SPECIFICATION of the GENERIC ELECTRICAL & PHYSICAL INTERFACE

Interconnection Specification 3

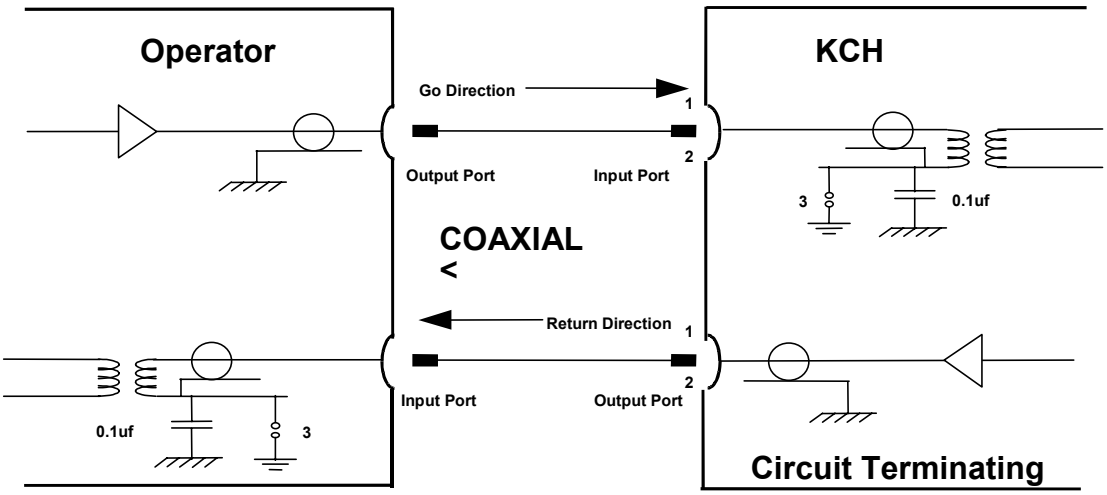
Index:

1. General

This document defines the physical and electrical characteristics of Interconnect Links, between the KCH System and the Operator System. Paragraphs 2 and 3 apply only to 2 Mbit/s Coaxial Cable Interconnect Links.
All references to ITU Recommendations refer to the White Book unless otherwise indicated.

2. Physical Interface for Coaxial Cable Interconnect

The interconnection between the KCH System and the Operator System shall be provided by a KCH digital path that terminates on a KCH Circuit Termination Unit (CTU). The KCH CTU will present a G703 interface on two 75 ohm coaxial cable connectors (BNC type). The Point of Interconnection shall be the coaxial cable connector at the KCH end of the cables connecting the CTU to the Operator Switch (or co-located Operator DDF) (See Fig 1). The coaxial cables connecting the CTU to the Operator Switch shall have a loss not exceeding 6dB at 1024 kHz (see Fig 1).



Notes:

1. The physical interface will be the coaxial connectors at the KCL end of the coaxial cables
2. BNC /Type 43 Connectors
3. Option for Earthing

FIGURE 1

3. Electrical interface

The following section shall apply to a 2Mbit/s interface using the coaxial pair option of ITU-T Recommendation G.703 (Physical/Electrical Characteristics of Hierarchical Digital Exchanges).

3.1 General Characteristics

These shall conform with section 6.1 of ITU-T Rec. G703

3.2 Specifications at the Output Ports

These shall conform with section 6.2 of ITU-T Rec. G.703 (Table 6).

3.3 Specifications at the Input Ports

These shall conform with section 6.3 of ITU-T Recommendation G.703.

3.4 Earthing of screen

3.4.1 Output Ports

At output ports the cable screen shall be bonded to the equipment metalwork at the equipment boundary or as near as possible to it.

3.4.2 Input Ports

The input port cable screen shall be earthed via a capacitor (typically 0.1 μF) to the equipment. Provision shall be also made at this point for providing a DC connection to earth. The equipment shall be set-up with the DC earth not connected, this is illustrated in figure 1.

A suitable ferrite tube ferrule should be threaded onto the cable so as to be located at a point between the bonding point and the equipment circuitry

3.5 Interference

The input ports shall tolerate, without error, interference from a non synchronous standard test signal (ITU-T Recommendation O.151- Error Performance Measuring Equipment for Digital Systems At The Primary Bit Rate and Above) at a level 18dB lower than the wanted signal.

3.6 Jitter and Wander

Jitter and Wander shall conform to Section 8 of the "Recommended standard for the national transmission plan for public networks" as amended from time to time and published by the Networks Interoperability Consultative Committee (NICC)

4. KCH and Operator Network Synchronisation

The KCH System employs a central master clock to maintain a co-operatively synchronised system within ITU-T recommended frequency limits.

4.1 Operator System Synchronisation

To ensure synchronisation with the KCH System, the Operator System shall employ a synchronisation system which is time traceable to a source complying with the requirements of ETS 300 462-6 (ITU-T G.811).

The performance of digital clocks, which derive synchronisation, shall comply with the objective slip rate characteristics given in ETSI 300 462 and ITU-T recommendations G.811 and G.822 for the purpose of minimising timing perturbations in general and slip rates in particular.

4.2 Deriving synchronisation from the KCH System

If the Operator System is to derive synchronisation from the KCH System it shall take its timing from KCH nominated synchronisation feeds in a master/slave relationship and in accordance with section 3.3.1.1 of the "UK National Network Timing Plan." Issue 1J: August 1997.

Where suitable, the synchronisation feeds may be taken from 2Mbit/s Interconnection Links carrying traffic between the KCH and Operator Switch Connections.

If the Operator Switch is taking timing information from the KCH System via a 2 Mbit/s Interconnect Link which fails (i.e. AIS is detected) then it must meet the following requirements:

A. Switching synchronisation to an alternative 2Mbit/s Interconnect Link, if available.

B. If no such synchronisation is available, entering holdover mode and keeping within the limits of holdover operation specified in section 2.2.3 of ITU-T Recommendation G.812 (Holdover Operation).

5. Functional Characteristics of the Interface

Functional characteristics of the 2 Mbit/s interface shall be in accordance with ITU-T Recommendations G.704 (Synchronous Frame Structures used at Primary and Secondary Hierarchical Levels) and G.706 (Frame Alignment and Cyclic Redundancy Check (CRC) Procedures Relating To Basic Frame Structures Defined In Rec. G.704) with the following additions and clarifications:

5.1 Signalling

If Time Slot 16 is not required for signalling information, it must not be used as a traffic carrying channel within the KCH System.

Signalling across the interface is not specified in this document.

5.2 Timeslot '0'

Chapter 2.3 of Rec. G.704 (Basic Frame Structure at 2048 kbit/s) applies. Bits 4-7 in time slot zero not containing the frame alignment signal should be set to "1". The use of bit 8 for the return direction shall be determined by KCH at each location. On some systems bit 8 will be set to "1" in the go and return direction. On other systems when KCH detects one or more errors in the

frame alignment word, this bit 8, in the return TSO "not" word, will be set at a "1" state on two successive occasions; when no errors are detected bit 8 will be set to the "0" state. If possible, the Operator Switch should make the same use of this bit 8, if not it should be tolerant to the sending of bit 8 in the return direction and set it to "0" in the go direction.

5.3 Alarm Indication Signal (AIS)

Under certain fault conditions AIS is used in the KCH System. AIS is indicated by a continuous stream of binary 1's. When transmitted AIS is controlled by a free running 2048 kbit/s crystal oscillator (accuracy within ± 50 ppm).

The strategy for detecting the presence of AIS should be such that AIS is detectable, even in the presence of an error ratio of 1 in 1000. However, a signal with all bits except the frame alignment word in the '1'state, should not be mistaken as an AIS.

5.4 Channel Time Slot Encoding

The 64 kbit/s channel time slots comprising the 2048 kbit/s stream shall carry 'A' law encoded information as defined in ITU-T Recommendation G.711 (Pulse Code Modulation (PCM) Of Voice Frequencies).

The idle channel bit pattern transmitted over the Interconnect Link shall be compliant with ITU-T Recommendation Q.522 section 2.12 (Bit Patterns Generated By The Exchange In Idle Channel Time slots).

6. Safety and Protection

6.1 Dangerous Voltages

In order to protect personnel and equipment on both sides of a Point of Interconnection, it is necessary to provide protection against the transmission of excessive voltage across the interface.

Excessive voltages shall be as defined in BS 6301: 1989. For equipment which uses or generates excessive voltages the interface shall be electrically isolated from those voltages. Suitable devices are described in BS 6301: 1989.

6.2 Radiation Hazards

Where radio equipment is used, arrangements shall be made to protect all personnel from levels of radiation exceeding 1 milliwatt per square centimetre.

7. References

ETSI Standards

ETS 300 462 Transmission and Multiplexing (TM); Generic requirements for synchronization networks

ITU-T recommendations

G.703 Physical/Electrical Characteristics of Hierarchical Digital Exchanges
G.704 Synchronous Frame Structures used at Primary and Secondary Hierarchical Levels.
G.706 Frame Alignment and Cyclic Redundancy Check (CRC) Procedures Relating To Basic Frame Structures Defined In Rec. G704
G.711 Pulse Code Modulation (PCM) Of Voice Frequencies.
G.811 International Connections Terminating on Synchronous Network Nodes
G.812 Timing Requirements of Slave Clocks suitable for use as Node Clocks in Synchronisation Networks
G.822 Controlled Slip Rate Objectives on an International Digital Connection
G.823 The Control of Jitter and Wander Within Digital Networks Which Are Based on the 2048 kbit/s Hierarchy
O.151 Error Performance Measuring Equipment for Digital Systems At The Primary Bit Rate and Above
O.171 Timing Jitter Measuring Equipment for Digital Systems
Q.522 Section 2.12 Bit Patterns Generated By The Exchange In Idle Channel Time slots
Q.551 Transmission Characteristics of Digital Exchanges

BS Specifications

BS 6301 1989. Safety Requirements for Apparatus for Connection to British Telecommunication Networks

NICC Recommendations

UK National Network Timing Plan. Issue 1J: August 1997
Recommended standard for national transmission plan for public networks (NPDS7(94)4) Issue 3. June 1999.

8. Glossary

µF	micro Farad
µs	microsecond
2Mbit/s	2048kbit/s
AIS	Alarm Indications Signal
BS	British Standard
CTU	Circuit Terminating Unit.
dB	Decibel
DC	Direct Current
DDF	Digital Distribution Frame
ITU-T	International Telecommunication Union - Telecommunications
kbit/s	kilobits per second
kHz	kilo Hertz
Mbit/s	Megabits per second
ppm	Parts per million
UI	Unit Interval

9. History

Issue 1	April 1998
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END OF SPECIFICATION

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