

- P1 -

Portable Single Channel RADSL Modem

- for flexible LAN extensions over copper -

Installation and Operation Manual (includes technical specifications : Appendix –B)



Update Note (Aug-02) : all SDSS P1 are shipped with Ethernet management enabled for ease of remote configuration and management (via SNMP) from any user terminal in the P3/P1 network. All P1-L IP address are set to 192.168.1.x (to be 'close' to P3 IP addresses) but can be changed to reflect user network parameters. Note 'Set Default' command will reset this modification.



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1 Overview

We are pleased with your choice of our product **P1'– Portable RADSL Modem** .

These following installation and operation procedures, will enabling you to quickly familiarise with diverse features and advantages of the **P1'Product Family** .

'P1' is an single channel RADSL (Rate Adaptive Digital Subscriber Loop) modem for point-to-point transmission (LAN / ETHERNET extensions) over single copper pair cable. There are two variant of the product; 'P1-H' and 'P1-L'. 'P1' stands for **Portable 1** x Channel modem – H and L indicate **High** speed out and **Low** speed out from either modems respectively. Both modems feature integrated bridge/router functionality. The Ethernet interface for symmetrical UTP cabling (10Base-T) permits the universal connection to an Ethernet LAN or to a PC with Ethernet adapter (see P1 system configuration).

This version is designed for industrial and detence applications, featuring in addition to standard telephone line connectors (RJ-11) spring loaded connectors for the ADSL interface.

P1-H' features main control functions for the DSL transmission system and should be deployed with its opposite model, **'P1-L'** (*these modems always work in pairs*).

In the mainstream direction from 'P1-H' towards 'P1-L' (*subsequently designated as a high-stream direction*), data rates up to max. 8 Mbit/s are achieved. In the opposite direction from 'P1-L' to the 'P1-H' (*subsequently designated as a low-stream direction*) maximum data rates up to 1 Mbit/s is achieved. The distances reach can be up to 5 km.

Option external 'splitter' units are offered for telephony services on the same twisted wire copper line and independently of the data transmission.

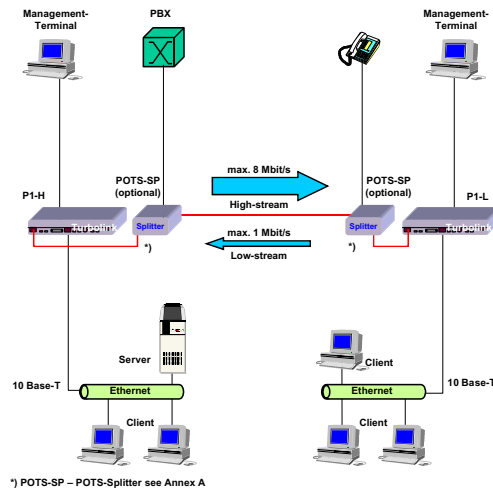


Figure 1: P1 system configuration

2 Feature Overview

2.1 Hardware features

'P1' modem feature RADSL, DMT modulation technology in accordance with the ANSI T1.413 standard (with maximum transmission rates of 8 Mbit/s in mainstream direction (High-stream) and 1Mbit/s in the opposite direction (Low-stream) for a maximum distance reach of about 5 km. Due to the signal/noise ratio the highest possible data rate will be adjusted automatically during the activation procedure.

DMT (discrete multi-tone) modulation scheme offers efficient channel coding algorithms (forward error correction and interleaving) and high resistance against existing interferences (e.g. cross talk, radio interference or impulsive noise interference).

Effectively, the combination of RADSL and DMT technologies in the 'P1' product offers a dependable product that is ideally suited for telecommunications, industrial and military environments.

Note: Special product models are available for military and industrial applications.

2.2 Software features

The System performs transparent Ethernet bridging on MAC layer between Ethernet sub-networks. As an alternative static routing applications are also possible whereas filtering functionality for particular packet formats (e.g. IP) is implemented.

2.3 Configuration and Management

Comprehensive configuration and management options are integrated:

6 light-emitting diodes (LED) indicate all important operating and interface conditions on the 'P1's' front panel.

A RS232 interface provides for additional, expanded configuration and management features, including device's performance statistics. Access to the remote 'P1' unit is provided from one location (*i.e. remote control of the remote modem from one RS232 interface*)

Beyond that, management access is supported via the Ethernet interface for 'P1' modems addressing from any point of a TCP/IP oriented network.

2.4 Mechanical features

The product represents a compact and practical design. 'P1' units can be stacked (on top of each other), used on desks or be wall mounted. A single, custom molded light weight plastic alloy housing design allows all of the above alternatives (see Figure 4).

3 Safety Information

It is recommended to carefully read the following notes before putting units in to operation. This is in the interest of your own safety and for the reliability of the devices.

1. 'P1' modems feature solid state transformers and are operated directly from the AC power, thus minimising need for external power adapters.
Please ensure that AC power plug fits securely into the AC outlet and that the voltage ratings indicated in this manual will correspond to the AC power source (see *Appendix-B*).
2. Do not open the device. There is a risk of electric shock. You should never try to repair the device yourself.
3. Before cleaning a device disconnect the device from the power supply completely. Clean it with dry or moistened cloth.
4. The direct contact with water has to be avoided. Never place the device in a location where the danger exists that water would be able to penetrate into the device.
5. Air vents on the case are used for the ventilation. In order to guarantee trouble-free operation and to prevent internal heat build-up the air vents should not be obstructed.
6. In case of following situations the device has to be disconnected from the power supply and taken to a qualified service engineer for repair:
 - the power cable or connector are worn or damaged.
 - water or other liquids penetrated the device
 - the case is damaged
 - the device shows striking deviations from normal operation

4 Scope of delivery

Packaged 'P1-H' and 'P1-L' units comprises the following components:

- **P1-H'(Id. 299100):**

Component	Number	Description
'P1-H'	1	Modem for transmitting data up to max. 8 Mbit/s and receiving data up to max. 1 Mbit/s
WAN Cable	1	Connecting cable for interconnecting 'P1-H' and TP transmission line with RJ-11 connector at both sides ¹
LAN Cable	1	1:1 connecting cable for interconnecting 'P1-H' and a Ethernet Hub with RJ-45 connector at both sides (black colour)
LAN Crossover Cable	1	Crossover (Patch) cable for interconnecting 'P1-H' and PC with RJ-45 connector at both (grey colour)
Management Cable	1	1:1 connecting cable for interconnecting 'P1-H' and a PC with 9 pin Sub-D male and female connector
Operations Manual	1	This document

¹ If POTS splitter is used for connection between POTS-SP and TP transmission line.

- **P1-L'(Id. 299101):**

Component	Number	Description
'P1-L'	1	Modem for transmitting data up to max. 1 Mbit/s and receiving data up to max. 8 Mbit/s
WAN Cable	1	Connecting cable for interconnecting 'P1-L' and TP transmission line with RJ-11 connector at both sides ¹
LAN Cable	1	1:1 connecting cable for interconnecting 'P1-L' and a Ethernet Hub with RJ-45 connector at both sides (black colour)
LAN Crossover Cable	1	Crossover (Patch) cable for interconnecting 'P1-L' and PC with RJ-45 connector at both (grey colour)
Management Cable	1	1:1 connecting cable for interconnecting 'P1-L' and a PC with 9 pin Sub-D male and female connector
Operations Manual	1	This document

1 If POTS splitter is used for connection between POTS-SP and TP transmission line.

• **POTS-SP (Id. 299108):**

The POTS splitter is delivered as a separate unit without any supplementary parts.

• **Splitter Cable Set (Id. 951529):**

Component	Number	Description
Splitter-Modem Cable	1	Connecting cable for interconnecting POTS-SP and 'P1-H'/ 'P1-L' with RJ-11 and RJ-45 connector
POTS Cable	1	Connecting cable for interconnecting POTS-SP and a phone or phone switch with RJ-11 connector at both sides

5 Operating modes

5.1 Bridging mode

Most popular standard gateway functions for data communication are realised by transparent bridges. Here Ethernet frames not addressed to the local sub-net will be transferred to the corresponding opposite sub-net via the point to point connection. Ethernet frames containing local sub-addressing are registered for cyclic analysis of the source addresses of all transmitted Ethernet frames (principle of self-learning bridge) and will not be sent via the point to point connections.

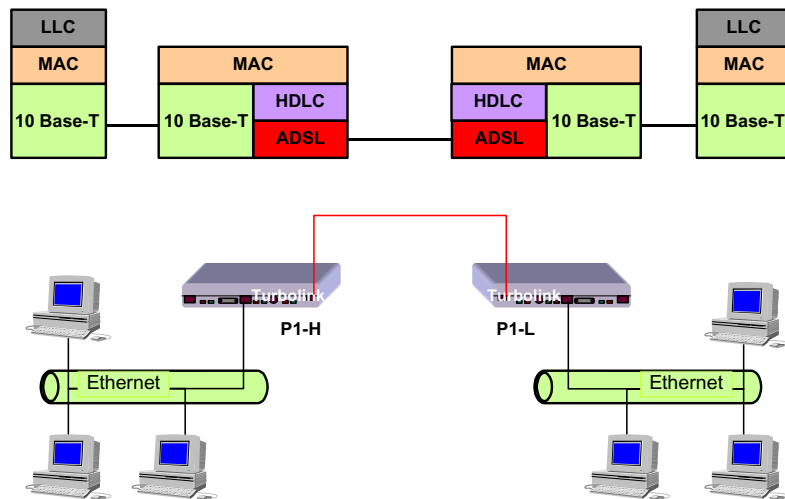


Figure 2: P1 modems in Bridging Mode Configuration

Though in the bridging mode normally no evaluation of IP packets will be performed a specific IP address can be assigned and configured for the management access via the Ethernet interface and can be configured (see section 7.4.6).

5.2 Router operating mode

In addition a static routing mode is implemented besides bridging functionality. In this way filtering of data packets becomes possible on network layer. Filtering criteria are as follows e.g.:

- specific layer 3 packet types (IP, IPX),
- specific IP services (e.g. ftp, telnet, WWW, smtp etc.)
- data packets with specific layer 3 addresses
- data packets whose forwarding is requested by means of existing routing entries

In this way a dedicated configuration of the system and an adaptation to capacity or safety requirements is supported.

The routing function supports data reduction via the point to point link and the realization of a basic firewall functionality.

The current software release provides filtering of the IP packets. The corresponding IP addresses have to be configured via the management interface. Further filtering mechanisms are offered in next releases and can then be loaded and activated by software download.

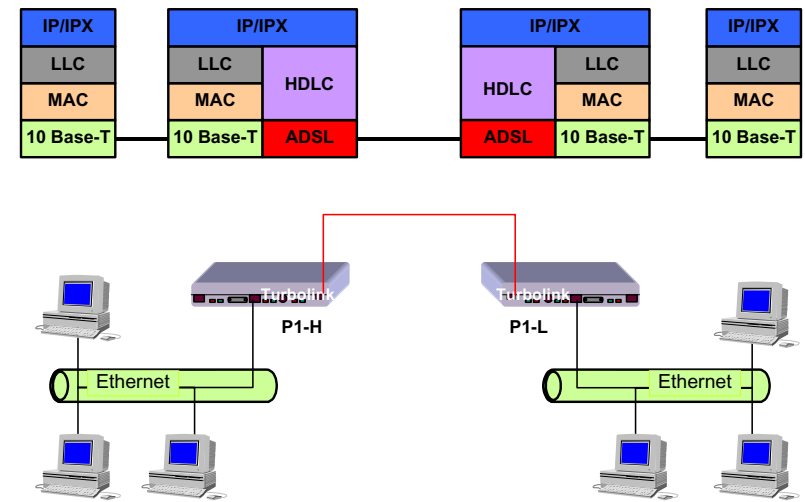


Figure 3: P1 modems in Routing Mode Configuration

6 Installation

6.1 Wall mounting

'P1' modems can be placed on a desktop or operated in a wall mounting environment. Figure 4 shows the mounting options for wall mounting.

You can use for this purpose the bore stencil which is contained within the documentation.

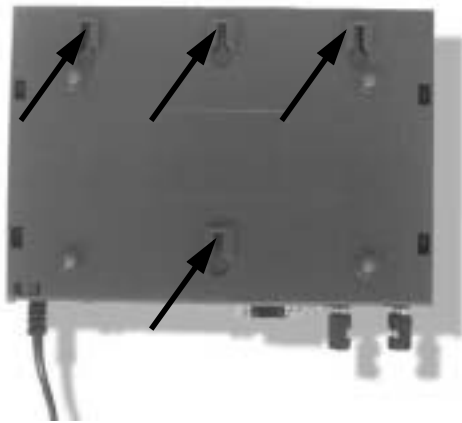


Figure 4: Rear of the device with fixing gadgets

6.2 Connectors Layout

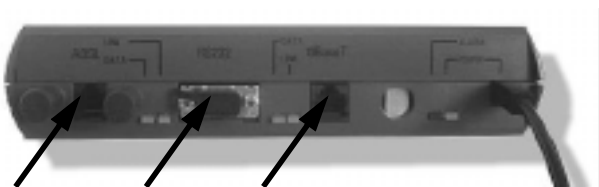


Figure 5: Connectors Layout

Connection options:

- ADSL - RJ-11 socket for twisted wire pair connection
 - spring loaded copper cable connectors ('DON10' type)
- RS232 - Serial interface for local configuration management and monitoring
- 10Base-T - Ethernet UTP - interface (RJ-45 connector)

The device is equipped with a AC power cord for power supply of 180..265 V / 45..55 Hz or 85..153 V / 55..65 Hz.

6.3 Interconnecting the units

The units 'P1-H' and 'P1-L' always have to be used as one pair for establishing a point-to-point connection. The relevant place of location depends on high-stream and low-stream directions accordingly.

The relevant type plate can be seen as a print on the device top face. Apart from that both devices have identical design and the same interfaces.

As an option a POTS splitter unit is available for separation of data and voice band signals.

Caution Please take care that 'P1' unit will always be interconnected only to properly installed mains socket via the power supply cable.

The 10Base-T interface has to be interconnected with a Ethernet Hub via the 1:1 LAN cable (black colour). If a direct connection to a terminal (PC or workstation) shall be established you need to select the LAN crossover cable (grey colour).

No modifications from default configuration have to be made provided that the system will be used in bridging mode which is the default mode. References about the access of the management interface and the configuration of 'P1' units can be found in chapter 7.

• Interconnection with TP transmission line for splitter-less operation:

In the splitter-less operation mode the P1 units have to be interconnected with the transmission line directly via it's ADSL interface and the WAN cable which is part of delivery (see Figure 6).

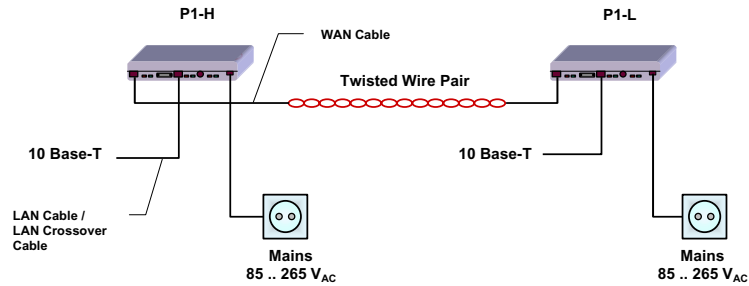


Figure 6: Splitter-less operation

• Interconnection with TP transmission line for operation with splitter:

The following connections have to be established if splitters are used (see Figure 7):

- between 'P1-H'/'P1-L' and POTS-SP (port DSL) via Splitter-Modem cable,
- between POTS-SP (port Line) and TP transmission line via WAN cable,
- between POTS-SP (port Phone) and phone set or phone switch via POTS cable.

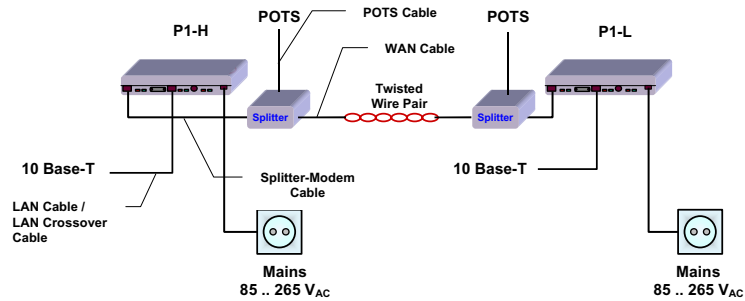


Figure 7: Operation with splitter

6.4 LED Assignment

Designation	Color	Status	Description
POWER	Green	On	Power supply available
		Off	Missing power supply
ALARM	Red	On	Internal system error
		Off	System operational
ETHERNET LINK	Green	On	LAN connectivity exists
		Off	No LAN connectivity
ETHERNET DATA	Yellow	On	Indication of sent or received Ethernet frames
ADSL LINK	Green	On	ADSL connection to remote site available
		Flashing	ADSL initialisation under progress
		Off	No ADSL connection to remote site
ADSL DATA	Yellow	On	Indication of sent or received data packets via the ADSL link

Table 1: Local LED signaling

6.5 Pin connections

• ADSL interface (RJ-11):

Pin assignment of the RJ-11 socket for the twisted wire pair connection of the two-wire communication line is shown in Table 2 and Figure 8 respectively:

Pin	Description
1..2	Not used
3	ADSL (a)
4	ADSL (b)
5..6	Not used

Table 2: Pin assignment of the ADSL interface

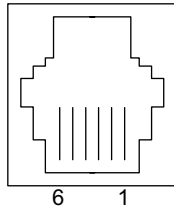


Figure 8: Front view of the RJ-11 socket

Recommended cable type: UTP-3 or higher category (e.g. UTP-5, STP)

• **10Base T interface:**

Pin assignment of the RJ-45 socket for the 10Base-T Ethernet interface connection is shown in Table 3 and Figure 9 respectively:

Pin	Description
1	TX+ (transmit data +)
2	TX- (transmit data -)
3	RX+ (receive data +)
4 .. 5	Not used
6	RX- (receive data -)
7 .. 8	Not used

Table 3: Pin assignment of the 10Base T interface

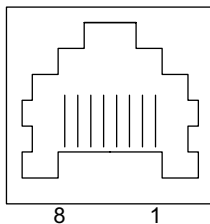


Figure 9: Front view of the RJ-45 socket

Recommended cable type: UTP-3 or higher category (e.g. UTP-5, STP)

The cable cord shall be shorter than 3 m!

• **RS232 interface:**

Pin assignment of the Sub-D jack for connecting a configuration terminal is shown in Table 4 and Figure 10 respectively.

Pin	Description
1,4,6..9	Not used
2	Transmit data
3	Receive data
5	Ground

Table 4: Pin assignment of the RS232 interface

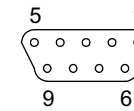


Figure 10: Front view of the RS232 socket

The cable cord shall be shorter than 3 m!

7 Configuration

7.1 Default configuration

'P1-H' and 'P1-L' provide default configurations as shown in Table 6:

Parameter	'P1-H'	'P1-L'
Operating mode	Bridge	Bridge
IP address /sub-net mask of management IP port(operating mode bridge with management IP port)	192.0.0.2 / 255.255.255.0	192.0.0.3 / 255.255.255.0
IP address /sub-net mask of LAN port(operating mode router)	192.0.0.1/ 255.255.255.0	192.0.1.1/ 255.255.255.0

Table 5: Default configuration

Parameter	'P1-H'	'P1-L'
IP address /sub-net mask of WAN port (HDLC)(operating mode router)	192.0.1.1 / 255.255.255.0	192.0.0.1 / 255.255.255.0
RS232 baud rate	38,4 kbits/s	38,4 kbits/s
ADSL configuration parameters(see chapter 8)	Highstream: SNR Margin: 3 dB Interleaver Delay: 0 ms Lowstream: SNR Margin: 2 dB Interleaver Delay: 0 ms	-

Table 5: Default configuration

The system will be operational after all cable connections have been made. Management access for modifications are required only, if

- the operating mode router,
- custom specific configuration optimisation and/or
- monitoring functions

should be performed. Information about parameter settings are described in the following sections.

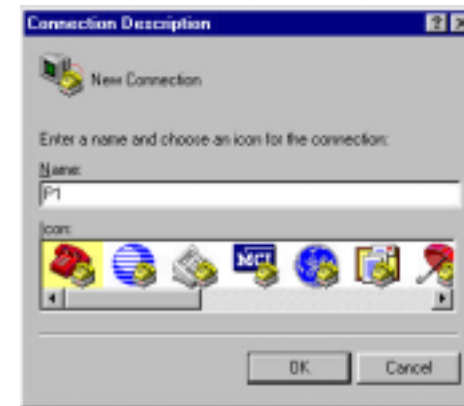
The POTS splitter POTS-SP requires no configuration management.

7.2 Management access via the RS232 interface

In the sequel management access via the serial interface of a Windows based PC is described. Alternatively other terminal types can be utilized as well. Please consult the documentation of the appropriate device in this case.

1. Connect your 'P1-H' and/or 'P1-L' device to the serial PC interface by means of the supplied cable cord.
2. Start the program "Hyper Terminal". You will find this program within the start menu, follow the path "program-accessories-Hyper Terminal"

3. Assign a name to it, e.g. P1!



4. Adjust the correct designation of the serial interface port in case your PC has more than one COM port!



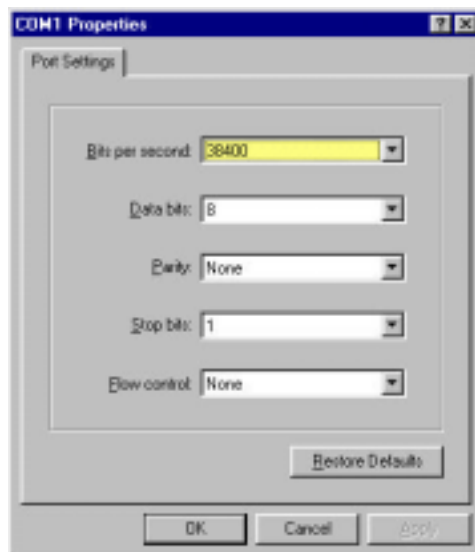
5. For serial data transfer following parameter settings have to be done:

Bits per second: Data rate for serial transfer:
The value has to be within the range of the data rate which was adjusted by 'P1' internally (default condition see section Default configuration). It can be assigned to values between 9600 bits per second and 115200 bits per second. In particular for Software Download functionality a highest possible data rate is recommended.

Data bits: Always utilise value 8 here!

Parity: Check whether "no parity" is set!

- Stop bits: Choose 1 stop bit!
 Flow Control: The option "None" has to be selected.



6. If you press now the enter key, the following command prompt appear at the screen.

- „ADSL-C>“ at P1-H'
- „ADSL-R>“ at P1-L'

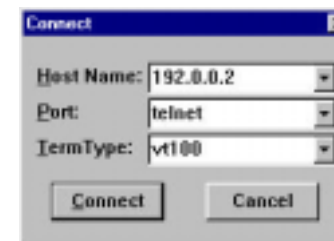
Now you are permitted to perform management transactions as described in section.

7.3 Management access via the Telnet interface

Beside the local management access via the RS232 interface management access to 'P1' can be performed alternatively by management-IP-port access via an Ethernet LAN when operating in mode bridging with management IP port or routing. The following steps are required:

1. Connect the 'P1' modem to the LAN via the Ethernet interface (10Base-T)!
2. Select the program "Telnet" at your PC or at your workstation!
3. Go to menu "connect" and open the window "remote system"!

4. Enter the current IP address of the 'P1' modem for establishing the connectivity:
 - the LAN or WAN port IP address in router mode
 - the management IP port address in bridge mode with management IP port
 Please refer to section Default configuration for default values. Also note that there exists a routing configuration for this node, the IP address of your host belongs to the same IP-sub-net respectively.



5. After display the ADSL-C> and/or ADSL-R> command prompt at the screen, you may perform configuration management of the 'P1' modem.



7.4 Description of management commands

Table 7 contains all available management commands for accessing 'P1' via the RS232 and/or the Telnet interface. Additionally it is shown how the respective command can be used for local management access via the serial or the Telnet connection and for accessing the remote device respectively.

Command	Description	available via RS232	available via Telnet	local applicable	remote applicable
help,?	Overview about commands	J	J	J	J
remote	Remote addressing	J	–	J	–
local	Local addressing	J	–	–	J
version	Display of current version	J	J	J	J
show	Status indication	J	J	J	J
set	Configuration	J	J	J	J
stats	statistics	J	J	J	J
write	Permanent storage of configuration data	J	J	J	J
reboot	New start	J	J	J	J

Table 6: Overview about management commands

Only lower case letters may be used for command input!

7.4.1 Help - Overview about all management commands

The **help** command lists all available management commands. Alternatively this could be done by entering the key question mark ("?").

7.4.2 REMOTE - Access to the remote P1'modem

(Access only available via the RS232 interface)

The **remote** command allows communication with the remote 'P1' modem. Consequently, all subsequent commands will affect the remote site. This is also indicated by an enlarged (bold) font of the character string (**remote**). The command is executed only if the ADSL link is activated. Addressing the local modem again is possible by entering the **local** command. In case of interruption of the ADSL link the local modem will be addressed automatically by executing a next management command.

7.4.3 LOCAL - Access to the local P1'modems

(Access only available via the RS232 interface)

The **local** command causes for accessing the local 'P1' modem provided that addressing to the remote device was selected before.

7.4.4 VERSION - Display of current version (administrative data)

The **version** command displays administrative data:

- Device designation
- Manufacturer
- Software version
- Software release date
- Software version of ADSL firmware

7.4.5 SHOW - Display of Status and Configuration information

The **show** command displays current status, configurations and interface conditions. For selecting particular status and configuration information additional qualifiers have to be selected, which parameters are listed in the sequel. This parameter list will also be displayed in case the **show** command is executed without additional qualifiers.

- ether** Configuration and status information of the Ethernet interface:
- Link (operational status of the Ethernet interface)
 - MAC layer address
 - Operating mode (bridging or routing)
 - IP address (in routing mode only)
 - Subnetmask (in routing mode only)
 - MTU-Size (maximum size of IP packets in bytes / in routing mode only)
- dsl** ADSL configuration and status information:
- actual status of the ADSL link (down, up, activation)
 - actual data rate in kbits/s (High-stream- and Low-stream direction)
 - actual SNR signal noise margin ('P1-H': Low-stream / 'P1-L': High-stream)
 - actual line attenuation ('P1-H': Lowstream / 'P1-L': High-stream)
- Following parameters are only available at the 'P1-H' modem (for High-stream and Low-stream direction)
- Selected SNR signal noise margin in dB
 - Delay caused by the interleaved channel in ms

hdlc	Configuration and status information of the WAN interface: <ul style="list-style-type: none"> - Link (actual operatoin status on the WAN interface) - Operating mode (bridging or routing) - IPAddress (in routing mode only) - Subnetmask (in routing mode only) - MTU-Size (maximum size of IP packets in bytes / in routing mode only) - Default gateway (in routing mode only)
serial	Configuration data about serial interface: <ul style="list-style-type: none"> - Baud rate in kbit/s
mode	Display of the operational mode and of corresponding basic information: <ul style="list-style-type: none"> - Indicating bridging mode (Enabled = Bridge or Disabled = Router) - Availability of the management IPport (in bridging mode only) - Management IP address (in bridging mode only including management IP port) - Management subnetmask (in bridging mode only including management IP port) - MTU size (only in bridging mode including management IP port)
route	Displays static routing entries (operating mode router): <ul style="list-style-type: none"> - IP destination address - sub-net mask of destination network - gateway address

7.4.6 SET -Configuration settings

The **set** command is used for configuration of the 'P1'. For selecting the particular functions additional qualifiers have to be selected, which possible parameter values are listed in the sequel. This parameter list will also be displayed in case the **set** command is executed without additional qualifiers.

ether	Configuration of the Ethernet interface: <ul style="list-style-type: none"> - IP address (in routing mode only) - Subnetmask (in routing mode only)
dsl	ADSL configuration settings (only possible at 'P1-H' modem): Separate for Highstream- and Lowstream directions: <ul style="list-style-type: none"> - Target SNR signal noise margin - Delay caused be interleaved channel in msec (recommended values see chapter 8)
hdlc	Configuration settings of the WAN interface (in routing mode only) <ul style="list-style-type: none"> - IPAddress - Subnetmask - MTU-Size (maximum size of IP packets in bytes) - Default gateway
serial	Configuration attitude of the serial interface: <ul style="list-style-type: none"> - Baud rate in kbits/s: 9600, 19200, 38400, 57600, 115200

Caution	Before changing the baudrate check whether this baudrate will be supported by your PC or Terminal respectively, otherwise the management access via the RS232 interface will be interrupted!
mode	Selection of operating mode and corresponding basic information: <ul style="list-style-type: none"> - Selection of bridging mode (Enable = Bridge or Disable = Router) - Availability of the management port (in bridging mode only) - Management IPAddress (only in bridging mode including management IP port) - Management subnetmask (only in bridging mode including management IP port)
route	Entry of static routing settings (operating mode router): <ul style="list-style-type: none"> - IP destination address - Destination subnetwork mask - Gateway address
defaults	Resetting of all configuration parameters to standard values (default values when delivered)

7.4.7 STATS - Display of statistics

The **stats** command displays the actual counter value of different data for valuation of data transmission capabilities and performance. For selecting the particular statistic information additional qualifiers have to be selected, which possible parameter values are listed below. This parameter list will also be displayed in case the **set** command is executed without additional qualifiers.

ether	Statistic data about the Ethernet interface: <ul style="list-style-type: none"> Receiver: <ul style="list-style-type: none"> - Number of received Ethernet frames - Number of received bytes - Total number receive errors - Number of received buffer overflows Transmission path: <ul style="list-style-type: none"> - Number of sent Ethernet frames - Number of sent bytes - Total number transmission errors - Number of send buffer overflows
dsl	ADSL statistical information: <ul style="list-style-type: none"> - Number of sent blocks - Number of received blocks - Number of corrected received blocks - Number of non correctable received blocks - Number of the re-initialisation procedures since system start

hdlc Statistical information of the WAN interface:

Receiving path:

- Number of received HDLC frames
- Number of received bytes
- Total number receive errors
- Number of received buffer overflows

Transmission path:

- Number of sent HDLC frames
- Number of sent bytes
- Total number transmission errors
- Number of send buffer overflows

7.4.8 WRITE - Permanent retention of configuration data

The `write` command stores current system configuration into the non-volatile memory to be reused by a new system start. Therefore all configuration modifications have to be executed by the `write` command before running a new system start provided that the configuration data shall be stored permanently.

7.4.9 REBOOT - Restart of the modem

The `reboot` command performs a restart of the local or remote modem. In case of reset the remote modem the remote access will be disrupted in the first instance so that the prompt command will be changed to "local". After approx. 10 seconds, the user can establish the remote access again by entering the command `remote`.

7.5 Software Download

The software download function serves for updating the 'P1' software, e.g. if new features become available.

To carry out this function the following steps have to be done:

1. Getting the TFTP server software and the 'P1' software image

The following files are required:

- PUMPKIN.EXE (contains installation software for TFTP server)
- 'P1' software image which is valid for both 'P1-H' and 'P1-L' units (file name is dependent on version)

Please contact your distributor or the manufacturer. They will inform you about new software releases and provide you with the latest version.

2. Installing the TFTP server

Please run the program PUMPKIN.EXE. This will install the TFTP server on your computer. You may select the destination directory during installation procedure.

3. Software Download from TFTP server to 'P1' units

Please start the TFTP server via the start menu ("Programs – Accessories - Klever Co - Pumpkin").

After the program window appeared on your screen, please select the menu "Options" and enter the directory of the 'P1' software image. Furthermore you need to choose the option "Give all files" within the group "Read behaviour".

Now you have to establish a connection between your computer and 'P1' via RS323 interface cable. Start the terminal program as described in section Management access via the RS232 interface and call the command `reboot`. Please press an arbitrary key within 2 seconds when you are asked to branch into the boot monitor after restart. Here you have to choose the menu "Software-Update (Flash) via TFTP".

Now you will be asked for some values relating to the necessary Ethernet connection between 'P1' and your computer.

- IP address for the 'P1' modem
- Subnet mask for the 'P1' modem
- Default gateway (optional, only required if TFTP server and 'P1' unit belong to different subnetworks)
- IP address of your computer containing the TFTP server

Finally you have to enter the file name of the 'P1' software image.

When the download has been finished the 'P1' unit will perform an automatic restart with the new software version. You may now quit the TFTP server or continue software download with further units.

Note: If the download could not be completed successfully e.g. because of power fail or Telnet link disconnection, you will always be able to repeat the software download by calling the boot manager again after restart.

8 System performance

The 'P1' modems adapt the maximum possible data rate depending on the conditions of the physical link. The attainable data rate is determined by following factors:

- Diameter and length of the twisted pair line,
- External interference (impulsive noise, radio interference, cross talk cause by adjacent lines).

For each transmission direction the automatic activation procedure of the ADSL-System adapts the highest possible data rate which can be achieved by keeping a determined signal/noise ratio. Decreasing the signal/noise ratio results in higher data rate, in that case this configuration can be used for bandwidth consuming services which are more tolerant concerning transmission errors (e.g. video services). Vice versa increasing the signal/noise ratio results in improving of transmission quality by reducing the data rate. This mode will be recommended for e. g. file transfer applications.

In Table 8 possible values for selecting the signal/noise ratio are shown:

	Bandwidth consuming applications tolerating faults	Applications without tolerating faults
Highstream direction (at data rates \geq 4 Mbit/s)	3 dB	> 3 dB
Highstream direction (at data rates < 4 Mbit/s)	4..6 dB	> 6 dB
Lowstream direction (at data rates \geq 320 kbits/s)	2 dB	> 2 dB
Lowstream direction (at data rates < 320 kbits/s)	3..6 dB	> 6 dB

Table 7: Optimization of signal/noise ratio

Interleave channel delay will be an additional parameter for performance optimization. By means of temporal nesting the data to be transmitted in combination with internally error correction error bursts of up to 500 μ sec can be corrected. This results into an additional delay of data transfer for up to 16 msec for each transmission direction. The optimal configuration can be achieved by selecting a maximal possible interleave channel delay in relation to a permissible delay of the application or higher level protocols respectively.

In Table 9 possible values for these parameter settings are given:

	Interleave channel delay [msec]	Acceptable burst [μ sec]
Highstream direction	0	8
	0,5	16
	1	32
	2	64
	4	128
	8	256
	16	512
Highstream direction (at data rates \geq 320 kbits/s)	0	8
	1	32
	4	128
	16	512
Lowstream direction (at data rates \geq 320 kbits/s)	0	8

Table 8: Optimization of interleave channel delay

Selection of these ADSL configuration parameters via the management system is explained in section 7.4.6 in more detail (for default values refer to section 7.1)

Annex A POTS Splitter

A.1 Introduction

The POTS Splitter (POTS-SP) is utilized in case the twisted wire pair should be used simultaneously for telephone service in addition to data transmission. It prevents mutual interference of ADSL- and voice band signals.

For a point-to-point connection the POTS-SP has to be inserted at both ends of the transmission link, therefore it is required in total twice.

A.2 Construction and connector arrangements

The POTS splitter is housed in an epoxy case, and can be placed on a table or can be mounted at a wall.

Interfaces:

- Line - RJ-11 socket for connecting the twisted wire transmission link
- DSL - RJ-45 socket for connecting 'P1-H' or 'P1-L' respectively
- POTS - RJ-45 socket for connecting a phone set or PBX

A.3 Pin connections

• Line interface:

Pin assignment of the RJ-11 socket for connecting the twisted-pair transmission link is shown in Table 10 and Figure 11:

Pin	Description
1..2	Not used
3	Twisted Pair (a)
4	Twisted Pair (b)
5..6	Not used

Table 9: Pin assignment of the line interface

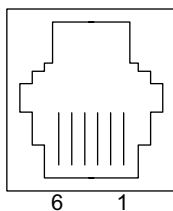


Figure 11: Front view of the RJ-11 socket

• **POTS interface:**

Pin assignment of the RJ-11 socket for connecting a phone set or a PBX (private branch exchange) is shown in Table 10 and Figure 11

Pin	Description
1,2	Not used
3	POTS (a)
4	POTS (b)
5,6	Not used

Table 10: Pin assignment of the POTS interface

• **DSL interface:**

Pin assignment of the RJ-45 socket for connecting 'P1-H' or 'P1-L' is shown in Table 11 and Figure 12:

Pin	Description
1..3	Not used
4	DSL (a)
5	DSL (b)
6..8	Not used

Table 11: Pin assignment of the ADSL interface

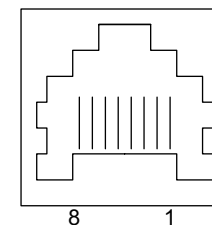


Figure 12: Front view of the RJ-45 socket

Recommended cable type: UTP-3 or higher category (e.g. UTP-5, STP)

Annex B P1 Product Specifications

B.1 P1-H'and P1-L'

• **ADSL interface:**

(compatible with ANSI T1.413, Issue 2)

Type of interface:	two-wire (twisted pair)
Connector type:	RJ-11 spring loaded copper cable connectors ('DON10' type)
Line code:	Discrete Multitone (DMT) / Frequency Division Multiplexing FDM)
Transmit data rates:	up to 8 Mbit/s ('P1-H') up to 1 Mbit/s ('P1-L')
Distance:	up to 5 km
Cable type:	Symmetrical twisted wire copper pair cable unshielded or shielded (e.g. 0,4 mm diameter)

• **Ethernet interface:**

(compatible with IEEE 802.3)

Connector type:	10Base-T
Connector type:	RJ-45
Distance:	patch cable < 3 m
Cable type:	UTP-3 or enhanced quality (e.g. UTP-5, STP)

- **RS232 interface:**

Connector type: Sub-D, 9 pins
 Baud rate: 9,6 kbits/s to 115 kbits/s
 (default set to 38,4 kbits/s)
 Distance: < 3 m
 Data format: 10 Bit:
 Start bit
 8 Data bits
 1 Stop bit

- **Power supply:**

Power source: 180 to 265 VAC / 45 to 55 Hz
 85 to 153 VAC / 55 to 65 Hz
 Current: maximum 80 mA (at 230 VAC)
 Connector type: according to Australian Standart AS 3112

- **Protocols:**

- MAC-bridging (self-learning, aging)
- static IP routing
- ARP, TCP, UDP, Telnet, TFTP
- HDLC-Encapsulation

- **Diagnostics and management:**

- Local status LEDs (power, alarm, Ethernet link/data, ADSL link/data)
- Internal self-testing capabilities
- Menu driven terminal interface via RS232 and Telnet
- Internal management channel for access to remote side

- **Mechanical data:**

Size: 45 mm x 215 mm x 155 mm
 (height x width x depth)
 Weight: 600 g

B.2 POTS-SP

- **Line interface:**

Connector type: RJ-11

- **Telephone interface:**

Connector type: RJ-11
 Frequency range: 300 Hz..3,4 kHz

Reference impedance: 600Ω

- **ADSL interface:**

Connector type: RJ-45

- **Mechanical data:**

Size: 27 mm x 71 mm x 83 mm
 (height x width x length)

Weight: 120 g

B.3 Environmental conditions

Safety: according CENELEC EN 60950

EMC: according CENELEC EN 50082-1, EN 55022

Climatical conditions:

	Reference	Class	Temperature	Rel. Humidity
Storage	ETSI ETS 300019-1-1	1.1	-5..45 °C	5..95 %
Transport	ETSI ETS 300019-1-2	2.3	-40..70 °C	< 95 %
Operation	ETSI ETS 300019-1-3	3.1	5..40 °C	5..85 %

(Information on compatibility with further standards on request)