Sirrix.PCI2S0

2-Port S_0 PCI-Card

Technical Data

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Sirrix.PCI2S0

2-Port S0 PCI-Card

Overview
The Sirrix.PCI2S0 is a PCI-based ISDN interface card. It provides 2 BRI (Basic Rate Interface) ports that can be connected directly to both, the public ISDN network as well as to ISDN end-user devices like telephones and fax machines. Sirrix.PCI2S0 is full ISDN compatible and thus, it can be employed for voice applications as well as for data communications.

Hardware Structure
The BRI ports are provided by two Infineon PSB 21150 (IPAC-X) interface circuits. There is a 32 KByte SRAM on-card that can be used for buffering the B-Channel data between hardware and the software application. The communication with the software is realized by an FPGA using the PCI bus.

The optionally available crypto mechanisms are realized in hardware and included within the FPGA. They allow a zero-delay encryption and decryption of the B-Channels.

BRI Interface Lines
All 2 BRI lines of Sirrix.PCI2S0 can be configured independently to work in the NT mode (Network Termination) or TE mode (Terminal Equipment). In both modes they can be operated as PtMP (Point-to-MultiPoint) or as PtP (Point-to-Point). Moreover - and in all configurations the Sirrix.PCI2S0 support MSNs (Multiple Subscriber Number) and DDI (Direct Dialing In).

Integrated PCM Bus
Using the Sirrix.PCM bus, one can link up several Sirrix.PCIS0 cards, building a fully hardware-based ISDN switching network. This provides a zero-delay perfect-quality voice and data transmission.

Power Supply
Sirrix.PCI2S0 can be connected with an internal 40V power supply (Sirrix.PS40V-A). The power is transformed from the computer's internal 12V power supply. Every line can be selected to be supplied by jumper configuration. Moreover, every line can be terminated (100 Ohm resistor for BRI line termination) also by using jumpers.

Optical Display
The activation of the BRI lines are indicated on LEDs. An additional LED indicates the status of the FPGA while another LED is freely programmable.

ISDN Facilities Support
Almost all ISDN facilities are supported by Sirrix.PCI2S0. This encloses, e.g., CLIP (Calling Line Identification), CF (Call Forwarding), CW (Call Waiting), Call Hold and Transfer, Advice of Charge (AOC) and AOC During Call (AOCD), 3PTY (Three Party Conference) etc. These facilities are supported by our comprehensive ISDN stack implementation. They can be used in PBX applications to provide the corresponding facilities.

Possible Applications
Sirrix.PCI2S0 can be used, e.g., with the open-source PBX software Asterisk, for which we provide a channel driver.

With Sirrix.PCI2S0, everyone can build flexible, COTS-based PBX systems that allow much more facilities than common PBX.

Moreover, Sirrix.PCI2S0 can be used to build ISDN crypto-gateways or Voice-over-IP gateways or least-cost routers.

Requirements
Sirrix.PCI2S0 card can be operated in an arbitrary PCI-based system with 32 Bit PCI 2.1 and with Linux kernel 2.6.

Sirrix.PCI2S0

Features

Hardware

- PCI V2.1 Card
  175 mm x 102 mm
  incl. PCI connector + bracket
- Two S0 ports (BRI)
  1 x RJ45 port each
- Programmable gate array
  (FPGA Altera Acex)
- LED (D9) for display of FPGA status
- Freely programmable LED (D11)
- 32 KByte SRAM as B-channel buffer for software switching with a depth of 64, 128, 256 or 512 Byte.
- Sirrix.PCM bus for B-channel switching in hardware across multiple cards (bandwidth 12,288 MBit = 192 B-channels)
- Conference room for three parties (3PTY) in A-law / μ-Law codec with a data delay of only one frame (125 μsec)
- Retrievable serial number
- Transparent encryption with low delay of B-channels with an arbitrary block cipher in the operation modes OFB, CFB, CTR or with another arbitrary stream cipher (cf. Sirrix.Crypt datasheet).

ISDN-Hardware

- S0 ports (BRI)
  Infineon PSB21150 ISAC-X V1.4
- Each S0 port is configurable in NT or TE mode independently.
- 100 Ω terminating resistors
- S0 power supply (POWER12, POWER34; 40 V power supply Sirrix.PS40V-A at POWER-40V); current-limiter to 0,1 A (4 W) per port onboard (ETSI EN 300 012-1)
- One LED for each S0 port for display of the Layer 1 activation state
  (LEDs D12 + D13)

ISDN-Stack

- Comprehensive implementation of the DSS1 ISDN stack
- Layer 1: Hardware with kernel module (ITU-T I.430 / ETSI EN 300 012-1)
- Layer 2 and 3: in user space (ITU-T Q.920, Q.921, Q.930, Q.931, Q.932, Q. 850 / ETSI EN 300 012, ETS 300 125, ETS 300 102, EN 300 196)
- NT and TE mode in PtP and PtMP configuration
- Arbitrary number of Layer 2 und 3 instances
- ISDN numbers with arbitrary length, with or without direct dialling in (MSN + DDI, ITU-T Q.951.1, Q.951.2, ETSI EN 300 064-1, EN 300 052-1)
- Display of calling party number (CLIP) (ITU-T Q.951.3, ETSI EN 300 092-1)
- CallerID name can be transmitted by Display Information Element
- Suppression of display of calling party number (CLIR), from telephone menu (ITU-T Q.951.4, ETSI EN 300 093-1)
- Connected Party Number (COLP) (ITU-T Q.951.5, ETSI EN 300 097-1)
- Call forward (CFU, CFNR, CFB, facility protocol), from telephone menu (ITU-T Q.952, ETSI EN 300 207-1)
- Hold and call selection (HOLD) (ITU-T Q.953.2, ETSI EN 300 196-1)
- Call transfer (ECT) (ITU-T Q.952.7, ETSI EN 300 369-1)
- CallWaiting (CW) (ITU-T Q.953.1, ETSI EN 300 058-1)
- Three party conference (3PTY) from telephone menu (ITU-T Q.954.2, ETSI EN 300 188-1)
- Advice of charge (AOCD) in units or currency (ITU-T Q.956.2, ETSI EN 300 188-1)

Additional Features

- Notify Information Element
  e. g. during HOLD or 3PTY
- Redirection Party Number Information Element
- Echo Cancellation
  (with software switching, e. g. for VoIP)

Applications

- Software based PBX systems
  (e. g. Asterisk)
- ISDN crypto gateways
- VoIP gateway to the public telephone network or VoIP Gateway for internal extensions; channel banks
- Least Cost Router for VoIP or CbC

Scalability

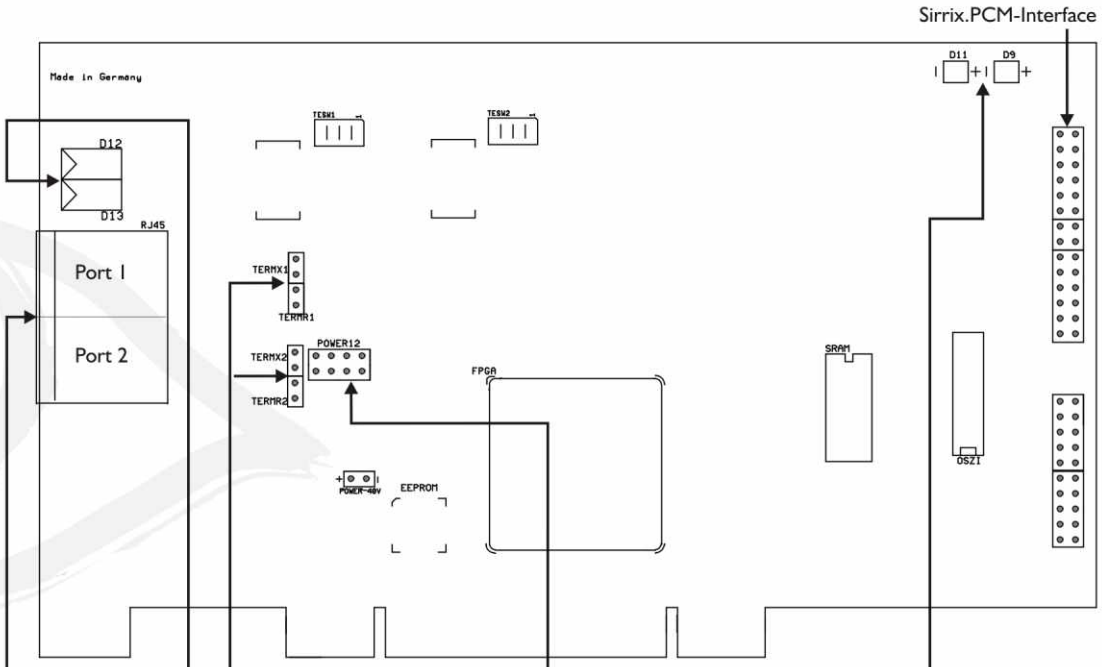
- Sirrix.PCM-Bus supports up to 12 PCI-cards with 96 B-channels in each system
- By interlinking multiple systems, a virtually arbitrary amount of extensions can be served.
- The connection to the public net can be achieved by an arbitrary number of S0- or S2M-ports.

System Requirements

- Arbitrary computer system
- Free 32 Bit PCI 2.1 slot
- Linux with kernel 2.6

Sirrix.PCI2S0

Hardware Overview



LEDs D12, D13

Front-view, ports on the right.

- No port active
- Port 1 active
- Port 2 active

Power-feeding in NT mode

- No power-feeding
- Power on port 1
- Power on port 2
- Connection 40V

LED D9

FPGA Status

on	FPGA not configured
off	FPGA configured

LED D11

Card status

slowly flashing	Card not configured
off	No port configured
on	Port(s) configured
fast flashing	B-Channels active

Pin-out RJ45 ports

1	not connected
2	not connected
3	RX +
4	TX +
5	TX −
6	RX −
7	not connected
8	not connected

Terminating resistors

- 100 Ω Terminating resistors deactivated
- 100 Ω Terminating resistors activiated

Abbreviation

- Jumper not set
- Jumper set
- LED not illuminated
- LED illuminated

Note: The RJ45 ports of the Sirrix.PCI2S0 are wired for the direct connection of phones (**NT mode**). If a port shall be operated in TE mode, a crossed cable must be used. In a crossed cable, pins 3 with 4 and 5 with 6 are swapped (RX ↔ TX).