Annex D

(Informative)

Checksum Algorithms

D.1 Symbols

The following symbols are used

C0, C1 variables used in the algorithms

i is the number (i.e. position) of an octet within the TPDU (see 12.1);

n is the number (i.e. position) of the first octet of the checksum parameter;

L is the length of the complete TPDU;

X is the value of the first octet of the checksum parameter;

Y is the value of the second octet of the checksum parameter.

D.2 Arithmetic conventions

Addition is performed in one of the two following modes:

a) modulo 255 arithmetic;

b) ones complement arithmetic in which if any of the variables has the value minus zero (i.e. 255) it shall be regarded as though it was plus zero (i.e. 0).

D.3 Algorithm for generating checksum parameters

D.3.1 Set up the complete TPDU with the value of the checksum parameter field set to zero.

D.3.2 Initialize C0 and C1 to zero.

D.3.3 Process each octet sequentially from i = 1 to L by

a) adding the value of the octet to C0; then

b) adding the value of C0 to C1.

D.3.4 Calculate X and Y such that

$$X = -C1 + (L - n)\, C0$$

$$Y = C1 - (L - n + 1)\, C0$$

D.3.5 Place the values X and Y in octets n and (n + 1) respectively.

NOTE – This algorithm calculates

$$C1 = \sum_{i=1}^{L} (L - i + 1)\, a_i$$

which is equal to zero, if the formulae in 6.17.3 are followed, since

$$\sum_{i=1}^{L} (L - i + 1)\, a_i = (L + 1) \sum_{i=1}^{L} a_i - \sum_{i=1}^{L} i a_i = 0$$

D.4 Algorithm for checking checksum parameters

D.4.1 Initialize C0 and C1 to zero.

D.4.2 Process each octet of the TPDU sequentially from i = 1 to L by

a) adding the value of the octet to C0; then

b) adding the value of C0 to C1.

D.4.3 If, when all the octets have been processed, one or both of the parameters C0 and C1 do not have the value zero, the checksum formulae in 6.17 have not been satisfied.

NOTE – The nature of the algorithm is such that it is not necessary to compare explicitly the stored checksum bytes.