All drawings appearing in this Fascicle have been done in Autocad.

Recommendation Q.702

SIGNALLING DATA LINK

1 General

1.1 A *signalling data link* is a bidirectional transmission path for signalling, comprising two *data channels* operating together in opposite directions at the same data rate. It constitutes the lowest functional level (level 1) in the Signalling System No. 7 functional hierarchy.

1.2 Functional configuration of a signalling data link is shown in Figure 1/Q.702.

The terms *transmission channel* and *transmission link* are used in Signalling System No. 7 instead of transfer channel and transfer link used in Signalling System No. 6.

1.3 A digital signalling data link is made up of digital *transmission channels* and digital switches or their terminating equipment providing an interface to signalling terminals. The digital transmission channels may be derived from a digital multiplex signal at 1544, 2048 or 8448 kbit/s having a frame structure as defined in Recommendation G.704 [1], or from digital multiplex streams having a frame structure specified for data circuits (Recommendations X.50 [4], X.51 [5], X.50 *bis* [6], X.51 *bis* [7]).

1.4 An analogue signalling data link is made up of voice—frequency analogue transmission channels either 4 kHz or 3 kHz spaced, and modems.

1.5 Signalling System No. 7 is capable of operating over both terrestrial and satellite *transmission links*[1)] .

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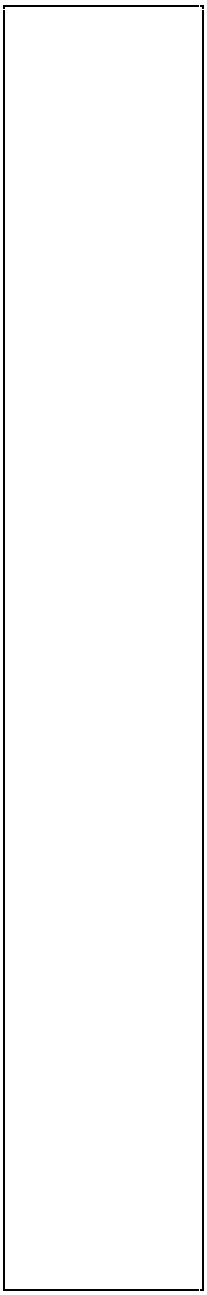
1) The terms *transmission channel* and *transmission link* are used in Signalling System No. 7 instead of transfer channel and transfer link used in Signalling System No. 6.

Figure 1/Q.702 - CCITT 34980



1.6 The operational signalling data link shall be exclusively dedicated to the use of a Signalling System No. 7 signalling link between two signalling points. No other information should be carried by the same channel together with the signalling information.

1.7 Equipment such as echo suppressors, digital pads, or A/μ law convertors attached to the transmission link must be disabled in order to assure full duplex operation and bit integrity of the transmitted data stream.

1.8 64—kbit/s digital signalling channels entering a digital exchange via a multiplex structure shall be switchable as semi—permanent channels in the exchange.

2 Signalling bit rate

2.1 *General*

2.1.1 The standard bit rate on a digital bearer will be 64 kbit/s.

2.1.2 Lower bit rates may be adopted for each application, taking into account the User Part requirements and the capability of available transmission links.

2.1.3 The minimum signalling bit rate for telephone call control applications will be 4.8 kbit/s. For other applications such as network management, bit rates lower than 4.8 kbit/s can also be used.

2.2 *Use of bit rates lower than 64 kbit/s*

2.2.1 For national telephone call control applications, use of Signalling System No. 7 at bit rates lower than 64 kbit/s shall take account of the requirement to minimize the answer signal delay when in—band line signalling systems are involved (Recommendation Q.27 [8]).

2.2.2 Signalling System No. 7 can be used for direct international application at bit rates lower than 64 kbit/s between countries which have no in—band line signalling systems in their national extension networks (see § 2.1.3).

2.2.3 The possible use of Signalling System No. 7 at bit rates lower than 64 kbit/s between countries which have in—band line signalling systems in their national extension networks is for further study.

3 Error characteristics and availability

Error characteristics and availability requirements will conform to relevant Recommendations (for example, Recommendation G.821 [9] on digital circuits). No additional characteristics or requirements will be specified in this Recommendation.

4 Interface specification points

4.1 Interface requirements may be specified at one of three points, A, B or C in Figure 2/Q.702. The appropriate point depends on the nature of transmission links used and the approach toward the implementation of interface equipment adopted by each Administration.

4.2 For the international application, interface requirements at either Point B or Point C will apply.

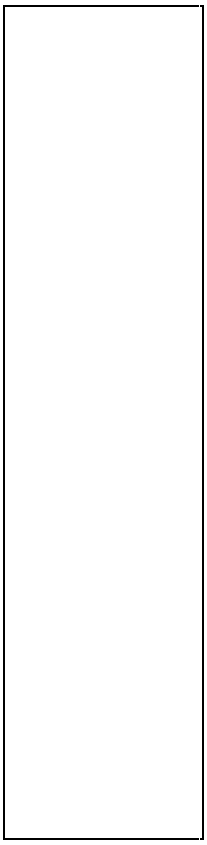
4.3 Interface requirements for an international digital signalling data link will be specified at Point C in accordance with the specific multiplex structure used (see § 5.)

4.4 Interface requirements for an international analogue signalling data link will be specified at Point B on a single channel basis, and thus are independent of multiplex equipment used. (See § 6.)

4.5 Interface at Point A may or may not appear in particular implementations, as each Administration may adopt different approaches towards the implementation of interface equipment. If it does appear in implementations, then the interface requirements specified in Recommendations V.10 [10], V.11 [11], V.24 [12], V.28 [13], V.35 [14], V.36 [15], X.24 [16] and G.703 [17] (for 64—kbit/s interface) should be followed as appropriate.

4.6 Implementations which do not follow all the requirements in the relevant Recommendations cited above should nevertheless take into account those requirements that are specified for testing and maintenance actions which require communication between the two ends of a data link. Interface requirements for testing and maintenance are specified in Recommendation Q.707.

Figure 2/Q.702 - CCITT 34990



5 Digital signalling data link

5.1 *Signalling data link derived from the 2048—kbit/s digital path*

When a signalling data link is to be derived from a 2048—kbit/s digital path, the following shall apply:

a) The interface requirements, specified at Point C in Figure 2/Q.702, should comply with Recommendations G.703 [17] for the electrical characteristics and G.704 [1] for the functional characteristics, in particular the frame structure.

b) The signalling bit rate shall be 64 kbit/s.

c) The standard channel time slot for the use of a signalling data link is time slot 16. When time slot 16 is not available, any channel time slot available for 64—kbit/s user transmission may be used.

d) No bit inversion is performed.

5.2 *Signalling data link derived from the 8448—kbit/s digital path*

When a signalling data link is to be derived from a 8448—kbit/s digital link, the following shall apply:

a) The interface requirements, specified at Point C in Figure 2/Q.702, should comply with Recommendations G.703 [23] for the electrical characteristics and G.704 [1] for the functional characteristics, in particular the frame structure.

b) The signalling bit rate shall be 64 kbit/s.

c) The standard channel time slots for the use of a signalling data link are time slots 67 to 70 in descending order of priority. When they are not available, any channel time slot available for 64—kbit/s user transmission may be used.

d) No bit inversion is performed.

5.3 *Signalling data link derived from the 1544—kbit/s digital path*

(For further study.)

Note — When a signalling bit rate of 64 kbit/s is adopted, the values of bits should be inverted within the signalling terminal or the interface equipment in order to meet the minimum mark density requirements of the Recommendation G.733 [2] based PCM systems.

5.4 *Signalling data link established over a digital path made up by digital sections based on different digital hierarchies*

When a signalling data link is to be established between networks based on different digital hierarchies and speech encoding laws, the following shall apply:

a) The interface requirements, specified at Point C in Figure 2/Q.702, should comply with Recommendations G.703 [17] for the electrical characteristics and G.802 [3] for other aspects, e.g., for interworking arrangements.

b) The signalling bit rate shall be 64 kbit/s.

c) No bit inversion is performed.

5.5 *Signalling data link established over data circuits*

When a signalling data link is to be established over data circuits derived from a 64—kbit/s digital stream having a frame structure as specified in such Recommendations as X.50 [10], X.51 [11], X.50 *bis* [12] and X.51 *bis* [13] the following shall apply:

a) The interface requirements, specified at Point C in Figure 2/Q.702, should comply with relevant requirements in one of the above—mentioned Recommendations, applicable to the environment of the intended use.

b) When 64—kbit/s multiplexed streams are carried on 2048—kbit/s or 1544—kbit/s digital links, Recommendation G.704 [1], should apply.

6 Analogue signalling data link

6.1 *Signalling bit rate*

6.1.1 Applications of the analogue signalling data link must take account of the delay requirements described in § 2.2.

6.1.2 For telephone call control applications, the signalling bit rate over an analogue signalling data link shall be higher or equal to 4.8 kbit/s.

6.2 *Interface requirements*

In case of 4.8—kbit/s operation, interface requirements specified at the interface point B in Figure 2/Q.702 should comply with relevant requirements specified for 4.8—kbit/s modems in Recommendations V.27 [18] and V.27 *bis* [19]. In addition, the following shall apply:

a) Application of either Recommendations V.27 [18] or V.27 *bis* [19] depends on the quality of the analogue transmission channels used. Recommendation V.27 [18] shall apply only to transmission channels conforming to Recommendation M.1020 [20], while Recommendation V.27 *bis* [19] to transmission channels conforming to Recommendation M.1020 [20] or of lower quality.

b) Full duplex operation over a 4—wire transmission link should be adopted.

c) If a separate modem is to be used, the interface requirements specified in Recommendations V.10 [10], V.11 [11], V.24 [12] and V.28 [13], applicable at Point A in Figure 2/Q.702, should be followed as much as possible.

References

[1] CCITT Recommendation *Functional characteristics of interfaces associated with network nodes*, Vol. III, Rec. G.704.

[2] CCITT Recommendation *Characteristics of primary PCM multiplex equipment operating at 1544 kbit/s*, Vol. III, Rec. G.733.

[3] CCITT Recommendation *Interconnection of digital paths using different techniques*, Vol. III, Rec. G.802.

[4] CCITT Recommendation *Fundamental parameters of a multiplexing scheme for the international interface between synchronous data networks*, Vol. VIII, Rec. X.50.

[5] CCITT Recommendation *Fundamental parameters of a multiplexing scheme for the international interface between synchronous data networks*, Vol. VIII, Rec. X.51.

[6] CCITT Recommendation *Fundamental parameters of a 48—kbit/s user data signalling rate transmission scheme for the international interface between synchronous data networks*, Vol. VIII, Rec. X.50 bis.

[7] CCITT Recommendation *Fundamental parameters of a 48—kbit/s user data signalling rate transmission scheme for the international interface between synchronous data networks using 10—bit envelope structure*, Vol. VIII, Rec. X.51 bis.

[8] CCITT Recommendation *Transmission of the answer signal*, Vol. VI, Rec. Q.27.

[9] CCITT Recommendation *Error performance on an international digital connection forming part of an integrated services digital network*, Vol. III, Rec. G.821.

[10] CCITT Recommendation *Electrical characteristics for unbalanced double—current interchange circuits for general use with integrated circuit equipment in the field of data communications*, Vol. VIII, Rec. V.10.

[11] CCITT Recommendation *Electrical characteristics for balanced double—current interchange circuits for general use with integrated circuit equipment in the field of data communications*, Vol. VIII, Rec. V.11.

[12] CCITT Recommendation *List of definitions for interchange circuits between data—terminal equipment and data circuit—terminating equipment*, Vol. VIII, Rec. V.24.

[13] CCITT Recommendation *Electrical characteristics for unbalanced double—current interchange circuits*, Vol. VIII, Rec. V.28.

[14] CCITT Recommendation *Data transmission at 48 kbit/s per second using 60—108 kHz group band circuits*, Vol. VIII, Rec. V.35.

[15] CCITT *Recommendation Modems for synchronous data transmission using 60—108 kHz group band circuits*, Vol. VIII, Rec. V.36.

[16] CCITT Recommendation *List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit—terminating equipment (DCE) on public data networks*, Vol. VIII, Rec. X.24.

[17] CCITT Recommendation *Physical/electrical characteristics of hierarchical digital interfaces*, Vol. III, Rec. G.703.

[18] CCITT Recommendation *4800 bit/s per second modems with manual equalizer standardized for use on leased telephone—type circuits*, Vol. VIII, Rec. V.27.

[19] CCITT Recommendation *4800/2400 bit/s per second modem with automatic equalizer standardized for use on leased telephone—type circuits*, Vol. VIII, Rec. V.27 bis.

[20] CCITT Recommendation *Characteristics of special quality international leased circuits with special bandwidth conditioning*, Vol. IV, Rec. M.1020.