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Digital Imaging and Communications in Medicine (DICOM)

Supplement 54: DICOM MIME Type

Prepared by:

DICOM Standards Committee

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30

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56 Example 1: Simple DICOM File MIME message (Informative) ~~12~~¹⁴

57 Example 2: DICOM File Set MIME message (Informative) ~~14~~¹⁶

59

Foreword

60 The American College of Radiology (ACR) and the National Electrical Manufacturers Association (NEMA)
61 formed a joint committee to develop a standard for Digital Imaging and Communications in Medicine
62 (DICOM). This DICOM Standard and the corresponding Supplements to the DICOM Standard were
63 developed according to the NEMA procedures.

64 DICOM is developed in liaison with other standardization organizations including CEN TC251 in Europe
65 and JIRA in Japan, with review also by other organizations including IEEE, HL7 and ANSI in the USA.

66 This document is a Supplement to the DICOM Standard. It is an extension to PS 3.11 and 3.12 of the
67 published DICOM Standard which consists of the following parts:

- 68 PS 3.1 Introduction and Overview
- 69 PS 3.2 Conformance
- 70 PS 3.3 Information Object Definitions
- 71 PS 3.4 Service Class Specifications
- 72 PS 3.5 Data Structures and Encoding
- 73 PS 3.6 Data Dictionary
- 74 PS 3.7 Message Exchange
- 75 PS 3.8 Network Communication Support for Message Exchange
- 76 PS 3.9 Point-to-Point Communication Support for Message Exchange
- 77 PS 3.10 Media Storage and File Format
- 78 PS 3.11 Media Storage Application Profiles
- 79 PS 3.12 Media Format and Physical Media for Media Interchange
- 80 PS 3.13 Print Management Point-to-Point Communication Support
- 81 PS 3.14 Grayscale Standard Display Function
- 82 PS 3.15 Security Profiles
- 83 PS 3.16 Content Mapping Resource

84 These parts are related but independent documents.

85 This Supplement includes the definition of DICOM MIME Type definition, which enables applications to
86 exchange DICOM objects with other applications that support communication by e-mail.

87

1 Supplement Scope and Field of Application

88 This Supplement describes the DICOM MIME Type. MIME (Multipurpose Internet Mail Extension)
89 describes how to include attached files as “parts” into internet mail, these may be sent by protocols such
90 as SMTP (Simple Mail Transfer Protocol).

91 DICOM network protocols are widely used for applications that:

- 92 — involve primary diagnosis and review,
- 93 — are used within a tightly integrated imaging department
- 94 — are used when there is controlled distribution of images (and other DICOM objects) to other
95 departments which also support DICOM protocols.

96 DICOM network protocols are less frequently used for applications in areas less amenable to tight
97 integration, such as:

- 98 — hospital-to-doctor DICOM object distribution for reviewing or referral purposes
- 99 — exchange of DICOM objects for testing purposes
- 100 — DICOM object distribution for education, scientific cooperation and contract research
- 101 — interpretation by professionals at home (e.g. teleradiology)

102 These applications are characterized by:

- 103 — greater desire to integrate with consumer desktop applications
- 104 — lower expectations of image quality, fidelity, reliability of delivery and conformance
- 105 — less centralized control over system setup and configuration

106 There has been an increasing demand for the ability to exchange DICOM objects by e-mail.

107 The DICOM MIME Type concept covers two levels:

- 108 — the DICOM File level, using the `Application/dicom` MIME Type
- 109 — the DICOM File-set level, using the `Multipart/mixed` MIME Type with some constraints
110 (naming, parameters)

111 Note: No `Image/dicom` MIME type is proposed, because DICOM objects may also contain other information,
112 not only images.

113 Since this document proposes changes to existing Parts of DICOM the reader should have a working
114 understanding of the Standard.

115 After having introduced the interest of such an extension of DICOM, this document includes a number of
116 Addenda to existing Parts of DICOM:

- 117 PS 3.11 Addendum Annex XX: General Purpose MIME Interchange Profile
- 118 PS 3.12 Addendum Annex XX: DICOM MIME Type

119 In addition, it contains the official text of the RFC (Request for Comments) to be submitted to the Internet
120 Engineering Task Force (IETF) and defining the `Application/dicom` MIME Type. Once approved this
121 RFC text will be included as an appendix to Part 12.

122 Finally it presents two examples of e-mail messages that can be generated by using DICOM MIME Type.

123

Part 11, Body Addendum

124

Add the following definitions to Section 4. Symbols and abbreviations.

125

4 Symbols and abbreviations

126

IETF Internet Engineering Task Force

127

MIME Multipurpose Internet Mail Extension

128

RFC Request for Comments

129

SMTP Simple Mail Transfer Protocol

130

Add the following Annex at the end of the document.

131

Annex Y (Normative) - General Purpose MIME Interchange Profile

132

Y.1 PROFILE IDENTIFICATION

133

This Annex defines an Application Profile Class including all defined Media Storage SOP Classes. This class is intended to be used for the interchange of Composite SOP Instances via e-mail for general purpose applications.

134

135

136

Note: This Media Storage Application Profile Class is not intended to replace the more robust DICOM Storage Service Class.

137

138

Objects from multiple modalities may be included on the same e-mail. A detailed list of the Media Storage SOP Classes that may be supported is defined in PS 3.4.

139

140

Table Y.1-1
STD-GEN-MIME Profile

141

Application Profile	Identifier	Description
General Purpose MIME Interchange	STD-GEN-MIME	Handles interchange of Composite SOP Instances by e-mail.

142

143

The identifier for this General Purpose MIME Interchange profile shall be STD-GEN-MIME.

144

Equipment claiming conformance to this Application Profile shall list the subset of Media Storage SOP Classes that it supports in its Conformance Statement.

145

146 Note: Since it is not required to support all Media Storage Classes the user should carefully consider the
147 subset of supported Media Storage SOP Classes in the Conformance Statements of such equipment to
148 establish effective object interchange.

149 **Y.2 CLINICAL CONTEXT**

150 This Application Profile facilitates the interchange of images and related data through e-mail.

151 This profile is intended only for general purpose applications. It is not intended as a replacement for
152 specific Application Profiles that may be defined for a particular clinical context.

153 Note: The present Application Profile does not include any specific mechanism regarding privacy. However it is
154 highly recommended to use secure mechanisms (e.g. S/MIME) when using STD-GEN-MIME Application
155 Profile over networks that are not otherwise secured.

156

157 **Y.2.1 ROLES AND SERVICE CLASS OPTIONS**

158 This Application Profile uses the Media Storage Service Class defined in PS3.4 with the Interchange
159 Option.

160 The Application Entity shall support one or two of the roles of File Set Creator (FSC) and File Set Reader
161 (FSR), defined in PS 3.10. Because the exchange of e-mail does not involve storage, the role of File Set
162 Updater (FSU) is not specified.

163 **Y.2.1.1 File Set Creator**

164 The role of File Set Creator may be used by Application Entities which generate a File Set under this
165 Interchange Class of Application Profiles.

166 File Set Creators may be able to generate the Basic Directory SOP Class in the DICOMDIR file with all the
167 subsidiary Directory Records related to the Image SOP Classes included in the File Set.

168 The Application Entity acting as a File Set Creator generates a File Set under the STD-GEN-MIME
169 Application Profile.

170 Note: A multiple volume (i.e. a logical volume that can cross multiple media) is not supported by this class of
171 Application profile. Because MIME is a virtual medium and since e-mail mechanisms include some way
172 of fragmenting MIME parts to be sent through limited size e-mail, there are no needs for multiple volume.

173 **Y.2.1.2 File Set Reader**

174 The role of File Set Reader shall be used by Application Entities which receive an exchanged File Set
175 under the Image Interchange Class of Application Profiles.

176 File Set Readers may be able to read the DICOMDIR directory file and shall be able to read all the SOP
177 Instance files defined for this Application Profile, using the Transfer Syntaxes specified in the Conformance
178 Statement.

179 **Y.3 STD-GEN-MIME PROFILE**

180 **Y.3.1 SOP Classes and Transfer Syntaxes**

181 This Application Profile is based on the Media Storage Service Class with the Interchange Option (see PS
182 3.4).

183
184

**Table Y.3-1
STD-GEN-MIME SOP Classes and Transfer Syntaxes**

Information Object Definition	Service Object Pair Class UID	Transfer Syntax and UID	FSC Requirement	FSR Requirement
Basic Directory	1.2.840.10008.1.3.10	Explicit VR Little Endian Uncompressed 1.2.840.10008.1.2.1	Optional	Optional
Composite Image & Stand-alone Storage	Refer to: PS 3.4 for SOPs UID definitions	Defined in Conformance Statement	Defined in Conformance Statement	Defined in Conformance Statement

185

186 The SOP Classes and corresponding Transfer Syntax supported by this Application Profile are specified in
187 the Table Y.3-1. The supported Storage SOP Class(es) and Transfers Syntax(es) shall be listed in the
188 Conformance Statement using a table of the same form.

189 **Y.3.2 Physical Medium and Medium Format**

190 The STD-GEN-MIME application profile requires the DICOM MIME medium as defined in PS3.12.

191 **Y.3.3 Directory Information in DICOMDIR**

192 If the DICOMDIR is included, conformant Application Entities shall include in it the Basic Directory IOD
193 containing Directory Records at the Patient and the subsidiary Study and Series levels, appropriate to the
194 SOP Classes in the File Set.

195 All DICOM files in the File Set incorporating SOP Instances defined for the specific Application Profile shall
196 be referenced by Directory Records.

- 197 Note:
1. DICOMDIRs with no directory information are not allowed by this Application Profile.
 2. In the DICOMDIR each object may be referenced by a referenced file ID (e.g. 000/000) which contains multiple values corresponding to a path for physical system, since the MIME organization is flat. There is no requirement that this path will be used by the receiving application to create file hierarchy.

201 There may only be one DICOMDIR file per File Set. The Patient ID at the patient level shall be unique for
202 each patient directory record in one File Set.

203 **Y.3.3.1 Additional Keys**

204 No additional keys are specified.

205

Part 12, Body Addendum

206

Add the following definitions to Section 2. Normative References.

207

2 Normative References

208

RFC 3240, Digital Imaging and Communications in Medicine (DICOM) - Application/dicom MIME

209

Sub-type Registration

210

211 The concepts "MIME", "Media Type", "MIME Entity", "MIME Part", "Content-Type", "Multipart/mixed",
212 "Message/partial", "Content-Transfer-Encoding", "Content-ID" and "Application/xx" are developed
213 in IETF "Multipurpose Internet Mail Extensions", or "MIME", described in RFC (Request for Comments)
214 number 2045, 2046, 2047, 2048 and 2049 (see <http://www.imc.org/rfc2045> and <ftp://ftp.isi.edu/in->
215 <notes/rfc2045.txt>).

216

Add the following Annex at the end of the document.

217

ANNEX X (Normative) DICOM MIME media

218

X.1 DICOM MAPPING TO MIME FORMATS

219

X.1.1 DICOM File set

220

One DICOM File set shall be contained in a MIME Multipart/mixed or Multipart/related Media
221 Type, called "DICOM File set" MIME Entity.

222

Notes: 1. It may be necessary to fragment a message by using the Message/partial Media Type format.

223

2. A "DICOM File set" MIME Entity may contain MIME Parts other than Application/dicom which
224 may be ignored by the DICOM application.

225

X.1.2 DICOM file

226

Each generic DICOM file shall be encoded as a MIME Application/dicom Media Type, called "DICOM
227 File" MIME Part, with the following parameters:

228

- "id" is constructed from the DICOM File ID. The total length is limited to 71 characters (to avoid that
229 the e-mail application splits the id string). Each component is limited to 8 characters. The delimiter is a
230 forward slash "/". There is never a leading delimiter (i.e. this is not a traditional path from a root
231 directory).

232

For example: "ROOTDIR/SUBDIR1/MRSCAN/A789FD07/19991024/ST00234/S00003/I00023"

233 - "name" is constructed from the last DICOM File ID component (that means the "file name" without
234 "path" information) and the extension ".dcm" (except for the DICOMDIR).

235 For example: "I00023.dcm"

236 Note: 1. Email clients typically use this parameter as the default name with which to save the file. If used for
237 only one "DICOM File" Part (versus one DICOM File set), the length of this parameter is not restricted
238 (unlike the "id" parameter).

239 2. This name can not be the same as the name inside the DICOMDIR where the file extension is
240 forbidden.

241

242 The other fields of the header of this "DICOM File" MIME Part are respecting the general rules of MIME.

243 **X.1.2.1 DICOMDIR**

244 One and only one DICOMDIR File may be present in any "DICOM File set" MIME Entity. It is encoded as
245 the generic "DICOM File" MIME Part, with a DICOM File ID set to "DICOMDIR" and the "id" parameter set
246 to "DICOMDIR".

247 **X.3 LOGICAL FORMAT**

248 The MIME logical format is used. The Content-Transfer-Encoding shall allow the transfer of binary
249 information (e.g. typically base64 if the higher level does not allow transfer of binary information).

250 **Add the following Annex at the end of the PS 3.12.**

251 **ANNEX Y (Informative) RFC 3240 – Digital Imaging and Communications in**
252 **Medicine (DICOM) – Application/dicom MIME Sub-type Registration**

253 Network Working Group D. Clunie
254 Request for Comments: 3240 E. Cordonnier
255 Category: Informational DICOM Committee
256 February 2002
257

258
259 Digital Imaging and Communications in Medicine (DICOM) -
260 Application/dicom MIME Sub-type Registration
261

262 Status of this Memo

263
264 This memo provides information for the Internet community. It does
265 not specify an Internet standard of any kind. Distribution of this
266 memo is unlimited.
267

268 Copyright Notice

269
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271

272 Abstract

273
274 This document describes the registration of the MIME sub-type
275 application/dicom (Digital Imaging and Communications in Medicine).
276 The baseline encoding is defined by the DICOM Standards Committee in
277 "Digital Imaging and Communications in Medicine".
278

279 1. DICOM Definition

280
281 Digital Imaging and Communications in Medicine (DICOM) specifies
282 protocols and formats for the exchange of images, time-based
283 waveforms, reports, and associated information for medical
284 applications.
285

286 Individual DICOM objects (such as images) may be encapsulated in
287 files and exchanged by e-mail using the Media Type defined herein.
288 In addition, a set of DICOM files may be described by an index file,
289 DICOMDIR, which may accompany the files that it references.
290

291 2. IANA Registration

292
293 MIME media type name: Application

294
295 MIME subtype name: dicom
296

297 Required parameters:

298
299 "id" is constructed from a DICOM File ID (see DICOM PS3.11). The
300 total length is limited to 71 characters. Each component is
301 limited to 8 characters. The delimiter is a forward slash "/".
302 There is never a leading delimiter (i.e., this is not a
303 traditional path from a root directory).
304
305 If a DICOMDIR (which provides an index of files) is included, then
306 it will refer to other DICOM files in the file set by use of this
307 File ID. The File ID is not encoded within each DICOM file. If a
308 DICOMDIR is not present, then the "id" parameter may be absent.
309 Note that the DICOMDIR will also have a Media Type of
310 application/dicom and is distinguished from other files by its ID
311 of "DICOMDIR".
312
313 For example:
314 "ROOTDIR/SUBDIR1/MRSCAN/A789FD07/19991024/ST00234/S00003/I00023"
315
316 Each component shall be character strings made of characters from
317 a subset of the G0 repertoire of ISO 8859. This subset consists
318 of uppercase alphabetic characters, numeric characters and
319 underscore. The following characters are permissible:
320
321 A, B, C, D, E, F, G, H, I, J, K, L, M, N, O, P, Q, R, S, T, U, V,
322 W, X, Y, Z (uppercase)
323 1, 2, 3, 4, 5, 6, 7, 8, 9, 0 and _ (underscore)
324
325 Optional parameters:
326
327 none
328
329 Encoding considerations:
330
331 The DICOM information is binary, therefore the encoding used shall
332 support lossless transfer of binary information. Typically, the
333 Content-Transfer-Encoding would be set to "Base64".
334
335 Multiple DICOM parts should be included as a Multipart/related
336 entity [2387]. Receiving agents shall also support multiple parts
337 as a Multipart/mixed entity. When multiple DICOM parts are
338 included, one of the parts may be a DICOMDIR, in which case, all
339 the files referred to by the DICOMDIR shall also be present. The
340 DICOMDIR is not required to be the first Application/dicom part
341 encoded in the message, in which case the optional "start"
342 parameter should refer to the content-id of the part containing
343 the DICOMDIR.
344
345 Multiple DICOM Application/dicom parts may be included with other
346 types of parts as a Multipart/mixed entity.
347
348 Security considerations:
349
350 Application/dicom parts contain medical information, including
351 individual demographic information. Accordingly, their exchange
352 should be restricted to a secure network or within a secure

353 wrapper that protects a patient's right to confidentiality
354 according to local and national policy. The specific security
355 mechanisms are outside the scope of this proposal. Such
356 mechanisms as Secured MIME (S/MIME) [2633] or similar might be
357 appropriate.
358

359 Interoperability considerations:

360
361 Because DICOM information is specific to the medical (imaging)
362 domain, generic e-mail applications may not be able to interpret
363 the information.
364

365 The Media Type has been designed in order to allow for

- 366
- 367 (i) DICOM aware applications to interoperate,
 - 368 (ii) generic applications to save the files in a form
369 recognizable as DICOM files, that a DICOM application may
370 subsequently use.
- 371

372 Published specification:

373
374 The Digital Imaging and Communications in Medicine (DICOM)
375 Standard is a standard of the DICOM Standards Committee, published
376 by the National Electrical Manufacturers Association (NEMA), 1300
377 N. 17th Street, Rosslyn, Virginia 22209 USA,
378 (<http://medical.nema.org>).
379

380 Applications which use this media:

381
382 Biomedical imaging applications.
383

384 Additional information:

- 385
- 386 1. Magic number(s): "DICM" after 128 byte preamble indicates DICOM
387 PS 3.10 file
388
 - 389 2. File extension(s): ".dcm" is recommended for files saved to
390 disk (other than DICOMDIR)
391
 - 392 3. Macintosh file type code: Macintosh File Type "DICM" is
393 recommended
394
 - 395 4. Object Identifiers: none
396

397 Person to contact for further information:

- 398
- 399 1. Name: Howard Clark
 - 400 2. E-mail: how_clark@nema.org
- 401

402 Intended usage:

403
404 Common
405
406 Interchange of biomedical images.
407

408 Author/Change controller:

409

DICOM Standards Committee

411

412 3. References

413

414 [DICOM] DICOM Standards Committee, "Digital Imaging and
415 Communications in Medicine", 2001.

416

417 [2387] Levinson, E., "The MIME Multipart/Related Content-type", RFC
418 2387, August 1998.

419

420 [2633] Ramsdell, B., "S/MIME Version 3 Message Specification", RFC
421 2633, June 1999.

422

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445

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475
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478

Example 1: Simple DICOM File MIME message (Informative)

```
479 From: "Dr Smith" <smith@provider1.com>
480 To: "Dr Johnson" <johnson@provider2.com>
481 Subject: test DICOM Mime Type
482 Date: Fri, 5 Nov 1999 15:15:35 +0100
483 MIME-Version: 1.0
484 Content-Type: Multipart/mixed;
485     boundary="-----_NextPart_000_0027_01BF27A0.9BE21980"
486
487 This is a multi-part message in MIME format.
488
489 -----_NextPart_000_0027_01BF27A0.9BE21980
490 Content-Type: text/plain;
491     charset="iso-8859-1"
492 Content-Transfer-Encoding: 7bit
493
494 Message text: this is a DICOM MIME Type example for DICOM File.
495
496 -----_NextPart_000_0027_01BF27A0.9BE21980
497 Content-Type: application/dicom;
498     id="i00023"; name="i00023.dcm"
499 Content-Transfer-Encoding: base64
500
501 byEAAALcAAABbAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
502 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
503 AAAAAAAAAAAAAAAAAABESUNNAgAAAFVMBACgAAAAAgABAE9CAAAACAAAAAECAAIAVUkaADEuMi44
504 NDAuMTAwMDguNS4xLjQuMS4xLjcAAgADAFVJFgBFeGftaw5lZC1ieS1ESUNPTS4xLjEAAgAQAFVJ
505 FAAXLjIuODQwLjEwMDA4LjEuMi4xAAIAEgBVSRYAMS4yLjI1MC4xLjU5LjMuMC4zLjMuMQIAEwBT
506 SBAARVRJQU1fRENNVetfMzMXIAGAAABVTAQAdgAAAAGAFgBVSROAMS4yLjg0MC4xMDAwOC41LjEu
507 NC4xLjEuNWAIABgAVUkWAeV4YW1pbmVklWJ5LURJQ09NLjEuMQAIAAAREEAAAAGAMABUTQAACABQ
508 AFNIAAAIAGAAQ1MCAE9UCABkaENTBAXBXU0QgCACQAFBOAAAQAAAUVUeAEYAAAAQABAAUE4QAERJ
509 Q09NIE1JTUVeVHlwZSAQACAATE8MAERJQ09NLVNVUDU0IBAAMABEQQgAMjAwMDAzMTAQAEAAQ1MC
510 AE0gIAAAAFVMBABkAAAAIAANAFVJEGBFeGftaw5lZC1ieS1ESUNPTQAgAA4AVUkUAeV4YW1pbmVkl
511 LWJ5LURJQ09NLjEAIAAQAFNIEgBFeGftaw5lZC1ieS1ESUNPTSAGABEASVMCADEgIAATAELTAGAx
512 ICgAAABVTAQAZAAACGAAGBVUwIAAQAAQAQ1MMAE1PTk9DSFJPTUUYICgACABJUwIAMSaOABAA
513 VVMCAB8AKAARAFVTAGAKACgAAAFVUwIACAAoAAEBVVMCAAGAKAACAVVTAGAHACgAAwFVUwIAAADg
514 fwaAVUwEAGgEADgfxAAT0IAAFwEAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAJJjoseAIAAAACSY8
515 KAAPLS0tFgAAAB4tLS0AABZTW0QAAAA3YmUjBQAWLRYAAyI9IwAtt7e3t5APAIm3t7cAHqeniadb
516 AHq3mKC3PQBbt5AAAKC3WwAtt1sATLdxAACJtwAAkLceABY9JrdxAACgppw9bt7cmrLe3WwAtt1sA
517 AJi3AACJtwAAt4kAAAAW7ctAABbtylbt5BxoIm3WwAtt1sAAJi3AACJtwAAt5gAAAAW7c1AABj
518 tylbtya3pz23WwAtt1sATLdxAACJtwAAgbc9ACZMFReQDxanoABbtwCBWY23WwAtt7e3t5APAIm3
519 t7cAD5i3t7dEAD2nt7egHgBbtwAAAC23WwAPLS0tFgAAAB4tLS0AAAAeLQ8AAAAPLS0AAAAWLQAA
520 AA8tFgAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
521 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
522 AAAAAA8tHgAADy0eAB4tLS0AHi0PAAAE1Q8PLS0tLR4AAAAAAAAAAAC23pw8AcbeJAIm3t7cAibdb
523 ABA3ty0tt7e3t4kAAAAAAAAAAAC23t1sWt7eJAACJtwAAibenD3G3ty0tt1sAAAAAAAAAAAAAC23
524 iaBxkLeJAACJtwAAiZinW7eBty0tt6CJiUQAAAAAAAAAAAC23Pae3JreJAACJtwAAiYlbt5Bbty0t
525 t4lbWY0AAAAAAAAAAAC23LVuBALeJAACJtwAAiYkWiTVbty0tt1sAAAAAAAAAAAAAC23LQAAALeJ
526 AIm3t7cAiYkAAABbty0tt7e3t4kAAAAAAAAAA8tDwAAAC0eAB4tLS0AHh4AAAAWLQ8PLS0tLR4A
527 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
528 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
529 AAAWLS0tLS0mLRYAABYtDy0tLS0AABYtLS0tFgAAAAAAAAAAABbt7e3t7c9p6cPD6CQALe3t7eg
530 Flu3t7e3WwAAAAAAAAAAAAAFu3LQAAATLdqW7ceALeJAEy3Wlu3LQAAAAAAAAAAAAAFu3
531 LQAAAJi3p1sAALeJAEy3U1u3mImJHGAAAAAAAAAAAAAFu3LQAAAB63oA8AALe3t7eQD1u3cVtb
532 FgAAAAAAAAAAAAAFu3LQAAAC3iQAAALeYLR4AAAFu3LQAAAAAAAAAAAAAFu3LQAAAC3
533 iQAAALeJAAAAAFu3t7e3WwAAAAAAAAAAAAABYtDwAAAAAtHgAAAC0eAAAAABYtLS0tFgAAAA=
```


534

535 -----_NextPart_000_0027_01BF27A0.9BE21980--

536

Example 2: DICOM File Set MIME message (Informative)

```
537 From: "Dr Johnson" <drjohnson@provider.org>
538 To: "Dr Smith" <drsmith@provider.org>
539 Subject: DICOM MIME sub-type file set example
540 Date: Sat, 9 Mar 2002 16:24:27 +0100
541 MIME-Version: 1.0
542 Content-Type: multipart/mixed;
543     boundary="====_NextPart_000_0062_01C1C786.EA262CC0";
544     start="<header1@provider.org>";
545     type="text/plain"
546
547 This is a multi-part message in MIME format.
548
549 -----_NextPart_000_0062_01C1C786.EA262CC0
550 Content-Type: text/plain;
551     charset="iso-8859-1"
552 Content-Transfer-Encoding: 7bit
553 Content-ID: "<intro@provider.org>"
554
555 This is an example message containing a DICOM file set encoded following the
556 DICOM MIME sub-type (RFC3240).
557
558
559 -----_NextPart_000_0062_01C1C786.EA262CC0
560 Content-Type: text/plain;
561     name="header1.txt"
562 Content-Transfer-Encoding: quoted-printable
563 Content-Disposition: attachment;
564     filename="header1.txt"
565 Content-ID: "<header1@provider.org>"
566 Content-Description: Header of the medical message
567
568 This is the header part of the message, which contains:
569 - a first text document (letter1)
570 - a DICOM file set part (dicomfileset1) including an additional =
571 complementary note
572 This message was sent by Dr Johnson to Dr Smith.
573 It relates to the patient: DICOM Nema (M) 01/01/1993
574 -----_NextPart_000_0062_01C1C786.EA262CC0
575 Content-Type: multipart/related;
576     boundary="====_NextPart_000_0062_01C1C786.EA262CC1_13487";
577     start="<dicomfileset1.dicomdir@provider.org>";
578     type="application/dicom"
579
580 -----_NextPart_000_0062_01C1C786.EA262CC1_13487
581 Content-Type: text/plain;
582     name="dicomfileset1note1.txt"
583 Content-Transfer-Encoding: 7bit
584 Content-Disposition: attachment;
585     filename="dicomfileset1note1.txt"
586 Content-ID: "<dicomfileset1.note1@provider.org>"
587 Content-Description: Note for the images use
588
589 This is a simple note, for receivers who can not read images.
590 These images are DICOM 3.0 images and the DICOMDIR index related file.
591 Please use a DICOM compatible application.
```

```
592 DICOM is a Standard Mark of Nema (www.nema.org).
593 -----_NextPart_000_0062_01C1C786.EA262CC1_13487
594 Content-Type: application/dicom;
595     id="DICOMDIR";
596     name="Dicomdir"
597 Content-Transfer-Encoding: base64
598 Content-Disposition: attachment;
599     filename="Dicomdir";
600 Content-ID: "<dicomfileset1.dicomdir@provider.org>"
601 Content-Description: Index of the images (DICOMDIR)
602
603 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
604 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
605 AAAAAAAAAAAAAAAAAAAAAABESUNNagAAAFVMBACIAAAAAgABAE9CAAACAAAAAQACAAI
606 NDAuMTAwMDguMS4zLjEwAgADAFVJIAAxLjIuMjUwLjEuNTkuMi40Mi4yMDAyMDMw
607 EABVSRQAMS4yLjg0MC4xMDAwOC4xLjIuMQACABIAVUkSADEuMi4yNTAuMS41OS4y
608 TAQAdgMAAAQAMBFDUw4ARVRJQU1fREVZRTI0NAEEAAASVUwEAGgBAAAEAAISVUwE
609 VVMCAAAABAAgElNRAAAyAwAA/v8A4G4AAAAEAAAUUVuEAAAAAAAAEABAUVVMCAP//
610 AQAABAawFENTCABQQVRJRU5UIBAAEABQTgoARE1DT01eTkVNQRAAIABMTwGARE1DT
611 REEIADE50TMwMTAxEABAAENTAgBNAP7/AOCmAAAAABAAAFVMBAAAAAABAAQFFVTA
612 TAQAJIAAAQAMBRDUwYAU1RVRfkgCAAgAERBCAAyMDAyMDMwOQgAMABUTQYAMTYwMz
613 CABESUNPTMwAAgAMBMTxgARE1DT00gTU1NRSB0eXBlIGV4YW1wbGUAIANAFVJGAAxL
614 LjEuNTkuMTIzLjQ1Ni43ODkgABAAU0gAAP7/AOCGAAAAABAAAFVMBAAAAAABAAQ
615 IBRVTAQAAGMAAAQAMBRDUwYAU0VSSUVTCABgAENTAgBPVAgAgABMTwAACACBAFN
616 AAgAUBBQTgAAIAAOAFVJGgAxLjIuMjUwLjEuNTkuMTIzLjQ1Ni43ODkuMSAAEQ
617 uAAAAQAABRVTAQA2gMAAAQAEBRVUwIA//8EACAUUVuEAAAAAAAAEADAUQ1MGAE1
618 UwwAU0UwMDAxL0kwMDAxBAAQFVVJGgAxLjIuODQwLjEwMDA4LjUuMS40LjEuMS4
619 MS4yLjI1MC4xLjU5LjEyMy40NTYuNzg5LjEuMQQAeHVSRQAMS4yLjg0MC4xMDAw
620 AAgAQ1MAACAAEwBJUwIAMQD+/wDguAAAAQAABRVTAQA2gMAAAQAEBRVUwIA//8E
621 AAEEADAUQ1MGAE1NQdFIAQAABVDUwAU0UwMDAxL0kwMDAyBAAQFVVJGgAxLjIuOD
622 QwLjEwMDA4LjUuMS40LjEuMS43AAQAERVVSRwAMS4yLjI1MC4xLjU5LjEyMy40
623 NTYuNzg5LjEuMgQAeHVSRQA
624
625 -----_NextPart_000_0062_01C1C786.EA262CC1_13487
626 Content-Type: application/dicom;
627     id="SE0001/I0001";
628     name="I0001.dcm"
629 Content-Transfer-Encoding: base64
630 Content-Disposition: attachment;
631     filename="I0001.dcm"
632 Content-ID: "<dicomfileset1.se0001.i0001@provider.org>"
633 Content-Description: Color image
634
635
636 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
637 AAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAAA
638 AAAAAAAAAAAAAAAAAAAAAABESUNNagAAAFVMBACmAAAAgABAE9CAAACAAAAAQACAAI
639 NDAuMTAwMDguNS4xLjQuMS4xLjg0MC4xMDAwOC41LjEuNC4xLjEuNwAIABgAVUkcA
640 AgAQAFVJFAAxLjIuODQwLjEwMDA4LjUuMi4xAAIAEgBVSRgAMS4yLjI1MC4xLjU5
641 LjEuMjUwLjEuNTkuMTIzLjQ1Ni43ODkuMS4xLjEwMDAwOC41LjEuNC4xLjEuNwA
642 IAgAVUkcADEuMi4yNTAuMS41OS4xMjMuNDU2LjE0S4xLjE1CAAREEIAIwMDIwMzA5
643 CABgAENTAgBPVAgAZABDUwQAV1NEAAgAkABQTgAACAAwEEeXPGABESUNPTSBSNU1
644 bXBzZQAQAAAVUwEADwAAAAQABAAUE4KAERJQ09NXk51bWEQACAATE8IAERJQ09N
645 MzAAEAAwAERBCAAxOTkzMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAwMDAw
646 NDU2LjE0SAAADgBVSRoAMS4yLjI1MC4xLjU5LjEyMy40NTYuNzg5LjEgABAAU0g
647 MQAgABMASVMCADEAKAAAAFVMBABmAAAAKAACAFVTAADACgABABDUwQAUkdCICgAB
648 gBVUwIAAAAoAAgASVMCADEAKAAQAFVTAAGIAICgAEQBvUwIAGgAoAAABVVMCAAG
649 BwAoAAAMBVMCAAAA4H8AAAFVMBAB8AgAA4H8QAE9CAABwAgAA///9fXs0NCiV
650 L6zMyZ4uLg7/Hr6+/v7vHx/f39+vv77PDw+vv7+/z83+X15erq/f399ff33uTk+
651 vv7/v7+9fb2////v7+7fDw+/z88PH1cYNRXnI5dIVPum1ISmpYaoJpdY+HtMPDeJKS603
652 tb4uL4ujoj6Wl1zdfXtcTEwc3Nm6+vyNPT
```

Supplement 54: DICOM MIME Type
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653 cY2N6+/vhJ2d9ff33uTkjqSk9/j4zs6fVWw2coNQY3pUGUU8K1NKdY19i5+P/f79kKamu8nJb4yM
654 v8zMiaCg/v7+/P39lKmpxdQ/v7+j6Wlrb29aYeHpri4oLozdZCQ////29u4l5k6RGJCnq1/TWlB
655 v8Wkh5yLg5mM/v7+ma2ty9XVb4yMyNLSdZCQ+fr6+/z8m6+vg7u7/v7+k6iou8jIo7WlYoKCsMDA
656 b4yM////+/v4ycmTfoxQurt+r7WF4ODDorKodpGQuMbGs8LC8vT0h5+f5uvrpri4nbCwq7y83eTk
657 kaentcTErb6+4efnu8jIq7y86+7uigH9ff3+/v4+Pjy5ubR3Ny74+PH8vLm+vr1+fn0+vr3+vr2
658 +fn0+/v3+vr1+fn0+fn1+Pjz+vr1+fn0+Pn1+vr2/Pz59/fw+fz+fn0+fn0/Pz66OjT0tKl1tau
659 3Ny6l9ew2tq2ltau1NSq5OTJ2dm03d294uLG2Niz2Nix2dmz19ex2Niz1NSq3t6+39+/5ubP0tKm
660 09Oo2dm11tau8fhj////+/v4/v7+/////////v7++/v4/Pz6/f38/////////
661 ///
662

663 -----_NextPart_000_0062_01C1C786.EA262CC1_13487
664 Content-Type: application/dicom;
665 id="SE0001/I0002";
666 name="I0002.dcm"
667 Content-Transfer-Encoding: base64
668 Content-Disposition: attachment;
669 filename="I0002.dcm"
670 Content-ID: "<dicomfileset1.se0001.i0002@provider.org>"
671 Content-Description: B&W image
672

673 AAA
674 AAA
675 AAAAAAAAAAAAAAAAAABESUNNAgAAAFVMBACmAAAAAgABAE9CAAAACAAAAAQACAAIAVUkaADEuMi44
676 NDAuMTAwMDguNS4xLjQuMS4xLjCAAgADAFVJHAAxLjIuMjUwLjEuNTkuMTIzLjQ1Ni43ODkuMS4y
677 AgAQAFVJFAAxLjIuODQwLjEwMDA4LjEuMi4xAAIAIEgBVSRgAMS4yLjI1MC4xLjU5LjIuNDMuODYu
678 MjQzAgATAFNIDgBBQ1EtRVRJQU0tMi40MwgAAABVTQAQAxAAAAAgABQBDUwoASVNPX01SIDeWMAgA
679 FgBVSRoAMS4yLjg0MC4xMDAwOC41LjEuNC4xLjEuNwAIABgAVUkCADEuMi4yNTAuMS41OS4xMjMu
680 NDU2LjC4OS4xLjIIACAAREEIAIwMDIwMzA4CAAwAFRNBgAwNzQ3NDIAIAFAAU0gIAERJQ09NMzAA
681 CABgAENTAgBPVAgAZABDUwQAV1NEAAgAkABQTgAACAAwEEExPGABESUNPTSBNsU1FIHR5cGUgZXhh
682 bXBsZQAQAAAAVUwEADwAAAAQABAAUE4KAERJQ09NXk5lbWEQACAATE8IAERJQ09NMzAAEAAwAERB
683 CAAxOTkzMDEwMRAAQABDUwIATQAgAAAVUwEAF4AAAAgAA0AVUkYADEuMi4yNTAuMS41OS4xMjMu
684 NDU2LjC4OSAAAgBVSRoAMS4yLjI1MC4xLjU5LjEYMy40NTYuNzg5LjEgABAAU0gAACAAEQBJUwIA
685 MQAgABMASVMCADIKAAAAFVMBABkAAAAKAACAFVTAgABACgABABDUwWATU9OT0NIUk9NRTIAKAAI
686 AE1TAGAxACgAEABVUwIADwAoABEAVVMCADMAKAAAVVTAgAIACgAAQFVUwIACAAoAAIBVVMCAACa
687 KAADAVVTAgAAAOB/AABVTAQACgMAAOB/EABPQgAA/gIAAP////98dPX5O/////////
688 ///dCcY2OnqW1yufa2tra6f///+Xa3f///+W5
689 uc/2///xwLnn///+d7/////5Nfx///6ox53blKghHl6h5J8N72mT2Lo/+sktv/7fX/Mx3as/6l0
690 0rhIgfz/51r///0Wdfn//+2WiM7YZFoJyMjIzt9V///92VX/f8k1P+ZWv3///rF0Tn4///hL6r/
691 zSTP//+nJPj///uScylco6MwQCgmI2+hS/v//80j4f8k1P9ImP////////gnH/////aWD/rkJr//lp
692 I9z///a0jHVqqZIoJGOSH7GrV/b//+Ujzv8k1P8/mP////////ZXT////////gUr/hLM127KuPsP///+i
693 jZQ4RLSiI5rFy7V+Uv3//9wq9f8k1P9VdP////////j0T9///boD/cvdreXH8WKT///kkI1sP9LH
694 T7Xk6HQ1RP///YaL//8k0v/AKbv///nQ4yux////////wQtj/YP/PJqH/gIH////////5qB1g709vcb291q
695 QYmbgJz9/+A+ofb/v1Zwf1/V/89adp93yv/dYOz/fvT/m2Pg////////vTppydq8Pa8////////j3///
696 ///59/r////////+Pj/////////
697 ///JwdnRz9vQy9Xh3N3VzODx0drez8/k38/czNji0NXd
698 2MrX2t/j2NH/u8DbxsfeYnN//nPzcHRyMv1c1cbUwLvXyrnzxs/K4tvd2sJN0sbLzsbayMHH0dLi
699 08fz0dHNwsbc0cJg////////+79/////////PD//+79/////////
700 ///
701 /wA=

703 -----_NextPart_000_0062_01C1C786.EA262CC1_13487--
704 -----_NextPart_000_0062_01C1C786.EA262CC0--
705