Keep in shape with

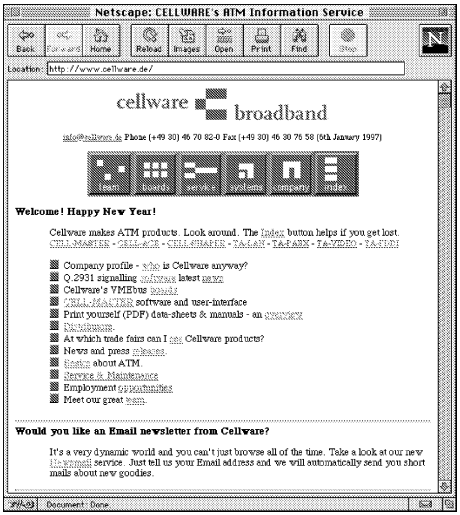
CELL-SHAPER

CONTENTS

ALTERNATIVE MANUAL - FOREWORD

One of the problems with documenting innovative technology is the constant improvements which are associated with innovation. As soon as the new manual comes off of the press, it is out of date.

One interesting alternative here is to use the Internet. As an experiment, Cellware has put this manual onto the World Wide Web. We are interested to see if this approach to documentation improves the situation. Let us know what you think, but first take a look.



The entrance to the Web server is at ***http://www.cellware.de***

INTRODUCTION

What is a CELL-SHAPER?

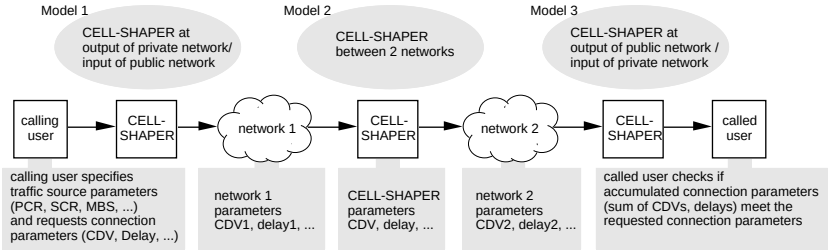
First of all, a little explanation is required about the process of setting up an ATM connection.

To make an ATM connection

The calling party sends a request to the network specifying the parameters of the traffic it wants to send (QOS, PCR, SCR, MBS, ...) and the parameters for the required connection (Destination, CDV, delay,...)

The network then has to check if there is a path to the destination, and if the requested connection quality can be provided. The request will be refused if the parameters cannot be met.

Where can CELL-SHAPER operate? - At 3 points in the network



CELL-SHAPER can influence CTD (Cell Transmission Delay) and CDV Cell Delay Variation). Thus the simplified model above only includes these.

The process of determining if the required connection parameters can be met consists of an accumulation of the several cell delays and cell delay variations along the path. The sum of both is then checked against the requested parameters. Only if both parameters can be met, can the connection be set up.

CELL-SHAPER improves CDV

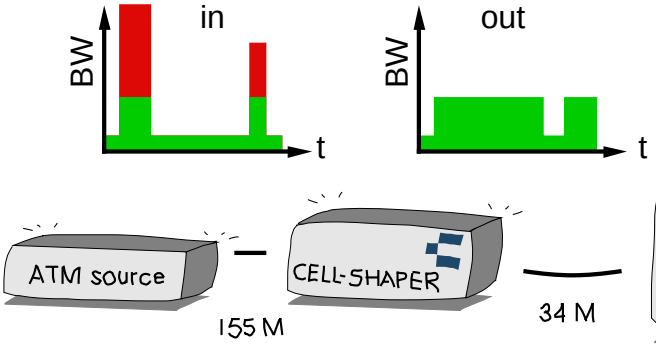
The main sources of CTD and CDV are switches, access concentrators etc. To cope with high values of CDV, a network operator has to assign more bandwidth than really needed, wasting resources and increasing cost.

This is where CELL-SHAPER comes in. Its job is to trade off CTD against CDV. More exactly - more Cell Transmission Delay (CTD) for less Cell Delay Variation (CDV).

Connections which have to be rejected without CELL-SHAPER may be possible with it.

CELL-SHAPER reduces Peak-Cell-Rate

In this scenario, an ATM product is to be attached to a public ATM network.



Traffic shaping (BW - bandwidth, t - time)

The traffic peaks are smoothed away by the CELL-SHAPER so as to prevent the Cross-Connect from discarding them.

CELL-SHAPER keeps the traffic policeman happy

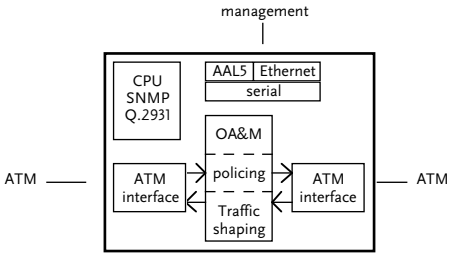
At the input of a public ATM switch (cross connect), the parameters used (PCR, SCR and MBS) will be policed, to check if the contract negotiated initially is being held. Sanctions for breaking the contract will include cells being discarded.

Traffic shaping can thus prevent lost cells, prevent repeats and save money. With shaped traffic you can use a lower maximum bit-rate through the network which is then cheaper!

CELL-SHAPER provides Operations Administration & Maintenance

OA&M cells are used to check an ATM connection for example by looping, to ensure that both cables are intact and carrying cells. OA&M cells are kept separate from the traffic measurement and shaping process in CELL-SHAPER so as not to "steal" bandwidth.

CELL-SHAPER internal detail



Complex block diagram of CELL-SHAPER

Traffic shaping is a service provided by the CELL-BUFF-VME board, which acts as a first in first out (FIFO) buffer for up to 1024 virtual ATM connections. 16 queues are supported. Each queue can be configured for a particular bit-rate, matching the bandwidth negotiated through a public ATM connection.

The flow of ATM cells through each connection is regulated so as to stay within the agreed limits. Short bursts of data are buffered on the board and then released at a controlled rate using a so-called "leaky-bucket" mechanism.

The parameters used are peak cell rate (PCR), sustainable cell rate (SCR) and maximum burst size (MBS). The use of the CLP bit can be supported.

CELL-SHAPER buffer size

SIMMs (socketed memory modules) are used for the buffer memory, so the buffer size is configurable up to 2 Mbyte. A maximum of 1024 connections can be handled within 16 queues. 2048 cells can be buffered for each VC or bundle of VCs. The maximum burst size ranges from 1 to 255 cells.

CELL-SHAPER parameters (Mar 97)

1 leaky bucket per queue

16 queues 

2048 ATM cells per queue

granularity 128 cells/second for line bit-rates up to 155 Mbit/s
32 cells/second for line interfaces up to 42 Mbit/s
8 cells/second for line interfaces up to 10.5 Mbit/s
2 cells/second for line interfaces up to 2.625 Mbit/s

3 priorities
1 x high priority queue for "well shaped connection" (e.g. CBR)
14 x queues for VBR
1 x low priority queue for "best effort traffic"

1 additional leaky bucket per physical interface 

Improvements to CELL-SHAPER parameters

Work is progressing on this unit (which can be easily updated in the field) to provide the following

dual leaky bucket per queue

16 queues

2048 ATM cells per queue

granularity 2 cells/second

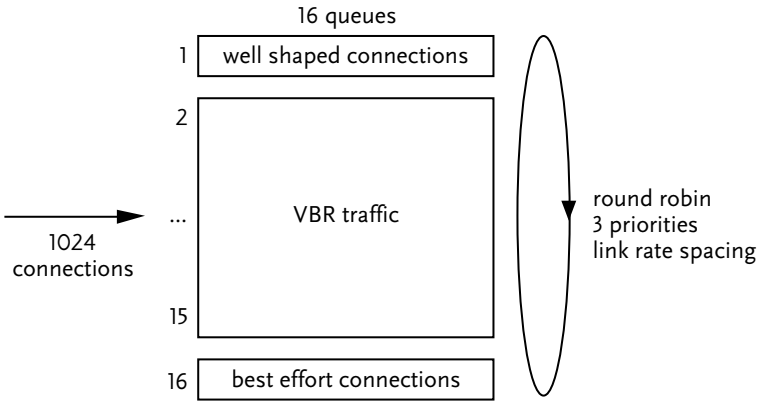
3 priorities

early packet discard

partial packet discard

EFCI (for ABR)

CELL-SHAPER queuing mechanism



CELL-SHAPER management

The CELL-SHAPER is configurable
locally, using a simple VT100 terminal
remotely, using TELNET
remotely, via SNMP

CELL-SHAPER's SNMP agent can be accessed
via the single Ethernet interface
"in-band" via a dedicated ATM channel using AAL5

Local configuration is menu driven, the CELL-SCREEN program running within CELL-SHAPER. CELL-SHAPER supports SNMP (Simple Network Management Protocol) and maintains a Management Information Base (MIB) for all relevant configuration data and statistics.

CELL-SHAPER signaling

Currently (1Q97) PVCs (permanent virtual circuits) must be configured for CELL-SHAPER. If required Q.2931 signalling and thus SVCs, (switched virtual circuits) could also be supplied for CELL-SHAPER. Q.2931 user side software is a CELLWARE product and has been available since 1994.

CELL-SHAPER mechanical

Dimensions: (W) 48 x (D) 31 x (H) 14 cm. 19 inch rack mounting

CELL-SHAPER electrical

Preconfigured at Cellware - Supply voltage either 90-132V (60Hz) or 184-265V (50Hz). Power consumption: 150 W max.

CELL-SHAPER QUICK START

This is meant to get you started as quickly as possible with your new CELL-SHAPER. If you can't follow this, try a slow start by reading the rest of the manual.

1. Connect to the CELL-SHAPER using a local terminal

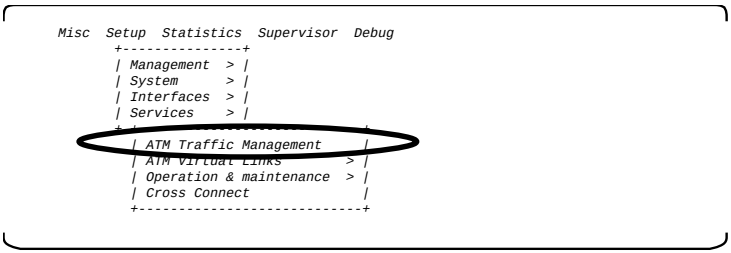
VT100 compatible - fixed configuration.

Speed	*19 200 Baud*
Data bits	*8*
Parity	*none*
Stop bits	*1*
(8N1)	
Required signals	*TXD (pin 2), RXD (pin 3), GND (pin 7)*
Protocol	*XON/XOFF*

The initial password is ***public***

2. Create a new ATM Descriptor for VBR or CBR traffic

For each traffic descriptor you can define the Peak Cell Rate (PCR), the Sustainable Cell Rate (SCR) and the Maximum Burst Size (MBS).



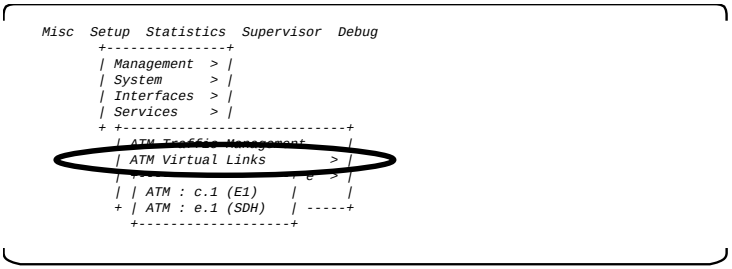

```
+------------------- ATM Traffic Descriptor Table --------------------+
|   Id  Type  Mux    PCR      SCR      MBS      Annotation   Used #n  |
|                                                                     |
|    1  NONE  YES  - n a -  - n a -  - n a -     best effort      6   |
|    2   NIL   NO        0  - n a -  - n a -      no traffic      0   |
|    3   VBR   NO     4518     3000        2    user defined      0   |
|                                                                     |
|  [Add VBR]    [Add CBR]    [Delete]                      >[Close]< |
+---------------------------------------------------------------------+
```

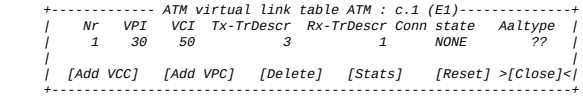
Example for an ATM traffic descriptor:

Id=3, Type=VBR, PCR=4518, SCR=3000, MBS=2

3. Add a virtual link to both ATM interfaces

(Applying a traffic descriptor to the ATM interface on the network side.)

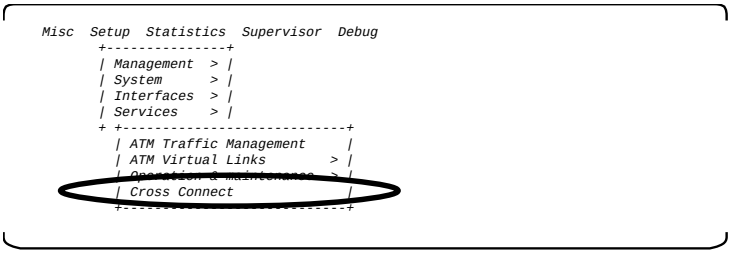


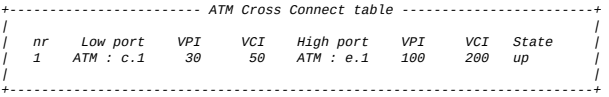


Example of an ATM virtual link:

The ATM interface in port c transceives with the VPI=30 VCI=50 and shapes the traffic as defined in the descriptor no. 3

4. Connect the two ATM interfaces via a Cross Connection





Example for a cross connection between the ATM interface in port c.1 with a VPI/VCI=30/50 and the ATM interface in port e.1 with the VPI/VCI=100/200.

ATM INTERFACES

This chapter helps you to choose an ATM interface. These are all "standardised" interfaces. The details have been agreed by the CCITT (ITU-T) and/or by the ATM Forum so that equipment from different manufacturers will be compatible.

The interesting differences concern speed and whether copper cable or optical fibre is used. ATM is a scalable technology. This means that ATM at 1.5 Mbit/s uses the same cells as ATM at 155 Mbit/s. The uninteresting differences include things like framing, which is a non-ATM overhead for certain types of interfaces e.g. SDH.

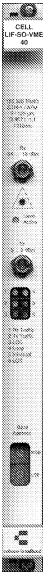
This chapter only lists the physical and electrical characteristics of each type of interface. This is a guide to help you to select the right type of cabling and the right connectors. Incidentally, you may know that one Ethernet cable can be shared by lots of users. ATM links may not be shared, they are always point to point. This is a fundamental characteristic of ATM.

The following ATM interfaces can currently be fitted:

part no.	name	bit-rate	cell-rate	≈ range
120-017	CELL-LIF-SO-VME-40	155 Mbit	353 207	40 000m
120-011	CELL-LIF-SO-VME-15	155 Mbit	353 207	15 000m
120-013	CELL-LIF-SO-VME-2	155 Mbit	353 207	2 000m
120-002	CELL-LIF-SE-VME	155 Mbit	353 207	300m
120-008	CELL-LIF-FO-VME	100 Mbit	235 489	2 000m
120-015	CELL-LIF-DS3-VME	45 Mbit	104 268	150m
120-009	CELL-LIF-E3-VME	34 Mbit	80 000	300m
125-021	CELL-LIF25-VME	25Mbit	60 377	300m
120-018	CELL-LIF-J2-VME	6 Mbit	14 490	300m
120-012	CELL-LIF-E1-VME	2 Mbit	4 528	200m
120-014	CELL-LIF-DS1-VME	1.5 Mbit	3 622	200m

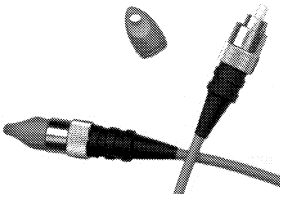
Each interface is now covered in turn. Please note that the range mentioned is for your guidance only. If the exact range is important, you must work out a power budget for your installation.

155 Mbit/s monomode (SDH/SONET) ATM interface - long haul



CELL-LIF-SO-VME-40

The interface complies with CCITT G.957-L1.1, long haul using 1310 nm fibre. It is suitable for 9/125µm monomode fibre (the receiver module has 50/125µm pigtail, thus ensuring compatibility to mono and multimode systems.)



155.520 Mbit/s ±20ppm, NRZ line coding
353 207 cells per second, 53 byte ATM cells in STM-1/STS3c structure

Centre wavelength	1280 nm min. 1335nm max.
rms spectral width	4nm max.
Laser output power	-5dBm min. 0 dBm max.
Input sensitivity	-34dBm min.
Optical path penalty	1 dBm max.
Input saturation level	-8dBm min.

Connectors - FC/PC

The unit has two FC/PC connectors. The outer sleeve on the flying cable must be screwed to the unit for reliable operation.

Distances

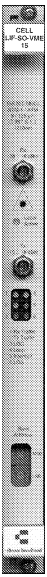
Minimum cable length. Note that a transmission loss of at least 8 dBm is required to prevent the input from being overloaded. If you loop input to output of this module - it won't work!

The maximum cable length depends on the power budget of the end to end configuration. Using monomode fibre, 40 km is typical. The TX power ranges from -0 to -5 dBm and the receiver sensitivity from -34 dBm. The worst case is 28dBm (1dBm optical path penalty) available to compensate for transmission losses - e.g. fibre loss per km, loss due to splices and loss due to connectors.

Abbreviations

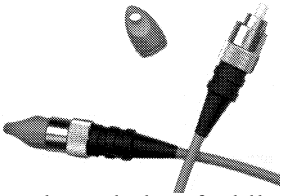
LOC - loss of cell synchronisation LOS - loss of signal TX - transmit, RX - receive

155 Mbit/s monomode (SDH/SONET) ATM interface - short haul



CELL-LIF-SO-VME-15

Physical /optical characteristics of digital interfaces to CCITT G.957-S1.1, interoffice / short haul using 1310 nm fibre. Optical interface for 9/125µm monomode fibre (the receiver module has 50/125µm pigtail, thus ensuring compatibility to mono and multimode systems.)



155.520 Mbit/s ±20ppm, NRZ line coding
353 207 cells per second, 53 byte ATM cells in STM-1/STS3c structure

Centre wavelength	1260 nm min. 1360nm max.
rms spectral width	7.7nm max.
Laser output power	-15dBm min. -8.0 dBm max.
Input sensitivity	-28dBm min.
Optical path penalty	1 dBm max.
Input saturation level	-8dBm min.

Connectors - FC/PC

The unit has two FC/PC connectors. The outer sleeve on the flying cable must be screwed to the unit for reliable operation.

Distances

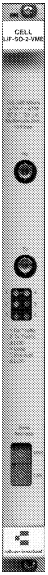
The minimum cable length is zero.

The maximum cable length depends on the power budget of the end to end configuration. Using monomode fibre, 15 km is a typical value. The TX power ranges from -8 to -15 dBm and the receiver sensitivity from -28 dBm. This results in a worst case of 12dBm (1dBm optical path penalty) available to compensate for transmission losses - e.g. fibre loss per km, loss due to splices and loss due to connectors. Please calculate your own power budget to see what range is achievable in your installation.

Abbreviations

LOC - loss of cell synchronisation LOS - loss of signal TX - transmit, RX - receive

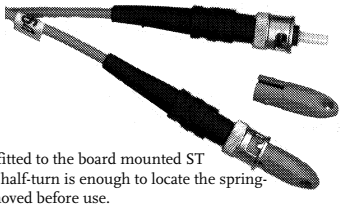
155 Mbit/s multimode (SDH/SONET) ATM interface - local



CELL-LIF-SO-VME-2

353 207 cells per second, 53 byte ATM cells in STM-1/STS3c structure
155.520 Mbit/s ±20ppm, NRZ line coding
Optical interface for 62.5/125µm multimode fibre

Centre wavelength	1260 nm min. 1380nm max.
LED output power	-19dBm min. -14.0 dBm max.
Input sensitivity	-31dBm min.
Input saturation level	-14dBm min.



Connectors - ST

The unit has two ST connectors. Each cable connector should be fitted to the board mounted ST connectors. These use the so-called bayonet mechanism, where a half-turn is enough to locate the spring-loaded retaining mechanism. Any plastic dust caps have to be removed before use.

Distances

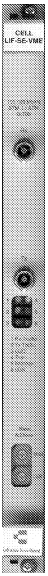
The minimum cable length is zero. Be aware that if a third party unit delivers more than -14dBm at the input, this will overload the input and no transmission will be possible.

The maximum cable length is set by the optical dispersion and the attenuation caused by loss in the fibre, connectors etc. With CELLWARE products at both ends, you have a start of life optical power budget of 12dBm. A typical 62.5/125 multimode fibre will offer less than 1 dB/km, but multimode transmission suffers from signal "smearing" over longer distances. For distances over 2km, consider using monomode transmission.

Abbreviations

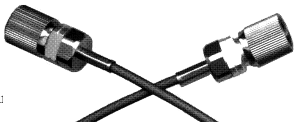
LOC - loss of cell synchronisation LOS - loss of signal TX - transmit, RX - receive

155 Mbit/s electrical, G.703 (SDH) ATM interface



CELL-LIF-SE-VME

353 207 cells per second, 53 byte ATM cells in STM-1/STS3c structure
155.520 Mbit/s ±20ppm, CMI line coding
G.703 electrical (twin 75Ω coaxial cables)



Connectors

DIN 47295 {1,6/5,6 mS (75Ω) The CELL-LIF-SE-VME has two coaxial connectors. Each cable connector should be screwed to the board mou DIN47295 connectors.

Distances

Achievable distances depend on the cable quality. The updated specification in G.703 says "...The attenuation of the coaxial pair should be assumed to follow an approximate root-f law and to have a maximum insertion loss of 12.7 dB at a frequency of 78 MHz.."

With a good cable, you may reach up to 200 metres. It all depends on the cable. Good cables are stiff and expensive. Note that the larger diameter cables may not fit directly into the required DIN 47295 connectors. Try and avoid complex cables with too many connections. Each connection will present a discontinuity in the characteristic impedance of the link and will reduce the useful distance.

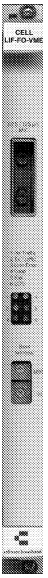
Earthing

The connectors are bonded to the front panel and thus to the housing when properly installed. This is necessary to minimise radiation from the very fast components in this unit.

Abbreviations

LOC - loss of cell synchronisation LOS - loss of signal TX - transmit RX - receive

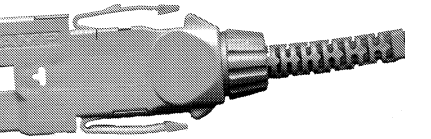
100 Mbit/s (TAXI) ATM interface



CELL-LIF-FO-VME

235 849 cells per second
100 Mbit/s ±20ppm (125 MBaud line rate) 62.5/125 µm multimode fibre 4B/5B line coding, based on ANSI X3T9.5 code used for FDDI

Centre wavelength	1270nm min.	1380nm max.
LED output power SOL	-18.5dBm min.	-14dBm max.
(allow a reduction of 1.5dB over 100 000 hours lifetime)		
Input sensitivity	-31dBm min.	
Input saturation level	-14dBm min.	



Connectors

MIC duplex connector as specified in ISO DIS9314-3. Note that an adapter cable is available from MIC to ST. The ST connector is simplex, one is required for each direction.

Distances

Achievable distances depend on the fibre quality. Multimode fibre causes dispersion of the signal. The fibre bandwidth should be such that a 5ms exit response time is achieved after 2km fibre. CELLWARE does not recommend ranges greater than 2km.

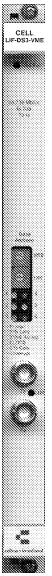
The minimum cable length is zero, if connected to another CELLWARE unit. Be aware that if a third party unit delivers more than -14dBm at the input, this will overload the input and no transmission will be possible.

The maximum cable length depends on the fibre quality, connector loss etc. With CELLWARE products at both ends, you have a start of life optical power budget of 12.5dBm. A typical 62.5/125 multimode fibre will offer less than 1 dB/km, but multimode transmission suffers from signal "smearing" over longer distances. For distances > 2km, consider monomode.

Abbreviations

LOS - loss of signal TX - transmit RX - receive

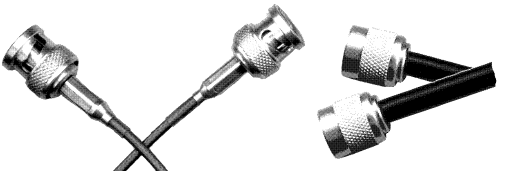
45 Mbit/s (DS3) ATM interface



CELL-LIF-DS3-VME

approx. 104 268 cells per second (Direct cell mapping. Framing to ITU-T G.804/G.832)
approx. 95 880 cells per second (Framing (PLCP) to ANSI TA-TSY-00773 (option))
44.736 Mbit/s ±20ppm, B3ZS line coding
G.703 electrical (twin 75Ω coaxial cables)
C-bit parity default, M23 option

Connectors



Either BNC or TNC

Distances

Achievable distances depend on the cable quality. A programmable line build out circuit (LBO) at the transmitter can be set by user selectable options to "0-225 ft" or "greater than 225 ft". When properly set, the shape of the transmitted signal through any cable length of 0 to 450 feet complies with the published templates of ANSI T1.102-1987.

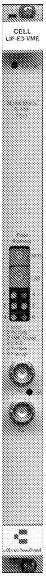
Earthing

The connectors are bonded to the front panel and thus to the housing when properly installed. This is necessary to minimise radiation from the very fast components in this unit.

Abbreviations

LOCD - loss of cell delineation LOS - loss of signal TX - transmit RX - receive

34.688 Mbit/s (E3) ATM interface



CELL-LIF-E3-VME

approx. 80 000 cells per second (53 byte ATM cells framed to ETS 300 337 (G.804/G.832))
approx. 71 594 cells per second (53 byte ATM cells framed to ETS 300 214 (PLCP))
34.368 Mbit/s ±20ppm, HDB3 line coding
G.703 electrical (twin 75Ω coaxial cables)

Connectors

Either BNC or DIN 47295 {1,6/5,6 mS (75 Ω)}.

Distances

Achievable distances depend on the cable quality. The G.703 specification says "...The attenuation of this cable shall be assumed to follow approximately a root f law and the loss at a frequency of 17 184 kHz shall be in the range 0 to 12 dB...". Using RG-59B/U cable, typically 200 metres will be achievable. It all depends on the cable. Good cables are stiff and expensive.

Earthing

The connectors are bonded to the front panel and thus to the housing when properly installed. This is necessary to minimise radiation from the very fast components in this unit.

Abbreviations

LOCD - loss of cell delineation LOS - loss of signal TX - transmit RX - receive

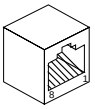
25 Mbit/s ATM interface

CELL-6LIF25-VME

approx 60 377 cells per second (53 byte ATM cells)
Physical /electrical characteristics to ATM Forum specification af-phy-0040.000 from November 7, 1995
25.6 Mbps ± 100 ppm full duplex (results in a 32 Mbaud line symbol rate after 4B5B encoding)
suitable for transmission media conforming to TIA/EIA 568 (UTP Category 3)
120 Ohm for best performance, 100 Ohm for UTP and 150 Ohm for STP also OK

Connectors - RJ45

Pin 1 = Tx A
Pin 2 = Tx B
Pin 3 = nc (not connected)
Pin 4 = nc
Pin 5 = nc
Pin 6 =nc
Pin 7 = Rx A
Pin 8 = Rx B



Distances

Typically 300 metres will be achievable. It all depends on the cable.

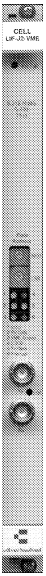
Earthing

The screened connectors are bonded to the front panel and thus to the housing when properly installed. This is necessary to minimise radiation from the fast components in this unit.

Abbreviations

LOCD - loss of cell delineation LOS - loss of signal TX - transmit RX - receive

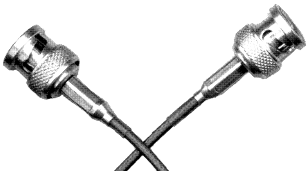
6.312 Mbit/s (J2) ATM interface



CELL-LIF-J2-VME

approx 14 490 cells per second (53 byte ATM cells, cell mapping to ITU-TS G.804/G.832 (ETS-300.337) and NTT-specified 6 312 Kbit/s)
6.312 Mbit/s +-30ppm, B6ZS/B8ZS line code
G.703 electrical (twin 75Ω coaxial cables)

Connectors - BNC



Distances

Achievable distances depend on the cable quality. The G.703 specification is not very explicit unfortunately. Typically 300 metres will be achievable. It all depends on the cable. Good cables are stiff and expensive.

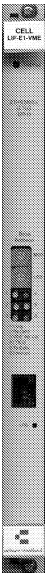
Earthing

The connectors are bonded to the front panel and thus to the housing when properly installed. This is necessary to minimise radiation from the fast components in this unit.

Abbreviations

LOCD - loss of cell delineation LOS - loss of signal TX - transmit RX - receive

2.048 Mbit/s (E1) ATM interface



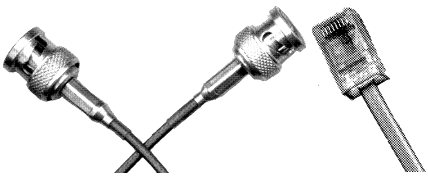
CELL-LIF-E1-VME

approx. 4528 cells per second (53 byte ATM cells framed to ETS 300 337 (G.804/G.832))
approx. 4210 cells per second (53 byte ATM cells framed to ETS 300 213 (PLCP))
2.048 Mbit/s ±50ppm, HDB3 line coding
G.703 (twin 75Ω coaxial cables or twin 120Ω twisted pair)

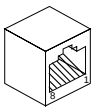
Distances

Achievable distances depend on the cable quality. The G.703 specification says "...The attenuation of this cable shall be assumed to follow approximately a root f law and the loss at a frequency of 1024 kHz shall be in the range 0 to 6dB...". Good cables are stiff and expensive.

Connectors



Either BNC(for 75Ω) or RJ48C(for 120Ω)



Pin connections RJ48C

1,2 nc
3 rx+ (input to module)
4 tx+ (output from module)
5 tx- (output from module)
6 rx- (input to module)
7 ,8 nc

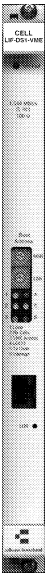
Earthing

The BNC connectors (if fitted) are bonded to the front panel and thus to the housing when properly installed. This is necessary to minimise radiation from the very fast components in this unit.

Abbreviations

LOCD - loss of cell delineation LOS - loss of signal TX - transmit RX - receive

1.544 Mbit/s (DS1) ATM interface

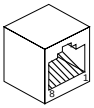


CELL-LIF-DS1-VME

approx. 3622 cells per second (53 byte ATM cells framed to ETS 300 337 (G.804/G.832))
approx. 3333 cells per second (53 byte ATM cells framed to Bellcore TR772 (PLCP))
1.544 Mbit/s ±50ppm, B8ZS line coding
G.703 (twin 75Ω coaxial cables or twin 100 Ω twisted pair)

Connectors

Either BNC(for 75Ω) or RJ48C(for 100Ω)



Pin connections RJ48C

1,2 nc
3 rx+ (input to module)
4 tx+ (output from module)
5 tx- (output from module)
6 rx- (input to module)
7 ,8 nc

Distances

It is expected here that you know how long your cable is and then configure this unit accordingly. The options offered are -

0-133 ft, 133-266ft, 266-399 ft, 399-533 ft, 533-655 ft

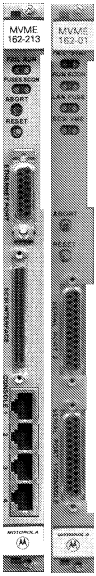
Earthing

The connector s are bonded to the front panel and thus to the housing when properly installed. This is necessary to minimise radiation from the very fast components in this unit.

Abbreviations

LOCD - loss of cell delineation LOS - loss of signal TX - transmit RX - receive

MANAGEMENT INTERFACES



Apart from the in-band (ATM) management access, via SNMP, there are two local possibilities to manage the equipment. One is a 19 200 Baud serial interface and the other is an Ethernet (10 Mbit) interface. They are both standard interfaces on the CPU board (illustrated left) which is an integral part of the basic CELL-SHAPER system.

Specification RS232 interface

VT100 compatible - fixed configuration.

Speed	19 200 Baud
Data bits	8
Parity	none
Stop bits	1
(8N1)	
Required signals	TXD, RXD, GND
Protocol	XON/XOFF

Distances

The maximum length allowed for an RS232 cable depends upon the Baud rate used. At 19 200 Baud, the maximum cable length is 10 metres.

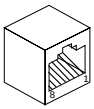
Connectors

There are 2 possibilities here depending upon which CPU is installed. (The serial interface is located on the CPU board.)

- An 8 pole RJ45 connector on the CPU board.
- A 25 way D-type (female connectors on the CPU board, cables must thus have male connectors)

A short adapter cable can be supplied with the equipment,

which adapts the RJ45 to a 25 pin female D-type. The two centre pins of the 8 pin RJ45 connector are TXD and RXD, the two adjacent pins (one on either side) are GND. The adapter cable t

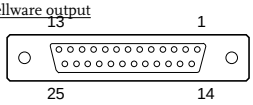


```
8 way RJ45   25 way D-type  Signal name
----------   -------------  -----------
    1             nc            DCD
    2             nc            RTS
    3-------------7             SG
    4-------------3             TXD
    5-------------2             RXD
    6-------------7             SG
    7             nc            CTS
    8             nc            DTR
```

Note that only 3 wires are required, for TXD, RXD and SG (signal ground). If not sure which is pin 1 on the RJ45, you only have 2 permutations to try.

Pin-outs RS232C terminal (For CPUs with this type of serial interface)

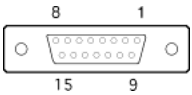
pin	abbr.	name	I-Cellware input O-Cellware output
1			nc
2	TXD	transmitted data	O
3	RXD	received data	I
4,5,6			nc
7	GND	signal ground	-
8 through 25			nc



Specification Ethernet AUI interface

This is the standard Ethernet interface, designed for an external medium adapter unit (MAU). This interface is located on the CPU board.

pin	abbr.	pin	abbr.
1	COL SHIELD	9	COL-
2	COL+	10	TX-
3	TX+	11	TX SHIELD
4	RX SHIELD	12	RX-
5	RX+	13	+12V PWR
6	GND	14	PWR SHIELD
7	NC	15	NC
8	NC		



INSTALLATION

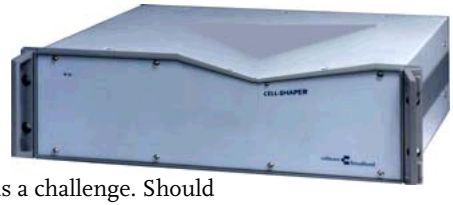
What to do before you start?

Did you get everything?

- CELL-SHAPER with all of the modules ordered
- Power cable

Plus - if explicitly ordered, connection cables.

What to do if equipment has arrived damaged?



CELLWARE takes all possible care when packaging equipment for despatch, but some transporters regard this as a challenge. Should the equipment be damaged when you receive it, please:

- Notify the transport company immediately and
- Send CELLWARE a copy of this notification and
- Contact CELLWARE to discuss further steps.

What are the basic precautions?

Earthing

This product is designed to be earthed over the normal power supply cable. Do not use twin conductor power cables without an earth connection. The housing is connected to earth.

Spilled drinks

Avoid spilling drinks on this product. This can cause permanent damage and such damage will not be repaired under guarantee.

Operating temperature

These products have a maximum operating temperature, corresponding to an environment of 50°C . Operation in direct sunlight or in a closed housing with no ventilation can result in excess temperatures.

Depending on the system size, two fans are fitted, one sucking and one blowing. These fans help to maintain the internal operating temperature within acceptable limits (typically 8°C above ambient). Do not restrict the flow of air to or from these fans. Occasionally the filters should be cleaned of dust. The black plastic frames are push fit and can be removed using both hands, with thumbs and forefingers on the corners and pulling gently. Dust should be blown from the filter. Washing the filters is not recommended.

Excess temperatures will result in the power supply shutting down, to prevent permanent damage. As the equipment cools down, power will be re-established and the system will automatically restart. Should this type of power cycling be observed, check that the ventilation is not obstructed and that the filters are not blocked.

Electromagnetic interference

The interfaces to this product operate at very high frequencies. Use only good quality screened cables and take care when routing the cables. Long runs parallel to other sensitive cables may result in crosstalk, which interferes with other signals. See the chapter headed CELL-SHAPER AND EMI.

Weight

CELL-SHAPER is a fairly heavy product (about 10kg) and the weight is not evenly distributed. Take care, particularly when using the handles to pull the unit out of a rack.

What housing options are available?

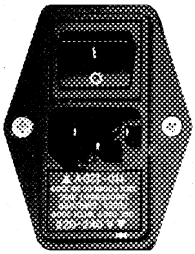
Cellware products are supplied in stand-alone housings. They can be left free standing, or can be fitted into a 19 inch rack mounting system.

Rack Mounting

The details will depend upon the exact rack mounting system used. If unsure about how to proceed, consult the supplier of your rack.

What are the power options?

CELL-SHAPER can be delivered in a number of options. Look for the label next to the power connector to see what your system can do. It may have an auto-ranging power unit, or a fixed input voltage. If you need a particular input voltage, specify this when ordering.



The fuse carrier beneath the power inlet also shows the supply voltage as configured before despatch. This is not a voltage switch and the orientation as delivered should be maintained.

For self-configuring power units this will not of course be correct. The larger adhesive label has the correct information.

How to treat cables

CELLWARE can supply ready-to-use cables - optical and or electrical. Note that cables have a minimum bending radius and that kinking coaxial cables will disturb the dielectric and cause a discontinuity in the characteristic

impedance. This will cause reflections and reduce the usable maximum cable length. Kinking optical cables will quite simply break them.

Kinked coaxial cables must be regarded as damaged and should be replaced.

(Kinking - bending too much, causing a sudden, damaging bend)

If the connectors used have a threaded outer sleeve, they should be firmly screwed to the CELL-SHAPER connectors to hold the cable in place and prevent movement which may cause errors.

When removing a cable, DO NOT PULL THE CABLE. Unscrew the connector and, when the fixing sleeve comes loose, pull the CONNECTOR, not the cable.

TTY cable for configuration & supervision

CELLWARE can supply a cable for the CELLWARE terminal used for configuration. If using your own cable and terminal, check the pin-outs of the "RS232C Terminal" as listed earlier, to ensure that the right signals are used in your configuration.

Can I update CELL-SHAPER?

As required, CELLWARE will distribute improved software. The equipment can then be updated via Ethernet, using TFTP. All modern CELLWARE boxes have an Ethernet interface.

A PC with a VT100 emulation is attached to the connector labelled "console 1". The password for the CELL-SCREEN environment is required, but then the update process is easy to use and no training is required, as prompts are issued to help the user. This process is described further in a later section, headed "SW update" in the CELL-SCREEN chapter.

HOW TO USE / CONFIGURE CELL-SHAPER

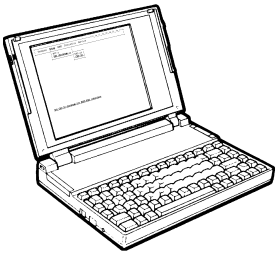
How to get management access

You can manage CELL-SHAPER in several ways
- VT100 terminal directly attached to the equipment
- VT100 terminal emulation using TELNET over Ethernet
- VT100 terminal emulation using TELNET over ATM, using AAL5
- SNMP access is possible via Ethernet
- SNMP access is possible via ATM
- Modules for the HP-OpenView management application are being prepared

You will need local access first to be able to configure the equipment for remote access.

How to get local management access from a VT100 terminal

CELL-SHAPER can be configured via a VT100 teletype, or VT100 emulation. The user interface is called CellScreen.



See the chapter called Management Interface Specs for the details of local connections to the VT100 interface - pins, Baud rate etc. Local management is a prerequisite to configuring remote management.

How to get remote management access

Remote management access always uses the IP protocol, so the IP parameters must be set for the access mode you require, either Ethernet or ATM. Both TELNET and SNMP access are then possible.

The dialogue to setup remote management

```
Misc  Setup  Statistics  Supervisor
      +---------------+
      | Management  > |
      | +-------------+
      | | Console     |
      | | Network   > |
      + + +---------------+
          | Interfaces  > |
          | +-----------------+
          + | Ethernet        |
            | In-band (ATM)   |
            +-----------------+
```

How to get remote management access - via Ethernet

For Ethernet, you can only set the IP parameters.

```
+------ Setup Ethernet -------+
|                              |
|   Enter Host Address         |
|   193.96.231.249             |
|                              |
|   Enter Subnet Mask          |
|   255.255.255.0              |
|                              |
| >[ Cancel ]<  [   OK   ]     |
+------------------------------+
```

How to get remote management access - via ATM

Suppose you want to establish an in-band management connection which connects the ATM interface in position "c" to the network management station with IP-address 211.1.1.4, where both VPI and VCI will have the value 1. The IP-address in this example at the CELL-SHAPER-side is defined as 211.1.1.1.

After selecting "in-band(ATM)" from the menu, the following table will be displayed:

```
+----------------- Inband management connection-table (ATM) ------------------+
|                                                                              |
|    ATM-if   VPI   VCI enc    ipaddress       subnetmask       peeraddr      |
|>  SDH : c.1  1     1   0     211.1.1.1    255.255.255.0      211.1.1.4    <+|
|                                                                             |
|                                                                             |
|                                                                            +|
|  [Add connection]    [Delete connection]                        >[Close]<  |
+-----------------------------------------------------------------------------+

ESC-Cancel  ^T-top ^B-bottom ^D-page down ^U-page up Tab-toggle buttons/data
```

In this table, all active in-band management connections will be listed. (The abbreviation "enc" is for "encapsulation.) Select "Add connection" and the following will be displayed:

```
+------------ Add AAL5 management Interface -----------+
|                                                      |
|                VPI    IPaddress     Destination      |
|                1      211.1.1.1     211.1.1.4        |
| ATM Interface                                        |
| SDH-3 :  c.1                          Encapsulation  |
|                VCI    Subnetmask     (.) none        |
|                1      255.255.255.0  ( ) LLC-Snap    |
+------------------------------------------------------+
```

Select (TAB to) the ATM-interface. Pressing the space-bar will result in a list of the available ATM-interfaces. Note that only ATM-interfaces which support in-band management will be shown. Use carriage return to select an interface.

IP-addresses and the subnet-mask must now be provided, followed by the type of AAL5 encapsulation, currently either no encapsulation ("none") or LLC-SNAP.

Possible problems with in-band management

After selecting "Ok", the in-band management connection will be created. If the request is rejected the following possible reasons should be borne in mind:

- the connection may already exist
- the IP-address(es) are not valid
- no memory is available to store the connection
- the limit on the number of in-band connections for the particular ATM-interface has been reached.

Early prototypes did not shape management traffic. From May 1997, this problem should be corrected.

Note that all in-band management connections will be stored so that every connection will be recovered after a power-failure.

Making remote changes

Note that currently not all in-band management connections are visible via SNMP. The only way to configure in-band management connections remotely is to do it via a Telnet connection.

How to use CellScreen

The CellScreen application runs within the CELL-SHAPER, uses the terminal keyboard for input and the terminal screen for display. Display updates are optimised within the application, before the serial link is addressed. Only the changes need transmitting, which results in an acceptable update speed. Pull down menus provide a familiar and easy to use environment, although only a terminal is required. Useful hints are constantly displayed at the bottom of the screen.

Selecting an option

Use the left (←) and (→) right cursor keys to move between the various “pull-down” menus. At each position a menu will appear as shown in the

example above. Use the cursor up (↑) and down (↓) keys to move through the options in each menu. The currently selected option will be highlighted. To activate an option use the carriage return (↵) key. The space bar is used to set/unset radio buttons - (o).

VT100 compatibility

Note that if you use an emulation package, it is important that it is fully VT100 compatible. The CellScreen environment makes use of various screen attributes and cursor positioning which are not always correctly emulated. The CELL-SHAPER will not be affected by missing reverse video in the display, but it can be tiring for the operator. Apart from the preconfigured PC, CELLWARE can recommend either a Wyse VT100 terminal or the use of a Sun window (under Open Windows)

How to log in

Having connected your local terminal to the connector labelled “console 1”, following power-up you should briefly see the following prompt -

```
Booting system complete.  Copyright (c) 1996, Cellware GmbH
------------------------------------------------------------------------------
SYSTEM CONFIGURATION:
The production version has been loaded
This system will restore settings from previous configuration
HARDWARE CONFIGURATION:
This system will use previous hardware settings
NETWORK INTERFACE PARAMETERS:
Ethernet MAC address is 08:00:3E:22:bd:58
IP-address on LAN (Ethernet) is 193.96.231.77
------------------------------------------------------------------------------
To change any of these settings, press any key within 5 seconds

(M)odify any of this or (C)ontinue ?
```

followed by

```
=== Cellware login ===>> initial password: public <<

Password:
```

If not the case, then check that you have configured your terminal correctly:

Speed	19 200 Baud
Data bits	8
Parity	none
Stop bits (8N1)	1
Required signals	TX, RX, GND
Protocol	XON/XOFF

You may see the following prompt.

```
+----------------------------------------+
| WARNING: Current software is           |
|          not up-to-date,               |
|          please perform software update  |
+----------------------------------------+
=== Cellware login ===>> initial password: public <<

Password:
```

In this case, the equipment is not running up-to-date software, but a permanently resident, minimum version. You should update the software immediately.

Security

Type in the password as supplied by CELLWARE concluded by a carriage return and you should see the following.

```
 Misc  Setup  Statistics  Supervisor


                              CELL-SHAPER v1.00


                                        __
                                     _|__|
            (c)1997  c e l l w a r e |_|__
                                     |__| b r o a d b a n d

Miscellaneous options
```

You are now within the CellScreen environment.

Note that the window has to be wide enough to allow 80 characters to be displayed. If it is less than 80 you may see something horrible.

Please also note that the options shown depend upon the password and ultimately on the boards fitted. If you need a non-visible option, you may have to log out and enter the appropriate password. Please note that, as the software is extended, small improvements will be made and your system may look a little different to the illustrations here.

How to select an option in CellScreen

Use the left and right cursor keys to move between the various “pull-down” menus. At each position a menu will appear as shown in the example above. Use the cursor up and down keys to move through the options in each menu. The currently selected option will be highlighted. To activate an option use the carriage return key. If a “radio button” “(o)” is highlighted, use the space bar to set or unset. The escape (ESC) key closes the current dialogue to "go back" one step.

Example - Info

If you select the Misc option, you will be presented with the following display. Use the cursor down key until the option “Info” is highlighted.

```
Misc  Setup  Statistics  Supervisor
+-------------+
| Info        |
| Refresh ^R  |
| Password    |
| Ping        |
| Exit    ^Q  |
+-------------+
                              CELL-SHAPER v2.50
                                        __
                                      _|__|
            (c)1997  c e l l w a r e |_|__
                                       |__| b r o a d b a n d


Miscellaneous options
```

Hit the carriage return key and you will see something like this.

```
Misc  Setup  Statistics  Supervisor

                  +------------ System Info -------------+
                  |                                      |
                  |  CELL-SHAPER updated-version 2.50d   |
                  |    Up since:Fri 23-1-1998 18:43:33   |
                  |  Logged on since: 4-2-1998 09:00:31  |
                  |                                      |
                  |         serial number:000000000      |
                  |         email info@cellware.de       |
                  |      (c) 1996 Cellware Broadband     |
                  |                                      |
                  |     [ Hardware ]      >[   OK   ]<   |
                  |                                      |
                  +--------------------------------------+
ESC-Cancel
```

Use TAB to move from "button" to "button" - [OK] is a "button".

The notation ^Q means "control Q" and shows that this key combination has the same effect as using the pull-down menu and selecting the option with carriage return.

Note that the bottom line often offers an explanation of the currently selected option. The example shown, ESC-cancel is fairly universal, to go back one level of dialogue, use the escape key.

Please note also, that the menus visible in your system may not include options shown here which are not physically installed in your system.

An overview of CellScreen

```
  Misc         Setup         Statistics    Supervisor
+----------+ +-----------+ +-----------+ +-----------------------+
|Info      | |Management>| |Protocol  >| |Software Update        |
|Refresh^R | |System    >| |Interfaces>| |Undo Software Update   |
|Password  | |Interfaces>| |Services  >| |Save/Load Configuration|
|Ping      | |Services  >| +-----------+ |Reboot                 |
|Exit   ^Q | +-----------+               +-----------------------+
+----------+
```

This overview shows a screen which you will never be able to see, where all of the menus are visible. Those options with an arrow > will produce a sub-menu with more choice.

The general approach to using CELL-SCREEN is as follows. Use the "Setup" options to set the system up, to configure it. To check that things are O.K. use the "Statistics" options to see if any errors are flagged and if any traffic is being registered.

The "Supervisor" options require a special password and are for unusual jobs, like updating the software or adding new hardware modules, setting test loops or altering the access rights for remote SNMP access.

"Misc" stands for miscellaneous.

How are interfaces labelled for CELL-SHAPER?

This is a bit tricky. The user interface is derived from CELL-MASTER where all of the boards are visible and labelled. CELL-SHAPER has two ATM interfaces ATM1 which is called "c.1" in the user interface and ATM2 which is called "e.1" in the user interface.

letters

If you take the front panel off, boards are labelled with lower case letters from top to bottom, a, b, c, d and e.

numbers

A complete interface location consists of 1 letter and 1 number e.g. e1. This is not relevant for CELL-SHAPER but is required for consistency with other Cellware products.

MISC MENU EXPLANATION

Misc stands for miscellaneous. If you select the Misc option, you will be presented with the following display.

Misc - Info

```
 Misc  Setup  Statistics  Supervisor
+--------------+
| Info         |
| Refresh ^R   |
| Password     |
| Ping         |
| Exit    ^Q   |
+--------------+

Miscellaneous options
```

Use the cursor down key until the option "Info" is highlighted. Hit carriage return and you will see something like this.

```
+------------- System Info -------------+
|                                       |
|  CELL-SHAPER updated-version 2.50d    |
|    Up since:Fri 23-1-1998 18:43:33    |
|  Logged on since: 4-2-1998 09:00:31   |
|                                       |
|         serial number:000021105       |
|         email info@cellware.de        |
|      (c) 1996 Cellware Broadband      |
|                                       |
|     [ Hardware ]      >[   OK   ]<    |
+---------------------------------------+
```

You will need this information if calling CELLWARE for assistance. To see a list of the hardware modules found in the system, use the left cursor key to move to the [Hardware] field and hit carriage return.

```
+---------- detected hardware ----------+
|                                       |
|    Nr. SDH-interfaces  (ATM): 1       |
|    Nr. E3-interfaces   (ATM): 1       |
|    Nr. AAL5-interfaces      : 1       |
|    Nr. Ethernet-interfaces  : 1       |
|                                       |
|               [  Ok  ]                |
+---------------------------------------+
```

When the CELL-SHAPER system is started, an automatic scan takes place, to establish which modules are fitted. The window above shows the results of the scan. This information may be required if asking for technical assistance. Note that the CPU board will not be shown in this overview. If you think that something needs correcting here go to the Setup menu, System > Hardware Configuration. This is described later on.

Misc - Refresh

This rewrites the entire screen. Some VT100 emulation packages are not completely VT100 conform and may produce some odd displays, which occasionally need correction via refresh. The notation ^R

```
+--------------+
| Info         |
| Refresh ^R   |
| Password     |
| Ping         |
| Exit    ^Q   |
+--------------+
```

means "control R" and shows that this key combination has the same effect as using the pull-down menu and selecting the option with carriage return.

Misc - Password

A password is required to manage the system. Within the system, two security levels are defined:

security level 1

enables basic access. In this level the user can configure interfaces, create PVC's and check the statistics. The initial password for this security level is 'public'. You should change this at once.

security level 2

enables supervisor access. This level provides basic access and also enables software updates and hardware configuration changes. The initial password for this security level is 'service'. You should change this at once.

To change security levels you must choose the 'Exit' option from the 'Misc' menu and log in using the appropriate password.

It is wise to modify these factory set passwords to prevent unqualified users from causing accidents.

Choose the 'Password' option from the 'Misc' menu to see the following.

```
+----- Change Password ------+
|                             |
|  >Enter your password       |
|                             |
|                             |
|  [ Cancel ]   [   OK   ]    |
+-----------------------------+
```

Note that you must first type in the existing password, before entering the new one. Passwords are not case sensitive. (Note that only normal ASCII symbols are allowed here.)

Misc - Ping

Ping is a very useful diagnostic tool in IP networks, checking if a particular IP host is reachable or not. Any IP machine receiving an echo request is supposed to respond with an echo reply. An echo request is known as a

'ping'. This is a method of testing whether a particular IP machine is 'alive', 'well' and reachable. Please ask your system administrator if you are not familiar with this idea.

```
+---------- Ping -----------+
|                           |
|  >Enter Host Address      |
|   0.0.0.0                 |
|                           |
|  [ Cancel ]  >[   OK   ]< |
+---------------------------+
```

To use this, you do have to know the complete, numeric IP address of the machine in question.

Every CELL-SHAPER has its own IP address. The dialogue to set this is under the Setup menu, Management >Network >Interfaces > Ethernet which is described later.

Misc - Exit

Quits CELL-SCREEN. A password is then required to re-enter. You should use this option when leaving the equipment unattended, to prevent accidents. The notation ^Q

```
+--------------+
| Info         |
| Refresh ^R   |
| Password     |
| Ping         |
| Exit    ^Q   |
+--------------+
```

means "control Q" and shows that this key combination has the same effect as using the pull-down menu and selecting the option with carriage return.

SETUP MENU EXPLANATION

This menu is used to configure or set-up the CELL-SHAPER.

```
Misc  Setup  Statistics  Supervisor
    +--------------+
    | Management  > |
    | System      > |
    | Interfaces  > |
    | Services    > |
    +---------------+


Configuration of management/interfaces/services/system
```

Setup - Management

Management is possible either via a VT100 terminal directly connected to the serial port or via a Telnet connection. To configure either of these options, Setup-Management must be selected. You now have two options.

```
+---------------+
| Management  > |
| +-------------+
| | Console     |
| | Network   > |
+ +-------------+
```

The Console option concerns a VT100 terminal directly attached to the equipment, via a short cable. The Network option implies remote access, via the network whatever that is, Ethernet, ATM ...

Setup - Management - Console

```
+--------------- Setup Console --------------+
|                                             |
| Serial Link Speed                           |
| ( ) 9600             Terminal Emulation     |
| (.) 19200            (.) vt100              |
| ( ) 38400            ( ) vt100 extended     |
|                                             |
|           [ Cancel ] [   Ok   ]            |
+---------------------------------------------+
```

Console lets you configure the serial port. Currently, the only parameter you can change is the Baud-rate. Note that this can't be changed via Telnet. In future, it will be possible to change the default character-set. Not all VT100 software supports this, so this feature can be disabled.

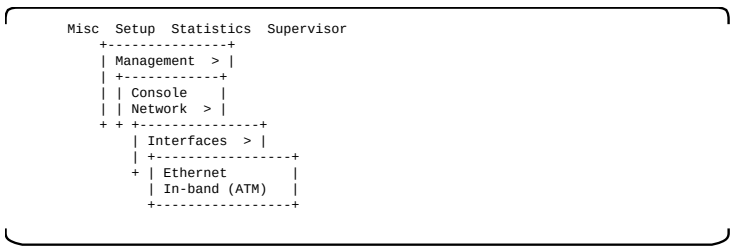
Setup - Management - Network

```
+---------------+
| Management  > |
| +-------------+|
| | Console     ||
| | Network   > ||
+ + +---------------+
    | Interfaces  > |
    | Routing     > |
    +---------------+
```

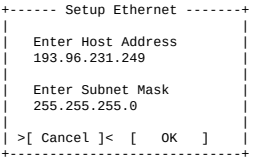
This option is to set up remote management access via a network. The Interfaces option allows you to choose between Ethernet using IP and ATM

using IP over AAL5. Once in the IP world, the remote equipment may be on a quite different network. The Routing option is required so that the equipment is told about it's default router for IP packets. Ask your network manager if you are not familiar with this concept.

Setup - Management - Network - Interfaces - Ethernet

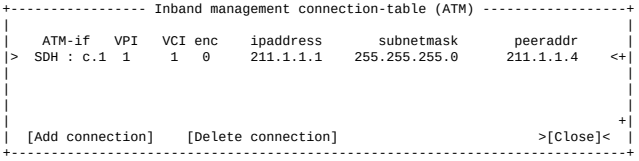


For Ethernet, you can only set the IP parameters.

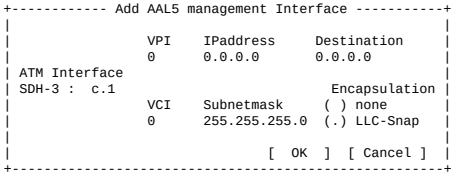


Setup - Management - Network - Interfaces - In-band (ATM)

For ATM both the ATM addresses and the IP parameters can be set. The following table will be displayed initially:



In this table, all active in-band management connections will be listed. (The abbreviation "enc" is for "encapsulation.) Select "Add connection" and the following will be displayed:



The ATM-interface must be selected. Pressing the space-bar will result in a list of the available ATM-interfaces. Note that only ATM-interfaces which

support in-band management will be shown. Use carriage return to select an interface.

IP-addresses and the subnet-mask must now be provided, followed by the type of AAL5 encapsulation, currently either no encapsulation ("none") or LLC-SNAP (the default setting).

Possible problems with in-band management

After selecting "Ok", the in-band management connection will be established. If the request is rejected the following possible reasons should be borne in mind:

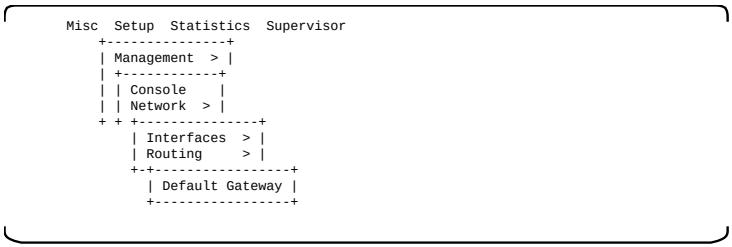
- the connection may already exist
- the IP-address(es) are not valid
- no memory is available to store the connection
- the limit on the number of in-band connections for the particular ATM-interface has been reached.

Note that all in-band management connections will be stored so that every connection will be recovered after a power-failure.

Making remote changes

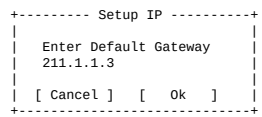
Note that currently not all in-band management connections are visible via SNMP. The only way to configure in-band management connections remotely is to do it via a Telnet connection.

Setup - Management - Network - Routing



If the CELL-SHAPER is part of an IP network (either via Ethernet or ATM). the router usually found within the system must be aware of a gateway where IP-packets are sent, when the destination is not reachable directly.

Select Default Gateway from the menu.



To configure the default gateway, you must specify its IP address. Hit OK, to activate the new setting.

Setup - System

```
Misc  Setup  Statistics  Supervisor
    +---------------+
    | Management  > |
    | System      > |
    | +-------------------------+
    | | Central Clock           |
    + | SNMP Agent              |
      | Hardware configuration  > |
      | Time & Date             |
      | System name             |
      +-------------------------+

Configuration of management/interfaces/services/system
```

You can see from the list of options what is meant by System. We will deal with each of the options in turn.

Setup - System - Central Clock

```
+---- setup central-clock ----+
|                              |
|   current clock-master       |
|   none                       |
|      +--- Centra ---+        |
|  [ Ca| SDH : e.1    |  ]     |
|      |              |        |
+------|>none        <|--------+
       +--------------+
```

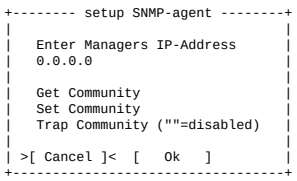
The initial setting here is "none". This means that each bidirectional line interface recovers a clock from the received (incoming) signal and reuses this clock to time the transmitted (outgoing) signal.

Hit the space bar for a list of available interfaces. If one of the interfaces is selected as the source of a "Central Clock", the recovered clock from that interface is reduced to 8kHz and this is supplied as a central reference to all interfaces. The other interfaces each "lock on" to this reference for their transmit (outgoing) signals. 8kHz is a common denominator between all of the available standard bit-rates.

Each interface will recover the clock from received (incoming) signals, whatever the source of the transmit timing. Should no received signal be available, the transmit timing as produced by each local oscillator will "free-run".

Setup - System - SNMP-Agent

Select the SNMP Agent option to see the following



The Managers IP-Address must be set or no SNMP access will be allowed.

There are then 3 "passwords" which in the SNMP world are called "Community names". Two are to get into CELL-SHAPER and one is to go from CELL-SHAPER to a remote management location.

The get community, using the "Get community" password, can read only. The set community, can read modify and write.

Traps are produced when significant errors are seen in the CELL-SHAPER, like loss of line synchronisation or wrong password used when trying to log-in. Traps are sent to the Managers IP-Address and the "trap community" is a password sent by the CELL-SHAPER to authenticate the trap message. If the "trap community" is empty, no traps will be produced.

Which SNMP MIBs are supported?

The following standard SNMP MIBs are supported:
- MIB2 (rfc1213), standard SNMP MIB
- ATM MIB (rfc1695)
- SDH MIB (rfc1595)
- DS3 MIB (rfc1407) - configuration part only
- DS1 MIB (rfc1406) - configuration part only

Other SNMP MIBs under development include:
- Ethernet MIB (rfc1643)
- ATM MIB (new generation)
- ATM2 MIB (signaling MIB)
- UNI 3.x ILMI
- ILMI 4.0

Traps
- Standard MIB II traps.

Setup - System - Hardware configuration

This process is required if a module is removed from or added to a system.

Cellware staff will preconfigure the system. If the hardware configuration is changed, the Hardware Config table in the Supervisor menu must be changed too.

The table below consists of entries which represent each slot in the housing, and the board fitted. The software use this information to determine the physical location of each board. (The presence can be detected automatically, but the VMEbus does not identify the physical location). Care must be taken when changing this table. Entering incorrect information here may cause severe problems.

```
+------------ boards configuration -------------+
|Slot  Presence     VME address    Board ID      |
|a     present      0x00000000     MVME-162      |
|b     absent       0xFFFFFFFF     --EMPTY--     |
|c     present      0x0F060000     CELL-LIF SO   |
|d     present      0x0F0A0000     CELL-BUFF     |
|e     present      0x0F080000     CELL-LIF SO   |
|                                                |
|        [   OK   ]          [ Cancel ]          |
+------------------------------------------------+
```

Slot

CELL-SHAPER slots are numbered using lower-case letters.

Presence

This has only 2 possibilities present or absent (not present).

VME address

Each board in a VMEbus system has a configurable "base" address, which defines the actual addresses of all on-board registers, memory etc. Boards should not normally be allocated overlapping addresses.

The base address for CELLWARE VMEbus products is set by two hexadecimally coded switches, located near the front of the board. You will have to remove the front panel to get access to the individual boards. For example, for the address 0x0F060000, set MSB to 0 and the LSB to 6.

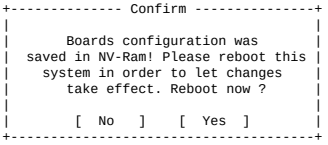
The software performs a scan at power-up and will find the board and automatically make a note of the address which you have chosen.

Board ID

To set a new Board ID enter the corresponding field and choose a board from the list offered. You will be asked to confirm the changes which you have made.

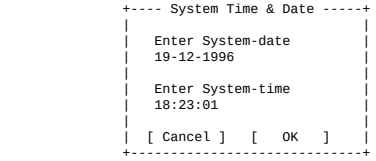
```
+-------------- Confirm ---------------+
|                                      |
|       Boards configuration will      |
|        be modified. Continue ?       |
|                                      |
|       [  No   ]    [  Yes  ]        |
+--------------------------------------+
```

The changes are only active after the system has been restarted.



Enter "Yes" to reboot the system and to activate the new settings.

Setup - System - Time & Date



Use the TAB or cursor keys to move to the right field and then enter a string as shown in the example. "19-12-1996" for the 19th December 1996. Please note that there is no plausibility check here so it is wise to check the result of your input, by re-entering this dialogue.

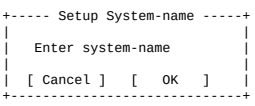
Date format

dd-mm-yyyy (d-day, m-month, y-year)

Time format

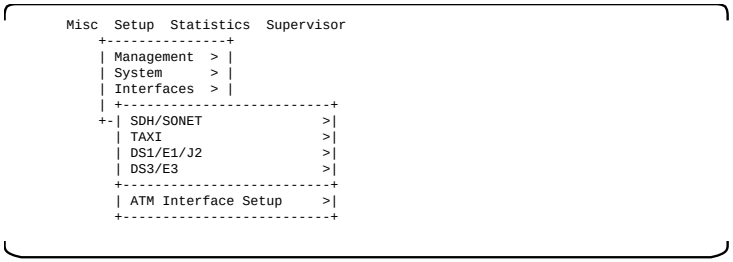
hh:mm:ss (h-hours, m-minutes, s-seconds).

Setup - System - System name



For remote management it is a good idea to use a descriptive name here.

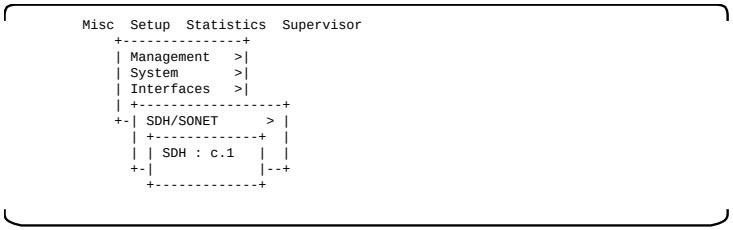
Setup - Interfaces



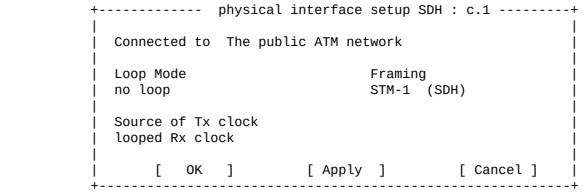
This menu shows all detected interface types. If, for example, no TAXI board is found in the system, no TAXI option will be visible here.

Note the separation into logical layers. The line coding and framing options come first (e.g. SDH) and are then followed by the ATM aspects. Each interface type will be dealt with in turn after some explanation of common terms.

Setup - Interfaces - SDH/SONET



Choose the interface and you will see something like this -



Connected to

This is a text string, up to 30 characters long, that you can use to describe the port.

Loop Mode

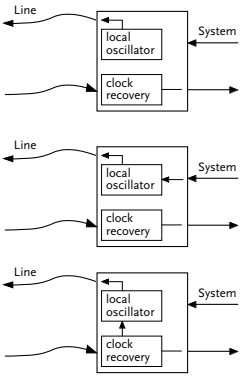
```
+- Loop Mode -+
| no Loop     |
| internal    |
| line        |
+-------------+
```

See the section MORE ABOUT SETUP - What is a test loop? for an explanation of these options.

Source of Tx clock

```
+--- Tx Clock -----+
| Local oscillator |
| Central Clock    |
| Looped Rx Clock  |
+------------------+
```

This chooses the source for the timing of the outgoing signal to the line. (Timing for signals coming in from the line are always derived from the signal.)



Local oscillator - a free-running oscillator on the line interface board concerned. This is effectively a fixed transmit frequency.

Central Clock - The clock is derived from the Master system clock. If the selected Interface has been chosen as the master it will be shown as "Source of Tx clock".

Looped Rx Clock - The timing recovered from the signal received from the line is used to transmit to the line. The local oscillator has then been synchronised to the received signal and is no longer free running.

Framing

```
+--- Framing ---+
| STS-3c (SONET)|
| STM-1  (SDH)  |
+---------------+
```

There are some small differences between the North American STS-3C and the European STM-1 framing and this is where you can choose between them.

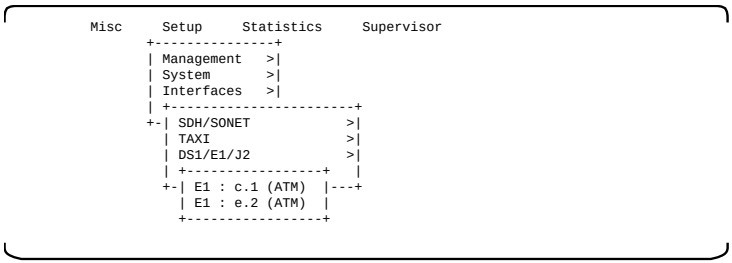
Setup - Interfaces - TAXI

```
+--- Interface Setup : TAXI : c.1 ---+
|                                     |
|  Loop Mode                          |
|  (.) none                           |
|  ( ) internal                       |
|                                     |
|      [  OK  ]     [Cancel]          |
+-------------------------------------+
```

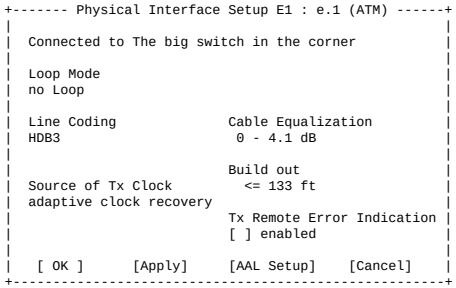
Apart from loops, there is not too much you can set up with a TAXI interface.

Setup - Interfaces - DS1/E1/J2

DS1, E1 and J2 are all G.703 ATM interfaces using PDH framing so they have been bundled together in one dialogue.



Choose your interface and then....

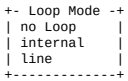


Use the Tab-key to move between fields and carriage return (enter) to change a field.

Connected to

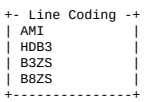
This is a text string, up to 30 characters long, that you can use to describe the port.

Loop Mode



See the section MORE ABOUT SETUP - What is a test loop? for an explanation of these options.

Line Coding



This concerns the coding used to represent ones and zeroes on the line. Look at the specification of the attached equipment to see what is required.

Cable Equalization

```
+- Cable Equal.-+
| 0 - 4.1 dB    |
| 2.5 - 6.5 dB  |
+---------------+
```

This is a J2 option only. Choose 0-4.1 dB for short cables, 2.5-6.5 dB for longer cables. Read the J2 spec. if you are not sure what short and long mean.

Source of Tx clock

```
+--- Source of Tx clock ---+
| local oscillator         |
| central clock            |
| looped Rx clock          |
+--------------------------+
```

This chooses the source for the timing of the outgoing signal to the line. (Timing for signals coming in from the line are always derived from the signal.)

Local oscillator - a free-running oscillator on the line interface board concerned

Central Clock - The clock is derived from the Master system clock. If the selected Interface has been chosen as the master it will be shown as "Source of Tx clock". (See the Setup - System dialogue)

Looped Rx Clock - The timing recovered from the signal received from the line is used to transmit to the line. The local oscillator has then been synchronised to the received signal and is no longer free running.

Build out

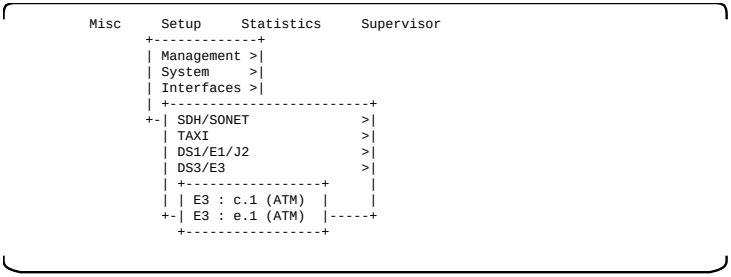
```
+- Build out -+
| <= 133 ft   |
| <= 266 ft   |
| <= 399 ft   |
| <= 533 ft   |
| <= 655 ft   |
| -7,5 dB     |
| -15 dB      |
+-------------+
```

This is an option available for DS1 to compensate for varying line lengths. If this option is not shown, it is not required. The specification for E1 demands an automatic process to cope with varying cable length. Ask the supplier of the attached equipment/line if not sure what to do here.

Tx Remote Error Indication

This is an E1 (AAL1) option. Should the flow of ATM cells be interrupted for any reason, normally you AIS will be produced at the circuit emulation port (all ones). If this option is set, a frame will be produced with the error bit set in the frame.

Setup - Interfaces - DS3/E3



Below is the dialogue for an ATM interface, which has no adaption layer, but may have framing (Transmission) options.

```
+---- Physical Interface Setup E3 : c.1 (ATM) -----+
|                                                   |
|  Connected to                                     |
|                                                   |
|  Loop Mode                                        |
|  no loop                                          |
|                                                   |
|  Tx Clock Source                Transmission      |
|  looped Rx clock                Cell-Mapping      |
|                                                   |
|     [  OK  ]      [ Apply  ]       [ Cancel ]     |
+---------------------------------------------------+
```

Connected to

This is a text string, up to 30 characters long, that you can use to describe the port.

Loop Mode

```
+- Loop Mode -+
| no Loop     |
| internal    |
| line        |
+-------------+
```

See the section MORE ABOUT SETUP - What is a test loop? for an explanation of these options.

Tx Clock Source

```
+----- Tx Clock Source ----+
| local oscillator         |
| central clock            |
| looped Rx clock          |
+--------------------------+
```

This chooses the source for the timing of the outgoing signal to the line. (Timing for signals coming in from the line are always derived from the signal.)

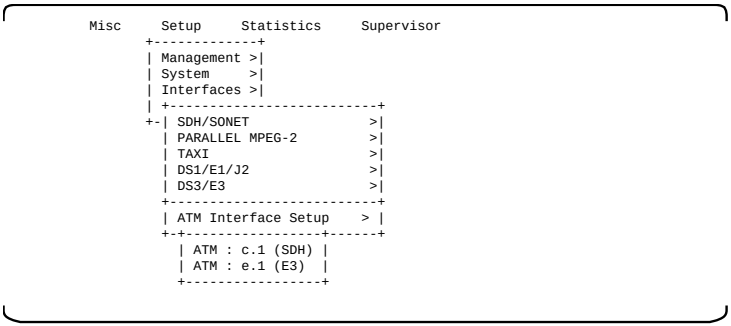
Local oscillator - a free-running oscillator on the line interface board concerned

Central Clock - The clock is derived from the Master system clock. If the

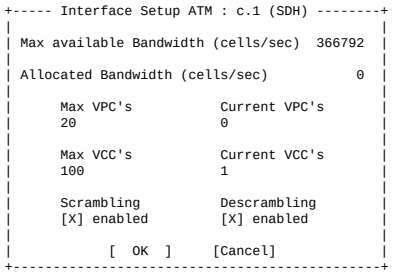
selected Interface has been chosen as the master it will be shown as "Source of Tx clock".

Looped Rx Clock - The timing recovered from the signal received from the line is used to transmit to the line. The local oscillator has then been synchronised to the received signal and is no longer free running.

Setup - Interfaces - ATM



Select each interface individually to see the ATM options. Remember that the non-ATM detail like framing/line coding is dealt with in the options above.



Max available bandwidth

This non-editable field shows the maximum number of cells per second which the interface can support.

Allocated bandwidth

This non-editable field shows the number of cells per second which have been allocated to this interface, via traffic descriptors.

Max VPC's

This field allows you to set the maximum number of valid paths.

Current VPC's

This non-editable field shows the number of paths currently set through this interface.

Max VCC's

This field allows you to set the maximum number of valid channels.

Current VCC's

This non-editable field shows the number of channels currently set through this interface.

Scrambling

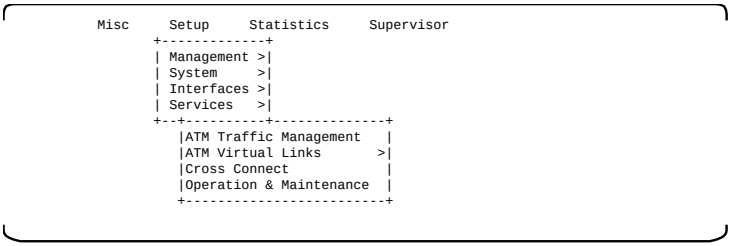
This option allows scrambling of the transmitted cells to be disabled/ enabled. It is normally active as scrambling spreads the spectrum used, improving the timing recovery process. Both ends of a link must be set the same of course. Use the space bar to make a change.

Descrambling

This option allows descrambling of the received cells to be disabled/ enabled. It is normally active as scrambling spreads the spectrum used, improving the timing recovery process. Both ends of a link must be set the same of course. Use the space bar to make a change.

Setup - Services

Going through the set-up process, first the simple things have been configured like the individual interfaces and basic management parameters. To join the interfaces up, so that data usefully flows between them, you now have to choose a "service".



Note that the services present in your system are dependent on the modules actually fitted. Some of the services described may not be available in your system.

Setup - Services - ATM traffic management

Traffic Descriptors

Selecting "Setup - Service - ATM-traffic management" will produce the following table:

```
+------------ ATM Traffic Descriptor Table -----------+
|                                                     |
| Id  Type   Mux   PCR  SCR   MBS   Annotation   Used  |
|  1  NONE   YES  -ns-  -ns-  -ns-  best effort    14  |
|  2   NIL    NO     0  -ns-  -ns-  no traffic      0  |
|                                                     |
|     [Add VBR]    [Add CBR]    [Delete]    [Close]    |
+-----------------------------------------------------+
(ns - not supported)
```

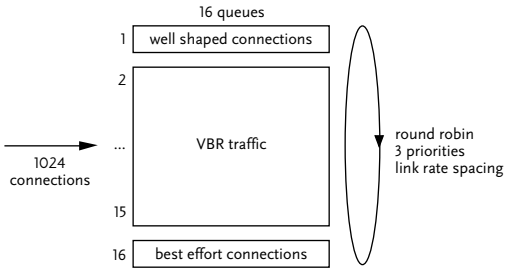
Id

A unique identifier. This must be used for each virtual link for both receive and transmit.

Type

The type of descriptor. The currently supported traffic descriptors are

NONE best effort traffic (no traffic shaping at all)
NIL no traffic (no user-data at all)
CBR constant bit rate traffic
VBR variable bit rate traffic



3 priorities are supported
1 x high priority queue for CBR
14 x queues for VBR
1 x low priority queue for "best effort traffic"
(or for multiplexed connections)

Type - NONE

This type is used for ATM-connections where no traffic-management is required. All traffic using this "best effort" descriptor passes through unchanged. No QOS is guaranteed. Congestion may cause cells to be discarded. This is automatically defined and is read-only. You cannot delete it. This is also called UBR (unspecified bit rate)

Type - NIL

This type is used for ATM-connections where NO bandwidth should be

allocated. A virtual link using this descriptor cannot carry any user data. Note that the transmission of OAM cells is not affected by this. A typical application is the creation of unidirectional ATM connections. (For each virtual link, two traffic descriptor must be provided, (one for each direction). The associated PCR-field always shows 0 cells per second. All other parameters are meaningless. This is automatically defined and is read-only. You cannot delete it.

Type - CBR

This type is used for constant bit-rate traffic. The bandwidth is the same under all circumstances. To ensure that a congested CBR connection maintains the required QOS, it is important that it has higher priority than other traffic.

Type - VBR

This type is for variable bit-rate traffic. The parameters used for a VBR service are Peak Cell Rate (PCR), Sustainable Cell Rate (SCR) and Maximum Burst Size (MBS). The number of cells allowed to exceed the SCR is determined by the MBS. A cell-rate which exceeds the PCR is permissible.

Mux

Defines whether multiplexing of several connections is allowed or not. The traffic-queue used for a traffic descriptor where multiplexing is allowed, will be shared by multiple connections. Every connection which uses this traffic descriptor can affect the others sharing the same queue. No form of traffic management is performed. Peak cell-rate , sustainable cell-rate, and maximum burst size parameters are then not applicable.

PCR

Peak cell rate. This is the maximum number of cells per second allowed for each connection using this descriptor.

SCR

Sustainable cell rate. This sets the upper limit to the average number of cells per second for each connection using this descriptor.

MBS

The maximum burst size is the number of cells which can be transmitted consecutively without inserting idle cells and ranges from 1 to 255.

Annotate

This is the name (text) of the traffic descriptor.

Used

A non-editable field showing the number of connections using this descriptor.

How to create a VBR ATM traffic descriptor

Select "Setup - Service - ATM-traffic management"

```
+------------ ATM Traffic Descriptor Table -----------+
|                                                     |
| Id  Type   Mux   PCR  SCR   MBS   Annotation   Used  |
|  1  NONE   YES  -ns-  -ns-  -ns-  best effort    14  |
|  2   NIL    NO     0  -ns-  -ns-  no traffic      0  |
|  3   CBR   YES  5447  -ns-  -ns-  E1 over aal1    6  |
|                                                     |
|     [Add VBR]    [Add CBR]    [Delete]    [Close]    |
+-----------------------------------------------------+
```

...and select Add VBR

```
+Add New Traffic Descriptor+
| Descriptor Type          |
| VBR                      |
|                          |
| SCR                      |
| 0                        |
|                          |
| MBS                      |
| 1                        |
| [  OK  ]    [Cancel]     |
+--------------------------+
```

For VBR only SCR and MBS can be entered. No multiplexing is allowed. This is to prevent connections from affecting one other. PCR is derived automatically from the known capacity of the ATM-interface used.

How to create a CBR ATM traffic descriptor

Select "Setup - Service - ATM-traffic management"

```
+------------ ATM Traffic Descriptor Table -----------+
|                                                     |
| Id  Type   Mux   PCR  SCR   MBS   Annotation   Used  |
|  1  NONE   YES  -ns-  -ns-  -ns-  best effort    14  |
|  2   NIL    NO     0  -ns-  -ns-  no traffic      0  |
|  3   CBR   YES  5447  -ns-  -ns-  E1 over aal1    6  |
|                                                     |
|     [Add VBR]    [Add CBR]    [Delete]    [Close]    |
+-----------------------------------------------------+
```

...and select Add CBR

```
+ Add New Traffic Descriptor +
|                            |
| Descriptor Type            |
| CBR                        |
|                            |
| Connection Multiplexing    |
| ( ) NO                     |
| (x) YES                    |
|                            |
| PCR                        |
| 0                          |
|                            |
| [  OK  ]    [Cancel]       |
+----------------------------+
```

For CBR only PCR can be set. Multiplexing is allowed. Enabling multiplexing will reduce the number of queues required and thus increase the number of connections that can be shaped. Note that the number of queues that currently can be created for user defined traffic descriptors is limited to 14. After a traffic descriptor has been created, it will be saved in non-volatile memory, to ensure it will be available after a reboot or power failure.

How to remove an ATM traffic descriptor

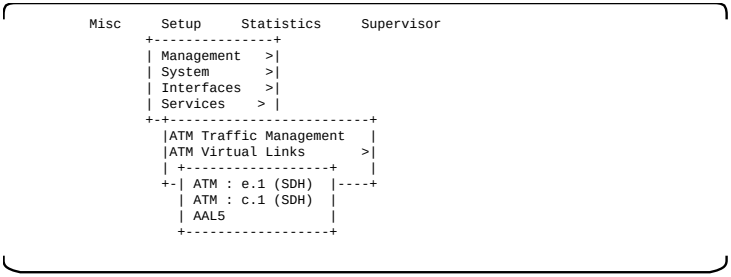
To delete a particular traffic descriptor, select it using the cursor keys. After selecting 'Delete' it will be deleted. If deletion fails, make sure that

1 - the selected traffic descriptor is not a predefined traffic descriptor, and
2 - the traffic descriptor is not in use by any other virtual link ("Used" must be 0 - this is the usage counter)

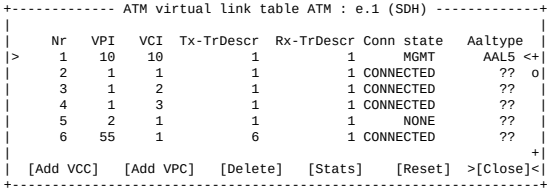
Setup - services - ATM Virtual Links
How to assign ATM addresses to ports

This dialogue is rather technical and we will be replacing it with a simpler version in future.

This, current approach is a 2 step configuration. First, ATM addresses are assigned to physical ports and then, in a separate dialogue, cross-connections or links are defined to make a through-path.



Two ports (interfaces) should be found. Choose one of them.



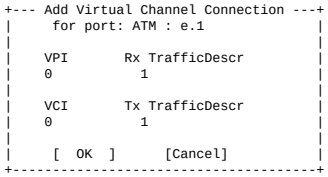
In this table you can set all of the addresses (VPI and VCI) for the chosen port. Note that it is quite usual to have many addresses for one port, these represent many "virtual links", each used as a separate point to point connection.

Nr	- An automatic index number (label)
VCI	- The VCI part of the ATM address
VPI	- The VPI part of the ATM address
Tx-TrDescr	- Transmit traffic descriptor number
Rx-TrDescr	- Receive traffic descriptor number
Conn state	- depends whether the port is connected in the Cross-Connect.
AALtype	- ATM adaption layer used

The Traffic Descriptor numbers can be found in the menu Setup/Service/ ATM Traffic Descriptor. There are predefined descriptors, or you create a new one if traffic shaping is required.

How to Add VCC

Use this to add a virtual channel connection. The address here involves both VCI and VPI.



VPI

Enter an integer from 0 to 255.

VCI

Enter an integer from 32 to 65535. (The VCI's 0 to 31 are reserved for signalling, OAM etc.)

Rx TrafficDescr

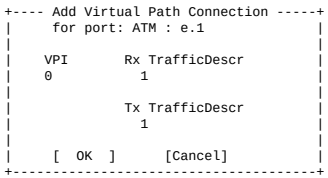
These are not editable as these are always best effort (1)
(currently policing is not supported in CELL-SHAPER).

Tx TrafficDescr

The transmit traffic descriptor number can be selected from the list available. Traffic descriptors are defined in detail elsewhere, you can only make a choice here.

How to Add VPC

Use this to add a virtual path connection. The address here involves only VPI. All possible values ov VCI are then covered.



VPI

Enter an integer from 0 to 255.

Note that if you want to route channels using a path connection, all the channels must have the same VPI. They should also be of the same traffic type (VBR or CBR).

Rx TrafficDescr

These are not editable as these are always best effort (1).
(currently policing is not supported in CELL-SHAPER).

Tx TrafficDescr

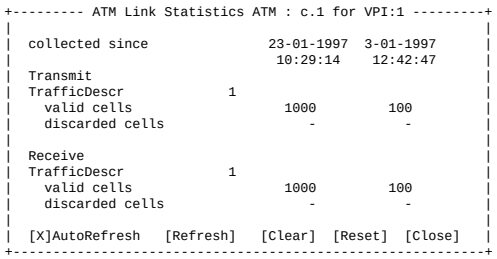
The transmit traffic descriptor number can be selected from the list available. Traffic descriptors are defined in detail elsewhere, you can only make a choice here.

Delete

This deletes the currently selected VPC/VCC. If this was not allowed, you may first need to delete the Cross-connections for this link.

Stats

Shows statistics for the selected connection.



There are 2 columns of statistics here. The left hand column shows the total since the time at the top of the column (10:29). The right hand column is the same but can be reset to 0 with the [Clear] button. This will change the time at the top, to the current time. The left hand column is not affected by [Clear]. Both columns are reset to 0 with [Reset].

valid cells

Normal, error-free, received ATM cells, with the correct VCI/VPI values.

discarded cells

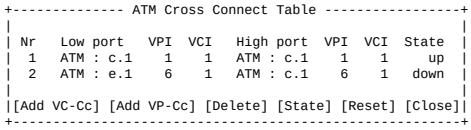
Should, for instance, a cell arrive out of sequence, it will be discarded and counted here.

Reset

Deletes all of the connections shown, except Management connections and links which are cross connected.

Setup - services - Cross Connect

This dialogue is rather technical and we will be replacing it with a simpler version in future. Before setting this table and making links (or PVCs) you must allocate the ATM addresses to the ports concerned, using the ATM Virtual Links option.

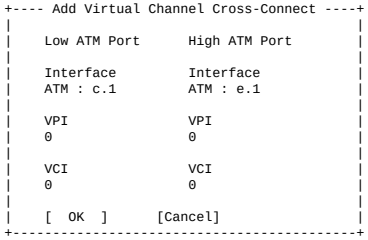


In this table you can make and break connections between ports. You can also temporarily disable (down) or enable (up) a connection. Low port and high port are just names, there is no difference in significance between high and low.

Low Port The name of the port and its location.
High Port The name of the port and its location.
VPI / VCI The ATM address of each port.
State Shows whether the connection has been temporarily disabled (down).

Add VC-Cc

To add a new virtual channel connection. You will be asked for the physical location of the port and for the address concerned.



Add VP-Cc

To add a new virtual path connection. You will be asked for the physical location of the port and for the address concerned, (but only the VPI part).

Delete

This permanently deletes the selected connection, after a confirmation.

State

This allows the connection to be temporarily disabled/enabled. Up means enabled, down means disabled.

Reset

This clears all of the connections with one command.

Close

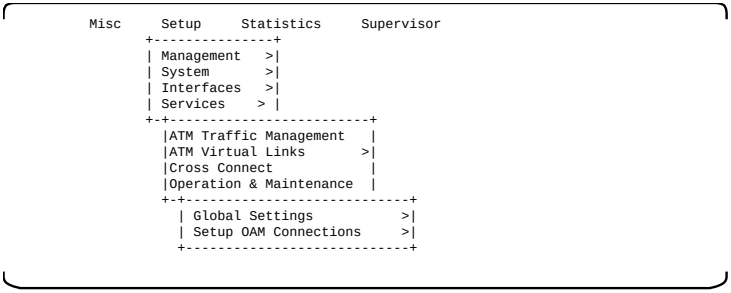
Close the dialogue.

Problems?

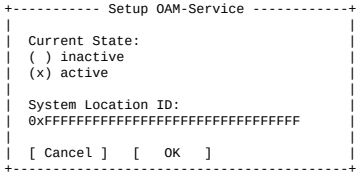
If a message "Could not make a Cross Connect" appears, one of the addresses is missing and you must first set this using ATM Virtual Link.

Setup - Services - Setup OAM Connections

See the section MORE ABOUT SETUP - What is OAM? for an introduction to OAM.

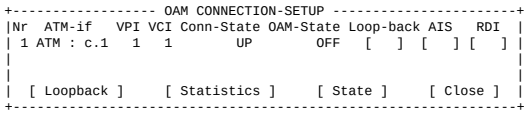


Global Settings



The System Location ID is the value (hexadecimal) used to identify this, local system. If this parameter is not set, OAM cells originating from remote connections cannot be looped back by this system. This parameter must be used by the remote system to label the cells to be looped back.

Setup OAM Connections



This dialogue is used to check whether any alarms are showing from remote equipment and to set loop-backs to localise network problems. All of the currently active channels or paths will be listed in this table.

Nr	- An automatic index number (label)
ATM-if	- The location of the port (where is it?)
VCI	- The VCI part of the ATM address

VPI - The VPI part of the ATM address
Conn-State - Whether the connection is enabled (UP) or disabled (DOWN)
OAM-State - Whether OAM operation is enabled (ON) or disabled (OFF)
Loop-back - [X] when loop-back cells are being sent.
AIS - [X] when the received ATM stream is faulty
RDI - [X] when the transmitted ATM stream is faulty at its destination

When the [State] button is selected, hitting the space bar will flip the OAM-State between ON and OFF.

Loopback

If this system is to produce OAM loop-back cells, the following dialogue is required.

```
+--- Insert OAM-Loopback cells ---+
|                                 |
|Insertion-State Loopback ID:     |
|( )inactive     ( )default (0xFF)|
|(x)active       (x)custom        |
|                                 |
|Custom-ID: (hex)                 |
|0x2                              |
|                                 |
|[ Cancel ]   [   OK   ]          |
+---------------------------------+
```

Cellware systems will react to OAM loop-back cells with the default value of Loopback ID. This is OK just to see that loops work, but to locate a problem it is necessary to set (x)custom and to then enter the Custom-ID. This is the OAM System Location ID of the particular equipment which is asked to loop the cells.

Having configured the ID, the Insertion-State must be set to (x)active for cells to actually be produced. [OK] activates the changes and returns to the table.

To see whether loop cells are successfully being returned, look at the Statistics option.

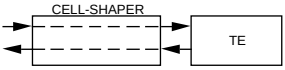
MORE ABOUT SETUP

What is a test loop?

A loop-back is when a signal is returned to to its source. This is very useful to test bidirectional connections and to locate faults. The following vocabulary is used - No loop, line loop-back, internal loop-back, payload loop-back

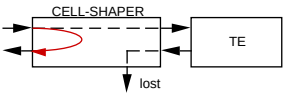
No loop

Data flows straight through.



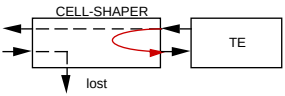
Line loop-back

Data arrives from the line and is immediately looped back onto the line. Data is also copied through to its normal destination. Data normally destined for the line is lost, to be replaced by the looped data.



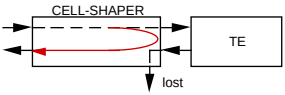
Internal loop-back

Data coming from CELL-SHAPER is looped back into the CELL-SHAPER, and is also passed through to the line as normal. Normal data from the line is lost, to be replaced by the looped data.



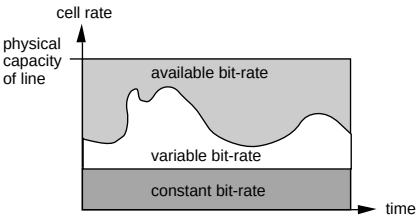
Payload loop-back

Data arriving from the line goes through the framer before being looped back. Data is also copied through to its normal destination. Data normally destined for the line is lost, to be replaced by the looped data.



What is ATM traffic management?

To talk about traffic management, it is necessary to understand the concept of ATM traffic and traffic descriptors. ATMs great strength is that it can transport all types of data at any bit-rate required. Imagine 3 services running over one ATM line -



Constant bit-rate traffic is easy and is the lower element in the graph above. Variable bit-rate traffic is typical for LAN data and can occupy the space left by the CBR traffic. This still leaves some capacity available and this can be used for non-critical data transfer which puts low demands on delivery time or constant transmission delay.

In this way you can see that the 3 services put different demands on the network owing to the different nature of the traffic concerned. Some parameters have been chosen to try and describe ATM traffic and one particular combination of the parameters is then called an "ATM traffic descriptor".

Traffic descriptors thus provide a standard way to describe traffic expected on a particular ATM connection. Each descriptor specifies the traffic in one direction only. In CELL-SHAPER, for every virtual link that is created, 2 descriptors must be defined; one for the transmit and one for the receive side.

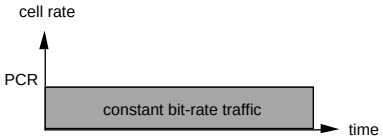
Note that all bandwidth parameters must be entered in cells per second. The formula for conversion from Mbits/sec to cells/sec is:

Rate (cells/sec) = bandwidth (Mbit/s) / (47 * 8) - for example:

DS1	4 106 Cells per second
E1	5 446
J2	16 787
E3	91 404
DS3	118 978
STM-1	353 207

What is CBR traffic?

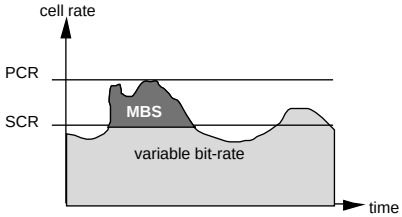
CBR is constant bit-rate traffic (which is not bursty). The bandwidth is the same under all circumstances. To ensure that a congested CBR connection maintains the required QOS, it is important that it has higher priority than other traffic.



The parameter used for a CBR service is Peak Cell Rate (PCR) [in cells per second]. Once a traffic contract has been negotiated, the transmission of cells within the PCR is guaranteed by the ATM network. CBR is used for voice and video transmission.

What is VBR traffic?

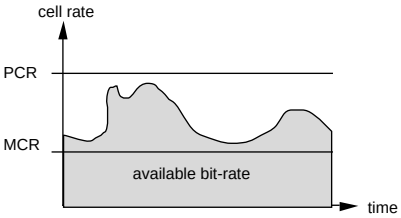
VBR is variable bit-rate traffic (is bursty).



The parameters used for a VBR service are Peak Cell Rate (PCR), Sustainable Cell Rate (SCR) and Maximum Burst Size (MBS). Once a traffic contract has been negotiated, the transmission of cells within the VBR parameters is guaranteed by the ATM network. The number of cells allowed to exceed the SCR is determined by the MBS. A cell-rate which exceeds the PCR is permissible.

What is Available Bit Rate? (not currently an option)

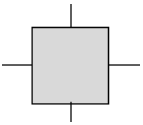
The parameters required to specify an ABR service are Minimum Cell Rate (MCR) and PCR which is necessary to limit the peak cell-rate.



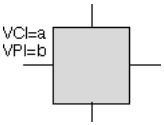
The area between MCR and PCR is known as the Allowed Cell Rate (ACR). The ACR varies, depending upon the current network situation.

What is a PVC, an ATM Virtual Link and a Cross Connect?

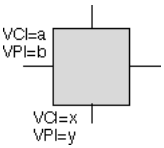
Consider first of all the configuring a 4 port switch. A port is just an attachment point, where data arrive and depart. In CELL-SHAPER there are of course only 2 ports.



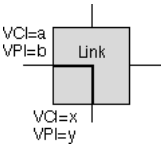
As an example, we would like to switch traffic from the left hand port to the bottom port. An ATM switch can't understand plain english, so we have to use switch parameters. Talking about the "left hand" port is no good, so we must assign an ATM address to it. An ATM address has 2 parts - VCI and VPI.



We must do the same for the "bottom" port.

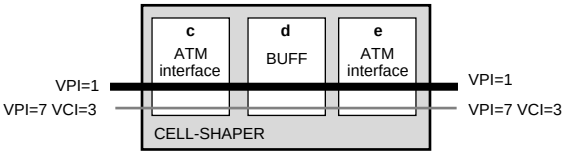


Now we have labelled both ports, we can tell the switch to join them up or cross connect them.



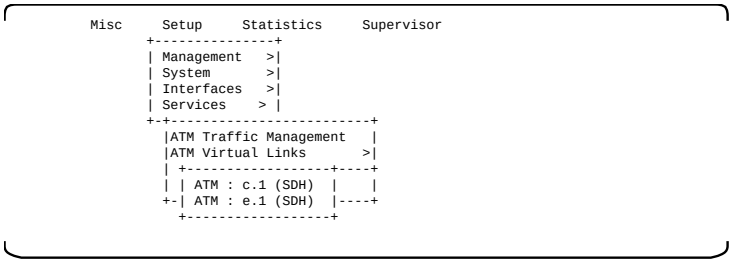
How to set up a PVC (permanent virtual circuit)

The example below shows a CELL-SHAPER with two ATM line interfaces in slots "c" and "e" and one CELL-BUFF board for traffic shaping in slot "d". There are 2 connections to be configured as shown.



Let's start with the ATM interface c.1 from the menu

How to assign the ATM addresses



The ATM addresses must be allocated first. Note that if several connections are required for one port, each connection requires it's own address. One port will thus have several addresses allocated.

```
+--------- ATM Virtual Link Table ATM : c.1 -----------+
|                                                      |
| Nr VPI  VCI Tx-TrDescr Rx-TrDescr Connstate AALtype  |
|                                                      |
|                                                      |
| [Add VCC] [Add VPC] [Delete] [Stats] [Reset] [Close] |
+------------------------------------------------------+
```

The ATM line interface in slot "c" requires 2 connections to the ATM line interface in slot "e", one using a channel (VCC) and another using a path (VPC).

Use [Add VCC], entering VPI=7 and VCI=3

```
  +--- Add Virtual Channel Connection ---+
  |    for port: ATM : c.1               |
  |                                      |
  |    VPI       Rx TrafficDescr         |
  |    7           1                     |
  |                                      |
  |    VCI       Tx TrafficDescr         |
  |    3           1                     |
  +--------------------------------------+
```

Use [Add VPC], entering VPI=1. No VCI needs entering as this is a path. Now the table should look like this.

```
+---------- ATM Virtual Link Table ATM : c.1 -----------+
|                                                       |
| Nr VPI  VCI  Tx-TrDescr Rx-TrDescr Conn state AALtype |
| 1   1   any         1           1      NONE       ??  |
| 2   7     3         1           1      NONE       ??  |
|                                                       |
| [Add VCC] [Add VPC] [Delete] [Stats] [Reset] [Close]  |
+-------------------------------------------------------+
```

Next, the ATM interface e.1. Use "ESC" to go one back and select the ATM-Line Interface in slot "e". Set the VCC's and VPC's in the same way as for c.1. See also ATM Traffic Descriptors.

The table for our example now looks like this.

```
+-------- ATM Virtual Link Table ATM : c.1 -----------+
|                                                     |
| Nr VPI VCI Tx-TrDescr Rx-TrDescr Conn state AALtype |
|  1   2   1         1          1  NONE          ??  |
|  2   2   2         1          1  NONE          ??  |
|  3   1  any        1          1  NONE          ??  |
|                                                     |
|[Add VCC] [Add VPC] [Delete] [Stats] [Reset] [Close] |
+-----------------------------------------------------+
```

Having configured the ports concerned, the next step is to set the cross connect table to link the ports as required.

Go to the menu

How to make the cross connections

```
Misc     Setup     Statistics     Supervisor
       +--------------+
       | Management   >|
       | System       >|
       | Interfaces   >|
       | Services    > |
       +-+-------------------------+
         |ATM Traffic Management   |
         |ATM Virtual Links       >|
         |Cross Connect            |
         |Operation & Maintenance  |
         +-------------------------+
```

The table looks like this.

```
+-------------- ATM Cross Connect Table -----------------+
|                                                        |
| Nr   Low port   VPI  VCI   High port  VPI  VCI  State  |
|                                                        |
|[Add VC-Cc] [Add VP-Cc] [Delete] [State] [Reset] [Close]|
+--------------------------------------------------------+
```

Use Add VC-Cc for the virtual channel connection -

```
+---- Add Virtual Channel Cross-Connect ----+
|                                           |
|    Low ATM Port      High ATM Port        |
|                                           |
|    Interface         Interface            |
|    AAL1 : c.2        ATM : e.1            |
|                                           |
|    VPI               VPI                  |
|    7                 2                    |
|                                           |
|    VCI               VCI                  |
|    2                 2                    |
|                                           |
|    [  OK  ]      [Cancel]                 |
+-------------------------------------------+
```

Use Add VP-Cc for the one virtual path. The final result should then look like this -

```
+-------------- ATM Cross Connect Table -----------------+
|                                                        |
| Nr   Low port   VPI  VCI   High port  VPI  VCI  State  |
|  1   ATM 1 c.1    7    1   ATM : e.1    2    1     up  |
|  2   ATM : c.1    1    -   ATM : e.1    1    -     up  |
|[Add VC-Cc] [Add VP-Cc] [Delete] [State] [Reset] [Close]|
+--------------------------------------------------------+
```

Done! Phew, have a nice cup of tea to celebrate.

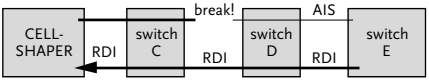
What is OAM?

Operations, Administration and Maintenance (OAM) is important for the smooth running of an ATM network. Special cells provides information relating to cell flow. OAM cells can be sent on the network using a unique header that uniquely identifies the cell as an OAM cell. These cells have a limited frequency. OAM is required to perform:

1. Fault Detection.
2. Fault Localisation.
3. Performance Monitoring. (not yet implemented)

Fault detection

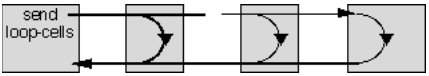
Consider the following example -



One of the cables is broken. Switch D detects the loss of input signal from switch C. It reacts to this by sending AIS (alarm indication signal) upstream. Switch E is the final destination for the ATM cells and when it receives AIS it replies with RDI (remote defect indication). RDI is passed unchanged through to CELL-SHAPER, which is the final destination for ATM cells going in this direction. When CELL-SHAPER receives RDI it knows that the data which it is sending is not getting through.

What it doesn't know (yet) is where the problem lies.

Fault Localisation



If each node in the network can be instructed to loop back cells received, then the break can be located. In our example, only the loop at switch C will work, switch D is not reachable, the loop can't work and so we have located the fault between switch C and D.

OAM cells are only looped when the "System Location ID" of the switch exactly matches the "System Location ID" in the OAM cell, otherwise the OAM cell will be passed along to the next node in the chain. In other words, to effectively diagnose an ATM network, the "System Location ID" of every node in the network must be known. These are unfortunately rather long hexadecimal numbers.

STATISTICS MENU EXPLANATION

```
Misc     Setup     Statistics     Supervisor
                  +---------------+
                  | Protocol    > |
                  | Interfaces  > |
                  | Services    > |
                  +---------------+
```

Statistics - Protocol

```
Misc     Setup     Statistics     Supervisor
                  +---------------+
                  | Protocol    > |
                  | +----------+  |
                  +-| Telnet  >|--+
                    +----------+
```

Currently, only the Telnet protocol is offered here.

Telnet

```
+---------------- Telnet statistics ----------------+
|                                                   |
|     nr incoming connections  :             0      |
|                     accepted :             0      |
|                     rejected :             0      |
|                       closed :             0      |
|                                                   |
|   current nr of users        :             0      |
|   nr general errors          :             0      |
|                                                   |
|   total bytes sent           :             0      |
|   total bytes received       :             0      |
|                                                   |
|   [X] autoRefresh      [Refresh]     [Close]      |
+---------------------------------------------------+
```

Statistics - Interfaces

```
Misc     Setup     Statistics     Supervisor
                  +---------------+
                  | Protocol    > |
                  | Interfaces  > |
                  | +-----------------------------+
                  +-| SDH/SONET                 > |
                    | DS1/E1/J2                 > |
                    | DS3/E3                    > |
                    +-----------------------------+
                    | ATM Interface Statistics  > |
                    | AAL 5                     > |
                    +-----------------------------+
                    | Reset ALL                 > |
                    +-----------------------------+
```

The statistics options show whether the individual services are working correctly or not as the case may be. If errors are reported in the statistics, the CELL-SHAPER configuration may need attention, the cabling may need checking or the attached equipment may be causing problems. If you

are having trouble, use the statistics to see if you can localise the source of the problems.

If "autoRefresh" is enabled, the statistics are updated every second. Use the space bar to disable this option. You can update the statistics manually with "refresh".

Statistics - Reset ALL

This resets all of the available statistics.

```
+-------------- Confirm ---------------+
|                                       |
|             Are you sure              |
|           you want to clear           |
|       ALL statistics counters ?       |
|                                       |
|        [  No   ]    [  Yes  ]         |
+---------------------------------------+
```

Which is quite dramatic, so you have to confirm.

Statistics - Interfaces - SDH/SONET

```
Misc     Setup     Statistics     Supervisor
                  +--------------+
                  | Protocol   > |
                  | Interfaces > |
                  | +--------------------------+
                  +-| SDH/SONET             > |
                    | +-------------+          |
                    +-| SDH : c.1   |----------+
                      | SDH : e.1   |
                      +-------------+
```

These statistics are concerned with line coding and framing. ATM statistics are shown separately under ATM Interface statistics.

Two interfaces will be found. Choose one of them and you will see something like this -

```
+-------- Physical Statistics : SDH : c.1 -------+
|                                                 |
| Interface               :  SDH : c.1            |
|                                                 |
| Near event                 State     Counter    |
| loss of signal          :  [   ]            0  |
| sec. OOF                :  [   ]            0  |
| sec. LOF                :  [   ]            0  |
| sec. BIP-8 (B1)         :  [   ]            0  |
| line AIS                :  [   ]            0  |
| line BIP-24 (B2)        :  [   ]            0  |
| line RDI (FERF)         :  [   ]            0  |
| line FEBE               :  -----            -  |
| path LOP                :  [   ]            0  |
| path FEBE               :  [   ]            0  |
| path AIS                :  [   ]            0  |
| path RDI (FERF)         :  [   ]            0  |
| path BIP-8 (B3)         :  [   ]            0  |
| path unequipped         :  [   ]            0  |
|                                                 |
|   [X] autoRefresh    [Refresh]    [Close]       |
+-------------------------------------------------+
```

loss of signal (LOS)

is set when no transitions are detected on the incoming signal.
or if the BER (bit error rate) exceeds 10 ** -3.
is reset when 2 consecutive, valid frames are detected.

sec.OOF (section Out Of Frame)

is set when 4 contiguous errored frame alignment signals have been received.
is reset upon detecting two contiguous error-free frames.

sec.LOF (section Loss Of Frame)

is set when an OOF persists for 3ms.
is reset when the incoming signal remains continously in-frame for 1ms to 3ms.

sec.BIP-8 (B1)

Section Bit Interleaved Parity. This 8-bit parity word is used for the error message.

line AIS (Line Alarm Indication Signal)

is defined in ANSI T1.105.
is set within a few microseconds of LOS or LOF occuring

sec.BIP-24 (B2)

This 24-bit-parity-word is used for the multiplex error message.

line RDI - FERF (Remote Defect Indication - Far End Receive Failure)

is defined in ANSI T1.105.
is set within 250 microseconds of LOS, LOF or line AIS.

line FEBE (Far End Bock Error)

indicates that the far end has detected errors in the last frame that it received from the line.

path LOP (Loss of Pointer)

is set when either a valid pointer is not detected in eight consecutive frames, or is set when eight consecutive frames are detected with the new Data Flag set to "1001" without a valid concatenation indicator.
is reset when either a valid pointer with a normal NDF set to "0110", or is reset when a valid concatenation indicator is detected for three contiguous frames.

path FEBE (Far End Bock Error)

indicates that the far end has detected errors in the last frame it received from the path.

path AIS (Path Alarm Indication Signal)

is defined in ANSI T1.105.

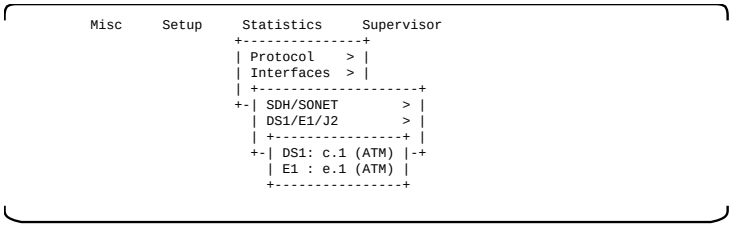
path RDI - FERF (Remote Defect Indication - Far End Receive Failure)

is defined in ANSI T1.105.

path BIP-8 (B3)

This 8-bit parity word is used for the path error message function. path unequipped the VC-4 payload is not marked as ATM cells.

Statistics - Interfaces - DS1/E1/J2



These statistics are concerned with line coding and framing. ATM statistics are shown separately under ATM Interface statistics. Two interfaces will be shown. Choose one of them and you will see something like this -

```
+------ Physical Statistics : DS1 : c.1 --------+
|   Interface               :  DS1: c.1          |
|                                                |
|   Event                     State   Counter    |
|   loss of signal          :  [   ]         0   |
|   loss of frame           :  [   ]         0   |
|   far end alarm           :  [   ]         0   |
|   payload AIS             :  [   ]         0   |
|   CRC performance failure :  [   ]         0   |
|   alarm indication signal :  [   ]         0   |
|   out of frame            :  [   ]         0   |
|   bipolar violation       :  [   ]         0   |
|   excessive zeroes        :  [   ]         0   |
|   line coding violation   :  [   ]         0   |
|   path coding violation   :  [   ]         0   |
|   controlled slip         :  [   ]         0   |
|                                                |
|   [X] autoRefresh    [Refresh]    [Close]      |
+------------------------------------------------+
```

Note that not all interfaces support all of these options. Only the options supported will actually be displayed.

loss of signal

for T1, this is set when 175 +/-75 contiguous pulse positions show no pulses of either polarity.

for E1, this is set when more than 10 consecutive zeroes are detected

loss of frame

for T1 frames is set when OOF or LOS has persisted for 2-10s

for E1, this is set when OOF is detected

far end alarm

for E1, this is set when bit 3 of time-slot zero is high on two consecutive occasions

this is reset when bit 3 of time-slot zero is received set to zero.

payload AIS

is set when an error in the payload is detected.

CRC performance failure

is set when a checksum error is detected.

alarm indication signal

is set when an AIS is received from an upstream device.

out of frame

is set when too many framing errors occur.

bipolar violation

for an AMI-coded signal, this is if 2 consecutive pulses have the same polarity (which is not allowed)

for a B8ZS- or HDB3-coded signal is if 2 consecutive pulses have the same polarity without being a part of the zero substitution code.

excessive zeroes

for an AMI-coded signal is the occurence of more than fifteen contiguous zeroes (which is not allowed).

for a B8ZS coded signal is the occurence of more than seven contiguous zeroes (which is not allowed).

line coding violation

is set for either BPV or EXZ

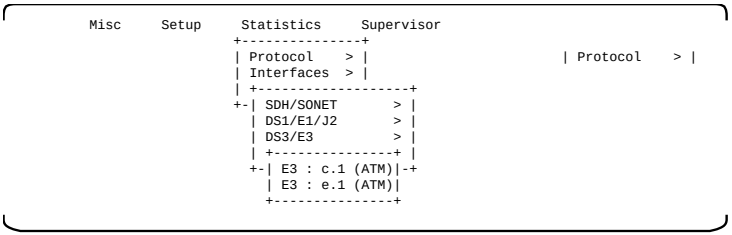
path coding violation

is a frame synchronization bit error in the E1 CRCless mode or a CRC error in the E1 CRC mode.

controlled slip

This is when there is a difference between the timing of a synchronous TE and the received signal.

Statistics - Interfaces - DS3/E3



These statistics are concerned with line coding and framing. ATM statistics are shown separately under ATM Interface statistics. Two interfaces will be shown. Choose one of them and you will see something like this -

```
+-------- Physical Statistics : E3 : h.1 -------+
|                                                |
|   Interface               :  E3 : h.1          |
|                                                |
|   Event                      State   Counter   |
|   loss of signal          :  [   ]         0   |
|   loss of frame           :  [   ]         0   |
|   far end alarm           :  [   ]         0   |
|   alarm indication signal :  [   ]         0   |
|   out of frame            :  [   ]         0   |
|   bipolar violation       :  -----         0   |
|   excessive zeroes        :  -----         0   |
|   line coding violation   :  -----         0   |
|   P-bit coding violation  :  -----         -   |
|   C-bit coding violation  :  -----         -   |
|                                                |
|  [X] autoRefresh     [Refresh]    [Close]      |
+------------------------------------------------+
```

Note that not all interfaces support all of these options. Only the options supported will actually be displayed. ----- means not supported.

loss of signal

for DS3, this is set when 175 +/-75 contiguous pulse positions show no pulses of either polarity.

loss of frame

for T1 frames is set when OOF or LOS has persisted for 2-10s

ends when reframe occurs.

far end alarm

is set if the two x-bits in an M-frame are zero.

alarm indication signal

is set after DS3 AIS is present in contiguous M-frames.

out of frame

for DS3 is set when three or more errors occur in sixteen or fewer consecutive F-bits, within a DS3

M-frame.

is reset when reframe occurs.
for E3 is set when four consecutive frame alignment signals were not correctly received in the right position.

bipolar violation

for an HDB3-coded signal (E3) is if 2 consecutive pulses have the same polarity without being a part of the zero substitution code.

excessive zeroes

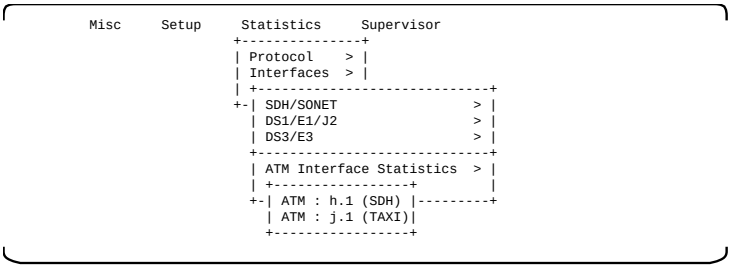
for an HDB3-coded signal (E3) is the occurence of more than xxx contiguous zeroes (which is not allowed).

for a B3ZS coded signal is the occurence of more than yyy contiguous zeroes (which is not allowed).

line coding violation

is set for either BPV or EXZ

Statistics - Interfaces - ATM



These statistics are not concerned with line code violations or framing errors, but consider the ATM layer of the transmission protocol stack. Two interfaces will be shown. Choose one of them and you will see something like this -

```
+----------------- ATM : h.1 (SDH) -------------------+
|                                                     |
| collected since            23-01-1998  23-01-1998   |
|                             10:29:14    14:21:19    |
|                                                     |
| sent cells                :    0            0       |
|                                                     |
| received cells            :    0            0       |
|  valid cells              :    0            0       |
|  corrupted cells          :    0            0       |
|  recovered cell           :    0            0       |
|  discarded cells          :    0            0       |
| idle cells                :    0            0       |
|                                                     |
| loss of cell-sync counter :    0            0       |
|                                                     |
| estimated bitrate [bps]        0                    |
|                                                     |
|[X]autoRefresh  [Refresh]  [Clear]  [Reset]  [Close] |
+-----------------------------------------------------+
```

There are 2 columns of statistics here. The left hand column shows the total since the time at the top of the column (10:29). The right hand column is the same but can be reset to 0 with the [Clear] button. This will change the time at the top, to the current time. The left hand column is not affected by [Clear]. Both columns are reset to 0 with [Reset].

sent cells

The number of ATM cells sent (transmitted). No errors are transmitted.

received cells

The total number of cells received.

valid cells

the number of error-free ATM cells received, with valid VCI/VPI values.

corrupted cells

The total number of errored cells received.

recovered cells

The number of errored cells which could be successfully repaired

discarded cells

The number of errored cells which could not be repaired and were discarded.

idle cells

The total number of idle cells received.

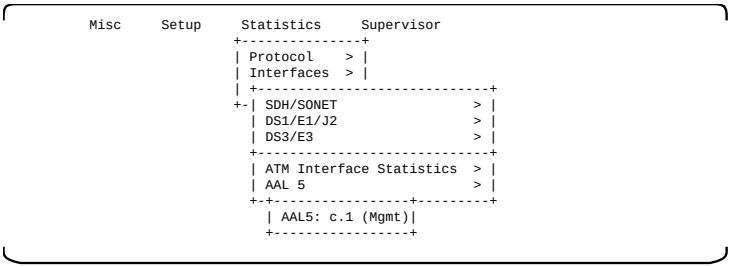
loss of cell-sync counter

The number of occasions when the synchronisation to received cells was lost.

estimated bitrate [bps]

An estimate of the payload carried, averaging over 1 or 2 seconds

Statistics - Interfaces - AAL5



These statistics are not concerned with line code violations or with the ATM layer, they are concerned with the ATM adaption layer type 5 only.

```
+----------------- AAL5 : Unit1 -------------------+
|  collected since        10-01-1997   10-01-1997  |
|                          11:36:10     15:21:20   |
|  tx cells        :          0            0       |
|  tx pkts         :          0            0       |
|  tx bytes        :          0            0       |
|  tx dropped pkts :          0            0       |
|  tx rate (bits/s):          0                    |
|  av. tx pkt len  :          0                    |
|                                                  |
|  rx cells        :          0            0       |
|  rx pkts         :          0            0       |
|  rx bytes        :          0            0       |
|  rx dropped pkts :          0            0       |
|  rx rate (bits/s):          0                    |
|  av. rx pkt len  :          0                    |
|                                                  |
| [X]autoRefresh [Refresh] [Clear] [Reset] [Close] |
+--------------------------------------------------+
```

There are 2 columns of statistics here. The left hand column shows the total since the time at the top of the column (11:36). The right hand column is the same but can be reset to 0 with the [Clear] button. This will change the time at the top, to the current time. The left hand column is not affected by [Clear]. Both columns are reset to 0 with [Reset].

tx cells/rx cells

The number of ATM cells sent/received by the AAL5 layer

tx pkts/rx pkts

The number of packets (AAL5-PDUs) sent/received

tx bytes/rx bytes

The number of bytes sent/received by the AAL5 layer

tx dropped pkts/rx dropped pkts

The number of packets discarded before completion

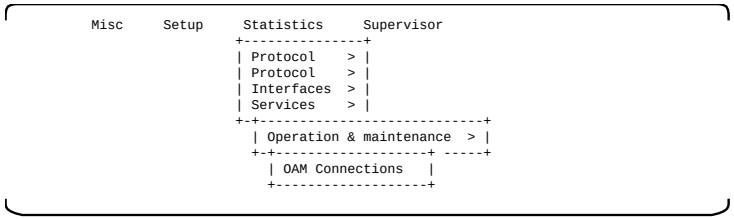
tx rate (bits/s)/rx rate (bits/s)

The average bit-rate measured over 1 second

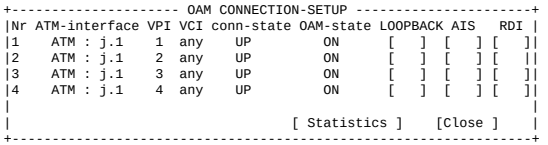
av. tx pkt len/av. rx pkt len

The average packet length measured over 1 second

Statistics - Services - OAM

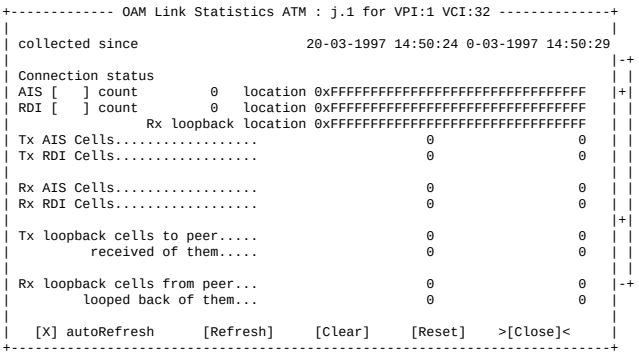


Currently, the only service with statistics is Operations, Administration and Maintenance.



First, you have to choose for which of the OAM connections you would like to see statistics. This brief overview shows whether AIS or RDI alarms are ringing and whether a loop-back check has been enabled.

Statistics - Services - OAM statistics



There are 2 columns of statistics here. The left hand column shows the total since the time at the top of the column (11:36). The right hand column is the same but can be reset to 0 with the [Clear] button. This will change the time at the top, to the current time. The left hand column is not affected by [Clear]. Both columns are reset to 0 with [Reset].

Alarm Indication Signals

"AIS [X]"
Means that an AIS is currently being received, signalling a fault on the receive (incoming) connection.

"AIS state counter"
Shows how often AIS has become active.

"Rx AIS Cells "
Shows the number of AIS OAM cells received on this link.

"Tx AIS Cells "
Shows the number of AIS OAM cells transmitted on this link.

Remote Defect Indication

"RDI [X]"
Means that an RDI is currently being received, signalling a fault on the transmit (outgoing) connection.

"RDI state counter"
Shows how often RDI has become active.

"Rx AIS Cells"
Shows the number of RDI OAM cells received on this link.

"Tx AIS Cells"
Shows the number of RDI OAM cells transmitted on this link.

Loop-back OAM cells

"Tx loopback cells to peer"
The number of loop-back cells transmitted on the link (they should all come back)

"received of them"
The number of loop-back cells which were successfully looped back by the remote equipment to arrive and be counted here

"Rx loopback cells from peer"
The number of loop-back cells received on the link originated by someone else (no ID match required for them to be counted)

"looped back of them"
The number of the loop-back cells received with an ID match which were then looped-back

SUPERVISOR MENU EXPLANATION

The Supervisor menu will only appear if the supervisor password was used at log-in. This allows more control over access and changes to the equipment.

```
Misc     Setup     Statistics     Supervisor
                                  +-------------------------+
                                  | Software Update         |
                                  | Undo Software Update    |
                                  | Save/Load Configuration |
                                  | Reboot                  |
                                  +-------------------------+
```

Supervisor - Software update

The Supervisor menu will only appear if the supervisor password was used at log-in. This allows more control over access and changes to the equipment.

How to do an update

When you select the Software Update option, you will be presented with the following screen. TFTP is the trivial file transfer protocol. If you don't know what this is or how to start a TFTP server in your network, you will need assistance from your network manager.

```
+--- TFTP-software update ----+
|                              |
|   Enter TFTP-Host            |
|   193.96.231.22              |
|                              |
|   Enter filename             |
|   master.rm2                 |
|                              |
|  [ Cancel ]   [   Ok   ]     |
+------------------------------+
```

Once you have filled in the details, an update can begin, which is preceded by a reminder/warning.

```
+-------------- Confirm ---------------+
|                                      |
|     Performing a software update     |
|       will destroy the current       |
|            Flash contents!           |
|               Proceed ?              |
|                                      |
|        [  Yes  ]    [  No   ]        |
+--------------------------------------+
```

Flash is a type of nonvolatile storage. To proceed, answer Yes.

If you see the following, you have not configured/started the TFTP server properly. Ask your network manager for assistance.

```
+--------------- Error ----------------+
|        Software update failed!       |
|            no answer from            |
|          host 193.96.231.22          |
|                                      |
|              [  OK   ]               |
+--------------------------------------+
```

If you see the following, then things are working and you can relax for a while.

```
  +--- Flash-Ram erase progress ----+
  | 0%                         100% |
  | ***************************  |
  +-----------------------------------+
      +--- Flash-RAM usage ----+
      | 0%               100% |
      | ************          |
      +-----------------------+
```

You may still see this...

```
+--------------- Error ----------------+
|                                      |
|        Software update failed!       |
|     TFTP-transfer did NOT succeed    |
|                 Sorry                |
|                                      |
|               [Cancel]               |
+--------------------------------------+
```

If this above appears please try again, check your TFTP-Host, the IP-address and the Ethernet connection.

If the screen below appears, you had more luck.

```
+-------------- Confirm ---------------+
|                                      |
|       Tftp-software update was       |
|    successful ! Please reboot this   |
|  system in order to let changes take |
|                 effect               |
|                                      |
|        [  Yes  ]    [  No   ]        |
+--------------------------------------+
```

Taraaa! It worked! Go for Reboot and wait for the system to restart. Lots of useful information is then shown.

```
-----------------------------------------------------------------
SYSTEM CONFIGURATION:
The update version has been loaded
This system will restore settings from previous configuration
HARDWARE CONFIGURATION:
This system will use previous hardware settings
NETWORK INTERFACE PARAMETERS:
Ethernet MAC-address is 08:00:3e:24:36:09
IP-address on LAN (ethernet) is 193.96.231.250
Baudrate on serial-port 1 is 19200
-----------------------------------------------------------------
```

Note that the system remembers the previous configuration options, so it is not necessary to completely reconfigure the equipment.

S-records

CELL-SHAPER software updates can be delivered on DOS diskettes or fetched from our ftp server in a format commonly known as "S-record". This format is designed for easy transfer of binary code information (where each byte can have any decimal value from 0 to 255) and is so encoded that

only normal ASCII text characters are required for the transmission process, thus avoiding the problem of what to do with decimal values used for control functions e.g. for flow control.

It is not necessary to understand S-records or to do any conversion. Care should be taken however, to use a simple ASCII (plain text) file transfer. If using the serial line interface, do not use a file transfer process designed for "binary" files such as X-modem or Kermit.

CELL-SHAPER expects to receive an S-record, plain and simple.

Important accessory whilst updating

FLASH memory is slow to erase and even slower to program. Programming (updating) via Ethernet can then take a while. At present, this process takes somewhat less than a minute.

Cellware's FTP server

Cellware maintains an FTP server from which you can download new versions of the CELL-SHAPER software. Please consult with Cellware before trying to use this server as you may need a password.

How to get an update step by step

New software must first be transferred to your local TFTP-server from Cellware's ftp-server. You will need advice from Cellware about the appropriate version number, the name of the file, your allocated user-name and your user-password.

You can use ftp from your web browser, type ftp://ftp.cellware.de/ as the URL.

Your WWW-browser may not support ftp. If it does not work, you will have to use more conventional ftp tools. Using such a tool enter ftp ftp.cellware.de (ask for an ftp connection to our ftp server) An example dialogue follows. The part which you would type is shown bold.

1. Log in to our ftp-server (ftp.cellware.de).

```
yourunixprompt>ftp ftp.cellware.de
Connected to ftp.cellware.de.
220 Netri FTP server (Version wu-2.4.2-academ[BETA-11](1) Tue Dec 10 13:53:54 ME
T 1996) ready.
Name (ftp.cellware.de:kim): user-name
331 Password required for user-name.
Password: user-password
230 User user-name logged in.

ftp> ls
200 PORT command successful.
150 Opening ASCII mode data connection for file list.
pub
bin
usr
dev
cell
```

```
shaper
signal
226 Transfer complete.
54 bytes received in 0.015 seconds (3.6 Kbytes/s)
```

2. Change directory to SHAPER

```
ftp> cd shaper
CWD command successful.
```

3. Change directory to the version of the software which you have been advised to use. For example v205

```
ftp> cd v250
CWD command successful.
```

4. Change to binary mode by typing

```
ftp> bin
200 Type set to I.
```

5. Now get the new software suggested by Cellware, for example

```
get shaper.rm2
ftp> get shaper.rm2 PORT command successful.
150 Opening BINARY mode data connection for shaper.rm2 (184976 bytes).
226 Transfer complete.
local: shaper.rm2 remote: shaper.rm2
1849760 bytes received in 5 seconds (3.6e+02 Kbytes/s)
```

6. When the transfer has been completed, log out by typing

```
ftp> quit
221 Goodbye.
[~]
midas#
```

If you get stuck with ftp...

There is an ftp help command. You might see something like this -

```
ftp> help
Commands may be abbreviated.  Commands are:
!               cr              macdef          proxy           send
$               delete          mdelete         sendport        status
account         debug           mdir            put             struct
append          dir             mget            pwd             sunique
ascii           disconnect      mkdir           quit            tenex
bell            form            mls             quote           trace
binary          get             mode            recv            type
bye             glob            mput            remotehelp      user
case            hash            nmap            rename          verbose
cd              help            ntrans          reset           ?
cdup            lcd             open            rmdir
close           ls              prompt          runique

ftp> help get
get             receive file

ftp>
```

7. Make sure that the file is on your local TFTP-server

8. Make sure that your CELL-SHAPER is connected to your TFTP-server via Ethernet. You MUST be able to reach the CELL-SHAPER from your TFTP server!!!

To check this, send a PING from your TFTP server to the CELL-SHAPER. If this fails, check the cables and or the IP configuration of the TFTP server & CELL-SHAPER

9. Make sure that the TFTP daemon is running.

10. Now select "Software Update" from the CellScreen-supervisor menu and fill in the correct filename (in our example master.rm2) and the IP-address of your TFTP-server.

11. If you are sure that everything has been set up correctly answer the "are you sure" message box with Yes.

12. At this time the software will be transferred from your local TFTP server into the CELL-SHAPER's memory (this will take a couple of minutes)

13. If something goes wrong during the transfer, check the hardware and or configuration and try again.

14. If the transfer was successful , a message box will be displayed, indicating that you must reboot, in order to activate the new-software.

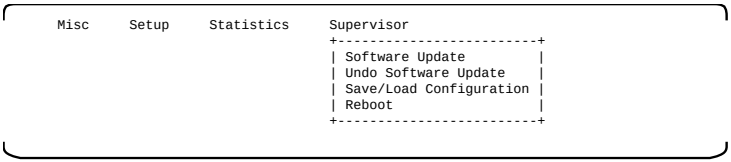
15. All of your settings (PVC's etc) will be kept in memory, so you can reboot by selecting 'reboot' or push the reset-button.

16. After about 30 seconds the new software will run. To verify that the upgrade was successful, log in and select the 'Info' submenu from the 'Misc' menu. The version number now displayed should match that supplied by Cellware.

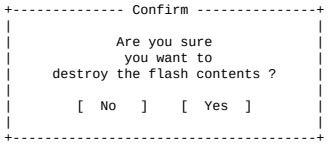
Fail-safe

A permanent, (unerasable) minimum version of the software is always available, in case an update fails for any reason.

Supervisor - Undo software update



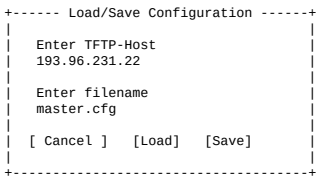
This process will erase the software version currently kept in the FLASH memory. The equipment will then restart with the older, indestructible version, which was installed in the factory.



Any new features associated with the version of the software kept in FLASH will be lost.

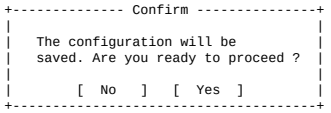
Supervisor - Save/Load Configuration

The configuration table can be saved to or fetched from a TFTP-Host. A connection between CELL-MASTER and the TFTP-Host is required of course, for example via Ethernet.

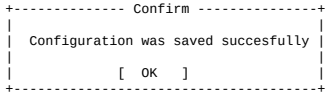


How to save the configuration

To save the file on the TFTP-Host, enter its IP-address, choose a filename, go to the "Save" field and hit enter.



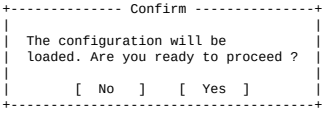
Select "Yes" and hit enter to save the file. If everything was OK you will see the following



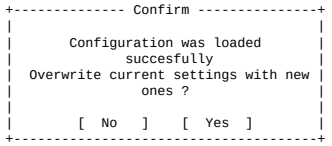
The file be now in the TFTP-path, on the TFTP-host.

How to load a configuration

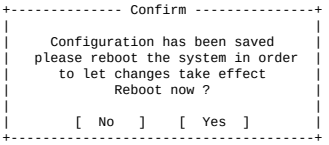
To load a configuration file from the TFTP-Host, enter the IP-address and the filename go to the "Load" field and hit enter.



Select "Yes" to load the file.



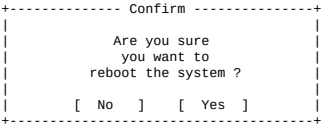
Choose "Yes" to alter the non-volatile configuration table (in FLASH).



The equipment must be restarted from zero (rebooted) for the changes to take effect. This will briefly interrupt the normal operation of the equipment.

Supervisor - Reboot

Reboot means to restart the system from zero. Parameters kept in Flash will be reused, but volatile memory will be cleared, allowing a "clean" start. This command will interrupt normal operation briefly, so don't do it unless you have good reason.



Just checking...

FURTHER READING

For further information, please refer to:

ATM Forum UNI3.1 User-Network Interface Specification

ATM Forum UNI4.0 User-Network Interface Specification

ATM Forum TM4.0 Traffic Management Specification

ATM Forum ILMI Integrated Local Management Interface Specification

ITU Rec. I.371 Traffic control and congestion control in B-ISDN

CELL-SHAPER AND EMI

CELL-SHAPER is CE conformant.

CELL-SHAPER has been tested in Berlin for

- the interference which it radiates
- the interference which it injects into the power supply
- its susceptibility to electrostatic discharge
- its susceptibility to electromagnetic fields
- its susceptibility to fast voltage transients (bursts)

The complete test reports are available for inspection in Berlin either in german or english.

NOTE!

The few details quoted here in no way replace the complete report.

The performance listed is only achieved when the Cellware system is in its delivered condition. If you remove any module or blanking plate, you will make a hole in the electromagnetic shielding and these test results will no longer apply and the corresponding standards will no longer be met.

Radiated interference

CELL-SHAPER meets DIN EN55022:1995 class A.

Interference injected into the power supply

CELL-SHAPER meets DIN EN55022:1995 class A.

Susceptibility to electrostatic discharge

CELL-SHAPER meets DIN EN60801 T2:1994.

(The air discharge test voltage was 8 kV. The contact test voltage 4 kV.)

Susceptibility to electromagnetic fields

CELL-SHAPER meets DIN V ENV50140:1995.

(The frequency range used was 26-1000 MHz, the field strength 3 V/m.)

Susceptibility to fast transients (bursts)

CELL-SHAPER meets prEN 6100-4-4:1994.

(1 kV on the power feed, 500 V capacitively to signal cables)

WHO CAN I TALK TO?

You can always talk to CELLWARE here in Berlin. There is usually someone in the office from 9 o'clock in the morning to 6 o'clock in the evening, Central European Time (CET).

Klaus Lohse is our general manager and he can either help you himself or he will organise the right specialist to help you.

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