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@ccess the Ethernet

USER GUIDE

CSX4



**arcutronix GmbH
Deutschland**

**Installation and
Operation Manual**

CSX - Connectivity G.SHDSL

USER GUIDE



Product Family:

CSX4

Enclosed Descriptions:

Product Type Number:

CSX4-E1R	0803-3100
CSX4-E1R-RF	0803-3300
CSX4-V.24	0803-3220
CSX4-X.21	0803-3221
CSX4-V.35 (obsolete)	0803-3230
CSX4-I.430	0803-3240
CSX4-FE	0803-3280

SW-Version (≥):

CSXA001V07

and/or (old PDT devices)

286000AB12

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Document Contents

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About this Book

Document Organization

This guide describes the hardware components of the CSX - Connectivity G.SHDSL Devices. It provides information on configuration, system installation and the technical data. Also, it provides the procedures to operate or test the components of these devices.

The intended audience of this document is anyone who is responsible for installing, maintaining or operating the CSX4. This person must be aware of the risks, affected with these actions and must be qualified and trained. **Observe the safety precautions in chapter “Safety, Instructions, Statements”.**

The manual is designed as printable book, therefore chapters start at an odd page (the last even page of the chapter before may be empty). The headlines of the pages contain chapter name, chapter count, and chapter headline. The foot lines of the pages contain chapter page count, the revision date and the document title. Font attributes are used to identify single words or chapters with certain content, e.g. screen shots and listings are in Courier, like:

```
This is a line of a screen shot.
```

The information in this manual is divided in several object orientated universal chapters. View and compare to your device to find the individual information: take the information that fits. Ignore the information, which is not relevant in the current case.

Chapters

Chapter 0, **Safety, Instructions, Statements:** Handling, precautions and warnings.

Chapter 1, **Introduction:** Description of arcutronix MSS and the CSX4 Copper Converter.

Chapter 2, **Getting Started:** Short form about installation, mounting and configuration of CSX4-family.

Chapter 3, **Hardware:** Description of hardware and front panel elements.

Chapter 4, **Power Management:** Installation procedures.

Chapter 5, **Control Software CSX4:** Control and configuration of the CSX4-family.

Chapter 6, **SNMP and MIBs:** Description of SNMP access.

Chapter 7, **SSH and CLI:** Explains the SSH access to the CSX4 and the usage of the Command Line Interface (CLI).

About this Book

Appendix A, **Technical Specifications**: Provides the general technical data of the CSX4-family.

Appendix B, **Additional Information**: More details about DSL technique.

Appendix EC, **EC Declaration of Conformity**: For all CSX - Connectivity G.SHDSL products.

Release History

- 2008-08-24 First issue of the CSX4 User Guide.
- 2009-09-29 Added and changed the following topics:
- Chapter 6 (SNMP) changed towards ax-MIBS.
 - Title-picture updated.
 - SW-Version incremented.
 - CSX4-FE: Jumper settings corrected.
 - Frontpage and last page in new design.
- 2010-10-27 Added and changed the following topics:
- New version of CSX4-FE added (HW and SW topics)
 - Obsolete information for out-of-date CSX4-FE added as attachment.
 - Obsolete information for out-of-date CSX4-V.35 added as attachment.
- 2011-02-14 Added and changed the following topics:
- Default Settings for Alarms and Traps added.
- 2011-05-13 Added and changed the following topics:
- ssh-support (chapter 7) added.
 - Settings for E1-service transmission more detailed.
- 2011-11-14 Added and changed the following topics:
- Remote Feeding CSX4-RF family.
- 2013-04-03 Added and changed the following topics:
- The documentation is enhanced by depicting the alarms in more detail.
 - The ax pinning overview is added as new “Appendix Pin”.

Table of Contents

About this Book

Document Organization	about-1
Chapters	about-1
Release History	about-2

Chapter 0 Safety, Instructions, Statements

Safety Precautions	0-1
Power Precautions	0-1
Handling Precautions	0-1
Preventing Damage From Electrostatic Discharge	0-2
Card Protection	0-2
Grounding Procedure	0-2
Fiber Optic Precautions	0-3
Technical Instructions to User	0-4
Inspection	0-4
Commissioning	0-4
Cleaning	0-4
Quality	0-4
Repair	0-5
Disposal and Recycling	0-5
CE Conformity	0-5
Electromagnetic Immunity Statement	0-5
Instructions to User	0-5
Electromagnetic Emissions Statements	0-6

Chapter 1 Introduction

CSX4 Description	1-1
General	1-1
Remote Power Feeding	1-2
Application Areas for the CSX4	1-2
Legacy Services	1-2
ISDN Digital Leased Circuit	1-3
Ethernet Over PDH	1-3
CSX4 Functions at a Glance	1-4
Error Recovery	1-4
Order Matrix	1-5
Accessories	1-7
Housings and Cables	1-7

Chapter 2 Getting Started

Delivered Parts	2-1
Preparing the Startup	2-1
Operating Conditions	2-1
Ambient Conditions	2-1
CSX4 Mounting	2-2
Startup of the CSX4	2-2
Switching on the Device	2-2
Configuration Methods	2-2

Chapter 3 Hardware

Main Board	3-1
CSX4 Front Panel	3-2
Common Indicators	3-2
Loop Mode Key	3-4
G.SHDSL Line-Interface	3-4
G.SHDSL Standard	3-4
LT and NT-Mode	3-5
Crossing of Copper Pair and Lines	3-5
Configuration of the G.SHDSL Line-Port	3-6
Pinout	3-7
Alarms of the G.SHDSL Port	3-7
CSX4-E1R,	3-7
CSX4-E1R-RF	3-7
Front View	3-7
G.703 TDM Port	3-8
G.704 Framing	3-8
Configuration of the TDM Line-Port for CSX4-E1R	3-9
Configuration of the TDM Line-Port for CSX4-E1B	3-9
Pinout of CSX4-E1R	3-10
Alarms of the E1 Interface	3-11
CSX4-V.24	3-11
Front View	3-11
Configuration of the V.24 Interface	3-12
Pin Assignment of the Female D-Sub25 Connector	3-13
Restrictions of Usable Clock Modes	3-13
Alarms of the V.24 Interface	3-14
CSX4-X.21	3-14
Front View	3-14
Configuration of the X.21 Interface	3-15
Pin Assignment of the Female D-Sub15 Connector	3-17
Restrictions of Usable Clock Modes	3-17
Alarms of the X.21 Interface	3-17
CSX4-FE	3-18

Front View	3-18
Ethernet Remote Bridge Functionality	3-19
Auto Negotiation	3-19
Flow Control	3-20
Restrictions of Usable Clock Modes	3-20
Pin Assignment Ethernet 10/100BaseTx I/F Connector RJ-45	3-21
Alarms of the FE Interface	3-22
CSX4-I.430	3-22
Front View	3-22
Configuration of the ISDN-S0 Interface	3-23
Pin Assignment ISDN-S0 Connector RJ-45	3-25
Pin Assignment of the Power Connector	3-25
Restrictions of Usable Clock Modes	3-26
Alarms of the I.430 Interface	3-26
CSX4 Rear Connector	3-26
RS-232 Interface	3-26
Management Port	3-26
Power Supply	3-27

Chapter 4 Installation, Tests & Basics

Preparation	4-1
ESD Protection of Cards	4-1
Environmental Conditions	4-1
Installation Hints	4-2
Power Management	4-3
Rules of the Power Management	4-3
Field Installation of CSX4 Cards	4-4
Installation	4-4
Removal	4-4
Power-Up Sequence	4-5
LED start up	4-5
Setup Sequence & Starting Procedures	4-6
Clock Mode Diagrams	4-6
Clock Mode Comments	4-6
Single Clock Source	4-6
Dual Clock Sources	4-7
Asynchronous Clock-Mode	4-7
E1 Transmission Standard	4-9
E1-Basics	4-9
Convert Serial Data To E1 and vice versa	4-10
Link Loss Indication	4-11
Special Functions	4-12
Diagnostic Functions of the CSX4	4-12
Self Test	4-12

Performance Monitoring	4-12
Test-Loops	4-13
CSX4 Loops	4-13
BER Testing	4-14
Troubleshooting Guide	4-14
Troubleshooting / Frequent Errors	4-15

Chapter 5 Control Software CSX4

General Information	5-1
Local RS-232 Interface	5-1
Local Ethernet Interface	5-1
Security Issues	5-2
Login via Serial Port on Singleslot Housing	5-3
Navigation	5-4
Select a menu entry	5-4
Display and User Actions	5-5
Exit	5-5
Login via the Main Agent	5-6
Display and User Actions	5-6
MENU Structure	5-7
MAIN Menu	5-8
GENERAL INFORMATION Menu	5-9
TESTS Menu	5-10
SELF TEST Menu	5-11
BER TEST	5-12
EXTRA Menu	5-13
PORT 1 (IF 1) Menu	5-14
PORT 1 (IF1) Menu for E1 (G.703/G.704) I/F	5-14
PORT 1 (IF1) Menu for Datacom Variants	5-15
PORT 1 (IF1) Menu for ISDN-S0	5-16
PORT 1 (IF1) Menu for Ethernet I/F	5-17
DETAILS Menu for Ethernet I/F	5-18
I/F Mode Menu for Ethernet I/F	5-19
Loop Mode	5-20
DATA RATE Menu	5-21
Recommendation for E1-Settings	5-22
PERFORMANCE MONITORING PORT 1 (IF1)	5-23
PORT 2 (LINE) Menu	5-24
PERFORMANCE MONITORING PORT 2 (LINE)	5-25
LOCAL MONITORING Menu and 15 MIN PERIODS RESULTS Menu	5-25
CLOCK Menu	5-26
TRAPS Menu	5-28
Setting Traps (I/F and Line)	5-28
Default (Factory-) Trap-Settings	5-29

ALARMS Menu	5-29
Setting Alarms (I/F and Line).....	5-30
Default (Factory-) Alarm-Settings	5-30
EVENT MONITORING Menu	5-31
USER ADMINISTRATION Menu.....	5-31
Change a Password	5-32
UPDATE Menu	5-32
Reboot.....	5-33
Software Update	5-33
Update via Y-Modem.....	5-34
Abort Update.....	5-35
Example	5-35

Chapter 6 SNMP and MIBs

SNMP Access Generally.....	6-1
SNMPv1	6-2
SNMPv2c	6-2
Traps.....	6-2
Installation Prerequisites.....	6-2
Preparing the SNMP Management System	6-3
Management Information Bases (MIBS)	6-3

Chapter 7 SSH and CLI

Access to the Device.....	7-1
SSH connection.....	7-1
Security Issues	7-3
Command Line Interface (CLI)	7-4
CLI Editor Features	7-4
Context Sensitive Help	7-4
Command Syntax Check	7-4
Command Completion	7-4
Hot Keys	7-5
Commands	7-5
arcutronix-CLI Usage.....	7-7
Rackview - Mode.....	7-7
Example SELECT.....	7-7
SELECT by rack/slot address.....	7-7
SELECT by name	7-7
Cardview - Mode.....	7-8
Example CONFIG.....	7-8
Quick Usage Guide for CLI-Commands	7-10
Menu-Structure (Directory-Tree) of CSX4	7-12

Appendix A Technical Specifications

CSX4 Technical Data	A-1
-------------------------------	-----

Appendix B Additional Information

DSL terms for a digital transmission link	B-1
G.SHDSL	B-1
TC-PAM.	B-1
E1	B-2
T1	B-2
DS1 coding	B-3
Integrated Services Digital Network	B-3

Appendix C Information about Obsolete Variants

Preface	C-1
CSX4-FE, with DIP-switch configuration	C-1
Front View	C-2
Configuration of the FE Interface	C-2
Ethernet and Auto Negotiation	C-2
Ethernet Bridge Functionality	C-4
Restrictions of Usable Clock Modes	C-4
Pin Assignment Ethernet 10/100BaseTx I/F Connector RJ-45	C-4
CSX4-V.35	C-4
Front View	C-4
Configuration of the V.35 Interface	C-5
Pin Assignment of the V.35 Female Winchester Connector	C-6

Appendix Pin arcutronix Pinning Overview

Overview to different pinnings	Pin-1
--	-------

Appendix EC EC Declaration of Conformity

Declaration of Conformity	EC-1
-------------------------------------	------

List of Tables

Table 0-1	Effects of Cleaning Liquids	0-4
Table 1-1	Order Matrix	1-5
Table 1-2	Accessories Housings & Cables	1-7
Table 2-1	Ambient Conditions	2-1
Table 3-1	Indicators of the CSX - Connectivity G.SHDSL	3-2
Table 3-2	Indicator Color Meanings	3-3
Table 3-3	Sequence for the Loop Mode Key Function	3-4
Table 3-4	CSX4-E1x Front Views	3-8
Table 3-5	Setup Main Board with RJ-45 Interface Port	3-9
Table 3-6	Setup Main Board with BNC Interface Port	3-10
Table 3-7	CSX4-V.24 Front View	3-12
Table 3-8	Pinning V.24 D-Sub25 Connector	3-13
Table 3-9	CSX4-X.21 Front View	3-15
Table 3-10	Pinning X.21 D-Sub15 Connector	3-17
Table 3-11	CSX4-FE Front View	3-18
Table 3-12	Settings Auto-Negotiation	3-19
Table 3-13	Electrical Interfaces	3-21
Table 3-14	CSX4-I.430 Front View	3-23
Table 3-15	I.430 Settings	3-24
Table 3-16	Pinning Power Connector	3-25
Table 3-17	Transmission Rate of the RS-232 Interface	3-27
Table 4-1	LED start up	4-5
Table 4-2	Oversampling of Asynchronous Data-Rates	4-7
Table 4-3	E1 Transmission Modes of the CSX4	4-9
Table 4-4	Timeslot Configuration	4-11
Table 4-5	Example	4-11
Table 4-6	Sequence for the Loop Mode Key Function CSX4	4-14
Table 5-1	Default Passwords	5-3
Table 5-2	Menu Structure	5-7
Table 5-3	main menu Options	5-9
Table 5-4	GENERAL INFORMATION Menu	5-10
Table 5-5	SELF TEST Menu Options	5-11
Table 5-6	BER TEST Menu Options	5-12
Table 5-7	Extra Menu Options	5-13

Table 5-8	Interface Configuration Menu Options E1/T1 I/F	5-14
Table 5-9	Interface Configuration Menu Options Datacom I/Fs	5-15
Table 5-10	Interface Configuration Menu Options ISDN-S0 I/F	5-16
Table 5-11	Interface Configuration Menu Options Ethernet I/F	5-17
Table 5-12	Details Menu Options Ethernet I/F	5-18
Table 5-13	Loop Mode Configuration Menu Options	5-20
Table 5-14	I/F Data Rate Configuration Menu Option.	5-21
Table 5-15	Recommendation for E1-Settings.	5-22
Table 5-16	PORT 2 (Line 1) Menu Items	5-24
Table 5-17	Clock Configuration Menu Options.	5-26
Table 5-18	Possible Clock Settings	5-27
Table 5-19	Trap Configuration Menu Options.	5-28
Table 5-20	Trap Defaults.	5-29
Table 5-21	Alarm Configuration Menu Options.	5-30
Table 5-22	Alarm Defaults	5-30
Table 5-23	Update Menu Options.	5-32
Table 7-1	CSX4 CLI Hot Keys	7-5
Table 7-2	CSX4 CLI Commands.	7-6
Table 7-3	Menu Indicators and corresponding CONFIG Commands	7-9
Table 7-4	Special CONFIG Commands	7-10
Table 7-5	Quick Reference	7-10
Table A-1	Technical Data of the CSX4	A-1
Table C-1	CSX4-FE Front View	C-2
Table C-2	FE Speed and I/F Settings	C-3
Table C-3	CSX4-V.35 Front View.	C-5
Table C-4	Pinning V.35 Winchester Connector (DCE-Mode)	C-6
Table C-5	Pinning V.35 Winchester Connector (DTE-Mode).	C-7

List of Figures

Figure 1-1	CSX4 applications in a modern network.	1-3
Figure 3-1	Unique Port Numbering	3-2
Figure 3-2	Front Panel CSX4 Rack Mount Card	3-2
Figure 3-3	Cross-Over of Copper Pair within one Line	3-6
Figure 3-4	Cross-Over of Copper Lines in 4-wire mode	3-6
Figure 3-5	V.24 Interface Board.	3-13
Figure 3-6	V.24 Interface: D-Sub25 Connector	3-13
Figure 3-7	X.21 Interface Board	3-16
Figure 3-8	X.21 Interface: D-Sub15 Connector	3-17
Figure 3-9	I.430 Interface Board	3-24
Figure 3-10	ISDN-S0: Power Connector	3-25
Figure 4-1	Single Clock Source	4-6
Figure 4-2	Dual Clock Sources	4-7
Figure 4-3	Asynchronous Clock Mode.	4-7
Figure 4-4	Link Loss Indication: Example 1.	4-11
Figure 4-5	Link Loss Indication: Example 2.	4-12
Figure 4-6	Terminal and Facility Loops for CSX4	4-13
Figure 5-1	Update with HyperTerminal	5-36
Figure 5-2	Send File	5-36
Figure 6-1	The SNMP Generation 2 MIB Tree	6-4
Figure 7-1	PuTTY ssh-Connection	7-2
Figure 7-2	Secure Shell.	7-3
Figure 7-3	Menu Structure CSX4	7-15
Figure C-1	FE Interface Board	C-3
Figure C-2	Ethernet 10/100BaseTx Interface: RJ-45 Connector	C-4
Figure C-3	V.35 Interface Board.	C-6

Chapter 0

Safety, Instructions, Statements

Safety Precautions

The following sections provide the safety precautions for the supplied device. You must always observe the power precautions for the device. You must follow all warning notes to ensure that the procedures are performed safely. You must follow all caution notes to ensure that the device is operated correctly.

WARNING: Serious injury or loss of life is possible, if instructions are not carried out.

CAUTION: Serious damage or destruction is possible, if instructions are not followed.

NOTE: Before installing the device find out if any local technical rules must be observed. These may be defined by ANSI, ITU, IEC, your PTT, or other similar organizations.

Power Precautions



WARNING:

- Disconnect the power cord before opening the device.
- Always plug the power cords into properly grounded receptacles. An improperly wired receptacle could place hazardous voltage on the accessible metal parts of the device.
- Use only approved power cords.
- Use only manufacturer supplied power supplies.
- The power supply must match the power specifications for the device.
- Do not work on the equipment during periods of lightning activity.

Handling Precautions

Note: Precautions for transporting, installing, and operating the device:

- Avoid excessive shocks and vibrations. Install shock absorbers, if you need to use the device for mobile applications.
- Avoid contact with any liquid (e.g. water) or dust or dirt.
- Avoid exposing the device to excessive direct sunlight.

- Ensure sufficient cooling of the device.
- Prevent loose items from falling into the device.
- Avoid damage to components when installing or setting switches or jumpers of the device.
- Always place protective covers on all fiber optic cables and connectors that are not in use to prevent breakage and contamination.
- Inspect all fiber optic connections and clean contaminated surfaces before use.
- Attach a wrist strap and follow ESD procedures, see next paragraph.

Preventing Damage From Electrostatic Discharge



CAUTION: Discharge of static electricity (ESD) can damage or degrade electronic components. The electrostatic potential of a person can be several thousand Volt and a discharge to semiconductor components may have severe consequences. Observe the precautions below when you are handling any hardware with electronic components.

Card Protection

Each card is shipped in a separate, reusable, and anti-static shielding bag. Leave each card in its bag until you are ready to install it into the system. Do not remove the card from its bag unless you are grounded. Do not place a bag on exposed contacts where it can cause short circuits.

Grounding Procedure

Before attempting to install or remove any part of the chassis, ensure that you, the equipment chassis, and the rack mount cards are at ground potential to prevent electrostatic discharge (ESD). Electrostatic discharges can damage the components of the system. To place yourself at ground potential, connect the chassis with a ground wire or via the power cord with a grounded mains socket and clip your wrist strap to the chassis.

The following advice will help you to prevent ESD damage to electrical components:

- Always use an ESD wrist strap with a metal clip for grounding.
- Limit your movement as much as possible. Movement can cause a build-up of static electricity.
- Handle the system and its components carefully. Never touch the circuitry. Place your hands only on the edges, rails, or frame of the unit.
- Touch a spare component - while it is still in the anti-static wrapping - to an unpainted metal portion of the chassis for at least two seconds. This allows the static electricity to discharge harmlessly from your body and the spare.
- Install the spare directly into the chassis after removing it from the anti-static wrapping. Do not remove the anti-static wrapping until you are ready to do the install. If you must set down an unwrapped spare, set it down on an anti-static mat or on its anti-static wrapping.

Caution: Do not place the spare component on the top of the chassis, rack, or on a metal table. Either action could cause severe damage to the spare.

- Set down cards with their component sides face up.
- Be aware of weather conditions. Cold weather increases the likelihood of static electricity build-up.
- Be aware of your own conductivity level. Wear ESD shoes to diminish personal static electricity build-up. Wear e.g. an electrostatic dissipative lab coat.

Fiber Optic Precautions



Caution: An optical fiber may carry (invisible) light from the remote system.

This device may contain Laser Class 1 components, like laser transmitters or light emitting diodes LED (refer to technical data). Operating components emits (invisible) laser radiation. Be careful when you are working with these components. The following safety precautions must be followed when working with fiber optics and Laser Class 1 components:

WARNING: Do not look into the fiber optic output. Looking into the fiber optic output can cause injury to the eye. When observation is necessary eye protection must be worn and precautions must be taken to avoid exceeding the limits recommended in ANSI Z136.1-1981.

WARNING: Use caution when working with the laser components of the device. The device is designed to protect the user against optical powers beyond laser class 1.

WARNING: Ensure that the incoming signal from the remote device does not exceed the power defined for laser class 1 when the cabling is disconnected. The device will also become unsafe, if any unsafe equipment is connected to the system.

WARNING: Do not disconnect the fiber optic cables while power is applied. Disconnecting the fiber optic cables could expose the user to optical powers beyond laser class 1.



Caution: Use Of Controls Or Adjustments Or Performance Of Procedures Other Than Those Specified Herein May Result In Hazardous Laser Light Exposure.

CAUTION Laser Class 1. Complies with FDA radiation standards, 21CFR subcategory J. DANGER (Invisible) laser radiation when open and / or interlock defeated. Avoid direct exposure to beam!

Technical Instructions to User

Do not use this product for other applications than suggested in this manual!

The international standards and the technical rules of your local PTT company must be observed.

All interface cables to this equipment must be shielded and designed in accordance with proper EMI techniques to ensure compliance with EMC requirements. arcutronix will provide cable shielding specifications on request.

Inspection

Before commissioning, check the content of the consignment for completeness and note whether any damage has occurred during transport. If so, do not use the parts and contact your arcutronix representative.

Commissioning

Work may be carried out only by qualified personnel. The relevant precautions must be taken.

Cleaning



To clean the outer surfaces, use a soft damp (not wet) cloth. Do not let moisture go inside. Please consider the properties of the housing and other material used!

Table 0-1 Effects of Cleaning Liquids

Valuation	ABS/ABS+PC/PC/PPE+PS
well resistant	water, aqueous saline solutions, sud, diluted acid and alkali
conditionally resistant	alcohol, aliphatics, oil and fat
not resistant	concentrated mineral acid, aromatic and halogenated hydrocarbon, ester, ether, ketone

Quality



The quality management of arcutronix is certified to DIN ISO 9001:2000.

This product is manufactured to the arcutronix quality standards

Repair

There are no repairable parts in the device. Defective parts must be sent to arcutronix for repair. The power supplies of a device may contain fuses. Blown-up mains fuses must be replaced by fuses of the same type and the same ratings. Using repaired fuses or short-circuit the fuse holder are not permitted.

Disposal and Recycling



This symbol on the product or on the packaging indicates that it can be recycled. To save our environment please hand it over to your next recycling point.



This symbol on the product or on its packaging indicates that it shall not be treated as household waste. Instead it shall be handled over to the applicable collection point for the recycling of electronic equipment.



For more detailed information about recycling contact your local city office, your waste disposal service or where you purchased the product.

CE Conformity



arcutronix products complies with the European standard regulation. They are tested to the Council guideline for harmonizing the legal regulations of the member states on electromagnetic compatibility.

Electromagnetic Immunity Statement

This equipment has been tested and found to comply with the limits of EN 50082-2 (Electromagnetic Immunity for heavy industry).

Instructions to User

All interface cables to this equipment must be shielded and designed in accordance with proper EMI techniques to ensure compliance with EMC requirements. arcutronix will provide cable shielding specifications on request.

Electromagnetic Emissions Statements

To achieve satisfactory EMC performance, all interface cables to this equipment must be shielded and designed in accordance with proper EMI techniques. Rack mount cards has to be inserted into the designated chassis. Chassis slots that are not used have to be covered with a blanking plate. The chassis must be bonded to earth. This is usually achieved by installing the power cord to the chassis. An extra earth terminal may be provided. If this device is used in a residential setting, resulting interference must be corrected by the user. Any user modification made to the unit voids the user's authority to operate the unit under the FCC rules.



WARNING: This is a Class A product. In a domestic environment, this product may cause interference in which case the user may be required to take adequate measure. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

United States Federal Communications Commission (FCC) Electromagnetic Emissions Statement

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions in this manual, may cause interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of the FCC Rules, which are designed to provide reasonable protection against such interference in which case the user at his own expense will be required to take whatever measures may be required to correct interference.

Canadian Department of Communications (DOC) Statement

WARNING: This equipment generates, uses, and can radiate radio frequency energy and if not installed and used in accordance with the instructions in this manual, may cause interference to radio communications. This digital apparatus has been tested and does not exceed the Class A limits for radio noise for digital apparatus set out in the DOC Radio Interference Regulations. The regulations are designed to provide reasonable protection against radio noise interference in which case the user at his own expense will be required to take whatever measures may be required to correct interference.

European Communities

WARNING: This equipment has been tested and found to comply with the limits of CISPR 22 and EN 55022 Class A for information technology equipment. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Chapter 1

Introduction

CSX4 Description

General

The CSX - Connectivity G.SHDSL for serial data stream is a flexible modem to transport a wide bunch of different interfaces over long haul copper infrastructure by the use of DSL technique as recommended in ITU-T G.SHDSL (ITU-T G.991.2). It offers bandwidth capability up to 4.096 Mbps and is based on a modular design to achieve an efficient and flexible concept. The support of variable customer interface modules with always the same configuration and maintenance views is an advantageous feature in handling and operating.

Several interfaces are possible for the CSX4:

- Fast Ethernet
- PDH acc. to ITU-T G.703/G.704 (E1)
- ISDN Digital Leased Line (I.430)
- Serial data in according different global standards
 - ITU-T X.21
 - ITU-T V.24 (RS-232)

Moreover, as part of arcutronix's Multi Service Platform, the CSX4 benefits from the future-proof system architecture and management features. This includes various chassis and housing options with optional redundant power supplies and centralized management via a rack agent (SCX2e). Thus, by using the IP forwarding feature the entire management system can easily be maintained and supervised by carriers or ISPs via a single access point.

The device is available as a 3RU rack mount card, which can be modified without the slightest effort to a stand-alone unit by using arcutronix' unique table-top housing SHX3.

The management capability of the CSX4 devices offers a wide range of features like a local and remote management, software update and performance monitoring. Remote management capability makes it easy to configure, operate and maintain units, which are even far away from the ISP's management access point.

Remote Power Feeding

Remote feeding is a technology which enables operators to power remote sites from a central location by delivering that power via twisted pair cable. Remote feeding is by far the most cost effective solution for powering remote sites and gives the service provider independence from any local power at the CPE location.

The CSX4-RF (Remote Feeding) family supports this feature in cooperation with the “Feeding Unit” SRX10-RF and the “Fedded Housing” SHX3-10W-RF. The SRX10-RF is usually installed in an CO environment. It can house 10x CSX4-RF and can feed via TP 10x CSX4-RF (in SHX3-10W-RF).

The arcutronix remote feeding implementation offers many additional benefits to operators and service providers:

- Safety

Deploying our system provides the safest powering solution for active equipment installed in street-side locations. Indeed in the event of any failure of the system the power source is shut down rendering the installation harmless to people.

- Size

With its original design arcutronix offers a highly compact solution to powering equipment in street cabinets.

- Very high reliability without remote batteries

- Ease of planning

A major advantage for operators is the ease with which the system can be deployed.

Application Areas for the CSX4

The CSX4 offers transport and conversion of several service interface onto a copper network. All this gives a wide bouquet of combinations, which will not all available or mentioned in the order matrix. Please check with your local arcutronix partner for your needs and possible options.

The user-side is variable and can support different types of applications, which will be depicted in more detail below.

Legacy Services

The CSX4 is mainly a copper converter for legacy services to PDH-type interfaces and vice versa. The legacy interfaces were very popular but today the most carries do not longer offer service-interfaces with this special characteristics. For this reason, a converter is required to adopt the legacy services towards the carriers network to allow transportation and reduce the customer’s need for changes.

The legacy services and there main usage are:

X.21	Traditional IP-Router I/F
------	---------------------------

V.24

Remote control and maintenance (RS-232)

ISDN Digital Leased Circuit

The CSX4 together with the I.430 option is used to offer Digital Leased Circuits (DLC) over a PDH network. More and more carriers do not offer DLC at low bandwidth but the customers do still have equipment in usage. To support this equipment, the CSX4-I.430 can be used. 4 types of DLC are supported:

D64S	1x 64k
D64S2	2x 64k
S01/TS01	1x B-channel, 1x D-channel
S02/TS02	2x B-channel, 1x D-channel

Note: The names are common for DTAG. In other countries there are similar services with different names used.

Ethernet Over PDH

Ethernet is packet-based interface, which is used more and more in the end-user's premise. The possibility to offer Ethernet-services is very important for all service providers. But Ethernet needs total different infra-structure, than a PDH/SDH based network does offer for service transport. To adopt the two divergent worlds, the CSX4-FE can be used. It maps Ethernet-packets into the (framed) E1/T1, to prepare it for further handling in the TDM metro and backbone.

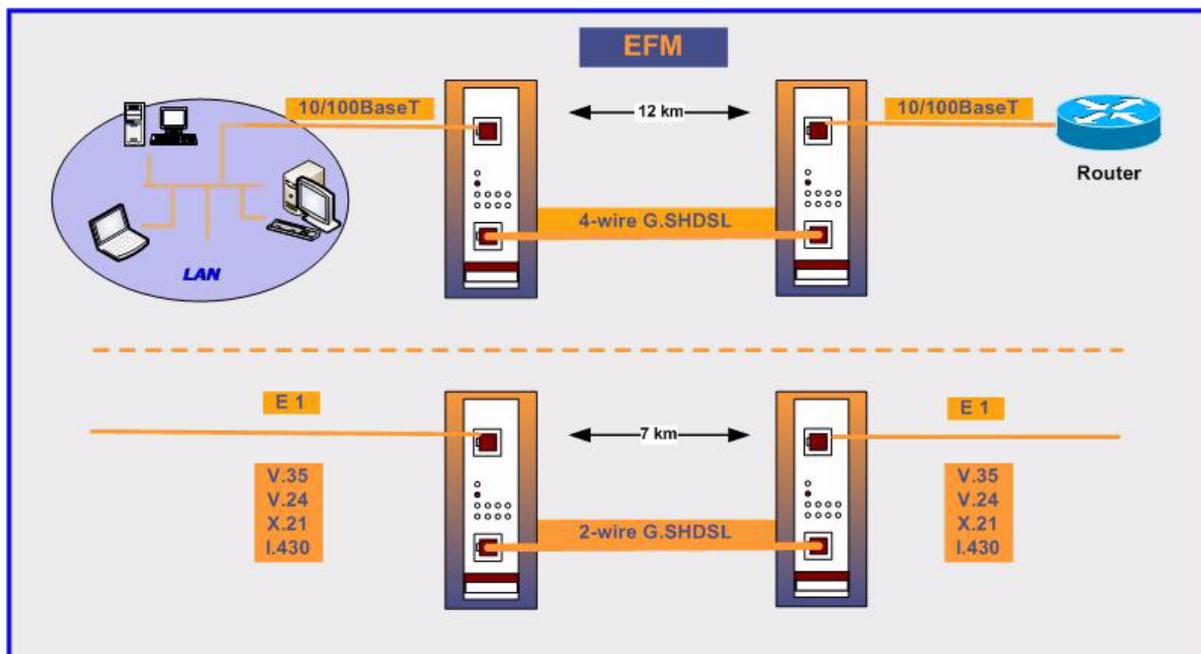


Figure 1-1 CSX4 applications in a modern network

CSX4 Functions at a Glance

- Support of a wide range of copper interfaces, including E1, Ethernet, X.21, V.24 and I.430.
- Seven LED indicators and a loop button for easy service diagnostics.
- Local and remote loop-back, BER test and performance monitoring on line and interface ports.
- Fully management configuration via
 - RS232 / VT100 in the SHX3 singleslot housing or with the arcutronix system controller and agent card SCX2e.
 - Ethernet/ Telnet with the Agent SCX2e
 - SNMP with the Agent SCX2e
 - web-based GUI (http) with the Agent SCX2e
- Universal 3RU rack mount card for 19" chassis or single slot housing
- Software update support also remote over the line
- Remote Power Feeding from local to remote unit (not available for all variants)

Error Recovery

If problems occur or if error messages will be displayed, please check whether the system has been installed as described in the installation instructions and whether all configuration rules have been followed.

Order Matrix

The order matrix shows the available variants of the CSX - Connectivity G.SHDSL. Further options are possible on request.

Table 1-1 Order Matrix

Art.- No.	Short Name	Description
0803-3100	CSX4-E1R	G.SHDSL Copper Modem: <ul style="list-style-type: none">• 2- or 4-wire mode supported;• up to 2048kbps; nx64kbps;• 1x G.SHDSL (RJ45);• 1x E1 (G.703, RJ45) port• 3RU rack mount card.
0803-3110	CSX4-E1R-RF	G.SHDSL Copper Modem: <ul style="list-style-type: none">• with Remote Power Feeding support;• external Power Feeding unit is required;• 2- or 4-wire mode supported;• up to 2048kbps; nx64kbps;• 1x G.SHDSL (RJ45);• 1x E1 (G.703, RJ45) port• 3RU rack mount card.
0803-3220	CSX4-V.24	G.SHDSL Copper Modem: <ul style="list-style-type: none">• 2- or 4-wire mode supported;• up to 230kbps; nx64kbps;• 1x G.SHDSL (RJ45);• 1x V.24 (D-Sub25) port;• synchronous and asynchronous mode supported;• 3RU rack mount card.
0803-3221	CSX4-X.21	G.SHDSL Copper Modem: <ul style="list-style-type: none">• 2- or 4-wire mode supported;• up to 4.608kbps; nx64kbps;• 1x G.SHDSL (RJ45);• 1x X.21 (D-Sub15) port;• 3RU rack mount card.
0803-3230 (obsolete!)	CSX4-V.35	G.SHDSL Copper Modem: <ul style="list-style-type: none">• 2- or 4-wire mode supported;• up to 4.608kbps; nx64kbps;• 1x G.SHDSL (RJ45);• 1x V.35 (Winchester) port;• 3RU rack mount card.

Table 1-1 *Order Matrix*

Art.- No.	Short Name	Description
0803-3240	CSX4-I.430	G.SHDSL Copper Modem: <ul style="list-style-type: none">• 2- or 4-wire mode supported;• up to 4.608kbps; nx64kbps;• 1x G.SHDSL (RJ45);• 1x BRI (I.430, RJ45) port;• 3RU rack mount card.•
0803-3280	CSX4-FE	G.SHDSL Copper Modem: <ul style="list-style-type: none">• 2- or 4-wire mode supported;• up to 4.608kbps; nx64kbps;• 1x G.SHDSL (RJ45);• 1x 10/100BaseTx (RJ45) Bridge-Module with speed auto-negotiation and VLAN support (802.1q);• 3RU rack mount card.

Accessories

Housings and Cables

The arcutronix' Multi Service Platform offers a range of accessories for an easy and space saving installation of your device into 19" cabinets or as desktop / wall-mount installation.

Table 1-2 Accessories Housings & Cables

Art.- No.	Short Name	Description
0805-9000	SRX10	Rack mount shelf: <ul style="list-style-type: none"> • 19" chassis; • Height: 3RU; • 10 slots for line-cards; • 1 slot for management; • 2 slots for modular AC (115/230V) and/or DC (-48V) power supplies; • with adjustable side fixing plates.
0805-9001	SRX10-RF	Rack mount shelf with Remote Feeding Support: <ul style="list-style-type: none"> • 19" chassis; • Height: 3RU; • 10 slots for line-cards; • 1 slot for management; • 1slot for modular DC (-48V) power supply; • 1slot for modular DC (-48V) remote feeding power supply; • with adjustable side fixing plates.
0805-9500 (obsolete!)	SRX24	Rack mount shelf: <ul style="list-style-type: none"> • 19" high density chassis; • Height: 6RU; • 24 slots for line-cards; • 1 slot for management; • 2 slots for modular AC (115/230V) and/or DC (-48V) power supplies.
0717-9001 (obsolete!)	SHX3-7W	Stand-alone housing: <ul style="list-style-type: none"> • 1 slot for 3RU line-card; • max. 7W power consumption; • VT100 Management port (D-Sub9); • alarm contact; • no ventilation; • integrated wide range power supply; • mains supply: 48VDC...110/230VAC; • power jack included.

Table 1-2 *Accessories Housings & Cables*

Art.- No.	Short Name	Description
0717-9101	SHX3-15W	Stand-alone housing; <ul style="list-style-type: none"> • 1 slot for 3RU line-card; • max. 15W power consumption; • VT100 Management port (D-Sub9); • alarm contact; • with ventilation; • integrated wide range power supply; • mains supply: 48VDC...110/230VAC; • power jack included.
0717-9401	SHX3-10W	Stand-alone housing; <ul style="list-style-type: none"> • 1 slot for 3RU line-card; • max. 10W power consumption; • VT100 Management port (D-Sub9); • alarm contact; • no ventilation; • integrated wide range power supply; • mains supply: 48VDC...110/230VAC; • power jack included.
0717-9411	SHX3-10W-RF	Stand-alone housing with Remote Feeding; <ul style="list-style-type: none"> • 1 slot for 3RU line-card; • max. 10W power consumption; • VT100 Management port (D-Sub9); • alarm contact; • with ventilation; • integrated wide range power supply; • local and/or remote feeding supported; • mains supply: 48VDC...110/230VAC; • power jack included.
0500-001	PC-E	Power cord, European plug.
0500-002	PC-B	Power cord, Great Britain plug.

NOTE: All order matrices will be regularly updated. Asked your arcutronix representative for the latest publications.

Chapter 2

Getting Started

For the startup of the CSX4 please follow the directions in this chapter. You must keep the operating conditions specified for the devices. In the following read about the startup preparation, the startup itself, and the possibility to automate the startup.



WARNING: Read the safety notes at the beginning of this manual carefully before you start the device!

Delivered Parts

Please check if all the items listed below are included in your delivery. Your delivery includes:

- An CSX4 system
- optional: SingleSlot Housing SHX3
- optional: Power Cord for AC

Preparing the Startup

Before you switch on the device you need to check the operating conditions and install the CSX4 into the chassis or the single-slot housing.

Operating Conditions

Read the operating conditions specified in this section carefully to avoid damages to the device or connected systems.

Ambient Conditions

The ambient conditions, which must be maintained for the CSX4, are shown in Table 2-1.

Table 2-1 Ambient Conditions

Operating Temperature	5°C to 40°C
Max. Relative Humidity (non-condensing)	85% (30°C)

Table 2-1 Ambient Conditions

Input Voltage	+5V DC
Power Consumption	< 7 VA ⁱ

i. Depends on the given variant.

CAUTION: If operating limits are exceeded, malfunctions and permanent damage to the equipment may result.

NOTE: In order to operate the various interfaces, please ensure that the plugs are firmly engaged in the sockets.

CSX4 Mounting

To mount the CSX4 into the chassis please follow the subsequent step-by-step instructions.

1. Disconnect all cables from the CSX4 before mounting the device.
2. Place the CSX4 right way up on a table with the front panel looking in your direction.
3. Insert the CSX4 that way into the chassis. Mount the CSX4 to the chassis using the provided screws.
4. Connect the interface cables to the CSX4.

Startup of the CSX4

Switching on the Device

Switching on the CSX4, please observe the following instructions:

1. Connect the mains cable to the chassis or single-slot housing containing the CSX4.
2. Plug the mains plug of the mains cable in a Home Office socket.

Configuration Methods

All configuration settings are made by using the management user I/F. For the system configuration you can choose one of the following configuration methods:

1. Local agent: To set up a connection to the system login using the telnet/SSH2 protocol or connect a serial terminal to the outband interface. A login screen will be presented to provide access to the local agent menus (Chapter 5, Control Software CSX4).
2. SNMP agent: You can use the SNMP protocol to manage the CSX4 (Chapter 6, SNMP and MIBs).
3. Web-based GUI. Connect with a standard internet browser (e.g. Firefox) to the IP-management I/F. A html-based GUI will allow easy configuration settings.

Chapter 3

Hardware

In this chapter beside a list of system components you will find a description of the function indicators and external interfaces for the CSX4.

The CSX4 is a compact unit. All external connection points for data lines and control elements are accessible on the front panel. The indicator elements are also on the front panel.

Main Board

The different hardware variants of all CSX4 variants are based on the same basic main board. The main board consists of 6 basic parts:

- E1/T1 Line I/F
- Space for modular User-I/F
- Micro Controller with Flash, RAM etc.
- DC/DC Converter
- Backplane Connector
- Front-Plate with Connectors and Indicators

The CSX4 G.SHDSL copper modems are always equipped with DSL-line port and LED indicators which are described in this chapter, as well as the interface port, which is different for each CSX4 type.

Use a VT100 terminal at the agent's control port or the single-slot housing to configure the unit via the control software. For information on the features and the menu system see Chapter 5, Control Software CSX4.

NOTE: There is a unique port numbering over all CSX4 variants as shown in Figure 3-1. If not all ports are equipped, the corresponding port number is missing in the overview.

E.g. CSX4-xxx: Only port 1 and port 2 can be found in the settings.

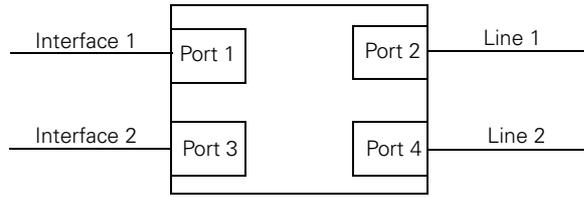


Figure 3-1 Unique Port Numbering

CSX4 Front Panel

The CSX4 series offers on the front side the connectors for user and line interfaces plus a number of LEDs to show status of unit and interfaces.

Depending on the given variant, the front panel looks slightly different. In the following the common parts and the differences of the front panel will be depicted.

Figure 3-2 provides the general front view of the CSX4.

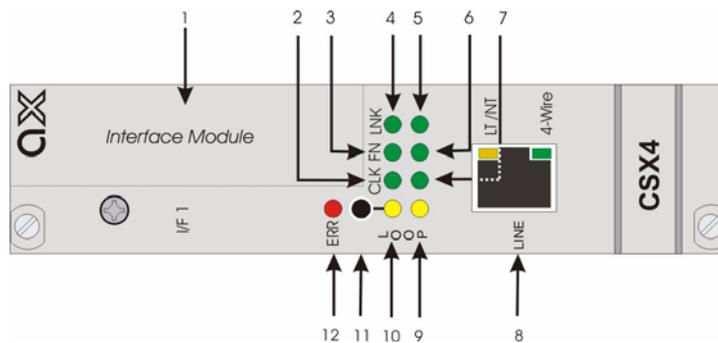


Figure 3-2 Front Panel CSX4 Rack Mount Card

Common Indicators

Table 3-1 provides information on the indicator positions (see Figure 3-2) and explanations for the CSX - Connectivity G.SHDSL. The LEDs are related either to an interface port (marked as I/F) or a line port (marked as Line in the table below)

Table 3-1 Indicators of the CSX - Connectivity G.SHDSL

Pos.	LED	Color	Function	Normal Operation
1	-	-	This is the position of the interface module and its probe connector(s). Normally no LEDs are placed here, but all indicators are on the main-board.	
2	CLK - I/F	green	On, if the clock source is external from the interface port or both CLK-LEDs are on at internal clock source.	Depends on the setting.

Table 3-1 Indicators of the CSX - Connectivity G.SHDSL (continued)

Pos.	LED	Color	Function	Normal Operation
3	FN - I/F	green	A signal is received on Interface port or handshake signal from local TE active.	On
4	LNK - I/F	green	Interface port 1 is fully working. Flashes, if no sync or AIS	On
5	LNK - Line	green	Link Up on the line port	On
6	FN - Line	green	Frame sync on the line port. Not available if line port is configured as unframed.	On
7	CLK - Line	green	On, if the clock source is remote transferred over the line or both CLK-LEDs are on at internal clock source	Depends on the setting
8	-	-	G.SHDSL Line I/F	
9	LOOP - Line	yellow	Indicates an line loop: On: facility loop (data back to line) Flash: terminal loop (data back to I/F) Note: Both LOOP-LEDs are also on during the BER test and initialization	Off
10	LOOP - I/F	yellow	Indicates an interface loop: On: facility loop (data back to I/F) Flash: terminal loop (data back to Line) Note: Both LOOP-LED are also on during the BER test and initialization.	Off
11	LOOP Key	Push-Button	Loop configuration for service cases. See Chapter 4, Test-Loops for more details.	./.
12	ERR	red	Indicates an (enabled) alarm condition. The alarm output will also be active (alarm relay closed).	Off

Note: All LEDs are switched on during the power-up test of the CSX4.

Note: The meaning of the LEDs is the same for all CSX4 variants.

Table 3-2 provides the meanings for the indicator colors.

Table 3-2 Indicator Color Meanings

Color	Meaning	Explanation
Green	Normal operation, signal level detection, mode display.	The LED indicators at the front of the CSX4 card will reveal its overall status. The colour of the LED indicator can help you to determine if there is a problem. The card is operating properly and no intervention is required, if only green LEDs are lit.
Yellow	Warning, indicates unusual operation modes like loop or test activity.	
Red	Indicates that errors and/or malfunctions have been occurred.	

Loop Mode Key

You can activate respectively change loop modes by pressing the loop mode key (see Figure 3-2, position 6). The selected mode is indicated on the LOOP LEDs at the front panel (see Table 3-1, position 7, 8). A delay of 2 sec. after each pressing is taken, before the selected loop mode will be active. This delay avoids unwanted loops during the selection.

Note: Always deactivate a loop mode before you change to a new one.

Table 3-3 Sequence for the Loop Mode Key Function

Loop Mode Key Pressed	Selected Loop / Result of the Sequence
1 times	facility loop on local interface port
2 times	facility loop on local line port
3 times	facility loop on remote interface port
4 times	facility loop on remote line port
5 times	or more will disable all loops

The management is not disturbed by loops. Loops can also be selected or changed via the control software.

G.SHDSL Line-Interface

G.SHDSL Standard

Single-Pair high-speed digital subscriber line (SHDSL) is a telecommunications technology for Digital Subscriber Line (DSL) subscriber lines. It describes a transmission method for signals on copper pair lines, being mostly used in access networks to connect subscribers to Telephone exchanges or POP Access Points.

G.SHDSL was standardized in February 2001 internationally by ITU-T with recommendation G.991.2.

G.SHDSL features symmetrical data rates from 192 kbit/s to 2,304 kbit/s of payload in 64 kbit/s increments for one pair and 384 kbit/s to 4,608 kbit/s in 128 kbit/s increments for two pair applications. The reach varies according to the loop rate and noise conditions (more noise or higher rate means decreased reach) and may be up to 3,000 meters. The two pair feature may alternatively be used for increased reach applications by keeping the data rate low (halving the data rate per pair will provide similar speeds to single pair lines while increasing the error/noise tolerance).

The payload may be either 'clear channel' (unstructured), T1 or E1 (full rate or fractional), n x ISDN Basic Rate Access (BRA), Asynchronous Transfer Mode (ATM) or 'dual bearer' mode (i.e. a mixture of two separate streams (e.g. T1 and 'packet based') sharing the payload bandwidth of the G.shdsl loop).

LT and NT-Mode

For proper operation, the standard G.SHDSL (G.991.2) defines two modes, which are used on the two different sides of the copper line.

- LT-mode (“STU-C”) and
- NT-mode (“STU-R”).

LT mode (Line termination) or STU-C (SHDSL Transceiver Unit, Central) is the master unit. The LT-side is acting as the master for clock-system and is starting the SHDSL line after fail.

The NT-side (Network termination) or STU-R (SHDSL Transceiver Unit, Remote) is normally located close to the customer and is the slave unit in the system. The NT is waiting for the start-up indication from the LT and takes the clock information from the LT, so generating an synchronous system.

During start-up, the two units (LT and NT) find the best filters to get optimized throughput for the given infra-structure. The principal functions are:

- symbol timing generation and recovery;
- coding and decoding;
- modulation and demodulation;
- echo cancellation;
- line equalization.

Crossing of Copper Pair and Lines

The CSX4 does support the operation of 1 or 2 copper pairs, where both are used for bidirectional transport. During installation, a mismatch of the for copper lines can occur, which will be automatically detected and resolved by the CSX4. This makes is very easy and robust during installation.

These two mismatches do have no influence on the operation of the CSX4:

- Crossing of a/b pairs within one line and
- Crossing of the two lines.

Please see the two next figures for details on the mentioned wiring mismatches.

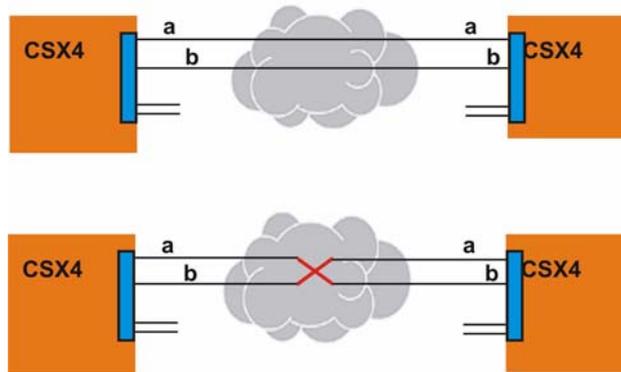


Figure 3-3 Cross-Over of Copper Pair within one Line

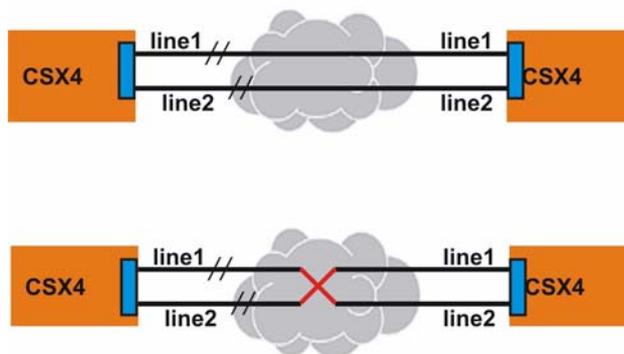


Figure 3-4 Cross-Over of Copper Lines in 4-wire mode

A mismatch of pairs and lines can not be resolved by the CSX4. This will lead to permanent fail of the line. Please check the wiring in such a case.

Configuration of the G.SHDSL Line-Port

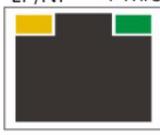
The configuration of the G.SHDSL I/F is done via the management I/F, as depicted in Chapter 5, Control Software CSX4.

These two settings must be choose properly to get the correct results:

- 2- or 4-wire mode. Both ends of the modem-pair must be configured to the same wiring model. The yellow LED in the RJ45 connector shows the selected mode.
- LT or NT mode. Both ends must have different setting for LT and NT mode. The green LED in the RJ45 connector shows LT mode when lighting.

Pinout

The pin assignment is as follows:

RJ-45	Pin	Assignment	2-Wire Mode	4-Wire Mode
LED: yellow green	1	-	-	-
	2	-	-	-
LT /NT 4-Wire 	3	TIP Line B	not used	Line B
	4	TIP Line A	Line A	Line A
	5	RING Line A	Line A	Line A
	6	RING Line B	not used	Line B
	7	-	-	-
	8	-	-	-

The meaning of the two integrated LEDs are as follows:

- Yellow LT /NT: Lit, when the unit is configured to LT-mode.
- Green 4-Wire: Lit, when the unit is in 4-wire mode.

Alarms of the G.SHDSL Port

The G.SHDSL port can raise the “Link Down”-alarm.

- “Link Down” is raised, when the G.SHDSL line is not established. the “Link Down” alarm will be cleared, when the startup of the line is finished, the negotiation between LT and NT is done and payload transmission is possible.

CSX4-E1R,

CSX4-E1R-RF

Front View

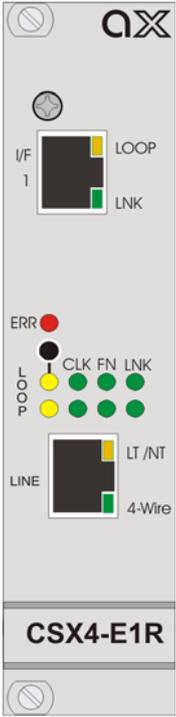
The CSX4-E1 variant offer E1 (G.703/G.704) transport via G.SHDSL copper line. The E1 is delivered in symmetrical (120 Ohms) characteristic:

1. CSX4-E1R with 1x RJ-45 connector for 120 Ohm twisted pair cables.

The unit can be operated on the user interface in leased line mode and fractional mode with framed data-structure. The configuration for this is done via management.

Table 3-4 provides the front view of the CSX4-E1R.

Table 3-4 CSX4-E1x Front Views

View	Product Number & Details
	<p>0803-3100</p> <p>Mounting screw in SRX or SHX.</p>
	<p>1x ITU-T G.703 E1-user port.</p> <p>1x ERR-LED.</p> <p>1x Loop-Button.</p> <p>8 LEDs for status indication.</p> <p>1x ITU-T G.SHDSL line I/F.</p>
<p>CSX4-E1R</p>	<p>Handle with Label.</p> <p>Mounting screw in SRX or SHX.</p>

- 1 x ITU-T G.703 / G.704 (RJ45),
- 1 x ITU-T G.SHDSL (RJ45).

G.703 TDM Port

The G.703 TDM port (see Figure 3-2) is capable to transfer data with a payload rate of $n \times 64$ kbit/s up to 2.048 Mbps including the remote (inband) management. The line coding is based on the ITU-T G.703 standard (HDB3) which guarantees a balanced ratio on the copper.

For further information see Appendix A, Technical Specifications. Please, feel free to ask for additional options.

G.704 Framing

The ITU-T recommendation G.704 defines a framing structure for the 2.048kbps data-stream, which is transported over the copper line. The data-stream is divided into 32 channels, each offering a capacity of 64kbps. These channels are also called timeslots (TS0 - TS31). The first timeslot (TS0) is reserved for framing purposes, and alternately transmits a fixed pattern. This allows the receiver to lock onto the start of

each frame and match up each channel in turn. The standards allow for a full Cyclic Redundancy Check to be performed across all bits transmitted in each frame, to detect if the circuit is losing bits (information).

The CSX4 has to be operated in framed mode, if the service is configured to less than 32 x 64kbps usage. If the CSX4 is configured to an interface data-rate (payload) of 32 x 64kbps (= 2048kbps) the device automatically switches to unframed (clear channel) mode.

Configuration of the TDM Line-Port for CSX4-E1R

The TDM Line-port can be operated in TE (Terminal Equipment) or NT (Network Termination) mode. The behavior is not much different, but the usage of the RJ-45 connector is changed. Signals, which are output in TE-mode, will become input in NT-Mode and vice versa.

Table 3-5 Setup Main Board with RJ-45 Interface Port

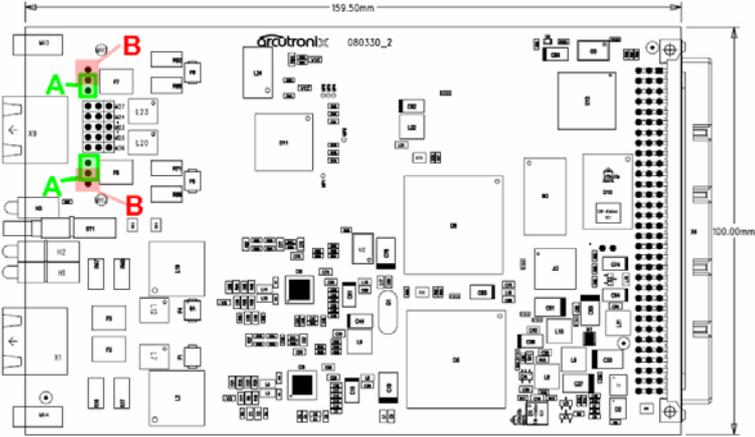
Position	Function
X11	Jumpers A The jumper block in A position sets the interface to TE (default setting).
	Jumpers B The jumper block in B position sets the interface to NT.

Configuration of the TDM Line-Port for CSX4-E1B

The CSX4-E1B is equipped with two BNC connectors, one for input (RX), the other for output (TX). The two shields can be separately connected to earth via two jumpers,

located on the PCBA. Please choose the correct value to get best results for the 75Ohm asymmetrical link.

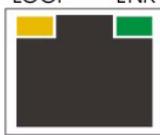
Table 3-6 Setup Main Board with BNC Interface Port

Position	Function
	
X9	Jumper A Input shield potential connected to frame ground (default setting).
	Jumper B Input shield potential floating.
X4	Jumper A Output shield potential connected to frame ground (default setting).
	Jumper B Output shield potential floating.

Pinout of CSX4-E1R

The TDM interface is connected via RJ-45 plug on the front side of the CSX4.

The pin assignment is as follows (TE pinning is default):

RJ-45	Pin	Assignment ⁱ	Direction TE-Mode	Direction NT-Mode
LED:	1	TX+	Input	Output
yellow green	2	TX-	Input	Output
LOOP LNK	3	CGND (Shielded ground, optional)	-	-
	4	RX+	Output	Input
8 1	5	RX-	Output	Input
	6	CGND (Shielded ground, optional)	-	-
	7	-	-	-
	8	-	-	-

i. The pin assignment is ajar to PRI interface

- The green LED (right, 'LNK') provides information regarding the link:

- on: the link is established
- The yellow LED (left, 'LOOP') indicates that a loop is switched on:
 - on: Local Loop is switched on.

Alarms of the E1 Interface

The E1 Interface can raise the “Link Down”-alarm, the “RX AIS”- alarm and the “No Sync”-alarm. “No Sync” can only be detected, when the interface is operated in G.704 framed mode.

- “Link Down” is raised, when there is no input signal on the E1-Port. No input signal is detected by all-0s.
- “RX AIS” is raised, when there are less than 3 zeros within 512 bits.
- “No Sync” is raised, when the device is configured to use G.704 frame or multiframe mode and there is no valid frame (or multiframe) detected.

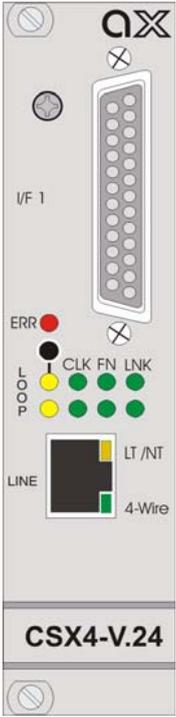
CSX4-V.24

Front View

The CSX4-V.24 is a modem for ITU-T V.24 (user I/F) transport via G.SHDSL copper line. The ITU-T V.24 is also very popular named RS-232. The V.24 I/F can be operated and used for slow data-rates, only. The maximum data-rate supported is 230kbps (asynchronous) or $3 \times 64\text{kbps} = 192\text{kbps}$ (synchronous). The operating mode and speed is configured via the management GUI. The V.24 I/F can be operated in either DTE or DCE mode. Please see below for details in configuration.

Table 3-4 provides the front view of the CSX4-V.24.

Table 3-7 CSX4-V.24 Front View

View	Product Number & Details
	0803-3220
	Mounting screw in SRX or SHX.
	1x V.24-user port.
	1x ERR-LED.
	1x Loop-Button.
	8 LEDs for status indication.
	1x ITU-T G.SHDSL line I/F.
	Handle with Label.
	Mounting screw in SRX or SHX.

- 1 x ITU-T V.24 (D-Sub25),
- 1 x ITU-T G.SHDSL (RJ45).

The details about the Line-I/F and the LEDs are given above (Chapter 3, **G.SHDSL Line-Interface**, and Chapter 3, **Common Indicators**,). The electrical details of the V.24 pinning are given below.

Configuration of the V.24 Interface

The V.24-I/F can be operated in DCE or DTE mode. The operating mode is chosen by a number of jumper-blocks (called X1 and X2), which must be change combined. Figure 3-5 shows the location of the jumper-blocks and the settings for DCE or DTE operation.

A third jumper (called X3) is located close to the front connector (D-Sub25). It is used to connect the digital ground (DG) of the chassis to the shielded ground of the interface connector. In the shown position (bottom), the DG is not connected to Shield.

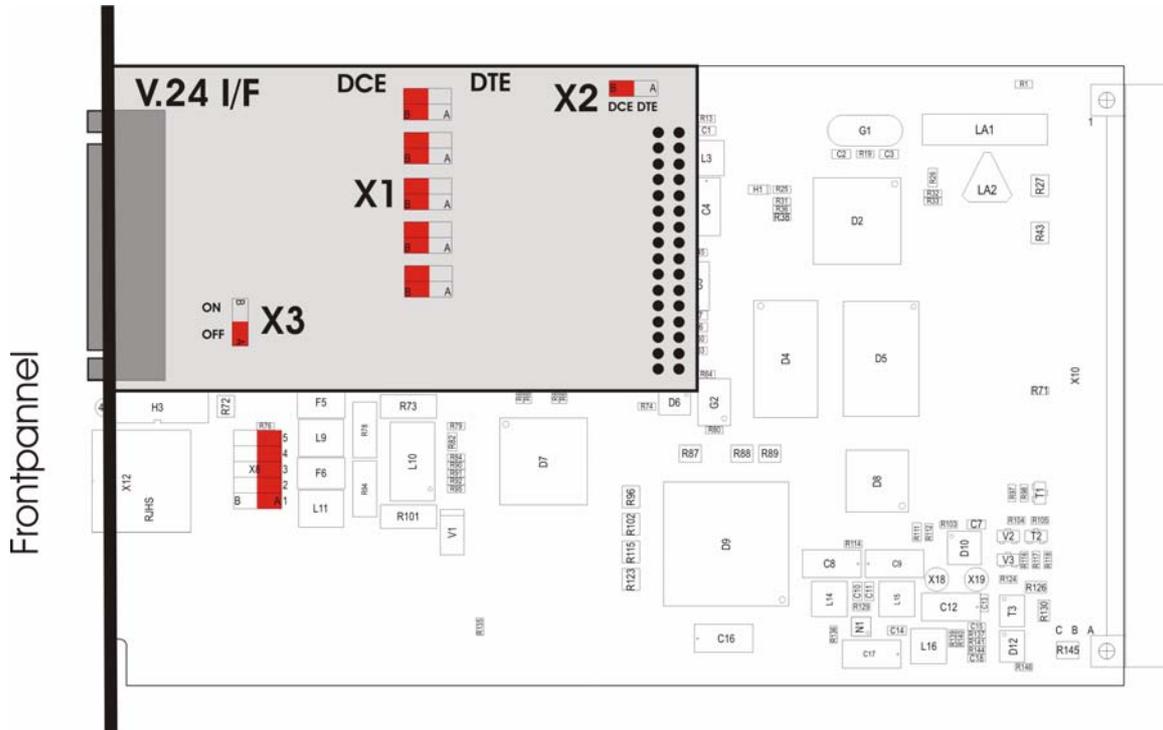


Figure 3-5 V.24 Interface Board

Pin Assignment of the Female D-Sub25 Connector

Table 3-8 Pinning V.24 D-Sub25 Connector

Pin	Signal	DTE Direction	DCE Direction
1	Shield	-	-
2	TXD	Out	In
3	RXD	In	Out
4	RTS	Out	In
5	CTS	In	Out
6	DSR	In	Out
7	Ground	-	-
8	DCD	In	Out
15	TXC	In	Out
17	RXC	In	Out
20	DTR	In	Out
24	EXTCLK	Out	In

Figure 3-6 V.24 Interface: D-Sub25 Connector

Restrictions of Usable Clock Modes

The V.24 module supports a maximum transmission speed of asynchronous 230.2kbps and synchronous 192kbps.

The external clock is not defined and not available for asynchronous connections.

Clock	Mode Port 1 with V.24 Interface used as:	
Single	DCE	DTE
• internal	available	available
• external	not applicable	not applicable
• remote	available	available

Alarms of the V.24 Interface

The V.24 Interface can raise the “Link Down”-alarm. The “RX AIS”- alarm and “No Sync”-alarm can not be raised by the V.24 Interface.

In DCE-mode:

- “Link Down” is raised, when the RTS-signal (pin 4 on the D-Sub25, see above) is 1 or not connected.

In DTE-mode:

- “Link Down” is raised, when the DCD-signal (pin 8 on the D-Sub25, see above) is 1 or not connected.

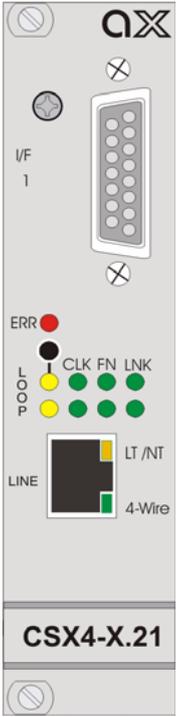
CSX4-X.21

Front View

The CSX4-X.21 is a modem to transport ITU-T X.21 (user I/F) via G.SHDSL copper line. The X.21 I/F can be operated in N x 64kbps-steps, which is configured via the management GUI. The X.21 I/F can be operated in either DTE or DCE mode. Please see below for details in configuration.

Table 3-9 provides the front view of the CSX4-X.21.

Table 3-9 CSX4-X.21 Front View

View	Product Number & Details
	<p>0803-3221</p> <p>Mounting screw in SRX or SHX.</p> <p>1x X.21-user port.</p> <p>1x ERR-LED.</p> <p>1x Loop-Button.</p> <p>8 LEDs for status indication.</p> <p>1x ITU-T G.SHDSL line I/F.</p> <p>Handle with Label.</p> <p>Mounting screw in SRX or SHX.</p>

- 1 x ITU-T X.21 (D-Sub15),
- 1 x ITU-T G.SHDSL (RJ45).

The details about the Line-I/F and the LEDs are given above (Chapter 3, **G.SHDSL Line-Interface**, and Chapter 3, **Common Indicators**,). The electrical details of the V.24 pinning are given below.

Configuration of the X.21 Interface

The X.21-I/F can be operated in DCE or DTE mode. The operating mode is chosen by one single jumper called X2. The X.21 interface operates with differential signals with 100Ohm termination. Jumpers X1 (4x) do insert (or remove) termination resistors into the following signals:

Jumper	Signal	Position left ("DCE")	Position right ("DTE")
X1.1	-	unused	unused
X1.2	TA / TB	100 Ohm Termination	No Termination
X1.3	SA / SB	No Termination	100 Ohm Termination
X1.4	RA / RB	No Termination	100 Ohm Termination

Figure 3-5 shows the location of the jumper-blocks and the settings for DCE or DTE operation.

A third jumper (called X3) is located close to the front connector (D-Sub15). It is used to connect the digital ground (DG) of the chassis to the shielded ground of the interface connector. In the shown position (bottom), the DG is not connected to Shield.

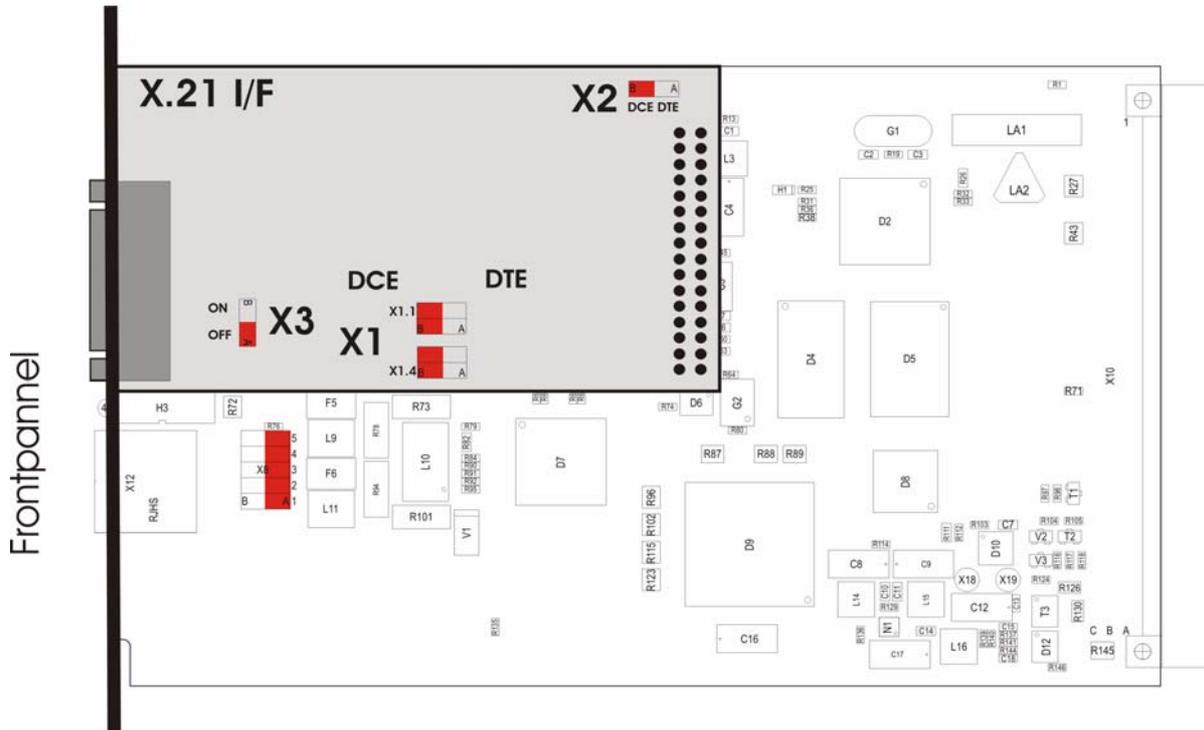
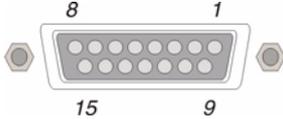


Figure 3-7 X.21 Interface Board

Pin Assignment of the Female D-Sub15 Connector

Table 3-10 Pinning X.21 D-Sub15 Connector



Pin	Signal	DTE Direction	DCE Direction
1	Shield	-	-
2	TA (Transmit A)	Out	In
3	CA (Control A)	Out	In
4	RA (Receive A)	In	Out
5	IA (Indication A)	In	Out
6	SA (Signal Timing A)	In	Out
7	unassigned	-	-
8	Ground	-	-
9	TB (Transmit B)	Out	In
10	CB (Control B)	Out	In
11	RB (Receive B)	In	Out
12	IB (Indicator B)	In	Out
13	SB (Signal Timing B)	In	Out
14	unassigned	-	-
15	unused	-	-

Figure 3-8 X.21 Interface: D-Sub15 Connector

Restrictions of Usable Clock Modes

Dual clock sources are not defined and not available for X.21 connections.

Single clock setting is conditional available if Port 1 is equipped with an X.21 interface. Conditional available clock mode settings for Port 1 with X.21 are:

Clock	Mode Port 1 with X.21 Interface used as:	
	DCE	DTE
Single		
• internal	available	not applicable
• external	not applicable	available
• remote	available	not applicable

Alarms of the X.21 Interface

The X.21 Interface can raise the “Link Down”-alarm. The “RX AIS”- alarm and “No Sync”-alarm can not be raised by the X.21 Interface.

In DCE-mode:

- “Link Down” is raised, when the control-signal (CA/CB on pins 3 and 10 on the D-Sub15, see above) is 1 or not connected.

In DTE-mode:

- “Link Down” is raised, when the indication-signal (IA/IB on pins 5 and 12 on the D-Sub15, see above) is 1 or not connected.

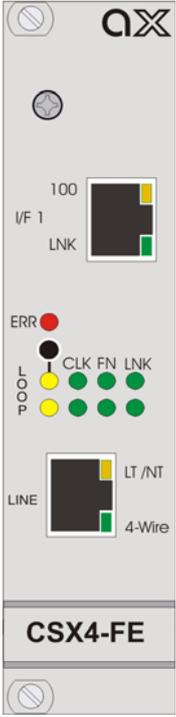
CSX4-FE

Front View

The CSX4-FE is an EFM (Ethernet in the First Mile) device to transport LAN-interface Fast Ethernet IEEE 802.3-2002 (user I/F) via modern DSL (symmetrical G.SHDSL) line I/F. The Fast Ethernet I/F can be operated in several modes (Full duplex, Half duplex, 10Mbps, 100Mbps). On the line-side, the CSX4-FE offers payload bandwidth in N x 64kbps-steps, which is configured via the management GUI. Please see below for details in configuration.

Table 3-11 provides the front view of the CSX4-FE.

Table 3-11 CSX4-FE Front View

View	Product Number & Details
	0803-3280
	Mounting screw in SRX or SHX.
	1x FE-user port.
	1x ERR-LED.
	1x Loop-Button.
	8 LEDs for status indication.
	1x ITU-T G.SHDSL line I/F.
	Handle with Label.
	Mounting screw in SRX or SHX.

- 1 x IEEE FE (RJ45),
- 1 x ITU-T G.SHDSL (RJ45).

The details about the Line-I/F and the LEDs are given above (Chapter 3, **G.SHDSL Line-Interface**, and Chapter 3, **Common Indicators**,). The electrical details of the FE pinning are given below.

Ethernet Remote Bridge Functionality

The CSX4 version with an Ethernet bridge module (CSX4-FE) is able to connect two networks over a long distance. It supports automatic detection of the connection speed (10/100 Mbps autosensing) and also the transmission of jumbo frames up to 2048 bytes frame size.

The CSX4-FE provides interconnection and mapping functionality between Ethernet Systems and WAN Time-Division Multiplexed (TDM) systems. Ethernet traffic is encapsulated with HDLC to be transmitted over the WAN Serial Interfaces. The WAN Serial Interfaces also receive encapsulated Ethernet frames and transmit the extracted frames over the Ethernet port.

The LAN frame interface can be configured via the management application. In normal operation, the default settings need no change for a proper operation. In the following chapters a short overview of the possible settings and their impact are given.

Auto Negotiation

Modern ethernet interfaces support a mechanism called Auto-negotiation to allow connection of ports with different capabilities. During the auto-negotiation process the common speed (10 or 100Mbps) and the duplex mode (full duplex or half duplex) are defined for the established link. Auto-negotiation is part of IEEE 802.3, the Ethernet standard. It was first defined in 1995 as IEEE 802.3u and was an optional implementation. Unfortunately at this time the standard gave partly space for interpretation and so different implementation in older equipment can be found. In 1998 the debatable portions were eliminated and a year later the standard was extended for Gigabit-Ethernet.

In the market, there is still a lot of the older equipment, where auto-negotiation was not clear defined, so there can always occur problems when devices try to do auto-negotiation. For this reason, CSX4 supports world's widest range of different settings to allow an interoperability with all known vendors of Ethernet devices. There are modes, where no auto-negotiation is done at all ("fixed") and the given settings are used. all other modes do auto-negotiation with the peered interface, but the possibilities are limited to the configured options. If the peered interface does not support auto-neg, too, it is the best to used the fixed mode, while otherwise problematic results can be achieved.

Please see table below for the possible settings and the resulting behavior.

Table 3-12 *Settings Auto-Negotiation*

Setting	Result		Remark
	Speed	Duplex	
Auto Speed, Auto Duplex	10, 100 or 1000 Mbps ⁱ	Full or Half Duplex ⁱⁱ	Auto-neg takes place; no limitations given.
Auto Speed, FDx	10, 100 or 1000 Mbps ⁱ	Full Duplex	Auto-neg takes place for speed; Duplex mode is given.
Auto Speed, HDx	10, 100 or 1000 Mbps ⁱ	Half Duplex	Auto-neg takes place for speed; Duplex mode is given.

Table 3-12 *Settings Auto-Negotiation*

Setting	Result		
	Speed	Duplex	Remark
100Mbit/s, Auto Duplex	100 Mbps (FastE)	Full or Half Duplex ⁱⁱ	Auto-neg takes place for duplex mode; speed is given.
100Mbit/s, FDx	100 Mbps (FastE)	Full Duplex	Auto-neg takes place; Speed and Duplex mode are given.
100Mbit/s, HDx	100 Mbps (FastE)	Half Duplex	Auto-neg takes place; Speed and Duplex mode are given.
100Mbit/s, FDx fixed	100 Mbps (FastE)	Full Duplex	No Auto-neg is done; Speed and Duplex mode are given.
100Mbit/s, HDx fixed	100 Mbps (FastE)	Half Duplex	No Auto-neg is done; Speed and Duplex mode are given.
10Mbit/s, Auto Duplex	10 Mbps	Full or Half Duplex ⁱⁱ	Auto-neg takes place for duplex mode; speed is given.
10Mbit/s, FDx	10 Mbps	Full Duplex	Auto-neg takes place; Speed and Duplex mode are given.
10Mbit/s, HDx	10 Mbps	Half Duplex	Auto-neg takes place; Speed and Duplex mode are given.
10Mbit/s, FDx fixed	10 Mbps	Full Duplex	No Auto-neg is done; Speed and Duplex mode are given.
10Mbit/s, HDx fixed	10 Mbps	Half Duplex	No Auto-neg is done; Speed and Duplex mode are given.

i. Depending on ports capability and auto-negotiation result.

ii. Depending on auto-negotiation result. All CSX4 ports do support full duplex mode.

Flow Control

Flow control is a process of managing the rate of data transmission between two nodes to prevent a fast sender from outrunning a slow receiver. The CSX4-FE provides this mechanism for the FE-interface to control the receive data, so that the TDM-bridge is not overwhelmed with data from the transmitting node. The CSX4-FE will send a so-called PAUSE frame, which halts the transmission of the sender for a specified period of time.

The usage of PAUSE frames is defined by IEEE 802.3x and uses MAC Control frames to carry the PAUSE commands.

Restrictions of Usable Clock Modes

The external clock is not defined and not available for Ethernet connections.

Pin Assignment Ethernet 10/100BaseTx I/F Connector RJ-45

The CSX4-FE has one electrical Fast-Ethernet port. For the interface two indicators give information on the Link state (LNK) and 10/100BaseTX (100). The device negotiates the operating mode of the corresponding interface automatically with the remote station using Auto Negotiation (if activated). Half-duplex and full-duplex connections are supported (see above). The data rate is either 10 Mbit/s or 100 Mbit/s. The protocol is according to IEEE 802.3 10BaseT or 100BaseTX. Auto negotiation and auto cross-over are supported.

Table 3-13 Electrical Interfaces

Item	Values
Standards:	IEEE802.3, 802.3u, 801.1 p&Q
Ports:	up to 8x 10/100BaseT
Data rate:	10Mbit/s or 100Mbit/s auto negotiation, full- or half-duplex, bandwidth limitation
Range:	Up to 100m over UTP-5 cable
Connectors:	RJ-45 8-pin

The connector is a RJ-45 plug with 2 LEDs, which indicate established Link (green LED on the left side) and the data rate (green LED, right). The pin assignment of the RJ45 is as follows:

RJ-45	Pin	Assignment
LED:	1	TD+
yellow green	2	TD-
100 LNK	3	RD+
	4	-
	5	-
	6	RD-
	7	-
	8	-

- The green LED (right, 'LNK') indicates, when the link is established and packets are transferred.
- The yellow LED (left, '100') indicates a 100BaseT link. if the LED does not lid, the link is established with 10BaseT, only.

The device is able to recognize

- a polarity inversion of the receiving signals (RD+ <--> RD-)
- a crossover of transmitting/receiving signals (RD+/RD- <--> TD+/TD-)

and corrects it automatically to ensure that the operation continues smoothly. This allows the usage of 1:1 cables in any case.

CAUTION: For access it is recommended to use twisted-pair cables of the category 5 and an impedance value of 100 Ω . The maximum cable length is 100 metres. Using cables of lower quality or different impedances may result in a restriction of the maximum cable length. In addition the employment of unshielded cables can have negative effect on the reliability of the data transmission.

NOTE: All LEDs are switched on during the power-up test of the CSX4.

Alarms of the FE Interface

The FastEthernet Interface can raise the “Link Down”-alarm. The “RX AIS”- alarm and “No Sync”-alarm can not be raised by the FE Interface.

- “Link Down” is raised, when the Ethernet PHY does not detect a link.

CSX4-I.430

Front View

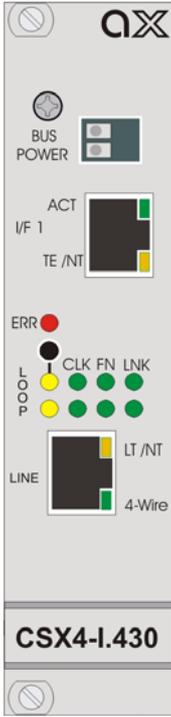
The CSX4-I.430 is a modem to expand ISDN-S0 bus. It operates as S0-Extender and can be configured to work as TE or NT. The ISDN-S0 I/F includes 2x B-channels (64kbps) and one D-channel (16kbps). On the I/F the baud-rate is 192kbps, including frame and overhead. Both B-channels and the D-channel can be selected to be mapped into the line I/F, where the configuration is done via the management GUI.

The ISDN-S0 I/F can be operated in either TE or NT mode. Please see below for details about the configuration.

The power connector on the front can be used to feed the ISDN-S0 I/F towards the connected terminals.

Table 3-14 provides the front view of the CSX4-I.430.

Table 3-14 CSX4-I.430 Front View

View	Product Number & Details
 <p>The image shows the front panel of the CSX4-I.430 device. At the top left is a mounting screw. To its right is the 'aX' logo. Below the logo is a 'BUS POWER' connector. In the center is an 'ACT I/F 1' port with a jumper block labeled 'TE /NT'. Below this is an 'ERR' LED (red) and a 'LOOP' button (black). To the right of the button are four LEDs labeled 'CLK', 'FN', 'LNK', and 'LNK'. At the bottom is a 'LINE' port labeled 'LT /NT' and '4-Wire'. The device name 'CSX4-I.430' is printed at the bottom, with another mounting screw below it.</p>	0803-3240
	Mounting screw in SRX or SHX.
	Power Connector for 48VDC input (feeding of ISDN-bus)
	1x I.430 (ISDN-S0)-user port.
	1x ERR-LED, 1x Loop-Button. 4 LEDs for status indication.
	1x ITU-T G.SHDSL line I/F.
CSX4-I.430	Handle with Label.
	Mounting screw in SRX or SHX.

- 1 x ITU-T I.430 (RJ45, ISDN-S0),
- 1 x Power Connector,
- 1 x ITU-T G.SHDSL (RJ45).

The details about the Line-I/F and the LEDs are given above (Chapter 3, **G.SHDSL Line-Interface**, and Chapter 3, **Common Indicators**,). The electrical details of the ISDN-S0 pinning are given below.

Configuration of the ISDN-S0 Interface

The ISDN-S0-I/F can be operated in TE or NT mode. The operating mode is chosen by a jumper-block (called X1), which must be set accordingly. Figure 3-9 shows the location of X1-block and the settings for TE or NT operation.

NOTE: Set this unit to NT mode if the user equipment is a TE, and vice versa. Ensure that the ISDN bus contains only one piece of user equipment which operates as NT.

A second jumper (called X2) is used to disconnect the front power-connector durable from the S0-I/F. This gives you safety in case the unit shall not feed the bus. Any

attached cable on the front will have no influence to the bus! The position shown in the picture below, disables the feeding current! This is normally used for TE-setting.

NOTE: Jumper X2 operates mirror inverted to jumper X1: In TE-mode X2 must be in the shown position. In NT-mode, X2 must be placed to the top position.

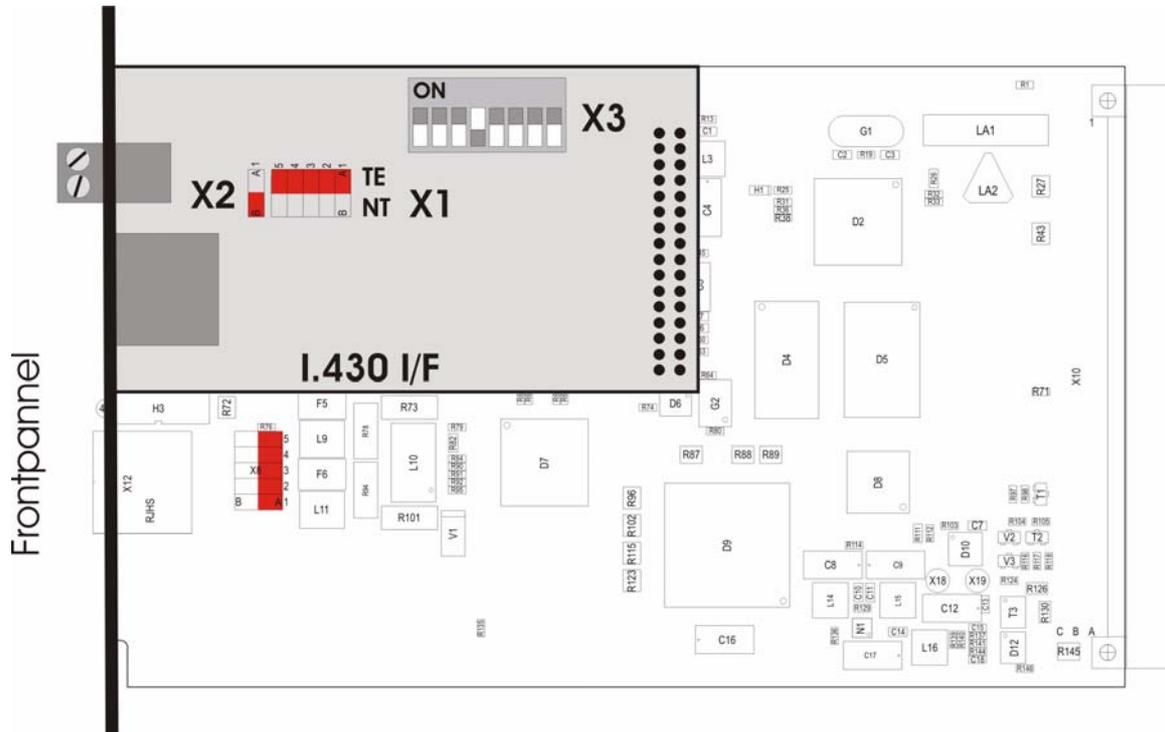


Figure 3-9 I.430 Interface Board

The setting, which of the 2 B-channels and the D-channel will be transported via the line-I/F is done with the help of DIP-switch X3. See Table 3-15 for details.

NOTE: Only slide 1-4 are used. The rest (5-8) are unused but must be left in given position (“OFF”).

NOTE: Corresponding settings must be configured via management to guarantee proper operation!

Slide 1-3 define the used channel capacity. The standard usage is all 3 slides set to OFF.

Table 3-15 I.430 Settings

Mode	DIP-Switch			Mgmt-Settings			
	SW1	SW2	SW3	NT		TE	
				Clock Source	Time Slots	Clock Source	Time Slots
S0/256k: 2xB + D	off	off	off	remote	4	external	4
S0/192k: 2xB + D	on	on	on	remote	3	external	3
I.430/B1 only	on	off	off	remote	1	external	1

Table 3-15 I.430 Settings

Mode	DIP-Switch			Mgmt-Settings			
	SW1	SW2	SW3	NT		TE	
				Clock Source	Time Slots	Clock Source	Time Slots
I.430/B2 only	off	on	off	remote	1	external	1
I.430/B1 + D	on	off	on	remote	2	external	2
I.430/B2 + D	off	on	on	remote	2	external	2
n.a.	-	off	off				

Slide 4 defines whether the 100Ohm termination is enabled or not. Set slide 4 to ON to enable 100Ohm S0-Termination. This setting is the default value and recommended.

Pin Assignment ISDN-S0 Connector RJ-45

The pin assignment is as follows (TE pinning is default):

RJ-45	Pin	Assignment ⁱ	Direction TE-Mode	Direction NT-Mode
LED:	1	-	-	-
	2	-	-	-
	3	TX+	Output	Input
	4	RX+	Input	Output
	5	RX-	Input	Output
	6	TX-	Output	Input
	7	-	-	-
	8	-	-	-

i. The pin assignment is ajar to PRI interface

- The yellow LED (right, 'TE /NT') provides information about the selected mode
 - on: the S0-I/F is operated in TE-mode
- The green LED (left, 'ACT') indicates whether the S0-bus is activated:
 - on: S0-bus is activated.
 - flashing: S0-bus is not activated

Pin Assignment of the Power Connector

Table 3-16 Pinning Power Connector

Pin	Signal	TE Mode
1	GND	Input
2	-48VDC	Input

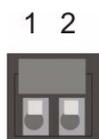


Figure 3-10 ISDN-S0: Power Connector

Restrictions of Usable Clock Modes

Dual clock sources are not defined and not available for ISDN-S0 connection.

Single clock setting is conditional available for ISDN-S0 interface. Conditional available clock mode settings for ISDN are:

Clock	Mode ISDN-S0 Interface used as:	
Single	NT	TE
internal	available	not applicable
external	not applicable	available
remote	available	not applicable

Alarms of the I.430 Interface

The I.430 Interface can raise the “Link Down”-alarm. The “RX AIS”- alarm and “No Sync”-alarm can not be raised by the ISDN Interface.

- “Link Down” is raised, when the S0-Port does not detect a link.

CSX4 Rear Connector

The CSX4 series has a connector on the rear-side offering the possibility to use the devices either in 19” racks or single-slot housing.

On the connector, the ports for local management (RS-232), power supply and rack-management are placed.

RS-232 Interface

Management Port

The internal management port of the CSX4 is placed on the card’s bus connector at the rear side of the unit. You need an agent card in the chassis or a singleslot housing with management connector. Also, SNMP management and web-based GUI according to the new advanced management concept is supported. The CSX4 allows to provide status information and to manage the devices (via a processing unit). The remote unit can be accessed via the line port. Inband management via the copper G.SHDSL data stream is used for the management of the remote unit.

The asynchronous RS-232 interface is used for the outband administration of the device. It is only available if the CSX4 is placed in a single-slot housing.

The standard transmission parameters for the outband interface is shown in Table 3-17. Function Indicators

Table 3-17 *Transmission Rate of the RS-232 Interface*

Transmission Rate (Baud)	Data Bits	Parity	Stop Bits
57600	8	none	1

Power Supply

For the CSX4 the operating voltage is fed through the backplane connector of the device. 5VDC must be applied to the unit for proper operation.

Chapter 4

Installation, Tests & Basics

This chapter provides the installation and removal procedures for the CSX4 rack mount cards in an arcutronix Multi Service System. It also provides hints for testing and troubleshooting.

Preparation

The installation of an arcutronix Multi Service System or a singleslot housing is described in the documentation of these parts. Care has to be taken to meet the requirements of power supply, air conditioning and proper environmental conditions.

2. Install the rack mount cards and other components.
Connect the cabling: Data cabling first, control cabling last. Do not connect any cables before the system has been mounted.
3. Configure the system.
Use a PC with VT100 emulation software at the singleslot housing's or agent card's RS-232 control port to configure the unit.

ESD Protection of Cards



CAUTION: Discharge of static electricity (ESD) can damage or degrade electronic components. Follow proper ESD procedures when working with the components of the arcutronix Multi Service System. For further information on ESD refer to the section "Preventing Damage From Electrostatic Discharge" on page 0-2.

NOTE: Always use an ESD wrist strap with a metal clip for grounding.

Each card is shipped in a separate, reusable, and anti-static shielding bag. Leave each card in its bag until you are ready to install it into the system. Do not remove the card from its bag unless you are grounded. Do not place a bag on exposed contacts where it can cause short circuits.

Environmental Conditions

Environmental conditions must be met. The air condition must be capable of keeping the temperature inside the allowed ranges. Observe that the allowed temperature ranges during storage and operation are different. Furthermore, the air condition must keep the humidity within the allowed range. High air temperature and low system temperature can cause condensation. Condensation must be prevented under any circumstances. The maximum thermal load of the unit equals the maximum effective power dissipation of the system, as explained in the previous chapter.

Installation Hints

CAUTION: The air flow concept requires closed card slots. Always mount cover plates on empty slots to avoid local increase of temperature.

All arcutronix Multi Service System devices offer hot-swap capability and can be replaced while power is applied to the system.

Power Management

The intelligent arcutronix Multi Service System power management is a power share bus, indicating the available power which is left to feed the rack mount cards. This allows an effective utilization of the power supply capabilities.

Each chassis has its specific power to feed the rack mount cards. This power depends on the capabilities of the power supply used. The remaining power of the chassis will be recalculated after a card has been inserted.

NOTE: Read the following descriptions of the arcutronix Multi Service System power management and the management rules carefully, in order to prevent malfunctions.

Rules of the Power Management

- If the remaining power is not sufficient in the arcutronix Multi Service System, a rack card, e.g. agent or modem card, will not power up.
- The decision whether a unit will be powered up or not is taken, when a new card is inserted into the chassis (SHX) or if the whole system is powered up simultaneously. Once taken, this decision will not be revised. That means, if a rack mount card has been powered up once it stays operating, even if the whole power resources are used and an additional unit with priority status is inserted. This also means that if a rack mount card was rejected, it stays rejected, even if later the whole power resources are released.
- If the whole system is powered up simultaneously, e.g. by switching on the mains power, cards with priority will be started first. Then the agent and rack mount cards will begin to analyze the remaining power separately, beginning with the agent and then starting from slot 1. **Therefore, it is mandatory to remove a card which has been rejected by the power management. After changing the power consumption in the chassis, the card may be installed successfully.**

NOTE: Violation of the rules can cause overloads in the power management. Such a failure will be indicated by an acoustic alarm (1 kHz) activated by the main agent. Furthermore, the “PS” LED of the “Alarm Out” component will be switched on.

Field Installation of CSX4 Cards

Installation

Procedure to install an CSX4 rack mount card in the arcutronix Multi Service System:



CAUTION: Prevent electrostatic discharge. Observe the ESD procedures and precautions below when you are handling the CSX4 hardware.

NOTE: Always use an ESD wrist strap with a metal clip for grounding. Ground the ESD wrist strap to the chassis.

Tools Required: A medium head Phillips (“Crosshead”) screwdriver is required. Use screwdrivers with the correct size.

1. Unscrew the cover plate of the slot you want to use and remove the cover plate.
2. Take the CSX4 card out of the anti-static bag.
3. Insert the card into the rails of the chassis (make sure that it slides in the rails).
4. Slide it in until you feel resistance and set the card into place.
5. Using the screwdriver secure the CSX4 card’s 2 self-retaining screws.
6. Connect the cabling to the user port and the line port.

After power-on the CSX4 rack mount card initializes itself.

Removal

Procedure to remove an CSX4 rack mount card from the arcutronix Multi Service System:



CAUTION: Prevent electrostatic discharge. Observe the ESD procedures and precautions below when you are handling the CSX4 hardware.

NOTE: Always use an ESD wrist strap with a metal clip for grounding. Ground the ESD wrist strap to the chassis.

Tools Required: A medium head Phillips (“Crosshead”) screwdriver is required. Use screwdrivers with the correct size.

1. Disconnect all cables from the CSX4.
2. Using the screwdriver loosen the CSX4 card’s 2 self-retaining screws, until you can feel that the screws have left the thread.
3. Pull out the card. Place it in an anti-static bag.
4. Close the gap of the card slot with a cover plate or with a spare rack card.
5. Fasten the fixing screws.

Power-Up Sequence

After providing power to the CSX4 by either plugging it into the arcutronix Multi Service System chassis or connecting the AC/DC-converter to the stand-alone chassis, the CSX4 will be powered up. The start-up will take several seconds, while internal SW is started and some tests are done to verify the CSX4 is not damaged and proper operation can be guaranteed.

The power-up sequence is indicated by special behavior of the LEDs in the front-plate. after finishing the start-up, the LEDs will operate “normal” and indicate status and alarms of the unit, as written in this book.

The special behavior of the LEDs allow to user to

1. check, whether all LEDs or operating well and
2. see when the unit’s start-up is finished and it is operational.

NOTE: After finishing the start-up, the unit is operational in meaning of data transmission and all services are running. The management access will be started a little later, as additional tasks have to be started here for.

LED start up

All LEDS are grouped together in 2 groups which offer the same behavior during start-up:

- Build-in RJ-45 connectors, (E1/T1 LEDs for LOOP and LNK)
- all other LEDs (ERR, CLK, LOOP, LNK)

The flow of these LED groups is depicted in the following table.

Table 4-1 LED start up

State	Build-in RJ45	Others	after time
S1 (after Power On)	both LEDs are off	all LEDs are off	0 sec
S2	both LEDs are off	all LEDs are on	2 sec
O1	LED LNK is on, LED LOOP is off.	LED ERR is off, LED LOOP is off, LED CLK is off (depending on Clock-Settings), LED LNK is on.	14 sec

Note: Sx = Startup state; O1 = Operational State reached.

Setup Sequence & Starting Procedures

This chapter provides procedures for setting up configurations and starting the CSX - Connectivity G.SHDSL. All configurations of the CSX4 are made via the control software. For details see Chapter 5, Control Software CSX4.

Clock Mode Diagrams

The clock mode for the CSX4 can be set by the software, see Chapter 5, CLOCK Menu. It depends on the installed module at PORT 1 I/F, if a clock mode is applicable. Restrictions of usable clock modes are found in the interface description. The default values for clock settings are internal clock, single clock source.

The CSX4 supports synchronous and asynchronous clock modes on the datacom interfaces (V.35, X.21 and V.24).

Clock Mode Comments

In synchronous communication, a periodic clock signal is used to synchronize transmission and reception of data and control characters.

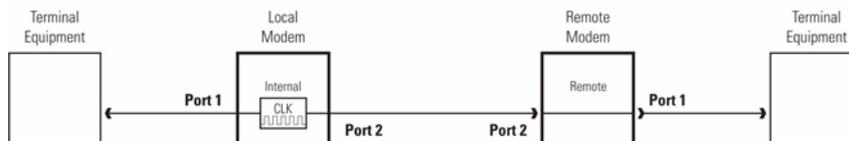
- 1 Internal** The clock is generated by the internal clock generator.
- 2 External** The clock is provided by the local terminal equipment.
- 3 Remote** The local channel receives the clock via the link from the distant channel.

Single Clock Source

Transmit and receive data operate with the same clock source.

Single clock source for transmit and receive

Variant 1:



Variant 2:

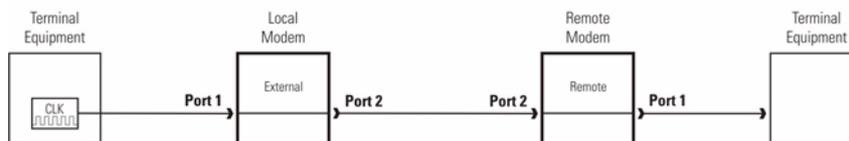


Figure 4-1 Single Clock Source

Dual Clock Sources

Dual Clock means, that the CSX4 does operate in “plesio-chronous” clock-mode: The two data-streams are operated with different clock (external) sources. This is the case, when the two connected Terminals do both operate with internal clock-source and are not synchronized to each other.

Dual clock sources for transmit and receive

Variant 3:

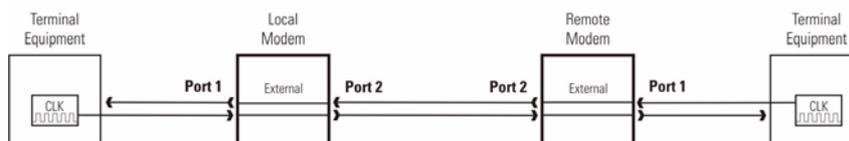


Figure 4-2 Dual Clock Sources

For Dual Clock Source it is recommended to operate both modem (local and remote) in the “External” clock mode. “Internal” is allowed, but not recommended. “Remote” clock mode is not allowed, as this would lead to a clock-loop!

NOTE: It is mandatory that the two Terminals are operating with clocks not more than 50ppm difference.

Asynchronous Clock-Mode

Neither transmission nor reception has dedicated clock-signal. The clocking information comes with the data.

CSX4 works with over-sampling of the incoming data-stream, so all possible modes of asynchronous data-transmission can be supported. Please configure the CSX4 to Internal clocking mode in case asynchronous clock mode is selected. The over-sampling frequency is defined by the number of used time-slots. Use more than the double frequency for over-sampling (according Nyquist-Shannon sampling theorem), recommended is a over-sampling rate of 6 times to reduce jitter at the egress.

Asynchronous Clock Mode

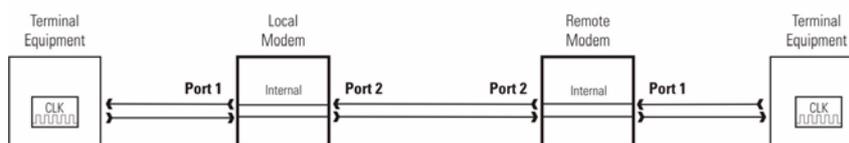


Figure 4-3 Asynchronous Clock Mode

Table 4-2 shows the recommended number of time-slots and the resulting over-sampling rate for asynchronous data-rates:

Data-Rate	Time-Slots	Oversampling Rate
<= 9600 kBaud/s	1	64 kbps
14400 kBaud/s	2	128 kbps

Table 4-2 Oversampling of Asynchronous Data-Rates

Installation, Tests & Basics

Setup Sequence & Starting Procedures

Data-Rate	Time-Slots	Oversampling Rate
19200 kBaud/s	2	128 kbps
38400 kBaud/s	4	256 kbps
57600 kBaud/s	6	384 kbps
115200 kBaud/s	11	704 kbps
230400 kBaud/s	22	1408 kbps

Table 4-2 *Oversampling of Asynchronous Data-Rates*

E1 Transmission Standard

E1-Basics

A 2.048 Mbps circuit provides high speed, digital transmission for voice, data, and video signals. 2.048 Mbps transmission systems are based on the ITU-T specifications G.703 and G.704. The 2.048 Mbps standards are now firmly established for transmission systems and used by telecommunication network suppliers, international carriers and end users.

The line code to transmit the 2.048 Mbps signal is known as HDB3 (High Density Bipolar 3) which is a bipolar code with a specific zero suppression scheme where no more than three consecutive zeros are allowed to occur.

The 2.048 Mbps signal typically consists of multiplexed data and/or voice which requires a framing structure for receiving equipment to properly associate the appropriate bits in the incoming signal with their corresponding time slots. Framing for the 2.048 Mbps signal as defined in ITU-T Recommendation G.704 is broken up into 32 timeslots numbered 0-31. Each timeslot contains 8 bits in a frame, and since there are 8000 frames per second, each time slot corresponds to a bandwidth of $8 \times 8000 = 64$ kbps.

Time slot 0 is allocated entirely to the frame alignment signal (FAS & NFAS) pattern, which can contain a remote alarm (FAS Distant Alarm) indication bit and CRC4 checksum bit.

If there are voice channels on the 2.048 Mbps signal, it is necessary to take up additional bandwidth to transmit the signaling information. ITU-T Recommendation G.704 allocates time slot 16 for the transmission of the channel-associated signaling (CAS) information. However, the 8 bits in time slot 16 are not sufficient for all 30 channels to signal in one frame. Therefore, a multiframe structure is required where channels can take turns using time slot 16.

The E1 interface can be operated in a transparent (non-fractional) or fractional mode to offer a wide range of different applications / services. In fractional mode only a subset of timeslots are transported via the G.SHDSL-Line to reduce the required bandwidth and increase the possible distance to reach. On the ingress side, the not-needed timeslots are removed and filled with All-1s on the egress-side.

Based on these basics the CSX4 supports the following transmission modes for E1:

Table 4-3 E1 Transmission Modes of the CSX4

Mode	Frame Description	Note
E1-unframed	Plain 2048 Mbps transmission. Also known as "Clear Channel" mode.	Transparent transmission of each bit. Can be used for structured and unstructured data streams.
E1-PCM31 fractional and non-fractional	TS0 contains the G.704 framing pattern. TS1-31 contain the payload.	G.704-doubleframe-detection and -supervision at the CSX4-ingress. If the (transparent) transport of TS0 is disabled, the G.704-frame is renewed at the CSX4-egress, otherwise TS0 is unchanged.

Table 4-3 E1 Transmission Modes of the CSX4

Mode	Frame Description	Note
E1-PCM31C fractional and non-fractional	TS0 contains the G.704 framing pattern with CRC4 checksum. TS1-31 contain the payload.	G.704-multiframe-detection and -supervision at the CSX4-ingress. If the (transparent) transport of TS0 is disabled, the G.704-multiframe is renewed at the CSX4-egress, otherwise TS0 is unchanged. The CRC error statistic can be monitored in the performance monitor.
E1-PCM30 fractional and non-fractional	TS0 contains the G.704 framing pattern. TS16 is reserved for signalling (CAS). TS1-15 & 17-31 contain the payload.	G.704-doubleframe-detection and -supervision at the CSX4-ingress. If the (transparent) transport of TS0 is disabled, the G.704-frame is renewed at the CSX4-egress, otherwise TS0 is unchanged. If the (transparent) transport of TS16 is disabled, it will be renewed at the CSX4-egress ⁱ , otherwise TS16 is unchanged.
E1-PCM30C fractional and non-fractional	TS0 contains the G.704 framing pattern with CRC4 checksum. TS16 is reserved for signalling. TS1-15 & 17-31 contain the payload.	G.704-multiframe-detection and -supervision at the CSX4-ingress. If the (transparent) transport of TS0 is disabled, the G.704-multiframe is renewed at the CSX4-egress, otherwise TS0 is unchanged. If the (transparent) transport of TS16 is disabled, it will be renewed at the CSX4-egress ⁱ , otherwise TS16 is unchanged.

i. The TS16 generation pattern in the CSX4 is defined as
Frame 0: 00001011
Frame 2-15: 01100110

See “Recommendation for E1-Settings” on page 5-22 for details about the right configuration.

Convert Serial Data To E1 and vice versa

The CSX - Connectivity G.SHDSL offers the possibility to map serial data into E1, a common PDH interface. Though it is possible to transmit serial data streams through a PDH/SDH network.

To adapt the serial data stream to the E1 frame, it is necessary to configure the timeslots used as follows:

Table 4-4 Timeslot Configuration

Item	Values	Note
Start Timeslot	0..31	Begin of the serial data stream in the E1 frame. Do not use 0 for this application, because TS0 is needed for the frame word.
Number of used Timeslots	1..32	The number of the timeslots used is equal to the data rate of the serial stream in 64 kbps steps.

Table 4-5 Example

A CSX4 with X.21 module shall convert 1024kbps (X.21) into 2048kbps (E1):

Settings for CSX4-X.21:

==> 16 timeslots must be allocated in E1 stream

See the timeslots below, to be used.

TS0	1	2	3	4	5	...	15	16	17	18	19	29	...	29	30	31
FAS			D1	D2	D3	...	D13	CAS	D14	D15	D15		...			
NFAS																

Link Loss Indication

The CSX4 provides the Alarm Indication Signal (AIS) for the Link Loss detection. The CSX4 can generate an SNMP trap and switch the alarm signal on the AIS event. These functions are selectable via the software configuration.

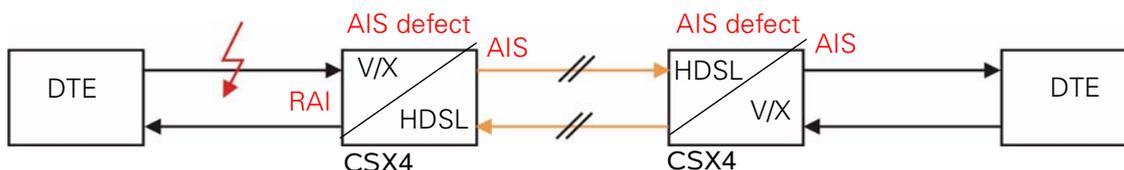


Figure 4-4 Link Loss Indication: Example 1

In case of a broken copper cable on the user interface (even if just the transmit path is cut) the CSX4 generates an alarm indication signal and informs the end equipment. In framed mode the remote alarm indication bit (RAI) in TS0 will also be generated.

NOTE: The transmission from the right to the left side is still able to transmit valid data.

NOTE: The link loss indication is only possible for datacom interfaces (X.. and V..). For the Ethernet/Bridge module, no link loss is shown.

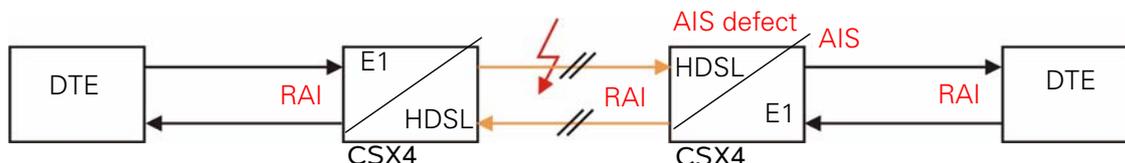


Figure 4-5 Link Loss Indication: Example 2

If the TDM line is broken (also even only the transmit path is cut), the CSX4 generates an alarm indication signal and informs the end equipment. Depending on the mode of the end equipment it should generate the RAI bit, which will be transmitted through the CSX4 transmission line.

NOTE: The transmission from the right to the left side will also be able to transmit valid data.

Special Functions

The CSX - Connectivity G.SHDSL supports permanent remote inband management via overhead bits and remote SW update.

Diagnostic Functions of the CSX4

You can start testing your system, once the local and remote unit are fully installed. All cabling and connections must be completed prior to testing the system. If the power-on initialization process of the CSX4 card has finished, and the cabling is OK, some LEDs should light green. You can test an CSX4 card using the following methods.

Self Test

The self test performs a memory test of the controller chip. This includes the RAM test and the FLASH Test, and some input/output functions such as internal bit error ratio tests.

Use the self test menu to perform a self test. The self test menu is accessible using the control software. You can access the control software by connecting a VT100 to the device's control port on the single slot housing. For instructions on how to run a self test refer to the section "SELF TEST Menu" on page 5-11.

Performance Monitoring

Each CSX4 interface port has a performance monitoring module for supervision of the received data. The performance monitoring modules work independently and can be activated at the same time. Performance monitoring enables data traffic checks accord-

ing to the protocol standards. You will find the menu description in the section “PERFORMANCE MONITORING PORT 1 (IF1)” on page 5-23.

Test-Loops

Several loops can be activated on an CSX4 to offer a wide bunch of diagnostic options in case of any problems in the network. You can activate respectively change loop modes by pressing the loop mode push button (see Figure 3-2, position 8) or via management access. The selected mode is indicated by the LOOP LEDs on the front panel (see Figure 3-2, position 9, 10) and of course visible in the management variables.

Using the loop-button will be explained hereafter. The loop becomes active within 2 seconds after the selection. This delay of 2 seconds avoids unwanted loops during the selection. You can activate the loop-back test via the LOOP mode key on the front panel or via the control software of the card. The following loop tests can be performed:

- Facility loop
- Terminal loop

To determine if you have activated the correct loop test, you need to look at the front panel of the CSX4 or in the control software of your device, see “Loop Mode” on page 5-20.

NOTE: Always deactivate a loop mode before you change to a new one. Only one loop in the unit will be activated via the loop mode button. Other loops which are active before using the push-button will be deactivated. Loop configuration via control software will deactivate a loop which was initiated by the push-button.

NOTE: Loop modes can also be selected or changed via the control software.

CSX4 Loops

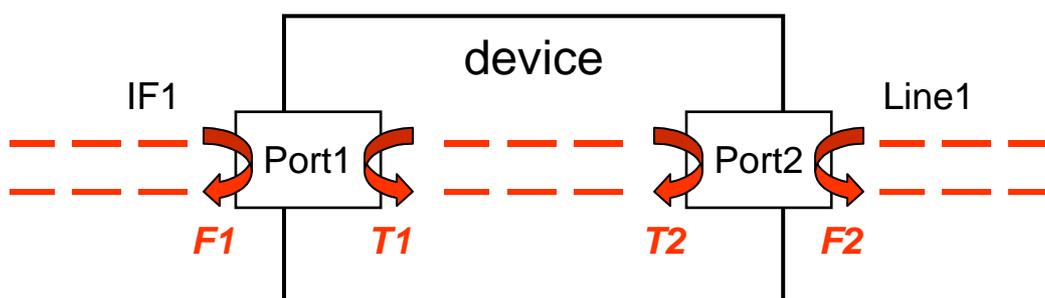


Figure 4-6 Terminal and Facility Loops for CSX4

The CSX4 does have 1 user interface and 1 line interface. The following table indicates the possible loops and how to invoke them using the loop-button in the front.

Table 4-6 Sequence for the Loop Mode Key Function CSX4

Loop number (refer to Figure 4-6)	Loop Mode Button Pressed	elected Loop / Result of the Sequence	LOOP LEDs	
			Loop-I/F	Loop-Line
F1	1 time	facility loop on interface port 1	On	off
T1	2 times	terminal loop on interface port 1	Flash	off
T2	3 times	terminal loop on line port 2	off	Flash
F2	4 times	facility loop on line port 2	off	On
	≥ 5 times	Loops off	off	off

BER Testing

The **Bit Error Rate** test is built inside the CSX4 with a **Pseudo-Random Binary Sequence (PRBS)** generator and monitor. You can perform a BER test by using the BER test control menu. For more information on this menu refer to the section “BER TEST” on page 5-12 of this user guide.

During a BER test the PRBS generator creates a continuous bit-pattern on the selected port according to ITU-T O.150/O.151. The test sequence 2^{15-1} with a length of 32,767 bits is primarily intended for error and jitter measurements at bit rates of 1544, 2048, 6312, 8448, 32 064 and 44 736 kbps (see Recommendation O.151). The ITU-T defined the inverted sequence signal as standard. With the CSX4 PRBS generator you can either create the inverted or normal signal. The PRBS monitor in the CSX4 will synchronize on both the inverted and non-inverted sequence. Additionally, the CSX4 generator can crate a 2^{20-1} sequence, which is primarily used in US standards.

A permanently updated statistic lists the test results in the CSX4 menu or in an SNMP table. Once started the BER test is running in the background until the test will be stopped manually.

NOTE: The CSX4 can perform a BER test with loops or in co-operation with an external BER-Tester or two CSX4 devices with a running BER test.

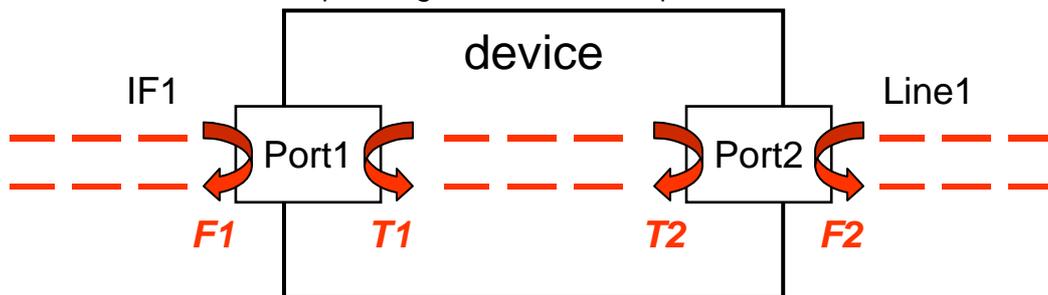
The data transmission is interrupted during the BER test for the selected port and the loop key of the unit is disabled.

NOTE: The PRBS generator inside the CSX4 always uses 31 timeslots (TS1...31 including TS16 independent from the selected data format).

Troubleshooting Guide

This chapter provides a troubleshooting guide. Follow the checklist to find a reason for malfunctions:

- Check the cabling. Connection, isolation, plugs, length, impedance OK?
- Is the configuration of the end units (auto speed negotiation mode, line configuration) according to the application scheme?
- Replace the units with another unit having the same setup. Does it work?
- Do the end units work back-to-back?
- Follow the step-by-step plan in order to find the error:
 - Connect the local and remote units via the line and view the performance monitoring screens, see the section “PERFORMANCE MONITORING PORT 1 (IF1)” on page 5-23.
 - Connect the arcutronix A and B units via the line. Run BERT on unit A and try several loops during the test. Which loop is successful?



Troubleshooting / Frequent Errors

- Distance too long:
Check the attenuation of the line. Measure the line.
- Cable too bad:
Check the attenuation of the line. Measure the line.
- Wrong cables:
Verify the cable type and the pinout.
- Mismatch of DCE/DTE and TE/NT setting. Changing the jumpers can adopt the unit to your application.
- Wrong mode setup:
Verify the protocol setup (speed and auto speed negotiation mode) of each unit. Make sure that the line protocol is identical. The interfaces must have the same speed setting.
- Wrong clock:
Verify the clock setting of each unit.
- Usage of the wrong documentation:
Only the manual with the correct article number shows the correct information.
- Loss of password:
Always keep your password! At the moment there is no way to reset the password by your own.

Chapter 5

Control Software CSX4

General Information

The control software of the CSX - Connectivity G.SHDSL allows you to configure the device via a control terminal. There are different ways to get access to the unit:

- In a singleslot housing (SHX) you can use the control port placed on the rear side.
- In a system rack (SRX) via the agent (SCX) it is possible to enter the software via a control port or a telnet session. Additionally, you have almost all possibilities to configure the unit using SNMP.

Local RS-232 Interface

Connect it to the control port of the singleslot housing or to agent's control port. The control port (designed as DCE) is an asynchronous RS232 interface with the following parameters:

- 57600 baud
- 8 data bit
- no parity
- 1 stop bit
- no flow control

Local Ethernet Interface

For the Telnet access you have to connect the ethernet port of the Main Agent to your network.

First, you must configure the IP parameters, at least the IP address and the IP subnet mask via the control port to get a valid ethernet access to your agent.

Start the Telnet program on your PC with the IP address of the Main Agent. The telnet program nowadays is a component of the operating system (e.g. Windows).

You get access to the agent and start at the Login screen.

Under certain circumstances, when routing the terminal signals via a network, the following may occur: Hitting the Enter key results in an endless redraw of the menu. In this case disconnect and use CTRL-J instead.

NOTE: If you get access via the singleslot housing do not press the ESC key. Pressing the ESC key deactivates the input of numbers. When this occurs press any letter key on the keyboard to regain menu control.

Security Issues

If only a few people shall be allowed to make changes in your system, it is possible to assign different access level and passwords. Refer to Chapter 5, Change a Password on page 5-32.

Any time you connect or reconnect to the initialized CSX4 the login-window is displayed and a password request turns up on the terminal.

Be careful with passwords. If you write them down, keep them in a safe place. Do not choose strings easy to hack. In particular, do not use the default strings which were valid when you received the unit.

Do not forget your password. If you forget your password the device will be rendered useless and will have to be sent back to the factory for basic re-configuration.

NOTE: Four different access-level are selectable with different access rights:

1. Monitor (only limited view)
2. Service (limited view plus limited modify)
3. Standard (view and modify)
4. Admin (full access inclusive user administration)

If the device is started-up the very first time, only the user "admin" is defined. See in "USER ADMINISTRATION Menu" on page 5-31, how to define the other users and how to change the user password.

Login via Serial Port on Singleslot Housing

After a management connection has been established towards the CSX4 plugged in a single slot housing (SHX3), the login screen will be displayed. It is used to protect the access against unwanted access.

The Login screen is shown in the figure below. The user selects his login level (1-4) from the following screen by entering the corresponding number and then the password.

```
CSX4 ON SLOT 1

Serial Number 51004711

Please Select your Access Level

1) Monitor
2) Service
3) Standard
4) Administrator

Please enter your choice:
```

After entering the corresponding number (1-4) a new line appears, asking for the password.

```
CSX4 ON SLOT 1

Serial Number 51004711

Please Select your Access Level

1) Monitor
2) Service
3) Standard
4) Administrator

Please enter your choice: 1
Please Enter your Password:*****
```

Table 5-1 provides the default passwords of the CSX4.

Table 5-1 Default Passwords

Access Level	Password
Monitor	monitor
Service	service
Standard	standard
Administrator	admin

CAUTION: Observe the section “Security Issues” above.

The password will not be displayed. Each character will be replaced by an asterisk (*). An error message will be displayed for any unsuccessful login. The application continues with the login screen. Depending on the access level, menu settings may not be accessible for the user. Which menu is displayed and/or accessible for the different access levels will be described in the menu structure, see page 5-7.

NOTE: The Main Agent has its own passwords. To get a login to the SCX you have to know the passwords of the Main agent. The SCX passwords can differ from the CSX4 passwords. The CSX4 passwords are only used for the access via the control port of the singleslot housing.

NOTE: The device returns to the screen “Please Select your Access Level” as soon as you leave the last menu or disconnect the terminal.

After the login you have to decide, if you want to get access to the local CSX4 unit or to its counterpart. The remote unit can always be accessed, when the line is established. See next screen-shot for CSX4 first screen.

```
CSX4 ON SLOT 1

1) LOCAL...
2) REMOTE 1 (LINE PORT 1)...
3) REMOTE 2 (LINE PORT 2)...

0) EXIT

Please enter your choice:
```

NOTE: The entry for the remote management can only be accessed, if there is a link to the remote device. This item allows the access to the remote unit. The header LOCAL is changed to REMOTE. The remainder of the screen is similar to the local mode but the data of the remote device is shown. In remote mode, EXIT terminates the remote mode and changes to local mode.

Navigation

The CLI is a graphic oriented user menu. Using the keyboard of your PC you can select menu entries and leave them on behalf.

Select a menu entry

All menu entries can be accessed by typing the number, which is displayed in front of the entry. After typing the number, the next level is entered.

Display and User Actions

Values which can be read and/or changed by the user are marked with number followed by a single character. The characters distinguish the type of variable, please see table below. If you want to access the item, type the number and press the Enter key.

The meanings of the shortages are:

...	Sub-Menu
R	Read only
s	Select
t	Toggle
w	Writable

Exit

The selection of '0' (or just <Enter>) always leads to a menu one level above.

Login via the Main Agent

NOTE: Please, also read the Main Agent user documentation for further information.

After having logged into the main agent the following screen will be displayed:

```
MAIN MENU

AGENT
SYSTEM

EXIT

zzz i
```

i. This line provides a short message concerning the highlighted command.

A user name and a valid password have to be entered before access to the configuration parameters is granted.

Login via telnet can be deactivated in the menu.

The local agent provides access either to the local CSX4 or to a remote CSX4.

Display and User Actions

Agent menu lines are accessible by the cursor. Select (highlight) the menu line of interest by the cursor-up/-down keys and press the Enter key. This will give access to the item of the line. Pressing two times the ESC key without selecting a menu line will lead you to the menu one level above. If you are in the MAIN MENU, pressing two times the ESC key will bring you back to the password entry prompt. The bottom line of each screen may display text with additional information on the selected line (where the cursor is positioned).

MENU Structure

The menu tree structure of the CSX4 is almost the same for the access via the control port of the singleslot housing or via the agent, but the menus look different as a result of different navigation procedures. The preceding numbers are omitted in the agent menus. Some items are only available via the local control port of CSX4.

The write- or change- access to many items depends on the access levels: 1) Monitor, 2) Service, 3) Standard, 4) Administrator.

Table 5-2 Menu Structure

LOCAL Menu Item	Access Level				Page
	1	2	3	4	
1) GENERAL INFORMATION...	R	R	R	x	page 5-9
2) TESTS...	x	x	x	x	page 5-10
1) SELF TEST...	R	x	x	x	page 5-11
2) BER TEST	R	x	x	x	page 5-12
3) EXTRA...	R	x	x	x	page 5-13
4) PORT 1 (IF1)...	x	x	x	x	page 5-14
10) DATA RATE...	R	R	x	x	page 5-21
11) PERFORMANCE MONITORING...	x	x	x	x	page 5-23
1) LOCAL MONITORING...	R	x	x	x	page 5-25
2) CURRENT 15 MIN PERIOD...	x	x	x	x	page 5-25
3) LAST 15 MIN PERIOD...	x	x	x	x	page 5-25
5) PORT 2 (LINE)...	x	x	x	x	page 5-24
12) PERFORMANCE MONITORING...	x	x	x	x	page 5-25
1) LOCAL MONITORING...	R	x	x	x	page 5-25
2) CURRENT 15 MIN PERIOD...	x	x	x	x	page 5-25
3) LAST 15 MIN PERIOD...	x	x	x	x	page 5-25
6) CLOCK...	Rx	R	x	x	page 5-26
7) TRAPS...	R	R	x	x	page 5-28
8) ALARMS...	R	R	x	x	page 5-29
9) EVENT MONITORING...	x	x	x	x	page 5-31
10) USER ADMINISTRATION...	-	-	-	x	page 5-31
11) UPDATE...	-	-	-	x	page 5-32

Table 5-2 Menu Structure (continued)

LOCAL Menu Item	Access Level				Page
	1	2	3	4	
5) SOFTWARE UPDATE...	-	-	-	x	page 5-33
0) EXIT	x	x	x	x	page 5-5

Caption:

- x** full access
- R** read only
- no access

NOTE: This chapter describes the menu access via the control port of the singleslot housing.

MAIN Menu

The main menu is entered after the user has selected, whether to access the local or remote device. It contains all common software functions. The main menu is shown in the following screen:

```
CSX4 ON SLOT 1->LOCAL

 1) GENERAL INFORMATION...
 2) TESTS...
 3) EXTRA...
 4) PORT 1 (IF1)...
 5) PORT 2 (LINE)...
 6) CLOCK...
 7) TRAPS...
 8) ALARMS...
 9) EVENT MONITORING...
10) USER ADMINISTRATION...
11) UPDATE...

 0) EXIT

Please enter your choice:
```

To select a menu function type the number of the desired function and press the Enter key. Table 5-3 provides information on the options of the main menu.

Table 5-3 main menu Options

Option	Result
1	This mask shows the CSX4 details. The screen displays the CSX4 serial number and the software revision, see page 5-9.
2	Enters the TESTS menu, see page 5-10.
3	Enters the EXTRA menu, see page 5-13.
4	Enters the PORT 1 INTERFACE menu, see page 5-14.
5	Enters the PORT 2 LINE menu, see page 5-24.
6	Enters the CLOCK menu, see page 5-26.
7	Enters the TRAPS menu, see page 5-28.
8	Enters the ALARMS menu, see page 5-29.
9	Enters the EVENT MONITORING mask to display recent system events, see page 5-31.
10	Enters the USER ADMINISTRATION menu, see page 5-31
11	Enters the UPDATE menu, see page 5-32.
0	Leaves the main menu.

GENERAL INFORMATION Menu

Enter 1 in the command line prompt of the main menu and press the Enter key to access the GENERAL INFORMATION menu. The following screen will be displayed:

```
CSX4 ON SLOT 1->LOCAL->GENERAL INFORMATION

1) R Name                CSX4
2) w User Name           <...>
3) R Device Description  CSX - Connectivity G.SHDSL
4) R Equipment Variant   CSX4-V.24
5) R Serial Number       20080100
6) R Software Revision   CSXA003V03 07/08/2009
7) R Article Number      0803-3220
8) R Article Release     V2.0
9) R Order Information   0803-3220/GS1
10) R Manufacturer       arcutronix GmbH

0)  return to LOCAL-Menu

Please enter your choice:
```

Control Software CSX4

TESTS Menu

This screen contains general information of the CSX4 unit. Most of these are factory settings. They cannot be changed by normal users (as indicated by the “R”). The only exception is the ‘User Name’ parameter.

Table 5-4 GENERAL INFORMATION Menu

Parameter	Description	Format	Default	Read/Write
Name	Name of the device	Display	‘CSX4’	Read only
User Name	Description/comment of the device/application	Text	<...>	Read/write
Device Description	Description of the device	Display	‘CSX - Connectivity G.SHDSL’	Read only
Equipment Variant	Description of the device variant	Display	Depends on factory settings	Read only
Serial Number	Serial number of the device	Display	Depends on factory settings	Read only
Software Revision	Revision of the loaded system software	Display	Depends on the loaded system software	Read only
Article Number	Article number of the device	Display	Depends on the factory settings	Read only
Article Release	Article release of the device	Display	Depends on factory settings	Read only
Order Information	Order information for the device	Display	Depends on factory settings	Read only
Manufacturer	Manufacturer of the device	Display	‘arcutronix GmbH’	Read only

TESTS Menu

Enter 2 at the main menu command line prompt and press the Enter key to access the TESTS menu. The menu allows access to the self-test menu.

```
CSX4 ON SLOT 1->LOCAL->TESTS

1) SELF TEST...
2) BER TEST...

0) return to LOCAL-Menu

Please enter your choice:
```

SELF TEST Menu

Enter 1 at the TESTS menu command line prompt and press the Enter key to access the SELF TEST menu. The self test performs an internal test of all circuits that can be tested through the software. The following screen appears:

```
CSX4 ON SLOT 1->LOCAL->TESTS->SELF TEST

  1) R RAM Test                wait-for-start
  2) R FLASH Test              running
  3) t Test Action              start

  0)  return to TESTS-Menu

Please enter your choice:
```

Table 5-5 provides information on these options.

Table 5-5 SELF TEST Menu Options

Option	Parameter	Description	Format	Default
1	RAM Test	Displays the current RAM test status	Display (never-started/wait-for-start-running/pass/failed)	'never-started'
2	FLASH Test	Displays the current FLASH test status	Display (never-started/wait-for-start-running/pass/failed)	'never-started'
3	Test Action	Starts and stops testing	Toggle (start/stop)	'stop'

Note: You can have data traffic when you are in test mode.

BER TEST

Enter 2 at the TESTS menu command line prompt and press the Enter key to access the BER TEST menu:

```

CSX4 ON SLOT 1->LOCAL->TESTS->BER TEST

 1) s BER Test Action          no-action
 2) s BER Test Port           line-port local loop
 3) t BER Test PRB Sequence    2^15-1
 4) t BER Test Logic          normal
 5) t BER Test PCM Modus      PCM30
 6) R BER Test Status         stopped
 7) R Time In Sync            00:00:00
 8) R With Error Time         00:00:00
 9) R Without Error Time      00:00:00
10) R Sync Status             no-sync
11) R Sync Losses             0
12) R Received kbits          0.000000E+00
13) R Bit Errors              0.000000E+00
14) R Bit Error Rate          0.000000E+00
 0) return to TESTS-Menu

Please enter your choice:

```

Table 5-6 provides information on these options.

Table 5-6 BER TEST Menu Options

Option	Result
1	Stops or starts the BER Test. ⁱ If the BERT is started it continues running in the background. When the BERT control menu is re-entered, the statistics will be updated. <ul style="list-style-type: none"> no-action: The BERT is not active. start: A bit pattern is sent out automatically. A permanently updated statistics shows the test results. stop: The transmission of the test pattern is stopped. reset-counters: Counting is restarted from zero.
2	Selects the port on which BERT will be executed. The selection will be marked by an asterisk (*). <ul style="list-style-type: none"> interface-port: BERT is executed on interface port 1. line-port local loop: BERT is executed on the local device. line-port remote BERT: The remote unit will also automatically activate a BERT via the DSL line. Errors occurring in transmit direction will be count on the remote unit and the local BERT will display received errors.
3	Toggles between the BER Test PRB sequence, e.g. $2^{15} - 1$ or $2^{23} - 1$
4	Toggles the BER Test Logic, e.g. normal or invert
5	Toggles between the BER Test PCM Mode PCM 30 or PCM 3 ⁱⁱ
6... 14	Continuous updated display of test results.

i. Not available in remote mode.
ii. Only available for CSX4-E1-variants.

Note: BERT is executed with the selected clock, see the section “CLOCK Menu” on page 5-26, option 2.

Note: BERT timer and BERT counter start after the first sync status.

Note: At E1-PCM30 framing the TS16 is reserved for signaling information.

EXTRA Menu

Enter 3 at the main menu command line prompt and press the Enter key to access the EXTRA menu. The following screen appears:

```
CSX4 ON SLOT 1->LOCAL->EXTRA

 1) R Device Run Time           00002130:02:24
 2) R Alarm Status              off
 3) w SysTime                   00:02:08
 4) w SysDate                   29/12/2006

 0) return to LOCAL-Menu

Please enter your choice:
```

Table 5-7 provides information on these options.

Table 5-7 Extra Menu Options

Option	Result
1	Displays the total run time of the device in hhhhhhhh:mm:ss (hours, minutes, seconds).
2	Displays the overall alarm status of the unit. Any enabled alarm condition in Connection 1 or 2 sets the status to „on“ and activates the alarm output.
3	Shows the local time and allows to enter the local time. Enter the current time in the format “hh:mm:ss”. Note: If the device has an active connection to any MACS agent, time and date will be copied from the agent and overwrite the device time and date.
4	shows the local date and allows to enter the date, e.g. 30/06/2005. Enter the date in the format “MM-DD-YYYY”. Note: If the device has an active connection to any MACS agent, time and date will be copied from the agent and overwrite the device time and date.

If the device has an active connection towards any SCX2e agent, time and date will be copied from the agent and overwrite the device time and date.

PORT 1 (IF 1) Menu

Enter 4 at the main menu command line prompt and press the Enter key to access the INTERFACE PORT 1 (IF 1) menu. Depending on the given variant of user I/F different screens will be displayed.

PORT 1 (IF1) Menu for E1 (G.703/G.704) I/F

The following screen will be displayed:

```
CSX4 ON SLOT 1->LOCAL->PORT 1 (IF1)

 1) t Port Status                enabled
 2) R Link Status                up
 3) R Detailed Receive Status    in-sync
 4) t Local Carrier Detect Mode  line link
 5) R Local Carrier Detect Status up
 6) s Loop Mode                  off
 7) R Interface Type             ITU-T G.703
 8) R Interface Emulation Mode   NT
 9) R Connector Type             RJ45
10)  DATA RATE...
11)  PERFORMANCE MONITORING...

13) t Send AIS                   no
14) t Transmit on Line-Failure   ais
15) R Transmit Status            normal operation

 0) return to LOCAL-Menu

Please enter your choice:
```

Table 5-8 provides information on these options.

Table 5-8 Interface Configuration Menu Options E1/T1 I/F

Option	Result
1	Toggles between the Port Status: enabled or disabled.
2	Displays the Link Status of the interface port 1: <down, up>.
3	Displays more detailed the status of interface 1: <operational, in-sync, no-sync, ais-detected, not-available>.
4	Toggles between Local Carrier Detect Mode options: <line link, remote hardware handshake>.
5	Displays the Local Carrier Detect Status: <up, down>.
6	Enters the Loop Mode configuration menu, see page 5-20.
7	The line 'Interface Type' informs about the interface of CSX4. For the E1 (G.703/G.704) variant it displays "ITU-T G.703".
8	Displays the Interface Emulation Mode: "LT" or "NT".
9	The line 'Connector Type' informs about the connector type of the CSX4 port 1. The information 'RJ45' or 'BNC' depends on the assembly.

Table 5-8 Interface Configuration Menu Options E1/T1 I/F

Option	Result
10	Enters the DATA RATE menu, see page 5-21.
11	Enters the PERFORMANCE MONITORING menu, see page 5-23.
12	n.a.
13	Sends AIS via interface 1. This can be used for test-purposes.
14	Selector to decide whether AIS or LOS is sent, when the G.SHDSL-line fails.
15	Indicator to show the status of the E1-transmitter. It can be one of the following items: <normal operation, sending-ais, deactivated>

PORT 1 (IF1) Menu for Datacom Variants

This chapter is valid for V.24, X.21 and V.35 interface.

The following screen will be displayed:

```

CSX4 ON SLOT 1->LOCAL->PORT 1 (IF1)

 1) t Port Status                enabled
 2) R Link Status                down
 3) R Sync Status                no-sync
 4) t Local Carrier Detect Mode  line link
 5) R Local Carrier Detect Status down
 6) s Loop Mode                  off
 7) R Interface Type             ITU-T V.24
 8) R Interface Emulation Mode   DCE
 9) R Connector Type             db-25-f
10) DATA RATE...

 0) return to LOCAL-Menu

Please enter your choice:

```

Table 5-9 provides information on these options.

Table 5-9 Interface Configuration Menu Options Datacom I/Fs

Option	Result
1	Toggles between the Port Status, e.g. enabled or disabled.
2	Displays the Link Status of the interface port 1: <down, up>.
3	Displays the Sync Status of the interface port 1: <no-sync, in-sync, not-available>.
4	Toggles between Local Carrier Detect Mode options: <line link, remote hardware handshake>.
5	Displays the Local Carrier Detect Status: <up, down>.
6	Enters the Loop Mode configuration menu, see page 5-20.
7	The line 'Interface Type' informs about the interface of CSX4: 'ITU-T X.21', 'ITU-T V.24', 'ITU-T V.35'.

Table 5-9 Interface Configuration Menu Options (continued)Datacom I/Fs

Option	Result
8	Displays the Interface Emulation Mode: DCE or DTE
9	The line 'Connector Type' informs about the connector type of the CSX4 port 1: 'db-25-f', 'db-15-f', 'winch-f'.
10	Enters the DATA RATE menu, see page 5-21.

PORT 1 (IF1) Menu for ISDN-S0

This chapter is valid for ISDN-S0 variant: CSX4-I.430.

The following screen will be displayed:

```

CSX4 ON SLOT 1->LOCAL->PORT 1 (IF1)

  1) t Port Status                enabled
  2) R Link Status                down
  3) R Sync Status                no-sync
  4) t Local Carrier Detect Mode  line link
  5) R Local Carrier Detect Status down
  6) s Loop Mode                  off
  7) R Interface Type             BRI-S0
  8) R Interface Emulation Mode  TE
  9) R Connector Type             RJ45
10)  DATA RATE...

  0) return to LOCAL-Menu

Please enter your choice:

```

Table 5-10 provides information on these options.

Table 5-10 Interface Configuration Menu Options ISDN-S0 I/F

Option	Result
1	Toggles between the Port Status: enabled or disabled.
2	Displays the Link Status of the interface port 1: <down, up>.
3	Displays the Sync Status of the interface port 1: <no-sync, in-sync, not-available>.
4	Toggles between Local Carrier Detect Mode options: <line link, remote hardware handshake>.
5	Displays the Local Carrier Detect Status: <up, down>.
6	Enters the Loop Mode configuration menu, see page 5-20.
7	The line 'Interface Type' informs about the interface of CSX4. For ISDN-S0 I/F it is always "BRI-S0".
8	Displays the Interface Emulation Mode: "TE" or "NT".

Table 5-10 Interface Configuration Menu Options ISDN-S0 I/F

Option	Result
9	The line 'Connector Type' informs about the connector type of the CSX4 port 1. For ISDN-S0 I/F it is always "RJ45".
10	Enters the DATA RATE menu, see page 5-21.

PORT 1 (IF1) Menu for Ethernet I/F

This chapter is valid for Fast Ethernet interface option.

The following screen will be displayed:

```

CSX4 ON SLOT 1->LOCAL->PORT 1 (IF1)

  1) t Port Status                enabled
  2) R Link Status                down
  3) R Sync Status                no-sync

  6) s Loop Mode                  off
  7) R Interface Type            IEEE 802.3 FE-Bridge

  9) R Connector Type            RJ45
 10) DATA RATE...

 12) Details FE Module (IF1)...

0) return to LOCAL-Menu

Please enter your choice:

```

Table 5-8 provides information on these options.

Table 5-11 Interface Configuration Menu Options Ethernet I/F

Option	Result
1	Toggles between the Port Status: enabled or disabled.
2	Displays the Link Status of the interface port 1: <down, up>.
3	Displays the Sync Status of the interface port 1: <no-sync, in-sync, not-available>.
4	n.a.
5	n.a.
6	Enters the Loop Mode configuration menu, see page 5-20.
7	The line 'Interface Type' informs about the interface of CSX4. For ISDN-S0 I/F it is always "IEEE 802.3 FE-Bridge".
8	n.a.

Table 5-11 Interface Configuration Menu Options Ethernet I/F

Option	Result
9	The line 'Connector Type' informs about the connector type of the CSX4 port 1. For ISDN-S0 I/F it is always "RJ45".
10	Enters the DATA RATE menu, see page 5-21.
12	Enter the menu for detailed settings and counters of the FE-module.

DETAILS Menu for Ethernet I/F

This chapter is valid for Fast Ethernet interface option, only.

The following screen will be displayed:

```

CSX4 ON SLOT 1->LOCAL->PORT 1 (IF1)->Details FE Module (IF1)

  1) w I/F Name                <...>
  2) R Current Status          up
  3) R Current Speed / Mode    100Mbit/s, FDx
  4) s I/F Mode                Auto Speed, Auto Duplex
  5) t Flow Control            enabled
  6) t Admin Status            enabled
  7) t Bridge Filter            enabled
  8) R Counters:
  9) R  -RX Good Frames        000000000
 10) R  -RX Error Frames       000000000
 11) R  -RX Overflow           000000000
 12) R  -TX Good Frames        000000000
 13) R  -TX Error Frames       000000000
 14) R  -TX Overflow           000000000
 15) t Reset Error Counters    No Reset

  0) return to CONNECTION 1-Menu

Please enter your choice:

```

Table 5-12 provides information on the Interface Settings menu options.

Table 5-12 Details Menu Options Ethernet I/F

Option	Result
1	An unique name can be given for the interface.
2	Displays the current state of the interface (up down).
3	Displays the current speed and duplex mode of the interface.
4	A sub-menu is opened which gives opportunity to select the speed and duplex mode. See chapter "Auto Negotiation" on page 3-19 for details.
5	Press '5' to enable or disable the Flow control feature.
6	Press '6' to enable or disable the interface.

Table 5-12 Details Menu Options Ethernet I/F

Option	Result
7	Press '7' to enable or disable the MAC-learning.
8	Headline for the below counters:
9	RX Good Frames: Sum of all received good frames (Unicast, Multicast and Broadcast).
10	RX Error Frames: Sum of all received errored frames (CRC error, Alignment error, Runt error, Jabber, Undersize frames, Oversize frames, Wrong length field).
11	RX Overflow: Sum of frames discarded due to a receive FIFO overflow.
12	TX Good Frames: Sum of all transmitted good frames (Unicast, Multicast and Broadcast).
13	TX Error Frames: Sum of all transmitted errored frames (Excessive collision, Carrier error, excessive deferral).
14	TX Overflow: Sum of frames discarded due to a transmit FIFO overflow.
15	Enter '15' to reset all the above counters to zero.

I/F Mode Menu for Ethernet I/F

This chapter is valid for Fast Ethernet interface option, only.

The following screen will be displayed:

```
CSX4 ON SLOT 1->LOCAL->PORT 1 (IF1)->Details FE Module (IF1)->I/F Mode

 1) * Auto Speed, Auto Duplex
 2) Auto Speed, FDx
 3) Auto Speed, HDx
 4) 100Mbit/s, Auto Duplex
 5) 10Mbit/s, Auto Duplex
 6) 100Mbit/s, FDx
 7) 100Mbit/s, HDx
 8) 10Mbit/s, FDx
 9) 10Mbit/s, HDx
10) 100Mbit/s, FDx, fixed
11) 100Mbit/s, HDx, fixed
12) 10Mbit/s, FDx, fixed
13) 10Mbit/s, HDx, fixed

 0) return to Details FE Module (IF1)-Menu

Please enter your choice:
```

See chapter "Auto Negotiation" on page 3-19 for details.

Loop Mode

Enter 6 at the PORT 1 (IF 1) menu command line prompt and press the Enter key to select the loop mode. The following screen appears:

```
CSX4 ON SLOT 1->LOCAL->PORT 1 (IF1)->Loop Mode

1) * off
2)  facility
3)  terminal

0)  return to PORT 1 (IF1)-Menu

Please enter your choice:
```

Select either 'facility' or 'terminal' to activate a desired loop mode. You will find a more detailed information regarding the available loop modes in the section "Test-Loops" on page 4-13.

Note: Always deactivate a loop mode before you change to a new one.

Table 5-13 provides information on the options of the Loop Mode configuration menu.

Table 5-13 Loop Mode Configuration Menu Options

Option	Result
1	Deactivates the chosen loop mode.
2	Activates the facility loop at the interface port 1. The entered loop status is shown in the configuration overview. If available, the remote unit enters the loop status.
3	Activates the terminal loop to the interface port 1. The entered loop status is shown in the configuration overview.
0	Returns to the PORT 1 (IF1)-Menu. The chosen loop setting remains active.

NOTE: You can not have data transmission through the modem application, when you are in a loop mode.

DATA RATE Menu

Enter 10 at the PORT 1 (IF 1) menu command line prompt and press the Enter key to access the DATA RATE menu. The following screen appears:

```

CSX4 ON SLOT 1->LOCAL->PORT 1 (IF1)->DATA RATE

 1) w Number Of 64kbit Channels          18
 2) R Payload Data Rate                  1152kBit/s
 3) R Line Data Rate
 4) t Auto Speed Negotiation i          enable
 5) R Line Probing Data Rate
 6) R G.703 Format ii                    E1
 7) R Framing Mode ii                   framed
 8) t CRC Generation ii                 doubleframe (no CRC)
 9) w Start Time Slot ii                1
10) t TS0 Transmission ii              disabled
11) t TS16 Transmission ii            disabled

 0) return to PORT 1 (IF1)-Menu

Please enter your choice:

```

i. Not available, if the CSX4 is equipped with an E1 onboard module.

ii. Only available, if the CSX4 is equipped with an E1 onboard module.

Table 5-14 provides information on the options of the (IF) DATA RATE menu.

Table 5-14 I/F Data Rate Configuration Menu Option

Option	Result
1	Sets the number of n x 64 kbit time slot channels to be used. If TS0 or TS16 are within the selected range, they will be sent only once. Note: n = 1... 30/32; 31 = 30 + TS16 enable
2	Displays the payload data rate.
3	Displays the line data rate.
4	Toggles the auto speed negotiation configuration setting. <ul style="list-style-type: none"> disable: Disables the auto speed negotiation function. Select the data transmission speed in the Change Data Rate menu. enable: Enables the auto speed negotiation function. The maximum possible speed is selected by the unit. The speed is not selectable in the Change Data Rate menu. The interface data transmission speeds 64 and 164 kbps are not supported. Note: If the CSX4 is equipped with an E1 onboard module, this menu option will not be available.
5	Indicates the maximum possible data rate of the line, that was detected by the line probing mechanism. <192 to 4608 kbps>
6 ⁱ	Displays the G.703 format. <E1>
7 ⁱ	Indicates the framing mode. <framed, unframed>

Table 5-14 *I/F Data Rate Configuration Menu Option (continued)*

Option	Result
8 ⁱ	Enables or disables the CRC Generation and Supervision. If this is set to "disabled" no CRC4-checksum is checked on the incoming E1-traffic nor is it rebuild on the outgoing (transmitting) E1-traffic.
9 ⁱ	Enter the desired value n <0 to 72>. The number of available time slots depends on the transmission format, framing mode, and line capacity of the CSX4. Recommendation is to use the value of 1 for framed traffic and the value of 0 for unframed traffic.
10 ⁱ	Enables or disables the TS0 transmission over the G.SHDSL-line. Note: If the TS0 transmission is enabled, the data in TS0 is NOT changed. This is also true for the CRC4-bits! So in fractional mode, the TS0-transmission must be disabled!
11 ⁱ	Enables or disables the TS16 transmission over the G.SHDSL-line. Note: In case of user's traffic is PCM30 or PCM30C, the transmission of TS16 is necessary. Note: In case of PCM31 or PCM31C with more than 15 TS of user traffic, the transmission of TS16 is necessary.

i. Only available, if the CSX4 is equipped with an E1 I/F.

The V.24, X.21, V.35 interfaces support the whole data rate range beginning with 64 kbps. The onboard interface and the Ethernet interface module start with 192 kbps.

Recommendation for E1-Settings

There are several typical modes for E1-transmission, which require fixed settings in the CSX4. These settings are listed below and usage is strongly recommended. See "E1-Basics" on page 4-9 for details.

Table 5-15 *Recommendation for E1-Settings*

Mode	Managed Objects	Setting
E1-unframed	Number Of 64kbit Channels CRC Generation Start Time Slot TS0 Transmission TS16 Transmission	32 <i>doubleframe (no CRC)</i> ⁱ 0 ⁱ <i>disabled</i> ⁱ <i>disabled</i> ⁱ
E1-PCM31 fractional and non-fractional	Number Of 64kbit Channels CRC Generation Start Time Slot TS0 Transmission TS16 Transmission	1-30 ⁱⁱ doubleframe (no CRC) 1 enabled or disabled ⁱⁱⁱ enabled (if N>=16) disabled (if N<16)
E1-PCM31C fractional and non-fractional	Number Of 64kbit Channels CRC Generation Start Time Slot TS0 Transmission TS16 Transmission	1-30 ⁱⁱ multiframe (with CRC) 1 disabled (if N<30) enabled (if N>=16) disabled (if N<16)

Table 5-15 Recommendation for E1-Settings

Mode	Managed Objects	Setting
E1-PCM30 fractional and non-fractional	Number Of 64kbit Channels	1-30
	CRC Generation	doubleframe (no CRC)
	Start Time Slot	1
	TS0 Transmission	enabled or disabled ⁱⁱⁱ
	TS16 Transmission	enabled
E1-PCM30C fractional and non-fractional	Number Of 64kbit Channels	1-30
	CRC Generation	multiframe (with CRC)
	Start Time Slot	1
	TS0 Transmission	disabled (if N<30)
	TS16 Transmission	enabled

i. This setting is irrelevant and any change of it will not accepted.

ii. Even for PCM31x the max. number of TS is 30. To invoke the 31th TS, one has to enable TS16 Transmission.

iii. Both settings are possible. The different behavior depends on further details of the service.

PERFORMANCE MONITORING PORT 1 (IF1)

Note: This menu is only available if the CSX4 is equipped with an E1 onboard module.

Enter 11 at the PORT 1 (I/F 1) menu for the PERFORMANCE MONITORING screen.

```
CSX4 ON SLOT 1->LOCAL->PORT 1 (IF1)->PERFORMANCE MONITORING

1) LOCAL MONITORING...
2) CURRENT 15 MIN PERIOD...
3) LAST 15 MIN PERIOD RESULTS...

0) return to PORT 1 (IF1)-Menu

Please enter your choice:
```

The functionality is the same as described in the section “PERFORMANCE MONITORING PORT 2 (LINE)” on page 5-25.

PORT 2 (LINE) Menu

Enter 5 at the main menu command line prompt and press the Enter key to access the LINE PORT 2 menu. The following screen appears:

```

CSX4 ON SLOT 1->LOCAL->PORT 2 (LINE)

 1) t Line Emulation Mode           LTU
 2) R Port Status                   enabled
 3) R Link Status                   down
 4) R DSL Activation Status         deactivated
 5) R Line Data Rate                192kBit/s
 6) R Noise Margin in dB            +19
 7) R Line Attenuation in dB        +6
 8) t Wire Mode                    2-wire
 9) s Loop Mode                    off
10) R Interface Type                g-shdsl
11) R Connector Type                RJ45
12) PERFORMANCE MONITORING...

 0) return to LOCAL-Menu

Please enter your choice:

```

Table 5-16 provides information on these items (see page 4-13 for loop mode principles).

Table 5-16 PORT 2 (Line 1) Menu Items

Option	Result
1	The Line Emulation Mode toggle allows to change from LTU to NTU and vice versa. HDSL unit type: <ul style="list-style-type: none"> • NTU (network termination unit) • LTU (line termination unit) Set one unit of two communicating counterparts to LTU and the other one to NTU. When the unit is switched to LTU operation the setting is forced to external clock. Note: Prior to clock setting select the desired line mode LTU or NTU.
2	Toggles between the Port Status <disabled, enabled> of the line port 2.
3	Shows the Link Status <up, down> of the line port 2.
4	Shows the DSL Activation Status <deactivated, in-progress, normal-operation> of the line port 2.
5	Shows the Line Data Rate.
6	Shows the Noise Margin in dB
7	Shows the Line Attenuation in dB
8	Only for a 4-wire CSX4: The Line Type toggle allows to disable 1 line <2-wire, 4-wire>.
9	Enters the Loop Mode configuration menu, see page 5-20.
10	Interface Type informs about the interface used. <g-shdsl>.

Table 5-16 PORT 2 (Line 1) Menu Items (continued)

Option	Result
11	Connector Type informs about the used connectors on the CSX4. <RJ45>
12	PERFORMANCE MONITORING opens the display of the performance statistic.

PERFORMANCE MONITORING PORT 2 (LINE)

Enter 12 at the PORT 2 (LINE) menu for the PERFORMANCE MONITORING screen.

```
CSX4 ON SLOT 1->LOCAL->PORT 2 (LINE)->PERFORMANCE MONITORING

 1) LOCAL MONITORING...
 2) CURRENT 15 MIN PERIOD...
 3) LAST 15 MIN PERIOD RESULTS...

 0) return to PORT 2 (LINE)-Menu

Please enter your choice:
```

Performance monitoring is running continuously. The values are counted up in the screen 'CURRENT 15 MIN PERIOD...'. After 15 minutes, the values are copied to the screen 'LAST 15 MIN PERIOD RESULTS...'. Then the entries in screen 2) are reset to zero and counting starts again. The last 15 minutes history is available in the screen 3).

The screens for selection 2) and 3) look similar to the screen 'LOCAL MONITORING...', but in 1) the additional first line allows manual intervention to the 6 counters.

LOCAL MONITORING Menu and 15 MIN PERIODS RESULTS Menu

Enter 1 in the PERFORMANCE MONITORING menu to open the LOCAL MONITORING screen. The screen below displays the default values, before the local monitoring has been started. The line 'Performance Monitoring Action' is available in the LOCAL MONITORING screen only, the other lines are available in all performance monitoring screens.

```
CSX4 ON SLOT 1->LOCAL->PORT 2 (LINE)->PERFORMANCE MONITORING->
LOCAL MONITORING

 1) s Performance Monitoring Action          no-action
 2) R Elapsed Seconds                       0
 3) R Error Free Seconds                    0
 4) R Errored Seconds (ES)                  0
 5) R Severely Errored Seconds (SES)        0
 6) R CRC Anomalies                         0
 7) R Loss Of Sync Word (LOSW) Seconds      0
 8) R Unavailable Seconds (UAS)             0

 0) return to PERFORMANCE MONITORING-Menu

Please enter your choice:
```

Enter 1 in the LOCAL MONITORING screen in order to activate the local monitoring. You can select between: <1) no-action, 2) start, 3) stop, 4) reset-counter, 5) inject DSL CRC errors>, e.g. to start local monitoring for the onboard interface. The parameter values count up, until you stop the local monitoring.

CLOCK Menu

Enter 6 at the main menu command line prompt and press the Enter key to access the Clock Reference menu. The following screen appears:

```
CSX4 ON SLOT 1->LOCAL->CLOCK

1) t Clock System                single-clock
2) s Clock Source                 internal
3) t Tx Clock Polarityi         normal

0)  return to LOCAL-Menu

Please enter your choice:
```

i. This entry is only visible for datacom I/Fs (X.21, V.24, V.35).

The interface clock reference is dependent on the selected protocol mode. Table 5-17 provides information on the options of the Clock configuration menu.

Table 5-17 Clock Configuration Menu Options

Option	Result
1	<p>Toggles between the Clock System settings:</p> <ul style="list-style-type: none">• Dual-clock Dual clock system for the link. Two different clock sources may exist within the system. Transmit clock and receive clock have different sources Note: This option is not selectable for X.21 interfaces.• Single-clock Single clock system for the link. One clock source exists within the system. Transmit clock and receive clock are locked and have the same source. Note: This option is selected by default for X.21 interface.• Asynchron The user-interface is operated in asynchronous mode (valid for V.24, X.21, V.35 IM). Note: This option is selected by default for V.24 interface.

Table 5-17 Clock Configuration Menu Options

Option	Result
2	<p>Changes the Clock Source configuration:</p> <ul style="list-style-type: none"> • Internal The transmit clock is generated internally by the device. • External The transmit clock is generated by the user equipment connected to the device (not with Ethernet). <p>Note: This option is not selectable when Ethernet interface module is equipped.</p> <ul style="list-style-type: none"> • Remote The transmit clock is taken from the remote device via the copper line.
3	<p>Toggles the polarity of the TX-clock: (this entry is only visible for datacom I/Fs)</p> <ul style="list-style-type: none"> • Normal Data is updated with rising clock edge of TX-clock. • Invert Data is updated with falling clock edge of TX-clock

As the different clocking modes and possible settings are not the same for all available modules, the next table gives an overview of limitations::

Table 5-18 Possible Clock Settings

Variable/Options	G.703/G.704	X.21	V.35	V.24	I.430	Ethernet
Clock System						
Dual-Clock	yes	no	yes	yes	no	yes
Single-Clock	yes	yes	yes	yes	yes	yes
Asynchron	no	yes	yes	yes	no	no
Clock Source						
Internal	yes	DCE only	yes	yes	NT only	yes
External	yes	DTE only	yes	yes	TE only	nos
Remote	yes	DCE only	yes	yes	NT only	yes
Tx Clock Polarity						
Normal	no	yes	yes	yes	yes	no
Invert	no	yes	yes	yes	no	no

Prior to clock setting select the desired line mode LTU or NTU.

For X.21 the clocking is fix and set by the termination of the interface:

NTU	Remote clock (always)
LTU and DCE	Internal clock
LTU and DTE	External clock

TRAPS Menu

Enter 7 at the main menu for the Traps screen. With setting 'enabled' SNMP traps are possible.

```
CSX4 ON SLOT 1->LOCAL->TRAPS

 1) t Link Status changed Port 1 (IF)      enabled
 2) t Sync Status changed Port 1 (IF)      enabled
 3) t RX AIS      changed Port 1 (IF)      enabled
 4) t Link Status changed Port 2 (LINE)    enabled
 6) t Local Carrier Detect changed        disabled

 0)   return to LOCAL-Menu

Please enter your choice:
```

Setting Traps (I/F and Line)

Table 5-19 provides information on the set Traps options of each item.

Table 5-19 Trap Configuration Menu Options

Option	Selection	Result
1	enabled	Trap is generated, if the Link Status changed at Port 1.
	disabled	Disables link trap generation.
2	enabled	Trap is generated, if Port 1 Sync Status changed.
	disabled	Disables sync trap generation.
3 ⁱ	enabled	Trap is generated, if Port 1 AIS Status changed.
	disabled	Disables AIS trap generation.
4	enabled	Trap is generated, if Link Status changed at Port 2.
	disabled	Disables link trap generation.
6	enabled	Trap is generated if the Local Carrier Detect Status changed.
	disabled	Disables trap generation.

i. Only available, if the CSX4 is equipped with an E1 onboard module.

Default (Factory-) Trap-Settings

Depending on the given variant, not all traps-sources are available and the Defaults may vary:

Table 5-20 Trap Defaults

Variant	CSX4-E1R	CSX4-V.24	CSX4-X.21	CSX4-I.430	CSX4-FE
ID	0803-3100	0803-3220	0803-3221	0803-3240	0803-3280
Link Status changed Port 1 (IF)	enabled	enabled	enabled	enabled	enabled
Sync Status changed Port 1 (IF)	enabled	n.a.	n.a.	n.a.	n.a.
RX AIS changed Port 1 (IF)	enabled	n.a.	n.a.	n.a.	n.a.
Link Status changed Port 2 (LINE)	enabled	enabled	enabled	enabled	enabled
Local Carrier Detect changed	disabled	disabled	disabled	disabled	disabled

ALARMS Menu

Enter 8 at the main menu for the Alarms screen. The ERR LED and the alarm output are triggered with setting 'enabled' conditions.

```
CSX4 ON SLOT 1->LOCAL->ALARMS

1) R Alarm Status                off
2) t Link Down Port 1 (IF)       enabled
3) t No Sync Port 1 (IF)         enabled
4) t RX AIS Port 1 (IF)          enabled
5) t Link Down Port 2 (LINE)     enabled
7) t Local Carrier Detect Down   disabled

0) return to LOCAL-Menu

Please enter your choice:
```

Setting Alarms (I/F and Line)

Table 5-21 provides information on the set Alarm options of each item.

Table 5-21 Alarm Configuration Menu Options

Option	Selection	Result
1	on	Alarm Status and alarm relay active, alarm is generated, the alarm LED is lit.
	off	No alarm is generated.
2	enabled	An alarm will be generated, if there is no link at Port 1.
	disabled	Disables the alarm generation.
3 ⁱ	enabled	An alarm will be generated, if there is no synchronization at Port 1.
	disabled	Disables the alarm generation.
4 ⁱ	enabled	An alarm will be generated, if an AIS is received at Port 1.
	disabled	Disables the alarm generation.
5	enabled	An alarm will be generated, if there is no link at Port 2.
	disabled	Disables the alarm generation.
6	enabled	An alarm will be generated, if there is no Local Carrier Detection.
	disabled	Disables the alarm generation.

i. Only available, if the CSX4 is equipped with an E1 onboard module.

Default (Factory-) Alarm-Settings

Depending on the given variant, not all traps-sources are available and the Defaults may vary:

Table 5-22 Alarm Defaults

Variant	CSX4-E1R	CSX4-V.24	CSX4-X.21	CSX4-I.430	CSX4-FE
ID	0803-3100	0803-3220	0803-3221	0803-3240	0803-3280
Link Down Port 1 (IF)	enabled	enabled	enabled	enabled	enabled
No Sync Port 1 (IF)	enabled	n.a.	n.a.	n.a.	n.a.
RX AIS Port 1 (IF)	enabled	n.a.	n.a.	n.a.	n.a.
Link Down Port 2 (LINE)	enabled	enabled	enabled	enabled	enabled
Local Carrier Detect Down	disabled	disabled	disabled	disabled	disabled

EVENT MONITORING Menu

Enter 9 in the command line prompt of the main menu and press the Enter key to access the EVENT MONITORING menu. A list with the last 14 events is shown. First entry shows the time, when the event occurred. An example for the event monitor is shown below:

```
CSX4 ON SLOT 1->LOCAL->EVENT MONITORING

00:00:00 CSX4: Port # 1 AIS Alarm disabled
00:00:00 CSX4: Port # 2 (Line) no Link Alarm disabled
00:00:00 CSX4: Local Carrier Detect Alarm disabled
00:00:00 CSX4: Port # 2 (Line) Loop mode off
00:00:00 CSX4: System Start O.K.
00:00:00 CSX4: Port # 1 (Interface) Link up
00:00:01 CSX4: Port # 1 (Interface) Link down
00:00:01 CSX4: Port # 1 (Interface) no Link Alarm is off
00:00:01 CSX4: Port # 2 (Line) no Link Alarm is off
00:00:01 CSX4: Local Carrier Detect Alarm is off
00:00:01 CSX4: Port # 1 (Interface) Sync Alarm is off
00:00:31 CSX4: Port # 1 (Interface) AIS Alarm is off
00:03:59 CSX4: Clock System changed to dual clock
00:03:59 CSX4: Clock Source changed to Remote
00:04:01 CSX4: Clock System changed to single clock
00:04:01 CSX4: Clock Source changed to Remote

0) return to LOCAL-Menu

Please enter your choice:
```

The list will be appended on the screen as soon as new events happen. Enter 0 to return to the menu one level above.

NOTE: The SCX Main Agent offers the possibility to view the history log of all events.

USER ADMINISTRATION Menu

Enter 10 at the main menu to access the USER ADMINISTRATION screen. It allows the definition respectively change of passwords to protect the configuration

NOTE: This menu is only accessible for users, logged in as "admin".

```
CSX4 ON SLOT 1->LOCAL->USER ADMINISTRATION

1) w Monitor Password          any Monitor Password
2) w Service Password         any Service Password
3) w Standard Password       any Standard Password
4) w Administrator Password  any Admin Password

0) return to LOCAL-Menu

Please enter your choice:
```

CAUTION: The given passwords are shown in clear text. Be careful who can see the screen, when you enter it.

Change a Password

The following two steps are necessary to change a password:

1. Enter the number of the password to be changed in the command line prompt and press the Enter key.
2. Enter your password (up to 31 characters) in the command line prompt and press the Enter key.

The new password is stored and must be used at the next password inquiry.

UPDATE Menu

Enter 11 in the command line prompt of the main menu and press the Enter key to access the UPDATE menu. The following screen will be displayed:

NOTE: This menu is only accessible for users, logged in as “admin”

```
CSX4 ON SLOT 1->LOCAL->UPDATE

 1) R Actual Software Revision          CSXA003V03 07/08/2009 (1)
 2) R Flash 1 Software Revision        CSXA003V03 07/08/2009
 3) R Flash 2 Software Revision        CSXA003V02 22/03/2009
 4) s Reboot                           no reboot
 5)   Software Update                  CSXA

 0) return to LOCAL-Menu

Please enter your choice:
```

Table 5-23 provides information on the Update menu options.

Table 5-23 Update Menu Options

Option	Result
1	Displays the running software version. The version is shown with version-number and release date. The number in brackets shows the flash-bank, used.
2	Displays the software version stored in Flash 1. The version is shown with version-number and release date.
3	Displays the software version stored in Flash 2. The version is shown with version-number and release date.

Table 5-23 Update Menu Options

Option	Result
4	Selection menu for an CSX4 reboot.
5	Enters the Software Update menu, where you can start the upload process to store a new SW-file in one of the flash-banks. (See page 5-33.) Note: The CSXA indicates, that only SW for CSX4 is accepted.

Reboot

Enter 4 in the command line prompt of the UPDATE menu and press the Enter key to access the Reboot menu. The following screen will be displayed:

```
CSX4 ON SLOT 1->LOCAL->UPDATE->Reboot

1) * no reboot
2)  reboot flash 1 software
3)  reboot flash 2 software

0)  return to UPDATE-Menu
```

The CSX4 offers two program memories (flash 1 and flash 2) from which you can reboot the unit. You can select, which SW-version (stored in flash 1 or flash 2) is used to run on CSX4 after reboot.

CAUTION: After having selected one of the two items of the reboot (flash 1 or flash 2), the unit automatically starts the re-initialisation process.

CAUTION: Interruptions and errors in the data transmission will occur!

Software Update

Enter 5 in the command line prompt of the UPDATE menu and press the Enter key to access the Software Update menu. The following screen will be displayed:

```
Software-Update via serial line

Kindly note that:
- Your Terminalprogram (e.g. HyperTerminal) must provide the file transfer
  with the Y-Protocol.
- Please make sure that the file to transfer is a real software file.
  If the file is not a software file designated for this device the result is
  not foreseeable.

Would you like to transfer the software file ? (y/n)
```

After pressing 'y' (or 'Y') the CSX4 is waiting to receive the new SW-image.

Update via Y-Modem

Load a new software-image via Y-Modem using the serial interface. The terminal emulation software must be able to transfer files using Y-Modem protocol. The new software is stored as file in the flash memory of the CSX4.

After confirming the update process by entering 'y' for yes, you have to initiate the Y-modem transmission of the new software file in your terminal program. Other key strokes stop the process and return to the UPDATE menu.

```
Software-Update via Serial Line

Kindly note that:
- Your Terminalprogram (e.g. HyperTerminal) must provide the file transfer
  with the Y-Protocol.
- Please make sure that the file to transfer is a valid software file.
  If the file is not a software file designated for this device the result is
  not foreseeable.

Would you like to transfer the software file ? (y/n) y
- Send software file named
  CSXA*.BIP
  with Y-Protocol. CCCCCC
```

NOTE: A new software will always be loaded into the free flash memory.

After the data transmission has been successful and the file is valid, the following screen will be displayed:

```
Software-Update via Serial Line

Kindly note that:
- Your Terminalprogram (e.g. HyperTerminal) must provide the file transfer
  with the Y-Protocol.
- Please make sure that the file to transfer is a valid software file.
  If the file is not a software file designated for this device the result is
  not foreseeable.

Would you like to transfer the software file ? (y/n) y
- Send software file named
  CSXA*.BIP
  with Y-Protocol. CC
- Load successful
- Software Update successful
To continue strike any key !
```

Press a key to return to the Update menu.

If the software has been loaded successfully into the flash, you can start the software by a reboot, see page 5-33.

For more information on the update process via the rack agent, refer to the control software description of the SCX user guide.

Abort Update

You can interrupt the update process manually by typing two times the ESC key or a cancel button of your terminal program. A hint is shown and you have to press a key to return to Update menu.

```
Software-Update via Serial Line

Kindly note that:
- Your Terminalprogram (e.g. HyperTerminal) must provide the file transfer
  with the Y-Protocol.
- Please make sure that the file to transfer is a valid software file.
  If the file is not a software file designated for this device the result is
  not foreseeable.

Would you like to transfer the software file ? (y/n) y
- Send software file named
  CSXA*.BIP
  with Y-Protocol. C
- Abort by Terminalprogram / User
  To continue strike any key !
```

Example

Example of a software update with HyperTerminal© (Hilgreave Inc.):

NOTE: The example pictures are taken from CFX product. The CFX does have SW number 3007xxxx instead of CSXAxxxx. The behavior of CFX and CSX4 is just the same concerning SW update.

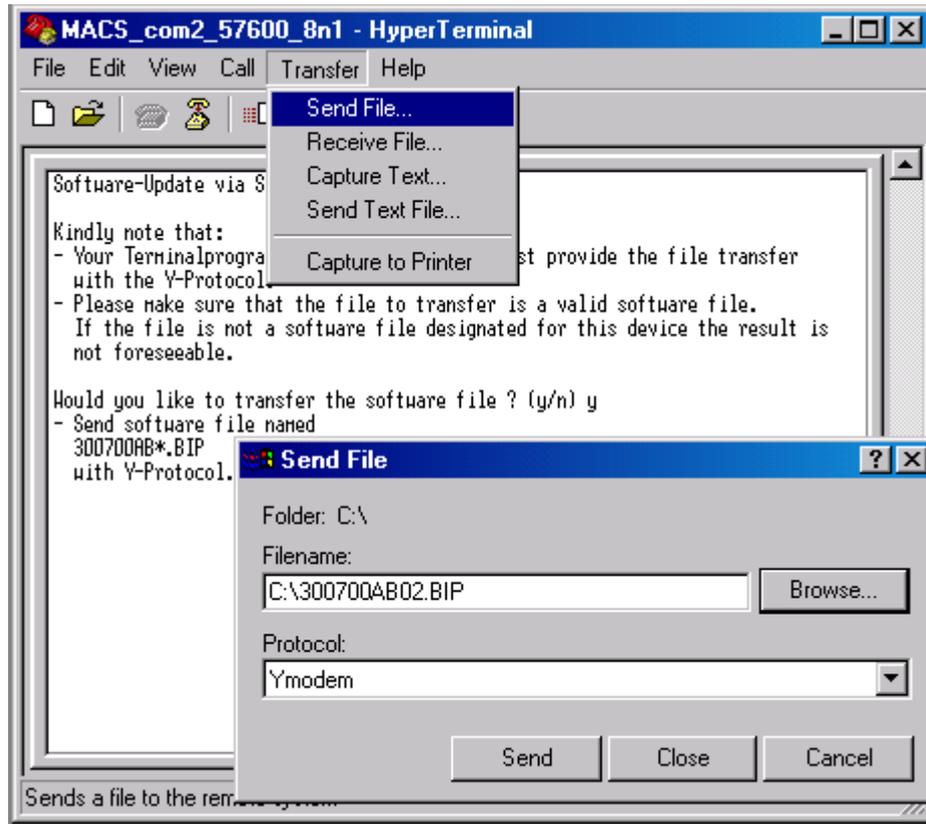


Figure 5-1 Update with HyperTerminal

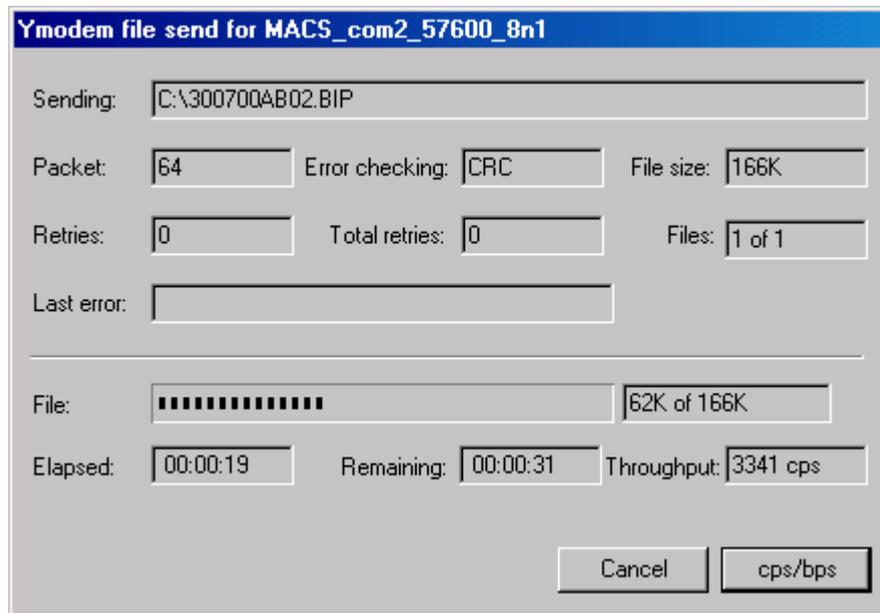


Figure 5-2 Send File

Chapter 6

SNMP and MIBs

This chapter provides information on the SNMP and the management information bases (MIBs) used by the CSX4.

SNMP Access Generally

The growing global network 'Internet' was the home of plans to simplify network maintenance by defining a maintenance protocol, which would allow network managers to control network equipment via the network itself. This protocol was given the name SNMP (Simple Network Management Protocol). As the name implies, SNMP was originally planned as an intern solution. However, SNMP became widely used and is now a universal standard.

What is the difference between equipment with and without SNMP? Generally, SNMP featured equipment has:

- Added intelligence to talk SNMP and to get and set unit parameters
- An own unique network address
- Some kind of local management port

Network management by SNMP requires at least two partners:

- Network equipment with SNMP software, called 'agent'
- A network station, running some kind of network management software

The two partners communicate via the net using SNMP. The network management station sends configuration commands and data requests to the network equipment. The network equipment responds to requests by sending the requested data. Additionally, traps are triggered by certain events in the network equipment. Traps are data packets containing information about these events. Their destination is a (or multiple) network management station, where the information is collected. SNMP traps enable an agent to notify the management station(s) of significant events by way of an unsolicited SNMP message.

Network configuration information, in particular configuration commands, is sensitive data and must therefore be protected against prying eyes. SNMP deals with this problem by implementing something called a 'community'. A community is comparable to a password and gets attached to each SNMP message. The attached community allows the receiving SNMP partner to decide if the transmitting partner is allowed to force the execution of the command.

The arcutronix Multi Service System supports two versions of SNMP: SNMPv1 (version 1) and SNMPv2c (version2, community-based).

SNMPv1

SNMPv1 first appeared in 1988 and is defined in IETF RFC1065, RFC1066 and RFC1067. It supports a basic set of commands (get, set and the possibility to send traps). Authentication of clients is performed only by a "community string", in effect a type of password, which is transmitted in clear text.

SNMPv2c

Community-Based Simple Network Management Protocol version 2, or SNMP v2c, is defined in IETF RFC 1901-RFC1908. SNMP v2c revises version 1 and includes improvements in the areas of performance, confidentiality, and manager-to-manager communications. It introduced GETBULK, an alternative to iterative GETNEXTs for retrieving large amounts of management data in a single request. SNMPv2c uses the same simple community-based security scheme as SNMP v1. While officially only a "Draft Standard", this is widely considered the de facto SNMP v2 standard.

Traps

SNMPv1 and SNPv2c encourage trap-directed notification. The idea behind trap-directed notification is as follows: if a manager is responsible for a large number of devices, and each device has a large number of objects, it is impractical for him to poll or request information from every object on every device. The solution is for each agent on the managed device to notify the manager without solicitation. It does this by sending a message known as a trap of the event or NOTIFICATION.

After receiving the event, the manager displays it and may choose to take an action. For instance, the manager can poll the agent directly, or poll other associated device agents to get a better understanding of the event.

Trap-directed notification can result in substantial savings of network and agent resources by eliminating the need for frivolous SNMP requests. However, it is not possible to totally eliminate SNMP polling. SNMP requests are required for discovery and topology changes. In addition, a managed device agent can not send a trap, if the device has had a catastrophic outage.

Installation Prerequisites

This section provides the installation prerequisites for SNMP.

Prerequisites for SNMP management:

- A management station with an Ethernet 10/100BaseT respectively RS232 interface.
- Management software for SNMP management (e.g. SNMPc, HP Openview).
- A VT100 compatible terminal or PC with terminal software (only used for initial installation).

Preparing the SNMP Management System

Before managing the CSX4 by SNMP, one has to prepare the SNMP management system. First install the MIBs for the CSX4 and second configure the correct access parameters.

You can download the MIB from the ax intranet (www.arcutronix.com/customer):

Login: **User = p49170644-0**
 Password = 1qayxsw2

A MIB (Management Information Base) is a kind of database, which tells the network management station about specific capabilities of the new equipment. Add the contained MIBs to the MIBs already known to your management system. Generally, you have to recompile the MIB database to include the new information.

Configure your management station to use SNMPv2c for read and write access mode and enter the community strings for read/write and read-only access.

Management Information Bases (MIBS)

The MIBs (Management Information Bases) define the variables which are used to control an SNMP device or to retrieve operational data from the device. The MIB hierarchy can be depicted as a tree with a nameless root, the levels of which are assigned by different organizations. This model permits management across all layers of the OSI reference model.

The MIBs for arcutronix's SNMP management Generation 2 are based on the arcutronix naming convention. The root-OID tree structure is accessible via

iso(1).org(3).dod(6).internet(1).private(4).enterprises(1).arcutronix(30507).g2Management(2)

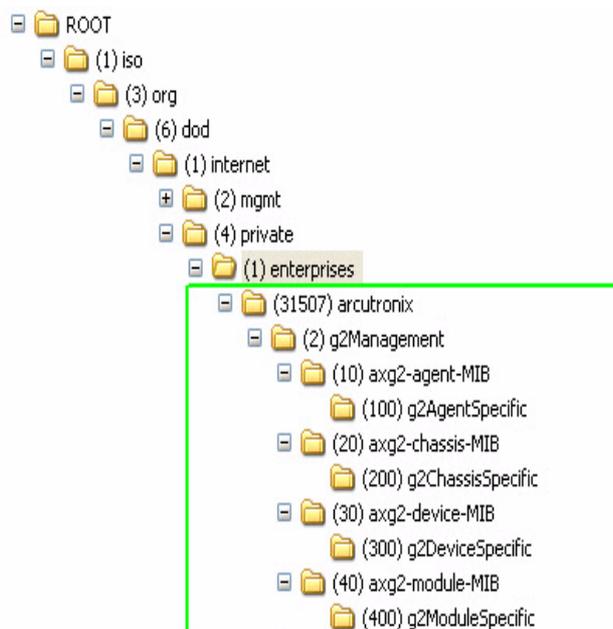


Figure 6-1 The SNMP Generation 2 MIB Tree

The format of the MIBs as well as global sections are defined in the SNMP standard. MIBs are written in a special language (ASN.1 = Abstract Syntax Notation One) and are plain ASCII text. Thus they can be read using any available editor.

The global MIB sections contain variables which should be served by any SNMP agent. Each MIB object is assigned a name. These names are shown in the following MIB explanation. However, these names may show up somewhat extended or abbreviated on your screen, depending on the network management software you use. This is no malfunction but a feature of your software.

The following MIB explanations will provide a quick overview about the available features. However, you might find useful additional information when inspecting the MIBs themselves.

axg2.mib

This MIB specifies the general OIDs for arcutronix g2Management.

axg2-agent.mib

This MIB describes the ax SNMP-agent, which runs on several platforms (SCX2e, EDX1000-family, etc.).

axg2-chassis.mib

This MIB describes all physical chassis of arcutronix. A chassis may be a stand-alone box as well as a cabinet consisting of several racks and other components that contain lots of slots and modules.

axg2-device.mib

This MIB describes general information about all devices from arcutronix (CSX4, EDX1000-family etc.).

axg2-modules.mib

This MIB describes general information about plugable modules from arcutronix.
This MIB is not required for CSX4.

axg2-csx-ds.mib

This MIB describes device specific details of CSX4.

Chapter 7

SSH and CLI

When the CSX4 is mounted in an arcutronix sub-rack (e.g. SRX10) with an arcutronix System Controller Card (SC-SC) it can be configured via a text-based Command Line Interface (CLI). The arcutronix-CLI can be reached over a Secure Shell (SSH) connection, which has to be established between the host (SC-SC) and your PC. Only a SSH-client and an IP-connection to the SC-SC is needed.

The SC-SC-Manual (axManual_SC-SC.pdf) explains in detail how to connect the agent via ssh and how to use the CLI. Within this chapter a short introduction to the CLI is given and the menu-tree of the CSX4 is shown.

NOTE: The CSX4-CLI menu-tree is the same as shown in Table 5-2 in chapter “Menu Structure” on page 5-7. The details of the menu and usage of variables are given there, too.

Access to the Device

The arcutronix-CLI can only be accessed via the system controller card (SC-SC) in a sub-rack.

SSH connection

There are many SSH client-SW on market, which are mainly freeware. We at arcutronix use normally the putty-ssh client and or the Tera Term. All the following examples are related to puTTY-ssh and or TeraTerm-ssh.

To connect to the SC-SC SSH-server establish a link via TCP/IP:

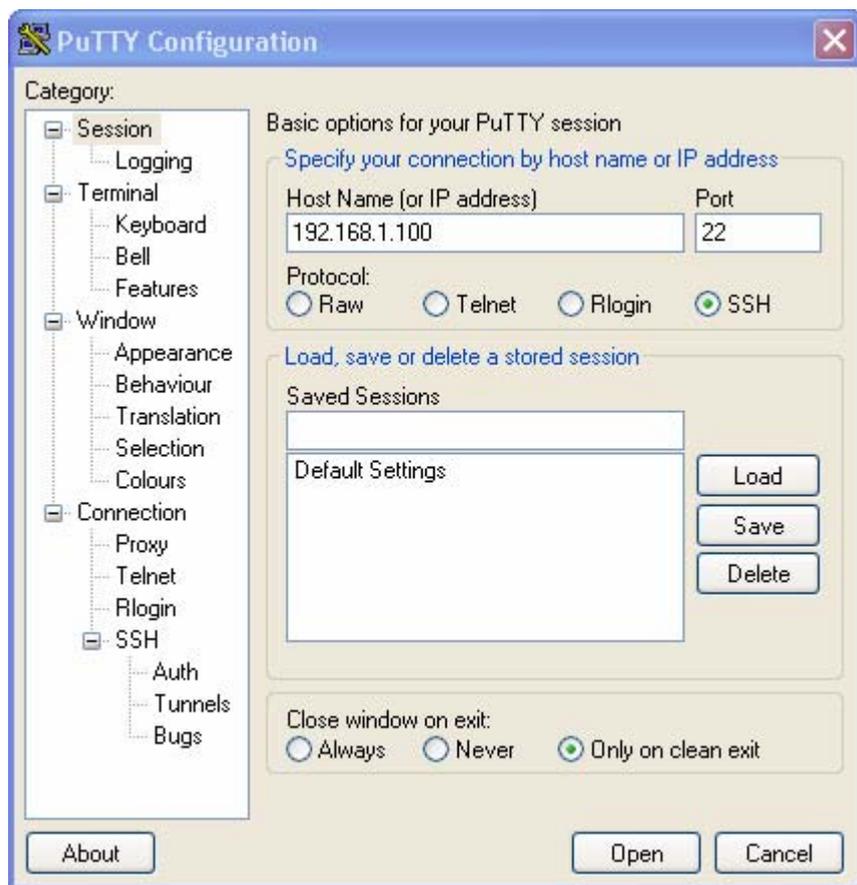


Figure 7-1 PuTTY ssh-Connection

After pressing “Open”, the Secure Shell will be opened and a prompt is visible.



Figure 7-2 Secure Shell

Now enter the username, which shall be used for the communication (e.g. admin) and enter the password (e.g. private).

The next message is "Welcome <username> !" and the connection is established.

Security Issues

The SSH/CLI is accessible via any TCP/IP link to the device, so it might be that other persons than the intended ones get connection and will see the login prompt. To avoid forbidden configuration or burglary of information, the access is protected against intruders via username and password.

Any time you connect or reconnect to the initialized CSX4 the login-window is displayed and a password request turns up on the terminal.

Be careful with passwords! If you write them down, keep them in a safe place. Do not choose strings easy to hack. In particular, do not use the default strings which were valid when you received the device.

Do not forget your password. If you forget your password the device will be rendered useless and will have to be sent back to the factory for basic re-configuration.

NOTE: Three different access-level are selectable with different access rights:

1. Guest (only view)
2. User (view and modify)
3. Admin (full access inclusive user administration)

If the device is started-up the very first time, only the user “admin” is defined. See in “USER ADMINISTRATION Menu” on page 5-30, how to define the other users and how to change the user password.

Command Line Interface (CLI)

The CLI is organized just in the same way as the “Control Software CFX2”. It has the same menu-structure and options. The “navigation” within the CLI-menus and the access to the management-variables will be depicted in the next chapter.

CLI Editor Features

Context Sensitive Help

arcutronix-CLI offers context sensitive help. This is a useful tool for a new user because at any time during an ssh-session, a user can type a question mark (?) to get help. Two types of context sensitive help are available - word help and command syntax help.

Word help can be used to obtain a list of commands that begin with a particular character sequence. To use word help, type in the characters in question followed immediately by the question mark (?). Do not include a space before the question mark. The router will then display a list of commands that start with the characters that were entered.

Command syntax help can be used to obtain a list of command, keyword, or argument options that are available based on the syntax the user has already entered. To use command syntax help, enter a question mark (?) in the place of a keyword or argument. Include a space before the question mark. The router will then display a list of available command options with <cr> standing for carriage return.

Command Syntax Check

If a command is entered improperly (e.g. typo or invalid command option), the CLI will inform the user and indicate where the error has occurred.

Command Completion

Commands can not be abbreviated but a commands and keywords can always be completed with <TAB>. For example, you can abbreviate the "config" command to "c<TAB>" because "config" is the only command that begins with "c" and the <TAB> will complete it. If there are more than one possible completion, the CLI will show them to give you help. For example, "s<TAB>" can be "show" and/or "select". Both commands will be shown.

Hot Keys

For many editing functions, the arcutronix-CLI editor provides hot keys. Table 7-2 lists some editing shortcuts that are available.

Table 7-1 CSX4 CLI Hot Keys

Hot Key	Description
Delete	Removes one character to the right of the cursor.
Backspace	Removes one character to the left of the cursor.
TAB	Completes a partial command.
Ctrl-A	Moves the cursor to the beginning of the current line.
Ctrl-B	Moves the cursor one word to the left.
Ctrl-D	Removes one character to the right of the cursor.
Ctrl-I	Finishes a partial command.
Ctrl-J	Repeats the last command.
Ctrl-H	Removes one character to the left of the cursor.
Ctrl-N	Erases a line.
Ctrl-M	<CR>.
Up Arrow	Allows user to scroll forward through former commands.
Down Arrow	Allows user to scroll backward through former commands.

NOTE: The most helpful Hot-Key is the TAB. It allows unexperienced users to complete commands, gives correct syntax and shows possible entries at all stages!

Commands

Once an ssh-session is established, one can navigate within CSX4-CLI like in a hierarchically structured tree. The CSX4-CLI menu-tree is shown in “Menu-Structure (Directory-Tree) of CSX4” on page 7-12. The tree is just the same as depicted in Table 5-2. Handling and meaning of the variables are the same and here it will not be presented in detail again.

To assist users in navigation through arcutronix-CLI, the command prompt will change to reflect the position of a user within the command hierarchy. This allows users to easily identify where within the command structure they are at any given moment. Also a <Tab> shows all possible options at the given position. This gives easy possibility to identify “Tab-by-Tab” the correct command.

NOTE: A <blanc> inside a string must be preceded by a back-slash (\) or the string must be wrapped by quotes. E.g.

```
$> mode "Rack View" or
```

```
$> mode Rack\ View
```

The “Tab-by-Tab”-feature helps here a lot to build always the correct syntax.

Table 7-2 is a summary of commands and the corresponding syntax.

Table 7-2 CSX4 CLI Commands

Command	Syntax / Explanation
help	<p>help [COMMAND]</p> <p>HELP is in any context available and lists the possible commands in the given context. If HELP is used with an command, it shows the syntax of the command together with a short help-text.</p> <ul style="list-style-type: none"> • ARG COMMAND - any available command.
log	<p>log</p> <p>LOG shows the last entries of agent's log file.</p>
config	<p>config [go up root SUBPAGE set OPTION VALUE do COMMAND [OPTION]]</p> <p>CONFIG shows and changes configuration settings. Configurations are grouped and this command can also be used to display/change configuration group. Without an argument CONFIG shows the current configuration group and its settings/subgroups.</p> <ul style="list-style-type: none"> • ARG go up root SUBPAGE - Go to another config page. Choose a SUBPAGE from the current config page, go UP to the parent page or go to the ROOT page. Type config to see available subpages (marked with '>'). • ARG set OPTION VALUE - Set a new VALUE for a writable OPTION • ARG do COMMAND - Execute a config command (displayed with config as [Command]) • ARG OPTION - Show config OPTION
select	<p>select [agent [rack RACK] slot SLOT serial SERIAL DEVICENAME]</p> <p>SELECT a device which should be configured in Cardview-mode.</p> <ul style="list-style-type: none"> • ARG agent - Select the agent card. • ARG rack RACK - Select device from RACK (integer). • ARG slot SLOT - Select device in slot SLOT (integer). • ARG serial SERIAL - Select device with serial number SERIAL. • ARG DEVICENAME - Select device DEVICENAME.
show	<p>show</p> <p>SHOW presents the information about all available racks.</p>
mode	<p>mode [MODE]</p> <p>With MODE one can easily switch between RACKVIEW and CARDVIEW.</p> <ul style="list-style-type: none"> • ARG MODE - Select mode MODE; available modes are: <ul style="list-style-type: none"> - MODE Card View - MODE Rack View

Table 7-2 CSX4 CLI Commands

Command	Syntax / Explanation
quit	quit
	Quit the current CLI session.

arcutronix-CLI Usage

Two modes are defined for the CSX4-CLI:

- Rackview-Mode and
- Cardview-Mode

Rackview-mode is to get mainly information about the rack, the plugged cards, power supply etc. In Cardview-mode one can select one single card and gets direct access to it. One can configure, supervise and control cards only in Cardview-mode. To switch between the two modes, one has to use the `mode` command.

Rackview - Mode

In the Rackview-mode, one can get information about (all) the discovered racks and plugged cards.

NOTE: Rackview-mode is the Default after first login.

The Rackview-mode can be reached from any point within the CLI using the command `MODE`:

```
cardview $> mode Rack\ View
rackview $>
```

In Rackview-mode no settings or changes are possible. One can see all racks and cards and has the option to navigate to one of the discovered cards via “select”-command or to change to CardView-mode via “mode”-command.

Example SELECT

The command `SELECT` gives you the chance to change into the Cardview-mode of a single card. If you want to select a CSX4, which is plugged in slot 7, the following ways are possible.

SELECT by rack/slot address

```
rackview $> select rack Rack1 slot 7
Rack1:7 CSX4 "Test Device7" $>
```

SELECT by name

```
rackview $> select "Test Device7"
Rack1:7 CSX4 "Test Device7" $>
```

SELECT by serial number:

```
rackview $> select serial 2010002229  
Rack1:7 CSX4 "Test Device7" $>
```

The 3 ways are identical by result. The mode is changed to Cardview-mode and the CSX4-device in slot 7 is selected.

Cardview - Mode

The Cardview-mode can be reached from any point within the CLI using the command MODE:

```
rackview $> mode Card\ View  
Agent SCX2e "Main Agent"$>
```

or by using the SELECT command (see examples above):

```
rackview $> select rack Rack1 slot 7  
Rack1:7 CSX4 "Test Device7" $>
```

NOTE: The default card, which is selected, when no other card is explicitly selected is the agent card.

Example CONFIG

The command CONFIG is the most mighty tool in the CSX4 CLI. It is only available in Cardview-mode and gives access to the menu-structure of the selected card. Within this document, the following examples will mostly depend on the CSX4 itself. The menu-structure of the CSX4 is shown in "Menu-Structure (Directory-Tree) of CSX4" on page 7-12.

When entering the command CONFIG apart in any context (of the Cardview-mode), the available menu-entries are shown:

```
Rack1:7 CSX4 "Test Device7" $> config  
--Login  
> Local
```

The first 1-2 signs in the resulting overview are type-indicators which shows can be done with this entry and which config-command can be used.

Table 7-3 Menu Indicators and corresponding CONFIG Commands

Type	Explanations / Examples
--	<p>Headline:</p> <p>This is the name of the shown menu. Nothing can be done with CONFIG; it is only a text.</p> <p>Example:</p> <pre>\$> config --LOGIN . . \$></pre>
>	<p>Sub-Menu:</p> <p>">" indicates a sub-menu, which can be accessed via CONFIG GO <sub-menu-name></p> <p>Example:</p> <pre>\$> config --Login > General System Information > Administration > Alarm Management > Firmware Update \$> config go Administration /Administration \$></pre>
*	<p>Changeable Management Variable</p> <p>"*" indicates a menu-entry which can be changed via CONFIG SET <variable-name> <value></p> <p>Example:</p> <pre>/General System Information \$> config --General System Information * Device Name: "Main Agent" . . . /General System Information \$> config set Device\ Name "New Name" /General System Information \$> config --General System Information * Device Name: "New Name" . . . /General System Information \$></pre>
+	<p>Command</p> <p>"+" indicates a command-entry which can be invoked via CONFIG DO <command-name></p> <p>Example:</p>

Table 7-3 Menu Indicators and corresponding CONFIG Commands

```
/Administration/Reset System $> config
--Reset System
  Reset State: No reset scheduled
* Reset Mode: Immediate reset
+ [Start Reset]
/Administration/Reset System $> config do Start\ Reset
```

blanc Read-Only Variable

No sign (or blanc character " ") indicates a read-only variable which can be read via
CONFIG <variable-name>

Example:

```
/General System Information $> config
--General System Information
.
.
.
Device Temperature: "35.5"
.
/General System Information $> config Device\ Temperature
"35.5"
/General System Information $>
```

There are some special CONFIG commands, which help to navigate:

Table 7-4 Special CONFIG Commands

Type	Explanations / Examples
	Go back one directory in the directory-tree of the selected device in Cardview-mode. Example: <pre>/Administration/Reset System \$> config go up /Administration \$> config go up \$></pre>
	Goto root directory of the selected device in Cardview-mode. Example: <pre>/Administration/Reset System \$> config go root \$></pre>

Quick Usage Guide for CLI-Commands

Table 7-5 Quick Reference

Select Agent:

```
$> select agent
```

Table 7-5 Quick Reference

Select Card in Slot 1:

```
$> select slot 1
```

Select Local/Remote Instance of Connectivity Products:

```
$> config go Local
$> config go Remote
```

Show options in actual menu:

```
$> config
```

Change (User-) Name (e.g. FCX10G): [Local -> Maintenance -> General Information -> User Name]

```
$> config go root
$> config go Local
$> config go Maintenance
$> config go General\ Information
$> config set User\ Name "new Name"
```

Reboot Device (e.g. FCX10G): [Local -> Maintenance -> Update]

```
$> config go root
$> config go Local
$> config go Maintenance
$> config go Update
$> config set Reboot\ flash\ 1\ software
```

View Alarms (e.g. FCX10G): [Local -> System Monitor]

```
$> config go root
$> config go Local
$> config go system\ Monitor
$> config
```

Clear Alarms (e.g. FCX10G): [Local -> System Monitor -> Clear Current Alarms]

```
$> config go root
$> config go Local
$> config go system\ Monitor
$> config set Clear\ Current\ Alarms clear_now
```

Go back 1 Step in Menu:

```
$> config go up
```

Go back to Top-Level Menu (/):

```
$> config go root
```

Menu-Structure (Directory-Tree) of CSX4

Level	1	2	3	4	5
--	LOGIN				
>	GENERAL INFORMATION				
		Name			
	*	User Name			
		Device Description			
		Equipment Variant			
		Serial Number			
		Software Revision			
		Article Number			
		Article Release			
		Order Information			
		Manufacturer			
>	TESTS				
	>	SELF TEST			
			RAM Test		
			FLASH Test		
		*	Test Action		
	>	BER TEST			
		*	BER Test Action		
		*	BER Test Port		
		*	BER Test PRB Sequence		
		*	BER Test Logic		
		*	BER Test PCM Modus		only for CSX4-E1
			BER Test Status		
			Time In Sync		
			With Error Time		
			Without Error Time		
			Sync Status		
			Sync Losses		
			Received kbits		
			Bit Errors		
			Bit Error Rate		
	>	FACTORY TEST			
>	EXTRA				
		Device Run Time			
>	PORT 1 (IF1)				
	*	Port Status			
		Link Status			
		Sync Status			

continues on next page ...

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*	Local Carrier Detect Mode	not for CSX4-FE
	Local Carrier Detect Status	not for CSX4-FE
*	Loop Mode	
	Interface Type	
	Interface Emulation Mode	not for CSX4-FE
	Connector Type	
>	DATA RATE	
*	Number Of 64kbit Channels	
	Payload Data Rate	
	Line Data Rate	
*	Auto Speed Negotiation	not for CSX4-E1
	Line Probing Data Rate	
	G.703 Format	\
	Framing Mode	
*	,CRC Generation	only for CSX4-E1
*	Start Time Slot	
*	TS0 Transmission	
*	,TS16 Transmission	/
>	PERFORMANCE MONITORING	\
>	LOCAL MONITORING	
*	Performance Monitoring Action	
	Elapsed Seconds	
	Error Free Seconds	
	Errored Seconds (ES)	
	Severely Errored Seconds (SES)	
	CRC/Code Anomalies	
	Loss of Sync word (LOSW) Seconds	
	Unavailable Seconds (UAS)	
>	CURRENT 15 MIN PERIOD	
	Elapsed Seconds	
	Error Free Seconds	only for CSX4-E1
	Errored Seconds (ES)	
	Severely Errored Seconds (SES)	
	CRC Anomalies	
	Loss of Sync word (LOSW) Seconds	
	Unavailable Seconds (UAS)	
>	LAST 15 MIN PERIOD RESULTS	
	Elapsed Seconds	
	Error Free Seconds	
	Errored Seconds (ES)	
	Severely Errored Seconds (SES)	
	CRC Anomalies	

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SSH and CLI
Menu-Structure (Directory-Tree) of CSX4

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		Loss of Sync word (LOSW) Seconds	
		Unavailable Seconds (UAS)	/
	*	Send AIS	only for CSX4-E1
		AIS Status	only for CSX4-E1
	>	Details FE Module (IF1)	\
		* I/F Name	
		Current Status	
		Current Speed / Mode	
		* I/F Mode	
		* Flow Control	
		* Admin Status	
		* Bridge Filter	only for CSX4-FE
		Counters:	
		-RX Good Frames	
		-RX Error Frames	
		-RX Overflow	
		-TX Good Frames	
		-TX Error Frames	
		-TX Overflow	
		* Reset Error Counters	/
	>	PORT 2 (LINE)	
		* Line Emulation Mode	
		* Port Status	
		Link Status	
		DSL Activation Status	
		Line Data Rate	
		Noise Margin in dB	
		Line Attenuation in dB	
		* Wire Mode	
		* Loop Mode	only for CFX2-E1
		Interface Type	
		Connector Type	
	>	PERFORMANCE MONITORING	
		> LOCAL MONITORING	
		* Performance Monitoring Action	
		Elapsed Seconds	
		Error Free Seconds	
		Errored Seconds (ES)	
		Severely Errored Seconds (SES)	
		CRC Anomalies	
		Loss of Sync word (LOSW) Seconds	
		Unavailable Seconds (UAS)	/

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	>	CURRENT 15 MIN PERIOD	
		Elapsed Seconds	
		Error Free Seconds	
		Errored Seconds (ES)	
		Severely Errored Seconds (SES)	
		CRC Anomalies	
		Loss of Syr RAM Test	
		Unavailable Seconds (UAS)	
	>	LAST 15 MIN PERIOD RESULTS	
		Elapsed Seconds	
		Error Free Seconds	
		Errored Seconds (ES)	
		Severely Errored Seconds (SES)	
		CRC Anomalies	
		Loss of Sync word (LOSW) Seconds	
		Unavailable Seconds (UAS)	
	>	CLOCK	
	*	Clock System	
	*	Clock Source	
	*	Tx Clock Polarity	
	>	TRAPS	
	*	Link Status changed Port 1 (IF)	
	*	Link Status changed Port 2 (LINE)	
	*	Local Carrier Detect changed	
	>	ALARMS	
		Alarm Status	
	*	Link Down Port 1 (IF)	
	*	Link Down Port 2 (LINE)	
	*	Local Carrier Detect Down	
	>	UPDATE	
		Actual Software Revision	
		Flash 1 Software Revision	
		Flash 2 Software Revision	
	*	Reboot	
		Software Update Status	

Figure 7-3 Menu Structure CSX4

Appendix A

Technical Specifications

CSX4 Technical Data

Table A-1 provides the general technical data of the CSX - Connectivity G.SHDSL.

Table A-1 Technical Dataⁱ of the CSX4

Type	Description		
CSX4	2- / 4-Wire G.SHDSL Modems		
	Transmission	Round Trip Delay	0.5 msec (through 2x CSX4)
G.SHDSL Line Interface			
	General	Norm	ITU-T G.991.2, Annex B (G.SHDSL)
		Number of Line Ports	1x @ CSX4 in 2-Wire Mode 2x @ CSX4 in 4-Wire Mode.
		Line Transmission Rate per Pair	208 kbps...2320 kbps
		Line Payload Rate per Pair	192 kbps ... 2304 kbps
	Data Rates	<i>E1</i>	<i>64 kbps, up to 2.048 Mbps (in 64 kbps increments), more distance with 4-wire</i>
		<i>all 2-wire modems</i>	<i>64 kbps to 2304 kbps (in 64 kbps increments), interface dependant</i>
		<i>all 4-wire modems</i>	<i>64 kbps to 4608 kbps (in 64 kbps increments), interface dependant</i>
		Line Code	TC- PAM 16, TC- PAM 32
		Impedance	135 Ω
		Transmit level @ 135 Ω	According TS101524 e.g. 14.5 dBm ±0.5 dB @ 2048 kbps
		Over voltage protection	ITU-T K.20/K.21
		Connector	RJ-45 for twisted pair: <ul style="list-style-type: none"> • 2-wire or • 4-wire (software switchable, if 1 or 2 pairs shall be used for data transmission)
	Line Transmission Distanceⁱⁱ	7 km (4.3 miles) 5 km (3.1 miles) 3.7 km (2.3 miles)	2-wire @ 256 kbps, 4-wire @ 512 kbps 2-wire @ 768 kbps, 4-wire @ 1536 kbps 2-wire @ 2304 kbps 4-wire @ 4608 kbps

Technical Specifications
CSX4 Technical Data

Table A-1 Technical Dataⁱ of the CSX4 (continued)

Type	Description		
Interface Port			
E1 on-board	Norm	ITU-T G.703 / G.704	
	Data Rate	2048 kbps +/-50 ppm	
	Jitter	Acc. ITU-T G.823	
	Line Code	HDB3	
	Framing	ITU-T G.704 / unframed CRC4 selectable	
	Connector	RJ45	BNC
	Input Impedance	120 Ohm	75 Ohm
	Transmit Amplitude	3.00 V	2.37 V
V.35	Norm	ITU-T V.35 / V.28	
	Data Rate	n x 64 kbps (n = 1...32) 2048 kbps	
	Connector	Winchester (female)	
	Supply Current @ 5V	<200mA	
X.21	Norm	ITU-T V.11	
	Data Rate	n x 64 kbps (n = 1...32) 2048 kbps	
	Connector	D-Sub15 (female)	
	Supply Current @ 5V	< 210 mA	
V.24	Norm	ITU-T V.11	
	Data Rate	n x 64 kbps (n = 1...3) 192 kbps (synchronous) 230kBaud (asynchronous)	
	Connector	D-Sub25 (female)	
	Supply Current @ 5V	< 210 mA	
I.430	Norm	ITU-T I.430	
	Data Rate	192kpbs	
	Connector	RJ45	
	Supply Current @ 5V	<200mA	

Table A-1 Technical Data ⁱ of the CSX4 (continued)

Type	Description	
Fast Ethernet	Norm	IEEE802.3 / 802.1d
	Data Rate	10 / 100 Mbps auto negotiation or fix configuration
	Bridge Table Size	10k MAC addresses
	Table Aging Time	300 sec.
	Packet Size	64...1535 bytes (VLAN support)
	Connector	RJ45
	Supply Current @ 5V	< 350 mA
Power Supply		
	Supply Voltage	+5 Vdc (4.8 V...5.2 V)
	Power Consumption	< 5 VA, over current protected Power management control
	Connector	via back plane connector VG64
	Housing	Single Slot SHX3 Chassis SRX10 or SRX24 (Please, ask the sales contact for a current list)
Environment		
Climatic	Storage Temperature	-25 °C ...+55 °C ETS300019-1-1; class1.2
	Transport Temperature	-25°C ...+70°C ETS300019-1-2; class2.2
	Operation Temperature	+5°C ...+40°C ETS300019-1-3; class3.1
	Humidity max.	10%...90%, non-condensing
Safety	Norm	acc. to EN60950
EMC	Emission	EN55022 class B
	Immunity	EN61000-4-3 10V/m
Mechanics		
Dimensions	Rack Mount Card (H x W x D)	30 x 130 x 190 mm; 3RU
	Single Slot Housing	45 x 145 x 260 mm
Weight	Rack Mount Card	< 290 g

Technical Specifications

CSX4 Technical Data

Table A-1 Technical Data ⁱ of the CSX4 (continued)

Type	Description
	Single Slot Housing 1.3 kg incl. Power Supply

i. Technical specifications are subject to change.

ii. Depending on quality of the cable used.

Appendix B

Additional Information

This information is not intended to explain standards in full detail, but supply instead keywords and some technical information. Abbreviations used in this book you will find in the chapter Glossary.

DSL terms for a digital transmission link

DSL Digital Subscriber Line, with its variants:
ADSL Asymmetric Digital Subscriber Line
HDSL High bit-rate Digital Subscriber Line
SDSL Single-line Digital Subscriber Line
S-HDSL Single-pair High Speed Digital Subscriber Line
VDSL Very high bit-rate Digital Subscriber Line
xDSL Digital Subscriber Line

DSL is coded to AMI standard, to eliminate long zero sequences:
AMI Alternate Mark Inversion

HDSL is coded with 2B1Q (PAM 4) to reduce the bandwidth. The binary values of 00, 01, 10 and 11 are transferred by four different voltages.

Data are transported in frames. Framing put data in 64 Kbit/s frames.
E1 with HDB3 (Framing cannot be switched off)
T1 with B8ZS (Framing may be switched off)

G.SHDSL

G.SHDSL, which supersedes SDHL, is a single-pair high-bit-rate DSL protocol for the transmission of data with speeds up to 2.3 Mbps via a copper wire pair. It permits the seamless integration of voice and data and also fine scalability of the data rate of user packets. The data rate for both directions is the same (different from ADSL).

TC-PAM

TC-PAM (trellis coded pulse amplitude modulation) coding supports higher data speeds and - because of the lower level of complexity - better interworking with the second modem.

TCPAM 16: Four bits (3 data, 1 TC correction) are transferred by 16 different voltages. This coding is realized in the CSX4.

TCPAM 32: Five bits (4 data, 1 TC correction) are transferred by 32 different voltages. This coding is not realized in the CSX4.

E1

E1 is an European framing specification for the transmission of 30 DS0 data streams. DS0 is the zeroth DS level, with a transmission rate of 64 kbits per second. By extension, it can also denote the transmission rate required (2.048 Mb/s). Unlike DS1 it is free of bit-robbing.

E1 was developed by the CEPT (Conference of European Postal and Communications Administrations) and is the European equivalent (DS1 level) of the North American T1 (1.544 Mbps), but E1 carries information at a higher rate of 2.048 million bits per second. CEPT stands for the Conference of European Postal and Telecommunications Administrations. At the rate of 2.048 Mbps, 32 time slots are defined at the CEPT interface, but two time slots (channels) are used for non-intrusive signaling and for framing (synchronization) and maintenance. The 30 remaining 64 kbps channels may be used for data, video, PCM coded voice, e.t.c. However, the form of PCM encoding differs between T1 and E1, since robbed-bit is not used. All 8 bits per channel are used to code the wave shape sample. Conversion of E1 to T1 involves both the compression law and the signaling format.

T1

T1 stands for stands for Trunk Level 1 and is a term for a digital carrier facility used to transmit a DS1 formatted digital signal at 1.544 megabits per second (baud). It uses a bipolar Return To Zero alternate mark inversion line coding scheme to keep the DC carrier component from saturating the line. T1 signals can be de multiplexed into 64 kilobit per second circuits for distribution to individual subscribers or combined for transmission via faster circuits.

DS1 is a DS level and framing specification for synchronous digital streams, over circuits in the North American digital transmission hierarchy. A DS1 "frame" is composed of 24 eight-bit bytes (commonly from 24 DS0 sources, originally digitized voice-grade telephone signals), plus one framing bit (193 bits). 8000 bytes per second come from each source, and thus 8000 frames per second are transported by the DS1 signal. The result is $193 \times 8000 = 1,544,000$ bits per second.

T1 signals, consisting of pips of a few hundred nanoseconds width, can be transported on unshielded twisted pair telephone lines or optical fibers. T1 is independent from the medium, you can run it over electrical (i.e., twisted pair or coaxial cable), optical (i.e., fiber optics or infrared) or radio (i.e., microwave or satellite) transmission media. The information is contained in the timing of the signals, not the polarity. A standard T1 circuit requires two (unidirectional) lines, one for each direction, to get a full duplex (bidirectional) circuit. Where fiber is available, T1 is delivered on fiber optic transmission systems by the CLECs (Competitive LECs) and by the ILECs (Incumbent Local Exchange Carriers).

Leased T1 is available as a channelized service (delivered as separate voice or data channels), or as an unchannelized raw bit stream (i.e., 1.536 Mbps of transmission both ways, plus 0.008 Mbps framing bits). The usage of the bit stream is free, however - the framing bits are not under your control. A channelized approach is required for access to the traditional PSTN, which is channelized throughout the traditional carrier net-

works. On the other hand, an unchanneled approach is better for most data communications applications, and for compressed voice, video and IP telephony.

DS1 coding

DS1 is part of a hierarchy for digital transmission pipes known generically as the DS (Digital Signal Level) hierarchy. In the original DS1 standard, the framing bits continuously repeated the sequence 110111001000, and such a 12-frame unit is called a super-frame. In voice telephony, errors are acceptable (early standards allowed as much as one frame in six to be missing entirely), so the least significant bit in two of the 24 streams was used for signaling between network equipment. This is called robbed-bit signaling.

An alternative called the extended super-frame (ESF) of 24 frames was developed, to promote error-free transmission. In this standard, six of the 24 framing bits provide a six bit cyclic redundancy check (CRC-6), and six provide the actual framing. The other 12 form a virtual circuit of 4000 bits per second for use by the transmission equipment, for call progress signals such as busy, idle and ringing. DS1 signals using ESF equipment are nearly error-free, because the CRC detects errors and allows automatic re-routing of connections.

Integrated Services Digital Network

ISDN communications standards are defined 1984 by ITU-T Red Book and allows to carry voice, video and digital network services over a single wire or optical fibre. As replacement for old telephone systems it supplies 2 “bearer” channels with 64 kbps (voice or data) and a special “delta” channel. This Basic Rate Interface (BRI) has three channels in total (“2B+D”). Each channel is equivalent to one voice channel. Existing Public Switched Telephone Network (PSTN) switches and wiring is mostly used by ISDN, resulting in an all-digital end-to-end channel of 64 kbits per second. DS0 is the lowest level of the circuit (intended to carry a phone call). Packet and frame modes are also provided in some places. A Terminal Adaptor (TA) can be used to connect ISDN channels to existing interfaces such as RS-232 and V.35.

	DS0	= 1 channel PCM at 64 kbps (1 B)
BRI	DS0	= 2 channels DS0 and a D channel (2 B + 1 D)
PRI	T1 or DS1	= 24 channels PCM at 1.54 Mbps (23 B + 1 D)
PRI	E1	= 30 channels DS0 at 2.048 Mbps (30 B + 1 D)

Additional Information

Appendix C

Information about Obsolete Variants

Preface

The products of arcutronix are always further developed and improved to give the customers best equipment and quality. This improvements can be caused by new features, obsoleted components from vendors and customer-specific demands. Some variants of the connectivity-family may be not longer sold, as the provided service is longer required by customers.

the changes in the hardware and software will be reflected in the actual version of the manual, which is also part of the permanent progress if change and improvement.

In the chapters below, one will find important information of obsoleted products, so the actual manual can still be used for the older versions. if a special required information is not found here, please contact us to send you the correct release of the manual.

CSX4-FE, with DIP-switch configuration

The CSX4-FE in the old version was delivered without management configuration option. The old variant had only DIP-switches to configure the unit.

an easy way to distinguish old and actual variant are the two LEDs in the RJ45 connector. The actual variant does offer two LEDs to indicate speed and traffic, while the old version did not offer these feature and no LEDs can be found in the RJ45 of the Ethernet-port.

Front View

Table C-1 provides the front view of the CSX4-FE.

Table C-1 CSX4-FE Front View

View	Product Number & Details
	0803-4080
	Mounting screw in SRX or SHX.
	1x FE-user port.
	1x ERR-LED.
	1x Loop-Button.
	8 LEDs for status indication.
1x Fiber Optic Line I/F.	
CSX4-FE	Handle with Label.
	Mounting screw in SRX or SHX.

- 1 x IEEE FE (RJ45),
- 1 x Fiber Optic (different types available).

The details about the Line-I/F and the LEDs are given above (Chapter 3, **G.703 TDM Port**, and Chapter 3, **Common Indicators**,). The electrical details of the FE pinning is given below.

Configuration of the FE Interface

Ethernet and Auto Negotiation

If both devices work in the auto-negotiation mode the optimum data transmission will be negotiated. The optimum speed and mode are chosen with the help of a priority sequence.

Note: If the corresponding device is manually set to full-duplex mode, the automatic chosen half-duplex mode of the Parallel Detection will result in faulty data transmission. This behavior is according to the standard.

You have to use X1 to configure the FE-I/F to the auto negotiation modes. The following transmission rates are supported:

- 100 Mbps and full-duplex mode
- 100 Mbps and half-duplex mode
- 10 Mbps and full-duplex mode
- 10 Mbps and half-duplex mode.

The table below shows how the I/F settings are done (the Default is shown in **Bold**):

Table C-2 FE Speed and I/F Settings

Transmission Mode	Status	Switch
Disable Auto Negotiation	Disable Auto-Neg	X1.1 On
	Enable Auto-Neg	Off
Speed Rate 10M	10 Mbps	X1.2 On
	100 Mbps	Off
Duplex Mode	Half-Duplex	X1.3 On
	Full-Duplex	Off
Disable Flow Control	Disable Flow Control	X1.4 On
	Enable Flow Control	Off

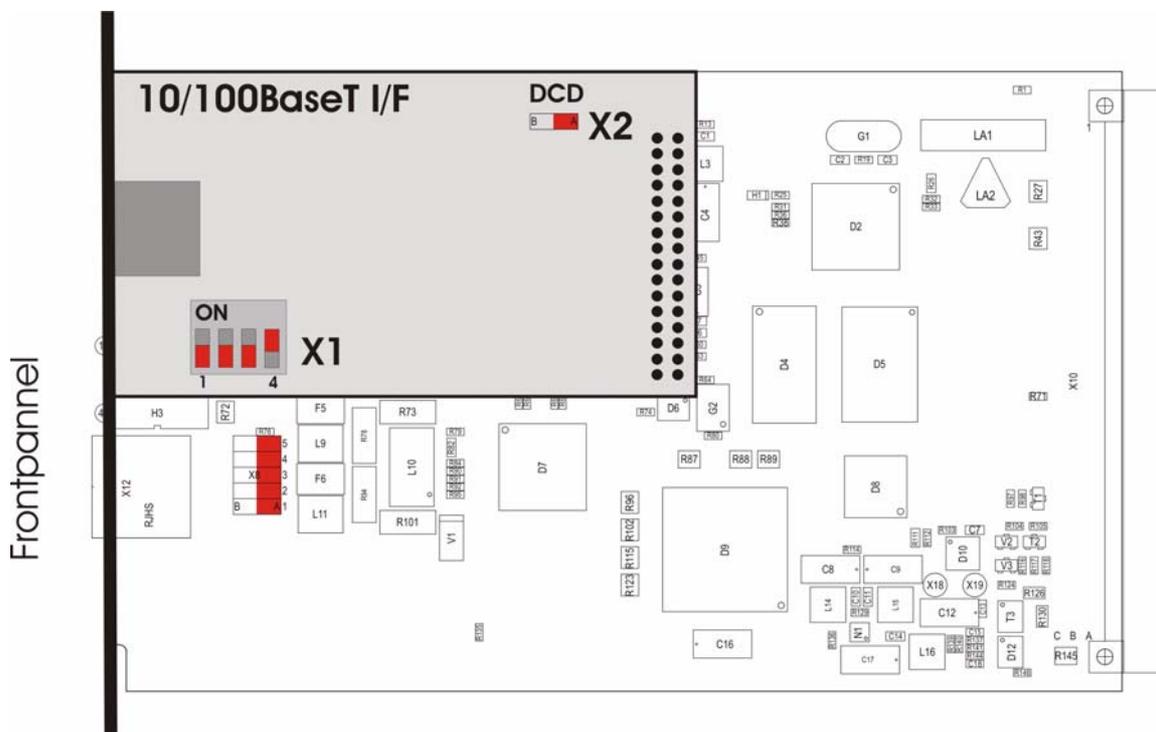


Figure C-1 FE Interface Board

Information about Obsolete Variants

CSX4-V.35

A second jumper (called X2) is located close to the rear connector of the module. Its setting is fixed and must not be changed.

Ethernet Bridge Functionality

The CSX4 version with an Ethernet bridge module is able to connect two networks over a long distance. It supports automatic detection of the connection speed (10/100 Mbps autosensing) and also the transmission of VLAN frames up to 1522 bytes.

Restrictions of Usable Clock Modes

The external clock is not defined and not available for Ethernet connections.

Pin Assignment Ethernet 10/100BaseTx I/F Connector RJ-45

Pin	Signal
1	RD +
2	RD -
3	TD +
6	TD -

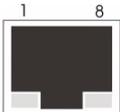


Figure C-2 Ethernet 10/100BaseTx Interface: RJ-45 Connector

This CSX4 device is equipped with an RJ-45 Ethernet connector at the interface. Use standard twisted pair cables to connect it to a copper network.

The female RJ-45 connector is wired as MDIX (media dependent interface with cross-over) port.

Note: Automatic MDI-MDIX selection in auto negotiation mode only.

NOTE: All LEDs are switched on during the power-up test of the CSX4.

CSX4-V.35

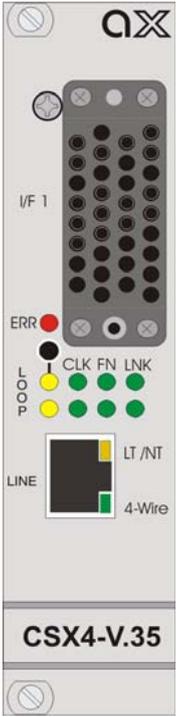
The CSX4-V.35 is not longer part of the ax portfolio.

Front View

The CSX4-V.35 is a converter between ITU-T V.35 (user I/F) and Fiber Optic (line I/F). The V.35 I/F can be operated in N x 64kbps-steps, which is configured via the management GUI. The V.35 I/F can be operated in either DTE or DCE mode. Please see below for details in configuration.

Table C-3 provides the front view of the CSX4-V.35.

Table C-3 CSX4-V.35 Front View

View	Product Number & Details
	0803-4030
	Mounting screw in SRX or SHX.
	1x V.35-user port.
	1x ERR-LED.
	1x Loop-Button.
	8 LEDs for status indication.
	1x Fiber Optic Line I/F.
	Handle with Label.
	Mounting screw in SRX or SHX.

- 1 x ITU-T V.35 (Winchester, M-35),
- 1 x Fiber Optic (different types available).

The details about the Line-I/F and the LEDs are given above (Chapter 3, **G.SHDSL Line-Interface**, and Chapter 3, **Common Indicators**,). The electrical details of the V.24 pinning are given below.

Configuration of the V.35 Interface

The V.35-I/F can be operated in DCE or DTE mode. The operating mode is chosen by a number of jumper-blocks (called X1, X2, X3 and X4), which must be change combined. Figure C-3 shows the location of the 4 jumper-blocks and the settings for DCE or DTE operation.

A fifth jumper (called X5) is located close to the front connector (Winchester). It is used to connect the digital ground (DG) of the chassis to the shielded ground of the interface connector. In the shown position (bottom), the DG is not connected to Shield.

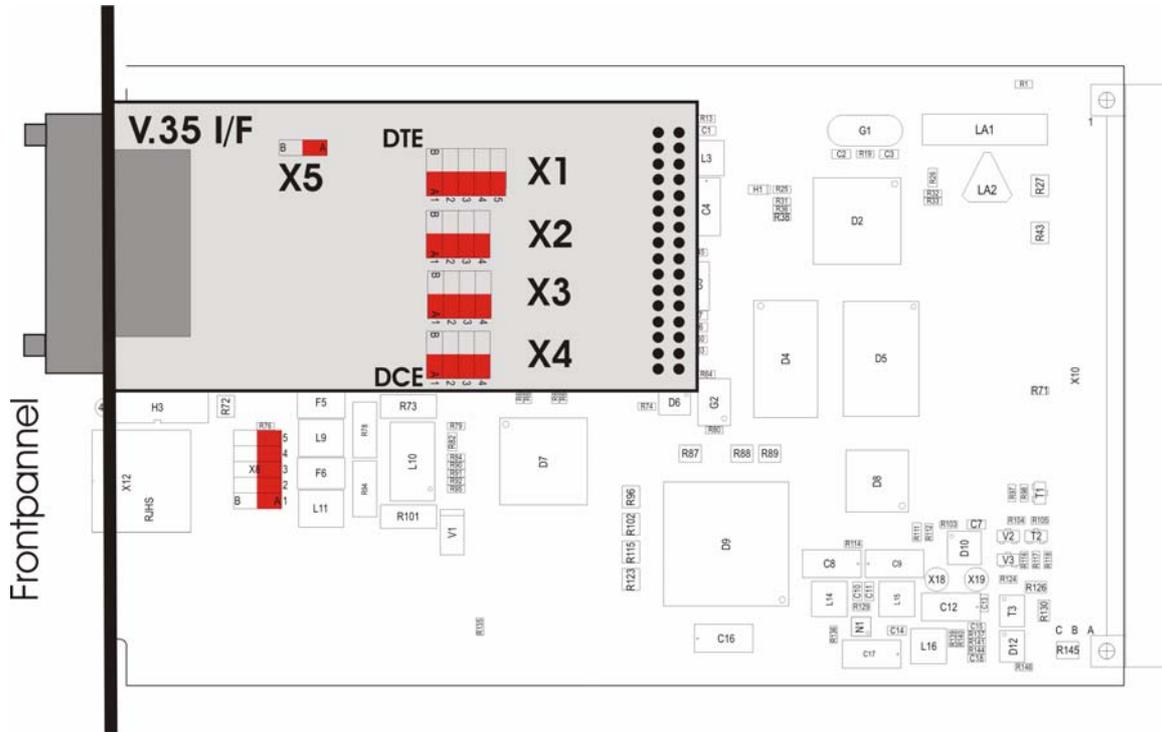


Figure C-3 V.35 Interface Board

Pin Assignment of the V.35 Female Winchester Connector

This unit default setting is DCE. For DCE pinout see the table below.

Table C-4 Pinning V.35 Winchester Connector (DCE-Mode)

Pin	Signal	Pin	Signal
A	Prot. GND	R	RD A (Out)
B	SG	S	TD B (In)
C	RTS (In)	T	RD B (Out)
D	CTS (Out)	U	SCTE A (In)
E	DSR (Out)	V	SCR A (Out)
F	RLSD (Out)	W	SCTE B (In)
H	DTR (In)	X	SCR B (Out)
J	RI (Out)	Y	SCT A (Out)
P	TD A (In)	AA	SCT B (Out)

DTE / DCE Remark:

The explanations in this table are valid for DCE mode.

If the default setting has been changed to DTE mode please refer to the following table.

Table C-5 Pinning V.35 Winchester Connector (DTE-Mode)

Pin	Signal	Pin	Signal
A	Prot GND	R	TD A (In)
B	SG	S	RD B (Out)
C	RLSD (Out)	T	TD B (In)
D	CTS (In)	U	SCR A (Out)
E	DTR (In)	V	SCTE A (In)
F	RTS (In)	W	SCR B (Out)
H	DSR (Out)	X	SCTE B (In)
J	RI (NC)	Y	SCT A (In)
P	RD A (Out)	AA	SCT B (In)

DTE / DCE Remark:
The explanations in this table are valid for DTE mode.

Information about Obsolete Variants

CSX4-V.35

arcutronix Pinning Overview



Signal Function	Direction	Logic		V.24		V.35		V.36		X.21		RS485		HSSI		RS530		RS530a		
		DTE	DCE	ITU-T	Unbalanced	Balanced / Unbalanced	Balanced	Balanced / Unbalanced	Balanced	Balanced	Balanced	Balanced	Balanced	Balanced	Balanced	Balanced	Balanced	Balanced	Balanced	
					V.24RS232D	V.35	V.36RS449	X.21	RS485	HSSI	RS530	RS530a								
					V.28*-	RS422-232	V.10-11RS422	X.27	DB-9	DB-9	DB-9	DB-9	DB-9	DB-9	DB-9	DB-9	DB-9	DB-9	DB-9	
					ISO2110*-	ISO2593	ISO4902RS449	ISO4903	DB-15	DB-15	DB-15	DB-15	DB-15	DB-15	DB-15	DB-15	DB-15	DB-15	DB-15	
					Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	Name	
					Frame Gnd	Prot Gnd	Shield	Shield	4wire / 2wire	GND	Shield									
Shield ground					1	A	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Signal ground					7	B	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Transmitted data A	Out	In			2	P	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Transmitted data B	Out	In			3	S	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Received data A	In	Out			2	R	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Received data B	In	Out			3	T	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Request to send A	Out	In			4	C	4	4	4	4	4	4	4	4	4	4	4	4	4	4
Request to send B	Out	In			5	D	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Clear to send A	In	Out			8	E	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Clear to send B	In	Out			6	F	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Data set ready A	In	Out			6	E	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Data set ready B	In	Out			6	E	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Data terminal ready A	Out	In			20	H	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Data terminal ready B	Out	In			20	H	20	20	20	20	20	20	20	20	20	20	20	20	20	20
Data carrier detect A	In	Out			8	F	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Data carrier detect B	In	Out			1	F	1	1	1	1	1	1	1	1	1	1	1	1	1	1
External clock A	Out	In			24	U	24(12)	24	24	24	24	24	24	24	24	24	24	24	24	24
External clock B	Out	In			24	W	10(13)	24	24	24	24	24	24	24	24	24	24	24	24	24
Transmit clock A	In	Out			15	Y	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Transmit clock B	In	Out			15	Y	15	15	15	15	15	15	15	15	15	15	15	15	15	15
Receive clock A	In	Out			17	V	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Receive clock B	In	Out			17	V	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Ring indicator	In	Out			22	J	22	22	22	22	22	22	22	22	22	22	22	22	22	22
Remote loopback	Out	In			21	K	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Local loopback	Out	In			18	L	18	18	18	18	18	18	18	18	18	18	18	18	18	18
Test mode A	In	Out			25	M	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Test mode B	In	Out			25	M	25	25	25	25	25	25	25	25	25	25	25	25	25	25
Loopback "A" A	Out	In																		
Loopback "A" B	Out	In																		
Loopback "B" A	Out	In																		
Loopback "B" B	Out	In																		
Loopback "C" A	In	Out																		
Loopback "C" B	In	Out																		

Appendix EC EC Declaration of Conformity



Declaration of EC-Conformity

We arcutronix GmbH
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declare under our sole responsibility that the product group

Name: CSX – Connectivity G.SHDSL Modem
Members: CSX4-E1R, CSX4-E1B, CSX4-V.24, CSX4-X.21, CSX4-FE,
CSX4-V.35, CSX4-I.430
Number: 0803-32xx

to which this declaration relates conforms to the following standards, which have been described in the CE-guideline:

93/68/EEC	CE marking
2004/108/EC	Electromagnetic compatibility (EMC)
2006/95/EC	Safety of low voltage equipment (LVD)
1999/5/EC	Radio & Telecommunications Terminal Equipment (R&TTE)
2002/95/EC	Restriction of the use of certain Hazardous Substances (RoHS)
2002/96/EC	Waste Electrical and Electronic Equipment (WEEE)

The above listed products satisfy all technical regulations, applicable to the products based on following standards:

EN 55022	Electromagnetic compatibility (EMC) for Information technology equipment
EN 55024	Electromagnetic compatibility (EMC) for Information technology equipment
EN 61000-4-1	Electromagnetic compatibility (EMC) for Information technology equipment
EN 61000-4-2	Electrostatic discharge immunity test
EN 61000-4-3	Radiated, radio-frequency, electromagnetic field immunity test
EN 61000-4-4	Electrical fast transient/burst immunity test
EN 61000-4-5	Surge immunity test
EN 61000-4-6	Immunity to conducted disturbances, induced by radio-frequency fields
EN 61000-4-11	Voltage dips, short interruptions and voltage variations immunity tests
EN 61000-6-1	Generic immunity standard – Residential, commercial and light industry
EN 61000-6-2	Generic immunity standard – Industrial environment
EN 60950	Safety of Information technology equipment

Hannover, 31.7.2008


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