INTERNATIONAL TELECOMMUNICATION UNION

ITU-T

TELECOMMUNICATION
STANDARDIZATION SECTOR
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V.18
Appendix IV
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SERIES V: DATA COMMUNICATION OVER THE
TELEPHONE NETWORK

Interfaces and voiceband modems

Operational and interworking requirements for
DCEs operating in the text telephone mode

**Appendix IV: Specification of V.18
implementation tests**

ITU-T Recommendation V.18 – Appendix IV

(Previously CCITT Recommendation)

ITU-T V-SERIES RECOMMENDATIONS

DATA COMMUNICATION OVER THE TELEPHONE NETWORK

General	V.1–V.9
Interfaces and voiceband modems	**V.10–V.34**
Wideband modems	V.35–V.39
Error control	V.40–V.49
Transmission quality and maintenance	V.50–V.59
Simultaneous transmission of data and other signals	V.60–V.99
Interworking with other networks	V.100–V.199
Interface layer specifications for data communication	V.200–V.249
Control procedures	V.250–V.299
Modems on digital circuits	V.300–V.399

For further details, please refer to ITU-T List of Recommendations.

ITU-T RECOMMENDATION V.18

OPERATIONAL AND INTERWORKING REQUIREMENTS FOR DCEs OPERATING IN THE TEXT TELEPHONE MODE

APPENDIX IV

Specification of V.18 implementation tests

Summary

This Appendix to ITU-T Recommendation V.18 contains test specifications for testing implementations of Recommendation V.18 Operational and Interworking Requirements for DCEs Operating in the Text Telephone Mode. It contains one small section with basic interworking tests on a functional level and one larger section with implementation test cases. The interworking test is meant to give some confidence in that there is reason to perform the more elaborate implementation tests. The tests are supposed to be supported by a semi-automatic test tool called the "tester". The tests are designed so that they verify one part of the V.18 logic each. The tests do not compose a full conformance test, but are intended to give confidence in that a V.18 implementation is made according to the Recommendation.

CONTENTS

Recommendation V.18

OPERATIONAL AND INTERWORKING REQUIREMENTS FOR DCEs OPERATING IN THE TEXT TELEPHONE MODE

APPENDIX IV

Specification of V.18 implementation tests

(Geneva, 1998)

IV.1   Scope

Tests have been defined for the majority of possible paths through the V.18 automoding states. These include calling, called and monitor automoding operation. There are tests for character conversion. There are also tests for operational functions such as provision of indications to the DTE of call status and tests for requirements of the compatibility modes described in the annexes.

There is a group of tests for exception conditions such as immunity to voice and fax machines. These are not specifically defined in Recommendation V.18 but are implicit if the Textphone Under Test (TUT) is to operate correctly under typical conditions.

There are no tests for V.8 *bis*, V.61 or for other multimedia related operations as described in clause 6/V.18. These may also be added at a later date.

Compliance with this suite of tests does not guarantee operation with all versions of all textphones. Although every effort has been made to test all relevant paths through V.18, it may be that some modes of operation are not covered either due to unpredictable use of V.18 or because V.18 itself does not cater for that particular mode.

Proper end-to-end interworking in the text telephone mode relies on compatibility at the presentation level. Although there are tests for implementation of the V.18 annexes, this should not be interpreted as guaranteeing end-to-end interworking at the presentation level.

The ease of use of text telephones relies on many factors including the network interface and human factors issues in the user interface. Verification against the following tests reflects only a part of the total usability.

IV.2   Definitions and abbreviations

IV.2.1 Definitions

This appendix defines the following terms:

IV.2.1.1   tester: The equipment used to perform the tests.

IV.2.1.2   operator: The person using the tester to perform the tests.

IV.2.2 Abbreviations

This appendix uses the following abbreviation:

TUT   Textphone Under Test

IV.3   Summary of tests

It is assumed throughout the tests that a purpose built test tool, referred to as the "tester", is available for an "operator" to perform the tests. The textphone under test is referred to as the TUT. The TUT

will be connected to the tester via some kind of network simulator which may be incorporated into the tester.

Only the tests that are applicable to a particular V.18 implementation should be performed, e.g. detection of RINGING is not applicable to an acoustically coupled device.

IV.3.1 Interworking tests

There are two interworking tests. They will be performed against the BT reference implementation of Recommendation V.18. This is a software implementation that runs on a PC using a purpose built DSP card to provide the necessary modem functions.

1)   Automode calling test.

2)   Automode called test.

IV.3.2 Implementation tests

There are 5 groups of implementation tests:

IV.3.2.1 Operational requirements tests

Test description	Identifier	V.18 ref.
No disconnection test	MISC-01	4 (1)
Automatic resumption of automoding	MISC-02	4 (2)
Retention of selected mode on loss of signal	MISC-03	4 (2)
Detection of BUSY tone	MISC-04	4 (4)
Detection of RINGING	MISC-05	4 (4)
"LOSS OF CARRIER" indication	MISC-06	4 (4)
Call progress indication	MISC-07	4 (4)
Circuit 135 test	MISC-08	4 (5)
Connection Procedures	MISC-09	Appendix III

IV.3.2.2 Automode originate tests

Test description	Identifier	V.18 ref.
CI and XCI signal coding and cadence	ORG-01	5.1.1
ANS signal detection	ORG-02	5.1.2
End of ANS signal detection	ORG-03	5.1.2.2
ANS tone followed by TXP	ORG-04	5.1.2.2
ANS tone followed by 1650 Hz	ORG-05	5.1.2.3
ANS tone followed by 1300 Hz	ORG-06	5.1.2.4
ANS tone followed by no tone	ORG-07	5.1.2
Bell 103 (2225 Hz signal) detection	ORG-08	5.1.3
V.21 (1650 Hz signal) detection	ORG-09	5.1.4
V.23 (1300 Hz signal) detection	ORG-10	5.1.5
V.23 (390 Hz signal) detection	ORG-11	5.1.6
5 bit mode (Baudot) detection tests	ORG-12 a to d	5.1.7

Test description	Identifier	V.18 ref.
DTMF signal detection	ORG-13	5.1.8
EDT rate detection	ORG-14	5.1.9.1
Rate detection test	ORG-15	5.1.9.1
980 Hz detection	ORG-16	5.1.9.2
Loss of signal after 980 Hz	ORG-17	5.1.9.3
Tr timer	ORG-18	5.1.9.3
Bell 103 (1270 Hz signal) detection	ORG-19	5.1.10
Immunity to network tones	ORG-20	–
Immunity to other non-textphone modems	ORG-21 a, b	–
Immunity to fax tones	ORG-22	–
Immunity to voice	ORG-23	–

IV.3.2.3 Automode answer tests

Test description	Identifier	V.18 ref.
Ta timer	ANS-01	5.2.1
CI signal detection	ANS-02	5.2.2
Early termination of ANS tone	ANS-03	5.2.2.1
Tt timer	ANS-04	5.2.2.2
ANS tone followed by 980 Hz	ANS-05	5.2.3.1
ANS tone followed by 1300 Hz	ANS-06	5.2.3.2
ANS tone followed by 1650 Hz	ANS-07	5.2.3.3
980 Hz followed by 1650 Hz	ANS-08	5.2.4.1
980 Hz calling tone detection	ANS-09 a to d	5.2.4.2
V.21 detection by timer	ANS-10	5.2.4.3
EDT detection by rate	ANS-11	5.2.4.4.1
V.21 detection by rate	ANS-12	5.2.4.4.2
Tr timer	ANS-13	5.2.4.4.3
Te timer	ANS-14	5.2.4.5
5 bit mode (Baudot) detection tests	ANS-15 a to d	5.2.5
DTMF signal detection	ANS-16	5.2.6
Bell 103 (1270 Hz signal) detection	ANS-17	5.2.7
Bell 103 (2225 Hz signal) detection	ANS-18	5.2.8
V.21 reverse mode (1650 Hz) detection	ANS-19	5.2.9
1300 Hz calling tone discrimination	ANS-20 a to d	5.2.10
V.23 reverse mode (1300 Hz) detection	ANS-21	5.2.11

Test description	Identifier	V.18 ref.
1300 Hz with XCI Test	ANS-22	–
Stimulate mode country settings	ANS-23	5.2.12
Stimulate carrierless mode probe message	ANS-24	5.2.12.1
Interrupted carrierless mode probe	ANS-25	5.2.12.1.1
Stimulate carrier mode probe time	ANS-26	5.2.12.2
V.23 Mode (390 Hz) detection	ANS-27	5.2.12.2.1
Interrupted carrier mode probe	ANS-28	5.2.12.2.2
Stimulate mode response during probe	ANS-29	5.2.12.2.2
Immunity to network tones	ANS-30	–
Immunity to fax calling tones	ANS-31	–
Immunity to voice	ANS-32	–

IV.3.2.4   Automode monitor tests

For the following tests, the TUT must be set to monitor mode as defined in 5.3/V.18 "Automode Monitor Mode".

Test Description	Identifier	V.18 ref.
Repeat all answer mode tests excluding tests ANS-01, ANS-20 and ANS-23 to ANS-29	MON-01 to 20	5.3
Automode monitor Ta timer	MON-21	5.3
Automode monitor 1300 Hz calling tone discrimination	MON-22 a to d	5.3
Automode monitor 980 Hz calling tone discrimination	MON-23 a to d	5.3

IV.3.2.5   V.18 annexes tests

For the following tests verify the requirements specified in Annexes A to F/V.18.

Test description	Identifier	V.18 ref.
Baudot carrier timing and receiver disabling	X-01	A.1
Baudot bit rate confirmation	X-02	A.2
Baudot probe bit rate confirmation	X-03	A.3
5-bit to T.50 character conversion	X-04	A.4
DTMF receiver disabling	X-05	B.1
DTMF character conversion	X-06	B.2
EDT carrier timing and receiver disabling	X-07	C.1
EDT bit rate and character structure	X-08	C.2-3
V.23 calling mode character format	X-09	E
V.23 answer mode character format	X-10	E
V.21 character structure	X-11	F.4-5
V.18 mode	X-12	G.1-3

IV.4 Interworking tests description

IV.4.1 Introduction

The interworking tests ensure that the Textphone Under Test (TUT) interworks satisfactorily with the reference V.18 Text-Telephone. These tests are intended to eliminate any implementation with serious errors and/or faulty equipment and to demonstrate the interworking integrity of the TUT. Further, they provide an opportunity to test the acoustic coupling or/and PSTN interface of the TUT.

No measure of quality is applied in these tests. The aim is simply to gain sufficient confidence to merit continuation of the tests.

IV.4.2 Test methodology

The TUT is set up in a working configuration and connected to the tester, possibly via a network simulator. No delays or errors are inserted into the link so that high quality, trouble free operation should be achievable.

IV.4.3 Test cases

Only two types of tests are performed:

1)   A call is made from the TUT set up in the automode calling mode to the reference V.18 text telephone.

2)   A call is made from the reference V.18 text telephone to the TUT in automode answer configuration.

In both cases the terminals should both arrive in V.18 mode in less than 5 s after the call is answered. It should then be possible to perform a text conversation correctly at least with the minimal character set and the editing operations specified in Recommendation T.140.

IV.5 V.18 implementation tests description

IV.5.1 Introduction

This group of tests verifies that the TUT protocol implementation conforms to the V.18 specification.

IV.5.2 Test methodology

The TUT is set up in a working configuration and connected to the tester via a suitable interface. This might be a direct PSTN connection or an acoustic coupler.

IV.5.3 Test case identifier numbers

The structure of each case identified number is as follows:

<group>- <number>

where group can be:

•   *MISC, Operational requirements and other tests.*

•   *ANS, Automode answer tests.*

•   *ORG, Automode originate tests.*

•   *MON, Automode monitor tests.*

•   *X, V.18 Annex tests.*

IV.5.4 Test cases

IV.5.4.1 Operational requirements tests

IV.5.4.1.1 No disconnection test

Identifier: MISC-01

Purpose: To verify that the DCE does not initiate a disconnection.

Preamble: N/A

Method: A call is made to the TUT from the tester which remains off hook for 10 minutes without sending any signal.

Pass criteria: The TUT should answer the call and enter the probing state after 3 s. The TUT should continue to probe until the test is terminated.

Comments: This feature should also be verified by observation during the automoding tests.

IV.5.4.1.2 Automatic resumption of automoding

Identifier: MISC-02

Purpose: To ensure that the DCE can be configured to automatically re-assume the automode calling state after 10 s of no valid signal.

Preamble: The TUT should be configured to automatically re-assume the initial automoding state.

Method: The tester should set up a call to the TUT in V.21 mode and then drop the carrier. The tester will then transmit silence for 11 s followed by a 1300 Hz tone for 5 s (i.e. V.23).

Pass criteria: 1) Ten seconds after dropping the carrier the TUT should return to state Monitor 1.

2) After 2.7 ± 0.3 s the TUT should select V.23 mode and send a 390 Hz tone.

Comments: The TUT should indicate that carrier has been lost at some time after the 1650 Hz signal is lost.

IV.5.4.1.3 Retention of selected mode on loss of signal

Identifier: MISC-03

Purpose: To ensure that the DCE stays in the selected transmission mode if it is not configured to automatically re-assume the initial automoding state.

Preamble: The TUT should be configured to remain in the selected transmission mode when the carrier is lost.

Method: The tester should set up a call to the TUT in V.21 mode, for example. It will drop the carrier for 9 s and then re-start transmission of the same carrier for 1 s followed by a short message.

Pass criteria: The TUT should resume operation in V.21 mode and capture the entire test message.

Comments: The TUT should indicate that carrier has been lost at some time after the carrier signal is removed and not disconnect.

IV.5.4.1.4 Detection of BUSY tone

Identifier: MISC-04

Purpose: To ensure that the DCE provides the call progress indication "BUSY" in presence of the national busy tone.

Preamble: N/A

Method: The TUT should be configured to dial out and then be presented with the appropriate national busy tone.

Pass criteria: Detection of busy tone should be displayed by the TUT.

Comments: Recommendation V.18 specifies that the DCE should not hang up, but that is intended to apply to the case where a connection is established and then lost. A terminal may automatically hang up when busy tone is detected. PABX busy tones may differ in frequency and cadence from national parameters.

IV.5.4.1.5 Detection of RINGING

Identifier: MISC-05

Purpose: To ensure that the DCE provides the call progress indication "RINGING" in presence of the national ringing tone.

Preamble: N/A

Method: The tester will make a call to the TUT using the nationally recommended cadence and the minimum recommended ring voltage/current.

Pass criteria: The RINGING condition should be visually indicated by the TUT.

Comments: This test should be repeated across a range of valid timings and ring voltages.

IV.5.4.1.6 "LOSS OF CARRIER" indication

Identifier: MISC-06

Purpose: To ensure that the DCE provides the call progress indication "LOSS OF CARRIER" upon a loss of carrier in full duplex modes, i.e. V.21, V.23, Bell 103.

Preamble: N/A

Method: Set up a call in each of the full duplex modes and force a carrier failure to the TUT.

Pass criteria: Loss of carrier should be indicated and disappear when the carrier is restored.

Comments: The V.18 modem should not automatically disconnect when used in a manual conversation mode. However, a V.18 equipped terminal may disconnect based on operational decisions, e.g. when it is a terminal in automatic answering machine mode. There may be other cases e.g. where the V.18 DCE is used in a gateway, when automatic disconnection is required.

IV.5.4.1.7 Call progress indication

Identifier: MISC-07

Purpose: To ensure that the DCE provides the call progress indication "CONNECT(x)" upon a connection.

Preamble: N/A

Method: Correct CONNECT messages should be verified during the automode tests that follow.

Pass criteria: The relevant mode should be indicated by the DCE when automoding is complete. However, this may possibly not be indicated by the DTE.

Comments: The possible modes are: V.21, V.23, Baudot 45, Baudot 50, EDT, Bell 103, DTMF.

IV.5.4.1.8 Circuit 135 test

Identifier: MISC-08

Purpose: To ensure that the DCE implements circuit 135 or an equivalent way of indicating presence of a signal.

Preamble: N/A

Method: A call from the TUT should be answered in voice mode after 20 s. The tester will transmit sampled voice messages. V.24 circuit 135 or its equivalent should be observed.

Pass criteria: The ring tone and speech shall be indicated by circuit 135.

Comment: The response times and signal level thresholds of circuit 135 are not specified in V.18 or V.24 and therefore the pattern indicated may vary.

IV.5.4.1.9 Connection procedures

Identifier: MISC-09

Purpose: To ensure that the TUT implements the call connect procedure described in Appendix III/V.18.

Preamble: N/A

Method: TBD

Pass criteria: TBD

Comment: TBD

IV.5.4.2 Automode originate tests

In this group of tests, the TUT is placed in the automode originate mode, while the tester emulates the operation of the answering station.

IV.5.4.2.1 CI and XCI signal coding and cadence

Identifier: ORG-01

Purpose: To verify that that TUT correctly emits the CI and XCI signals with the ON/OFF cadence defined in 5.1.1/V.18.

Preamble: N/A

Method: V.21 demodulator is used to decode the CI sequence and a timer to measure the silence intervals between them. The XCI signal is also monitored and decoded for to check for correct coding and timing of the signal.

Pass criteria: 1) No signal should be transmitted for one second after connecting to the line.

2) Four CI patterns are transmitted for each repetition.

3) No signal is transmitted for two seconds after the end of each CI.

4) Each CI must have the correct bit pattern.

5) The CI patterns followed by two seconds of silence must be repeated twice.

6) One second after every 3 blocks CI an XCI signal must be transmitted.

7) The XCI should have the structure defined in 3.11/V.18.

8) The whole sequence should be repeated until the call is cleared.

9) When V.18 to V.18, the XCI must not force V.23 or Minitel mode.

Comments: –

IV.5.4.2.2   ANS signal detection

Identifier: ORG-02

Purpose: To verify that TUT correctly detects the ANS (2100 Hz) signal during the two second interval (T_{off}) between transmission of CI sequences.

Preamble: Make a V.18 call from the TUT.

Method: The test system waits for the TUT to stop transmitting a CI and responds with an ANS signal. The V.21 demodulator is used to decode the TXP sequence and a timer measures the silence intervals between them. ANS should be transmitted for 2 s.

Pass criteria: 1) No signal should be transmitted by TUT for 0.5 s from detection of ANS.

2) The TUT should reply with transmission of TXP as defined in 5.1.2/V.18.

3) Verify that TXP sequence has correct bit pattern.

Comments: –

IV.5.4.2.3   End of ANS signal detection

Identifier: ORG-03

Purpose: The TUT should stop sending TXP at the end of the current sequence when the ANS tone ceases.

Preamble: Test ORG-02 should be successfully completed immediately prior to this test.

Method: The tester send ANS for 2 s followed by silence. The tester will then monitor for cessation of TXP at the end of the answer tone.

Pass criteria: The TUT should stop sending TXP at the end of the current sequence when ANS tone ceases.

Comments: –

IV.5.4.2.4   ANS Tone Followed by TXP

Identifier: ORG-04

Purpose: To check correct detection of V.18 modem.

Preamble: Test ORG-02 and ORG-03 should be successfully completed prior to this test.

Method: Tester transmits ANS for 2.5 s followed by 75 ms of no tone then transmits 3 TXP sequences using V.21 (2) and start a 1 s timer. It will then transmit 1650 Hz for 5 s.

Pass criteria: 1) TUT should initially respond with TXP.

2) TUT should stop sending TXP within 0.2 s of end of ANS.

3) TUT should respond with 980 Hz carrier within 1 s of end of 3 TXP sequences.

4) Data should be transmitted and received according to T.140 to comply with the V.18 operational requirements.

Comments: The TUT should indicate that V.18 mode has been selected.

IV.5.4.2.5 ANS tone followed by 1650 Hz

Identifier: ORG-05

Purpose: To check correct detection of V.21 modem upper channel when preceded by answer tone and to confirm discrimination between V.21 and V.18 modes.

Preamble: Test ORG-02 and ORG-03 should be successfully completed prior to this test.

Method: Tester transmits ANS for 2.5 s followed by 75 ms of no tone then transmits 1650 Hz and starts a 0.7 second timer.

Pass criteria: 1) TUT should initially respond with TXP.

2) TUT should stop sending TXP within 0.2 s of end of ANS.

3) TUT should respond with 980 Hz at 0.5 (+0.2-0.0) s of start of 1650 Hz.

4) Data should be transmitted and received at 300 bit/s complying with Annex F/V.18.

Comments: Selection of V.21 as opposed to V.18 should be confirmed by examination of TUT. If there is no visual indication, verify by use of T.50 for V.21 as opposed to UTF-8 coded ISO 10646 character set for V.18.

IV.5.4.2.6 ANS tone followed by 1300 Hz

Identifier: ORG-06

Purpose: To check correct detection of V.23 modem upper channel when preceded by answer tone.

Preamble: Test ORG-02 and ORG-03 should be successfully completed prior to this test.

Method: Tester transmits ANS for 2.5 s followed by 75 ms of no tone then transmit 1300 Hz and start a 2.7 s timer.

Pass criteria: 1) TUT should initially respond with TXP.

2) TUT should stop sending TXP within 0.2 s of end of ANS.

3) TUT should respond with 390 Hz after 1.7 (+0.2-0.0) s of start of 1300 Hz.

4) Data should be transmitted and received at 75 bit/s and 1200 bit/s respectively by the TUT to comply with Annex E/V.18.

Comments: The TUT should indicate that V.23 mode has been selected.

IV.5.4.2.7 ANS tone followed by no tone

Identifier: ORG-07

Purpose: To confirm that TUT does not lock up under this condition.

Preamble: Test ORG-02 and ORG-03 should be successfully completed prior to this test.

Method: Tester transmits ANS for 2.5 s followed by no tone for 10 s. It then transmits DTMF tones for 2 s.

Pass criteria: 1) TUT should initially respond with TXP.

2) TUT should stop sending TXP within 0.2 s of end of ANS.

3) TUT should return to Monitor 1 state and then connect in DTMF mode within 12 s of the end of ANS tone.

Comments: This condition would cause the terminal to lock up if the V.18 standard is followed literally. It may however, occur when connected to certain Swedish textphones if the handset is lifted just after the start of an automatically answered incoming call.

IV.5.4.2.8 Bell 103 (2225 Hz signal) detection

Identifier: ORG-08

Purpose: To verify that the TUT correctly detects the Bell 103 upper channel signal during the 2 s interval between transmission of CI sequences.

Preamble: N/A

Method: The tester waits for a CI and then sends a 2225 Hz signal for 5 s.

Pass criteria: 1) The TUT should respond with a 1270 Hz tone in 0.5 ± 0.1 s.

    2) Data should be transmitted and received at 300 bit/s to comply with Annex D/V.18.

Comments: The TUT should indicate that Bell 103 mode has been selected.

IV.5.4.2.9 V.21 (1650 Hz signal) detection

Identifier: ORG-09

Purpose: To verify that the TUT correctly detects the V.21 upper channel signal during the 2 s interval between transmission of CI sequences.

Preamble: N/A

Method: The tester waits for a CI and then sends a 1650 Hz signal for 5 s.

Pass criteria: 1) The TUT should respond with a 980 Hz tone in 0.5 ± 0.1 s.

    2) Data should be transmitted and received at 300 bit/s to comply with Annex F/V.18.

Comments: The TUT should indicate that V.21 mode has been selected.

IV.5.4.2.10 V.23 (1300 Hz signal) detection

Identifier: ORG-10

Purpose: To verify that the TUT correctly detects the V.23 upper channel signal during the 2 s interval between transmission of CI sequences.

Preamble: N/A

Method: The tester waits for a CI and then sends a 1300 Hz signal for 5 s.

Pass criteria: 1) The TUT should respond with a 390 Hz tone in 1.7 ± 0.1 s.

    2) Data should be transmitted and received at 75 bit/s and 1200 bit/s respectively by the TUT to comply with Annex E/V.18.

Comments: The TUT should indicate that V.23 mode has been selected.

IV.5.4.2.11 V.23 (390 Hz signal) detection

Identifier: ORG-11

Purpose: To confirm correct selection of V.23 reverse mode during sending of XCI.

Preamble: N/A

Method: The tester should wait for the start of the XCI signal and then send 390 Hz to TUT for 5 s.

Pass criteria: 1) The TUT should complete the XCI as normal.

    2) The TUT should then maintain the 1300 Hz tone while the 390 Hz test tone is present.

3) Data should be transmitted and received at 1200 bit/s and 75 bit/s respectively by the TUT to comply with Annex E/V.18 when connection is indicated.

Comments: The TUT should indicate that V.23 mode has been selected at least 3 s after the start of the 390 Hz tone.

IV.5.4.2.12 5 bit mode (Baudot) detection tests

Identifier: ORG-12(a) to (d)

Purpose: To confirm detection of Baudot modulation at various bit rates that may be encountered.

Preamble: N/A

Method: The tester transmits the 5-bit coded characters "0" to "9" followed by "abcdef" at (a) 45.45, (b) 47.6, (c) 50 and (d) 100 bits per second. When TUT indicates a connection, type at least 5 characters back to the tester so that correct selection of bit rate can be confirmed.

Pass criteria: 1) TUT should select Baudot mode and the appropriate bit rate.

2) The tester will analyse the bit rate of received characters, which should be at either 45.45 or 50 bits per second as appropriate.

Comments: 45.45 and 50 bit/s are the commonly used Baudot bit rates. However, certain textphones can operate at higher rates (e.g. 100 bit/s). Responding at either 45.45 or 50 bit/s is acceptable to these devices which normally fall back to the selected rate.

47.6 bit/s may possibly be encountered from another V.18 textphone in the automode answer state. The TUT may then select either 45.45 or 50 bit/s for the transmission.

IV.5.4.2.13 DTMF signal detection

Identifier: ORG-13

Purpose: To verify whether the TUT correctly recognizes DTMF signals during the 2 s interval between transmission of CI.

Preamble: N/A

Method: The tester will send a single DTMF tone of 40 ms duration to TUT. When TUT indicates a connection, type at least 5 characters back to the tester so that correct selection of mode can be confirmed.

Pass criteria: The tester will analyse the received characters to confirm DTMF mode selection.

Comments: TUT should indicate that it has selected DTMF mode. The DTMF capabilities of the TUT should comply with Recommendation Q.24 for the Danish Administration while receiving for best possible performance.

IV.5.4.2.14 EDT rate detection

Identifier: ORG-14

Purpose: To confirm detection of EDT modems by detecting the transmission rate of received characters.

Preamble: N/A

Method: The tester transmits EDT characters "abcdef" to TUT at 110 bit/s. When TUT indicates that the connection is established, type characters "abcdef<CR>" back to the tester. The same characters will then be transmitted back to the TUT.

Pass criteria: Ensure correct reception of characters by tester and TUT.

Comments: The TUT should be able to determine the rate on the six characters given. If it takes more than this then performance is probably inadequate as too many characters would be lost. Some characters may be lost during the detection process. However, the number lost should be minimal. The data bits and parity are specified in Annex C/V.18.

IV.5.4.2.15 Rate detection test

Identifier: ORG-15

Purpose: To verify the presence of 980/1180 Hz at a different signalling rate than 110 bits/s returns the TUT modem to the "monitor A" state.

Preamble:

Method: The tester transmits 980/1180 Hz signals at 300 bit/s for 2 s.

Pass criteria: The TUT should not select EDT or any other mode and should continue to transmit the CI signal.

Comments: Echoes of the CI sequences may be detected at 300 bit/s.

IV.5.4.2.16 980 Hz detection

Identifier: ORG-16

Purpose: To confirm correct selection of V.21 reverse mode.

Preamble: N/A

Method: The tester sends 980 Hz to TUT for 5 s.

Pass criteria: 1) TUT should respond with 1650 Hz tone after 1.5 ± 0.1 s after start of 980 Hz tone.

2) Data should be transmitted and received at 300 bit/s complying with Annex F/V.18.

Comments: The TUT should indicate that V.21 mode has been selected.

IV.5.4.2.17 Loss of signal after 980 Hz

Identifier: ORG-17

Purpose: To confirm that TUT returns to the Monitor 1 state if 980 Hz signal disappears.

Preamble: N/A

Method: The tester sends 980 Hz to TUT for 1.2 s followed by silence for 5 s.

Pass criteria: TUT should not respond to the 980 Hz tone and resume sending CI signals after a maximum of 2.4 s from the end of the 980 Hz tone.

Comments: –

IV.5.4.2.18 Tr timer

Identifier: ORG-18

Purpose: To confirm that TUT returns to the Monitor 1 state if timer Tr expires.

Preamble: N/A

Method: The tester sends 980 Hz to TUT for 1.2 s followed by 1650 Hz for 5 s with no pause.

Pass criteria: TUT should respond with 980 Hz after 1.3 ± 0.1 s of 1650 Hz.

Comments: This implies timer Tr has expired 2 s after the start of the 980 Hz tone and then 1650 Hz has been detected for 0.5 s.

IV.5.4.2.19 Bell 103 (1270 Hz signal) detection

Identifier: ORG-19

Purpose: To confirm correct selection of Bell 103 reverse mode.

Preamble: N/A

Method: The tester sends 1270 Hz to TUT for 5 seconds.

Pass criteria: 1) TUT should respond with 2225 Hz tone after 0.7 ± 0.1 s.

            2) Data should be transmitted and received at 300 bit/s complying with Annex D/V.18.

Comments: The TUT should indicate that Bell 103 mode has been selected

IV.5.4.2.20 Immunity to network tones

Identifier: ORG-20

Purpose: To ensure that the TUT does not interpret network tones as valid signals.

Preamble: N/A

Method: The tester will first send a dial tone to the TUT: this will be followed by a ringing tone and a network congestion tone. The frequencies and cadences of the tones will vary according to the country setting. The tester must be configured for the same country as the TUT.

Pass criteria: The countries supported by the TUT should be noted along with the response to each tone. The tones should either be ignored or reported as the relevant network tone to the user.

Comments: V.18 is required to recognize and report RINGING and BUSY tones. Other network tones may be ignored. Some devices may only provide a visual indication of the presence and cadence of the tones, for instance by a flashing light. The TUT may disconnect on reception of tones indicating a failed call attempt.

IV.5.4.2.21 Immunity to non-textphone modems

Identifier: ORG-21(a) and (b)

Purpose: To ensure that the TUT does not interpret modem tones not supported by V.18 as valid text telephone tones.

Preamble: N/A

Method: The tester will respond with an ANS tone (2100 Hz) followed by simulated (a) V.32 *bis* and (b) V.34 modem training sequences.

Pass criteria: The tones should either be ignored or reported back to the user. No textphone modem should be selected.

Comments: Some high speed modems may fall back to a compatibility mode e.g. V.21 or V.23 that should be correctly detected by the TUT.

IV.5.4.2.22 Immunity to fax tones

Identifier: ORG-22

Purpose: To ensure that the TUT will not interpret a called fax machine as being a textphone.

Preamble: N/A

Method: The tester will respond as if it were a typical group 3 fax machine in automatic answer mode. It should send a CED tone (2100 Hz) plus Digital Identification Signal (DIS) as defined in T.30.

Pass criteria: The TUT should ignore the received tones.

Comments: Ideally the TUT should detect the presence of a fax machine and report it back to the user.

IV.5.4.2.23 Immunity to voice

Identifier: ORG-23

Purpose: To ensure that the TUT does not misinterpret speech as a valid textphone signal.

Preamble: N/A

Method: The tester will respond with sampled speech. A number of phrases recorded from typical male and female speakers will be transmitted. This will include a typical network announcement.

Pass criteria: The TUT should ignore the speech.

Comments: Ideally the TUT should report the presence of speech back to the user e.g. via circuit 135.

IV.5.4.3 Automode answer tests

For the tests in this subclause, a call must be established from the tester to the TUT. All tests, except where stated otherwise, will commence 0.5 s after the call is answered to ensure that the actions are begun before timer Ta expires within the TUT. This implies that the tester must detect when the TUT goes off hook.

IV.5.4.3.1 Ta timer

Identifier: ANS-01

Purpose: To ensure that on connecting the call, the DCE starts timer **Ta** (3 s) and on expiry begins probing.

Preamble: N/A

Method: The tester makes a call to the TUT and attempts to determine when the TUT answers the call. It will then monitor for any signal.

Pass criteria: The TUT should start probing 3 s after answering the call.

Comments: –

IV.5.4.3.2 CI signal detection

Identifier: ANS-02

Purpose: To confirm the correct detection and response to the V.18 CI signal.

Preamble: N/A

Method: The tester will transmit 2 sequences of 4 CI patterns separated by 2 s. It will monitor for ANS and measure duration.

Pass criteria: 1) The TUT should respond after either the first or second CI with ANS tone.

2) ANS tone should remain for 3 s ± 0.5 s followed by silence.

Comments: The answer tone is an unmodulated 2100 Hz tone with no phase reversals. The XCI signal is tested in a separate test.

IV.5.4.3.3 Early Termination of ANS tone

Identifier: ANS-03

Purpose: To confirm that the TUT will respond correctly to TXP signals, i.e. by stopping ANS tone on reception of TXP signal.

Preamble: N/A

Method: The tester will transmit 2 sequences of 4 CI patterns separated by 2 s. On reception of the ANS tone the tester will wait 0.5 s and then begin transmitting the TXP signal in V.21 (1) mode.

Pass criteria: 1) On reception of the TXP signal, the TUT should remain silent for 75 ± 5 ms.

2) The TUT should then transmit 3 TXP sequences in V.21(2) mode.

3) The 3 TXPs should be followed by continuous 1650 Hz.

4) Correct transmission and reception of T.140 data should be verified after the V.18 mode connection is completed.

Comments: The TUT should indicate V.18 mode.

IV.5.4.3.4 Tt timer

Identifier: ANS-04

Purpose: To ensure that after detection of ANS the TUT will return to Monitor A after timer Tt expires.

Preamble: Successful completion of test ANS-03.

Method: After completion of test ANS-03, the tester will continue to monitor for signals.

Pass criteria: The TUT should start probing 3 s after ANS disappears.

Comments: It is assumed that timer Ta is restarted on return to Monitor A.

IV.5.4.3.5 ANS tone followed by 980 Hz

Identifier: ANS-05

Purpose: To check correct detection of V.21 modem lower channel when preceded by answer tone.

Preamble: N/A

Method: Tester transmits ANS for 2.5 s followed by 75 ms of no tone then transmits 980 Hz and starts a 1 s timer.

Pass criteria: TUT should respond with 1650 Hz within 400 ± 100 ms of start of 980 Hz.

Comments: The TUT should indicate that V.21 mode has been selected.

IV.5.4.3.6 ANS tone followed by 1300 Hz

Identifier: ANS-06

Purpose: To check correct detection of V.23 modem upper channel when preceded by answer tone.

Preamble: N/A

Method: Tester transmits ANS for 2.5 s followed by 75 ms of no tone then transmits 1300 Hz and starts a 2 s timer.

Pass criteria: TUT should respond with 390 Hz after 1.7 (+0.2-0.0) s of start of 1300 Hz.

Comments: The TUT should indicate that V.23 mode has been selected.

IV.5.4.3.7   ANS tone followed by 1650 Hz

Identifier: ANS-07

Purpose: To check correct detection of V.21 modem upper channel when preceded by answer tone and to confirm discrimination between V.21 and V.18 modes.

Preamble: N/A

Method: Tester transmits ANS for 2.5 s followed by 75 ms of no tone then transmits 1650 Hz and starts a 1 s timer.

Pass criteria: TUT should respond with 980 Hz within 400 ± 100 ms of start of 1650 Hz.

Comments: The TUT should indicate that V.21 mode has been selected.

IV.5.4.3.8   980 Hz followed by 1650 Hz

Identifier: ANS-08

Purpose: To ensure the correct selection of V.21 modem channel when certain types of Swedish textphones are encountered.

Preamble: N/A

Method: The tester will simulate a call from a Diatext2 textphone that alternates between 980 Hz and 1650 Hz until a connection is made.

Pass criteria: The TUT should respond with the appropriate carrier depending on when it connects.

Comments: The TUT should indicate a V.21 connection. The time for which each frequency is transmitted is random and varies between 0.64 and 2.56 s.

IV.5.4.3.9   980 Hz calling tone detection

Identifier: ANS-09 (a) to (d)

Purpose: To confirm correct detection of 980 Hz calling tones as defined in V.25.

Preamble: N/A

Method: The tester will send bursts of 980 Hz signals (a) 400 ms, (b) 500 ms, (c) 700 ms and (d) 800 ms followed by 1 s of silence.

Pass criteria: 1) The TUT should not respond to bursts of 400 or 800 ms.

2) The TUT should immediately begin probing after a burst of 980 Hz for 500 or 700 ms followed by 1 s of silence.

Comments: The probe sent by the TUT will depend on the country setting.

IV.5.4.3.10 V.21 detection by timer

Identifier: ANS-10

Purpose: To confirm correct selection of V.21 calling modem when the received signal is not modulated, i.e. there is no 1180 Hz.

Preamble:	N/A
Method:	The tester sends 980 Hz to TUT for 2 s.
Pass criteria:	The TUT should respond with a 1650 Hz tone in 1.5 ± 0.1 s.
Comments:	The TUT should indicate that V.21 mode has been selected.

IV.5.4.3.11 EDT detection by rate

Identifier:	ANS-11
Purpose:	To confirm detection of EDT modems by detecting the transmission rate of received characters.
Preamble:	N/A
Method:	The tester transmits EDT characters "abcdef" to TUT at 110 bit/s. When TUT indicates that the connection is established, type characters "abcdef<CR>" back to the tester. The same characters will then be transmitted back to the TUT.
Pass criteria:	Ensure correct reception of characters by tester and TUT.
Comments:	The TUT should indicate that EDT mode has been selected. Some characters may be lost during the detection process. However, the number lost should be minimal. The data bits and parity are specified in Annex C/V.18.

IV.5.4.3.12 V.21 detection by rate

Identifier:	ANS-12
Purpose:	To confirm detection of V.21 modem low channel by detecting the transmission rate of received characters and to ensure correct discrimination between V.18 and V.21 modes.
Preamble:	N/A
Method:	The tester transmits characters "abcdef" to TUT using V.21(1) at 300 bit/s. When TUT indicates that the connection is established, type characters "abcdef<CR>" back to the tester. The same characters will then be transmitted back to the TUT.
Pass criteria:	Ensure correct reception of characters by tester and TUT.
Comments:	This situation is unlikely to occur in practice unless the DCE is sending a V.21 (1650 Hz) probe. However, it is catered for in Recommendation V.18. It is more likely that this is where CI or TXP characters would be detected (see test ANS-02).

IV.5.4.3.13 Tr timer

Identifier:	ANS-13
Purpose:	To ensure that the TUT returns to the Monitor A state on expiry of timer Tr (2 s). Timer Tr is started when a modulated V.21(1) signal is detected.
Preamble:	N/A
Method:	The tester will transmit 980 Hz for 200 ms followed by alternating 980 Hz/1180 Hz at 110 bit/s for 100 ms followed by 980 Hz for 1 s.
Pass criteria:	The TUT should begin probing 4 ± 0.5 s after the 980 Hz signal is removed.
Comments:	It is not possible to be precise on timings for this test since the definition of a "modulated signal" as in 5.2.4.4/V.18 is not specified. Therefore it is not known exactly when timer Tr will start. It is assumed that timer Ta is restarted on re-entering the Monitor A state.

IV.5.4.3.14 Te timer

Identifier: ANS-14

Purpose: To ensure that the TUT returns to the Monitor A on expiry of timer Te (2.7 s). Timer Te is started when a 980 Hz signal is detected.

Preamble: N/A

Method: The tester will transmit 980 Hz for 200 ms followed silence for 7 s.

Pass criteria: The TUT should begin probing 5.5 ± 0.5 s after the 980 Hz signal is removed.

Comments: It is assumed that timer Ta (3 s) is restarted on re-entering the Monitor A state.

IV.5.4.3.15 5 bit mode (Baudot) detection tests

Identifier: ANS-15(a) to (d)

Purpose: To confirm detection of Baudot modulation at various bit rates that may be encountered.

Preamble: N/A

Method: The tester transmits the 5-bit coded characters "0" to "9" followed by "abcdef" at (a) 45.45, (b) 47.6, (c) 50 and (d) 100 bits per second. When TUT indicates a connection, type at least 5 characters back to the tester so that correct selection of bit rate can be confirmed.

Pass criteria:
1) The TUT should select Baudot mode and the appropriate bit rate.
2) The tester will analyse the bit rate of received characters, which should be at an appropriate rate, and confirm the carrier on/off times before and after the characters.

Comments: 45.45 and 50 bit/s are the commonly used Baudot bit rates. However, some textphones can transmit at higher rates e.g. 100 bit/s. Responding at either 45.45 or 50 bit/s is acceptable to these devices which then fall back to the selected rate.

    A rate of 47.6 bit/s may be encountered from another V.18 textphone in the automode answer state. The TUT may then select either 45.45 or 50 bit/s for the transmission.

IV.5.4.3.16 DTMF signal detection

Identifier: ANS-16

*Purpose***:   To verify whether the TUT correctly recognizes DTMF signals.

Preamble: N/A

Method: The tester will send a single DTMF tone of 40 ms duration to TUT. When TUT indicates a connection, type at least 5 characters back to the tester so that correct selection of mode can be confirmed.

Pass criteria: Tester will analyse the received characters to confirm DTMF mode selection.

Comments: The TUT should indicate that it has selected DTMF mode. The DTMF capabilities of the TUT should comply with Recommendation Q.24 for the Danish Administration.

IV.5.4.3.17 Bell 103 (1270 Hz signal) detection

Identifier: ANS-17

Purpose: To ensure correct detection and selection of Bell 103 modems.

Preamble: N/A

Method: The tester sends 1270 Hz to TUT for 5 s.

Pass criteria: TUT should respond with 2225 Hz tone after 0.7 ± 0.1 s.

Comments: The TUT should indicate that Bell 103 mode has been selected.

IV.5.4.3.18   Bell 103 (2225 Hz signal) detection

Identifier: ANS-18

Purpose: To ensure correct detection and selection of Bell 103 modems in reverse mode.

Preamble: N/A

Method: The tester sends 2225 Hz to TUT for 5 s.

Pass criteria: The TUT should respond with 1270 Hz after 1 ± 0.2 s.

Comments: The TUT should indicate that Bell 103 mode has been selected. Bell 103 modems use 2225 Hz as both answer tone and higher frequency of the upper channel.

IV.5.4.3.19   V.21 reverse mode (1650 Hz) detection

Identifier: ANS-19

Purpose: To ensure correct detection and selection of V.21 reverse mode.

Preamble: N/A

Method: The tester sends 1650 Hz to TUT for 5 s.

Pass criteria: The TUT should respond with 980 Hz after 0.4 ± 0.2 s.

Comments: The TUT should indicate that V.21 mode has been selected.

IV.5.4.3.20   1300 Hz calling tone discrimination

Identifier: ANS-20 (a) to (d)

Purpose: To confirm correct detection of 1300 Hz calling tones as defined in Recommendation V.25.

Preamble: N/A

Method: The tester will send 1300 Hz bursts of (a) 400 ms, (b) 500 ms, (c) 700 ms and (d) 800 ms followed by 1 s of silence.

Pass criteria: 1) The TUT should not respond to bursts of 400 or 800 ms.

                 2) The TUT should immediately begin probing after a burst of 1300 Hz for 500 or 700 ms followed by 1 s of silence.

Comments: The probe sent by the TUT will depend on the country setting.

IV.5.4.3.21   V.23 reverse mode (1300 Hz) detection

Identifier: ANS-21

Purpose: To ensure correct detection and selection of V.23 reverse mode.

Preamble: N/A

Method: The tester sends 1300 Hz only, with no XCI signals, to TUT for 5 s.

Pass criteria: The TUT should respond with 390 Hz after 1.7 ± 0.1 s.

Comments: The TUT should indicate that V.23 mode has been selected.

IV.5.4.3.22 1300 Hz with XCI test

Identifier: ANS-22

Purpose: To ensure correct detection of the XCI signal and selection of V.18 mode.

Preamble: N/A

Method: The tester sends XCI signal as defined in 3.1.1/V.18. On reception of ANS it will become silent for 500 ms then transmit the TXP signal in V.21(1) mode.

Pass criteria: The TUT should respond with TXP using V.21(2) and select V.18 mode.

Comments: –

IV.5.4.3.23 Stimulate mode country settings

Identifier: ANS-23

Purpose: To ensure that the TUT steps through the probes in the specified order for the country selected.

Preamble: The TUT should be configured for each of the possible probe orders specified in Appendix 1/V.18 in turn.

Method: The tester will call the TUT, wait for Ta to expire and then monitor the probes sent by the TUT.

Pass criteria: The TUT should use the orders described in Appendix I/V.18.

Comments: The order of the probes is not mandatory.

IV.5.4.3.24 Stimulate carrierless mode probe message

Identifier: ANS-24

Purpose: To ensure that the TUT sends the correct probe message for each of the carrierless modes.

Preamble: –

Method: The tester will call the TUT, wait for Ta to expire and then monitor the probes sent by the TUT.

Pass criteria: The TUT should send the user defined probe message for Annex A, B and C/V.18 modes followed by a pause of Tm (default 3) s.

Comments: The carrierless modes are those described in Annexes A, B and C/V.18.

IV.5.4.3.25 Interrupted carrierless mode probe

Identifier: ANS-25

Purpose: To ensure that the TUT continues probing from the point of interruption a maximum of 20 s after a failed connect attempt.

Preamble: The TUT should be configured for the United Kingdom country setting.

Method: The tester will call the TUT, wait for Ta to expire and then during the pause after the first Baudot probe it will send a 200 ms burst of 1270 Hz followed by silence for 30 s.

Pass criteria: The TUT should transmit silence on detecting the 1270 Hz tone and then continue probing starting with the V.23 probe 20 s after the end of the 1270 Hz signal.

Comments: –

IV.5.4.3.26 Stimulate carrier mode probe time

Identifier: ANS-26

Purpose: To ensure that the TUT sends each carrier mode for time Tc (default 6 s) preceded by the correct answer tone.

Preamble: None

Method: The tester will call the TUT, wait for Ta to expire and then monitor the probes sent by the TUT.

Pass criteria: The TUT should send the ANS tone (2100 Hz) for 1 s followed by silence for 75 ± 5 ms and then the 1650 Hz, 1300 Hz and 2225 Hz probes for time Tc.

Comments: The carrier modes are those described in Annexes D, E and F/V.18.

IV.5.4.3.27 V.23 mode (390 Hz) detection

Identifier: ANS-27

Purpose: To confirm correct selection of V.23 mode.

Preamble: N/A

Method: The tester waits until the 1300 Hz probe is detected from the TUT and then transmits 390 Hz for 11 s.

Pass criteria:
1) After 3 s of the 390 Hz signal the TUT should indicate that V.23 has been selected.

2) The tester will confirm that the 1300 Hz carrier is maintained for at least 4 s beyond the normal probe duration i.e. Tc (= 6 s default) + 4 s = 10 s total.

Comments: All known V.23 devices need to receive 1300 Hz tone before they will respond with 390 Hz. When the 1300 Hz probe is not being transmitted, a 390 Hz tone may be interpreted as a 400 Hz network tone.

IV.5.4.3.28 Interrupted carrier mode probe

Identifier: ANS-28

Purpose: To ensure that the TUT continues probing from the point of interruption a maximum of 4 s after a failed connect attempt.

Preamble: The TUT should be configured for the United Kingdom country setting.

Method: The tester will call the TUT, wait for Ta to expire and then during the first V.21 probe it will send a 200 ms burst of 1270 Hz followed by silence for 30 s.

Pass criteria: The TUT should transmit silence on detecting the 1270 Hz tone and then continue probing with the Baudot stored message 4 s after the end of the 1270 Hz burst.

Comments: It is most likely that the TUT will return to probing time Ta (3 s) after the 1270 Hz tone ceases. This condition needs further clarification.

IV.5.4.3.29 Stimulate mode response during probe

Identifier: ANS-29

Purpose: To ensure that the TUT is able to detect an incoming signal while transmitting a carrier mode probe.

Preamble: –

Method:	The tester will step through each possible response as defined in tests ANS-08 to ANS-23 for each of the carrier mode probes and for each pause after a carrierless mode probe message.
Pass criteria:	The TUT should respond as described in the appropriate test above.
Comments:	The TUT may not respond to any signals while a carrierless mode probe is being sent since these modes are half duplex.

IV.5.4.3.30 Immunity to network tones

Identifier:	ANS-30
Purpose:	To ensure that the TUT does not interpret network tones as valid signals.
Preamble:	N/A
Method:	The tester will first send a busy tone to the TUT this will be followed by a number unobtainable tone. The frequencies and cadences of the tones will vary according to the country setting. The tester must be configured for the same country as the TUT.
Pass criteria:	The countries supported by the TUT should be noted along with the response to each tone. The tones should either be ignored or reported as the relevant network tone to the user.
Comments:	V.18 is required to recognize and report RINGING and BUSY tones. Other network tones may be ignored. Some devices may only provide a visual indication of the presence and cadence of the tones for instance by a flashing light.

IV.5.4.3.31 Immunity to fax calling tones

Identifier:	ANS-31
Purpose:	To determine whether the TUT can discriminate fax calling tones.
Preamble:	–
Method:	The tester will call the TUT and send the fax calling tone, CNG. This is an 1100 Hz tone with cadence of 0.5 s ON and 3 s OFF as defined in T.30.
Pass criteria:	The TUT should not respond to this signal and may report it as being a calling fax machine.
Comments:	This is an optional test as detection of the fax calling tone is not required by V.18.

IV.5.4.3.32 Immunity to voice

Identifier:	ANS-32
Purpose:	To ensure that the TUT does not misinterpret speech as a valid textphone signal.
Preamble:	N/A
Method:	The tester will respond with sampled speech. A number of phrases recorded from typical male and female speakers will be transmitted. This will include a typical network announcement.
Pass criteria:	The TUT should ignore the speech.
Comments:	Ideally the TUT should report the presence of speech back to the user. This is an optional test.

IV.5.4.4 Automode monitor tests

For the following tests, the TUT must be set to monitor mode as defined in 5.3/V.18 "Automoding Monitor Mode". These tests should be the same as the automode answer case except that the stimulate tests are not applicable and the calling tone test should result only in the TUT reporting the fact that a calling tone has been detected.

IV.5.4.4.1 Automode monitor Ta timer test

Identifier: MON-21

Purpose: To ensure that on entering monitor mode, timer Ta (3 s) is not active and that the TUT does not enter the probing state.

Preamble: N/A

Method: The TUT should be put into monitor state. The tester will then monitor for signals for 1 minute.

Pass criteria: The TUT should not start probing.

Comments: –

IV.5.4.4.2 Automode monitor 1300 Hz calling tone discrimination

Identifier: MON-22 (a) to (d)

Purpose: To confirm correct detection and reporting of 1300 Hz calling tones as defined in Recommendation V.25.

Preamble: N/A

Method: The tester will send 1300 Hz bursts of (a) 400 ms, (b) 500 ms, (c) 700 ms and (d) 800 ms followed by 1 s of silence.

Pass criteria:
1) The TUT should not respond to bursts of 400 or 800 ms.
2) The TUT should report detection of calling tones to the DTE after a burst of 1300 Hz for 500 or 700 ms followed by 1 s of silence.

Comments: In automode answer, the 1300 Hz calling causes the DCE to start probing. In monitor mode it should only report detection to the DTE.

IV.5.4.4.3 Automode monitor 980 Hz calling tone discrimination

Identifier: MON-23 (a) to (d)

Purpose: To confirm correct detection and reporting of 980 Hz calling tones as defined in Recommendation V.25.

Preamble: N/A

Method: The tester will send 980 Hz bursts of (a) 400 ms, (b) 500 ms, (c) 700 ms and (d) 800 ms followed by 1 s of silence.

Pass criteria:
1) The TUT should not respond to bursts of 400 or 800 ms.
2) The TUT should report detection of calling tones to the DTE after a burst of 980 Hz for 500 or 700 ms followed by 1 s of silence.

Comments: In automode answer, the 980 Hz calling causes the DCE to start probing. In monitor mode it should only report detection to the DTE.

IV.5.4.5 V.18 annexes tests

The following tests verify features required in Annexes A to F/V.18.

IV.5.4.5.1   Baudot carrier timing and receiver disabling

Identifier: X-1

*Purpose***:**   To verify that the TUT sends unmodulated carrier for 150 ms before a new character and disables its receiver for 300 ms after a character is transmitted.

Preamble: Establish a call between the tester and TUT in Baudot mode.

Method: The operator should send a single character from the TUT. The tester will immediately start sending a unique character sequence. Examination of the TUT display will show when its receiver is re-enabled.

Pass criteria: 1) The TUT should send unmodulated carrier for 150 ms before the beginning of the start bit.

2) The receiver should be re-enabled after 300 ms.

3) The tester will confirm that 1 start bit and at least 1.5 stop bits are used.

Comments: The carrier should be maintained during the 300 ms after a character.

IV.5.4.5.2   Baudot bit rate confirmation

Identifier: X-2 (a) and (b)

*Purpose***:**   To verify that the TUT uses the correct bit rates in the Baudot mode.

Preamble: Establish a call between the tester and TUT in Baudot mode for each of the two tests.

Method: The operator should select Baudot (a) 45 bit/s followed by (b) 50 bit/s modes and transmit the string "abcdef" at each rate.

Pass criteria: The tester will measure the bit timings and confirm the rates.

Comments: –

IV.5.4.5.3   Baudot probe bit rate confirmation

Identifier: X-3

*Purpose***:**   To verify that the TUT uses the correct bit rates in the Baudot mode probe during automoding.

Preamble: Set the user defined carrierless mode probe message to the string "abcdef" if possible. Set the TUT country setting to "United States". A call should be initiated from the tester to the TUT.

Method: The tester will wait for the Baudot mode probe and measure the bit rate.

Pass criteria: The tester will measure the bit timings and confirm the rate of 47.6 bit/s.

Comments: The probe message must be long enough for the tester to establish the bit rate. "GA" may not be sufficient.

IV.5.4.5.4   5-bit to T.50 character conversion

Identifier: X-4

Purpose: To check that the character conversion tables in Annex A/V.18 have been correctly implemented.

Preamble: Establish a call between the tester and TUT in Baudot mode at 45 bit/s.

Method:	The tester will send all possible characters preceded by the relevant case shift command one at a time and wait for a response from the TUT operator. Each character should be responded to at the TUT by typing the received character or <CR> if the character is not available.

Pass criteria:	1) The tester will verify that each character is correctly echoed back by the TUT. The operator should verify that each character is correctly displayed on the TUT.
	2) The TUT will send the LTRS symbol before its first character and the appropriate mode character (either LTRS or FIGS) after every 72 subsequent characters.

Comments:	The tester should indicate which character has been sent in each case. Some of the characters may not be available from the TUT keyboard and can be ignored. It is assumed that the character conversion is the same for Baudot at 50 bit/s and any other supported speed.

IV.5.4.5.5 DTMF receiver disabling

Identifier:	X-5
Purpose:	To verify that the TUT disables its DTMF receiver for 300 ms when a character is transmitted.
Preamble:	Establish a call between the tester and TUT in DTMF mode.
Method:	The operator should send a single "e" character from the TUT which will result in sending a single DTMF tone to the tester. The tester will immediately start sending a unique character sequence using single DTMF tones. Examination of the TUT display will show when its receiver is re-enabled.
Pass criteria:	The receiver should be re-enabled after 300 ms.
Comments:	–

IV.5.4.5.6 DTMF character conversion

Identifier:	X-6
Purpose:	To check that the character conversion tables in Annex B/V.18 have been correctly implemented.
Preamble:	Establish a call between the tester and TUT in DTMF mode.
Method:	The tester will send each character from the set in Annex B/V.18, waiting for a response after each one. Each character should be responded to at the TUT by typing the same character.
Pass criteria:	The tester will verify that each character is correctly echoed back by the TUT.
Comments:	The conversion table is specified in Annex B/V.18. The receiver at the tester may be re-enabled 100 ms after transmission of each character to maximise likelihood of receiving character from the TUT. It is assumed that the echo delay in the test system is negligible.

IV.5.4.5.7 EDT carrier timing and receiver disabling

Identifier:	X-7
Purpose:	To verify that the TUT sends unmodulated carrier for 300 ms before a character and disables its receiver for 300 ms after a character is transmitted.

Preamble: Establish a call between the tester and TUT in EDT mode.

Method: The operator should send a single character from the TUT. The tester will immediately start sending a unique character sequence. Examination of the TUT display will show when its receiver is re-enabled.

Pass criteria: 1) The TUT should send unmodulated carrier for 300 ms before the beginning of the start bit.

2) The receiver should be re-enabled after 300 ms.

3) The tester will confirm that 1 start bit and at least 1.5 stop bits are used.

Comments: The carrier should be maintained during the 300 ms after a character.

IV.5.4.5.8   EDT bit rate and character structure

Identifier: X-8

*Purpose***:**   To verify that the TUT uses the correct bit rate and character structure in the EDT mode.

Preamble: Establish a call between the tester and TUT in EDT mode.

Method: The operator should transmit the string "abcdef" from the TUT.

Pass criteria: 1) The tester should measure the bit timings and confirm that the rate is 110 bit/s.

2) The tester should confirm that 1 start bit, 7 data bits, 1 even parity bit and 2 stop bits are used.

Comments: –

IV.5.4.5.9   V.23 calling mode character format

Identifier: X-9

*Purpose***:**   To verify that the TUT uses the correct character format in the V.23 calling mode.

Preamble: Establish a call from the TUT to the tester in V.23 mode.

Method: The operator should transmit the string "abcdef" from the TUT. The tester will echo characters back to the TUT as they are received. The tester will then transmit the string "abcdef" with ODD parity to the TUT.

Pass criteria: 1) Confirm that 1 start bit, 7 data bits, 1 even parity bit and 2 stop bits are transmitted.

2) The operator should confirm that there is no local echo at the TUT by checking that there are no duplicate characters on the TUT display.

3) The received string should be correctly displayed despite the incorrect parity.

Comments: –

IV.5.4.5.10 V.23 answer mode character format

Identifier: X-10

*Purpose***:**   To verify that the TUT uses the correct character format in the V.23 answer mode.

Preamble: Establish a call from the tester to the TUT in V.23 mode.

Method: The tester will transmit the string "abcdef" with ODD parity. The TUT should echo characters back to the tester as they are received. The operator should then transmit the string "abcdef" from the TUT.

Pass criteria: 1) The received string should be correctly displayed at the TUT despite the incorrect parity.

2) Confirm that 1 start bit, 7 data bits, 1 even parity bit and 2 stop bits are transmitted by the TUT.

3) The tester should confirm that there is remote echo from TUT.

4) The operator should confirm that there is local echo on the TUT.

Comments: This test is only applicable to Minitel *Dialogue* terminals. Prestel and Minitel *Normal* terminals cannot operate in this mode.

IV.5.4.5.11 V.21 character structure

Identifier: X-11

*Purpose***:** To verify that the TUT uses the character structure in the V.21 mode.

Preamble: Establish a call from the TUT to the tester in V.21 mode.

Method: The operator should transmit a string from the TUT that is long enough to cause the display to word wrap followed by "abcdef", new line (CR+LF). The tester will then transmit the string "123456", BACKSPACE (0/8) with ODD parity to the TUT.

Pass criteria: 1) The tester should confirm that 1 start bit, 7 data bits, 1 even parity bit and 1 stop bits are transmitted.

2) The word wrap should not result in CR+LF.

3) The forced new line should be indicated by CR+LF.

4) The last five characters on the TUT display should be "12345" (no "6") correctly displayed despite the incorrect parity.

Comments: –

IV.5.4.5.12 V.18 mode

Identifier: X-12

*Purpose***:** To verify that the TUT uses the protocol defined in Recommendation T.140.

Preamble: Establish a call from the TUT to the tester in V.18 mode.

Method: The operator should transmit a string from the TUT that is long enough to cause the display to word wrap followed by "abcdef", new line (CR+LF), new line (UNICODE preferred). The tester will then transmit the string "123456", BACKSPACE.

Pass criteria: The tester should confirm UTF8 encoded UNICODE characters are used with the controls specified in Recommendation T.140.

Comments: –

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