Recommendation X.408

MESSAGE HANDLING SYSTEMS:
ENCODED INFORMATION TYPE CONVERSION RULES

(MalagaÑTorremolinos, 1984; amended at Melbourne, 1988)

The establishment in various countries of telematic services and computerÑbased storeÑandÑforward message services in association with public data networks creates a need to produce standards to facilitate international message exchange between subscribers to such services.

The CCITT,

considering

(a) the need for interpersonal messaging and message transfer services;

(b) the need to transfer messages of different types having a large variety of formats;

(c) that the FÑseries of Recommendations defines telematic services;

(d) that the TÑseries of Recommendations defines terminal equipment and control procedures for telematic services;

(e) that the VÑseries of Recommendations provides the means for data communication over the telephone network;

(f) that Recommendation X.200 defines the reference model of open systems interconnection for CCITT applications;

(g) that a set of Recommendations describes various aspects of message handling X.400, X.402, X.403, X.407, X.408, X.411, X.413, X.419 and X.420;

(h) that the CCITT and ISO have drawn up a suitable set of convertion rules;

(i) that, for specific user applications, some variations may be developed and applied by bilateral agreement,

unanimously declares the view

(1) that the purpose and scope of this Recommendation are described in ¤ 1;

(2) that general aspects of the rules for converting between encoded information types are described in ¤ 2;

(3) that conversion rules for particular encoded information types are defined in subsequent sections.

TABLE OF CONTENTS

1 *Purpose and scope*

2 *General aspects of conversion*

2.1 Encoded information types

2.2 Two aspects of conversion

2.3 Loss of information

2.4 Encoded information types properties

3 *Conversion from TLX*

3.1 Conversion from TLX to IA5Text

3.2 Conversion from TLX to TTX

3.3 Conversion from TLX to G3Fax

3.4 Conversion from TLX to G4Class1

3.5 Conversion from TLX to Videotex
3.6 Conversion from TLX to voice
3.7 Conversion from TLX to mixedmode
4 *Conversion from IA5Text*
4.1 Conversion from IA5Text to TLX
4.2 Conversion from IA5Text to TTX
4.3 Conversion from IA5Text to G3Fax
4.4 Conversion from IA5Text to G4Class1
4.5 Conversion from IA5Text to Videotex
4.6 Conversion from IA5Text to voice
4.7 Conversion from IA5Text to mixedmode
5 *Conversion from TTX*
5.1 Conversion from TTX to TLX
5.2 Conversion from TTX to IA5Text
5.3 Conversion from TTX to TTX
5.4 Conversion from TTX to G3Fax
5.5 Conversion from TTX to G4Class1
5.6 Conversion from TTX to Videotex
5.7 Conversion from TTX to voice
5.8 Conversion from TTX to mixedmode
6 *Conversion from G3Fax*
6.1 Conversion from G3Fax to G3Fax
6.2 Conversion from G3Fax to G4Class1
6.3 Conversion from G3Fax to mixedmode
7 *Conversion from G4Class1*
7.1 Conversion from G4Class1 to G3Fax
7.2 Conversion from G4Class1 to G4Class1
7.3 Conversion from G4Class1 to mixedmode
8 *Conversion from Videotex*
8.1 Conversion from Videotex to TLX
8.2 Conversion from Videotex to IA5Text
8.3 Conversion from Videotex to TTX
8.4 Conversion from Videotex to G3Fax
8.5 Conversion from Videotex to G4Class1
8.6 Conversion from Videotex to Videotex
8.7 Conversion from Videotex to voice
8.8 Conversion from Videotex to mixedmode

9 *Conversion from Voice*

9.1 Conversion from voice to voice.

10 *Conversion from Mixedmode*

10.1 Conversion from mixedmode to TLX

10.2 Conversion from mixedmode to IA5Text

10.3 Conversion from mixedmode to TTX

10.4 Conversion from mixedmode to G3Fax

10.5 Conversion from mixedmode to G4Class1

10.6 Conversion from mixedmode to Videotex

10.7 Conversion from mixedmode to voice

10.8 Conversion from mixedmode to mixedmode

Annex A Ñ Code conversion tables

Annex B Ñ Abbreviations

1 Purpose and scope

This is one of a set of Recommendations for Message Handling. The entire set provides a comprenhensive specification for Message Handling comprising any number of cooperating open systems.

This Recommendation specifies the algorithms the MHS uses when converting between different types of encoded information.

Other aspects of Message Handling are defined in other Recommendations. The overall system and services of Message Handling is specified in Recommendation X.400. The overall architecture of the MHS is defined in Recommendation X.402. The conformance testing of MHS components is described in Recommendation X.403. The conventions used in the definition of the abstract services provided by MHS components are defined in Recommendation X.407. The abstract service the MTS provides and the procedures that govern its distributed operation are defined in Recommendation X.411. The abstract service the MS provides is defined in RecommendationÊX.413. The application protocols that govern the interaction of MHS components are specified in Recommendation X.419. The interpersonal Messaging System, an application of Message Handling, is specified in Recommendation. X.420.

Paragraph 2 of this Recommendation describes the general aspects of converion for the MHS. In ¤¤ 3 to 10, particular conversion rules are defined. Annex A provides code conversion tables. Annex B lists the abbreviations used.

2 General aspects of conversion

Among the data elements subject to conversion are the subject and body of a message. The conversion has two aspects, format and code. The aspect of control is described elsewhere in the relevant Recommendations.

2.1 *Encoded information types*

This Recommendation defines the conversion rules for eight types of encoded information utilized in the MHS. In order to refer to each types, the following terms are used:

TLX The code is defined in Recommendation F.1. The format is defined in Recommendation S 5.

IA5Text The code is defined in Recommendation T.50.

TTX The format is defined in Recommendations F.200 and T.60, and the code is defined in Recommendation T.61.

G3Fax The encoding scheme is defined in Recommendation T.4, and the signalling of the encoding scheme is defined in Recommendation T.30.

G4Class1 The format and encoding scheme are defined in Recommendations T.6, T.503 and T.563.

Videotex The format and encoding scheme are defined in Recommendations T.101, T.504 and T.541.

Voice The encoding scheme is for further study.

Mixedmode The format and encoding scheme are defined in Recommendations T.501 and T.561.

Note Ñ TLX: Telex, TTX: Teletex.

The TTX and G3Fax types have two subtypes: basic and optional. The G4Class1 type and the mixedmode type have two subtypes: basic and nonÑbasic.

Table 1/X.408 depicts all conceivable conversions between the above types and subtypes. It characterizes each as: (Ñ) No conversion, (a) possible without loss of information, (b) possible but loss of information may occur, or (c) impractical. This Recommendation defines the rules for format and code conversion for conversions in the second and third categories.

TABLE 1/X.408 = 10cm

2.2 *Two aspects of conversion*

The conversion rules have two aspects:

1) the format aspect;

2) the code aspect.

The conversion rules for encoded information types which have logical structures are for further study.

2.2.1 *Ground rules*

If there is an existing standard on the conversion between different types, it should be referred to without any modifications unless required. If there is not, the following ground rules are specified:

1) If there are standards on the subject and object types, the conversion rules should be defined such that the intersecting part of the standards is preserved. The creation of new rules for nonÑintersecting parts should be based on clear requirements, otherwise they should not be created.

2) When either the subject or object type has no standard, the conversion rules should be defined such that standard types can be accommodated as much as possible for both directions of the conversion.

3) When neither type has a standard, the definition of the rules is for further study.

2.2.2 *Format aspect*

The format aspect represents the dimensional attributes of the presentation space of user messages.

The twoÑdimensional (X and Y) aspect of the conversion is to be specified for a message being transferred. Following are the parameters to be defined for this aspect. Whether voice should be considered in the same context is for further study.

a) The XÑdirection of the presentation space is defined by means of either:

   1) the size of a character and the number of characters to be presented;

   2) length.

   If the object type has a smaller size of the XÑdirection than the subject type, a mechanism for adjustment of line length, such as the insertion of a CR/LF pair, should be defined as the format conversion rule.

b) The YÑdirection of the presentation space is defined by means of either:

   1) the number of lines per presentation space or per unit length;

   2) length.

   If the object type has a smaller page size of the YÑdirection than the subject type, a mechanism for change of page format, such as the insertion of a CR/FF pair, should be defined as the format conversion rule. If the object type has no length limitation of YÑdirection and the subject type is pagenated, some format conversion rule, such as the insertion of one or more blank lines, should be defined to represent the page boundary.

   When converting characters to G3Fax or G4Class1, the rules for imaging should be applied according to Recommendation T.351.

2.2.3 *Code aspect*

With respect to the code aspect, Annex A specifies the conversion between different types. Further notes can be found in each subsection if necessary.

2.3 *Loss of information*

2.3.1 *Initial assumption on loss of information*

When considering conversion between different encoded information types some initial assumptions were taken into account. Changes to the character font, character size or paper type, etc. are not regarded as loss of information.

2.3.2 *Format loss of information*

The format conversions take two different forms; line length and number of lines. The following definitions apply:

1) *Line length (number of characters)*
   a) originator's line length less than, or equal to recipient's line length: no loss of information;
   b) originator's line length more than recipient's line length: loss of information.
2) *Page length (number of lines)*
   a) originator's page length less than, or equal to recipient's page length: no loss of information. However, in the recipient's pages, a clean field should be inserted between the originator's pages;
   b) originator's page length more than recipient's page: no loss of information, provided the originator's page is mapped onto an integer number of destination pages.

Note Ñ Information may also be lost due to differences between the printable and reproducible areas in facsimile.

2.3.3 *Code loss of information*

If a graphic character is reproduced identically on both systems then there is no loss of information. However, if there is a change between italic, bold, underlined, normal or coloured (as in the case of Videotex) this could be considered to be a loss of information. (e.g., one type of rendition could mean a positive financial result and the other a negative result!). This requires further study.

A conversion to a similar character, but not identical, in the second system is loss of information. A conversion from one character to many characters (e.g., $ to dollar) is also loss of information.

2.4 *Encoded information type properties*

Followings are the properties of encoded information types assumed for this Recommendation.

2.4.1 *TLX encoded information type*

The TLX encoded information type is not paginated. A TLX text line contains maximum 69 graphic characters as defined in Recommendation S.5. The end of a line is also represented by an ITA2 CRÑLF pair.

2.4.2 *IA5Text encoded information type*

The IA5Text encoded information type is paginated. An IA5Text line contains maximum N_1 graphic characters. The end of a line is also represented by an IA5 CRÑLF pair. An IA5Text page contains maximum M_1 lines. The end of a page is also represented by an IA5 CRÑFF pair.

Note Ñ Any value to N_1 or M_1 are not assurmed in this Recommendation unless explicitly specified in the relevant sections. A common value to N_1 is 80.

2.4.3 *TTX encoded information type*

The TTX encoded information type is paginated. The format of a TTX page is as defined by following Òdefault condition of basic TeletexÓ:

- Ñ paper size and orientation: vertical basic page format;
- Ñ character spacing: 2.54 mm;
- Ñ line feed spacing: 4.23 mm;
- Ñ rendition: default rendition.

This implies that the maximum number of characters per line is 77 and the maximum number of lines per page is 55. The end of a TTX line is represented by a TTX CRÑLF pair. The end of a TTX page is represented by a TTX CRÑFF pair.

Note Ñ When converting from Teletex, each Teletex line shall be preceded by 5 spaces reduced by the number of backspaces (BS) found in the beginning of each Teletex line (refer to Recommendation F.200, ¤ 7.6.9.1).

2.4.4 *G3Fax encoded information type*

The G3Fax encoded information type is paginated. The format of a G3Fax is described in RecommendationÊT.4.

2.4.5 *G4Class1 encoded information type*

The G4Class1 encoded information type is paginated. The format of a G4Class1 is described in Recommendation T.563.

2.4.6 *Videotex encoded information type*

The Videotex encoded information type is paginated. A Videotex line contains maximum N_2 graphic characters. The end of a line is represented by a Videotex APDÑAPR pair. An Videotex page contains maximum M_2 lines in the definedÑdiplay area. The end of a page is represented by an Videotex CS. The function of scroll is not assumed.

Among various graphic elements that Videotex can handle, the following rules apply only to the alphanumeric characters in the displayÑdata elements. The use of Interworking Data Syntax (IDS) requires further study.

Note Ñ Values of N_2 or M_2 are not assumed in this Recommendation; they may differ according to the syntax used.

2.4.7 *Voice encoded information type*

Requires further study.

2.4.8 *Mixedmode encoded information type*

The format and encoding scheme are defined in Recommendations T.501 and T.561.

3 Conversion from TLX

3.1 *Conversion from TLX to IA5Text*

3.1.1 *Format conversion*

A TLX line is directly converted into an IA5Text line if the number of graphic characters of the codeÑconverted TLX line does not exceed the maximum number of graphic characters available in an IA5Text line (N_1) and if the number of lines in a TLX does not exceeds the number of lines available in an IA5Text page (M_1).

An ITA2 CRÑLF pair invokes a new IA5Text line. If an LF is not associated with a CR, an LF may be inserted after the CR.

A TLX line should be converted into the appropriate number of IA5Text lines (with possible insertion of an IA5 CRÑLF pair) if the number of graphic characters of the codeÑconverted TLX line exceeds N_1. Each split IA5Text line (except the last one) may contain the maximum number of graphic characters available for the IA5Text line. Folding at the word boundary requires further study.

A TLX should be split into the appropriate number of IA5Text pages if the number of codeÑconverted TLX line exceeds M_1. Each split IA5Text page (except the last one) may contain the maximum number of lines available for the IA5Text page. The number of lines in a TLX should be calculated after the insertion of any required IA5 CRÑLF pairs.

Note Ñ Inclusion of data escape mode in a TLX is for further study.

Those aspects other than above (e.g., character spacing, line spacing and so on) are outside the scope of this conversion rule.

3.1.2 *Code conversion*

This conversion rule is defined in Annex A.

3.2 *Conversion from TLX to TTX*

3.2.1 *Format conversion*

A TLX text is directly converted into a TTX text if the number of graphic characters of the code converted TLX line does not exceed the maximum number of graphic characters available in a TTX text line and if the number of lines in a TLX does not exceeds the number of lines available in a TTX page.

An ITA2 CRÑLF pair invokes a new TTX text line. If an LF is not associated with a CR, an LF may be inserted after the CR.

A TLX text line should be converted into the appropriate number of TTX text lines (with possible insertion of a TTX CRÑLF pair) if the number of graphic characters in a codeÑconverted TLX line exceeds the maximum number of graphic characters available in a TTX text line. Each split TTX text line (except the last one) may contain the maximum number of graphic characters available for the TTX text line. Folding at the word boundary requires further study.

A TLX text should be split into the appropriate number of TTX pages (with possible insertion of a TTX CRÑFF pair) if the number of codeÑconverted TLX line exceeds the number available in a TTX page. Each split TTX page (except the last one) may contain the maximum number of lines available for the TTX page. The number of lines in a TLX should be calculated after the insertion of any required TTX CRÑLF pairs.

3.2.2 *Code conversion*

This conversion rule is defined in Annex A.

3.3 *Conversion from TLX to G3Fax*

3.3.1 *Format conversion*

A TLX text is directly converted into a G3Fax if the number of graphic characters of the codeÑconverted TLX line does not exceed the maximum number of graphic characters available in a G3Fax character line and if the number of lines in the TLX does not exceeds the number of lines available in a G3Fax pag.

An ITA2 CRÑLF pair invokes a new G3Fax character line. If an LF is not associated with an CR, a LF may be inserted after the CR.

A TLX text line should be converted into the appropriate number of G3Fax character lines (with possible insertion of an ITA2 CRÑLF pair) if the number of graphic characters in a codeÑconverted TLX line exceeds the maximum number of graphic characters available in a G3Fax character line. Each split G3Fax character line (except the last one) may contain the maximum number of graphic characters available for the G3Fax character line. Folding at the word boundary requires further study.

A TLX text should be split into the appropriate number of G3Fax pages if the number of codeÑconverted TLX lines exceeds the number available in a G3Fax page. Each split G3Fax page (except the last one) may contain the maximum number of lines available for the G3Fax page. The number of lines in a TLX should be calculated after the insertion of any required ITA2 CRÑLF pairs.

Imaging of characters to G3Fax should be in accordance with Recommendation T.351.

3.3.2 *Code conversion*

This conversion rule is defined in Annex A. The charater rendition is a national option.

3.4 *Conversion from TLX to G4Class1*

3.4.1 *Format conversion*

A TLX text is directly converted into a G4Class1 if the number of graphic characters of the codeÑconverted TLX line does not exceed the maximum number of graphic characters available in a G4Class1 character line and if the number of lines in the TLX does not exceeds the number of lines available in a G4Class1 page.

An ITA2 CRÑLF pair invokes a new G4Class1 character line. If an LF is not associated with a CR, an LF may be inserted after the CR.

A TLX text line should be converted into the appropriate number of G4Class1 character lines (with possible insertion of a ITA2 CRÑLF pair) if the number of graphic characters in a codeÑconverted TLX line exceeds the maximum number of graphic characters available in a G4Class1 character line. Each split G4Class1 character line (except the last one) may contain the maximum number of graphic characters available for the G4Class1 character line. Folding at the word boundary requires further study.

A TLX text should be split into the appropriate number of G4Class1 pages if the number of codeÑconverted TLX lines exceeds the number available in a G4Class1 page. Each split G4Class1 page (except the last one) may contain the maximum number of lines available for the G4Class1 page. The number of lines in a TLX should be calculated after the insertion of any required ITA1 CRÑLF pairs.

Imaging of characters to G4Class1 should be in accordance with Recommendation T.351.

3.4.2 *Code conversion*

This conversion rule is defined in Annex A. The character rendition is a national option.

3.5 *Conversion from TLX to Videotex*

3.5.1 *Format conversion*

A TLX text is converted directly into a Videotex if the number of graphic characters of the codeÑconverted TLX line does not exceed the number of charcters available in the Videotex line, and if the number of lines in the TLX does not exceed the number of lines available in the Videotex page.

An ITA2 CRÑLF pair invokes a new Videotex line. If an LF is not associated with a CR, an LF may be inserted after the CR.

A TLX text line should be converted into the appropriate number of Videotex lines (with possible insertion of a T.101 APDÑAPR pair) if the number of graphic characters in a codeÑconverted TLX line exceeds the maximum number of graphic charcters available in a Videotex line (N_2). Each split Videotex line (except the last one) may contain the maximum number of graphic characters available for the Videotex line. Folding at the word boundary requires further study.

A TLX text should be split into the appropriate number of Videotex pages if the number of codeÑconverted TLX lines exceeds the number available in a Videotex page (M_2). Each split Videotex page (except the last one) may contain the maximum number of lines available for the Videotex page. The number of lines in a TLX should be calculated after the insertion of any required T.101 APDÑAPR pairs.

By definition, if one TLX line is converted into one Videotex line and the TLX text is converted into one or several Videotex pages, this is not considered as loss of information.

3.5.2 *Code conversion*

The code conversion is specified in Annex A.

3.6 *Conversion from TLX to voice*

Requires further study.

3.7 *Conversion from TLX to mixedmode*

Requires further study.

4 Conversion from IA5Text

4.1 *Conversion from IA5Text to TLX*

4.1.1 *Format conversion*

An IA5Text is converted directly into a TLX if the number of graphic characters of the codeÑconverted IA5Text line does not exceed the number of characters available in the TLX line.

An IA5 CRÑLF pair invokes a new TLX line. If an LF is not associated with a CR, an LF may be inserted after the CR.

An IA5Text line should be converted into the appropriate number of TLX lines (with possible insertion of an IA5 CRÑLF pair) if the number of graphic characters in a codeÑconverted TLX line exceeds the maximum number of graphic characters available in a TLX line. Each split TLX line (except the last one) may contain the maximum number of graphic characters available for the TLX line. Folding at the word boundary requires further study.

An IA5 CRÑFF pair is converted into an ITA2 CRÑLF pair plus the optional addition of up to 3 blank lines.

4.1.2 *Code conversion*

This conversion rule is defined in Annex A.

When the IA5Text changes from a letter to a figure type then an ITA2 Figure Shift shall be generated. When the IA5Text changes from a figure to a letter then an ITA2 Letter Shift shall be generated.

At the start of the message an ITA2 Letter Shift shall be generated to ensure the TLX is in a known shift mode.

4.2 *Conversion from IA5Text to TTX*

4.2.1 *Format conversion*

An IA5Text is directly converted into a TTX if the number of graphic characters of the codeÑconverted IA5Text line does not exceed the maximum number of graphic characters available in a TTX line and if the number of lines in the IA5Text does not exceeds the number of lines available in a TTX page.

An IA5 CRÑLF pair invokes a new TTX line. If an LF is not associated with a CR, an LF may be inserted after the CR.

An IA5Text line should be converted into the appropriate number of TTX lines (with possible insertion of a TTX CRÑLF pair) if the number of graphic characters in a codeÑconverted IA5Text line exceeds the maximum number of graphic characters available in a TTX line. Each split TTX line (except the last one) may contain the maximum number of graphic characters available for the TTX line. Folding at the word boundary requires further study.

An IA5 CRÑFF pair invokes a new TTX page.

An IA5Text page should be split into the appropriate number of TTX pages (with possible insertion of TTX CRÑFF pair) if the number of codeÑconverted IA5Text lines exceeds the number available in a TTX page. Each split TTX page (except the last one) may contain the maximum number of lines available for the TTX page. The number of lines in an IA5Text should be calculated after the insertion of any required TTX CRÑLF pairs.

4.2.2 *Code conversion*

Every IA5 character is represented by seven bits (b_7Ñb_1). Characters of IA5 are converted into the corresponding characters of T.61 by adding 0 as the eighth bit (b_8). The conversion rules is specified in Annex A.

Note Ñ In the case of circumflex accent, grave accent, and overline, whether diacritical marks of T.61 can be chosen as converted codes is for further study.

4.3 *Conversion from IA5Text to G3Fax*

4.3.1 *Format conversion*

An IA5Text is directly converted into a G3Fax if the number of graphic characters of the codeÑconverted IA5Text line does not exceed the maximum number of graphic characters available in a G3Fax character line and if the number of lines in the IA5Text does not exceed the number of lines available in a G3Fax page.

An IA5 CRÑLF pair invokes a new G3Fax character line. If an LF is not associated with a CR, an LF may be inserted after the CR.

An IA5Text line should be converted into the appropriate number of G3Fax character lines (with possible insertion of an IA5 CRÑLF pair) if the number of graphic characters in a codeÑconverted IA5Text line exceeds the maximum number of graphic characters available in a G3Fax character line. Each split G3Fax character line (except the last one) may contain the maximum number of graphic characters available for the G3Fax character line. Folding at the word boundary requires further study.

An IA5 CRÑFF pair invokes a new G3Fax page.

An IA5Text page should be split into the appropriate number of G3Fax pages if the number of codeÑconverted IA5Text lines exceeds the number available in a G3Fax page. Each split G3Fax page (except the last one) may contain the maximum number of lines available for the G3Fax page. The number of lines in an IA5Text should be calculated after the insertion of any required IA5 CRÑLF pairs.

When converting from IA5Text to G3Fax, the G3Fax image format will be 80 characters per line with a left marging of 20 mm and 55 lines per page.

Imaging of characters to G3Fax should be in accordance with Recommendation T.351.

4.3.2 *Code conversion*

This conversion rule is defined in Annex A. The character rendition is a national option.

4.4 *Conversion from IA5Text to G4Class1*

4.4.1 *Format conversion*

An IA5Text is directly converted into a G4Class1 if the number of graphic characters of the codeÑconverted IA5Text line does not exceed the maximum number of graphic characters available in a G4Class1 character line and if the number of lines in the IA4Text does not exceeds the number of lines available in a G4Class1 page.

An IA5 CRÑLF pair invokes a new G4Class1 character line. If an LF is not associated with a CR, an LF may be inserted after the CR.

An IA5Text line should be converted into the appropriate number of G4Class1 character lines (with possible insertion of an IA5 CRÑLF pair) if the number of graphic characters in a codeÑconverted IA5Text line exceeds the maximum number of graphic characters available in a G4Class1 character line. Each split G4Class1 character line (except the last one) may contain the maximum number of graphic characters available for the G4Class1 character line. Folding at the word boundary requires further study.

An IA5 CRÑFF pair invokes a new G4Class1 page.

An IA5Text page should be split into the appropriate number of G4Class1 pages if the number of codeÑconverted IA5Text lines exceeds the number available in a G4Class1 page. Each split G4Class1 page (except the last one) may contain the maximum number of lines available for the G4Class1 page. The number of lines in an IA5Text should be calculated after the insertion of any required IA5 CRÑLF pairs.

When converting from IA5Text to G4Class1, the G4Class1 image format will be 80 characters per line with a left margin of 20 mm and 55 lines per page.

Imaging of characters to G4Class1 should be in accordance with Recommendation T.351.

4.4.2 *Code conversion*

This conversion rule is defined in Annex A. The character rendition is a national option.

4.5 *Conversion from IA5Text to Videotex*

4.5.1 *Format conversion*

An IA5Text is directly converted into a Videotex if the number of graphic characters of the codeÑconverted IA5Text line does not exceed the maximum number of graphic characters available in a Videotex line and if the number of lines in the IA5Text does not exceeds the number of lines available in a Videotex page.

An IA5 CRÑLF pair invokes a new Videotex line. If an LF is not associated with a CR, an LF may be inserted after the CR.

An IAa5Text line should be converted into the appropriate number of Videotex lines (with possible insertion of a T.101 APDÑAPR pair) if the number of graphic characters in a codeÑconverted IA5Text line exceeds the maximum number of graphic characters available in a Videotex line. Each split Videotex character line (except the last one) may contain the maximum number of graphic characters available for the Videotex character line. Folding at the word boundary requires further study.

An IA5 CRÑFF pair invokes a new Videotex page.

An IA5Text page should be split into the appropriate number of Videotex pages (with possible insertion of a T.101 CS) if the number of codeÑconverted IA5Text lines exceeds the number available in a Videotex page. Each split Videotex page (except the last one) may contain the maximum number of lines available for the Videotex page. The number of lines in a IA5Text should be calculated after the insertion of any required IA5 CRÑLF pairs.

By definition, if one IA5Text line is converted into one Videotex line and if a IA5Text page is converted into one or several Videotex pages, each IA5Text page starting with a new Videotex page, this is not considered as loss of information.

4.5.2 *Code conversion*

The conversion rule is specified in Annex A.

4.6 *Conversion from IA5Text to voice*

Requires further study.

4.7 *Conversion from IA5Text to mixedmode*

Requires further study.

5 Conversion from TTX

5.1 *Conversion from TTX to TLX*

5.1.1 *Format conversion*

A TTX is converted directly into a TLX if the number of graphic characters of the codeÑconverted TTX line does not exceed the number of characters available in the TLX line.

A TTX CRÑLF pair invokes a new TLX line. If an LF is not associated with a CR, an LF may be inserted after the CR.

A TTX line should be converted into the appropriate number of TLX lines (with possible insertion of an ITA2 CRÑLF pair) if the number of graphic characters in a codeÑconverted TLX line exceeds the maximum number of graphic characters available in a TLX line. Each split TLX line (except the last one) may contain the maximum number of graphic characters available for the TLX line. Folding at the word boundary requires further study.

A TTX CRÑFF pair is converted into an ITA2 CRÑLF pair plus the optional addition of up to 3 blank lines.

5.1.2 *Code conversion*

This conversion rule is defined in Annex A.

When the TTX changes from a letter to a figure type then an ITA2 Figure Shift shall be generated. When the TTX changes from a figure to a letter then an ITA2 Letter Shift shall be generated.

At the start of the message an ITA2 Letter Shift shall be generated to ensure the TLX is in a known shift mode.

5.2 *Conversion from TTX to IA5Text*

5.2.1 *Format conversion*

A TTX is converted into an IA5Text assuming the vertical orientation and a maximum of 77 characters per line (a line may be constructed by placing 72 characters to the right of the left marging and additional 5 characters to the left of the left margin). Teletex information in the horizontal orientation will result in loss of information.

A TTX is directly converted into an IA5Text if the number of graphic characters of the codeÑconverted TTX line does not exceed the maximum number of graphic characters available in a IA5Text character line and if the number of lines in the TTX does not exceed the number of lines available in a IA5Text page.

A TTX CRÑLF pair invokes a new IA5Text line. If an LF is not associated with an CR, an LF may be inserted after the CR.

A TTX line should be converted into the appropriate number of IA5Text lines (with possible insertion of an IA5 CRÑLF pair) if the number of graphic characters in a codeÑconverted TTX line exceeds the maximum number of graphic characters available in an IA5Text line. Each split IA5Text character line (except the last one) may contain the maximum number of graphic characters available for the IA5Text character line. Folding at the word boundary requires further study.

A TTX CRÑFF pair invokes a new IA5Text page.

A TTX page should be split into the appropriate number of IA5Text pages if the number of codeÑconverted TTX lines exceeds the number available in a IA5Text page. Each split IA5Text page (except the last one) may contain the maximum number of lines available for the IA5Text page. The number of lines in a TTX should be calculated after the insertion of any required IA5 CRÑLF pairs.

5.2.2 *Code conversion*

Every character in the set of T.61 is converted into the corresponding character of IA5 by deleting Bit b_8. The conversion rule is specified in Annex A.

Note Ñ Other conversion rules for the currency sings are for further study.

5.3 *Conversion from TTX to TTX*

Requires further study.

5.4 *Conversion from TTX to G3Fax*

5.4.1 *Format conversion*

A TTX text is directly converted into a G3Fax if the number of graphic characters of the codeÑconverted TTX line does not exceed the maximum number of graphic characters available in a G3Fax character line and if the number of lines in the TTX does not exceeds the number of lines available in a G3Fax page.

A TTX CRÑLF pair invokes a new G3Fax character line. If an LF is not associated with a CR, an LF may be inserted after the CR.

A TTX line should be converted into the appropriate number of G3Fax character lines (with possible insertion of an TTX CRÑLF pair) if the number of graphic characters in a codeÑconverted TTX line exceeds the maximum number of graphic characters available in a G3Fax character line. Each split G3Fax character line (except the last one) may contain the maximum number of graphic characters available for the G3Fax character line. Folding at the word boundary requires further study.

A TTX CRÑFF pair invokes a new G3Fax page.

A TTX page should be split into the appropriate number of G3Fax pages (with possible insertion of a TTX CRÑFF pair) if the number of codeÑconverted TTX lines exceeds the number available in a G3Fax page. Each split G3Fax page (except the last one) may contain the maximum number of lines available for the G3Fax page. The number of lines in an TTX should be calculated after the insertion of any required TTX CRÑLF pairs.

Imaging of characters to G3Fax should be in accordance with Recommendation T.351. The use of figures, however, in Recommendation T.351 corresponding to the options of TTX requires further study.

5.4.2 *Code conversion*

This conversion rule is defined in Annex A. The character rendition is a national option.

5.5 *Conversion from TTX to G4Class1*

5.5.1 *Format conversion*

A TTX text is directly converted into a G4Class1 if the number of graphic characters of the codeÑconverted TTX line does not exceed the maximum number of graphic characters available in a G4Class1 character line and if the number of lines in the TTX does not exceeds the number of lines available in a G4Class1 page.

A TTX CRÑLF pair invokes a new G4Class1 line. If an LF is not associated with a CR, an LF may be inserted after the CR.

A TTX line should be converted into the appropriate number of G4Class1 character lines (with possible insertion of a TTX CRÑLF pair) if the number of graphic characters in a codeÑconverted TTX line exceeds the maximum number of graphic characters available in a G4Class1 character line. Each split G4Class1 character line (except the last one) may contain the maximum number of graphic characters available for the Videotex character line. Folding at the word boundary requires further study.

A TTX CRÑFF pair invokes a new G4Class1 page.

A TTX page should be split into the appropriate number of G4Class1 pages (with possible insertion of a TTX CRÑFF pair) if the number of codeÑconverted TTX lines exceeds the number available in a G4Class1 page. Each split G4Class1 page. Each split G4Class1 page (except the last one) may contain the maximum number of lines available for the G4Class1 page. The number of lines in a TTX should be calculated after the insertion of any required TTX CRÑLF pairs.

Imaging of characters to G4Class1 should be in accordance with Recommendation T.351. The use of figures, however, in Recommendation T.351 corresponding to the options of TTX requires further study.

5.5.2 *Code conversion*

The conversion rule is specified in Annex A. The character rendition is a national option.

5.6 *Conversion from TTX to Videotex*

5.6.1 *Format conversion*

A TTX is converted into an Videotex assuming the vertical orientation and a maximum of 77 characters per line (a line may be constructed by placing 72 characters to the right of the left margin and additional 5 characters to the left of the left margin). Teletex information in the horizontal orientation will result in loss of information.

Note Ñ BS at the beginning (maximum 5) of a TTX line moves the first logical character position of all Videotex lines to the left, according to the number of BS. This enables an extention the line length by 5 characters. An appropriate number of spaces has to be added at the beginning of each Videotex line in order to ensure that all Videotex lines begin at the first logical position given by the line having the most BS at the beginning of the TTX line.

A TTX is directly converted into an Videotex if the number of graphic characters of the codeÑconverted TTX line does not exceed the maximum number of graphic characters available in a Videotex line and if the number of lines in the TTX does not exceed the number of lines available in a Videotex page.

A TTX CRÑLF pair invokes a new Videotex line. If an LF is not associated with a CR, an LF may be inserted after the CR.

A TTX line should be converted into the appropriate number of Videotex lines (with possible insertion of an T.101 APDÑAPR pair) if the number of graphic characters in a codeÑconverted TTX line exceeds the maximum number of graphic characters available in an Videotex line. Each split Videotex character line (except the last one) may contain the maximum number of graphic characters available for the Videotex character line. Folding at the word boundary requires further study.

A TTX CRÑFF pair invokes a new Videotex page.

A TTX page should be split into the appropriate number of Videotex pages (with possible insertion of a T.101 CS) if the number of codeÑconverted TTX lines exceeds the number available in a Videotex page. Each split Videotex page (except the last one) may contain the maximum number of lines available for the Videotex page. The number of lines in a TTX should be calculated after the insertion of any required IA5 CRÑLF pairs.

By definition, if one TTX line is converted into one Videotex line and if a TTX page is converted into one or several Videotex pages, each TTX page starting with a new Videotex page, this is not considered as loss of information.

5.6.2 *Code conversion*

The conversion rule is specified in Annex A.

5.7 *Conversion from TTX to voice*

Requires further study.

5.8 *Conversion from TTX to mixedmode*

5.8.1 *Format conversion*

Requires further study.

5.8.2 *Code conversion*

Not required. T.61 String is allowed in mixedmode.

6 Conversion from G3Fax

6.1 *Conversion from G3Fax to G3Fax*

Requires further study.

6.2 *Conversion from G3Fax to G4Class1*

Requires further study.

6.3 *Conversion from G3Fax to mixedmode*

Requires further study.

7 Conversion from G4Class1

7.1 *Conversion from G4Class1 to G3Fax*

Requires further study.

7.2 *Conversion from G4Class1 to G4Class1*

Requires further study.

7.3 *Conversion from G4Class1 to mixedmode*

Requires further study.

8 Conversion from Videotex

8.1 *Conversion from Videotex to TLX*

8.1.1 *Format conversion*

A Videotex is directly converted into a TLX if the number of graphic characters of the codeÑconverted Videotex line does not exceed the maximum number of graphic characters available in a TLX line.

A T.101 APDÑAPR pair invokes a new TLX line. If an APR is not associated with an APD, an APR may be inserted after the APD.

A Videotex line should be converted into the appropriate number of TLX lines (with possible insertion of an ITA2 CRÑLF pair) if the number of graphic characters in a codeÑconverted Videotex line exceeds the maximum number of graphic characters available in a TLX line. Each split TLX line (except the last one) may contain the maximum number of graphic characters available for the TLX line. Folding at the word boundary requires further study.

A T.101 CS is converted into an ITA2 CRÑLF pair plus the optional addition of up to 3 blank lines.

8.1.2 *Code conversion*

This conversion rule is defined in Annex A.

8.2 *Conversion from Videotex to IA5Text*

8.2.1 *Format conversion*

A Videotex is directly converted into an IA5Text if the number of graphic characters of the codeÑconverted Videotex line does not exceed the maximum number of graphic characters available in a IA5Text line and if the number of lines in the Videotex does not exceed the number of lines available in a IA5Text page.

A T.101 APDÑAPR pair invokes a new IA5Text line. If an APR is not associated with an APD, an APR may be inserted after the APR.

A Videotex line should be converted into the appropriate number of IA5Text lines (with possible insertion of an IA5 CRÑLF pair) if the number of graphic characters in a codeÑconverted Videotex line exceeds the maximum number of graphic characters available in a IA5Text line. Each split IA5Text line (except the last one) may contain the maximum number of graphic characters available for the IA5Text line. Folding at the word boundary requires further study.

A T.101 CS invokes a new IA5Text page or, alternatively, 3 blank lines if the next videotex page can be represented fully on the same IA5Text page.

A Videotex page should be split into the appropriate number of IA5Text pages (with possible insertion of a IA5 CRÑFF pair) if the number of codeÑconverted Videotex lines exceeds the number available in a IA5Text page. Each split IA5Text page (except the last one) may contain the maximum number of lines available for the IA5Text page. The number of lines in an Videotex should be calculated after the insertion of any required IA5 CRÑLF pairs.

By definition, if one Videotex line is converted into one IA5Text line and if multiple Videotex pages are converted into one IA5Text pages, each IA5Text page starting with a new Videotex page, this is not considered as loss of information.

8.2.2 *Code conversion*

The conversion rule is specified in Annex A.

8.3 *Conversion from Videotex to TTX*

8.3.1 *Format conversion*

A Videotex is directly converted into a TTX if the number of graphic characters of the codeÑconverted Videotex line does not exceed the maximum number of graphic characters available in a TTX line and if the number of lines in the Videotex does not exceed the number of lines available in a TTX page.

A T.101 APDÑAPR pair invokes a new TTX line. If an APR is not associated with an APD, an APR may be inserted after the APR.

A Videotex line should be converted into the appropriate number of TTX lines (with possible insertion of a TTX CRÑLF pair) if the number of graphic characters in a codeÑconverted Videotex line exceeds the maximum number of graphic characters available in a TTX line. Each split TTX line (except the last one) may contain the maximum number of graphic characters available for the TTX line. Folding at the word boundary requires further study.

A T.101 CS invokes a new TTX page or, alternatively, 3 blank lines if the next videotex page can be represented fully on the same TTX page.

A Videotex page should be split into the appropriate number of TTX pages (with possible insertion of a TTX CRÑFF pair) if the number of codeÑconverted Videotex lines exceeds the number available in a TTX page. Each split TTX page (except the last one) may contain the maximum number of lines available for the TTX page. The number of lines in an Videotex should be calculated after the insertion of any required TTX CRÑLF pairs.

By definition, if one Videotex line is converted into one TTX line and if multiple Videotex pages are converted into one TTX pages, each TTX page starting with a new Videotex page, this is not considered as loss of information.

8.3.2 *Code conversion*

The conversion rule is specified in Annex A.

8.4 *Conversion from Videotex to G3Fax*

Requires further study.

8.5 *Conversion from Videotex to G4Class1*

Requires further study.

8.6 *Conversion from Videotex to Videotex*

Requires further study.

8.7 *Conversion from Videotex to voice*

Requires further study.

8.8 *Conversion from Videotex to mixedmode*

Requires further study.

9 Conversion from voice

9.1 *Conversion from voice to voice*

Requires further study.

10 Conversion from mixedmode

10.1 *Conversion from mixedmode to TLX*

Requires further study.

10.2 *Conversion from mixedmode to IA5Text*

Requires further study.

10.3 *Conversion from mixedmode to TTX*

Requires further study.

10.4 *Conversion from mixedmode to G3Fax*

Requires further study.

10.5 *Conversion from mixedmode to G4Class1*

Requires further study.

10.6 *Conversion from mixedmode to Videotex*

Requires further study.

10.7 *Conversion from mixedmode to voice*

Requires further study.

10.8 *Conversion from mixedmode to mixedmode*

Requires further study.

ANNEX A

(to Recommendation X.408)

Code conversion tables

A.1 *Introduction*

This Annex was developed for describing the code conversion rules for the use of message handling concisely and consistently.

A.2 *Premises*

A.2.1 *References*

a) Tables 1/S.18 and 2/S.18 (Rules);

b) Tables 1/T.50 to 9/T.50 and 11/T.50 (Symbol and description);

c) Figures 1/T.51 and 2/T.51, Tables 1/T.51 and 2/T.51 and Tables 4/T.51 and 5/T.51 (Symbol and description);

d) Table CÑ1/T.60 (Rules);

e) Paragraphs 3.2 and 3.3 of T.61 (Symbol and identification);

f) Figures 2/T.61 and 3/T.61, Tables 1/T.61 and 2/T.61 and Figures BÑ1/T.61 and CÑ1/T.61 (Symbol)

g) T.100 (Identification);

h) X.408 (1984) (Rules)

A.2.2 *Structure of the tables*

A.2.2.1 *Introduction*

The tables are divided into two columns:

a) REFERENCE SET

b) CONVERTED SET

A pair of the REFERENCE SET and a subÑcolumn in the CONVERTED SET column form the definition of the code conversion rule for the encoded information type referenced as an output.

The tables are developed under the premises described below. The extension of the tables requires further study.

A.2.2.2 *REFERENCE SET*

The REFERENCE SET is a collection of the final visible graphic form (e.g. printed or displayed) of characters. This set is NOT intended to introduce a new character set to be implemented elsewhere.

Regarding control characters, the visibility of the character could not form a criterion to enlist it to the REFERENCE SET. Any available controls are enlisted in order to show if the intent of the particular control character is maintained after conversion.

Note Ñ Use of a control character may be different from one type to other. This may imply that we need to deal with character escape sequences defined in ISO 2022 first, then character conversion. This requires further study.

This column is provided for the reference character set. The set is a conceptual one and may contain any conceivable characters. It is completely independent of the peculiar encoding of individual characters. There are, however, three exceptions on the characters Òcircumflex accentÓ, Ògrave accentÓ and Òoverline/tildeÓ of IA5 because of historical and technical reasons.

The symbols # and Û whose encoding is different from one type to another are assigned the same identification numbers.

Questions relating to the registration and maintenance authority of the REFERENCE SET are left for further study.

The column has three subÑcolumns:

a) *Identification:* Identification number for a character increased by 10 and also the identification code developed in T.61 if available. Numbers 0 through 999 will be allocated for the controls and numbers 1000 or over will be allocated to graphic characters.

b) *Name or description:* Concise description of a character.

c) *Symbol:* Known symbol for a character.

A.2.2.3 *Column ÒCONVERTED SETÓ*

This column has a number of subÑcolumns. Each subÑcolumn defines a corresponding character(s) to that of the REFERENCE SET.

Some part of the conversion rule may not necessarily be used when converting one type to the other. For example, in the TelexÑtoÑTeletex conversion, there is no need to use the part for the characters numbered more than 2000.

Originally, five subÑcolumns are provided for:

a) Teletex encoded information type (referred to as T.61);

b) IA5 text encoded information type (referred to as IA5IRV);

c) Telex encoded information type (referred to as ITA2);

d) G3Fax and G4Class1 encoded information type (referred as facsimile);

e) Videotex encoded information type (referred as Videotex).

A.2.3 *Use of other standards*

For message handling applications, the conversion table shall be used wherever possible. The conversion table does not attempt to replace existing international standards that deal with conversions for other applications other than message handling.

The basic rules for the use of the conversion tables shall be that the conversions defined in the tables are derived from the basic character representations of the codes as found in the appropriate international standards. For this version of X.408, alternative representations may be used but are for further study.

When there are alternative conversions defined in existing Recommendations, X.408 shall not constrain choices. Examples of alternative conversion are as follows:

a) ITA2 ♦IA5 conversion defined in Recommendation S.18 has alternative conversions such as:

   The IA5 Asterisk character * can be converted to either ITA2 character ? or characters (?).

b) ITA2 ♦T.61 conversion defined in Recommendation T.60 has alternative conversions such as:

   The ITA2 character A can be converted to either T.61 character A or a.

Note that the conversion from one graphic character to many graphic characters may be used where appropriate as a national option.

A.3 *Conventions*

a) If both SYM and No. boxes are left blank in the ÒCONVERTED SETÓ column, this means that the conversion is not provided (i.e., NOT convertible).

b) FS means Òfor further studyÓ.

c) disc. means ÒDISCARDEDÓ.

d) The symbols for the control characters should not be interpreted as to print the symbols literally. They are simply placed for reference information. The intent is that semantics of those characters defined elsewhere should be kept. See ¤ A.2.2.2.

A.4 *Notes*

a This character is used only to operate the answerÑback unit for corresponding equipment in the international public service.

b These characters have no international allocation.

c These characters have no corresponding function in other encoded information types. Conversion equipment operates the appropriate shift and discard the characters.

d Classification of control functions numbered less than 1000 requires further study.

Table A-1/X.408

Table A-2/X.408

Table A-3/X.408

Table A-4/X.408

Table A-5/X.408

Table A-6/X.408

Table A-7/X.408

Table A-8/X.408

Table A-9/X.408

Table A-10/X.408

Table A-11/X.408

Table A-12/X.408

Table A-13/X.408

Table A-14/X.408

Table A-15/X.408

Table A-16/X.408

Table A-17/X.408

Table A-18/X.408

Table A-19/X.408

Table A-20/X.408

Table A-21/X.408

Table A-22/X.408

Table A-23/X.408

ANNEX B

(to Recommendation X.408)

ABBREVIATIONS

The following abbreviations are used in this Recommendation.

APD	Active Position Down
APR	Active Position Return
BS	Backspace
CR	Carriage Return
CS	Clear Screen
FF	Form Feed
FS	Further Study
G3	Group 3
G3Fax	Group 3 Facsimile Type
G4	Group 4
HT	Horizontal Tabulation
IA	International Alphabet
IGS	Identify Graphic Subrepertoire
ITA	International Telegraph Alphabet
LF	Line Feed
MHS	Message Handling System
OSI	Open Systems Interconnection
PFS	Page Format Selection
PLD	Partial Line Down
PLU	Partial Line Up
RLF	Reverse Line Feed
SGR	Select Graphic Rendition
SHS	Select Horizontal Spacing
SP	Space
SUB	Substitute Character
SVS	Select Vertical Spacing
TLX	Telex Type
TTX	Teletex Type
VT	Vertical Tabulation