corelatus

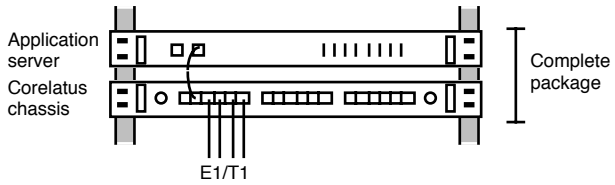
Product introduction

Corelatus develops a range of products where the common denominator is that they are connected to the telephone network via E1 or T1 links (2 or 1.5Mbit/s) and are controlled over ethernet.

The product range consists of: E1/T1 network probes, Gateways, IVR functions and Voice mail functions.

Our customers are system builders who add their own application software on a server and market the complete package. The end customers are normally telecom operators.

A typical installation consists of an application server (processor) and one or several Corelatus chassis. Both the chassis and the server are normally mounted in a 19" rack and are interconnected via ethernet. Corelatus products handle all telecom specific and time critical operations. Higher protocol levels and application software are handled by the server.



All products are designed to provide telecom grade reliability. Reliability is achieved on all levels: hardware, software and system level.

Product range

E1/T1 Network Probes

Probes non-intrusively extract information from E1/T1 links. The probe filters and forwards signalling information or voice to an external application over TCP/IP.

Protocols:
• ISDN LAPD (ITU Q.921)
• SS7 MTP-2 (ITU Q.703)
• Frame Relay (ITU Q.922)
• ATM over E1/T1
• HSSL

Gateways

Gateways are used to transfer signalling and media streams between E1/T1 PCM links and IP.

LAPD, MTP-2 and Frame Relay are available for signalling. Voice streams can be forwarded over either RTP (for real-time voice applications) or TCP (for logging and analysis applications).

IVR functions

The Interactive Voice Response (IVR) functions provides the timing-sensitive parts of IVR applications:
• Voice prompt playback
• DTMF detection
• Timeslot switching
• Conferencing, 3 party or multi-party

Voice mail functions

Voice mail functions provide a possibility to play and record voice messages from/to the harddrive of an application host.
• Recording: incoming speech on a time slot is forwarded to a TCP socket.
• Playing: speech on a TCP socket is forwarded to a time slot.

Combinations

Signalling gateways, IVR and Voice mail functions can often be combined in the same physical equipment. It is thus possible to create a compact and cost efficient solution. An example is where an MTP-2 signalling gateway and IVR functions are combined for a mobile prepaid system.

corelatus

Carrier-grade hardware

All products are based on a common hardware module, the Generic Telecom Hardware (GTH). A GTH module is completely self-sufficient and distinguishes itself from PCI or cPCI boards by being **physically**, **electrically** and **functionally isolated**. Well defined interfaces and clear responsibilities simplify the system builder's job.

Common system features:

- 19" rack mount (1U high)
- No moving parts
- Dual 48VDC power inputs
- Up to 3 modules in a chassis

Module features:

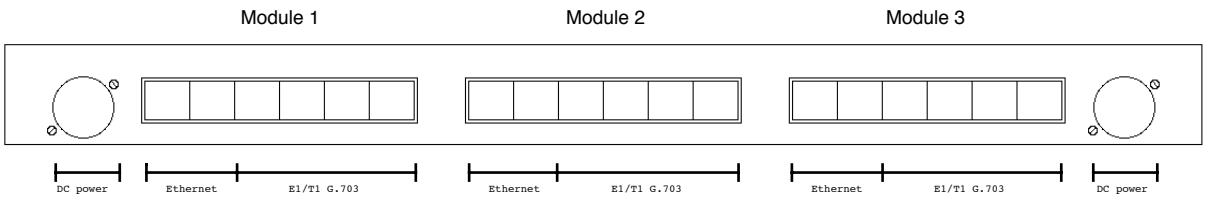
- 8 duplex or 16 RX E1/T1 G.703 interfaces
- Dual ethernet
- Low power consumption (8 - 10W)
- +/- 1ppm frequency source
- An XML-based API

Generic Telecom Hardware

A GTH module is generic in the sense that it is equipped with E1/T1 interfaces, two ethernet interfaces and the hardware resources to process the data to and from the telecom interfaces in almost any way. Up to 3 modules can be mounted in a 1U high 19" chassis.

Three GTH modules in their 19" chassis

The GTH module is extremely "soft". Functionality is, to a large degree, determined by software in the processor, the DSP and in the programmable logic. The GTH, unlike more traditional designs, is not functionally constrained by ASICs: the software and the "soft" hardware of the GTH module allow functionality to be added without hardware modifications.



The FPGA's parallel operation is exploited to provide very high performance for specific bit manipulations such as encryption/decryption, IP packet analysis/generation and low level protocol processing.

Reliability

The GTH is designed for very high reliability. The design is based on long experience from both military and public communication systems.

System reliability

Reliability in a system consisting of several GTH modules is created by combining simplicity, symmetry and robustness.
• Simplicity: A system is built from one or several identical modules. It can be scaled from small to large without limitations.
• Symmetry: A system built with several GTH modules has no single, central point of failure.
• Robustness: A system is built from physically, electrically and functionally isolated parts. The parts are interconnected via well defined serial interfaces. It is easy to verify correct operation at these interfaces. A hardware or software fault is contained within one GTH module and affects only a small number of interfaces.

Hardware reliability

• State of the art technology allows us to to put a complete telecom system with all resources on a single board. The component count is relatively low and classical failure points such as board-to-board inteconnects is avoided.
• The power dissipation is low and well distributed. Low temperature greatly improves MTBF.
• No moving parts are used. Fans are not needed and the hard drive uses solid state technology.
• Each module can take power from two power sources simultaneously. If one power source fails, the module automatically switches to single supply mode without interruption.

Software reliability

All real-time critical issues are handled in hardware. This avoids the need for hard real-time software and allows Linux to be used as the operating system.

Isolation

An important advantage of GTH-based systems over PCI and compact PCI-based systems is that the GTH modules are physically, electrically and functionally isolated from each other and from the rest of the system.

Physical isolation

Up to three GTH modules are mounted in a 19" chassis. The modules are independent of each other, sharing only the two external power connectors. The modules are also completely independent of the server; the server could be in

another room or even another building. In a PC or other backplane system the boards affect each other with heat and electromagnetic interference in ways which are not always predictable.

A system can be scaled linearly. When the number of interfaces are increased, all other resources are also linearly scaled. In a more classical design there are normally limitations such as backplane positions, power supply and processor power.

The 19" chassis with the modules is separately approved for safety, EMC and specific telecom requirements. The safety and EMC responsibilities for boards in a PC are not completely clear.

Electrical isolation

All of the GTH's external interfaces (E1/T1, ethernet and power) are transformer isolated, i.e. galvanically isolated. Transformer isolation is possible because no backplane is used and all external interfaces use serial communication.

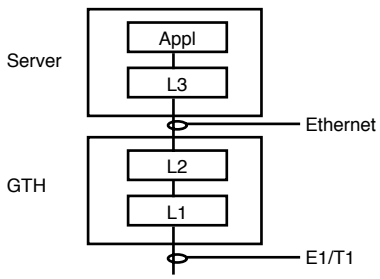
The interface between the GTH module and the server is ethernet. It is difficult for a malfunctioning module to electrically interfere with the server or other parts of the system. A malfunctioning board in a backplane system can seriously affect other boards.

The DC/DC converter in each GTH module accepts two separate, polarity-independent input voltages of 38 - 60V. This makes the module relatively insensitive to supply variations. A board in a backplane system shares a low voltage supply with other boards. Power consumption fluctuations from different boards can cause voltage dips which are difficult to diagnose and localise to a particular board.

Replacing a module in a running system (hotswap) is often considered important in telecom systems. In a backplane system, hotswap is normally quite complex and requires both hardware and software support. With a GTH module, hotswap is trivial: just pull out the cables.

Functional isolation

The API is an XML structured text protocol over TCP/IP. No constraints or requirements are put on the application programming language or the server's operating system.



It is very unlikely that a misbehaving GTH module can cause a crash or reboot of the server. In a PC or in a backplane system, a bug in a low level board driver can more easily affect the host.

An attractive side-effect of a physically, electrically and functionally separated equipment is that future hardware upgrades can be made with little impact on the system as a whole.

Technical data

The GTH is delivered in a 1U high 19" chassis. Each chassis can be equipped with one, two or three modules. Two chassis variants are available for front or rear cabling.

• Total size (H x W x D): 44 x 482 x 345 mm
• Size in 19” rack (H x W x D): 44 x 435 x 343 mm

Each GTH module has the following interfaces:

• 8x duplex or 16x Rx only G.703: Software selectable E1 or T1 standard, 75 or 100/120 ohm. Balanced or un-balanced operation is selected by the cable.
• 2x 10/100-BaseT Ethernet: Both interfaces can be used as media and/or control ports.
• 2x Power: Polarity independent, 38-60V DC. If supplied from two sources simultaneously, the module selects the source with the higher voltage. The power consumption is between 8W and 10W, depending on application.

Each module is equipped with a stable, temperature compensated voltage controlled oscillator (TC-VCXO). The temperature stability is 1 ppm. The oscillator can be locked to any interface or it can operate stand-alone.

More information

The API manual, list of frequently asked questions, application notes and contact details are available online at www.corelatus.se