TDM DSL modems

XDSL (DIGITAL SUBSCRIBE LINE) TECHNOLOGY IS TODAY THE MOST IMPORTANT BROADBAND ACCESS TECHNOLOGY AS IT IS USED FOR X.25, FRAME RELAY, IP AND LEASED LINE ACCESS.

Telindus offers the complete range of xDSL access technology, ranging from 48 kbps to more than 4 Mbps.

The equipment described in this chapter fits into the TDM (Time Division Multiplexing) concept of the CN4, and covers all the symmetrical xDSL transmission technologies (IDSL, SDSL, HDSL, SHDSL).

The same xDSL technology (including ADSL) is also used for DSLAM (Digital Subscriber Line Access Multiplexer) access. These products are described in the chapter on Broadband CPE.

CROCUS HS

FEATURES & BENEFITS

- SYNCHRONOUS HIGH-SPEED BASEBAND MODEM FOR 2-WIRE UNCONDITIONED, UNSHIELDED TWISTED-PAIR CABLES.
- UP TO 9 KM AT 144 KBPS OVER 0.5-MM CABLE WITHOUT REPEATERS
- POWERFUL 2B1Q LINE-CODING SCHEME
- USER SELECTABLE DATA RATES FROM 48 KBPS TO 144 KBPS
- CENTRAL SITE HIGH-DENSITY CARD-NESTS FOR UP TO 30 MODEMS
- MODULAR PLUG-IN DATA INTERFACES FOR MAXIMUM FLEXIBILITY AND EFFICIENT STOCK MANAGEMENT

> THE CROCUS HIGH SPEED (HS) IS A MANAGEABLE BASEBAND MODEM FOR DIGITAL SUBSCRIBER LINES OR PRIVATE COPPER NETWORKS.

The modem offers multiple user speeds between 48 and 144 kbps for operation over a single unconditioned, unshielded twisted pair. Through a powerful 2B1Q line-coding scheme and adaptive line equalisation, the Crocus HS covers long distances without the need for expensive repeaters or pair selection.

LINE INTERFACE

- Single pair line access
- Impedance: 135 ohm
- Coding: 2B1Q conform ANSI T1.601
- Modulation rate: 160 kbps
- Line connection: RJ12 on desktop model screw connections on rack-mount version
- Transmit level: 13.5 dBm
- Performance: distance covered noise free (independent of the speed)

WIRE DIAMETER		DISTANCE (KM)
0.4 mm	26 AWG	6.9
0.5 mm	24 AWG	9.5
0.6 mm		13.5
0.8 mm	20 AWG	17.5
1.0 mm	18 AWG	26.0

MANAGEMENT INTERFACE (MANAGEABLE VERSIONS ONLY)

- Desktop versions: 9600 bps asynchronous (RJ45)
- Rack-mount versions: Synchronous high-speed bus (RJ45)

FRONT PANEL

- Testloops AL: Analogue Loop
  RDL: Remote Digital Loop
  DL: local Digital Loop
  ET: Integrated Error Test generator (conform V.52)
- Indications PWR: Power
  TST: Test indicator (circuit 142)
  ERR: Error Test error indication - AIS for G.703
  DCD: Data Carrier Detect (circuit 109)
  TXD: Transmit Data (circuit 103)
  RXD: Receive data (circuit 104)

DIGITAL INTERFACES

- V.35 User speed: 48,56,64,72,96,112,128,144 kbps
- V.36/RS-449 User speed: 48,56,64,72,96,112,128,144 kbps
- X.21 User speed: 48,56,64,72,96,112,128,144 kbps
- RS-530/RS-530A User speed: 48,56,64,72,96,112,128,144 kbps
- V.24/RS-232 User speed: 48,56,64,72,96,112,128,144 kbps
- G.703 User Speed: 64 kbps (co-directional)
- IP Router 2M* User Speed: 48,56,64,72,96,112,128,144 kbps
  * When used in the Crocus HS, the router requires a BootP server or TMA software for initial configuration

MECHANICAL DATA (H X W X D)

- Desktop versions: 50 x 200 x 350 mm weight: 1.4 kg
- Rack-mount versions: 235 x 20 x 300 mm weight: 1 kg

POWER REQUIREMENTS

- Desktop versions: 230Vac +/-10% 50-60 Hz 30 mA
  115Vac +/-10% 50-60Hz 60 mA
  48Vdc (36Vdc - 72Vdc) 30 mA
- Rack-mount versions: 48Vdc (36Vdc - 72Vdc) 60 mA (Twin)

SALES CODES

- 142192 Crocus HS NMS Cent. TT BU 230/115VAC
- 142194 Crocus HS /NMS-REM/ TT BU 230/115 VAC (no management connector)
- 142193 Crocus HS NMS Cent. TT BU 48VDC
- 142195 Crocus HS /NMS-REM/ TT BU 48VDC (no management connector)
- 142191 Crocus HS NMS Twin-CV BU

SALES CODES: INTERFACES

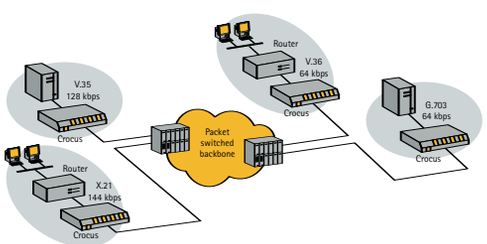
The equipment uses transparent data interface modules as found in the sales codes quick reference section

A complete range of plug-in interface boards makes the Crocus HS ideal for interfacing with almost any application. Not only traditional serial interfaces such as V.24, V.35, V.36, RS-530 and X.21, but also G703 (64 kbps co-directional) and direct Ethernet 10BaseT connections with integrated bridge or router functionality are available. All these interface boards can be exchanged in only a few seconds.

For large concentration sites, rack-mounted versions are mounted in a standard 19" card-nest with densities up to 30 modems per nest.
Both 230/115 Vac and direct 48 Vdc powering can be used.

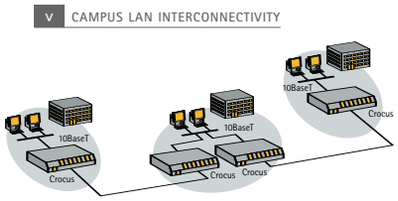
In addition, all Crocus modems in the network can be managed in an integrated way by a high-performance SNMP based management system (HP OpenView®). The integrated management enables one to configure the modem remotely, to query the actual status of the modems, to permanently monitor the performance (real-time and statistical information), to perform fault analysis, and to report alarms to the operator.

V PACKET SWITCHED BACKBONE ACCESS



The Crocus HS is ideally suited for medium-speed backbone access (like X.25 and Frame-Relay), professional high-speed Internet access, LAN-to-LAN connections, and other bandwidth-demanding applications. All versions come as a desktop unit or as a dual rack-mounted card.

V CAMPUS LAN INTERCONNECTIVITY



CROCUS SDSL SERIES

> THE CROCUS SDSL BASE-BAND SERIES OFFERS FULL DUPLEX TRANSMISSION UP TO 2 MBPS OVER A SINGLE TWO-WIRE UNCONDITIONED UNSHIELDED TWISTED-PAIR CABLE, USING THE TRADITIONAL 2B1Q MODULATION SCHEME.

The series is made up of

> A desktop unit with modular plug-in application interface

> A dual card-version with modular plug-in application interfaces

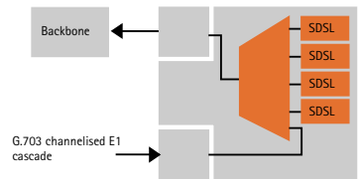
> A quad card-version with integrated add-and-drop multiplexer with G.703/G.704 up-link

The complete range of plug-in interface boards makes the Crocus SDSL series ideal for interfacing with almost any application. Not only traditional serial interfaces such as V.35, V.36, RS-530 and X.21, but also G.703 and direct Ethernet 10/100Base-T connections with integrated router functionality are available.

For large concentration sites, rack-mount versions are mounted into the Telindus CN4 card-nest and can offer densities of up to 60 modems per nest. The quad card-version can terminate up to 4 remotely installed Nx64k applications connected over an SDSL access line multiplexing them onto 1 or 2 channelised E1 interfaces towards the backbone. The E1 interfaces can also be used in add-and-drop mode, where multiple cards can be cascaded.

All units are designed for integration into demanding network environments and can be controlled by the complete set of network maintenance and management tools as they are described in this catalogue.

V CASCADING CROCUS SDSL QUAD CARDS



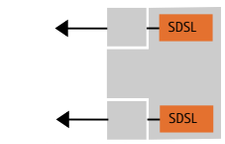
SALES CODES: BASIC UNITS

> 165893 165893 Crocus SDSL F_2M TT BU 115/230V
> 165896 Crocus SDSL F_2M TT BU 48V
> 165897 Crocus SDSL F_2M Twin-CV BU (2 modems/card)
> 160692 Crocus SDSL F Quad-CV BU (4 modems/card)

SALES CODES: INTERFACES

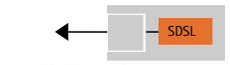
All transparent and Nx64k data interface modules are found in the sales codes quick reference section

V CROCUS SDSL CV



Modular Interfaces

V CROCUS SDSL TT



Modular Interface

FEATURES & BENEFITS

> HIGH-SPEED BASE-BAND MODEM SERIES FOR USE ON A SINGLE UNSHIELDED TWISTED COPPER PAIR

> LINE-TRANSMISSION RATES UP TO 2 MBPS BASED ON 2B1Q CODING

> MODULAR PLUG-IN DATA INTERFACES FOR MAXIMUM FLEXIBILITY AND EFFICIENT STOCK MANAGEMENT

> CENTRAL-SITE HIGH-DENSITY CARD-NEST SOLUTION FOR UP TO 60 MODEMS

> SUPPORTED BY THE ADVANCED TMA MAINTENANCE AND MANAGEMENT SUITE

VERSIONS

> Crocus SDSL TT (desktop unit):
  > Separate 48Vdc and 230/115Vac versions
  > Modular data interface
> Crocus SDSL Twin CV (2 modems per card) - hot swappable
  > 15 cards per rack (30 modems)
  > 2 Modular data interfaces
> Crocus SDSL Quad CV (4 modems per card) - hot swappable
  > 15 cards per rack (60 modems)
  > 2 Modular interfaces with add-and-drop functionality

LINE INTERFACE

> Single pair line access
> Connector: screws
> Impedance: 135 ohm
> Coding: 2B1Q (HDSL based)
> Transmit level: 13.5 dBm
> Line speeds:
  > Crocus SDSL TT/ Crocus SDSL Twin CV: 128, 256, 384, 512, 768, 1152, 1536, 2048, 2304 kbps
  > Crocus SDSL Quad CV: 128, 384, 768, 1152 kbps
> Performance (distance covered noise free)

SPEED	0.4 MM 26 AWG (KM)	0.5 MM 24 AWG (KM)	0.6 MM (KM)	0.8 MM 20 AWG (KM)	1.0 MM 18 AWG (KM)	1.2 MM (KM)
128 kbps	6.5	8.9	12.7	16.1	22.5	25.1
256 kbps	5.5	7.5	10.8	13.6	19.0	21.2
384 kbps	5.1	7.0	10.0	12.6	17.6	19.7
512 kbps	4.7	6.4	9.2	11.6	16.3	18.1
768 kbps	4.4	6.0	8.6	10.9	15.2	17.0
1152 kbps	3.8	5.2	7.4	9.4	13.1	14.7
1536 kbps	3.3	4.5	6.5	8.2	11.4	12.7
2048 kbps	2.5	3.4	4.9	6.2	8.7	9.7
2304 kbps	2.2	3.0	4.3	5.4	7.6	8.5

CROCUS SDSL TT / CROCUS SDSL TWIN CV

User speeds
> when used with transparent interfaces: line speeds
> when used with Nx64k interfaces: Nx64 kbps (up to the configured line speed)

Modular interfaces (field exchangeable)
> V.35, V.36/RS-449, X.21, RS-530/RS-530A/RS232, G.703 64 kbps (co-directional), G.703/G.704 2Mbps, IP Router 2M

All interfaces are available in transparent or Nx64k version

Front panel indications

General indications
> PWR: Power

Indications per modem
> TST: Test indicator (circuit 142)
> ERR: Test error / AIS for G.703 / Local alarm signalling indication
> SQ: Signal quality indication and Data Carrier Detect (circuit 109)
> TXD: Transmit Data (circuit 103)
> RXD: Receive data (circuit 104)

CROCUS SDSL QUAD CV

Primary backbone interface (field exchangeable)
> G.703/G.704 User speed: E1 channelised
  Connector: RJ45 (120 ohm)
  BNC (75 ohm)

Secondary cascade interfaces (field exchangeable)
> G.703/G.704: Fractional E1
> V.35: Nx64 kbps (N=1..31)
> V.36/RS-449: Nx64 kbps (N=1..31)
> X.21: Nx64 kbps (N=1..31)
> RS-530/RS-530A/RS232: Nx64 kbps (N=1..31)

Front panel indications

General indications
> PWR: Power
> AIS Upper: AIS/LFA/LOS indication for primary backbone interface
> AIS Lower: AIS/LFA/LOS indication for G.703 cascade interface

Indications per modem
> ERR: Test error/ local alarm indication
> 109/DCD: Signal Quality and Data Carrier Detect
> TST: Test Indicator

TEST LOOPS PER MODEM

> AL: Analogue Loop
> RDL: Remote Digital Loop
> DL: local Digital Loop
> ET: Integrated Error test generator (Test pattern 215-1)

CONTROL INTERFACE

> Applicable standards: ITU-T V.24, V.28, EIA/TIA 574
> DCE signals: RXD, TXD, SGND
> Connector: female DB9 (EIA/TIA 574)

NETWORK MANAGEMENT TOOLS

> Integration in the TMA management suite

MECHANICAL DATA (H X W X D)

> Desktop versions: 50 x 200 x 350 mm weight: 1.4 kg
> Rack-mount versions: 235 x 20 x 300 mm weight: 1 kg

POWER REQUIREMENTS

> Desktop versions: 230Vac +/-10% 50-60 Hz 50 mA
  115Vac +/-10% 50-60Hz 100 mA
  48Vdc (36Vdc - 72Vdc) 140 mA
> Rack-mount versions: 48Vdc (36Vdc - 72Vdc) 200 mA

CROCUS HDSL

> THE CROCUS HDSL (HIGH BIT RATE DIGITAL SUBSCRIBER LINE) IS A SERIES OF MANAGEABLE BASEBAND MODEMS FOR 2 MBPS TRANSMISSION OVER GALVANIC COPPER LINES.

The Crocus HDSL series integrates the standard HDSL technology into a product range designed to cover long distances at 2 Mbps over unshielded twisted pairs.

A complete range of plug-in interface boards makes the Crocus HDSL ideal for interfacing with almost any application. All these interface boards can be exchanged in only a few seconds, so flexibility is maximised.

For large concentration sites, rack-mount versions are mounted in a standard 19" card-nest and can offer densities of up to 30 modems per nest.

The unit is designed for integration into demanding network environments and can be controlled by the complete set of network maintenance and management tools as they are described in this catalogue.

In the event of line problems, the equipment can disable the faulty pair(s) and continue with a reduced bandwidth on the remaining pairs (fractional E1).

The Crocus HDSL series is equipped with flash-memory for easy software upgrades.

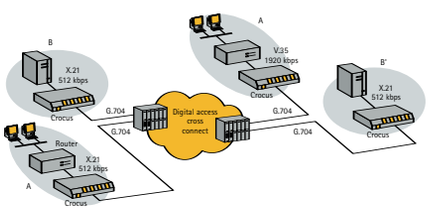
SALES CODES BASIC UNITS

> 152483 Crocus HDSL F 2P TT BU 115/230V (2 pair model)
> 152484 Crocus HDSL F 3P TT BU 115/230V (3 pair model)
> 152487 Crocus HDSL F 2P TWIN-CV BU (2 modems/card)
> 152488 Crocus HDSL F 3P CV BU (1 modem/card)

SALES CODES: MODULAR INTERFACES

All transparent and Nx64k data interface modules are found in the sales codes quick reference section

V LEASED LINE SERVICE WITH DIGITAL CROSS-CONNECT



FEATURES & BENEFITS

> HDSL MODEM SERIES FOR 2 MBPS DATA TRANSMISSION ON STANDARD TWISTED-PAIR CABLES
> MODULAR PLUG-IN DATA INTERFACES FOR MAXIMUM FLEXIBILITY AND EFFICIENT STOCK MANAGEMENT
> 2-PAIR VERSIONS AND 3-PAIR VERSIONS FOR LONGER DISTANCES
> ADVANCED FREE MAINTENANCE SOFTWARE
> PARTIAL FALLBACK SUPPORTED IN CASE OF LINE PROBLEMS
> CENTRAL SITE HIGH-DENSITY CARD-NEST FOR UP TO 30 MODEMS

LINE INTERFACE

> up to 3 pair + shield (screw connections)
> impedance: 135 ohm
> coding : 2B1Q conform ETSI ETR 152
> line-speed/pair: 2E1: 1168 kbps/3E1: 784 kbps
> throughput delay: 300 µsec
> transmit level: 13.5 dBm
> G.704 Time Slot prioritisation (G.704 Mode)
> fractional E1 support
> performance (distance covered noise free)

WIRE DIAMETER		2-PAIR VERSION (KM)	3-PAIR VERSION (KM)
0.4 mm	26 AWG	3.6	4.0
0.5 mm	24 AWG	5.0	5.5
0.6 mm		7.1	7.8
0.8 mm	20 AWG	8.9	9.9
1.0 mm	18 AWG	12.5	13.9

VERSIONS

> Standard desktop units: Separate 48Vdc and 230/115Vac version
> Rack-mount units: 2-pair version: 2 modems/card
3-pair version: 1 modem/card

DIGITAL INTERFACES

> V.35
> V.36/RS-449
> X.21
> RS-530/RS-530A
> G.703/G.704
> IP Router 2M

MANAGEMENT INTERFACE

> Desktop versions: 9600 bps asynchronous (subD 9-pin)
> Rack-mount versions: Synchronous High speed bus (RJ45)
9600 bps asynchronous (subD 9-pin)

SUPPLEMENTARY FEATURES

> The modem has a flash memory to allow firmware upgrades
> Maintenance of local and remote modem with free Windows® software
> Transparent asynchronous 2400 user data channel

FRONT PANEL

> Testloops AL: Analogue Loop
RDL: Remote Digital Loop
DL: local Digital Loop
ET: Integrated Error Test generator
> Indications PWR: Power
TST: Test indicator (circuit 142)
AIS ERR: Test error indication / AIS for G.703 / Local alarm signalling indication
SQ1-SQ3: Signal quality indication and Data Carrier Detect (circuit 109)
TXD: Transmit Data (circuit 103)
RXD: Receive data (circuit 104)

MECHANICAL DATA (H X W X D)

> Desktop versions: 50 x 200 x 350 mm weight: 1.4 kg
> Rack-mount versions: 235 x 20 x 300 mm weight: 1 kg

POWER REQUIREMENTS

> Desktop versions: 230Vac +/-10% 50-60 Hz 60 mA
115Vac +/-10% 50-60Hz 120 mA
48Vdc (36Vdc-72Vdc) 170 mA
> Rack-mount versions: 48Vdc (36Vdc-72Vdc) 200 mA (Twin:240)

CROCUS HDSL REPEATER

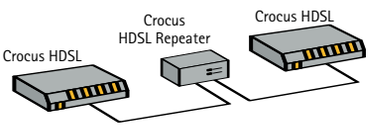
> THE CROCUS HDSL REPEATER OFFERS THE EQUIVALENT OF TWO BACK-TO-BACK CROCUS HDSL MODEMS.

One Crocus HDSL Repeater allows effectively to double the distance between two Crocus HDSL modems. Two repeaters allow to triple the distance.

One Repeater offers the functionality necessary to do the regeneration of the two line-pairs found on the Crocus HDSL 2P F modem. The module can be locally powered at 48Vdc, or can be powered from the remote end. In the latter case the remote modem should be equipped with the remote power source functionality.

The Crocus HDSL Repeater can be fitted into different housings, depending on the environment.

V TYPICAL CROCUS HDSL REPEATER CONFIGURATION



Following housings are available:

> In-door housing for one single Crocus HDSL 2P Repeater module. The standard crocus HDSL Repeater is delivered with this housing.

> Out-door housing with protection against moisture, vibration and impact for up to two Crocus HDSL 2P Repeater modules

> Out-door housing with protection against moisture, vibration and impact for up to six Crocus HDSL 2P Repeater modules

V CROCUS HDSL REPEATER OUTDOOR HOUSING (2 MODULES)

FEATURES & BENEFITS

> DOUBLES THE DISTANCE BETWEEN TWO HDSL MODEMS

> LOCALLY OR REMOTELY POWERED

> AVAILABLE WITH INDOOR OR OUTDOOR HOUSING

LINE INTERFACE

> Modulation: 2B1Q, ETR 152
> Transmit level: 13.5 dBm
> Number of pairs per unit: 2 pairs repeater (suited for 1 Crocus HDSL 2-pair extension)

CHARACTERISTICS

> Performance conform ETSI ETR 152
> Jitter & Wander: conform G.823
> Surge immunity: ITU-T K.20, K.21

STATUS INDICATIONS

> System and power status
> Central side pair 1 status
> Central side pair 2 status
> Remote side pair 1 status
> Remote side pair 2 status

POWER

> Consumption: max 4 Watts
> Supply: Local or Remote from transmission pairs
> Source: jumper selectable: remote, central or local
> Voltage range: 40-120Vdc

PHYSICAL

> Connector DIN41612 Male 16 pins only equipped with "A" row even pins
> Module size (HxWxD) 8 TE x 100mm x 176mm (connector included)

SALES CODES

> 164214 Crocus HDSL 2p indoor Repeater (Repeater including indoor housing)
> 162015 Crocus HDSL 2p Repeater Module (no housing)
> 162016 Crocus HDSL 2p Repeater indoor housing (for 1 repeater module)
> 162017 Crocus HDSL 2p Repeater outdoor housing 2 (for 2 repeater modules)
> 162018 Crocus HDSL 2p Repeater outdoor housing 6 (for 6 repeater modules)

CROCUS SHDSL G.703
CROCUS SHDSL RS-530 new

FEATURES & BENEFITS

- > HIGH-SPEED BASEBAND MODEM FOR USE ON A SINGLE OR DUAL UNSHIELDED TWISTED COPPER PAIRS
- > BASED ON THE G.SHDSL STANDARD FOR HIGHER SPEEDS AND LONGER LOOP RANGES
- > FIXED G.703/G.704 (120 AND 75 OHM) OR SERIAL RS530 INTERFACE
- > ADAPTER CABLES FOR V.35, V.36 (RS449), RS530, V.24 (RS232) AND X.21
- > VARIABLE LINE-TRANSMISSION RATES FOR HIGHEST POSSIBLE REACH
- > LOCAL OR REMOTE POWERED UNITS AVAILABLE
- > ADVANCED MAINTENANCE AND MANAGEMENT OPTIONS

> THE CROCUS SHDSL G.703 AND CROCUS SHDSL RS530* (SINGLE-PAIR HIGH BIT RATE DIGITAL SUBSCRIBER LINE) ARE MANAGEABLE BASE BAND MODEMS OFFERING FULL 2.3 MBPS DUPLEX TRANSMISSION OVER UNCONDITIONED UNSHIELDED TWISTED-PAIR CABLE.

Dedicated 2-pair versions offer the possibility to extend the reach to longer distances or higher speeds (up to 4.6 Mbps). For extreme long distances, the equipment can fall back to a lower transmission rate, offering reduced speeds on the serial interface (RS530 model) or Fractional E1 (FE1) operation (G.703 model).

The equipment is based on the TC-PAM (Trellis Coded Pulse Amplitude Modulation) modulation, which guarantees higher speeds and longer loop performance. It also guarantees spectral compatibility with legacy and ADSL transmission systems in the same cable bundle.

The unit can be used in a point-to-point configuration, or can be used with a central solution based on card-nest 4 (CN4) or the Telindus 2300.

The Crocus SHDSL G.703 and Crocus SHDSL RS530 are available as a locally or remotely powered (RP) unit. The remotely powered unit can also be locally powered at –48VDC directly or by 230Vac through an external power adapter.

The unit is designed for integration into demanding network environments and can be controlled by the complete set of network maintenance and management tools as they are described in this catalogue.

LINE INTERFACE

- > Coding: TC PAM, compliant ITU-T G.991.2 Annex A&B (G.SHDSL), ETSI TS 101524
- > Handshaking: compliant G.994 (automatic speed negotiation) or fixed speed
- > Single pair or two pair line access
- > Connector: RJ45 with plug-in converter for RJ12
- > Impedance: 135 ohm
- > Line speeds:
  - > Single pair: N x 64 kbps (N = 3 ... 36)
  - > Two pair: N x 128 kbps (N = 3 ... 36)
- > Handshaking: compliant G.994.1 (automatic speed negotiation) or fixed speed
- > Performance monitoring: compliant G.826 (errored seconds, severely errored seconds, unavailability seconds)
- > Analogue Loop, Analogue Loop + Error pattern and Digital Loop tests on the SHDSL line interface

G.703 INTERFACE (G.703 MODELS ONLY)

- > User speed: (F)E1 2 Mbps (co-directional)
- > Connector: > BNC (75 ohm)
  - > RJ45 (120 Ohm), DCE
- > Transparent or fractional operation
- > Clocking: internal, external

RS530 INTERFACE (RS530 MODELS ONLY)*

- > Applicable standards: ITU-T V10, V11, RS530, RS530A
- > Connector: female DB25 (ISO2110), compliant RS530, RS530A DCE
- > Through adapter cable: V.35, V.36 (RS449), X.21, V.24 (RS232)
- > User speeds:
  - > Single pair: N x 64 kbps (N = 1 ... 36)
  - > Two pair: N x 128 kbps (N = 1 ... 36)
- > Clocking: internal, external, slave

CONTROL INTERFACE

- > Applicable standards: ITU-T V.24, V.28, EIA/TIA 574
- > DCE signals: RXD, TXD, SGND
- > Connector: female DB9 (EIA/TIA 574)

FRONT PANEL INDICATIONS

- > PWR: Power- differentiates between local and remote powering
- > SERIAL: indicates the state of the connected DTE
- > DCD 109 / 1: first line pair status
- > DCD 109 / 2: second line pair status

LOCAL MAINTENANCE TOOLS

- > Direct connection for VT100 local console (command line interface or interactive interface)
- > Direct connection for TMA (Telindus Maintenance Application)
- > External hand LCD terminal

NETWORK MANAGEMENT TOOLS

- > Integration in the TMA management suite

MECHANICAL DATA (H X W X D)

- > 45 x 220 x 235 mm Weight: 750 g

POWER REQUIREMENTS

- > 9 Vdc / 1A with external 230Vac power adapter
- > -48Vdc / 130mA (only on RP models)
- > Remote powering (only on RP models)

* Model available form Q3 2004

SALES CODES

- > 181080 Crocus SHDSL TT G703 230Vac (1 pair, local powering)
- > 178715 Crocus SHDSL TT G703 RP (1 pair, dual powering)
- > 178713 Crocus SHDSL 2P TT G703 RP (2 pair, dual powering)
- > 181082 Crocus SHDSL TT RS530 230VAC* (1 pair, local powering)
- > 178716 Crocus SHDSL TT RS530 RP* (1 pair, dual powering)
- > 178714 Crocus SHDSL 2P TT RS530 RP* (2 pair, dual powering)

CROCUS SHDSL

A complete range of plug-in interface boards makes the Crocus SHDSL ideal for interfacing with almost every application. Not only traditional serial interfaces like V.35, V.36, RS-530 and X.21 (configurable for Nx64 kbps operation), but also G703 (transparent or with G.704 framing) and direct Ethernet 10/100Base-T connections with integrated router functionality are available. All these interface boards can be exchanged in only a few seconds, so flexibility is maximised.

For large concentration sites, rack-mount versions are mounted in a standard 19" card-nest and can offer densities of up to 30 modems per nest. Both 230/115 Vac and direct 48 Vdc powering can be used.

With a free user-friendly graphical Windows® application, the operator can configure the local or remotely installed equipment. It is a valuable tool for the field engineer as it supports performance monitoring, retrieval of statistics and troubleshooting.

> THE CROCUS SHDSL (SINGLE-PAIR HIGH BIT RATE DIGITAL SUBSCRIBER LINE) IS A NEW GENERATION MANAGEABLE BASEBAND MODEM OFFERING FULL DUPLEX TRANSMISSION UP TO 2.3 MBPS OVER A SINGLE TWO-WIRE UNCONDITIONED UNSHIELDED TWISTED-PAIR CABLE.

A special 2-pair version offers the possibility to extend the speed range to 4.6 Mbps. The line speed of the modem can be automatically adapted to optimise the throughput as a function of the characteristics of the local loop.

The equipment is based on a new modulation technology called TC-PAM (Trellis Coded Pulse Amplitude Modulation), which guarantees higher speeds and longer loop performance.

The TC-PAM modulation also guarantees spectral compatibility with legacy and ADSL transmission systems in the same cable bundle, offering an attractive solution for high-speed backbone access, for LAN to LAN connections, as well as for imaging and other bandwidth-demanding applications.

VERSIONS

- Standard desktop units:
  - separate 48Vdc and 230/115Vac versions
  - separate 1-pair and 2-pair versions
- Rack-mount units:
  - 1-pair version: 2 modems/card
  - 2-pair version: 2 modems/card

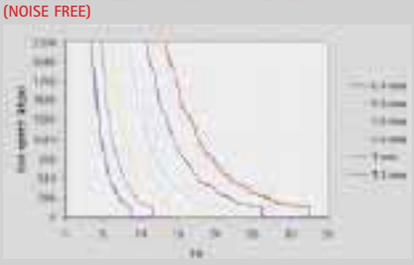
LINE INTERFACE

- Single or dual pair line access
- Connector: RJ45 with plug-in coverter for RJ12
- Impedance: 135 ohm
- Coding: TC PAM, compliant ITU-T G.991.2 Annex A&B (G.SHDSL), ETSI TS 101524
- Transmit level: 13.5 dBm
- Line speed per pair: Nx 64 kbps (N=1..36, except G.703: N=3..32)
- User speeds: 1 pair-model: Nx 64 kbps (N=1..36)
- 2 pair-model: Nx 128 kbps (N=1..36)
- Handshaking: compliant G.994.1 (automatic speed negotiation) or fixed speed
- Performance monitoring: compliant G.826 (errored seconds, severely errored seconds, unavailability seconds)

FRONT PANEL INDICATIONS

- PWR: Power
- 142 TST: Test indicator (circuit 142)
- AIS ERR: Test error indications/AIS for G.703/local alarm indications
- 103 TXD: Transmit Data on modular interface
- 104 RXD: Receive data on modular interface
- 109 DCD: Data carrier detect

CONNECTION SPEED WITH G.994.1 RATE NEGOTIATION (NOISE FREE)



POSSIBLE TEST LOOPS

- Analogue loop
- Remote digital loop
- Local digital loop
- Integrated error test generator

LOCAL MAINTENANCE TOOLS

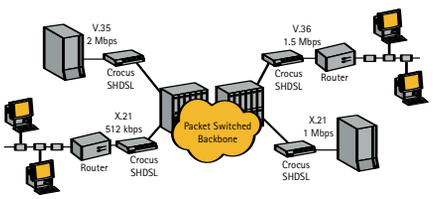
- Direct connection for VT100 local console (command line interface or interactive interface)
- Direct connection for TMA (Telindus Maintenance Application)
- External hand LCD terminal

Alternatively one can obtain a comparable functionality through the use of a VT100 terminal or by connecting an external LCD hand terminal. The Crocus SHDSL also offers an automatic installation mode, which allows standard configurations to be set up in only a few seconds.

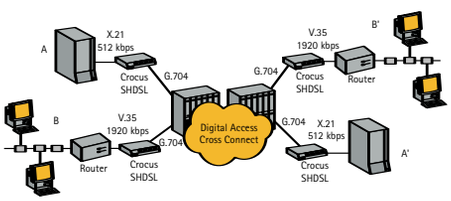
For larger networks, the Crocus SHDSL can be managed with a management application running on the SNMP based HP OpenView® management platform. On this platform one can combine the management of the Crocus SHDSL with the management of all Telindus and many third party equipment.

The integrated management allows one to configure the modem remotely, to query the actual status of the modems, to permanently monitor the performance (real-time and statistical information), to conduct fault analysis, and to report alarms to the operator.

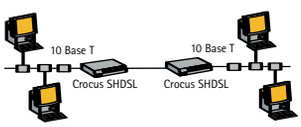
V PACKET SWITCHED BACBONE ACCESS



V LEASED LINE SERVICE WITH DIGITAL CROSS CONNECT



V DIRECT ETHERNET INTERCONNECTIVITY



FEATURES & BENEFITS

- > BASED ON THE NEW G.SHDSL STANDARD FOR HIGHER SPEEDS AND LONGER LOOP RANGES
- > LINE-TRANSMISSION RATES UP TO 2.3 MBPS (4.6 MBPS FOR 2-PAIR MODEL)
- > ADVANCED FREE MAINTENANCE SOFTWARE
- > AUTOMATIC LINE RATE ADAPTATION
- > MANAGEABLE UNDER HP OPENVIEW®
- > EASY AUTO-INSTALL MODE FOR FAST ROLL-OUT
- > MODULAR PLUG-IN DATA INTERFACES FOR MAXIMUM FLEXIBILITY AND EFFICIENT STOCK MANAGEMENT
- > CENTRAL SITE HIGH-DENSITY CARD-NEST FOR UP TO 30 MODEMS

NETWORK MANAGEMENT TOOLS (IN COMBINATION WITH ORCHID ONTROLLER)

- > TELNET: command line interface or interactive interface
- > TMA: Telindus Maintenance Application
- > TFTP configuration download
- > HTTP web interface
- > PING
- > SNMP: MIB2 and private MIB
- > Software flash download
- > TMA CLI: stand-alone command line console software (optional)
- > TMA for HP OV: management integration in HP Openview (optional)

AVAILABLE DIGITAL INTERFACES

- > V.35
- > V.36/RS-449
- > X.21
- > RS-530/RS-530A
- > G.703/G.704
- > G.703 + serial (dual port)
- > IP Router 2M
- > IP Router 10M

MANAGEMENT INTERFACE

- > Desktop versions: 9600 bps asynchronous (subD 9-pin)
- > Rack-mount versions: Synchronous High speed bus (RJ45) 9600 bps asynchronous (subD 9-pin)
- > Insertion/extraction of management channel in G.703 time-slot 0

IDEAL MAXIMUM DISTANCE (NOISE-FREE)

1 pair Speed (kbps)	2 pair Speed (kbps)	0.4mm 26AWG (km)	0.5mm 24AWG (km)	0.6mm (km)	0.8mm 20AWG (km)	1.0mm 18AWG (km)	1.2mm (km)
64	128	11.0	15.1	21.5	27.2	38.2	42.4
128	256	8.0	11.0	15.6	19.8	27.8	30.8
256	512	8.2	11.3	16.0	20.3	28.5	31.6
512	1024	7.2	9.9	14.0	17.8	25.0	27.7
1024	2048	5.5	7.6	10.7	13.6	19.1	21.2
1536	3072	4.0	5.5	7.8	9.9	13.9	15.4
2048	4096	4.2	5.8	8.2	10.4	14.6	16.2
2304	4608	4.0	5.5	7.8	9.9	13.9	15.4

MECHANICAL DATA (H X W X D)

- > Desktop version: 45 x 220 x 235 mm weight: 750 g (excl interface)
- > Rack-mount version: 235 x 20 x 300 mm weight: 1 kg (excl interface)

POWER REQUIREMENTS

- > 1 pair desktop versions: 85..265 Vac, 9W / 36..72Vdc, 4W
- > 2 pair desktop versions: 85..265 Vac, 15W / 36..72Vdc, 8W
- > Rack-mount versions: 36..72 Vdc, 8W

SALES CODES

- > 1 pair basic units
  - > 180055 Crocus SHDSL TT BU VAC
  - > 171284 Crocus SHDSL TT BU 48VDC
  - > 180057 Crocus SHDSL TWIN-CV BU (2 modems)
- > 2 pair basic units
  - > 180053 Crocus SHDSL 2P TT BU VAC
  - > 171976 Crocus SHDSL 2P TT BU 48VDC
  - > 171977 Crocus SHDSL 2P TWIN-CV BU (2 modems)

SALES CODES: INTERFACES

- > 175253 G703 INTF 2M Crocus
- > 175254 G703 INTF NX64K Crocus

All other transparent data interface modules are found in the sales codes quick reference section

SALES CODES: WETTING CURRENT

- > 180329 Crocus SHDSL wetting current option board (4 lines)

CROCUS SHDSL QUAD

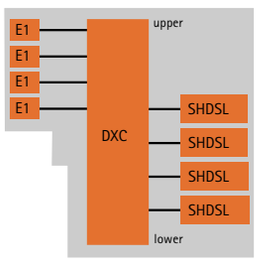
> THE CROCUS SHDSL QUAD DXC IS A CARD FITTING IN THE CARD-NEST 4 (CN4) INTEGRATING SHDSL TRANSMISSION TECHNIOLOGY WITH CROSS-CONNECT FUNCTIONALITY INTO A HIGH-DENSITY MODULAR CENTRAL OFFICE SOLUTION.

The Crocus SHDSL Quad DXC is a card fitting in the card-nest 4 (CN4) integrating SHDSL transmission techniology with cross-connect functionality into a high-density modular central office solution. For this purpose, the card features 4 SHDSL line pairs and 4 fixed G.703 interfaces. The SHDSL line pairs can be configured as individual links or can be combined into two-pair operation for increased distance reach.

The SHDSL lines can be terminated at the remote end by the complete range of Crocus SHDSL desktop units, offering full flexibility for end-user connectivity. The SHDSL line-speed can be automatically adapted based on the user requirements, optimising distance performance.

The on-board digital cross connect (DXC) function offers switching of the 64 kbps time-slots between all ports without restrictions. It gives possibilities for grooming lines, add-and-drop multiplexing and cascading of several cards. Alternatively, the digital cross connect function may also be disabled, offering up to four individual modem links that can be operated in framed or unframed mode.

V CROCUS SHDSL QUAD SCHEMATIC VIEW



Using an option board, the Crocus SHDSL Quad DXC can deliver wetting current or remote powering on the lines. It also can be used in combination with the CN4 add-on chassis for remote power feeding.

The unit is designed for integration into demanding network environments and can be controlled by the complete set of network maintenance and management tools as they are described in this catalogue.

FEATURES & BENEFITS

- > BASED ON THE NEW G.SHDSL STANDARD FOR HIGHER SPEEDS AND LONGER LOOP RANGES
- > 4 SHDSL LINE PAIRS PER CARD WITH BUILT-IN DIGITAL CROSS CONNECT
- > 4 G.703/G.704 UPLINKS
- > 1-PAIR OR 2-PAIR SHDSL OPERATION
- > ADVANCED MAINTENANCE SOFTWARE AND MANAGEMENT TOOLS
- > CENTRAL SITE HIGH-DENSITY CARD-NEST FOR UP TO 60 MODEMS

LINE INTERFACES
- > Number of interfaces: 4
- > Single pair or two pair line access
- > Connector: screw
- > Impedance: 135 ohm
- > Coding: TC PAM, compliant ITU-T G.991.2 Annex A&B (G.SHDSL), ETSI TS 101524
- > Line speeds: Single pair: N x 64 kbps (N = 3 ... 32)
  Two pair: N x 128 kbps (N = 3 ... 16)
- > Handshaking: compliant G.994.1 (automatic speed negotiation) or fixed speed
- > Performance monitoring: compliant G.826 (errored seconds, severely errored seconds, unavailability seconds)

G703 INTERFACES
- > Number of interfaces: 4
- > Applicable standards: I.431, G.703, G.704, G.706, G.736, G.823, G.825
- > User speed: (F)E1 N x 64 kbps (N = 1 ... 32)
- > Connector: RJ45 (120 Ohm), DCE
- > Transparent or fractional operation

CONTROL INTERFACE
- > Applicable standards: ITU-T V.24, V.28, EIA/TIA 574
- > DCE signals: RXD, TXD, SGND
- > Connector: female DB9 (EIA/TIA 574)

CROSS-CONNECT FUNCTIONALITY
- > Applicable standards: ETS 300 010-1, ETS 300 010-2
- > Maximum DXC throughput delay: 650 µsec

CLOCKING
- > Possible clock source: Station Clock
  G.703 interfaces
  Internal clock
- > Fallback possibility in case of clocking failure
- > Applicable standards: G.812, G.813

REMOTE POWER FEEDING OPTION
- > Controlled by network management
- > Maximum standard remote power voltage: 120 Vdc
- > Maximum standard remote power current: 60 mA
- > Conform ITU-T K.15
- > Conform IEC60950-21 Edition 2002-12

WETTING CURRENT OPTION
- > Maximum standard wetting current: 10 mA

FRONT PANEL INDICATIONS
General
- > PWR: Power

For each G.703
- > AIS ERR AIS (Alarm Indication Signal)
  Bit Error Test (ET) indication
  Local alarm signalling

For each SHDSL connection:
- > 142 TST Test indicator
- > 109 DCD Handshaking progress
  Data carrier detect

Testloops
- > SHDSL analogue loop
- > SHDSL remote digital loop
- > G.703 external loopback
- > G.703 internal loopback
- > G.703 internal nx64kbit/s loopback (ETS 300 010-2 §7.1.3)
- > Built-in test pattern generator

Local maintenance tools
- > Direct connection for VT100 local console (command line interface or interactive interface)
- > Direct connection for TMA (Telindus Maintenance Application)
- > External hand LCD terminal

NETWORK MANAGEMENT TOOLS
- > Integration in the TMA management suite

MECHANICAL DATA H X W X D
- > 235 x 20 x 300 mm Weight: 1 kg

POWER REQUIREMENTS (PER CARD)
- > 48Vdc (36Vdc - 72Vdc) 190 mA

SALES CODES
- > 175258 Crocus SHDSL Quad CV DXC
- > 180329 Crocus SHDSL wetting current option board (4 lines)
- > 182466 Crocus SHDSL CV Remote powering option board (4 lines)

CROCUS SHDSL REPEATER

FEATURES & BENEFITS

- > SHDSL LINE REPEATER FOR USE ON A SINGLE UNSHIELDED TWISTED COPPER PAIR
- > BASED ON THE G.SHDSL STANDARD FOR HIGHER SPEEDS AND LONGER LOOP RANGES
- > VARIABLE LINE-TRANSMISSION RATES UP TO 2 MBPS
- > LOCALLY OR REMOTELY POWERED
- > AVAILABLE AS DESKTOP UNIT OR IN PROTECTED IP67 HOUSING
- > MANAGEABLE VIA DSL LINK

> THE SHDSL LINE CODING UTILIZED IN THE TELINDUS SHDSL TRANSMISSION EQUIPMENT PROVIDES SUPERIOR REACH AND NOISE IMMUNITY COMPARING TO OTHER DSL TECHNOLOGIES.

Nevertheless local loop distances may exceed the distance achievable by simple point-to-point configurations, especially if full 2Mbps transport is required. Examples include DSL links alongside railways, motorways, pipelines, waterways, power lines and local loops in rural areas. Therefore, the Telindus SHDSL range is complemented with a SHDSL repeater.

Each repeater fully regenerates the signal and thus doubles the transmission distance. It is possible to deploy multiple repeaters on a single link without introducing jitter and wander problems. Repeaters can be locally or remotely powered. The Crocus SHDSL Repeater is available in an indoor and an outdoor version. The outdoor version is IP67 protected.

The Crocus SHDSL Repeater can be managed locally with a VT100 terminal or terminal emulation. Alternatively it is manageable over the line from the central SHDSL equipment, using the standard EOC messages. It means that the Crocus SHDSL repeater can be fully integrated in network maintenance and management suite as described in this catalogue. Apart from status, performance and alarms information, several test loops can be initiated.

LINE INTERFACE

- > Single pair line access
- > Connector: one RJ45 (desktop unit)
- > Impedance: 135 ohm
- > Coding: TC PAM, compliant ITU-T G.991.2 Annex A&B (G.SHDSL), ETSI TS 101524
- > Line speeds: N x 64 kbps (N = 1 ... 32)
- > Handshaking: compliant G.994.1 (automatic speed negotiation) or fixed speed
- > Performance monitoring: compliant G.826 (errored seconds, severely errored seconds, unavailability seconds)
- > Analogue Loop and Digital Loop test to central SHDSL modem

IDEAL MAXIMUM DISTANCE (NOISE-FREE)

1 pair Speed (kbps)	0.4mm 26AWG (km)	0.5mm 24AWG (km)	0.6mm (km)	0.8mm 20AWG (km)	1.0mm 18AWG (km)	1.2mm (km)
64	11.0	15.1	21.5	27.2	38.2	42.4
128	8.0	11.0	15.6	19.8	27.8	30.8
256	8.2	11.3	16.0	20.3	28.5	31.6
512	7.2	9.9	14.0	17.8	25.0	27.7
1024	5.5	7.6	10.7	13.6	19.1	21.2
1536	4.0	5.5	7.8	9.9	13.9	15.4
2048	4.2	5.8	8.2	10.4	14.6	16.2

LOCAL CONSOLE INTERFACE

- > Electrical: ITU-T V.24, V.28
- > Connector: female DB9 (EIA/TIA 574)

FRONT PANEL INDICATIONS

- > PWR: green
- > NE: indicates the near line status (green/red) (line towards central modem)
- > FE: indicates the far line status (green/red) (line towards remote modem)

MAINTENANCE AND MANAGEMENT SUPPORT

- > Direct connection for VT100 local console
- > Management information available over the line via the EOC messages
- > Complete set of management tools on a central SHDSL equipment gives full access to repeater information

MECHANICAL DATA (H X W X D)

Indoor housing: 46 x 230 x 160 mm Weight: 700 g
Outoor housing IP67: 70 x 295 x 170 mm

POWER REQUIREMENTS

- > Power consumption: below 3.2W
- > -48VDC connector (-36 -72VDC)
- > Molex mini-fit 4-pins connector

SALES CODES

- > 180913 Crocus SHDSL indoor repeater
- > 180914 Crocus SHDSL outdoor repeater
- > 184587 Crocus SHDSL outdoor repeater IP67 including IP65 connector kit

V CROCUS SHDSL REPEATER OUTDOOR & INDOOR HOUSING