM, "Procedure reported")	1	M	Code sequence (P5-08000, SRT, Computed Tomography X-ray) sent
3	>		INCLUDE	DTID (1002) Observer Context	1-n	M	Observer context sent with Device context values equal to Implementation UID. Single item sent.
4	>	HAS OBS CONTEXT	DATETIME	EV (113809, DCM, "Start of X-ray Irradiation")	1	M	Sent
5	>	HAS OBS CONTEXT	DATETIME	EV (113810, DCM, "End of X-ray Irradiation")	1	M	Sent
6	>	HAS OBS CONTEXT	CODE	EV (113705, DCM, "Scope of Accumulation")	1	M	Code sequence (113014, DCM, Study) sent
7	>>	HAS PROPERTIES	UIDREF	DCID (10001) UID Types	1	M	Study Instance UID sent
8	>	CONTAINS	INCLU	DTID (10012) CT	1	M	See CT Accumulated Dose Data

			DE	Accumulated Dose Data			table below for details
9	>	CONTAINS	INCLUDE	DTID (10013) CT Irradiation Event Data	1-n	M	See CT Irradiation Event Data table below for details
10	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1	U	Not sent

9.4.2 TID 10012 – CT Accumulated Dose Data

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Notes
1			CONTAINER	EV (113811, DCM, "CT Accumulated Dose Data")	1	M	Sent
2	>	CONTAINS	NUM	EV (113812, DCM, "Total Number of Irradiation Events")	1	M	Sent
3	>	CONTAINS	NUM	EV (113813, DCM, "CT Dose Length Product Total")	1	M	Sent
4	>	CONTAINS	NUM	EV (113814, DCM, "CT Effective Dose Total")	1	U	Not sent
5	>>	HAS PROPERTIES	TEXT	EV (121406,DCM, "Reference Authority")	1	MC	Not sent
6	>>	HAS PROPERTIES	CODE	EV (121406,DCM, "Reference Authority")	1	MC	Not sent
7	>>	HAS CONCEPT MOD	CODE	EV (G-C036,SRT, "Measurement Method")	1	M	Not sent
8	>>	HAS PROPERTIES	TEXT	EV (113815,DCM, "Patient Model")	1	MC	Not sent
9	>>	HAS PROPERTIES	CONTAINER	EV (113816, DCM, "Condition Effective Dose measured")	1	MC	Not sent
10	>>>	CONTAINS	TEXT	EV (113817,DCM, "Effective Dose	1	M	Not sent

				Phantom Type")			
11	>>>	CONTAINS	TEXT	EV (113818, DCM, "Dosimeter Type")	1	M	Not sent
12	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1	U	Not sent

9.4.3 TID 10013 – CT Irradiation Event Data

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Notes
1			CONTAINER	EV (113819, DCM, "CT Acquisition")	1	M	Sent
2	>	CONTAINS	TEXT	EV (125203, DCM, "Acquisition Protocol")	1	U	Not sent
3	>	CONTAINS	CODE	EV (123014 , DCM, "Target Region")	1	M	Sent. See note below for specifics.
4	>	CONTAINS	CODE	EV (113820, DCM, "CT Acquisition Type")	1	M	Sent
5	>	CONTAINS	CODE	(G-C232, SRT, "Procedure Context")	1	U	Not sent
6	>	CONTAINS	UIDREF	EV (113769, DCM, "Irradiation Event UID")	1	M	Sent
7	>	CONTAINS	NUM	EV (113821, DCM, "X-ray Filter Aluminium Equivalent")	1	U	Not sent
8	>	CONTAINS	CONTAINER	EV (113822, DCM, "CT Acquisition Parameters")	1	M	Sent
9	>>	CONTAINS	NUM	EV (113824, DCM, "Exposure Time")	1	M	Sent
10	>>	CONTAINS	NUM	EV (113825, DCM, "Scanning Length")	1	M	Sent
11	>>	CONTAINS	NUM	EV (113826, DCM, "Nominal Single Collimation Width")	1	M	Sent
12	>>	CONTAINS	NUM	EV (113827, DCM,	1	M	Sent

				"Nominal Total Collimation Width")			
13	>>	CONTAINS	NUM	EV (113828, DCM, "Pitch Factor")	1	MC	Sent per conditional
14	>>	CONTAINS	NUM	EV (113823, DCM, "Number of X-ray Sources")	1	M	Sent
15	>>	CONTAINS	CONTAINER	EV (113831, DCM, "CT X-ray Source Parameters")	1-n	M	Single item sent.
16	>>>	CONTAINS	TEXT	EV (113832, DCM, "Identification Number of the X-ray Source")	1	M	Sent
17	>>>	CONTAINS	NUM	EV (113733, DCM, "KVP")	1	M	Sent
18	>>>	CONTAINS	NUM	EV (113833, DCM, "Maximum X-ray Tube Current")	1	M	Sent
19	>>>	CONTAINS	NUM	EV (113734, DCM, "Mean X-ray Tube Current"	1	M	Sent
20	>>>	CONTAINS	NUM	EV (113834, DCM, "Exposure Time per Rotation")	1	MC	Sent per conditional
21	>	CONTAINS	CONTAINER	EV (113829, DCM, "CT Dose")	1	MC	Sent per conditional
22	>>	CONTAINS	NUM	EV (113830, DCM, "Mean CTDIvol ")	1	M	Sent
23	>>	CONTAINS	CODE	EV (113835, DCM, "CTDIw Phantom Type")	1	M	Sent (IEC Head Dosimetry Phantom or IEC Body Dosimetry Phantom)
24	>>	CONTAINS	NUM	EV (113836, DCM, "CTDIfreeair Calculation Factor")	1	U	Not sent
25	>>	CONTAINS	NUM	EV (113837, DCM, "Mean CTDIfreeair")	1	U	Not sent
26	>>	CONTAINS	NUM	EV (113838, DCM, "DLP")	1	M	Sent
27	>>	CONTAINS	NUM	EV (113839, DCM, "Effective Dose")	1	U	Not sent
28	>>>	HAS CONCEPT	CODE	EV (G-C036, SRT, "Measurement	1	MC	Not sent

		MOD		Method")			
29	>>>>	HAS PROPERTIES	NUM	EV (113840, DCM, "Effective Dose Conversion Factor")	1	MC	Not sent
30	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1	U	Not sent

Note: Target region is filled in per the following table:

Protocol Category	Value stored in Target Region
Head	SRT T-D1100 Head
Orbit	SRT T-D0801 Orbital region
Neck	SRT T-D1600 Neck
Upper Extremity	SRT T-02220 Shoulder
Chest	SRT T-D3000 Chest
Abdomen	SRT T-D4000 Abdomen
Spine	SRT T-11503 Lumbar spine
Pelvis	SRT T-D6000 Pelvis
Lower Extremity	SRT T-D0300 Extremity

9.5 Configuration

The product is configured by default to not generate the CT X-Ray Radiation Dose SR Record. Creation of the CT Dose Record can be enabled via reconfig.

The product implements the CT Radiation Dose Report template (TID 10011) per DICOM. The DICOM standard says that the SOP class shall be the "X-Ray Radiation Dose SR" SOP Class (1.2.840.10008.5.1.4.1.1.88.67). However, since many products may not support this SOP class, the product supports the option via reconfig to create the CT Radiation Dose Report as an "Enhanced SR" SOP Class (1.2.840.10008.5.1.4.1.1.88.22). reconfig "Dose Report:" set to "Full" will produce the X-Ray Radiation Dose SR SOP class and "Yes" will produce the Enhanced SR
SR setting can be configured in "Dose Report" in reconfig menu as below.

- "Full" will produce the X-Ray Radiation Dose SR SOP class
- "On" will produce the Enhanced SR SOP class.
- "Off" will not produce any SOP class.

APPENDIX A: CT/PET Image and Secondary Capture Modules/Attributes

Enclosed is a listing of only the Optional/Conditional modules/attributes used by this implementation for CT/SC.

Note: All other modules that are mandatory and attributes that are type 1 & 2 in nature per the DICOM standard are supported by this implementation but are not explicitly listed here.

A.1 CT Specific IOD Definition

A.1.1 CT Image IOD Modules

Entity Name	Module Name	Référence	Usage
Patient	Patient	A.3.1	M
Study	General Study	A.3.2	M
	Patient Study	A.3.3	U
Series	General Series	A.3.4	M
Frame of Reference	Frame of Reference	A.3.5	M
Equipment	General Equipment	A.3.6	M
Image	General Image	A.3.7	M
	Image Plane	A.4.1	M
	Image Pixel	A.4.2	M
	Contrast/Bolus	A.4.3	C
	CT Image	A.4.4	M
	VOI LUT	A.4.5	U
	SOP Common	A.4.6	M

A.2 SC Image IOD

A.2.1 SC Image IOD Modules

Entity Name	Module Name	Reference	Usage
Patient	Patient	A.3.1	M
Study	General Study	A.3.2	M
	Patient Study	A.3.3	U
Series	General Series	A.3.4	M
Equipment	General Equipment	A.3.6	U
	SC Equipment	A.5.1	M
Image	General Image	A.3.7	M
	Image Pixel	A.5.2	M

	SC Image	Not sent (consists entirely of type 3 element).	M
	VOI LUT	A.5.3	U
	SOP Common	A.5.4	M

A.2.2 CT Dose Report SC Image Details

The product is configured by default to generate a CT X-Ray Radiation Dose Report SC Image summarizing the study dose. The pixel data contains a textual, viewable report of the dose information. The next section identifies the additional standard DICOM attributes added to capture the same information as reported in the CT X-Ray Radiation Dose Record, described in Section 9. The Discovery 710/610 and Optima 560 products will write these additional attributes.

A.2.2.1 Implementation Specific details

Attribute Name	Tag	Type	Notes
Total Number of Exposures	(0040,0301)	3	Total number of exposures made during this Performed Procedure Step.
Exposure dose sequence	(0040,030E)	3	Exposure Dose Sequence will contain Total Number of Exposures (0040,0301) items.
>kVp	(0018,0060)	3	Peak kilo voltage output
>X-Ray Tube Current	(0018,8151)	3	X-Ray tube current in microA. NOTE: the X-Ray Radiation Dose SR records this in mA.
>Exposure Time	(0018,1150)	3	Time of x-ray exposure in msec.
>Acquisition Type	(0018,9302)	3	
>CTDIvol	(0018,9345)	3	Computed Tomography Dose Index in mGy according to IEC 60601-2-44.
>CTDI Phantom Type Code Seq	(0018,9346)	3	The type of phantom used for CTDI measurement according to IEC 60601-2-44.
>Single Collimation Width	(0018,9306)	3	The width of a single row of acquired data in mm.
>Total Collimation	(0018,9307)	3	The width of the total collimation in mm over the area of active x-ray detection.
>Sprial Pitch Factor	(0018,9311)	3	Ratio of the Table Feed per Rotation (0092,9310) to the Total Collimation Width (0018,9307)
>Body Part Examined	(0018,0015)	3	Text description of the part of the body examined. See the values for target region at the end of section 9.4.3 for the values stored.
Comments on Radiation Dose	(0040,0310)	3	Used to record total and per exposure DLP. The format is: TotalDLP=xxx DLP=xxx DLP=xxx

A.3 Common Modules

A.3.1 Patient Module

Attribute Name	Tag	Type	Notes
Patient's Name	(0010,0010)	2	As entered at user interface or from worklist. *Supports 5 different components delimited by "^". Supports a maximum length of 32 characters including the delimiter.*

Patient ID	(0010,0020)	2	As entered at user interface or from worklist. Supports maximum of 16 characters.
Patient's Birth Date	(0010,0030)	2	As entered at user interface or from worklist.
Patient's Sex	(0010,0040)	2	As entered at user interface or from worklist.

A.3.2 General Study Module

Attribute Name	Tag	Type	Notes
Study Instance UID	(0020,000D)	1	Value from worklist, if present, is used. Otherwise, the scanner creates a unique value for each exam. If worklist is reused, system can be configured to reuse the study instance uid. Default behavior is to generate a new study instance uid if the worklist is reused.
Study Date	(0008,0020)	2	Generated for each exam and always sent.
Study Time	(0008,0030)	2	Generated for each exam and always sent.
Accession Number	(0008,0050)	2	Value from user interface or worklist sent.
Referring Physician's Name	(0008,0090)	2	Value from user interface sent. Accepts 32 characters.
Study ID	(0020,0010)	2	Generated for each exam on the scanner and always sent.
Study Description	(0008,1030)	3	Value from user interface or worklist sent. Accepts 22 characters by default but is configurable to accept 64 characters.
Name of Physician(s) Reading Study	(0008,1060)	3	Sent if entered at the user interface.

A.3.3 Patient Study Module

Attribute Name	Tag	Type	Notes
Patient's Age	(0010,1010)	3	Calculated from Date of Birth entered at user interface.
Patient's Weight	(0010,1030)	3	Value from user interface or worklist sent.
Additional Patient's History	(0010,21b0)	3	Value from user interface.

A.3.4 General Series Module

Attribute Name	Tag	Type	Notes
Series Number	(0020,0011)	2	Generated sequentially, always sent.
Laterality	(0020,0060)	2C	Always sent zero-length.
Series Date	(0008,0021)	3	Generated for each series and always sent.

Series Time	(0008,0031)	3	Generated for each series and always sent.
Modality	(0008,0060)	1	Always sent
Protocol Name	(0018,1030)	3	Sent if entered at user interface.
Series Description	(0008,103E)	3	Value from user interface is sent.
Operators Name	(0008,1070)	3	Value from user interface is sent.
Patient Position	(0018,5100)	2C	Sent. As selected by operator when patient is positioned. Defined terms are: HFP = Head-First Prone HFS = Head-First Supine HFDR = Head-First Decubitus Right HFDL = Head-First Decubitus Left FFDR = Feet-First Decubitus Right FFDL = Feet-First Decubitus Left FFP = Feet-First Prone FFS = Feet-First Supine
Series Instance UID	(0020,000E)	1	Always sent
Performed Procedure Step Start Date	(0040,0244)	3	Sent when MPPS option is enabled
Performed Procedure Step Start Time	(0040,0245)	3	Sent when MPPS option is enabled
Performed Procedure Step ID	(0040,0253)	3	Sent when MPPS option is enabled
Performed Procedure Step Description	(0040,0254)	3	Sent when MPPS option is enabled

A.3.5 Frame of Reference Module

Attribute Name	Tag	Type	Notes
Frame of Reference UID	(0020,0052)	1	See Caution below.
Position Reference Indicator	(0020,1040)	2	Value as entered at the user interface.

CAUTION

It is possible for the operator of Discovery CT system to change the table height while scanning a series of images. Therefore, implementations must use the Frame of Reference UID (0020,0052) in conjunction with the Table Height (0018,1130) to determine if two images are spatially related.

A.3.6 General Equipment Module

Attribute Name	Tag	Type	Notes
Manufacturer	(0008,0070)	2	Always sent as “GE MEDICAL SYSTEMS”
Institution Name	(0008,0080)	3	Sent. Value is configurable.
Station Name	(0008,1010)	3	Sent. Value is configurable.

Attribute Name	Tag	Type	Notes
Manufacturers Model Name	(0008,1090)	3	
Device Serial Number	(0018,1000)	3	Sent if present in image.
Software Versions	(0018,1020)	3	Always sent as "05" for this version - does not distinguish individual software releases.
Spatial Resolution	(0018,1050)	3	Sent only for MR images.
Pixel Padding Value	(0028,0120)	3	Sent.

A.3.7 General Image Module

Attribute Name	Tag	Type	Notes
Image Number	(0020,0013)	2	Generated sequentially, always sent.
Patient Orientation	(0020,0020)	2C	Always sent zero length for SC images.
Image Date	(0008,0023)	2C	Generated for each image, always sent.
Image Time	(0008,0033)	2C	Generated for each image, always sent.
Image Type	(0008,0008)	3	Always sent. Value 3: CT Image IOD specific specializations **AXIAL** **LOCALIZER** **SEGMENTED** **REFORMATTED** **PROCESSED** **COMBINED** **CTINTERVENTION** Value 4: GE CT Image implementation specific **MIN IP** **MIP** **AVERAGE** **VOLREN** **INTEGRAL** **HD MIP** **RAYSUM** **SURFACE** **MINMAX** **FLUORO** **GSI MONO** **GSI HIGH KV** **GSI LOW KV** **GSI MD**

			GSI QC **GSI EFF Z** **GSI CLR OVRLY** **DIGITALTILT**
Acquisition Number	(0020,0012)	3	Generated for each acquisition, always sent.
Acquisition Date	(0008,0022)	3	Generated for each acquisition, always sent.
Acquisition Time	(0008,0032)	3	Generated for each acquisition, always sent. Format is in fractional seconds as small as 1 millionth of a second.

A.4 CT Image Modules

A.4.1 Image Plane Module

Attribute Name	Tag	Type	Notes
Slice Thickness	(0018,0050)	2	Value always sent.
Image Slice Location	(0020,1041)	3	Value always sent. Note: Slice Location reflects the gantry ISO center table location value for the image in mm. If the gantry is tilted, this value will differ from the image position (0020, 0032) Z value which reflects the upper left-hand voxel (center of the first voxel transmitted) of the grid, in mm in the registered Frame of Reference. The system can be configured to save the upper left-hand corner Z coordinate value into (0020, 1041) Slice Location instead of the gantry ISO center table location.
Image Position	(0020, 0032)	1	Always sent. System configuration allows images to be flipped and rotated. Default behavior is to not allow flip and rotate.
Image Orientation	(0020, 0037)	1	Always sent. System configuration allows images to be flipped and rotated. Default behavior is to not allow flip and rotate.
Pixel Spacing	(0028,0030)	1	Always sent

A.4.2 Image Pixel Module

Attribute Name	Tag	Type	Notes
Samples per Pixel	(0028,0002)	1	Always sent with value = 1
Photometric Interpretation	(0028,0004)	1	Always sent.
Rows	(0028,0010)	1	Always sent
Columns	(0028,0011)	1	Always sent

Bits Allocated	(0028,0100)	1	Always sent with value = 16
Bits Stored	(0028,0101)	1	Always sent with value = 16
High Bit	(0028,0102)	1	Always sent with value = 15
Pixel Representation	(0028,0103)	1	Always sent with value = 1
Pixel Data	(7FE0,0010)	1	Always sent

A.4.3 Contrast Bolus Module

Attribute Name	Tag	Type	Notes
Contrast/Bolus Agent	(0018,0010)	2	Sent if contrast exam, as entered in user interface.
Contrast/Bolus Route	(0018,1040)	3	Sent if contrast exam, as entered in user interface.

A.4.4 CT Image Module

Attribute Name	Tag	Type	Notes
Image Type	(0008,0008)	1	Always sent. See section 2.5.1 Value 3: **AXIAL** **LOCALIZER** **SEGMENTED** **REFORMATTED** **PROCESSED** **COMBINED** **CTINTERVENTION** Value 4: **MIN IP** **MIP** **AVERAGE** **VOLREN** **INTEGRAL** **HD MIP** **RAYSUM** **SURFACE** **MINMAX** **FLUORO** **GSI MONO** **GSI HIGH KV** **GSI LOW KV** **GSI MD**

Attribute Name	Tag	Type	Notes
			GSI QC **GSI EFF Z** **GSI CLR OVRLY** **DIGITALTILT**
Samples per Pixel	(0028,0002)	1	Always sent with value = 1
Photometric Interpretation	(0028,0004)	1	Always sent
Bits Allocated	(0028,0100)	1	Always sent with value = 16
Bits Stored	(0028,0101)	1	Always sent with value = 16
High Bit	(0028,0102)	1	Always sent with value = 15
Rescale Intercept	(0028,1052)	1	Always sent
Rescale Slope	(0028,1053	1	Always sent
KV	(0018,0060)	2	Value always sent.
Acquisition Number	(0020,0012)	2	Value always sent.
Scan Options	(0018,0022)	3	Value always sent.
Data Collection Diameter	(0018,0090)	3	Value always sent.
Reconstruction Diameter	(0018,1100)	3	Value sent for all images except scouts.
Distance Source to Detector	(0018,1110)	3	Value always sent.
Distance Source to Patient	(0018,1111)	3	Value always sent.
Gantry / Detector Tilt	(0018,1120)	3	Value always sent.
Table Height	(0018,1130)	3	Value always sent.
Rotation Direction	(0018,1140)	3	Not sent for scout or axial.
Exposure Time	(0018,1150)	3	Value always sent.
X-Ray Tube Current	(0018,1151)	3	Value always sent.
Exposure	(0018,1152)	3	Value always sent. (See Note below)
Filter Type	(0018,1160)	3	Sent. Defined terms: BODY FILTER MEDIUM FILTER HEAD FILTER
Generator Power	(0018,1170)	3	Always sent
Focal Spot	(0018,1190)	3	Sent. Fixed value of 0.7 or 1.2.
Convolution Kernel	(0018,1210)	3	Not sent for scouts. Defined terms: SMOOTH SOFT STANDARD STD+

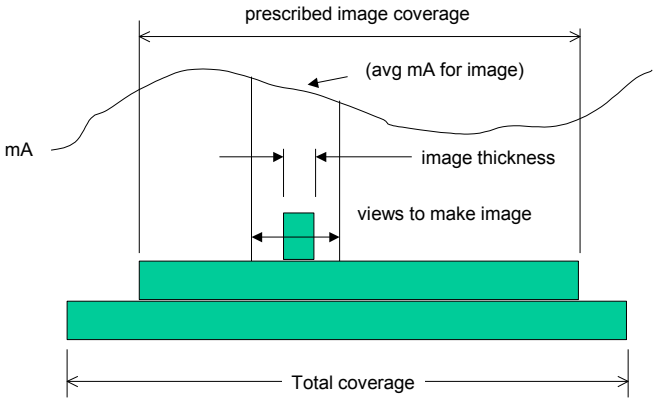
Attribute Name	Tag	Type	Notes
			DETAIL BONE BONEPLUS CHST EDGE SHARP LUNG HD LUNG STANDARD2 DETAIL2 BONE2 BONEPLUS2 EDGE2 STANDARDPLUS2 DETAILPLUS2 HD ULTA HD SOFT PET AC
Revolution Time	(0018, 9305)	3	Sent for spiral scan only
Single Collimation Width	(0018, 9306)	3	Sent for spiral scan only
Total Collimation Width	(0018, 9307)	3	Sent for spiral scan only
Table Speed	(0018, 9309)	3	Sent for spiral scan only
Table Feed per Rotation	(0018, 9310)	3	Sent for spiral scan only
CT Pitch Factor	(0018, 9311)	3	Sent for spiral scan only
Scan Options	(0018,0022)		AXIAL MODE SCOUT MODE AXIAL XRON MODE AXIAL XROFF MODE STATIC XRON MODE STATIC XROFF MODE TUBE HEAT MODE DAS MODE TUBE CAL MODE BIOPSY MODE CINE HELICAL ROTGENCAL MODE FLUORO MODE
CT Image IOD specific specializations	(0008,0008)	3	AXIAL LOCALIZER SEGMENTED REFORMATTED

Attribute Name	Tag	Type	Notes
			PROCESSED COMBINED CTINTERVENTION
CT Image implementation specific	(0008,0008)		MIN IP MIP AVERAGE VOLREN INTEGRAL HD MIP RAYSUM SURFACE MINMAX FLUORO

CAUTION

It is possible for the operator of PET-CT Discovery systems to change the table height while scanning a series of CT images. Therefore, implementations must use the Frame of Reference UID (0020,0052) in conjunction with the Table Height (0018,1130) to determine if two images are spatially related. For PET-CT hybrid scans, scanning the PET and CT at different table heights is prevented.

Decsciption of how to calculate the Dicom Exposure field (0018,1152)



exposure = (exposure time) * (image avg mA)* (slice thickness)/(total coverage)

exposure time = total x-ray on time
helical total coverage= (exposure time * table velocity)
axial or cine total coverage = macro row thickness * no of active rows
Slice thickness = nominal prospective reconstructed slice selection

Exposue.ppt
T. Toth 03-Aug-04

Note:

A.4.5 VOI LUT Module

Attribute Name	Tag	Type	Notes
Rescale intercept	(0028,1052)	1C	Always sent

Rescale Slope	(0028,1053)	1C	Always sent
Rescale Type	(0028,1054)	1C	Always sent with value = HU
Window Center	(0028,1050)	3	Window Center for display. Always sent.
Window Width	(0028,1051)	1C	Window Width for display. Always sent.

A.4.6 SOP Common Module

Attribute Name	Tag	Type	Notes
SOP Class UID	(008,0016	1	Always sent.
SOP Instance UID	(008,0018)	1	Always sent.
Specific Character Set	(0008,0005)	1C	ISO_IR 100

A.5 SC Image Modules

A.5.1 SC Equipment Module

Attribute Name	Tag	Type	Notes
Conversion Type	(0008,0064)	1	Always sent with value WSD
Modality	(0008,0060)	3	Modality of original image

A.5.2 Image Pixel Module

Attribute Name	Tag	Type	Notes
Samples per Pixel	(0028,0002)	1	Always sent with value = 1
Photometric Interpretation	(0028,0004)	1	Always sent.
Rows	(0028,0010)	1	Always sent
Columns	(0028,0011)	1	Always sent
Bits Allocated	(0028,0100)	1	Always sent with value = 16
Bits Stored	(0028,0101)	1	Always sent with value = 16
High Bit	(0028,0102)	1	Always sent with value = 15
Pixel Representation	(0028,0103)	1	Always sent with value = 1
Pixel Data	(7FE0,0010)	1	Always sent

A.5.3 VOI LUT Module

Attribute Name	Tag	Type	Notes
Rescale intercept	(0028,1052)	1C	Always sent
Rescale Slope	(0028,1053)	1C	Always sent

Rescale Type	(0028,1054)	1C	Always sent with value = HU
Window Center	(0028,1050)	3	Window Center for display. Always sent.
Window Width	(0028,1051)	1C	Window Width for display. Always sent.

A.5.4 SOP Common Module

Attribute Name	Tag	Type	Notes
SOP Class UID	(008,0016	1	Always sent.
SOP Instance UID	(008,0018)	1	Always sent.
Specific Character Set	(0008,0005)	1C	ISO_IR 100

A.6 Other Attributes

Attribute Name	Tag	Type	Notes
Temporal Position Index	(0020,9128)	3	Filled into CT image for some applications. Pass number for shuttle images.
Nominal Percentage of Cardiac Phase	(0020,9241)	3	Filled into CT image for some applications. Prescribed percentage of cardiac phase.

A.7 PET Specific IOD Common Module Definitions

A.7.1 PET Image IOD Modules

Entity Name	Module Name	Référence
Patient	Patient	A.7.2
Study	General Study	A.7.3
	Patient Study	A.7.4
	Discovery PET Exam	A.7.5
Series	General Series	A.7.6
	PET Series	A.7.7
	PET Isotope	A.7.8
	PET Multi-gated Acquisition	A.7.9
	NM/PET Patient Orientation	A.7.10
	Discovery PET Imageset	A.7.11
	Discovery PET Scan	A.7.12
Frame of Reference	Frame of Reference	A.7.13
Equipment	General Equipment	A.7.14
Image	General Image	A.7.15
	Image Plane	A.7.16
	Image Pixel	A.7.17
	PET Image	A.7.18
	Overlay Plane	A.7.19
	VOI LUT	A.7.20
	Discovery PET Image	A.7.21
	Discovery PET Frame	A.7.22
General Modules	SOP Common	A.7.23

A.7.2 Patient Module

This section specifies the Attributes of the Patient that describe and identify the Patient who is the subject of a diagnostic Study. This Module contains Attributes of the patient that are needed for diagnostic interpretation of the Image and are common for all studies performed on the patient.

Attribute Name	Tag	Type	VR	VM	Notes
Patient's Name	(0010,0010)	2	PN (32)	1	
Patient ID	(0010,0020)	2	LO (16)	1	

Patient's Birth Date	(0010,0030)	2	DA (26)	1	
Patient's Sex	(0010,0040)	2	CS (16)	1	
Referenced Patient Sequence	(0008,1120)	3	SQ	1	Not used
>Referenced SOP Class UID	(0008,1150)	1C	UI	1	Not used
>Referenced SOP Instance UID	(0008,1155)	1C	UI	1	Not used
Patient's Birth Time	(0010,0032)	3	TM	1	Not used
Other Patient IDs	(0010,1000)	3	LO	1-n	Not used
Other Patient Names	(0010,1001)	3	PN	1-n	Not used
Ethnic Group	(0010,2160)	3	SH	1	Not used
Patient Comments	(0010,4000)	3	LT	1	Not used

A.7.3 General Study Module

Attribute Name	Tag	Type	VR	VM	Notes
Study Instance UID	(0020,000D)	1	UI	1	
Study Date	(0008,0020)	2	DA	1	Same as Exam Date
Study Time	(0008,0030)	2	TM	1	Same as Exam Time
Referring Physician's Name	(0008,0090)	2	PN	1	
Study ID	(0020,0010)	2	SH	1	
Accession Number	(0008,0050)	2	SH	1	
Study Description	(0008,1030)	3	LO	1	
Physician(s) of Record	(0008,1048)	3	PN	1-n	Not used
Name of Physician(s) Reading Study	(0008,1060)	3	PN	1-n	Diagnostician
Referenced Study Sequence	(0008,1110)	3	SQ	1	Value copied from SPS
> Referenced SOP Class UID	(0008,1150)	1C	UI	1	Value copied from SPS
> Referenced SOP Instance UID	(0008,1155)	1C	UI	1	Value copied from SPS
Procedure Code Sequence	(0008,1032)	3	SQ	1	Not Used

A.7.4 Patient Study Module

This section defines Attributes that provide information about the Patient at the time the Study was performed.

Attribute Name	Tag	Type	VR	VM	Notes
Admitting Diagnosis Description	(0008,1080)	3	LO	1-n	Not Used

Patient's Age	(0010,1010)	3	AS	1	Value equals to Exam date minus Patient Birth date
Patient's Size	(0010,1020)	3	DS	1	Value is always in meter unit
Patient's Weight	(0010,1030)	3	DS	1	
Occupation	(0010,2180)	3	SH	1	Not used
Additional Patient's History	(0010,21B0)	3	LT	1	

A.7.5 Discovery PET Exam Module

Refer to Section B.2.3 for details.

A.7.6 General Series Module

Attribute Name	Tag	Type	VR	VM	Notes
Modality	(0008,0060)	1	CS	1	
Series Instance UID	(0020,000E)	1	UI	1	
Series Number	(0020,0011)	2	IS	1	
Laterality	(0020,0060)	2C	CS	1	Not used
Series Date	(0008,0021)	3	DA	1	
Series Time	(0008,0031)	3	TM	1	
Performing Physician's Name	(0008,1050)	3	PN	1-n	Not used
Protocol Name	(0018,1030)	3	LO	1	User selected protocol
Series Description	(0008,103E)	3	LO	1	
Operators' Name	(0008,1070)	3	PN	1-n	
Referenced Performed Procedure Step Sequence	(0008,1111)	3	SQ	1	
> Referenced SOP Class UID	(0008,1150)	1C	UI	1	
> Referenced SOP Instance UID	(0008,1155)	1C	UI	1	
Body Part Examined	(0018,0015)	3	CS	1	Not used
Patient Position	(0018,5100)	2C	CS	1	
Smallest Pixel Value in Series	(0028,0108)	3	US/SS	1	Not used
Largest Pixel Value in Series	(0028,0109)	3	US/SS	1	Not used
Request Attributes Sequence	(0040, 0275)	3	SQ	1	
> Accession Number	(0008, 0050)	3	SH	1	

Attribute Name	Tag	Type	VR	VM	Notes
> Reference Study Sequence	(0008, 1110)	3	SQ	1	
>> Referenced SOP Class UID	(0008, 1150)	3	UI	1	
>> Referenced SOP Instance UID	(0008, 1155)	3	UI	1	
> Study Instance UID	(0020, 000D)	3	UI	1	
> Requested Procedure Description	(0032, 1060)	3	LO	1	
> Requested Procedure Code Sequence	(0032, 1064)	3	SQ	1	
>> Code Value	(0008, 0100)	1C	SH	1	
>> Coding Scheme Designator	(0008, 0102)	1C	SH	1	
>> Code Meaning	(0008, 0104)	3	LO	1	
> Scheduled Procedure Description	(0040, 0007)	3	LO	1	
> Scheduled Procedure Step ID	(0040, 0009)	3	SH	1	
> Requested Procedure ID	(0040, 1001)	3	SH	1	

A.7.7 PET Series Module

Attribute Name	Tag	Type	VR	VM	Notes
Series Date	(0008,0021)	1	DA	1	Always shows Acquisition Date
Series Time	(0008,0031)	1	TM	1	Always shows Acquisition Time
Counts Source	(0054,1002)	1	CS	1	
Units	(0054,1001)	1	CS	1	
Series Type	(0054,1000)	1	CS	2	
Reprojection Method	(0054,1004)	2C	CS	1	
Number of R-R Intervals	(0054,0061)	1C	US	1	For Gated Scan, Value equals to 1. Provided from [0x0009,0x10dd] Number of R-R Intervals, always 1 if scan is gated
Number of Time Slots	(0054,0071)	1C	US	1	For Gated Scan, value equal to the number of bin intervals. Provided from [0x0009,0x10de] Number of Time Slots, which is # bins

Number of Time Slices	(0054,0101)	1C	US	1	
Number of Slices	(0054,0081)	1	US	1	
Corrected Image	(0028,0051)	2	CS	1-n	
Randoms Correction Method	(0054,1100)	3	CS	1	
Attenuation Correction Method	(0054,1101)	3	LO	1	
Scatter Correction Method	(0054,1105)	3	LO	1	
Decay Correction	(0054,1102)	1	CS	1	
Reconstruction Diameter	(0018,1100)	3	DS	1	
Convolution Kernel	(0018,1210)	3	SH	1-n	
Reconstruction Method	(0054,1103)	3	LO	1	
Detector Lines of Response Used	(0054,1104)	3	LO	1	
Acquisition Start Condition	(0018,0073)	3	CS	1	
Acquisition Start Condition Data	(0018,0074)	3	IS	1	
Acquisition Termination Condition	(0018,0071)	3	CS	1	
Acquisition Termination Condition Data	(0018,0075)	3	IS	1	
Field of View Shape	(0018,1147)	3	CS	1	
Field of View Dimensions	(0018,1149)	3	IS	1-2	
Gantry / Detector Tilt	(0018,1120)	3	DS	1	
Gantry/Detector Slew	(0018,1121)	3	DS	1	
Type of Detector Motion	(0054,0202)	3	CS	1	
Collimator Type	(0018,1181)	2	CS	1	
Collimator/Grid Name	(0018,1180)	3	SH	1	
Axial Acceptance	(0054,1200)	3	DS	1	
Axial Mash	(0054,1201)	3	IS	2	
Transverse Mash	(0054,1202)	3	IS	1	
Detector Element Size	(0054,1203)	3	DS	2	Not used
Coincidence Window Width	(0054,1210)	3	DS	1	Difference between Upper and Lower Coincidence limits
Energy Window Range Sequence	(0054,0013)	3	SQ	1	
> Energy Window Lower Limit	(0054,0014)	3	DS	1	
> Energy Window Upper Limit	(0054,0015)	3	DS	1	
Secondary Counts Type	(0054,1220)	3	CS	1-n	Value equals “DLYD” if scan delay events is separate.

A.7.8 Acquisition Context Module

Attribute Name	Tag	Type	VR	VM	Notes
Acquisition Context Sequence	(0040,0555)	2	SQ	1	
>Concept Name Code Sequence	(0040,A043)	1C	SQ	1	
>> Code Value	(0008, 0100)	1C	SH	1	
>> Coding Scheme Designator	(0008, 0102)	1C	SH	1	
>> Code Meaning	(0008, 0104)	3	LO	1	
> Concept Code Sequence	(0040,A168)	3	SQ	1	
>> Code Value	(0008, 0100)	1C	SH	1	
>> Coding Scheme Designator	(0008, 0102)	1C	SH	1	
>> Code Meaning	(0008, 0104)	3	LO	1	

A.7.9 PET Isotope Module

Attribute Name	Tag	Type	VR	VM	Notes
Radiopharmaceutical Information Sequence	(0054,0016)	2	SQ	1	Single item sequence
> Radionuclide Code Sequence	(0054,0300)	2	SQ	1	Single item sequence
>> Code Value	(0008,0100)	1C	SH	1	Code value is based on radionuclide name
>> Coding Scheme Designator	(0008,0102)	1C	SH	1	SRT
>> Code Meaning	(0008,0104)	3	LO	1	Radionuclide name
> Radiopharmaceutical Route	(0018,1070)	3	LO	1	Not Used
> Administration Route Code Sequence	(0054,0302)	3	SQ	1	Not Used
>> Code Value	(0008,0100)	1C	SH	1	Not Used
>> Coding Scheme Designator	(0008,0102)	1C	SH	1	Not Used
>> Code Meaning	(0008,0104)	3	LO	1	Not Used
> Radiopharmaceutical Volume	(0018,1071)	3	DS	1	
> Radiopharmaceutical Start Time	(0018,1072)	3	TM	1	
> Radiopharmaceutical Stop Time	(0018,1073)	3	TM	1	Not Used
> Radionuclide Total Dose	(0018,1074)	3	DS	1	Value depends on tracer activity, post injection activity, half life, measure date time, admin date time, post injection

					date time
> Radionuclide Half Life	(0018,1075)	3	DS	1	
> Radionuclide Positron Fraction	(0018,1076)	3	DS	1	
> Radiopharmaceutical Specific Activity	(0018,1077)	3	DS	1	Not Used
> Radiopharmaceutical	(0018,0031)	3	LO	1	Tracer name
> Radiopharmaceutical Code Sequence	(0054,0304)	3	SQ	1	Single item sequence
>> Code Value	(0008,0100)	1C	SH	1	Value is based on Tracer name
>> Coding Scheme Designator	(0008,0102)	1C	SH	1	SRT
>> Code Meaning	(0008,0104)	3	LO	1	Tracer name
Intervention Drug Information Sequence	(0018,0026)	3	SQ	1	Not Used
> Intervention Drug Name	(0018,0034)	3	LO	1	Not Used
> Intervention Drug Code Sequence	(0018,0029)	3	SQ	1	Not Used
>> Code Value	(0008,0100)	1C	SH	1	Not Used
>> Coding Scheme Designator	(0008,0102)	1C	SH	1	Not Used
>> Code Meaning	(0008,0104)	3	LO	1	Not Used
> Intervention Drug Start Time	(0018,0035)	3	TM	1	Not Used
> Intervention Drug Stop Time	(0018,0027)	3	TM	1	Not Used
> Intervention Drug Dose	(0018,0028)	3	DS	1	Not Used

Radionuclide (0054,0300)

UI Selection	Code Value (0008,0100)	Code Meaning (0008,0104)
18F	C-111A1	^18^Fluorine
13N	C-107A1	^13^Nitrogen
11C	C-105A1	^11^Carbon
15O	C-B1038	^15^Oxygen
68Ga	C-131A3	^68^Gallium
68Ge	C-128A2	^68^Germanium
62Cu	C-127A5	^62^Copper
82Rb	C-159A2	^82^Rubidium
22Na	C-155A1	^22^Sodium
75Br	C-113A1	^75^Bromine
76Br	C-113A2	^76^Bromine
64Cu	C-127A2	^64^Copper
124I	C-114A5	^124^Iodine
14O	C-1018C	^14^Oxygen
60Cu	C-127A4	^60^Copper

61Cu	C-127A1	^61^Copper
66Ga	C-131A1	^66^Gallium
38K	C-135A4	^38^Potassium
52Mn	C-149A1	^52^Manganese
94mTc	C-163AA	^94m^Technetium
45Ti	C-166A2	^45^Titanium
86Y	C-162A3	^86^Yttrium
90Y	C-162A7	^90^Yttrium

Radiopharmaceuticals (0054,0304)

UI Selection	Code Value (0008,0100)	Code Meaning (0008,0104)
FDG -- fluorodeoxyglucose	C-B1031	Fluorodeoxyglucose F^18^
FDOPA -- fluoroDOPA	C-B1034	Fluoro-L-dopa F^18^
F- -- Fluorine	Y-X1745	F- -- Fluorine
NH3 -- ammonia	C-B103C	Ammonia N^13^
H2O -- water	C-B1039	Oxygen-water O^15^
O2 -- oxygen	C-B1038	Oxygen O^15^
[150]CO -- carbon monoxide	C-B103A	Carbon monoxide O^15^
[150]CO2 -- carbon dioxide	C-B103B	Carbon dioxide O^15^
OAc -- Acetate	C-B1043	Acetate C^11^
Palmitate	C-B1044	Palmitate C^11^
[11C]CO -- carbon monoxide	C-B1045	Carbon monoxide C^11^
[11C]CO2 -- carbon dioxide	Y-X1754	CO2 -- carbon dioxide
Rubidium cation	Y-X1755	Rubidium cation
FluoroSpiperone	C-B1033	Spiperone F^18^
L-2-Fluorotyrosine	Y-X1757	L-2-Fluorotyrosine
Misonidazole	C-B07E1	Fluormisonidazole F^18^
[11C]Butanol	Y-X1759	[11C]Butanol
Deoxyglucose	Y-X1760	Deoxyglucose
Glucose	Y-X1761	Glucose
Methionine	C-B103E	Methionine C^11^
N-MethylSpiperone	Y-X1763	N-MethylSpiperone
Raclopride	C-B1042	Raclopride C^11^
Thymidine(FLT)	C-B1036	Thymidine (FLT)F^18^
L-1-Tyrosine	Y-X1766	L-1-Tyrosine
[15O]Butanol	C-B07DC	Butanol O^15^
EDTA	C-B07DD	EDTA Ga^68^
PTSM	C-B07E7	PTSM Cu^62^
Choline	choline	Choline

Rubidium chloride	C-B1037	Rubidium chloride Rb^82^
Sodium	C-B1047	Sodium Na^22
[62Cu]ATSM	C-B07DB	ATSM Cu^64^
[11C]Carfentanil	C-B103F	Carfentanil C^11^
[11C]Flumazenil	C-B07DE	Flumazenil C^11^
[18F]Flumazenil	C-B07DF	Flumazenil F^18^
Fluorethyltyrosin	C-B07E0	Fluorethyltyrosin F^18^
Fluoromethane	C-B07E2	Fluoromethane F^18^
Fluorouracil	C-B07E3	Fluorouracil F^18^
Fluorobenzothiazole	C-B07E4	Fluorobenzothiazole F^18^
Germanium	C-B1046	Germanium Ge^68^
[13N]Glutamate	C-B103D	Glutamate N^13^
[I124]Monoclonal Antibody	C-B07E6	Monoclonal antibody I^124^
Sodium Flouride	C-B1032	Sodium flouride F^18^
[I124]Sodium Iodide	C-B07E8	Sodium iodide I^124^
[18F]Flutemetamol	UNKNOWN	Flutemetamol F^18^
[18F]Fluciclatide	UNKNOWN	Fluciclatide F^18^
[18F]Fluciclovine	UNKNOWN	Fluciclovine F^18^

A.7.10 PET Multi-gated Acquisition Module

Attribute Name	Tag	Type	VR	VM	Notes
Beat Rejection Flag	(0018,1080)	2	CS	1	Value is "Y" or "N" depends on Trigger Rejection Method selected by Users.
Trigger Source or Type	(0018,1061)	3	LO	1	Not Used
PVC Rejection	(0018,1085)	3	LO	1	
Skip Beats	(0018,1086)	3	IS	1	
Heart Rate	(0018,1088)	3	IS	1	Not Used
Framing Type	(0018,1064)	3	LO	1	

Note: The Multi-Gated Acquisition Module is only sent for Gated (respiratory/cardiac) acquisition.

A.7.11 NM/PET Patient Orientation Module

Attribute Name	Tag	Type	VR	VM	Notes
Patient Orientation Code Sequence	(0054,0410)	2	SQ	1	Zero length sequence
> Code Value	(0008,0100)	1C	SH	1	
> Coding Scheme Designator	(0008,0102)	1C	SH	1	99SDM
> Code Meaning	(0008,0104)	3	LO	1	
> Patient Orientation Modifier Code	(0054,0412)	2C	SQ	1	

Sequence					
>> Code Value	(0008,0100)	1C	SH	1	
>> Coding Scheme Designator	(0008,0102)	1C	SH	1	99SDM
>> Code Meaning	(0008,0104)	3	LO	1	
Patient Gantry Relationship Code Sequence	(0054,0414)	2	SQ	1	Zero length sequence
> Code Value	(0008,0100)	1C	SH	1	
> Coding Scheme Designator	(0008,0102)	1C	SH	1	99SDM
> Code Meaning	(0008,0104)	3	LO	1	

Patient Orientation

Code Value (0008,0100)	Code Meaning (0008,0104)
F-10450	recumbent

Patient Orientation Modifier

Code Value (0008,0100)	Code Meaning (0008,0104)
F-10310	prone
F-10317	right lateral decubitus
F-10319	left lateral decubitus
F-10340	supine

Patient Gantry Relationship

Code Value (0008,0100)	Code Meaning (0008,0104)
F-10470	headfirst
F-10480	feet-first

A.7.12 Discovery PET Image Set Module

Refer to Section B.2.6 for details.

A.7.13 Discovery PET Scan Module

Refer to Section B.2.4 for details

A.7.14 Frame of Reference Module

This section specifies the Attributes necessary to uniquely identify a frame of reference which insures the spatial relationship of Images within a Series. It also allows Images across multiple Series to share the same Frame Of Reference. This Frame Of Reference (or coordinate system) shall be constant for all Images related to a specific Frame Of Reference.

Attribute Name	Tag	Type	VR	VM	Notes
Frame of Reference UID	(0020,0052)	1	UI	1	
Position Reference Indicator	(0020,1040)	2	LO	1	Scan Landmark

A.7.15 General Equipment Module

This section specifies the Attributes, which identify and describe the piece of equipment, which produced a Series of Images.

Attribute Name	Tag	Type	VR	VM	Notes
Manufacturer	(0008,0070)	2	LO	1	GE Medical System
Institution Name	(0008,0080)	3	LO	1	Hospital name
Institution Address	(0008,0081)	3	ST	1	Not Used
Station Name	(0008,1010)	3	SH	1	Not Used
Institutional Department Name	(0008,1040)	3	LO	1	Not Used
Manufacturer's Model Name	(0008,1090)	3	LO	1	Scanner Description
Device Serial Number	(0018,1000)	3	LO	1	
Software Versions	(0018,1020)	3	LO	1	Image software version Frame software version
Spatial Resolution	(0018,1050)	3	DS	1	Not Used
Date of Last Calibration	(0018,1200)	3	DA	1-n	Not Used
Time of Last Calibration	(0018,1201)	3	TM	1-n	Not Used
Pixel Padding Value	(0028,0120)	3	US or SS	1	Not Used

A.7.16 General Image Module

This section specifies the Attributes, which identify and describe an image within a particular series.

Attribute Name	Tag	Type	VR	VM	Notes
Image Number	(0020,0013)	2	IS	1	

Patient Orientation	(0020,0020)	2C	CS	2	Not Used
Image Date	(0008,0023)	2C	DA	1	Extract date from image date time
Image Time	(0008,0033)	2C	TM	1	Extract time from image date time
Image Type	(0008,0008)	3	CS	1-n	
Acquisition Number	(0020,0012)	3	IS	1	Not Used
Acquisition Date	(0008,0022)	3	DA	1	Acquisition Date
Acquisition Time	(0008,0032)	3	TM	1	Acquisition Time
Referenced Image Sequence	(0008,1140)	3	SQ	1	Not Used
> Referenced SOP Class UID	(0008,1150)	1C	UI	1	Not Used
> Referenced SOP Instance UID	(0008,1155)	1C	UI	1	Not Used
Timezone Offset From UTC	(0x0008,0x0201)	3	LO	1	Contains the offset from UTC to the time zone for all DA and TM Attributes present in this SOP Instance. Encoded as an ASCII string in the format "&ZZZ". The components of the string, from left to right, are & = "+" or "-", and ZZZZ = Hours and Minutes of offsets.
Source Image Sequence	(0008,2112)	3	SQ	1	Not Used
> Referenced SOP Class UID	(0008,1150)	1C	UI	1	Not Used
> Referenced SOP Instance UID	(0008,1155)	1C	UI	1	Not Used
Images in Acquisition	(0020,1002)	3	IS	1	Not Used
Image Comments	(0020,4000)	3	LT	1	Not Used
Lossy Image Compression	(0028,2110)	3	CS	1	

A.7.17 Image Plane Module

This section specifies the Attributes, which define the transmitted pixel array of a two **dimensional image plane.**

Attribute Name	Tag	Type	VR	VM	Notes
Pixel Spacing	(0028,0030)	1	DS	2	Value 1 = pixel width Value 2 = pixel height
Image Orientation (Patient)	(0020,0037)	1	DS	6	Patient Row inferior Patient Row Posterior Patient Row Superior Patient Column inferior Patient Column Posterior Patient Column Superior

Image Position (Patient)	(0020,0032)	1	DS	3	Patient inferior Patient Posterior Patient Superior
Slice Thickness	(0018,0050)	2	DS	1	
Slice Location	(0020,1041)	3	DS	1	

A.7.18 Image Pixel Module

This section specifies the Attributes that describe the pixel data of the image.

Attribute Name	Tag	Type	VR	VM	Notes
Samples per Pixel	(0028,0002)	1	US	1	
Photometric Interpretation	(0028,0004)	1	CS	1	
Rows	(0028,0010)	1	US	1	Matrix Size Height
Columns	(0028,0011)	1	US	1	Matrix Size Width
Bits Allocated	(0028,0100)	1	US	1	
Bits Stored	(0028,0101)	1	US	1	
High Bit	(0028,0102)	1	US	1	
Pixel Representation	(0028,0103)	1	US	1	= 0001H (2's complement)
Pixel Data	(7FE0,0010)	1	OB/ OW	1	Pixel data (sent as OW)
Planar Configuration	(0028,0006)	1C	US	1	Not Used
Pixel Aspect Ratio	(0028,0034)	1C	IS	2	Not Used
Smallest Image Pixel Value	(0028,0106)	3	US/ SS	1	Not Used
Largest Image Pixel Value	(0028,0107)	3	US/ SS	1	Not Used
Red Palette Color Lookup Table Descriptor	(0028,1101)	1C	US/ US or SS/ US	3	Not Used
Green Palette Color Lookup Table Descriptor	(0028,1102)	1C	US/ US or SS/ US	3	Not Used
Blue Palette Color Lookup Table Descriptor	(0028,1103)	1C	US/ US or SS/	3	Not Used

			US		
Red Palette Color Lookup Table Data	(0028,1201)	1C	US or SS	1-n	Not Used
Green Palette Color Lookup Table Data	(0028,1202)	1C	US or SS	1-n	Not Used
Blue Palette Color Lookup Table Data	(0028,1203)	1C	US or SS	1-n	Not Used

A.7.19 PET Image Module

This section specifies the Attributes that describe the image within a particular PET Series.

Attribute Name	Tag	Type	VR	VM	Notes
Image Type	(0008,0008)	1	CS	1-n	Use Image Set Source
Samples per Pixel	(0028,0002)	1	US	1	1
Photometric Interpretation	(0028,0004)	1	CS	1	”MONOCHROME2”
Bits Allocated	(0028,0100)	1	US	1	Image depth (always 16)
Bits Stored	(0028,0101)	1	US	1	Image depth (always 16)
High Bit	(0028,0102)	1	US	1	15
Rescale Intercept	(0028,1052)	1	DS	1	0
Rescale Slope	(0028,1053)	1	DS	1	Use scale factor,
Frame Reference Time	(0054,1300)	1	DS	1	Value equals to Frame Referenced Time if not Zero, otherwise, value equals to Image Time.
Trigger Time	(0018,1060)	1C	DS	1	Time interval, in msec, from the start of the trigger to the beginning of data acquisition for this image.
Frame Time	(0018,1063)	1C	DS	1	For Gated Scans, value equals to Image bin Duration. Otherwise, value equals to 0.
Low R-R Value	(0018,1081)	1C	IS	1	Lower rejection limit
High R-R Value	(0018,1082)	1C	IS	1	Upper rejection limit
Lossy Image Compression	(0028,2110)	1C	CS	1	Value equals 00H for NO compression. Otherwise, value equals 01H if compression is lossy.
Image Index	(0054,1330)	1	US	1	scan mode

					image location image time image bin time
Acquisition Date	(0008,0022)	2	DA	1	Value equals Scan Date Time plus Image Time.
Acquisition Time	(0008,0032)	2	TM	1	Value equals Scan Date Time plus Image Time.
Actual Frame Duration	(0018,1242)	1C	IS	1	Image duration (Converted from seconds in DB to milliseconds)
Nominal Interval	(0018,1062)	3	IS	1	Not Used
Intervals Acquired	(0018,1083)	3	IS	1	Triggers acquired
Intervals Rejected	(0018,1084)	3	IS	1	Triggers rejected
Primary Counts (Prompts) Accumulated	(0054,1310)	3	IS	1	Total prompts
Secondary Counts Accumulated	(0054,1311)	3	IS	1-n	Value 1 = total delays
Slice Sensitivity Factor	(0054,1320)	3	DS	1	Value equals coefficient if coefficient is not NULL. Otherwise, value equals 1.0
Decay Factor	(0054,1321)	1C	DS	1	Decay factor
Dose Calibration Factor	(0054,1322)	3	DS	1	Value equals Activity factor times 1.0e+06 (Value is converted MBq/ml to Bq/ml)
Scatter Fraction Factor	(0054,1323)	3	DS	1	Value equals Scatter subtracted divided by total counts
Dead Time Factor	(0054,1324)	3	DS	1	Deadtime factor
Referenced Overlay Sequence	(0008,1130)	3	SQ	1	Not Used
>Referenced SOP Class UID	(0008,1150)	1	UI	1	Not Used
>Referenced SOP Instance UID	(0008,1155)	1	UI	1	Not Used
Referenced Curve Sequence	(0008,1145)	3	SQ	1	Not Used
>Referenced SOP Class UID	(0008,1150)	1	UI	1	Not Used
>Referenced SOP Instance UID	(0008,1155)	1	UI	1	Not Used
Anatomic Region Sequence	(0008,2218)	3	SQ	1	Not Used
> Code Value	(0008,0100)	1	SH	1	Not Used
> Coding Scheme Designator	(0008,0102)	1	SH	1	Not Used
> Code Meaning	(0008,0104)	3	LO	1	Not Used
> Anatomic Region Modifier Sequence	(0008,2220)	3	SQ	1	Not Used
>> Code Value	(0008,0100)	1	SH	1	Not Used
>> Coding Scheme Designator	(0008,0102)	1	SH	1	Not Used
>> Code Meaning	(0008,0104)	3	LO	1	Not Used

Primary Anatomic Structure Sequence	(0008,2228)	3	SQ	1	Not Used
> Code Value	(0008,0100)	1	SH	1	Not Used
> Coding Scheme Designator	(0008,0102)	1	SH	1	Not Used
> Code Meaning	(0008,0104)	3	LO	1	Not Used
> Primary Anatomic Structure Modifier Sequence	(0008,2230)	3	SQ	1	Not Used
>> Code Value	(0008,0100)	1	SH	1	Not Used
>> Coding Scheme Designator	(0008,0102)	1	SH	1	Not Used
>> Code Meaning	(0008,0104)	3	LO	1	Not Used

A.7.20 Overlay Plane Module

This section contains Attributes that describe characteristics of an Overlay Plane. Overlay Planes are not currently used in GE Discovery ST PET AE.

A.7.21 VOI LUT Module

This section specifies the Attributes that describe the VOI LUT.

Attribute Name	Tag	Type	VR	VM	Notes
VOI Lut Sequence	(0028,3010)	3	SQ	1	Not Used
> LUT Descriptor	(0028,3002)	1C	US\US or SS\US	3	Not Used
> LUT Explanation	(0028,3003)	3	LO	1	Not Used
> LUT Data	(0028,3006)	1C	US or SS	1-n	Not Used
Window Center	(0028,1050)	3	DS	1-n	Window center
Window Width	(0028,1051)	1C	DS	1-n	Window width
Window Center & Width Explanation	(0028,1055)	3	LO	1-n	Not Used

A.7.22 Discovery PET Image Module

Refer to Section B.2.7 for details.

A.7.23 Discovery PET Frame Module

Refer to Section B.2.5 for details.

A.7.24 SOP Common

This section defines the Attributes which are required for proper functioning and identification of the associated SOP Instances. They do not specify any semantics about the Real-World Object represented by the IOD.

Attribute Name	Tag	Type	VR	VM	Notes
SOP Class UID	(0008,0016)	1	UI	1	
SOP Instance UID	(0008,0018)	1	UI	1	
Specific Character Set	(0008,0005)	1C	CS	1	Always sent as "ISO_IR 100"
Instance Creation Date	(0008,0012)	3	DA	1	Current Date
Instance Creation Time	(0008,0013)	3	TM	1	Current Time
Instance Creator UID	(0008,0014)	3	UI	1	

APPENDIX B: Private Data Elements

Enclosed is a listing of private data elements used in this implementation for CT Image IOD definition.

B.1 CT Image IOD Private Data Elements Definition

B.1.1 Private Creator Identification (GEMS_IDEN_01)

Attribute Name	Tag	VR	VM
Full fidelity	(0009,1001)	LO	1
Suite id	(0009,1002)	SH	1
Product id	(0009,1004)	SH	1
Image actual date	(0009,1027)	SL	1
Equipment UID	(0009,10E3)	UI	1

Note: For all images created by Discovery system (0009,xx01) element will have the value "CT_DISCOVERY".

B.1.2 Private Creator Identification (GEMS_ACQU_01)

Attribute Name	Tag	VR	VM
Number of cells I in Detector	(0019,1002)	SL	1
Cell number at Theta	(0019,1003)	DS	1
Cell spacing	(0019,1004)	DS	1
Horiz. Frame of ref.	(0019,100F)	DS	1
Series contrast	(0019,1011)	SS	1
First scan ras	(0019,1018)	LO	1
Last scan ras	(0019,101A)	LO	1
Table speed	(0019,1023)	DS	1
Mid scan time	(0019,1024)	DS	1
Mid scan flag	(0019,1025)	SS	1
Degrees of azimuth	(0019,1026)	SL	1
Gantry period	(0019,1027)	DS	1
Number of triggers	(0019,102C)	SL	1
Angle of first view	(0019,102E)	DS	1
Trigger frequency	(0019,102F)	DS	1
Scan FOV type	(0019,1039)	SS	1
Segment number	(0019,1042)	SS	1
Total segments requested	(0019,1043)	SS	1
View compression factor	(0019,1047)	SS	1
Recon post proc. Flag	(0019,1052)	SS	1
Dependent on #views processed	(0019,106A)	SS	1

B.1.3 Private Creator Identification (GEMS_RELA_01)

Attribute Name	Tag	VR	VM
Series from which Prescribed	(0021,1003)	SS	1
Series Prescribed From	(0021,1035)	SS	1
Image Prescribed From	(0021,1036)	SS	1
Biopsy position	(0021,1091)	SS	1
Biopsy T location	(0021,1092)	FL	1
Biopsy ref location	(0021,1093)	FL	1

B.1.4 Private Creator Identification (GEMS_STDY_01)

Attribute Name	Tag	VR	VM
Start time(secs) in first axial	(0023,1070)	FD	1

B.1.5 Private Creator Identification (GEMS_IMAG_01)

Attribute Name	Tag	VR	VM
Scout Type	(0027,1010)	SS	1
Vma mamp	(0027,101C)	SL	1
Vma mod	(0027,101E)	SL	1
Vma clip	(0027,101F)	SL	1
Smart scan ON/OFF flag	(0027,1020)	SS	1
Plane Type	(0027,1035)	SS	1
Center R coord of plane image	(0027,1042)	FL	1
Center A coord of plane image	(0027,1043)	FL	1
Center S coord of plane image	(0027,1044)	FL	1
Normal R coord	(0027,1045)	FL	1
Normal A coord	(0027,1046)	FL	1
Normal S coord	(0027,1047)	FL	1
Table start location	(0027,1050)	FL	1
Table end location	(0027,1051)	FL	1

B.1.6 Private Creator Identification (GEMS_0039)

Attribute Name	Tag	VR	VM
SR Application Name	(0039,1095)	LO	1

B.1.7 Private Creator Identification (GEMS_0039)

Attribute Name	Tag	VR	VM
SR Application Name	(0039,1095)	LO	1

B.1.8 Private Creator Identification (GEMS_PARM_01)

Attribute Name	Tag	VR	VM

Attribute Name	Tag	VR	VM
Window value	(0043,1010)	US	1
X-ray chain	(0043,1012)	SS	3
Number of overranges	(0043,1016)	SS	1
Delta start time	(0043,101E)	DS	1
Max overranges in a view	(0043,101F)	SL	1
Corrected after glow terms	(0043,1021)	SS	1
Reference channels	(0043,1025)	SS	6
No views ref chans blocked	(0043,1026)	US	6
Scan pitch ratio	(0043,1027)	SH	1
Unique image iden	(0043,1028)	OB	1
Private Scan Options	(0043,102B)	SS	4
RA cord of target recon center	(0043,1031)	DS	2
Trigger on position	(0043,1040)	FL	1
Degree of rotation	(0043,1041)	FL	1
DAS trigger source	(0043,1042)	SL	1
DAS fpa gain	(0043,1043)	SL	1
DAS output source	(0043,1044)	SL	1
DAS ad input	(0043,1045)	SL	1
DAS cal mode	(0043,1046)	SL	1
Start scan to X-ray on delay	(0043,104D)	FL	1
Duration of X-ray on	(0043,104E)	FL	1
Recon filter	(0043, 1064)	LO	1

B.1.9 Private Creator Identification(GEMS_HELIOS_01)

Note: Dicom elements (0045, 1030-1034) and (0045, 1036-1039) and (0045, 103B) are present only if the appropriate cardiac option is installed on the scanner.

Attribute Name	Tag	VR	VM
Number of Macro Rows in Detector	(0045, 1001)	SS	1
Macro width at ISO Center	(0045, 1002)	FL	1
DAS type	(0045, 1003)	SS	1
DAS gain	(0045, 1004)	SS	1
DAS Temprature	(0045, 1005)	SS	1
Table Direction	(0045, 1006)	CS	1
Z smoothing Factor	(0045, 1007)	FL	1
View Weighting Mode	(0045, 1008)	SS	1
Sigma Row number	(0045, 1009)	SS	1
Minimum DAS value	(0045, 100A)	FL	1
Maximum Offset Value	(0045, 100B)	FL	1
Number of Views shifted	(0045, 100C)	SS	1
Z tracking Flag	(0045, 100D)	SS	1
Mean Z error	(0045, 100E)	FL	1
Z tracking Error	(0045, 100F)	FL	1
Start View 2A	(0045, 1010)	SS	1
Number of Views 2A	(0045, 1011)	SS	1
Start View 1A	(0045, 1012)	SS	1
Sigma Mode	(0045, 1013)	SS	1

Attribute Name	Tag	VR	VM
Number of Views 1A	(0045, 1014)	SS	1
Start View 2B	(0045, 1015)	SS	1
Number Views 2B	(0045, 1016)	SS	1
Start View 1B	(0045, 1017)	SS	1
Number of Views 1B	(0045, 1018)	SS	1
Iterbone Flag	(0045, 1021)	SS	1
Perisstaltic Flag	(0045, 1022)	SS	1
CardiacReconAlgorithm	(0045, 1030)	CS	1
AvgHeartRateForImage	(0045, 1031)	CS	1
TemporalResolution	(0045, 1032)	FL	1
PctRpeakDelay	(0045, 1033)	CS	1
ActualPctRpeakDelay	(0045, 1034)	CS	1
EkgFullMaStartPhase	(0045, 1036)	CS	1
EkgFullMaEndPhase	(0045, 1037)	CS	1
EkgModulationMaxMa	(0045, 1038)	CS	1
EkgModulationMinMa	(0045, 1039)	CS	1
NoiseReductionImageFilterDesc	(0045, 103B)	LO	1
RPeakTimeDelay	(0045, 103F)	IS	1
ActualRPeakTimeDelay	(0045, 1044)	IS	1
CardiacScanOptions	(0045, 1045)	ST	1

B.1.10 Private Creator Identification (GEMS_CT_CARDIAC_001)

Note: Private Group 49 is present only if the appropriate cardiac option is installed on the scanner.

Attribute Name	Tag	VR	VM
CT Cardiac Sequence	(0049, 1001)	SQ	1
HeartRateAtConfirm	(0049, 1002)	CS	1
AvgHeartRatePriorToConfirm	(0049, 1003)	FL	1
MinHeartRatePriorToConfirm	(0049, 1004)	CS	1
MaxHeartRatePriorToConfirm	(0049, 1005)	CS	1
StdDevHeartRatePriorToConfirm	(0049, 1006)	FL	1
NumHeartRateSamplesPriorToConfirm	(0049, 1007)	US	1
AutoHeartRateDetectPredict	(0049, 1008)	CS	1
SystemOptimizedHeartRate	(0049, 1009)	CS	1
EkgMonitorType	(0049, 100A)	ST	1
NumReconSectors	(0049, 100B)	CS	1
RpeakTimeStamps	(0049, 100C	FL	256
EkgGatingType	(0049,1016)	SH	1
EkgWaveTimeOffFirstDataPoint	(0049,101B)	FL	1

B.1.11 Private Creator Identification (GEHC_CT_ADVAPP_001)

Note: Private tags (0053,1070) through (0053,109D) are only present for multi-energy CT images.

Attribute Name	Tag	VR	VM
ShuttleFlag	(0053, 1020)	IS	1

TableSpeedNotReachesTargetFlag	(0053, 1021)	IS	1
IterativeReconAnnotation	(0053, 1040)	SH	1
IterativeReconMode	(0053, 1041)	SH	1
IterativeReconConfiguration	(0053, 1042)	LO	1
IterativeReconLevel	(0053, 1043)	SH	1
reconFlipRotateAnno	(0053, 1060)	SH	1
HiResMode	(0053, 1061)	SH	1
RespiratoryFlag	(0053, 1062)	SH	1

B.1.12 Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM	Notes
Gating Type	(0x0015,0x101A)	3	US	1	Gating Type: Cardiac = 1 Respiratory = 2 No Gating = 3
Total Number of Bins	(0x0015,0x101B)	3	SL	1	The number of selected target phases in the binning protocol use in Adv4D application.
% Phase Value	(0x0015,0x101C)	3	US	1	The target phase value that the images belong to.

Note: Private Group 15 is only generated images from the Motion Free Application, specifically the Advantage4D application version which runs on the CT/PET scanner.

B.2 PET Image IOD Private Data Elements Definition

B.2.1 Private Creator Identification (GEMS_PETD_01)

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
Private Creator Data Element	(0009,0010)	1	SH	1
GE Discovery PET Implementation Version Name	(0009,1001)	3	LO	2

B.2.2 Discovery PET Patient Module

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
PET Implementation Name	(0009,1001)	3	LO	2
PET patient_id	(0009,1002)	3	LO	1
PET compatible_version	(0009,1003)	3	SH	1
PET patient_datetime	(0009,1005)	3	DT	1
PET type	(0009,1006)	3	SL	1

Blood Glucose Level	(0009,10F3)	3	FL	1
IsPatientDiabetic	(0009,10F4)	3	SL	1
Date of Last Treatment	(0009,10F5)	3	DA	1

B.2.3 Discovery PET Exam Module

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
PET exam_id	(0009,1007)	3	UI	1
PET compatible_version	(0009,1008)	3	SH	1
PET software_version	(0009,1009)	3	SH	1

B.2.4 Discovery PET Scan Module

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
PET scan_id	(0009,100A)	3	UI	1
PET compatible_version	(0009,100B)	3	SH	1
PET software_version	(0009,100C)	3	SH	1
PET scan_datetime	(0009,100D)	3	DT	1
PET scan_ready	(0009,100E)	3	DT	1
PET scan_description	(0009,100F)	3	ST	1
PET hospital_name	(0009,1010)	3	LO	1
PET scanner_desc	(0009,1011)	3	LO	1
PET manufacturer	(0009,1012)	3	LO	1
PET for_identifier	(0009,1013)	3	UI	1
PET landmark_name	(0009,1014)	3	LO	1
PET landmark_abbrev	(0009,1015)	3	SH	1
PET patient_position	(0009,1016)	3	SL	1
PET scan_perspective	(0009,1017)	3	SL	1
PET scan_type	(0009,1018)	3	SL	1
PET scan_mode	(0009,1019)	3	SL	1
PET start_condition	(0009,101A)	3	SL	1
PET start_cond_data	(0009,101B)	3	SL	1
PET sel_stop_cond	(0009,101C)	3	SL	1
PET sel_stop_cond_data	(0009,101D)	3	SL	1

PET collect_deadtime	(0009,101E)	3	SL	1
PET collect_singles	(0009,101F)	3	SL	1
PET collect_countrate	(0009,1020)	3	SL	1
PET countrate_period	(0009,1021)	3	SL	1
PET delayed_events	(0009,1022)	3	SL	1
PET delayed_bias	(0009,1023)	3	SL	1
PET word_size	(0009,1024)	3	SL	1
PET axial_acceptance	(0009,1025)	3	SL	1
PET axial_angle_3d	(0009,1026)	3	SL	1
PET theta_compression	(0009,1027)	3	SL	1
PET axial_compression	(0009,1028)	3	SL	1
PET gantry_tilt_angle	(0009,1029)	3	FL	1
PET collimation	(0009,102A)	3	SL	1
PET scan_fov	(0009,102B)	3	SL	1
PET axial_fov	(0009,102C)	3	SL	1
PET event_separation	(0009,102D)	3	SL	1
PET mask_width	(0009,102E)	3	SL	1
PET binning_mode	(0009,102F)	3	SL	1
PET tracer_name	(0009,1036)	3	LO	1
PET batch_description	(0009,1037)	3	LO	1
PET tracer_activity	(0009,1038)	3	FL	1
PET meas_datetime	(0009,1039)	3	DT	1
PET pre_inj_volume	(0009,103A)	3	FL	1
PET admin_datetime	(0009,103B)	3	DT	1
PET post_inj_activity	(0009,103C)	3	FL	1
PET post_inj_datetime	(0009,103D)	3	DT	1
PET radionuclide_name	(0009,103E)	3	SH	1
PET half_life	(0009,103F)	3	FL	1
PET positron_fraction	(0009,1040)	3	FL	1
PET source1_holder	(0009,1041)	3	SL	1
PET source1_activity	(0009,1042)	3	FL	1
PET source1_meas_dt	(0009,1043)	3	DT	1
PET source1_radnuclide	(0009,1044)	3	SH	1
PET source1_half_life	(0009,1045)	3	FL	1
PET source2_holder	(0009,1046)	3	SL	1

PET source2_activity	(0009,1047)	3	FL	1
PET source2_meas_dt	(0009,1048)	3	DT	1
PET source2_radnuclide	(0009,1049)	3	SH	1
PET source2_half_life	(0009,104A)	3	FL	1
PET source_speed	(0009,104B)	3	SL	1
PET source_location	(0009,104C)	3	FL	1
PET emission_present	(0009,104D)	3	SL	1
PET lower_axial_acc	(0009,104E)	3	SL	1
PET upper_axial_acc	(0009,104F)	3	SL	1
PET lower_coinc_limit	(0009,1050)	3	SL	1
PET upper_coinc_limit	(0009,1051)	3	SL	1
PET coinc_delay_offset	(0009,1052)	3	SL	1
PET coinc_output_mode	(0009,1053)	3	SL	1
PET upper_energy_limit	(0009,1054)	3	SL	1
PET lower_energy_limit	(0009,1055)	3	SL	1
PET normal_cal_id	(0009,1056)	3	UI	1
PET normal_2d_cal_id	(0009,1057)	3	UI	1
PET blank_cal_id	(0009,1058)	3	UI	1
PET wc_cal_id	(0009,1059)	3	UI	1
PET derived	(0009,105A)	3	SL	1
PET contrast_agent	(0009,105B)	3	LO	1
PET vqc_x_axis_trans	(0009, 10CB)	3	FL	1
PET vqc_x_axis_tilt	(0009, 10CC)	3	FL	1
PET vqc_y_axis_trans	(0009, 10CD)	3	FL	1
PET vqc_y_axis_swivel	(0009, 10CE)	3	FL	1
PET vqc_z_axis_trans	(0009, 10CF)	3	FL	1
PET vqc_z_axis_roll	(0009, 10D0)	3	FL	1
PET image_set_id	(0009, 10D2)	3	UI	1
PET image_one_loc	(0009, 10D6)	3	FL	1
PET image_index_loc	(0009, 10D7)	3	FL	1
PET num_of_rr_interval	(00**09**,10DD)	1C	US	1
PET num_of_time_slots	(00**09**,10DE)	1C	US	1
PET num_of_slices	(00**09**,10DF)	1C	US	1
PET num_of_time_slices	(00**09**,10E**0**)	1	US	1
PET rest_stress	(0009,10E2)	1	SL	1

PET tracerInjection_UID	(0009,10F2)	3	UI	1
PET Q Static Scan Mode	(0009,10F6	3	SL	1
PET Sharp IR Flag	(0015,103D)	3	UL	1
PET Scatter Limit	(0015,103E)	3	UL	1
PET Q Static Recon	(0015,103F)	3	SH	1
Event histogram Format	(0015,1039)	3	SL	1
Number of Detector Rows	(0015,103A)	3	SL	1
Number of Detector Columns	(0015,103B)	3	SL	1
Physio Gating Type	(0015,101A)	3	SL	1
Total Number of Bins	(0015, 101B)	3	SL	1

B.2.5 Discovery PET Frame Module

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
PET frame_id	(0009,105C)	3	UI	1
PET trig_rej_method	(0009,1030)	3	SL	1
PET number_for_reject	(0009,1031)	3	SL	1
PET lower_reject_limit	(0009,1032)	3	SL	1
PET upper_reject_limit	(0009,1033)	3	SL	1
PET triggers_acquired	(0009,1034)	3	SL	1
PET triggers_rejected	(0009,1035)	3	SL	1
PET scan_id	(0009,105D)	3	UI	1
PET exam_id	(0009,105E)	3	UI	1
PET patient_id	(0009,105F)	3	LO	1
PET compatible_version	(0009,1060)	3	SH	1
PET software_version	(0009,1061)	3	SH	1
PET where_is_frame	(0009,1062)	3	ST	1
PET frame_size	(0009,1063)	3	SL	1
PET file_exists	(0009,1064)	3	SL	1
PET patient_entry	(0009,1065)	3	SL	1
PET table_height	(0009,1066)	3	FL	1
PET table_z_position	(0009,1067)	3	FL	1
PET landmark_datetime	(0009,1068)	3	DT	1
PET slice_count	(0009,1069)	3	SL	1
PET start_location	(0009,106A)	3	FL	1

PET acq_delay	(0009,106B)	3	SL	1
PET acq_start	(0009,106C)	3	DT	1
PET acq_duration	(0009,106D)	3	SL	1
PET acq_bin_dur	(0009,106E)	3	SL	1
PET acq_bin_start	(0009,106F)	3	SL	1
PET actual_stop_cond	(0009,1070)	3	SL	1
PET total_prompts	(0009,1071)	3	FD	1
PET total_delays	(0009,1072)	3	FD	1
PET frame_valid	(0009,1073)	3	SL	1
PET validity_info	(0009,1074)	3	SL	1
PET archived	(0009,1075)	3	SL	1
PET compression	(0009,1076)	3	SL	1
PET uncompressed_size	(0009,1077)	3	SL	1
PET accum_bin_dur	(0009,1078)	3	SL	1
PET frame_number	(0009,10D8)	3	SL	1
PET list_file_exists	(0009,10D9)	3	SL	1
PET where_is_list_frame	(0009,10DA)	3	ST	1
PET unlisted_scan	(0009,10E1)	3	SL	1
PET phase percentage	(0009, 10E3)	3	FL	1
PET acq_bin_num	(0009, 10E8)	3	SL	1
PET acq_bin_dur_percent	(0009, 10E9)	3	FL	1
PET prompt gamma	(0009, 10F1)	3	SL	1
PET tracerInjection UID	(0009,10F2)	3	UI	1
PET Q Static Frame	(0009,10F7)	3	SL	1
PET Sharp IR Flag	(0015,103D)	3	UL	1
PET Scatter Limit	(0015,103E)	3	UL	1

B.2.6 Discovery PET ImageSet Module

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
PET compatible_version	(0009,1079)	3	SH	1
PET software_version	(0009,107A)	3	SH	1
PET is_datetime	(0009,107B)	3	DT	1
PET is_source	(0009,107C)	3	SL	1
PET is_contents	(0009,107D)	3	SL	1
PET is_type	(0009,107E)	3	SL	1
PET is_reference	(0009,107F)	3	DS	3
PET multi_patient	(0009,1080)	3	SL	1
PET number_of_normals	(0009,1081)	3	SL	1
PET color_map_id	(0009,1082)	3	UI	1
PET window_level_type	(0009,1083)	3	SL	1
PET rotate	(0009,1084)	3	FL	1
PET flip	(0009,1085)	3	SL	1
PET zoom	(0009,1086)	3	FL	1
PET pan_x	(0009,1087)	3	SL	1
PET pan_y	(0009,1088)	3	SL	1
PET window_level_min	(0009,1089)	3	FL	1
PET window_level_max	(0009,108A)	3	FL	1
PET recon_method	(0009,108B)	3	SL	1
PET attenuation	(0009,108C)	3	SL	1
PET atten_coefficient	(0009,108D)	3	FL	1
PET bp_filter	(0009,108E)	3	SL	1
PET bp_filter_cutoff	(0009,108F)	3	FL	1
PET bp_filter_order	(0009,1090)	3	SL	1
PET bp_center_l	(0009,1091)	3	FL	1
PET bp_center_p	(0009,1092)	3	FL	1
PET atten_smooth	(0009,1093)	3	SL	1
PET atten_smooth_param	(0009,1094)	3	SL	1
PET angle_smooth_param	(0009,1095)	3	SL	1
PET wellcountercal_id	(0009,1096)	3	UI	1
PET trans_scan_id	(0009,1097)	3	UI	1

PET norm_cal_id	(0009,1098)	3	UI	1
PET blnk_cal_id	(0009,1099)	3	UI	1
PET cac_edge_threshold	(0009,109A)	3	FL	1
PET cac_skull_offset	(0009,109B)	3	FL	1
PET emiss_sub_id	(0009,109C)	3	UI	1
PET radial_filter_3d	(0009,109D)	3	SS	1
PET radial_cutoff_3d	(0009,109E)	3	FL	1
PET axial_filter_3d	(0009,109F)	3	SL	1
PET axial_cutoff_3d	(0009,10A0)	3	FL	1
PET axial_start	(0009,10A1)	3	FL	1
PET axial_spacing	(0009,10A2)	3	FL	1
PET axial_angles_used	(0009,10A3)	3	SL	1
PET ir_num_iterations	(0009,10B2)	3	SS	1
PET ir_num_subsets	(0009,10B3)	3	SS	1
PET ir_recon_fov	(0009,10B4)	3	FL	1
PET ir_corr_model	(0009,10B5)	3	SS	1
PET ir_loop_filter	(0009,10B6)	3	SS	1
PET ir_pre_filt_parm	(0009,10B7)	3	FL	1
PET ir_loop_filt_parm	(0009,10B8)	3	FL	1
PET response_filt_parm	(0009,10B9)	3	FL	1
PET post_filter	(0009,10BA)	3	SS	1
PET post_filt_parm	(0009,10BB)	3	FL	1
PET ir_regularize	(0009,10BC)	3	SS	1
PET regularize_parm	(0009,10BD)	3	FL	1
PET ac_bp_filter	(0009,10BE)	3	SS	1
PET ac_bp_filt_cut_off	(0009,10BF)	3	FL	1
PET ac_bp_filt_order	(0009,10C0)	3	SL	1
PET ac_img_smooth	(0009,10C1)	3	SS	1
PET ac_img_smooth_parm	(0009,10C2)	3	FL	1
PET scatter_method	(0009,10C3)	3	SL	1
PET scatter_num_iter	(0009,10C4)	3	SS	1
PET scatter_parm	(0009,10C5)	3	FL	1
PET ctac_conv_scale	(0009, 10D4)	3	LO	1
PET loop_filter_parm	(0009,10D5)	3	FL	1
Recon Protocol	(0009,10E4)	3	ST	1

PET prompt gamma	(0009,10F1)	3	SL	1
PET tracerInjectionUID	(0009,10F2)	3	UI	1
PET Q Static ScanMode	(0009,10F6)	3	SL	1
PET Q Static Frame	(0009,10F7)	3	SL	1
Blood Glucose Level	(0009,10F3)	3	FL	1
IsPatientDiabetic	(0009,10F4)	3	SL	1
Date of Last Treatment	(0009,10F5)	3	DA	1
PET QStatic Recon	(0015,103F)	3	SH	1

Privates added for Discovery 710/610 and Optima 560

Attribute Name	Tag	Type	VR	VM
Phase Matched Series	(0015,101D)	3	SL	1
CTAC Percent Value	(0015, 101E)	3	SL	1
Recon Matrix Size	(0015, 103C)	3	US	1
PET Recon Parameters Exists	(0015, 101F)	3	UL	1
First Packet Number	(0015, 1020)	3	SL	1
IR Loop Filter Ratio	(0015, 1021)	3	FL	1
IR Loop Filter Correction	(0015, 1022)	3	FL	1
BP3d Filter FlagU	(0015, 1023)	3	UL	1
BP3d Filter CutoffU	(0015, 1024)	3	FL	1
BP3d Filter OrderU	(0015, 1025)	3	SL	1
BP3d Filter FlagV	(0015, 1026)	3	UL	1
BP3d Filter OrderV	(0015, 1027)	3	FL	1
BP3d Filter CutoffV	(0015, 1028)	3	SL	1
Decay Flag	(0015, 1029)	3	UL	1
Image filter 3d flag	(0015, 102E)	3	UL	1
WCC Cal Flag	(0015, 102F)	3	UL	1
Emission Scatter Flag	(0015, 1030)	3	UL	1
Recon Algorithm	(0015, 1031)	3	UL	1
Normalization Flag	(0015, 1032)	3	UL	1
Emission Deadtime Flag	(0015, 1033)	3	UL	1
Emission Random Flag	(0015, 1034)	3	UL	1
Blank Scan Flag	(0015, 1035)	3	UL	1
PET sharp IR Flag	(0015,103D)	3	UL	1
PET scatter limit	(0015,103E)	3	UL	1

Regularized Recon Beta	(0009,10F8)	3	FL	1
Regularized Recon Gamma	(0009,10F9)	3	FL	1

B.2.7 Discovery PET Image Module

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
PET compatible_version	(0009,10A4)	3	SH	1
PET software_version	(0009,10A5)	3	SH	1
PET slice_number	(0009,10A6)	3	SL	1
PET total_counts	(0009,10A7)	3	FL	1
PET other_atts	(0009,10A8)	3	OB	1
PET other_atts_size	(0009,10A9)	3	SL	1
PET archived	(0009,10AA)	3	SL	1
PET bp_center_x	(0009,10AB)	3	FL	1
PET bp_center_y	(0009,10AC)	3	FL	1
PET trans_frame_id	(0009,10AD)	3	UI	1
PET tpluse_frame_id	(0009,10AE)	3	UI	1
PET profile_spacing	(0009,10B1)	3	FL	1
PET seg_qc_parm	(0009,10C6)	3	FL	1
PET overlap	(0009,10C7)	3	SL	1
PET ovlp_frm_id	(0009,10C8)	3	UI	1
PET ovlp_trans_frm_id	(0009,10C9)	3	UI	1
PET ovlp_tpulse_frm_id	(0009,10CA)	3	UI	1
PET ir_z_filter_flag	(0009, 10DB)	3	SL	1
PET ir_z_filter_ratio	(0009, 10DC)	3	FL	1
PET left shift	(0009, 10E5)	3	FL	1
PET posterior shift	(0009, 10E6)	3	FL	1
PET superior shift	(0009, 10E7)	3	FL	1
3D Filter flag	(0009,10EA)	3	SL	1
3D Filter cutoff	(0009,10EB)	3	FL	1
3D Filter order	(0009,10EC)	3	SL	1
Reformat group	(0009,10F0)	3	UI	1
PET prompt gamma	(0009,10F1)	3	SL	1
PET tracerInjectionUID	(0009,10F2)	3	UI	1
PET Q Static Scan Mode	(0009,10F6)	3	SL	1
PET Q Static Frame	(0009,10F7)	3	SL	1
Number of Detector Rows	(0015,103A)	3	SL	1

Number of Detector Columns	(0015,103B)	3	SL	1
Physio Gating Type	(0015,101A)	3	SL	1
Total Number of Bins	(0015,101B)	3	SL	1

APPENDIX C: DICOMDIR Directory Information

Enclosed here is a listing of only the optional (conditional) modules and optional attributes used by this implementation in the DICOMDIR definition. All standard attributes as defined in Part 3 Addendum (Basic Directory Information Object) are supported by this implementation but not listed here.

C.1 Basic Directory IOD Definition

Module	Reference	Usage	Notes
Directory Information	DICOM Part 3 Annex F.3	U	

C.2 File Set Identification Module

Attribute Name	Tag	Type	Notes
File Set ID	(0004,1130)	2	Set by application

C.3 Directory Information Module

Attribute Name	Tag	Type	Notes
Offset of the First Directory Record of the Root Directory Entity	(0004,1200)	1	Set by application
Offset of the Last Directory Record of the Root Directory Entity	(0004,1202)	1	Set by application
File-set Consistency Flag	(0004,1212)	1	0000H: no known inconsistencies.
Directory Record Sequence	(0004,1220)	2	Not supported.
>Offset of the Next Directory Record	(0004,1400)	1C	Set by application
>Record In-use Flag	(0004,1410)	1C	FFFFH: record is in use
>Offset of Referenced Lower-Level Directory Entity	(0004,1420)	1C	Set by application
>Directory Record Type	(0004,1430)	1C	PATIENT, STUDY, SERIES, IMAGE, PRESENTATION, SR DOCUMENT and PRIVATE
>Private Record UID	(0004,1432)	1C	
>Referenced File ID	(0004,1500)	1C	Generated only for Image Directory Record, starting with A/A/A/A/Z01.
>MRDR Directory Record Offset	(0004,1504)	1C	Not generated
>Referenced SOP Class UID in File	(0004,1510)	!C	Generated for Image Directory Record

>Referenced SOP Instance UID in File	(0004,1511)	1C	Generated for Image Directory Record. Set to SOP Instance UID (0008,0018) during save to media.
>Referenced Transfer Syntax UID in File	(0004,1512)	1C	Not supported

C.4 Directory Record Selection Keys

The STD-GEN-CD and STD-GEN-DVD Application Profiles will have only the Patient, Study, Series, and Image directory record types. Given below are the attributes supported under each of these records.

C.4.1 Patient Keys

Attribute Name	Tag	Type	Notes
Specific Character Set	(0008,0005)	1C	ISO_IR 100.
Patient's Name	(0010,0010)	2	If present in composite object instances it will be set to same value, other wise set to NULL.
Patient ID	(0010,0020)	1	If present in composite object instances it will be set to same value, other wise set to NULL.
Patient Birth Date	(0010, 0030)	2	If present in composite object instances it will be set to same value, other wise set to NULL.
Patient Birth Time	(0010, 0032)	2	If present in composite object instances it will be set to same value, other wise set to NULL.
Patient Sex	(0010, 0040)	2	If present in composite object instances it will be set to same value, other wise set to NULL.

C.4.2 Study Keys

Attribute Name	Tag	Type	Notes
Specific Character Set	(0008,0005)	1C	ISO_IR 100.
Study Date	(0008,0020)	1	If present in composite object instances it will be set to same value, other wise set to NULL.

Study Time	(0008,0030)	1	If present in composite object instances it will be set to same value, other wise set to NULL.
Study Description	(0008,1030)	2	If present in composite object instances it will be set to same value, other wise set to NULL.
Study Instance UID	(0020,000D)	1C	This is set to value that is present in the composite object instances, otherwise composite object instances are not Archived.
Study ID	(0020,0010)	1	If present in composite object instances it will be set to same value, other wise set to NULL.
Accession Number	(0008,0050)	2	If present in composite object instances it will be set to same value, other wise set to NULL.

C.4.3 Series Keys

Attribute Name	Tag	Type	Notes
Specific Character Set	(0008,0005)	1C	ISO_IR 100
Modality	(0008,0060)	1	Set to one that is found in composite object instances.
Series Instance UID	(0020,000E)	1	This is set to value that is present in the composite object instances, otherwise check for presence of Referenced SOP Instance UID in File (0004,1511), if both not present, instance is not archived.
Series Number	(0020,0011)	1	If present in composite object instances it will be set to same value, other wise set to NULL.
Icon Image Sequence	(0088,0200)	3	Not supported
Manufacturer	(0008,0070)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Series Description	(0008,103E)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Manufacturer's Model Name	(0008,1090)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Image Type	(0008,0008)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Series Date	(0008, 0021)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Performing Physician's Name	(0008,1050)	2	If present in composite object instances it will be set to same value, other wise set to NULL

Series Type	(0054, 1000)	2	If present in composite object instances it will be set to same value, other wise set to NULL

C.4.4 Image Keys

Attribute Name	Tag	Type	Notes
Specific Character Set	(0008,0005)	1C	ISO_IR 100 .
Image Number	(0020,0013)	1	If present in composite object instances it will be set to same value, other wise set to NULL
Icon Image Sequence	(0088,0200)	3	Note supported
SOP Class UID	(0008,0016)	1	If present in composite object instances it will be set to same value, other wise set to NULL
Slice Thickness	(0018,0050)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Repetition Time	(0018,0080)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Echo Time	(0018,0081)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Inversion Time	(0018,0082)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Number of Averages	(0018,0083)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Spacing Between Slices	(0018,0088)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Data Collection Diameter	(0018,0090)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Contrast Bolus Route	(0018,1040)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Trigger Time	(0018,1060)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Reconstruction Diameter	(0018,1100)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Gantry Detector Tilt	(0018,1120)	2	If present in composite object instances it will be set to same value, other wise set to NULL

Flip Angle	(0018,1314)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Slice Location	(0020,1041)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Rows	(0028,0010)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Columns	(0028,0011)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Echo Numbers	(0008,0086)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Samples Per Pixel	(0028,0002)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Bits Allocated	(0028,0100)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Bits Stored	(0028,0101)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Referenced SOP Class UID in File	(0004,1510)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Referenced SOP Instance UID in File	(0004,1511)	2	If present in composite object instances it will be set to same value, other wise set to NULL
SOP Instance UID	(0008,0018)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Referenced Transfer Syntax UID in File	(0004,1512)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Frame of Reference UID	(0020,0052)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Sequence Variant	(0018,0021)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Convolution Kernel	(0018,1210)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Image Position Patient	(0020,0032)	2	If present in composite object instances it will be set to same value, other wise set to NULL
Image Orientation Patient	(0020,0037)	2	If present in composite object instances it will be set to same value, other wise set to NULL

Pixel Spacing	(0028,0030)	2	If present in composite object instances it will be set to same value, other wise set to NULL

C.4.5 PRESENTATION Keys

Key	Tag	Type (for CD)	Type (for DVD / USB)	Attribute Description
Specific Character Set	(0008,0005)	1C	1C	ISO_IR 100
Instance Number	(0020,0013)	1	1	If present in composite object instance it will be set to same value, otherwise computed
SOP Instance UID	(0008,0018)	E	E	If present in composite object instances it will be set to same value, otherwise sent empty
Referenced Series Sequence	(0008,1115)	1C	1C	Not used.
Content Label	(0070,0080)	1	1	If present in composite object instance it will be set to same value, otherwise not sent
Content Description	(0070,0081)	2	2	If present in composite object instances it will be set to same value, otherwise not sent
Presentation Creation Date	(0070,0082)	1	1	If present in composite object instances it will be set to same value, otherwise not sent
Presentation Creation Time	(0070,0083)	1	1	If present in composite object instances it will be set to same value, otherwise not sent
Content Creator's Name	(0070,0084)	2	2	If present in composite object instances it will be set to same value, otherwise not sent

C.4.6 STRUCTURED REPORT Keys

Key	Tag	Type (for CD)	Type (for DVD / USB)	Attribute Description
Specific Character Set	(0008,0005)	1C	1C	ISO_IR 100
Instance Number	(0020,0013)	1	1	If present in composite object instance it will be set to same value, otherwise computed
SOP Instance UID	(0008,0018)	E	E	If present in composite object instances it will be set to same value, otherwise sent empty
Completion Flag	(0040,A491)	1	1	If present in composite object instance it will be set to same value, otherwise not sent

Content Date	(0008,0023)	1	1	If present in composite object instances it will be set to same value, otherwise not sent
Content Time	(0008,0033)	1	1	If present in composite object instances it will be set to same value, otherwise not sent
Concept Name Code Sequence	(0040,A043)	1C	1C	If present in composite object instances it will be set to same value, otherwise not sent
Verifying Observer Sequence	(0040,A073)	E	E	If present in composite object instances it will be set to same value, otherwise sent empty
Verification Flag	(0040,A493)	1	1	If present in composite object instances it will be set to same value, otherwise not sent
Verification Date Time	(0040,A030)	1C	1C	Not used
Content Sequence	(0040,A730)	1C	1C	Not used

C.4.7 PRIVATE (GEMS PET RAW) Keys

Key	Tag	Type (for CD)	Type (for DVD / USB)	Attribute Description
Specific Character Set	(0008,0005)	1C	1C	ISO_IR 100
Instance Number	(0020,0013)	1	1	If present in composite object instance it will be set to same value, otherwise computed
SOP Instance UID	(0008,0018)	2	2	If present in composite object instances it will be set to same value, otherwise sent empty
Frame of Reference UID	(0020,0052)	2	2	If present in composite object instance it will be set to same value, otherwise sent empty
Rows	(0028,0010)	2	2	If present in composite object instances it will be set to same value, otherwise sent empty
Columns	(0028,0011)	2	2	If present in composite object instances it will be set to same value, otherwise sent empty

APPENDIX D: GE Discovery Private PET RAW DATA

D.1 GE Private PET Raw Data Information Object Implementation

This section specifies the implementation of GE private defined Information Object namely 'GE Private PET Raw Data IOD' used in the GE PET Raw Data Storage (SOP Class "1.2.840.113619.4.30". The implementation is detailed to the extent that vendor applications can recognize an instance of the object.

Storage devices that supports full fidelity storage of this IOD can use the data detailed here to optimize the storage and retrieval of the data or display useful information to the user to distinguish among the IOD instances.

The IOD contains data that are not published in this document. No implementation shall assume any meaning to such data and its meaning and definition is subject to change without notice.

D.1.1 Discovery PET RAW Data Patient Entity Module

This section specifies the attributes of the Patient that describe and identify the Patient who is the subject of a diagnostic Study. This Module contains Attributes of the patient that are needed for diagnostic interpretation of the Image and are common for all studies performed on the patient.

Attribute Name	Tag	Type	VR	VM	Notes
Patient's Name	(0010,0010)	2	PN (64)	1	
Patient ID	(0010,0020)	2	LO (64)	1	
Patient's Birth Date	(0010,0030)	2	DA (26)	1	
Patient's Sex	(0010,0040)	2	CS (16)	1	

D.1.2 Discovery PET RAW Data Exam Module

This section specifies the attributes which describe and identify the Study performed upon the Patient.

Attribute Name	Tag	Type	VR	VM	Notes
Study Instance UID	(0020,000D)	1	UI	1	
Study Date	(0008,0020)	2	DA	1	
Study Time	(0008,0030)	2	TM	1	
Referring Physician's Name	(0008,0090)	2	PN	1	
Study ID	(0020,0010)	2	SH	1	
Accession Number	(0008,0050)	2	SH	1	

D.1.3 Discovery PET RAW Data Scan Entity Modules

This section specifies the attributes which identify and describe general information about the Scan within a Study.

Attribute Name	Tag	Type	VR	VM	Notes
Modality	(0008,0060)	1	CS	1	
Series Instance UID	(0020,000E)	1	UI	1	
Series Number	(0020,0011)	2	IS	1	
Operators' Name	(0008,1070)	3	PN	1-n	
Patient Position	(0018,5100)	2C	CS	1	

D.1.4 Discovery PET RAW Data Equipment Entity Modules

This section specifies the attributes which identify and describe the piece of equipment which produced the instance of the Private SOP class.

Attribute Name	Tag	Type	VR	VM	Notes
Manufacturer	(0008,0070)	2	LO	1	
Institution Name	(0008,0080)	3	LO	1	
Manufacturer's Model Name	(0008,1090)	3	LO	1	
Software Versions	(0018,1020)	3	LO	1	

D.1.5 Private Creator Identification Information

Refer to section B.2.1 of this document, as GEMS_PETD_01 is used for this private IOD.

D.1.6 Discovery PET Patient Module

Refer to section B.2.2 of this document

D.1.7 Discovery PET Exam Module

Refer to section B.2.3 of this document

D.1.8 Discovery PET Scan Module

Refer to section B.2.4 of this document

D.1.9 Discovery PET Frame Module

Refer to section B.2.5 of this document.

D.1.10 General Modules

This section defines the attributes which are required for proper functioning and identification of the associated SOP Instances. They do not specify any semantics about the Real-World Object represented by the IOD.

D.1.10.1 SOP Common Module Attributes

Attribute Name	Tag	Type	VR	VM	Notes
SOP Class UID	(0008,0016)	1	UI	1	
SOP Instance UID	(0008,0018)	1	UI	1	
Specific Character Set	(0008,0005)	1C	CS	1	
Instance Creation Date	(0008,0012)	3	DA	1	
Instance Creation Time	(0008,0013)	3	TM	1	
Instance Creator UID	(0008,0014)	3	UI	1	

D.1.11 Discovery PET Raw Data Module

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
PET raw_data_type	(0021,1001)	3	US	1
PET raw_data_size	(0021,1002)	3	UL	1
PET raw_data_blob	(0023,1002)	3	OB	1

Recon parameters

Attribute Name	Tag	Type	VR	VM	Notes
Recon Matrix Size	(0x0015,0x103C)	3	US	1	
PET Recon Parameters Exists	(0x0015|0x101F)	3	UL	1	
First Packet Number	(0x0015|0x1020)	3	SL	1	
IR Loop Filter Ratio	(0x0015|0x1021)	3	FL	1	
IR Loop Filter Correction	(0x0015|0x1022)	3	FL	1	
BP3d Filter FlagU	(0x0015|0x1023)	3	UL	1	
BP3d Filter CutoffU	(0x0015|0x1024)	3	FL	1	
BP3d Filter OrderU	(0x0015|0x1025)	3	SL	1	
BP3d Filter FlagV	(0x0015|0x1026)	3	UL	1	
BP3d Filter OrderV	(0x0015|0x1027)	3	FL	1	
BP3d Filter CutoffV	(0x0015|0x1028)	3	SL	1	
Decay Flag	(0x0015|0x1029)	3	UL	1	
Image filter 3d flag	(0x0015|0x102E)	3	UL	1	
WCC Cal Flag	(0x0015|0x102F)	3	UL	1	
Emission Scatter Flag	(0x0015|0x1030)	3	UL	1	
Recon Algorithm	(0x0015|0x1031)	3	UL	1	
Normalization Flag	(0x0015|0x1032)	3	UL	1	
Emission Deadtime Flag	(0x0015|0x1033)	3	UL	1	
Emission Random Flag	(0x0015|0x1034)	3	UL	1	
Blank Scan Flag	(0x0015|0x1035)	3	UL	1	

D.1.12 Discovery PET Correction Cal Module

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
PET scan_type	(0009,1018)	3	SL	1
PET frame unlisted scan	(0009,10E1)	3	SL	1
PET prompt gamma	(0009,10F1)	3	SL	1
PET tracerInjection UID	(0009,10F2)	3	UI	1
PET correction_cal_id	(0017,1001)	3	UI	1
PET compatible_version	(0017,1002)	3	SH	1
PET software_version	(0017,1003)	3	SH	1
PET cal_datetime	(0017,1004)	3	DT	1
PET scan_type	(0009,1018)	3	SL	1

PET cal_description	(0017,1005)	3	LO	1
PET cal_type	(0017,1006)	3	SL	1
PET where_is_corr	(0017,1007)	3	ST	1
PET corr_file_size	(0017,1008)	3	SL	1
PET scan_id	(0017,1009)	3	LO	1
PET scan_datetime	(0017,100A)	3	DT	1
PET norm_2d_cal_id	(0017,100B)	3	LO	1
PET hosp_identifier	(0017,100C)	3	SH	1
PET archived	(0017,100D)	3	SL	1

D.1.13 Discovery PET Well Counter Module

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
PET scan_type	(0009,1018)	3	SL	1
PET frame unlisted scan	(0009,10E1)	3	SL	1
PET prompt gamma	(0009,10F1)	3	SL	1
PET tracerInjection UID	(0009,10F2)	3	UI	1
PET wc_cal_id	(0019,1001)	3	UI	1
PET compatible_version	(0019,1002)	3	SH	1
PET software_version	(0019,1003)	3	SH	1
PET cal_datetime	(0019,1004)	3	DT	1
PET cal_type	(0019,1005)	3	SL	1
PET cal_description	(0019,1006)	3	LO	1
PET cal_hardware	(0019,1007)	3	LO	1
PET coefficients	(0019,1008)	3	OB	1
PET activity_factor_hr	(0019,1009)	3	FL	1
PET activity_factor_hs	(0019,100A)	3	FL	1
PET activity_factor_3d	(0019,100B)	3	FL	1
PET scan_id	(0019,100C)	3	LO	1
PET scan_datetime	(0019,100D)	3	DT	1
PET hosp_identifier	(0019,100E)	3	SH	1
PET meas_activity	(0019,100F)	3	FL	1
PET meas_datetime	(0019,1010)	3	DT	1
PET axial_filter_3d	(0019,1011)	3	SL	1
PET axial_cutoff_3d	(0019,1012)	3	FL	1

PET default_flag	(0019,1013)	3	SL	1
PET archived	(0019,1014)	3	SL	1
PET wc_cal_rec_method	(0019,1015)	3	SL	1
PET activity_factor_2d	(0019,1016)	3	FL	1
PET isotope	(0019,1017)	3	SL	1
WCC Image Set ID	(0019,1018)	3	UI	1

D.2 GE Private PET List Data Information Object Implementation

This section specifies the implementation of GE private defined Information Object namely 'GE Private PET List Data IOD' used in the GE List Data (SOP Class "1.2.840.113619.4.30". The implementation is detailed to the extent that vendor applications can recognize an instance of the object.

This IOD is not supported for any network Send/Receive operations and Archive Restore operations (DVD/MOD) Though it is having same SOP class UID has GE PET Raw Data, the PET List Data IOD is handled by using modality (0008,0060) which is having different value "GEMS PET LST".

- The exam containing PET List Series (list objects) will skip the same while transferring by exam.
- Push Series is not supported for PET List Series
- Push Image is not supported for PET List Frame

The IOD contains data that are not published in this document. No implementation shall assume any meaning to such data and its meaning and definition is subject to change without notice.

D.2.1 Discovery PET LIST Data Patient Entity Module

This section specifies the attributes of the Patient that describe and identify the Patient who is the subject of a diagnostic Study. This Module contains Attributes of the patient that are needed for diagnostic interpretation of the Image and are common for all studies performed on the patient.

Attribute Name	Tag	Type	VR	VM	Notes
Patient's Name	(0010,0010)	2	PN (64)	1	
Patient ID	(0010,0020)	2	LO (64)	1	
Patient's Birth Date	(0010,0030)	2	DA (26)	1	
Patient's Sex	(0010,0040)	2	CS (16)	1	

D.2.2 Discovery PET LIST Data Exam Module

This section specifies the attributes which describe and identify the Study performed upon the Patient.

Attribute Name	Tag	Type	VR	VM	Notes
Study Instance UID	(0020,000D)	1	UI	1	
Study Date	(0008,0020)	2	DA	1	
Study Time	(0008,0030)	2	TM	1	
Referring Physician's Name	(0008,0090)	2	PN	1	
Study ID	(0020,0010)	2	SH	1	

Accession Number	(0008,0050)	2	SH	1	

D.2.3 Discovery PET LIST Data Scan Entity Modules

This section specifies the attributes that identify and describe general information about the Scan within a Study.

Attribute Name	Tag	Type	VR	VM	Notes
Modality	(0008,0060)	1	CS	1	
Series Instance UID	(0020,000E)	1	UI	1	
Series Number	(0020,0011)	2	IS	1	
Operators' Name	(0008,1070)	3	PN	1-n	
Patient Position	(0018,5100)	2C	CS	1	

D.2.4 Discovery PET LIST Data Equipment Entity Modules

This section specifies the attributes that identify and describe the piece of equipment, which produced the instance of the Private SOP class.

Attribute Name	Tag	Type	VR	VM	Notes
Manufacturer	(0008,0070)	2	LO	1	
Institution Name	(0008,0080)	3	LO	1	
Manufacturer's Model Name	(0008,1090)	3	LO	1	
Software Versions	(0018,1020)	3	LO	1	

D.2.5 Private Creator Identification Information

Refer to section B.2.1 of this document, as GEMS_PETD_01 is used for this private IOD.

D.2.6 Discovery PET Patient Module

Refer to section B.2.2 of this document

D.2.7 Discovery PET Exam Module

Refer to section B.2.3 of this document

D.2.8 Discovery PET Scan Module

Refer to section B.2.4 of this document

D.2.9 Discovery PET Frame Module

Refer to section B.2.5 of this document.

D.2.10 General Modules

This section defines the attributes which are required for proper functioning and identification of the associated SOP Instances. They do not specify any semantics about the Real-World Object represented by the IOD.

D.2.10.1 SOP Common Module Attributes

Attribute Name	Tag	Type	VR	VM	Notes
SOP Class UID	(0008,0016)	1	UI	1	
SOP Instance UID	(0008,0018)	1	UI	1	
Specific Character Set	(0008,0005)	1C	CS	1	
Instance Creation Date	(0008,0012)	3	DA	1	
Instance Creation Time	(0008,0013)	3	TM	1	
Instance Creator UID	(0008,0014)	3	UI	1	

D.2.11 Discovery PET List Data Module

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
PET raw_data_type	(0021,1001)	3	US	1
PET raw_data_size	(0021,1002)	3	UL	1
PET raw_data_blob	(0023,1002)	3	OB	1

Recon parameters

Attribute Name	Tag	Type	VR	VM	Notes
Recon Matrix Size	(0x0015,0x103C)	3	US	1	
PET Recon Parameters Exists	(0x0015|0x101F)	3	UL	1	
First Packet Number	(0x0015|0x1020)	3	SL	1	
IR Loop Filter Ratio	(0x0015|0x1021)	3	FL	1	
IR Loop Filter Correction	(0x0015|0x1022)	3	FL	1	
BP3d Filter FlagU	(0x0015|0x1023)	3	UL	1	
BP3d Filter CutoffU	(0x0015|0x1024)	3	FL	1	
BP3d Filter OrderU	(0x0015|0x1025)	3	SL	1	
BP3d Filter FlagV	(0x0015|0x1026)	3	UL	1	
BP3d Filter OrderV	(0x0015|0x1027)	3	FL	1	
BP3d Filter CutoffV	(0x0015|0x1028)	3	SL	1	
Decay Flag	(0x0015|0x1029)	3	UL	1	
Image filter 3d flag	(0x0015|0x102E)	3	UL	1	
WCC Cal Flag	(0x0015|0x102F)	3	UL	1	
Emission Scatter Flag	(0x0015|0x1030)	3	UL	1	
Recon Algorithm	(0x0015|0x1031)	3	UL	1	
Normalization Flag	(0x0015|0x1032)	3	UL	1	
Emission Deadtime Flag	(0x0015|0x1033)	3	UL	1	
Emission Random Flag	(0x0015|0x1034)	3	UL	1	
Blank Scan Flag	(0x0015|0x1035)	3	UL	1	

D.2.12 Discovery PET Correction Cal Module

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
PET scan_type	(0009,1018)	3	SL	1
PET frame unlisted scan	(0009,10E1)	3	SL	1
PET prompt gamma	(0009,10F1)	3	SL	1
PET tracerInjection UID	(0009,10F2)	3	UI	1
PET correction_cal_id	(0017,1001)	3	UI	1
PET compatible_version	(0017,1002)	3	SH	1
PET software_version	(0017,1003)	3	SH	1
PET cal_datetime	(0017,1004)	3	DT	1
PET scan_type	(0009,1018)	3	SL	1

PET cal_description	(0017,1005)	3	LO	1
PET cal_type	(0017,1006)	3	SL	1
PET where_is_corr	(0017,1007)	3	ST	1
PET corr_file_size	(0017,1008)	3	SL	1
PET scan_id	(0017,1009)	3	LO	1
PET scan_datetime	(0017,100A)	3	DT	1
PET norm_2d_cal_id	(0017,100B)	3	LO	1
PET hosp_identifier	(0017,100C)	3	SH	1
PET archived	(0017,100D)	3	SL	1

D.2.13 Discovery PET Well Counter Module

Private Creator Identification (GEMS_PETD_01)

Attribute Name	Tag	Type	VR	VM
PET scan_type	(0009,1018)	3	SL	1
PET frame unlisted scan	(0009,10E1)	3	SL	1
PET prompt gamma	(0009,10F1)	3	SL	1
PET tracerInjection UID	(0009,10F2)	3	UI	1
PET wc_cal_id	(0019,1001)	3	UI	1
PET compatible_version	(0019,1002)	3	SH	1
PET software_version	(0019,1003)	3	SH	1
PET cal_datetime	(0019,1004)	3	DT	1
PET cal_type	(0019,1005)	3	SL	1
PET cal_description	(0019,1006)	3	LO	1
PET cal_hardware	(0019,1007)	3	LO	1
PET coefficients	(0019,1008)	3	OB	1
PET activity_factor_hr	(0019,1009)	3	FL	1
PET activity_factor_hs	(0019,100A)	3	FL	1
PET activity_factor_3d	(0019,100B)	3	FL	1
PET scan_id	(0019,100C)	3	LO	1
PET scan_datetime	(0019,100D)	3	DT	1
PET hosp_identifier	(0019,100E)	3	SH	1
PET meas_activity	(0019,100F)	3	FL	1
PET meas_datetime	(0019,1010)	3	DT	1
PET axial_filter_3d	(0019,1011)	3	SL	1
PET axial_cutoff_3d	(0019,1012)	3	FL	1

PET default_flag	(0019,1013)	3	SL	1
PET archived	(0019,1014)	3	SL	1
PET wc_cal_rec_method	(0019,1015)	3	SL	1
PET activity_factor_2d	(0019,1016)	3	FL	1
PET isotope	(0019,1017)	3	SL	1
WCC Image Set ID	(0019,1018)	3	UI	1

APPENDIX E: Implementation UID for Product Versions

Product Model	Software Revision	Implementation UID
Discovery 610	pet_coreload.xx, pet_mfk.xx	1.2.840.113619.2.290
Discovery 710	pet_coreload.xx pet_mfk.xx	1.2.840.113619.2.290
Optima 560	pet_mfk.xx	1.2.840.113619.2.290

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