INTERNATIONAL TELECOMMUNICATION UNION

ITU-T Q.251

TELECOMMUNICATION
STANDARDIZATION SECTOR
OF ITU

SPECIFICATIONS OF SIGNALLING SYSTEM No. 6

FUNCTIONAL DESCRIPTION OF THE SIGNALLING SYSTEM

GENERAL

ITU-T Recommendation Q.251

(Extract from the *Blue Book*)

NOTES

1 ITU-T Recommendation Q.251 was published in Fascicle VI.3 of the *Blue Book*. This file is an extract from the *Blue Book*. While the presentation and layout of the text might be slightly different from the *Blue Book* version, the contents of the file are identical to the *Blue Book* version and copyright conditions remain unchanged (see below).

2 In this Recommendation, the expression "Administration" is used for conciseness to indicate both a telecommunication administration and a recognized operating agency.

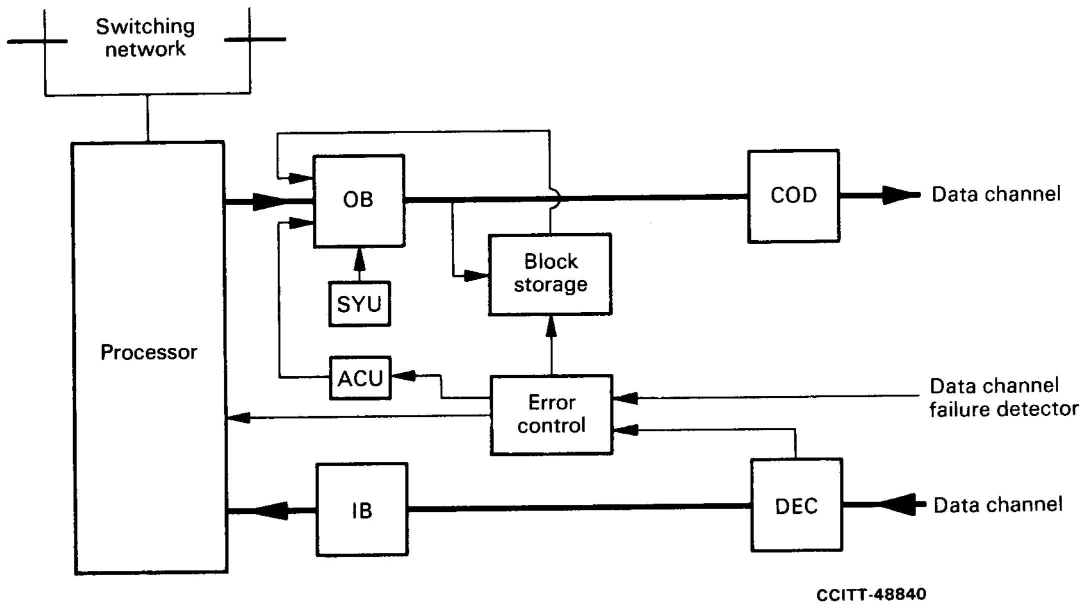
Recommendation Q.251

1.1 GENERAL

1.1.1 *Block diagrams*

Because common channel signalling, used in conjunction with exchanges having stored programme control, allows a wide latitude in the distribution of signalling functions between the processor and peripheral equipment, and because common channel signalling is not limited to exchanges of this type, it is not practicable to specify well-defined equipment interfaces.

The major signal transfer functions are shown in Figures 1/Q.251, 2/Q.251 and Table 1/Q.251 for both the analogue version and the digital version. The blocks are functional blocks and should not be construed as depicting equipment arrangements.



OB output buffer
IB input buffer
SYU synchronization signal unit generator
ACU acknowledgement signal unit generator
COD coder
DEC decoder

FIGURE 1/Q.251

Functional block diagram of a System No. 6 terminal

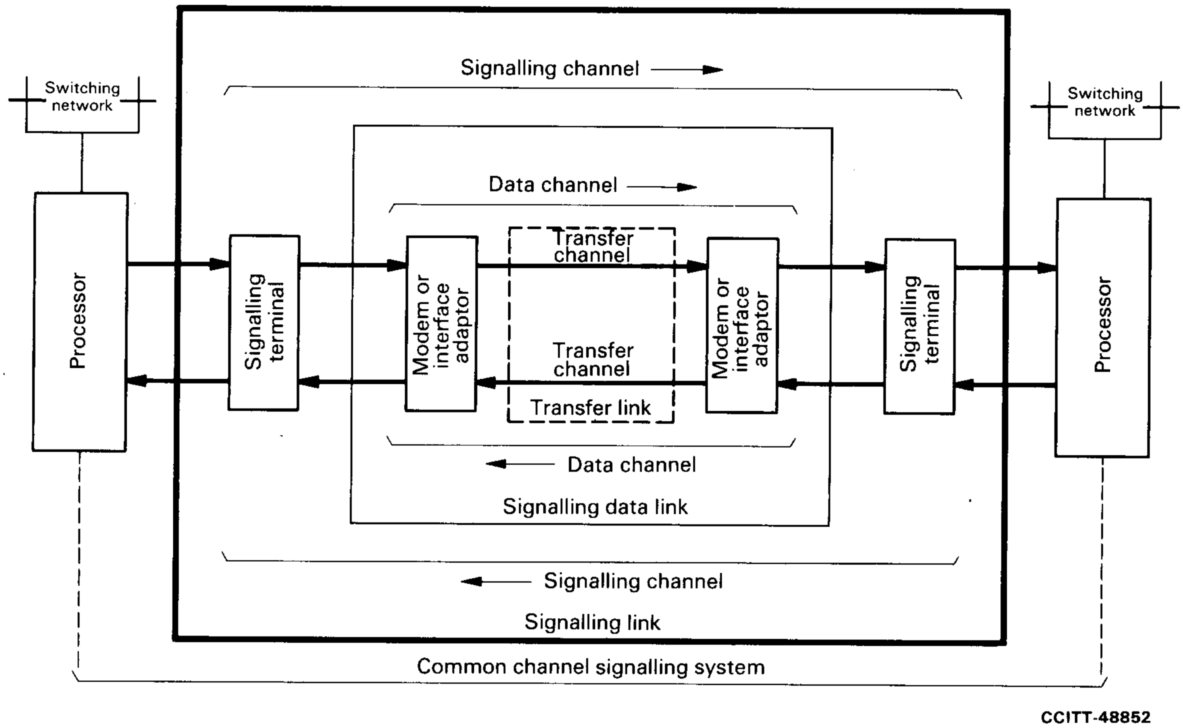


FIGURE 2/Q.251

Basic diagram of the common channel signalling system

TABLE 1 /Q.251

	Analogue version	Digital version
Data transceiver	Modem	Interface adaptor
Transfer channel	(Voice-frequency channel) a one-way voice-frequency transmission path from the output of a data modulator to the input of a data demodulator, made up of one or more voice-frequency channels in tandem.	(Digital channel) a one-way digital transmission path, from the output of the interface adaptor to the input of the interface adaptor, made up of one or more digital channels in tandem.
Transfer link	(Voice-frequency link) a two-way voice-frequency transmission path between two data modems, made up of one voice frequency channel in each direction.	(Digital link) a two-way digital transmission path between two interface adaptors, made up of one digital channel in each direction.
Data channel	a one-way data transmission path between two points, made up of a modulator, a voice-frequency channel and a demodulator.	a one-way data transmission path between two points, made up of a digital channel terminating on an interface adaptor at each end.
Signalling data link	a two-way data transmission path between two points, made up of one data channel in each direction.	
Signalling channel	a one-way signalling path from the processor of one switching machine to the processor of another switching machine.	
Signalling link	a two-way direction signalling path from processor to processor made up of one signalling channel in each direction.	

1.1.2 *Signal unit and block structure*

Each signalling channel of the system (shown in Figure 2/Q.251) is operated synchronously: that is, a continuous stream of data flows in both directions. The data stream is divided into signal units of 28 bits each, of which the last 8 are check bits, and these signal units in turn are grouped into *blocks* of 12 signal units. The 12th and last signal unit of each block is an acknowledgement signal unit coded to indicate the number of the block being transmitted, the number of the block being acknowledged and whether or not each of the I 1 signal units of the block being acknowledged was received without detected errors.

Eight consecutive blocks form a *multi-block.* Since the system allows for up to 32 multi-blocks, the maximum number of blocks in the error control loop is 256.

In normal operation, the first 11 signal units within a block will consist of signal units carrying either telephone signals or management signals, or of synchronization signal units. Synchronization signal units, which are transmitted only in the absence of other signalling traffic, are coded to indicate the number of the position they occupy within the block to facilitate locating the acknowledgement signal unit. Their format has been chosen to produce a large number of dibit transitions to facilitate achieving or maintaining bit synchronism in the analogue version.

During system-synchronizing procedures, only synchronization and acknowledgement signal units are transmitted until bit, signal unit, and block synchronism has been achieved at both ends of the signalling system.

1.1.3 *Transmitting terminal*

The transmission of a signal in System No. 6 starts in the processor as shown in Figure 1/Q.251. Signals corresponding to the information to be transmitted are formed in accordance with the format specified and delivered to the output buffer. These signals, which may be one-unit messages or multi-unit messages, are stored in this buffer according to their priority level. The output buffer delivers the highest priority signal awaiting transmission to the coder in serial form in the next available time slot. In the coder, each signal unit is encoded by the addition of check bits in accordance with the check bit polynomial.

In the analogue version of the signalling system the signal is then modulated and delivered to the outgoing voice frequency channel for transmission to the distant receiving terminal. In the digital version of the signalling system the signal is passed through the interface adaptor before entering the outgoing digital channel.

1.1.4 *Receiving terminal*

The receiving function starts with the acceptance of the serial data from the transmission path. The output of the demodulator or the interface adaptor is delivered to the decoder where each signal unit is checked for errors on the basis of the associated check bits. Signal units received with detected errors are discarded. Signal units carrying telephone signals or management signals which are error-free are transferred to the input buffer after deletion of the check bits. The input buffer delivers the signal units to the processor where the processor analyzes the signals and takes appropriate action.

1.1.5 *Error control*

Error control is based on error detection by redundant coding and on error correction by retransmission of those signal messages found to be in error. This procedure requires that each transmitted signal message be stored until acknowledged as being received correctly. In the case of multi-unit messages, each signal unit of the message must be stored until all units of the message are acknowledged as being received correctly. When an acknowledgement signal unit is received, it is analyzed in the box marked *error control* in Figure 1/Q.251. If an acknowledgement bit indicates that a signal unit being acknowledged was received in error, the retransmission process is started. Request for retransmission of a synchronization signal unit is ignored. If any unit of a multi-unit message is in error, the entire multi-unit message must be retransmitted in its initial order.

The data channel failure detector complements the decoder for longer error bursts. When activated it gives an indication to the box marked *error control* in Figure 1/Q.251. An error indication from either the decoder or the data channel failure detector is associated with the position of the erroneous signal unit(s) within the block.

This information is used by the acknowledgement signal unit generator to control the marking of the acknowledgement bits.

As shown in Figure 1/Q.251, the processor may also be notified whenever an error is detected in a signal unit. This information may be used by the processor to erase the memory of any signal unit(s) of a multi-unit message received which is associated with the one found in error, since this entire message will be retransmitted.