PROCEDURES FOR THE TRANSFER OF FACSIMILE DATA VIA INTERNET MAIL

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INTRODUCTION

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This document is based on a draft which received an
affirmative "determination" at the October, 1997 meeting of
ITU Study Group 8. This version tunes and corrects some
portions of that document, as well as creating an alternate
organization and separating some control and value-added
functions from the core process of sending a facsimile
document. One of the goals of the reorganization is to
facilitate use for simple facsimile over the Internet,
possibly even compatible with the work being done by the IETF
Fax working group, while still permitting use for the more

advanced features desired by some constituencies of the ITU
Study Group.

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TITLE: PROPOSED REVISION OF NEW DRAFT PROCEDURES FOR THE
         TRANSFER OF FACSIMILE DATA VIA INTERNET MAIL

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 Based on discussons with the author of TD 2128, the enclosed
 document attempts a reorganization and revision of TD 2128 to
 improve interworking with Internet mail end users and to
 simplify the specification and distinction between Simple and
 Basic Internet Fax services.

 The enclosed revised copy of TD2128 includes the following
 changes:

1.   **Revised** list of References to include additional RFC
      specifications

2.   **Revision** of document structure to distinguish Basic and
      Simple Internet fax within the main body of the document

[3]. **Revision of Basic Internet Fax to form a functional** core service.

[4]. **Revision** of specification for Simple Internet Fax to build upon the specification of Simple Internet Fax

[5]. **Addition** of sections for Internet mail addressing, tailored for use with Internet Fax.

[6]. **Addition** of sections for Internet mail message headers, to specify the headers required for use with Internet Fax.

[7]. **Addition of section specifying delivery confirmation through use of existing Internet mail standards.**

[8]. **Revision of specification for exchange of capabilities, to use separate MIME type during a message exchange without** other facsimile data.

[9]. **Inclusion of annotations for opportunities to incorporate IETF RFCs by reference.**

PROCEDURES FOR THE TRANSFER OF FACSIMILE DATA VIA STORE AND FORWARD ON THE INTERNET

CONTENTS:

_1. Summary and scope

This Recommendation:

a)   defines procedures that enable facsimile data to be
     transferred via Internet Email.
b)   supports the requirements of F.IFax.
c)   defines a method for identifying the capabilities of the
     remote equipment.
d)   defines a method for providing positive or negative
     acknowledgement of receipt.

e)   does not require changes to current ITU facsimile
     Recommendations.
f)   does not require changes to current IETF internet
     standards.
g)   does not require terminals to have multi-page memory.

h)   permits extensive interworking between facsimile and
     Internet mail users and facilities, sharing common services
     where possible and isolated facsimile-specific functions

2.   Introduction and Background

F.IFax, defines the service requirement for both real-time and
store and forward facsimile over the Internet. For store and
forward facsimile this Recommendation defines addressing, MIME
encapsulation of document components and data formats for
those components..

Store and forward facsimile uses Internet mail standard
protocols for posting, relaying and delivery of store and
forward facsimile document. It requires no changes to Internet
standards or to ITU Facsimile Recommendations.   Such an
approach leads to a system that can be used universally
without changes to Internet servers or other intermediate
systems between the sender and the recipient and which permits
interworking between facsimile store and forward users and
users of general Internet mail.

3.   References

The following ITU-T Recommendations, and other references
contain provisions which, through reference in this text,
constitute provisions of this Recommendation. At the time of
publication,   the   editions   indicated   were   valid.   All
Recommendations and other references are subject to revision;
all users of this Recommendation are therefore encouraged to
investigate the possibility of applying the most recent
edition of the Recommendations and other references listed
below. A list of the currently valid ITU-T Recommendations is
regularly published.

Internet RFC (Request For Comments) documents are available
via http://ds.internic.net/ds/dspg/intdoc.html.

1.   **ITU-T**   T.30:   Procedures   for   document   facsimile
     transmission in the general switched telephone network
2.   **ITU-T T.4: Standardization of Group 3 facsimile apparatus
     for document transmission**
3.   **ITU-T T.6: Facsimile coding schemes and coding control
     functions for Group 4 facsimile apparatus**
4.   **ITU-T T.50: International Reference Alphabet (IRA)**

5. **ITU-T E.164:** Numbering plan for the ISDN era
6. **ITU-T F.IFax: Internet facsimile: operations and definition of service**
7. **ISO 8601:1988:** Data elements and interchange formats representation of dates and times
8. **ISO** 2111: Data Communications - basic mode control procedures - code independent information transfer
9. **RFC** 822: Standard for the format of ARPA Internet text messages
10. **RFC 821:** Simple Mail Transfer Protocol
11. **RFC-2045:** Multipurpose Internet Mail Extensions (MIME) Part One: Format of Internet Message Bodies
12. **RFC-2046:** Multipurpose Internet Mail Extensions (MIME) Part Two: Media Types
13. **RFC-2047:** MIME (Multipurpose Internet Mail Extensions) Part Three: Message Header Extensions for Non-ASCII Text
14. **RFC-2048:** Multipurpose Internet Mail Extensions (MIME) Part Four: Registration Procedures
15. **RFC-2049:** Multipurpose Internet Mail Extensions (MIME) Part Five: Conformance Criteria and Examples
16. **RFC-1725: Post Office Protocol   Version 3**
17. **ITU-T**   T.563: Terminal characteristics for Group   4 facsimile apparatus

18. **RFC** 1123: Requirements for Internet Hosts -- Application and Support
19. **RFC-1891 SMTP Service Extension for Delivery Status Notifications**
20. **RFC-1894 An Extensible Message Format for Delivery Status Notifications**

4. Definitions and abbreviations

All abbreviations are as per documents ITU-T T.30 and ITU-F.IFax unless specifically stated otherwise.

G3	Group 3 facsimile
G4	Group 4 facsimile
Relay terminal	A receiving system capable of relaying the received facsimile to one or more Group 3 or Group 4 facsimile terminals
Email	Electronic Mail
IETF	Internet Engineering Task Force
IMAP	Internet Mail Access Protocol version 4
MIME	Multipurpose Internet Mail Extensions
POP3	Post Office Protocol version 3
RFC	Request For Comment (Draft IETF standard)
SMTP	Simple Mail Transfer Protocol
TIFF	Tagged Image File Format
UTC	Coordinated Universal Time: Time scale, based on the

```
           second (SI)
IP         Internet Protocol
TCP        Transmission Control Protocol
```

In the descriptions below the following formats are used to
represent octet values:

```
X"nn"          hexadecimal
B"nnnnnnnn"    binary: X"A3" = B"10100011"
nnnn nnnn      ITU  format  as  bits are  received:  X"A3"  =
               B"10100011" = 1100 0101
```

5. Simple Internet Fax

5.1 Reason for simple store and forward facsimile

This mode is designed so that a facsimile terminal sends and
receives the facsimile document as an image attached to an
Email.

5.2 Addressing

(This sub-section may be replaced by RFC citation, if the
current   IETF specification for facsimile addressing   is
published in a sufficiently timely fashion.)

Specification of store and forward facsimile senders and
recipients is accomplished by the use existing Internet mail
addressing mechanisms and standards.   Those mechanisms are
tailored for store and forward facsimile through a compatible
profile, which encodes the information required to refer to a
facsimile terminal and the store and forward relay which
connects that terminal to the Internet mail service.

```
    simple-fax-mbox           =  "FAX=" ( global-phone / local-
    phone )

    global-phone      =  "+" digit-string

    local-phone       =  digit-string

    digit-string      =  1*(DIGIT / "-" / ".")
```

5.3 Message structure

The structure of an Internet mail message containing a
facsimile is:

  Table 1/T.IFax - Simple store and forward facsimile Format

DESCRIPTION	NOTE
Email envelope	1
Email header	2
Image Data	3

Notes:

1.   **Envelope** information specifies the list of destinations
      to which the message is currently being sent, as well as the
      address of the agent which posted the message, and any other
      transfer-specific information which applies to the current
      transfer of the message. Normally this information is carried
      via SMTP (Reference 10, 18) commands.

2.   **This contains all normal end-to-end Internet mail message
      header fields such as "To:", "From:", "CC:", "BCC:", "Reply
      to:"** etc., as documented in (References 9, 18) and extensions.

3.   **The body of the email is a MIME part which contains one
      or more pages of image data in the format defined in Annex A.**

4.   **Some** terminals may transmit character coded information
      with or without image data using Multipart/mixed. It is
      recommended that a terminal supporting the format defined here
      be designed to process such mixed content email; however it is
      outside the specification of this annex.

5.4 **Message headers**

The following standard Internet mail headers are required for
facsimile store and forward:

5.4.1   **Date:**

This contains the date and time of message posting

5.4.2   **From:**

This specifies the originator (author) of the message

5.4.3   To: and CC:

These list the primary and secondary recipients, respectively, for the message. The lists can be a mixture of general Internet mail addresses and Internet mail addresses tailored for use by facsimile store and forward, as defined in [Section 5.1](#).

5.4.4   Message-ID:

This is a unique string which identifyies the message

6. Basic Internet Fax

6.1 Addressing

(This sub-section may be replaced by RFC citation, if the current IETF specification for facsimile addressing is published in a sufficiently timely fashion.)


```
     basic-fax-mbox      =  simple-fax-mbox

                              [  sub-sep sub-addr ]
                              [ post-sep post-dial]

     sub-sep        =

     sub-addr       =

                       ;  This contains the contents of the T.30
                          SUB FIF.

     post-sep       =

     post-dial      =
```

6.2 Message structure

The structure of an Email message containing a Basic facsimile store and forward message is the same as for Simple Internet Fax, with the addition of support for binary file data using standard MIME structuring and labelling:

   Table 2/T.IFax - Basic Store and forward facsimile Format

```
        DESCRIPTI   NOTE
           ON
```

```
         Email        1
        envelope




         Email        2
         header




         Image        3
          Data




         Binary       4
        File Data
```

Notes:

1.   **This is the same as for Simple Internet Fax.**

2.   **This is the same as for Simple Internet Fax.**

3.   **The** body of the email is a MIME part which contains one
        or more pages of image data in the format defined in Annex B.

4.   **This MIME part contains other binary file data using** any
        of the formats acceptable for facsimile.

5.   **Where** possible the content types for binary files should
        be the same as those already existing. Where no suitable
        content type exists it will be necessary to apply for a new
        content type after consultation with the IETF. This paragraph
        needs detailed specification of the alignment between BFT and
        MIME types.)

6.   **Binary file parts and image data parts may be interleaved
        in any order.**

6.3 **Message headers**

Message headers are the same as for Basic Internet fax.

7.   **Confirmation of receipt**

Senders of facsimile store and forward may request delivery
confirmation.   Existing Internet mail Delivery Service
Notification (DSN) (Reference 19, 20) mechanisms shall be
used.

Facsimile store and forward recipients which receive a DSN request must return a delivery service notice, upon successful delivery of the facsimile.

For the purposes of facsimile store and forward relay devices, the DSN shall be issued upon receipt of the confirmation message from the target facsimile station. For the purposes of Internet mail recipients, the DSN shall be issued according the standard rules specified for DSNs.

8. Exchange of capabilities

Facsimile store and forward participants may wish to communicate their capabilities prior to sending a facsimile. A special MIME Content-Type is defined for this purpose, in place of the Image Data MIME body-part present in a facsimile message. In all other respects the capabilities message shall conform to requirements for Simple or Basic Internet Facsimile.

The sending system must make use of the "Capabilities Request" message type to obtain the capabilities of the recipient. This can be done as part of a first facsimile transmission or as a special transmission using the ITU header alone with no image or binary data. The sending system should store the recipient's capabilities for use during future transmissions.

The sender of any message using the procedures defined in this Recommendation shall be free to use any valid facsimile capabilities during its first call to other equipment. If the receiving equipment can process the data transmitted it will send back an acknowledgement of successful reception otherwise it will send back an acknowledgement indicating "Capabilities mismatch".

8.1 MIME label for exchange of capabilities body part

The MIME label is:

    Content-Type: application/fax-poll

  (NB: this section may also be expressed in ASN.1 notation following an editorial update from those desiring such notation):

The MIME label is:

    Content-Type:application/fax-capabilities

8.2 Format of exchange of capabilities body-part

The   Application/Fax-Capabilities MIME part contains   the
following data (NB: this section may also be expressed in
ASN.1 notation following an editorial update from those
desiring such notation):

3/T.IFax: Exchange of Capabilities Body-Part

Description	Mandatory	Repeatable	Field Type
DIS: G3 sender's capabilities	Yes1	No	X"09"
TSI: G3 sender's facsimile number	No	No	X"0A"
NSF: G3 NSF signal	No	No	X"0B"
NSS: G3 NSS signal	No	No	X"0C"
NSC: G3 NSS signal	No	No	X"0D"
G4 capabilities	Yes2	No	X"12"

Notes:
  1 For Group 3 only
  2 For Group 4 only

All fields within the ITU header part have the following
format:

```
Field type   Data length   Data
   Field type          (1 octet)
   Data length    (2 octets: low octet/high octet order)
   Data       (Of defined length)
```

The desirability of an extension method for this format is to
be studied and, if it is felt necessary, a method is to be
added to this draft Recommendation.

The following field types are allocated:

8.2.1   G3: Sender's capabilities

This contains the contents of the T.30 DIS FIF. It is present
in all messages and identifies the capabilities of the sender.

8.2.2   X"0A" G3: Sender's facsimile telephone number

This contains the contents of the T.30 TSI FIF.

8.2.3   X"0B" G3: NSF signal

This contains the contents of the T.30 NSF FIF.

8.2.4   X"0C" G3: NSS signal

This contains the contents of the T.30 NSS FIF.

8.2.5 X"0D" G3: NSC signal

This contains the contents of the T.30 NSC FIF.

8.2.6 G4 capabilities

This contains Group 4 applications capability data as defined in T.563 Appendix II.

The sender of any message using the procedures defined in this Recommendation shall be free to use any valid facsimile capabilities during its first call to other equipment. If the receiving equipment can process the data transmitted it will send back an acknowledgement of successful reception otherwise it will send back an acknowledgement indicating "Capabilities mismatch".

9. Facsimile polling

Facsimile store and forward participants may wish to poll a destination facsimile station, to request return transmission of one or more fax documents. A special MIME Content-Type is defined for this purpose, in place of the Image Data MIME body-part present in a facsimile message. In all other respects the capabilities message shall conform to requirements for Simple or Basic Internet Facsimile.

The sender of any message using the procedures defined in this Recommendation shall be free to request any facsimile document. If the receiving equipment can process the data transmitted it will send back the requested document(s); otherwise it will send back an acknowledgement indicating "Document(s) unavailable".

9.1 MIME label for Document-Retrieval body-part

The MIME label is:

    Content-Type: application/fax-poll

  (NB: this section may also be expressed in ASN.1 notation following an editorial update from those desiring such notation):

9.2 Format of the Document-Retrieval body-part

The ITU header MIME part contains the following data (NB: this section may also be expressed in ASN.1 notation following an editorial update from those desiring such notation):

Table 2/T.IFax: ITU Header Format

Description	Mandatory	Repeatable	Field Type
SEP: G3 selective poll	No	Yes	X"0F"
PWD: G3 password	No	Yes	X"10"
DTC: G3 polling request	No	No	X"11"

Notes:
  1 Where known
  2 For Group 3 only
  3 For Group 4 only

All fields within the ITU header part have the following format:

Field type	Data length	Data
Field type	(1 octet)	
Data length	(2 octets: low octet/high octet order)	
Data	(Of defined length)	

The desirability of an extension method for this format is to be studied and, if it is felt necessary, a method is to be added to this draft Recommendation.

The following field types are allocated:

9.2.1   X"0F" G3: Selective poll

This contains the contents of the T.30 SEP FIF.

9.2.2   G3: Password

This contains the contents of the T.30 PWD FIF.

9.2.3   G3: DTC

This contains the contents of the T.30 DTC FIF. This is used for a non-selective poll or turnaround poll.

Annex A: TIFF-F format

(This annex forms an integral part of this Recommendation)

Editorial consideration will be given to reconciling Annex A

and Annex B.

A.1 References, definitions and abbreviations

IFD : Image File directory

(See main body of this Recommendation for other references,
definitions and abbreviations)

A.2 TIFF

(This annex forms an integral part of this Recommendation)

Editorial consideration will be given to reconciling Annex A
and Annex B.

A.2.1   References, definitions and abbreviations

TIFF: "The TIFF 6.0 specification dated June 3,   1992
specification © 1986-1988, 1992 Adobe Systems Incorporated.
All Rights Reserved"

This Annex is not a complete definition of TIFF but is,
instead, a use of a particular TIFF specification referenced.
This annex includes a definition of an extension to TIFF to
meet the requirements of facsimile. Under the terms of the
letter dated September 19th 1997 from Adobe Systems
Incorporated to the Director if the ITU-T Adobe grants a
license to use the TIFF specification as the basis for an ITU
Recommendation.   Detailed terms are contained within the
letter which is available from the ITU.

(See main body of this Recommendation for other references,
definitions and abbreviations)

A.3 MIME labelling

The email body part which contains the TIFF-F file shall be
preceded by the following indicator.

    Content-type: Image/TIFF
    (specific type/subtype & parameter details need to be
    reconciled with IETF documents currently in Working Group
    Last Call.)
TIFF creates binary data which shall may need MIME Content-
Transfer-Encoding, such as Base64, for carriage   through
Internet mail relay systems. Hence is may be necessary to
convert the binary data to MIME base64 format and to follow
the Content-Type MIME header with:

  Content-Transfer-Encoding: base64

(This sub-section may be replaced by RFC citation, if the
current IETF specification for TIFF-F is published in a
sufficiently timely fashion.)

In this section a minimum set of TIFF features is described.

A.4.1   **IFD and image data**

Flexibility of positioning IFD and image data in a TIFF data
stream is constrained in the format defined in this annex.
The three elements of a TIFF file: Header, IFD and Image data;
shall appear as shown in Fig, Annex A.1/T.IFax.   Header
information shall be at the beginning of the file and IFD and
Image data shall follow in pairs according to page order.   A
pair of IFD and Image data shall correspond to one page of the
facsimile document.

  Fig. Annex A.1/T.IFax - Sequence of Header, IFD and image
                             data

The fixed values used in the Header field are described in
Table Annex A-1/T.IFax.

          Table Annex A.1/T.IFax - Header

Offset	Description	Value
0	Byte Order	0x4949
2	42	0x2A
4	Offset of 1st IFD	0x00000008

The structure of an IFD is described in Table Annex A.2/T.IFax
along with coding samples.