TAHOE

FREEDOM OF COMMUNICATION

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Tahoe® 635 (G.shdsl+ / V.35 modem)
User Manual
http://www.tahoe-group.com/
Firmware version 1.2.6

1.   Introduction

Thank you for purchasing the Tahoe 671 modem. We did our best to ensure highest reliability and performance of our products. Devoting many years of research and development we are proud to provide a superior quality device unfolding new possibilities for the use of the copper lines.

Tahoe$^®$ 635 is a G.shdsl+ modems allowing data transmission with speeds up to 4664 kbps over a 2-wire line. Thanks to powerful TCPAM-32 modulation throughputs and ranges are much higher than using HDSL technique. TCPAM-16 modulation is also available to provide compatibility with other manufacturers' products.

The modem is equipped with a V.35 interface having a standard Winchester (ISO-2589) connector. A router or another DTE device can be connected there.
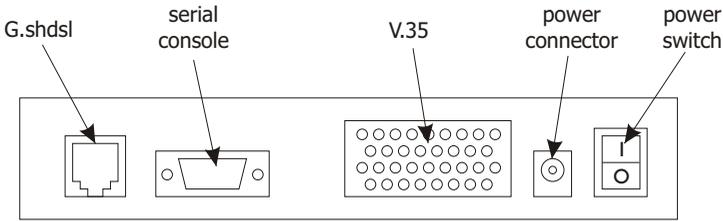
The modem may be managed using a built-in LCD and keyboard, using a serial console or remotely through the DSL line.

The system firmware is stored in the Flash memory - it is possible to update it through the serial console. The configuration is stored in the EEPROM memory.

2. Interfaces

Following connectors are found on the rear panel of the modem:

2.1. G.shdsl

It is a 6-pin RJ-11 connector used to connect the leased line. The line should be connected to the two central pins (3 and 4). The polarization of a line is not important.

Pin	Function
1	-
2	-
3	line
4	line
5	-
6	-

2.2. Serial console

The RS-232 serial console is used for modem management. It has a DB9/M connector and works as a DTE, i.e. a null-modem cable should be used to connect it to a PC. Only three lines (written in bold) are necessary for transmission. Terminal settings are 9600 bps, 8 data bits, 1 stop bit, no parity, no handshaking.

Pin	Name	Description
1	DCD	carrier detect, transmission readiness signaling
2	**RXD**	**data received from the PC**
3	**TXD**	**data sent by the modem to the PC**
4	DTR	active, when the PC is switched on
5	**GND**	**signal ground**
6	DSR	active, when the modem is switched on
7	RTS	used by the PC to inform that is has data to send
8	CTS	used by the modem to permit data transmission
9	RI	ring indicator (signal used in telephone modems)

2.3.   V.35

The V.35 interface is used to transfer data between the modem and router or other DTE device. It is equipped with a standard 34-pin Winchester (ISO-2589) connector.

Modem supplies clocking signal for both transmitted and received data. The frequency of this signal is equal to the throughput set on the G.shdsl line.

Following table describes the pinout of the V.35 interface:

Pin	Name	DTE|DCE	Description
A	shield		Cable shield
B	GND		Ground
C	RTS	➡	Signal active during transmission from router
D	CTS	⬅	Permission for sending data from modem
E	DSR	⬅	Signals modem readiness
F	DCD	⬅	Active when modems are synchronized
H	DTR	➡	Signals router readiness
P	SD(A)	➡	Data sent to modem (A)
R	RD(A)	⬅	Data received from modem (A)
S	SD(B)	➡	Data sent to modem (B)
T	RD(B)	⬅	Data received from modem (B)
U	SCTE(A)	➡	Transmit clock supplied by router (A)
V	SCR(A)	⬅	Receive clock (A)
W	SCTE(B)	➡	Transmit clock supplied by router (B)
X	SCR(B)	⬅	Receive clock (B)
Y	SCT(A)	⬅	Transmit clock (A)
AA	SCT(B)	⬅	Transmit clock (B)

- ○ DTE - router, DCE - modem
- ○ SD, RD, SCT, SCR and SCTE are differential signals. The remaining signals conform to RS-232.

3. Modem configuration using built-in keyboard and LCD

The easiest way to configure a modem is to use the four-button keyboard and the LCD. After switching the power on, an information about the modem type, the line throughput and state will be displayed:

```
Tahoe 635
4664 kb/s     BOOT
```

Four-letter code in the bottom right describes the DSL line state:

- ○ BOOT   - booting of the G.shdsl transceiver
- ○ IDLE   - transceiver inactive
- ○ DOWN   - transceiver active, line not synchronized
- ○ SYNC   - line synchronized, data may be transmitted

On the right of the display there is a keyboard with "up", "down", "Escape" and "Enter" keys. By pressing up/down buttons you may browse the configuration menu:

- ○ speed setting
- ○ modem type setting (Master/Slave)
- ○ line modulation selection
- ○ CRC4 setting
- ○ G.703 port line coding, sensitivity and range
- ○ test loopbacks
- ○ console throughput
- ○ language selection
- ○ storing settings in the EEPROM memory
- ○ connection reset
- ○ modem reset

Each pressing of the "Escape" button causes the return to the primary display with modem type and state. Pressing of the "Enter" button selects given menu option.

3.1. Throughput setting

```
Line rate:
4664 kb/s
```

After pressing Enter the throughput may be set using up/down buttons. It may be chosen from 64-4664 kbps range. After pressing

Enter new throughput will be set and the G.shdsl connection will be renegotiated with new settings.

NOTE: The same throughput must be set on both modems.

3.2. Modem type

```
Modem type:
Master / HTU-C
```

After pressing Enter the modem type may be selected - either Master (HTU-C) or Slave (HTU-R). After selecting the type and pressing Enter again the connection will be reset and renegotiated with new settings.

NOTE: Always one modem has to be set as a Master and the other one as a Slave.

3.3. Line coding

```
Line coding:
32-TCPAM
```

After pressing Enter the G.shdsl line coding (signal modulation) may be chosen. The number (32 in the example above) means the number of values encoded in one symbol (32 - 5 bits per symbol). The higher this number is, the lower is the signal frequency, which gives better immunity for signal attenuation and higher reach.

The second part - PAM or TCPAM - means either the Pulse Amplitude Modulation or Trellis Coded Pulse Amplitude Modulation. The latter is more efficient.

It is recommended to use the 32-TCPAM modulation, which provides the best results. The remaining line codings are available to provide compatibility with others' manufacturers equipment. The 32-TCPAM allows throughputs from 256 kbps to 4664 kbps, while 16-TCPAM - from 128 kbps to 2320 kbps.

The "Auto" setting forces use of 32-TCPAM for speeds higher than or equal to 256 kbps per line and 16-TCPAM for lower rates.

3.4. Console throughput

```
Console port:
9600 bps
```

Different console port throughputs may be chosen - 9600, 19200 or 38400 bps. Be sure to set the same throughput on the modem and the PC.

3.5. Language selection

```
Language:
English
```

After pressing "Enter" the language used on the LCD and the serial console may be changed.

3.6. Write configuration to EEPROM

```
Write config
to EEPROM
```

Every change to the configuration will be lost after reboot or power off unless the settings are written to the EEPROM. After reaching this option just press Enter to save them.

3.7. Connection reset

```
Connection reset
(press Enter)
```

After pressing Enter the G.shdsl link will be disconnected and negotiated again.

3.8. Modem reset

```
Modem reset
(press Enter)
```

After pressing Enter the whole modem is rebooted. If some

settings were not saved to the EEPROM, they will be lost.

3.9.   Line parameters

The "Esc" button returns to the main screen (with modem type, throughput and link state). While having this screen displayed, you may press Enter to display line attenuation in dB (proper value appears only after the line synchronizes):

```
Line attenuation:
12.5 dB
```

Pressing Enter again will show so-called Noise Margin (or Signal-Noise Ratio). This is the difference between the useful signal and the background noise. It may be used to estimate, how much the line rate may be increased without causing any problems with the synchronization.

```
Noise margin:
6.0 dB
```

When the NMR is less than 0 dB modems will be unable to bring the link up.

It is the best practice to keep the NMR equal to or higher than 7-8 dB, so the error rate will be unnoticeable. Otherwise the packets will be lost due to bit errors and the retransmission would be necessary, thus decreasing the overall effective throughput.

Pressing Enter again will return to the main screen with the throughput and modem state.

4. Modem configuration using the serial console

After connecting the converter to a PC, running a VT-100 terminal emulation software and switching the modem on a menu will appear:

main menu   V.35 port state   DSL parameters   DSL state

```
Line rate...............  4608 kb/s        Link state:            SYNC
Modem type..............  Slave / HTU-R    Line attenuation:   2.5 dB
G.shdsl line coding.....  32-TCPAM         Noise margin:      19.5 dB
Console port speed......  38400 bps        V.35 port: DSR DTR DCD
Language................  English
Save settings to EEPROM
Manage remote modem
Connection reset
                                           Uptime: 0d 00:00:16
                                           Version: 1.2.5
                                           Sat Nov 15 17:24:05 CET 2003
 — Log —
0d 00:00:00 Tahoe 635 G.shdsl V.35 booting...
0d 00:00:01 Transceiver 0 booting
0d 00:00:16 Transceiver 0 initialized
0d 00:00:16 Transceiver 0 self test successful!
0d 00:00:16 System Enable -- Remote Site.
0d 00:00:47 ActivationMonitor(0): Link is UP.
```

log containing most important information about modem status   time elapsed since power-on or reboot   firmware version and compilation date

Up and down arrows may be used to navigate through the menu. Either Enter or right arrow should be pressed to select an option. To confirm a changed parameter press Enter. To cancel a parameter change press left arrow.

All options are identical to the LCD options described in point 3. However two options were added - "Manage remote modem" and "Refresh screen".

4.1.   Manage remote modem

It is possible to manage the remote modem through the DSL line. First the modems must reach the synchronized state. Then after selecting this option modems will establish a connection in so-called Embedded Operations Channel (EOC, separate from the main data channel).

A blinking message will appear on the top of the screen informing that the connection was made. Now all the options on the screen concern the remote modem. They may be changed and stored to the EEPROM.

 The "Manage remote modem" option will change to "Return to local modem". Selecting it will cease the remote management.

4.2.   Refresh screen

When a working converter is connected to the PC's serial port the screen contents may be incomplete - selecting this option or pressing Ctrl+L will refresh the screen.

5.   Technical data

○ processor:
   Motorola MC68302

○ G.shdsl interface:
   connector: RJ-11
   standards: ITU G.991.2 (G.shdsl)
                  ITU G.994.1 (G.hs)
   modulations: TCPAM-32, TCPAM-16, TCPAM-8, TCPAM-4,
                  PAM-16, PAM-8, PAM-4, PAM-2
   throughput: 64 -4664 kbps

○ V.35 interface:
   Winchester 34-pin female connector

○ serial console:
   RS-232, DB9/M connector

○ dimensions:
   200 mm (width) x 45 mm (height) x 130 mm (length)

○ power supply:
   15 V, 230 mA, 3,5W
   external power supply included

○ environmental conditions:
   storage: temperature   -20°C to 65°C
                                 humidity   5 to 95%
   operation: temperature   0°C to 40°C
                                 humidity   0 to 85%

6. Declaration of Conformity

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TAHOE
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50-951 Wroclaw, Poland

We declare that the product Tahoe 635 complies with the regulations of the following European Directives:

- ○ **73/23/EEC**   low voltage safety requirements
- ○ **89/336/EEC**   EMC requirements
- ○ **99/5/EEC**   radio & telecommunication terminal equipment requirements

The compliance of Tahoe 635 with the requirements of the above mentioned directives is ensured by complete application of the following harmonized European Standards:

- ○ **EN 60950:2000**
- ○ **EN 55022:1998**
- ○ **EN 61000-6-1:2002**
- ○ **EN 61000-6-3:2002**

Signed: Piotr Kaczmarzyk
Position: Director

Signature:

Date: 2 Feb 2004
Place: Wroclaw, Poland