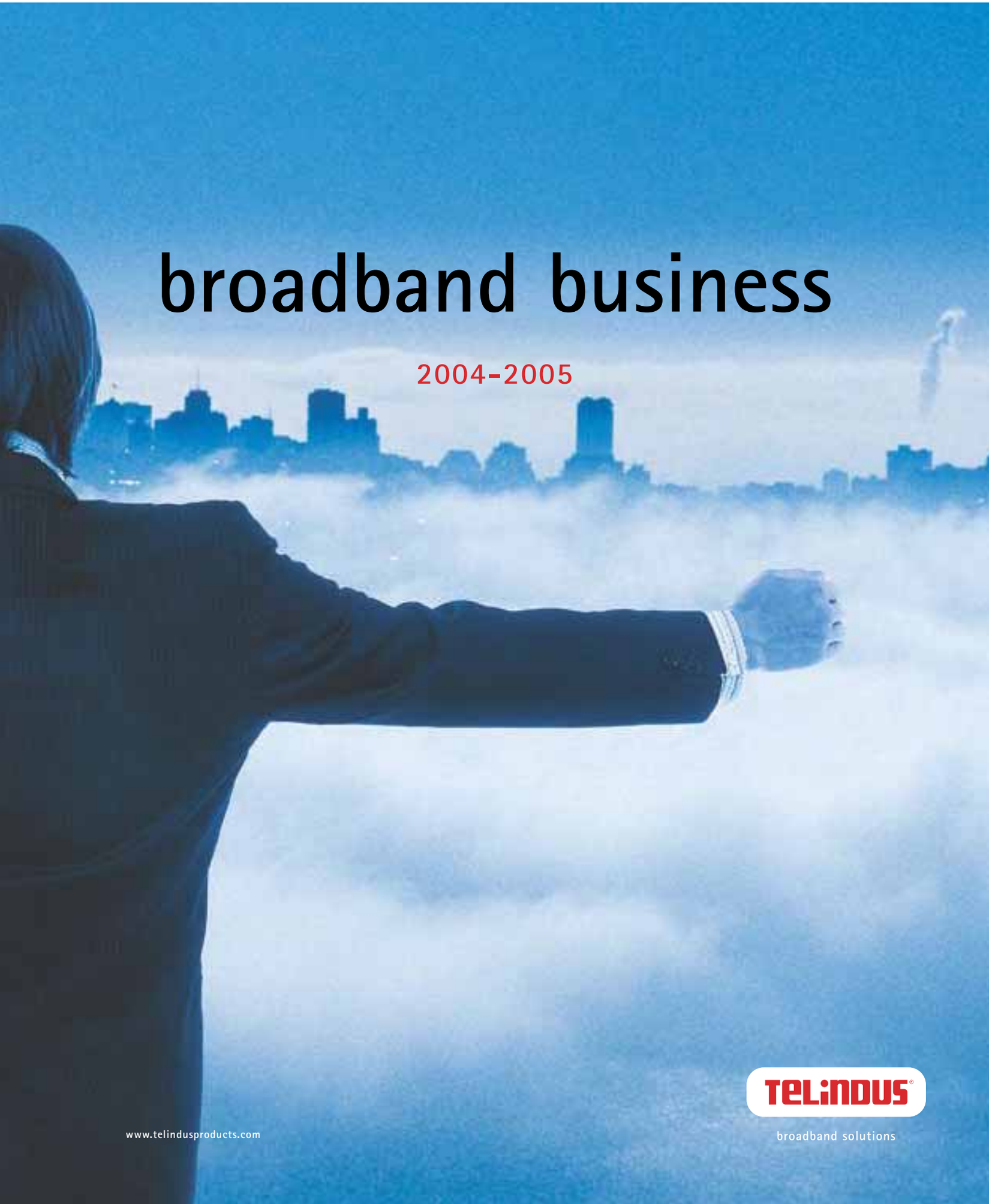


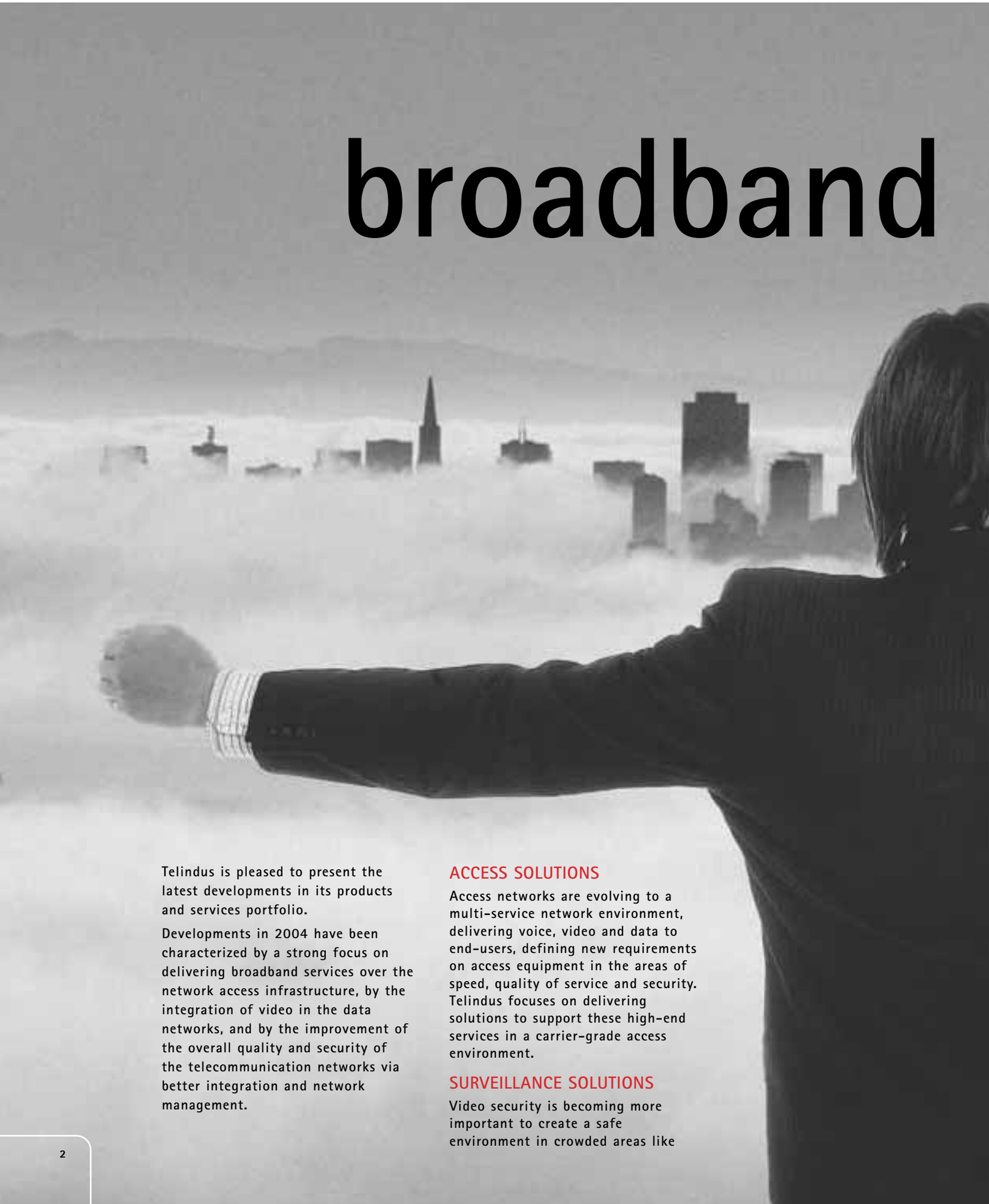
broadband business

2004-2005

TELINDUS®

broadband solutions

www.telindusproducts.com



broadband

Telindus is pleased to present the latest developments in its products and services portfolio.

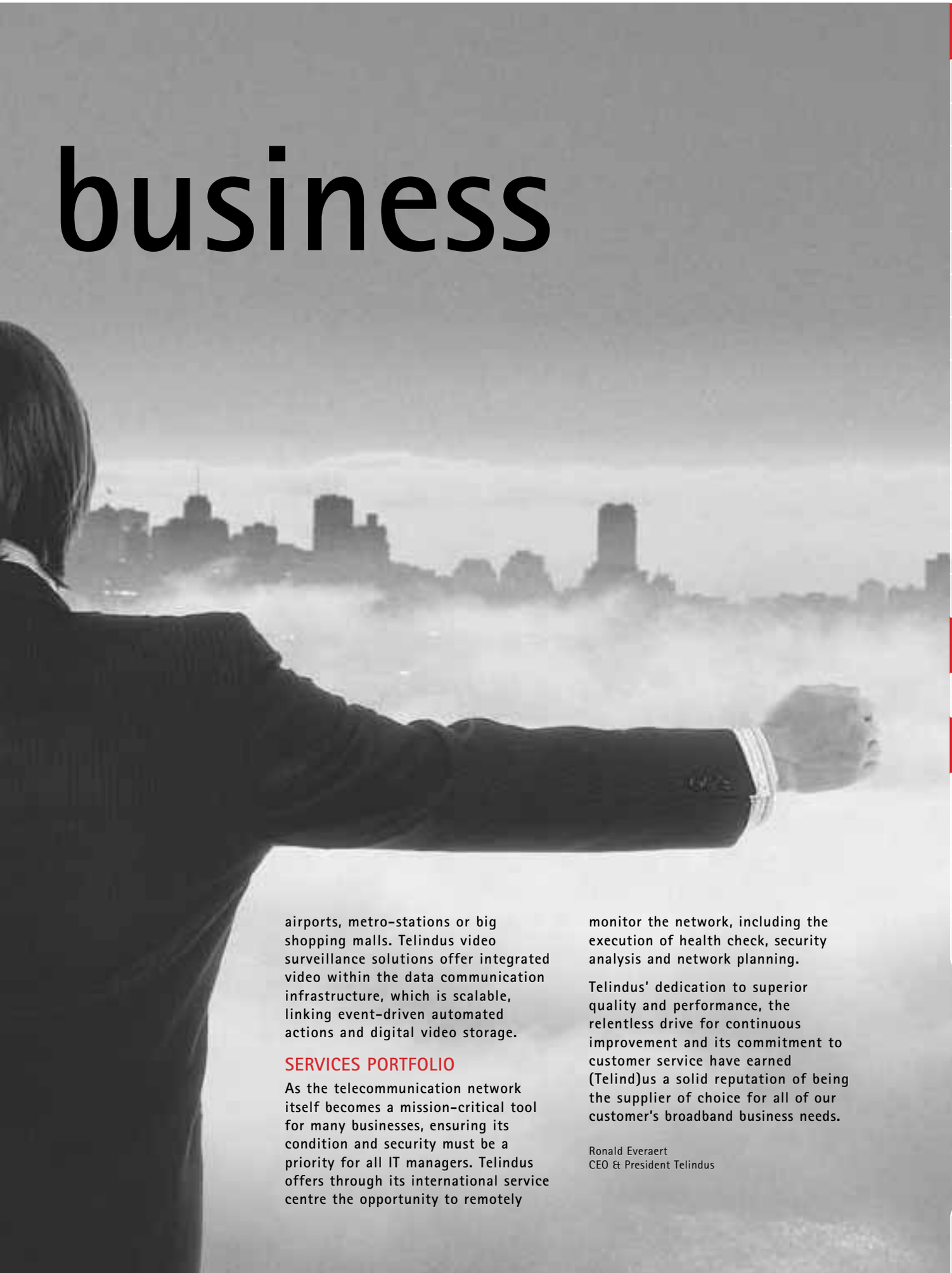
Developments in 2004 have been characterized by a strong focus on delivering broadband services over the network access infrastructure, by the integration of video in the data networks, and by the improvement of the overall quality and security of the telecommunication networks via better integration and network management.

ACCESS SOLUTIONS

Access networks are evolving to a multi-service network environment, delivering voice, video and data to end-users, defining new requirements on access equipment in the areas of speed, quality of service and security. Telindus focuses on delivering solutions to support these high-end services in a carrier-grade access environment.

SURVEILLANCE SOLUTIONS

Video security is becoming more important to create a safe environment in crowded areas like



business

airports, metro-stations or big shopping malls. Telindus video surveillance solutions offer integrated video within the data communication infrastructure, which is scalable, linking event-driven automated actions and digital video storage.

SERVICES PORTFOLIO

As the telecommunication network itself becomes a mission-critical tool for many businesses, ensuring its condition and security must be a priority for all IT managers. Telindus offers through its international service centre the opportunity to remotely monitor the network, including the execution of health check, security analysis and network planning.

Telindus' dedication to superior quality and performance, the relentless drive for continuous improvement and its commitment to customer service have earned (Telind)us a solid reputation of being the supplier of choice for all of our customer's broadband business needs.

Ronald Everaert
CEO & President Telindus

index

TELINDUS ACCESS SOLUTIONS

TELINDUS SURVEILLANCE SOLUTIONS

TELINDUS SERVICES PORTFOLIO

REFERENCE SECTION

CONTACT TELINDUS

CONFORMITY TO INTERNATIONAL STANDARDS

All Telindus access equipment carries the CE mark and conforms to all relevant international standards related to safety and electromagnetic radiation and immunity.

Following list of standards is applicable to all the access equipment mentioned in this catalogue. A short explanation of each of them can be found in the reference section. The table below only mentions the latest version of the standard. Older corresponding standards that are superseded can be found in the reference section.

SAFETY
- EN60950
- EN 41003
- ITU-T K.15 (remote power feed)
- ITU-T K.17 (remote power sink)
- ITU-T K.20 (central office)
- ITU-T K.21 (customer premises)
- ITU-T K.44
- ITU-T K.45

EMC EMISSION
- EN 61000-6-3
- EN 55022 Class B
- FCC Part 15 Class A

EMC IMMUNITY
- EN 61000-6-1
- EN 55024
- EN 50121-4
- EN 61000-3-2
- EN 61000-3-3
- EN 61000-4-2
- EN 61000-4-3
- EN 61000-4-4
- EN 61000-4-5
- EN 61000-4-6
- EN 61000-4-8
- EN 61000-4-11
- ENV 50204
- ETS 300386

POWERING
- ETS 300132-1 (AC)
- ETS 300132-2 (DC)

ENVIRONMENTAL CONDITIONS FOR NORMAL OPERATION (UNLESS OTHERWISE NOTED)
- Ambient operational temperature: -10°C to 50°C
- Operational relative humidity: 0% to 95% non-condensing
- Compliant to ETSI ETS 300019-1-3 class 3.2
- Storage temperature: -25°C to +70°C
- Compliant to ETSI ETS 300019-1-1 class 1.1
- Maximum altitude: 3000 m
- Mechanical protection: EN 60529 IP40
- Fire protection: UL94HB

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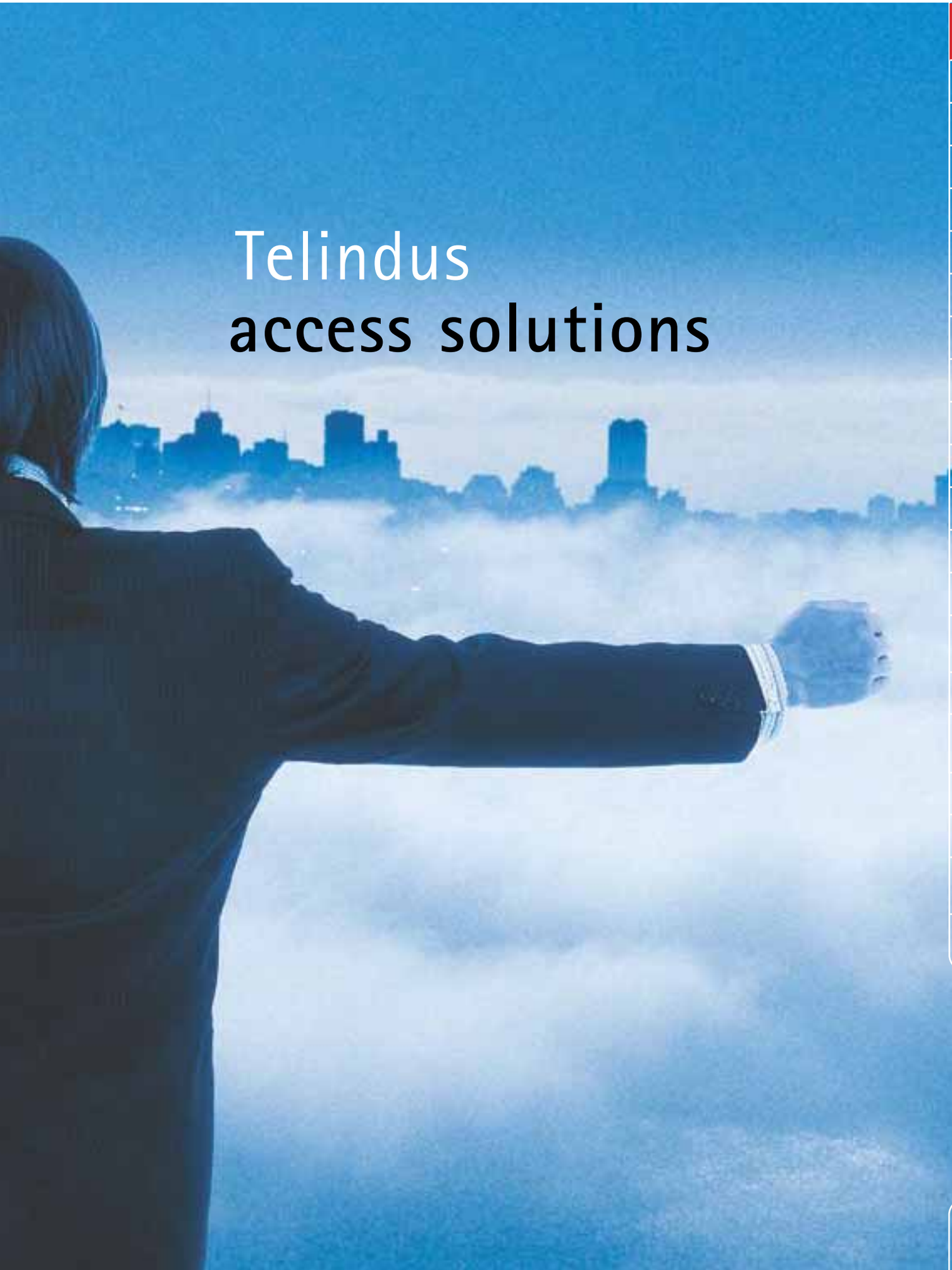


Telindus
access solutions

Telindus Dynamic Routing Engine

TELINDUS DYNAMIC ROUTING ENGINE new

> AVAILABLE ON AN EXTENSIVE RANGE OF TELINDUS PLATFORMS, THE TELINDUS DYNAMIC ROUTING ENGINE (TDRE) SOFTWARE IS A FEATURE-RICH OPERATING SYSTEM THAT PROVIDES A COMMON IP FABRIC, FUNCTIONALITY AND MAINTENANCE INTERFACE ACROSS YOUR NETWORK.

The TDRE guarantees a common feature set across the different product lines and a uniform support by maintenance and management tools. Telindus operates a policy of free upgrades and includes all functionality in a standard package.

PRODUCT LINES SUPPORTED BY TDRE

Following products are based on the TDRE:

- > 103x Desktop Access Router series
- > 106x Desktop Access Router series
- > 122x ADSL Router series
- > 142x SHDSL Router series
- > 1431 SHDSL CPE series
- > 24xx Access concentrator series
- > Crocus Router 10M modular interface

TELINDUS DYNAMIC ROUTING ENGINE

FEATURES & BENEFITS

- > UNIFORM FEATURE SET FOR TELINDUS IP PRODUCT RANGE
- > UNIFORM SET OF MAINTENANCE AND MANAGEMENT TOOLS
- > ALL FEATURES ARE STANDARD INCLUDED
- > INCLUDING VPN AND QOS FUNCTIONALITY
- > FREE UPGRADES

PPP ENCAPSULATION

- > Encapsulation compliant with RFC 1661, 1662
- > LCP (Link Control Protocol)
- > IPCP (IP Control Protocol, RFC 1332)
- > BCP (Bridge Control Protocol, RFC 2878)
- > CCP (Compression Control Protocol, RFC 1962) with support for the Predictor compression algorithm (RFC 1978)
- > Support of CHAP authentication with MD5 hashing (RFC 1994), unidirectional or bi-directional authentication
- > Support of PAP (PPP Authentication Protocols, RFC 1334), unidirectional or bi-directional authentication
- > Support of MS-CHAP and MS-CHAP v2, unidirectional or bi-directional authentication
- > Support for multi-link PPP (RFC 1990)
- > Support for PPP fragmentation (RFC 1990)

FRAME-RELAY ENCAPSULATION

- > Encapsulation compliant with RFC 1490, 2427
- > The equipment supports multiple DLCI's (PVC) on each WAN interface. The number of DLCIs per WAN interface is only limited by the amount of available memory. As (for example on a channelised E1 interface) the number of WAN ports on a router may be quite high, the total number of DLCIs in the router may become quite important.
- > CIR (Committed Information Rate) configurable per DLCI
- > EIR (Excess Information Rate) configurable per DLCI
- > Support of Inverse ARP over Frame-Relay for automatic gateway configuration
- > Support of different types of LMI (Local Management Interface):
  - > revision 1 LMI
  - > ANSI T1.617 D
  - > ITU-T Q933 Annex A
  - > FRF 1.2
- > Support for Frame-relay fragmentation (FRF 12)
- > Support for Multi-link Frame-Relay (FRF 16.1)

ATM ENCAPSULATION

- > Supported higher layer protocols:
  - > Classical IP according to RFC 1577
  - > Ethernet or IP according to RFC 2684
  - > PPPoA (PPP over ATM) according to RFC 2364
  - > PPPoE (PPP over Ethernet) according to RFC 2516, 2684
- > Multiprotocol encapsulation using
  - > LLC (Logical Link Control)
  - > VC (Virtual Connection) multiplexing
- > Support of Reverse ARP for automatic IP address resolution
- > Configuration of PCR (Peak Cell Rate) per PVC
- > ATM cell format ITU-T I.361
- > ATM forum UNI 3.1/4.0 PVCs
- > ATM forum ILMI 3.1/4.0
- > OAM F4 loop back support (ITU-T I.610)
- > OAM F5 loop back support (ITU-T I.610)

INTERFACE DEFINITION

The definition of an "interface" on equipment entirely depends on the configuration of the unit and can correspond to the following:

- > A physical interface, e.g. an Ethernet interface, a serial interface,..
- > A Frame-Relay DLCI
- > An ATM PVC
- > An L2TP Tunnel
- > A VLAN

Logical interfaces behave similarly as physical interfaces, except that they don't send interface alarms.

IP ADDRESS ASSIGNMENT

- > BOOTP/DHCP server (RFC 2131, RFC 2132)
  - > Static or dynamic address assignment
- > DHCP relay agent (RFC 2131, RFC 2132)
- > Static IP address assignment
- > Automatic IP assignment through BootP client (RFC 951)
- > Automatic IP assignment through DHCP client (RFC 2131, RFC 2132)
- > Automatic IP assignment through IPCP
- > Possible assignment of secondary IP address on LAN interface
- > Automatic IP gateway assignment through Inverse ARP (RFC 2390, supported on Frame-Relay, PPP, ATM or L2TP)
- > Numbered or unnumbered mode

IP ROUTING

The equipment complies to the router requirements as stated in RFC 1812 and supports the routing of standard IP packets (RFC 791) between the different interfaces on the equipment according to following routing protocols:

Standard static routing:
Routing is done through static routing entries in the routing table. Alternate routing is possible through the use of different preferences for different routes to the same destination.

Policy based static routing:
Normal routing is based on the destination IP address. Policy based routing offers the possibility to define different routing entries based on additional information. Traffic is routed to a certain interface or gateway based on following parameters:

sourceIpStartAddress sourceIpEndAddress	These elements set the range for the IP source address as specified in the IP header. Packets that fall within the specified range and fulfil the other conditions are using this route
destinationIpStartAddress destinationIpEndAddress	These elements set the range for the IP destination address as specified in the IP header. Packets that fall within the specified range and fulfil the other conditions are using this route
TosStartValue TosEndtValue	These elements set the range for the Type Of Service field value. Packets that fall within the specified range are forwarded
IpProtocol	Use this element to set the protocol field from the IP header. Packets that have the specified protocol field are forwarded You can specify the protocol by typing the protocol number. For ease of use, some common protocols can be selected from a drop-down box: any (0), ICMP (1), IGMP (2), IPinIP (4), TCP (6), EGP (8), IGP (9), UDP (17), RSVP (46), IGRP (88), OSPFIGP (89), TCPestablished (255).
SourcePortStart sourcePortEnd	These elements set the range for the sourceport as specified in the UDP / TCP headers. Packets that fall within the specified range and fulfil the other conditions are using this route. You can specify the port by typing the protocol number. For ease of use, some common port numbers can be selected from a drop-down box: any or optional (0), echo (7), discard (9), ftp-data (20), ftp (21), telnet (23), smtp (25), domain (53), www-http (80), pop3 (110), nntp (119), snmp (161), snmptrap (162), z39.50 (210), syslog (514), router (520), socks (1080), l2tp (1701), telindus (1728).
DestinationPortStart destinationPortEnd	These elements set the range for the destination port as specified in the UDP / TCP headers. Packets that fall within the specified range and fulfil the other conditions are using this route. You can specify the port by typing the protocol number. For ease of use, some common port numbers can be selected from a drop-down box: see above.

RIP1 (RFC 1058)

- > Support of SplitHorizon and selective router updates per interface
- > Support for broadcasting of selective RIP updates limited to information on specific network subnets

RIP2 (RFC 2453)

- > Support of SplitHorizon and selective router updates per interface
- > Support for broadcasting of selective RIP updates limited to information on specific on specific network subnets
- > Support for authentication with MD5 hashing or clear text

OSPF (RFC2328) *

Support for ICMP to inform the originator of the packets about possible shorter routes

- > "TTL exceeded" messages
- > "destination unreachable: port unreachable" messages
- > "destination unreachable: communication with destination is administratively prohibited" messages

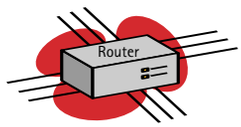
TELINDUS DYNAMIC ROUTING ENGINE

BRIDGING AND VLAN SUPPORT

The equipment supports bridging with support of the spanning tree protocol (IEEE 802.1D). The spanning tree protocol allows having multiple paths between two sites, building redundancy in the connection. Bridging may be enabled or disabled for each of the available ports on the router and may be combined with IP routing on the same interface. The bridging foresees also the blocking of certain MAC-addresses on outgoing traffic based on a bridge access list. There is no hard-coded limitation on the number of MAC addresses that can be stored in the unit. A minimum of 10.000 MAC addresses is guaranteed on all products. It is possible to disable the self-learning functionality of the bridge and operate it as a repeater.

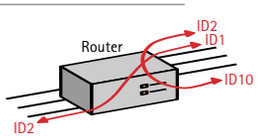
The equipment offers the possibility to create multiple bridge groups. A bridge group is a collection of interfaces that are connected through bridging. In case a bridge-group is connected to a virtual Ethernet VLAN interface, it is possible to forward or strip-off the VLAN ID before sending the Ethernet packets to the other interfaces of the bridge group. Within a bridge group, the equipment can monitor a predefined VLAN for management purposes. As described in the section on QoS (Quality of Service), the equipment can also take into account the 802.1P tag for setting the priority when forwarding the packet.
Between different bridge-groups in the equipment, routing may be enabled.

MULTIPLE BRIDGE GROUPS IN A MULTIPORT DEVICE



A bridge-group can also be configured as a "VLAN switch". In this case, a mapping is done between a VLAN ID on one interface and a VLAN ID on another interface. For this purpose, a VLAN switching table is used. This table can also be used for "tagging" or "untagging" VLAN tags and for changing the priority tags.

ACTING AS A "VLAN SWITCH"



MULTICASTING AND BROADCASTING

The Telindus equipment supports the handling of broadcasts and multicasts and includes following related functionalities:

> Support for IGMPV2 (Internet Group Management protocol, RFC 2236), as the standard for IP multicasting.
> Enabling or disabling the forwarding of directed broadcasts on a certain interface
> Setting of helper address for broadcasts, in order to replace the general broadcast address by the address of specific host(s) in the network.

NETWORK ADDRESS TRANSLATION (NAT AND PAT)

NAT allows the use of private IP addresses on the local Ethernet, while still having access via the WAN interface to the Internet (official IP addresses). Each Ethernet IP address that needs Internet access is translated into an official IP address before sending traffic on the WAN interface. The number of simultaneous users with Internet access is limited to the number of official IP addresses. This may be a static or a dynamic (automatic) process.

PAT (RFC 3022) uses only one single official IP address on the WAN network. The Telindus router translates all private IP addresses on the local Ethernet to the single official IP address. The PAT implementation also supports incoming traffic from the public network through the use of a service-mapping table.
You can combine both translation methods (NAT and PAT) and tune them to specific needs.

TUNNELLING AND VPN SUPPORT

L2TP tunnelling (Layer 2 Tunnelling Protocol RFC 2661)
This protocol is used to emulate a point-to-point connection over IP, which can be used to set-up a PPP session between the two routers. The implementation includes the possibility to configure tunnel authentication prior to the setup of L2TP.
> Supported on WAN and LAN interfaces
> Each equipment can be configured as a LAC (L2TP Access Concentrator) or as a LNS (L2TP Network Server)

IPSec security (RFCs 2401-2411)
> Support of L2TP transport mode (RFC 3193)
> Support of ESP (Encapsulation Security Payload), allowing authentication of the sender and encryption of the data
> Support of DES or 3DES encryption (56 bit or 3x 56bit)
> Support for HMAC (Keyed-Hashing for Message Authentication) based on MD5 or SHA-1 for integrity and authentication.
> Support of Manual SA (Security Association)

Note: On most standard equipment, encryption in IPSEC is handled by software. As this is a processor-consuming task, the forwarding performance of the equipment decreases. Therefore, some equipment is also available in a version with a 3DES encryption chip. This chip takes care of the DES and 3DES encryption / decryption, unburdening the software of this task.

FIREWALL FUNCTIONALITY AND ACCESS LISTS

The equipment allows the filtering of traffic on outgoing traffic on LAN or WAN interfaces based on extended access lists. These lists allow the filtering of the traffic based on following parameters:

sourceIpStartAddress sourceIpEndAddress	These elements set the range for the IP source address as specified in the IP header. Packets that fall within the specified range are forwarded
destinationIpStartAddress destinationIpEndAddress	These elements set the range for the IP destination address as specified in the IP header. Packets that fall within the specified range are forwarded
TosStartValue TosEndtValue	These elements set the range for the Type Of Service field value. Packets that fall within the specified range are forwarded
IpProtocol	Use this element to set the protocol field from the IP header. Packets that have the specified protocol field are forwarded You can specify the protocol by typing the rotocol number. For ease of use, some common protocols can be selected from a drop-down box: any (0), ICMP (1), IGMP (2), IPinIP (4), TCP (6), EGP (8), IGP (9), UDP (17), RSVP (46), IGRP (88), OSPFIGP (89), TCPestablished (255).
SourcePortStart sourcePortEnd	These elements set the range for the source port as specified in the UDP / TCP headers. Packets that fall within the specified range are forwarded. You can specify the port by typing the protocol number. For ease of use, some common port numbers can be selected from a drop-down box: any or optional (0), echo (7), discard (9), ftp-data (20), ftp (21), telnet (23), smtp (25), domain (53), www-http (80), pop3 (110), nntp (119), snmp (161), snmptrap (162), z39.50 (210), syslog (514), router (520), socks (1080), l2tp (1701), telindus (1728).
DestinationPortStart destinationPortEnd	These elements set the range for the destination port as specified in the UDP / TCP headers. Packets that fall within the specified range are forwarded. You can specify the port by typing the protocol number. For ease of use, some common port numbers can be selected from a drop-down box: see above.

An additional access list can be activated for the traffic towards to the protocol stack used for the network management and remote control of the router. In this case, incoming traffic can be blocked based on the address-range of the IP source.

QUALITY OF SERVICE (QOS)

The QoS mechanism is implemented based on different forwarding queues. The Telindus routers implement for every interface on the equipment a total of 7 different queues, of which 6 are actually used by user data.
The implementation of the queues is as follows:

Queue	Queue type	Description
1 - 5	configurable queue	The user can decide which data goes into which queue.
6	low delay queue	This queue is always addressed between every user configurable queue and should be used by delay sensitive traffic.
7	system queue	This queue is filled with link monitoring messages etc. and has priority over all other queues.

The way that the configurable queues are transmitting data can be selected according to different algorithms. Following algorithms are implemented:
> Fifo (first in first out)
> Round Robin (each configurable queue has equal weight)
> Absolute Priority
> Weighted Fair Queuing
> Low delay Weighted Fair Queuing

The distribution of the traffic between the different queues can occur according to various QoS Traffic Policies:
The QoS Traffic Policy defines the ways in which the router will distribute the traffic over the different forwarding queues in the equipment. A total of 6 queues is available for user data.

Following policies for distributing the traffic over the queues are defined:

A: Trafficshaping
Based on a table, a complete customised policy may be set. The elements that define how the traffic is forwarded to a certain priority queue are the following:

sourceIpStartAddress sourceIpEndAddress	These elements set the range for the IP source address as specified in the IP header. Packets that fall within the specified range are forwarded and queued if applicable.
destinationIpStartAddress destinationIpEndAddress	These elements set the range for the IP destination address as specified in the IP header. Packets that fall within the specified range are forwarded and queued if applicable.
TosStartValue TosEndtValue	These elements set the range for the Type Of Service field value. Packets that fall within the specified range are forwarded and queued if applicable.
IpProtocol	Use this element to set the protocol field from the IP header. Packets that fall within the specified range are forwarded and queued if applicable. You can specify the protocol by typing the protocol number. For ease of use, some common protocols can be selected from a drop-down box: any (0), ICMP (1), IGMP (2), IPinIP (4), TCP (6), EGP (8), IGP (9), UDP (17), RSVP (46), IGRP (88), OSPFIGP (89), TCPestablished (255).
SourcePortStart sourcePortEnd	These elements set the range for the source port as specified in the UDP / TCP headers. Packets that fall within the specified range are forwarded and queued if applicable. You can specify the port by typing the protocol number. For ease of use, some common port numbers can be selected from a drop-down box: any or optional (0), echo (7), discard (9), ftp-data (20), ftp (21), telnet (23), smtp (25), domain (53), www-http (80), pop3 (110), nntp (119), snmp (161), snmptrap (162), z39.50 (210), syslog (514), router (520), socks (1080), l2tp (1701), telindus (1728).
DestinationPortStart destinationPortEnd	These elements set the range for the destination port as specified in the UDP / TCP headers. Packets that fall within the specified range are forwarded and queued if applicable. You can specify the port by typing the protocol number. For ease of use, some common port numbers can be selected from a drop-down box: see above.
newTosValue	Use this element to set the new TOS field value. When you select a new TOS field value, then the TOS value of a packet that matches an entry in the trafficShaping table is changed. Selecting unchanged, leaves the TOS field value as it is.
priority	Use this element to set the destination queue for a packet matching an entry in the trafficShaping table. In case an overload condition occurs, then a packet that matches an entry in the trafficShaping table is sent to the specified queue. The priority element has the following values: Queue1, Queue2, Queue3, Queue4, Queue5, lowDelayQueue.

B: TosDiffServ
The data is redirected to the queues based on DiffServ (refer to RFC2597) regarding class and drop precedence.This means that, depending on their Type Of Service (TOS) field, some packets are moved to other queues and/or dropped sooner than other packets in case the queue is full.

The highest 3 bits of the TOS field are mapped as follows:

Bit values	correspond with
000 up to 100 101 and higher	queues 1 up to 5, respectively the low delay queue

The next 2 bits define the drop precedence:

Bit values	correspond with
00 and 01 10 11	maxLength1 MaxLength2 MaxLength3

Where maxlength1, Maxlength2, Maxlength3 correspond to the number of data packets that may be present in a queue before a packet is dropped. These values may be different for each of the queues.

C: TosMapped
This simple and flexible policy allows to queue the traffic based on a user defined range of the TOS field.

In case of VLAN tagged Ethernet traffic, the 802.1P tag can be used to map the traffic to any of the priority queues described above.

ACCESS SECURITY

The equipment is password protected for access through the different maintenance and management tools. For each router one can define an unlimited number of users, where each user can be given a customised access-right to the equipment. The access-right is based on a combination of following elements:
> Read-access: read all parameters except security parameters
> Write-access: write all parameters except security parameters
> Security-access: read and change security parameters
> Filesystem-access: access to the file system (for advanced users)

The unit also features a Radius client functionality (RFC 2865), that can be used for Authentication, Authorisation and Accounting (AAA) of network maintenance sessions, or for PPP sessions initiated by remote end-users.

MAINTENANCE AND MANAGEMENT TOOLS

The equipment is supported by a wide set of local and remote maintenance and management tools. These tools include:
> TMA (Telindus Maintenance Application):
A free graphical maintenance application delivered with the equipment. It can be used to access the device through a local serial connection or through an IP connection (UDP socket 1728).
> TMA CLI stand-alone command line console software
> TMA for HP OV management integration in HP Openview
> TMA elementview stand-alone element management
> Local console: a standard VT100 connection with command line interface or interactive menu-driven interface
> TELNET with command line interface or interactive menu-driven interface (RFC 854)
> HTTP web interface with interactive menu-driven interface (RFC 2616)
> PING (RFC 792)
> TFTP configuration and software download (RFC 1350)
> FTP configuration and software download (RFC 414)
> TML: Telindus Memory Loader for the donload of configuration or software through the serial console port.
> SNMP (RFC 1157)
> SNMP MIB2 (RFC 1213), private MIB
> SNMP traps (RFC 1215)
> SYSLOG event logging generation (RFC 3164)
> Simple Network Time Protocol (SNTP) (RFC 2030)
> IP loop back address

* Feature under development. Please check availability.

access routers

TELINDUS HAS A LONG HISTORY OF IN-HOUSE ROUTER DEVELOPMENT, WHICH MAKES IT A VALUABLE SUPPLIER OF INTEGRATED OR STAND-ALONE ROUTING EQUIPMENT.

The stand-alone access routers described in this chapter offer high speed routing characteristics and are fully compatible with all major third party router equipment.

The different models can offer solutions for encapsulation into PPP, X.25, frame relay or ATM and support serial, ISDN or G.703 based WAN interfaces.

They offer a cost-effective and flexible solution as end-user access equipment with the support for advanced VPN (Virtual Private Network) based services.

CROCUS ROUTER 2M

FEATURES & BENEFITS

- > SINGLE PORT HIGH-PERFORMANCE 2 MBPS ROUTER
- > AVAILABLE WITH SERIAL INTERFACE (X.21, V.35, V.36, RS-232, RS-530) OR FRACTIONAL E1 (G.703)
- > COMPATIBLE WITH ALL MAJOR ROUTER MANUFACTURERS
- > PPP, FRAME-RELAY AND X.25 ENCAPSULATION
- > STATIC AND RIP-2 ROUTING
- > NAT, PAT, DHCP
- > LIFETIME FREE SOFTWARE UPGRADES
- > CONFIGURATION AND MAINTENANCE SOFTWARE INCLUDED

> THE CROCUS 2M ROUTER HIGH-SPEED ACCESS ROUTER OFFERS A COST EFFECTIVE SOLUTION FOR REALISING LAN CONNECTIVITY FOR SMALL AND MEDIUM SIZE END USER NETWORKS.

Through its versatile serial WAN interface, it can connect to almost any leased line transport infrastructure.

The router comes with a classical serial interface like X.21, V.35, V.36 (RS-449), RS-232 and RS-530, or also with a (fractional) G.703 E1 interface.

LAN PHYSICAL CHARACTERISTICS
> Compliant with IEEE 802.3 10Mbps HDX Ethernet
> RJ45 Unshielded Twisted Pair (UTP)

WAN PHYSICAL CHARACTERISTICS
Serial interface models
> ISO 2110 (DB25 female): DTE, direct compliant to RS 232, RS-530, RS-530A
> Through adapter cable: X.21, V.35, V.36 (RS-449)
> Synchronous clocking modes: internal, internal transmit, slave-receive, external
> Synchronous internal clock speeds: 64, 128, 256, 512, 1024, 2048 kbps
> Asynchronous mode speeds: 9600, 19200,38400, 57600, 115200bps, CTS flow control

G.703 interface model
> 120 ohm balanced, RJ45 connector
> 75 ohm unbalanced, BNC coaxial connectors
> Clocking modes: internal, slave-receive
> Support of fractional framed E1 or unframed 2 Mbps

SUPPORTED LAN PROTOCOLS
> IP
> Bridging of other protocols

SUPPORTED WAN ENCAPSULATION PROTOCOLS
Frame-Relay (RFC 1490, RFC2427)
> Maximum number of Frame-Relay DLCIs: 32
> CIR (Committed Information Rate) configurable per DLCI
> EIR (Excess Information Rate) configurable per DLCI
> Support of Inverse ARP over Frame-Relay for automatic gateway configuration
> Support of LMI
  - Revision 1 LMI
  - ANSI T1.617
  - ITU-T
> Max WAN speed: 2 Mbps

PPP (RFC1661, RFC1662)
> Synchronous or asynchronous operation
> Support of Chap authentication with MD5 hashing (RFC 1994)
> Max WAN speed: 2 Mbps

X.25
> Maximum number of X.25 SVCs: 5
> Max WAN speed: 128 kbps

AUTOINSTALL SUPPORT
DLCI number configuration: LMI (Frame-Relay only)
IP address configuration
> BootP client (RFC951)
> DHCP client & relay agent (RFC2131, RFC2132)
> IPCP (for PP only)

Gateway configuration
> Inverse ARP (for Frame-Relay only)
> IPCP (for PPP only)

Full configuration
> Automatic TFTP configuration download (RFC1350)

IP ROUTING AND BRIDGING
> Static routes
> RIP version 2 with MD5 hashing and authentication (RFC2453)
> Bridging with spanning tree

FIREWALL FUNCTIONS
Access filtering on LAN and WAN interfaces
> Source IP Address
> Destination IP Address
> Source port number
> Destination port number
> IP protocol field

MAINTENANCE AND MANAGEMENT SUPPORT
> Local console (command line interface or interactive interface)
> TELNET (command line interface or interactive interface)
> TFTP configuration download
> TMA (Telindus Maintenance Application)
> HTTP web interface
> PING
> SNMP Mib2, private Mib
> Software flash download
> TMA CLI stand-alone command line console software*
> TMA Element Management software*
> TMA for HP OV management integration in HP Openview*

ADDITIONAL FEATURES
> NAT (Network Address Translation)
  Dynamic or static IP address conversion
> PAT (Port Address Translation)
> DHCP server, relay agent
> Numbered/unnumbered WAN Interface
> L2TP tunneling
> Diffserv COS

FRONT PANEL
> PWR: power
> LOS/AIS: physical link indication of serial interface
> 103/TXD: WAN Layer2 status/ data sent to WAN
> 104/RXD: data received from WAN
> LAN/TXD: Ethernet status/ data sent to LAN
> LAN/RXD: data received from LAN
> COL: collision on LAN

POWER REQUIREMENTS
> 7.5 Vdc, 750 mA with external power adapter
> External power adapters available for 24/48Vdc and 230Vac

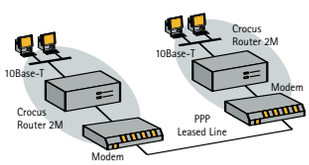
* optional

The latter allows the user to map the routed traffic into any number of selected time-slots, offering the largest possible flexibility for the interconnection to a G.704 based Digital Access Cross Connect System (DACCS) or an SDH backbone.

The use of Frame-Relay or X.25 encapsulation allows the router to interface seamlessly with any frame relay or X.25 network. This is illustrated in the figure below. PPP is more common when realising point-to-point connections.

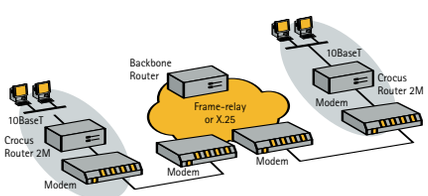
The unit is designed to support differentiated services based on VPNs (Virtual Private Networks). Therefore it supports features like L2TP (Layer 2 Tunneling Protocol) and QOS (Quality Of Service) based on Diffserv. The unit is designed for integration into demanding network environments and can be controlled by the complete set of network maintenance and management tools as they are described in this catalogue.

V POINT-TO-POINT ROUTER CONNECTION



Finally the Crocus 2M Router is equipped with flash memory. As supplementary features become available, the end-user can download free product upgrades.

V CONNECTION THROUGH X.25 OR FRAME RELAY BACKBONE



SALES CODES
> 167317 Crocus ROUTER 2M G703 230VAC
> 167318 Crocus ROUTER 2M RS-530 230VAC
> 167319 Crocus ROUTER 2M V.35 230VAC (includes V.35 DTE adapter cable)
> 167320 Crocus ROUTER 2M X.21 230VAC (includes X.21 DTE adapter cable)
> 167321 Crocus ROUTER 2M V.36 230VAC (includes V.36 DTE adapter cable)

Units without power module and separate power adapters can be found in the sales codes quick reference.

TELINDUS 1030 ROUTER SERIES

> THE TELINDUS 1030 ROUTER SERIES IS A SET OF IP ACCESS ROUTERS DESIGNED FOR HIGH-SPEED WAN ACCESS. THEY OFFER HIGH-PERFORMANCE IP ROUTING AND BRIDGING FOR LESS MONEY THAN OTHER PROFESSIONAL ACCESS ROUTERS.

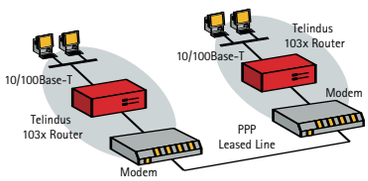
The Telindus router series is based on a high-performance routing core (45.000 pps) and is suited for delivering professional IP services over it's wide choice of WAN interface options, including serial (X.21, V.35, V.36,RS530, RS530A, RS232), Basic Rate ISDN (BRI) and E1 ports.

The versions with 2Mbps E1 interfaces are extremely well suited to transport LAN traffic over a PDH or SDH infrastructure. These G703 interfaces (1 or 2, depending on the model) can be used as channelised E1 interfaces, offering multiple logical interfaces on one physical port. The versions with serial interface allow speeds up to 10Mbps.

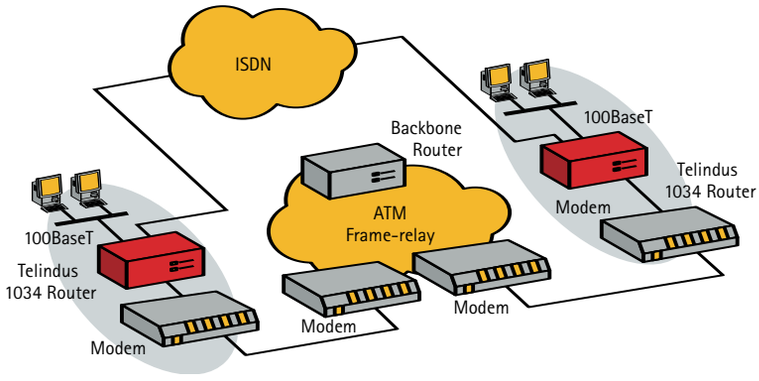
The units with ISDN feature 2 ISDN BRI ports, offering a (backup) speed up to 256 kbps.

All models fully support the TDRE (Telindus Dynamic Routing Engine) and include the possibility for encapsulation into Frame-Relay, ATM or PPP.

V POINT-TO-POINT ROUTER CONNECTION

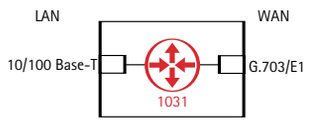


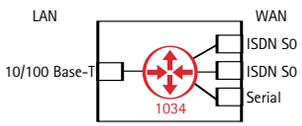
V CONNECTION THROUGH SWITCHED NETWORK WITH ISDN BACK-UP

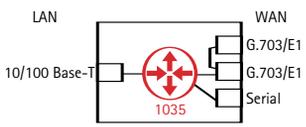


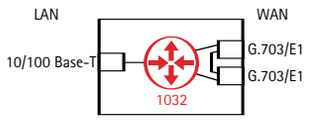
The unit supports differentiated services based on VPNs (Virtual Private Networks). Therefore it integrates features like L2TP (Layer 2 Tunnelling Protocol), IPSEC, 802.1Q (VLAN tagging) and COS (Class Of Service) based on Diffserv priority tagging and queuing. Specific models supporting a hardware accelerator for DES and 3DES encryption are also available.

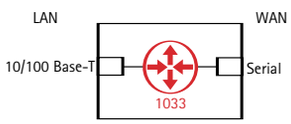
V DIFFERENT 103X ROUTER MODELS











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.

The Telindus 1030 Router series supports auto-install features over the WAN network. This makes it ideally suited for plug-and-play installation at customer premises while the configuration is prepared at a central site.

FEATURES & BENEFITS

> PROFESSIONAL 10 MBPS WAN ROUTERS
> AVAILABLE WITH SERIAL, ISDN OR CHANNELISED E1 INTERFACES
> 10/100 AUTO SENSE ETHERNET INTERFACE
> IP ROUTING AND BRIDGING
> CLASS OF SERVICE ROUTING
> VLAN INTERCONNECT
> ATM, FRAME RELAY AND PPP WAN ENCAPSULATION
> BUILT-IN L2TP AND IPSEC SECURITY
> FULLY MANAGEABLE WITH A VARIETY OF TOOLS

LAN INTERFACE
> Compliant with IEEE 802.3 10Mbps HDX/FDX Ethernet
> Compliant with IEEE 802.3u 100Mbps HDX/FDX Ethernet
> 10/100Mbps auto-sense
> RJ45 Unshielded Twisted Pair (UTP)

WAN INTERFACES
Available WAN interfaces depend on the model
> Telindus 1031 Router: 1x 2Mbps G703 interface
> Telindus 1032 Router: 2x 2Mbps G703 interfaces
> Telindus 1033 Router: 1x serial interface
> Telindus 1034 Router: 1x serial and 2x BRI interface
> Telindus 1035 Orchid: 1x serial and 2x 2Mbps G703 interfaces

Note: The 1035 does not support multiport operation on the G.703 interfaces (only add-and-drop)

G703 INTERFACE CHARACTERISTICS
> Applicable standards: ITU-T G.703, G.704, G.823, G.826
> Line data rate (nominal): 2048 kbps
> Line code: HDB3
> Line connection: RJ45 DTE
> Line Impedance: 120 ohm balanced
> Clocking: slave receive, internal
> Unframed 2Mbps mode: support for PPP, Frame-Relay
> Channelised E1 mode: support for PPP, Frame-Relay
> Fractional E1 mode: support for PPP, Frame-Relay, ATM
> Possibility for add-and-drop on 64kbps time-slots between the two G.703 interfaces

RS530 INTERFACE CHARACTERISTICS
> Applicable standards: ITU-T V.10, V.11
> DTE signals: RXD, TXD, SGND, RTS, CTS, DTR, RXCLK, TXCLK, EXTCLK
> Connector: female DB25 (ISO 2110), directly compliant with RS530, RS530A
> Through adapter cable: V.35, V.36 (RS449), X.21, V.24 (RS232)
> Clocking: internal, internal transmit, slave receive, external
> PPP, frame relay and ATM WAN encapsulations

BRI INTERFACE CHARACTERISTICS
> Line connection: RJ45 S0 DTE
> PPP WAN encapsulation

AUX INTERFACE CHARACTERISTICS
> Applicable standards: ITU-T V.24, V.28, EIA/TIA 574
> DTE signals: RXD, TXD, SGND, RTS, CTS, DSR, DTR, DCD, RI
> Connector: female DB9
> Speed: 9600 bps
> Asynchronous PPP WAN encapsulation

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

FRONT PANEL INDICATORS
> PWR: Power
> G703 / ISDN 1 / LNK: first G.703/ISDN interface status (1031, 1032, 1034, 1035)
> G703 / ISDN 1 / ACT: first G.703/ISDN interface's WAN protocol status (1031, 1032, 1034, 1035)
> G703 / ISDN 2 / LNK: second G.703/ISDN interface status (1032, 1034, 1035)
> G703 / ISDN 2 / ACT: second G.703/ISDN interface's WAN protocol status (1032, 1034, 1035)
> RS530 : LNK: RS530 interface status (1033, 1035)
> RS530 / ACT: RS530 interface's WAN protocol status (1033, 1035)
> LAN / ACT: LAN status
> LAN / COL: LAN collision detect

MEMORY
> Flash memory: 16Mbyte
> RAM (1031-1034): 16Mbyte
> RAM (1035): 64Mbyte

ROUTING AND BRIDGING CHARACTERISTICS
> Conform TDRE (Telindus Dynamic Routing Engine)

ROUTING AND BRIDGING PERFORMANCE
> Full forwarding performance of 64byte packets at maximum interface speed
> Routing performance: 45.000 pps
> Buffering: up to 4800 packets (64 bytes/packet)
> Maximum number of Frame-Relay DLCIs: 200
> Maximum number of ATM PVCs: 31
> Maximum number of (VPN) tunnels: 10
> Maximum number of bridge-groups: 13

MAINTENANCE AND MANAGEMENT SUPPORT
> Conform TDRE (Telindus Dynamic Routing Engine)

MECHANICAL DATA (H X W X D)
> 45 x 220 x 235 mm Weight: 800 g

POWER REQUIREMENTS
> 9 Vdc, 1A with external power adapter
> External power adapters available for 24/48Vdc and 230 Vac

SALES CODES: STANDARD UNITS

> 177460 Telindus 1031 Router 230VAC (1x G.703)
> 177463 Telindus 1032 Router 230VAC (2x G.703)
> 177465 Telindus 1033 Router 230VAC (1x RS-530)
> 183014 Telindus 1034 Router 230VAC (1x RS-530, 2x BRI)
> 177468 Telindus 1035 Orchid 230VAC (1x RS-530, 2x G.703)

SALES CODES: WITH HARDWARE ENCRYPTION

> 177627 Telindus 1032 Router 3DES 230VAC (2x G.703)
> 177633 Telindus 1033 Router 3DES 230VAC (1x RS-530)
> 183016 Telindus 1034 Router 3DES 230VAC (1x RS-530, 2x BRI)

A cardversion of the 1035 is also available. See chapter Network Maintenance & Management

Units without power module and separate power adapters can be found in the sales codes quick reference section

1061 ROUTER

new

> THE TELINDUS 1061 ROUTER IS A HIGH-SPEED ROUTER FOR ACCESS TO A WAN AT RATES UP TO 155 MBPS WITH A VERY COMPETITIVE PRICE / PERFORMANCE RATIO.

The unit features two independent on-board 100Base-T LAN interfaces, and an interface slot accepting various TIMs (Telindus Interface Modules) with support for PPP, Frame-Relay or ATM. These interfaces include

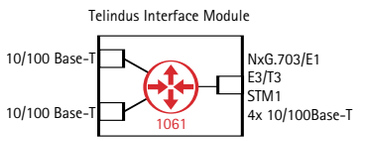
- Multiple E1 (up to 8) with support for IMA (Inverse Multiplexing over ATM), multilink PPP or multilink Frame-Relay
- E3/T3 with support for PPP, Frame-Relay or ATM
- STM1 with support for ATM
- 10/100 Ethernet interface with built-in 4 port switch

The Telindus 1061 Router is fully supported by the TDRE (Telindus Dynamic Routing Engine) and includes the possibility for encapsulation into Frame-Relay, ATM or PPP.

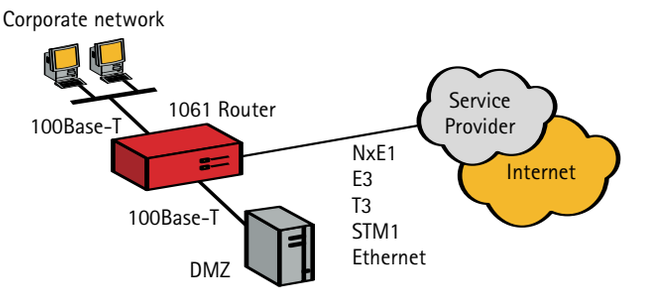
The equipment can be used in corporate environments to deliver business oriented IP services, including the termination of VPN (Virtual Private Network) connections towards remote offices, where it can be used in combination with other Telindus or third-party router equipment. For this purpose, the Telindus 1061 Router also integrates an on-board DES/3DES accelerator. Highly quality dependent traffic like Voice over IP (VoIP) can be supported through the advanced built-in QoS mechanisms.

Service providers (SPs) may use the Telindus 1061 Router in their Points of Presence (POP) to concentrate a large number of customers over a high-speed WAN link. For this purpose, the device supports features like Layer 2 Tunnelling Protocol (L2TP), PPP over ATM (PPPoA) and PPP over Ethernet (PPPoE) termination, various PPP authentication protocols and Remote Access Dial-in User Service (RADIUS)

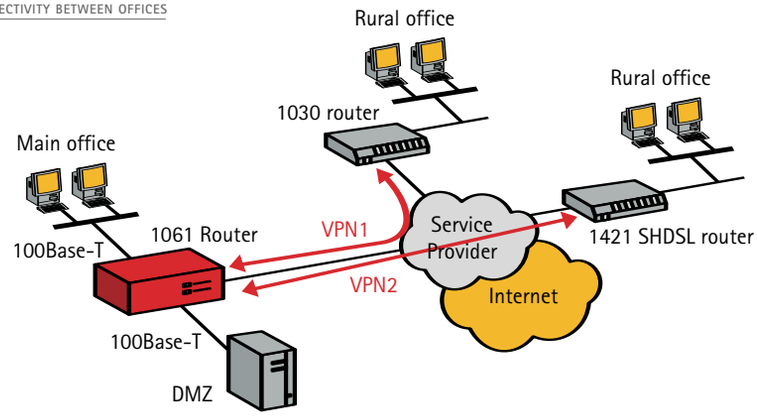
SCHEMATIC REPRESENTATION



CORPORATE NETWORK CONNECTIVITY



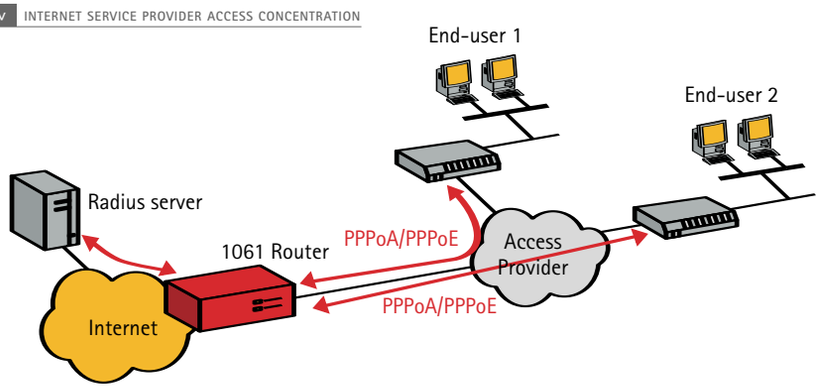
V VPN CONNECTIVITY BETWEEN OFFICES



FEATURES & BENEFITS

- > HIGH PERFORMANCE ACCESS ROUTER WITH STM1 CAPACITY
- > MODULAR INTERFACE MODULES FOR MAXIMUM FLEXIBILITY
- > ON-BOARD DUAL ETHERNET CONNECTIVITY
- > SUITABLE FOR ENTERPRISES AND SERVICE PROVIDERS
- > 1 UNIT HIGH COMPACT HOUSING
- > COMBINES IP ROUTING, BRIDGING, VLAN SWITCHING AND VPN TERMINATION IN ONE DEVICE
- > FULL IP QOS SUPPORT
- > COMPLETE MANAGEMENT SUITE

V INTERNET SERVICE PROVIDER ACCESS CONCENTRATION



LAN INTERFACE
> Number: 2
> Compliant with IEEE 802.3 10Mbps HDX/FDX Ethernet
> Compliant with IEEE 802.3u 100Mbps HDX/FDX Ethernet
> 10/100Mbps auto-sense
> RJ45 Unshielded Twisted Pair (UTP)

MODULAR INTERFACE SLOT
> Number: 1
> For use in combination with Telindus Interface Modules (TIMs)
  > Multiple E1 TIM
    - Support for Frame-Relay & Multilink Frame-Relay (up to 8 ports)
    - Support for PPP & Multilink PPP (up to 8 ports)
    - Support for ATM & ATM IMA (up to 6 ports)
  > E3/T3 TIM
    - Support for Frame-Relay, PPP & ATM
  > STM1 TIM
    - Support for ATM
  > 4 port Ethernet TIM

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

FRONT PANEL INDICATORS
> PWR: Power
> R: Reset condition
> LAN: LAN status

CLOCKING
> Slave on STM1, E3, T3 or E1 uplink
> Internal

ROUTING AND BRIDGING CHARACTERISTICS
> Conform TDRE (Telindus Dynamic Routing Engine)
> Standard DES/3DES on-board hardware accelerator

ROUTING AND BRIDGING PERFORMANCE
> Minimum routing performance: 150.000 pps
> Minimum bridging performance: 150.000 pps
> Minimum supported number of Frame-Relay DLCIs: 500
> Minimum supported number of ATM PVCs: 500
> Minimum supported number of (VPN) tunnels: 100
> Supported number of bridge-groups: 13

MAINTENANCE AND MANAGEMENT SUPPORT
> Conform TDRE (Telindus Dynamic Routing Engine)

MECHANICAL DATA (H X W X D)
> 44 x 440 x 240mm
> Weight: 3.5 kg

POWER REQUIREMENTS
> Dual power supply AC/DC
  DC: -36 up to -72V
  AC: 85 – 264V, 47 – 63 Hz
> Power consumption: max. 15 W

SALES CODES

> 184364 Telindus 1061 Router AC/DC
> 183021 Rack mount kit (19" or ETSI)

Sales codes and for Telindus Interface Modules (TIMs) can be found in the modular interface section and the sales code quick reference

The unit comes with an advanced built-in management agent and is supported by the complete TMA management suite for local and remote control

The Telindus 1061 Router comes in a very compact size (1 unit high) and is rack mountable. It fits in 30 cm deep ETSI racks with all connectors and indicators on the front. Combined with its low power consumption it is easily stackable.

Available from Q3 2004

broadband central office

TELINDUS OFFERS A FULL RANGE OF CENTRAL OFFICE (CO) ACCESS SOLUTIONS, FOR USE IN A TDM AND BROADBAND ACCESS ENVIRONMENT.

This chapter describes the broadband central office solutions designed for integration into IP, ATM or Frame-Relay environments.

The Telindus 2400 mini-DSLAM (Digital Subscriber Line Access Multiplexer) series can be used for the delivery of business oriented broadband services and for installations in areas with few customers, where flexibility on the backhaul connection to the backbone is key.

All Telindus Central Office solutions can be controlled by a variety of carrier-grade maintenance and management tools, which are common for all centrally and remotely installed network elements.

2400 ADSL / SHDSL SERIES

> THE TELINDUS 2400 MINI-DSLAM SERIES ENABLES ENTERPRISES AND SERVICE PROVIDERS TO DEPLOY BUSINESS SERVICES OVER ADSL AND SHDSL, WHILE MAINTAINING A MAXIMUM FLEXIBILITY FOR THE CONNECTION TO THE BACKBONE.

Apart from a fixed 100Base-T backbone connection, the Telindus 2400 Series can accept various modular interfaces with support for PPP, Frame-Relay or ATM.
These interfaces include:

- Multiple E1 (up to 8) with support for IMA (Inverse Multiplexing over ATM), multilink PPP or multilink Frame-Relay. The number of E1 lines and the encapsulation scheme effectively used can be selected by configuration (e.g. 4x E1 IMA)
- E3/T3* with support for PPP, Frame-Relay or ATM
- STM1* with support for ATM
- 10/100 Ethernet interface with built-in 4 port switch*

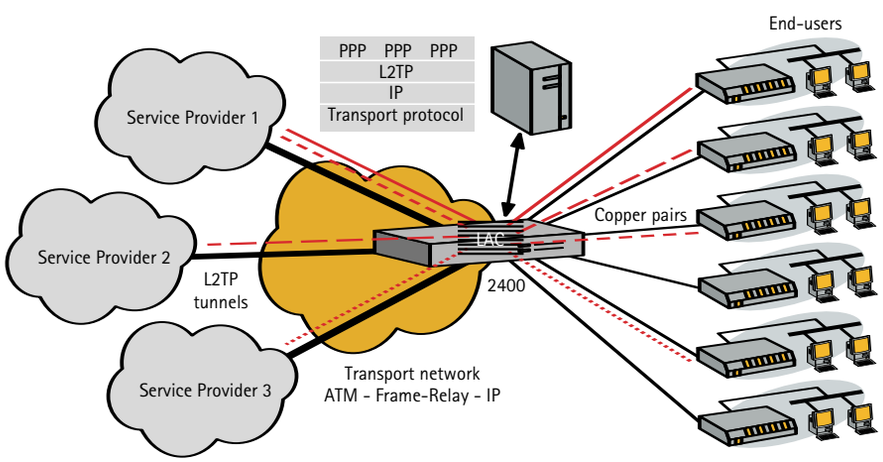
Fully supported by the TDRE (Telindus Dynamic Routing Engine), the 2400 Operating System supports ATM switching, full IP-routing, bridging and VLAN switching. The unit can be split into multiple bridge groups, enabling direct mappings between DSL lines and VLANs. In addition is has an extended support for IP CoS (Class of Service) and it can initiate and terminate VPN (Virtual Private Network) circuits. Therefore, the Telindus 2400 Series can be used for supporting services like VoIP (Voice over IP) and intranet applications.

Integrated Service Selection (LAC: L2TP Access Concentrator) allows selecting the service based on the user ID and password. This allows the set-up of a complete service, without the need for installing a separate BAS (Broadband Access Server).

FEATURES & BENEFITS

- SMALL ADSL/SHDSL DSLAM FOR PROFESSIONAL BROADBAND SERVICES
- 1 UNIT HIGH HOUSING FOR COMPACT CENTRAL-OFFICE SOLUTION
- UP TO 24 ADSL OR SHDSL LINE PAIRS PER UNIT WITH POSSIBILITY FOR CASCADING
- MULTIPLE PROTOCOL SUPPORT FOR FLEXIBLE MIGRATION FROM FRAME-RELAY / ATM TO IP TRANSPORT
- MODULAR INTERFACE FOR MAXIMUM FLEXIBILITY FOR BACKBONE CONNECTIVITY

V INTEGRATED SERVICE SELECTION FUNCTIONALITY*



The unit comes with an advanced built-in management agent and is supported by the complete TMA management suite for local and remote control. The existing backbone infrastructure (IP, ATM or Frame-relay) can be used to transport all management information to a central location without the need for a separate overlay network.

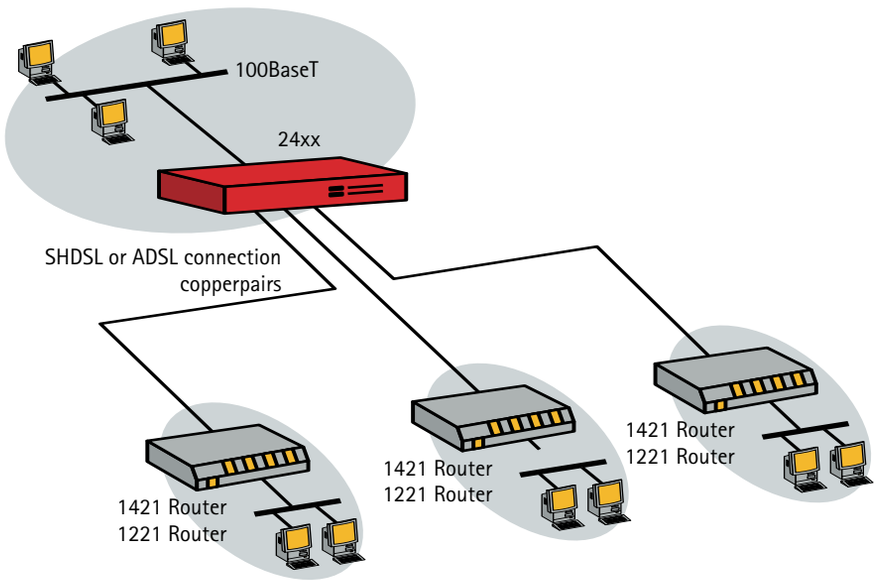
The Telindus 2400 access concentrator houses 8, 16 or 24 ADSL or SHDSL modems. Two SHDSL circuits can also be combined to increase the distance or speed towards the end-users.

The Telindus 2400 series comes in a very compact size (1 unit high) and can be used as desktop unit or can be rack-mounted through the optional rack-mount-kit. It fits in 30 cm deep ETSI racks with all connectors and indicators on the front. Combined with its low power consumption it is easily stackable.

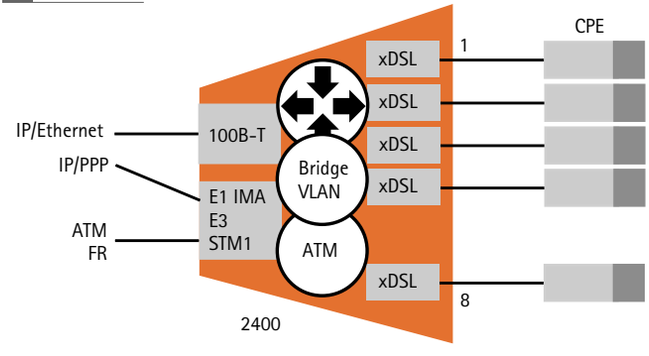
In case of IP routing, bridging or VLAN switching, several units can be cascaded via the fixed and modular Ethernet interfaces. On the last Telindus 2400 unit, the data is encapsulated for the WAN interface. In case of ATM switching, 2 units can be cascaded over Ethernet using a proprietary mechanism.

Typical applications include the rollout of business-oriented services over DSL as it is applicable in operator or campus network environments.

V CAMPUS NETWORK CONCENTRATION



V BLOCK DIAGRAM



Business oriented services based on:

- IP
- ATM
- Frame-Relay
- Clear channel

VERSIONS

Version	# DSL ports	Options	Power supply
2401 ADSL	8	Annex A / annex B, built-in splitter	-48VDC, AC
2402 ADSL	16	Annex A / annex B	-48VDC
2403 ADSL	24	Annex A / annex B	-48VDC
2421 SHDSL	8		-48VDC, AC
2422 SHDSL	16		-48VDC
2423 SHDSL	24		-48VDC

ADSL LINE INTERFACE

> Single-pair ADSL line access
> Coding: compliant to ITU-T G.992.1 (ADSL G.dmt), ITU-T G.992.2 (ADSL G.Lite), ETSI TS 101 388 v1.3.1, ITU-T G.992.3 (ADSL2 G.dmt)* and ITU-T G.992.4 (ADSL2 G.Lite)*
> Support for ITU-T annex A (POTS) or Annex B (ISDN and POTS)
> Optional integrated POTS or ISDN splitters (on 2401 versions)
> Connector: 50 pin telco connector
> Line speeds: Downstream: 32 kbps up to 12* Mbps
Upstream: 32 kbps up to 1024* kbps
> Performance monitoring: compliant G.826 (errored seconds, severely errored seconds, unavailability seconds)

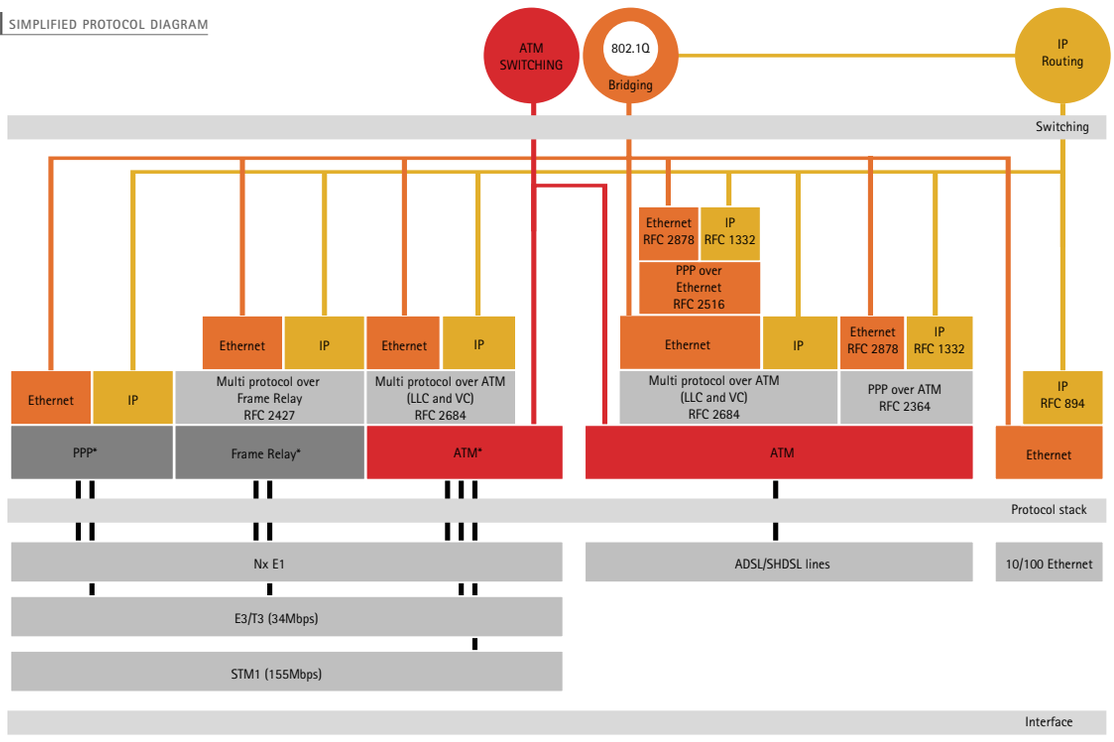
SHDSL LINE INTERFACE

> Single or two-pair SHDSL line access (configurable)
> Coding: TC PAM, compliant to ITU-T G.991.2 (G.SHDSL) and ETSI TS 101524
> Connector: 50 pin telco connector
> 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)

FIXED ETHERNET UPLINK

> Compliant with IEEE 802.3 10Mbps HDX/FDX Ethernet
> Compliant with IEEE 802.3u 100Mbps HDX/FDX Ethernet
> 10/100Mbps auto-sense
> RJ45 Unshielded Twisted Pair (UTP)

SIMPLIFIED PROTOCOL DIAGRAM



*Notes:
-The STM1 module only supports ATM encapsulation
-The 6x E1 module supports multilink operation or IMA

MODULAR UPLINK INTERFACE:

> Number: 1
> For use in combination with Telindus Interface Modules (TIMs)
  > Multiple E1 TIM
    Support for Frame-Relay & Multilink Frame-Relay* (up to 8 ports)
    Support for PPP & Multilink PPP (up to 8 ports)*
    Support for ATM & ATM IMA (up to 6 ports)
  > E3/T3* TIMs
    Support for Frame-Relay, PPP & ATM
  > STM1* TIM
    Support for ATM
  > 4 port Ethernet TIM

CONTROL INTERFACE

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

STATION CLOCK INTERFACE

> G.703/G.704, 2048 kbps, RJ45 120 Ohm

IP ROUTING

> Conform TDRE (Telindus Dynamic Routing Engine)
> Protocol on DSL lines: ATM
> Uplink Protocols: ATM, IP, PPP*, Frame-relay*
> L2TP LAC* including the use of RADIUS (RFC 2809)

ROUTING AND BRIDGING PERFORMANCE

> Minimum routing performance: 150.000 pps
> Minimum bridging performance: 150.000 pps
> Minimum supported number of Frame-Relay DLCIs on uplink: 200
> Supported number of ATM PVCs: 32 per DSL port
> Supported number of L2TP tunnels: 256
> Supported number of VLANs: 256
> Supported number of bridge-groups: 24

FRONT PANEL INDICATIONS

> PWR: Power indication for each power inlet
> R: Reset condition
> LAN: Lan status
> CLK: Station clock status
> DCD: Data Carrier Detect for each SHDSL line

CLOCKING

> Slave on STM1, E3, T3 or E1 uplink
> Station clock (G.703 clock input)
> Internal

MAINTENANCE AND MANAGEMENT SUPPORT

> Conform TDRE (Telindus Dynamic Routing Engine)
> 2 alarm contact outputs (normally open and closed contacts)
> 7 alarm input contacts with common return (normally closed contacts)

MEMORY

> 32 MByte DRAM
> 16 MByte Flash

MECHANICAL DATA (H X W X D)

> 44 x 440 x 240 mm (desktop)
> Weight: 3.5 kg

POWER REQUIREMENTS

> Single or dual powered
> DC: -36 up to -72V
> AC: 85 – 264V, 47 – 63 Hz
> Power consumption: 8P versions: 25 W
  16P versions: 35W
  24P versions: 45 W

* feature soon available

SALES CODES

> 182573 8 lines ADSL annex A, internal line splitter, redundant 48VDC
> 182735 8 lines ADSL annex A, internal line splitter, 48VDC and 230VAC
> 182736 8 lines ADSL annex A, redundant 48VDC
> 182737 8 lines ADSL annex A, internal line splitter, 48VDC and 230VAC
> 182574 8 lines ADSL annex B, internal line splitter, redundant 48VDC
> 182738 8 lines ADSL annex B, internal line splitter, 48VDC and 230VAC
> 182739 8 lines ADSL annex B, redundant 48VDC
> 182740 8 lines ADSL annex B, internal line splitter, 48VDC and 230VAC
> 182577 24 lines ADSL annex A, redundant 48VDC
> 182578 24 lines ADSL annex B, redundant 48VDC
> 181305 8 lines SHDSL, redundant 48VDC
> 183065 8 lines SHDSL, 48VDC and 230VAC
> 181307 24 lines SHDSL, redundant 48VDC
> 184106 24 lines POTS splitter
> 184107 24 lines ISDN splitter
> 185881 Desk-top Power supply module 70W (230/115Vac -> 48Vdc)
> 183021 Rack mount kit (19" or ETSI)
> 182590 CBL Telco M /wires 24*2*0,14 120° 2M
> 182591 CBL Telco M/M 24*2*0,14 120° 2M

> 16 port models are available on request
> Sales codes and for Telindus Interface Modules (TIMs) can be found in the modular interface section and the sales code quick reference

broadband CPE

THIS CHAPTER DESCRIBES THE TELINDUS CPE (CUSTOMER PREMISES EQUIPMENT) AS IT CAN BE USED TOGETHER WITH CENTRALLY INSTALLED DSLAM (DIGITAL SUBSCRIBER LINE ACCESS MULTIPLEXING) EQUIPMENT.

The range includes CPE's based on different xDSL modulation schemes, including ADSL, and SHDSL.

This equipment integrates the transmission functionality with integrated bridging or routing, offering direct IP based Internet or VPN (Virtual Private Network) access.

While ADSL equipment primarily aims to give Internet access to residential users and SHDSL is more appropriate for delivering high-speed symmetrical services to business users.

111X ADSL BRIDGE

> THE TELINDUS 1110 ADSL BRIDGE IS THE ULTIMATE SOLUTION FOR ANY OFFICE OR HOME SEARCHING FOR ULTRA FAST ACCESS TO THE INTERNET AND REMOTE NETWORKING OVER ADSL.

The Telindus 1110 ADSL Bridge is equipped with a 10/100Base-T Ethernet and a USB (Universal Serial Bus) interface.

The Telindus 1110 ADSL Bridge is a stand-alone device with true plug-and-play capability. Besides easy installation and user friendliness, it works with any computer with an Ethernet port, and it is transparent to most installed operating systems such as Windows® 9x, ME, Windows® NT, Windows® 2000, Windows XP, Mac®, Unix, Linux, etc. The USB interface is plug-and-play compatible with Windows® 98, Windows® 2000, Windows XP.

The Telindus 1110 ADSL Bridge is fully compliant to all current ADSL standards, which allows interfacing to almost any central DSLAM solution.

FEATURES & BENEFITS

- > G.DMT, G.LITE AND T1.413 COMPATIBLE ADSL MODEM
- > INTEGRATED BRIDGE FUNCTIONALITY
- > USB AND ETHERNET INTERFACE
- > EXTERNAL, STAND-ALONE DEVICE
- > PLUG-AND-PLAY INSTALLATION ON ALL COMPUTER PLATFORMS WITH ETHERNET
- > PLUG-AND-PLAY INSTALLATION ON WINDOWS® WITH USB SUPPORT
- > MULTI-MODE AUTO-HANDSHAKE FOR DIFFERENT ADSL FLAVORS ASSURES INTEROPERABILITY
- > ENHANCEMENTS AND NEW FEATURES AVAILABLE THROUGH FLASH DOWNLOAD OF NEW FIRMWARE

LINE INTERFACE
- > Single pair unshielded twisted copper
- > Connector: RJ11
- > Impedance: 135 ohm
- > ADSL Protocol: G.DMT (G.992.1)
  T1.413.Issue 2
  G.Lite (G922.2) automatic mode detection

MAXIMUM LINE SPEEDS (DOWNSTREAM/UPSTREAM)
- > G.DMT: 8 Mbps/1 Mbps
- > T1.413: 8 Mbps/1 Mbps
- > G.Lite: 1.5 Mbps/1 Mbps

DATA INTERFACES
- > Ethernet:
  - > RJ45 unshielded twisted pair (UTP)
  - > 10/100Base-T compliant with IEEE 802.3, 802.3u
- > USB: plug-and-play compatible with Windows® 98/ME/2000/XP

ATM WAN CHARACTERISTICS
- > Support ATM cell format ITU-T I.361
- > Support ATM forum UNI 3.1/4.0 PVC
- > Support UBR and CBR traffic shaping
- > Up t 8 AAL5 PVC
- > OAM F5 loopback support (I.610)

ATM ENCAPSULATION
- > AAL5, Bridge over ATM (RFC 1483), LLC or VC-multiplexed
- > PPP over ATM (RFC 2364)
- > PPP over Ethernet (RFC 2416)

FILTERING
- > Automatic learning up to 510 MAC addresses
- > Additional filtering based on: > Source MAC address
  > Destination MAC address

NETWORK MANAGEMENT
- > Web base GUI
- > Telnet
- > SNMP
- > Remote firmware upgrade

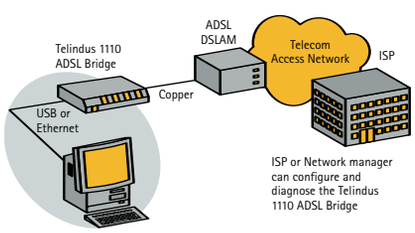
NETWORK MANAGEMENT SECURITY
- > Password control for:
  - > Web based GUI
  - > Telnet session

FRONT PANEL INDICATIONS
- > POWER
- > DIAG
- > LAN
- > USB
- > WAN LINK
- > WAN ACT

MECHANICAL DATA (H X W X D)
- > 38 x 160 x132 mm, Weight: 400 g

POWER REQUIREMENTS
- > External Power: Input: 100-240V, 47-63Hz, 0.4A
  Output: 13.5Vac, 1A
- > Dissipation: 7 watts max.

V TYPICAL ADSL ACCESS TOPOLOGY



SALES CODES
- > 182028 Telindus 1110 ADSL Bridge
- > 182029 Telindus 1111 ADSL Bridge (Annex B for ISDN)

112X ADSL ROUTER

> THE TELINDUS 1120 ADSL ROUTER IS AN INTEGRATED DEVICE THAT ALLOWS MULTIPLE WORKSTATIONS TO SHARE THE HIGH BANDWIDTH OFFERED BY ADSL, REALISING ULTRA FAST ACCESS TO THE INTERNET OR REMOTE NETWORKS.

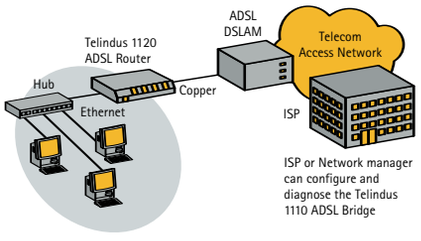
In order to facilitate the network access, the Telindus 1120 ADSL incorporates advanced routing and bridging functionality, including static or dynamic routing, network address translation (NAT/PAT), DHCP server, filtering, authentication (PAP/CHAP), etc.

The Telindus 1120 ADSL Router can be managed in multiple ways, offering users and service providers versatile tools to keep their network in optimal condition. The tools offered include a web-browser GUI, and a command line interface via a telnet session.

The Telindus 1120 ADSL Router is fully compliant to all current ADSL standards, which allows interfacing to almost any central DSLAM solution.

The Telindus 1120 ADSL Router is a stand-alone device with true plug-and-play capability. It is equipped with a 10/100Base-T Ethernet interface or a 4 ports integrated switch, and permits the direct connection of up to 253 workstations.

V TYPICAL 1120 ADSL ROUTER TOPOLOGY



SALES CODES

> 182030 Telindus 1120 ADSL Router
> 182031 Telindus 1121 ADSL Router ANNEX B (for use with ISDN)
> 182032 Telindus 1124 ADSL Router Switch
> 182033 Telindus 1125 ADSL Router Switch ANNEX B (for use with ISDN)

FEATURES & BENEFITS

- > G.DMT, G.LITE AND T1.413 COMPATIBLE ADSL MODEM
- > INTEGRATED ROUTER FUNCTIONALITY
- > INTEGRATED BRIDGING FUNCTIONALITY
- > NAT AND PAT SUPPORT
- > PLUG-AND-PLAY INSTALLATION ON ALL COMPUTER PLATFORMS WITH ETHERNET
- > DIRECT ETHERNET INTERFACE
- > EXTERNAL, STAND-ALONE DEVICE
- > MULTI-MODE AUTO-HANDSHAKE FOR DIFFERENT ADSL FLAVORS ASSURES INTEROPERABILITY
- > ENHANCEMENTS AND NEW FEATURES AVAILABLE THROUGH FLASH DOWNLOAD OF NEW FIRMWARE

LINE INTERFACE
> Single pair unshielded twisted copper
> Connector: RJ11
> Impedance: 135 ohm
> ADSL Protocol:
> G.DMT (G.992.1)
> T1.413.Issue 2
> G.Lite (G922.2)
> Automatic mode detection

MAXIMUM LINE SPEEDS (DOWNSTREAM/UPSTREAM)
> G.DMT: 8 Mbps/1 Mbps
> T1.413: 8 Mbps/1 Mbps
> G.Lite: 1.5 Mbps/1 Mbps

ETHERNET INTERFACE
> 10/100Base-T compliant with IEEE 802.3, IEE 802.3u
> RJ45 unshielded twisted pair (UTP)
> Number of interfaces 1 or 4 with integrated switch
Support for secondary IP address

ATM WAN CHARACTERISTICS
> Support ATM cell format ITU-T I.361
> Support ATM forum UNI 3.1/4.0 PVC
> Support UBR and CBR traffic shaping
> Support of up to 8 AAL5 PVC
> OAM F5 loopback support (I.610)

ATM ENCAPSULATION
> AAL5, bridge over ATM (RFC 1483) , LLC or VC-multiplexed
> Classical IP (RFC 1577)
> PPP over ATM (RFC 2364)
> PPP over Ethernet (RFC 2416)

ROUTER
> IP (RFC 791)
> Static Routing, RIP1 (RFC 1058), RIP2 (RFC 2453) on the LAN and/or WAN
> DHCP Server: Automatic assignment of IP address, mask, default gateway and DNS servers address to workstation
> DHCP client (from WAN interface) (RFC 2131, RFC 2132)
> ARP (RFC 826)

ROUTER FILTERING
> Source IP address
> Destination IP address
> Protocol type
> TCP/IP port number

BRIDGE FILTERING
> Automatic transparent bridge filtering up to 510 MAC addresses
> Additional filtering based on: Source MAC address Destination MAC address

INTERNET ACCESS SHARING
> NAT/PAT (RFC 1631) including:
> Server hosting
> Support for Microsoft PPTP VPN
> Auto DNS

AUTHENTICATION
> PAP (RFC 1334), CHAP (RFC 1994) and MS-CHAP user

AUTHENTICATION
> Password control for:
  > Remote maintenance session
  > Telnet session

NETWORK MANAGEMENT
> Web base GUI
> Telnet
> SNMP
> Remote firmware upgrade

FRONT PANEL INDICATIONS
> POWER
> DIAG
> LAN
> WAN LINK
> WAN ACT

MECHANICAL DATA (H X W X D)
> 38 x 160 x132 mm (1.5 x 6.3 x 5.2 ") Weight: 400 g

POWER REQUIREMENTS
> External Power: Input: 100-240V, 47-63Hz, 0.4A Output: 13.5Vac, 1A
> Dissipation: 7 watts max.

112X ADSL WIRELESS ROUTER

FEATURES & BENEFITS

- > SUPPORTS THE 802.11B (2.4GHZ) WIRELESS ETHERNET STANDARD, ALLOWING UP TO 11MBPS WIRELESS RATE
- > FLEXIBLE EXTERNAL ANTENNA FOR MAXIMUM WIRELESS COMMUNICATION
- > ADSL MODEM WITH INTEGRATED ROUTER FOR USE WITH THIRD PARTY DSLAM
- > DIRECT 10BASE-T ETHERNET INTERFACE
- > WEP (WIRED EQUIVALENT PRIVACY) UP TO 128 BIT ENCRYPTION AND SSID

> THE TELINDUS 1122 ADSL WIRELESS ROUTER SERIES NOT ONLY ALLOWS MULTIPLE USERS TO SHARE A HIGH-SPEED DSL CONNECTION BUT ALSO ENJOY SEAMLESS WIRELESS CONNECTIVITY IN YOUR RESIDENTIAL AND BUSINESS MTU ENVIRONMENT.

LINE INTERFACE
- > Single pair line access
- > Connector: RJ11
- > Impedance: 135 ohm
- > Coding: G.DMT (G.992.1), T1.413.Issue2, G.Lite (G992.2)

WIRELESS ACCESS
- > Wireless IEEE 802.11b compliant
- > Operating Band Unlicensed 2.4GHz ISM band
- > Operation Frequency 2.412~2.462 GHz (11 channels) 2.412~2.472 GHz (14 channels)
- > Modulation Technique Direct Sequence Spread Spectrum (CCK, DQPSK, DBPSK)
- > Media Access Protocol CSMA/CA with ACK
- > Security Management WEP (wired equivalent privacy)
- > Dynamic Rate Shifting 11, 5.5, 2 and 1Mbps
- > Coverage Range Up to 100m in an open office environment

LAN INTERFACE
- > RJ45 Unshielded Twisted Pair (UTP)
- > Fully IEEE 802.3 compatible

ATM WAN CHARACTERISTISCS
- > Support ATM cell format ITU-T I.361
- > Support ATM forum UNI 3.1/4.0 PVC
- > Support UBR and CBR traffic shaping
- > Support of up to 8 AAL5 PVC

ATM ENCAPSULATION
- > Multiple protocol over AAL5: LLC encapsulation and VC-based multiplexing (RFC 1483, 2684)
- > Classical IP and ARP over ATM (RFC 1577)
- > PPP over AAL5 (RFC 2364)
- > PPP over Ethernet (RFC 2516)

ROUTER
- > IP (RFC 791)
- > Static Routing, RIP1 (RFC 1058), RIP2 (RFC 1389) on the LAN and/or WAN
- > DHCP Server: Automatic assignment of IP address, mask, default gateway and DNS servers address to workstation (RFC 2131, RFC 2132)
- > ARP (RFC 828)

ROUTER FILTERING
- > Source IP address
- > Destination IP address
- > Protocol type
- > TCP/IP port number

BRIDGE FILTERING
- > Automatic transparent bridge filtering up to 510 MAC addresses
- > Additional filtering based on > Source MAC address
  > Destination MAC address

INTERNET ACCESS SHARING
- > NAT/PAT (RFC 1631) including
  > Server hosting
  > Support for Microsoft PPTP VPN
- > Auto DNS

AUTHENTICATION
- > PAP (RFC 1334), CHAP (RFC 1994) and MS-CHAP user authentication
- > Password control for > Remote maintenance session
  > Telnet session

NETWORK MAINTENANCE
- > GUI based windows® 95/98/2000, NT4.0, ME
- > Web-based GUI
- > Telnet
- > Configuration backup and restore using windows® based GUI
- > Real time status display and event report using windows® based GUI

FRONT PANEL INDICATIONS
- > PWR Power
- > DIAG indicates end-to-end ATM PVC connection
- > DSL LINK/ACT
- > LAN LINK/ACT
- > WLAN LINK/ACT

MECHANICAL DATA (WXDXH)
- > Dimensions: 245 x 165 x 36 mm Weight: 600g

POWER REQUIREMENTS
- > External Power Input: 100-240V, 47-63Hz, 1A
  Output: 13.5VAC (1.0A)

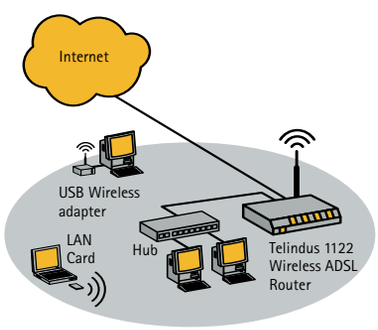
The Telindus 1122 Wireless Router shares all the advanced router features of the Telindus 1120 router series, with the addition of an extra wireless LAN access point.

Based on the IEEE 802.11b standard the Telindus 1122 allows mobile users to maintain a wireless connection to the LAN via a radio connection while roaming around a MTU building or campus environment with a portable computer device, such as a notebook, laptop, or other hand-held devices.

Implementing the latest wireless modulation technology (DSSS), the Telindus 1122 guarantees maximum noise immunity to MTU residential and office broadband interference and offers four speed options (11Mbps, 5.5Mbps, 2Mbps and 1Mbps), covering an ideal combination of throughput and ranges.

At 11Mbps, the router can cover a maximum range of 100m in an open space office environment. The Telindus 1122 also promises its users the highest security with a full range of advanced security protocols and WEP (Wired Equivalent Privacy), the newest data encryption technology.

V TYPICAL CONFIGURATION



SALES CODES
- > 184367 Telindus 1122 ADSL Router
- > 183926 Telindus 1123 ADSL Router (Annex B, for use over ISDN)

1221 ADSL ROUTER SERIES

new

> THE TELINDUS 1221 ADSL ROUTER IS A PROFESSIONAL STATE-OF-THE-ART ROUTER WITH BUILT-IN ADSL LINE INTERFACE OFFERING ASYMMETRIC DOWNLOAD SPEEDS UP TO 12 MBPS OVER A SINGLE TWO-WIRE UNCONDITIONED UNSHIELDED TWISTED-PAIR CABLE. TOGETHER WITH ITS ADVANCED ROUTING FEATURES, IT MAKES THE TELINDUS 1221 ADSL ROUTER THE IDEAL ACCESS DEVICE FOR CONNECTING BUSINESS USERS.

The Telindus 1221 ADSL Router is used as CPE in combination with the Telindus 2400 Central office solution, or in combination with any third-party DSLAM (Digital Subscriber Access Multiplexer)

Available from Q3 2004

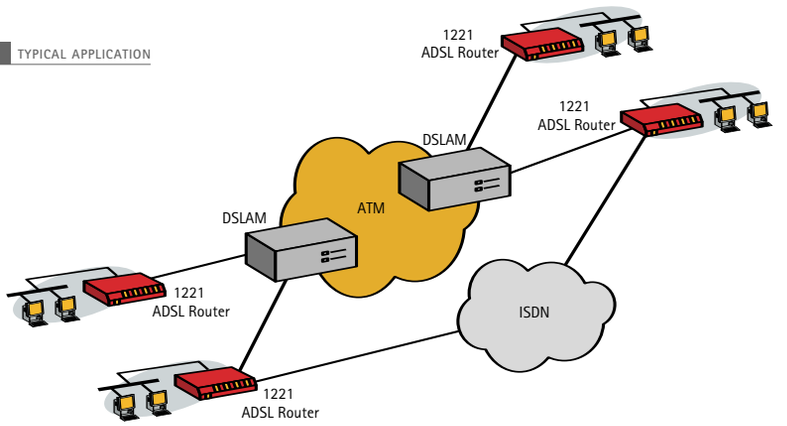
Fully supported by the TDRE (Telindus Dynamic Routing Engine), the unit supports differentiated services including VPNs (Virtual Private Networks) and the delivery of application dependent QoS (Quality of Service) connections. A specific model offering a hardware-based encryption accelerator is also available.

The basic unit features one DSL interface and one 10/100 Base-T Ethernet Interface. Additional models offer the possibility to have an integrated Ethernet switch, to have a second independent Ethernet interface for the creation of e.g. a DMZ (Demilitarised zone), and to secure the DSL line by integrating backup through ISDN or PSTN.

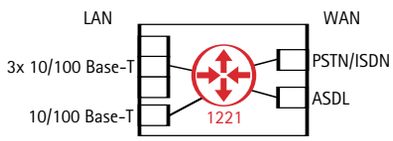
The unit is designed for integration into demanding network environments and can be controlled by the complete set of network maintenance and management tools as they are described in this catalogue.

The Telindus 1221 ADSL Router supports auto-install features over the WAN network. This makes it ideally suited for plug-and-play installation at customer premises while the configuration is prepared at a central site.

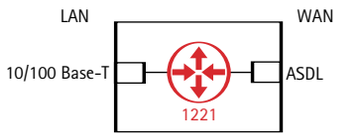
V TYPICAL APPLICATION



V MULTIPORT 1221 ADSL ROUTER MODEL



V BASIC 1221 ADSL ROUTER MODEL



FEATURES & BENEFITS

> FEATURE-RICH ROUTER WITH BUILT-IN ADSL LINE INTERFACE
> DIRECT CONNECTION TO A DSLAM BASED ACCESS NETWORK
> SUPPORT FOR ADVANCED SERVICES BASED ON VPN AND VLANS
> ADVANCED QOS MECHANISMS FOR SUPPORTING VOIP TRAFFIC
> STANDARD 10/100 AUTO-SENSE ETHERNET INTERFACE
> OPTIONAL SECOND ETHERNET INTERFACE FOR CREATION OF DMZ
> OPTIONAL BUILT-IN ETHERNET SWITCH
> OPTIONAL ISDN OR PSTN BACK-UP FOR SECURING THE DSL LINE
> FULLY MANAGEABLE WITH A VARIETY OF TOOLS

STANDARD VERSIONS

Version	Ethernet ports	ADSL Annex	ISDN S0 ports	PSTN ports	DES / 3DES Accelerator
1221 ADSL-A	1x 10/100Base-T	A	0	0	No
1221 ADSL-B	1x 10/100Base-T	B	0	0	No
1221 ADSL-A 2ETH-4P 3DES	3x 10/100Base-T+ 1x 10/100Base-T	A	0	0	Yes
1221 ADSL-B 2ETH-4P 3DES	3x 10/100Base-T+ 1x 10/100Base-T	B	0	0	Yes
1221 ADSL-A 2ETH-4P ISDN-BRI 3DES	3x 10/100Base-T+ 1x 10/100Base-T	A	1	0	Yes
1221 ADSL-B 2ETH-4P ISDN-BRI 3DES	3x 10/100Base-T+ 1x 10/100Base-T	B	1	0	Yes
1221 ADSL-A 2ETH-4P PSTN 3DES	3x 10/100Base-T+ 1x 10/100Base-T	A	0	1	Yes

Other combinations and versions available on request

LINE INTERFACE

> Single-pair ADSL line access
> Connector: RJ12/RJ45
> Impedance: 135 ohm
> Coding: compliant to ITU-T G.992.1 (ADSL G.dmt), ITU-T G.992.2 (ADSL G.Lite), ETSI TS 101 388 v1.3.1, ITU-T G.992.3 (ADSL2 G.dmt) and ITU-T G.992.4 (ADSL2 G.Lite)
> Support for ITU-T annex A (POTS) or Annex B (ISDN and POTS)
> Line speeds: Downstream: 32 kbps up to 12 Mbps
Upstream: 32 kbps up to 1024 kbps
> Performance monitoring: compliant G.826 (errored seconds, severely errored seconds, unavailability seconds)

PRIMARY LAN INTERFACE(S)

> Compliant with IEEE 802.3 10Mbps HDX/FDX Ethernet
> Compliant with IEEE 802.3u 100Mbps HDX/FDX Ethernet
> 10/100Mbps auto-sense, auto cross-over
> RJ45 Unshielded Twisted Pair (UTP)
> Number of interfaces: 1, 3 or 4 with integrated switching (depending on model)

SECONDARY LAN INTERFACE (ON SELECTED MODELS ONLY)

> Compliant with IEEE 802.3 10Mbps HDX/FDX Ethernet
> Compliant with IEEE 802.3u 100Mbps HDX/FDX Ethernet
> 10/100Mbps auto-sense, auto cross-over
> RJ45 Unshielded Twisted Pair (UTP)
> Number of interfaces: 1

BRI INTERFACE (ON SELECTED MODELS ONLY)

> PPP WAN encapsulation
> Connector: RJ45 S0 DTE
> Number of interfaces: 1

PSTN INTERFACE (ON SELECTED MODELS ONLY)

> PPP WAN encapsulation
> Maximum speed: 33.6 kbps (V.34)
> Connector: RJ45
> Number of interfaces: 1

CONTROL INTERFACE

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

SUPPORTED DSL ENCAPSULATION PROTOCOLS

> ATM

IP ROUTING

> Conform TDRE (Telindus Dynamic Routing Engine), ATM only

ROUTING AND BRIDGING PERFORMANCE

> Routing performance: 40.000 pps
> Bridging performance: 30.000 pps
> Supported number of ATM PVCs: 31
> Supported number of VPN tunnels: 10
> Supported number of VLANs: 256
> Supported number of bridge-groups: 13

MAINTENANCE AND MANAGEMENT SUPPORT

> Conform TDRE (Telindus Dynamic Routing Engine)

FRONT PANEL INDICATIONS

> PWR: Power
> LINE / LNK1: first line pair status
> LINE / LNK2: second line pair status (on 2 pair versions only)
> ACT: WAN encapsulation protocol status (DSL or, ISDN or PSTN)
> BACKUP: ISDN/PSTN status (only on ISDN/PSTN models)
> LAN / ACT: LAN status

MECHANICAL DATA (H X W X D)

> 45 x 220 x 135 mm
> Weight: 500 g

POWER REQUIREMENTS

> 9 Vdc, 1A
> External power adapters available for 24/48Vdc and 230 Vac

SALES CODES

> 188513 1221 ADSL-A 230VAC (Annex A)
> 188536 1221 ADSL-B 230VAC (Annex B)
> 188518 1221 ADSL-A 2ETH-4P 3DES 230VAC
> 188542 1221 ADSL-B 2ETH-4P 3DES 230VAC
> 188523 1221 ADSL-A 2ETH-4P ISDN-BRI 3DES 230VAC
> 188547 1221 ADSL-B 2ETH-4P ISDN-BRI 3DES 230VAC
> 188529 1221 ADSL-A 2ETH-4P PSTN 3DES 230VAC

Units without external power module and separate power adapters can be found in the sales codes quick reference

1421 SHDSL ROUTER

> THE TELINDUS 1421 SHDSL ROUTER IS A PROFESSIONAL STATE-OF-THE-ART ROUTER WITH BUILT-IN SHDSL LINE INTERFACE OFFERING SYMMETRIC FULL-DUPLEX TRANSMISSION UP TO 2.3 MBPS OVER A SINGLE TWO-WIRE (4.6 MBPS ON 2 PAIR) UNCONDITIONED UNSHIELDED TWISTED-PAIR CABLE.

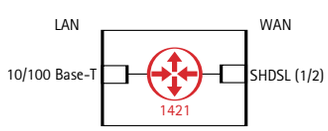
The Telindus 1421 SHDSL Router can be used as CPE in combination with any Telindus or third-party DSLAM (Digital Subscriber Access Multiplexer), in combination with a Frame Relay or PPP based access network or in a point-to-point set-up. The Telindus 1421 SHDSL Router is the ideal access device for connecting business users, offering managed IP services at the highest possible speeds.

The line speed can be automatically adapted to optimise the throughput as a function of the characteristics of the local loop. To achieve even higher speeds (up to 4.6Mbps) or a longer reach, a 2-line pairs version is also available.

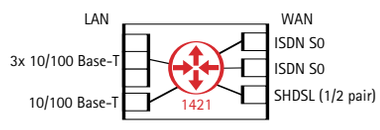
Fully supported by the TDRE (Telindus Dynamic Routing Engine), the unit supports differentiated services including VPNs (Virtual Private Networks) and the delivery of application dependent QoS (Quality of Service) connections. A specific model offering a hardware-based encryption accelerator is also available.

The basic unit features one DSL interface and one 10/100 Base-T Ethernet Interface. Additional models* offer the possibility to have an integrated Ethernet switch, to have a second independent Ethernet interface for the creation of e.g. a DMZ

v BASIC 1421 SHDSL ROUTER MODEL



v MULTIPORT 1421 SHDSL ROUTER MODEL



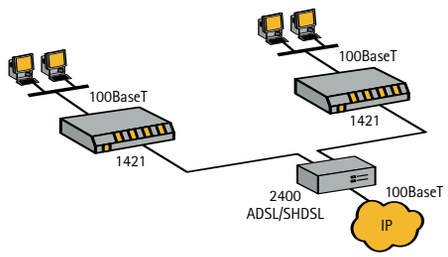
(Demilitarised zone), and to secure the DSL line by integrating backup through ISDN or PSTN.

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.

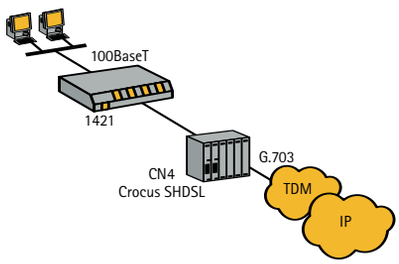
The Telindus 1421 SHDSL Router supports auto-install features over the WAN network. This makes it ideally suited for plug-and-play installation at customer premises while the configuration is prepared at a central site.

v OUTDOOR VERSION (IP67) ON REQUEST

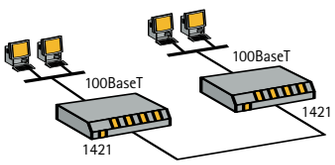
V IN COMBINATION WITH 2400 ADSL/SHDSL



V IN COMBINATION WITH CROCUS SHDSL



V POINT-TO-POINT CONNECTION



FEATURES & BENEFITS

- > FEATURE-RICH ROUTER WITH BUILT-IN SHDSL LINE INTERFACE
- > FOR USE IN POINT-TO-POINT CONFIGURATIONS OR IN COMBINATION WITH A DSLAM
- > SUPPORT FOR ADVANCED SERVICES BASED ON VPN AND VLANS
- > ADVANCED QOS MECHANISMS FOR SUPPORTING VOIP TRAFFIC
- > STANDARD 10/100 AUTO-SENSE ETHERNET INTERFACE
- > OPTIONAL SECOND ETHERNET INTERFACE FOR CREATION OF DMZ*
- > OPTIONAL BUILT-IN ETHERNET SWITCH*
- > OPTIONAL ISDN BACK-UP FOR SECURING THE DSL LINE*
- > ALSO AVAILABLE WITH 2 LINE PAIRS FOR LONGER REACH OR HIGHER SPEED (UP TO 4.6MBPS)
- > FULLY MANAGEABLE WITH A VARIETY OF TOOLS

STANDARD VERSIONS

Version	# Copper pairs	Ethernet ports	ISDN S0 ports	DES/3DES Accelerator
1421 SHDSL	1	1x 10/100Base-T	0	No
1421 SHDSL-2P	2	1x 10/100Base-T	0	No
1421 SHDSL 3DES	1	1x 10/100Base-T	0	Yes
1421 SHDSL 2ETH-4P 3DES*	1	3x 10/100Base-T+ 1x 10/100Base-T	0	Yes
1421 SHDSL-2P 2ETH-4P 3DES*	2	3x 10/100Base-T+ 1x 10/100Base-T	0	Yes
1421 SHDSL 2ETH-4P ISDN-BRI 3DES*	1	3x 10/100Base-T+ 1x 10/100Base-T	2	Yes
1421 SHDSL-2P 2ETH-4P ISDN-BRI 3DES*	2	3x 10/100Base-T+ 1x 10/100Base-T	2	Yes

Other combinations and versions available on request

LINE INTERFACE

- > Single pair or two pair line access
- > Connector: RJ12
- > 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 = 1 ... 36)
  - > Two pair: N x 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)

IDEAL MAXIMUM DISTANCE (NOISE-FREE) ON A SINGLE PAIR

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

* Model available from Q4 2004

PRIMARY LAN INTERFACE(S)

- > Compliant with IEEE 802.3 10Mbps HDX/FDX Ethernet
- > Compliant with IEEE 802.3u 100Mbps HDX Ethernet (FDX on multi-port models)
- > 10/100Mbps auto-sense
- > RJ45 Unshielded Twisted Pair (UTP)
- > Number of interfaces: 1, 3 or 4 with integrated switching (depending on model)

SECONDARY LAN INTERFACE (ON SELECTED MODELS ONLY)

- > Compliant with IEEE 802.3 10Mbps HDX/FDX Ethernet
- > Compliant with IEEE 802.3u 100Mbps HDX/FDX Ethernet
- > 10/100Mbps auto-sense, auto cross-over
- > RJ45 Unshielded Twisted Pair (UTP)
- > Number of interfaces: 1

BRI INTERFACE (ON SELECTED MODELS ONLY)

- > PPP WAN encapsulation
- > Connector: RJ45 S0 DTE
- > Number of interfaces: 2

PSTN INTERFACE (ON SELECTED MODELS ONLY)

- > PPP WAN encapsulation
- > Maximum speed: 33.6 kbps (V.34)
- > Connector: RJ45
- > Number of interfaces: 1

CONTROL INTERFACE

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

SUPPORTED DSL ENCAPSULATION PROTOCOLS

- > ATM, Frame-Relay, PPP

IP ROUTING

- > Conform TDRE (Telindus Dynamic Routing Engine)

ROUTING AND BRIDGING PERFORMANCE

- > Routing performance: 40.000 pps
- > Bridging performance: 30.000 pps
- > Minimum supported number of Frame-Relay DLCIs: 40
- > Supported number of ATM PVCs: 31
- > Supported number of VPN tunnels: 10
- > Supported number of VLANs: 256
- > Supported number of bridge-groups: 13

MAINTENANCE AND MANAGEMENT SUPPORT

- > Conform TDRE (Telindus Dynamic Routing Engine)

FRONT PANEL INDICATIONS

- > PWR: Power
- > LINE / LNK1: first line pair status
- > LINE / LNK2: second line pair status (on 2 pair versions only)
- > ACT: WAN encapsulation protocol status (DSL or, ISDN or PSTN)
- > BACKUP: ISDN/PSTN status (only on ISDN/PSTN models)
- > LAN / ACT: LAN status

MECHANICAL DATA (H X W X D)

- > 45 x 220 x 235 mm
- > Weight: 700 g

POWER REQUIREMENTS

- > 7.5Vdc, 0.75A (basic 1 pair model), 9 Vdc, 1A (other versions)
- > External power adapters available for 24/48Vdc and 230 Vac

SALES CODES

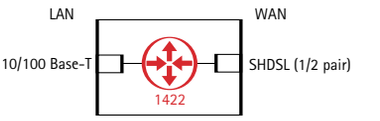
- > 177446 1421 SHDSL 230VAC
- > 177452 1421 SHDSL-2P 230VAC (2 pair)
- > 177638 1421 SHDSL 3DES 230VAC
- > 188495 1421 SHDSL 2ETH-4P 3DES 230VAC *
- > 188503 1421 SHDSL-2P 2ETH-4P 3DES 230VAC *
- > 188498 1421 SHDSL 2ETH-4P ISDN-BRI 3DES 230VAC *
- > 188507 1421 SHDSL-2P 2ETH-4P ISDN-BRI 3DES 230VAC *

Units without external power module and separate power-adapters can be found in the sales codes quick reference

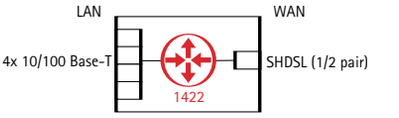
1422 SHDSL ROUTER

new

V BASIC 1422 SHDSL ROUTER MODEL



V MULTIPORT 1422 SHDSL ROUTER MODEL



> THE TELINDUS 1422 SHDSL ROUTER IS A PROFESSIONAL STATE-OF-THE-ART ROUTER WITH BUILT-IN SHDSL LINE INTERFACE OFFERING SYMMETRIC FULL-DUPLEX TRANSMISSION UP TO 2.3 MBPS OVER A SINGLE TWO-WIRE (4.6 MBPS ON 2 PAIR) UNCONDITIONED UNSHIELDED TWISTED-PAIR CABLE.

It should be used in combination with a DSLAM based central office solution.

The Telindus 1422 SHDSL Router is the ideal access device for connecting business users, offering managed IP services at the highest possible speeds.

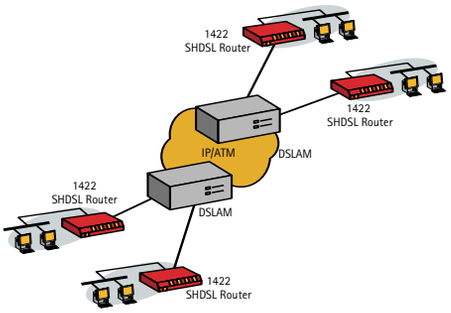
Fully supported by the TDRE (Telindus Dynamic Routing Engine), the unit supports differentiated services including VPNs (Virtual Private Networks) and the delivery of application dependent QoS (Quality of Service) connections.

The basic unit features one DSL interface and one 10/100 Base-T Ethernet interface. The unit with 4 Ethernet interfaces* integrates a 4-port switching functionality.

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.

The Telindus 1422 SHDSL Router supports auto-install features over the WAN network. This makes it ideally suited for plug-and-play installation at customer premises while the configuration is prepared at a central site.

V BUSINESS SERVICES BASED ON DSLAM BROADBAND NETWORK



FEATURES & BENEFITS

> SHDSL CPE FOR DELIVERING BUSINESS ORIENTED IP SERVICES ON DSLAM BASED NETWORKS

> BASED ON THE ITU-T G.991.2 SHDSL STANDARD FOR HIGH SPEEDS (UP TO 4.6MBPS) AND LONG LOOP RANGES

> SUPPORT FOR ADVANCED SERVICES BASED ON VPN AND VLANS

> ADVANCED QOS MECHANISMS FOR SUPPORTING VOIP TRAFFIC

> OPTIONAL BUILT-IN ETHERNET SWITCH*

> 1 OR 2 PAIR SHDSL MODELS AVAILABLE

> FULLY MANAGEABLE WITH A VARIETY OF TOOLS

STANDARD VERSIONS

Version	# Copper pairs	Ethernet ports
1422 SHDSL	1	1x 10/100Base-T
1422 SHDSL-2P	2	1x 10/100Base-T
1422 SHDSL ETH-4P*	1	4x 10/100Base-T
1422 SHDSL-2P ETH-4P*	2	4x 10/100Base-T

LINE INTERFACE

> Single pair or two pair line access
> Connector: RJ12
> 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 = 1 ... 36)
  > Two pair: N x 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)

LAN INTERFACE

> Compliant with IEEE 802.3 10Mbps HDX/FDX Ethernet
> Compliant with IEEE 802.3u 100Mbps HDX Ethernet (FDX on multi-port models)
> 10/100Mbps auto-sense
> RJ45 Unshielded Twisted Pair (UTP)
> Number of interfaces: 1 or 4 with integrated switching (depending on model)

CONTROL INTERFACE

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

SUPPORTED DSL ENCAPSULATION PROTOCOLS

> ATM

IP ROUTING

> Conform TDRE (Telindus Dynamic Routing Engine), limited to ATM

ROUTING AND BRIDGING PERFORMANCE

> Routing performance: 40.000 pps
> Bridging performance: 30.000 pps
> Supported number of ATM PVCs: 31
> Supported number of VPN tunnels: 10
> Supported number of VLANs: 256
> Supported number of bridge-groups: 13

MAINTENANCE AND MANAGEMENT SUPPORT

> Conform TDRE (Telindus Dynamic Routing Engine)

FRONT PANEL INDICATORS

> PWR: Power
> LINE / LNK1: first line pair status
> LINE / LNK2: second line pair status (on 2 pair versions only)
> LINE / ACT: WAN encapsulation protocol status
> LAN / ACT: LAN status

MECHANICAL DATA (H X W X D)

> 45 x 220 x 235 mm Weight: 700 g

POWER REQUIREMENTS

> 1P single Ethernet version: 7,5Vdc, 0.75A
> Other versions: 9Vdc, 1A
> External power adapters available for 24/48Vdc and 230 Vac

SALES CODES

> 186682 1422 SHDSL 230VAC
> 187874 1422 SHDSL-2P 230VAC (2 pair)
> 188493 1422 SHDSL ETH-4P 230VAC *
> 188500 1422 SHDSL-2P ETH-4P 230VAC (2 pair)*

Units without external power module and separate power adapters can be found in the sales codes quick reference

* Model available from Q4 2004

1431 SHDSL CPE

> THE TELINDUS 1431 SHDSL CPE USES THE STATE-OF-THE-ART SHDSL MODULATION TO DELIVER LEASED LINE AND FRAME RELAY SERVICES OVER AN ATM BASED DSLAM ACCESS NETWORK.

For this purpose the unit can accept exchangeable serial and G.703 interfaces. The unit features also a fixed Ethernet auto-sense 10/100 Base-T connection for the delivery of professional IP services, including VPN (Virtual Private Networks), VLAN (Virtual Local Area Networks) and COS (Class Of Service)

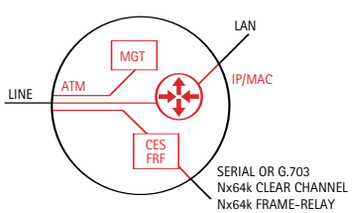
The Telindus 1431 SHDSL uses symmetric full-duplex transmission up to 4.6 Mbps over a single or dual two-wire unconditioned unshielded twisted-pair cable. The line speed can be adapted to optimise the throughput as a function of the characteristics of the local loop. The equipment is based on the ITU-T G.991.2 SHDSL recommendation, which guarantees spectral compatibility with legacy and ADSL transmission systems in the same cable bundle.

The Frame Relay service is encapsulated in ATM using the Frame Relay forum recommendations FRF 5 or FRF 8. The leased line service is emulated using the ATM Circuit Emulation Service (CES).

Apart from the delivery of IP, Frame-Relay and leased line services over a DSLAM based network, the unit can also be used in a point-to-point configuration.

Fully supported by the TDRE (Telindus Dynamic Routing Engine), the unit supports also differentiated IP services including VPNs (Virtual Private Networks) and the delivery of application dependent QoS (Quality of Service) connections.

V BLOCK DIAGRAM OF 1431 CPE



FEATURES & BENEFITS

- > PROFESSIONAL CPE EQUIPMENT TO DELIVER LEASED LINE, FRAME-RELAY AND IP SERVICES OVER AN ATM BASED DSLAM ACCESS NETWORK
- > BASED ON THE ITU-T G.991.2 SHDSL STANDARD FOR HIGHER SPEEDS (UP TO 4.6MBIT/S) AND LONGER LOOP RANGES
- > AVAILABLE IN 1 AND 2 LINE PAIR VERSIONS
- > EXCHANGEABLE SERIAL AND G703 INTERFACES
- > FIXED 10/100 AUTO-SENSE ETHERNET INTERFACE
- > ATM CES ENCAPSULATION FOR LEASED LINE SERVICE
- > ATM FRF 5 AND FRF 8 ENCAPSULATION FOR FRAME RELAY SERVICE
- > IP ROUTING AND BRIDGING WITH VPN AND COS SUPPORT
- > FULLY MANAGEABLE WITH A VARIETY OF TOOLS

LINE INTERFACE
- > Single pair or two pair line access
- > Connector: RJ12 and RJ45
- > 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 ... 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

AVAILABLE MODULAR INTERFACES
- > V.35, V.36/RS-449, X.21, RS-530/RS-530A, G.703/G.704

LAN INTERFACE
- > Compliant with IEEE 802.3 10Mbps HDX/FDX Ethernet
- > Compliant with IEEE 802.3u 100Mbps HDX/FDX Ethernet
- > 10/100Mbps auto-sense
- > RJ45 Unshielded Twisted Pair (UTP)

FRONT PANEL INDICATORS
- > PWR: Power
- > LINE / LNK1: first line pair status
- > LINE / LNK2: second line pair status (on 2 pair versions only)
- > LINE / ACT: WAN encapsulation protocol status
- > SERIAL / LNK: G703 interface: G703/G704 status OK
  Serial interface: DTE connected (RTS)
- > SERIAL / ACT: layer 2 status (in case of PPP, Frame Relay)
- > LAN / ACT: LAN status

ATM LINE ENCAPSULATION
- > Supports up to 8 ATM PVCs (10 PVCs if Ethernet interface not in use)
- > Supports ATM Forum Traffic Management 4.0 service types CBR, UBR and VBR

CLEAR CHANNEL SERVICE
- > ATM Forum af-vtoa-0078.000 Circuit Emulation Service (CES) version 2.0
- > User speeds: Nx64 kbps up to 2048 kbps/4096 kbps (1 pair/2-pair system)
- > User interface: V.35, V.36/RS-449, X.21, RS-530/RS-530A, G.703 (framed/unframed)
- > Clocking source for DSLAM configuration:
  > synchronised to network clock
- > Clocking source for point to point configuration:
  > internally generated clock
  > derived from central G.703 interface

FRAME RELAY SERVICE
- > Frame Relay / ATM PVC Network Interworking Implementation Agreement (FRF.5)
- > Frame Relay / ATM PVC Service Interworking Implementation Agreement (FRF.8.1)
- > User speeds: Nx64 kbps up to 2304 kbps/4608 kbps (1 pair/2-pair system)
- > User interface: V.35, V.36/RS-449, X.21, RS-530/RS-530A, G.703 (framed/unframed)

IP ROUTING AND BRIDGING
- > Conform TDRE (Telindus Dynamic Routing Engine)

ROUTING AND BRIDGING PERFORMANCE
- > Routing performance: 40.000 pps
- > Bridging performance: 30.000 pps
- > Minimum supported number of Frame-Relay DLCIs: 40
- > Supported number of VPN tunnels: 10
- > Supported number of VLANs: 256
- > Supported number of bridge-groups: 13

MAINTENANCE AND MANAGEMENT SUPPORT
- > Conform TDRE (Telindus Dynamic Routing Engine)

MECHANICAL DATA (H X W X D)
- > 45 x 220 x 235 mm Weight: 800 g

POWER REQUIREMENTS
- > 7.5 Vdc / 750mA with external power adapter or -48Vdc / 130mA

SALES CODES
- > 178722 Telindus 1431 SHDSL CPE 230Vac
- > 178717 Telindus 1431 SHDSL 2P CP 230Vac

MODULAR INTERFACES

Sales codes for all data interface modules are found in the sales codes quick reference section
Units without power module and separate power adapters can be found in the sales codes quick reference section

TDM central office

TELINDUS OFFERS A FULL RANGE OF CENTRAL OFFICE (CO) ACCESS SOLUTIONS, FOR USE IN A TDM AND BROADBAND ACCESS ENVIRONMENT.

With the Card-nest 4 (CN4), Telindus delivers a modular platform for the deployment of a universal data access solution, integrating different access technologies like voice-band, xDSL and fibre-optic. In order to optimise the interfacing to the backbone network, the platform can also accommodate the functionality of digital cross connect (DXC), multiplexing and interface conversion.

The Telindus 2300 series is ideally adapted for access to network infrastructures based on G.703.

All Telindus Central Office solutions can be controlled by a variety of carrier-grade maintenance and management tools, which are common for all centrally and remotely installed network elements.

CARDNEST CN4

FEATURES & BENEFITS

- > HIGH-DENSITY CARDNEST FAMILY FOR TELINDUS ACCESS EQUIPMENT
- > UP TO 60 MODEMS IN ONE CARDNEST
- > ALL CARDS HOT SWAPPABLE
- > 19" RACK-MOUNTABLE AND DESKTOP VERSIONS AVAILABLE
- > -48VDC OR 230/115VAC POWERING WITH OPTIONAL REDUNDANCY
- > ALL CONNECTIONS (LINES, POWER AND INTERFACES) ON THE REAR FOR OPTIMAL RACK CABLING

> THE CARDNEST CN4 IS A FAMILY OF CONCENTRATION UNITS FOR THE DIFFERENT TYPES OF TELINDUS ACCESS EQUIPMENT.

The family is constituted of one 19" rack-mountable device, and two desktop units. The 19" rack-mountable system (Cardnest CN4) is equipped with 15 card-slots, 30 interface-slots and 2 power-slots. It provides a high-density solution for the Telindus access equipment with densities of up to 30 or 60 modems in one nest (depending on the modem type). Interface plug-in modules (maximum two per card-slot position) are plugged into the available interface-slots on the back of the CN4. A high-speed management bus permits the management of all the equipment installed in the CN4. For this purpose an Orchid controller card can be mounted in the chassis. Since the high-speed management bus can be cascaded over several cardnests, one single controller card can control up to seven cardnests and all the remotely connected equipment. The CN4 cardnest is designed to provide full power redundancy and to generate the required alarms to the management system should one of the power sources fail. The cardnest is also equipped with an output for local alarm generation.

The first desktop system (Desktop CN4/4 slots) offers the same features as the rack-mountable system. However it comes as a compact desktop unit with 4 card-slots, 8 interface-slots and 2 power-slots.

The second desktop system (Desktop CN4/2 slots) is a compact low-cost system with 2 card-slots, 4 interface slots, and an integrated dual power supply.

All CN4 systems are designed to be directly powered at -48 Vdc. In this case no additional power module is required (no CN4 power slots are used). -48 Vdc is directly routed to each card in the system. When the Cardnest CN4 or the Desktop CN4/4 slots is powered at 230/115Vac, one or two 230/115Vac power modules may be inserted in the available power slots. These power modules can work in full power redundancy and allow hot swapping in case of power problems.

CN4 FAMILY OVERVIEW

	CARDNEST CN4	DESKTOP CN4/ 4 SLOTS	DESKTOP CN4/ 2 SLOTS
Height	6U (270 mm)	6U (270 mm)	82 mm
Width	19" (482 mm)	170 mm	353 mm
Depth	350mm	350 mm	325 mm
Weight (empty)	6.1 kg	4.5 kg	3.2 kg
Number of card-slots	15	4	2
Number of interface-slots	30	8	4
Number of line pairs/card-slot	4	4	4
Direct ±48 Vdc powering	yes	yes	yes
230/115 Vac power supply	no	no	yes
230/115 Vac power-slots	2	2	-
48Vdc connector	screw	screw	scew
230/115 Vac connector	IEC	IEC	IEC
Line connectors	screw	screw	screw
Local alarm contacts	2x RJ45	2x RJ45	no
High-speed mgt connectors	2x RJ45	2x RJ45	no
Station clock input	RJ45	RJ45	no

LOCAL ALARM CONTACTS (NOT ON DESKTOP CN4 / 2 SLOTS)

Two RJ45 connectors with tension-less contacts are provided to connect a local alarm device. They may be daisy chained to group the local alarm for more than one cardnest.
The connectors include contacts for:
- > Major alarm
- > Minor alarm
- > Power fail alarm

STATION CLOCK INPUT (NOT ON DESKTOP CN4/ 2 SLOTS)

Some cards in the CN4 can accept a centrally provided station clock .This 2 Mbps clock can be connected using a RJ45 connector and complies to G.703, 120 ohm

HIGH-SPEED MANAGEMENT CONNECTORS (NOT ON DESKTOP CN4 / 2 SLOTS)

Two RJ45 connectors are provided to connect the CN4 with the orchid controller card or to daisy-chain different cardnests when more than one nest is located at the same site. (cable delivered with the CN4)

POWER REQUIREMENTS

- > 230/115Vac Operating Range: 230Vac +/-10% 50-60 Hz
  115Vac +/-10% 50-60 Hz
- > 48Vdc Operating Range: 36Vdc - 72Vdc

SALES CODES CARDNEST

- > 142189 Cardnest CN4
- > 163459 Desktop CN4 / 4 SLOTS
- > 167992 Desktop CN4 / 2 SLOTS
- > 142187 Blanking Modemslot CN4
- > 142188 Blanking PWR Mod CN4
- > 142449 Blanking intf slot CN4

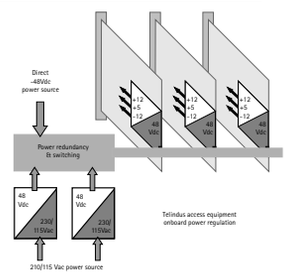
SALES CODES POWER MODULES (FOR CARDNEST CN4 AND DESKTOP CN4 /4 SLOTS)

- > 142190 PWR Mod 220/110V CN4 80W
- > 143678 PWR Mod 220/110V CN4 300W

< CARDNEST CN4 4 SLOTS

v CARDNEST CN4 2 SLOTS

v CARDNEST CN4 AND DESKTOP CN4/4 SLOTS POWER MANAGEMENT



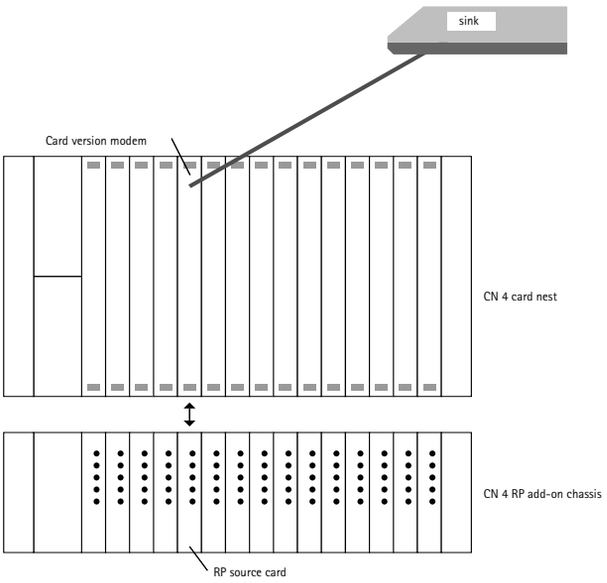
REMOTE POWER CHASSIS

> THE CN4 RP ADD-ON CHASSIS IS DESIGNED TO SUPPLY REMOTE POWER FEEDING FOR HDSL AND SHDSL REPEATERS OR CPE (CUSTOMER PREMISES EQUIPMENT).

The unit can also be using for delivering wetting current for the copper pairs. It is used in combination with the CN4 central office solution. The modular CN4 RP add-on chassis can accept up to 15 remote power source cards with power feeding for up to 4 line pairs.

There is a one to one mapping between a remote power source card and a modem card installed in the CN4 card nest. The CN4 RP add-on chassis is powered at –48Vdc. Optionally Telindus can provide an external 230Vac to –48Vdc power converter.

SALES CODES
> 157056 RP add-on chassis CN4
> 157058 RP source module 4 lines



FEATURES & BENEFITS

> ADDS REMOTE POWER FEEDING CAPABILITY TO THE CN4 CARD NEST

> COMPLIANT TO HIGH REQUIREMENTS CONCERNING SAFETY, ROBUSTNESS, FLEXIBILITY AND EMC

> REMOTE POWER FEEDING FOR UP TO 60 LINE PAIRS

> FITS IN A STANDARD 19 INCH RACK

> INTEGRATED NETWORK MAINTENANCE AND MANAGEMENT CAPABILITIES

CN4 RP ADD-ON CHASSIS

MECHANICAL DATA (H X D X W)
> 135(3U) x 230 x 445 mm Weight: 2.8 kg
> Number of remote power slots: 15

POWER REQUIREMENTS
> 36-72 Vdc, 3A max

REMOTE POWER SOURCE CARDS

ELECTRICAL CHARACTERISTICS
> Maximum remote power voltage: 120 Vdc (100 Vdc for UK units)
> Maximum remote power current: 60 mA
> Wetting current: 10 mA
> Number of power feeds per card: 4

HARDWARE CONFIGURATION:
> Selection between remote powering and wetting current per card
> Activation/deactivation per line pair
> Selection of symmetrical or floating power per line pair

SOFTWARE CONFIGURATION
> Enabling or disabling of remote power feeding or wetting current per line pair

FRONT PANEL INDICATORS
> CTRL: Remote power source card management
> L1..L4: Remote power/wetting current condition per line pair

NETWORK MANAGEMENT ALARMS
> Remote power overcurrent
> No current
> Communication fail
> Manually disabled

MECHANICAL DATA (H X D X W)
100 x 200 x 21 mm Weight: 0.2 kg

2300 SHDSL SERIES

> THE 2300 SHDSL SERIES FAMILY PROVIDES ENTERPRISES OR OPERATORS WITH A VERY HIGH-DENSITY SHDSL TRANSMISSION SOLUTION AT THE CENTRAL OFFICE OR IN CONCENTRATOR SITES.

It is possible to use variable bit rates as well as dual pair operation to extend the reach of the transmission over longer distances. Data is delivered over G.703/G.704 interfaces and both transparent and fractional operation is supported. In case of service delivery at speeds lower than 2 Mbps, grooming (concentration) of different users on a single E1 circuit can be provided. The dedicated 2300 concentrator with remote powering can be used to power repeaters or network termination equipment.

The unit is designed for integration into demanding network environments and can be directly controlled by the complete set of network maintenance and management tools as they are described in the section on network management. For management purposes the concentrator features a direct 10/100Base-T connection for IP, a local console interface, and G.703/G.704 interface.

Typical applications in a carrier environment include the provisioning of high-quality data services like leased lines or Frame-Relay and the concentration of multiple circuits interconnecting base-stations of a mobile operator. Enterprises or organisations with own copper infrastructure can use this type of equipment to meet their own communication requirements without having to invest in a new transmission infrastructure.

FEATURES & BENEFITS

- > SMALL HIGH-DENSITY SHDSL CONCENTRATOR
- > UP TO 24 SHDSL PAIRS IN 1 UNIT-HIGH ENCLOSURE
- > 1 OR 2 PAIR OPERATION
- > UP TO 24 G.703 E1 UP-LINKS WITH POSSIBILITY FOR GROOMING
- > VARIABLE BIT RATE AND MULTIPLE PAIR OPERATION FOR EXTENDED REACH
- > REMOTE POWERING CAN BE PROVIDED AS AN OPTION

LINE INTERFACE

- > Single pair or two pair line access
- > Remote power feeding* under management control
- > Connector: 50 pin telco connector with 8, 16 or 24 line pairs
- > Impedance: 135 ohm
- > Coding: TC PAM, compliant to ITU-T G.991.2 (G.SHDSL) and 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)

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)
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

REMOTE POWER FEEDING*

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

APPLICATION INTERFACE

- > 8, 16 or 24 balanced 120 ohm interfaces concentrated on DB25 female (ISO 2110)
- > Electrical: G.703
- > Unframed or framed operation (G.704)
- > User speed: (F)E1 Nx64 kbps (N = 1 ...32)
- > Grooming possibility per set of 8 SHDSL lines

MAINTENANCE AND NETWORK MANAGEMENT INTERFACES

- > Local 9-pin sub-D connector
- > Local RJ45 - Ethernet connector
  - > Compliant with IEEE 802.3 10Mbps HDX/FDX Ethernet
  - > Compliant with IEEE 802.3u 100Mbps HDX/FDX Ethernet
  - >10/100Mbps auto-sense
- > G.703/G.704 RJ45 interface

FRONT PANEL INDICATIONS

- > PWR: Power indication for each power inlet
- > LAN: Lan status
- > STCLK: Station clock status
- > DCD: Data Carrier Detect for each SHDSL line
- > G.703: LOS/AIS/Data for each G.703 interface

CLOCKING

- > Internal
- > External (from G.703)
- > Station clock (with possibility for fallback)

MAINTENANCE AND MANAGEMENT SUPPORT

- > Conform TMA management suite
- > 2 alarm contact outputs (normally open and closed contacts)
- > 7 alarm input contacts with common return (normally closed contacts)

MECHANICAL DATA (H X W X D)

- > 44 x 440 x 240 mm (desktop)
- > Rack-mount kit included
- > Weight: 3.5 kg

POWER REQUIREMENTS

- > -48Vdc, with possibility for connection of redundant power source,
- > Power consumption: 2301 SHDSL concentrator: 15W
  2303 SHDSL concentrator: 50W
  Units with remote powering: 260W max

*Only on specific models

SALES CODES

- > 181299 Telindus 2301 (8 SHDSL modems)
- > 181301 Telindus 2303 (24 SHDSL modems)
- > 185881 Desk-top Power supply module 70W (230/115Vac -> 48Vdc)
- > 182590 CBL Telco M /wires 24*2*0,14 120° 2M

Telindus 2302 (16 SHDSL modems) and units with remote powering on request

voiceband modems

VOICE-BAND TECHNOLOGY ALLOWS THE USE OF THE EXISTING PUBLIC SWITCHED TELEPHONY NETWORKS (PSTN) FOR THE TRANSMISSION OF DATA OVER LONG DISTANCES.

Thanks to its in-house DSP (Digital Signal Processor) developments an its long experience, Telindus is a well known name for the application of voice-band technology in professional transactional networks, banking environments and for signalling or measurement applications.

ASTER 5

FEATURES & BENEFITS

- V.34+ 33,600 BIT/S ON STANDARD SWITCHED TELEPHONE LINES (PSTN) AND 2/4 WIRE LEASED LINES
- SUPERIOR TELINDUS DSP TECHNOLOGY FOR OPTIMUM LINE PERFORMANCE
- FLASH MEMORY FOR FUTURE PROOF SOLUTION
- FULL DUPLEX ASYNCHRONOUS AND SYNCHRONOUS DATA COMPRESSION
- ADVANCED PSTN BACKUP SCENARIOS UPON LEASED LINE FAILURE
- HACKER-PROOF PSTN SECURITY ACCESS CONTROL
- OPTIONAL DES ENCRYPTION
- MULTIPLE MANAGEMENT FACILITIES
- BACKWARDS COMPATIBLE WITH ASTER 4 SERIES

> THE ASTER 5 SERIES USES THE SUPERIOR TELINDUS DSP TECHNOLOGY TO ACHIEVE DATA-TRANSFER RATES (UNCOMPRESSED) OF UP TO 33.6 KBPS ON LEASED LINES AND PSTN DIAL-UP CIRCUITS WITH AUTOMATIC OR USER-CONTROLLED (E.G. BY THE NETWORK MANAGEMENT SYSTEM) FALLBACK BASED ON CUSTOM-DEFINED LINE-QUALITY THRESHOLDS. THE MODEM IS DESIGNED FOR BOTH 2-WIRE AND 4-WIRE ANALOGUE LINES.

LINE INTERFACE
- RJ12 2 wire /4 wire Leased Line (TT)
- RJ12 PSTN (TT)
- Screw connections for 2 wire LL + PSTN or 4 wire LL (CV)
- Leased Line output level: -15 .. 0 dBm
- PSTN output level: -15 .. -10 dBm
- Maximum input level Leased Line: -3 dBm
- Maximum input level PSTN: -10 dBm
- Impedance: 600 Ohm, resistive or complex, according to CTR21
- Echo canceller: up to 1.3 sec (2 satellite hops)

USER INTERFACE
- LCD screen: 2x24 characters (TT)
- Keyboard: up, down, left, right, esc, enter (TT)
- Easyconnect handheld terminal with LCD and keyboard (CV)

CONTROL PORT
- Auxiliary port for management through TMA® , TML, VT100 or Easyconnect handheld terminal
- 9 pins Sub-D DCE, 9600 bps, 8+N

MODULATIONS
- Data Modulations: V.34, V33, V32bis, V.32, V.29(4W), V.22bis, V.22, V.23, V.21, Bell212A, Bell 103
- PSTN interoperability: V.8, Auto-Mode
- MNP1..MNP4 Error Correction: Max window size: 14
  Max frame-size: 256 bytes
- V.42 Error correction: Support for SREJ and MSREJ
  Max window size: 22
  Max frame-size: 192 bytes
- Compression: MNP5, V.42bis

DTE INTERFACE
- V.24/V.28 DCE 25 pins sub-D connector (on V.24 models)
- RS-530 DCE interface available for operation with RS-530, RS-530A, X.21, V.35 or V.36 based applications (on RS-530 models)
- DTE speeds for buffered mode: 0.3, 1.2, 2.4, 4.8, 9.6, 19.2, 24.0, 32.0, 38.4, 40.0, 48.0, 57.6, 64.0, 72.0, 80.0, 96.6, 115.2, 128.0 kbps
- Flow control: CTS, CTS/RTS, Xon/Xoff
- RTS/DCD simulated switched carrier operation according to V.13

SYNCHRONOUS OPERATION
- Modem Clocking: internal, external, slave/receive, X.21 internal

ASYNCHRONOUS OPERATION
- V.14 supporting 8/9/10/11 bits/char.
- Automatic speed and parity detection for Hayes AT and V.25bis (7+even/odd, 7+mark/space, 8+none, 8+even/odd)
- Max buffer size: 8000 bytes

SYNCHRONOUS COMPRESSION OPERATION (FOR HDLC FRAMED PROTOCOLS)
- NRZ/NRZI encoding
- Max HDLC frame size: 1550 bytes (includes CRC16/32)
- Max number of HDLC frame buffers: 30

AUTOMATIC DIALLER
- Dialler protocol: Hayes AT set, V.25bis
- Dial format: Asynchronous, HDLC, Bisync ASCII & EBCDIC, BSC ASCII & EBCDIC
- Memory for 200 telephone numbers
- Automatic PSTN dial-backup in case of Leased Line failure*

FEATURES
- Flash upgradeable firmware and Digital Signal Processing software
- Full control over remote modem with local keyboard and LCD
- Password exchange and call-back security on PSTN interface
- Access passwords list
- Analogue line parameter monitoring on LCD
- Free local maintenance software (TMA) available on Telindus website
- Free Flash download program (TML) available on Telindus website
- Optional model with 56 bit key DES data encryption
- Customised interface signalling GPIN,GPOUT
- V.54 testloops: AL,RDL,DL and integrated 511 BER generator with error count

MECHANICAL DATA (H X W X D)
- Desktop versions (TT): 45 x 220 x 215 mm weight: 1 kg
- Rack-mount version (CV) (CN4): 235 x 25 x 335 mm weight: 1 kg (2 modems/card)

POWER REQUIREMENTS
- Desktop versions: 85..265 Vac 47-63 Hz 8 W
  -18..-72 Vdc 6 W
- Double (Twin) Rack-mount versions (for cardnest CN4): 5 W

The Aster 5 can even further increase the user data rate by using powerful compression algorithms. Both the V.42bis and the MNP5 algorithm are supported. It provides not only regular asynchronous compression but also synchronous compression on HDLC frames (such as LAPB, LAPF, and SDLC) as a unique standard feature. This gives higher throughput and faster response times when interconnecting Frame Relay, X.25, or SNA equipment.

An optional hardware DES encryption model ensures data confidentiality, which makes the Aster 5 ideal for demanding security environments such as those of financial institutions, government agencies, and leading-edge research and development enterprises.

Flexible backup scenarios of the analogue leased line through the PSTN network guarantee the reliability of the network. To prevent unauthorized access to the network, high-level security features are included to protect the PSTN port. Access security on this high-performance modem includes fully encrypted password exchange, call-back, and dial backup security.

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

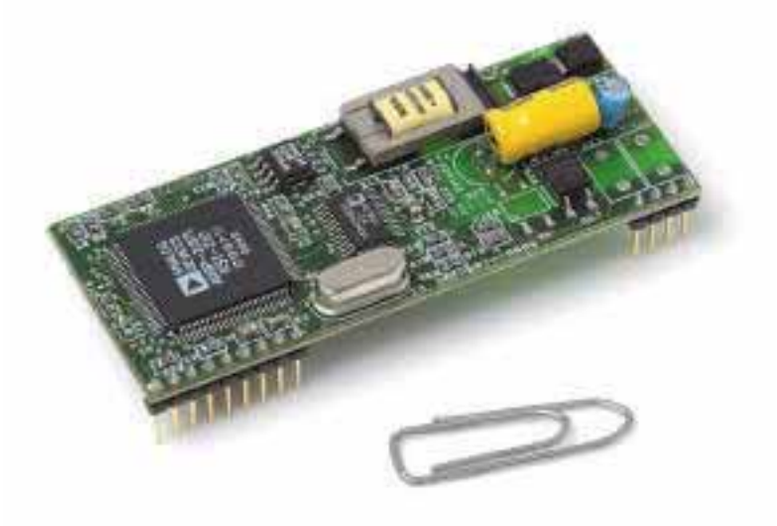
The Aster 5 is designed for integration into demanding network environments and can be controlled by the complete set of network maintenance and management tools as described in the Telindus Access Products catalogue.

V FREE TELINDUS MAINTENANCE APPLICATION (TMA)

SALES CODES
- 171296 Aster 5 TT LCD VAC (integrated wide-range pwr Vac, LCD, V24 interface)
- 171297 Aster 5 TT LCD 24/48VDC (integrated pwr 24/48Vdc, LCD, V24 interface)
- 171301 Aster 5 TWIN-CV (Twin version for CN4, V24 interface)

Models with RS-530 interface (instead of V.24) or models with DES encryption are available on request

DSP SOCKET MODEM - SERIAL



> TELINDUS DESIGNED AND DEVELOPED A COMPLETE VOICE-BAND MODEM FOR USE IN EMBEDDED APPLICATIONS. IT CAN BE DELIVERED AS A STANDARD MOUNTED UNIT (SOCKET MODEM), OR AS A REFERENCE DESIGN.

The modem does not require any micro-controller and is fully based on soft-coded DSP algorithms developed by Telindus. Therefore, it offers a more flexible and cost-effective alternative for the more rigid modem-chip solutions.

The modem design offers very low operating power requirements and a small form factor, making it ideal for many applications, such as embedded control systems, communications for instrumentation equipment, set-top box, Internet TV, email phone and portable communications equipment.

The socket modem communicates with standard RS-232 serial interface with the embedded applications. Upon power up or reset of the chipset, the modem code is loaded from flash memory into the modem DSP internal memory. The end user can now communicate with the modem through the serial interface using industry-standard AT commands.

For evaluation purposes, Telindus markets a complete evaluation platform. This is a standalone reference design and includes the evaluation board with an evaluation copy of the software, schematics, etc.

On project base, Telindus can make adaptations to the modem software to fit any particular need on modulation or interfacing.

^ DSP SOCKET MODEM EVALUATION PLATFORM

FEATURES & BENEFITS

- > COMPLETE VOICE-BAND MODEM WITH SERIAL USER INTERFACE FOR EMBEDDED APPLICATIONS
- > FULL INTERNATIONAL COMPLIANCE AND COMPATIBILITY WITH FCC AND CTR21
- > INTERNATIONAL OPERATION WITH MULTIPLE COUNTRY CALL PROGRESS
- > 3.3V ONLY DESIGN WITH LOW POWER DRAIN
- > SUPPORTS MODULATIONS FROM 300 BPS TO 56 KBPS
- > AT COMMAND INTERFACE
- > FAX CLASS 1 OPERATION
- > GENERAL PURPOSE DSP BASED MODEM WITH FLEXIBLE UPGRADE OF SOFTWARE

MODULATIONS

- > V.90 (server and client), V.34bis, V.34, V.33, V.32bis, V.32, V.29, V.22bis, V.22, V22fast (HYPERCOM compatible), V.23, V.21, V.18, Bell 212A, Bell 103
- > Fax Mode modulation complying with V.17, V.27ter, V.29, V.21
- > DTMF generation and detection
- > General purpose tone detection and generation
- > V.25 auto answer
- > Upgradeable to V.92

AUTOMATIC DIALER

- > Country specific automatic dialer
- > Support for DTMF and pulse dialing

CALLER ID

- > International CID (ETSI, Bell core, BT)

LINE SENSING

- > Distinctive ring detect
- > Line in use
- > Parallel Phone pick up
- > Distinctive DC line voltage sensing

PROTOCOLS

- > V.42 or MNP2-4 error correction
- > V.42bis or MNP 5 data compression
- > Buffered mode with Xon/Xoff flow control
- > AT Commands according to V.250 with NVRAM profile storing
- > FAX Class 1 and T.30 protocol
- > V80 synchronous mode with SDLC framing
- > Extended diagnostics to implement management agents
- > Upgradeable to V.44

SERIAL MODEM INTERFACES FEATURES

- > Asynchronous serial control and data interface via software UART

LINE INTERFACES

- > Analog interface using the ADSST-1803 CODEC and Transformer based DAA with sensing for Ring detect, Caller ID, Line In Use and Parallel phone Pick Up.
- > IOM2 or TDM digital PCM interface, suitable for ISDN or T1/E1 environments

SOFTWARE FORMAT

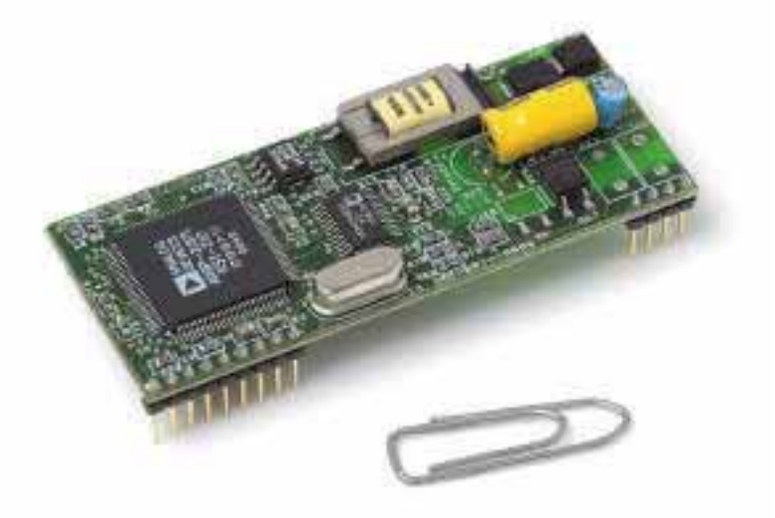
- > Binary customized image (selection of line interface and modem features)

SALES CODES

- > 181313 Socket modem module serial
- > 181318 Socket modem evaluation kit serial

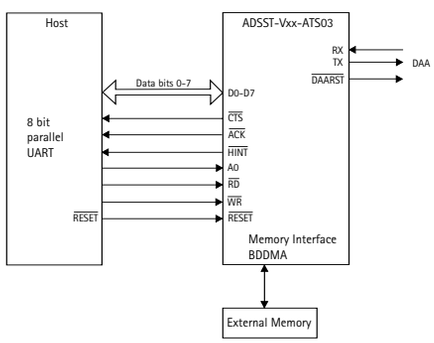
DSP SOCKET MODEM - PARALLEL

new



FEATURES & BENEFITS

- > COMPLETE VOICE-BAND MODEM WITH 8-BIT PARALLEL USER INTERFACE FOR EMBEDDED APPLICATIONS
- > FULL INTERNATIONAL COMPLIANCE AND COMPATIBILITY WITH FCC AND CTR21
- > INTERNATIONAL OPERATION WITH MULTIPLE COUNTRY CALL PROGRESS
- > 3.3V ONLY DESIGN WITH LOW POWER DRAIN
- > SUPPORTS MODULATIONS FROM 300 BPS TO 56 KBPS
- > AT COMMAND INTERFACE
- > FAX CLASS 1 OPERATION
- > GENERAL PURPOSE DSP BASED MODEM WITH FLEXIBLE UPGRADE OF SOFTWARE



SCHEMATIC DIAGRAM

MODULATIONS

- > V.90 (server and client), V.34bis, V.34, V.33, V.32bis, V.32, V.29, V.22bis, V.22, V22fast (HYPERCOM compatible), V.23, V.21, V.18, Bell 212A, Bell 103
- > Fax Mode modulation complying with V.17, V.27ter, V.29, V.21
- > DTMF generation and detection
- > General purpose tone detection and generation
- > V.25 auto answer
- > Upgradeable to V.92

AUTOMATIC DIALER

- > Country specific automatic dialer
- > Support for DTMF and pulse dialing

CALLER ID

- > International CID (ETSI, Bell core, BT)

LINE SENSING

- > Distinctive ring detect
- > Line in use
- > Parallel Phone pick up
- > Distinctive DC line voltage sensing

PROTOCOLS

- > V.42 or MNP2-4 error correction
- > V.42bis or MNP 5 data compression
- > Buffered mode with Xon/Xoff flow control
- > AT Commands according to V.250 with NVRAM profile storing
- > FAX Class 1 and T.30 protocol
- > V80 synchronous mode with SDLC framing
- > Extended diagnostics to implement management agents
- > Upgradeable to V.44

PARALLEL MODEM INTERFACES FEATURES

- > Asynchronous parallel control and data interface via 8-bit parallel UART.

LINE INTERFACES

- > Analogue interface using the ADSST-1803 CODEC and Transformer based DAA with sensing for Ring detect, Caller ID, Line In Use and Parallel phone Pick Up.
- > IOM2 or TDM digital PCM interface, suitable for ISDN or T1/E1 environments

SOFTWARE FORMAT

- > Binary customized image (selection of line interface and modem features)

SALES CODES

- > 189076 Socket modem module parallel
- > 181319 Socket modem evaluation kit parallel

> TELINDUS DESIGNED AND DEVELOPED A COMPLETE VOICE-BAND MODEM FOR USE IN EMBEDDED APPLICATIONS. IT CAN BE DELIVERED AS A STANDARD MOUNTED UNIT (SOCKET MODEM), OR AS A REFERENCE DESIGN.

The modem does not require any micro-controller and is fully based on soft-coded DSP algorithms developed by Telindus. Therefore, it offers a more flexible and cost-effective alternative for the more rigid modem-chip solutions.

The modem design offers very low operating power requirements and a small form factor, making it ideal for many applications, such as embedded control systems, communications for instrumentation equipment, set-top box, Internet TV, email phone and portable communications equipment.

The parallel socket modem supports a 16550 UART in parallel interface version with reduced register set. It communicates through this 8 bit parallel interface with the embedded applications. Upon power up or reset of the chipset, the modem code is loaded from flash memory into the modem DSP internal memory. The end user can now communicate with the modem through the parallel interface using industry-standard AT commands.

For evaluation purposes, Telindus markets a complete evaluation platform. This is a standalone reference design and includes the evaluation board with an evaluation copy of the software, schematics, etc.

On project base, Telindus can make adaptations to the modem software to fit any particular need on modulation or interfacing.

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

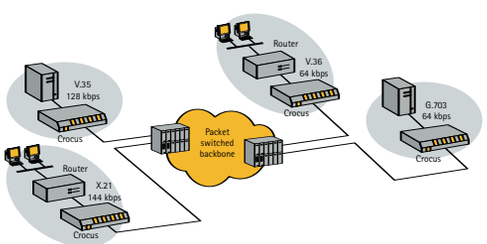
The equipment uses transparent data interface modules as found in the sales codes quick reference section

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.

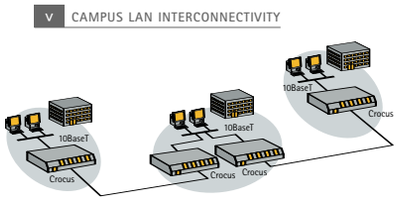
In addition, all Crocus modems in the network can be managed in an integrated way by a high-performance SNMP based management system (HP OpenView®). The integrated management enables one to configure the modem remotely, to query the actual status of the modems, to permanently monitor the performance (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

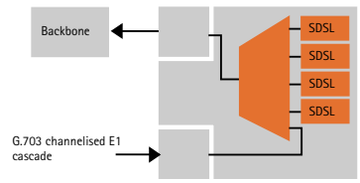
> A quad card-version with integrated add-and-drop multiplexer with G.703/G.704 up-link

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



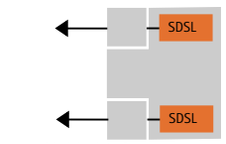
SALES CODES: BASIC UNITS

> 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

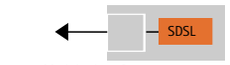
All transparent and Nx64k data interface modules are found in the sales codes quick reference section

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.

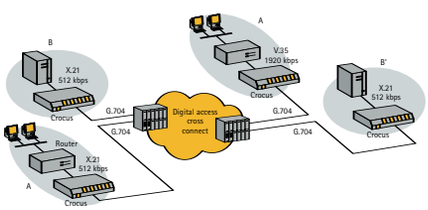
SALES CODES BASIC UNITS

> 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

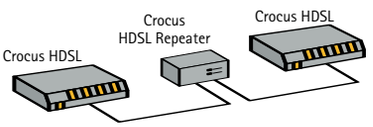
> THE CROCUS HDSL REPEATER OFFERS THE EQUIVALENT OF TWO BACK-TO-BACK CROCUS HDSL MODEMS.

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

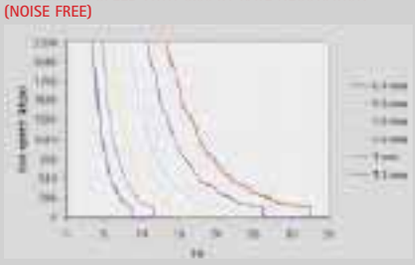
LINE INTERFACE

- 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

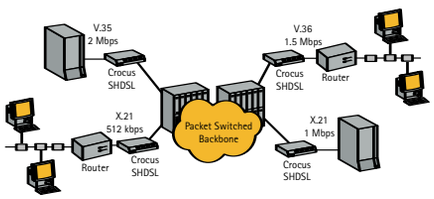
- Direct connection for VT100 local console (command line interface or interactive interface)
- Direct connection for TMA (Telindus Maintenance Application)
- External hand LCD terminal

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.

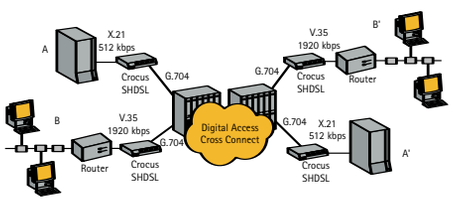
For larger networks, the Crocus SHDSL can be managed with a management application running on the SNMP based HP OpenView® management platform. On this platform one can combine the management of the Crocus SHDSL with the management of all Telindus and many third party equipment.

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.

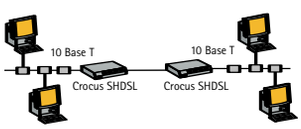
V PACKET SWITCHED BACBONE ACCESS



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

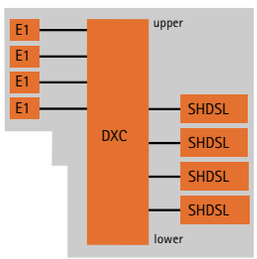
> THE CROCUS SHDSL QUAD DXC IS A CARD FITTING IN THE CARD-NEST 4 (CN4) INTEGRATING SHDSL TRANSMISSION TECHNIOLOGY WITH CROSS-CONNECT FUNCTIONALITY INTO A HIGH-DENSITY MODULAR CENTRAL OFFICE SOLUTION.

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

fibre optics modems

FIBRE-OPTIC (FO) TRANSMISSION TRADITIONALLY IS PRESENT IN LONG HAUL BACKBONE AND METROPOLITAN AREA NETWORKS.

However, since increasingly more fibre becomes available in campus-based and local loop infrastructures, fibre optic transmission becomes also important as a method for the direct connection of traditional end-user applications.

The equipment in this chapter offers a flexible way for the connection of a variety of applications by different types of fibre media. The units support applications based on serial connections, G.703 connections or Ethernet at speeds ranging from 64 kbps up to 45 Mbps.

CROCUS FO10M

FEATURES & BENEFITS

- > MODEM FOR FIBRE OPTIC CONNECTIVITY UP TO 10MBPS
- > WIDE RANGE OF EXCHANGEABLE FIBRE OPTIC MODULES FOR MULTI-MODE AND SINGLE-MODE FIBRE
- > MULTIPLE EXCHANGEABLE DATA INTERFACES FOR CONNECTIVITY TO ANY TYPE OF APPLICATION
- > FULLY MANAGEABLE BY FREE MAINTENANCE SOFTWARE (TMA®)
- > INTEGRATION WITH HP OPENVIEW® MANAGEMENT PLATFORM
- > OPTIONAL REDUNDANCY ON THE OPTICAL LINK

> THE CROCUS FO10M IS A HIGH-SPEED MODEM DESIGNED FOR CONNECTING END-USER EQUIPMENT USING OPTICAL FIBRE.

Thanks to the field exchangeable fibre modules, the Crocus FO10M can be used for almost any type of fibre medium, ranging from short haul multimode fibre, to the long haul singlemode fibre connection. When using a long haul module, distances of over 70 km can easily be covered.

AVAILABLE OPTIC MODULES

Direct SC/PC or ST/PC connectors*
Multimode or single mode modules
Dual fibre or single fibre modules
Up to 70 km
*Note: SC/PC to FC/PC and FC/APC adapter cables (male/male) are also available

USER SPEEDS

- > Internal clocking: Nx64 kbps (up to 2 Mbps) Nx2 Mbps (up to 10 Mbps)
- > Slave/Receive clocking: Nx64 kbps (up to 2 Mbps) Nx2 Mbps (up to 10 Mbps)
- > External clocking: Nx32 kbps (up to 10 Mbps)

AVAILABLE APPLICATION INTERFACES

- > V.35: up to 10 Mbps
- > V.36/RS-449: up to 10 Mbps
- > X.21: up to 10 Mbps
- > RS-530/RS-530A: up to 10 Mbps
- > V.24/RS-232: up to 128 kbps
- > G.703 E1: 2 Mbps (E1 or FE1) fixed
- > Quad G.703 E1: 4 x 2 Mbps (E1) fixed
- > Ethernet IP Router 2M: up to 2 Mbps
- > Ethernet IP Router 10M: up to 10 Mbps

FRONT PANEL

- > Testloops
  AL: Analogue Loop
  RDL: Remote Digital Loop
  DL: Local Digital Loop
  ET: Error Test generator (test pattern 215-1)
- > Indications
  PWR: Power
  TST: Test indicator (circuit 142)
  ERR: Bit Error Indicator (Error test) - AIS for G.703
  DCD A: Data Carrier Detect for fibre module A (circuit 109)
  DCD B: Data Carrier Detect for fibre module B (circuit 109)
  TXD: Transmit data (circuit 103)
  RXD: Receive data (circuit 104)

SUPPLEMENTARY FEATURES

- > The modem has a flash memory to allow firmware upgrades
- > Maintenance of local and remote modem with free Windows ® software
- > Integrated network management module for HP OpenView ®
- > Optional Second optic module for redundancy

MECHANICAL DATA (H X W XD)

- > 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
  24/48Vdc (18Vdc - 72Vdc): 160 mA
- > Rack-mount version 48Vdc (36Vdc - 72Vdc): 180 mA

SALES CODES: BASIC UNITS (REQUIRES ADDITIONAL MODULAR DATA AND FIBRE INTERFACE)

- > 175659 Crocus FO10M TT BU 230V
- > 159645 Crocus FO10M TT BU 24/48V
- > 175658 Crocus FO10M TWIN-CV BU

SALES CODES: INTERFACES

- > 154404 G703 intf. Crocus SDSL-FO
- > 163369 4E1 Intf. Crocus

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

The Crocus FO10M allows the user to connect at speeds up to 10 Mbps, and can be terminated on almost any type of data interface. Not only traditional serial interfaces like V.35, V.36, RS-530 and X.21, but also G.703 (transparent 2 Mbps or with G.704 framing) and direct Ethernet 10/100Base-T connections with integrated bridge or router functionality are available. It is possible to combine different types of interfaces on the two sides of the communication link, so eliminating the need for external interface conversion. All these interface boards can be exchanged in only a few seconds, so flexibility is maximised. The actual speed of the connection can be locally or centrally configured in multiples of 64 kbps (up to 2Mbps), or in multiples of 2 Mbps (up to 10 Mbps). This makes the equipment also very suited for offering multiple user speeds in carrier access environments.

For critical connections, it is possible to create 100% redundancy on the optical link, by inserting a second optical interface into the Crocus FO10M. This creates a complete 1-to-1 backup of the physical connection.

For large concentration sites, rackmount versions are mounted in a CN4 cardnest and can offer densities of up to 30 modems per nest. Both 230/115 Vac and direct 24/48 Vdc powering can be used.

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.

V TMA INTERFACE

CLASS 1 LASER PRODUCT LASER RADIATION: AVOID EXPOSURE TO THE BEAM
To avoid possible eye damage, do not view into an uncovered optical module when the equipment is operational.

CROCUS FO45M

> THE CROCUS FO45M IS A HIGH-SPEED MODEM DESIGNED FOR CONNECTING END-USER EQUIPMENT USING OPTICAL FIBRE.

Thanks to the field-exchangeable fibre modules, the Crocus FO45M can be used for almost any type of fibre medium, ranging from short-haul multi-mode fibre, to the long-haul single-mode fibre connection. When using a long-haul module, distances of over 70 km can easily be covered.

The Crocus FO45M allows the user to connect at speeds up to 45 Mbps, and can be terminated on almost any type of data interface. Not only traditional serial interfaces like V.35, V.36, RS-530 and X.21 , but also G.703 E1 (transparent 2Mbps or with G.704 framing), G.703 E3 (34 Mbps), G.703 T3 (45 Mbps) , HSSI (High Speed Serial Interface) and direct Ethernet 10/100Base-T connections with integrated bridge or router functionality are available. It is possible to combine different types of interfaces on the two sides of the communication link, eliminating the need for external interface conversion. All these interface boards can be exchanged in only a few seconds, so flexibility is maximised. The actual speed of the connection can be configured in multiples of 64 kbps (up to 2Mbps), in multiples of 2 Mbps (up to 10 Mbps), or for 34 and 45 Mbps. This makes the equipment well suited for offering multiple user-speeds in carrier access environments.

For critical connections, it is possible to create 100% redundancy on the optical link by inserting a second optical interface into the Crocus FO45M. This creates a complete 1-to-1 backup of the physical connection.

V MODULAR INTERFACES

For large concentration sites, rackmount versions are mounted in a CN4 cardnest and can offer densities of up to 30 modems per nest. Both 230/115 Vac and direct 24/48 Vdc powering can be used.

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

- > MODEM FOR FIBRE OPTIC CONNECTIVITY UP TO 45 MBPS
- > WIDE RANGE OF EXCHANGEABLE FIBRE OPTIC MODULES FOR MULTI-MODE AND SINGLE-MODE FIBRE
- > MULTIPLE EXCHANGEABLE DATA INTERFACES FOR CONNECTIVITY TO ANY TYPE OF APPLICATION
- > FULLY MANAGEABLE USING FREE MAINTENANCE SOFTWARE (TMA®)
- > OPTIONAL REDUNDANCY ON THE OPTICAL LINK

AVAILABLE OPTIC MODULES

- > Direct SC/PC or ST/PC connectors*
- > Multimode or single mode modules
- > Dual fibre or single fibre modules
- > Up to 70 km

  * Note: SC/PC to FC/PC and FC/APC adapter cables (male/male) are also available

USER SPEEDS

- > Internal clocking: Nx64 kbps (up to 2 Mbps)
  Nx2 Mbps (up to 10 Mbps)
  34 Mbps
  45 Mbps
- > Slave/Receive clocking: Nx64 kbps (up to 2 Mbps)
  Nx2 Mbps (up to 10 Mbps)
  34 Mbps
  45 Mbps
- > External clocking: Nx32 kbps (up to 10 Mbps)
  34 Mbps
  45 Mbps

AVAILABLE APPLICATION INTERFACES

- > V.35, V.36/RS-449, X.21, RS-530/RS-530A: up to 10 Mbps
- > V.24/RS-232: up to 128 kbps
- > G.703 E1: 2 Mbps (E1 or FE1) fixed
- > Quad G.703 E1: 4 x 2 Mbps (E1) fixed
- > Ethernet IP Router 2M: up to 2 Mbps
- > Ethernet IP Router 10M: up to 10 Mbps
- > G.703 E3/T3: 34 or 45 Mbps fixed
- > HSSI: up to 45 Mbps

FRONT PANEL

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

CLASS 1 LASER PRODUCT LASER RADIATION: AVOID EXPOSURE TO THE BEAM
To avoid possible eye damage, do not view into an uncovered optical module when the equipment is operational.

- > Indications
  PWR: Power
  TST: Test indicator (circuit 142)
  ERR: Bit Error Indicator (Error test) - AIS for G.703
  DCD A: Data Carrier Detect for fibre module A (circuit 109)
  DCD B: Data Carrier Detect for fibre module B (circuit 109)
  TXD: Transmit data (circuit 103)
  RXD: Receive data (circuit 104)

SUPPLEMENTARY FEATURES

- > The modem has a flash memory to allow firmware upgrades
- > Maintenance of local and remote modem with free Windows ® software
- > Integrated network management module for HP OpenView ®
- > Optional Second optic module for redundancy

MECHANICAL DATA (H X W XD)

- > 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
  24/48Vdc (18Vdc - 72Vdc): 160 mA
- > Rack-mount version 48Vdc (36Vdc - 72Vdc): 180 mA

SALES CODES: BASIC UNITS (REQUIRES ADDITIONAL MODULAR DATA AND FIBRE INTERFACE)

- > 171277 Crocus FO45M TT BU 230V
- > 171278 Crocus FO45M TT BU 24/48V
- > 171279 Crocus FO45M TWIN-CV BU

SALES CODES: INTERFACES

- > 154404 G703 intf. Crocus SDSL-FO
- > 163369 4E1 Intf. Crocus
- > 171280 E3/T3 Intf Crocus FO45 BNC

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

CROCUS FIBRE MODULES & ADAPTERS

CROCUS FIBRE MODULES

> THE CROCUS FIBRE MODULES ARE USED ON THE DIFFERENT TELINDUS FIBRE-OPTIC TRANSMISSION EQUIPMENT AND CAN EASILY BE EXCHANGED IN FUNCTION OF THE DESIRED CONNECTOR AND TRANSMISSION CHARACTERISTICS.

CROCUS FO SC TX13 RX15 SM-MH

> CONNECTOR TYPE: single SC/PC
> TRANSMISSION WAVELENGTH (NM): 1310
> RECEIVE WAVELENGTH (NM): 1550
> OPTICAL SOURCE: Laser, single-mode
> MINIMUM OPTICAL BUDGET (DB): 17
> TYPICAL OPTICAL BUDGET (DB): 24
> TYPICAL DISTANCE (KM): 15
> SALES CODE: 177620
> To be used in combination with Crocus FO SC TX15 RX 13 SM-MH on peer modem

CROCUS FO SC TX15 RX13 SM-MH

> CONNECTOR TYPE: single SC/PC
> TRANSMISSION WAVELENGTH (NM): 1550
> RECEIVE WAVELENGTH (NM): 1310
> OPTICAL SOURCE: Laser, single-mode
> MINIMUM OPTICAL BUDGET (DB): 17
> TYPICAL OPTICAL BUDGET (DB): 24
> TYPICAL DISTANCE (KM): 15
> SALES CODE: 177621

CROCUS FO SC TX13 RX15 SM-LH

> CONNECTOR TYPE: single SC/PC
> TRANSMISSION WAVELENGTH (NM): 1310
> RECEIVE WAVELENGTH (NM): 1510
> OPTICAL SOURCE: Laser, single-mode
> MINIMUM OPTICAL BUDGET (DB): 29
> TYPICAL OPTICAL BUDGET (DB): 33
> TYPICAL DISTANCE (KM): 60
> SALES CODE: 179173
> To be used in combination with Crocus FO SC TX15 RX 13 SM-LH on peer modem

CROCUS FO SC TX15 RX13 SM-LH

> CONNECTOR TYPE: single SC/PC
> TRANSMISSION WAVELENGTH (NM): 1550
> RECEIVE WAVELENGTH (NM): 1310
> OPTICAL SOURCE: Laser, single-mode
> MINIMUM OPTICAL BUDGET (DB): 29
> TYPICAL OPTICAL BUDGET (DB): 33
> TYPICAL DISTANCE (KM): 60
> SALES CODE: 179175

CROCUS FO ST13 MM-SH MODULE

> CONNECTOR TYPE: dual ST/PC
> TRANSMISSION WAVELENGTH (NM): 1310
> OPTICAL SOURCE: LED, multi-mode
> MINIMUM OPTICAL BUDGET (DB): 11
> TYPICAL OPTICAL BUDGET (DB): 17
> TYPICAL DISTANCE (KM): 2
> SALES CODE: 159650

CROCUS FO ST13 SM-MH MODULE

> CONNECTOR TYPE: dual ST/PC
> TRANSMISSION WAVELENGTH (NM): 1310
> OPTICAL SOURCE: Laser, single-mode
> MINIMUM OPTICAL BUDGET (DB): 16
> TYPICAL OPTICAL BUDGET (DB): 25
> TYPICAL DISTANCE (KM): 50
> SALES CODE: 159652

CROCUS FO ST13 SM-LH MODULE

> CONNECTOR TYPE: dual ST/PC
> TRANSMISSION WAVELENGTH (NM): 1310
> OPTICAL SOURCE: Laser, single-mode
> MINIMUM OPTICAL BUDGET (DB): 29
> TYPICAL OPTICAL BUDGET (DB): 33
> TYPICAL DISTANCE (KM): 70
> SALES CODE: 160525

CROCUS FO SC13 MM-SH MODULE

> CONNECTOR TYPE: dual SC/PC
> TRANSMISSION WAVELENGTH (NM): 1310
> OPTICAL SOURCE: LED, multi-mode
> MINIMUM OPTICAL BUDGET (DB): 11
> TYPICAL OPTICAL BUDGET (DB): 17
> TYPICAL DISTANCE (KM): 2
> SALES CODE: 159646

CROCUS FO SC13 SM-MH MODULE

> CONNECTOR TYPE: dual SC/PC
> TRANSMISSION WAVELENGTH (NM): 1310
> OPTICAL SOURCE: Laser, single-mode
> MINIMUM OPTICAL BUDGET (DB): 16
> TYPICAL OPTICAL BUDGET (DB): 25
> TYPICAL DISTANCE (KM): 50
> SALES CODE: 159648

CROCUS FO SC13 SM-LH MODULE

> CONNECTOR TYPE: dual SC/PC
> TRANSMISSION WAVELENGTH (NM): 1310
> OPTICAL SOURCE: Laser, single-mode
> MINIMUM OPTICAL BUDGET (DB): 29
> TYPICAL OPTICAL BUDGET (DB): 33
> TYPICAL DISTANCE (KM): 70
> SALES CODE: 159649

FIBRE OPTIC ADAPTER CABLES

> FIBRE OPTIC ADAPTER CABLES ALLOW MATCHING OTHER TYPES OF FIBRE CONNECTORS. THE ADAPTER CABLES HAVE A SC/PC MALE CONNECTOR AT ONE END (COMPATIBLE WITH THE CORRESPONDING TELINDUS FIBRE MODULES) AND A VARIETY OF (MALE) CONNECTOR TYPES AT THE OTHER END.

The adapter cables are based on single-mode fibre. Because some of the Telindus Fibre Modules have dual connectors (transmit and receive), two adapter cables may be required per Telindus Fibre Module.

FO PATCHCBL SC/PC_FC/PC_2M

> CONVERTS TO: FC/PC male
> SALES CODE: 172741

FO PATCHCBL SC/PC_FC/APC_8_2M

> CONVERTS TO: FC/APC 8 degrees male
> SALES CODE: 172744

FO PATCHCBL SC/PC_SC/APC_8_2M

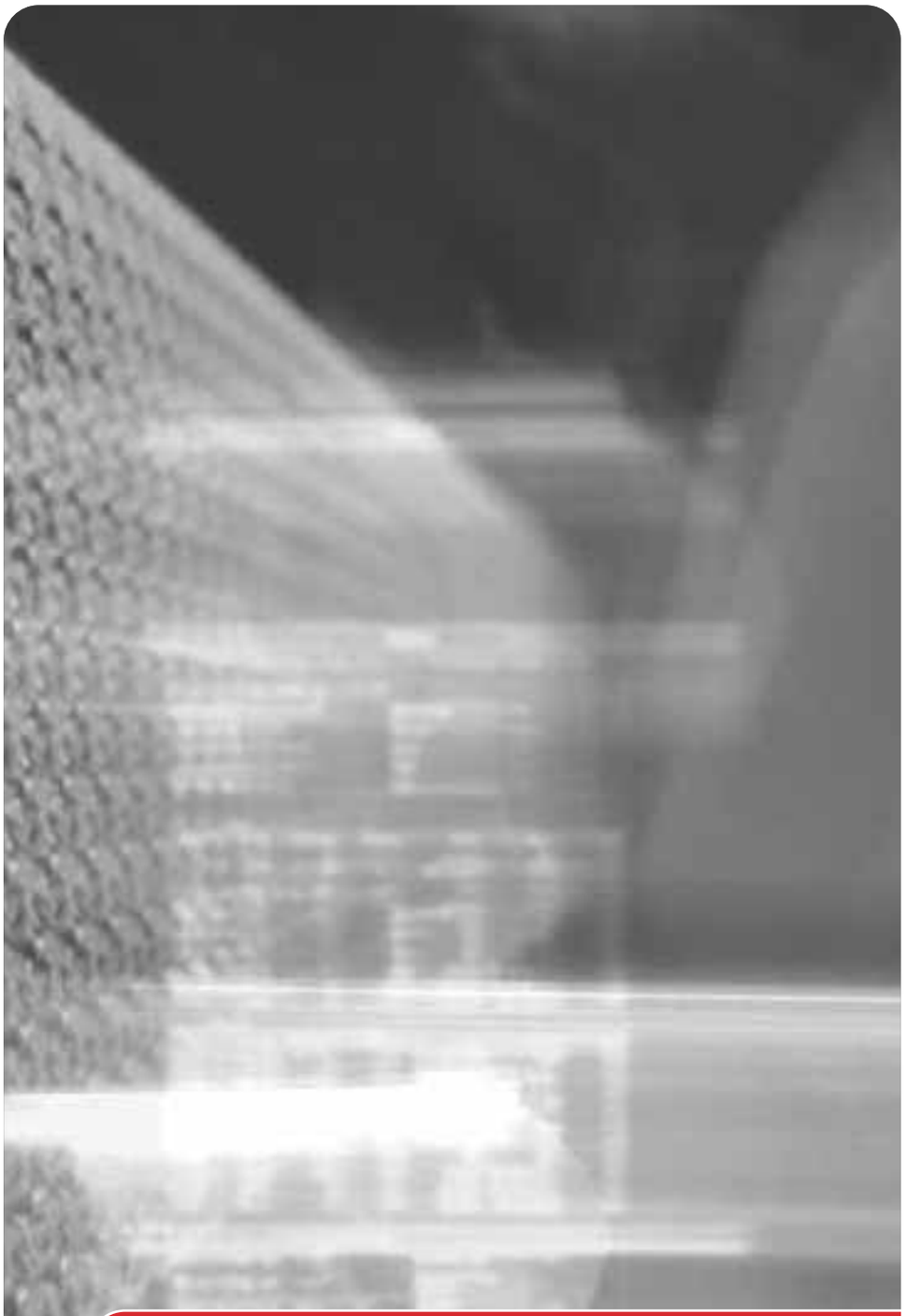
> CONVERTS TO: SC/APC 8 degrees male
> SALES CODE: 172735

FO PATCHCBL SC/PC_SC/APC_9_2M

> CONVERTS TO: SC/APC 9 degrees male
> SALES CODE: 172738

FO PATCHCBL SC/PC_ST/PC_2M

> CONVERTS TO: ST/PC male
> SALES CODE: 177623



multiplexers & interface converters

INTERFACE CONVERSION, DIGITAL CROSS CONNECTS (DXC) AND MULTIPLEXING ALLOW THE OPTIMISATION OF THE ACCESS INFRASTRUCTURE BY ITS ABILITY TO DO LOCAL SWITCHING, TO REDUCE THE NUMBER OF PHYSICAL INTERFACES NEEDED FOR CONNECTING TO THE BACKBONE NETWORK, AND BY THE REDUCTION OF NUMBER OF (NON-MANAGED) EXTERNAL INTERFACE CONVERSION BOXES.

Because it shares the same card-nest (CN4) and it integrates into the same network management concept than the voice band modems, xDSL and fibre optic modems, this equipment is an essential part of the global Telindus access solution.

CROCUS 2M CNV TT

FEATURES & BENEFITS

- 2MBPS G.703 INTERFACE CONVERTER
- MODELS FOR X.21 OR V.35
- WIDE RANGE OF CLOCKING POSSIBILITIES
- FULL SIZE CONNECTORS (NO ADAPTER CABLES REQUIRED)

> THE CROCUS 2M CNV IS A FAMILY OF COST-EFFECTIVE INTERFACE CONVERTERS FOR CONNECTING DIFFERENT TYPES OF APPLICATIONS TO G.703 BASED INFRASTRUCTURES.

The Crocus 2M CNV TT offers transparent 2 Mbps operation, and supports a wide range of clocking possibilities. With its full size connectors, the interface converter eliminates the need for costly adapter cables. The models with X.21 and V.35 interface can be used for connecting applications like routers or switches to a G.703 transport infrastructure.

The Crocus 2M CNV TT is suited for connection to G.703 transport infrastructures based on both 120 ohm twisted pair and 75 ohm coax cable.

INTERFACES

- G703 telecom interface (all models)
  - conform ITU G.703
  - balanced interface at 120 ohm on RJ45 connector
  - unbalanced interface at 75 ohm on BNC connectors
- X21 interface (X.21 model)
  - electrical interface conform V11
  - functional interface conform X24/DCE
  - mechanical interface conform ISO 4903 (DB15 female)
  - support of 't', 'r', 's', 'c', 'i' and 'x'
- V35 interface (V.35 model)
  - electrical interface conform V11- V10
  - functional interface conform V24/DCE
  - support of TXD, RXD, TXC, RXC, TXC', DCD, RTS->CTS, DSR->DTR
  - mechanical interface conform ISO 2593 (34 pin Winchester female)

CLOCKING MODES

- Free Run
  - internal clock used to transmit to the G.703 network
  - internal clock used for RxD and TxD
- Slave to Network
  - G.703 clock is recovered with jitter filtering
  - recovered clock is used to transmit to the G.703 network
  - recovered clock is used for TxD and RxD
- Transparent
  - DTE clock is used to transmit to the G.703 network
  - recovered clock from the G.703 network is used for RxD
- Mixed mode
  - internal clock is used for TxD and to transmit to the G.703 network
  - recovered clock from the G.703 network is used for RXD

SUPPLEMENTARY FEATURES

- built-in G.703 line driver supports line attenuation up to 40 dB resulting extended transmission capacity on two twisted pairs
- compatible with the older Telindus Datax BITS-INT product

FRONT PANEL INDICATORS

- PWR: Power
- LIS/AIS: indicates Loss of Incoming Signal and Alarm Indication Signal
- LL/RL: indicates status of loops (local loop, request for remote loop)
- DL/RDL: indicates status of loops (digital loop set locally or remotely)
- TXD: lights up when transmitted data is present
- RXD: lights up when received data is present

TESTLOOPS

- loop mechanism for maintenance based on V54 loop definition
  - local loop: loops data back to the local connected application
  - digital loop: loops data back to the G703 interface
  - remote loop requested at 1 site forces digital loop in remote site

MECHANICAL DATA (H X W X D)

- 38 x 150 x 270 mm weight: 0.6 kg (excl. power adapter)

POWER REQUIREMENTS

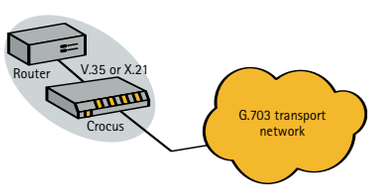
- 7.5 Vdc, 750mA
- 230 Vac Power adapter included

SALES CODES

- 169320 Crocus 2M CNV TT X21
- 169319 Crocus 2M CNV TT V35

Units without power module and separate power adapters can be found in the sales codes quick reference section

V INTERFACING V.35 OR X.21 APPLICATIONS TO G.703 TRANSPORT INFRASTRUCTURES



CROCUS 2M CNV CV

> THE CROCUS 2M CNV TWIN-CV IS A DUAL MANAGEABLE 2 MBPS INTERFACE CONVERTER WITH EXCHANGEABLE INTERFACES.

It can perform the conversion between virtually any type of interface and a fixed G.703 E1. Supported modular interfaces include classical serial type of interfaces like X.21, V.35, V.36, RS-530, RS-232, but also 10-Base-T interfaces with integrated bridging or routing functionality. The unit can be mounted in the family of CN4 card-nests and is compatible with the Crocus 2M CNV TT desktop version.

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.

SALES CODES

> 171292 Crocus 2M CNV Twin-CV BU

SALES CODES: INTERFACES

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

FEATURES & BENEFITS

- > DUAL 2 MBPS G.703 INTERFACE CONVERTER WITH MODULAR DATA INTERFACES
- > MODULAR DATA INTERFACES FOR MAXIMUM FLEXIBILITY
- > RACK-MOUNT VERSION WITH TWO CONVERTERS PER CARD
- > FULLY MANAGEABLE, INCLUDING FREE MAINTENANCE SOFTWARE TMA®
- > WIDE RANGE OF CLOCKING POSSIBILITIES

FIXED G703 TELECOM INTERFACES

- > Number of interfaces per card: 2
- > Applicable standards: ITU-T G.703, G.704, G.732, G.736, G.812, G.813, I.431,CRC-4 insertion
- > Balanced interface at 120 ohm on RJ45 connector, DTE
- > Jitter performance: ITU-T G.823, G.825
- > Nominal line data rate: 2048 kbps, E1
- > Transmit level: 0dBm
- > Receiver sensitivity: -15 dBm (short haul mode), -36 dBm (long haul mode)
- > Line code: HDB3, AMI (short haul mode only)
- > Performance monitoring: G.704 CRC-4 (configurable)

MODULAR INTERFACES (FIELD EXCHANGEABLE)

- > Number of interfaces per card: 2
- > Datamode: DCE
- > Available modular serial interfaces: V.35, V.36, X.21, RS-530, RS-232
- > Available modular 10Base-T interface: IP router 2M
- > User speeds: 2 Mbps fixed

CLOCKING SCHEMES

- > Free run
  - > Internal clock used to transmit to the G.703 network
  - > Internal clock used for RxD and TxD
- > Slave to network
  - > G.703 recovered clock is used to transmit to the G.703 network
  - > G.703 recovered clock is used for TxD and RxD
- > Transparent
  - > DTE clock (x or TxClk) is used to transmit to the G.703 network
  - > Recovered G.703 clock is used for RxD
- > Mixed mode
  - > Internal clock is used for TxD and to transmit to the G.703 network
  - > Recovered G.703 clock is used for RXD
- > Fallback to other clock source in case of absence

MANAGEMENT INTERFACE

- > Synchronous High speed bus RJ45 connector on CN4 card nest
- > Console port: 9600 bps, asynchronous, 8N1, SubD 9-pin
- > ATWIN, TMA, CLI user interfaces
- > Easyconnect handheld terminal (optional)
- > Alarm contacts on CN4: Major, minor
- > Flash memory
- > Password protected

FRONT PANEL INDICATORS

- > PWR: Power
- > TST: Test indicator
- > ERR: Local Alarm Signalling
- > LOS: Loss Of Signal
- > 103/TXD: Transmit data (input)
- > 104/RXD: Receive data (output)

TEST LOOPS

- > Analog Loop
- > Digital Loop
- > Remote Digital Loop
- > Error test generator: 2^{15}-1

MECHANICAL DATA (H X W X D)

- > 20 x 235 x 300 mm weight: 1 kg (modular interfaces excluded)

POWER REQUIREMENTS

- > -36 Vdc .. -72 Vdc, 7.2W max

CROCUS NX64K CNV

FEATURES & BENEFITS

- > NX64K G.703 INTERFACE CONVERTER WITH MODULAR DATA INTERFACES
- > DESKTOP AND RACK-MOUNT VERSIONS
- > MODULAR DATA INTERFACES FOR MAXIMUM FLEXIBILITY
- > FULLY MANAGEABLE, INCLUDING FREE MAINTENANCE SOFTWARE TMA ®
- > WIDE RANGE OF CLOCKING POSSIBILITIES

AVAILABLE BASIC INTERFACE CONVERTER UNITS (WITHOUT MODULAR INTERFACES)

	Number of interface converters
Crocus Nx64 CNV TT	1
Crocus Nx64 CNV TWIN-CV	2

FIXED G703 TELECOM INTERFACES

- > Applicable standards: ITU-T G.703, G.704, G.732, G.736, G.812, G.813, I.431,CRC-4 insertion
- > Balanced interface at 120 ohm on RJ45 connector, DTE
- > Unbalanced interface at 75 ohm on BNC connectors (desktop only)
- > Jitter performance: ITU-T G.823, G.825
- > Nominal line data rate: 2048 kbps, E1 or FE1
- > Transmit level: 0dBm
- > Receiver sensitivity: -15 dBm (short haul mode), -36 dBm (long haul mode)
- > Line code: HDB3, AMI (short haul mode only)
- > Performance monitoring: G.704 CRC-4 (configurable)

MODULAR INTERFACES (FIELD EXCHANGEABLE)

- > Datamode: DCE
- > Available modular serial interfaces: V.35, V.36, X.21, RS-530, RS-232
- > Available modular 10Base-T interface: IP router 2M
- > User speeds: Nx64 kbps (N=1..32)

CLOCKING SCHEMES

- > Free run
  - > internal clock used to transmit to the G.703 network
  - > internal clock used for RxD and TxD
- > Slave to network
  - > G.703 recovered clock is used to transmit to the G.703 network
  - > G.703 recovered clock is used for TxD and RxD
- > Transparent
  - > DTE clock (x or TxClk) is used to transmit to the G.703 network
  - > recovered G.703 clock is used for RxD
- > Mixed mode
  - > internal clock is used for TxD and to transmit to the G.703 network
  - > recovered G.703 clock is used for RXD
- > Fallback to other clock source in case of absence

MANAGEMENT INTERFACE

- > Synchronous High speed bus (CV only): RJ45 connector on CN4 card nest
- > Console port: 9600 bps, asynchronous, 8N1, SubD 9-pin
- > ATWIN, TMA, CLI user interfaces
- > Easyconnect handheld terminal (optional)
- > Alarm contacts on CN4: Major, minor (CV only)
- > Flash memory
- > Password protected

FRONT PANEL INDICATORS

- > PWR: Power
- > TST: Test indicator
- > ERR/AIS: AIS (Alarm Indication Signal)
  RAI (Remote Alarm Indication)
  Local Alarm Signalling
- > LOS/LFA: Loss Of Signal
  Loss Of Frame Alignment
- > 103/TXD: Transmit data (input)
- > 104/RXD: Receive data (output)

TEST LOOPS

- > Analog Loop
- > Digital Loop
- > Remote Digital Loop
- > Error test generator: 2^{15}-1

MECHANICAL DATA (H X W X D)

- > Desktop: 45 x 220 x 235 mm
  weight: 0.75 kg (modular interface excluded)
- > Card versions: 20 x 235 x 300 mm
  weight: 1 kg (modular interfaces excluded)

POWER REQUIREMENTS

- > Desktop VAC version: 85 .. 265 Vac, 45 – 60 Hz
- > Desktop 48VDC version: -36 Vdc .. -72 Vdc
- > Card version: -36 Vdc .. -72 Vdc, 7.2W max

> THE CROCUS NX64K CNV IS A FAMILY OF MANAGEABLE INTERFACE CONVERTERS WITH EXCHANGEABLE INTERFACE.

It can perform the conversion between virtually any type of interface and a fixed G.703 (F)E1. Supported modular interfaces include classical serial type of interfaces like X.21, V.35, V.36, RS-530, RS-232, but also 10-Base-T interfaces with integrated bridging or routing functionality. The unit supports all multiples of 64 kbps (Nx64k, N=1..32), and allows a free mapping of the time-slots on the G.703/G.704 fixed interface.

The family consists of desktop versions with AC or 48V DC powering, and a dual rack-mount version for mounting in the CN4 family.

SALES CODES

- > 171289 Crocus Nx64k CNV BU Vac
- > 171290 Crocus Nx64k CNV BU 48Vdc
- > 171291 Crocus Nx64k CNV Twin-CV BU (2 converters)

SALES CODES: INTERFACES

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

CROCUS ADM 2P

> THE CROCUS ADM 2P (ADD AND DROP MULTIPLEXER WITH 2 MODULAR PORTS) IS PART OF THE UNIVERSAL CROCUS ACCESS SOLUTION, AND OFFERS A FLEXIBLE AND MODULAR APPROACH FOR INTERFACE CONVERSION AND TIME DIVISION MULTIPLEXING (TDM).

The unit is equipped with 2 fixed (F)E1 G.703 interfaces and 2 slots for user-selectable plug-in interfaces. The main application for the equipment is the use as a dual port Nx64k multiplexer with (F)E1 G.703 output and an additional add-and-drop FE1 G.703 interface (figure 1). This add-and-drop interface can be used for stacking the cards and creating a multiplexer with an arbitrary number of Nx64k input ports.

Because the core of the equipment supports full cross-connect functionality, rather than only multiplexing, it is also possible to use the equipment as interface converter (Figure 2 and 3) or as a time slot re-organiser, when used between the fixed G.703 interfaces (figure 4).

The equipment comes as a card for mounting into the CN4 range of cardnests. Depending on the selected cardnest, a rackmount or desktop solution can be created.

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.

FIGURE1: STACKABLE TDM MULTIPLEXER (2 CARDS STACKED)

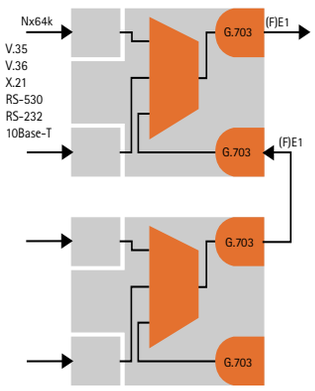


FIGURE2: DUAL NX64K TO G.703 FE1 INTERFACE CONVERTER

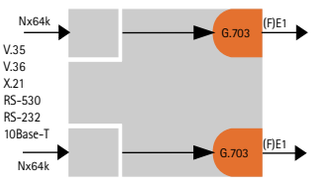


FIGURE3: NX64K INTERFACE CONVERTER

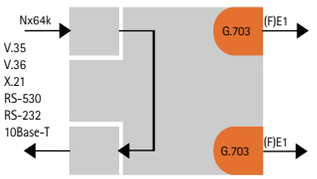
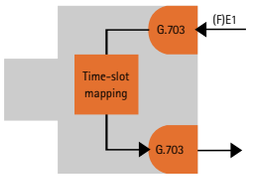


FIGURE4: G.703 TIME-SLOT RE-ORGANISER



FEATURES & BENEFITS

- > MODULAR STACKABLE NX64K MULTIPLEXER
- > G.703 (F)E1 OUTPUT AND ADD-AND-DROP INTERFACE
- > NX64K FIELD-EXCHANGEABLE SERIAL OR 10/100BASE-T INTERFACES

FIXED G.703 E1 INTERFACES (2 PIECES)

- > User speed: (F)E1
- > Connector: 120 ohm balanced RJ45 connector
  120 ohm balanced terminal block connector

MODULAR INTERFACES (2 PIECES, FIELD EXCHANGEABLE)

- > Datamode: DCE
- > Available modular serial interfaces: V.35, V.36, X.21, RS-530, RS-232, G.703/G.704
- > Available modular Ethernet interfaces: IP router 2M, IP router 10M
- > User speeds: Nx64 kbps (N=1..32)

FIXED G.703 E1 INTERFACE CHARACTERISTICS

- > Applicable standards: ITU-T G.703, G.704, G.736, G.732, I.431,CRC-4 insertion
- > Jitter performance: ITU-T G.823
- > Nominal line data rate: 2048 kbps
- > Transmit level: 0dBm
- > Receiver sensitivity: -15 dBm (short haul mode)
  -36 dBm (long haul mode)
- > Line code: HDB3
  AMI (short haul mode only)
- > Performance monitoring: G.704 CRC-4 (configurable)
- > The two G.703 interfaces are automatically interconnected on power fail or self-test failure

MANAGEMENT INTERFACE

- > Synchronous High speed bus: RJ45 on CN4 card nest
- > Console port: 9600 bps, asynchronous, 8N1, SubD 9-pin
  ATWIN, TMA, CLI
- > Alarm contacts: Major, minor (See CN4)
- > Flash memory
- > Password protected
- > Insertion/extraction of management channel in G.703 time-slot 0

INTERNAL CROSS-CONNECT FUNCTIONALITY

- > Non-blocking
- > Any arbitrary combination of 64k time-slots
- > Compliant with ETSI ETS 300 010-1 and ETS 300 010-A

STATION CLOCK INTERFACE (ON CARD NEST CN4)

- > Nominal rate: 2048 kbps
- > Line code: HDB3
- > Line connection: 120 ohm balanced RJ45 connector

CLOCKING SCHEMES

- > External transmit clock (station clock)
- > Transmit clock slaved on E1 receive clock from ports 1...2
- > Internal transmit clock
- > Fallback to other clock source in case of absence

FRONT PANEL INDICATORS

- > General PWR: Power
- > For each fixed E1 TST: Test indicator
  ERR/AIS: AIS (Alarm Indication Signal)
  RAI (Remote Alarm Indication)
  Local Configured Alarm
- > For each modular intf. 103/TXD: Transmit data (input)
  104/RXD: Receive data (output)

MECHANICAL DATA (H X D X W)

25 x 335 x 262 mm

POWER

48Vdc or 230Vac, 7.2W max

SALES CODES

> 171294 Crocus ADM 2P CV
(incl. 2 fixed G.703 intf)

SALES CODES: INTERFACES

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

CROCUS DXC

FEATURES & BENEFITS

- > PROVIDES PROGRAMMABLE NON-BLOCKING CROSS CONNECTION OF 64K CHANNELS
- > 8 OR 16 E1 INTERFACES
- > FITS INTO CN4 FAMILY OF CARD-NESTS
- > ADVANCED FREE MAINTENANCE SOFTWARE
- > MANAGEABLE UNDER HP OPENVIEW®

CROSS-CONNECT

- > Number of E1 links: up to 8 or up to 16
- > Maximum throughput delay: 650 µsec
- > Non-blocking
- > Any arbitrary combination of 64k time-slots
- > Compliant with ETSI ETS 300 010-1 and ETS 300 010-2

E1 LINK INTERFACES

- > Applicable standards: ITU-T G.703, G.704, G.736, I.431,CRC-4 insertion
- > Jitter performance: ITU-T G.823
- > Line data rate (nominal): 2048 kbps
- > Line code: HDB3
- > Line connection: RJ45 DTE
- > Line Impedance: 120 ohm balanced or 75 ohm unbalanced (strap selectable)

STATION CLOCK INTERFACE (ON CARD-NEST CN4)

- > Nominal rate: 2048 kbps
- > Line code: HDB3
- > Line connection: RJ45
- > Line Impedance: 120 ohm balanced

CLOCKING SCHEMES

- > External transmit clock (station clock)
- > Transmit clock slaved on E1 receive clock from ports 1...4
- > Internal transmit clock
- > Fallback to other clock source in case of absence of clocking

TESTS

- > External loop-back (Loop3) for each individual E1 line
- > Internal loop-back (Loop4) for each individual E1 line

FRONT PANEL INDICATORS

- > General: PWR: Power
- > For each E1
  - > TST: Test indicator
  - > ERR: Error condition: LOS, LOF, AIS, RAI (Remote Alarm Indication), Local configured alarm indication
- > Master clock indications
  - > STATION:Station clock on the card-nest is used
  - > 1...4: Clock derived from port 1..4 is used
  - > INTERNAL: Internal free running clock is used

MANAGEMENT INTERFACE

- > Synchronous High speed bus (for use with Orchid 1003 LAN) RJ45 connector on CN4 card nest
- > Console port: 9600 bps, asynchronous, 8N1, SubD 9-pin ATWIN, TMA, CLI
- > Alarm contacts Major, minor (See CN4)
- > Dual Flash memory
- > Password protected
- > Insertion/extraction of management channel in G.703 time-slot 0

MECHANICAL DATA (H X W X D)

- > 8 ports version: 25 x 262 x 335 mm
- > 16 ports version: 50 x 262 x 335 mm

POWER

- > 48Vdc or 230Vac, 8W max

SALES CODES

- > 167322 Crocus DXC 8 CV (8x G.703 ports)
- > 167323 Crocus DXC 16 CV (16x G.703 ports)

> THE CROCUS DXC (DIGITAL CROSS CONNECT) OFFERS 64 KBPS CROSS-CONNECT FUNCTIONALITY BASED ON G.703/G.704 2 MBPS (E1) PORTS.

The Crocus DXC allows the switching of any 64 kbps time-slot from any E1 port to any time slot from any other E1 port.

The main applications are found in the local switching of Nx64k leased line connections, and the concentration (grooming) of Nx64k services onto 2 Mbps E1 circuits. This solution is particularly useful for smaller concentration points where the investment in backbone switching equipment might be too high.

The Crocus DXC is available either as a card with 8 or 16 E1 ports, which fit into the CN4 range of card-nests. Depending on the selected card-nest, a rack-mount or desktop solution can be created.

The unit is configured through the free Telindus Maintenance Application (TMA®), which also gives comprehensive and visual information on the status and statistics of the Crocus DXC. Additional capabilities, like SNMP based management, Telnet, integration in network management platforms like HP OpenView® become possible when the Crocus DXC is used in combination with a controller card (Orchid).

In larger networks, the Crocus DXC can be combined with other Telindus units, like xDSL, Fibre-optic, or multiplexing equipment. This will create a global access platform, combining copper or fibre based access-connectivity with local switching and grooming. This complete system can be controlled through a uniform integrated network management solution.

CROCUS E3 MUX

> THE CROCUS E3 MUX IS PART OF THE CROCUS TDM ACCESS SOLUTION AND OFFERS A COMPREHENSIVE SOLUTION FOR THE CONCENTRATION OF UP TO SIXTEEN 2 MBPS E1 BASED TRAFFIC STREAMS ONTO A SINGLE 34 MBPS E3 CONNECTION.

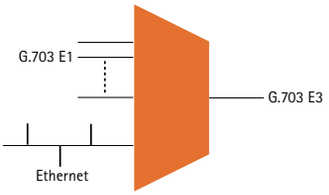
The operation is based on a two-stage concentration mechanism. In a first stage, 4 E1 channels can be concentrated onto an 8 Mbps internal E2 circuit. The second stage concentrates 4 of these E2 circuits onto a 34 Mbps E3 circuit. Each E2 circuit can accept either a quad E1 module or a 10/100Base-T module with integrated bridge or router functionality operating at 8 Mbps. This modular design allows to scale the number of E1 input circuits with the needs of the end-user, and allows the combination of the E1 data with Ethernet based traffic.

The equipment comes as a card for mounting into the CN4 range of card-nests. Depending on the selected card-nest, a rack-mount or desktop solution can be created. The card has an on-board SNMP agent, and supports directly TELNET, PING and TFTP through an integrated 10Base-T connection.

The unit can also be configured through the free Telindus Maintenance Application (TMA), which also gives comprehensive and visual information on the status and statistics of the Crocus E3 MUX.

One of the important applications is situated in the concentration of 2 Mbps based services.

V MULTIPLEXING E1 CIRCUITS AND ETHERNET INTO E3



For this purpose, the Crocus E3 MUX can be combined with the cross-connect and different high-speed modem cards in the Crocus range.

The global access solution is presented as a compact single shelf solution with integrated network management facilities.

FEATURES & BENEFITS

- > E3 MULTIPLEXER WITH UP TO 16 E1 INPUT CIRCUITS
- > INTEGRATES SEAMLESSLY IN CN4 PRODUCT RANGE
- > INCLUDES FREE MAINTENANCE SOFTWARE
- > ETHERNET PORT FOR DIRECT SNMP AND TELNET SUPPORT

INPUT MODULES

Number of input Modules: 4
- > Types of input Modules (field exchangeable)
  - Quad E:
    - > 4x G.703 E1 circuits
    - > Nominal line data rate 2048 kbps
    - > Line code HDB3
    - > Line connection 120 ohm balanced RJ45 connector DTE
  - Router:
    - > 10/100Base-T module with integrated router
    - > IEEE 802.3 and 802.3u compatible

MULTIPLEXING CHARACTERISTICS

- > E1 characteristics: ITU-T G.703, G.704, I.431,CRC-4 insertion
- > E3 characteristics: ITU-T G.703, 75 ohm BNC connector
- > E1 to E2 internal multiplexing: ITU-T G.742
- > E2 to E3 multiplexing: ITU-T G.751
- > Global jitter performance: ITU-T G.823

STATION CLOCK INTERFACE (ON CARD NEST CN4)

- > Nominal rate: 2048 kbps
- > Line code: HDB3
- > Line connection: 120 ohm balanced RJ45 connector

MANAGEMENT INTERFACES

- > Synchronous High speed bus CN4 card nest backplane connection for use with Orchid 1003 LAN controller card
- > Console port 9600 bps, asynchronous, 8N1, SubD 9-pin ATWIN, TMA, CLI, TML
- > Local RJ45 – Ethernet connector
  - > Compliant with IEEE 802.3 10Mbps HDX Ethernet
- > Direct connection of TMA, TMA for HP OpenView, Telnet, SNMP, TFP, TMA CLI
- > Alarm contacts - Major, minor (See CN4)
- > Password protected

E3 CLOCKING SCHEMES

- > Internal clock: free running
- > Station clock: from CN4 chassis
- > Slave/Receive: recovered from E3 receive data
- > A fallback mechanism to internal clock will occur in case the configured clock is not present.

FRONT PANEL INDICATORS

- > PWR: Power
- > LNK: LAN link condition
- > For each E2 input slot and E3 output:
  - > TST: Test indicator
  - > ERR: Error condition
  - > LOS/LOF: Loss Of Signal/Loss Of Frame-alignment

TESTS

- > External loop-back (Loop3) for each individual E1 line
- > Internal loop-back (Loop4) for each individual E1 line
- > External loop-back (Loop3) for E3 line
- > Internal loop-back (Loop4) for E3 line

MECHANICAL DATA (H X W X D)

- > 50 x 335 x 262 mm

POWER

- > 48Vdc or 230Vac, 10W max

SALES CODES
- > 171293 Crocus E3 Mux CV BU

SALES CODES: INTERFACES
- > 163369 4E1 intf. crocus
- > 177455 Router intf 10M crocus

CROCUS INVERSE MULTIPLEXER

FEATURES & BENEFITS

- > CONNECTS UP TO 8 MBPS SERIAL DATA OVER SEVERAL E1 LINKS
- > AUTOMATIC SPEED ADAPTATION IN CASE OF E1 LINK LOSS
- > ADVANCED FREE MAINTENANCE SOFTWARE
- > MANAGEABLE UNDER HP OPENVIEW®
- > MODULAR PLUG-IN DATA INTERFACES FOR MAXIMUM FLEXIBILITY AND EFFICIENT STOCK MANAGEMENT

> THE CROCUS INVERSE MULTIPLEXER PROVIDES TRANSPARENT TRANSMISSION OF SYNCHRONOUS DATA AT SPEEDS UP TO 7808 KBPS ON A SERIAL OR 10/100BASE-T INTERFACE USING MULTIPLE 2 MBPS E1 LINES.

INVERSE MULTIPLEXING
- > Number of E1 links: up to 4
- > Maximum delay variance between links: 64 msec
- > Throughput delay: 50 µsec + variance between links
- > Framing overhead: 1.6 %
- > Net user-speed per E1 link: 1952 kbps
- > Performance monitoring per E1 link: end-to-end CRC-4

E1 LINK INTERFACES
- > Applicable standards: ITU-T G.703, G.704, G.732
- > Jitter performance: ITU-T G.823
- > Nominal line data rate: 2048 kbps
- > Line code: HDB3
- > Line connection:
  120 ohm balanced, RJ45 connector
  75 ohm unbalanced, BNC coaxial connectors
- > Performance monitoring: G.703 CRC-4 (configurable)

STATION CLOCK INTERFACE
- > Nominal rate: 2048 kbps
- > Line code: HDB3
- > Line connection:
  120 ohm balanced, RJ45 connector
  75 ohm unbalanced, BNC coaxial connectors

ETHERNET LAN INTERFACE (MANAGEMENT)
- > Compliant with IEEE 802.3 10Mbps HDX Ethernet
- > RJ45 Unshielded Twisted Pair (UTP)

CONSOLE PORT
- > Connector: 9-pins subD female V.24/RS-232
- > Data rate: 9600 bps, asynchronous, 8N1

CLOCKING SCHEMES
- > External transmit clock (station clock)
- > Transmit clock slaved on E1 receive clock with possibility for automatic E1 channel source selection
- > Internal transmit clock

HIGH-SPEED DATA INTERFACE
Clocking Speed
- > 1952, 3904, 5856, 7808 kbps, following the number of E1 links used
- > Automatic fallback to next lower rate in case of E1 link failure

Serial interfaces available:
- > V.35
- > V.36/RS-449
- > X.21
- > RS-530/RS-530A
- > Ethernet Router 10M

FRONT PANEL INDICATORS
- > General: PWR: Power
  TST: Test indicator
- > Ethernet: LNK: Link Integrity
  COL: Data Collision
  TXD: Transmit Data
  RXD: Receive Data
- > For each E1: LOS: Loss Of Signal
  LOF: Loss Of Frame synchronisation
  AIS: Alarm Indication Signal
  ERR: CRC-4 performance problem
- > DTE: TXD: Transmit Data (circuit 103)
  RXD: Receive Data (circuit 104)

TESTS
- > Local analogue loop-back (Loop3) for each individual E1 line
- > Local line loop-back (Loop4) for each individual E1 line
- > Local digital loop-back (Loop2) for high-speed user interface
- > Remote digital loop-back (remote Loop2) for high-speed user interface
- > Integrated BER testing conform ITU-T O.151 (2^{15}-1 pattern)

MECHANICAL DATA (H X W X D)
- > Desktop version: 50 x 430 x 270 mm weight: 4.3 kg
- > Rack-mount version: 43 x 482 x 270 mm weight: 4.6 kg

POWER REQUIREMENTS
- > Power voltage: 90-264 Vac, 47-63 Hz
  36-72Vdc Vdc
- > Maximum power consumption: 25 W

SALES CODES
- > 153862 Crocus 4E1 inv mux BU 115/230Vac
- > 153863 Crocus 4E1 inv mux BU 48Vac
- > 150322 RMK 01003/Crocus 4E1 inv mux (19" rackmount kit)

SALES CODES: INTERFACES
All transparent data interface modules are found in the sales codes quick reference section

Based on an efficient bonding mechanism for multiple E1 lines, the equipment enables one to cross the 2 Mbps barrier without having to adapt the installed user applications. These E1 lines may have a difference in throughput delay as high as 64 msec, so different routings of the constituent E1 lines can be used. In addition, an automatic fallback/step-up mechanism permits the user to add or suppress E1 lines and so to adapt dynamically the user speed in multiples of 1952 kbps.

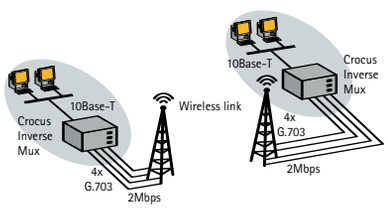
A complete range of plug-in interface boards makes the Crocus Inverse Multiplexer ideal for interfacing with almost any high-speed application. Not only traditional interfaces such as V.35, V.36, X.21 or RS-530, but also direct 10/100Base-T connections with integrated bridge or router functionality are available.

Typical 2 Mbps transport infrastructures on which this equipment can realise a cost-effective high-speed connection include HDSL (High-speed Digital Subscriber Lines), wireless 2 Mbps point-to-point and SDH (Synchronous Digital Hierarchy).

The example shows how the Crocus Inverse Multiplexer, equipped with an Ethernet interface, is used in combination with 2 Mbps wireless links to offer a high-speed (7808 kbps) LAN-to-LAN connection. This system offers a very attractive alternative to the use of routers equipped with multiple G.703/E1 ports, since the solution with a multi-port router is expensive and can be subject to poor performance because of issues related to load-balancing.

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.

V TYPICAL APPLICATION: HIGH SPEED LAN-TO-LAN CONNECTION USING 2 MBPS BASED WIRELESS LINKS



ISDN multiplexers

THE ISDN MULTIPLEXING SERIES OF TELINDUS OFFERS THE POSSIBILITY TO OFFER FLEXIBLE INTEGRATED ISDN AND DATA SERVICES.

The equipment can combine ISDN primary rate, ISDN basic rate, Nx64 kbps and IP connectivity in a single access device.

For optimised bandwidth usage towards the backbone, the units can combine full ISDN switching (Q.931) with a digital cross connect functionality on the same link.

ID-MUX ISDN MULTIPLEXER

FEATURES & BENEFITS

- > SMART ISDN AND TDM ACCESS MULTIPLEXER
- > PRIMARY AND BASIC RATE ISDN INTERFACES
- > OPTIONAL NX64K SERIAL DATA INTERFACES
- > ON-BOARD ETHERNET INTERFACE WITH INTEGRATED IP ROUTER
- > LEAST COST ISDN SWITCHING

> THE TELINDUS ID-MUX IS A COMBINATION OF A SMART ISDN ACCESS SWITCH AND A TIME DIVISION MULTIPLEXER.

It offers the possibility to deliver cost-effectively a combination of services based on ISDN (basic rate or primary rate), Nx64k serial data and IP Ethernet traffic.

The basic unit comes with 8 basic rate ISDN interfaces (BRI), 2 primary rate ISDN interfaces (PRI) and one Ethernet interface. Optionally a second board can be added to include 4 additional Nx64k serial data interfaces.

The unit is fully compliant to the Euro-ISDN standard (Q.931) and features full ISDN switching between all the ISDN ports on the unit. It also includes the possibility to perform least cost switching, number alteration (e.g. prefix dialling) and ISDN BRI to PRI aggregation.

Each of the 2 Mbps G.703 interfaces can be defined as a PRI, a channelised E1 (G.704) or a combination of both (FPRI+FE1). This allows carrying on the same link ISDN traffic together with user data from the Nx64k serial or IP Ethernet interfaces.

Typical applications include the conversion between PRI and BRI, least cost ISDN switching or prefix dialling when connecting to a new license operator (NLO) and the delivery of combined ISDN and data services over the same 2 Mbps connection.

G.703 INTERFACES

- > Number of interfaces: 2
- > Connector: RJ45, DTE
- > Maximum line attenuation: 40 dB at 1 MHz
- > Maximum distance: 1.5 km
- > Interface type: G.703/G.704
- > Operation Modes:
  - > ISDN TE or NT, conform CTR4, I431, Q.921, Q.931, ETS 300 125 (LAP-D) and ETS 300 102-1 (ISDN Layer 3 Call Control)
  - > Channelised E1
  - > Combined FE1/FPRI

BRI INTERFACES

- > Number of interfaces: 8
- > Connector: RJ45, DTE
- > Operation Modes:
  - > ISDN TE or NT S Interface, conform CTR3, I430, Q.921, Q.931, ETS 300 125 (LAP-D) and ETS 300 102-1 (ISDN Layer 3 Call Control)

CONSOLE INTERFACE

- > Connector: RJ45
- > Operation: V.24/V.28
- > Speeds: 9600 8N1

ETHERNET INTERFACE

- > Connector: RJ45
- > Operation: 10Base-T Ethernet

SERIAL PORT EXTENSION BOARD (OPTIONAL)

- > Number of interfaces: 4
- > User speed: Nx64k (N=1..31)
- > Connector: High Density DCE (optional adapter cables for V.35, V.36, X.21)
- > Test loops: Digital Loop, Local Loop

ISDN STATISTICS

- > Line performance according to Q.821
- > CRC-4 errors per line
- > Charges per line
- > Line occupation
- > Call routing information

ISDN CALL ROUTING FUNCTIONALITY

- > Called Dial Number (CDN) based routing
- > Connection Identification Profile (CIP) based routing
- > Flexible redialling
- > Alternative routing in case of call-setup failure
- > Calling Line Identification (CLI) and replacement
- > Advice Of Charge (AOC) insertion
- > Standard hardware fail-safe relay for connecting BR or PR circuit upon power fail

EMBEDDED IP ROUTER FUNCTIONALITY

- > Routing Modes:
  - > ISDN dial on demand routing
  - > FE1 leased line routing
  - > FE1 leased line routing with ISDN backup
- > WAN speeds:
  - > ISDN dialup routing: 64 kbps
  - > FE1 leased line routing: Nx64 kbps up to 256 kbps (128 kbps sustained performance)
- > PPP encapsulation compliant RFC 1661,1662
- > Calling Line Identification (CLI) for dial-in connection
- > PAP access security
- > Port Address Translation (PAT)
- > Static routing with up to 10 static routes

MAINTENANCE AND MANAGEMENT

- > Tracing with configurable trace level
- > Built-in SNMP agent for alarm management with call-home feature
- > Integrated HTTP Web server interface
- > Support of TELNET
- > Access to management via LAN port, permanent leased line or via ISDN call.

FRONT PANEL

- > Heart Beat: Overall system operation
- > ALM: configuration error
- > LAN: LAN traffic monitoring
- > BR (1..8): activation of BR interfaces
- > PR (1..2): status of PR Interfaces

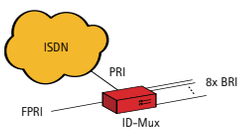
MECHANICAL DATA (H X W X D)

- > Dimensions: 64 x 268 x 260 mm - Weight: 2.5 kg
- > Free extension slot

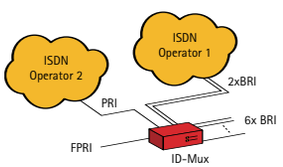
POWER REQUIREMENTS

- > External AC/DC power adapter (90..264 VAC, 50/60 Hz) included
- > Optional DC/DC power adapter (48 VDC)
- > Maximum power consumption: 15 Watts

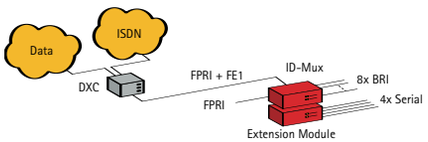
TYPICAL APPLICATION: SPLITTING A PRI IN A FRACTIONAL PRI (FPRI) AND DIFFERENT BRI'S



TYPICAL APPLICATION: LEAST COST SWITCHING BETWEEN DIFFERENT PROVIDERS



TYPICAL APPLICATION: DELIVERING COMBINED ISDN AND DATA SERVICES



SALES CODES

- > 180034 ID-MUX desktop unit with free extension slot
- > 180038 Extension module with 4 generic serial interfaces
- > 180046 V.35 adapter cable for extension module
- > 180047 V.36 adapter cable for extension module
- > 180048 X.21 adapter cable for extension module

PRI-MUX ISDN MULTIPLEXER

> THE TELINDUS PRI-MUX IS A COMBINATION OF A SMART ISDN ACCESS SWITCH AND A TIME DIVISION MULTIPLEXER.

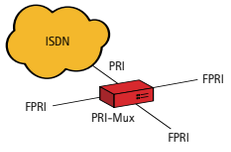
It offers the possibility to deliver cost-effectively a combination of services based on Primary Rate ISDN (PRI), Nx64k serial data and IP Ethernet traffic.

The basic unit comes with 4 primary rate ISDN interfaces and one Ethernet interface. Optionally a second board can be added to include 4 additional Nx64k serial data interfaces.

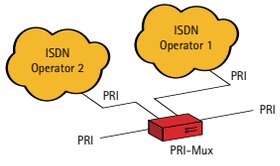
The unit is fully compliant to the Euro-ISDN standard (Q.931) and features full ISDN switching between all the ISDN ports on the unit. It also includes the possibility to perform least cost switching, number alteration (e.g. prefix dialling) and FPR (Fractional Primary Rate) to PRI aggregation.

The G.703 interfaces towards the backbone can be operated as a PRI, as a channelised E1 (G.704) or as a combination of both (FPRI+FE1).

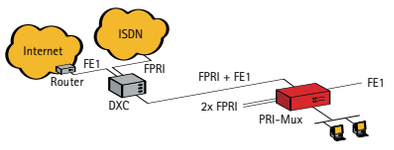
V TYPICAL APPLICATION: SHARING A PRI BETWEEN DIFFERENT USERS



V TYPICAL APPLICATION: LEAST COST SWITCHING BETWEEN DIFFERENT PROVIDERS



V TYPICAL APPLICATION: DELIVERING COMBINED ISDN, FE1 AND IP SERVICES



This allows using a single E1 link to offer simultaneously services based on ISDN, Nx64k serial data and IP Ethernet traffic.

Typical applications include sharing a PRI between different users, least cost ISDN switching or prefix dialling when connecting to a new license operator (NLO), and the delivery of combined ISDN and data services over the same 2 Mbps connection.

FEATURES & BENEFITS

- > SMART ISDN AND TDM ACCESS MULTIPLEXER
- > FOUR PRIMARY RATE ISDN INTERFACES
- > OPTIONAL NX64K SERIAL DATA INTERFACES
- > ON-BOARD ETHERNET INTERFACE WITH INTEGRATED IP ROUTER
- > SHARING OF ISDN BETWEEN DIFFERENT USERS
- > LEAST COST ISDN SWITCHING

G.703 INTERFACES
- > Number of interfaces: 4
- > Connector: RJ45, DTE
- > Maximum line attenuation: 40 dB at 1 MHz
- > Maximum distance: 1.5 km
- > Interface type: G.703/G.704
- > Operation Modes:
  - > ISDN TE or NT, conform CTR4, I431, Q.921, Q.931, ETS 300 125 (LAP-D) and ETS 300 102-1 (ISDN Layer 3 Call Control)
  - > Channelised E1
  - > Combined FE1/FPRI

CONSOLE INTERFACE
- > Connector: RJ45
- > Operation: V.24/V.28
- > Speeds: 9600 8N1

ETHERNET INTERFACE
- > Connector: RJ45
- > Operation: IEEE 802.3 (10Base-T Ethernet)

SERIAL PORT EXTENSION BOARD (OPTIONAL)
- > Number of interfaces: 4
- > User speed: Nx64k (N=1..31)
- > Connector: High Density DCE (optional adapter cables for V.35, V.36, X.21)
- > Test loops: Digital Loop, Local Loop

FAIL-SAFE RELAY EXTENSION BOARD (OPTIONAL)
- > Number of interfaces: 2x4
- > Connector: RJ45

The board allows the automatic interconnection of two pairs of G.703 circuits in case of power fail

ISDN CALL ROUTING FUNCTIONALITY
- > Called Dial Number (CDN) based routing
- > Connection Identification Profile (CIP) based routing
- > Flexible redialling
- > Alternative routing in case of call-setup failure
- > Calling Line Identification (CLI) and replacement
- > Advice Of Charge (AOC) insertion

ISDN STATISTICS
- > Line performance according to Q.821
- > CRC-4 errors per line
- > Charges per line
- > Line occupation
- > Call routing information

EMBEDDED IP ROUTER FUNCTIONALITY
- > Routing Modes:
  - > ISDN dial on demand routing
  - > FE1 leased line routing
  - > FE1 leased line routing with ISDN backup
- > WAN speeds:
  - > ISDN dialup routing: 64 kbps
  - > FE1 leased line routing: Nx64 kbps up to 256 kbps (128 kbps sustained performance)
- > PPP encapsulation compliant RFC 1661,1662
- > Calling Line Identification (CLI) for dial-in connection
- > PAP access security
- > Port Address Translation (PAT)
- > Static routing with up to 10 static routes

MAINTENANCE AND MANAGEMENT
- > Tracing with configurable trace level
- > Built-in SNMP agent for alarm management with call-home feature
- > Integrated HTTP Web server interface
- > TELNET and local console: command line or menu-driven interface
- > Access to management via LAN port, permanent leased line or via ISDN call.

FRONT PANEL
- > Heart Beat: Overall system operation
- > ALM: configuration error
- > LAN: LAN traffic monitoring
- > PR (1..4): status of PR Interfaces

MECHANICAL DATA (H X W X D)
- > Dimensions: 64 x 268 x 260 mm -
- > Weight 2.5 kg
- > Free extension slot

POWER REQUIREMENTS
- > External AC/DC power adapter (90..264 VAC, 50/60 Hz) included
- > Optional DC/DC power adapter (48 VDC)
- > Maximum power consumption: 15 Watts

SALES CODES

>	180032	PRI-MUX desktop unit with free extension slot
>	180037	Fail-safe relay extension module
>	180038	Extension module with 4 generic serial interfaces
>	180046	V.35 adapter cable for extension module
>	180047	V.36 adapter cable for extension module
>	180048	X.21 adapter cable for extension module

E141 ISDN MULTIPLEXER

FEATURES & BENEFITS

- > SMART ISDN AND TDM ACCESS DEVICE
- > E1 OR FE1 UPLINK TO SERVICE PROVIDER
- > BASIC RATE ISDN (BRI) USER INTERFACES
- > UNIVERSAL NX64K SERIAL USER INTERFACE
- > ONE ETHERNET INTERFACE WITH INTEGRATED IP ROUTER
- > FLEXIBLE ISDN SWITCHING

> THE TELINDUS E141 IS A COMBINATION OF A SMART ISDN ACCESS SWITCH AND A TIME DIVISION MULTIPLEXER.

It offers end-user connectivity for Basic Rate ISDN (BRI), Nx64k serial data and IP Ethernet traffic. All those services can be delivered over a single E1 connection.

The standard unit comes with one 2 Mbps G.703 interface, 4 BRI interfaces, one universal serial Nx64k interface and one Ethernet interface.

The unit is fully compliant to the Euro-ISDN standard (Q.931) and features full ISDN switching between all the ISDN ports on the unit. It includes the possibility for BRI to PRI (Primary Rate ISDN) aggregation and ISDN number alteration (e.g. prefix dialling). The G.703 interface towards the backbone can be operated as a PRI, a channelised E1 (G.704) or a combination of both (FPRI+FE1). This allows using a single E1 link to offer simultaneously services based on ISDN, Nx64k serial and IP Ethernet traffic.

Typical applications include the delivery of combined ISDN and data services over the same 2 Mbps connection, and point-to-point multiservice connections.

G.703 INTERFACES

- > Connector: RJ45, DTE
- > Interface type: G.703/G.704
- > Maximum line attenuation: 40 dB at 1 MHz
- > Maximum distance: 1.5 km
- > Operation Modes:
  - > ISDN TE or NT, conform CTR4, I431, Q.921, Q.931, ETS 300 125 (LAP-D) and ETS 300 102-1 (ISDN Layer 3 Call Control)
  - > Channelised E1
  - > Combined FE1/FPRI

BRI INTERFACES

- > Number of interfaces: 4
- > Connector: RJ45, DTE
- > Operation Modes:
  - > ISDN TE or NT S Interface, conform CTR3, I430, Q.921, Q.931, ETS 300 125 (LAP-D) and ETS 300 102-1 (ISDN Layer 3 Call Control)

SERIAL NX64K PORT

- > User speed: Nx64k (N=1..31)
- > Connector: ISO 2110 (DB25 female), DCE
- > Operation: RS-530 (optional adapter cables for V.35, V.36, X.21)
- > Test loops: Digital Loop, Local Loop

CONSOLE INTERFACE

- > Connector: EIA/TIA 574 (DB9 female), DCE
- > Operation: V.24/V.28
- > Speeds: 9600 8N1

ETHERNET INTERFACE

- > Connector: RJ45
- > Operation: 10Base-T Ethernet

ISDN STATISTICS

- > Line performance according to Q.821
- > CRC-4 errors per line
- > Line occupation
- > Call routing information

ISDN CALL ROUTING FUNCTIONALITY

- > Called Dial Number (CDN) based routing
- > Connection Identification Profile (CIP) based routing
- > Flexible redialling
- > Alternative routing in case of call-setup failure
- > Calling Line Identification (CLI) and replacement

EMBEDDED IP ROUTER FUNCTIONALITY

- > Routing Modes:
  - > ISDN dial on demand routing
  - > FE1 leased line routing
  - > FE1 leased line routing with ISDN backup
- > WAN speeds:
  - > ISDN dial on demand routing: 64 kbps
  - > FE1 leased line routing: Nx64 kbps up to 512 kbps
- > PPP encapsulation compliant RFC 1661,1662
- > Calling Line Identification (CLI) for dial-in connection
- > PAP access security
- > Port Address Translation (PAT)) with port forwarding
- > Static routing with up to 10 static routes

MAINTENANCE AND MANAGEMENT

- > Tracing with configurable trace level
- > Built-in SNMP agent for alarm management with call-home feature
- > Integrated HTTP Web server interface
- > TELNET and local console: command line or menu-driven interface
- > Access to management via LAN port, permanent leased line or via ISDN call.

FRONT PANEL

- > Heart Beat: Overall system operation
- > LAN: LAN traffic monitoring
- > BR (1..4): activation of BR interfaces
- > E1N: status of E1 interface
- > PORT: status of Nx64k serial port interface

MECHANICAL DATA (H X W X D)

- > Dimensions: 43 x 268 x 260 mm
- > Weight: 2 kg (without power adapter)

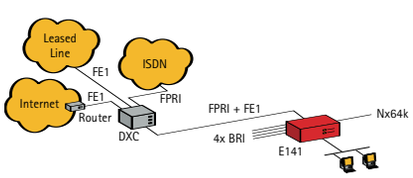
POWER REQUIREMENTS

- > External AC/DC power adapter (90..264 VAC, 50/60 Hz) included
- > Optional DC/DC power adapter (48 VDC)
- > Maximum power consumption: 6 Watts

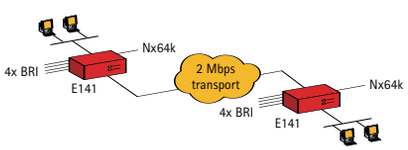
SALES CODES

- > 180039 Telindus E141 desktop unit 115/230 Vac
- > 180066 V.35 adapter cable for Nx64k serial port
- > 180065 V.36 adapter cable for Nx64k serial port
- > 180064 X.21 adapter cable for Nx64k serial port

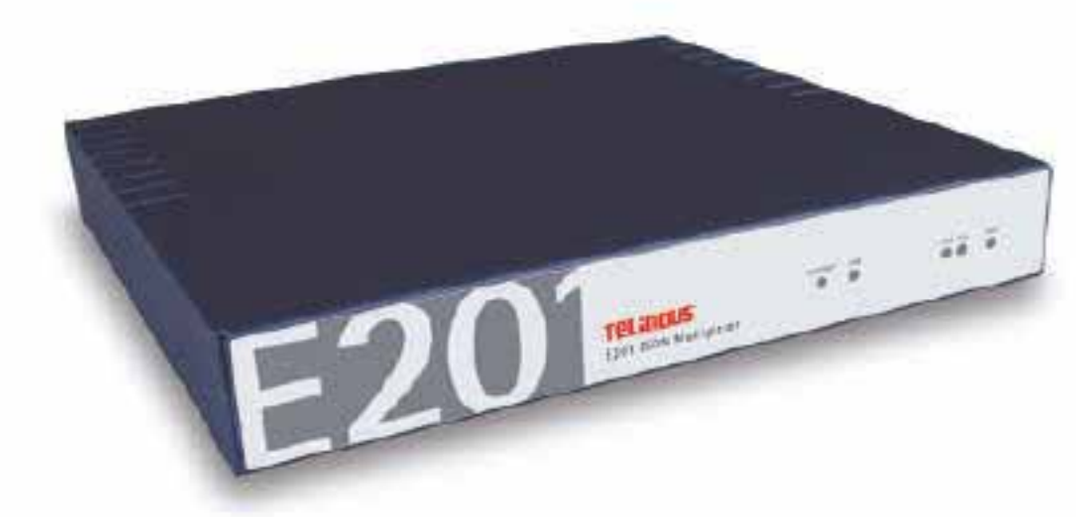
TYPICAL APPLICATION: DELIVERING COMBINED ISDN, NX64 KBPS AND IP SERVICES



TYPICAL APPLICATION: POINT-TO-POINT MULTISERVICE CONNECTIVITY



E201 ISDN MULTIPLEXER



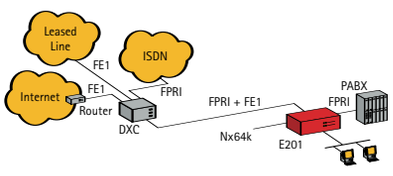
> THE TELINDUS E201 IS A COMBINATION OF A SMART ISDN ACCESS SWITCH AND A TIME DIVISION MULTIPLEXER. IT OFFERS END-USER CONNECTIVITY FOR PRIMARY RATE ISDN (PRI), NX64K SERIAL DATA AND IP ETHERNET TRAFFIC.

All those services can be delivered over a single E1 connection. The standard unit comes with two 2 Mbps G.703 interfaces, one universal serial Nx64k interface and one Ethernet interface.

The unit is fully compliant to the Euro-ISDN standard (Q.931) and features full ISDN switching between the two G.703 interfaces on the unit. It includes the possibility for call filtering and ISDN number alteration (e.g. prefix dialling). The G.703 interface towards the backbone can be operated as a PRI, a channelised E1 (G.704) or a combination of both (FPR+FE1). This allows using a single E1 link to offer simultaneously services based on ISDN, Nx64k serial and IP Ethernet traffic.

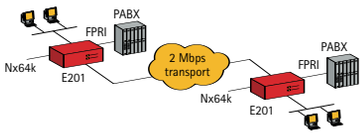
Typical applications include the delivery of combined ISDN and data services over the same 2 Mbps connection, and point-to-point multiservice connections.

V TYPICAL APPLICATION: DELIVERING COMBINED PRI, NX64 KBPS AND IP SERVICES



Typical applications include the delivery of combined ISDN and data services over the same 2 Mbps connection, and point-to-point multiservice connections.

V TYPICAL APPLICATION: POINT-TO-POINT MULTISERVICE CONNECTIVITY



FEATURES & BENEFITS

- > SMART ISDN AND TDM ACCESS DEVICE
- > ONE E1 OR FE1 UPLINK TO SERVICE PROVIDER
- > ONE PRIMARY RATE ISDN (PRI) OR E1 USER INTERFACE
- > ONE UNIVERSAL NX64K SERIAL USER INTERFACE
- > ONE ETHERNET INTERFACE WITH INTEGRATED IP ROUTER
- > FLEXIBLE ISDN SWITCHING

G.703 INTERFACES
- > Number of interfaces: 2
- > Connector: RJ45, DTE and DCE
- > Interface type: G.703/G.704
- > Maximum line attenuation: 40 dB at 1 MHz
- > Maximum distance: 1.5 km
- > Operation Modes:
  - > ISDN TE or NT, conform CTR4, I431, Q.921, Q.931, ETS 300 125 (LAP-D) and ETS 300 102-1 (ISDN Layer 3 Call Control)
  - > Channelised E1
  - > Combined FE1/FPRI

SERIAL NX64K PORT
- > User speed: Nx64k (N=1..31)
- > Connector: ISO 2110 (DB25 female), DCE
- > Operation: RS-530 (optional adapter cables for V.35, V.36, X.21)
- > Test loops: Digital Loop, Local Loop

CONSOLE INTERFACE
- > Connector: EIA/TIA 574 (DB9 female), DCE
- > Operation: V.24/V.28
- > Speeds: 9600 8N1

ETHERNET INTERFACE
- > Connector: RJ45
- > Operation: 10Base-T Ethernet

ISDN STATISTICS
- > Line performance according to Q.821
- > CRC-4 errors per line
- > Line occupation
- > Call routing information

ISDN CALL ROUTING FUNCTIONALITY
- > Called Dial Number (CDN) based routing
- > Connection Identification Profile (CIP) based routing
- > Flexible redialling
- > Alternative routing in case of call-setup failure
- > Calling Line Identification (CLI) and replacement

EMBEDDED IP ROUTER FUNCTIONALITY
- > Routing Modes:
  - > ISDN dial on demand routing
  - > FE1 leased line routing
  - > FE1 leased line routing with ISDN backup
- > WAN speeds:
  - > ISDN dial on demand routing: 64 kbps
  - > FE1 leased line routing: Nx64 kbps up to 512 kbps
- > PPP encapsulation compliant RFC 1661,1662
- > Calling Line Identification (CLI) for dial-in connection
- > PAP access security
- > Port Address Translation (PAT)) with port forwarding
- > Static routing with up to 10 static routes

MAINTENANCE AND MANAGEMENT
- > Tracing with configurable trace level
- > Built-in SNMP agent for alarm management with call-home feature
- > Integrated HTTP Web server interface
- > TELNET and local console: command line or menu-driven interface
- > Access to management via LAN port, permanent leased line or via ISDN call.

FRONT PANEL
- > Heart Beat: Overall system operation
- > LAN: LAN traffic monitoring
- > E1U: status of E1 DCE interface
- > E1N: status of E1 DTE interface
- > PORT: status of Nx64k serial port interface

MECHANICAL DATA (H X W X D)
- > Dimensions: 43 x 268 x 260 mm
- > Weight: 2 kg (without power adapter)

POWER REQUIREMENTS
- > External AC/DC power adapter (90..264 VAC, 50/60 Hz) included
- > Optional DC/DC power adapter (48 VDC)
- > Maximum power consumption: 6 Watts

SALES CODES
- > 180040 Telindus E141 desktop unit 115/230 Vac
- > 180066 V.35 adapter cable for Nx64k serial port
- > 180065 V.36 adapter cable for Nx64k serial port
- > 180064 X.21 adapter cable for Nx64k serial port

E800 ISDN MULTIPLEXER

FEATURES & BENEFITS

- > 8 PORTS CROSS-CONNECT AND ISDN SWITCH
- > FOR AGGREGATION OF TDM AND ISDN TRAFFIC
- > DESKTOP OR HIGH-DENSITY RACK-MOUNT VERSION AVAILABLE
- > INTEGRATED MANAGEMENT AGENT
- > ETHERNET INTERFACE WITH INTEGRATED IP ROUTER

> THE TELINDUS E800 COMBINES THE FUNCTIONS OF AN 8-PORT E1 CROSS-CONNECT AND A 8 LINE PRI BASED ISDN SWITCH IN A COMPACT, ROBUST AND MANAGEABLE MODULE.

G.703 INTERFACES

- > Number of interfaces: 8
- > Connector: RJ45, DTE
- > Interface type: G.703/G.704
- > Maximum line attenuation: 40 dB at 1 MHz
- > Maximum distance: 1.5 km
- > Operation Modes:
  - > ISDN TE or NT, conform CTR4, I431, Q.921, Q.931, ETS 300 125 (LAP-D) and ETS 300 102-1 (ISDN Layer 3 Call Control)
  - > Channelised E1
  - > Combined FE1/FPRI

CONSOLE INTERFACE

- > Connector: EIA/TIA 574 (DB9 female), DCE
- > Operation: V.24/V.28
- > Speeds: 9600 8N1

ETHERNET INTERFACE

- > Connector: RJ45
- > Operation: 10Base-T Ethernet

ISDN STATISTICS

- > Line performance according to Q.821
- > CRC-4 errors per line
- > Line occupation
- > Call routing information

ISDN CALL ROUTING FUNCTIONALITY

- > Called Dial Number (CDN) based routing
- > Connection Identification Profile (CIP) based routing
- > Flexible redialling
- > Alternative routing in case of call-setup failure
- > Calling Line Identification (CLI) and replacement

EMBEDDED IP ROUTER FUNCTIONALITY

- > Routing Modes:
  - > ISDN dial on demand routing
  - > FE1 leased line routing
  - > FE1 leased line routing with ISDN backup
- > WAN speeds:
  - > ISDN dial on demand routing: 64 kbps
  - > FE1 leased line routing: Nx64 kbps up to 512 kbps
- > PPP encapsulation compliant RFC 1661,1662
- > Calling Line Identification (CLI) for dial-in connection
- > PAP access security
- > Port Address Translation (PAT)) with port forwarding
- > Static routing with up to 10 static routes

MAINTENANCE AND MANAGEMENT

- > Tracing with configurable trace level
- > Built-in SNMP agent for alarm management with call-home feature
- > Integrated HTTP Web server interface
- > TELNET and local console: command line or menu-driven interface
- > Access to management via LAN port, permanent leased line or via ISDN call.

FRONT PANEL

- > Heart Beat: Overall system operation
- > LAN: LAN traffic monitoring
- > PRI (1..8): status of E1 interface

MECHANICAL DATA (H X W X D)

Desktop unit:
- > Dimensions: 43 x 268 x 260 mm - Weight: 2 kg (without power adapter)

Rack-mount unit:
- > Dimensions: 265 x 26 x 250 mm - Weight: 0.6 kg

Card-nest:
- > Dimensions: 265 x 485 x 280 mm
- > Number of cards: 12 (10 in case of power redundancy)

POWER REQUIREMENTS

Desktop unit:
- > External AC/DC power adapter (90..264 VAC, 50/60 Hz) included
- > Optional DC/DC power adapter (48 VDC)
- > Maximum power consumption: 6 Watt

Rack-mount unit:
- > AC power supply module 90..264 VAC, 50/60 Hz, 200W
- > DC (48Vdc) power supply module on request
- > Possibility for redundant powering (takes up 2 additional slots)

SALES CODES

>	180036	E800 desktop unit 115/230 Vac
>	180035	E800 rack-mount unit
>	180041	Card-nest for 12 (or 10) rack-mount units
>	180042	Power module for card-nest 115/230 Vac 200W

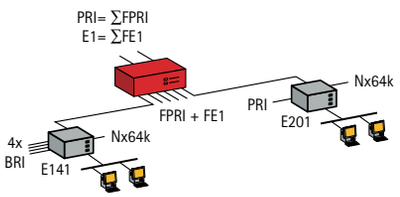
The access units of the Telindus E-series (E141, E201) are designed to deliver bundled services covering ISDN, Internet access and legacy data services. They interface on their uplink on E1 lines that contain FPRI (Fractional Primary Rate ISDN) and FE1 (Fractional E1) circuits. The Telindus E800 can connect to several of those access units and cross-connect the different FE1 data services into a single E1 trunk while bundling the different Fractional PRI lines on 1 single PRI interface. This is also illustrated in the typical application below.

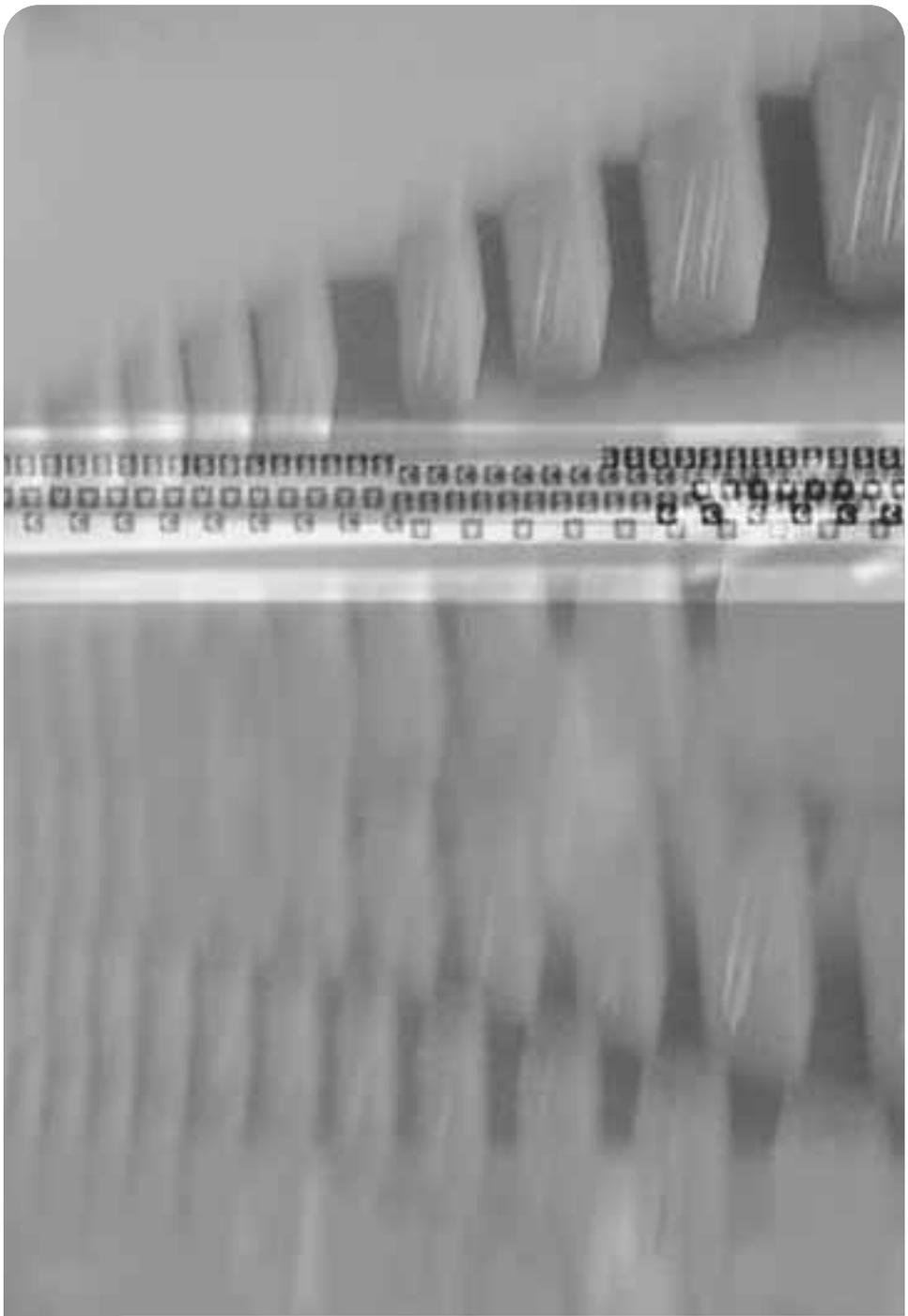
Depending on the density of the connected users, the Telindus E800 can be installed in a Multi Tenant Building (MTB) or in a Point Of Presence (POP) of the network service provider.

When used in a MTB, a distance of up to 1.5 km can be covered between the Telindus E800 and the E-series access units using 2 twisted copper pairs.

When installed in a POP environment, several modules can be installed in a single 19" card-nest.

TYPICAL APPLICATION: SERVICE AGGREGATION FOR MULTIPLE USERS





modular data interfaces

MANY TELINDUS ACCESS EQUIPMENT USE THE CONCEPT OF MODULAR INTERFACES. A COMPLETE RANGE OF PLUG-IN INTERFACE BOARDS MAKES THE EQUIPMENT IDEAL FOR INTERFACING WITH ALMOST EVERY APPLICATION.

Not only traditional serial interfaces like V.35, V.36, RS-530, RS-232 and X.21, but also G.703 (transparent or with G.704 framing), HSSI (High Speed Serial Interface) and direct Ethernet 10/100Base-T connections with integrated professional router functionality are available.

For high-speed devices like the 1060 and 2400 series, interfaces like Multiple E1, E3/T3 and STM1 guarantee fast connections to the backbone.

CROCUS DATA INTERFACES

> MOST OF THESE INTERFACE BOARDS ARE TERMINATED ON FULL SIZE CONNECTORS, ELIMINATING THE NEED FOR COSTLY ADAPTER CABLES. THEY CAN BE EXCHANGED IN ONLY A FEW SECONDS, SO FLEXIBILITY IS MAXIMISED.

For selecting the proper interface when using particular access equipment, please consult the reference section.

CROCUS V.35 INTERFACE

> USER SPEED: up to 10 Mbps
> CONNECTOR: ISO 2593 (female 1,6mm pin), DCE

CROCUS V.36/RS-449 INTERFACE

> USER SPEED: up to 10 Mbps
> CONNECTOR: ISO 4902 (DB37 female), DCE

CROCUS X.21 INTERFACE

> USER SPEED: up to 10 Mbps
> CONNECTOR: ISO 4903 (DB15 female), DCE

CROCUS RS-530/RS-232 INTERFACE

> USER SPEED: up to 10 Mbps (in RS-530/RS-530A mode)
up to 128 kbps (in RS-232 mode)
> CONNECTOR: ISO 2110 (DB25 female), DCE
> FEATURES: hardware strapping for RS-530, RS-530A or RS-232 operation

CROCUS G.703 64KBPS INTERFACE

> USER SPEED: 64 kbps (co-directional)
> CONNECTOR: ISO 4903 (DB15 female), RJ45, DCE

CROCUS G.703 (F)E1 INTERFACE

> USER SPEED: 2 Mbps (co-directional)
> CONNECTOR: BNC or1.6/5.6 (75 ohm)
RJ45 (120 ohm), DCE
> FEATURES: Transparent or fractional operation

CROCUS G.703 E3/T3 INTERFACE

> USER SPEED: 34 or 45 Mbps (co-directional)
> CONNECTOR: BNC or1.6/5.6 (75 ohm)

CROCUS HSSI INTERFACE

> USER SPEED: up to 45 Mbps
> CONNECTOR: HD50 female, DCE

CROCUS DUAL PORT INTERFACE

The Crocus dual port interface offers two interfaces on one single modular board. It houses a G.703/G.704 together with a serial Nx64 kbps interface. The interface can be used In the Crocus SHDSL and allows sharing the available bandwidth between two different applications.

> G.703 CONNECTOR: RJ45 (120 ohm) DCE
> G.703 USER SPEED: (Fractional) E1, depending on available bandwidth

> SERIAL CONNECTOR: DB26 female
> SERIAL USER SPEED: Nx64 kbps, depending on available bandwidth
> SERIAL OPERATION MODE: RS-530, RS-530A, V.35, V.36, X.21

SALES CODES
PLEASE CONSULT THE QUICK REFERENCE GUIDE

CROCUS 2M ROUTER INTERFACE

> THE CROCUS 2M ROUTER INTERFACE INTEGRATES HIGH-SPEED ACCESS TECHNOLOGY AND IP ROUTING IN ONE SINGLE PIECE OF EQUIPMENT. THE ROUTER FITS INTO THE CURRENT GENERATION OF CROCUS ACCESS EQUIPMENT. IT PERMITS AN ETHERNET SEGMENT TO BE CONNECTED DIRECTLY TO THE BASIC UNIT.

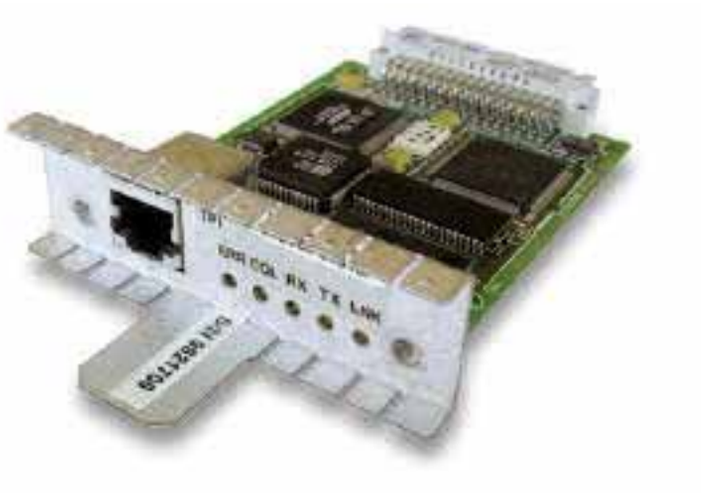
Many vendors use only bridge technology to make LAN-to-LAN connections. This approach is adequate for only a few users. It also has the major drawback of sending the broadcast traffic over the access link, thus reducing the overall performance of the network. In addition, security and reliability issues may require the use of a router instead of a bridge.

The integrated Crocus 2M Router Interface on one side of the link can be combined with an external router on the other side of the link. In this case, the external router will be connected to the Crocus modem by means of a serial interface, like V.35. This combination has the advantage of combining an integrated and cost-effective solution on a remote user site with the power and flexibility of an external router on a central access site.

The router-interface card is available either in a transparent or in an Nx64k version. With the transparent interface card, the complete available modem bandwidth is used by the router interface.

With the Nx64k version, the operator can configure the router-access speed as any multiple of 64 kbps up to the speed available on the line access. After routing of the IP packets, the LAN traffic is encapsulated for transmission over the WAN link. The router supports PPP and Frame-Relay encapsulation.

Features of the Crocus 2M Router Interface include Static IP routing, RIP version 2, filtering of IP packets (basic firewall functionality), Network Address Translation (NAT) and Port Address Translation (PAT). The Crocus Router Interface supports auto-install features over the WAN network for both PPP and Frame-Relay.



The unit is designed for integration into demanding network environments and can be controlled by the complete TMA Maintenance and Management Suite.

FEATURES & BENEFITS

- > IP ROUTER INTERFACE FOR CROCUS ACCESS EQUIPMENT
- > DIRECT 10BASE-T ETHERNET CONNECTIVITY
- > LAN-INTERCONNECT WITH SPEEDS UP TO 2 MBPS
- > MANAGEABLE UNDER HP OPENVIEW®

LAN INTERFACE

- > Compliant with IEEE 802.3 10Mbps HDX Ethernet
- > RJ45 Unshielded Twisted Pair (UTP)

SUPPORTED LAN PROTOCOLS

- > IP
- > Bridging of other protocols

SUPPORTED WAN ENCAPSULATION PROTOCOLS

Frame-Relay (RFC 1490, RFC2427)

- > Maximum number of Frame-Relay DLCI's: 32
- > CIR (Committed Information Rate) configurable per DLCI
- > EIR (Excess Information Rate) configurable per DLCI
- > Support of Inverse ARP over Frame-Relay for automatic gateway configuration
- > Support of LMI
  - > Revision 1 LMI
  - > ANSI T1.617
  - > ITU-T

PPP (RFC1661, RFC1662)

- > Support of Chap authentication with MD5 hashing (RFC 1994)

PERFORMANCE

- > Processing speed: up to 14400 packets/sec
- > Forwarding on WAN link: up to 3000 packets/sec
- > Buffering: up to 7000 packets (64 bytes/packet)

IP ROUTING AND BRIDGING

- > Static routes
- > RIP version 2 with MD5 hashing and authentication (RFC2453)
- > Bridging with spanning tree

ADDITIONAL FEATURES

- > NAT (Network Address Translation) Dynamic or static IP address conversion
- > PAT (Port Address Translation)
- > DHCP server,client, relay agent
- > Numbered/unnumbered WAN Interface

AUTOINSTALL SUPPORT

DLCI number configuration

- > LMI (Frame-Relay only)

IP address configuration

- > BootP client (RFC951)
- > DHCP client & relay agent (RFC2131, RFC2132)
- > IPCP (for PPP only)

Gateway configuration

- > Inverse ARP (for Frame-Relay only)
- > IPCP (for PPP only)

Full configuration

- > Automatic TFTP configuration download (RFC1350)

FIREWALL FUNCTIONS

Access filtering on LAN and WAN interfaces

- > Source IP Address
- > Destination IP Address
- > Source port umber
- > Destination port number
- > IP protocol field

MAINTENANCE AND MANAGEMENT SUPPORT

- > Integration in the TMA management suite

NX64 KBPS FUNCTIONALITY (NX64K MODEL ONLY)

- > Configuration of any multiple of 64 kbps, up to the line speed
- > G.704 compatible framing for direct interfacing on central cross connect systems, SDH backbones, and routers equipped with G.703 interface

FRONT PANELS

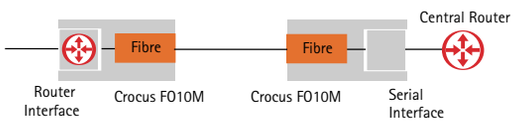
- > LNK: indicates the good Link integrity on the UTP interface
- > TX: indicates the LAN is transmitting data
- > RX: indicates the LAN is receiving data
- > COL: indicates the occurrence of a collision on the LAN
- > ERR: indicates an overrun/underrun in the router functionality

SALES CODES

- > 161613 Router intf Crocus
- > 175257 Router (Nx64k) intf. Crocus

CROCUS 10M ROUTER INTERFACE

v REMOTE NETWORK EXTENSION USING FIBRE-OPTIC MEDIA



FEATURES & BENEFITS

- > LAN INTERFACE FOR THE CROCUS PRODUCT FAMILY
- > LAN INTERCONNECT WITH SPEEDS UP TO 10 MBPS
- > 10/100 AUTO-SENSE ETHERNET INTERFACE
- > IP ROUTING AND BRIDGING
- > CLASS OF SERVICE ROUTING
- > VLAN INTERCONNECT
- > ATM, FRAME RELAY AND PPP WAN ENCAPSULATION
- > BUILT-IN L2TP SECURITY
- > FULLY MANAGEABLE WITH A VARIETY OF TOOLS

LAN INTERFACE
> Compliant with IEEE 802.3 10Mbps Ethernet
> Compliant with IEEE 802.3u 100Mbps Ethernet
> 10/100Mbps auto-sense
> RJ45 Unshielded Twisted Pair (UTP)

FRONT PANEL INDICATIONS
> LAN / ACT: LAN status
> SERIAL / ACT: WAN layer 2 status

SUPPORTED WAN ENCAPSULATION PROTOCOLS
> ATM
> Frame-Relay
> PPP

IP ROUTING AND BRIDGING
> Conform TDRE (Telindus Dynamic Routing Engine)

ROUTING AND BRIDGING PERFORMANCE
> Routing performance: 45.000 pps
> Bridging performance: 36.000 pps
> Minimum supported number of Frame-Relay DLCIs: 40
> Supported number of VPN tunnels: 10
> Supported number of VLANs: 256
> Supported number of bridge-groups: 13

MAINTENANCE AND MANAGEMENT SUPPORT
> Conform TDRE (Telindus Dynamic Routing Engine)

MEMORY
> Flash memory: 8 Mbyte
> RAM: 8 Mbyte

MECHANICAL DATA (H X W X D)
> 25 x 88 x 105 mm Weight: 100 g

SALES CODES
> 177455 Router Intf.10M Crocus

> THE CROCUS ROUTER 10M INTERFACE CAN ADD PROFESSIONAL INTEGRATED ROUTING AND BRIDGING FUNCTIONALITY TO A WIDE RANGE CROCUS PRODUCTS, INCLUDING SHDSL, FIBRE-OPTIC AND MULTIPLEXING EQUIPMENT.

Therefore, by effectively embedding routing and bridging in the transmission or interface conversion unit, the solution can drastically reduce the global investment and operational costs.

The Crocus 10M Router interface is fully supported by the TDRE (Telindus Dynamic Routing Engine) and includes the possibility for encapsulation into Frame-Relay, ATM or PPP.

The unit comes with a direct Ethernet auto-sense 10/100 Base-T connection and supports differentiated services based on VPNs (Virtual Private Networks). For this reason, it integrates features like L2TP (Layer 2 Tunnelling Protocol), 802.1Q (VLAN tagging) and QOS (Quality Of Service) based on Diffserv.

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. The Crocus 10M Router interface supports auto install features over the WAN network. This makes it ideally suited for plug-and-play installation at customer premises while the configuration is prepared at a central site.

CROCUS QUAD E1 INTERFACE

> THE CROCUS QUAD E1 INTERFACE ALLOWS FOR THE SIMULTANEOUS TRANSPORT OF UP TO 4 G.703/E1 CONNECTIONS BY USING THE CROCUS FIBRE MODEMS OR CROCUS E3 MULTIPLEXER.

It is used as an interface in the Crocus FO10M, Crocus FO45M or Crocus E3 Mux.

The interface board fits in both the desktop and the card-versions of the Crocus equipment, allowing for a cost-effective solution for both end-user and central office equipment. Thanks to integrated bit stuffing algorithms, the four available G.703 interfaces on the board allow for the connection of totally independent applications, which do not have to be frequency locked.

Typical applications include:

> the offering of multiple simultaneous E1 services for voice or combined voice/data applications

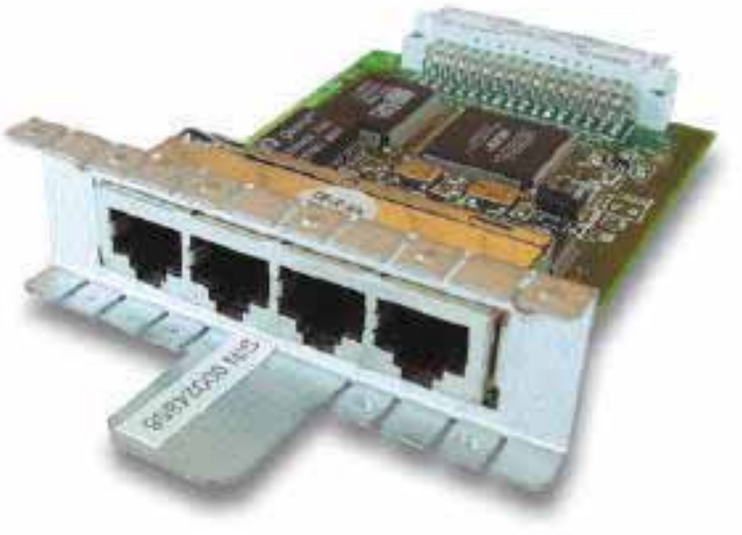
> extensions of multiple 2Mbps access ports on SDH or PDH networks

> street cabinet connections or fibre to the building (FTTB) for hybrid fibre copper connectivity.

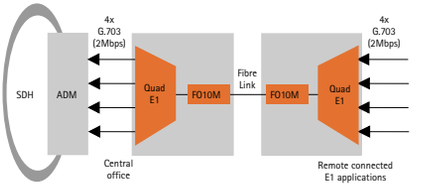
Today, gradually more new access installations include fibre to the building (FTTB). Inside the building, a copper distribution infrastructure may be present. This is indicated in the picture.

The Crocus FO10M fibre modem equipped with the quad E1 interface is ideally suited for delivering the required multiple 2Mbps connectivity to the building.

From that point, access multiplexing and xDSL transmission techniques can be used for further distribution of Nx64k and 2 Mbps services to different subscribers.



V EXTENSIONS OF MULTIPLE 2 MBPS ACCESS PORTS ON SDH NETWORKS



FEATURES & BENEFITS

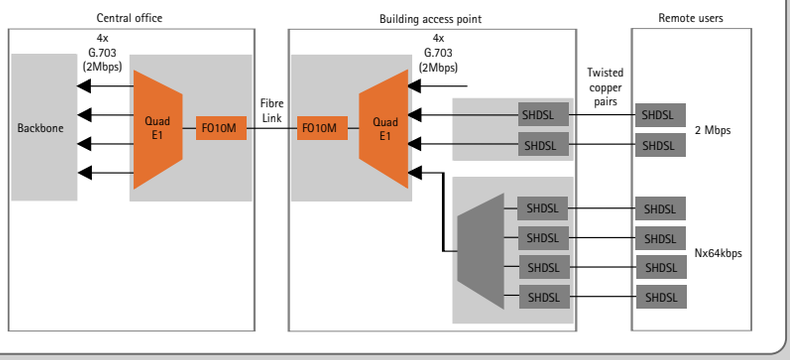
> TRANSPORTS OF MULTIPLE G.703/E1 CONNECTIONS OVER FIBRE MODEM OR E3 MULTIPLEXER

> SEAMLESS INTEGRATION WITH GLOBAL CN4 BASED ACCESS SOLUTION

> INDEPENDENT CLOCKING PER G.703/E1 INTERFACE

This global hybrid fibre copper connectivity (as shown on the picture below) includes the use of xDSL, fibre optic and access multiplexing technologies.
Telindus can offer the complete solution and integrates the different technologies in one physical unit.

V GLOBAL HYBRID FIBRE COPPER ACCESS INFRASTRUCTURE



INTERFACE CHARACTERISTICS

> Interface type: G.703
> Number of interfaces per module: 4
> Nominal user speed per interface: 2048 kbps +- 50 ppm
> Jitter: Conform ITU-T G.823
> Clocking: Originated by the connected application
Independent per interface
> Connector: RJ45
> Impedance: 120 ohm
> Support for unframed and framed G.704 operation
> Support for CRC-4 regeneration

STATUS INDICATIONS (WITH TMA SOFTWARE)

> LOS: Loss Of Signal
> LFA: Loss of Frame Alignment
> AIS: Alarm Indication Signal

SALES CODES
> 163369 Quad E1 intf. Crocus

TELINDUS INTERFACE MODULES

new

FEATURES & BENEFITS

> MODULAR INTERFACES FOR 16XX AND 24XX ROUTER RANGE

> FOR WAN OR LAN CONNECTIONS

MULTIPLE E1 TIM

Connectivity
> Connector: 6x RJ45, DTE
> Electrical: 8x G.703, 120 Ohm

Supported WAN encapsulation protocols
> Frame-Relay & Multilink Frame-Relay* (up to 8 ports)
> PPP & Multilink PPP* (up to 8 ports)
> ATM & ATM IMA (up to 6 ports)

Indications
> Status LED per port

Testloops
> Internal loop-back per interface
> External loop-back per interface

E3/T3 TIM

Connectivity
> Single E3/T3 port
> Connectors: BNC (1.6/5.6 on request)
> Electrical: G.703, 75 Ohm
> Speed: 34 Mbps or 45 Mbps

Supported WAN encapsulation protocols
> Frame-Relay
> PPP
> ATM

Indications
> Status
> Test

Testloops
> Internal loop-back
> External loop-back

DUAL E3/T3 TIM*

Connectivity
> Two independent E3/T3 ports
> Connectors: BNC (1.6/5.6 on request)
> Electrical: G.703, 75 Ohm
> Speed: 34 Mbps or 45 Mbps

Supported WAN encapsulation protocols
> Frame-Relay
> PPP
> ATM

Indications
> Status per port
> Test per port

Testloops
> Internal loop-back per interface
> External loop-back per interface

STM1 TIM*

Onboard UTP
> Connector: RJ45
> Speed: 155 Mbps (STM1)

SFP fibre interface slots
> Number of SFP fibre interface slots:2
> SFF-8472 MSA compliant
> Point-to-point fibre optic backup functionality
> Speed: 155 Mbps (STM1)

Available SFP fibre interface modules
> Dual fibre 850 nm, multimode short haul, typ. 2 km
> Dual fibre 1310nm, single mode medium haul, typ. 40km
> Single fibre 1310-1550nm, single mode medium haul, typ. 15km (on request)

Supported WAN encapsulation protocols
> ATM

Indications
> Status
> Test

Testloops
> Internal loop-back
> External loop-back

ETHERNET SWITCH TIM

LAN interface
> Number of interfaces: 4
> Built-in Ethernet Switch
> Compliant with IEEE 802.3 10Mbps HDX/FDX Ethernet
> Compliant with IEEE 802.3u 100Mbps HDX/FDX Ethernet
> 10/100Mbps auto-sense
> Auto cross-over
> RJ45 Unshielded Twisted Pair (UTP)

Indications
> Status per port

SALES CODES

>	181308	TIM 4P 100BASE TX
>	181309	TIM STM1 BU*
>	181310	TIM E3/T3 BNC
>	187705	TIM 2 E3/T3 BNC
>	181312	TIM 6E1 IMA
>	188295	SFP13 DUAL FIBRE MM-SH*
>	188296	SFP13 DUAL FIBRE SM-MH*

> TELINDUS INTERFACE MODULES (TIM) OFFER HIGH-SPEED WAN OR LAN CONNECTIVITY TO THE TELINDUS 16XX AND 24XX ROUTER FAMILY.

WAN interface modules range from E1 (2 Mbps) up to STM1 (155 Mbps). They provide wire-speed router connectivity for network connections based on PPP, Frame-Relay or ATM.

The E1 module comes with 6 physical G.703 connections, supporting either independent or groomed operation. When operated independently, each port acts as an individual port on the router, running ATM, Frame-Relay or PPP encapsulation. In combined mode, the bandwidth of different ports is aggregated through IMA (Inverse Multiplexing over ATM), multi-link Frame-Relay or multi-link PPP.

The E3/T3 module comes in a single or dual port version. The latter provides an independent second port on the router and can be used for backup purposes. The E3/T3 module supports encapsulation for ATM, Frame-Relay or PPP at 34 or 45 Mbps.

The STM1 module features an on-board UTP connector and two-slots for Small Form-factor Pluggable (SFP) fibre-optic transceivers, where the second fibre transceiver module can provide physical backup for the first one.

The LAN interface module provides 4-port Fast Ethernet connectivity.

* Model available from Q3 2004

network maintenance & management

TELECOMMUNICATION NETWORKS EVOLVE FROM YEAR TO YEAR, AND INCREASINGLY PEOPLE RELY ON THESE NETWORKS FOR CONDUCTING THEIR BUSINESS. AS A RESULT, PERFORMANCE AND RELIABILITY OF THESE INFRASTRUCTURES HAVE BECOME AN ESSENTIAL REQUIREMENT IN TODAY'S WORLD.

IMPROVING EFFICIENCY

Telindus offers a complete range of maintenance and management tools for keeping its access solutions tuned to their optimal performance level.

It includes both interactive and script-based software operating on a multitude of operating systems.

The combination of these complementary systems drastically improves the efficiency of the day-to-day operation of those networks. The concept allows to co-ordinate the work of the field engineer and the operations handled by the network manager.

The field engineer is responsible for installing the access equipment both at the access point and at the customer premises. The field engineer works very closely with the network manager, who is responsible for the supervision of the network.

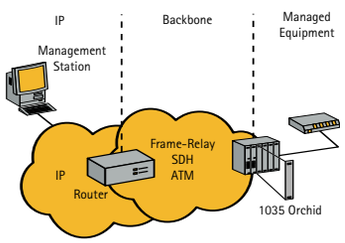
The network manager detects network problems in its earliest stages. However, only the field engineer can solve some of those problems because they require on-site intervention. At this point, when the field engineer can use powerful maintenance tools to verify locally the condition of the access equipment, the co-ordination between the network manager and field engineer can be significantly improved.

FLEXIBLE TRANSPORT OF MANAGEMENT INFORMATION

One of the traditional problems in the network management of access equipment is the multiplicity of backbone networks in service.

This can cause difficulties because the network management information needs to be transported from the access equipment to a central management centre. For practical and economic reasons, it is desirable to use the backbone itself for this transport and not to use a separate overlay network.

V FLEXIBLE TRANSPORT OF MANAGEMENT INFORMATION



Most of the described maintenance and management mechanisms below use IP as the underlying protocol to communicate with the Telindus equipment. Some units (such as the router range) have a direct IP Ethernet port, whilst other units (such as the Aster and Crocus modem ranges) are connected through a controller device (Orchid) which acts as an IP proxy device.

Only centrally installed equipment is connected to the Orchid. An out-band auxiliary channel on the communication-link is used to give management access to remote equipment. Also more complex configurations such as management on extended links are possible.

Telindus access management is different from other systems because it directly supports many protocols for the transport of management information.

This is possible because the Orchid, which acts as an IP proxy, can encapsulate the intrinsic IP information in a multitude of transmission protocols.

The controller device (Orchid) is equipped with a 10/100 Base-T connection for direct IP connectivity or it can encapsulate the IP management traffic directly into Frame-Relay and ATM PVCs or PPP serial links. This permits the transport of the management information over different types of backbone installations without the need for an overlay network.

SNMP

All Telindus equipment (often through the IP proxy controller called Orchid) **supports both the standard SNMP Simple Network Management Protocol) MIB 2 as well as a private MIB.**

It is ideal for performance monitoring based on the polling of different parameters (e.g. noise level, line attenuation). Additionally, it offers an open interface for integrating the management into third-party management platforms.

TELNET

Every field engineer can use a Telnet session (often through the Orchid) to reach any Telindus access device in the network.

This Telnet interface offers an interactive windows-like interface, offering full configuration possibilities for the device, and giving access to status and statistical information. The Telnet interface also provides a command-line interface that allows the same actions in script mode.

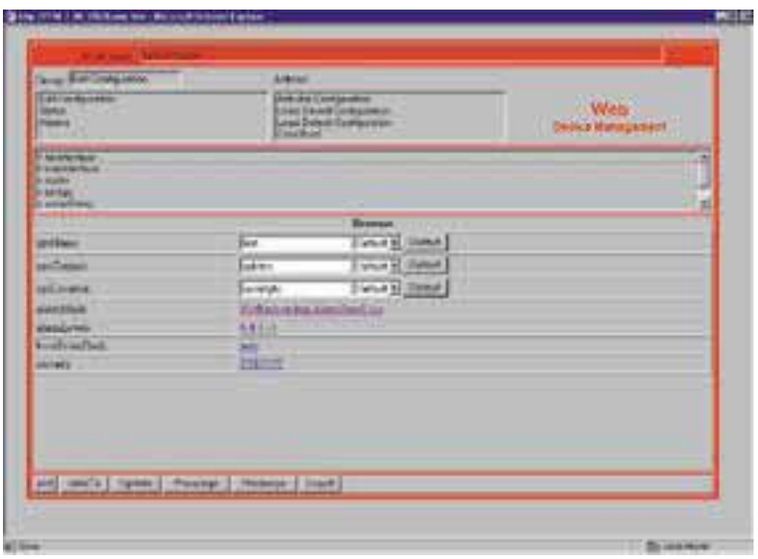
V TELNET INTERFACE

WEB BROWSER INTERFACE

The Orchid and all router products implement a web server protocol stack.

Therefore, it is possible to use a simple web browser client to control any network element. The functionality of the web browser interface is identical to the Telnet interface described before.

V WEB BROWSER INTERFACE



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TELINDUS MAINTENANCE APPLICATION (TMA)

TMA (Telindus Maintenance Application) is a free Windows software for the complete control of locally and remotely installed Telindus access equipment.

The system offers not only configuration functionality, but also includes the creation of configuration profiles stored on the harddisk, a completely interactive picture of the connected device, real-time monitoring, interrogation and export of status and statistics, test-loop facilities, etc.

One possibility to make a maintenance connection to a device is a straight serial cable between the equipment and the PC. It will provide the TMA access to the locally and remotely installed equipment (including also possible extensions of the link).

Other topologies include IP connectivity and the maintenance concentration through a concentration device (Orchid), extending the maintenance access to a large number of network elements from one central location.

TMA SPECIFICATIONS

TMA SYSTEM FUNCTIONALITY

- Password protected access
- Reading and changing configuration of the equipment
- Real time monitoring (e.g. of interface signals or line parameters)
- Retrieving status information (current operation) of the equipment, including the current alarm status
- Retrieving statistical information (e.g. covering a period of 24 hours)
- Diagnostic tests
- Configuration storage and retrieval on harddisk
- Statistics storage and retrieval on harddisk
- Software download to equipment with flash-memory (software upgrades)
- Interactive pictures reflecting the equipment and the status of indicators and push-buttons

MINIMUM SYSTEM REQUIREMENTS

- One serial communication port or Ethernet adapter
- Windows 9x, Windows ME, Windows NT 4.X, Windows 2000, Windows XP

TMA COMMAND LINE INTERFACE

The Command Line Interface (CLI) module offers an open interface module that can be installed on different operating systems (Windows, Sun Solaris).

The module allows the use of a simple ASCII syntax for configuration, initiation of test-loops and retrieval of status or statistical information for all equipment present in the network. It is an ideal base for the development of automated scripts or for the interfacing with custom network management developments.

TMA COMMAND LINE INTERFACE SPECIFICATIONS

MINIMUM SYSTEM REQUIREMENTS

- Solaris 7, Solaris 8
- Windows 9x, Windows ME, Windows NT 4.X, Windows 2000, Windows XP

V TELINDUS MAINTENANCE APPLICATION (TMA) INTERFACE

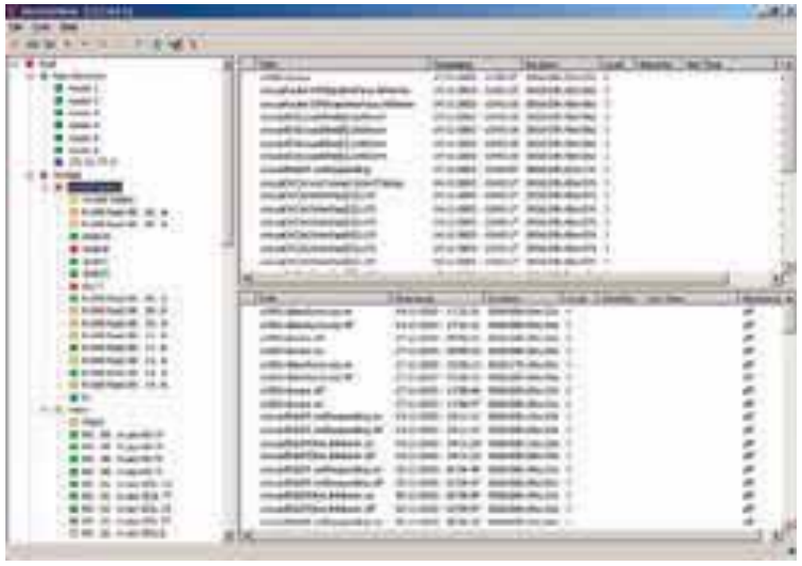
new

TMA ELEMENT MANAGEMENT

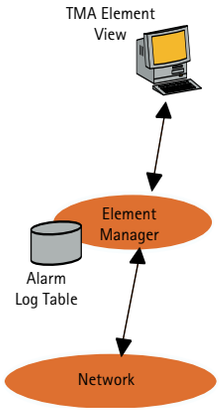
TMA Element Management offers a stand-alone element management solution for Telindus access networks, running on Windows or Unix based platforms.

It is constituted of a background process (Element Manager) and one or more graphical user interfaces, called TMA ElementView. It is ideally suited for the network management of small and medium size networks.

V TMA ELEMENTVIEW INTERFACE



V TMA ELEMENT MANAGEMENT ARCHITECTURE



TMA Element Management offers a complete network management solution, including a logical representation of the network, status and alarm reporting, configuration, and performance monitoring. Clicking the network icon opens the interactive TMA graphical interface to the selected device.

TMA ELEMENT MANAGEMENT SPECIFICATIONS

TMA ELEMENT MANAGEMENT FUNCTIONALITY

- Guaranteed reception of alarm from the network elements by connection oriented sessions
- Alarm status and alarm history
- Alarm re-synchronisation after connection loss
- Alarm history log file in Ascii format
- Alarm visualization by coloured icons
- Alarm acknowledgement
- Start of TMA graphical user session by clicking on the device icon
- Auto-discovery of Orchid proxied devices

MINIMUM SYSTEM REQUIREMENTS

- Sun Solaris 7, Solaris 8
- Windows NT 4.0, Windows 2000, Windows XP

TMA FOR HP OPENVIEW

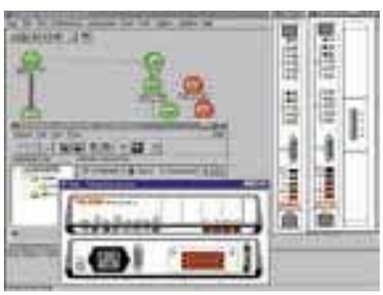
TMA (Telindus Management Application) for HP OpenView is the plug-in module for HP Openview Network Node Manager (NNM) for the support of Telindus access equipment.

The system is designed to support large numbers of Telindus network elements and supports permanent performance monitoring (alarms, status and statistics), network element configuration, and operator initiated actions (such as testing).

All alarms on each individual network element are immediately logged in the HP OpenView event-log, and the icon in the HP OpenView map reflects the resulting status.

For this purpose, TMA for HP OpenView fully supports the HP OpenView alarm levels (warning, minor, major, critical). The status of all network equipment is also easily visualised by an interactive picture (including LED and push-button status), where colour-codes allow for a quick identification of the cause of potential network trouble.

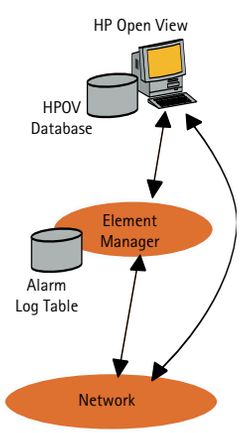
V TMA FOR HP OPENVIEW



A user-friendly menu enables the configuration of any individual network element, and allows distributing the same configuration profile to a multitude of network elements.

TMA for HP OpenView can be installed together with third-party management modules for HP OpenView, making it possible to integrate the management of Telindus access and third-party equipment on the same platform.

V TMA FOR HP OPENVIEW ARCHITECTURE



TMA FOR HP OPENVIEW SPECIFICATIONS

TMA FOR HP OPENVIEW FUNCTIONALITY

- Individual network element configuration
- Configuration distribution
- Interactive picture of every network element
- Alarm notification with user-selectable severity
- Coupling of alarms to the HP OpenView map
- Private MIB for continuous performance monitoring

MINIMUM SYSTEM REQUIREMENTS

- OPERATING SYSTEM
  - Solaris 7, Solaris 8
  - Windows NT 4.X, Windows 2000, Windows XP
- MANAGEMENT PLATFORM
  - HP OpenView Network Node Manager 6.x or 7.0 native GUI)

TMA INVENTORY MANAGEMENT

TMA inventory management is an add-on product to TMA for HP OpenViewor TMA Element Management. It provides a communication interface to a database with inventory information on the Telindus access products in a network.

TMA inventory management automatically builds a database with a number of inventory parameters from each Telindus access device in the network. It retrieves the information automatically from the devices and the Orchid concentrators.

The database includes device information such as the name, the contact person, the location, the description, the unique identification code, the software version(s) and the available interfaces. Additionally the most recent configurations of all devices are stored as well.

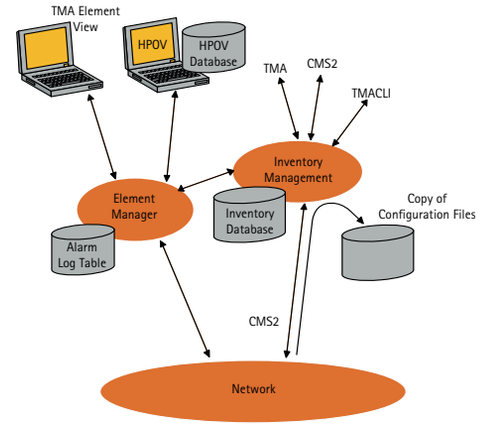
The database information is accessible from an outside application, using the Telindus proprietary CMS2 protocol. This is a CORBA-like protocol, thus making the integration with other network management platforms easier. TMA inventory management includes complete protocol documentation. Once a session with an outside management platform is established, the outside application is automatically triggered of any database changes.

>>>

The database information is also available on the TMA user interface. Any changes can be logged in a file.

Subscription of a maintenance contract for TMA inventory management is required. The maintenance contract includes web-based assistance concerning the operation and the application. The service is provided during office hours Central European Time. It also includes free upgrades for new releases for TMA inventory management.

V TMA INVENTORY MANAGEMENT ARCHITECTURE



TMA INVENTORY SPECIFICATIONS

INVENTORY DATABASE INFORMATION PER TELINDUS DEVICE

- Most recent configuration files (default 3)
- Device selection name: unambiguously unique nam for each device. Based on IP addresses and the name or position for proxied devices.
- sysName: The SNMP sysName value as configured in the device
- sysContact: the SNMP sysContact value as configured in the device
- sysLocation: the SNMP sysLocation value as configured in the device
- sysDescription: the SNMP sysDescription status attribute
- sysObjectID: the SNMP sysObjectID status attribute
- sysServices: the SNMP sysServices status attribute
- Identification: the unique identification code for the device
- Software table. this table contains the software revisions in the device
- Interfaces table: lists all the interfaces. Per interface it contains the following information:
  - name
  - interface reference
  - ifAdminStatus: whether the interface is administratively up or down
  - ifType: SNMP interface type
  - ifSpeed: current interface speed of this interface

MINIMUM SYSTEM REQUIREMENTS

- Sun Solaris 7, Solaris 8
- Windows NT 4.0, Windows 2000, Windows XP
- Installation of TMA for HP OpenView or TMA Element management

TMA PATH MANAGEMENT

With the advent of devices with TDM multiplexing features like Crocus SHDSL Quad, Crocus DXC and Crocus ADM 2P, users can build complete backbone extensions and even points of presence (POPs) with only Telindus access products.

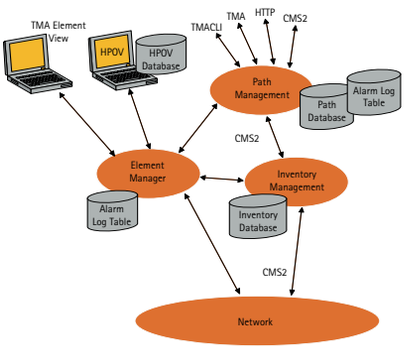
Along with this there is an increasing demand to manage not only all devices as separate entities (element management), but to manage as well the logical TDM connections within such network.

TMA path management is the answer to this. It is a software product for end-to-end management (network management) between different Telindus access devices. TMA path management is an add-on product to TMA inventory management.

Paths are defined by reference to their end points. For an existing path, TMA path management tries to find out the complete path given only the end points. It continuously monitors the path status and keeps related performance information for the last day, the last month and the last year. Changes in the path status are logged and may be forwarded as alarms to other platforms.

TMA path management provides also the possibility to completely provision a path. Provisioning results in the correct configuration of all the equipment along the path.*

V TMA PATH MANAGEMENT ARCHITECTURE



TMA PATH MANAGEMENT SPECIFICATIONS

PATH CONFIGURATION

- Each path has a name (uniquely refers to the path), a description and a section table.
- Each section contains a description (optional), the end points for the section and whether the section is active or passive.
- Each section end point is defined by the device's name in TMA inventory management, the interface name and either the path speed or its E2/E1/Time slot selection.

PATH MONITORING AND ALARMS

- A status table gives the actual path status for all paths. Additionally the status for all individual path constituting links is listed as well, being one of the following:
  - Up: this link is working correctly for this path
  - Passive up: this link is passive and therefore always up
  - Down: this link is down
  - Unknown: no information could be retrieved from this link, i.e. at least one of the link end points is not reachable
  - Not configured: due to a configuration error, this link cannot be up within this path
- Applicable restrictions to automatically find the individual links in a path:
  - Only digital interconnections with G703 2Mbit/s interfaces between different Telindus devices can be automatically detected
- A performance table shows per path the creation date, the total up and down times, the last time the state changed and how many times the path state has changed.
- Performance tables show per path the up and down times and how many times the path state changed for the following most recent periods:
  - 1 day (2 hour intervals)
  - 1 month (1 day intervals)
  - 1 year (1 month intervals)
- Log table with most recent path related alarms.

PATH PROVISIONING*

- Only unused (but available) bandwidth can be used to provision a new path
- Line speed configuration on modem links is not automatically adapted
- Path provisioning logging

USER AND APPLICATION INTERFACES

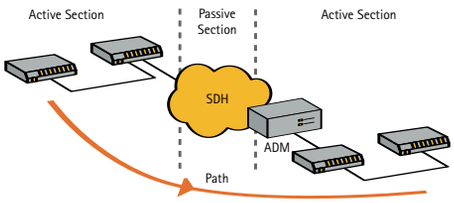
- TMA for configuration (administration level)
- Web interface (operator level). Supports click through to device level*.
- CLI interface

MINIMUM SYSTEM REQUIREMENTS

- Sun Solaris 7, Solaris 8
- Windows NT 4.0, Windows 2000, Windows XP
- Installation of TMA for HP OpenView or TMA Elements Management
- Installation of TMA inventory management

* Not available in the first release

V PATH DEFINITION



TMA path management has 2 different user interfaces. For administration purposes (definition of the paths, configuration) the TMA user interface is available. For operation and maintenance purposes a web interface is available with click-through possibilities to the individual devices.

Subscription of a maintenance contract for TMA path management is required. The maintenance contract includes Web-based assistance related to the operation and the application. It also includes free upgrades for new releases for TMA path management..

* Not available in the first release

SALES CODES

TMA FOR OPENVIEW
- > 156685 TMA_HP/OV SUN SOLARIS Entry Level Ver. (up to 250 devices)
- > 156686 TMA_HP/OV SUN SOLARIS Unlimited Ver.
- > 156689 TMA_HP/OV Windows NT/2000 Entry Level Ver. (up to 250 devices)
- > 156690 TMA_HP/OV Windows NT/2000 Unlimited Ver.
- > 156986 TMA_HP/OV Windows/Solaris Demo Ver. (Max 8 devices)
- > 171269 TMA_HP/OV Entry Level to unlimited upgr.

TMA COMMAND LINE INTERFACE
- > 171267 TMA_CLI Windows, SUN SOLARIS, HP-UX (Command Line Interface)

TMA ELEMENT MANAGEMENT
- > 187387 TMA element management Sun Solaris Entry level (up to 250 devices)
- > 187388 TMA element management Sun Solaris Unlimited
- > 187385 TMA element management Windows Entry level (up to 250 devices)
- > 187386 TMA element management Window Unlimited
- > 156986 Demo version for Windows/Solaris (Max 8 devices)

TMA INVENTORY MANAGEMENT
- > 177948 TMA inventory management
- > 156986 Demo version for Windows/Solaris (Max 8 devices)

TMA PATH MANAGEMENT
- > 177952 TMA path management
- > 156986 Demo version for Windows/Solaris (Max 8 devices)

MAINTENANCE CONTRACTS
- > 158673 TMA_HP/OV Entry Level Maint. Contract
- > 158674 TMA_HP/OV Unlimited Maint. Contract
- > 163131 TMA_HP/OV Entry Level +TMA_CLI Maint. Contract
- > 163133 TMA_HP/OV Unlimited +TMA_CLI Maint. Contract
- > 163135 TMA_CLI Maint. Contract
- > 187389 TMA element management Entry Level Maint. Contract
- > 187390 TMA element management Unlimited Maint. Contract
- > 177949 TMA inventory management maintenance contract
- > 177953 TMA path management maintenance contract

EASYCONNECT

> THE EASYCONNECT HAND-HELD TERMINAL IS A COMPACT CONFIGURATION AND MONITORING TOOL FOR TELINDUS ACCESS PRODUCTS.

It can be connected through a serial cable to the control port of the equipment, and offers the possibility to monitor its status and performance, to launch test-loops, and to do local configuration.

It is an alternative to the wide set of other maintenance tools that are available for Telindus products (TMA, VT100, Telnet, etc..)

SALES CODES
- > 175259 Easyconnect Hand-Terminal 230VAC

Units without power module and separate power adapters can be found in the sales codes quick reference section

FEATURES & BENEFITS

- > UNIVERSAL TERMINAL FOR TELINDUS ACCESS PRODUCTS
- > OFFERS LCD FUNCTIONALITY TO NON-LCD EQUIPMENT

FRONT PANEL
- > LCD: 2x24 characters
- > Buttons: up, down, left, right, esc, enter

SERIAL CONNECTION
- > Speed: 9600bps, 8N1
- > Connector: DB9

POWER REQUIREMENTS
- > External power adapter, 9Vdc 1A
- > Battery backup with integrated automatic battery charger
- > Batteries: 4xAA NiMh

MECHANICAL DATA (H X W X D)
- > Dimensions:35 x 200 x 120 mm
- > Weight: 0.6 kg (external power adapter excluded)

1035 ORCHID

> THE 1035 ORCHID IS A NETWORK MANAGEMENT MEDIATION DEVICE (OR MANAGEMENT CONCENTRATOR) FOR CONNECTING EQUIPMENT WITHOUT BUILT-IN IP PROTOCOL STACK TO THE NETWORK MANAGEMENT SYSTEM (NMS).

It is available as a desktop or as a card for the card nest CN4.

The 1035 orchid collects management information from the managed equipment and translates it into a number of IP based protocols: SNMP, TELNET, HTTP or PING. This is called IP proxy functionality.

The 1035 orchid can also encapsulate the Telindus proprietary CMS2 (Card nest Management System) protocol into UDP/IP packets. TMA, TMA CLI, TMA Inventory management, TMA path management and TMA for HP OpenView® communicate in this way with the 1035 orchid. Advantages of this approach are the efficient use of the available bandwidth and delivery confirmation.

Because the 1035 orchid integrates a multi-port router architecture, it can support different types of IP encapsulation when forwarding the management information to the Network Management System: MAC encapsulation over Ethernet, PPP, Frame Relay and ATM.

For this purpose the 1035 orchid accomodates a synchronous serial port (up to 10 Mbps), two G.703/G.704 interfaces, a 10/100Base-T Ethernet Interface and an auxiliary asynchronous port. The two channelised E1 (G.703/G.704) interfaces offer the possibility to transport the management information over 64 kbps time-slots of a SDH/PDH infrastructure. The unit also features a high-speed port for connecting to the network management bus of the card nest CN4.

Therefore, the 1035 orchid can be integrated in almost any network architecture without having to build a separate overlay network for network management. The 1035 orchid is typically installed at the access concentration point and can control all central and remote customer premises equipment.

FEATURES & BENEFITS

- > NETWORK MANAGEMENT CONCENTRATOR WITH SUPPORT FOR G.703/G.704
- > CONTROLS ALL CENTRAL AND REMOTE EQUIPMENT
- > SUPPORT OF IP PROXY FUNCTIONALITY
- > SUPPORT OF FRAME-RELAY, ATM, IP AND SDH/PDH BACKHAUL NETWORKS

I/O PORT FUNCTIONALITY

High-speed ports (HS)
- > Number of port: 1
- > Connector: RJ45
- > Max speed: 800 kbps
- > Usage:
- > Connect the 1035 orchid to a card nest. Up to 7 card nests can be connected in cascade to one 1035 orchid

Aux port
- > Number of ports: 1
- > Connector: DB9 female, DTE
- > Electrical: V.24/RS-232
- > Max speed: 115200 bps, async
- > Usage: Connection of desktop network elements
  Connection of Orchid DM
  Asynchronous PPP for backhaul network

Serial port
- > Number of ports: 1
- > Connector: DB25 female, DTE
- > Electrical: RS-530/RS-232
- > Max speed: 10 Mbps sync (Nx 64kbps), 115200 bps async
- > Usage: Connect to frame relay, PPP (Sync or async) or ATM backhaul network

G.703/G.704 ports
- > Number of ports: 2
- > Connector: RJ45, DTE
- > Electrical: G.703, 120 ohm
- > Max speed: 2048 kbps, framed or unframed
- > Usage: Connect to PDH/SDH backhaul network

Control port
- > Number of ports: 1
- > Connector: DB9 female, DCE
- > Electrical: V.24/RS-232
- > Max speed: 9600 bps async
- > Usage: Local management of the 1035 orchid using VT100 terminal or TMA

Ethernet port
- > Number of ports: 1
- > Compliant with IEEE 802.3 10Mbps HDX/FDX Ethernet
- > Compliant with IEEE 802.3u 100Mbps HDX/FDX Ethernet
- > 10/100Mbps auto-sense
- > RJ45 Unshielded Twisted Pair (UTP)
- > Usage: Connect to an IP LAN network

IP PROXY SUPPORTED PROTOCOLS

- > SNMP V1: > MIB2
  > private MIB
  > traps
- > HTTP web server functionality
- > TELNET server
- > PING
- > TFTP
- > FTP

SUPPORTED IP ENCAPSULATION PROTOCOLS

- > MAC encapsulation over Ethernet
- > Frame-Relay (RFC 1490, RFC 2427)
  - > Support of multiple DLCI's (PVC)
  - > Support of LMI (revision1, ANSI T1.617, ITU-T)
  - > Support of Inverse ARP over Frame-Relay for automatic gateway configuration
  - > Support of multilink Frame-Relay (FRF15)
- > PPP (RFC 1661, RFC 1662)
  - > Synchronous or asynchronous operation
  - > Support of Chap authentication with MD5 hashing (RFC 1994)
  - > Support of multilink PPP (RFC 1990)
- > ATM
  - > Framed (G.704) or unframed operation
  - > Supports up to 32 ATM PVCs

ACCESS SECURITY

- > Extended access lists
- > Password protection
- > Encrypted management protocol

IP ROUTING

- > Please consult IP routing features as stated for the 1030 router family

FRONT PANEL INDICATORS

- > PWR: Power
- > G703 1 / LNK: first G703 interface status
- > G703 1 / ACT: first G703 WAN protocol status
- > G703 2 / LNK: second G703 interface status
- > G703 2 / ACT: second G703 WAN protocol status
- > RS530 / LNK: RS530 interface status
- > RS530 / ACT: RS530 WAN protocol status
- > LAN / ACT: LAN status
- > LAN / COL: LAN collision detect

MECHANICAL DATA (H X W X D)

- > Desktop version: 45 x 220 x 235 mm Weight: 800 g
- > Card version: 20 x 235 x 300 mm Weight: 1 kg

POWER REQUIREMENTS

Desktop version:
- > Standard with 230Vac/9 Vdc, 1 A EUR external adapter
- > Other external power adapters available for 48Vdc and 230Vac
- > Max power dissipation for 230Vac adapter: 9W

Card version:
- > 36 - 72 Vdc 9W

SALES CODES
- > 177468 1035 Orchid desktop 230VAC
- > 180330 1035 Orchid Card Version (CN4)

ORCHID DM

FEATURES & BENEFITS

> INCREASES THE NUMBER OF AVAILABLE MANAGEMENT PORTS

> COMPACT DESKTOP HOUSING

MANAGEMENT CONNECTIONS

> Number of upstream links: 1, DCE
> Number of downstream links: 6, DTE
> Connector type: RJ45
> Supported speeds: asynchronous up to 19.2 kbps
> Electrical characteristics: V.28
> Supported signals: TXD, RXD, GND

FRONT PANEL INDICATIONS

> PWR: Power
> MAIN 103 TXD (incoming transmit data on uplink)
> MAIN 104 RXD (outgoing receive data on uplink)

MECHANICAL DATA (H X W X D)

> 38 x 150 x 270 mm weight: 0.6 kg (excl. power supply)

POWER REQUIREMENTS

> 7.5 Vdc, 500mA
> External power adapters available for 48Vdc, 230 Vac

SALES CODES

> 171295 Orchid DM NPWR (without power adapter)
> 171302 PWR-Plug (EUR version) 230VAC->7,5VDC
> 173720 PWR-Plug (UK version) 230VAC->7,5VDC
> 171304 PWR-Plug 48VDC->7,5VDC

CONNECTION CABLES

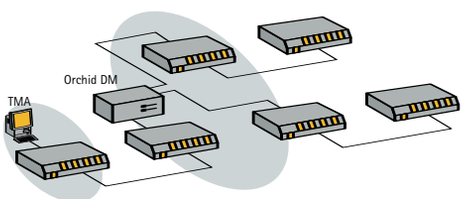
> 149220 CBL RJ45 – DB9M 2M Cable for connection between Orchid DM DTE port and standard NMS port 2 meter
> 141972 CBL X RJ45 – DB9M 2M Cable for connection between Orchid DM DCE port and standard NMS port 2 meter

> THE ORCHID DM (DIGITAL MULTIPOINT) ALLOWS SPLITTING A SERIAL NETWORK MANAGEMENT CHANNEL TOWARDS MULTIPLE DEVICES, AS MAY BE REQUIRED IN COMPLEX NETWORKS THAT ARE NOT BUILT ACCORDING TO THE STRICT STAR TOPOLOGY.

The unit can split one low speed management channel (typically 9600 bps 8N1) into up to six downstream channels. This results in a cost-effective way for increasing the number of network management ports available at a certain location. The examples show some typical applications.

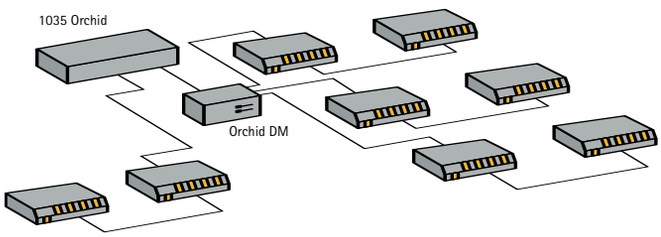
The Orchid DM is equipped with one uplink and six downstream links. It supports asynchronous transmission at speeds up to 19.2 kbps.

v EXTENSION OF A NETWORK MANAGEMENT PORT TO MULTIPLE MODEM LINKS



v ORCHID DM REAR VIEW

v EXTENSION OF THE NUMBER OF SERIAL MANAGEMENT PORTS ON A 1035 ORCHID



accessories

CABLES FOR NETWORK MAINTENANCE AND MANAGEMENT

> THE CABLES HAVE A LENGTH OF 1 METER. LESS COMMON CABLES AND CABLES OF DIFFERENT LENGTH CAN BE FOUND IN THE SALES CODES QUICK REFERENCE SECTION.

ETHERNET TWISTED PAIR CABLING

Straight RJ45 Ethernet twisted pair cabling. Also used for connecting the high speed (HS) bus on the Orchid 1003 LAN
> PIN LAYOUT: 1-1, 2-2, 3-3, 4-4, 5-5, 6-6, 7-7, 8-8
> SALES CODE: 173786 CBL TMA RJ45-RJ45 STRAIGHT

Crossed RJ45 Ethernet twisted pair cabling
> PIN LAYOUT: 1-3, 2-6, 3-1, 6-2
> SALES CODE: 173789 CBL TMA RJ45-RJ45 CROSSED

CONNECTING TMA MAINTENANCE SOFTWARE THROUGH SERIAL CONNECTION

Straight cable for the connection of the serial port of a PC (DB9) to all Telindus products with DB9 NMS connector
> PIN LAYOUT: 2-2, 3-3, 5-5
> SALES CODE: 173774 CBL TMA DB9F-DB9M

CONNECTING NMS CHANNEL IN BACK-TO-BACK EQUIPMENT

NMS cross-cable for the connection of two DB9 NMS connectors in a back-to-back configuration
> PIN LAYOUT: 2-3, 3-2, 5-5
> SALES CODE: 173795 CBL TMA DB9M-DB9M CROSSED

AC TO 48V POWER CHASSIS

> THE 2901 POWER SYSTEM IS DESIGNED TO OPERATE IN TELECOM ENVIRONMENTS AND OFFERS UP TO 4 TIMES 270W IN FREE CONVECTION AT 48V.

The modular rectifiers (up to 4) work in load sharing mode and are controlled through a supervisor unit designed for telecom applications. The system provides a connection for battery backup including deep discharge protection and a controlled recharging current. The unit comes as a chassis with all connections on the front and includes the supervisor unit.

AC INPUT
> 180-264Vac, 47-63 Hz (115Vac on request)
> Maximum inrush current: 4x 10A according to ETSI 300132-1

DC OUTPUT
> Output: 40-59Vdc, adjustable
> Continuous power output: 4x270W
> Integrated over-voltage and over-current protection
> Connector: screw

BATTERY BACKUP
> Deep discharge protection
> Configurable recharging current
> Connector: screw

MECHANICAL DATA (HXWXD)
> 3U (133mm) x 19" (483mm) x 246mm
> Rack-mountable in 19" or ETSI rack.

The number of modular rectifiers is chosen depending on the specific needs of the configuration. The unit is ideally suited for powering (multiple) units from the Telindus 2300 or 2400 series, or for the powering of the remote power add-on chassis.

ALARM-OUTPUTS
> Number of alarm outputs: 3 (configurable)
> Type of alarm output: voltage free normally closed contacts, max 60V/1A
> Connector: 9-pin Sub-D connector
> Supported alarms
> > Mains absent
> > Rectifier failure
> > More than one rectifier failure
> > Output voltage low (2 configurable levels)
> > Temperature exceeded
> > Digital input activated (2 input contacts)

SALES CODES
> 183019 2901 Power Supply Chassis for up to 4 PSU's
> 183030 270W PSU for 2901

AC TO 48V POWER ADAPTER

> THIS COMPACT POWER ADAPTER IS DESIGNED FOR OFFERING AC POWER CAPABILITIES TO A TELINDUS 2300 OR 2400 UNIT (EXCEPT FOR UNITS INCLUDING REMOTE POWER FEED CAPABILITIES), IN CASE ONLY A DC POWER INPUT IS PRESENT ON THE EQUIPMENT.

The adapter offers a royal 70W power capacity and features a built-in short-circuit protection.

AC INPUT
> 90-264Vac, 47-63 Hz
> Connector: IEC, European power cord included

DC OUTPUT
> 48Vdc +- 2%, 70W
> Integrated short-circuit protection
> Connector: stripped wires

SALES CODES
> 185881 AC to 48Vdc power adapter

230VAC TO 7.5/9VDC POWER ADAPTERS

> SOME TELINDUS UNITS REQUIRE EXTERNAL POWER ADAPTERS. FOR THIS PURPOSE EITHER 7.5 VDC OR 9 VDC POWERING IS USED. THIS SECTION CONTAINS POWER ADAPTERS THAT HAVE 230VAC AS THEIR NOMINAL INPUT VOLTAGE.

230VAC TO 7.5VDC POWER ADAPTER EUROPE
> WALL-PLUG: European
> NOMINAL OUTPUT VOLTAGE: 7.5Vdc, not stabilised
> MAXIMUM LOAD: 750 mA
> SALES CODE: 171302

230VAC TO 7.5VDC POWER ADAPTER UK
> WALL-PLUG: UK
> NOMINAL OUTPUT VOLTAGE: 7.5Vdc, not stabilised
> MAXIMUM LOAD: 750 mA
> SALES CODE: 173720

230VAC TO 9VDC POWER ADAPTER EUROPE
> WALL-PLUG: European
> NOMINAL OUTPUT VOLTAGE: 9Vdc, not stabilised
> MAXIMUM LOAD: 1 A
> SALES CODE: 175590

230VAC TO 9VDC POWER ADAPTER UK
> WALL-PLUG: UK
> NOMINAL OUTPUT VOLTAGE: 9Vdc, not stabilised
> MAXIMUM LOAD: 1 A
> SALES CODE: 175592

24/48VDC TO 7.5/9VDC POWER ADAPTERS

> SOME TELINDUS UNITS REQUIRE EXTERNAL POWER ADAPTERS. FOR THIS PURPOSE EITHER 7.5 VDC OR 9 VDC POWERING IS USED.

This power adapter is suited for 24Vdv or 48Vdc power sources. The same adapter can be used for powering equipment with nominal input voltages of 7.5Vdc or 9Vdc.

AC INPUT
> Voltage range: 18..72Vdc
> Connector: screw

DC OUTPUT
> Nominal output voltage: 9Vdc, stabilised
> Maximum load: 2A

SALES CODES
> 171304 PWR-PLUG 24/48VDC->9VDC

PATCH PANELS

> PATCH PANELS FOR INDIVIDUAL RJ45 CONNECTORS

PATCH PANEL 24X RJ45 TO LSA PLUS CL5 AMP
> SALES CODE: 133017

PATCH PANEL 48X RJ45 TO LSA PLUS CL5 AMP
> SALES CODE: 133018

PATCH PANEL 96X RJ45 TO LSA PLUS CL5 AMP
> SALES CODE: 133019

RACK-MOUNT KITS

> THESE RACK-MOUNT KITS ARE USED FOR MOUNTING TELINDUS ACCESS EQUIPMENT INTO A 19" RACK.

Rack-mount kit for the Crocus Inverse Mux
> SALES CODE: 150322

Rack-mount kit for CN4 2 slots
> SALES CODE: 179092

Rack-mount kit for ID-Mux or PRI-Mux
> SALES CODE: 180043

Rack-mount kit for 2300 and 2400 series
> SALES CODE: 183021

BALUNS

> BALUNS ALLOW THE IMPEDANCE CONVERSION FOR G.703 INTERFACES FROM TWISTED PAIR CABLING (120 OHM) TO COAX (75 OHM).

Twisted pair is terminated on a RJ45 connector, coax is terminated on BNC or 1.6/5.6 connectors.

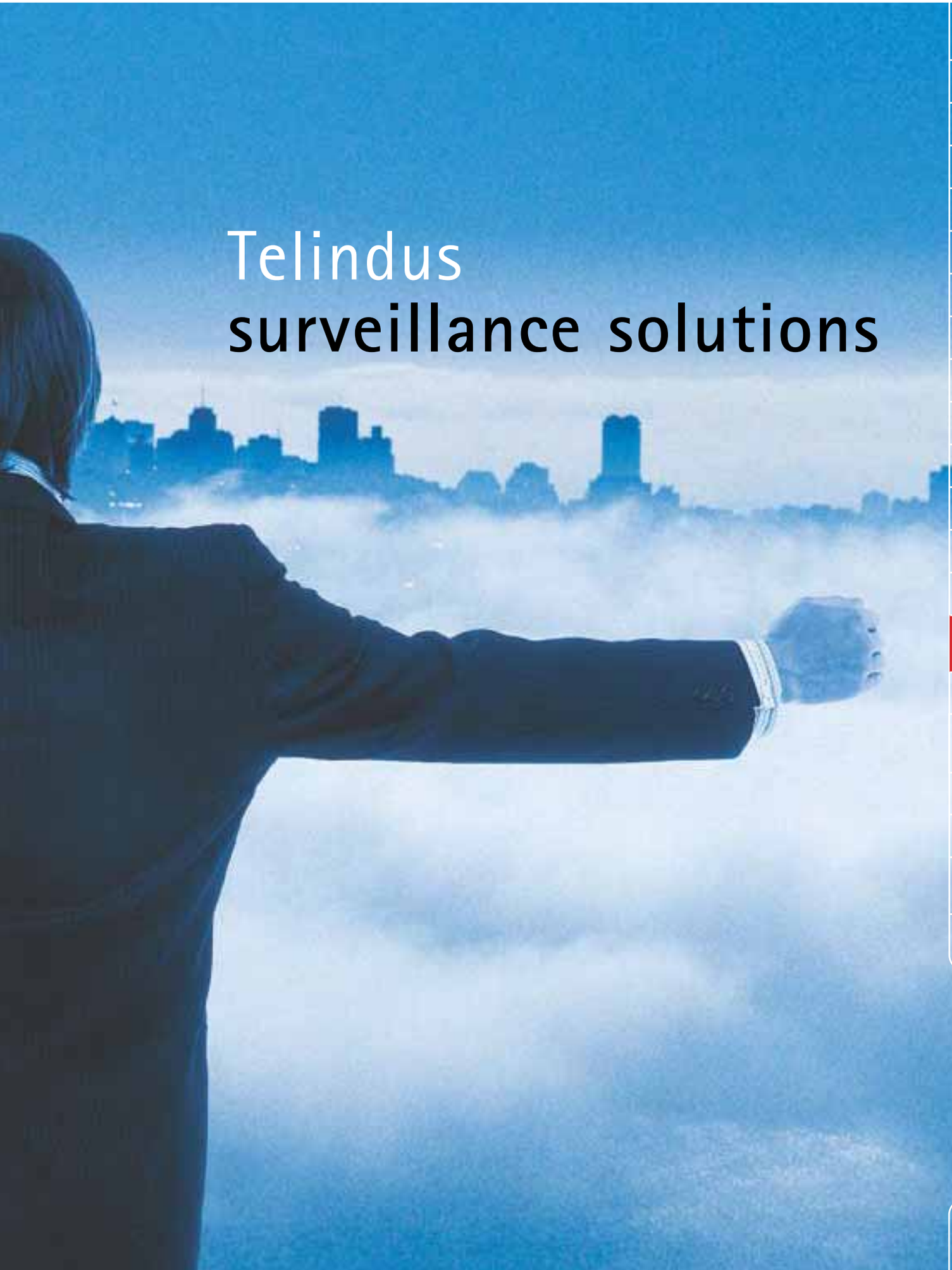
Balun RJ45 to BNC
> SALES CODE: 185876

Balun RJ45 to 1.6/5.6
> SALES CODE: 185877

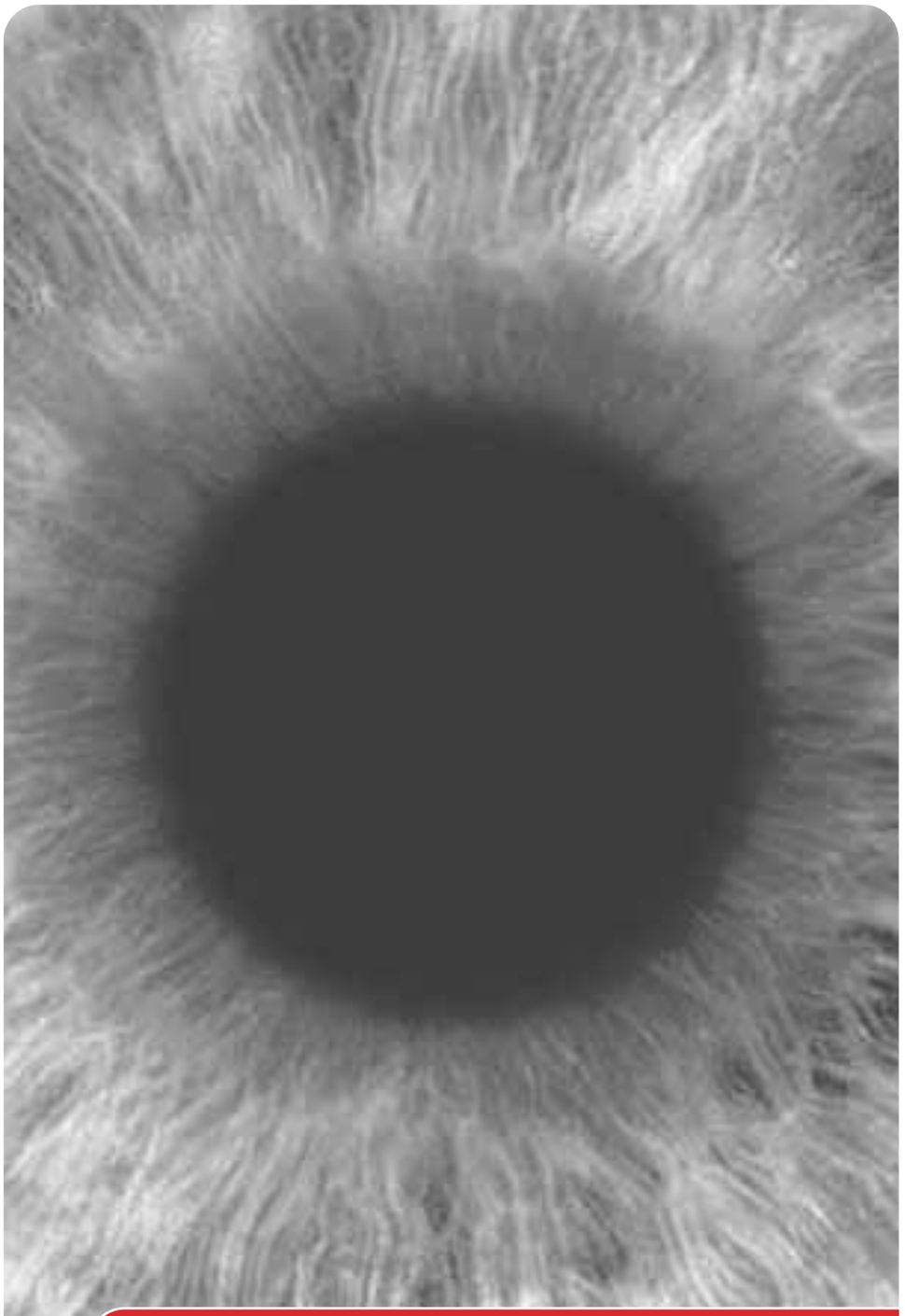
Baluns can be rack-mounted using a 1U rack-mount adapter, holding up to 16 baluns (not included).

Rack-mount adapter for code 185876 (RJ45 to BNC)
> SALES CODE: 185879

Rack-mount adapter for code 185877 (RJ45 to 1.6/5.6)
> SALES CODE: 185878



Telindus surveillance solutions



video surveillance codecs

THE PAST FEW YEARS HAVE SEEN A DRAMATIC INCREASE IN THE USE OF CLOSED CIRCUIT TELEVISION (CCTV) SURVEILLANCE.

We now expect – and for our own safety even demand – that major road junctions, airports, railway stations, mass transit systems and even shopping centres will be continuously watched over by electronic 'eyes'.

Whilst just a few years ago a mass transit system might have had three or four cameras, today a large city centre station may easily have well over one hundred ensuring that no part of the building can go unseen.

The increase in the numbers of CCTV cameras now employed by organisations has made existing installations seem inflexible and outdated. Conventional CCTV installations have not changed with cameras typically connected to a video matrix switch, using a point to point cabling concept; the video switch being installed in a central location usually within or close to the security control room where the monitors are installed. Whilst this type of installation works well when an entire system consisted of a few cameras, a single monitor bank and a single security function, installation and running of a modern CCTV system with hundreds of cameras becomes cost prohibitive, inflexible and difficult to scale.

The Telindus cellstack video surveillance solves these problems enabling large camera based networks to be flexibly and cost effectively linked to central monitoring rooms, video storage systems and multiple emergency incident centres – the video network itself acting as a core dynamic matrix switch.

CENTAURI VIDEO HUB

> THE CENTAURI PROVIDES AN ALL-DIGITAL, HIGH QUALITY, FLEXIBLE SOLUTION TO THE PROBLEM THAT HAS PLAGUED CONVENTIONAL SYSTEMS; THAT OF POOR QUALITY AND RESTRICTED HIGH COST NETWORK EXPANSION.

FEATURES & BENEFITS

- > HIGH QUALITY, LOW LATENCY FULL FRAME RATE VIDEO
- > AUDIO AND TELEMETRY SUPPORT (PTZ) PLUS I/O CONNECTIONS
- > REAL-TIME PERFORMANCE AND SCALEABLE ARCHITECTURE
- > LOW COST OF OWNERSHIP
- > HIGH SYSTEM AVAILABILITY (PSU, NETWORK & CONTROL REDUNDANCY)
- > UP TO 44 UNIQUELY CONFIGURABLE VIDEO CHANNELS
- > MPEG-2 OR MOTION-JPEG
- > SUPPORT FOR ATM OR GIGABIT ETHERNET (VIDEO OVER IP OR ATM)
- > INDUSTRY STANDARD MANAGEMENT
- > A SUITE OF MANAGEMENT TOOLS
- > FULL INTEGRATION WITH EXISTING CCTV EQUIPMENT
- > FULLY INTEGRATED WITH THE CELLSTACK STORAGE SOLUTION

It is a modular system based on a 19" high performance chassis (12 slots) and can support up to 44 ports operating at full video resolution and full motion. Video, audio and telemetry information for all channels may be transmitted simultaneously to multiple monitoring and storage centres. This can be done using a maximum of 4 high-speed ATM or Gigabit Ethernet connections.

The Centauri can be configured as a fully resilient system protecting all critical system components including the power supply and controller module. Multiple network connections may be implemented and operated in a load sharing / dual homing configuration; re-routing surveillance data via an alternative network path should a network route become unavailable as a result of failure.

All system modules are 'hot-swappable' and incorporate temperature sensing; power supply units also monitor voltage and current levels supporting automatic power down and restoration of unit operation as 'out-of-spec' environmental factors determine.
A key aspect of the Centauri design has been to achieve very high system availability – Centauri yields greater than 99.999%.

CONTROLLER MODULES

At the heart of a Centauri video hub is a centralised control module responsible for all system activity. This includes unit configurations, network based connections and unit management. The module is available as an ATM Controller, offering a single 155 Mbps ATM port, or as an IP Controller offering dual Gigabit Ethernet interfaces. The Controller cards also feature ports for local configuration and maintenance. An incorporated I/O port allows for alarm state notification or monitoring. If required, the I/O port can be connected to a CellStack Centauri I/O unit, providing 32 input/output.

Should system control redundancy be a requirement then a duplicate controller module may be fitted. As well as providing further alarm and digital network ports, it monitors the status of the primary controller and can take control on detection of failure. Provision of the additional on-board network interface(s) provides for redundant and dual homing network operation.

VIDEO MODULES

Video Encoder (Tx) modules are available in both MPEG and JPEG compression variants. Each variant is capable of delivering high quality video with fully configurable profiles, low latency compression, and advanced bandwidth management features.

Each Centauri video module supports a high-speed transparent data channel configurable for RS232 / RS422 communication. This can be used for single camera (point-to-point) telemetry or as a sub-addressed port to support multiple cameras.

Decoded Video (Rx) may be viewed on industry standard monitors using a stand-alone Centauri Rx module, or the Centauri Quad Rx module where up to four images may be output to a single monitor. Alternatively, high quality / full frame rate video may be received and displayed using the CellStack Vision application. CellStack Vision is a network attached PC software application that can receive and display Centauri based video streams without the need for specialised video hardware adapters. CellStack Vision performs all decoding functions in 'pure' software.

All Centauri video decoder cards include support for On Screen Display (OSD) that allows alarm or status information to be displayed on the viewing monitor.

Various video modules within the Centauri hub can provide high quality audio communication. Whilst intended as an audio 'talk-back' channel for simple end-to-end voice communication, Centauri audio does in fact support a wide range of stereo and mono sampling rates and both balanced and un-balanced audio, software configurable according to the requirements of the application.

CENTAURI VIDEO NETWORK

In the event of a major emergency, an incident control centre can be easily set up. By using inherent features of an ATM or IP based network combined with a Centauri, a single network connection is all that is required. Support for multicast video together with bi-directional audio enables emergency services to have a high quality video and 'talk back' channel to assist in resolving the emergency.

Advanced features of Centauri offer auto-recovery from a network failure by means of multiple network interfaces, dual homing and an auto-reconnection process. A Centauri makes a good network design even better.

INTEGRATION WITH EXISTING CCTV EQUIPMENT

The Centauri video hub enables an existing installation comprising conventional CCTV equipment to be integrated into an advanced digital network. This includes the continuing use of cameras, control and telemetry systems, analogue multiplexers and storage equipment thereby permitting a phased migration to an all-digital advanced solution.

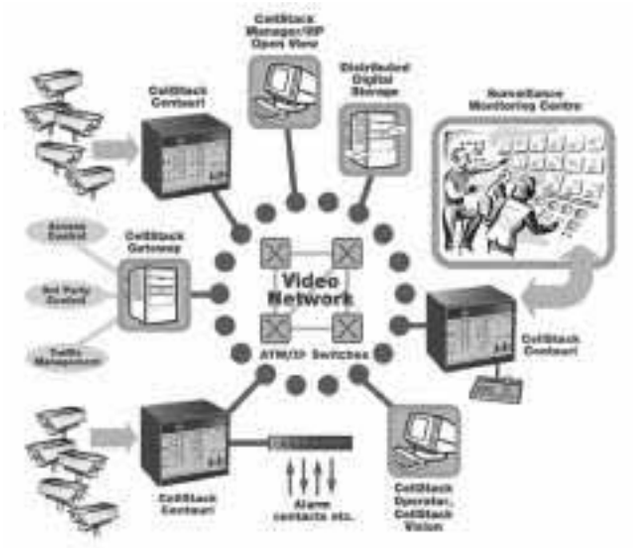
This capability, in conjunction with the CellStack Integration Suite, provides for a dynamic network wide surveillance solution consisting of hundreds of end-points; network control being via control keyboards, contact closures and graphical PC applications, for example HP OpenView.

MANAGEMENT & CONTROL

A Centauri networked video solution is not only about transmission of video across a digital network. Effective management and ease of operation are crucial to ensure that system performance is optimised, Service Level Agreements (SLAs) are met and downtime reduced. CellStack offer system wide solutions that enable management and operational control of a video network. The CellStack Integration Suite includes:

- CellStack Manager - Centauri network management tool
- CellStack Operator – User interface for security personnel
- CellStack Gateway – For integration of third party applications
- CellStack Event Handling System – For monitoring of external events to trigger pre-programmed actions

v CENTAURI TYPICAL NETWORK APPLICATION



CHASSIS

> Slots: One dedicated slot for a double width PSU (12 HP) and a further 12 standard (6 HP) slots.
> Passive Backplane capable of delivering 622 Mbps duplex
> Redundant power supply (optional)
> Redundant controller cards (optional)
> Removable Fan Tray

MANAGEMENT

> Local terminal connection
> Remote management via Telnet, HTTP, SNMP, CellStack Manager and CellStack Operator
> Out-of-band Management via Fast Ethernet Port
> API for interfacing to custom management applications

ATM CONTROLLER CARDS

ATM SUPPORT

> ATM forum AAL5 adaptation layer supported for all audio, video, data and control
> Support for UBR and VBR. CBR support for MPEG only
> Permanent Virtual Circuits (PVC): full VPI and VCI address range
> Switched Virtual Circuits (SVC): full VPI and VCI address range and ATM Forum UNI 3.0 and 3.1 signalling
> Each Centauri rack can support up to four 155 Mbps ATM interfaces and a maximum of 512 separate ATM virtual circuit connections (PVC and SVC)

NODE CONTROL FUNCTION

> Provides core system control, configuration and connection management functionality for the rack
> Two cards can be fitted to provide redundancy management

MANAGEMENT INTERFACES

> Ethernet interface: 10 Base-T, RJ45
> Serial port: RS-232, DB9 male

I/O PORT

> DB25 female
> 3 dry relay contact connections (external output voltage: 5 V, 300 mA max.)
> 10 I/O lines
> Connection for I/O Unit

ATM NETWORK CONNECTION

> Single 155 Mbps ATM interface (UNI 3.0/3.1)
> Available controller cards:

CS-CEN-RM-CTRL/001

> STM1/OC-3 multi-mode fibre ATM interface port
> Typical range: ~ 2 km
> Connector type: SC

CS-CEN-RM-CTRL/002-16DB

> STM1/OC-3 16 dB single-mode fibre ATM interface port
> Single-mode 1300 nm Class I Laser
> Typical range: ~ 24 km
> Connector type: SC

CS-CEN-RM-CTRL/002-26DB

> STM1/OC-3 26 dB single-mode fibre ATM interface port
> Single-mode 1300 nm Class I Laser
> Typical range: ~ 40 km
> Connector type: SC

CS-CEN-RM-CTRL/003

> Cat.5 UTP ATM interface ports
> Category 5 UTP
> Typical range: ~ 100 m
> Connector type: RJ45

GIGABIT ETHERNET CONTROLLER CARD

GIGABIT ETHERNET SUPPORT

ETHERNET

> Dual Gigabit (1000 Mbps) Ethernet ports
> IEEE 802.3 and Ethernet II Encapsulation
> IEEE 802.1q support for VLAN tagging and IEEE 802.1p User Priority
> Spanning Tree for Daisy Chain and Redundancy
> Link (network) Redundancy

PROTOCOLS

> IPv4, TCP, UDP, ARP, ICMP, IGMPv1 & v2, TFTP, HTTP, SNMP, DHCP, DNS, Telnet, RTP
> Integrated support for network diagnostics

HARDWARE ACCELERATED UDP/IP STACK FOR MEDIA TRAFFIC

> RTP encapsulated video, audio and data streaming
> IP multicast or unicast transmission of media streams
> Manual or dynamic multicast IP address allocation
> DiffServ support for layer 3 QoS

NODE CONTROL FUNCTION

> Provide core system control, configuration and connection management functionality for the rack
> Two cards can be fitted to provide controller redundancy

MANAGEMENT INTERFACE

> Serial Port: RS-232, DB9 male
> Ethernet interface: 10/100 Base-T, RJ45

I/O PORT

> RJ45 for connection to Cellstack I/O Unit

GIGABIT ETHERNET NETWORK CONNECTION

> 2 x standard GBIC slot that accepts a range of fibre and copper network media modules

MODELS

CS-CEN-RM-IPCTRL

MJPEG VIDEO OUTPUT CARDS

VIDEO OUTPUT PORTS

> Formats: PAL 25 frames/sec (720x576 resolution), NTSC 30 frames/sec (720x480 resolution)
> Digital resolution: 8 Bit YCbCr
> Software selectable On Screen Display (OSD) which consists of a title bar, real-time status information bar (camera name and status notifications), a free text area and a real time clock. Full control via UI and API
> Connectors: 2/4 BNC composite, 2/4 mini-DIN 5 pin S Video (Y/C)
> Output impedance: 75 ohms
> Decompression standard: Low latency M-JPEG. Full frame rate and resolution available on all ports simultaneously

SERIAL DATA PORT

> Format: RS232 / RS422 / RS485 interface configurable to 19,200 baud
> 8 data bits, no parity, or 7 data bits plus parity, hardware flow control (optional)
> Connector: DB9 male

AUDIO PORT

> Format: Analogue, 1 x bi-directional stereo or 2 x bi-directional mono, balanced or unbalanced, selectable
> Input level: 1 V rms unbalanced / 2 V rms balanced
> Input impedance: 20 k ohms @ 1 kHz unbalanced / 40 k ohms @ 1 kHz balanced
> Output level: 0.707 V rms unbalanced / 1.4 V rms balanced (nominal)
> Output impedance: £ 10 ohms balanced / unbalanced
> Minimum load: 2 k ohms balanced / unbalanced
> Sample resolution: 16 bit linear PCM, 8 bit linear PCM, 8 bit A-law or 8 bit µ-law
> Sample rates: 48 kHz, 44.1 kHz, 24 kHz, 22.05 kHz, 12 kHz, 11.025 kHz, 8 kHz and 6 kHz
> Connector: DB9 female

MODELS

RX4 FOUR PORT OUTPUT CARD: CS-CEN-RM-JPEG-RX4

> Four channel video output card. Each channel can be configured to display a full screen image.

DRX2 DUAL IMAGE OUTPUT CARD: CS-CEN-RM-JPEG-DRX2

> Two channel video output card. Each channel can be configured to display either a dual image or a full screen image. When using the dual image configuration, a dividing line can be drawn at any angle across the display.

QRX4 QUAD DISPLAY OUTPUT CARD: CS-CEN-RM-JPEG-QRX4

> Quad display card with four decompression channels and two display ports. Each port can be configured to display a quad image (all four channels on one screen) or a full size image of one of the quad images.

MJPEG VIDEO INPUT CARDS

VIDEO INPUT PORTS

> Formats: PAL 25 frames/sec (720x576 resolution), NTSC 30 frames/sec (720x480 resolution)
> Digital resolution: 8 Bit YCbCr
> Comprehensive picture adjustment settings, including contrast, brightness, colour saturation (U and V) and hue (NTSC only).
> TX6 connectors: 6 x BNC composite, 2 x mini-DIN 5 pin S Video (Y/C)
> TX4 connectors: 4 x BNC composite, 4 x mini-DIN 5 pin S Video (Y/C)
> Input impedance: 75 ohms (jumper selectable)
> Compression: Low latency M-JPEG

COMPRESSION THROUGHPUT

> TX6 (6 port card): 2 x full rate compression channels shared between six ports. Up to 2 x 25/30 frames/sec (PAL/NTSC), shared between all video ports
> TX4 (4 port card): 4 x full rate compression channels. Up to 25/30 frames/sec (PAL/NTSC) for each port

SERIAL DATA PORT

> Format: RS232 / RS422 / interface configurable to 19,200 baud
> 8 data bits, no parity, or 7 data bits plus parity, hardware flow control (optional)
> Connector: DB9 male

AUDIO PORT

> Format: Analogue, 1 x bi-directional stereo or 2 x bi-directional mono, balanced or unbalanced, selectable
> Input level: 1 V rms unbalanced / 2 V rms balanced
> Input impedance: 20 k ohms @ 1kHz unbalanced / 40 k ohms @ 1 kHz balanced
> Output level: 0.707 V rms unbalanced / 1.4 V rms balanced (nominal)
> Output impedance: £ 10 ohms balanced / unbalanced
> Minimum load: 2 k ohms balanced / unbalanced
> Sample resolution: 16 bit linear PCM, 8 bit linear PCM, 8 bit A-law or 8 bit µ-law
> Sample rates: 48 kHz, 44.1 kHz, 24 kHz, 22.05 kHz, 12 kHz, 11.025 kHz, 8 kHz and 6 kHz.
> Connector: DB9 female

MODELS

> Two different JPEG video input cards are available with four or six video ports and configurations.

CS-CEN-RM-JPEG-TX6
CS-CEN-RM-JPEG-TX4

MPEG-2 VIDEO OUTPUT CARDS

VIDEO OUTPUT PORTS

> Formats: PAL 25 frames/sec (720x576 resolution), NTSC 30 frames/sec (720x480 resolution)
> Digital resolution: 8 Bit YCbCr
> Software selectable On Screen Display (OSD), that consists of a title bar, real-time status information bar (camera name and status notification), a free text area and a real time clock. Full control via UI and API
> Connectors: 2/4 BNC composite, 2/4 mini-DIN 5 pin S Video (Y/C)
> Output impedance: 75 ohms
> Decompression: MP@ML
> Maximum decoder bit rate: 15 Mbps

SERIAL DATA PORT

> Format: RS232 / RS422 interface configurable to 19,200 baud
> 8 data bits, no parity, or 7 data bits plus parity, hardware flow control (optional)
> Connector: DB9 male

MODELS

> Two different MPEG video output cards are available with two or four video ports. Both have a single serial data port.

CS-CEN-RM-V420-RX2
CS-CEN-RM-V420-RX4

MPEG-2 VIDEO INPUT CARDS

VIDEO INPUT PORTS

> Formats: PAL 25 frames/sec (720x576 resolution), NTSC 30 frames/sec (720x480 resolution)
> Digital resolution: 8 Bit YCbCr
> Connectors: 2/4 BNC composite, 2/4 mini-DIN 5 pin S Video (Y/C)
> Input impedance: 75 ohms (jumper selectable)
> Compression: MP@ML (4:2:0)
> Encoder output bit rate: 800 kbps to 15 Mbps
> GOP structure: Open or closed GOP with up to 2 B-frames between reference pictures

SERIAL DATA PORT

> Format: RS232 / RS422 interface configurable to 19,200 baud
> 8 data bits, no parity, or 7 data bits plus parity, hardware flow control (optional)
> Connector: DB9 male

MODELS

> Two different MPEG video output cards are available with two or four video ports

CS-CEN-RM-V420-TX2
CS-CEN-RM-V420-TX4

HIGH-DENSITY AUDIO CARD

AUDIO PORTS

> Ports: 4 x bidirectional
> Format: Analogue, 1 x bi-directional stereo or 2 x bi-directional mono, balanced or unbalanced, selectable per connector
> Input level: 1 V rms unbalanced / 2 V rms balanced
> Input impedance: 20 k ohms @ 1kHz unbalanced / 40 k ohms @ 1 kHz balanced
> Output level: 0.707 V rms unbalanced / 1.4 V rms balanced (nominal)
> Output impedance: £ 10 ohms balanced / unbalanced
> Minimum load: 2 k ohms balanced / unbalanced
> Sample resolution: 16 bit linear PCM, 8 bit linear PCM, 8 bit A-law or 8 bit µ-law
> Sample rates: 48 kHz, 44.1 kHz, 24 kHz, 22.05 kHz, 12 kHz, 11.025 kHz, 8 kHz and 6 kHz
> Connector: DB9 female 'D' type

SERIAL DATA PORT

> Format: RS232 / RS422 interface configurable to 19,200 baud
> 8 data bits, no parity, or 7 data bits plus parity, hardware flow control (optional)
> Connector: DB9 male

MODELS

CS-CEN-RM-PCM-AUD4

DUAL PORT ATM NETWORK INTERFACE CARDS

MAIN CHARACTERISTICS

> Provides additional ATM bandwidth.
> Two STM1 ATM ports
> Models for different ATM media

MODELS

CS-CEN-RM-DPATM/001

> STM1/OC-3 multi-mode fibre ATM interface ports
> Multi-mode 1300 nm LED
> Typical range: ~ 2 km
> Connector type: SC

CS-CEN-RM-DPATM/002-16DB

> STM1/OC-3 16 dB single-mode fibre ATM interface ports
> Single-mode 1300 nm Class I Laser
> Typical range: ~ 24 km
> Connector type: SC

CS-CEN-RM-DPATM/002-26DB

> STM1/OC-3 26 dB single-mode fibre ATM interface ports
> Single-mode 1300 nm Class I Laser
> Typical range: ~ 40 km
> Connector type: SC

CS-CEN-RM-DPATM/003

> Cat.5 UTP ATM interface ports
> Category 5 UTP
> Typical range: ~ 100 m
> Connector type: RJ45

POWER SUPPLY MODULES

AC POWER SUPPLY MODULE

> Input: 88 to 264 V AC, 47-63Hz (auto ranging)
> Output power: 400 W

DC POWER SUPPLY MODULE

> Input: -40.5 to -60 V DC
> Output power: 400 W

I/O UNIT

> Allows a CellStack Centauri to interface with third-party control and monitoring equipment.
> Up to 32 simple input signals from external devices (e.g. contact closures, alarm monitors)
> Up to 32 output signals (which can be used for LED indicators, relay drives etc.)
> Connected to a Centauri rack via the I/O port

MECHANICAL DATA

Module	Height (mm)	Width (mm)	Depth (mm)	Weigh (Kg)
Chassis	400 (9U) (19" rack fitting with supplied fittings)	453	348	13.25 (excl. cards and Power Supply Modules)
Power Supply Module	266.5 (6U)	60.96 (12HP)	285	2.5
Control/ Network I/F Card	266.5 (6U)	30.48 (6HP)	285	0.7
Video Input Cards				
MJPEG TX4, TX6	266.5 (6U)	30.48 (6HP)		0.7
MPEG TX2, TX4	266.5 (6U)	30.48 (6HP)	285	0.7
Video Output Cards				
MJPEG RX2, RX4	266.5 (6U)	30.48 (6HP)	285	0.7
DRX2, QRX4	266.5 (6U)	30.48 (6HP)	285	0.7
MPEG RX2, RX4	266.5 (6U)	30.48 (6HP)	285	0.7
Audio Card				
PCM-AUD4	266.5 (6U)	30.48 (6HP)	285	0.7

SALES CODES: GENERAL

177913 Chassis including controller with ATM Multi Mode Fibre - CS-CEN-RM-CHASS/001/AC
168533 Chassis including controller with ATM Single Mode(16dB) Fibre - CS-CEN-RM-CHASS/002-16dB
168533 Chassis including controller with ATM Single Mode(26dB) Fibre - CS-CEN-RM-CHASS/002-26dB
168537 Chassis including controller with ATM 155Mb/S Cat.5 UTP - CS-CEN-RM-CHASS/003
184109 Chassis including controller with IP Interface (without GBIC) - CS-CEN-RM-CHASS/IP/AC

168538 Power Supply 400W - 110-120/230-240VAC - CS-CEN-RM-PSU/AC
168539 Power Supply 400W - 48VDC - CS-CEN-RM-PSU/DC
168540 Table Top Mounting Centaury - CS-CEN-COVER

SALES CODES: ETHERNET CONTROLLER CARDS

184110 Spare Centralised IP Controller Module (without GBIC)- CS-CEN-RM-IPCTRL
184422 GBIC UTP - CS-1000BASET
184424 GBIC Multimode fibre - CS-1000BASESX
184425 GBIC Single mode fibre -CS-1000BASELX

SALES CODES: ATM CONTROLLER CARDS

168389 Spare Controller with ATM Multi Mode Fibre - CS-CEN-RM-CTRL/001
168390 Spare Controller with ATM Single Mode (16dB) Fibre - CS-CEN-RM-CTRL/002-16DB
168391 Spare Controller with ATM Single Mode (26dB) Fibre - CS-CEN-RM-CTRL/002-26DB
168392 Spare Controller with ATM Single 155Mb/S Cat.5 UTP - CS-CEN-RM-CTRL/003
177870 Optional ATM Interface module with 2 Multi Mode interfaces CS-CEN-RM-DPATM/001
177871 Optional ATM Interface module with 2 Single Mode(16dB) interfaces CS-CEN-RM-DPATM/002-16dB
177872 Optional ATM Interface module with 2 Single Mode(26dB) interfaces CS-CEN-RM-DPATM/002-26dB
177873 Optional ATM Interface module with 2 155Mb/s Cat.5 UTP ATM interfaces CS-CEN-RM-DPATM/003

SALES CODES: VIDEO MJPEG CARDS

168393 6 Port input Card - CS-CEN-RM-JPEG-TX-6
168394 4 Port input Card - CS-CEN-RM-JPEG-TX-4
168395 2 Port output Card - CS-CEN-RM-JPEG-RX-2
168396 4 Port output Card - CS-CEN-RM-JPEG-RX-4
181056 4 Port output Card / Quad Display - CS-CEN-RM-JPEG-QRX4
177869 2 Port output Card / 2 Image Output display-Cutover - CS-CEN-RM-JPEG-DRX2

SALES CODES: VIDEO MPEG2 CARDS

184112 4 Port input Card - CS-CEN-RM-V420-TX-4
184428 2 Port input Card - CS-CEN-RM-V420-TX-2
184114 4 Port Output Card - CS-CEN-RM-V420-RX-4
184429 2 Port Output Card - CS-CEN-RM-V420-RX-2

SALES CODES: AUDIO CARDS

184430 High Density Audio module - CS-CEN-RM-PCM-AUD-4

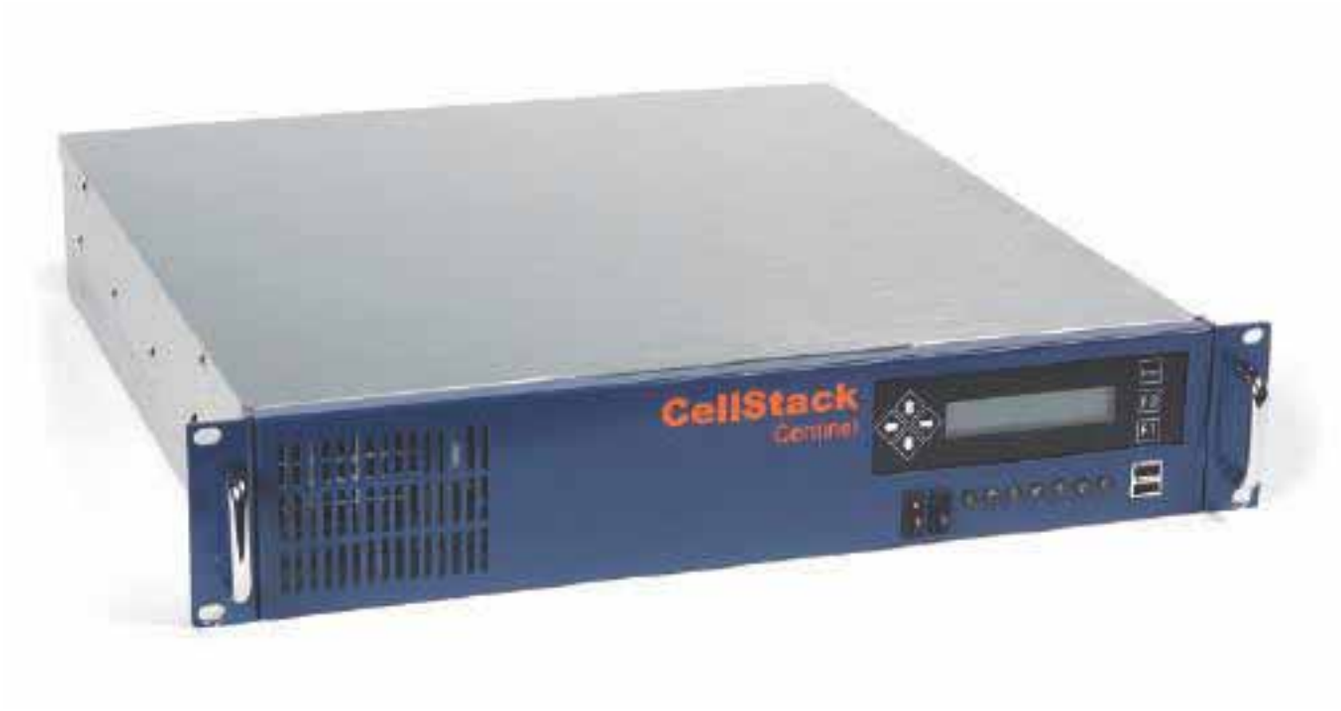
SALES CODES: I/O UNIT

184157 IO UNIT with 32 inputs/outputs - CS-CEN-RM-IO-32

V CELLSTACK I/O UNIT

CENTINEL VIDEO STORAGE new

CellStack Systems
A TELINDUS COMPANY



> THE CELLSTACK CENTINEL IS A HIGH PERFORMANCE NETWORK-ATTACHED DIGITAL VIDEO RECORDER (NVR) SPECIFICALLY DESIGNED FOR THE SURVEILLANCE INDUSTRY.

The Centinel allows the storage of MPEG-2 and M-JPEG digital video streams and audio streams on industry standard digital storage devices. In addition to storing data, the Centinel can process incoming streams to allow live viewing by any authenticated Real-Time Streaming Protocol (RTSP) client. The Centinel presents data to users via the industry standard Network File System (NFS), allowing any standard client to browse the stored files. The Centinel accepts out-of-band event messages over the network, which can be used to control how the unit stores received data streams.

The Centinel comprises a Controller Unit and at least one Storage Unit. The Controller Unit is a 2U high 19" rackmount chassis with:

- Redundant power supplies
- Multiple Gigabit Ethernet or ATM OC-3/12 ports
- Intel based high performance architecture
- ATA flash disk
- LCD front panel display with a 7 button overlay kit.

The Storage Unit is a 19" rack mount chassis, either 2U or 5U. The 2U version is available with 2TB or 3TB of storage, while the 5U version has 6TB. Both versions have redundant power supplies and RAID 5 redundancy protection for disabled disk drives. There is no limit to the number of Storage Units that can be attached to a single Centinel, and no limit to the number of Centinel Units that can be utilised within a CellStack surveillance system.

The Centinel utilises the Real-Time Internet Kernel (RTIK) embedded software engine to achieve throughput equal to the line rate of its ATM and Gigabit Ethernet interfaces, surpassing current products on the market.

This software allows easy development of applications that take full advantage of the hardware platform without the unnecessary overhead and potential instability of a general-purpose operating system.

SIMULATED LIVE ENCODER PLAYBACK

Most security control rooms use analogue TV monitors to view video feeds from security cameras. Typical digital storage solutions can only provide the stored video as large files, transmitted in bulk form. Thus a computer is required for buffering and replaying the video on the computer's monitor.

Utilising patent pending technology, the CellStack Centinel can supply digitally stored video to the analogue TV monitors. By emulating a digital encoder, the CellStack Centinel sends encoded video at a constant field rate to a CellStack Centauri decoder, which outputs analogue video to the TV monitors. Thus, the security operator can view the retrieved video on the same TV monitors used for live viewing.

The Centinel is also capable of serving any received real-time video stream to any authorised RTSP client, such as a hand-held PC, over a wireless network. This allows a roving security guard, for example to view both live and stored video.

PRE/POST EVENT STORAGE

As the Centinel receives video, it simultaneously writes full frame rate video to one file and reduced frame rate video to another file.

The full frame rate video is in a much shorter loop (for example 30-60 minutes). When an out-of-band event notifies the Centinel, it begins storing video at full rate and replaces a selected duration of previously stored reduced rate video with the full rate video, for pre-event viewing at full frame-rate.

FRAME STORAGE ARCHITECTURE (FSA)

Typically, video storage is achieved by storing small files based on a period of time. This creates thousands of files, each having a unique name to represent the time base for the video, causing administrative problems in both file management and retrieval.

FSA is a storage technique designed specifically to eliminate this problem. Data received from a video stream is stored as a contiguous set of 'frames' internally indexed by time. This file creates simulated 'tape style' storage with easy access to any portion of the stream. The file is designed in a loop of configurable length, meaning that as the file reaches its maximum size, older data is overwritten by newer data. Any data that has been flagged for permanent storage is by-passed by this overwriting, immediately unlinked from this chain and turned into a separate file.

SIMPLE NETWORK TIME PROTOCOL (SNTP)

System level timing in any security system is crucial in order to correlate events. The CellStack Centinel maintains a time of day clock expressed in Universal Co-ordinated Time (UTC) via the Simple Network Time Protocol. Universal Co-ordinated Time is also known as Greenwich Mean Time (GMT).

The SNTP client on the Centinel synchronises with any NTP server and provides clock accuracies to within 100 milliseconds.

The Centinel uses this clock both to correlate events and to timestamp logs and stored video files. The Centinel supports a primary and a secondary NTP server, which provides redundancy if the primary server is not available.

FEATURES & BENEFITS

- > UP TO 250 SIMULTANEOUS CAMERA FEEDS PER UNIT
- > ATM OR IP/GIGABIT ETHERNET
- > PRE/POST EVENT STORAGE
- > EXPANDABLE REDUNDANT STORAGE ARCHITECTURE
- > MPEG-2 AND M-JPEG VIDEO STREAM STORAGE
- > FULL PER-CAMERA REAL-TIMESTREAMING PROTOCOL (RTSP) SERVER

CAMERA FEEDS

- > Up to 250 simultaneous camera feeds per unit
- > Full per-camera control with its own operating parameters
- > MPEG-2 and M-JPEG video stream storage

NETWORK CHARACTERISTICS

- > ATM or IP/Gigabit Ethernet
- > Real-Time Protocol (RTP) and Real-Time Control Protocol (RTCP)
- > Simple Network Time Protocol (SNTP)

STORAGE CHARACTERISTICS

- > Industry standard storage
  - > Network Attached Storage (NAS) based a IP network using Network File System (NFS)
  - > Storage Area Network (SAN) based using SCSI over fibre channel
- > Frame Storage Architecture (FSA)
  - > The video stream is stored as a contiguous set of indexed 'frames' simulating tape style storage for rapid access
- > Virtual file system allowing the organisation of the file system under headings of your choice, for example by camera or by date
- > Time indexed data access, enabling instant access to the video for a particular period
- > Optional frame rate reduction to reduce the amount of storage
- > Out-of-band event processing (events, alarms etc.) to perform useful functions such as start or stop the video stream, increase or reduce the frame rate etc.
- > Pre/post event storage
- > Full per-camera Real-Time Streaming Protocol (RTSP) server
- > Simulated live encoder playback for the supply digital video at a constant frame rate to a CellStack Centauri, which then outputs analogue video for viewing on security monitors
- > RAID 5 redundancy
- > Unlimited expandable storage capacity

MANAGEMENT

- > Integrated control and configuration through the well-proven CellStack Integration Suite software

MECHANICAL DATA

Controller Unit

- > 19" rackmount chassis
- > W 483mm H 89mm (2U)
- > D 450mm
- > Weight: 4.5kg

Storage Unit

- > 19" rackmount chassis
- > W 483mm H 222mm (5U)
- > W 483mm 89mm (2U)
- > D 650mm
- > Weight: 73kg (5U) 38kg (2U)

POWER REQUIREMENTS

- > Power: 100/240VAC, 50/60Hz (auto ranging)
- > Power Tolerances: 88-264VAC, 47-63Hz

4100 MPEG-4 ENCODER/DECODER

new

Photo only illustrative – housing subject to change

> THE TELINDUS 4100 IS AVAILABLE AS A STANDALONE VIDEO ENCODER OR DECODER, CAPABLE OF PROVIDING REAL TIME S-VHS-QUALITY VIDEO AT UP TO 30 FPS.

It is ideally suited for security tasks such as access control and alarm monitoring, or for use in remote, single camera locations.

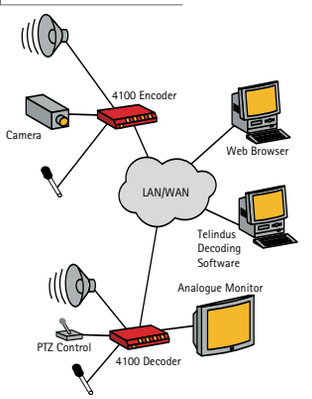
The encoder features Dual Encoding, allowing two independent data streams to be transmitted to suit different needs and ensuring efficient use of bandwidth.

The Telindus 4100 supports remote control of all popular PTZ cameras, and has sophisticated motion detector and alarm management capabilities. Control features include loss-of-video alarm and three-level password protection.

The unit has input/output connections for video, audio and alarms plus analogue sensor inputs. In addition there is a relay output, two serial data ports and a Fast Ethernet interface.

As a decoder, the Telindus 4100 can display an MPEG-4 stream on a standard CCTV monitor. Alternatively the stream can be displayed in a web browser or by using Telindus decoding software.

V 4100 TYPICAL APPLICATION



FEATURES & BENEFITS

- > MPEG-4 @ FULL D1/4CIF/2CIF/HALF D1/CIF
- > M-JPEG @ 720X576/480
- > DUAL ENCODING FOR EFFICIENT BAND-WIDTH
- > MULTICASTING & INTERNET STREAMING
- > FAST ETHERNET INTERFACE
- > COMPREHENSIVE SECURITY FEATURES
- > ALARM/ANALOGUE SENSOR INPUTS & RELAY OUTPUT
- > TWO SERIAL DATA PORTS
- > POWER-OVER-LAN
- > AUDIO INTERCOM

VIDEO

- > Compression: MPEG-4, M-JPEG
- > Data rate: 9.6 Kbps - 4 Mbps
- > Video resolution:
  - > 720 x 576/480 (full D1: 12 fields/s)
  - > 704 x 576 (4CIF: 12 fps)
  - > 704 x 288 (2CIF: 20 fps)
  - > 352 x 576/480 (half D1: 25/30 fields/sec PAL/NTSC)
  - > 352 x 288 (CIF: 25/30 fps PAL/NTSC)
  - > 176 x 144 (QCIF: 25/30 fps PAL/NTSC)
- > Low latency mode < 100 ms
- > Overall delay (IP) 100ms

AUDIO

- > Audio standard: G.711: 300 Hz - 3.4 KHz
- > Data rate: 80 Kbps
- > Sampling rate: 8 KHz

NETWORK PROTOCOLS

- > RTP
- > RTCP
- > UDP
- > TCP
- > IP
- > ARP
- > HTTP
- > IGMP
- > ICMP
- > SNMP

INTERFACES

- > Video in (encoder): 1 x analogue composite 75 ohm switchable
- > Video out (decoder): 1 x analogue composite 75 ohm
- > Audio in: mono 3.5mm jack socket 50 Kohms
- > Audio out: mono 3.5mm jack socket 8 ohms
- > Trigger: 1 x clamp (non-isolated contact closure) 24 V
- > Relay output: 1 x clamp, 30 Vpp 1A
- > Analogue sensor i/p: 1 x 0.5 VDC general purpose
- > COM ports: 1 x RS232/422/485 DB9
- > Ethernet: 10/100 base T half/full duplex RJ45

MECHANICAL DATA (H X W X D)

- > 33 x 143 x 135 mm
- > Weight: 0.4 kg

POWER REQUIREMENTS

- > Input voltage: 12-24 VDC RJ11
- > Power consumption: 10 VA

SALES CODES

- > 189088 Telindus 4100 MPEG-4 Encoder
- > 189089 Telindus 4100 MPEG-4 Decoder
- > 189090 19" Rackmount kit (for 3 units)

Available from Q3 2004

4200 MPEG-2 VIDEO CODEC

new

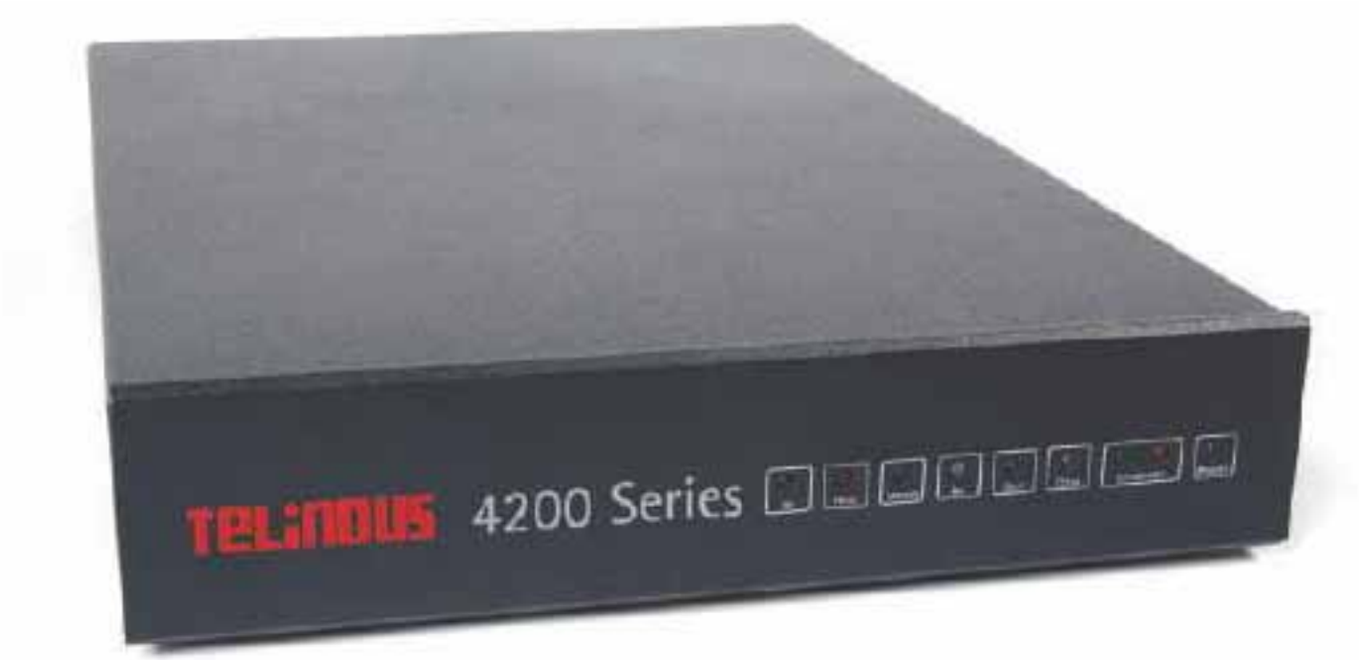
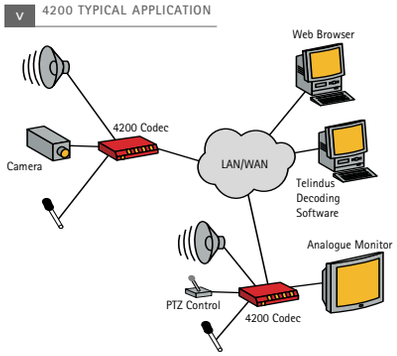


Photo only illustrative – housing subject to change

FEATURES & BENEFITS

- > MPEG-2 ENCODING
- > FULL D1 RESOLUTION
- > MULTICASTING AND INTERNET STREAMING
- > FULLY INTERLACED VIDEO
- > SIMULTANEOUS ENCODING/DECODING
- > ALARM INPUTS & USB OUTPUT
- > FAST ETHERNET INTERFACE
- > BI-DIRECTIONAL AUDIO FOR CCTV APPLICATIONS
- > DOME AND PTZ CAMERA SUPPORT

V 4200 TYPICAL APPLICATION



VIDEO

- > Compression: MPEG-2
- > Data rate MPEG-2: 1 Mbit/s – 8 Mbit/s
- > Video resolution MPEG-2:
  - > 720 x 576 (full D1: 50/60 fields/s)
  - > 352 x 288 (CIF:25/30 fps)
- > GOP structure: I, IP, IPB, IPBB
- > Overall delay (IP): MPEG-2: 198/180 ms (PAL/NTSC)
- > Selectable frame rate:
  - > 1-50/60 fields/s (PAL/NTSC): Field/frame based coding

AUDIO

- > Audio standard: MPEG-1 - MPEG-2: 300 Hz–10 KHz
- > Data rate: MPEG-2: 256 Kbit/s
- > Sampling rate: MPEG-2: 48 KHz
- > Multiplex standards MPEG-2: ISO/IEC 13818-1

INTERFACES

- > Video in: 1 x analogue composite 75 ohm switchable
- > Video out: 1 x analogue composite 75 ohm
- > Audio in: stereo 3.5 mm jack socket 50 Kohms
- > Audio out: stereo 3.5 mm jack socket 8 ohms
- > Trigger: 1 x clamp (non-isolated contact closure) 24 V
- > Relay output: 1x clamp, 30 Vpp 1A
- > Analogue sensor i/p: 1 x 0.5 VDC general purpose
- > COM ports: 1 x RS232/422/485 DB9
- > Ethernet: 10/100 base T half/full duplex RJ45

MAINTENANCE AND MANAGEMENT

- > Tracing with configurable trace level
- > Built-in SNMP agent for alarm management with call-home feature
- > Integrated HTTP Web server interface
- > TELNET and local console: command line or menu-driven interface
- > Access to management via LAN port, permanent leased line or via ISDN call.

MECHANICAL DATA (H X W X D)

- > 49 x 205 x 314 mm
- > Weight: 2.7 kg

POWER REQUIREMENTS

- > Input voltage: 90-250 VAC 50/60 Hz
- > Power consumption: 33 VA

SALES CODES

- > 189091 MPEG-2 video codec
- > 189092 19" Rackmount kit (for 2 units)

Available from Q3 2004

> THE TELINDUS 4200 IS A DIGITAL VIDEO CODEC, FULLY COMPATIBLE WITH MPEG-2 COMPRESSION STANDARDS.

It allows transmission of video to remote sites for viewing on a networked PC or a CCTV monitor, and can form part of a complete CCTV system with a virtual matrix and sophisticated alarm handling functions.

The Telindus 4200 can display a video stream on a standard CCTV monitor, in a web browser or by using Telindus decoding software.

The MPEG-2 compression allows extremely high quality pictures to be recorded, and the unit includes full alarm management plus more than 100 protocols for remote control of peripheral devices. A wide range of dome and PTZ cameras is supported.

In addition to high quality video, the unit provides high quality stereo audio and bi-directional audio for CCTV applications.

INTEGRATION SUITE

> A NETWORKED SOLUTION FOR VIDEO SURVEILLANCE IS COMPLEX AND REQUIRES A POWERFUL MANAGEMENT SYSTEM THAT ALLOWS THE USER TO PERFORM DAILY TASKS. A KEY ATTRIBUTE OF THIS SYSTEM MUST BE ITS ABILITY TO MASK THE COMPLEXITY OF THE NETWORK FROM THE SURVEILLANCE OPERATOR WHILE STILL ALLOWING THE EXPERIENCED IT USER TO PERFORM ESSENTIAL SYSTEM ADMINISTRATION TASKS.

The Cellstack integration suite (CIS) is a comprehensive surveillance network management system. CIS is well suited to a multi-service IT environment, which allows the network designer to create a video surveillance network suitable for all user types and enables the network administrator to manage the video surveillance network. The Cellstack integration suite comprises the following products:

- > Manager
- > Operator
- > Event Handling
- > Gateway
- > Vision
- > Vision Webgate

CELLSTACK MANAGER

CellStack Manager allows the system administrator to graphically represent a surveillance network and manage network devices to meet Service Level Agreements (SLAs).

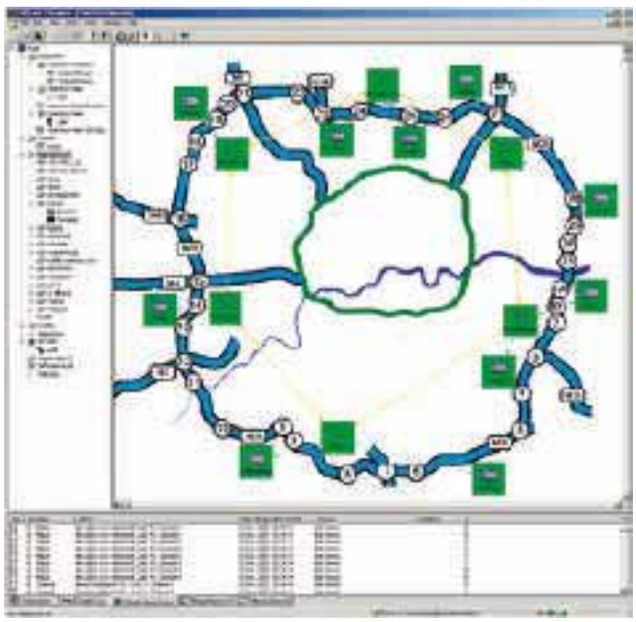
Therefore, apart from network configuration, Cellstack Manager includes a high degree of fault diagnosis and management.

The ability to manage, control and update the entire video network quickly and efficiently through CellStack Manager results in lower maintenance costs and increased availability.

CellStack Manager uses a generic Microsoft Windows user interface and 'tree-view' structure, allowing an administrator to manage many features, including:

- > CellStack Centauri MPEG-2/ MJPEG video codecs and virtual connections between them.
- > Codec domains and the allocation of codecs and users to domains.
- > Maps and cameras and camera telemetry.
- > Video sequences.
- > Timed events, allowing managers to preset an allocated time period for the viewing of certain cameras.
- > Permission and access privileges for operators, including maps, cameras, monitors, workstations and video profiles.
- > Network fault diagnosis and notification.
- > Performance Monitoring and Call records, informing managers of the behaviour of the video network, which may be required as part of a Service Level Agreements (SLAs).
- > Audit trail analysis, enabling managers to monitor all connection and operator activity.
- > 24/7 Operational Data Back-up, providing a means through which system managers can back-up the shared network database at set intervals while the system is still active.
- > Software Auditing, which enables system managers to upgrade codecs when new software features are made available.
- > Full integration with CellStack Operator, Event handling system, Gateway and Vision.

V CELLSTACK MANAGER INTERFACE



CELLSTACK MANAGER

FEATURES AND BENEFITS

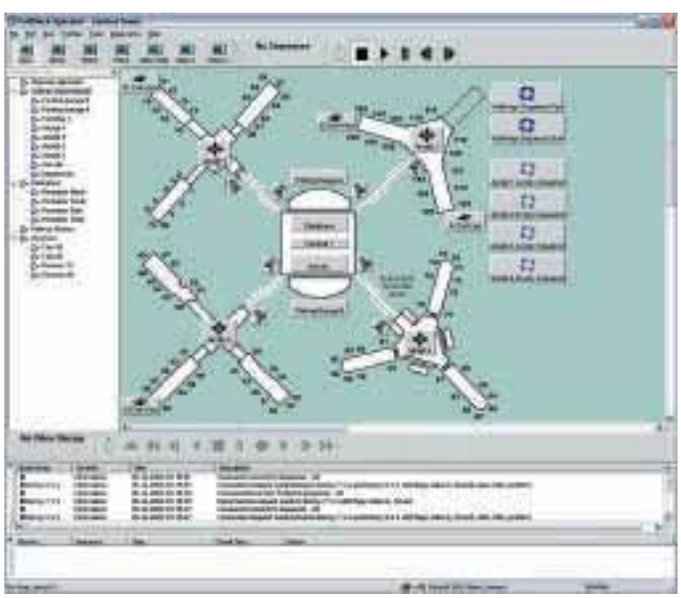
- Full management of CellStack Centauri MPEG/M-JPEG video codecs on ATM and IP networks.
- Simple drag and drop interface for creating video, audio and telemetry connections.
- Video sequences for switching automatically between camera views.
- Centralised administration features for CellStack Operator and the Event Handling Service.
- Fully configurable user security system for controlling access to codecs and CellStack Manager features.
- Network fault diagnosis and notification.
- Performance monitoring; chassis temperature monitoring and connection reports, allowing the administrator to maintain SLAs.
- Audit trail analysis, enabling the administrator to analyse system performance over long periods of time.
- 24/7 operational data backup; allowing the administrator to backup system configuration data at set intervals while the system is still active.
- Codec software auditing and upgrading.

A special version of CellStack Manager that is fully-integrated with Hewlett Packard OpenView Network Node Manager (NNM) is also available, so users familiar with this product can work with CellStack Systems nodes and view alarms.

CELLSTACK OPERATOR

CellStack Operator is used in the surveillance operations centre to make video, audio and telemetry connections at the click of a button using a simple user interface.

V CELLSTACK OPERATOR USED IN AN AIRPORT SURVEILLANCE APPLICATION



The software also alerts the user to events monitored by the Event Handling System (EHS) and node alarms. The profile and access rights for every operator can be made specific and is controlled by the Cellstack Manager software.

CELLSTACK OPERATOR

FEATURES AND BENEFITS

- Simple point-and-click interface for creating connections.
- Allows connections to CellStack Vision PCs, as well as multiple monitors and quad split displays.
- Display of alarm and status information from video endpoints.
- Simple selection of video, audio and telemetry settings using profiles.
- Real time control of camera PTZ functions using an on screen control or joystick.
- Instant notification of EHS events.
- Automatic display of camera view on operator's monitor when handling an EHS event.

CELLSTACK EVENT HANDLING SYSTEM

The CellStack Event Handling System (EHS) allows users to combine Access Control Systems and networked video surveillance.

The EHS accepts inputs from a wide range of third party devices via a CellStack I/O Unit or directly via a PC Ethernet or serial port.

The inputs are used to trigger important functions, such as camera positioning, video recording or external alarms.

All these features can be controlled automatically or with operator intervention.

CELLSTACK EVENT HANDLING

FEATURES AND BENEFITS

- CellStack I/O Unit trigger system for automatic monitoring of up to 64 devices.
- Timed trigger system for performing actions automatically at set intervals.
- Tertiary trigger system for use with third party monitoring systems.
- Fully configurable list of actions, such as opening and closing connections, controlling camera telemetry and much more.
- Fully automatic or semi-automatic operation.
- Automatic queuing of events, so important alarms are not missed.
- Automatic override of existing video or audio connections.
- One EHS can monitor up to 16320 ports.
- Multiple Event Handling Systems can run on a network.

CELLSTACK GATEWAY

CellStack Gateway enables users to integrate third party applications, such as camera control, access control, alarms, electronic road signs and network management systems, with a CellStack video network.

CellStack Gateway is a key element in creating a fully integrated end-to-end networked surveillance solution. It provides CellStack video, voice and telemetry functionality to a third party control system.

CELLSTACK GATEWAY

FEATURES AND BENEFITS

- Extensive API for application development.
- Full control of CellStack Systems codecs.
- Full control of third party devices via CellStack I/O Units.
- Test software for application quality assurance.
- Load-balancing over multiple CellStack Gateway servers.
- Server redundancy management.

CELLSTACK VISION

CellStack Vision enables users to view high quality MPEG-2 and MJPEG video on their PC monitors.

CELLSTACK VISION

FEATURES AND BENEFITS

- Convenient selection of different camera inputs using channel buttons.
- MPEG-2 and M-JPEG video decoding in one product.
- Connection initiation from within Vision or via another CellStack Systems application, such as Manager or Operator.

CELLSTACK VISION WEBGATE

CellStack Vision WebGate allows users to display live video images from CellStack Systems codecs on a website. The software samples M-JPEG video from codecs on an ATM network and automatically saves the video frames as graphics files for transfer to a web server.

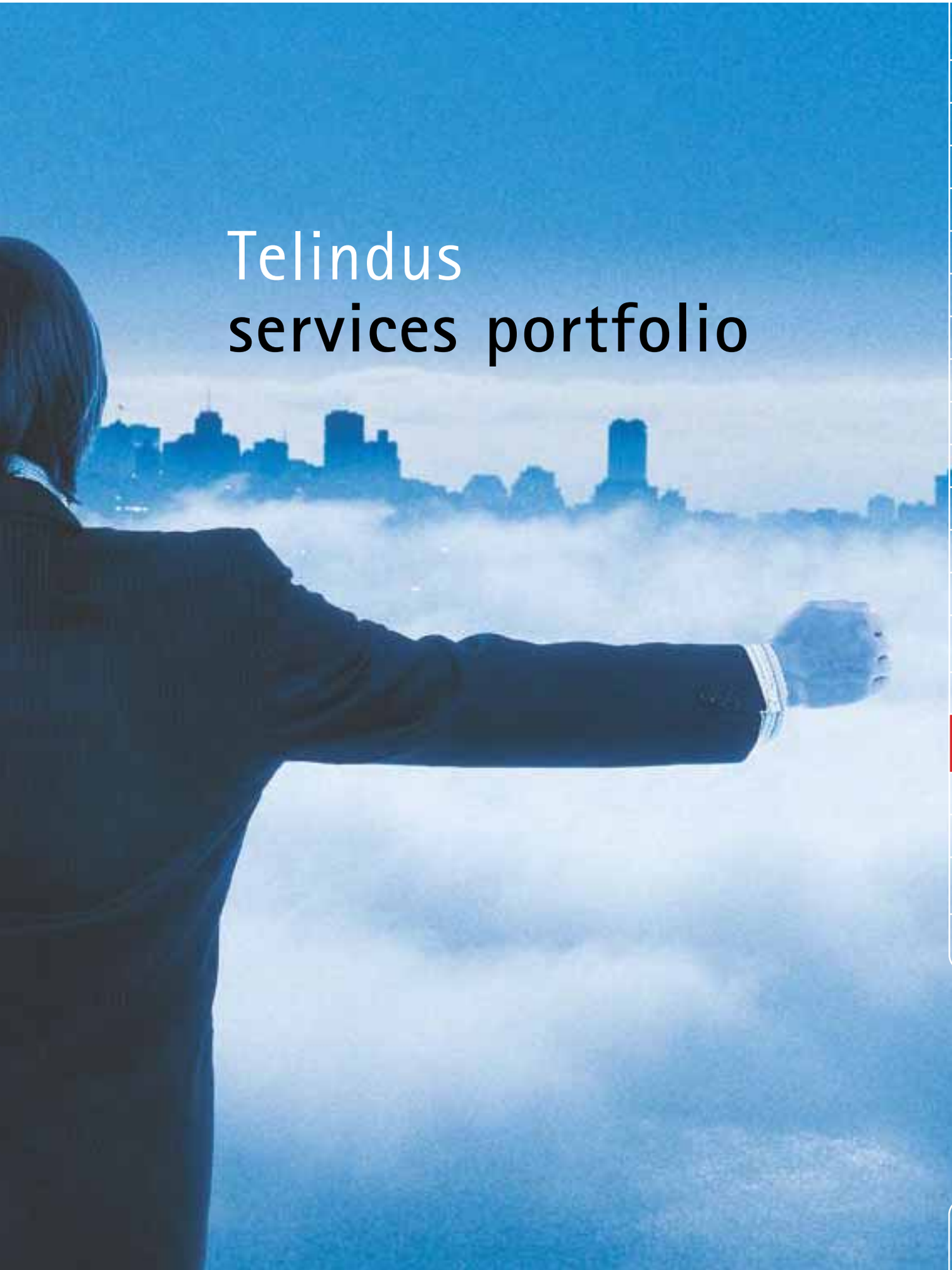
CELLSTACK VISION WEBGATE

FEATURES AND BENEFITS

- Simultaneous processing of up to 32 video streams.
- Configurable sampling rate.
- Configurable image size and quality.
- Simultaneous processing of both PAL and NTSC video.
- Automatic FTP copying of image files to web server.
- Connection initiation from within Vision or another CellStack Systems application, such as CellStack Operator.

SALES CODES

- 181057 Operator workstation application
- 182817 Network manager license for 50 nodes
- 184431 Network manager license for 50 nodes with HP Openview integration
- 184158 Event Handling system single user license
- 184432 Gateway application for application integration
- 184433 Vision visualistaion software single user license
- 184434 ATM PCI NIC (SC MMF) with MS OS system drivers
- 184435 ATM PCI NIC (UTP5) with MS OS



Telindus services portfolio

integrated applications

seamless application integration from concept to final acceptance

AS A WELL-SYNCHRONISED TEAM OF SOFTWARE DEVELOPERS AND CONSULTANTS, THE PROJECT ENGINEERING AND CONSULTANCY TEAM HAS A LONG EXPERIENCE IN THE DEVELOPMENT OF SOFTWARE FOR INTEGRATING DIFFERENT EXISTING SOFTWARE MODULES INTO ONE SEAMLESS APPLICATION.

Consultants help identifying the software integration requirements, take the global technical lead of the project, define and assure consistency of the global architecture and follow up the project up to final acceptance.

Developers are responsible for the implementation, documentation, installation and tests. As a result, project engineering and consultancy will guarantee a smooth integration with existing infrastructure, a fully integrated network and efficient operation and maintenance of all the systems.

The development team is used to working in accordance with the highest standards imposed by large administrations, industry, carriers and approval institutions. Extensive training is an ongoing process for team members in order to anticipate technology trends and best practices.

Its track record includes several examples in the area of electronic message handling, Internet and Extranet applications, mobile workers applications, Voice over IP (VoIP) integration, and custom-specific developments. The team also developed off-the-shelf products like SMSGate and GAF, unified messaging applications in the area of SMS and voice over IP networking respectively.

ELECTRONIC MESSAGING HANDLING

> Customisation of MS Outlook and development of connectors for MS Exchange
> Synchronisation of address books
> SMS – SMTP gateway with/without database, web management

INTERNET / INTRANET APPLICATIONS

> Internet banking projects, including integration with legacy systems and secure transactions
> Development of Intranet sites assisted by a graphical design office
> Construction of Internet shops: back-office and secure payment integration
> Database access via Internet
> Video streaming applications

MOBILE WORKERS APPLICATIONS

> Integration of dispatching applications with mobile handheld devices based on SMS, GPRS or UMTS
> Track and trace applications integration based on GPS (Global Positioning System)

V TRACK AND TRACE APPLICATION FOR LOCALISATION OF MOBILE WORKERS

VOICE OVER IP INTEGRATION

> Integration and synchronisation of VoIP networks with Outlook address-book and calendar
> VoIP PABX applications

SPECIFIC SOFTWARE DEVELOPMENT

> Integration of network management
> Development of specific software modules and gateways in the area of telecom, legacy integration and application security
> Unified messaging integration

SMS GATE

FEATURES & BENEFITS

> SMS GATEWAY
> INTERFACE USING SMTP OR FILE API
> NOTIFICATION OF DELIVERED MESSAGES
> MODULAR DESIGN FOR INTEGRATION WITH DIFFERENT APPLICATIONS

> THE TELINDUS SMS GATE SOFTWARE IS DESIGNED TO INTERFACE DIFFERENT CORPORATE APPLICATIONS WITH THE SHORT MESSAGING SERVICE (SMS) AND SUPPORTS VARIOUS POSSIBILITIES FOR THE CONNECTION TO THE SHORT MESSAGE SERVICE CENTRE (SMSC).

The SMS Gate software is based on a modular design and can be adapted to the business requirements of its user.

The Telindus SMS Gate software is available in four versions: SMS GATE LITE, SMS GATE LITE+, SMS GATE SERVER and SMS GATE ENTERPRISE.

V LOCAL MONITORING OF MESSAGES

SMS GATE LITE

This file API version uses a file interface to communicate with a back-end application. Files are dropped in a shared folder and processed by the gateway software. Communication with the SMSC is done through a mobile originator hardware attached to the serial port of the server.

SMS GATE LITE+

This version adds a SMTP module to the SMS Gate Lite software, linking the SMS Gateway to any SMTP based enterprise-messaging system (MS Exchange, Lotus Notes, etc.). All messages sent to the "SMS Gateway domain" will be processed by the gateway and directed to the GSM user. Delivery Notifications can be returned to the originator as separate messages. Also incoming SMS messages to the Gateway can be routed to an e-mail user.

SMS GATE SERVER

This version extends the SMS Gate Lite+ software with web-based management and adds the possibility to run the Gateway software as a service on a MS Windows platform.

The web-based management module allows the administrator to remotely manage the Gateway using an Internet browser.

SALES CODES

> 183165 SMSGATE LITE
> 183166 SMSGATE LITE Maintenance
> 183167 SMSGATE LITE+
> 183168 SMSGATE LITE+ Maintenance
> 183169 SMSGATE SERVER
> 183170 SMSGATE SERVER Maintenance
> 183171 SMSGATE SERVER MOBILE ORIGINATOR
> 183172 SMSGATE SERVER MOBILE ORIGINATOR Maintenance
> 183173 SMSGATE SERVER SMPP CONNECTOR
> 183174 SMSGATE SERVER SMPP CONNECTOR Maintenance
> 183175 SMSGATE SERVER UCP CONNECTOR
> 183176 SMSGATE SERVER UCP CONNECTOR Maintenance
> 183177 SMSGATE SERVER DBASE INTEGRATION
> 183178 SMSGATE SERVER DBASE INTEGRATION Maintenance

The SMS Gate Server version supports the following optional modules:

> Additional mobile originator. By adding an extra mobile originator to the gateway, redundancy and load sharing can be implemented.

> SMPP (Short Message Peer to Peer Protocol) support. Direct leased line connections with the SMSC for higher traffic rates.

> UCP+ (Universal Computer Protocol) support. Direct leased line connections with the SMSC for higher traffic rates.

> Database Integration. The SMS messages are recorded in a Microsoft SQL or Oracle database. The administrator can manage the database from his workstation by using an Internet browser.

SMS GATE ENTERPRISE

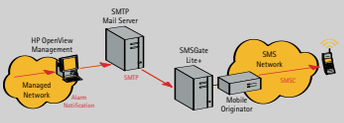
When other SMS integrations are required, Telindus also offers turnkey SMS Gate solutions for integration into various applications such as ERP (Enterprise Resource Planning), CRM (Customer Relation Management), etc.

The support of distribution lists in this version allows sending broadcast messages to many people starting from one single address at the originator. Expansion of the distribution list destinations is done at SMS gateway rather than on the application or mail server level.

SYSTEM REQUIREMENTS

> Windows 98/XP/NT/2000/XP

V SENDING OF HP OPENVIEW® ALARM NOTIFICATIONS TO A SMS CELLULAR PHONE



GAF < GROUP ACCESS FUNCTIONALITY >

> TELINDUS GAF (GROUP ACCESS FUNCTIONALITY) IS A SERVICE FOR USE IN A CISCO IP TELEPHONY ENVIRONMENT.

Integrating telephony systems with corporate e-mail servers, SMS, global address books and employees' calendars will drastically increase business efficiency.

A fast look on the screen of the IP phone immediately shows who is having a busy line, who has a meeting scheduled in its calendar and what the GSM number or e-mail address is for a certain person. If it is necessary to take a message, a small note to someone's e-mail address of cellular phone (SMS) can be entered directly on the IP phone.

Telindus GAF is a modular XML (extended Markup Language) application and runs on a Microsoft Windows platform where it is defined as an IP phone service using the Cisco CallManager.

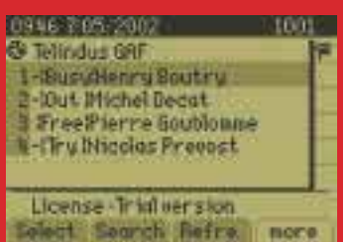
The group access functionality can be tailored to fit the needs of its user and is available in 4 standard configurations: GAF LIGHT, GAF LIGHT-SMS, GAF EXCHANGE and GAF EXCHANGE-SMS.

FEATURES & BENEFITS

> SERVICE FOR CISCO CALLMANAGER

> INTEGRATION WITH CORPORATE E-MAIL ADDRESS BOOKS, SMS, CALENDAR, ETC.

> INCREASES RESPONSIVENESS TO YOUR CUSTOMERS



∧ TELINDUS GAF ON CISCO IP PHONE DISPLAY

SALES CODES

> 183179 GAF_LIGHT (< 100 IP PHONES)
> 183180 GAF_LIGHT (< 100 IP PHONES) Maintenance
> 183181 GAF_LIGHT (100-250 IP PHONES)
> 183182 GAF_LIGHT (100-250 IP PHONES) Maintenance
> 183183 GAF_LIGHT (> 250 IP PHONES)
> 183184 GAF_LIGHT (> 250 IP PHONES) Maintenance
> 183185 GAF_EXCHANGE (< 100 IP PHONES)
> 183186 GAF_EXCHANGE (< 100 IP PHONES) Maintenance
> 183187 GAF_EXCHANGE (100-250 IP PHONES)
> 183188 GAF_EXCHANGE (100-250 IP PHONES) Maintenance
> 183189 GAF_EXCHANGE (> 250 IP PHONES)
> 183190 GAF_EXCHANGE (> 250 IP PHONES) Maintenance

GAF LIGHT

> Manually maintained list of users (add, edit, delete)
> Information per user: name, phone, GSM number

POSSIBLE ACTIONS

> Show list of users with their phone status (Busy/Free)
> Select one user in the list to show the detailed information
> Call the Phone number of a selected user
> Call the GSM number of a selected user

GAF LIGHT-SMS

Same functionalities as the GAF LIGHT

ADITIONAL ACTIONS

> Send SMS (includes Telindus SMS GATE software)

GAF EXCHANGE

> Same functionalities as the GAF LIGHT
> Integration with the corporate Microsoft Exchange server

ADITIONAL ACTIONS

> Show list of users with their phone status (Busy/Free) and exchange calendar status (Busy/free/Out of Office)
> Search function using the corporate global address book
> Show detailed exchange calendar for a selected user
> Send e-mail

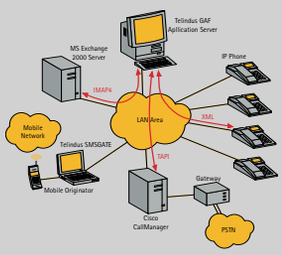
GAF EXCHANGE-SMS

> Same functionalities as the GAF EXCHANGE

ADITIONAL ACTIONS

> Send SMS (includes Telindus SMS GATE software)

∨ TELINDUS GAF GLOBAL ARCHITECTURE



remote management services

Confidentiality, Integrity and Availability at all times

INFORMATION AND TECHNOLOGY ARE POWERFUL TOOLS, TOGETHER THEY SHAPE THE BACKBONE OF ANY BUSINESS AND CONSEQUENTLY NEED TO BE SUITABLY MANAGED AND PROTECTED. A COMPANY'S DATA AND INTELLECTUAL PROPERTY ARE STORED ON BUSINESS CRITICAL ASSETS.

To safeguard the desired level of Confidentiality, Integrity and Availability of data, those assets need to be optimally protected. But how to ensure the optimal level of performance, reliability and security of the network and ICT infrastructure at all times?

In today's chaotic and competitive business environment, companies are constantly challenged to properly manage and secure their networks and information flows. New business drivers, such as the use of the World Wide Web for commercial and other business activities, the ability to check on-line inventories, the use of e-mail as the most important communication tool ...have radically changed the commercial environment.

In order to ensure commercial success and business growth, companies have not to only anticipate changes in the marketplace, but also quickly align their activities to stay ahead of the game. While integrating their heterogeneous communication systems, organizations are faced with an ever-growing network and increased security complexity.

Valuable information needs to be kept safe from hackers, viruses, and malicious individuals. Managing these issues is not a core competency for most companies and often they do not have the internal staff to properly deal with these issues. Keeping their own ICT staff up-to-date with ever evolving technologies is often a time consuming and resource depleting activity.

Improving business processes and protecting business assets should also not depend on a better economic climate or on the availability of new technologies. Organizations need to optimize their processes and infrastructures in order to efficiently manage the business risk and protect their assets through difficult times.

CENTRAL OPERATIONS & LOCAL EXPERTS PROVIDE LEADING EDGE SERVICES 24x7

CO-SOURCING THE MANAGEMENT OF NETWORKS, SECURITY ENTITIES, (SUB-)SYSTEMS AND APPLICATIONS IS IN MANY CASES A PRACTICAL AND COST EFFECTIVE SOLUTION.

Within the concept of co-management of the ICT infrastructure, Telindus takes a unique approach to the integration of technology and information through the Remote Management Services it provides to its customers. Access to the business critical assets will be secured.

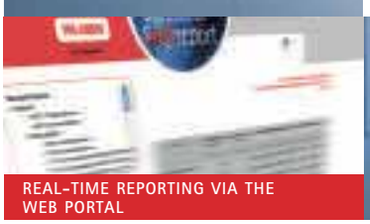
The confidentiality, integrity and availability of the data and information stored on these assets will be optimized.

Telindus has developed a set of comprehensive centralized Remote Management Services. These Services can be resumed as follows:

TELINDUS' REMOTE MANAGEMENT SERVICES

- > INCIDENT & PERFORMANCE MANAGEMENT
- > CONFIGURATION MANAGEMENT
- > CHANGE MANAGEMENT
- > MULTISCAN
- > INTRUSIVE TEST
- > INTERNET CONNECTIVITY WATCH
- > SECURITY RESEARCH
- > LOG FILE SECURITY AUDIT
- > COMPUTER INCIDENT FORENSICS
- > ON-LINE WEB REPORTING

REDUNDANT STATE-OF-THE-ART INFRASTRUCTURE



REAL-TIME REPORTING VIA THE WEB PORTAL

TROJAN HORSES AND VIRUSES INDENTIFIED DAILY

INCIDENT & PERFORMANCE MANAGEMENT

The Telindus Network Operations Centre will retrieve pre-filtered and correlated information on events occurring on the Managed Elements (which it monitors on a 24x7 basis, over a secured connection). The events will be assigned a priority level and a ticket will be created. The customer will be notified within pre-defined time periods on the status of the tickets. Based on a profound analysis of potential causes of the incident, specific actions and/or work-arounds will be proposed. Incident trends will be analyzed to determine long term corrective recommendations or to initiate different activities related to corrective changes to be taken. Within the Corrective Service Level, the Telindus analysts will remotely perform configuration and change management to resolve the incident.

When on-site activities are needed or when a Telindus local affiliate or third parties are involved, the Telindus analysts will collaborate with these parties to detect the root cause of the incident and to co-ordinate the actions to be taken.

Based on the analysis of performance parameters, Telindus will consider the usage and potential degradation over time of the Managed Element. General information on what actions could be taken to prevent incidents in the future will be provided.

BUSINESS BENEFITS

- The 'window of exposure' during which the company's data and intellectual property could be at risk due to an incident will be minimized, as Telindus will immediately and effectively respond
- Downtime costs will decrease, as the average network availability will increase. Incidents will be detected and resolved quicker through 24x7 monitoring
- The continuity of business processes will be optimized through pro-active release management and trend analysis
- The business risk of the potential impact of incidents will be reduced.

CONFIGURATION MANAGEMENT

Telindus will keep an inventory database of all Managed Elements, containing information needed to properly manage the secured network. This data will either be provided by the customer or gathered during a site survey. The database will include management information on network and security elements, systems and applications, on interfaces and software versions, and on people to be contacted in case of incidents.

Configuration files will be checked and improvements or changes proposed to increase the performance of the secured network.

Should differences be detected against the actual infrastructure and the configuration information, Telindus will correct the exceptions in the database.

Back-ups of event logs, element policies, configuration data and latest software revisions will be kept available and restored on the Managed Elements in the event of incidents or problems.

Release management services include the pro-active implementation of software upgrades, signature database updates, critical security releases and new security software enhancements. Vulnerability and intrusive tests can be performed to assess the level of exposure of the secured network.

BUSINESS BENEFITS

- This service allows ICT managers to have the latest view on the characteristics of the Managed Elements at all times
- The 'window of exposure' during which the company's data and intellectual property could be at risk due to an incident will be minimized.
- Downtime costs will decrease, as the average network availability will increase. Incidents will be detected and resolved quicker through 24x7 monitoring
- The continuity of business processes will be optimized through pro-active release management and trend analysis
- The business risk of the potential impact of incidents will be reduced through pro-active actions

CHANGE MANAGEMENT

The goal of Change Management is to manage all changes in the secured network.

As systems are increasingly becoming interconnected, any change made in one part of the secure network may have an impact on another part. Therefore it is crucial to have the highest quality operational processes in place in order to ensure the delivery of optimum levels of reliability and availability of the network components and safeguards.

Telindus Remote Management Services make use of a clearly defined Change Management process, based upon best practices such as ITIL, in order to perform changes in the secure networks managed by Telindus.

Telindus works in close collaboration with the customer in order to fully document the change, identify actions to be taken and perform a business risk assessment of the change request. If the requested change introduces risks, alternative solutions can be proposed before any implementation is scheduled. Careful project planning is crucial as minimal disruption is of utmost importance. At different stages of the process, the customer is informed of the status of the change and of any decisions that need to be taken.

BUSINESS BENEFITS

- Uncontrolled changes to the secured network will not be possible, as only Telindus will be able to implement changes upon specific request from the customer
- Optimal implementation of changes as requests are assessed by highly experienced analysts
- Minimal business disruption as changes can only take place within pre-agreed timeframes that are designed to keep business continuity flowing
- Increased productivity of ICT staff via focus on key activities and no diversion towards unplanned duties such as urgent changes
- Better assessment of the cost of proposed changes before they are incurred
- Rapid response of ICT towards changing business, service or technology needs
- Changes will be implemented along firm and strict procedures, regardless of who does the job

MULTISCAN

This Remote Management Service evaluates on a monthly basis the potential vulnerabilities specific to each system component, provides simulated attacks on these systems, and gives a summary list of vulnerabilities.

Each tested system is rated according its risk level:

- high risk: urgent actions are required
- medium risk: corrections are needed
- no major problems, but regular checks are recommended
- or the equipment is unreachable during the tests (hidden / disconnected / no equipment).

The reports provide a summary of all the systems tested and more detail on vulnerabilities related to each IP address. The differences between two successive scans are provided and

highlighted in order to see progression. These are exhaustive results that can be directly exploited by people in charge of security within an organization.

BUSINESS BENEFITS

- Cost effective by the use of automated tools
- Exhaustive report by the use of two different vulnerability scanners
- Clear differential report between each MultiScan in order to control and manage the evolution of the security
- Being up-to-date on actions to be taken allows to take pro-active measures and to organize work
- Value for money as it shows which weaknesses have been corrected in order to keep business up and running
- Continuous improvement of the service delivered to the business by avoiding unavailability due to viruses and hackers.

INTRUSIVE TEST

Without constant surveillance and proper management, the security posture on secured networks will degrade over time.

The Telindus Security Research Centre (SRC) has built up a considerable knowledge on security and can help to increase the total security of the ICT environment. For over 6 years the SRC has been providing a wide range of tests dedicated to specific sensitive elements (Web application, PABX, RAS, WLAN, ...) or architectures (internal test, Internet interconnection, Voice over IP architecture, PSTN/ISDN Line scan, ...).

Each qualification provides a report that can be a useful tool to manage a specific or global security project, with a list of vulnerabilities and recommendations to increase the security level. Each tested system is rated according to the potential risks and the urgency of required corrective actions. The differences between two Intrusive Tests are provided and highlighted.

BUSINESS BENEFITS

- Cost effective through the maximum use of automated tools
- Clear differential report between 2 Intrusive Tests in order to control and manage the evolution of the security
- Being up-to-date on actions planned allows to take pro-active measures and to organize work
- Value for money as it shows which weaknesses have been corrected in order to keep business up and running
- Continuous improvement of the service delivered to the business by avoiding unavailability due to viruses and hackers.

INTERNET CONNECTIVITY WATCH

This offer is a special package consisting of an intrusive test at the start-up of the service (with a detailed report on vulnerabilities and recommendations) to obtain the state of security, followed by regular MultiScans including the validation of the new vulnerabilities discovered.

BUSINESS BENEFITS

- Cost effective through the maximum use of automated tools
- Exhaustive MultiScan reports by the use of 2 different vulnerability scanners and the manual validation of vulnerabilities
- Clear differential report between each MultiScan in order to control and manage the evolution of the security
- Being up-to-date on actions planned allows to take pro-active measures and to organize work
- Value for money as it shows which weaknesses have been corrected in order to keep business up and running
- Continuous improvement of the service delivered to the business by avoiding unavailability due to viruses and hackers.

SECURITY RESEARCH

Based on a permanent security research on all technologies, Telindus offers the Security Research Service, including

- A daily "Security Bulletin" report with relevant information on new bugs, vulnerabilities, exploits, patches and updates, viruses, utilities and tools, with an indication of the level of severity. It provides pertinent and reliable information applicable for each component of the information system.
- Secured Web access to the on-line Security Research database, containing all technical details
- An immediate notification of urgent alerts in case of a major vulnerability
- Optionally, an in-depth diagnosis of specific vulnerabilities or patches can be provided.

This information is exchanged with the Telindus NOC in order to take recommended actions within the Corrective Service Level.

BUSINESS BENEFITS

- All relevant information on sensitive and urgent issues available
- Reduced cost compared to internal research
- A daily service
- Internal people will not be flooded by too much information, as only relevant information will be given at the right time.
- Reduced cost to apply patches and security updates
- No loss of information with the access to the database.

LOG FILE SECURITY AUDIT

Telindus' Computer Forensics Centre helps companies to identify security events they were exposed to and to optimize the security level of their infrastructure. This post-mortem service allows tracing intrusions and other security problems and identifying weaknesses in the ICT architecture.

Archived events generated over a defined period on selected systems and network elements are analyzed to:

- Verify the implemented security policies
- Identify internal and external intrusion attempts and policy violations in regards of well-known attack patterns and abnormal behaviour determined by correlation, time-window analysis, stimulus analysis, sequencing, differential analysis
- Trace incidents
- Audit the used bandwidth of the various flows.

BUSINESS BENEFITS

- An executive summary with trends and majors security events
- An in-depth analysis of Events of Interest including an in-depth security analysis of the event, definition on the gravity, Log/file traces of the incidents or breaches and a possible correlation with other events, with Internet activity, with internal violations
- A list of activities to be taken to solve the Event of Interest.

COMPUTER INCIDENT FORENSICS

This service completes the Telindus Incident & Performance Management Service and is useful whenever an incident (virus, internal hacker...) has occurred on an IT infrastructure and would require the knowledge of a security expert to immediately evaluate the security risks and implications of the incident on-site. The on-site service provides complete traces of the incident

with an exhaustive report on implications, profiling, proofs, conclusion and actions to take.

BUSINESS BENEFITS

The deliverable is a full-detailed 'Computer Incident Report' containing:

- An executive summary
- The In depth analysis and explanation of the incident
- All the important log files, system traces and any other evidence in relation with the incident
- If possible a profile of the intruder
- Task-list including actions to be taken

ON-LINE WEB REPORTING

Telindus Remote Management Services offer a comprehensive reporting procedure aimed at various different types of audience. These reports range from executive management summaries to in-depth technical analysis in order to provide the right information to the right person.

Reports on all remote management services are provided 24x7 via the secured Telindus Web Report.

Statistical information on each Managed Element will be available on an individual basis and in aggregation.

Web Reports include Ticket Reporting, Performance Reporting, Incident Reporting, Intrusive Testing Reports and Computer Forensics Reporting.

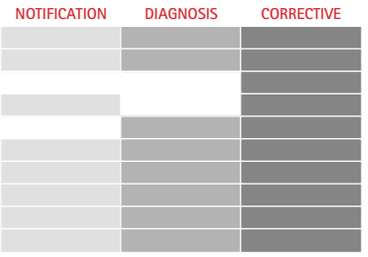
BUSINESS BENEFITS

- Constant updates on actions taken, incident status and performance of the secured network
- Being up-to-date on actions planned allows to take pro-active measures and to organize work
- Clear, extensive and comprehensive reporting allows thorough co-management of the network
- Value for money as it shows what has been done in order to keep business up and running
- Continuous improvement of the secure network and the quality of the service delivered to the business
- Conformance of the remote management services to the pre-agreed service levels

DIFFERENT SERVICE LEVELS

Telindus' Remote Management Services are delivered according to three different service levels:

- Incident & Performance Management
- Configuration Management
- Change Management
- MultiScan
- Intrusive Test
- Internet Connectivity Watch
- Security Research
- Log File Security Audit
- Computer Incident Forensics
- On-line Web Reporting



> Notification Service Level

Some customers have the ability to manage their security and networking equipment in-house, but do not have the time or ability to monitor systems on a 24x7 basis. For these organizations, Telindus can provide 24x7 services that will inform the client in the event of certain abnormalities or when performance parameters are not in line with the specified threshold values.

> Diagnosis Service Level

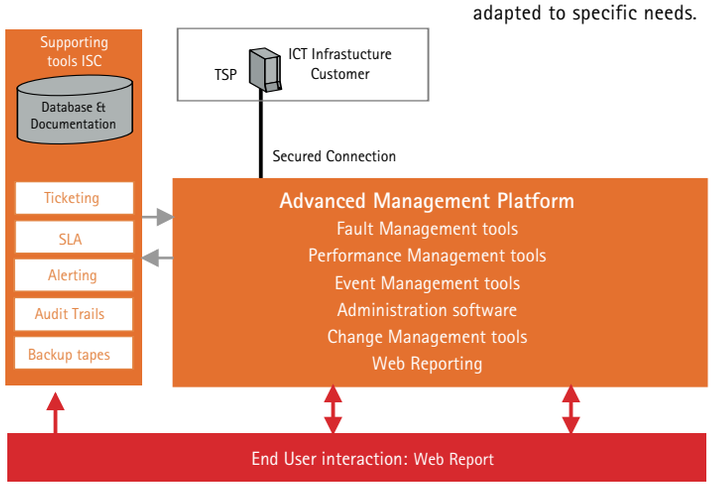
Many customers not only want to be notified of a potential problem, but they want to know what causes the incident. With a dedicated team of network and security professionals on staff, Telindus can provide a complete diagnostic assessment on any secured network, system or application problem that is discovered.

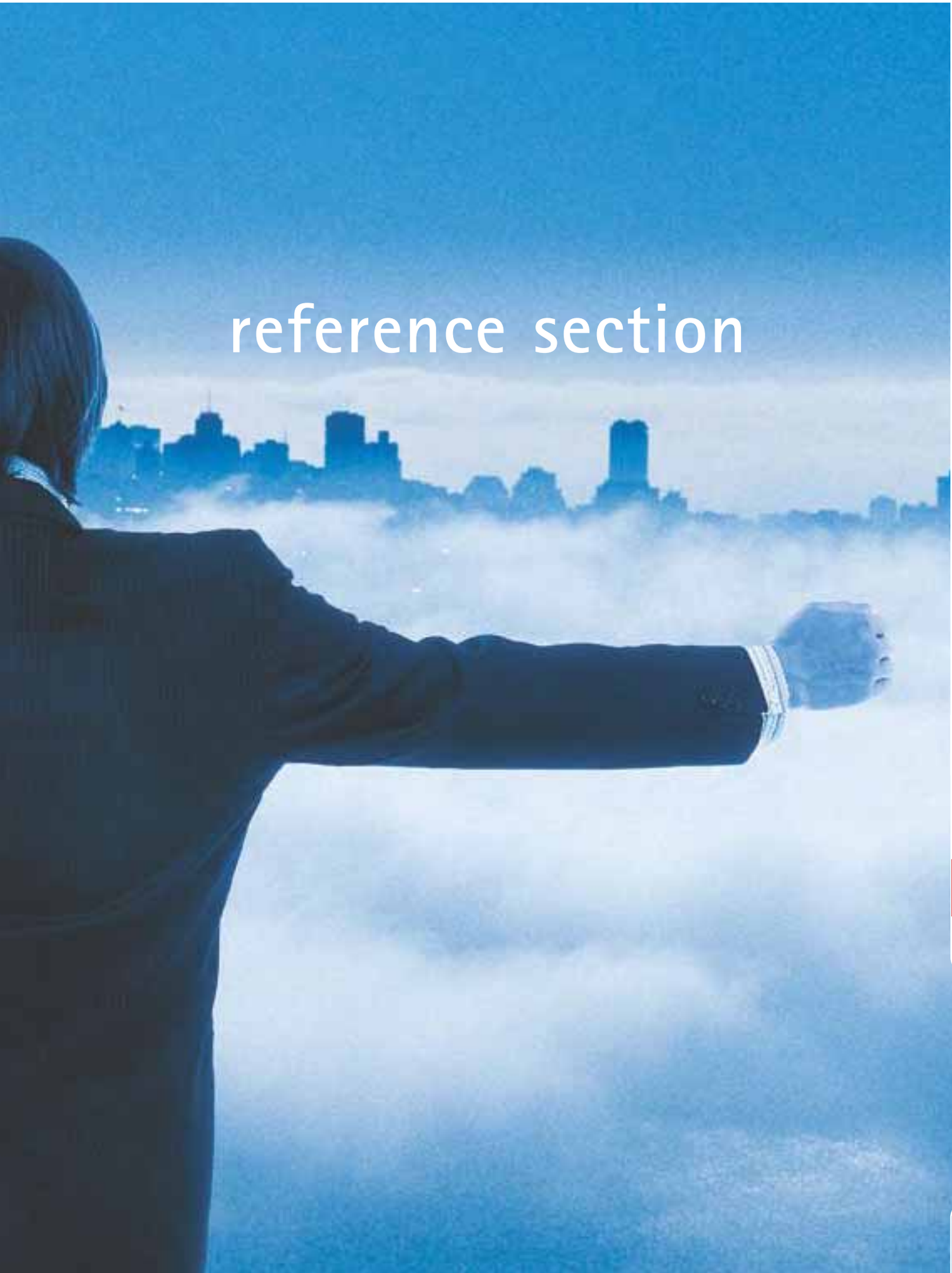
> Corrective Service Level

The full time management and monitoring of large secure networks can be an overwhelming task for many organizations. Pro-active risk assessment, software upgrades and security patch installations will prevent many potential network problems. When incidents do occur, Telindus will notify and diagnose the problem, and takes corrective action to fix the issue. This includes log file analysis, workaround evaluation and implementation. In the case of a critical incident, Telindus takes evasive action in order to protect the integrity of the network.

The result is a standardized, yet at the same time flexible service offering, allowing the customer to select several standard modules, and have them complemented with new specially developed and tailor-made services, adapted to specific needs.

V ISC MANAGEMENT INFRASTUCTURE





reference section

QUICK REFERENCE GUIDE

ACCESS ROUTERS

ROUTERS

	CROCUS ROUTER 2M G.703	CROCUS ROUTER 2M RS-530	1031 ROUTER	1032 ROUTER	1033 ROUTER	1034 ROUTER	1035 ORCHID	1061 ROUTER
> Desktop 230VAC (EUR)	167317	183746	177460	177463	177465	183014	177468	
> Desktop dual powered AC/DC								184364
> Desktop NPWR	171287	183747	177461	177464	177467	183015	177469	
> Desktop 230VAC (EUR) + 3DES				177627	177633	183016		
> Desktop NPWR + 3DES				177629	177634	183018		
> PWR-PLUG 230Vac -> Vdc EUR	171302	171302	175590	175590	175590	175590	175590	
> PWR-PLUG 230Vac -> Vdc UK	173720	173720	175592	175592	175592	175592	175592	
> PWR-PLUG 24/48Vdc -> Vdc	171304	171304	171304	171304	171304	171304	171304	
> Card version CN4							180330	
> Rack-mount-kit								183021

TELINDUS INTERFACE MODULES FOR 1061

	BASIC UNIT	DUAL FIBRE MULTI-MODE SHORT HAUL OPTION	DUAL FIBRE SINGLE-MODE MEDIUM HAUL OPTION
> TIM 4P 100BASE TX	181308		
> TIM 6E1 IMA	181312		
> TIM E3/T3 BNC	181310		
> TIM STM1 BU	181309	188295	188296

BROADBAND CENTRAL OFFICE

2400 SERIES

	2401 ADSL 8P ANNEX A	2401 ADSL 8P ANNEX B	2402 ADSL 16P ANNEX A	2402 ADSL 16P ANNEX B	2403 ADSL 24P ANNEX A	2403 ADSL 24P ANNEX B	2421 SHDSL 8P	2422 SHDSL 16P	2423 SHDSL 24P
> 48VDC wo splitter	182736	182739	182575	182576	182577	182578	181305	181306	181307
> AC / 48VDC wo splitter	182737	182740					183065		
> 48VDC with splitter	182573	182574							
> AC / 48VDC with splitter	182735	182738							
> 230VAC – 48VDC PSU			185881	185881	185881	185881		185881	185881
> Rack Mount Kit	183021	183021	183021	183021	183021	183021	183021	183021	183021

TELINDUS INTERFACE MODULES FOR 2400 SERIES

	BASIC UNIT	DUAL FIBRE MULTI-MODE SHORT HAUL OPTION	DUAL FIBRE SINGLE-MODE MEDIUM HAUL OPTION
> TIM 4P 100BASE TX	181308		
> TIM 6E1 IMA	181312		
> TIM E3/T3 BNC	181310		
> TIM STM1 BU	181309	188295	188296

ADSL SPLITTERS

> Splitter 24 POTS	184106
> Splitter 24 ISDN	184107

2400 ACCESSORIES

> 2901 Power Supply chassis	183019
> 2902 230VAC – 48VDC Power Supply 270W	183020

BROADBAND CPE

ADSL

	1110/1 ADSL BRIDGE	112X ADSL ROUTER	1221 ADSL ROUTER	1221 ADSL ROUTER 3DES
> Annex A 230Vac	182028	182030 (1120)	188513	
> Annex B 230Vac	182029	182031 (1121)	188536	
> Annex A 230Vac Wireless		184367 (1122)		
> Annex B 230Vac Wireless		183926 (1123)		
> Annex A 230Vac 4 port Ethernet		182032 (1124)		
> Annex B 230Vac 4 port Ethernet		182033 (1125)		
> Annex A 230Vac 1+3 Ethernet ports				188518
> Annex B 230Vac 1+3 Ethernet ports				188542
> Annex A 230Vac 1+3 Ethernet ports ISDN backup				188523
> Annex B 230Vac 1+3 Ethernet ports ISDN backup				188547
> Annex A 230Vac 1+3 Ethernet ports PSTN backup				188529
> PWR-PLUG 230Vac -> Vdc EUR			175590	175590
> PWR-PLUG 230Vac -> Vdc UK			175592	175592
> PWR-PLUG 24/48Vdc -> Vdc			171304	171304

LEGEND

XXXXXX Standard product | XXXXXX Product available on special order | **XXXXXX** New product: check availability

SHDSL

	1421 SHDSL ROUTER	1421 SHDSL 2P ROUTER	1421 SHDSL ROUTER 3DES	1421 SHDSL 2P ROUTER 3DES	1422 SHDSL ROUTER	1422 SHDSL 2P ROUTER	1431 SHDSL CPE	1431 SHDSL 2P CPE
> 230VAC (EUR)	177446	177452	177638	177636	186682	187874	178722	178717
> NPWR	177450	177454	177639	177637			178721	178718
> 230VAC 4 Ethernet					188493	188500		
> 230Vac 1+3 Ethernet			188495	188503				
> 230Vac 1+3 Eth. + ISDN backup			188498	188507				
> PWR-PLUG 230Vac -> Vdc EUR	171302	175590	175590	175590	175590	175590	175590	175590
> PWR-PLUG 230Vac -> Vdc UK	173720	175592	175592	175592	175592	175592	175592	175592
> PWR-PLUG 24/48Vdc -> Vdc	171304	171304	171304	171304	171304	171304		
> V35 intf							143666	143666
> V36 intf							142199	142199
> X21 intf							142200	142200
> RS530 intf							161611	161611
> G703 E1 intf RJ45 + BNC							188245	188245
> G703 E1 intf RJ45 + 1.6/5.6							188383	188383

TDM CENTRAL OFFICE

CN4

> Card nest CN4 (15 card positions, 19" rack-mount unit)	142189
> Desktop CN4 4-slots	163459
> Desktop CN4 2-slots (includes 48VDC and VAC PS)	167992
> Power Module 230/115Vac 300W (for Card nest CN4)	143678
> Power Module 230/115Vac 80W (for Desktop CN4 4-slots)	142190
> RP add-on chassis CN4 (add remote power source on CV)	157056

> RP source module 4 lines (1 module per CN4 card)	157058
> Blanking card slot	142187
> Blanking Power Module	142188
> Blanking Interface slot	142449
> CN4 2-slots Rack mount kit	179092

2300 SHDSL

	2301 (8P)	2302 (16P)	2303 (24P)	2321 (8P RP)	2322 (16P RP)	2323 (24P RP)
> 2300 SHDSL Series	181299	181300	181301	181302	181303	181304
> 230VAC – 48VDC PSU	185881	185881	185881	183019 and 183020	183019 and 183020	183019 and 183020

2300 ACCESSORIES

> 2901 Power Supply chassis	183019
> 2902 230VAC – 48VDC Power Supply 270W	183020

VOICEBAND MODEMS

ASTER 5

	V.24	RS530	V24 DES	RS530 DES
> Desktop Vac with LCD	171296	175573	179177	175572
> Desktop 24/48Vdc with LCD	171297	175582	179178	175580
> Desktop Vac without LCD	175578	175575		
> Desktop 24/48Vdc without LCD	175579	175583		
> TWIN Card version (2 modems/card)	185874	175587	179176	175585
> Interface cover for TWIN Card (2 per card)	154422	154422	154422	154422

EMBEDDED SOLUTIONS

> Socket modem module serial	181313
> Socket modem evaluation kit serial	181318
> Socket modem module parallel	189076
> Socket modem evaluation kit parallel	181319

TDM DSL MODEMS

CROCUS (MODULAR INTERFACE)

	HS NMS CENT	HS NMS REM	SDSL F 2M	SDSL F QUAD	HDSL 2P F	HDSL 3P F	SHDSL	SHDSL 2P
> Desktop Vac	142192	142194	165893		152483	152484	180055	180053
> Desktop 48Vdc		142195	165896		152485	152486	171284	171976
> Desktop 24Vdc							182598	182599
> Desktop Vac with LCD							180054	177938
> Desktop 48Vdc with LCD							177937	177939
> SINGLE Card version (CN4)						152488		180057
> TWIN Card version (2 modems/card)	142191		165897		152487		180057	171977
> QUAD Card version (4 modems/card)				160692				
Digital Interface modules								
> V35 intf	143666	143666	143666		143666	143666	143666	143666
> V35 Nx64 intf			149378	149378	149378	149378		
> V36 intf	142199	142199	142199		142199	142199	142199	142199
> V36 Nx64 intf			149377	149377	149377	149377		
> X21 intf	142200	142200	142200		142200	142200	142200	142200
> X21 Nx64 intf			149379	149379	149379	149379		
> RS530 intf	161611	161611	161611		161611	161611	161611	161611
> RS530 Nx64 intf			161612	161612	161612	161612		
> Router 2M intf	175256	175256	175256		175256	175256	175256	175256
> Router 2M Nx64 intf			175257		175257	175257		
> Router 10M intf	177455						177455	177455
> G703 64K intf	142197	142197	165901					
> G703 2Mbit/s intf RJ45 + BNC							175253	175253
> G703 2Mbit/s intf RJ45 + 1.6/5.6							175252	175252
> G703 E1 intf (128, 384, 768, 1152 kbit/s line speeds only) RJ45 + BNC			154404	154404				
> G703 E1 intf RJ45 + BNC			165899		143664	143664	175254	175254
> G703 E1 intf RJ45+ 1.6/5.6			165900		165898	165898	175255	175255
> G703 – Serial Dual intf RJ45 + BNC							177458	177458

CROCUS SHDSL (FIXED INTERFACE)

	SHDSL TT G703 RP	SHDSL 2P TT G703 RP	SHDSL TT G703	SHDSL TT RS530 RP	SHDSL 2P TT RS530 RP	SHDSL TT RS530	SHDSL QUAD CV DXC
> Desktop 230VAC (EUR)			181080			181082	
> Desktop NPWR	178715	178713	181081	178716	178714	181083	
> PWR-PLUG 230Vac -> Vdc EUR	175590	175590	175590	175590	175590	175590	
> PWR-PLUG 230Vac -> Vdc UK	175592	175592	175592	175592	175592	175592	
> CN4 card version							175258

CROCUS REMOTE POWERING & REPEATER ITEMS

> Cr. HDSL Repeater (including in-door housing)	164214
> Cr. HDSL Repeater card (without housing)	162015
> Cr. HDSL Repeater Indoor housing (1 repeater card)	162016
> Cr. HDSL Repeater Outdoor housing (2 repeater cards)	162017
> Cr. HDSL Repeater Outdoor housing (6 repeater cards)	162018

> Cr. SHDSL Repeater in Indoor housing	180913
> Cr. SHDSL Repeater IP67	180914
> Cr SHDSL Repeater IP67 + ext cable connect	184587
> Cr. SHDSL wetting current board for CV (up to 4 lines)	180329
> Cr SHDSL remote powering board for CV (up to 4 lines)	182466

FIBRE OPTIC MODEMS

CROCUS FO

	FO 10M	FO 45M
> Desktop 230/115 Vac	175659	171277
> Desktop 48Vdc	175660	171278
> TWIN card version (2 modems/card)	175658	171279
Digital Interface modules		
> V35 intf	143666	143666
> V36 intf	142199	142199
> X21 intf	142200	142200
> RS530 intf	161611	161611
> HSSI intf		171282
> Router intf (up to 2Mbit/s)	161613	161613
> Router 10M intf	177455	177455
> G703 E1 intf RJ45 + BNC	154404	154404
> 4 E1 intf	163369	163369
> G703 E3/T3 intf BNC		171280
> G703 E3/T3 intf 1.6/5.6		171281

FIBER OPTIC MODULES

	SC CONN.	ST CONN.
> 1300 nm Multi Mode Short Haul	159646	159650
> 1300 nm Single Mode Medium Haul	159648	159652
> 1300 nm Single Mode Long Haul	159649	160525
> Tx 1300 Single Fibre Single Mode Medium Haul	177620	
> Tx 1500 Single Fibre Single Mode Medium Haul	177621	
> Tx 1300 Single Fibre Single Mode Long Haul	179173	
> Tx 1500 Single Fibre Single Mode Long Haul	179175	

FIBRE PATCH CABLES

	2 METER	5 METER	10 METER
> SC – FC/PC Single Mode	172741	172742	172743
> SC – FC/APC8 Single Mode	172744	172745	172746
> SC – SC/APC8 Single Mode	172735	172736	172737
> SC – SC/APC9 Single Mode	172738	172739	172740
> SC – ST Single Mode	177623	177625	177622

MULTIPLEXERS AND INTERFACE CONVERTERS

	4E1 INV MUX	DXC 8P	DXC 16P	ADM 2P	E3 MUX	2M CNV CV	2M CNV V35	2M CNV X21	NX64 CNV
> Desktop 230/115 Vac (internal P.S.)	153862								171289
> Desktop 48Vdc (internal P.S.)	156363								171290
> Desktop 230VAC (EUR)							169319	169320	
> Desktop NPWR							175249	175250	
> PWR-PLUG 230Vac -> Vdc UK							173720	173720	
> PWR-PLUG 24/48Vdc -> Vdc							171304	171304	
> Single Card version CN4		167322	167323	171294	171293				
> TWIN Card version CN4						171292			171291
Digital Interface modules									
> V35 intf	143666			143666		143666			143666
> V36 intf	142199			142199		142199			142199
> X21 intf	142200			142200		142200			142200
> RS530 intf	161611			161611		161611			161611
> Router 2M intf				175256		175256			175256
> Router 10M Intf	177455			177455	177455				
> G703 E1 intf RJ45 + BNC				175254					
> G703 E1 intf RJ45 + 1.6/5.6				175255					
> 4 E1 intf					163369				
> Rack mount kit	150322								

ISDN MULTIPLEXERS

> PRI_MUX with 4PRI; desktop Vac	180032
> ID_MUX with 2PRI & 8BRI; desktop Vac	180034
> Fail-safe relay for PRI_MUX	180037
> 4 generic interfaces (V35,V36,X21) for PRI_MUX & ID_MUX	180038
> DX_C2_VX_V35_T (Cable 2m)	180046
> DX_C2_VX_V36_T (Cable 2m)	180047
> DX_C2_VX_X21_T (Cable 2m)	180048
> E800 with 8PRI; desktop Vac	180036

> E800 with 8PRI; card version	180035
> DX_E800_MSC_T	180977
> E141 with 1PRI, 4BRI, 1 serial, desktop Vac	180039
> E201 with 2PRI, 1 serial, desktop Vac	180040
> 19" subrack (10/12 card positions, _ power modules)	180041
> Power module 230/115Vac 200W for subrack	180042
> Rack-mount kit for PRI-MUX & ID-MUX	180043
> Spare power adapter	180044

NETWORK MAINTENANCE AND MANAGEMENT

SOFTWARE

	TTMA HP/OV	TMA ELMGT	TMA_CLI	TMA INV MGT	TMA PATH MGT TDM
> Demo version (<= 8 dev)	156986	156986		156986	156986
> Windows entry level (<= 250 dev)	156689	187385			
> Windows (unlimited)	156690	187386	171267	177948	177952
> Sun Solaris entry level (<= 250 dev)	156685	187387			
> Sun Solaris (unlimited)	156686	187388	171267	177948	177952
> Windows entry level (<= 250 dev) + 3Y maint.fee	186598	187393			
> Windows (unlimited) + 3Y maint.fee	186599	187394	186597	189051	189053
> Sun Solaris entry level (<= 250 dev) + 3Y maint.fee	186600	187395			
> Sun Solaris (unlimited) + 3Y maint.fee	186601	187396	186597	189051	189053
> Upgrade entry level to unlimited version	171269	187456			
> Maintenance contract entry level + 1Y fee	158673	187389			
> Maintenance contract unlimited + 1Y fee	158674	187390	163135	177949	177953
> Maintenance contract entry level + 3Y fee	177956	187391			
> Maintenance contract unlimited + 3Y fee	177942	187392	177947	189052	189054

HARDWARE

	ORCHID 1035	ORCHID DM	EASY-CONNECT
> Desktop 230VAC (EUR)	177468		175259
> Desktop NPWR	177469	171295	177432
> PWR-PLUG 230Vac -> Vdc EUR	175590	171302	175590
> PWR-PLUG 230Vac -> Vdc UK	175592	173720	175592
> PWR-PLUG 48Vdc -> Vdc	171304	171304	171304
> Card version CN4	180330		

ACCESSORIES AND CABLES

ACCESSORIES

> BALUN G703 BNC/RJ45 SINGLE CNV	185876
> PATCH PANEL 24 * RJ45 TO LSA PLUS CL5 AMP	133017
> PATCH PANEL 48 * RJ45 TO LSA PLUS CL5 AMP	133018
> PATCH PANEL 96 * RJ45 TO LSA PLUS CL5 AMP	133019

CABLES

	1 METER	3 METER	5 METER
Management Cables			
> CBL TMA DB9F-RJ45	173760	173761	173763
> CBL TMA DB25F-RJ45	173765	173766	173767
> CBL TMA DB25F-DB25M	173768	173769	173770
> CBL TMA DB9F-DB25M	173771	173772	173773
> CBL TMA DB9F-DB9M	173774	173775	173776
> CBL TMA DB9M-DB9M	181077	181078	181079
> CBL TMA DB25F-DB9M	173777	173778	173779
> CBL TMA Cross DB9F-RJ45	173780	173781	173782
> CBL TMA Cross DB25F-RJ45	173783	173784	173785
> CBL TMA RJ45-DB9M	173792	173793	173794
> CBL TMA DB9M-DB9M Cross	173795	173797	173798
> CBL TMA DB9M-RJ45	173800	173801	173802
> CBL TMA Cross RJ45-RJ45	173803	173804	173805
> CBL TMA Cross DB9M-RJ45	173806	173808	173809
> CBL O1003 – DCE SYNC	141989		152896
> CBL O1003 – DTE SYNC	145939		152897
G703/ISDN cables	1 METER	3 METER	5 METER
> CBL PRI/E1/BRI RJ45-RJ45 straight	182925	182926	182927
> CBL BRI RJ45-RJ45 Cross	182931	182932	182933
> CBL PRI/E1 RJ45-RJ45 Cross	182928	182929	182930
G703 cables 2300 Series	1 METER	3 METER	5 METER
> CBL DB25M – wires 12*2*CAT5E	182934	182935	182936
LAN cables	1 METER	3 METER	5 METER
CBL RJ45-RJ45 straight CAT5E	173786	173787	173788
> CBL RJ45-RJ45 crossed CAT5E	173789	173790	173791
Line cables	1 METER	3 METER	5 METER
> CBL Line RJ12 – RJ12 CAT5E	182940	182579	182941
> CBL Line RJ12 – RJ45 CAT5E	182942	182581	182943
> CBL Line RJ45 – RJ45 CAT5E	182944	182582	182945
> CBL Line RJ12 – 2*RJ12 CAT5E	182946	182583	182947
> CBL Line RJ12 – 2*RJ45 CAT5E	182948	182585	182949
> CBL Line RJ45 – 2*RJ12 CAT5E	182950	182586	182993
> CBL Line RJ45 – 2*RJ45 CAT5E	182953	182588	182954
> Adapter cable RJ45 to screw conn.	185322*		

CABLES

	1 METER	3 METER	5 METER
Line cables 2300 / 2400 Series			
> CBL Telco M /wires 24*2*0,14 120°	182955	182590	182956
> CBL Telco M/M 24*2*0,14 120°	182957	182591	182958***
RS530 cables for DCE (modems)	1 METER	3 METER	5 METER
> CBL RS530M – V35M sh	170458**		182965
> CBL DCE RS530M – DTE V36M sh	182968**		182969
> CBL DCE RS530M – DTE X21M sh	182970**		182971
RS530 cables for DTE (routers)	1 METER	3 METER	5 METER
> CBL RS530M – V35M sh	170458**		182965
> CBL DTE RS530M – DCE V36M sh	170459**		182966
> CBL DTE RS530M – DCE X21M sh	170457**		182967
Dual Port Intf RS530 cables	1 METER	3 METER	5 METER
> CBL DPINTF DB26M Serial - V35M sh	180981	180982	180983
> CBL DPINTF DB26M Serial - V36M sh	180984	180985	180986
> CBL DPINTF DB26M Serial – X21M sh	180987	180988	180989
> CBL DPINTF DB26M Serial – RS530M sh	180978	180979	180980
> CBL DPINTF DB26M Serial - V35F sh	183630*		
> CBL DPINTF DB26M Serial - V36F sh	183631*		
> CBL DPINTF DB26M Serial – X21F sh	183632*		
> CBL DPINTF DB26M Serial – RS530F sh	183633*		
1035 CV RS530 cables	1 METER	3 METER	5 METER
> CBL DB26M Serial - V35M sh	183878	183879	183881
> CBL DB26M Serial - V36M sh	183883	183884	183885
> CBL DB26M Serial – X21M sh	183887	183888	183889
> CBL DB26M Serial – RS530M sh	183874	183875	183876
> CBL DB26M Serial - V35F sh	183877*		
> CBL DB26M Serial - V36F sh	183882*		
> CBL DB26M Serial – X21F sh	183886*		
> CBL DB26M Serial – RS530F sh	183873*		
Other serial cables	1 METER	3 METER	5 METER
> CBL V35 M/M sh	139176	139177	139178
> CBL V35 M/F sh	139181	139182	139183
> CBL X21 M/M sh	126541	182972	149185
> CBL X21M/F sh	126226	142593	138102
> CBL V24/RS530 (DB25) M/M sh	182973	182974	182975
> CBL V24/RS530 (DB25) M/F sh	182976	182977	182978

* 0.5m instead of 1m
** 2m instead of 1m
***6m instead of 5m

VIDEO SURVEILLANCE

CENTAURI

General	
> Chassis (AC) including controller with ATM Multi Mode Fibre	177913
> Chassis (AC) including controller with ATM Single Mode(16dB) Fibre	168533
> Chassis (AC) including controller with ATM Single Mode(26dB) Fibre	168533
> Chassis (AC) including controller with ATM 155Mb/S Cat.5 UTP	168537
> Chassis (AC) including controller with IP Interface (without GBIC)	184109
> Power Supply 400W - 110-120/230-240VAC	168538
> Power Supply 400W - 48VDC	168539
> Table Top Mounting cover	168540
Ethernet Controller cards	
> Spare Centralised IP Controller Module (without GBIC)	184110
> GBIC UTP	184422
> GBIC Multimode fibre	184424
> GBIC Single mode fibre	184425
ATM Controller cards	
> Spare Controller with ATM Multi Mode Fibre	168389
> Spare Controller with ATM Single Mode (16dB) Fibre	168390
> Spare Controller with ATM Single Mode (26dB) Fibre	168391
> Spare Controller with ATM Single 155Mb/S Cat.5 UTP	168392
> Optional ATM Interface module with 2 Multi Mode interfaces	177870
> Optional ATM Interface module with 2 Single Mode(16dB) interfaces	177871
> Optional ATM Interface module with 2 Single Mode(26dB) interfaces	177872
> Optional ATM Interface module with 2 155Mb/s Cat.5 UTP ATM interfaces	177873
Video MJPEG cards	
> 6 Port input Card	168393
> 4 Port input Card	168394
> 2 Port output Card	168395
> 4 Port output Card	168396
> 4 Port output Card / Quad Display	181056
> 2 Port output Card / 2 Image Output display-Cutover	177869
Video MPEG2 cards	
> 4 Port input Card	184112
> 2 Port input Card	184428
> 4 Port Output Card	184114
> 2 Port Output Card	184429
Audio cards	
> High Density Audio module	184430
> I/O unit	
> IO UNIT with 32 inputs/outputs	184157

4000 SERIES

4100 series	
> Telindus 4100 MPEG-4 Encoder	189088
> Telindus 4100 MPEG-4 Decoder	189089
> Telindus 4100 19" Rackmount Kit (for 3 units)	189090
4200 series	
> Telindus 4200 MPEG-2	189091
> Telindus 4200 19" Rackmount Kit (for 2 units)	189092

SURVEILLANCE MANAGEMENT SUITE

> Operator workstation application	181057
> Network manager license for 50 nodes	182817
> Network manager license for 50 nodes with HP Openview integration	184431
> Event Handling system single user license	184158
> Gateway application for application integration	184432
> Vision visualistaion software single user license	184433
> ATM PCI NIC (SC MMF) with MS OS system drivers	184434
> ATM PCI NIC (UTP5) with MS OS	184435

APPLICATION INTEGRATION

SMS GATEWAY

	PRODUCT	MAINTENANCE CONTRACT
> smsgate lite	183165	183166
> smsgate lite+	183167	183168
> smsgate server	183169	183170
> smsgate server mobile originator	183171	183172
> smsgate server smpp connector	183173	183174
> smsgate server ucp connector	183175	183176
> smsgate server dbase integration	183177	183178
> **Mobile originator hardware kit**		
> Siemens TC35 terminal	176031	
> 220v power supply for TC35 terminal	176032	
> Nano magnet antenna - 900/1800mhz	176033	
> Adapter FMA m/m	158127	
> Cable DB9m-DB9f pin to pin 2m	139370	

GROUP ACCESS FUNCTIONALITY (GAF)

	PRODUCT	MAINTENANCE CONTRACT
> gaf_light (< 100 ip phones)	183179	183180
> gaf_light (100-250 ip phones)	183181	183182
> gaf_light (> 250 ip phones)	183183	183184
> gaf_exchange (< 100 ip phones)	183185	183186
> gaf_exchange (100-250 ip phones)	183187	183188
> gaf_exchange (> 250 ip phones)	183189	183190

CONNECTOR PIN LAY-OUT

> THE MOST COMMON PIN-LAYOUT DESCRIPTIONS, AS THEY ARE IMPLEMENTED ON THE TELINDUS ACCESS EQUIPMENT.

RS-232 (DB25)

PIN	CIRCUIT	SIGNAL	FUNCTION	DCE
1			PROTECTIVE GROUND	
2	103	TXD	TRANSMIT DATA	INPUT
3	104	RXD	RECEIVE DATA	OUTPUT
4	105	RTS	REQUEST TO SEND	INPUT
5	106	CTS	CLEAR TO SEND	OUTPUT
6	107	DSR	DATA SET READY	OUTPUT
7	102	GND	SIGNAL GROUND	-
8	109	DCD	DATA CARRIER DETECT	OUTPUT
9		GPIN	CUSTOMISED INTERFACE SIGNALLING	INPUT
10		GPOUT	CUSTOMISED INTERFACE SIGNALLING OUTPUT	OUTPUT
11	126	CS	CHANNEL SELECT	INPUT
12	112	DRI	DATA SIGNAL RATE INDICATOR	OUTPUT
13		STDL	SELECT USER PROFILE	INPUT
14	116.1/2	SSTBY	SELECT STANDBY	INPUT
15	114	TXCLK	TRANSMIT CLOCK	OUTPUT
16	117	STBYI	STANDBY INDICATOR	OUTPUT
17	115	RXCLK	RECEIVE CLOCK	OUTPUT
18	141	AL	LOCAL ANALOGUE LOOP BACK TEST REQUEST	INPUT
19		LLOK	LEASED LINE QUALITY INDICATION	OUTPUT
20	108	DTR	DATA TERMINAL READY	INPUT
21	140	RDL	REMOTE DIGITAL LOOP BACK REQUEST	INPUT
22	125	RI	RING	OUTPUT
23	111	DRS	DATA SIGNAL RATE SELECTOR	INPUT
24	113	EXTCLK	EXTERNAL CLOCK	INPUT
25	142	TI	TEST INDICATOR	OUTPUT

RS-232 (DB9)

PIN	CIRCUIT	SIGNAL	FUNCTION	DCE
1	109	DCD	DATA CARRIER DETECT	OUTPUT
2	104	RXD	RECEIVE DATA	OUTPUT
3	103	TXD	TRANSMIT DATA	INPUT
4	108	DTR	DATA TERMINAL READY	INPUT
5	102	GND	SIGNAL GROUND	-
6	107	DSR	DATA SET READY	OUTPUT
7	105	RTS	REQUEST TO SEND	INPUT
8	106	CTS	CLEAR TO SEND	OUTPUT
9	125	RI	RING	OUTPUT

10BASE-T ETHERNET (RJ45)

PIN	SIGNAL	DCE
1	TRANSMIT – POSITIVE	OUTPUT
2	TRANSMIT – NEGATIVE	OUTPUT
3	RECEIVE – WIRE A	INPUT
6	INDICATOR – WIRE A	INPUT

V.35 (34 PIN WINCHESTER)

PIN	CIRCUIT	SIGNAL	FUNCTION	DCE
B	102	GND	COMMON RETURN	-
C	105	RTS	REQUEST TO SEND	INPUT
D	106	CTS	CLEAR TO SEND	OUTPUT
E	107	DSR	DATA SET READY	OUTPUT
F	109	DCD	DATA CARRIER DETECT	OUTPUT
L	141	AL	ANALOGUE LOOP (L3)	INPUT
N	140	RDL	REMOTE DIGITAL LOOP (RL2)	INPUT
P	103	TXD A	TRANSMIT DATA – WIRE A	INPUT
R	104	RXD A	RECEIVE DATA – WIRE A	OUTPUT
S	103	TXD B	TRANSMIT DATA – WIRE B	INPUT
T	104	RXD B	RECEIVE DATA – WIRE B	OUTPUT
U	113	EXTCLK A	EXTERNAL CLOCK – WIRE A	INPUT
V	115	RXCLK A	RECEIVE CLOCK – WIRE A	OUTPUT
W	113	EXTCLK B	EXTERNAL CLOCK – WIRE B	INPUT
X	115	RXCLK B	RECEIVE CLOCK – WIRE B	OUTPUT
Y	114	TXCLK A	TRANSMIT CLOCK – WIRE A	OUTPUT
AA	114	TXCLK B	TRANSMIT CLOCK – WIRE B	OUTPUT
NN	142	TST	TEST INDICATOR	OUTPUT

G.703/ 64K AND 2M (RJ45)

PIN	SIGNAL	DCE
1	RECEIVE A	OUTPUT
2	RECEIVE B	OUTPUT
3	SIGNAL GROUND	
4	TRANSMIT A	INPUT
5	TRANSMIT B	INPUT
6	SIGNAL GROUND	-
7	NOT USED	-
8	NOT USED	-

X.21 (DB15)

PIN	CIRCUIT	SIGNAL	DCE
2	T (A)	TRANSMIT – WIRE A	INPUT
3	C (A)	CONTROL – WIRE A	INPUT
4	R (A)	RECEIVE – WIRE A	OUTPUT
5	I (A)	INDICATOR – WIRE A	OUTPUT
6	S (A)	SIGNAL ELEMENT TIMING – WIRE A	OUTPUT
7	X (A)	EXTERNAL CLOCK – WIRE A	INPUT
8	G	SIGNAL GROUND	-
9	T (B)	TRANSMIT – WIRE B	INPUT
10	C (B)	CONTROL – WIRE B	INPUT
11	R (B)	RECEIVE – WIRE B	OUTPUT
12	I (B)	INDICATOR – WIRE B	OUTPUT
13	S (B)	SIGNAL ELEMENT TIMING – WIRE B	OUTPUT
14	X (B)	EXTERNAL CLOCK – WIRE B	INPUT

RS-449 – V.36 (DB37)

PIN	CIRCUIT	SIGNAL	FUNCTION	DCE
4	103	TXD A	TRANSMIT DATA – WIRE A	INPUT
5	114	TXCLK A	TRANSMIT CLOCK – WIRE A	OUTPUT
6	104	RXD A	RECEIVE DATA – WIRE A	OUTPUT
7	105	RTS A	REQUEST TO SEND – WIRE A	INPUT
8	115	RXCLK A	RECEIVE CLOCK – WIRE A	OUTPUT
9	106	CTS A	CLEAR TO SEND – WIRE A	OUTPUT
10	141	AL A	ANALOGUE LOOP (L3) – WIRE A	INPUT
11	107	DSR A	DATA SET READY – WIRE A	OUTPUT
13	109	DCD A	DATA CARRIER DETECT – WIRE A	OUTPUT
14	140	RDL A	REMOTE DIGITAL LOOP (RL2) – WIRE A	INPUT
17	113	EXTCLK A	EXTERNAL CLOCK – WIRE A	INPUT
18	142	TST A	TEST INDICATOR – WIRE A	OUTPUT
19	102	GND	SIGNAL GROUND	-
20	102B	GND	COMMON RETURN DCE	-
22	103	TXD B	TRANSMIT DATA – WIRE B	INPUT
23	114	TXCLK B	TRANSMIT CLOCK – WIRE B	OUTPUT
24	104	RXD B	RECEIVE DATA – WIRE B	OUTPUT
25	105	RTS B	REQUEST TO SEND – WIRE B	INPUT
26	115	RXCLK B	RECEIVE CLOCK – WIRE B	OUTPUT
27	106	CTS B	CLEAR TO SEND – WIRE B	OUTPUT
29	107	DSR B	DATA SET READY – WIRE B	OUTPUT
31	109	DCD B	DATA CARRIER DETECT – WIRE B	OUTPUT
35	113	EXTCLK B	EXTERNAL CLOCK – WIRE B	INPUT
37	102A	GND	COMMON RETURN DTE (AL B, RDL B)	-

RS-530 (A) (DB25)

PIN	CIRCUIT	SIGNAL	FUNCTION	DCE
1	-	SHIELD		-
2	103	BA	TRANSMIT DATA A	INPUT
3	104	BB	RECEIVE DATA A	OUTPUT
4	105/133	CA/CJ	REQUEST TO SEND / READY TO RECEIVE A	INPUT
5	106	CB	CLEAR TO SEND A	OUTPUT
6	107	CC	DCE READY (A)	OUTPUT
7	102A	AB	COMMON SIGNAL	-
8	109	CF	RECEIVED LINE SIGNAL DETECTOR A	OUTPUT
9	115	DD	RECEIVE SIGNAL ELEMENT TIMING B	OUTPUT
10	109	CF	RECEIVED LINE SIGNAL DETECTOR B	OUTPUT
11	113	DA	TRANSMIT SIGNAL ELEMENT TIMING B (DTE)	INPUT
12	114	DB	TRANSMIT SIGNAL ELEMENT TIMING B (DCE)	OUTPUT
13	106	CB	CLEAR TO SEND B	OUTPUT
14	103	BA	TRANSMIT DATA B	INPUT
15	114	DB	TRANSMIT SIGNAL ELEMENT TIMING A (DCE)	OUTPUT
16	104	BB	RECEIVE DATA B	OUTPUT
17	115	DD	RECEIVE SIGNAL ELEMENT TIMING A	OUTPUT
18	141	LL	LOCAL LOOP	INPUT
19	105/133	CA/CJ	REQUEST TO SEND / READY TO RECEIVE B	INPUT
20	108,1,2	CD	DTE READY (A)	INPUT
21	140	RL	REMOTE LOOP	INPUT
22	125	CE	NOT USED (DCE READY B)	(OUTPUT)
23	102B	AC	GND (DTE READY B)	(INPUT)
24	113	DA	TRANSMIT SIGNAL ELEMENT TIMING A (DTE)	INPUT
25	142	TM	TEST MODE	OUTPUT

HSSI (HIGH SPEED SERIAL INTERFACE)

PIN	CIRCUIT	SIGNAL	DCE
1	SG	SIGNAL GROUND	-
2	RT (POS.)	RECEIVE TIMING	OUTPUT
3	CA (POS.)	DATA COMMUNICATIONS EQUIPMENT AVAILABLE	OUTPUT
4	RD (POS.)	RECEIVE DATA	OUTPUT
5	LC (POS.)	LOOP-BACK CIRCUIT C	OUTPUT
6	ST (POS.)	SEND TIMING	OUTPUT
7	SG	SIGNAL GROUND	-
8	TA (POS.)	DATA TERMINAL EQUIPMENT AVAILABLE	INPUT
9	TT (POS.)	TERMINAL TIMING	INPUT
10	LA (POS.)	LOOP-BACK CIRCUIT A	INPUT
11	SD (POS.)	SEND DATA	INPUT
12	LB (POS.)	LOOP-BACK CIRCUIT B	INPUT
13	SG	SIGNAL GROUND	-
14 – 18	RESERVED	–	-
19	SG	SIGNAL GROUND	-
20 – 23	RESERVED	–	-
24	TM (POS.)	TEST MODE	OUTPUT
25	SG	SIGNAL GROUND	-
26	SG	SIGNAL GROUND	-
27	RT (NEG.)	RECEIVE TIMING	OUTPUT
28	CA (NEG.)	DATA COMMUNICATIONS EQUIPMENT AVAILABLE	OUTPUT
29	RD (NEG.)	RECEIVE DATA	OUTPUT
30	LC (NEG.)	LOOP-BACK CIRCUIT C	OUTPUT
31	ST (NEG.)	SEND TIMING	OUTPUT
32	SG	SIGNAL GROUND	-
33	TA (NEG.)	DATA TERMINAL EQUIPMENT AVAILABLE	INPUT
34	TT (NEG.)	TERMINAL TIMING	INPUT
35	LA (NEG.)	LOOP-BACK CIRCUIT A	INPUT
36	SD (NEG.)	SEND DATA	INPUT
37	LB (NEG.)	LOOP-BACK CIRCUIT B	INPUT
38	SG	SIGNAL GROUND	-
39 – 43	RESERVED	–	-
44	SG	SIGNAL GROUND	-
45 – 48	RESERVED	–	-
49	TM (NEG.)	TEST MODE	OUTPUT
50	SG	SIGNAL GROUND	-

DIGITAL HIERARCHY

> FOLLOWING TABLE GIVES THE AMERICAN AND EUROPEAN NAMING FOR THE MOST COMMON SPEEDS IN THE DIGITAL HIERARCHY.

UNITED STATES		EUROPE	
T1/DS1	> 1,544 M	E1	> 2,048 M
T2	> 6 M	E2	> 8 M
T3/DS3	> 44 M	E3	> 34 M
T4	> 279 M	E4	> 139 M

SONET	SDH	FIBRE OPTIC		
STS-1	-	OC-1	>	51,84 M
STS-3	STM-1	OC-3	>	155,52 M
STS-12	STM-4	OC-12	>	622,08 M
STS-24	-	OC-24	>	1,244 G
STS-48	STM-16	OC-48	>	2,488 G
STS-192	STM-64	OC-192	>	10 G
STM-256	-		>	40 G
STS-N	STM-M	OC-N	>	N x 51,84 M

AWG CONVERSION TABLE

> THIS TABLE CONVERTS THE AMERICAN STANDARD FOR WIRE DIAMETER AWG (AMERICAN WIRE GAUGE) INTO EUROPEAN WIRE DIAMETER, EXPRESSED IN MILLIMETRE (MM).

AWG	INCHES	MM
40	0.0031	0.079
39	0.0035	0.089
38	0.004	0.102
37	0.0045	0.114
36	0.005	0.127
35	0.0056	0.142
34	0.0063	0.16
33	0.0071	0.18
32	0.008	0.203
31	0.0089	0.226
30	0.01	0.254
29	0.0113	0.287
28	0.0126	0.32
27	0.0142	0.361
26	0.0159	0.404
25	0.0179	0.455

AWG	INCHES	MM
24	0.0201	0.511
23	0.0226	0.574
22	0.0253	0.643
21	0.0285	0.724
20	0.032	0.813
19	0.0359	0.912
18	0.0403	1.02
17	0.0453	1.15
16	0.0508	1.29
15	0.0571	1.45
14	0.0641	1.63
13	0.072	1.83
12	0.0808	2.05
11	0.0907	2.3
10	0.1019	2.6

STANDARDS GLOSSARY

> THIS SECTION GIVES A SHORT DESCRIPTION OF THE MOST COMMON STANDARDS AND RECOMMENDATIONS, AS THEY ARE USED IN ACCESS AND VIDEO NETWORKS.

802.1D
> Bridging with spanning tree protocol

802.1P
> VLAN priority queuing

802.1Q
> VLAN interconnect

802.1T
> Media Access Control (MAC) Bridges

802.3
> The media access control characteristics for the Carrier Sense Multiple Access with Collision Detection access method for shared medium local area networks.

802.3AB
> Gigabit Ethernet operation over distances of up to 100 meters using four pairs of CAT-5 balanced copper cabling.

802.3U
> The media access control characteristics for the Carrier Sense Multiple Access with Collision Detection access method for shared medium local area networks at 100 Mbps.

802.3Z
> The Gigabit Ethernet standard.

802.5
> A Local Area Network protocol suite commonly known as Token Ring. A standard originated by IBM for a token passing ring network that can be configured in a star topology. Versions supported are 4 Mbps and 16 Mbps.

AF-ILMI-0065.000
> Integrated Local Management Interface (ILMI)

AF-UNI-0010.001
> User-Network Interface version 3.1 (UNI 3.0)

AF-UNI-0010.002
> User-Network Interface (UNI 3.1)

CISPR 22
> See EN 55022

E.164
> A public network addressing standard utilising up to a maximum of 15 digits. ATM uses E.164 addressing for public network addressing.

EN 41003
> This standard applies to equipment designed and intended to be connected to a TELECOMMUNICATIONS NETWORK termination. It does not apply to equipment covered by EN 60950. It specifies requirements intended to ensure safety for the operator and layman who may come into contact with the equipment and, where specifically stated, for service personnel

EN 50081-1
> See EN 61000-6-3

EN 50082-1
> See EN 61000-6-1

EN 50082-1
> See EN 61000-6-1

EN 50121-4
> Electromagnetic immunity of the signalling and telecommunications apparatus in railway applications.

EN 55022
> Procedures are given for the measurement of the levels of spurious signals generated by the equipment and limits are specified for the frequency range 9 kHz to 400. The intention of this standard is to establish uniform requirements for the radio disturbance level of the equipment contained in the scope, to fix limits of disturbance, to describe methods of measurement and to standardise operating conditions and interpretation of results.

EN 60380
> see EN 60950

EN 60435
> see EN 60950

EN 60529
> Degrees of protection provided by enclosures (IP Code).

EN 60801-2
> see EN 61000-4-2

EN 60950
> Applies to information technology equipment including electrical business equipment and associated equipment, with a rated voltage not exceeding 600 V. Specifies requirements intended to ensure safety for the operator and layman who may come into contact with the equipment and, where specifically stated, for service personnel. Supersedes EN 60380 and 60435.

EN 61000-3-3
> This section of IEC 61000-3 is concerned with the limitation of voltage fluctuations and flicker impressed on the public low-voltage system. It specifies limits of voltage changes, which may be produced by equipment tested under specified conditions, and gives guidance on methods of assessment. This section is applicable to electrical and electronic equipment having an input current up to and including 16 A per phase and intended to be connected to public ow-voltage distribution systems of between 220 V and 250 V at 50 Hz line to neutral.

EN 61000-4-11
> This standard defines the immunity test methods and range of preferred test levels for electrical and electronic equipment connected to low voltage power supply networks for voltages dips, short interruptions, and voltage variations. It applies to electrical and electronic equipment having a rated input current not exceeding 16 A per phase. It does not apply to electrical and electronic equipment for connection to d.c. networks or 400 Hz a.c. networks.

EN 61000-4-2
> This publication is based on EN 60801-2 (second edition: 1991). It relates to the immunity requirements and test methods for electrical and electronic equipment subjected to static electricity discharges. It additionally defines ranges of test levels, which relate to different environmental and installation conditions and establishes test procedures. The object of this standard is to establish a common and reproducible basis for evaluating the performance of electrical and electronic equipment when subjected to electrostatic discharges. In addition, it includes electrostatic discharges, which may occur from personnel to objects near vital equipment

EN 61000-4-3
> Applies to the immunity of electrical and electronic equipment to radiated electromagnetic energy. Establishes test levels and the required test procedures. Establishes a common reference for evaluating the performance of electrical and electronic equipment when subjected to radio-frequency electromagnetic fields

EN 61000-4-4
> Relates to the immunity requirements and test methods for electrical and electronic equipment to repetitive electrical fast transients. Additionally defines ranges of test levels and establishes test procedures. The object of this standard is to establish a common and reproducible basis for evaluating the performance of electrical and electronic equipment when subjected to repetitive fast transients (bursts), on supply, signal and control ports.

EN 61000-4-5
> Relates to the immunity requirements, test methods, and range of recommended test levels for equipment to unidirectional surges caused by overvoltages from switching and lightning transients. Several test levels are defined which relate to different environment and installation conditions. Establishes a common reference for evaluating the performance of equipment when subjected to high-energy disturbances on the power and inter-connection lines.

EN 61000-4-6
> Relates to the conducted immunity requirements of electrical and electronic equipment to electromagnetic disturbances coming from intended radio-frequency (RF) transmitters in the frequency range 9 kHz up to 80 MHz. This standard does not intend to specify the tests to be applied to particular apparatus or systems. Its main aim is to give a general basic reference to all concerned product committees of the IEC. The product committees (or users and manufacturers of equipment) remain responsible for the appropriate choice of the test and the severity level to be applied to their equipment.

EN 61000-4-8
> Relates to the immunity requirements of equipment, only under operational conditions, to magnetic disturbances at power frequency related to: - residential and commercial locations - industrial installations and power plants - medium voltage and high voltage sub-stations

EN 61000-4-9
> Relates to the immunity requirements of equipment, only under operational conditions, to pulse magnetic disturbances mainly related to: - industrial installations and power plants – medium voltage and high voltage sub-stations.

EN 61000-6-1
> Defines the immunity test requirements in relation to continous and transient, conducted and radiated disturbances, including electrostatic discharges, for electrical and electronic apparatus intended for use in residential, commercial and light-industrial environment, and for which no dedicated product or product-family standard exists. Immunity requirements in the frequency range 0 kHz to 400 GHz are covered and are specified for each port considered. This standard applies to apparatus intended to be directly connected to a low-voltage public mains network or connected to a dedicated d.c. source which is intended to interface between the apparatus and the low-voltage public mains network.

EN 61000-6-3

> This standard for emission requirements applies to electrical and electronic apparatus intended for use in the residential, commercial and light-industrial environment, for which no dedicated product or product-family emission standard exists. Apparatus designed to radiate electromagnetic energy for radio communications purposes is excluded from this standard. Disturbances in the frequency range 0 Hz to 400 GHz are covered. Where a relevant dedicated product or product-family EMC emission standard exists, this shall take precedence over all aspects of this generic standard. Apparatus installed in the locations covered by this standard are considered to be directly connected to low-voltage public mains supplies or to a dedicated DC source which is intended to interface between the apparatus and the low-voltage public mains supply.

EN61000-3-2

> Specifies limits for harmonic current emissions applicable to electrical and electronic equipment having an input current up to and including 16 A per phase, and intended to be connected to public low-voltage distribution systems. The tests according to this standard are type tests. For systems with nominal voltages less than 220 V (line to neutral), the limits have not yet been considered.

ENV 50204

> The standard relates to the immunity of electrical and electronic equipment to the electromagnetic fields radiated from GSM (Group Special Mobile) and the DECT (Digital European Cordless Telephone) radio systems operating at the frequencies 900 MHz and 1,89 GHz using TDMA (Time Division Multiple Access) techniques. The object of this standard is to establish a common reference for evaluating by test the performance of apparatus when subjected to this type of radiated electromagnetic field.

ETS 300010-1

> Transmission and Multiplexing (TM);Synchronous cross connect equipment;64 kbit/s and n x 64 kbit/s cross connection rate 2 048 kbit/s access ports;Part 1: Core functions and characteristics

ETS 300010-2

> Transmission and Multiplexing (TM);Synchronous cross connect equipment;64 kbit/s and n x 64 kbit/s cross connection rate 2 048 kbit/s access ports;Part 2: Management aspects

ETS 300019

> Environmental conditions and environmental tests for telecommunications equipment. The standards contains different parts that give a classification of the environmental conditions for storage, transportation and stationary use. Part 1-x describes the conditions. Part 2-x describes the related environmental tests.

ETS 300019-1-1

> Classification of environmental conditions: storage

ETS 300019-1-2

> Classification of environmental conditions: transportation

ETS 300019-1-3

> Classification of environmental conditions: stationary use at weather protected locations

ETS 300132-1

> Defines the power input requirements of the telecommunications equipments operated by alternating current "AC".

ETS 300132-2

> Defines the power input requirements of the telecommunications equipments operated by direct current "DC".

ETS 300386

> ETSI recommendation on EMC requirements: "Public telecommunications network equipment. Electro-magnetic compatibility (EMC) requirements". V1.3.1 (2001-09) is a new version where there are no more 2 parts.

ETS 300386-1

> ETSI recommendation on EMC requirements: "Public telecommunications network equipment. Electro-magnetic compatibility (EMC) requirements" Part 1: "Product family overview, compliance criteria and test levels". Versions of 1994 and 1997.

ETS 300386-2

> ETSI recommendation on EMC requirements: "Public telecommunications network equipment. Electro-magnetic compatibility (EMC) requirements" Part 2: "Product family standard". Version of 1997.

FCC part 15

> Federal Communications Commission's (FCC) standard setting the RF emission limits.

FRF 1.2

> PVC User-to-Network Interface (UNI) Implementation Agreement describing LMI (Local Management Interface).

FRF 5

> This Implementation Agreement provides the functional requirements configurations across interfaces for network interworking between the Frame Relaying Bearer Service and ATM Permanent Virtual Connection Services.

FRF 6

> Frame Relay Service Customer Network Management Implementation Agreement (MIB)

FRF 8.1

> Frame Relay / ATM PVC Service Interworking Implementation Agreement. Service interworking applies when a Frame Relay service user interworks with an ATM service user. The ATM service user performs no frame relaying service-specific functions, and the frame relaying service user performs no ATM service-specific functions. The optional translation of particular higher layer protocols to satisfy the requirements of end-systems is also specified herein.

FRF 12

> Frame Relay Fragmentation Implementation Agreement.

FRF 14

> Frame-relay Physical Layer Interface Implementation Agreement, describing Frame-Relay transmission on different types of physical interfaces.

FRF 15

> End-to-End Multilink Frame Relay Implementation Agreement.

FRF 16.1

> Multilink Frame Relay UNI/NNI Implementation Agreement.

G.703

> Physical/electrical characteristics of hierarchical digital interfaces at 64, 1544, 6312, 32064, 44736, 2048, 8448, 34368, 139264 kbps.

G.704

> Synchronous frame structures used at 1544, 6312, 2048, 8448 kbps hierarchical levels

G.706

> Frame alignment and cyclic redundancy check (CRC) procedures relating to basic frame structures defined in Recommendation G.704.

G.732

> Characteristics of primary PCM multiplex equipment operating at 2048 kbps.

G.736

> Characteristics of a synchronous digital multiplex equipment operating at 2048 kbps.

G.742

> Second order digital multiplex equipment operating at 8448 kbps and using positive justification.

G.747

> Second order digital multiplex equipment operating at 6312 kbps and multiplexing three tributaries at 2048 kbps.

G.751

> Digital multiplex equipment operating at the third order bit rate of 34 368 kbps and the fourth order bit rate of 139 264 kbps and using positive justification.

G.804

> Mapping of ATM traffic onto the basic frame structure at 1544 or 2048 kbps as described in Recommendation G.704. In case of 2048 kbps, the ATM cell is mapped into bits 9 to 128 and bits 137 to 256 (i.e. time slots 1 to 15 and time slots 17 to 31 described in Recommendation G.704) of the 2048 kbit/s frame with the octet structure of the cell aligned with the octet structure of the frame.

G.812

> Timing requirements of slave clocks suitable for use as node clocks in synchronisation networks.

G.813

> Timing characteristics of SDH equipment slave clocks (SEC).

G.823

> The control of jitter and wander within digital networks which are based on the 2048 kbps .

G.825

> The control of jitter and wander within digital networks which are based on the synchronous digital hierarchy (SDH).

G.826

> End-to-end error performance parameters and objectives for international, constant bit-rate digital paths and connections. Typical performance parameters include errored seconds, severely errored seconds and unavailability seconds.

G.991.1

> High bit rate Digital Subscriber Line (HDSL) transceivers.

G.991.2

> Single-Pair High-Speed Digital Subscriber Line (SHDSL) transceivers.

G.992.1

> Asymmetrical digital subscriber line (ADSL) transceivers.

G.992.2

> Splitterless asymmetric digital subscriber line (ADSL) transceivers.

G.992.3
> Asymmetrical digital subscriber line (ADSL2) transceivers based on DMT modulation and improved performance relative to G.992.1

G.992.4
> Splitterless asymmetric digital subscriber line (ADSL2 Lite) transceivers. With improved performance and speed relative to G.992.2

G.992.5
> Asymmetrical digital subscriber line (ADSL2+) transceivers based on DMT modulation and improved performance, bandwidth and speed (up to 26 Mbps) relative to G.992.1

G.993.1
> Very-high-speed digital subscriber line foundation.

G.994.1
> Handshake procedures for Digital Subscriber Line (DSL) transceivers.

G.995.1
> Overview of digital subscriber line (DSL) recommendations.

G.996.1
> Test procedures for digital subscriber line (DSL) transceivers.

G.997.1
> Physical layer management for digital subscriber line (DSL) transceivers.

H.222
> An ITU-T Study Group 15 standard that addresses the multiplexing of multimedia data on an ATM network.

H.261
> ITU standard for video coding for video. H.261 is a discrete cosine transform (DCT) based algorithm for video in the 64kb/s to 2mb/s range. All H.323 compliant video conferencing systems are required to support this codec.

H.263
> ITU standard for video coding within video. H.263 offers better compression than H.261, particularly in the low bit-rate range used by modems.

H.320
> ITU standard for video over ISDN and fractional T1 lines.

H.323
> ITU standard for video over networks that do not guarantee bandwidth, such as the Internet. H.323 is the standard that this cookbook is recommending that most users in the education community should be using. For more detailed information on this and the other ITU standards see the bibliography of this document.

H.324
> ITU standard for video over standard phone lines.

I.361
> B-ISDN ATM layer specification

I.431
> Primary rate ISDN user-network interface - Layer 1 specification.

I.610
> B-ISDN ATM operation and maintenance principles and functions

IEC 1000
> See EN 61000

IEC 529
> See EN 60529

IEC 60801
> See EN 61000-4

IEC 60950
> See EN 60950

IEC 801
> See EN 61000-4

IEC 950
> See EN 60950

ISO 10918-1
> Joint Photographic Experts Group (JPEG)

ISO 13818-2
> Moving Pictures Expert Group (MPEG-2)

K.15
> ITU-T recommendation for Protection of remote – feeding systems and line repeaters against lightning and interference from neighbouring electricity lines. Product specific requirement (see also K.45).

K.17
> ITU-T recommendation for Tests on power-fed repeaters using solid-state devices in order to check the arrangements for protection from external interference. Product specific requirement.

K.20
> Resistibility of telecommunication equipment installed in a telecommunications centre to overvoltages and overcurrents.

K.21
> Resistibility of telecommunication equipment installed in customer's premises to overvoltages and overcurrents.

K.44
> General standard, describing the resistibility of telecommunication equipment to overvoltages and overcurrents.

K.45
> Resistibility of access network equipment to overvoltages and overcurrents.

Q.2100
> B-ISDN Signalling ATM Adaption Layer Overview.

Q.2110
> B-ISDN Adaption Layer -- Service Specific Connection Oriented Protocol.

Q.2130
> B-ISDN Adaption Layer -- Service Specific Connection Oriented Function for Support of Signalling at the UNI.

Q.2931
> The signalling standard for ATM to support Switched Virtual Connections. This is based on the signalling standard for ISDN.

Q.921
> ISDN user-network interface - Data link layer specification.

Q.931
> The signalling standard for ISDN to support SVCs. The basis for the signalling standard developed for Frame Relay and ATM.

Q.933
> The signalling standard for Frame Relay to support SVCs. This is based on the signalling standard for ISDN.

RFC 0354
> see RFC 414

RFC 0385
> see RFC 414

RFC 0414
> File Transfer Protocol (FTP).

RFC 0791
> Basic definition of IP (Internet protocol)

RFC 0792
> Internet Control Message Protocol (ICMP). It uses the basic support of IP as if it were a higher level protocol, however, ICMP is actually an integral part of IP, and must be implemented by every IP module. It is the basis for the well known PING command.

RFC 0826
> ARP (Address Resolution Protocol)

RFC 0854
> TELNET. A TELNET connection is a Transmission Control Protocol (TCP) connection used to transmit data with interspersed TELNET control information. The TELNET Protocol is built upon three main ideas: first, the concept of a "Network Virtual Terminal"; second, the principle of negotiated options; and third, a symmetric view of terminals and processes.

RFC 0894
> This RFC specifies a standard method of encapsulating Internet Protocol (IP) datagrams on an Ethernet.

RFC 0951
> Bootstrap Protocol (BOOTP). This RFC describes an IP/UDP bootstrap protocol (BOOTP) which allows a client machine to discover its own IP address, the address of a server host, and the name of a file to be loaded into memory and executed.

RFC 1042
> This RFC specifies a standard method of transmitting IP datagrams.

RFC 1058
> RIP1 (Routing Information Protocol 1) This RFC describes an existing protocol for exchanging routing information among gateways and other hosts.

RFC 1098
> see RFC 1157

RFC 1112
> see RFC 2236

RFC 1155
> Structure and Identification of Management Information for TCP/IP based internets.

RFC 1156
> Management Information Base for network management of TCP/IP based internets.

RFC 1157
> Simple Network Management Protocol (SNMP).

RFC 1213
SNMP MIB2 (Management Information Base) for Network Management.

RFC 1215
> Definition of traps used with SNMP

RFC 1332
> IPCP (Internet Protocol Control Protocol). The Point-to-Point Protocol (PPP) provides a standard method of encapsulating Network Layer protocol information over point-to-point links. PPP also defines an extensible Link Control Protocol, and proposes a family of Network Control Protocols (NCPs) for establishing and configuring different network-layer protocols. This document defines the NCP for establishing and configuring the Internet Protocol over PPP.

RFC 1350
> Trivial File Transfer Protocol (TFTP). TFTP is a very simple protocol used to transfer files. Each nonterminal packet is acknowledged separately. This document describes the protocol and its types of packets.

RFC 1483
> see RFC 2684

RFC 1490
> see RFC 2427

RFC 1631
> see RFC 3022

RFC 1638
> see RFC 2878

RFC 1661
> The Point-to-Point Protocol (PPP). This document defines the PPP organization and methodology, and the PPP encapsulation, together with an extensible option negotiation mechanism which is able to negotiate a rich assortment of configuration parameters and provides additional management functions.

RFC 1662
> PPP (Point-to-Point Protocol) in HDLC-like Framing. This document describes the use of HDLC-like framing for PPP encapsulated packets.

RFC 1716
> see RFC 1812

RFC 1717
> see RFC 1990

RFC 1769
> see RFC 2030

RFC 1812
> (formerly RFC 1716) Requirements for IP Version 4 Routers.

RFC 1889
> RTP (Real time Transport Protocol).

RFC 1890
> RTP version 2 and RTCP (Real time Transport Control Protocol).

RFC 1962
> This document defines a method for negotiating data compression over PPP links: the PPP Compression Control Protocol (CCP).

RFC 1978
> This document describes the use of the Predictor data compression algorithm for compressing PPP encapsulated packets.

RFC 1990
> Description of multilink PPP, for fragmenting, recombining and sequencing datagrams across multiple logical data links.

RFC 1994
> PPP Challenge Handshake Authentication Protocol (CHAP). The Point-to-Point Protocol (PPP) also defines an extensible Link Control Protocol, which allows negotiation of an Authentication Protocol for authenticating its peer before allowing Network Layer protocols to transmit over the link. This document defines a method for Authentication using PPP, which uses a random Challenge, with a cryptographically hashed Response which depends upon the Challenge and a secret key.

RFC 2030
> This memorandum describes the Simple Network Time Protocol (SNTP) Version 4, which is an adaptation of the Network Time Protocol (NTP) used to synchronize computer clocks in the Internet.

RFC 2068
> see RFC 2616

RFC 2131
> Dynamic Host Configuration Protocol (DHCP). The Dynamic Host Configuration Protocol (DHCP) provides a framework for passing configuration information to hosts on a TCPIP network. DHCP is based on the Bootstrap Protocol (BOOTP), adding the capability of automatic allocation of reusable network addresses and additional configuration options.

RFC 2132
> DHCP Options and BOOTP Vendor Extensions. Configuration parameters and other control information are carried in tagged data items that are stored in the 'options' field of the DHCP message. The data items themselves are also called "options." This document specifies the current set of DHCP options

RFC 2236
> This memo documents IGMPv2, used by IP hosts to report their multicast group memberships to routers. IGMPv2 allows group membership termination to be quickly reported to the routing protocol, which is important for high-bandwidth multicast groups and/or subnets with highly volatile group membership

RFC 2328
> Version 2 of the OSPF protocol. OSPF is a link-state routing protocol. It is designed to be run internal to a single Autonomous System. Each OSPF router maintains an identical database describing the Autonomous System's topology. From this database, a routing table is calculated by constructing a shortest-path tree.

RFC 2364
> PPP Over AAL5, also called PPPoA (PPP over ATM). The Point-to-Point Protocol (PPP) provides a standard method for transporting multi-protocol datagrams over point-to-point links. This document describes the use of ATM Adaptation Layer 5 (AAL5) for framing PPP encapsulated packets.

RFC 2401-2411
> IPSec security

RFC 2427
> Multiprotocol Interconnect over Frame Relay. This memo describes an encapsulation method for carrying network interconnect traffic over a Frame Relay backbone. It covers aspects of both Bridging and Routing.

RFC 2453
> This document specifies an extension of the Routing Information Protocol (RIP), as defined in RFC 1058, to expand the amount of useful information carried in RIP messages and to add a measure of security.

RFC 2474
> Definition of the Differentiated Services (Diffserv) Field (DS Field) in the IPv4 and IPv6 Headers. Differentiated services enhancements to the Internet protocol are intended to enable scalable service discrimination in the Internet without the need for per-flow state and signaling at every hop.

RFC 2475
> An Architecture for Differentiated Services (Diffserv). This document defines an architecture for implementing scalable service differentiation in the Internet. This architecture achieves scalability by aggregating traffic classification state which is conveyed by means of IP-layer packet marking using the DS field [DSFIELD].

RFC 2516
> A Method for Transmitting PPP Over Ethernet (PPPoE). This specification is intended to provide the facilities which are defined for PPP, such as the Link Control Protocol, Network-layer Control Protocols, authentication, and more. These capabilities require a point-to-point relationship between the peers, and are not designed for the multi-point relationships which are available in Ethernet and other multi-access environments.

RFC 2601
> Intergrated Local Management Interface (ILMI)

RFC 2616
> Hypertext Transfer Protocol (HTTP). HTTP has been in use by the World-Wide Web global information initiative since 1990. This specification defines the protocol referred to as "HTTP/1.1", and is an update to RFC 2068.

RFC 2661
> Layer Two Tunneling Protocol (L2TP). L2TP facilitates the tunneling of PPP packets across an intervening network in a way that is as transparent as possible to both end-users and applications.

RFC 2684
> (formerly RFC 1483) Multiprotocol Encapsulation over ATM Adaptation Layer 5. It describes two encapsulations methods for carrying network interconnect traffic over AAL type 5 over ATM. The first method allows multiplexing of multiple protocols over a single ATM virtual connection whereas the second method assumes that each protocol is carried over a separate ATM virtual connection.

RFC 2686
> The Multi-Class Extension to Multi-Link PPP.

RFC 2865
> This document describes the RADIUS protocol for carrying authentication, authorization, and configuration information between a Network Access Server which desires to authenticate its links and a shared authentication Server.

RFC 2868
> This document defines a set of RADIUS attributes designed to support the provision of compulsory tunneling in dial-up networks.

RFC 2868
> This document defines a set of RADIUS attributes designed to support the provision of compulsory tunnelling in dial-up networks.

RFC 2878
> PPP Bridging Control Protocol (BCP). This document defines the Network Control Protocol for establishing and configuring Remote Bridging for PPP links. This document obsoletes RFC 1638.

RFC 3022
> Traditional IP Network Address Translator (Traditional NAT). The NAT operation described in this document extends address translation introduced in RFC 1631 and includes a new type of network address and TCP/UDP port translation. In addition, this document corrects the Checksum adjustment algorithm published in RFC 1631 and attempts to discuss NAT operation and limitations in detail.

RFC 3164
> This document describes the behaviour of the syslog protocol, which has been used for the transmission of event notification messages across networks for many years.

RFC2250
> A payload format for MPEG-1/MPEG-2 video.

RS-232
> The RS-232 interface is a data interface with asymmetrical signalling. This interface can only be used for low speeds (typically 100 kbps). Although the recommendation does not specify the connector, it is common to use a 25 pins interface.

RS-422
> Equivalent to V.11

RS-423
> Equivalent to V.10

RS-449
> The RS-449 interface is a 37-pin interface (DN37) with symmetrical signalling. Also called V.36.

RS-449
> The RS-530 interface is a 25-pin interface (DB25) with symmetrical signalling.

T.120
> An ITU-T standard (International Telecommunications Union) for document conferencing. Document conferencing allows two or more people to concurrently view and edit a document across a network.

T1.413
> This standard presents the electrical characteristics of the Asymmetric Digital Subscriber Line (ADSL) signals appearing at the network interface. The physical interface between the network and the customer installation is also described.

T1.601
> This interface standard was written to provide the minimal set of requirements to provide for satisfactory transmission between the network and the NT, while conforming, wherever possible, with the I-Series of International Telegraph and Telephone Consult.

T1.617
> This standard specifies the procedures for user-network signaling for ISDN support of frame relay calls. It defines the messages and procedures for B-channel, H-channel, and D-channel frame relay connections to a frame handler (FH) and B-channel and H-c.

TS 101388 V1.3.1
> This ETSI document specifies European requirements for ADSL and can be considered an extension to ITU-T Recommendation G.992.1

UL94HB
> Standard for setting the requirements for fire retardancy of the materials used.

V.10
> Electrical characteristics for unbalanced double-current interchange circuits operating at data signalling rates nominally up to 100 kbps, equivalent to RS-423.

V.11
> Electrical characteristics for balanced double-current interchange circuits operating at data signalling rates up to 10 Mbps, equivalent to RS-422.

V.110
> A form of ISDN rate adaptation, V.110 is a fixed-frame based rate adaptation standard that subdivides the ISDN channel capacity so that it can carry one lower speed (subrate) data channel.

V.120
> An ISDN rate adaptation standard that is popular in North America, V.120 allows one B-channel to carry multiple subrate channels in a succession of statistically multiplexed (variable-length) frames. These frames support error detection and correction procedures.

V.14
> Transmission of start-stop characters over synchronous bearer channels.

V.17
> A 2-wire modem for facsimile applications with rates up to 14 400 bit/s.

V.21
> 300 bits per second duplex modem standardised for use in the general switched telephone network.

V.22
> 1200 bits per second duplex modem standardised for use in the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits.

V.22bis
> 2400 bits per second duplex modem using the frequency division technique standardised for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits.

V.23
> 600/1200-baud modem standardised for use in the general switched telephone network.

V.24
> List of definitions for interchange circuits between data terminal equipment (DTE) and data circuit-terminating equipment (DCE).

V.25
> Automatic answering equipment and general procedures for automatic calling equipment on the general switched telephone network including procedures for disabling of echo control devices for both manually and automatically established calls.

V.25bis
> Synchronous and asynchronous automatic dialling procedures on switched networks.

V.26
> 2400 bits per second modem standardised for use on 4-wire leased telephone-type circuits.

V.26bis
> 2400/1200 bits per second modem standardised for use in the general switched telephone network

V.26ter
> 2400 bits per second duplex modem using the echo cancellation technique standardised for use on the general switched telephone network and on point-to-point 2-wire leased telephone-type circuits.

V.27
> 4800 bits per second modem with manual equaliser standardised for use on leased telephone-type circuits.

V.27bis
> 4800/2400 bits per second modem with automatic equaliser standardised for use on leased telephone-type circuits.

V.27ter
> 4800/2400 bits per second modem standardised for use in the general switched telephone network.

V.28
> Electrical characteristics for unbalanced double current interchange circuits.

V.29
> 9600 bits per second modem standardised for use on point-to-point 4-wire leased telephone-type circuits.

V.32
> A family of 2-wire, duplex modems operating at data signalling rates of up to 9600 bit/s for use on the general switched telephone network and on leased telephone-type circuits.

V.32bis
> A duplex modem operating at data signalling rates of up to 14 400 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits.

V.33
> 14 400 bits per second modem standardised for use on point-to-point 4-wire leased telephone-type circuits.

V.34
> A modem operating at data signalling rates of up to 33 600 bit/s for use on the general switched telephone network and on leased point-to-point 2-wire telephone-type circuits.

V.35
> Data transmission interface using balanced and unbalanced interface signals. Mostly terminated on a 34 pin winchester connector.

V.36
> Data transmission interface using balanced and unbalanced interface signals. Mostly terminated on a DB37 connector.

V.42
> Error-correcting procedures for DCEs using asynchronous-to-synchronous conversion based on the Link Access Protocol (LAP)-M.

V.42bis
> Data compression procedures for data circuit-terminating equipment (DCE) using error correction procedure.

V.52
> Characteristics of distortion and error-rate measuring apparatus for data transmission.

V.8
> Procedures for starting sessions of data transmission over the public switched telephone network.

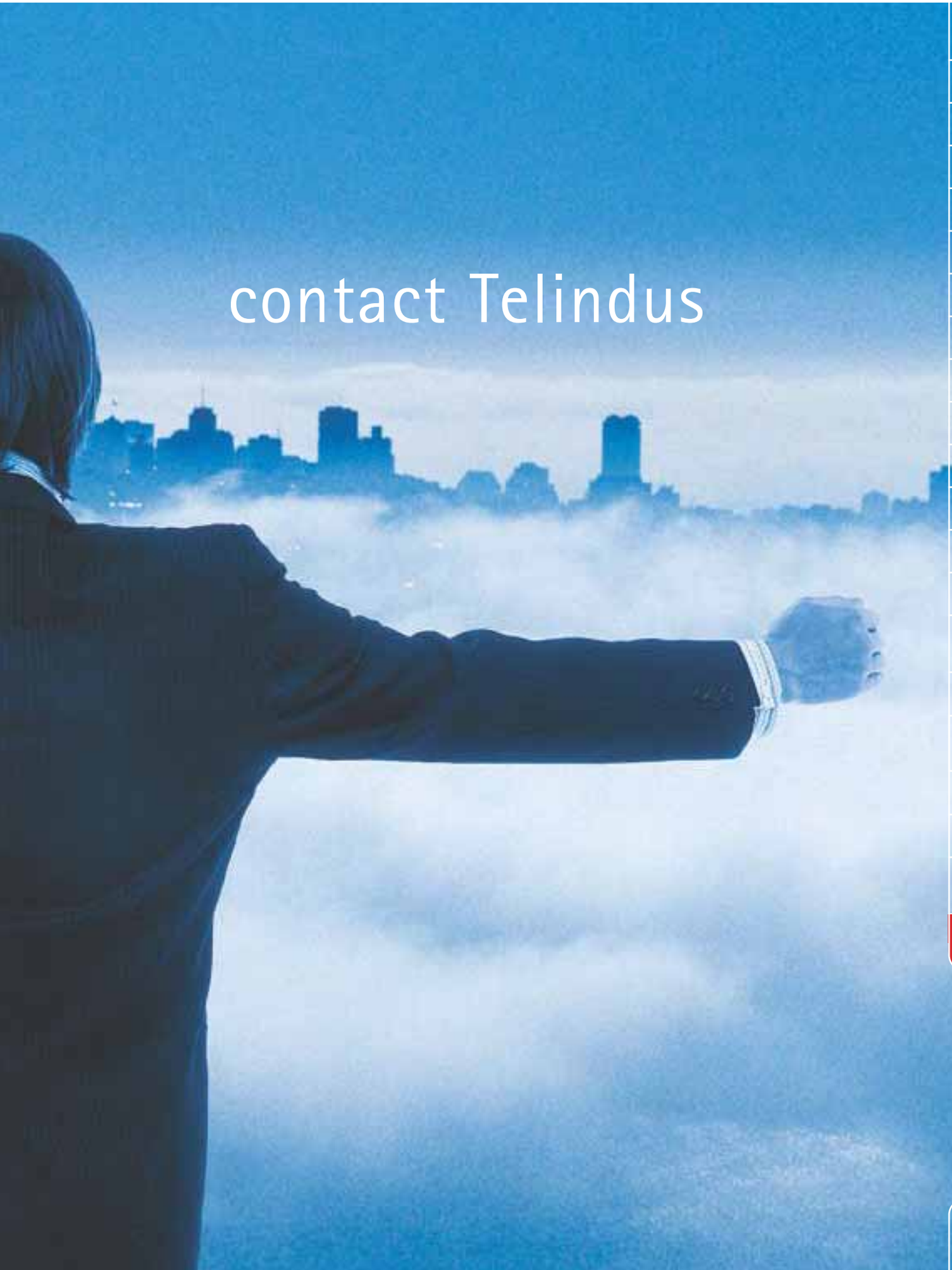
V.8bis
> Procedures for the identification and selection of common modes of operation between Data Circuit-terminating Equipments (DCEs) and between Data Terminal Equipments (DTEs) over the public switched telephone network and on leased point-to-point telephone-type circuits.

V.90
> A digital modem and analogue modem pair for use on the Public Switched Telephone Network (PSTN) at data signalling rates of up to 56 000 bit/s downstream and up to 33 600 bit/s upstream.

V.91
> A digital modem operating at data signalling rates of up to 64 000 bit/s for use on a 4-wire circuit switched connection and on leased point-to-point 4-wire digital circuits.

V.92
> Enhancements to Recommendation V.90.

X.21
> Data transmission interface using balanced signals. Mostly terminated on a DB15 connector.



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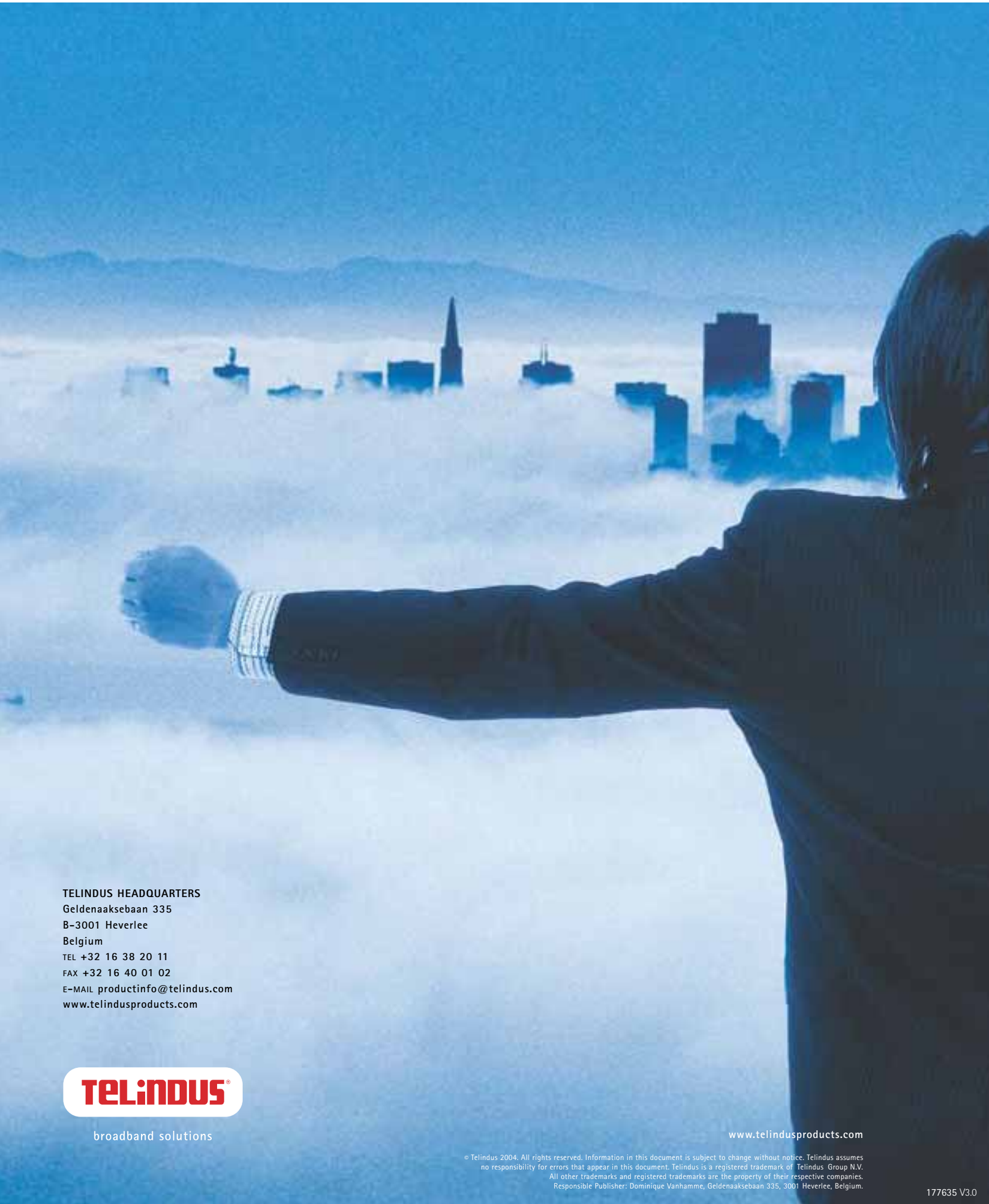

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