

Proprietary Extension for

COMMON-ISDN-API

Version 2.0

Extended Modem Configuration

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Dialogic Corporation

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Motivation:

To enable specific analog modem applications via **COMMON-ISDN-API**, it is necessary to extend the current B1 protocol 7 (modem with full negotiation) with some additional configuration parameters. This document describes a manufacturer-specific extension to the **COMMON-ISDN-API** that enables extended control over modem settings.

It was sought was to minimize the additions required in a CAPI application in order to make use of the extension; therefore, the parameters are passed via additional structs in the B1 configuration of B1 protocol 7. This means that there could be a risk of conflict with future official extensions of the **COMMON-ISDN-API**. To prevent incompatibilities, support for extended modem configuration has to be enabled explicitly in one of the two ways described below so as to turn off any future CAPI extension that would cause incompatibility.

1. Support can be enabled by the application for a designated controller through a manufacturer request command 9 (Options request) with bit 7 (Enable extended modem configuration) set. It will remain active until the application either releases the **COMMON-ISDN-API** or issues another options request with bit 7 not set. This is the recommended method.

2. Support can be enabled for the duration of a physical connection by setting bit 14 of the speed negotiation parameter in the B1 configuration of B1 protocol 7.

An application can determine whether the **COMMON-ISDN-API** supports extended modem configuration by examining the CAPI profile and searching the manufacturer string for "Eicon" or by examining the CAPI profile and trying the manufacturer command 9 as described below.

Release notes:

Changes since the first version from 9.2.2001:

- Introduced the bit *Disable async framer flush timer* in the *Extended options* word that enables an application to switch off the timer that flushes received data in the async rx framer not later than 100 ms after the first new character was received. This was a request in conjunction with the V.23 half duplex mode.

Changes since the second version from 21.2.2001:

- Added the bit *V.22 Diva[®] Fast Setup* in the *Enabled modulations mask* word and related values in the *connected norm* parameter of the CTS_ON and DCD_ON indication to be able to support these modulations. They are used in conjunction with point of sales (POS) terminals.

Changes since the third version from 10.8.2002:

V.23 HDX features have been extended by the following functionalities:

- Since 27.4.2002 it is allowed to set bit *V.23 according to ETS 300 659-2* (V.23 off-hook) and bit *V.23 according to ETS 300 659-1* (V.23 on-hook) of the *Enabled modulations mask* word at the same time to establish automodring. The behavior of the modulation is that it waits silently until one of the startup sequences is detected. Then it enters the data state with this modulation, i.e. all data that need to be

sent will be sent using this modulation and only frames with this modulation will be received. When the bit *Bypass protocol* in the *Extended options* word is set, the transition to data state will be indicated by a CTS ON and a DCD ON message as described in annex E.2.

- A new bit *Enable empty frames* has been added to the *Extended options* word. When this bit is set, it is allowed to issue data packets with length 0. They are sent to the line as V.23 frames with no data content. If a frame without data content is received, it will be indicated to the application as data packet with length 0. This feature might be used together with the automodding facility described above. In that case, an empty frame will be accepted in the process of determining the modulation used by the peer device.
- A bit *Enable multimodding* has been added to the *Extended options* word. If this bit is set, the first byte of every data packet is treated as modulation tag (refer to annex F). On a received packet it indicates in which norm this frame was modulated. For a packet that has to be sent, the modulation selected via its modulation tag byte will be used. This mode of operation might be used together with the Enable empty frames bit. Then, the **COMMON-ISDN-API** will indicate frames without data content as packets consisting of only the modulation tag byte. When both bits *V.23 according to ETS 300 659-2* and *V.23 according to ETS 300 659-1* are set, both type of frames are recognized and reported to the application.

Changes since the fourth version from 23.8.2002:

- Added support for automodding from V.22 FC to ITU-T modulations. A COMMON-ISDN-API application may just select B1 protocol 7, B2 protocol 7 and B3 protocol 7.
- Added extended parameter fields *Extended modem protocol configuration* and *SDLC modem protocol configuration* in the *B2 configuration* struct for more detailed control of the Modem protocol and to be able to pass the SDLC parameters that are required when automodding results in a V.22 Fast Setup connection with SDLC protocol.

Changes since the fifth version from 4.10.2002:

- Added the possibility to force SDLC modem operation for standard ITU-T modulations by setting bit 0 *disable V.42 / V.42 bis*, bit 1 *disable MNP4 / MNP5* and bit 2 *disable transparent mode* of the modem options at the same time.
- There are two separate bits to disable step-up and step-down.

Changes since the sixth version from 13.1.2003:

- Added the bit *Bell 202 (Caller ID)* in the *Enabled modulations mask* word and the related value in the *connected norm* parameter of the CTS_ON and DCD_ON indication. This modulation is used in some countries for caller ID transmission in the PSTN.

Changes since the seventh version from 13.1.2004:

- Added support for break signaling via annex *G.1 Break signaling requests* and *G.2 Break signaling indications*.
- Added the bits *V21, 10 bit/s* and *Bell 202 (POS)* in the *Enabled modulations mask* word and the related value in the *connected norm* parameter of the CTS_ON and DCD_ON indication. Bell 202 (POS) is used in some environments for point of sales transactions.

Changes since the eighth version from 13.7.2005:

- Included additional options for SDLC operation in the *SDLC options* field of the *SDLC modem configuration*. The option *single data packets* forces SDLC to send out every data packet individually with poll/final bit set. This is needed for interoperability with most POS terminals. *Reverse establishment* reverts the roles during link establishment. If set, the DCE sends SNRM. It's mandatory for operation with POS terminals. If *explicit data acknowledgement* is set every received data packet is acknowledged immediately by a RR frame. This is optional and may be useful in some applications. *Fast poll recovery* enables a workaround for a certain POS terminal where the loss of a frame with poll/final bit set must be recovered quickly to achieve interoperability, therefore its use for POS operation is recommended. If *initiate fast establishment* is set, a RR frame is sent out immediately instead of SNRM. To skip the SNRM/UA frames this way will result in a faster link establishment if the peer supports it.

4.2.2.7 CAPI_GET_PROFILE

Applications call CAPI_GET_PROFILE to retrieve capability information from **COMMON-ISDN-API**. **COMMON-ISDN-API** copies information about implemented features, the total number of controllers and protocols supported by the requested controller to a 64-byte buffer passed by the calling application. The application must ignore unknown bits. **COMMON-ISDN-API** sets every reserved field to zero. CAPI_GET_PROFILE fills the buffer with the following structure:

| Type | Description |
|---------|---|
| 2 bytes | number of installed controllers, least significant byte first |
| 2 bytes | number of supported B-channels, least significant byte first |
| 4 bytes | Global Options (bit field): [0]: internal controller supported [1]: external equipment supported [2]: Handset supported (external equipment must also be set) [3]: DTMF supported [4]: Supplementary Services (see Part III) [5]: channel allocation supported (leased lines) [6]: parameter <i>B channel operation</i> supported [7]: Line Interconnect supported [8]...[31]: reserved |
| 4 bytes | B1 protocol support (bit field): [0]: 64 kbit/s with HDLC framing, always set. [1]: 64 kbit/s bit-transparent operation with byte framing from the network [2]: V.110 asynchronous operation with start/stop byte framing [3]: V.110 synchronous operation with HDLC framing [4]: T.30 modem for fax group 3 [5]: 64 kbit/s inverted with HDLC framing. [6]: 56 kbit/s bit-transparent operation with byte framing from the network [7]: Modem with all negotiations [8]: Modem asynchronous operation with start/stop byte framing [9]: Modem synchronous operation with HDLC framing [10]...[31]: reserved |
| 4 bytes | B2 protocol support (bit field): [0]: ISO 7776 (X.75 SLP), always set [1]: Transparent [2]: SDLC [3]: LAPD in accordance with Q.921 for D-channel X.25 (SAPI 16) [4]: T.30 for fax group 3 [5]: Point-to-Point Protocol (PPP) [6]: Transparent (ignoring framing errors of B1 protocol) [7]: Modem error correction and compression (V.42 <i>bis</i> or MNP5) [8]: ISO 7776 (X.75 SLP) modified supporting V.42 <i>bis</i> compression [9]: V.120 asynchronous mode [10]: V.120 asynchronous mode supporting V.42 <i>bis</i> [11]: V.120 bit-transparent mode [12]: LAPD in accordance with Q.921 including free SAPI selection [13]...[31]: reserved |

| | |
|----------|---|
| 4 bytes | B3 protocol support (bit field): [0]: Transparent, always set [1]: T.90NL with compatibility to T.70NL in accordance to T.90 Appendix II. [2]: ISO 8208 (X.25 DTE-DTE) [3]: X.25 DCE [4]: T.30 for fax group 3 [5]: T.30 for fax group 3 with extensions [6]: reserved [7]: Modem [8]...[31]: reserved |
| 24 bytes | reserved for COMMON-ISDN-API use |
| 4 bytes | Private options (bit field): [0]...[6]: reserved [7]: Extended modem configuration supported [8]...[31]: reserved |
| 16 bytes | Manufacturer-specific information |

CAPI_GET_PROFILE information structure

Manu ID (dword)

The purpose of the parameter *Manu ID* is to communicate a dword which identifies the manufacturer in MANUFACTURER messages. Every manufacturer supplying MANUFACTURER messages should choose a unique value (such as an abbreviation of the company name).

The manufacturer ID used by Dialogic is:

0x44444944

This information element appears in:

**MANUFACTURER_REQ
MANUFACTURER_RESP
MANUFACTURER_CONF
MANUFACTURER_IND**

Manufacturer Specific

The purpose of the parameter *manufacturer specific* is to exchange manufacturer-specific information.

Manufacturer specific information for MANUFACTURER_REQ:

| | | |
|--------|---------------------------------|--|
| word | manufacturer command | Manufacturer-specific operation requested. |
| struct | manufacturer command parameters | Command-dependent parameters for manufacturer request. |

Manufacturer specific information for MANUFACTURER_CONF:

| | | |
|------|----------------------|---|
| word | manufacturer command | Manufacturer-specific operation that was requested. |
| word | info | Result of the operation according to COMMON-ISDN-API definition of Info. |

This information element appears in:

**MANUFACTURER_REQ
MANUFACTURER_RESP
MANUFACTURER_CONF
MANUFACTURER_IND**

Manufacturer Command

The purpose of the parameter *manufacturer command* is to specify the kind of operation requested in a MANUFACTURER_REQ.

The following manufacturer commands are defined:

- 1: Assign PLCI
- 2: Advanced Codec control
- 3: DSP control
- 4: Signaling control
- 5: RXT control
- 6: IDI control
- 7: Configuration control
- 8: Remove Codec
- 9: Options request

This information element appears in:

Manufacturer Specific

Manufacturer Command Parameters

The purpose of the parameter *manufacturer command parameters* is to specify command dependent parameters.

Parameters for manufacturer command 9: Options Request:

| | | |
|-------|--------------|---|
| dword | Options mask | Manufacturer-specific options that have to be enabled: [Bit 0..6]: reserved, must be set to 0 [Bit 7]: Enable extended modem configuration [Bit 8..31]: reserved, must be set to 0 |
|-------|--------------|---|

This information element appears in:

Manufacturer Command

Protocol-dependent parameters

B1 Configuration (struct)

The purpose of the sub-parameter *B1 configuration* is to provide additional configuration information for the B1 protocol.

The coding of the parameter *B1 configuration* for each protocol is described below:

B1 Configuration for B1 protocol 7: Modem with full negotiation:

| | | |
|--------|------------------------------|---|
| word | maximum bit rate | coded as unsigned integer value, default: adaptive |
| word | bits per character | coded as unsigned integer value, default: 8 |
| word | parity | 0: none, 1: odd, 2: even (default: no parity) |
| word | stop bits | 0: 1 stop bit, 1: 2 stop bit (default: 1 stop bit) |
| word | options | [Bit 0]: disable retrain [Bit 1]: disable ring tone [Bits 3...2]: guard tone: 00: no guard tone (default) 01: 1800hz 10: 550hz [Bits 5...4]: loudspeaker 00: off 01: on during dialing and negotiation (default) 10: always on [Bits 7...6]: loudspeaker volume 00: silent 01: normal low (default) 10: normal high 11: maximum |
| byte | speed negotiation | 0: none, 1: within modulation class, 2: V.100, 3: V.8 (default) Note: The highest implemented negotiation mode is used as default. |
| byte | proprietary options | proprietary options that are valid for the scope of this B-protocol configuration: [Bit 6]: Enable extended modem configuration |
| struct | Extended modem configuration | Extended configuration settings for standard data modem |

Extended modem configuration:

| | | |
|-------|---------------------------|---|
| dword | Extended options | <p>Extended modem options:</p> <ul style="list-style-type: none"> [Bit 0] : Leased line mode [Bit 1] : 4-wire operation [Bit 2] : Disable disconnect on busy tone [Bit 3] : Disable calling tone [Bit 4] : Disable answer tone [Bit 5] : Enable dial tone detection [Bit 6..7] : reserved [Bit 8] : Disable retrain [Bit 9] : Disable step-down [Bit 10] : Disable split speed [Bit 11] : Disable trellis coding [Bit 12] : Allow RDL test loop [Bit 13] : Disable step-up [Bit 14] : Disable async framer flush timer [Bit 15] : reserved [Bit 16] : Enable empty frames [Bit 17] : Enable multimoding [Bit 18..30] : reserved [Bit 31] : Bypass protocol |
| dword | Disabled modulations mask | <p>Disabled automode modulations:</p> <ul style="list-style-type: none"> [Bit 0] : Disable V.21 [Bit 1] : Disable V.23 [Bit 2] : Disable V.22 [Bit 3] : Disable V.22 bis [Bit 4] : Disable V.32 [Bit 5] : Disable V.32 bis [Bit 6] : Disable V.34 [Bit 7] : Disable V.90 DPCM [Bit 8] : Disable Bell 103 [Bit 9] : Disable Bell 212 A [Bit 10] : Disable V.FC [Bit 11] : Disable K56 flex [Bit 12] : Disable X.2 [Bit 13..31] : reserved |
| dword | Enabled modulations mask | <p>Enabled modulations:</p> <ul style="list-style-type: none"> [Bit 0] : V.29 FDX [Bit 1] : V.33 [Bit 2] : V.90A [Bit 3] : V.22 Diva® Fast Setup [Bit 4] : reserved for V.22 bis Diva Fast Setup [Bit 5] : reserved for V.29 Diva Fast Setup [Bit 6-8] : reserved [Bit 9] : V.23 according to ETS 300 659-2 [Bit 10] : V.23 according to ETS 300 659-1 [Bit 11] : reserved [Bit 12] : Bell 202 (Caller ID) [Bit 13] : V.21, 10 bit/s [Bit 14] : Bell 202 (POS) [Bit 15-31] : reserved |
| word | Minimum transmit speed | Minimum transmit speed coded as unsigned integer Value 0 will set the default |
| word | Maximum transmit speed | Maximum transmit speed coded as unsigned integer Value 0 will set the default |
| word | Minimum receive speed | Minimum receive speed coded as unsigned integer Value 0 will set the default |
| word | Maximum receive speed | Maximum receive speed coded as unsigned integer Value 0 will set the default |
| word | Transmit level adjust | Transmit level in dBm, coded as 2-s complement signed integer. Valid range: -1..-15 dBm Value 0 will set the default |

| | | |
|------|--------------|---|
| word | V.34 Options | Specific V.34 options: [Bit 0] : Disable transmit level reduction [Bit 1] : Disable pre-coding [Bit 2] : Disable pre-emphasis [Bit 3] : Disable shaping [Bit 4] : Disable non-linear encoding [Bit 5] : Disable manual reduction [Bit 6] : Disable 16 point training [Bit 7] : reserved [Bit 8] : Disable symbol rate 2400 [Bit 9] : Disable symbol rate 2743 [Bit 10] : Disable symbol rate 2800 [Bit 11] : Disable symbol rate 3000 [Bit 12] : Disable symbol rate 3200 [Bit 13] : Disable symbol rate 3429 [Bit 14-15] : reserved |
|------|--------------|---|

B2 Configuration (struct)

The purpose of the sub-parameter *B2 configuration* is to provide additional configuration information for the B2 protocol.

The coding of the parameter B2 configuration for each protocol is described below:

B2 Configuration for B2 protocol 7: Modem with full negotiation:

| | | |
|--------|---------------------------------------|--|
| word | options | [Bit 0]: disable V.42 / V.42 bis [Bit 1]: disable MNP4/MNP5 [Bit 2]: disable transparent mode (accept only V.42 / V.42 bis or MNP4/5 connects) [Bit 3]: disable V.42 negotiation [Bit 4]: disable compression [other]: reserved |
| struct | Extended modem protocol configuration | |
| struct | SDLC modem protocol configuration | |

Note: When bit 0 *disable V.42 / V.42 bis*, bit 1 *disable MNP4 / MNP5* and bit 2 *disable transparent mode* are set at the same time, SDLC will be taken as error correction protocol.

Extended modem protocol configuration:

| | | |
|------|------------------------------|--|
| byte | Extended protocol options | Extended modem protocol options: [Bit 0..4] : reserved [Bit 5] : require protocol if V.34 or above [Bit 6] : disable SDLC [Bit 7] : reserved |
| byte | Extended negotiation options | [Bit 0] : no protocol if 1200 Bit/s [Bit 1] : buffer during V.42 detection [Bit 2] : disable V.42 selective reject [Bit 3] : disable MNP 3 [Bit 4] : disable MNP 4 [Bit 5] : disable MNP 10 [Bit 6] : no protocol if V.22 bis [Bit 7] : no protocol if V.32 bis |
| byte | Break configuration | 0 : break disabled 1 : break normal 2 : break expedited 3 : break destructive |
| byte | Application options | [Bit 0] : early connect [Bit 1] : pass indications [Bit 2..7] : reserved |

SDLC modem configuration:

| | | |
|--------|--------------|--|
| byte | Address A | link address (default is 0x30) |
| byte | Address B | reserved, coded as 0 |
| byte | Modulo Mode | <ul style="list-style-type: none"> • 8 - normal operation (default) • 128 - extended operation |
| byte | Window Size | window size (default: 7) |
| struct | XID | contents of the XID response when a XID command is received |
| byte | SDLC options | [Bit 0-2] : reserved [Bit 3] : single data packets [Bit 4] : reverse establishment [Bit 5] : explicit data acknowledgement [Bit 6] : fast poll recovery [Bit 7] : initiate fast establishment |

NCPI (struct)

The purpose of the parameter *NCPI* is to provide additional protocol-specific information.

NCPI for B3 protocol 7: Modem (messages CONNECT_B3_ACTIVE_IND, DISCONNECT_B3_IND):

| | | |
|------|----------|--|
| word | rate | Actual bit rate used, coded as unsigned integer value. If receive and transmit rates are different the lower rate is displayed. |
| word | protocol | result of negotiation [Bit 0]: negotiation results in V.42 / V.42 bis [Bit 1]: negotiation results in MNP4/MNP5 [Bit 2]: negotiation results in transparent mode [Bit 3]: reserved [Bit 4]: negotiation results in compression [other]: reserved |

Note: If none of the bits 0, 1 and 2 is set, a modem connection was established with SDLC protocol.

NCPI for B3 protocol 7: Modem (messages except CONNECT_B3_ACTIVE_IND, DISCONNECT_B3_IND):

coded as an empty struct

E.2 Control Messages: Indications

When the bit *Bypass protocol* is set in the *Extended options* word, DATA_B3_IND messages with break bit (bit position 4) set in the flags field are used to signal indications from the B1 protocol modem.

The following indications are defined:

Modem DCD OFF indication

Indication that signals carrier loss for carrier mode modulations and modulation norm changes for carrierless modulations.

| | | |
|------|------------|----------|
| byte | indication | 0x01 |
| word | time stamp | reserved |

Modem DCD ON indication

Indication that signals carrier detect.

| | | |
|-------|--------------------------|--|
| byte | indication | 0x02 |
| word | time stamp | reserved |
| byte | connected norm | Connected norm 0: unspecified 1: V.21 2: V.23 3: V.22 4: V.22 bis 5: V.32 bis 6: V.34 7: reserved 8: Bell 212A 9: Bell 103 10: V.29 leased line 11: V.33 leased line 12: V.90 13..17: reserved 18: V.32 19: K56 flex 20: X.2 20..38: reserved 39: V.23 according to ETS 300 659-2 40: V.23 according to ETS 300 659-1 41: reserved 42: Bell 202 (Caller ID) 43: V.21, 10 bit/s 44: Bell 202 (POS) 45..71: reserved 72: V.22 Diva [®] Fast Setup 73: reserved for V.22 bis Diva Fast Setup 74: reserved for V.29 Diva Fast Setup |
| word | connected options | reserved |
| dword | connected speed | Maximum of transmit and receive speed in bit/s |
| word | round trip delay | Round trip delay in milliseconds |
| dword | connected transmit speed | transmit speed of the connection in bit/s |
| dword | connected receive speed | receive speed of the connection in bit/s |

Modem CTS OFF indication

Indication that signals clear to send off. For V.23 HDX modes this indication is issued at the same time as the DCD OFF indication. It might be ignored.

| | | |
|------|------------|----------|
| byte | indication | 0x03 |
| word | time stamp | reserved |

Modem CTS ON indication

Indication that signals clear to send. For V.23 HDX modes this indication is issued at the same time as the DCD ON indication. It might be ignored.

| | | |
|-------|--------------------------|--|
| byte | indication | 0x04 |
| word | time stamp | reserved |
| byte | connected norm | Connected norm. For coding see parameter <i>connected norm</i> of DCD ON indication. |
| word | connected options | reserved |
| dword | connected speed | Maximum of transmit and receive speed in bit/s |
| word | round trip delay | Round trip delay in milliseconds |
| dword | connected transmit speed | transmit speed of the connection in bit/s |
| dword | connected receive speed | receive speed of the connection in bit/s |

F Modulation tag in multimoding operation

If multimoding operation is selected via the bit *Enable multimoding* in the *Extended options* word, the first byte of every data packet is treated as modulation tag. On a received packet it indicates in which norm this frame was modulated. A packet that has to be sent, uses the modulation selected via its modulation tag byte. The frame content is represented by the second til n-th byte where n is the length of the packet and thus n-1 the length of the data content of the frame.

The coding of the modulation tag byte is as described in the parameter *connected norm* of the DCD ON indication.

G.1 Break signaling requests

DATA_B3_REQ messages with UI frames bit (bit position 4) set in the flags field are used to control the break state.

The following requests are defined:

Modem request set break

Request that starts sending break to the remote modem.

| | | |
|------|----------------|--|
| byte | request | 0x0a |
| byte | break option | 0 : break disabled 1 : break normal 2 : break expedited 3 : break destructive |
| word | break duration | break duration in milliseconds |

Modem request clear break

Request that stops sending break to the remote modem.

| | | |
|------|---------|------|
| byte | request | 0x0b |
|------|---------|------|

G.2 Break signaling indications

When the *Break configuration* is set not equal to *break disabled*, DATA_B3_IND messages with break bit (bit position 4) set in the flags field are used to signal the break state.
The following indications are defined:

Modem indication break set

Indication that signals the start of a break from the remote modem.

| | | |
|------|------------|------|
| byte | indication | 0x0a |
|------|------------|------|

Modem indication break cleared

Indication that signals the end of a break from the remote modem.

| | | |
|------|------------|------|
| byte | indication | 0x0b |
|------|------------|------|