Manual AT commands

Technical Documentation

Contents

1   Introduction

The eviateg devices are controlled with AT commands over a RS232 or USB interface. The command set is Hayes compatible, so the device can be used like a normal analog modem.

ISDN specific settings can be set with commands from the extended **AT*** command set.

1.1   Transfer modes, protocols

The eviateg devices facilitate the following protocols:

D channel protocols:

DSS1	EURO ISDN
1TR6	Legacy protocol for some PABXes
NI1, 5ESS, DMS100	American D channel protocols
X.31	Packet switched data transmission over D channel

B channel protocols:

V.110	Transfer mode in accordance with ITU-T V.110 up to 38400 bit/s
V.120	Error corrected transfer mode in accordance with ITU-T V.120 for 64000 and 56000 bit/s, as well as ISDN connections to stations in the USA
X.75	Error corrected transfer mode in accordance with ITU-T X.75 e.g. connections to ISDN PC cards
PPP	Point-to-Point protocol asynchron in accordance with RFC 1662 for TCP/IP connections, e.g. connections to routers
HDLC transparent	Transparent data transfer
Data scrambling	Error corrected scrambled data transfer
X.25	Packet switched data transmission over B channel
V.23hdx	Transmission of Fixed network SMS (FSMS)

Application protocols:

TAP, UCP	Protocols for SMS and pager gateways
ES 201912	Protocol for Fixed network SMS

1.2   Features

MSN	The device supports 3 to 8 independent Multiple Subscriber Numbers (MSN). To each MSN a separate transfer protocol and ISDN service can be assigned.
Connection monitoring	An established connection is automatically disconnected after a period of line inactivity as defined by the user.
Leased lines	Connections over ISDN leased lines are supported on some eviateg devices.
DTR dialling	The connected computer can establish a connection by switching the DTR line active from OFF to ON. The device automatically dials the number stored at position 0. If the DTR line changes inactive from ON to OFF the connection will be disconnected automatically. The DTR line validation time (DTR guard time) can be adjusted.
PowerOn Auto-connect	Automatic connection establishment is possible after power-up. The device dials the number stored at positon 0. The connection will be disconnected if the DTR line changes from ON to OFF (inactive).
Preselection	An adjustable dial prefix with an maximum length of 7 characters is implemented. The dial prefix is used as the beginning of each dial number. This feature can be used to dial out from a PABX to the public network or to select a network provider.
DTMF transmission	Some eviateg devices are able to send and receive DTMF tones for special applications.
Voice transmission	On some devices voice sequences can be stored in flash memory. They can be used for voice alerts over ISDN or GSM. The duration of all voice sequences can be up to 56 seconds.
Alarm messages	The command **AT*A** (page 60 et sqq.) supports transmission of alarm messages to mobile phones or pagers. The provider and gateway is selected automatically by the first digits of the destination number.
Flash ROM	Use of Flash memory allows an easy update of firmware during operation, extending the features of the device. The update can be done over RS232 / USB interface and over ISDN / GSM, using a remote access.

Blockade break (on request)	Some devices are able to establish alarm calls even if both B channels of the S_0 bus are engaged. If this feature is active, at least one connection on the S_0 bus will be disconnected.
Sabotage break	Devices with VdS2465 protocoll can recognize a manipulated S_0 bus and disconnect the remaining bus to ensure alarm transmission.
Line test	By using the command **AT∗ELine?** (page 25) the user can check the ISDN line to the public exchange. If the line is out of order, the user may choose a secondary alarm way for transmission of alarm messages.
Date and time	All devices derive date and time from the ISDN network. Daylight Saving Time is handled automatically.

2 Controlling a device with AT commands

2.1 General

AT interpreter

The device is controlled with AT commands, which is established world wide as a modem command set. So the device can be used like an analog modem.

AT commands can be issued e.g. with an terminal program like Hyperterm™ from Windows™.

The software in the device, which interpretes and executes AT commands, is called **AT interpreter**.

Devices with two serial interfaces like the eviateg TA Twin can have two independent AT interpreters.

Operation states

The device can operate in two states, the **command state** and the **online state** (data transmission).

Command state

After power-up the device is in command state. Only in this state AT commands will be accepted, interpreted and executed.

After a successful connection establishment the device changes from the command state to the online state. The TA returns automatically from online state to command state when the connection is terminated.

Terminating the connection can be done by an escape sequence (page 10) followed by the **ATH** command or by changing the DTR line from ON to OFF.

Online state

In this state a connection to an other party is established. The device is „online" and data can be transferred. The online state is reached after a successful connection establishment (outgoing call) or with the acceptance of an incoming call.

Note:

A successful connection is only possible if the other party is using the same B channel protocol (V.110, X.75 or V.120 etc.).

Connections to parties in the analog PSTN like a normal telephone can be established only in telephony mode (**AT\N11**) or for transmission of DTMF tones (command **AT\N16**, see page 28).

Profile	The AT interpreter has two sets of S registers **S0**..**S99**, called profiles (page 41 to 55).
	After power on, one of the two profiles is loaded into the memory as the current working profile. All changes done by AT commands are made in the working memory (Current profile).
	Note: the changes will not be stored automatically. The current configuration has to be stored in the nonvolatile memory with the **AT&W** command (page 37).
Multiple Subscriber Numbers (MSN)	The device supports three to eight Multiple Subscriber Numbers (MSNs). To each MSN, a separate transfer protocol and ISDN service can be assigned. One of these three MSNs can be marked as active MSN for outgoing calls.
	During an incoming call, the preselected protocol according the called MSN will be used automatically.
	During an outgoing call, the marked active MSN will be transmitted as Calling Party Number (CGPN).
	The administration of the MSN is made with the **AT*E** command (page 25).
<u>Note</u>:	For some features like Fixed Network SMS, additional MSNs (beyond the three to eight) are used. For these additional MSNs, the ISDN service and the transfer protocols are predetermined and cannot be changed.

2.2   Escape sequence

Changing to the
command state

The escape sequence is used to change from the online state to the command state. This sequence can only be recognized in the online state. With the change from the online state to the command state the connection is **not** disconnected. The disconnection has to be done by the **ATH** command or the change of the DTR line from ON to OFF. If the connection shall be kept, returning back to the online state is possible by the **ATO** command (page 30).

Escape sequence

The escape sequence consists of a sequence of three escape characters (register **S2**, see page 41). These three characters have to be entered within the escape prompt delay time (default one second, register S12, see page 43). Before and after the escape sequence no characters must be entered within the escape prompt delay time.

Note: The escape character is **not** the escape key on a PC keyboard. The escape character is defined in register **S2** (default character is '**+**', see page 41).

2.3   Detection of baudrate and data format

Automatic detection

The baudrate on the serial interface between the device and the connected computer is automatically detected. As standard data format 8 data bits, one stop bit and no parity are assumed.
The following baudrates are supported:
300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 bit/s.
On devices with two serial interfaces, only at the first serial interface the baudrate is deteced. Baudrate and data format of the second serial interface are adjusted via register **S93** and **S94** (page 54).

Computer line speed

In V.110 mode, the line speed on the serial interface will be used as the V.110 speed on the ISDN network side.
The following V.110 baudrates are available: 1200, 2400, 4800, 9600, 19200 and 38400 bit/s.
Serial speeds above 115100 bit/s are adapted to 38400 bit/s.

A fixed V.110 speed is adjustable by using the **AT%G1** command (page 26). If **AT%G1** is set, the speed defined by **AT%B** command (page 18) is used.

2.4   Command line

Command input | All AT commands start with '**AT**' or '**at**' and end with the carriage return character. After receiving the final carriage return character, the command line will be executed.
The Line Feed character must not be used to terminate the command input !

Command line | The maximum length of a command line is 512 characters including spaces and the final carriage return character. Upper and lower case characters are irrelevant
(exception: **AT*A**, **AT*C** and **AT*E** commands)

Spaces are allowed in the command line. Usualy the final character is carriage return. The user can adjust the final character for the command line in a range from 0 to 127 by using the register S3 (page 42).

Command line repetition | An exception is the '**A/**'-command. This command repeats the execution of the last command line and has no final carriage return character.

Command / response | An AT command may only be entered, when the previous command has been executed and the device has given a response like **OK** or **ERROR** !

Command line editing | If the Ctrl+R character is entered after the leading '**A**' in a command line, the command line will be copied into the command line buffer without execution. This feature allows command line editing.

Interpretation | The command line can contain more than one AT command. The interpretation of the command line starts at the leading 'AT' and ends at the final carriage return. Each AT command is excuted before the next command will be interpreted. If an AT command produces an error, the execution of the command line will be stopped at this position and the response ERROR will be transmitted.

Single command |
```
AT\N2
OK
ATI3
Firmware Version = $ 2.88 2007-01-26
OK
ATS0?
S00:001
```

OK

Multiple command	**AT \N2 I3 S0?**
	Firmware Version = $ 2.88 2007-01-26
	S00:001
	OK

Command parameter — The most AT commands have parameters like 0,1 or 2. Command inputs without any parameter are possible. In this case the parameter 0 is assumed (e.g. the command **AT&Q** will be interpreted like **AT&Q0**).

Exceptions — The following commands have to be the last in a command line:

ATA	call acceptance
ATDxx	all dial commands
ATO	return to the online state
ATZ	initialization command
AT* commands	

Saving the configuration — All parameters should be saved with the **AT&W** command, otherwise the configuration will be lost by power down or reset.

Default values — In the following chapters, each value marked with '●' indicates the default value (factory settings).

3 AT command summary

	AT command	Meaning	Page
	A	Accept an incoming call	17
	$A	Display advice of charge	17
	*A	Transmission of an alarm message to a mobile phone or pager	60
•	**$B1** $B2	**1 B channel is terminated during blockade break** 2 B channels are terminated during blockade break	18
•	%B1200 %B2400 %B4800 **%B9600** %B19200 %B38400	V.110 network bitrate 1200 bit/s V.110 network bitrate 2400 bit/s V.110 network bitrate 4800 bit/s **V.110 network bitrate 9600 bit/s** V.110 network bitrate 19200 bit/s V.110 network bitrate 38400 bit/s	18
	*B	Execute blockade break	18
	C	Get a waiting call	19
	$C	Show a waiting call	19
•	&C0 **&C1**	DCD line is always active **DCD line indicates an connection**	19
	*C	Programming command for extended functions	19, 63
	D[<nnn>] D*B1 D*B2 DB<nnn> DC[<nnn>] DI<nnn> DL DQ<nnn> DR<nnn> DS=<i> DW<nnn> DX<nnn> D?	Connection establishment to number <nnn> Connection establishment on channel B1 exclusive Connection establishment on channel B2 exclusive Blockade break and connection establishment to number <nnn> Call back, using automatic recognized B channel protocol PABX internal dialling without dial prefix Dial the last number Anonymous dial Establish a remote access connection Dial the number stored at position <i> Dial with single digits Sabotage break and connection establishment to number <nnn> Online help for the ATD command	20, 21 21 22 22 22 22 22 23 23, Fehler : Refere nz nicht gefund en 23 23 23 20
•	**$D0** $D1	**Change of DTR line does not establish connection** Automatic connection establishment when DTR line is activated	24
•	**%D0** %D1	**Dial abort possible** Dial abort not possible	24
	&D0 &D1 **&D2** &D3	Changes of DTR line have no effect Switch to the command state when DTR is deactivated **Terminate a connection when the DTR is deactivated** Terminate a connection and reset the device when DTR is deactivated	24

Note: The • bullet appears next to &D2 row.

AT command	Meaning	Page
E0	No command echo during command state	25
• **E1**	**Echo during command state**	
*E?	Online help for the **AT*E** command	
*E or *E Show	Show ISDN and device specific parameters	85
*EMSN<i>	Set MSN <i> as active MSN (for outgoing calls)	85
*EMSN<i>?	Show MSN number <i>	
*EMSN<i>=<nnn>	Assign number <nnn> to MSN <i>	
*EActMSN?	Show active MSN (for outgoing calls)	87
*EService?	Show online help for ISDN services	87
*EService<i>?	Show service for MSN <i>	
*EService<i>=<x>	Assign ISDN service <x> to MSN <i>	
*ETEI=<n>	Set fix TEI value for D channel protocol (Point-to-Point accesses)	87
*EXTEI=<n>	Set fix TEI value for X.31 protocol	88
*EPrefix=<n>	Set dial prefix (e.g. 0 or 9)	88
*EXPrefix=<n>	Set dial prefix for X.31 connections (e.g. 0262)	89
*EDChannelProt=<p>	Set D channel protocol	89
*EFlen=<i>	Set frame length of data to be transmitted	89
*ECountryCode=<n>	Set country code for the **AT*A** command	90
*EAreaCode=<n>	Set area code for the **AT*A** command	90
*EOwnNumber=<n>	Set own number for the **AT*A** command	91
*EInitF	Restart the device with factory settings (all parameters)	91
*ELine?	Perform a line check to the exchange / PABX	91
*ECCMode	Clear Channel mode (**AT\N7**)	91
*ECCSilence	Clear Channel silence (**AT\N7**)	92
&F	Restore parameters of the AT interpreter	26
\F	Show stored numbers	26
%G0	Network V.110 bitrate follows serial bitrate	26
• %G1	Network V.110 bitrate is determined by **%B** command	
H [<cause>]	Terminate connection (optional with cause)	27
I0	Display device type number	27
I1	Display ROM check sum	
I3	Display firmware version and date	
I5	Display serial number	
I6	Display device name	
I8	Display the device property string	
I9	Display the Plug-and-Play ID-string	
I*	Calculate and show the firmware checksum	
%L0	Adapt the serial bitrate to the network bitrate	27
%L1	Adapt the serial bitrate to the network bitrate	
• **%L2**	**No adaption of the serial bitrate**	
%L3	Adapt the serial bitrate to the network bitrate	

	AT command	Meaning	Page
•	**&L0**	**Dial up mode**	28
	&L1	Leased line mode on channel B1	
	&L2	Leased line mode on channel B2	
	&L3	Leased line mode on channel B1 and B2 (twin models)	
	\N?	Online help for implemented operation modes	28
	\N0	Automatic protocol recognition	
	\N1	V.110 protocol	
•	**\N2**	**X.75 protocol**	
	\N3	PPP conversion during HDLC transparent mode	
	\N4	V.120 protocol	
	\N5	HDLC UI mode	
	\N6	HDLC transparent mode	
	\N7	Clear Channel	
	\N8	Data scrambling	
	\N9	X.75 / T.70	
	\N10	Codec mode with User-To-User signaling	
	\N11	Codec mode / telephony	
	\N12	HDLC frames without control field	
	\N14	Data over PCM bus	
	\N16	Transmission and reception of DTMF tones	
	\N17	Codec mode wit DTMF tone transmission	
	\N18	DTMF receiver	
	\N20	Channel bundling (HyperChannel mode)	
	\N21	Channel bundling (X.75 bundling)	
	\N25	Packet mode over B channel	
	\N31	Packet mode over D channel	
	\N40	V.22bis over GSM modem	
	\N41	V.32 over GSM modem	
	\N42	V.34 over GSM modem	
	\N43	V.110 over GSM modem	
	O	Return to the online state	30
•	**$P0**	**No check of address and control field**	31
	$P1	Check of address and control field in PPP mode	
	$P2	No check of PPP frames, forced sync to async conversion	
	$P3	Check of address and control field, forced sync to async conversion	
•	**%P0**	**No PPP asynchron/synchron conversion**	31
	%P1	PPP asynchron/synchron conversion activated	
•	**&P0**	**No PowerOn AutoConnect**	31
	&P1	PowerOn AutoConnect	
	\P=<abc>	Set the callback password to <abc>	32
	\P?	Show the stored callback password	
•	**Q0**	**Responses enabled**	23
	Q1	Responses are disabled	
	Q2	Responses are enabled, PowerOn message suppressed	
•	**$Q0**	**ERROR message on wrong character 'A' or 'a'**	32
	$Q1	No ERROR message	
•	**&Q0**	**Autobaud detection is enabled**	33
	&Q1	Autobaud detection is disabled	
	\Q0	No flow control	33
	\Q1	Software flow control XON/XOFF	
•	**\Q3**	**Hardware flow control RTS/CTS**	

	AT command	Meaning	Page
	\R=<pwd> \R?	Set the remote password to <pwd> Show the stored remote password	34
	S<i>=<x> S<i>?	Set S register <i> to value <x> Display the value of S register n	34
•	**%S0** %S1 %S2 %S3	**Normal operation, no password controlled call back** Password controlled call back Only password check for incoming calls is enabled Background password check	34
•	**&S0** &S1 &S2	**DSR line is always active** DSR line indicates an assigned TEI DSR line indicates an assigned TEI and activated layer 1	35
	*S	Control of Supplementary Services	93
	%T? %T1?	Show the current date and time Show the system time	35
	\T<n> \T?	Set the inactivity timer to n <x> 10 sconds Show the inactivity timer	35
	*U	Access user memory	36
•	V0 **V1**	Response in short format **Responses in text format**	36
	&V &V?	Display the configuration profiles Online help for the most important S registers	36
	*V	Send VdS2465 telegrams	36
	&W0 &W1	Save configuration in profile 0 Save configuration in profile 1	37
•	**X0** X1 X2 X3 X4	**Normal CONNECT message** CONNECT message with ISDN bitrate CONNECT message with ISDN bitrate, RING message with Calling Party Number RING and CONNECT messages with Calling Party Number CONNECT message with ISDN bitrate and protocol, RING message with Calling Party Number	37
•	**$X0** $X1 $X2	**NO CARRIER message without ISDN cause** NO CARRIER message with numeric ISDN cause NO CARRIER message with ISDN cause in text format	38
•	**%X0** %X1	**No „NO CARRIER" message when call is lost** NO CARRIER message when call is lost	38
•	**&X0** &X1	**After passive disconnect, B channel is released automatically** After passive disconnect, B channel must be relesed with ATH	39
	*X	Sabotage break	39
•	**&Y0** &Y1	Select profile 0 Select profile 1	39
	Z0 Z1 Z*	Reset and load profile 0 Reset and load profile 1 Hardware reset and load profile 0	40
	&Z<i>=<nnn> &Z<i>= &Z<i>?	Store number <nnn> at position <i> Clear number stored at position <i> Display number stored at position <i>	40

4   Description of AT commands

This manual covers all eviateg products and describes AT commands, which may not be available on all devices. **Standard commands** available **on all devices** are marked with the ✓ **sign**.

The AT commands are listed in alphabetical order, related to the first character after „AT" (e.g. **ATC** and **AT$C** before **ATD** and **AT$D**).

A	Accept an incoming call	✓

> **ATA**   **accept an incoming call**
> **ATA;**   **accept an incoming call and stay in command mode**
>
> This command accepts an incoming call if the automatic call acception is disabled (register **S0=0**, see page 41).
> If the semicolon version is used, the device stays in the command mode, so further commands can be issued.
>
> **Hints:**
> The incoming call is signalled with RING messages according to the **ATX** settings (see page 37).
> If used, the ring line is activated along with the RING messages (refer to register **S54**, page 47).

A+	Acknowledge incoming calls on Point-to-Point accesses

> **ATA+**   **Acknowledge incoming call**
>
> On Point-to-Point accesses (see chapter 12.2, page 105) incoming calls can be **acknowledged** after checking DDI (Direct Dial In) information.
> The caller gets a call connected tone, after the **ATA+** command has been issued at the called side. The call connected tone lasts until the incoming call has been **accepted** with the **ATA** command (see above).

$A	Advice of Charge	✓

> **AT$A**   **Show advice of charge information (AOC)**
>
> The **AT$A** command shows the advice of charge information for the **last** outgoing **connection** (if the network provider has supplied **AOCE** information).
> During online state the user has to change to the command state for showing the advice of charge information for the **current connection** (**AOCD** information).

For changing to the command state see page 10.

⋆A	Alarm message to a mobile or pager

AT*A <number> <text>   Send an alarm message

With the **AT⋆A** command, alarm messages can be sent, e.g.
• SMS messages to mobile phones
• text or numeric messages to pager devices
• Fax messages (depending from the service provider)
• eMails (depending from the service provider)
The **AT⋆A** command is described in detail in chapter 7, page 60 et sqq.

$B	B channels to be released during blockade break

●   **AT$B1   release one B channel during blockade break**
       AT$B2   release two B channels during blockade break

With the **AT$B** command can be specified, how many B channels shall be released, when a blockade break is initiated (see **AT⋆B** command, page 18, and **ATDB** command, page 22).

%B	Network V.110-speed

       AT%B1200   1200 bit/s
       AT%B2400   2400 bit/s
       AT%B4800   4800 bit/s
●   **AT%B9600   9600 bit/s**
       AT%B19200   19200 bit/s
       AT%B38400   38400 bit/s

The command **AT%B** is used for setting the network side speed for **outgoing** V.110 connections. While incoming calls, the device adapts the V.110 speed to the calling device.

Note: The **AT%B** command has to be enabled with the command **AT%G1** (page 26).

⋆B	Initiate blockade break

AT⋆B   initiate a blockade break

With the **AT⋆B** command other connections on the same S_0 bus can be

disconnected to free at least one B channel for alarm messages.

Note: With the **AT$B** command (see page 18) you can specifiy the number of B channels to be disconnected.

C	Get a waiting call

ATC   Get a waiting call

With the **ATC** command a waiting call can be accepted.
During an active connection, a waiting call is signalled with the ring indicate line.
In this state a change to the command phase is possible with the escape sequence (see page 10), to issue one of the following commands:

AT$C   Show the number of the waiting call.
ATC   Disconnect the active connection and get the waiting call.
ATO   Reject the waiting call and resume the active connection.
ATH   Disconnect the active connection and reject the waiting call.

$C	Number of the waiting call

AT$C   Show the number of the waiting call

When a waiting call is signalled with the ring indicate line and the escape sequence (see page 10) has been issued, the **AT$C** command shows the number of the waiting call. In this situation the following commands are possible:

ATC   Disconnect the active connection and get the waiting call.
ATO   Reject the waiting call and resume the active connection.
ATH   Disconnect the active connection and reject the waiting call.

&C	DCD line option	✓

AT&C0   DCD is always active
● **AT&C1**   **DCD is active during online state**

The DCD line is used to indicate an established connection.

---

*C	Programming command for extended functions

AT*C   Programming command for extended functions

The **AT*C** command controls parameter for extended functions like X.31 or GSM operation or shows the current values.
The **AT*C** command is described in detail in chapter 8, page 63 et sqq.

D	**Connection establishment**	✓

ATD\<nnn\>   **Dial the number \<nnn\>**
ATD\<nnn\>;   **Dial the number \<nnn\> and stay in command mode**

Using the **ATD** command, a connection to destination number \<**nnn**\> is established. The maximum length of the destination number is 20 digits.
The **ATD** command must be the last one in a command line.

For compatibility to an analog modem the destination number can include the following characters: "**- P T W ( ) / ! , @ >**".
These characters will be ignored during execution of the **ATD** command.

If the **ATD** command is terminated with a semikolon ('**;**'), the AT interpreter stays in the command mode after connection establishment.

The following **special forms** of the dial command are possible:

- **ATD**   Dial without destination number (single digit dialling, page 21)
- **ATD*B1**   Dial on channel B1 exclusive (page 21)
- **ATD*B2**   Dial on channel B2 exclusive (page 22)
- **ATDB\<nnn\>**   Dialwith blockade break (page 22)
- **ATDC[\<nnn\>]** Call back with the recognized B channel protocol
- **ATDI\<nnn\>**   Dial an internal number without dial prefix (page 22)
- **ATDL**   Dial the last destination number (page 22)
- **ATDQ\<nnn\>**   Dial with Calling Line Identification Restriction (**CLIR**, page 23)
- **ATDR\<nnn\>**   Dial a remote / maintanance connection (page 23)
- **ATDS=\<i\>**   Dial a stored destination number (page 23)
- **ATDW\<nnn\>**   Dial with pause between the digits (page 23)
- **ATDX\<nnn\>**   Dial with sabotage break
- **ATD?**   Syntax help for the **ATD** command

The specifal forms **ATDB**, **ATDI**, **ATDQ**, **ATDR**, **ATDS**, **ATDW** and **ATDX** can be combined.

Example: ATDBQW\<nnn\>

The dial command can be completed with the following **optional parameters**:
- the own origination number (Calling Party Number, CGPN)
- the own sub address (Calling Party Subaddress, CGPSA)
- the called sub address (Called Party Subaddress, CDPSA)
- X.31 User Data

These parameters can be entered after the destination number \<nnn\>. Each parameter is preceded by a special **separator character**, which can be adjusted in an S register:

- the CGPN is preceeded by '.' (adjustable in register **S46**, page 48)
- the CGPSA is preceeded by ':' (adjustable in register **S41**, page 47)
- die CDPSA is preceeded by '#' (adjustable in register **S40**, page 48)
- X.31 User Data is preceeded by '$' (adjustable in register **S51**, page 50)

The CGPN may contain up to 20 digits ('0' bis '9', '*' and '#').
CGPSA and CDPSA may contain up to 20 ASCII characters.

Notes: CGPSA and CDPSA are not supported by all ISDN networks.

When '*' and '#' are used in CGPN or CDPN, it may be necessary to adjust the separator character registers (S40, S41, S46 to S48, S50 and S52) to avoid misinterpretation of these characters.

The X.31 User Data may contain up to 16 characters. Binary values can be entered in hexadecimal notation with leading '**\x**' or '**0x**'. Binary values and text can be mixed.

Example: ATD 0262 40300019052 $User\x01\x02Data

D	**Dialling with separate destination number**

ATD   Occupy an ISDN B channel

In telephony modes (**\N11**, page 28Fehler: Referenz nicht gefunden) the connection can be established with single digit dialling (Overlap Sending). After issuing the command **ATD<CR>** (without destination number) an ISDN B channel is occupied, so the dial tone is audible like using a normal telephone.
After entering the first digit of the destination number, the public exchange stops sending the dial tone. If all digits of the destination number are entered, the ringing or busy tone becomes audible.
The duration between the digits may not exceed 15 seconds. Each character entered on the serial interface, which is not a digit '0' to '9' or '*' / '#' terminates the dialling process.

D*B1	**Dialling on channel B1 exclusive**

ATD*B1<nnn>   Dial number <nnn> on channel B1 exclusive

Normally the public exchange / PABX assigns the B channel for a connection.
With the **ATD*B1** command, the device can request to use B1 exclusively. If this B channel is occupied, the NO DIALTONE message will be issued.

D∗B2 Dialling on channel B2 exclusive

ATD∗B2<nnn>   **Dial number <nnn> on channel B2 exclusive**

Normally the public exchange / PABX assigns the B channel for a connection.
With the **ATD∗B2** command, the device can request to use B2 exclusively. If this B
channel is occupied, the NO DIALTONE message will be issued.

DB   Dialling with Blockade break

ATDB<nnn> Deblock the S_0 bus and dial destination number <nnn>

With the additional character 'B' in the dial command, the blockade break is used
to terminate one or all active connections on the S_0 bus (depending on the **AT$B**
setting, see page 18). When a B channel is free, the connection to destination
number <nnn> is established.

ATDC Call back with recognized B channel protocol

ATDC   **Call back last caller with last recognized B channel protocol**
ATDC<nnn> Call number <nnn> with last recognized B channel protocol

On devices with automatic B channel protocol recognition (mode **AT\N0**, page 28),
the **ATDC** command calls back the last caller, using the last recognized B channel
protocol.
The **ATDC<nnn>** command uses an explicit number, but the last recognized
B channel protocol.

DI   Dial an internal number   ✓

ATDI<nnn>   Dial an internal number

If the device is connected to a local PABX, a dial prefix can be set to get a local
loop or to select a provider (command **AT∗EPrefix**, page 88).
If an internal connection is needed and the prefix mechanism needs to be
overridden, the **ATDI<nnn>** command dials without the prefix.

DL   Redial the last number   ✓

ATDL   Redial the last number

This command redials the last number. Before executing the redial command
ATDL, an **ATD** command or the **ATDS=<n>** command must be executed for

holding a valid number in memory. If the internal number memory is empty, an **ERROR** message will be issued.

DQ	Anonymous dial	

ATDQ<nnn> Suppress the own number

The parameter '**Q**' in the **ATD** command suppresses the own number for this connection (Calling Line Identification Restriction, CLIR).

DR	Establish a remote access connection	✓

ATDR<nnn> Establish a remote access to an other eviateg device

The **ATDR** command allows the establishment of a remote access connection to an eviateg device. In this way the remote control and configuration of that eviateg device is possible. More details about remote access are described in chapter 13.2 at page 109.

DS	Dial a stored number	

ATDS=<i>   Dial the stored number of position <i>

The **ATDS=<i>** command establishes a connection to the number stored at position <i>. The number has to be stored with the **AT&Z<i>=<nnn>** command (see page 40).
After executing the ATDS command, the **ATDL** command can be used to redial the same number.

DW	Suppression of en-bloc dialling	✓

ATDW<nnn> Dial destination number <nnn> with single digits

With the additional character '**W**' in the dial command the connection is established using single digits dialling (Overlap sending).
This dialling mode uses pauses of 100 ms between each digit instead of en-bloc dialling.

DX	Dial with sabotage break	

ATDX<nnn> Activate the sabotage break and dial destination number <nnn>

With the additional character '**X**' in the dial command the sabotage break is

activated and with an additional relais the downstream S_0 bus is cut. Then the connection is established with the destination number <nnn>. After termination of the connection, the sabotage break is deactivated and the downstream S_0 bus is reconnected.

$D	Automatic DTR dialling	✓

● **AT$D0   DTR dialling is deactivated**
   AT$D1   DTR dialling is activated

If DTR dialling is activated, a change of the DTR line from OFF to ON will establish a connection to the number stored at position 0.
If there is no number stored with the **AT&Z0=<nnn>** command, the connection can't be established and an **ERROR** message will be issued.
The time the DTR line has to be stable until a change is recognized, can be adjusted with the DTR guard time in register **S31** (see page 45)

Note: Using X.31 and the **$D1** option, the DTR guard time should be set to at least 200 ms (**ATS31=10**).

%D	Dial abort	✓

● **AT%D0   Enable dial abort with any character**
   AT%D1   Disable dial abort

If dial abort is enabled, any character sent to the device between an **ATD** command and the **CONNECT** message will terminate the dial process.

&D	DTR control during online state	✓

   AT&D0   No evaluation of the DTR line
   AT&D1   Change to the command state
● **AT&D2   Disconnect the line**
   AT&D3   Disconnect the line and reset the device

During online state a change of the DTR line from ON to OFF can change to the command state or can terminate the connection:
If the commands **AT$D1** and **AT&D2** are active, a connection can quite easily be established with activating the DTR line from OFF to ON and disconnected with a change from ON to OFF. In this case no **ATD<nnn>** command is necessary for dialling a number.

If no DTR line is connected, **AT&D0** has to be set, otherwise no incoming connection would be signalled.

| E | **Echo during command state** | ✓ |

ATE0   **Disable command echo**

●   **ATE1**   **Enable command echo**

The **ATE1** command enables the echo during command state.
During online state echo is generally disabled.

| ∗E | **ISDN and device specific settings** | ✓ |

The **AT∗E** command has the following subcommands, which control ISDN and device specific parameters.
The **AT∗E** is described in detail in chapter 9, page 84.

Command	Description
AT∗E ?	Short online help for the **AT∗E** command
AT∗E or AT∗E Show	Show ISDN and device specific settings
AT∗E MSN<i>	Set the MSN entry <i> as the active MSN
AT∗E MSN<i>?	Show the number of MSN entry <i>
AT∗E MSN<i>=<nnn>	Set number <nnn> to MSN entry <i>
AT∗E ClearMSNs	Clear all MSN numbers
AT∗E ActMSN ?	Show the active MSN for outgoing calls
AT∗E Service?	List of all ISDN services
AT∗E Service<i>?	Show the ISDN service for MSN entry <i>
AT∗E Service<i>=<x>	Set ISDN service <x> to MSN entry <i>
AT∗E TEI=<n>	Set a fix TEI value for the D channel protocol
AT∗E XTEI=<n>	Set a X.31 fix TEI
AT∗E Prefix=<n>	Set a dial prefix for PABX operation
AT∗E XPrefix=<n>	Set a dial prefix for X.31 operation
AT∗E DChannelProt=<p>	Set the D channel protocol
AT∗E Flen=<n>	Set the frame length for X.75, V.120 etc.
AT∗E CountryCode=<nn>	Set the country code for SMS submission
AT∗E AreaCode=<nn>	Set the area code for SMS submission
AT∗E OwnNumber=<nnn>	Set the own numer for SMS submission
AT∗E InitF	Restore factory settings for **all** parameters
AT∗E Line?	Check the ISDN line to the public exchange
AT∗E CCMode	Set the coding of Clear Channel data (AT\N7)
AT∗E CCSilence	Set the silence byte for Clear Channel data (AT\N7)

| &F | **Restore factory settings for AT interpreter parameters** | ✓ |

> **AT&F0**   **Restore factory settings from profile 0**
> **AT&F1**   **Restore factory settings from profile 1**

The **AT&F** command restores the factory setting for the AT interpreter parameters. If a connection is established, the **AT&F** command disconnects the line.

> **Note**:   The command **AT&F** restores only **parameters of the AT interpreter**. If you want to restore **all parameters** of the device, you have to use the command **AT*EInitF**.

> **Note**:   The command **AT&F** does not restore the serial interface speed to the factory settings. The response to the command **AT&F** is issued with the same speed used when entering the command.

> **Note**:   The MSNs and the stored numbers will not be changed.

| \F | **Show the stored numbers** | ✓ |

> **AT\F**   **Show the stored numbers**

The **AT\F** command shows all numbers which has been stored using the command **AT&Zn=nnn** (page 40) or the command **AT*C Number**.
If there is no number stored, the device only issues an **OK** message.
On devices with more than ten numbers, only the first ten numbers will be displayed.

| %G | **V.110 baudrate control** | |

> **AT%G0**   **ISDN baudrate is determined by serial speed**
> ● **AT%G1**   **ISDN baudrate is determined by the AT%B command**

With **AT%G1** the network ISDN baudrate for outgoing V.110 connections is derived by the **AT%B** command (page 18), e.g. 9600 bit/s.

If the **AT%G0** command is set, the serial bitrate determines the bitrate on the ISDN network side. In this case the **AT%B** command has no effect. If the serial bitrate is greater than 38400 bit/s, on the network side 38400 bit/s will be used.

The following V.110 bitrates are available: 1200, 2400, 4800, 9600, 19200 and 38400 bit/s.

H	Disconnect the active connection	✓

ATH   **Disconnect**
ATH \x<ab>   **Disconnect with predefined cause**

When the device is in command state after an escape sequence, the connection can be **disconnected** with the **ATH** command. A change to the command state can also be achieved by changing the DTR line from ON to OFF if **AT&D1** is set.

The **ATH** command can be used to **reject** an incoming call, if automatic call acception is disabled. The disconnect cause is set to „Normal call clearing" (\x90, see chapter 6.2, page 58).
With the **ATH \x<ab>** format, a user defined disconnect cause can be specified. Valid values for <ab> are in the range from \x80 until \xFF. The standard ISDN causes are shown on page 58.

Note: Some public exchanges and PABXes do not allow all user defined causes and replace them.

I	Show Info	✓

ATI0   **Show the type number of the device**
ATI1   **Show the ROM checksum**
ATI2   **Check the integrity of the firmware**
ATI3   **Show firmware version and date**
ATI5   **Show serial number**
ATI6   **Show device name**
ATI8   **Show the property information string**
ATI9   **Show the Plug&Play-ID string**
ATI∗   **Calculate and display the firmware checksum**

The **ATI** commands return several informations about the device.
The commands **ATI2, ATI4** and **ATI7** return the **OK** message only for compatibility to other modems.
The **ATI∗** command calculates the checksum over the firmware, which can take some seconds. The checksum can be used to identify the loaded firmware version.

%L	V.110 bitrate adaption for incoming calls	

      AT%L0   **Adapt the serial bitrate to the network bitrate**
      AT%L1   **Adapt the serial bitrate to the network bitrate**
●   **AT%L2**   **No adaption of the serial bitrate**
      AT%L3   **Adapt the serial bitrate to the network bitrate**

In V.110 mode the device adapts the network bitrate automatically.
The **AT%L** command allows to adapt also the serial bitrate to the network bitrate.
The **AT%L2** command disables the bitrate adaption of the serial interface.

Note: When the serial bitrate is adapted due to the **AT%L** command, RING and CONNECT messages will be sent with the previous bitrate.

&L	**Leased line mode**

- **AT&L0**   **Dial-up operation (Point-to-Point or Point-to-Multipoint access)**
  AT&L1   **Leased line mode on channel B1**
  AT&L2   **Leased line mode on channel B2**
  AT&L3   **Leased line mode on channels B1 and B2**

With the command **AT&L** the leased line modes are enabled. The command **AT&L3** can only be used on devices with two serial interfaces. Changing the operation mode must be saved with the command **AT&W.** The new mode becomes effective on the next restart of the device.

Example: AT &L1 &W Z∗

<u>**Note**</u>:   In order to establish a leased line connection, the DTR line must be set or DTR line evaluation must be disabled (**AT&D0**, page 24).

\N	**Select B channel protocol**	✓

  AT\N0   **Automatic protocol recognition**
  AT\N1   **V.110**
- **AT\N2**   **X.75**
  AT\N3   **PPP**
  AT\N4   **V.120**
  AT\N5   **HDLC UI**
  AT\N6   **HDLC transparent**
  AT\N7   **Clear Channel**
  AT\N8   **Data scrambling**
  AT\N9   **X.75 / T.70**
  AT\N10   **Codec mode with User To User signaling**
  AT\N11   **Codec mode**
  AT\N12   **HASC protocol**
  AT\N14   **Data over PCM interface**
  AT\N16   **DTMF tone transmission / reception**
  AT\N17   **Codec mode with DTMF tone transmission / reception**
  AT\N20   **Channel bundling (Hyper channel)**
  AT\N21   **Channel bundling (X.75 bundling)**

AT\N22	**Channel bundling (X.75 MLP)**
AT\N23	**Channel bundling (ML-PPP)**
AT\N24	**Channel bundling (PPP bundling)**
AT\N25	**X.25**
AT\N31	**X.31**
AT\N40	**V.22bis over GSM modem**
AT\N41	**V.32 over GSM modem**
AT\N42	**V.34 over GSM modem**
AT\N43	**V.110 over GSM modem**
AT\N?	**Overview of the implemented B channel protocols**

AT\N0 allows the automatic B channel protocol recognition, depending on the information signalled from the calling device over the D channel protocol. Outgoing calls are established with the factory preset protocol (X.75). For more information about automatic B channel protocol recognition, see chapter 13.1, page 109.

AT\N1 activates the bit rate adaption protocol according ITU recommendation V.110 (see also **AT%B**, **AT%G** and **AT%L**).

AT\N2 allows error corrected connections with the X.75 protocol. If the opposite side does not work with X.75, the connection is terminated.

AT\N3 is used for PPP protocol. Data on the serial interface is encoded with the **Octet stuffing method** according to **RFC1662**. In the B channel, HDLC transparent frames are transmitted. Between serial interface and B channel, an asynchronous / synchronous conversion takes place. This mode sets automatically **AT%P1** (page 31).

AT\N4 selects an error corrected connection according to V.120 protocol. This operating mode is often used for international connections. The length of data frames can be adjusted by register **S72**.

AT\N5 is used for transmitting and receiving HDLC UI frames (adress field 0xFF, control field 0x03). This mode allows an error recognition, but no error correction.

AT\N6 is used for transmitting and receiving transparent HDLC frames (no adress field and no control field). This mode allows an error recognition, but no error correction.

AT\N7 is used for Clear Channel mode to receive and transmit voice data. The serial speed must be 115,200 bps to avoid dropouts in the voice stream.

AT\N8 allows data scrambling over B channel to keep data transmission private. Data scrambling is not a real data encryption. On both sides, eviateg devices must be used in **AT\N8** mode.

AT\N9 is used for data transfer with X.75 protocol on layer 2 and T.70 protocol on layer 3. This combination is used for some Telematic services.

AT\N10 and **\N11** are used for telephony calls using an external codec (connected to the PCM bus) or an on-board codec.
With **AT\N10** data will be transmitted to the other party by User-To-User signalling. This feature has to be enabled by the network provider.

AT\N12 is used for transmitting HDLC frames without address field. In the idle state, empty HDLC frames are sent. This mode allows an error recognition, but no error correction.

AT\N14 is used for data communication, where an external circuitry is connected to the PCM bus to transmit / receive the data.

AT\N16 selects transmission and reception of DTMF tones. After an connection establishment the 16 DTMF tones **0** to **9**, **A**, **B**, **C**, **D**, **⋆** and **#** can be transmitted to the opposite side. Some devices are capable of receiving DTMF tones too.

AT\N17 establishes a telephony connection using an external or internal codec. During the connection the 16 DTMF tones **0** to **9**, **A**, **B**, **C**, **D**, **⋆** and **#** can be transmitted to the opposite side.

AT\N20 establishes a connection, bundling two B channels to a physical 128 kbit/s data stream (two time slots). This data stream is error corrected by an X.75 protocol.

AT\N21 establishes a connection, bundling two B channels to a logical 128 kbit/s data stream. Two independent X.75 procedures are used (one on each B channel). On both sides, eviateg devices must be used in **AT\N21** mode.

AT\N25 selects the X.25 protocol for packet switched mode over B channel.

AT\N31 selects packet switched mode over D channel (X.31). This operating is often used in Point-of-Sale applications.

AT\N40 to **AT\N43** can be used on eviateg devices with built-in GSM modem to send and receive data with the protocols V.22bis, V.32, V.34 and V.110.

The command **AT\N?** returns a list of the implemented operating modes.

O	**Return to online state**	✓

    ATO   **Return to online state**

When the device is in the command state after an escape sequence (page 10) or after a change of the DTR line from ON to OFF (setting **AT&D1**), the **ATO** command can be used to return to the online state.

After using the **ATO** command, another **CONNECT** message will be issued. An **ATO** command without an established connection results in an **ERROR** message.

$P	Check received PPP frames

●   **AT$P0**   no check of address and control field
    AT$P1   address and control field are checked
    AT$P2   no check of address and control field,
            forced sync / async conversion for LCP / IPCP datagrams
    AT$P3   address and control field are checked,
            forced sync / async conversion for LCP / IPCP datagrams

The commands **AT$P1** and **AT$P3** activate the check of address and control field during PPP synchronous to asynchronous conversion. Received datagrams are checked, if they have the address field 0xFF and the control field 0x03 (UI frame). All other frames will be discarded and not transmitted at the serial interface.

The commands **AT$P2** and **AT$P3** force the synchronous to asynchronous conversion for all received LCP and IPCP datagrams (work around for some malfunctioning Embedded Linux implementations).

%P	Asynchronous to synchronous conversion for PPP

●   **AT%P0**   no asynchronous to synchronous conversion for PPP
    AT%P1   asynchronous to synchronous conversion for PPP activated

The **AT%P1** command activates the automatic asynchronous to synchronous conversion and reverse for PPP protocol according RFC1662.

Note: The command **AT\N3** sets the asynchronous to synchronous conversion **%P1** and HDLC transparent mode.

If **AT%P1** is used after an **AT\N** command, for the selected B channel protocol the async / sync conversion is activated (e.g. Octet stuffing with X.75).

&P	PowerOn auto connect	✓

●   **AT&P0**   PowerOn auto connect OFF

AT&P1   **PowerOn auto connect ON**

The **AT&P1** command activates the automatic connection establishment to the number stored at position 0 after PowerOn or reset.

The number on storage location 0 can be set with the command **AT&Z0=<nnn>**, see page 40. If there is no number stored on position 0, the connection can't be established and an **ERROR** message will be issued.

The number and the command **AT&P1** have to be stored by the **AT&W** command, otherwise the settings will be lost during power down / reset.

\P	Access Password	

AT\P=<abc>   **Entering the Access Password <abc>**
AT\P?   **Show the Access Password**

The command **AT\P** is implemented for entering the password for the access control (see chapter 13.6, page 113).

Valid characters for the Access Password are in the range from 33 to 127.
The password check is case sensitive.
The maximum length of the Access Password is 20 characters.
The Access Password should be saved with the **AT&W** command.
The **AT\P** command must be the last command in a command line.

Note: The factory setting of the Access Password is **AccessPassword**.

Q	Quiet mode	✓

●   **ATQ0**   **Responses are issued**
      ATQ1   **No responses are transmitted (quiet mode)**
      ATQ2   **Responses are issued, boot message is suppressed**

The **ATQ** command controls the results issued by the AT interpreter of the device.

$Q	ERROR message on wrong autobaud character	✓

●   **AT$Q0**   **ERROR message on wrong autobaud character**
      AT$Q1   **No ERROR responses will be transmitted**

Each command line has to start with the character '**A**' or '**a**'.
If the device doesn't recognize these characters at the beginning of a command line, an **ERROR** message will be issued.

The **AT$Q** command controls the response in cases of wrong characters at the beginning of the command line.

&Q	Autodetection of baudrate	✓

● **AT&Q0**   **Autodetection of baudrate**
  AT&Q1   **No autodetection of baudrate**

The command **AT&Q0** enables the automatic detection of baudrate at the serial interface. Recognized baudrates are 300, 600, 1200, 2400, 4800, 9600, 19200, 38400, 57600 and 115200 bit/s with 8 data bits, no parity and one stop bit.
Data formats that can't be recognized are adjustable by the registers **S93** and **S94** (page 54).

Note: On devices with two serial interfaces the automatic detection of baudrate is only supported at the first serial interface. The baudrate and the data format of the second serial interface have to be adjusted by the registers **S93** and **S94**.
The factory setting for the second serial interface is 115200 bit/s, 8 data bit, no parity and one stop bit.

\Q	Flow control at the serial interface	✓

  AT\Q0   **No flow control**
  AT\Q1   **XON/XOFF software flow control**
● **AT\Q3**   **RTS/CTS hardware flow control**

For an error-free data transfer, flow control (handshake) <u>must</u> be established between the serial interfaces of the device and the connected computer.

With **software flow control** the handshaking is done with **XON** and **XOFF** characters, which are inserted into the current data stream. The opposite side recognizes the flow control characters, evaluates them and eliminates them from the data stream.
Factory setting for the XON character is 17, for the XOFF character it is 19.
Both settings can be changed with the registers **S32** and **S33** (page 46).
Software flow control requires only three lines at the serial interface: RXD (receive data), TXD (transmit data) and GND.

Note: When software flow control is used, transfer of binary data is not possible because binary data can contain XON or XOFF characters.

The **hardware flow control** uses five lines at the serial interface: RXD (receive data), TXD (transmit data), RTS (request to send), CTS (clear to send) and GND.
Hardware flow control is faster than software flow control, as there are no

characters to be inserted into the current data stream. Binary data can be transferred without limitation.

\R   Remote password (for maintenance)

AT\R=<abc> Entering the remote password <abc>
AT\R?   Show the remote password

With the **AT\R** command, the remote Access Password can be changed, which is expected at an incoming remote access connection (see chapter 13.2, page 109).

Valid characters for the remote password are in the range from 33 to 127.
The password check is case sensitive.
The maximum length of the password is 31 characters.
The password should be saved by the **AT&W** command.
The **AT\R** command must be the last command in a command line.

<u>Note</u>:   The factory setting of the remote password is **RemotePassword**.

S   S register handling   ✔

ATS<i>=<x> Set the register <i> to value <x>
ATS<i>?   Show the value of register <i>

The S registers can be handled with the **ATS** command.

Valid values <x> for the registers and their numbers <i> are sometimes limited. You can find further details in the chapter „S registers", page 41 et sqq.

If you access an invalid S register number or the register value is out of range, the ERROR message will be issued.

The command **ATS<i>?** returns the current value of the S register <i>.

An overview of all S registers is given with the command **AT&V**.

%S   Password controlled call back

● **AT%S0   Password controlled call back is OFF**
  AT%S1   Password controlled call back is ON
  AT%S2   Only password check is ON
  AT%S3   Background password check

The **AT%S** command manages the access control, which is described in detail in

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chapter 13.6, page 113.

&S	DSR control	✓

- **AT&S0**   **The DSR line is always active**
  AT&S1   **DSR indicates an assigned TEI**
  AT&S2   **DSR indicates an assigned TEI and activated layer 1**

The command **AT&S1** activates the DSR line, as the public exchange or PABX assigns a **T**erminal **E**ndpoint **I**dentifier (TEI) to the device. This is an indicator for a working S_0 bus and a right cabling.

The command **AT&S2** shows with the DSR line, if a TEI is assigned and the layer 1 is activated.
The layer 1 will be deactivated by the public exchange after a timeout when no connections exist on the S_0 bus. Layer 1 is also deactivated when the physical connection is interrupted. If you want to signal a faulty line, you should request a permanent activated layer 1 from your network provider.

Note: For a cyclic check of the line to the public exchange refer to the **AT*ELine?** command (page 25).

%T?	Show system date and time	✓

AT%T?   **Display of date and time** (format YYYY-MM-TT hh:mm:ss TZ)
AT%T1?   **Display of system time**

The command **AT%T?** shows the date and time of the device.
If date and time are not set, the message „**Date and time not set**" is issued.

If the device has an internal RTC (Real Time Clock), date and time are available from the start. Otherwise date and time are derived from the D channel protocol at the first outgoing call on the S_0 bus (even if an other device places the call).

Changes to Daylight Saving Time and back will be done automatically.

The command **AT%T1?** displays the time since (re)start of the device. If date and time are set, also the day of week is displayed.

\T	Inactivity timer	✓

AT\T<n>   **Set the inactivity timer (n * 10 seconds), 0 = disabled**
AT\T?   **Show the inactivity timer value**

The inactivity timer controls the automatic termination of a connection if there was no data transfer at the serial interface during the inactivity timeout.

Timeout values can be selected in a range from 0 to 255 in steps of 10 seconds.
The inactivity timer is disabled with the value zero.
The corresponding S register for the inactivity timer is register **S30** (page 45).

*U	Access to the User memory

AT*U ?   **show command overview and memory capacity**
AT*U Erase *   **erase entire user memory**
AT*U Erase <ads>   **erase a 64 KB segment at address <ads>**
AT*U Write <ads> <len> <cont>

                  write <len> bytes of data into the user memory
                  at adress <ads>
AT*U Read <ads> <len>

                  read <len> bytes of data from the user memory
                  at adress <ads>

With the **AT*U** commands parts of the flash memory can be accessed as user memory, e.g. for data logging applications.
The **AT*U** commands are described in detail in chapter ??, page 36.

V	Responses	✓

     ATV0   **Numeric responses**
●   **ATV1**   **Responses in text format**

The command **ATV** controls the format of the responses after executing an AT command line. A list of the responses of the device is shown in the appendix (page 57).

&V	Show configuration profiles	✓

     AT&V   **Display of the configuration profiles**
     AT&V?   **Online help for the most important S registers**

This command shows the complete configuration profile and the S registers of the device.
Other settings can be displayed with the **AT*E** and **AT*C** command.

*V	Transmission of VdS telegrams

AT∗V   Send a VdS telegram

With the **AT∗V** command, messages according to the **VdS2465** protocol can be transmitted to security central sites.

The **AT∗V** is described in detail in the *Handbuch VdS2465-Protokoll*.

&W Save current configuration	✓

AT&W0   Save current configuration to profile 0
AT&W1   Save current configuration to profile 1

The **AT&W** command saves the current AT command settings and S registers to profile 0 or 1 into the flash memory.

Note: There are no profiles for all parameters set with **AT∗E** commands, as these values are effective for the whole device (even on devices with two serial interfaces). These parameters are stored with the **AT&W** command too.
Parameters set with **AT∗C** commands have their own save syntax.

X RING and CONNECT messages	✓

● **ATX0   short CONNECT message**
ATX1   CONNECT message with network bitrate
ATX2   like ATX1, RING message with calling / called party number
ATX3   RING and CONNECT message with numbers
ATX4   comprehensive RING and CONNECT message

The **ATX** command controls the complexity of **RING** and **CONNECT** messages. The elements of these messages are separated by special characters, which can be set in registers **S40**, **S41**, **S50** and **S52**.

A more flexible way to define the displayed elements gives register **S57** (for the **RING** message) and **S58** (for the **CONNECT** message), see also page 52. When using **S57** and **S58**, the **ATX0** parameter should be set !

Elements of the RING message:

Element	ATX0	ATX1	ATX2	ATX3	ATX4
RING	✓	✓	✓	✓	✓
Bearer service	-	-	∗	-	∗
B channel protocol	-	-	∗	-	∗

Element	ATX0	ATX1	ATX2	ATX3	ATX4
B channel	-	-	*	-	*
Calling Party Numbers (CGPN)	-	-	✓	-	✓
Called Party Subaddress (CDPSA)	-	-	✓	-	✓
Calling Party Subaddress (CGPSA)	-	-	✓	-	✓
User data (only in X.31 mode)	-	-	✓	-	✓
Called Party Number (see note)	-	-	✓	-	✓

* - not valid for all devices

Notes: Using the device on a Point-to-Point access, a '**+**' character is added to the Called Party Number, if not all extension digits have been sent by the public exchange.
If an incoming call is signalled with multiple CGPNs in the D channel protocol, all CGPNs are displayed with the RING message (not on all devices).

Elements of the CONNECT message:

Element	ATX0	ATX1	ATX2	ATX3	ATX4
CONNECT	✓	✓	✓	✓	✓
B channel	*	*	*	*	*
Network speed	-	✓	✓	-	✓
B channel protocol	-	-	✓	-	✓
Called respectively Calling Party Number	-	-	✓	-	✓

* - not valid for all devices

$X	**Cause of connection termination / ISDN cause**	

●   **AT$X0**   **No ISDN cause is shown**
      AT$X1   **Numeric ISDN cause is shown**
      AT$X2   **ISDN cause appears in text format**

The command **AT$X** shows more details about termination of a connection. The ISDN causes are displayed in combination with the messages „**NO CARRIER**", „**BUSY**", „**NO DIALTONE**" and „**NO ANSWER**".
The ISDN causes and their numeric values are listed in chapter 6.2, page 58.

%X	**„NO CARRIER" message on lost incoming calls**	✓

●   **AT%X0**   **No „NO CARRIER" message on loss of calls**
      AT%X1   **„NO CARRIER" message when an incoming call is lost**

An incoming call is signalled with **RING** messages each three seconds, if register **S0** (page 41) isn't set to automatic call acceptance.

If in this state the incoming call is accepted by another terminal on the S_0 bus or terminated by the caller, the **NO CARRIER** message is issued when **AT%X1** is set.

With **AT%X0** set, only the absence of **RING** messages indicates, that the incoming call isn't valid any longer.

&X	B channel release after passive disconnect

● **AT&X0** **Normal disconnect**
 AT&X1 **DISCONNECTED message is issued, ATH is necessary**

For telephony applications it is useful to hear a busy tone, when the opposite site terminates the connection.

In normal operation (**AT&X0**), the B channel is released immediately after the opposite side terminates the connection.
In **AT&X1** mode, the **DISCONNECTED** message is issued, when the opposite side disconnects, and a busy tone is audible. Within 30 seconds, the connection must be terminated with the **ATH** command.

*X	Sabotage break

● **AT*X0** **Deactivate sabotage break**
 AT*X1 **Activate sabotage break**

Some devices have an built-in relais to support the sabotage break feature. In idle state, this relais connects the S_0 bus through to other devices on the bus. In case of a manipulated / spoofed S_0 bus, the command **AT*X1** activates the relais and disconnects then downstream S_0 bus.

Note: If the sabotage break is only needed for the current connection, the **ATDX** command (page 23) activates the sabotage break, dials, and reconnects the S_0 bus after connection termination.

&Y	Select configuration profile	✓

● **AT&Y0** **Select configuration profile 0**
 AT&Y1 **Select configuration profile 1**

This command selects the configuration profile which will be loaded with the next **ATZ** command or the next reboot of the device. The **AT&Y** command must be

stored with an **AT&W** command.

Z	Reset command	✓

ATZ0   **Reset AT interpreter and load device configuration profile 0**
ATZ1   **Reset AT interpreter and load device configuration profile 1**
ATZ*   **Reboot the device (hardware reset)**

The command **ATZ0** and **ATZ1** reset the AT interpreter and load the stored
configuration from profile 0 respectively 1.
When a connection is established, the connection will be terminated.
On devices with two serial interfaces, the other AT intrerpreter is not effected by an
ATZ0 or **ATZ1** command.

The **ATZ*** command causes the internal watchdog of the device to issue a
hardware reset. Active connections are lost, and the AT interpreter restarts with
the profile selected by the **AT&Y** command.

&Z	Store numbers	✓

AT&Z<i>=<nnn>   **Store number <nnn> at position <i>**
AT&Z<i>=   **Delete the number stored at position <i>**
AT&Z<i>?   **Show the number stored at position <i>**

Up to ten numbers can be set with the **AT&Z** command (0 to 9). The number is not
automatically stored in the flash memory and has to be saved by the **AT&W**
command.

The maximum length of a number is 20 digits.
The stored numbers can be displayed by the **AT\F** command (page 26).

Numbers can be stored with a leading character **'I'** for internal calls if a dial prefix
is set (see page 25).

5   S Registers

The device uses internal registers for some parameters. Register values can be changed with the **ATS** command (page 34). There are **bit-mapped** and **byte-mapped** registers.

Bit-mapped register	Bit-mapped registers store status information of the device in a single byte. Values of bit-mapped registers should be changed carefully, it is recommended to use the correspondant AT commands instead.
Changes	Bit-mapped registers can be changed by addition of the decimal bit value of the specific bit and by setting the calculated value with the **ATSn=x** command. All changes should be saved with the **AT&W** command.

S0	Automatic call acception

Valid values: 0..10 **RING** messages

Default value: 1 (automatic call acception)

The register S0 controls the automatic call acception of the device. When register **S0** is set to 0, automatic call acception is disabled. Values greather than 0 activate the automatic call acception. The adjusted value determines the number of **RING** messages (distance 3 seconds) the device waits before accepting the call automatically. During this time the user can accept the incoming call immediately with an **ATA** command or he can reject the call with an **ATH** command.

S1	RING counter

Valid values: 0..10

The register **S1** counts the **RING** messages. An incoming call will be automatically accepted if the counted value of register **S1** exceeds the determined value of register **S0**. The register **S1** is only readable. The counted value is held in register **S1** until the next incoming call.

S2	Escape character

Valid values: 0..127

Default value: 43 (ASCII character '**+**')

Register **S2** determines the escape character which is used for detecting the escape sequence (page 10) during online state.

For detection of a valid escape sequence, a string of exact three escape characters is necessary within one second escape delay time. The escape delay time is determined by register **S12** (page 43).

A value of 128 disables the escape character recognition. Connections can be terminated in this case only by dropping the DTR line. The command **AT&D0** must not used together with **ATS2=128** !

S3	Return character

Valid values: 0..127

Default value: 13 (ASCII character Carriage Return)

Register **S3** determines the carriage return character. If the device receives this character, the command line will be closed and executed immediately.

For responses, the AT interpreter uses this character together with the Linefeed Character from register **S4**.

S4	Linefeed character

Valid values: 0..127

Default value: 10 (ASCII character Linefeed)

Register S4 determines the linefeed character. The AT interpreter uses this character together with the Carriage Return character from register **S3**.

S5	Backspace character

Valid values: 0..127

Default value: 8 (ASCII character backspace)

Register **S5** determines the backspace character. This character can be used for editing the command line.
During input of command line the backspace character is echoed as backspace, space and backspace.

S10	Abort character

Valid values: 0..255

Default value: 27 (ASCII character ESC)

Register **S10** determines the Abort character This character can be used for cancelling the command line. After receiving the Abort character the command line will be cleared and the **ABORT** message is issued. Afterwards the device ist ready to receive a new command line.

S11	DTMF tone length

Valid values: 1..255

Default value: 90 (90 ms)

The length of transmitted DTMF tones and silence between DTMF tones can be determined by register **S11**. For transmission of DTMF tones, operation mode **AT\N16** is required.

S12	Escape delay time (guard time)

Valid values: 0..255

Default value: 50 (50 • 20 ms = 1 s)

Register **S12** determines the escape delay time in steps of 20 ms. Three Escape characters according to register **S2** must be entered within this time, without sending any character within this time before and after the Escape characters.

S14	AT interpreter settings

Default value: 9

Register **S14** is a bit-mapped register for various device settings. The bits of register **S14** have the following meaning:

Bit	Decimal	Meaning	AT command
0	0	0 - Echo OFF	ATE0
	1	**1 - Echo ON**	**ATE1**
1..2	**0**	**0 - Response messages ON**	**ATQ0**
	2	1 - Response messages OFF	ATQ1
	4	2 - No boot message	ATQ2
3	0	0 - Response messages as numeric responce	ATV0
	8	**1 - Response messages as text**	**ATV1**
4	**0**	**0 - ERROR message on wrong character 'A' or 'a'**	**AT$Q0**
	16	1 - No ERROR message	AT$Q1
5	**0**	**0 - Cancelation of dialing process by any character'**	**AT%D0**
	32	1 - No cancelation of dialing process	AT%D1
6	**0**	**0 - Load profile 0**	**AT&Y0**
	64	1 - Load Profile 1	AT&Y1

Bit	Decimal	Meaning	AT command
7	**0**	**0 - Autodetection of baudrate ON**	**AT&Q0**
	128	1 - Autodetection of baudrate OFF	AT&Q1

S21   Serial interface control

Default value: 12

Register **S21** determines the operation of the serial interface. The bits of register **S21** have the following meaning:

Bit	Decimal	Meaning	AT command
0	**0**	**0 - No check of PPP frames**	**AT$P0**
	1	1 - Address and control field will be checked	AT$P1
1,2	0	0 - DTR has no effect	AT&D0
	2	1 - DTR change from ON to OFF during online state changes to the command state	AT&D1
	4	**2 - DTR change from ON to OFF during online state terminates the connection**	AT&D2
	6	3 - DTR change from ON to OFF terminates the connection with reboot of the device	AT&D3
3	0	0 - DCD line is always active	AT&C0
	8	**1 - DCD line indicates an established connection**	**AT&C1**
4,5	**0**	**0 - DSR line is allways active**	**AT&S0**
	16	1 - DSR indicates the TEI assignment	AT&S1
	32	2 - DSR is active after TEI assignment and activated layer 1	AT&S2
6	**0**	**0 - asynchronous/synchronous conversion for PPP**	**AT%P0**
	64	1 - no asynchronous/synchronous conversion	AT%P1
7	**0**	**0 - normal treatment of LCP and IPCP datagrams (PPP)**	**AT$P2**
	128	1 - LCP and IPCP datagrams are escaped on the serial interface even after ACCM negotiation (adaption for some Linux versions)	AT$P3

S22   Response messages of connection establishment

Default value: 0

The register **S22** controls the output of the response messages after connection establishment. The bits of register **S22** have the following meaning:

Bit	Decimal	Meaning	AT command
0,1	**0**	**0 - No details about the ISDN cause**	**AT$X0**
	1	1 - ISDN cause in numeric format	AT$X1
	2	2 - ISDN cause in text format	AT$X2
2..3	0	no function	

Bit	Decimal	Meaning	AT command
4..6	**0**	**0 - Normal CONNECT message**	**ATX0**
	64	1 - CONNECT message with ISDN bitrate	ATX1
	80	2 - CONNECT message with protocol and ISDN bitrate	ATX2
	96	3 - Normal CONNECT message with ISDN bitrate	ATX3
	112	4 - CONNECT message with protocol and ISDN bitrate, RING message with calling party number	ATX4
7	**0**	**0 - No NO CARRIER message on lost call**	**AT%X0**
	128	1 - NO CARRIER message on lost call	AT%X1

S28   PowerOn auto connect, call back

Default value: 16

The register **S28** controls the PowerOn AutoConnect and the call back function. The bits of **S28** have the following meaning:

Bit	Decimal	Meaning	AT command
0	**0**	**0 - PowerOn auto connect is enabled**	**AT&P0**
	1	1 - PowerOn auto connect is disabled	AT&P1
1,2	**0**	**0 - Call back function is disabled**	**AT%S0**
	2	1 - Password controlled call back enabled	AT%S1
	4	2 - Password check is enabled, but no automatic call back	AT%S2
3..5	0	0 - adaption of the serial bitrate	AT%L0
	8	1 - adaption of the serial bitrate	AT%L1
	16	**2 - no adaption of the serial bitrate**	**AT%L2**
	32	3 - adaption of the serial bitrate	AT%L3
6,7	0	no function	

S30   Inactivity timer

Valid values: 0..255 (max. 255 • 10 s = 42.5 min)

Default value: 0 (disabled)

The inactivity timer entered with the **AT\T** command is stored in register **S30**. When no data transfer at the serial interface is detected during that time, the connection will be terminated automatically.

S31   DTR guard time and DTR dialling

Valid values: 0..127 (max. 127 • 20 ms = 2.54 min) for the DTR guard time

Default value: 0 (device dependent)

The register **S31** is bit-oriented and controls automatic DTR dialling, when then DTR line

changes from OFF to ON.
Furthermore in bits 0 to 6 the DTR guard time can be adjusted. This time defines the delay time, when the DTR line state is considered as valid.

Bit	Decimal	Meaning	AT command
0..6	0	DTR guard time (max. 127 • 20 ms = 2,54 min)	ATS31=nnn
7	**0**	**0 - DTR dialling is deactivated**	**AT$D0**
	128	1 - DTR dialling is activated	AT$D1

S32 XON character

Valid values: 0..127

Default value: 17 (ASCII character Ctrl-Q)

The XON character can be defined in register **S32**. This character is only used by software handshake XON/XOFF (setting **AT\Q1**, see page 33).

S33 XOFF character

Valid values: 0..127

Default value: 19 (ASCII character Ctrl-S)

The XOFF character can be defined in register **S33**. This character is only used by software handshake XON/XOFF (setting **AT\Q1**, see page 33).

S34 Receive timeout

Valid values: 0..255

Default value: 0 (5 ms pause)

All characters, which are sent by the connected computer during online state, are retained by the eviateg device before they are sent in the B channel protocol (packetizing).
The data is forwarded due to the following conditions:
- the count of bytes, adjusted with the **AT*EFlen** command (page 25), is reached
- the data stream from the connected computer to the eviateg device has a gap, which exceeds the timeout specified in register S34

The timeout can be adjusted in 5 ms steps.

S36 Operating modes

Valid values: 0..43

Default value: 2 (X.75, device dependent)

Register **S36** determines the operating mode / B channel protocol of the device selected with an **AT\N** command (page 28).

S37   Bitrate on the ISDN network side

Default value: 16

The bit-oriented register **S37** determines the ISDN network bitrate and the **%G** parameter for V.110 operation. The bits have the following meaning:

Bit	Decimal	Meaning	AT command
0..5		6 - ISDN network bitrate 1200 bit/s	AT%B1200
		9 - ISDN network bitrate 2400 bit/s	AT%B2400
		10 - ISDN network bitrate 4800 bit/s	AT%B4800
		12 - ISDN network bitrate 9600 bit/s	**AT%B9600**
		14 - ISDN network bitrate 19200 bit/s	AT%B19200
		16 - ISDN network bitrate 38400 bit/s	AT%B38400
6	0	0 - ISDN network bitrate follows the serial bitrate	AT%G0
	64	**1 - ISDN bitrate is determined by AT%B**	**AT%G1**
7	0	no function	

S39   Flow control

Default value: 3 (RTS/CTS hardware handshake)

The bit-oriented register **S39** determines the flowcontrol operation at the serial interface. The bits have the following meaning:

Bit	Decimal	Meaning	AT command
0,2	0	0 - no flow control	AT\Q0
	2	1 - XON/XOFF software handshake	AT\Q1
	3	**3 - RTS/CTS hardware handshake**	**AT\Q3**
3..7	0	no function	

S40   Separator character for Called Party Subaddress (CDPSA)

Valid values: 0..127

Default value: 35 (ASCII character '**#**')

Register **S40** determines the character that is used to separate the Called Party

Subaddress (CDPSA) in an **ATDnnn** command (page 20) and in a RING message.

Example: **ATD 04012345678 #123**

S41	Separator character for Calling Party Subaddress (CGPSA)

Valid values: 0..127

Default value: 58 (ASCII character '**:**')

Register **S41** determines the character that is used to mark the beginning of the Calling Party Subaddress (CGPSA) in an **ATDnnn** command (page 20) and in a RING message.

Example: **ATD 04012345678 :123**

S42	Terminal Endpoint Identifier

The read-only register **S42** contains the **Terminal Endpoint Identifier** (TEI) assigned by the network exchange or (on Point-to-Point accesses) was assigned with the **AT∗ETEI=** command (page 87).

S43	Fix TEI

Register **S43** contains the fix TEI for Point-to-Point accesses. The value of register **S43** can be set with the **AT∗E TEI =<n>** command (page 87).

S44	Termination causes / ISDN causes

The read-only register **S44** contains the termination cause of the last connection as a decimal value. A description of the ISDN causes is shown in chapter 6.2 on page 58.

S45	Distance between responses

Valid values: 0..255 (max. 255 • 10 ms = 2.55 s)

Default value: 3

Register **S45** determines a delay between two responses of the device, e.g. **RING** and **CONNECT** message. This is necessary sometimes if the connected computer is very slow.

S46	Separator character for the Calling Party Number (CGPN)

Valid values: 0..127

Default value: 46 (ASCII character '**.**')

Register **S46** contains the character used to mark the beginning of the Calling Party Number (CGPN) in the **ATD** command (page 20) and a **RING** message.

Example: ATD 08154711 . 60848791

S47	Separator character for the Reconnected Name

Valid values: 0..127

Default value: 44 (ASCII character '**,**')

Register **S47** contains the character used to mark the beginning of the Reconnected Name during Call Transfers (see chapter ??, page 95).

S48	Separator character for the X.25 address

Valid values: 0..127

Default value: 38 (ASCII character '**&**')

When using X.25 in the B channel (see AT\N25, page 30) there is a difference between the ISDN number (to which the B channel connection was established) and the X.25 address (which is used during the X.25 connection establishment over the switched-through B channel).
Register **S48** contains the character used to mark the beginning of the X.25 address in the **ATD** command (page 20).

Example: ATD 06987654321 & 45400019052

S50	Separator character for the Called Party Number (CDPN)

Valid values: 0..127

Default value: 37 (ASCII character '**%**')

When **ATX4** is activated, the beginning of the Called Party Number (CDPN) in a **RING** message is marked with the character according to register **S50**.

Note: In an **ATD** command, the Called Party Number is the first parameter, so no separator character is needed.

S51   Separator character for X.31 User Data

Valid values: 0..127

Default values: 36 (ASCII character '**$**')

When an X.31 connection is established with an **ATD** command (page 20), X.31 User Data can be specified which can be checked by the called DTE before accepting the call. Register **S51** contains the character used to mark the beginning of the X.31 User Data.

User data may be up to 16 bytes long.
Binary values can be used in hexadecimal notation with a leading „**\x**".

Example: ATD 0262 40300019052 $Login\x01\x0216Chrs

Note: If all dialled X.31 connections use the same X.31 User Data, the command
            AT∗C X31 UserData (page 83) can be used to set these data.

S52   Separator character for a second dialled number

Valid values: 0..127

Default value: 42 (ASCII character '**∗**')

On devices supporting simultnous data and telephony connections, register **S52** determines the character, which separates the first Called Party Number (data connection) and the second CDPN (Codec connection).

Example: ATD 04012345 ∗ 04012346

S53   AOC message

Default value: 0 (AOC message is not issued)

Register **S53** controls the output of an AOC message with charging units during a connection. The bits of register **S53** have the following meaning:

Bit	Decimal	Meaning
0	1	1 - AOC message is issued in command mode
1..3	0	no function
4	16	16 - AOC uses the called party number (CPDN)
5..7	0	no function

S54 Unused serial control lines

Default value: 0 (all serial control lines in use)

Register **S54** determines the unused control lines of the serial interface. Unused marked control lines can be used as additional I/O lines for controlling external devices. The bits of register **S54** have the following meaning:

Bit	Decimal	Meaning
0..3	1 2 4 8	1 - RI line is not in use 2 - DSR line is not in use 4 - DCD line is not in use 8 - CTS line is not in use
4,5	16 32	16 - DTR line is not in use 32 - RTS line is not in use
6,7	0	no function

Note: The value in register **S54** can't be restored to the factory settings with an **AT&F** command. This can be accomplished with the command **AT*EInitF** (page 91).

S55 State of D channel protocol

Register **S55** shows the state of the D channel protocol with the following bits:

Bit	Decimal	Meaning
0	1	0 – Layer 1 ist deactivated 1 – Layer 1 ist activated
1	2	0 – Layer 2 is not established 2 – Layer 2 is established
2	4	0 – Layer 3 established 4 – Layer 3 is established
3	8	0 – no connection established 4 – at least one connection established
4..7	0	no meaning

Notes: Register **S55** is read-only.
The different meanings of bit 2 and 3 are only relevant for Point-to-Point accesses (chapter 12.2, page 105).

S56 Display of D channel protocol state changes

Default value: 0 (no additonal messages)

Register **S56** controls the output of additional messages on D channel protocol status changes. The bits of register **S56** have the following meaning:

Bit	Decimal	Meaning
0	1	Indication on Layer 1 status changes „Layer 1 activated" respectively „Layer 1 deactivated"
1	2	Indication on Layer 2 status changes „Layer 2 established" respectively „Layer 2 not established"
2	4	Indication on Layer 3 status changes „Layer 3 established" respectively „Layer 3 not established"
3	8	Indication of connections „Connection established" / „No connection established"
4..5	0	no meaning
6	64	Indication of changes of the ISDN feeding voltage (if the device supports measuring the ISDN feeding voltage): „FEEDING OFF" „FEEDING NORMAL" „FEEDING RESTRICTED"
7	128	Indication of TEI assignment „TEI <n> assigned"

Note: The additional messages are issued only during command phase.

S57 Elements of the RING message

Default value: 0 (no additonal elements)

The bit oriented register **S57** specifies the addtional elements sent along with the **RING** message. The bits of register **S57** have the following meaning:

Bit	Decimal	Meaning
0	1	displays the service
1	2	displays the assigned B channel
2	4	displays the network speed
3	8	displays the B channel protocol
4	16	displays the Calling Party Number (CGPN)
5	32	displays the Called Party Number (CDPN)
6	64	displays the sub addresses (CGPSA und CDPSA)
7	128	displays User-To-User information (UTU) respective UserData during X.31 connections

Note: When using register **S57**, the parameter **ATX0** should be set (see page 37). The elements are displayed in an ascending order of the selected bits (service,

B channel...).

S58   Elements of the CONNECT message

Default value: 0 (no additonal elements)

The bit oriented register **S58** specifies the addtional elements sent along with the **CONNECT** message. The bits of register **S58** have the following meaning:

Bit	Decimal	Meaning
0	1	displays the service
1	2	displays the assigned B channel
2	4	displays the network speed
3	8	displays the B channel protocol
4	16	displays the Calling Party Number (CGPN)
5	32	displays the Called Party Number (CDPN)
6	64	displays the sub addresses (CGPSA und CDPSA)
7	128	displays User-To-User information (UTU) respective UserData during X.31 connections

Note: When using register **S58**, the parameter **ATX0** should be set (see page 37). The elements are displayed in an ascending order of the selected bits (service, B channel...).

S59   Elements of the CALL WAITING message

Default value: 0 (no additonal elements)

The bit oriented register **S59** specifies the addtional elements sent along with the **CALL WAITING** message (after an **AT$C**). The bits of register **S59** have the following meaning:

Bit	Decimal	Meaning
0	1	displays the service
1	2	displays the assigned B channel
2	4	displays the network speed
3	8	displays the B channel protocol
4	16	displays the Calling Party Number (CGPN)
5	32	displays the Called Party Number (CDPN)
6	64	displays the sub addresses (CGPSA und CDPSA)
7	128	displays User-To-User information (UTU) respective UserData during X.31 connections

Note: When using register **S59**, the parameter **ATX0** should be set (see page 37).
The elements are displayed in an ascending order of the selected bits (service, B channel...).

S60   MSN mask

Default value: 7 (device dependent)

Register **S60** determines to which MSNs the device listens for incoming calls. The value set to **S60** is a bit mask: for each MSN, the AT interpreter shall use for incoming calls, the corresponding bit must be set. Calls to MSNs not covered by the MSN mask are ignored.

Bit	Decimal	Meaning
0..3	1 2 4	1 - Signalling of incoming calls for MSN0 2 - Signalling of incoming calls for MSN1 4 - Signalling of incoming calls for MSN2
4..7	0	device dependent: signalling calls for MSN3 to MSN7

S72   Length of data blocks during V.120 connections

Default value :   2 (257 bytes per frame)

The register **S72** defines the maximum frame length during V.120 connections
(see **AT*E FLen** command).

Bit	Decimal	Meaning
0..1	0 1 **2**	0 - Length as defined by command **AT*EFLen** 1 - Length max. 127 bytes **2 - Length max. 257 bytes**
2..7	0	no function

S90   Signalling of unread SMS

Default value: 0

The register **S90** determines, how the device signals received unread SMS, which are stored in the flash memory.

Bit	Decimal	Meaning
0..1	**0**	**0 - unread SMS are not signalled**
	1	1 - unread SMS are signalled with an activated RI line
	2	2 - unread SMS are signalled with a message UNREAD SMS
	3	3 - combination of 1 and 2
2..7	0	no function

S93   Serial baudrate

Default value: 20 (115,200 bit/s)

Register **S93** determines the baudrate of the serial interface.
The device uses this baudrate after power on for all messages until autobaud detection.
When executing the **AT&W** command, the current baudrate is stored in register **S93**.
The following baudrates are selectable:

Bit	Decimal	Meaning
0..5	3	3 - baudrate 150 bit/s
	4	4 - baudrate 300 bit/s
	5	5 -baudrate 600 bit/s
	6	6 - baudrate 1,200 bit/s
	9	9 - baudrate 2,400 bit/s
	10	10 - baudrate 4,800 bit/s
	12	12 - baudrate 9,600 bit/s
	14	14 - baudrate 19,200 bit/s
	16	16 - baudrate 38,400 bit/s
	17	17 - baudrate 57,600 bit/s
	20	**20 - baudrate 115,200 bit/s**
	21	21 - baudrate 230,400 bit/s (device dependent)
6,7		no function

S94   Serial data format

Default value: 9 (8N1 - 8 databit, no parity, 1 stopbit)

The bit-oriented register **S94** determines the data format of the serial interface.
The device uses this data format after power on for all messages until autobaud detection.
The bits of register **S94** have the following meaning:

Bit	Decimal	Meaning
0,1	**1**	**1 - no parity**
	2	2 - even parity
	3	3 - odd parity
2	**0**	**0 - 1 stopbit**
	4	1 - 2 stopbits

Bit	Decimal	Meaning
3	0 **8**	0 - 7 data bits **1 - 8 data bits**
4..7	0	no function

S97   Power-On call protection

Valid values: 0..255 (max. 255 s)

Default value: 0 (deactivated)

The register **S97** determines a time after power-on or reset, in which incoming calls are ignored. During this time **RING** messages are suppressed.

S99   User register

Valid values: 0..255

Default value: 0

Register **S99** can be used as user register. Any value written into this register is kept and is only cleared on restart of the eviateg device. With this user register, a connected computer can check, if the eviateg device is reset by an external reset circuitry.

6 Responses

Responses
ON / OFF

The device is normally configured to issue response messages in text format (command **ATQ0**). The command **ATQ1** suppresses all responses.

Text format

The text format of responses can be selected by the **ATV1** command (default). In this case the transmitted response is terminated with a carriage return character (register **S3**, page 42) and a linefeed character (register **S4**, page 42).

Numeric format

When the responses are interpreted by a computer, a short format of responses may be preferred. A short response consists of the response number followed by the carriage return character (register **S3**, page 42).

Disconnection

After terminating a connection the message „**NO CARRIER**" is issued. The command **AT$X** enables additional details about the termination cause in numeric or text form (see page 38).
The ISDN cause can only be shown if the command **ATV1** is active.

6.1 List of responses in text form and numeric form

Text response	Short form	Meaning
OK	0	AT command line executed successfully
CONNECT	1	Connection to another party established
RING	2	Incoming call
NO CARRIER	3	Connection has been disconnected or can't be established
ERROR	4	Error during execution AT command line
CONNECT 1200	5	V.110 connection with 1200 bit/s established
NO DIALTONE	6	Local access is busy, or there is no connection to the ISDN exchange
BUSY	7	Called party is busy
NO ANSWER	8	Called party did not answer
ABORT	9	Command line aborted with the abort character
CONNECT 2400	10	V.110 connection with 2400 bit/s established
CONNECT 4800	11	V.110 connection with 4800 bit/s established
CONNECT 9600	13	V.110 connection with 9600 bit/s established
CONNECT 19200	15	V.110 connection with 19200 bit/s established
CONNECT 38400	20	V.110 connection with 38400 bit/s established
CONNECT 64000	30	Connection in one of the operating modes X.75, V.120, HDLC transparent or scrambled data is established

6.2   Termination causes / ISDN causes

The following table shows the ISDN causes when a connection is terminated or cannot be established. The ISDN cause is transmitted by the network exchange and stored in register **S44** (page 48).

ISDN cause hexadecimal	ISDN cause decimal	Description
81	129	Unassigned number
82	130	No route to specified transit network
83	131	No route to destination
86	134	Channel unacceptable
87	135	Call awarded
90	144	Normal call clearing
91	145	User busy
92	146	No user responding
93	147	No answer from user
95	149	Call rejected
96	150	Number changed
9A	154	Non-selected user clearing
9B	155	Destination out of order
9C	156	Invalid number format
9D	157	Facility rejected
9E	158	Response to STATUS ENQ
9F	159	Normal, unspecified
A2	162	No circuit / channel available
A6	166	Network out of order
A9	169	Temporary failure
AA	170	Switching equipment congestion
AB	171	Access information discarded
AC	172	Requested circuit / channel not available
AF	175	Resources unavailable, unspecified
B1	177	Quality of service unavailable
B2	178	Requested facility not subscribed
B9	185	Bearer capability not authorized
BA	186	Bearer capability not presently available
BF	191	Service or option not available
C1	193	Bearer capability not implemented
C2	194	Channel type not implemented
C5	197	Requested facility not implemented
C6	198	Only restricted digital information bearer capability available
CF	207	Service or option not implemented, unspecified

ISDN cause hexadecimal	ISDN cause decimal	Description
D1	209	Invalid call reference value
D2	210	Identified channel does not exist
D3	211	A suspended call exists, but this call ID not
D4	212	Call ID in use
D5	213	No call suspended
D6	214	Call with requested call ID has been cleared
D8	216	Incompatible destination
DB	219	Invalid transit network selection
DF	223	Invalid message, unspecified
E0	224	Mandatory info element missing
E1	225	Message type non-existent or not implemented
E2	226	Message not compatible with state
E3	227	Info element non-existent or not implemented
E4	228	Invalid info element contents
E5	229	Message not compatible with state
E6	230	Recovery on timer expiry
E7	231	Protocol error, unspecified
F7	247	Interworking, unspecified

7   The AT*A command - sending alert messages

With the **AT*A** command alert messages can be sent to mobile phones and pagers. The eviateg device handles all necessary protocols and responds with **OK** or **ERROR**, depending on the success of sending the message.

7.1   Communication networks

Depending on the networks and properties supported by the device, alert messages can be sent over
  - ISDN, using the **TAP** or **UCP** protocol
  - ISDN, using the Fixed Network SMS (**FSMS**) protocol according to ETSI ES 201192
  - GSM, using the **GSM SMS** service

When using devices capable of sending alert message over multiple communication networks, the network should be selected with the **AT*A <net>...** command, see page 61.

7.2   Routing

When sending a SMS over ISDN using the **TAP** and **UCP** protocol, a gateway for the mobile network is selected depending on the first digits of the destination number, and a connection is established with the particular protocols (**automatic routing**).

Note: The **UCP** protocol requires the parameters **CountryCode**, **AreaCode** and **OwnNumber** to be set with the **AT*E** command, see page 90.

The gateway table is country specific, please contact the eviateg support for the availability of a gateway table for a particular country.

The automatic routing can be overridden (see **AT*A Gateway...** command on page 62), when the destination number has been taken to a new mobile network (Number Portability).

7.3   Using the number storage and text storage

When a destionation number is often used, it should be stored with the **AT*C Number** command (page 75) into the number storage.

The same applies to often used text, which should be stored with the **AT*C Text** command (page 81) into the text storage.

7.4   Syntax of the AT⋆A command

AT⋆A <nnn> <text>   Send a text to a destination number

This command sends the specified text to the specified destination number:

Example: AT⋆A 017123456789 Alarm !!!

AT⋆A =<i> <text>   Send a text to a stored destination number

This command send the specified text to the destination number stored at location <i> of the number storage:

Example: AT⋆A =3 Alarm !!!

AT⋆A =<i> =<j>   Send a stored text to a stored destination number

This command sends the text stored at location <j> of the text storage to the destination number stored at location <i> of the number storage:

Example: AT⋆A =3 =7

AT⋆A <net> <nnn> <text>   Send a text to a number with network selection

This command selects a communication network to send the alert message. For the parameter <net> can be specified (device dependent) the following key words:
• **ISDN**
• **X.31** or **X31**
• **GSM**
• **FixedNetSMS**

Selection of the communication network can be combined with the selection of stored destination numbers and stored text:

Example: AT⋆A GSM =3 =7
            AT⋆A FixedNetSMS 04060840790 Alert using fixed net SMS !

AT⋆A Gateway <g> <nnn> <text>   Send a text to a specified mobile network

Normally the devices recognizes with the first digits of the destination number, to which mobile network the number belongs and sends the text over the associated gateway (automatic routing).

In the context of Number Portability a mobile user can change the network provider, keeping his mobile number. This case cannot be covered by the automatic routing, so in the **AT⋆A** command must be specified, over which gateway the TAP / UCP message shall be sent:

Example: **AT⋆A Gateway 0 01723456789 Alert over gateway 0**

Note: When the message is to be sent with **Fixed Network SMS** or **SMS over GSM**, the routing is done by the network provider, so the gateway must be specified for **SMS over ISDN** with **TAP** and **UCP** only !

Note: For destination number in the number storage, a gateway can be specified with the **AT⋆C Number** command, see page 75.

8 AT∗C command - extended programming

The **AT∗C** commands are not available on all eviateg devices.
The supported **AT∗C** commands can be checked with the **AT∗C ?** command.

Note: Parameters adjusted with **AT∗C** commands are not saved with the **AT&W** command, please use the respective **AT∗C ... Save** command !

AT∗C command summary:

AT∗C ?	List of supported **AT∗C** commands
AT∗C Abandon	Signalling of an incoming call to all dial protocols / AT interpreters or only to the first dial protocol / AT interpreter
AT∗C ALaw	Set the Codec mode to A-Law or µ-Law
AT∗C ASCII	Change the code set between ASCII and Latin-1
AT∗C BCExt	not longer supported, command is replaced by **AT∗C DCP Option + BCExt** (see page 70)
AT∗C CallForwarding **AT∗C CF**	Set or clear the CallForwarding service (page 66)
AT∗C CmdWatchdog	Programming of a watchdog function (page 68)
AT∗C DateAndTime	Read or set date and time (page 68)
AT∗C DCP	Read or set the D channel protocol (page 69)
AT∗C Feeding	Check the ISDN feeding voltage (page 70)
AT∗C Gateway	Adjust parameters for sending SMS and pager messages (page 71)
AT∗C GSM	Adjust parameters for a built-in GSM modem (page 71)
AT∗C LineCheck	Check the operability of the ISDN line (page 74)
AT∗C LLC	not longer supported, command is replaced by **AT∗C DCP Option + LLC** (see page 70)
AT∗C MSN	Read or set MSNs (page 74)
AT∗C Number	Read or set destination numbers (page 75)
AT∗C PnP	Enable or disable automatic Plug & Play recognition (page 76)
AT∗C Reboot	Restart the device (identical to **ATZ∗**)
AT∗C Remote	Adjust parameters for remote access (page 76)
AT∗C SMS	Adjust parameter for transmission and reception of Fixed Network SMS (FSMS, page 77).
AT∗C SPID	Read or set the SPID for american D channel protocols NI1, 5ESS and DMS100 (page 81)
AT∗C Text	Access the text storage (page 81)

AT∗C X31	Adjust settings for X.31 operation (page 82)

The following **AT∗C** commands are described in detail in the ***Manual Programming*** of the respective device:

AT∗C Alert	Transmission of SMS and pager messages
AT∗C Bid	Operation of bidirectional IOs
AT∗C Caller	Configuration of numbers for the Caller event
AT∗C Config	Configuration of inputs and outputs
AT∗C Counter	Configuration of 32 bit counters.
AT∗C Deblock	Blockade break for urgent calls
AT∗C SendDTMF	Transmission of DTMF tone sequences
AT∗C Group	Configuration of number groups for group alerting
AT∗C In	Configuration of inputs
AT∗C IO	Command for checking the state of IOs and for logical conjunction of IOs
AT∗C Macro	Execution of a command macro
AT∗C Out	Configuration of outputs
AT∗C Reaction	Programming reactions to internal or external events
AT∗C SabotageBreak	Sabotage break for urgent calls
AT∗C SendText	Send a text message to an ISDN /GSM terminal
AT∗C SendVoice	Send a voice alert to a (mobile) phone
AT∗C Serial	Send a text message to the serial interface
AT∗C SetMacro	Configuration of command sequences (action macros)
AT∗C SnapShot	Take a snapshot from a camera and transmit the picture to a terminal
AT∗C Temp	Configuration of digital temperatur sensors
AT∗C TimeTable	Read and set the time table matrix
AT∗C TimeTest	Read the current state of the time table matrix
AT∗C Timer	Start and stop and check internal timers
AT∗C Voice	Show stored voice segements for voice alerts

The following **AT∗C** command is described in detail in the ***Manual D channel analyzer***:

AT∗C Analyzer	Operation of a built-in D channel analyzer

The follwoing **AT∗C** commands are described in detail in the ***Handbuch zum VdS2465-***

Protokoll:

AT*C VdS	Read or set parameters for the VdS2465 -protocol
AT*C VdSMsg	Send a VdS2465 message

AT*C Abandon	**Signalling of incoming calls**

AT*C Abandon ?	**Show the settings for the signalling of incoming calls**
AT*C Abandon On	**An incoming call is signalled only by the first dial protocol / AT interpreter**
AT*C Abandon Off	**An incoming call is signalled all dial protocols / AT interpreters**

This command determines, how an incoming call shall be handled, which could be signalled by means of service and MSN to multiple dial protocols (e.g. the AT interpreter). Refer also to chapter 12, page 102.

The selected setting is stored automatically.

AT*C ALaw	**Codec mode**

AT*C ALaw ?	**The current Codec mode is displayed**
AT*C ALaw On	**The Codec is switched to A-Law**
AT*C ALaw Off	**The Codec is switched to µ-Law**

On some eviateg devices, with this command the Codec operation mode can be switched between A-Law (Europe) and µ-Law (USA).

The selected setting is stored automatically.

AT*C ASCII	**ASCII encoded text messages**

AT*C ASCII ?	**The current format is displayed**
AT*C ASCII On	**Message to be sent are ASCII encoded**
AT*C ASCII Off	**Message to be sent are ISO-Latin1 encoded**

With this command the coding format for messages (ASCII or ISO-Latin1) can be determined.
When sending a message with the **AT*A** command or when SMS are received, special

characters are treated according to this setting.

The selected setting is stored automatically.

AT⋆C CallForwarding or **AT⋆C CF**	Controlling CallForwarding services

AT⋆C CallForwarding ?   Show all numbers which are redirected

AT⋆C CallForwarding <Procedure> ?
Show numbers which are redirected under the specified circumstances

AT⋆C CallForwarding <Procedure> <Service> ?
Show numbers which are redirected under the specified circumstances with the specified service

AT⋆C CallForwarding <Procedure> <Service> <ServedUserNr> ?
Show the redirection for the specified number under the specified circumstances with the specified service

AT⋆C CallForwarding <Procedure> <Service> <ServedUserNr> <ForwardedToAds>
Activate call forwarding

AT⋆C CallForwarding <Procedure> <BasicService> <ServedUserNr> Deactivate
Deactivate call forwarding

<Procedure>
describes the situation, under which the incoming call shall be forwarded:
- „**Unconditional**" is used to forward each incoming call
- „**Busy**" is used to forward calls only if the specified own number is busy
- „**NoReply**" is used to forward calls, if they are not answered within 15 seconds

<BasicService>
describes the service, for which incoming calls shall be forwarded:
- "**AllServices**" is used to forward incoming calls for all services
- "**Speech**" is used for the service „Speech"
- "**UDI**" is used for the service „Unrestricted digital information" (data communication)
- "**Audio3K1**" is used for the service „Audio 3.1 kHz"
- "**Telephony3K1**" is used for the service „Telephony 3.1 kHz"
- "**Telephony7K**" is used for the service „Telephony 7 kHz"
- "**FaxG2G3**" is used for the service „Fax group 2 / group 3" (analogue fax)
- "**FaxG4**" is used for the service „Fax group 4" (digital fax)

<ServedUserNr>

specifies the number, for which incoming calls shall be forwarded. The following variants can be used (please refer also to the examples below):

- one of the **MSN**s (complete number, but without area code)
- „**=<idx>**" as a reference to a number from the number storage (see commands **AT&Z**, page 40, and **AT*C Number**, page 75)
- „**All**" to forward calls to all numbers of the access

<**ForwardedToAds**>

specifies the number, to which the calls shall be forwarded. The following variants can be used (please refer also to the examples below):

- a number (with area code, if needed)
- „**=<idx>**" as a reference to a number from the number storage (see commands **AT&Z**, page 40, and **AT*C Number**, page 75)

Notes:

The following words can be abbreviated:

- „**CallForwarding**" by „**CF**"
- „**Unconditional**" by „**U**"
- „**Busy**" by „**B**"
- „**NoReply**" by „**NR**"
- „**Deactivated**" to „**D**"

The parameter <BasicService> can be abbreviated, but it must be unambiguous.

The display of diverted numbers use the following format:
<**Procedure**>, <**BasicService**>, <**ServedUserNr**> > <**ForwardedToAds**>

Examples:

> **AT*C CallForwarding Unconditional All All 017098765432**
> forwards all incoming call for all services and all own numbers to the destination number 017098765432.

> **AT*C CF NR Speech 60848790 98237782**
> forwards incoming speech calls to the number 98237782, which are not answered by the number 60848790 within 15 seconds.

> **AT*C CF B UDI 60848791 =3**
> forwards all data calls for the own number 60848791 in engaged condition to the number from storage place 3.

> **AT*C CF U A A D**
> deactivates all unconditional diversions for all services and numbers.

> **AT*C CF ?**
> show all activated diversions.

> **AT*C CF B ?**

show all activated diversions to be executed in busy conditions. („B" is used for Procedure Busy)

AT∗C CF N U ?

show all activated diversions to be executed if no terminal answers an incoming digital call („N" is used for Procedure NoReply, „U" is used for BasicService UDI)

AT∗C CF B A 60848790 ?

shaows all diversions for all services, if then number 60848790 is busy
(„B" is used for Procedure Busy, „A" is used for AllServices)

<u>**Note:**</u>   Call forwarding is not supported by all network providers on all accesses !

AT∗C CmdWatchdog	Timer supervision for AT commands

AT∗C CmdWatchdog ?

Shows the settings for the AT command supervision

AT∗C CmdWatchdog Save

Stores the settings for the AT command supervision

AT∗C CmdWatchdog Command <cmd>

Sets the AT command, which re-triggers the supervision

AT∗C CmdWatchdog Timeout <timer>

Sets the time, after which the supervision expires, when the specified AT command isn't issued

This command can be used to keep the connected computer under surveillance (watchdog function): The eviateg devices checks, if the connected computer has issued the specified command at least once in specified time.

Depending on the implementation is either an event signalled and a reaction triggered (refer to the *Programming Manual*) or the device is reset. In the latter case e.g. a PowerOn Autoconnect can be used to signal the missing AT command.

The timeout value can be enterend in the extended time format (e.g. „D2H14M30", see *Programming Manual*).

AT∗C DateAndTime	Date and time

AT∗C DateAndTime ?   **Show date and time**

AT∗C DateAndTime <dt>   **Set date and time**

The format for date and time is **YYYY-MM-DD HH:MM:SS**.
The device switches automatically to Daylight Saving Time (DST) and back.

AT⋆C DCP	D channel protocol settings
AT⋆C DCP ?	**Show the current D channel protocol and the D channel protocols implemented in the device**
AT⋆C DCP <protocol>	**Set the D channel protocol**
AT⋆C DCP LeasedLine Latency	**Set the time for LeasedLine mode, after which the next RING message is issued**
AT⋆C DCP KeepTEI	**not longer supported; command is replaced by AT⋆C DCP Option + KeepTEI**
AT⋆C DCP ToN ?	**Show the „Type of Number" for outgoing connections.**
AT⋆C DCP ToN <t>	**Set the „Type of Number" (according to ETS 300 102) for outgoing connections.**
AT⋆C DCP NP ?	**Show the „Numbering Plan" for outgoing connections.**
AT⋆C DCP NP <p>	**Set the „Numbering Plan" (according to ETS 300102) for outgoing connections.**

Some devices support in addition to the D channel protocol **DSS1** („Euro ISDN") other
D channel protocols like:
*   **1TR6**   old national protocol in Germany, still used for some PABXes
*   **NI1**   National ISDN 1 for the USA
*   **5ESS**   for operation on Lucent's 5ESS exchanges
*   **DMS100** for operation on Nortel's DMS-100 exchanges
*   **AUTO**   for automatic recognition of 1TR6 and DSS1

On eviateg devices supporting LeasedLine operation, the parameter <protocol> can be
specified as:
*   **LeasedLine B1**   LeasedLine mode on channel B1
*   **LeasedLine B2**   LeasedLine mode on channel B2
*   **LeasedLine B1+B2** LeasedLine mode on both channels:
                                        B1 on the first serial port and
                                        B2 on the second serial port and

Example: AT⋆C DCP NI1
             AT⋆C LeasedLine B1

The specified D channel protocol is stored automatically. Subsequently the device reboots

with the changed protocol and issues an **OK** message.
If the specified and the current D channel protocol are identical, only the **OK** is issued.

Note: For the protocols NI1, 5ESS and DMS100 the SPID (Service Profile Identifier) supplied by the network provider must be set with the **AT⋆C SPID** command (see page 81).
On a restart with one of the protocols NI1, 5ESS or DMS100 without stored SPID the message **No SPID stored** is issued.

Note: If the data transfer shall use 56000 bit/s (only for NI1, 5ESS or DMS100), the service has to be set with the **AT⋆E Service** command (page 87).

AT*C DCP Option	Options for the D channel protocol

AT⋆C DCP Option ? show the active options

AT⋆C DCP Option + <opt1> [<opt2> ...]
sets one or more options

AT⋆C DCP Option - <opt1> [<opt2> ...]
resets one or more options

The following options are currently supported:

- **AckReleaseCollision** Workaround for some Nextira PABXes
- **BCExt** Send extended Info Element Bearer Capability when dialling a connection (eg with speed information for V.110 connections or frame length for V.120 connections);
BCExt must be deactivated for some GSM networks and for American D channel protocols NI1, DMS100 and 5ESS
- **ExpandToN** Expand numbers according to the Type Of Number field with „0" for national and „00" for international numbers
- **KeepTEI** Keep the TEI value after deactivation of Layer 1 to support terminal portability on the S_0 bus
- **LLC** Send Info Element Low Layer Compatibility when dialling a connection with additional B channel protocol info (eg with speed information for V.110 connections or frame length for V.120 connections)
- **RebootOnL2Error** Reboot the device if repeatedly no connection to the exchange can be established on Layer 2

AT*C Feeding	Check the ISDN feeding voltage

AT*C Feeding ? Show the ISDN feeding voltage

Some eviateg devices have additional hardware to monitor the the ISDN feeding voltage on the S_0 bus. On this devices, the **AT*C Feeding ?** command checks the voltage on the S_0 bus and responds one of the following messages:

- **No feeding**   if there is no connection to the S_0 access
- **Normal mode**   if the access is in normal operation mode and the network terminator feeds the S_0 bus
- **Restricted mode**   if the access is in restricted operation mode and the public exchange feeds one selected ISDN terminal
- **Feeding recognition faulty**   if the additional hardware is not present or is defective

AT*C Gateway	Settings for transmission of SMS / pager messages

AT*C Gateway ?   Show the settings of all gateways

AT*C Gateway Save   Save the settings of all gateways

AT*C Gateway <g> ?   Show the settings of a single gateway

AT*C Gateway <g> Save   Save the setting of single gateway

AT*C Gateway <g> Prefix ?   Show the number prefixes for a gateway

AT*C Gateway <g> Prefix <pre>   Set the number prefixes for a gateway

With the **AT*C Gateway** command the gateway table can be modified, which is used when sending SMS messages with TAP or UCP protocol to the mobile network gateways.

The complete table can be queried with the **AT*C Gateway ?** command.
The entry of a single gateway can be queried, along with the index of the gateway, with the **AT*C Gateway <g> ?** command.

The automatic routing algorithm for the **AT*A** command checks the first digits („prefix") of the destination number in order to associate the right mobile network (automatic routing).
All prefixes belonging to a gateway can be queried with the **AT*C Gateway <g> Prefix ?** command and can be set **AT*C Gateway <g> Prefix <pre>** command.

Example: AT*C Gateway 0 Prefix 151 160 170 171 175

Note: All other parameters of the gateway table may only be modified after consulting eviateg – otherwise sending SMS messages can become impossible !

AT*C GSM	Parameters for a built-in GSM modem

AT*C GSM ?   Show all parameters for the built-in GSM modem

AT*C GSM Save   Save all parameters for the built-in GSM modem

AT*C GSM PIN ?   Show the PIN for the SIM card

AT*C GSM PIN <p>   Set the PIN for the SIM card

AT*C GSM PIN2 ?   Show the PIN2 for the SIM card

AT*C GSM PIN2 <p>   Set the PIN2 for the SIM card

AT*C GSM LoginLimit ?   Show the maximum time until forced logoff / logon

AT*C GSM LoginLimit <t>   Set the maximum time until forced logoff / logon

AT*C GSM PrePaidCard ?   Show the Prepaid card parameter

AT*C GSM PrePaidCard AutoPIN2Recharge On | Off

> Enable / disable the automatic recharge of a PrePaid card with PIN2

AT*C GSM PrePaidCard Credit ?

> Show the current credit of the PrePaid card

AT*C GSM PrePaidCard Limit ?

> Show the minimum credit of the PrePaid card

AT*C GSM PrePaidCard Limit <l>

> Set the minimum credit of the PrePaid card (1 to 500 €)

AT*C GSM PrePaidCard Recharge PIN2

> Recharge the PrePaid card using PIN2

AT*C GSM PrePaidCard Recharge Number <n>

> Recharge the PrePaid card using a recharge code <n>

AT*C GSM PrePaidCard Credit Cmd ?

> Show the GSM supplementary service command used by the internal GSM modem to check the credit at the network provider

AT*C GSM PrePaidCard Credit Cmd <c>

> Set the GSM supplementary service command used by the internal GSM modem to check the credit at the network provider

AT*C GSM PrePaidCard Recharge Number Cmd ?

> Show the GSM supplementary service command used by the internal GSM modem to recharge the PrePaid card with a recharge code

AT*C GSM PrePaidCard Recharge Number Cmd <c>

> Set the GSM supplementary service command used by the internal GSM modem to recharge the PrePaid

card with a recharge code

AT*C GSM PrePaidCard Recharge PIN2 Cmd ?
> **Show the GSM supplementary service command used by the internal GSM modem to recharge the PrePaid card with PIN2**

AT*C GSM PrePaidCard Recharge PIN2 Cmd <c>
> **Set the GSM supplementary service command used by the internal GSM modem to recharge the PrePaid card with PIN2**

The **AT*C GSM** command controls all parameters necessary for the operation of an internal GSM modem.

PIN and PIN2 can contain up to eight digits.

Non-portable GSM modems, which are registered to the same base station for a long time, may be lowered in their priority. In order to keep obtainable, all eviateg GSM devices support a cyclic forced logoff and re-logon. The maximum login time can be specified with the command **AT*C GSM LoginLimit** in the extended time format (e.g. „D1H8", see *Programming Manual*).

Prepaid cards are supported by the command **AT*C GSM PrePaidCard**. The minimum credit can be specified with the command **AT*C GSM PrePaidCard Limit**. When the credit falls below this limit, the device can either trigger an event / a reaction (see *Programming Manual*) or can recharge the credit automatically using PIN2.

With the command **AT*C GSM PrePaidCard Recharge** the credit can be recharged manually. Depending on the mobil network provider, recharging is done with PIN2 or with a recharge code.

Special cases for the execution of GSM Supplementary Services:
If the mobile network provider doesn't use the standard command ***100#** for the GSM Supplementary Service „**Query credit**", the device can be adapted with the command **AT*C GSM PrePaidCard Credit Cmd <c>**.

If the mobile network provider doesn't use the standard command ***101*nnnn#** for the GSM Supplementary Service „**Recharge with code**", the device can be adapted with the command **AT*C GSM PrePaidCard Recharge Number Cmd <c>**.
Parameter <c> must contain an exclamation mark as a placeholder for the recharge code (e.g. ***101*!#**).

If the mobile network provider doesn't use the standard command ***102*pppp#** for the GSM Supplementary Service „Recharge with PIN2", the device can be adapted with the command **AT*C GSM PrePaidCard Recharge PIN2 Cmd <c>**.

Parameter <c> must contain an exclamation mark as a placeholder for PIN2 (e.g. ***102*! #**).

AT*C LineCheck	Check the availability of the ISDN line

With the command **AT*C LineCheck** the ISDN line can be checked to the point of the user port in the public exchange. For this purpose the Layer 2 of the D channel protocol is checked and established if necessary. If Layer 2 can't be established, an **ERROR** message is issued.

Note: **AT*C LineCheck** does not establish a connection liable to pay costs.

As this kind of test checks also parts of the public exchange, it is more meaningful than the electric measurement of the ISDN feeding voltage (**AT*C Feeding**, page 70).

AT*C LLC	Signalling of transmission parameters

AT*C LLC ?   **Show the settings for signalling of transmission parameters**

AT*C LLC On   **Enable signalling of transmission parameters**

AT*C LLC Off   **Disable signalling of transmission parameters**

For the B channel protocols V.110 and V.120 additional informations (e.g. the V.110 speed or the V.120 frame length) can be signalled in the information element LLC (Low Layer Compatibility).
This command determines if the information element LLC is signalled in the D channel protocol on outgoing calls.

Note: The selected setting is stored automatically.
                In the factory setting the LLC signalling is enabled.

AT*C MSN	Setting up MSNs (Multiple Subscriber Numbers)

AT*C MSN ?   **Show all MSNs**

AT*C MSN <i> ?   **Show MSN on storage location <i>**

AT*C MSN <i> <n>   **Assign a number to MSN storage location <i>**

AT*C MSN <i>   **Clear the number on MSN storage location <i>**

AT*C MSN Save   **Store all MSNs**

The command **AT*C MSN ?** shows all MSNs. The number of MSNs available to the AT interpreter for incoming and outgoing connections is device dependent (between 3 and 8).

These MSNs can be used for Caller Events (see *Programming Manual*).

Some eviateg devices have in excess of these three to eight MSNs additional **MSN** storage locations **for special functions**, e.g. transmission of SMS messages. The firmware manages incoming and outgoing connections and protocols for these special functions automatically (see also page 86).

The command **AT*C MSN <i> ?** shows a single MSN.

The command **AT*C MSN <i> <n>** assigns a number to MSN storage location <i>. The number may have up to 20 digits. As on incoming calls the numbers are matched from right to the left, it is adequate to use only the last significant digits of the number.

If no number <n> is given, the number stored at MSN location <i> is cleared.

The command **AT*C MSN Save** saves all MSNs (including those for special functions).

<u>Note</u>:   The **AT*C MSN** commands have the same functionality as the command **AT*EMSN** (page 85), but a different syntax

AT*C Number	Administration of destination numbers
AT*C Number ?	Show all numbers
AT*C Number <i> ?	Show number on storage location <i>
AT*C Number <i> <n>	Assign a number to storage location <i>
AT*C Number <i> Gateway <g>	Assign a mobile network to location <i>
AT*C Number <i> <n> Gateway <g>	Assign a number and a mobile network
AT*C Number <i>	Clear number and mobile network
AT*C Number Type <t>	Determine behaviour on incoming calls (blacklisting / whitelisting)
AT*C Number Save	Store numbers

The command **AT*C Number** can be used to manage the destination numbers for sending SMS, voice alert messsage etc. The number of number storage locations is device dependent (typically 10, on devices with group alert function 256).

The command **AT*C Number <i> <n>** assigns number <n> to storage location <i>. If no number <n> is specified, any number on storage location <i> is cleared.

Example: AT*C Number 4 0160987654321

Assign number 0160987654321 to number storage location 4.

The device identifies during automatic routing the mobile network, to which the destination number belongs, and sends the message to the associated gateway.
Within the scope of Number Portability, a mobile network subscriber can change the network and take along his mobile number. For these cases the gateway of the new mobile network must be specified in the **AT*C Number** command.

Example: AT*C Number 2 Gateway 1
AT*C Number 3 01723456789 Gateway 0

Some eviateg devices support the conditional acceptance or rejects of incoming calls (Whitelisting / Blacklisting). For this feature, the number storage is used to determine the behaviour, when an incoming call with one of the stored numbers is detected:

Accept:	incoming calls are accepted
Reject:	incoming calls are rejected (active)
Ignore:	incoming calls are ignored (passive)
Callback:	the calling number is called back
CallbackDeblock:	the calling number is called back and (if necessary) a blockade break is issued

Example: **AT*C Number Type Callback**

AT*C PnP	**Enable / disable Plug & Play recognition**
AT*C PnP ?	**Show setting for Plug & Play recognition**
AT*C PnP Off	**The device does not respond to the Plug & Play checking procedures of the PC operating system.**
AT*C PnP On	**The device responds to the operating systems Plug & Play checking procedures.**

AT*C Remote	**Settings for remote access**
AT*C Remote ?	**Show all parameters for remote access**
AT*C Remote Central <i> ?	**Show the number of remote central storage location <i>**
AT*C Remote Central <i> <n>	**Assign a number to remote central storage location <i>**
AT*C Remote Password ?	**Show the remote Access Password**

AT⋆C Remote Password <pwd>   **Set the remote Access Password**

AT⋆C Remote Password   **Clear the remote Access Password**

AT⋆C Remote Protocol <p>   **Set the B channel protocol for remote access**

AT⋆C Remote Save   **Save all parameters for remote access**

The command **AT⋆C Remote** shows all parameters for the remote access to the device.

If remote access is done from a specified number, this number can be stored with the command **AT⋆C Remote Central** to one of three storage locations. Each incoming connection from one of these numbers is accepted as a remote connection and will not be signalled with a **RING** or **CONNECT** message an the serial interface.

The password used by the device to protect itself against misuse, can be modified with the command **AT⋆C Remote Password**. The password is case-sensitive and can have up to 31 characters. The factory setting for the remote password is „**RemotePassword**".

The B channel protocol used for incoming and outgoing remote connections can be set with the command **AT⋆C Remote Protocol**. The protocols X.75, V.110 and V.120 are available, the factory setting is X.75.

Example: **AT⋆C Remote Protocol V110**
                    AT⋆C Remote Protocol X75

AT⋆C SMS	Settings for SMS transmission and reception

The command **AT⋆C SMS** adjusts all settings for transmission and reception of SMS over GSM and Fixed Network SMS (SMS).

AT⋆C SMS ?   **Show all settings for SMS transmission and reception**

AT⋆C SMS Save   **Save all settings for SMS transmission and reception**

AT⋆C SMS Factory   **Restore the factory settings of all settings for SMS transmission and reception**

AT⋆C SMS MSN <m>   **Set the MSN for Fixed Network SMS transmission and reception**

AT⋆C SMS SubAds ?   **Show the Fixed Network SMS sub address**

AT⋆C SMS SubAds <s>   **Set the Fixed Network SMS sub address**

AT⋆C SMS Central ?   **Show all Fixed Network SMS center (FSMSC) settings**

AT⋆C SMS Central Save   **Save all Fixed Network SMS center (FSMSC) settings**

AT*C SMS Central <i> ?   **Show the settings of FSMSC <i>**

AT*C SMS Central <i> Provider <p>

Set the provider name for FSMSC <i>

AT*C SMS Central <i> InNumber <n>

Set the number used by FSMSC <i> to call the device

AT*C SMS Central <i> OutNumber <n>

Set the number used by the device to call FSMSC <i>

AT*C SMS SelectedCentral <i>

Select FSMSC <i> for outgoing SMS

AT*C SMS List All   **List all received SMS**

AT*C SMS List Read   **List only SMS already read**

AT*C SMS List Unread   **List only unread SMS**

AT*C SMS Read <i>   **Read SMS on SMS storage location <i>**

AT*C SMS Read Unread   **Read the first unread SMS**

AT*C SMS Free   **Show the free SMS storage locations**

AT*C SMS Erase All   **Clear all stored SMS**

AT*C SMS Erase <i>   **Clear SMS on SMS storage location <i>**

The following **AT*C SMS** commands are implemented only on devices, which can be controlled by SMS:

AT*C SMS User ?   **Show all users allowed to control the device by SMS**

AT*C SMS User <i> ?   **Show SMS user <i>**

AT*C SMS User <i> Number <n>

Set the number of SMS user <i>

AT*C SMS User <i> Password <p>

Set the SMS password of user<i>

AT*C SMS Master Password <p>

Set the master password for controlling the device by SMS

AT*C SMS Timeout <t>   **Set the timeout, after which a password is needed for the next control SMS**

With the command **AT*C SMS Save** all parameters for transmission and reception of SMS over GSM or Fixed Network SMS (FSMS) are stored.

For Fixed Network SMS (FSMS) the device needs a MSN, which is not in use by other ISDN terminals on the S_0 bus like telephones. This is done with the command **AT*C SMS MSN**.

Some European FSMS providers support the operation of multiple FSMS devices with the same MSN. The devices are differentiated with a one-digit subaddress.
This subaddress can be set with the command **AT*C SMS SubAds <s>** , where <s> is a digit from '0' to '9'. If subaddressing is used, the 'InNumber' and 'OutNumber' of the FSMS needs a '*' as a placeholder for the subaddress.

The device support three storage locations for Fixed Network SMS Centers (FSMSC). Parameters for all FSMSC can be queried with the **AT*C SMS Central ?** command. Parameters for a single FSMS can be queried using the storage location.

For each FSMSC the following parameters can be set:
• the provider name (**AT*C SMS Central <i> Provider <p>**)
• the number used by the FSMSC to call the device (incoming SMS calls) (**AT*C SMS Central <i> InNumber <n [*]>**)
• the number used by the device to call the FSMSC (outgoing calls) (**AT*C SMS Central <i> OutNumber <n [*]>**)

If at the end of InNumber or OutNumber a '*' is entered, it will be replaced by the subaddress automatically.

The FSMSC used for sending FSMS can be selected with the command **AT*C SMS SelectedCentral <i>**.

SMS are accepted from all stored FSMSC.

Some eviateg devices have a number storage with five storage location for users, who may control the device per SMS. On reception of SMS the senders number is compared to the entries in this user number storage. If the number matches, the text of the SMS is treated as a control command for the device itself („Control SMS"").
If the number doesn't match, the SMS is stored in the flash memory and can be read with the **AT*C SMS Read** command.

The first Control SMS must contain the password assigned to the particular user. All following Control SMS sent by the same user within an adjustable timeout, do not need the password again.

In order to authorize users with unknown numbers, a Master password can be set.
If a received SMS contains the Master password, it is treated as a Control SMS without checking the senders numbers.

Each valid Control SMS re-starts the SMS command timer. If a SMS command timeout occured, each further Control SMS without the user password is rejected with the SMS „**Access denied (Timeout)**“.

If a known user provides a wrong password with the Control SMS, the device rejects the command with „**Access denied (wrong password)**“.

If a known user sends a Control SMS before the Command timeout of an other user expires, the device rejects the command with „**Access denied (other user active)**“.

All received SMS message not interpreted as Control SMS are stored in the flash memory. They are signalled according to the register **S90** (page 54) with the RI line and / or with the message **UNREAD SMS**.

The number of all storage locations for received SMS is device dependent and is displayed during factory reset (**AT*EInitF** command). The number of free storage locations can be checked with the **AT*C SMS Free** command.

Stored SMS messages can be listed with the command **AT*C SMS List All**.
The list shows the following information:
• sequential number
• status (read / unread)
• date and time of SMS reception
• originator number
• the first few words of the message

Unread SMS are marked with an exclamation mark behind the sequential number. If the storage is empty, the message **No message stored** is issued.

The list output can be filtered for all unread (**AT*C SMS List Unread**) or all read SMS (**AT*C SMS List Read**). If there is no SMS matching this criterion, the message **No matching message** is issued.

A stored SMS can be read with the command **AT*C SMS Read <i>**. The SMS is displayed with the following fields:
• sequential number <i>
• sending date and time (timestamp of the SMS center)
• receiving date and time (timestamp of the device)
• originatior number
• text

Reading a SMS sets the status from „Unread“ to „Read“.
If the specified storage location index <i> is beyond the number of stored SMS, the error message **SMS index too large** is issued.

Alternatively the first unread SMS can be displayed using the **AT*C SMS Read Unread**

command. If there are no unread SMS, the error message **No unread message** is issued.

Stored SMS can be erased with the **AT*C SMS Erase <i>** command. If the specified storage location index <i> is beyond the number of stored SMS, the error message **SMS index too large** is issued.

All SMS can be erased with the **AT*C SMS Erase All** command.

Note: Even unread SMS can be erased.

AT*C SPID	SPID for american D channel protocols

AT*C SPID ?	**Show the SPID**
AT*C SPID <nr>	**Set and check the SPID**
AT*C SPID	**Clear the SPID**

The american D channel protocols NI1, 5ESS and DMS100 (**AT*C DCP**, page 69) need a Service Profile Identifier assigned by the ISDN network provider.
The given SPID is stored and checked with the public exchange. If the exchange confirms the SPID, the **OK** message is issued. If the SPID can't be verified within five seconds, the warnnng **SPID not verified** is issued. If the given and the already stored SPID are identical, only the **OK** message is issued.

AT*C Text	Message text storage

AT*C Text ?	**Show the entire message text storage**
AT*C Text Save	**Save the entire message text storage**
AT*C Text <i> ?	**Show the message text on storage location <i>**
AT*C Text <i> <t>	**Assign a message text to storage location <i>**
AT*C Text <i>	**Clear message storage location <i>**

The **AT*C Text** command manages the message text storage, used with the **AT*A** command (page 61). The number of storage location is device dependent (typically 10). The length of a message text is also device dependent (typically 160 bytes).

The command **AT*C Text <i> <t>** sets the message text <t> to storage location <i>. If no text <t> is given, the storage location <i> is cleared.

Example: AT*C Text 2 This is an alert from an eviateg device !

AT*C X31	Parameters for X.31 operation

AT*C X31 ?	Show all parameters for X.31 operation
AT*C X31 Save	Save all parameters for X.31 operation
AT*C X31 TEI ?	Show the X.31 Terminal Endpoint Identifier
AT*C X31 TEI <v>	Set the X.31 Terminal Endpoint Identifier
AT*C X31 Prefix ?	Show the dial prefix for X.31 connections
AT*C X31 Prefix <p>	Set the dial prefix for X.31 connections
AT*C X31 PacketLen <p> ?	Show the X.31 packet length
AT*C X31 PacketLen <p>	Set the X.31 packet length
AT*C X31 WindowSize ?	Show the X.31 window size
AT*C X31 WindowSize <w>	Set the X.31 window size
AT*C X31 UserData ?	Show the X.31 User Data
AT*C X31 UserData <u>	Set the X.31 User Data for all connections
AT*C X31 <ch> ?	Show a channel from the channel mal
AT*C X31 <ch> <i>	Modify the cannel map

The command **AT*C X31** manages all parameters for X.31 operation, e.g. when activating the X.31 protocol with the **AT\N31** command (page 30).

The X.31 network provider assigns an X.31 TEI (Terminal Endpoint Identifier) when the X.31 service is enabled on the S_0 bus. This value (typically 1) must be programmeed in the device before establishing X.31 connections. If multiple X.31 terminals are operated on the same ISDN bus, each X.31 terminal must have an unique X.31 TEI value.

Example: AT*C X31 TEI 1

If the device establishes always connections to the same destination network, the prefix of that network (e.g. 0262 for the German DATEX-P) can be set with the **AT*C X31 Prefix** command.

In some cases the length of the X.31 data packets have to be adapted to the specifications of the X.31 network provider. The packet length can be modified with the command **AT*C X31 PacketLen <p>** between 64 and 256. The factory setting is 128 bytes.

In some cases the window size (the number of unacknowledged X.31 packets) must be adapted to the specifications of the X.31 network provider. The window size can be

modified with the command **AT⋆C X31 WindowSize <w>** between 1 and 7. The factory setting is 2.

The X.31 protocol allows up to 16 bytes user data to be sent along with a connection establishment, so the called side can decide to accept or to reject the incoming X.31 call. If for all X.31 connection the same user data are used, they can be set with the command **AT⋆C X31 UserData <u>**.
Binary values in the user data <u> can be marked with „**0x**" or „**\X**".

Example: **AT⋆C X31 UserData Test\X00ABCD**

Note: In the **ATD** command for establishing a X.31 connection, for each connection individual user data can be specified (page 21).

In X.31 mode logical circuits are used to transport data. In the normal case, logical circuit 1 is used. In exceptional cases it may become necessary to modify the X.31 channel table.

Note: These parameters should be changed only by experts in coordination with the X.31 network provider !

Channel	Description	Lowest value	Highest value	Factory setting
Lowest incoming circuit	LIC	0	ask network provider	0
Highest incoming circuit	HIC	LIC	LTC - 1	0
Lowest two-way circuit	LTC	HIC + 1	ask network provider	1
Highest two-way circuit	HTC	LTC	LOC -1	1
Lowest outgoing circuit	LOC	HTC + 1	ask network provider	0
Highest outpgoing circuit	HOC	LOC	4096	0

Example: AT⋆C X31 LTC ?   **Show the lowest two-way circuit**

Beispiel: AT⋆C X31 HTC 1   **Set the highest two-way circuit to 1**

9   AT∗E command - extended IDSN settings

The **AT∗E** command controls extended ISDN settings like MSN, TEI values etc. These settings do not apply only to the AT interpreter, but also for extended functions (e.g. VdS2465 protocol).

Some of the parameters controlled by **AT∗E** commands, can also be changed by **AT∗C** commands within the scope of programming the particular device.

The following **AT∗E** commands are available:

Command	Description	Page
AT∗E	Show the extended ISDN settings (see below)	85
AT∗E Show	like **AT∗E**	85
AT∗E MSN	Control the MSNs	85
AT∗E Service	Control ISDN services for the MSNs	87
AT∗E TEI	Control the TEI value for the D channel protocol	87
AT∗E XTEI	Control the TEI value for X.31	87
AT∗E Prefix	Control the dial prefix for operation behind PABXes	88
AT∗E XPrefix	Control the dial prefix for automatic network selection in X.31 mode	89
AT∗E DChannelProt	Control the D channel protocol	89
AT∗E FLen	Control the frame length for B channel protocols	89
AT∗E CountryCode	Control the country code for SMS transmission	90
AT∗E AreaCode	Control the area code for SMS transmission	90
AT∗E OwnNumber	Control the number for SMS transmission	91
AT∗E InitF	Restore the factory setting for all parameters	91
AT∗E Line	Check the ISDN line availability	91
AT∗E CCMode	Set the encoding of Clear Channel data (**AT\N7**)	
AT∗E CCSilence	Set the silence code of Clear Channel data (**AT\N7**)	

A command line may contain multiple **AT∗E** commands. The commands must be separated by a space character and must have the prefix **∗E**.

Example: **AT ∗E MSN0=14 \N3 ∗E MSN1 ∗E MSN1=15 \N1 &W**

Note: Paraters set with an **AT∗E** command can be deleted with the format **AT∗E.....=[carriage return]**.

Note: Each parameter changed with an **AT∗E** command, must be saved with the command **AT&W** (exception: **AT∗E InitF**).

AT*E
AT*E Show ✓

The commands **AT*E** and **AT*E Show** show the current settings in the following format:

Example:

```
MSN0<->      <14>,X.75,unrestricted digital
MSN1 ->      <15>,V.120,unrestricted digital
MSN2 ->      <>,X.75,unrestricted digital
MSN4         <> Remote
MSN5         <> Alert
MSN6         <> SMS-TE
TEI          108 (dynamic)
XTEI         1
Prefix       <>
XPrefix      <>
DChannelProt DSS1
Flen         2040 Byte
LeasedLine   0
CountryCode  <>
AreaCode     <>
OwnNumber    <>
```

In the first lines the MSNs and their assigned B channel protocols and their assigned ISDN services are displayed.

The characters "->" mark the MSNs, on which incoming calls are signalled / accepted according to the setting of register S60 (page 54). If no line contains the characters "->", it suggests that the DTR line is not set and incoming calls will be not signallled or accepted.

The character '<-' marks the active MSN for outgoing calls, the assigned B channel protocol and the assigned ISDN service.

MSNs 4 to 6 are used for special functions (for maintenance calls, for **AT*A** commands and for Fixed Network SMS).

The line „TEI" shows the current Terminal Endpoint Identifier for the D channel protocol. A value of 127 indicates, that there is no connection to the public exchange (e.g. cabling problems).

AT*E MSN   **Control the MSNs (Multiple Subscriber Number)** ✓

AT*E MSN<i>?   **Show the number of MSN storage location <i>**

AT⋆E MSN<i>=<nnn>   **Assign a number to MSN storage location <i>**

AT⋆E MSN<i>   **Set MSN <i> as the active MSN**

The device supports three to eight storage locations for Multiple Subscriber Numbers (MSN), which are used for all connections established using the AT interpreter. A MSN number may contain up to 20 digits.

On **incoming calls** the Called Party Number (CDPN) is compared with the numbers on the MSN storage locations and their assigned ISDN services (see also command **AT⋆E Show**, page 85). The comparison is done from the right to the left, so only the last significant digits have to be set.

A MSN can be displayed with the command **AT⋆E MSN<i>?**. The value for <i> is device dependent and must be in the range for MSN storage locations (e.g. 0 to 2).

Example: **AT⋆EMSN1?**

The command **AT⋆EMSN<i>=<nnn>** can be used to assign the number <nnn> to MSN storage location <i>. The value <i> depends on the number of MSN storage locations (e.g. 0 to 2).

Example: **AT⋆EMSN2=790**

One of the three to eight MSNs is used as Calling Party Number (CGPN) for **outgoing calls**, marked in the following as „**active MSN**".
The active MSN can be selected with the command **AT⋆EMSN<i>**. The value <i> depends on the number of MSN storage locations (e.g. 0 to 2).

Example: **AT⋆EMSN0**

Adjusting the B channel protocol with the command **AT\N** (page 28) has only effect on the active MSN.
The active MSN can be displayed with the command **AT⋆E ActMSN ?** (page 87).

On some eviateg devices beyond the three to eight MSNs for the AT interpreter there are additional **MSNs for special functions**:

- **VdS MSN**   MSN for incoming and outgoing calls with the VdS2465 protocol
- **Remote MSN**   MSN for remote / maintenance calls
- **Alert MSN**   MSN for all outgoing alerting calls (**AT⋆C Alert / SendText / , SendVoice / SendDTMF / SendRemoteCommand**)
- **SMS-TE MSN**   MSN for incoming and outgoing calls with the Fixed Network SMS (FSMS) service
- **ApplicationTask-MSN** MSN for incoming and outgoing calls with custom specific applications

For those MSNs for special functions the B channel protocol and the ISDN service are defined by the special function and can't be changed.

AT⋆E ActMSN?	Show the active MSN for outgoing calls	✓

The command **AT⋆E ActMSN?** shows the index of the MSN used as active MSN for outgoing calls.

Note: The active MSN can be selected with the command **AT⋆EMSN<i>**.

AT⋆E ClearMSNs	Clear the numbers of all MSN entries	✓

The command **AT⋆E ClearMSNs** clears **all** MSNs set with the **AT⋆E MSN<i>=<nnn>** command. The assigned B channel protocols and ISDN services are not effected.

AT⋆E Service	Control the ISDN services	✓

AT⋆E Service ?   Show all possible ISDN services

AT⋆E Service<i>?   Show the ISDN service for MSN storage location <i>

AT⋆E Service<i>=<x>   Assign ISDN service <x> for MSN storage location <i>

During connection setup, the ISDN service (e.g. Speech, Data, Video) is specified, to ensure that at the called side only compatible terminals will answer the call.

The command **AT⋆E Service ?** shows all ISDN services supported by the device.

The command **AT⋆E Service<i>?** shows the ISDN service assigned to MSN storage location <i>. The value range for <i> depends on the number of MSN storage locations.

The command **AT⋆E Service<i>=<x>** assignes the service <x> to the MSN storage location <i>. The value range for <i> depends on the number of MSN storage locations. For the value <x> please refer to the table in chapter ?? on page 107.

Example: AT⋆E Service0=8 sets the service Data transfer with 56000 bit/s to MSN 0.

For normal data transfer the service 2 (unrestricted digital) is set as default.

AT⋆E TEI	Control the TEI value for the D channel protocol	✓

AT⋆E TEI=127   Dynamic TEI assignment (Point-to-Multipoint access / S$_0$ bus)

AT⋆E TEI=<n>   Assign a fixed TEI (Point-to-Point access)

Each ISDN terminal needs for the communication with the public exchange in the D channel protocol a Terminal Endpoint Identifier (TEI).

On a **S$_0$ bus** (**Point-to-Multipoint acccess**) the public exchange can address multiple ISDN terminals in the D channel protocol with their TEI values. Each ISDN terminal on a S$_0$ bus gets the TEI value assigned dynamically.

On a **Point-to-Point access** only one ISDN terminal can be connected, which has a fixed TEI value assigned by the network operator (normally 0 or 1).

Note: Devices with X.31 protocol have as well a TEI value for the D channel protocol as a different TEI value for X.31 !

The command **AT⋆E TEI=127** sets the device to Point-to-Multipoint operation with dynamic TEI assignement.

The command **AT⋆E TEI=<n>** assigns a fixed TEI value for Point-to-Point operation.

Example: AT⋆E TEI=1

Note: The changed TEI value has to be stored with the command **AT&W** and becomes effective after restarting the device (e.g. with the **ATZ⋆** command).

AT⋆E XTEI   Control the TEI value for X.31

AT⋆E XTEI=<n>   Set the X.31 TEI value

Each X.31 terminal needs for the communication with the Frame Handler at the public exchange a Terminal Endpoint Identifier (TEI). This value is assigned by the X.31 network provider and can be set with the command **AT⋆EXTEI=<n>**.

Note: The changed X.31 TEI value has to be stored with the command **AT&W** and becomes effective after restarting the device (e.g. with the **ATZ⋆** command).

AT⋆E Prefix   Control the dial prefix   ✓

AT⋆E Prefix=   Clear the dial prefix

AT⋆E Prefix=<n>   Set the dial prefix

When operating a device behind a PABX, often a '0' must be dialled to get a trunk line.
All eviateg devices have a dial prefix storage, which is prepended to each dialled number.

By using this dial prefix it is ensured, that gateways for sending SMS messages can be reached even behind a PABX..

If an internal line shall be connected and the automatic dial prefix shall not prepended to its number, the dial command **ATDI<nnn>** must be used.

The dial prefix may contain up to 7 digits, so it can be used also as a preselection of a network provider (Carrier Identification Code, CIC).

Note: The dial prefix **AT*E Prefix** does not apply to X.31 connections (see also the command **AT*E XPrefix** below).

AT*E XPrefix	Control the X.31 dial prefix

AT*E XPrefix=   Clear the X.31 dial prefix

AT*E XPrefix=<n>   Set the X.31 dial prefix

If in X.31 mode all connections have to be established to the same packet network, the command **AT*E XPrefix** can be used to set a X.31 prefix, which is prepended to all dialled X.31 addresses.

Example: AT*E XPrefix=0262

AT*E DChannelProt	Set the D channel protocol (obsolete)

AT*E DChannelProt ?   Set the automatic D channel protocol recognition

AT*E DChannelProt E   Set the DSS1 protocol

AT*E DChannelProt 1   Set the 1TR6 protocol

Note: This command has been superseded by the **AT*C DCP** command (page 69).

AT*E FLen	Control the frame length for B channel protocols	✓

AT*E Flen?   Show the frame length for B channel protocols

AT*E Flen=<n>   Set the frame length for B channel protocols

If the Data Terminal Equipment (DCE) connected to the eviateg device sends continous data during the transparent phase, the device has to determine, when the data must be combined and sent in the B channel (packetizing).

This packetizing is done with the protocols X.75, HDLC-UI and HDLC-transparent, as soon

as the frame length is reached, which is set with the **AT⋆E Flen** command.

For the V.120 protocol the frame length is determined by register **S72** (page 54).
For the PPP protocol the frame length is derived from the asynchronous datagram.
For all other prootcols the frame length setting is not relevant.

The standard setting is 2040 bytes. The minimum frame length is defined by the speed of the serial interace:

115200 Bit/s	60 characters
57600 Bit/s	30 characters
38400 Bit/s	20 characters
19200 Bit/s	10 characters
9600 Bit/s	5 characters
4800 Bit/s	2 characters
< 4800 Bit/s	1 character

If there are time gaps of 5 ms or more in the data stream sent by the DTE to the eviateg device, the data is also packetized and sent in the B channel. This timeout can be adjusted with the register **S34** (page 46).

AT⋆E CountryCode	**Set the country code**

AT⋆E CountryCode=<nn>   Set the country code for UCP protocol

Some of the gateways used to transmit SMS messages with the **AT⋆A** command, need a source identifier including country code, area code and own number.

With the command **AT⋆E CountryCode=<nn>** the country code can be set (max. 4 digits).

Example: AT⋆E CountryCode=49
assigns „49" for Germay.

AT⋆E AreaCode	**Set the area code**

AT⋆E AreaCode=<nn>   Set the area code for UCP protocol

Some of the gateways used to transmit SMS messages with the **AT⋆A** command, need a source identifier including country code, area code and own number.

With the command **AT⋆E AreaCode=<nn>** the area code can be set (max. 5 digits).

Example: AT⋆E AreaCode=40
assigns „40" as the area code for Hamburg.

AT⋆E OwnNumber	Set the own number

AT⋆E OwnNumber=<nnn> Set the own number for UCP protocol

Some of the gateways used to transmit SMS messages with the **AT⋆A** command, need a source identifier including country code, area code and own number.

With the command **AT⋆E OwnNumber=<nnn>** the number of the ISDN access can be set.

Example: AT⋆E OwnNumber=60848790
assigns „60848790" as the number for the eviateg GmbH.

AT⋆E InitF	Restore the factory settings

AT⋆E InitF   Restore the factory settings for the entire device

The **AT⋆E InitF** command restores **all** parameters of the device to the factory settings and reboots the device.

Note: The command **AT&F** restores only parameters for the AT interpreter.
                Message text, destination numbers etc. are only reset by an **AT⋆E InitF**
                command, not by an **AT&F** command !

AT⋆E Line	Test the ISDN line

AT⋆ELine?   Test the ISDN line

With the command **AT⋆ELine?** the ISDN line can be checked to the point of the user port in the public exchange. For this purpose, Layer 2 of the D channel protocol is checked and established, if necessary.
If Layer 2 can't be established, the **ERROR** message is issued. In this case to a secondary communication network (e.g. GSM) can switched.

AT*ECCMode	Coding of data in Clear Channel mode

AT⋆ECCMode=<m>   Set the coding of data for AT\N7 mode

In the mode **AT\N7** the B channel is converted transparently to the serial interface („Clear Channel" mode). This is used e.g. for telephony applications, where speech is recorded on a PC and where announcements are transmitted to the ISDN (like telephone answering machines)
The voice signals are transmitted bidirectional with 8000 bytes per second in the A-Law format according to ITU-T recommendation G.711.

The coding to transmittend and received data can be influenced with the bit mask <m>:

Bit	Decimal	Description
0	1	**0 - Normal bit-order of received data** 1 - Mirrored bit-order of received data
1	2	**0 - Normal bit order of data to be transmitted** 2 - Mirrored bit-order of data t be transmitted
2	4	**0 - Normal logic for received and transmitted data** 4 - Inverted logic for received and transmitted data

The factory setting for the mask <m> is 0.

AT*ECCSilence	**Codierung des Ruhezustandes bei Transparent-Betrieb**

If in **AT\N7** mode transmit data is not supplied fast enough, or if there is no voice signal to be transmitted at the moment, the silence state is transmitted, which can be set with the command **AT*ECCSilence**.

The factory setting for the silence state is hexadecimal 0xAB.

10   AT*S command - Supplementary Services

With the **AT∗S** command Supplementary Services for telephony application can be controlled. This command can't be used for data applications.

Supplementary Service	Abbreviation	ETSI recommendation	Commands	page
Holding a connection	HOLD	EN 300 141	**AT∗S Hold** **AT∗S Retrieve**	93 94
Terminal portablity Parking a connection	TP	EN 300 055	**AT∗S Suspend** **AT∗S Resume**	94 95
Explicit call transfer	ECT	EN 300 369	**AT∗S ECT**	95
Three party conference	3PTY	EN 300 188	**AT∗S 3PTY**	96

AT∗S Hold	**Holding a connection**

With the command **AT∗S Hold** an active telephoy connection can be held, e.g. for a callback, for a consultation or for starting a conference. The held subscriber hears a waiting music or an announcement.

In this state an additional connection can be established with the **ATD** command, which becomes subsequently the active connection.

An **ATH** command with a held and an active connection affects only the active connection. In this state the held connection can be retrieved with the command **AT∗S Retrieve**:

Command to the device	Response from the device
ATD08154711;	**CONNECT 64000 Codec <08154711>**
AT∗S Hold	**Connection held:** **Hold: CR 3, CNR 08154711, State 2** **NO CARRIER**
ATD1234567;	**Hold status:** **Main: B1, CR 4, CNR 1234567, State 4** **Hold: CR 3, CNR 08154711, State 2** **CONNECT 64000 Codec <1234567>**
...	...

Note: The **ATD** command should be terminated with a semicolon, so that the device stays in the command mode.

AT⋆S Retrieve	Retrieving a held connection

AT⋆S Retrieve   **Retrieve a held connection on any channel**

AT⋆S Retrieve ⋆B1   **Retrieve a held connection on channel B1**

AT⋆S Retrieve ⋆B2   **Retrieve a held connection on channel B2**

With the command **AT⋆S Retrieve** a held connection can be retrieved. A connection, which was **active** before using the **AT⋆S Retrieve** command, is **held** afterwards.
Repeating the **AT⋆S Retrieve** command toggles between both subscribers.

By using the addition **⋆B1** or **⋆B2** the B channel can be specified, which shall be used for retrieving the connection.

An **ATH** command with a held and an active connection affects only the active connection. In this state the held connection can be retrieved with the command **AT⋆S Retrieve**:

Command to the device	Response from the device
ATD08154711;	
AT⋆S Hold	**Connection held:** **Hold: CR 6, CNR 08154711, State 2** **NO CARRIER**
ATD1234567;	**Hold status:** **Main: B1, CR 7, CNR 1234567, State 4** **Hold: CR 6, CNR 08154711, State 2** **CONNECT 64000 Codec <1234567>**
ATH	**Hold status:** **Main: B1, CR 7, CNR 1234567, State 11** **Hold: CR 6, CNR 08154711, State 2** **NO CARRIER**
AT⋆S Retrieve	**Connection retrieved:** **Main: B1, CR 6, CNR 08154711, State 10** **CONNECT 64000 Codec <08154711>**
...	...

AT⋆S Suspend <CallId>	Parking a connection

An active telephone call can be suspended with the command **AT⋆S Suspend <CallId>**, stating an call identification.
The call identification is case sensitive and can contain up to eight characters.

A suspended call can be resumed by the same or by an other ISDN terminal on the S_0 bus,

stating the call identification used for suspending.

Command to the device	Response from the device
ATD08154711;	**CONNECT 64000 Codec <08154711>**
AT*S Suspend MyId1	**Connection suspended** **NO CARRIER**
...	...

AT*S Resume <CallId>   Resume a parked connection

A suspended telephone call can be resumed with the command **AT*S Resume <CallId>**, stating a used call identification.
The call identification is case sensitive and can contain up to eight characters.

Note: The parking and the resuming ISDN terminal must not be identical.

Command to the device	Response from the device
AT*S Resume MyId1	**Connection resumed** **CONNECT 64000 Codec <08154711>**
...	...

AT*S ECT   Explicit call transfer

With the command **AT*S ECT** a **held** telephone call (see **AT*S Hold**) and an **active** telephone call can be switched together in the public exchange. Both subscribers are connected with each other after completion of this Supplementary Services, while the invoking ISDN terminal is disconnected:

Command to the device	Response from the device
ATD08154711;	**CONNECT 64000 Codec <08154711>**
AT*S Hold	**Connection held:** **Hold: CR 8, CNR 08154711, State 2** **NO CARRIER**
ATD1234567;	**Hold status:** **Main: B1, CR 9, CNR 1234567, State 4** **Hold: CR 8, CNR 08154711, State 2** **CONNECT 64000 Codec <1234567>**
AT*S ECT	**Supplementary service ok** **NO CARRIER**

AT⋆S 3PTY	Three Party Conference

AT⋆S 3PTY Begin	**Begin a Three Party Conference**
AT⋆S 3PTY End Both	**Terminate the conference with both subscribers**
AT⋆S 3PTY End Active	**Terminate the conference with the active subscriber, retain the connection to other subscriber**
AT⋆S 3PTY End Held	**Terminate the conference with the held subscriber, retain the connection to other subscriber**
AT⋆S 3PTY Private Active	**Close the conference and start a „private" connection with the active subscriber**
AT⋆S 3PTY Private Held	**Close the conference and start a „private" connection with the held subscriber**

With the command **AT⋆S 3PTY Begin** a **held** (see **AT⋆S Hold**) and an **active** telephone call can be connected together to a Three Party Conference:

Command to the device	Response from the device
ATD08154711;	**CONNECT 64000 Codec <08154711>**
AT⋆S Hold	**Connection held:** **Hold: CR 10, CNR 08154711, State 2** **NO CARRIER**
ATD1234567;	**Hold status:** **Main: B1, CR 11, CNR 1234567, State 4** **Hold: CR 10, CNR 08154711, State 2** **CONNECT 64000 Codec <1234567>**
AT⋆S 3PTY Begin	3Pty status: **Main: B1, CR 11, CNR 1234567, State 10, 3Pty** **Hold: B1, CR 10, CNR 08154711, State 2, 3Pty** **3PTY established** **OK**
...	**...**

With the command **AT⋆S 3PTY End Both** the Three Party Conference with both subscribers is disconnected. Afterwards for all three ISDN terminals the connections are terminated:

Command to the device	Response from the device
...	**...**

Command to the device	Response from the device
AT⋆S 3PTY Begin	3Pty status: Main: B1, CR 11, CNR 1234567, State 10, 3Pty Hold: B1, CR 10, CNR 08154711, State 2, 3Pty 3PTY established OK
...	...
AT⋆S 3PTY End Both	3PTY terminated NO CARRIER

When the conference is terminated, both remote subscribers hear a busy tone.

With the command **AT⋆S 3PTY End Active** the Three Party Conference is terminated for the user, which was **active** during conference invocation.
Afterwards the connection is resumed, which was **held** during conference invocation:

Command to the device	Response from the device
...	...
AT⋆S 3PTY Begin	3Pty status: Main: B1, CR 11, CNR 1234567, State 10, 3Pty Hold: B1, CR 10, CNR 08154711, State 2, 3Pty 3PTY established OK
...	...
AT⋆S 3PTY End Active	3PTY terminated Connection retrieved: Main: B1, CR 10, CNR 08154711, State 10 CONNECT 64000 Codec <08154711>

When the conference is terminated, the previous active subscriber hears a busy tone.

With the command **AT⋆S 3PTY End Held** the Three Party Conference is terminadted for the user, which was **held** during conference invocation.
Afterwards the connection is resumed, which was **active** during conference invocation:

Command to the device	Response from the device
...	...
AT⋆S 3PTY Begin	3Pty status: Main: B1, CR 11, CNR 1234567, State 10, 3Pty Hold: B1, CR 10, CNR 08154711, State 2, 3Pty 3PTY established OK
...	...

Command to the device	Response from the device
AT⋆S 3PTY End Held	**3PTY terminated** **CONNECT 64000 Codec <1234567>**

When the conference is terminated, the previous held subscriber hears a busy tone.

With the command **AT⋆S 3PTY Private Active** the Three Party Conference is closed and a „private" conversation is started with the subscriber which was **active** during conference invocation.

The subscriber which was **held** during conference invocation, is **held** again and hears a music or announcement.

For terminating the „private" conversation and for re-starting the conference, the command **AT⋆S 3PTY Begin** can be used again:

Command to the device	Response from the device
...	**...**
AT⋆S 3PTY Begin	**3Pty status:** **Main: B1, CR 11, CNR 1234567, State 10, 3Pty** **Hold: B1, CR 10, CNR 08154711, State 2, 3Pty** **3PTY established** **OK**
...	**...**
AT⋆S 3PTY Private Active	**3PTY terminated** **CONNECT 64000 Codec <1234567>**
...	**...**
AT⋆S 3PTY Begin	**3Pty status:** **Main: B1, CR 11, CNR 1234567, State 10, 3Pty** **Hold: B1, CR 10, CNR 08154711, State 2, 3Pty** **3PTY established** **OK**
...	**...**

With the command **AT⋆S 3PTY Private Held** the Three Party Conference is closed and a „private" conversation is started with the subscriber which was **held** during conference invocation.

The subscriber which was **active** during conference invokation, is held and hears a music or announcement.

For terminating the „private" conversation and for re-starting the conference, the command **AT⋆S 3PTY Begin** can be used again:

Command to the device	Response from the device
...	**...**

Command to the device	Response from the device
AT⋆S 3PTY Begin	**3Pty status:** **Main: B1, CR 11, CNR 1234567, State 10, 3Pty** **Hold: B1, CR 10, CNR 08154711, State 2, 3Pty** **3PTY established** **OK**
...	**...**
AT⋆S 3PTY Private Held	**3PTY terminated** **CONNECT 64000 Codec <08154711>**
...	**...**
AT⋆S 3PTY Begin	**3Pty status:** **Main: B1, CR 11, CNR 1234567, State 10, 3Pty** **Hold: B1, CR 10, CNR 08154711, State 2, 3Pty** **3PTY established** **OK**
...	**...**

11 AT*U command - User memory

Some eviateg devices offer a part of their flash memory as an user memory.
The user memory size is device dependent and can be checked with the **AT*U ?**
command.

Note: Parts of the flash memory, which may be used as user memory, are also used
as storage for voice alerts (**AT*C Voice**) or as a buffer for firmware downloads
during remote connections.

AT*U ?	Show a command summary and the storage capacity

AT*U ?   **Show a command summary and the storage capacity**

The command **AT*U ?** shows a short summary for the **AT*U** commands, the total length of
the user memory and its segmentation into 64 KB sectors.

Example: **READ <Ads> <Len>**
WRITE <Ads> <Len> <Contents...>
ERASE <Ads> | *

<Ads>, <Len>, <Contents> in hex

Length $60000 (6 sectors * $10000 Bytes)

AT*U Erase	Clear the user memory

AT*U Erase *   **Clear the entire user memory**

AT*U Erase <ads>   **Erase a 64 KB segment at address <ads>**

Before using the user memory it must be cleared (either the entire space with the command
AT*U Erase *, or the particular 64 KB segment with the command **AT*U Erase <ads>**).
The address <ads> must be specified in hexadecimal notation.

Example: AT*U Erase 20000

AT*U Write	Write data to the user memory

AT*U Write <ads> <len> <cont> Write <len> bytes of data into the user memory
at adress <ads>

For writing data into the user memory, the start address, the length and the data have to be
specified in hexadecimal notation. The address range used for writing must be erased with

the **AT⋆U Erase** command.

Example: AT⋆U WRITE 20000 A 54 65 73 74 31 32 33 1 2 3

AT⋆U Read	Read data from user memory

AT⋆U Read \<ads\> \<len\>   **read \<len\> bytes of data from the user memory
at address \<ads\>**

For reading data from user memory, the start address and the length have to be specified in hexadecimal notation. The output show 16 hexadecima bytes per line. Reading from an empty storage range shows „FF" bytes.

Examples: AT⋆U READ 20000 10

12 Incoming and outgoing ISDN connections

The devices can be operated on different kinds of ISDN acesses:

- Point-to-Multipoint accesses („S$_0$ bus", PMP)
- Point-to-Point accesses (PTP)
- Leased lines

Depending on the kind of access, for incoming and outgoing connections there are different conditions for connection establishment. This chapter describes the operational sequences for incoming and outgoing ISDN connections.
Additional hints for X.31 operation are given in chapter ??, page 111.

Precondition for an operation on Point-to-Multipoint and Point-to-Point accesses is the setting of the right D channel protocol. In Europe the protocol DSS1 is used (also called „Euro ISDN"), which is set by factory. On some devices, the D channel protocol can be changed (see chapter ??, page 89).

A special case is Leased Line operation, which does not use a D channel protocol: the connection is established without dialling.

During connection establishment, the following elements are signalled in the D channel protocol:

Service	The service signals the kind of connection: Telephone and data calls can be distinguished, so a telephone would ring only on incoming telephone calls and would ignore data calls. A list of ISDN services can be found on page 107.
Calling number	This number (also referred to as Calling Party Number, CGPN) identifies the calling equipment. The public exchange checks, if the CGPN specified by the calling equipment belongs to the number space of the access. If the check fails, the main number of the access will be signalled as CGPN. If the calling equipment has activated the service CLIR (Calling Line Identification Restriction), the CDPN is suppressed at the public exchange of the called equipment.
Called number	This number (also referred to as Called Party Number, CDPN) is checked by the called equipment, whether the call shall be accepted or not: the CDPN is compared with the Multiple Subscriber Numbers (MSNs) stored in the called equipment. The comparison of CDPN and MSNs is done from the right to the left. So one needs only to store the last significant digits of number as a MSN. Numbers should not be stored with leading zeroes, because some PABXes do not signal them correctly, so a comparison would fail.

> If no MSN is stored in the equipment, any call matching the service would be accepted.

Accepting the incoming call, a connection with costs is established. When two ISDN devices shall exchange data, the same B channel protocol has to be used on both devices. Otherwise the connection is terminated after a short while.

The following example shows the relevant settings of an eviateg device, as being shown after an **AT*E** command:

```
MSN0<->        <790>,X.75,unrestricted digital
MSN1 ->        <791>,V.110,unrestricted digital
MSN2 ->        <>,X.75,unrestricted digital
MSN4           <5678> VdS
MSN5           <34> Remote
MSN6           <> Alert,SendText,SendRemoteCmd,SendVoice
MSN7           <> SMS-TE
TEI            108 (dynamic)
XTEI           1
Prefix         <0>
XPrefix        <>
DChannelProt DSS1
LeasedLine   0
```

In the following chapters will be referred to this list with „**Display**".

12.1 Point-to-Multipoint (bus operation)

The eviateg devices can be configured to Point-to-Multipoint / bus operation with the command **AT*E TEI=127** (see chapter ??, page 87).

After power-on, the device requests from the public exchange a unique, dynamic identification number (Terminal Endpoint Identifier, **TEI**).
On Point-to-Multipoint accesses the TEI can have a value in the range 64 to 126.

Display: TEI   108 (dynamic)

A value of 127 shows, that the device has no physical connection to the public exchange.

On a Point-to-Multipoint access, up to eight ISDN devices (e.g. telephones or terminal adapter) can be connected at the same time.
The network providers assigns between three and ten Multiple Subscriber Numbers (MSNs) to a Point-to-Multipoint access. With the MSN a singular device can be called, as on an incoming call the CDPN is compared with the devices MSN(s).

On eviateg ISDN devices to each MSN number a B channel protocol and an ISDN service

is stored. For each incoming call the right B channel protocol can be ensured. Depending on the eviateg device, between three and eight MSN can be stored for data and voice communication (MSN 0 to MSN2 in the example):

Display: `MSN2 ->        <>,X.75,unrestricted digital`

If no number is assigned to a MSN entry, this is marked with the signs „ <> " before the B channel protocol and the service.

The sign "`->`" shows those MSNs accepting i**ncoming calls** according to the settings of register S60 (page 54). If no line contains the sign "`->`", this is an indication that either
• the DTR line is not active, but evaluated (see page 24) or
• the register S60 is set to 0
and no incoming calls will be processed.

Display: `MSN1 ->        <791>,V.110,unrestricted digital`

If there is no number stored on the first three to eight MSN entries, all incoming calls will be accepted, where the ISDN service matches. If there is at least one number stored, incoming calls are only accepted, if number and service match.

The signs "`<-`" indicate the **active MSN** used as CGPN for **outgoing calls** as well as the B channel protocol and the ISDN service.
If there is no number stored for the active MSN and no CGPN is explicitly given with the ATD command (page 21), the public exchange inserts the main number as CGPN.

Display: `MSN0<->        <790>,X.75,unrestricted digital`

On some eviateg devices, beyond the three to eight MSNs for data communication or voice connections, there are additional MSNs for special functions available (e.g. for remote access to the device or alarm messages, refer to page 86):

On devices with VdS2465 protocol, the **VdS MSN** is used to identify the device at the central site (number identification). Also this number is used from the central site to dial into the device and switch outputs or to request a status.

Display: `MSN4           <5678> VdS`

One alternative to set up a remote connection to an eviateg device, is to program a **Remote MSN** on the device. All incoming data calls with this number are accepted as a remote access call (see chapter 13.2, page 109).

Display: `MSN5           <34> Remote`

All outgoing alarm connections (including SMS sent with the **AT*A** command) use the **Alert MSN**. Some gateways use number identification to identify the alerting device.

Display: `MSN6           <> Alert,SendText,SendRemoteCmd,SendVoice`

Devices with the feature Fixed Network SMS (FSMS) use the **SMS-TE MSN** for incoming and outgoing connections. More informations about Fixed Network SMS can be found in chapter 14, page 114 et sqq.

Display:	`MSN7`	`<> SMS-TE`

On custom specific devices, additional MSNs for special functions can be available.

12.2 Point-to-Point accesses

Only one ISDN device can be connected to a Point-to-Point access. The network provider assigns a fixed Terminal Endpoint Identifier (TEI) for this device. The fixed TEI value (commonly 0 or 1) must be stored in the device using the **AT*E TEI=** command (see chapter ??, page 87).

Display:	`TEI`	`1`	`(fix)`

On Point-to-Point accesses, numbers are combined from a trunk number and one or more extension digits. Usually an application software evaluates the extension digits (Direct Dial In, DDI) für routing purposes.

With an incoming call the public exchange forwards either
*   only the trunk number
*   the trunk number and parts of the extension digits or
*   the complete destination number including the trunk number and all extension digits.

The eviateg device shows in the extended RING message (see page 37) all available digits (trunk number and already received extension digits). If the number is not complete, the device appends a '**+**' to the last digit.

On every received extension digit, another RING message is issued with the digits recevied so far, and the interval of three seconds to the next RING message is restarted.

If not all necessary extension digits are forwarded by the public exchange, the incoming call can be acknowledged with the **ATA+** command (page 17). In this case the eviateg device signals the public exchange, that the user is alerted (like ringing a telephone). The calling persons gets a call connected tone after the **ATA+** command is issued.
After DDI evaluation the incoming call has to be accepted with the **ATA** command.

For evaluation of the RING messages the register **S0** (page 41) has to be set to a value, that the call is not accepted automatically (values of 0 or 4 are recommended).

The number matching method used on Multipoint accesses (from right side to left side) will fail on Point-to-Point accesses. So it is recommended for Point-to-Point accesses to clear all programmed MSNs with the command **AT*EClearMSNs** (see page 85).

<u>Note</u>: All **MSNs for special functions** (page 86) are forwarded by the public exchange en-bloc including all extension digits. The have to be programmed completely (trunk number plus extension digits).

12.3   Priorities for incoming calls

On a Point-to-Multipoint access up to eight ISDN terminal equipments can be connected at the same time. Each of these devices can accept one or more connections. It is a valid operation situation, that some ISDN terminals <u>at the same time</u> try to accept an incoming call (see also next chapter).

For call acceptance by an eviateg device there are the following priorities:

1. If a Remote MSN is programmed, each incoming call for this MSN is accepted as a remote access connection.
2. Matches the Calling Party Number one of the numbers of Remote Centrals (see the **AT*C Remote Central** command, page 76) the call is accepted as a remote access connection.
3. If both preceding criteria do not apply, it is checked according the settings of register S60 (page 54) and the ISDN service, whether the call **can** be accepted.
   When and how the call **is** accepted, is determined by the register S0 settings (page 41).
4. If the VdS MSN is programmed and the Calling Party Number matches one of the VdS central numbers, the incoming call is accepted by the VdS 2465 protocol automatically.
5. If the SMS-TE MSN is programmed and the Calling Party Number matches one of the FSMS service centers „InNumber", the incoming call is accepted by the Fixed Net SMS protocol automatically (see chapter ??, page 77).

12.4   Call acceptance collisions

If two or more ISDN terminals try to accept an incoming call at the same time, it is not predictable, which terminal will get the call assigned by the public exchange.

If an incoming call has been lost to an other terminal, an **ATA** command to accept the call will be acknowled by an eviateg device with the **NO CARRIER** message.
If the loss of the call is longer than five seconds ago, the **ATA** command is rejected with the **ERROR** message.

The **AT%X1** command (page 38) generates an immediate **NO CARRIER** message, as soon as an incoming call is lost to an other ISDN terminal (even if automatic call acceptance is set with **ATS0=0**).

When the ISDN cause display is active (**AT$X2**, page 38), a lost call is marked with the cause **<Non-selected user clearing>**.

In order to avoid call collision, different MSNs should be programmed

- for different ISDN terminals or
- different functions within one ISDN terminal

12.5 Leased Line operation

Some eviateg devices support Leased Line operation with speeds of 64000 bit/s or 128000 bit/s. Connections with the protocols X.75 or V.120 can be established between eviateg devices only, as the role „Calling device" / „Called device" is not predictable.

A Leased Line is switched through permanently. When an eviateg device with Leased Line mode enabled (see **AT&L** command, page 28) is connected to the Leased Line, immediately a CONNECT message is issued.
The eviateg device tries depending on the register **S0** setting (page 41) automatically or after an **ATA** command, to establish the selected B channel protocol with the remote device.
On success, a CONNECT message is issued and the device changes to the data transfer phase. Otherwise a **NO CARRIER** message is issued and after some seconds latency time (**AT*C DCP LeasedLine Latency**, page 69) the next RING message is issued.

Note: To establish a Leased Line connection, the DTR line must be active or must be ignored with the **AT&D0** command (page 24).

12.6 ISDN services

At each ISDN connection setup is signalled, which ISDN service will be used. This shall ensure that only compatible terminals will respond to an incoming call (eg to suppress telephone ringing on incoming data calls).

The eviateg devices use the following numerical values to adjust the ISDN services (see also commands **AT*EService**, page 87, and **AT*C BERT Service**, page 120).

Number	ISDN service
1	speech
2	**unrestricted digital**
3	restricted digital
4	3.1 kHz audio
5	7.0 kHz audio
6	video
7	packet mode
8	56 k rate adaption
9	announcements
16	telephony
17	fax G2 / G3

Number	ISDN service
18	fax G4 class 1
19	teletex mixed mode
20	teletex proc mode
21	teletex basic mode
22	videotex
23	telex
24	MHS X.400
25	OSI X.200
26	telephony 7.0 kHz
27	videotelephony 1
28	videotelephony 2

13   Special operation modes

13.1   Automatic B channel protocol recognition

The automatic B channel protocol recognition is set with the command **AT\N0** (page 28Fehler: Referenz nicht gefunden). The recognition method uses information signalled in the D channel protocol (Bearer Capability and Low Layer Compatibility).

These informations are signalled before accepting the call. If the calling ISDN terminal or the ISDN network does not supply these information, the call is accepted using X.75.

The following B channel protocols are recognized:
• V.110 including the standard speeds (1200, 2400, 4800, 9600, 19200 and 38400 bit/s)
• X.75
• V.120
• X.75 with T.70
• X.25
• PPP (HDLC transparent with Octett Stuffing according to RFC 1662)

Outgoing calls in the **AT\N0** mode use always X.75 and the ISDN service „Unrestricted Digital Information".

If for the outgoing call an other service shall be used, you can
• change the mode (e.g. **AT\N2**, see page 28)
• change the service (e.g. **AT*EService0=21**, see page 87)
• dial the destination number (e.g. **ATD**08154711, see page 20)
• switch back to **AT\N0** mode after the connection

13.2   Remote access (maintenance)

Remote access can be used to control an eviateg device remotely over ISDN or GSM.

The following criteria are used by eviateg devices to recognize an incoming call as a remote connection, which is not signalled with **RING** at the serial interface:

• the connection was dialled with the command **ATDR<nnn>** (page 23)
• the CGPSA or CDPSA contains the serial number of the called eviateg device
• the called number is the Remote MSN (Seite 85)
• the calling number is found in the list of remote centrals (page 76)

Connection establishment with the **ATDR** command uses a special signalling in the D channel protocol and can be used between two eviateg devices only.
For all other methods any ISDN terminal can be used.

When using the devices serial number in the CGPSA or CDPSA, it must be given with eight hexadecimal digits including leading zeroes. Hexadecimal characters must be given as upper case characters.

During the remote maintenance connection the device is not interfered in its operation. Remote commands and their responses do not appear at the serial interface, all responses are sent back to the caller.

The remote connections use the following sequence:

Connection establishment
After executing the **ATDR<nnn>** command the remote connection to the remote eviateg device will be established and the calling device shows a **CONNECT** message.
In this state a connection is established to a special command interpreter of the called eviateg device, called the **Remote Process**.

Login
After connection establishment the called eviateg device expects a carriage return in order to start the password input. Then the called eviateg device sends **Password:** as a password request.

Password input
At this state the caller has to enter the remote password. The factory default of the remote password is „**RemotePassword**" (see command **AT\R**, page 34).
If the password input was faulty, the user has two additional tries to enter the correct password. After the third faulty password input the connection will be disconnected by the called device.
If the password was correct, a login message similar to the following will be returned:
Login TA Basic - Ser# 0000112D - FW 1.71/20010805 - 2003-05-05 10:22:25

Remote commands
After login the remote prompt character „**>**" appears. In this state the commands described as follows can be given to the controlled device.
Each command line has to be terminated with a carriage return and is executed immediately.

AT
Access to the AT interpreter of the called eviateg device. The command must have the prefix AT.
Example: **>AT*E**
This command line executes the **AT*E** command at the called device and returns the response to the caller.

Reset
The reset command terminates the remote connection and executes a hardware reset at the called device.

Quit
Terminate the remote connection.

Shut   The Shut(down) command terminated the remote connection in tha way, that for the next three minutes no further remote connection will be accepted. This command can be used on Point-to-Multipoint accesses, where multiple eviateg devices can accept remote connections.

<u>**Note**</u>:   All **AT*C** commands described in chapter 8, page 63 et sqq., can be used in a remote connection. The **AT*C** command prefix must not be used on remote connections.

13.3   X.31 operation

In X.31 mode the connection establishment as well as the data is transferred in the D channel. The Frame Handler at the public exchange filters all X.31 information from the D channel and forwards it to the Packet Handler. This entity is responsible to transport the X.31 data to a X.25 packet network (e.g. DATEX-P) or to another Packet Handler, so that connections between two X.31 accesses are possible too.

Between the X.31 terminal and the Frame Handler an error corrected link in the D channel is established. In order that the Frame Handler can address multiple X.31 terminals on a S_0 bus, each X.31 terminal must have an X.31 TEI value (see commands **AT*EXTEI**, page 88, or **AT*C X31 TEI**, page 82). The X.31 TEI value is assigned by the X.31 network provider.

When establishing a connection **from a X.31 access to an access in a X.25 network** (e.g. DATEX-P) the four-digit network identifier and X.25 address must be dialled.

Example: ATD 0262 40300019052

Together with the X.31 connection establishment up to 16 bytes user data can be sent (see page 21).

When establishing a connection **from a X.31 access to another X.31 access** the country code and the area code (both without leading zeroes) and the number of the X.31 access must be dialled.

Beispiel: ATD 49 40 60848790

<u>**Note:**</u>   Connections between two X.31 accesses are not supported by each tariff and by each network provider !

The numbers in the table below can be used for testing a X.31 access.
The **echo server** sends each entered character back immediately.
The traffic generator sends continously test packets.

Connections can be established either with

- the number including the network identifier (middle column) or
- the number without the network identifier (right column), if the X.31 dial prefix has been set with the command **AT*E XPrefix=0262** (page 89) to the German DATEX-P network

The connection can be terminated either with the DTR line or with the „**+++**" sequence and the **ATH** command.

Test facility	Number including network identifier	Number without network identifier
Echo server	0262 45228093056	45228093056
Traffic generator	0262 45228093057	45228093057

(as at October 2013)

13.4   Data transfer to GSM networks

For data transmission to GSM networks the V.110 protocol is used with a typical bitrate of 9600 bit/s. The following commands set the device to this parameters:

AT\N1	Enable V.110 mode.
AT%B9600	Set the network speed to 9600 bit/s.
AT%G1	Use the speed specified by the **AT%B** command.

When using higher speeds in the GSM network (e.g. for HSCSD) the speed can be up to 38400 bit/s. The following commands set the device to this parameters:

AT\N1	Enable V.110 mode.
AT%B38400	Set the network speed to 38400 bit/s.
AT%G1	Use the speed specified by the **AT%B** command.

During **incoming calls** the device recognizes the V.110 network speed and adapts itself to this speed (see next chapter).

13.5   V.110 bitrate adaption for incoming calls

The device is able to adapt the speed of the serial interface to the V.110 bitrate of incoming calls. The bitrate adaption can be enabled with the command **%L0** (page 27).

If the calling device is working with **%G0**, the speed of the serial interface of the calling partner is used at the network side. The called device evaluates the speed at the network side (%L0 is required) and changes its own serial speed after the CONNECT message to the new serial speed. In this case the serial speed of both partners the same.

13.6   Access control

The device has a security function that can be activated if the automatic call acception is ON (register **S0=1**, see page 41).

The command **AT%S0** deactivates the password request and the automatic call back function.

The command **AT%S1** activates the password controlled call back. The device accepts the next incoming call and requests the calling party to enter the Access Password.
When the password is right, the device disconnects the line and calls back.
The caller gets three attempts to enter the correct Access Password.
The Access Password can be stored with the command **AT\P=abcd** (page 32).

When the command **AT%S2** is set, the device only demands the password. After entering the correct password data transfer is possible, otherwise the device disconnects the line.

The command **AT%S3** activates the background access control. An incoming call must have the Access Password of the called device in the Calling Party Subaddress (CGPN) or in the Called Party Subaddress (CDPN). Otherwise the incoming call is ignored.

The Access Password of the called device can be specified in the **ATD** command (see page 20). If in the calling device **AT%S3** is set also, its Access Password is append automatically to the **ATD** command.

If **AT%S3** is activated, a Calling Party Subaddress or Called Party Subaddress specified in an **ATD** command is overwritten by the Access Password !.

The command **AT%S0** deactivates the password protected access control.

Note: The factory setting for the Access Password is **AccessPassword**.

14 Fixed Network SMS (FSMS)

14.1 Setting-up operation

If multiple FSMS terminals are installed on an ISDN S_0 bus, each device needs an own MSN for transmission and reception of Fixed Network SMS. The FSMS MSN is set with the command **AT∗C SMS MSN** (see page 77). Some FSMS centers support also the selection of FSMS terminals with a subaddress (see page 77).

If the device is operated on an internal S_0 bus of a PABX, incoming voice connections must be routed to the internal S_0 bus. Also the dial prefix for external connections must be set with the **AT∗EPrefix** command (page 88).

The FSMS reception is enabled per factory setting. If the device shall not accept incoming FSMS connections, this can be solved by setting a not used MSN:

Example: AT∗C SMS MSN 99999

14.2 Registration at a FSMS Center

Some FSMS centers require registration before FSMS can be sent or received (e.g. for the FSMSC of the **Deutsche Telekom AG** a message containing the text **ANMELD** must be sent to the number **8888**).

Example: AT∗A Fix 8888 ANMELD

The registration at the FSMSC is acknowledged with a FSMS. If the device can't receive this message (e.g. because the device is used behind a PABX, which doesn't route the incoming call), the FSMSC tries a few time to deliver the FSMS. After some attempts the SMS is delivered per telephony call using a voice synthesizer.

On other FSMS centers (like **Dr. Materna's Anny Way**) a registration is only needed, when FSMS shall be received via this FSMSC. Registration can be accomplishd by sending a FSMS to a special number (e.g. **2547** for Anny Way):

Example: AT∗A Fix 2547 Test

If SMS shall be sent from a mobile phone to a FSMS device, the SMS center number in the mobile phone should be checked. Otherwise the GSM SMS center can't ascertain that a FSMS is installed at the given number and would try to deliver the SMS per telephone call.

14.3   Indication of received and unread SMS

The device can indicate received, but not yet read SMS with the RI line or with a message at the serial interface (see register **S90**, page 54).

If both possibilites can't be used, the attached PC has to poll with an AT command, whether new SMS have been received (see **AT∗C SMS READ**, **AT∗C SMS UNREAD** and **AT∗C SMS LIST**, page 77).

14.4   Storage of received SMS messages

Received SMS are stored by the device in its flash memory. The number of free storage locations for received SMS is device dependent and can be checked with the command **AT∗C SMS Free**.

14.5   Controlling the device with SMS commands

Received SMS beginning with a valid SMS password are not stored, but are treated as a control command (see page 79).

14.6   Routing of outgoing SMS messages

Outgoing SMS messages can be sent as well over the mobile networks gateways (using the TAP and UCP protocol) as well as per Fixed Network SMS.
In order to instruct the device to send a SMS per FSMS, either
• the alerting command can be expanded with the mark **FIXEDNETSMS** or
• the prefix lists in the gateway tables can be cleared
  (command **AT∗C Gateway <i> Prefix**, page 71)

In this way a mixed operation (some number ranges over TAP / UCP protocol, other number ranges per FSMS) is possible.

The FSMS center for outgoing FSMS can be selected with the command
AT∗C SMS SelectedCentral <i> (page 77).

14.7   Sending a fax per FSMS

The parameter for marking a FSMS to be delivered as fax depends on the FSMSC operator. For the FSMSC of e.g. the Deutsche Telekom AG it is suffcent to prepend the digits „99" before the destination fax number. Fax per FSMS is delivered (contrary to standard FSMS) is delivered around the clock.

Example: AT∗A FIX 9904060849041 This is a fax message.

Note: A line feed can be inserted with the string **^M^J** (CR / LF).

Note: Some FSMSC do not support delivery as fax.

14.8   Sending an eMail per FSMS

The parameter for sending an eMail per FSMS depends on the FSMSC operator. Usually the SMS has to be sent to a special destination number, and the text has to start with the eMail address. eMails per FSMS are delivered (similar to fax) around the clock.

Note: The "@" can be replaced by a star ("*").
             A line feed can be inserted with the string **^M^J** (CR / LF).

Example: AT*A FIX 8000 info@eviateg.de eMail per FSMS over Deutsche Telekom

Example: AT*A FIX 6245 info*eviateg.com: eMail per FSMS over Anny Way

14.9   Unregistering from a FSMS center

If a different MSN shall be used for receiving FSMS or if the device shall be operated on a different access, it should be unregistered from the FSMSC.

Some FSMSC operator need a defined text to be sent to a special number (e.g. for the Deutsche Telekom AG, a FSMS with the text **ABMELD** must be sent to the number **8888)**.

Example: AT*A FIX 8888 ABMELD

Other FSMS operators (e.g. Anny Way) do not support unregistering.

15   BERT testing

Some eviateg devices support **B**it **E**rror **R**ate **T**esting (BERT).
For Bit error rate testing data connections are established and one out of eight test pattern is continously sent. On the receiving side the data connection is automatically accepted and the incoming pattern is compared to the expected test pattern.

All bit errors are counted and will be displayed during and / or at the end of the BERT connection together with a bit error statistic.

The statistic contains
– the duration of the measurement
– the number of seconds without bit errors („**N**on **E**rrored **S**econds“ / „NES“)
– the ratio of seconds without errors to the measuerement duration („**N**on **E**rrored **S**econds Ratio“ / „NESR“)
– the number of seconds with errors („Errored Seconds“ / „ES“)
– the seconds with errors related to the measuerement duration („**E**rrored **S**econds **R**atio“ / „ESR“)
– the number of seconds with severe errors („**S**everely **E**rrored **S**econds“ / „SES“) with more than 640 errors per second
– the seconds with severe errors related to the measuerement duration („**S**everely **E**rrored **S**econds **R**atio“ / „SESR“)
– the total error count
– the errors within the last minute
– the errors within the last hour
– the errors within the last day
– the number of synchronisation losses
– the **B**it **E**rror **R**ate („BER“)

15.1   Automatic call receiving (receiver side)

An incoming BERT connection shall be accepted indepently of a second serial interface and a second AT interpreter (unattended operation). This is accomplished by an independent background process.

This process checks on all incoming data connections if the Called Party Number (CDPN) corresponds to the BERT MSN. If the numbers can be matched and the automatic BERT call acceptance is activated, the process answers the incoming call and issues (according to the Verbosity settings) a BERT Connect message.

Subsequently the received data stream is compared to the selected test pattern; any discrepancy is counted as a bit error.

Depending on the Verbosity setting, during the BERT connection each new minute, new hour or new day a BERT statistic is issued.

15.2 Establishing a BERT connection (transmitter side)

For establishing a BERT connection the BERT mode must be selected with the **AT\N19** command (see page 28) and it must be dialled with the **ATD** command (see page 20).

The established connection is signalled with the CONNECT message.

In order to test the proper working of the BERT test, on the transmitter side one or more exclamation marks ('!') can be sent (like data in the transparent phase). Each exclamation mark generates a synthetic bit error in the data stream, which is recognized and displayed on the receiver side and which appears in the BERT statistic.

The BERT connection can be terminated either with the DTR line or with the **"+++"** sequence and the **ATH** command.

15.3 Command for configuration of BERT tests

Command	Meaning	Page
AT*C BERT ?	Display of all BERT settings	118
AT*C BERT Listen	Automatic answering of BERT connections	118
AT*C BERT MSN	MSN for BERT connection answering	119
AT*C BERT Pattern	Test pattern for BERT test	119
AT*C BERT Port	RS232 interface for output of BERT messages	119
AT*C BERT Save	Stores all BERT parameters	120
AT*C BERT Service	ISDN service used for BERT tests	120
AT*C BERT Verbosity	Controls the displayed messages during BERT tests	120

AT*C BERT ?	**Display of all BERT settings**

AT*C BERT ?   **Display of all BERT settings**

This command list the following settings:
- the automatic answering of incoming BERT connections (see page 118)
- the BERT MSN (see page 119)
- the Test pattern for the BERT test (see page 119)
- the RS232 interface for messages during the BERT test (see page 119)
- the ISDN service for BERT connections (see page 120)

AT*C BERT Listen	**Automatic answering of incoming BERT connections**

AT*C BERT Listen ?   **shows if the automatic answering is enabled**

AT⋆C BERT Listen On   **activates automatic answering**

AT⋆C BERT Listen Off   **deactivates automatic answering**

AT⋆C BERT MSN	**MSN for incoming BERT connections**

AT⋆C BERT MSN ?   **displays the MSN for incoming BERT connections**

AT⋆C BERT MSN <MSN>   **sets the MSN for incoming BERT connections**

With this command the MSN for **incoming** BERT connections can be set. Der number matching is carried out from right to left, so only the significant last digits must be set.

Hint: The MSN for **outgoing** BERT connections is controlled with the active MSN (see **AT⋆EActMSN**, see page 87).

AT⋆C BERT Pattern	**Test pattern for the BERT test**

AT⋆C BERT Pattern ?   **display the number of the test pattern (see table below)**

AT⋆C BERT Pattern <p>   **sets the test pattern according to the table below**

Value	Tes pattern	ITU recommendation	Werkseinstellung
0	Permanent '0'	-	
1	Permanent '1'	-	
2	Pseudo random pattern, length 2^9-1 bits	O.153	
3	Pseudo random pattern, length 2^{11}-1 bits	O.153	✔
4	Pseudo random pattern, length 2^{15}-1 bits	O.151	
5	Pseudo random pattern, length 2^{20}-1 bits	O.153	
6	Pseudo random pattern, length 2^{20}-1 bits, max. 14 continozus '0' bits	O.151	
7	Pseudo random pattern, length 2^{23}-1 bits	O.151	

AT⋆C BERT Port	**RS232 interface for output of BERT messages**

AT⋆C BERT Port ?   **Displays the selected serial interface**

AT⋆C BERT Port <p>   **Selects the RS232 interface for output of BERT messages**

On devices with multiple RS232 interfaces the interface for output of BERT messages (eg the error statistic) can be selected (port 0, 1 or 2 depending on the eviateg device).

AT*C BERT Save	Saving of all BERT parameters

AT*C BERT Save	This command stores alle settings for Bit Error Rate Tests

AT*C BERT Service	ISDN service for the BERT test

AT*C BERT Service ?	Display the used ISDN service
AT*C BERT Service <s>	Selects the ISDN service for BERT tests

Please refer to the table in chapter ?? on side 107.

AT*C BERT Verbosity	Controlling the messages during BERT tests

AT*C BERT Verbosity ?	Displays the enabled messages
AT*C BERT Verbosity + <m>	Enable message <m> (refer to table below)
AT*C BERT Verbosity + <m> <n>	Enable messages <m> and <n>
AT*C BERT Verbosity + *	Enable all messages
AT*C BERT Verbosity - <m>	Disable message <m>
AT*C BERT Verbosity - <m> <n>	Disable message <m> and <n>
AT*C BERT Verbosity - *	Disable all messages

The follwing messages can be selected:

Name	Meaning / usage	Factory setting
Connections	shows connection establishment and termination including numbers	✔
Errors	shows errors during the BERT test	✔
SevereErrors	shows severe errors during the BERT test (only meaningful if **Errors** is not selected)	
ReportOnError	shows after an error or an severe error the statistic	✔
States	shows the following status changes during the BERT analysis: - "Unsynced", when the incoming call is accepted - "WaitForFirstSync", when the call was accepted and one second is waited for the test pattern - "Synced", if the test pattern is received - "SyncLost", if the test pattern is not recognized any long in the received data stream - "WaitForResync", if the device waits for a re-synchronisations	
Statistic	shows the clearing of BERT statistic (eg on connection establishment)	

Name	Meaning / usage	Factory setting
VerboseReport	shows the statistic more detailed and more user-friendly; if **VerboseReport** is switched of, the Report is optimized for evaluation by software	✔
MinutelyReport	issues during BERT connections each minute a BERT statistic	✔
HourlyReport	issues during BERT connections each hour a BERT statistic (only meaningful if **MinutelyReport** is switched off)	
DailyReport	issues during BERT connections at midnight a BERT statistic (only meaningful if **MinutelyReport** and **HourlyReport** are switched off)	
DateStamp	adds to each BERT message the current date (if set with **AT*C DateAndTime** or via ISDN)	
TimeStamp	adds to each BERT message the current time (if set with **AT*C DateAndTime** or via ISDN)	✔
Midnight	issues at midnight a hint on the new day (useful for long BERT tests when **DateStamp** is switched off)	✔

Example for a BERT statistic with VerboseReport **enabled**:

```
atd881416234

BERT 15:41:59: Incoming call from 040881416123
BERT 15:42:00: Connected to 040881416123

CONNECT

BERT 15:43:00: Duration: 59 s
BERT 15:43:00: Non Errored Seconds: 59 (Ratio NESR 1.000)
BERT 15:43:00: Errored Seconds: 0 (Ratio ESR 0.000)
BERT 15:43:00: Severely Errored Seconds: 0 (Ratio SESR 0.000)
BERT 15:43:00: Errors: 0 total, 0/0/0 per minute/hour/day, 0 sync losses
BERT 15:43:00: BitErrors: 0/3776000 (Ratio BER 0.000)
BERT 15:44:00: Duration: 119 s
BERT 15:44:00: Non Errored Seconds: 119 (Ratio NESR 1.000)
BERT 15:44:00: Errored Seconds: 0 (Ratio ESR 0.000)
BERT 15:44:00: Severely Errored Seconds: 0 (Ratio SESR 0.000)
BERT 15:44:00: Errors: 0 total, 0/0/0 per minute/hour/day, 0 sync losses
BERT 15:44:00: BitErrors: 0/7616000 (Ratio BER 0.000)
BERT 15:45:00: Duration: 179 s
BERT 15:45:00: Non Errored Seconds: 179 (Ratio NESR 1.000)
BERT 15:45:00: Errored Seconds: 0 (Ratio ESR 0.000)
BERT 15:45:00: Severely Errored Seconds: 0 (Ratio SESR 0.000)
BERT 15:45:00: Errors: 0 total, 0/0/0 per minute/hour/day, 0 sync losses
BERT 15:45:00: BitErrors: 0/11456000 (Ratio BER 0.000)
BERT 15:46:00: Duration: 239 s
BERT 15:46:00: Non Errored Seconds: 239 (Ratio NESR 1.000)
BERT 15:46:00: Errored Seconds: 0 (Ratio ESR 0.000)
BERT 15:46:00: Severely Errored Seconds: 0 (Ratio SESR 0.000)
BERT 15:46:00: Errors: 0 total, 0/0/0 per minute/hour/day, 0 sync losses
BERT 15:46:00: BitErrors: 0/15296000 (Ratio BER 0.000)
BERT 15:47:00: Duration: 299 s
BERT 15:47:00: Non Errored Seconds: 299 (Ratio NESR 1.000)
BERT 15:46:00: Errors: 0 total, 0/0/0 per minute/hour/day, 0 sync losses
BERT 15:46:00: BitErrors: 0/15296000 (Ratio BER 0.000)
BERT 15:47:00: Duration: 299 s
BERT 15:47:00: Non Errored Seconds: 299 (Ratio NESR 1.000)
OK
ath
NO CARRIER

BERT 15:48:07: Duration: 366 s
```

```
BERT 15:48:07: Non Errored Seconds: 366 (Ratio NESR 1.000)
BERT 15:48:07: Errored Seconds: 0 (Ratio ESR 0.000)
BERT 15:48:07: Severely Errored Seconds: 0 (Ratio SESR 0.000)
BERT 15:48:07: Errors: 0 total, 0/0/0 per minute/hour/day, 0 sync losses
BERT 15:48:07: BitErrors: 0/23424000 (Ratio BER 0.000)
BERT 15:48:07: Disconnected
```

Example for a BERT statistic with VerboseReport **disabled** and synthetical errors (72 exclamation marks entered on the transmitter side):

```
atd881416234
BERT 15:53:19: Incoming call from 040881416123
BERT 15:54:00: Connected to 040881416123
CONNECT

BERT 15:55:00: Duration: 59 s, 59 NES (1.000), 0 ES (0.000), 0 SES (0.000)
BERT 15:55:00: Errors: 0 total, 0/0/0 per minute/hour/day, 0 sync losses
BERT 15:55:00: BER: 0/3776000 (0.000)
BERT 15:56:00: Duration: 119 s, 119 NES (1.000), 0 ES (0.000), 0 SES (0.000)
BERT 15:56:00: Errors: 0 total, 0/0/0 per minute/hour/day, 0 sync losses
BERT 15:56:00: BER: 0/7616000 (0.000)
BERT 15:56:11: 72 errors !!!
BERT 15:56:11: Duration: 130 s, 129 NES (9.923e-01), 1 ES (7.692e-03), 1 SES (7.692e-03)
BERT 15:56:11: Errors: 72 total, 72/72/72 per minute/hour/day, 0 sync losses
BERT 15:56:11: BER: 72/8320000 (8.653e-06)
BERT 15:57:00: Duration: 179 s, 178 NES (9.944e-01), 1 ES (5.586e-03), 1 SES (5.586e-03)
BERT 15:57:00: Errors: 72 total, 72/72/72 per minute/hour/day, 0 sync losses
BERT 15:57:00: BER: 72/11456000 (6.284e-06)
OK
ath
NO CARRIER

BERT 15:57:19: Duration: 198 s, 197 NES (9.949e-01), 1 ES (5.050e-03), 1 SES (5.050e-03)
BERT 15:57:19: Errors: 72 total, 0/72/72 per minute/hour/day, 0 sync losses
BERT 15:57:19: BER: 72/12672000 (5.681e-06)
BERT 15:57:19: Disconnected
```

16   Document history

Vers.	Date	Changes	Page
1.0	2005-04-20	First issue	
1.1	2005-04-27	Length of Access Password changed	32
1.2	2005-07-08	Definition of the Abort character in register S10	42
2.10	March 2007	Synchronisation with the German language manual	
2.11	May 2008	New S registers: S47 (separator character for the Reconnected Name) S48 (separator character for the X.25 address in AT\N25) New command for the automatic Plug & Play recognition by the PCs operating system: **AT*C PnP** New command **AT*C DCP KeepTEI** for the validity of the TEI value after deactivation of layer 1 New commands for controlling the „Type of Number" and „Numbering Plan" for outgoing connections.	49 49 76 69 69, 69
2.12	August 2008	New register **S53** for AOC message	50
2.13	August 2008	**AT*C CallForwarding** for the call forwarding supplementary service.	66
2.14	December 2009	New registers: - **S55** for D channel protocol state - **S56** for additional messages on D channel protocol status changes - **S57** to **S59** for controlling the elements of **RING, CONNECT** and **CALL WAITING** messages	51 51 52.. 53
2.15	May 2010	Hint for using '*' and '#' in the **ATD** command and the possible need to adjust the separator character registers	20
2.16	March 2013	Hints for separators between parts of RING message (S57), CONNECT message (S58) and CALL WAITING message (S59). Table for ISDN services in a separate chapter Description of BERT tests	52 53 53 107 117
2.17	July 2013	New command **AT*C DCP Option**	70
2.18	October 2013	Update of numbers for X.31 Echo server and X.31 Traffic generator. Enhancement of S56 for indication of ISDN feeding voltage changes.	112 51

Vers.	Date	Changes	Page
2.19	January 2016	Enhancements for die interrogation of forwarded calls (Call Forwarding).	66

Index