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TERMINALS FOR TELEMATIC SERVICES

ASYNCHRONOUS FACSIMILE DCE CONTROL – SERVICE CLASS 1

ITU-T Recommendation T.31

(Previously “CCITT Recommendation”)

FOREWORD

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ITU-T Recommendation T.31 was prepared by ITU-T Study Group 8 (1993-1996) and was approved under the WTSC Resolution No. 1 procedure on the 11th of August 1995.

NOTE

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

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SUMMARY

A Group 3 Facsimile Terminal may include a DTE and a Facsimile DCE. This Recommendation describes a Facsimile DCE that includes physical and data layer functions. The corresponding DTE must implement the T.30 session protocol, and any necessary higher layer functions, such as Recommendations T.4, T.6 or T.434.

KEYWORDS

Class 1; DCE; Group 3 Facsimile; Modem; Programmable Communications Interface.

Recommendation T.31**ASYNCHRONOUS FACSIMILE DCE CONTROL –
SERVICE CLASS 1***(Geneva, 1995)***1 Introduction and scope****1.1 Facsimile terminals**

Group 3 facsimile machines were developed for sending digitized documents over the General Switched Telephone Network (GSTN). These facsimile terminals are now in widespread use around the world.

The operation of Group 3 facsimile terminals has been standardized in Recommendations T.4, T.6 and T.30.

1.2 Facsimile DCE

There are two types of adapters which allow Data Terminal Equipment (DTE) to communicate as Group 3 facsimile terminals. Some of these adapters are installed inside the DTE, on the processor bus; these are called “FAX boards”. Others are configured as an external “facsimile DCE”, connected to the DTE by a standard serial port (e.g. Recommendation V.24), using serial data interchange, as defined in Recommendation V.4.

1.3 Scope

This Recommendation contains protocols for use between a DTE and a Facsimile DCE. It includes automatic calling and answering.

This Recommendation defines the commands that the DTE may issue to configure and control the DCE, and the responses the facsimile DCE may issue to those commands.

This Recommendation is useful for intelligent DTEs and DTE software, facsimile DCEs, and facsimile terminals with digital connection to DTEs.

This Recommendation assumes that the DTE and DCE are connected via serial asynchronous connection using V.24 circuits. However, the protocols defined may be implemented in any environment that provide a character serial bidirectional data stream, including processor bus attached “fax boards”, local area networks, Small Computer Systems Interface (ISO 9316), IEEE 1284 parallel ports, etc. The adaptation of the protocols and procedures to these alternative communication schemes is beyond the scope of this Recommendation.

1.4 Overview

A system including a DTE and a facsimile DCE partitions Group 3 facsimile functions between the two devices. There are several levels in the communications path where a functional partition can be made. This Recommendation describes protocols for use at one of those levels, Service Class 1. Each level is described as a “Service Class” based on the functions performed by the DCE.

1.4.1 Service Class 1

Clause 7 describes a set of services at the physical and data link layers: waiting, signalling, and HDLC data formatting. T.30 session management and T.4 image data handling are done by the DTE.

1.4.2 Service Class 2

Recommendation T.32, Asynchronous Facsimile DCE Control, Service Class 2, describes a facsimile DCE which provides a set of services described by Recommendation T.30. The facsimile DCE makes and terminates calls, manages the communication session, and transports image data. The DTE prepares and interprets image data in compressed form, as described in Recommendation T.4.

2 Normative references

The following ITU-T Recommendations, and other references contain provisions which, through reference in this text, constitute provisions of this Recommendation. At the time of publication, the editions indicated were valid. All Recommendations and other references are subject to revision; all users of this Recommendation are therefore encouraged to investigate the possibility of applying the most recent edition of the Recommendations and other references listed below. A list of the currently valid ITU-T Recommendations is regularly published.

- ITU-T Recommendation T.4 (1993), *Standardization of Group 3 facsimile apparatus for document transmission.*
- ITU-T Recommendation T.30 (1993), *Procedures for document facsimile transmission in the general switched telephone network.*
- ITU-T Recommendation T.32 (1995), *Asynchronous facsimile DCE control – Service Class 2.*
- CCITT Recommendation T.50 (1992), *International Reference Alphabet (IRA) (formerly International Alphabet No. 5 or IA5) – Information technology – 7-bit coded character set for information interchange.*
- CCITT Recommendation V.4 (1988), *General structure of signals of International Alphabet No. 5 code for character oriented data transmission over public telephone networks.*
- ITU-T Recommendation V.8 (1994), *Procedures for starting and ending sessions of data transmission over the general switched telephone network.*
- CCITT Recommendation V.17 (1991), *A 2-wire modem for facsimile applications with rates up to 14400 bit/s.*
- CCITT Recommendation V.21 (1988), *300 bits per second duplex modem standardized for use in the general switched telephone network.*
- ITU-T Recommendation V.24 (1993), *List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE).*
- CCITT Recommendation V.25 (1988), *Automatic answering equipment and/or parallel automatic calling equipment on the general switched telephone network including procedures for disabling of echo control devices for both manually and automatically established calls.*
- ITU-T Recommendation V.25 ter (1995), *Serial asynchronous automatic dialling and control.*
- CCITT Recommendation V.27 ter (1988), *4800/2400 bits per second modem standardized for use in the general switched telephone network.*
- CCITT Recommendation V.29 (1988), *9600 bits per second modem standardized for use on point-to-point 4-wire leased telephone-type circuits.*
- CCITT Recommendation V.33 (1988), *14400 bits per second modem standardized for use on point-to-point 4-wire leased telephone-type circuits.*
- ITU-T Recommendation V.34 (1994), *A modem operating at data signalling rates of up to 28800 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits.*
- ISO 2111: 1985, *Data communication – Basic mode control procedures – Code independent information transfer.*

3 Definitions

For the purposes of this Recommendation, the following definitions apply:

3.1 DTE, Data Terminal Equipment: A DTE is any terminal or computer capable of providing commands and data to operate a DCE or facsimile DCE. In practice, these are computers of any size.

3.2 DCE, Data Circuit Terminating Equipment: A DCE is any device that connects a DTE to a communications network. This Recommendation focuses on DCEs which connect to the General Switched Telephone Network (GSTN). This class of DCEs includes DCEs compatible with the V-Series modem Recommendations and facsimile DCEs described below.

3.3 Facsimile DCE: A facsimile DCE is a device which provides facsimile communication facilities between a DTE and the GSTN. A Class 1 facsimile DCE includes the following functions:

- control functions;
- interchange circuits to the DTE;
- HDLC data link layer functions;
- V-Series signal converters;
- autodialler functions;
- GSTN interface.

3.4 Facsimile DTE: A facsimile DTE must provide those Group 3 facsimile functions and services not provided by the facsimile DCE. The specific implementation of these functions is beyond the scope of this Recommendation.

4 Abbreviations

For the purposes of this Recommendation, the following abbreviations are used:

CCITT	International Telegraph and Telephone Consultative Committee
IEEE	Institute of Electrical and Electronics Engineers
IRA	International Reference Alphabet (Recommendation T.50)
ISO	International Organization for Standardization
ITU-T	International Telecommunication Union – Telecommunication Standardization
XON	IRA DC1 character, used to enable data flow on the opposite circuit
XOFF	IRA DC3 character, used to disable data flow on the opposite circuit

5 Facsimile DTE-DCE interchange circuits

A facsimile DCE described by this Recommendation uses an asynchronous serial connection between the DTE and the DCE. Serial data is formatted in 10 bit character frames, including a start bit, 8 data bits, no parity and 1 stop bit (see Recommendation V.4). Use of this protocol on other DTE-DCE interfaces is beyond the scope of this Recommendation.



5.1 DTE-DCE communication link data rates

The DTE-facsimile DCE communications link shall provide full duplex character data at rates fast enough to accommodate the transfer of synchronous T.30 Phase C data. A data rate greater than or equal to 18 000 bit/s (e.g. 19 200 bit/s) is the minimum rate needed to support 14 400 bit/s V.17 Phase C data. With flow control, it is not necessary, and not recommended, to change the DTE-DCE communications link data rate during facsimile operation. Mechanisms to set the DTE-DCE serial rate are described in 6.10 and 6.2.10/V.25 *ter* (IPR parameter).

5.2 Asynchronous to synchronous conversion

Group 3 data communication is bit-synchronous. The DCE must delete, start and stop elements from these characters before transmission and add them to received octets. Bit sequencing is maintained between the DTE-DCE interface and the DCE-remote station interface, as specified in Recommendations T.4 and T.30.

5.3 Flow control

Flow control is necessary to match the DTE-DCE data rate to the line signalling rate and to the requirements of Group 3 data transmission. (For example, provision must be made for minimum scan line times.) Provision of in-band unidirectional DC1/DC3 (T.50 1/1 and 1/3) flow control is mandatory; flow control using V.24 circuits 106 and 133 is optional.

This Recommendation specifies a mandatory command to configure DCE flow control, the +IFC command from 6.2.12/V.25 *ter*.

The response times of the DCE to indication of a DTE not-ready condition and of the DTE to indication of a DCE not-ready condition are for further study. These times should be kept as short as practical. DCEs should accommodate latency in the DTE recognition of the DCE not-ready indication by accepting several characters on Circuit 103 after the indication is given.

NOTE – A facsimile DCE may provide additional data buffering beyond the needs of flow control.

5.4 Serial data interchange circuits

5.4.1 Mandatory circuits

The required circuits are shown in Table 1:

TABLE 1/T.31

Mandatory serial data interchange circuits

V.24 circuit	Description
102	Signal ground
103	Transmitted data
104	Received data

5.4.2 Optional circuits

The optional circuits are shown in Table 2:

TABLE 2/T.31

Optional serial data interchange circuits

V.24 circuit	Description
133	Ready for receiving
105	Request to send
106	Ready for sending
107	Data set ready
108/2	Data terminal ready
109	Data channel received line signal detector
125	Calling indicator

Provision of additional circuits is optional, but not addressed in this Recommendation.

5.4.3 Optional circuit behaviour

The behaviour of circuits 105, 106, and 133 is described in 6.9 and 6.2.12/V.25 *ter*.

The behaviour of circuit 108/2 is described in 6.6.

The behaviour of circuit 125 is described in 6.4.

Circuit 107, if provided, shall be held in the ON condition at all times when the DCE is powered on and +FCLASS = 1.0. Manufacturers may provide an option, controlled by the AT&C command (6.2.8/V.25 *ter*), to cause Circuit 107 to obey the V.24 definition, which is for circuit 107 to be ON only when the DCE is off-hook, and OFF when the DCE is on-hook.

Circuit 109, if provided, shall normally be held in the ON condition at all times when the DCE is powered on and +FCLASS = 1.0. Manufacturers may provide an option to cause circuit 109 to obey the definitions in the selected V-Series modem. The &C command, defined in 6.2.8/V.25 *ter*, may be used for this purpose; the &C0 setting holds circuit 109 always in the ON condition, and the &C1 setting would select the behaviour in which circuit 109 indicates the status of the selected V-Series modem.

6 Autodialler services

The protocol described in this Recommendation requires services common to those provided by serial asynchronous Automatic Calling Equipment (ACE).

6.1 Command syntax

The T.50 International Alphabet No. 5 is used for the issuance of commands and responses. Only the low order 7 bits of each character are used for commands or parameters; the high order bit is ignored. Upper case characters are equivalent to lower case characters.

For data transmission or reception, all 8 bits are needed.

