High Density Audio Conferencing

Executive Summary

Lindenbaum GmbH[1], a leading provider of high density audio conferencing solutions for enterprise and telecom networks was facing the requirements to reduce cost-per-caller while enhancing functionality and maintaining high quality. Its existing system, based on CompactPCI technology, was not up to the challenge.

N.A.T worked with the customer's engineering team and the ecosystem of MicroTCA companies to assemble a solution that increased channel density by a factor of four to significantly lower cost-per-call, while simplifying maintenance and preserving the customer's reputation for high quality.

The solution is future-safe due the ability to add modules for additional capacity and upgrade modules for even higher density, potentially up a 16-times increase.

Scenario

The market for audio conferencing equipment is extremely competitive, with companies under constant pressure to reduce the cost-per-caller (or cost-per-channel) and ongoing maintenance costs while retaining high voice quality and adding more functionality. A leading provider of high density audio conferencing solutions was facing these challenges with equipment based on the CompactPCI (cPCI) open standard and H.110 TDM bus.

The company's system was limited by the TDM bus to a maximum of 1000 channels and faced other limitations due to the hardware architecture. For example, the company could only increase the uptime availability of its product by adding redundancy at the system level, adding more systems, rather than at the board level.

This customer recognised a need to increase the density of its conference call product. The target was to at least double density and preferably achieve an even bigger increase, while also reducing the cost of ongoing maintenance. So, the density of the telecom interface cards and overall processing power of the system had to be increased. With a reputation for high quality to protect, this company had to maintain excellent audio quality even when an audio conference may have had hundreds of users.

[1] https://www.lindenbaum.eu/en/company/about-us/

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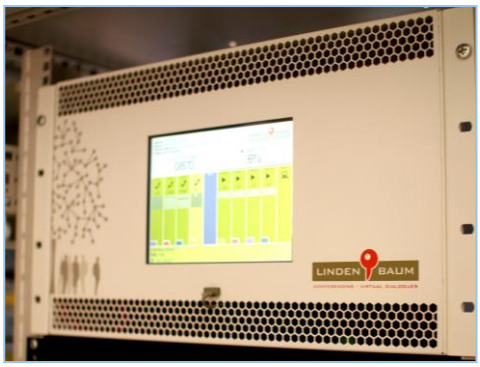
Challenge

With an existing user base that relied on the traditional TDM bus and a recognized emerging demand for IP-based solutions, the company's R&D team evaluated several different hardware standards against the following requirements:

- Resilient platform to fulfil high availability requirements
- Overcome the limitations of the TDM bus
- High density of E1 interfaces
- High density IP support
- Efficient maintenance
- Built-in remote access
- Built-in redundancy
- Easy-to-use web-based user interface
- Easy-to-use web-based app for service engineers
- Support over long lifecycles and a mechanism for simple upgrades or technology evolution



The N.A.T. Solution

Having identified the suitability of the open MicroTCA system standard and associated AdvancedMC (AMC) board-level specifications, the company approached N.A.T. as a market leader in MicroTCA and AMC technologies for expert help in moving their product to a future-safe new generation. Beyond availability of the right hardware components, this customer also appreciated the open and interoperable approach that is at the heart of N.A.T. products.

The AMC specification allows for multiple interfaces, such as Gigabit Ethernet (GbE), 10GbE, PCI Express (PCIe), RapidIO, SATA and SAS, in a variety of configurations in a small footprint of typically just 180 mm x 73.5 mm per module.

The MicroTCA standard combines a passive backplane with differential LVDS lines for excellent signal-to-noise ratio. It also supports single- and dual-star topologies, as used by the latest switching silicon. This allows a customer to reuse the same infrastructure components for different protocols simply by selecting the right combinations of switch and AMC boards.

i-TDM

In common with most modern modular architectures and standards, MicroTCA defines communication systems that do not include a TDM backplane or TDM interconnect technology for LAN attached communication modules. TDM traffic has not been eliminated, just the legacy H.1x0 bus. Packet

backplanes and LANs have replaced legacy physical interconnects, but there still needs to be a standard way of transporting TDM traffic from one module to another.

The answer is I-TDM or “Internal TDM”. I-TDM is an aggregated voice over packet protocol that is optimized for voice LANs and packet backplanes (i.e. for connecting telephony equipment within the same chassis, room or building). I-TDM does not aim to be an end user protocol. It typically exists only within the logical confines of a voice processing system, hence the name “Internal TDM”. Note that a voice processing system may physically consist of multiple LAN-attached boxes that span a room, building, campus, city, country or even multinational.

The next generation voice conferencing implementation uses a customised chassis equipped with a standard Intel Core-i7 processing hardware and the following components from N.A.T.:

1. AC or DC Power supplies

NAT-PM-AC600 or NAT-PM-DC840 redundant DC or AC power supplies monitoring all 16 power channels separately.

2. Switch, management and clock distribution

System management is provided by the NAT-MCH-Base12-GbE-CLK123 module, which also controls a built-in display.

3. Telecom Interface Modules

In its product range, N.A.T. has several telecom interface modules offering four times the number of E1 channels compared with the customer’s existing CPCI boards: The NAMC-8569-xE1/T1 for example, can provide up to 16 E1/T1 interfaces. Other AMCs in the range offer up to 4 STM1/OC3 or 1 redundant STM4/OC-12 channel.

4. Voice Processing

Audio processing is provided by the NAMC-ODSP-M, which combines a powerful FPGA with an array of DSPs, an on-board switch and advanced media gateway software. Up to eight Octasic OCT2224M DSPs, each with twenty-four DSP cores and one ARM core, provide the specialized processing power needed for video and audio media processing.

Summary

Lindenbaums MicroTCA-based solution for a Media Resource Function (MRF) including Media and Signalling Gateway Functionality is a solid basis to serve demanding and at the same time cost-conscious telcos and service providers for the next 10 years.

A growing number of media and signalling channels beyond ISDN and VoIP, such as WebRTC, VoLTE, VoWiFi, Streaming can be bridged to a conference or any other kind of call.

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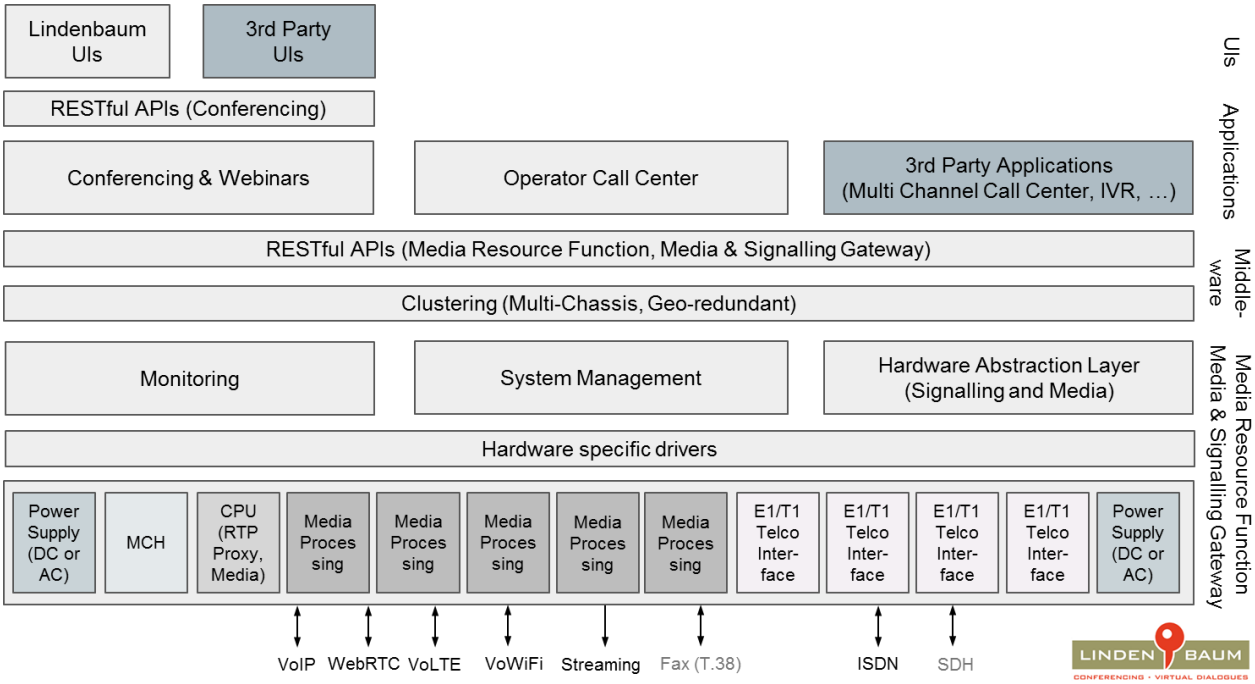
Powerful voice applications build by Lindenbaum or 3rd party developers profit from the achieved advantages based on MicroTCA.



Cost-per-channel

A MicroTCA-based solution enabled this customer to achieve four times the channel density compared to its previous solution. Cost-per-channel was therefore significantly reduced.

Scalability

The new system is very easy to scale up, simply by adding more AMCs with E1 connections and more DSP resources and by cascading multiple chassis. The modular nature of MicroTCA allows the customer to create multiple configurations of E1, SDH and DSP boards to suit the specific application requirements. Density can be increased even further by exchanging the E1 interface modules for an SDH module (NAMC-SDH), which would enable another four times increase in channel density and associated reduction in cost-per-channel.

Simplicity

The NAMC-ODSP-M can be ordered with a complete set of audio and video codecs as an out-of-the-box solution. The customer took advantage of this rich set of libraries to avoid the complexity of low level DSP programming. In this way, integrating the media acceleration module was minimised to the development of configuration, monitoring and management tasks.

Maintenance

The N.A.T. MicroTCA solution is designed with remote management and maintenance in mind, so this customer has seen maintenance cost reduced. All components, including remote hot swap, power down and restart functionality, can be managed remotely.