SHDSL

Teldat-Dm 742-I

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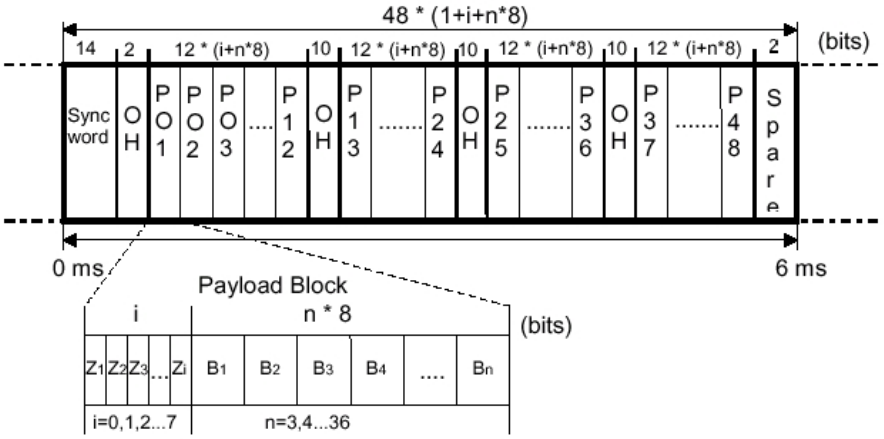
Chapter 1 SHDSL Technology

1.1 SHDSL

The G.SHDSL standard (Single-Pair High-Speed Digital Subscriber Line), ITU G.991.2 recommendation describes a method for data transmission in telecommunications access networks.

Modems designed with this technology permit transmission of data at rates from 192 Kbps up to 5696 Kbps over conventional telephone pairs, partly thanks to the use of TC-PAM (Trellis Coded Pulse Amplitude Modulation) line codification.

G.SHDSL is a purely digital technique.



G.SHDSL.bis adds:

- Two new annexes (F/G) that enable the use of 32 TCPAM encoding to offer higher bit rates
- The use of Packet Transfer Mode (PTM) to support Ethernet in the First Mile (ETM)

PTM, dedicated to the transport of Ethernet frames, has three main advantages over ATM-AAL5:

- ATM has not been imposed as a technology in the carrier networks and the standard is in fact Ethernet (which means many of the advantages that provided by ATM are lost and therefore unnecessary)
- The increase in bandwidth provided by the new annexes makes encapsulation efficiency an important consideration: ATM-AAL5 has an efficiency of about 88%, while PTM-Ethernet pushes bandwidth efficiency up to 98%
- EFM includes bonding of physical lines in its most basic definition, while bonding in ATM mode is a later addition (M-pair and IMA) and, therefore, more complex and less robust.

Chapter 2 SHDSL Configuration

2.1 Accessing the interface configuration

To access the SHDSL interface configuration menu, you must first access the ATM interface linked to the SHDSL interface through the **network** <**ATM interface**> command, located in the general configuration menu. Once in the ATM interface, access the physical configuration layer using the **phy** command:

```
Config>network atm1/0

-- ATM interface configuration --
atm1/0 config>phy

------ SHDSL Config -------
atm1/0:shdsl0 config>
```

There are certain commands that are common to all the device interfaces. These commands are described in the interfaces common configuration manual (Teldat-Dm772-I Common Configuration Interfaces).

Devices supporting SHDSL in PTM/EFM mode also support ATM modes. With a view to minimizing the impact of PTM/EFM support on the configuration and monitoring of our devices:

- In a device with a SHDSL interface that only supports ATM, there is an ATM interface (atmx/y) with a submenu (phy) providing access to the SHDSL.
- In a device with a SHDSL interface that supports both ATM and PTM, there is:

  An ATM interface (atmx/y) with a submenu (phy) which provides access to the SHDSL (physical layer).

  An Ethernet interface (ethernetx/y) which represents the data interface when the connection is established in PTM/EFM mode, associated with the same connector as the ATM interface.

Therefore, everything relating to SHDSL technology is contained in the ATM interface submenu phy while everything relating to the data interface is contained in:

- The ATM interface and subinterfaces where the negotiated encapsulation is ATM, i.e. this is only UP when the SHDSL link is using ATM mode.
- The associated Ethernet interface where the negotiated encapsulation is PTM, i.e. this is only UP when the link is using PTM mode.

Note

While you would expect the “ptmx/y” to be defined in a similar way to the “atmx/y”, this is not the case. This is because only Ethernet is transported over PTM and it seems more natural to think of a SHDSL-PTM connection as an Ethernet interface where a copper pair and PTM are used rather than a class 5 twisted pair and 802.3 protocol.

2.2 Interface Configuration Commands

The SHDL configuration commands are described and numerated in this section.

Command	Function
? (HELP)	Lists the available commands or their options.
ADVANCED	Allows you to configure the specific parameters for each chipset.
IGNORE-ERRORS-SECONDS	Establishes the initial connection seconds during which the errors in the connection are ignored.
LINE-RATE	Allows you to configure the line-rate.
LIST	Displays all of the current configuration.
NO	Negates a command or sets its default value.
OPEN-MODE	Configures the open mode (standard, annex, etc.).
PTM-BUNDLE-CONTROL	Defines parameters to control the state of a PTM interface that is using several

	links (bonding)
SHUTDOWN	Deactivates the interface.
EXIT	Exits the SHDSL configuration menu.

2.2.1 ADVANCED

Allows you to configure specific parameters for each chipset.

These commands should only be used under the express instructions of our technical team. Incorrect configuration may leave the interface inoperative.

2.2.2 IGNORE-ERRORS-SECONDS

When the connection is established with some DSLAMs, there is a brief transitory phase where some errors may be detected; these errors are ignored with this command. Once the connection has passed through this phase, it's completely stable and valid.

```
atm1/0:shdsl0 config>ignore-errors-seconds <0..127>
```

0	Deactivates the aforementioned mechanism.
1…127	Number of seconds during which the initial errors are ignored.

By default, the errors are ignored for 15 seconds.

2.2.3 LINE-RATE

Allows you to configure the SHDSL line opening rate.

```
atm1/0:shdsl0 config>line-rate <192..5696>
atm1/0:shdsl0 config>line-rate auto [current-snr <-10..21>]*
           [worst-snr <-10..21>]*
           [probing <standard | globespan>]*
```

auto	The rate is negotiated on establishing the link and is the result of the line conditions (length, noise, attenuation, etc.), and the speeds permitted by both ends.
current-snr	Defines the required noise margin (in dB) for the current conditions of the line. Default: 0 dB
worst-snr	Defines the required noise margin (in dB) for the worst standard predefined line conditions. Default: disabled
probing	Line probing method to use. In fix rate mode, line probing is disabled.
standard	Default
globespan	Special mode to improve interoperability with GlobeSpan-based ends.
192…5696	Link rate in Kbps, per pair (if the line conditions or the remote end do not permit these, then the link is not established).

*Available depending on the hardware

Note

The configured rate does not include the overhead for the links (8 Kbps per link; therefore, 8 Kbps in2-wire links and 16 Kbps in 4-wire links) given that the bandwidth is not available for the user and is reserved for the standard operation.

Note

We recommend that you make the open rate explicit (including "auto") and do not delegate the value assigned by default.

2.2.4 LIST

Displays the whole of the interface configuration.

Example:

```
atm1/0:shdsl0 config>list

Chipset:        Conexant Orion Single Channel (PCI with PQ2SAR)

Open mode:
  Equipment:    CPE
  Standard:     ITU G.991.2 (G.Shdsl)
  Annex:        A (North America)
  Wire mode:    2-wire

Line rate: Default -> auto
   Current SNR 0 dB
   Worst SNR disabled
   Line Probing: default -> standard

Ignore Errors Seconds:   Default # 15

Admin status:   UP
```

2.2.5 NO

This command is used to disable functionalities or to set the default values for some parameters.

2.2.6 OPEN-MODE

Allows you to configure the SHDSL interface open-mode.

```
atm1/0:shdsl0 config>open-mode <cpe | co> g.shdsl
                            annex <a | b | b-anfp | a/b | a/b-anfp |
                                   f | g | a/f | b/g | a/b/f/g>
                            <2-wire | 4-wire-standard | 4-wire-enhanced |
                             1-pair-ptm | 2-pair-ptm | 3-pair-ptm | 4-pair-ptm |
                                 1-pair-mpair | 2-pair-mpair | 3-pair-mpair | 4-pair-mpair>
                            [pair-map <0-3>]
```

cpe | co	Configures the operating mode: user device - CPE – Customer Premises Equipmental central device - CO – Central Office
g.shdsl annex	Determines the ITU G.991-2 recommendation annex going to be used.
A	North America
B	Europe
B-ANFP (*)	Europe (Access Network Frequency Plan)
A/B (*)(+)	This adapts to the annex requested (A or B) by the other end.
A/B-ANFP (*)(+)	This adapts to the annex requested (A or B-ANFP) by the other end.
F (*)	North America (G.SHDSL.bis)
G (*)	Europe (G.SHDSL.bis)
A/F (*)	North America (G.SHDSL / G.SHDSL.bis)
B/G (*)	Europe (G.SHDSL / G.SHDSL.bis)
A/B/F/G (*)	
2-wire	Establishes the operating mode for two wires (ATM)
4-wire-standard (*)	Establishes the operation mode for four wires with the two channels linked (there is only one effective negotiation) (ATM)
4-wire-enhanced	Establishes the operating mode for four wires with the two channels unlinked (there are two ne-

(*)	gotiations; the status of one link does not affect the status of the other).(ATM)
1-pair-ptm (*)	Defines a link in PTM mode using 1 pair
2-pair-ptm (*)	Defines a link in PTM mode using 2 pairs in EFM bonding mode
3-pair-ptm (*)	Defines a link in PTM mode using 3 paris in EFM bonding mode
4-pair-ptm (*)	Defines a link in PTM mode using 4 paris in EFM bonding mode
1-pair-mpair (*)	Defines a link in ATM mode using 1 pair
2-pair-mpair (*)	Defines a link in ATM mode using 2 pairs in M-pair mode
3-pair-mpair (*)	Defines a link in ATM mode using 3 pairs in M-pair mode
4-pair-mpair (*)	Defines a link in ATM mode using 4 pairs in M-pair mode
pair-map <0-3> (*)	Optional
	Selects the physical pairs to be used by the link. In case of collision, the interface with the lowest index gets the pairs and all the colliding interfaces are disabled.

(*) Available depending on the type of hardware

(+) Only in CPE mode.

By default, the open mode is CPE in Annex B 2-wire.

Note

We recommend that you make the open rate explicit and not delegate the value assigned by default.

Note

If the open mode is modified, the line rate configuration is set back to default.

2.2.7 PTM-BUNDLE-CONTROL

Defines the parameters that control the availability of the Ethernet-PTM interface.

```
atm1/0:shdsl0 config>ptm-bundle-control [min-aggregated-rate <192..22784>]
         [min-links <2..4>]
```

min-aggregated-rate	When the SHDSL interface is configured to operate in PTM mode, the corresponding Ethernet-PTM interface will only be declared up if the aggregate rate offered by the SHDSL interface (calculated by adding up the rate of all the active pairs in the bonded group) meets this lower limit. Default: disabled
min-links	Similar to the previous parameter but applied to the number of active pairs in the bonding group. Default: disabled

2.2.8 SHUTDOWN

Detains any SHDSL interface activity.

2.2.9 EXIT

Returns the access to the ATM configuration menu.

2.3 Commands Summary

```
[no] advancedmindspeed-zipwire-plus <0x0..0xffff> <0x0..0xff> <0x0..0xff>
conexant-orion         <1..65535> <0 | 1> <0..65535> <0x0..0xffff>
lantiq-socrates-4e <1..65535> <0..65535> <0x0..0xffffffff>
                                          <0x0..0xffffffff>

[no] ignore-errors-seconds<0..127>

[no] line-rateauto [current-snr <-10..21>] [worst-snr <-10..21>]
                    [probing <standard|globespan>]>
[no] line-rate<192..5696>

[no] open-mode <cpe |co> g.shdsl
                annex <a | b | b-anfp | a/b | a/b-anfp | f | g | a/f | b/g | a/b/f/g>
               <2-wire       | 4-wire-enhanced | 4-wire-standard |
                1-pair-ptm   | 2-pair-ptm      | 3-pair-ptm      | 4-pair-ptm |
                1-pair-mpair | 2-pair- mpair   | 3-pair- mpair   | 4-pair- mpair>
               [pair-map <0-3>]

[no] ptm-bundle-control [min-aggregate-rate <192..22784>] [min-links <2..4>]

[no] shutdown

exit
```

Chapter 3 SHDSL Monitoring

3.1 Accessing the interface monitoring

To access the SHDSL interface monitoring menu, you must first access the ATM interface linked to the SHDSL interface through the **network** <**ATM interface**> command, located in the general monitoring menu. Once in the ATM interface, access the physical monitoring layer using the **phy** command:

```
+network atm1/0

-- ATM Console --
atm1/0 monitor+phy
------ SHDSL Monitor -------
atm1/0:shdsl0 monitor+
```

3.2 Interface Monitoring Commands

The SHDSL interface monitoring commands are described and numerated in this section.

Command	Function
? (HELP)	Lists the available commands or their options.
CLOSE	Finalizes any interface activity and prevents any activity from being produced.
OPEN	Reactivates the interface activity.
SIGNAL	Returns information on the SHDSL signal.
STATE	Information on the chipset status.
HISTORIC	Connections history.
VENDOR-INFO	Vendor information on the CEP and the CO.
TEST	Test commands.
EXIT	Exits the SHDSL monitoring menu.

3.2.1 CLOSE

Finalizes any interface activity and prevents any activity from being produced.

3.2.2 OPEN

Reactivates the interface activity.

3.2.3 SIGNAL

3.2.3.1 SIGNAL PARAMETERS

Displays the most representative signal parameters.

```
atm1/0:shdsl0 monitor+signal parameters

                          Remote          Local
                       --------------  --------------
Noise Margin (dB)       +  0.0          + 37.6
Attenuation (dB)        +  0.0          + 29.3
Tx power (dB)           +  0.0          + 13.5
Rx Gain (dB)            +  0.0          + 21.0
Activation state        Data            Data

Actual Line Rate (bps):        392
Actual Payload Rate (bps):     384
Transmission Mode:             ITU-T G.991.2 Annex B
```

Note

Values relative to the remote end are obtained through the EOC channel and, therefore, availability is subject to the functioning of said channel.

3.2.3.2 SIGNAL PERFORMANCE GLOBAL

Displays the global performance parameters.

```
atm1/0:shdsl0 monitor+signal performance global

                            Remote       Local
                          ----------  ----------
Errored Seconds                    0           1
Severely errored seconds           0           0
CRC anomalies                      0           5
SEG anomalies                      0         724
Loss of sync word                  0           4
Unavailable seconds                0        1782
Current 15 min
    Time Elapsed                   0        1942
    Errored Seconds                0           1
    Severely errored seconds       0           0
    CRC anomalies                  0           5
    SEG anomalies                  0           8
    Loss of sync word              0           4
    Unavailable seconds            0         159
Current day
    Time Elapsed                   0        1942
    Errored Seconds                0           1
    Severely errored seconds       0           0
    CRC anomalies                  0           5
    SEG anomalies                  0         724
    Loss of sync word              0           4
    Unavailable seconds            0        1782
```

Note

Values relative to the remote end are obtained through the EOC channel and, therefore, availability is subject to the functioning of said channel.

3.2.3.3 SIGNAL PERFORMANCE 15 MIN-INTERVAL

Displays the performance parameters for the last day at 15 minute intervals.

```
atm1/0:shdsl0 monitor+signal performance 15min-interval
Interval index (1..96)[1]? 2

                          Remote      Local
                        ----------  ----------
Interval number                 2           2
Errored Seconds                 0           0
Severely errored seconds        0           0
CRC anomalies                   0           0
SEG anomalies                   0         131
Loss of sync word               0           0
Unavailable seconds             0         132
```

3.2.3.4 SIGNAL PERFORMANCE 1DAY-INTERVAL

Displays the performance parameters at 1 day intervals.

```
monitor+signal performance 1day-interval
Interval index (1..30)[1]? 2

                          Remote      Local
```

```
                          ----------  ----------
Interval number                    1           1
Monitored seconds                  0           0
Errored Seconds                    0           0
Severely errored seconds           0           0
CRC anomalies                      0           0
SEG anomalies                      0           0
Loss of sync word                  0           0
Unavailable seconds                0           0
```

3.2.4 STATE

Displays information on the chipset.

```
atm1/0:shdsl0 monitor+state

   Chipset               Conexant Single Orion
   Board revision        A
   Modem status          DOWN
   Interface HSM state   Opening
     Channel 0 HSM state Opening (UNKNOWN)

   Interrupts A:         0
   Interrupts B:         0

 Internal Transceiver configuration (Num: 29 Len: 29)

  Item   0: 0x0000 0x0001 0x0000 0x6600 0x0004
  Item   5: 0x0004 0x0000 0x0000 0x016e 0x0331
  Item  10: 0x0005 0x0005 0x0001 0x0002 0x359f
  Item  15: 0x359f 0x000f 0x000f 0x0000 0x2c00
  Item  20: 0x0000 0x0000 0x0000 0x0000 0x0000
  Item  25: 0x0000 0x0001 0x0024 0x0910

 Transceiver parameters: Modified items default value
   Item   0 (0x00): 0xffff --> 0x0000
   Item  13 (0x0d): 0x0001 --> 0x0002


 Internal Framer configuration (Num: 18 Len: 18)

  Item   0: 0x0003 0x0000 0x0000 0x0000 0x0000
  Item   5: 0x0001 0x0000 0x0021 0x0000 0x0000
  Item  10: 0x0000 0x0000 0x0000 0x0000 0x0000
  Item  15: 0x0000 0x0000 0x0000
```

3.2.5 HISTORIC

Returns the connections history with the most important connection parameters.

```
atm1/0:shdsl0 monitor+historic

Id Start          End            Mode        Rate   NM (dB) Att(dB)
-- -------------- -------------- ----------- ------ ------- -------
 8 14/10 16:17:33 14/10 16:18:41 6WIRE-PTM    17088    ----    ---- (0)
                                                      17.0     0.0 (1)
                                                      16.0     0.0 (2)
                                                      17.0     0.0 (3)
```

Mode:	2WIRE / 4WIRE / 6WIRE / 8WIRE 2WIRE-PTM / 4WIRE-PTM / 6WIRE-PTM / 8WIRE-PTM
Rate:	in kbps
NM (dB):	Noise margin in dB
Att (dB):	Attenuation in dB

3.2.6 VENDOR-INFO

Returns the vendor information relative to the local and the remote ends.

```
atm1/0:shdsl0 monitor+vendor-info

Remote unit vendor info
  ID:                 TELDAT
  Model Number:       CNXT ORION S
  Serial Number:      106/01024
  EOC sw version:     1
  Standard version:   8
  List Number:        00 00 00
  Issue Number:       00 00
  SW version:         R3.1.1
  Equipment code:     TS-542A/0
  Other:              10.6.31
  Tx Mode Capability: unknown

Local unit vendor info
  ID:                 TELDAT
  Model Number:       CNXT ORION D
  Serial Number:      106/01023
  EOC sw version:     1
  Standard version:   8
  List Number:        00 00 00
  Issue Number:       00 00
  SW version:         R3.1.1
  Equipment code:     TS-542B/1
  Other:              10.6.31-Alfa
  Tx Mode Capability: ITU-T G.991.2 Annex B
```

Note

Values relative to the remote end are obtained through the EOC channel and, therefore, availability is subject to the functioning of said channel.

3.2.7 TEST

The use and interpretation of these test commands must be supervised by our technical personnel.

3.2.8 EXIT

Exits to the previous menu.