$Id: README.audio,v 1.8 1999/07/11 17:17:29 armin Exp $

ISDN subsystem for Linux.
  Description of audio mode.

When enabled during kernel configuration, the tty emulator of the ISDN
subsystem is capable of a reduced set of commands to support audio.
This document describes the commands supported and the format of
audio data.

Commands for enabling/disabling audio mode:

        AT+FCLASS=8   Enable audio mode.
                           This affects the following registers:
                             S18: Bits 0 and 2 are set.
                             S16: Set to 48 and any further change to
                                   larger values is blocked.
        AT+FCLASS=0   Disable audio mode.
                           Register 18 is set to 4.
        AT+FCLASS=?   Show possible modes.
        AT+FCLASS?   Report current mode (0 or 8).

Commands supported in audio mode:

All audio mode commands have one of the following forms:

        AT+Vxx?   Show current setting.
        AT+Vxx=?   Show possible settings.
        AT+Vxx=v   Set simple parameter.
        AT+Vxx=v,v ...   Set complex parameter.

where xx is a two-character code and v are alphanumerical parameters.
The following commands are supported:

        AT+VNH=x   Auto hangup setting. NO EFFECT, supported
                           for compatibility only.
        AT+VNH?   Always reporting "1"
        AT+VNH=?   Always reporting "1"

        AT+VIP   Reset all audio parameters.

        AT+VLS=x   Line select. x is one of the following:
                             0 = No device.
                             2 = Phone line.
        AT+VLS=?   Always reporting "0,2"
        AT+VLS?   Show current line.

        AT+VRX   Start recording. Emulator responds with
                           CONNECT and starts sending audio data to
                           the application. See below for data format

        AT+VSD=x,y   Set silence-detection parameters.
                           Possible parameters:
                             x = 0 ... 31 sensitivity threshold level.
                                     (default 0 , deactivated)
                             y = 0 ... 255 range of interval in units

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                                    of 0.1 second.  (default 70)
        AT+VSD=?          Report possible parameters.
        AT+VSD?           Show current parameters.

        AT+VDD=x,y        Set DTMF-detection parameters.
                          Only possible if online and during this connection.
                          Possible parameters:
                            x = 0 ... 15  sensitivity threshold level.
                                          (default 0 , I4L soft-decode)
                                          (1-15 soft-decode off, hardware on)
                            y = 0 ... 255 tone duration in units of 5ms.
                                          Not for I4L soft decode (default 8,
40ms)
        AT+VDD=?          Report possible parameters.
        AT+VDD?           Show current parameters.

        AT+VSM=x          Select audio data format.
                          Possible parameters:
                            2 = ADPCM-2
                            3 = ADPCM-3
                            4 = ADPCM-4
                            5 = aLAW
                            6 = uLAW
        AT+VSM=?          Show possible audio formats.

        AT+VTX            Start audio playback. Emulator responds
                          with CONNECT and starts sending audio data
                          received from the application via phone line.
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General behavior and description of data formats/protocol.
    when a connection is made:

    On incoming calls, if the application responds to a RING
    with ATA, depending on the calling service, the emulator
    responds with either CONNECT (data call) or VCON (voice call).

    On outgoing voice calls, the emulator responds with VCON
    upon connection setup.

  Audio recording.

    When receiving audio data, a kind of bisync protocol is used.
    Upon AT+VRX command, the emulator responds with CONNECT, and
    starts sending audio data to the application. There are several
    escape sequences defined, all using DLE (0x10) as Escape char:

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    <DLE><ETX>              End of audio data. (i.e. caused by a
                            hangup of the remote side) Emulator stops
                            recording, responding with VCON.
    <DLE><DC4>              Abort recording, (send by appl.) Emulator
                            stops recording, sends DLE,ETX.
    <DLE><DLE>              Escape sequence for DLE in data stream.
    <DLE>0                  Touchtone "0" received.
      ...
    <DLE>9                  Touchtone "9" received.
    <DLE>#                  Touchtone "#" received.
    <DLE>*                  Touchtone "*" received.
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<DLE>A	Touchtone "A" received.
<DLE>B	Touchtone "B" received.
<DLE>C	Touchtone "C" received.
<DLE>D	Touchtone "D" received.

<DLE>q	quiet. Silence detected after non-silence.
<DLE>s	silence. Silence detected from the start of recording.

Currently unsupported DLE sequences:

<DLE>c	FAX calling tone received.
<DLE>b	busy tone received.

Audio playback.

When sending audio data, upon AT+VTX command, emulator responds with CONNECT, and starts transferring data from application to the phone line. The same DLE sequences apply to this mode.

Full-Duplex-Audio:

When _both_ commands for recording and playback are given in _one_ AT-command-line (i.e.: "AT+VTX+VRX"), full-duplex-mode is selected.
   In this mode, the only way to stop recording is sending <DLE><DC4> and the only way to stop playback is to send <DLE><ETX>.