

PROBLEMS OR CONSIDERATIONS OF CONTROL OF EFFECTS UNITS AND POSSIBLE SOFTWARE STRUCTURES.

Morten Lave

t.c.electronic A/S

1. INTRODUCTION

Over the last decade the control of effects has changed drastically. Most effects units today offer some way of changing parameters externally. In the audio industry MIDI has been the most popular communication standard, mainly because it was the only standard in that area. MIDI was never designed to control multiple devices in a bi-directional way, and the original purpose was to connect several synthesizers to one keyboard. Various manufacturers have implemented their own proprietary protocols on top of the MIDI protocol through the "SYSEX" facility.

The PA422 protocol was an attempt to make a standard, but it did not succeed in becoming a widespread standard, partly because of the lack of versatility.

2. LIMITATIONS OF MIDI

One of the most obvious limitations of MIDI is the uni-directional point to point nature of the physical connection. There is no standard way to connect a number of devices on a MIDI line, with bi-directional communication.

Normally this would result in separate MIDI lines for each device, and sometimes even a separate computer.

Another important limitation is actually due to the versatility of the SYStem EXclusive (SYSEX) part of the specification. Almost all advanced implementations of MIDI on effect devices use this part of the protocol to control parameters. The layout of SYSEX data is not defined, and each manufacturer uses their own "standard". The effect of this is that there are different PC programs for each type of product, which often results in multiple computers in a studio or permanent installation setup.

The implementation of MIDI in effect devices is often very simple, because the manufacturer can choose the layout of the SYSEX.

3. NEW STANDARDS

The SC-10 standards committee under the AES has been working on a general protocol for sound systems control for some years. This protocol will enable all equipment in a setup to be controlled on the same physical network. The SC-10 is not only concerned with the physical network, but also with the higher software layers in the protocol. Any equipment on the network must be able to report its function and parameters in a standard way. This will enable remote devices (dedicated remotes and/or PC software) to "learn" the properties of any device and control it.

With a general protocol like this it will be possible to control a whole installation from one central position on one computer or generic remote, even if the installation consists of equipment from various manufacturers.

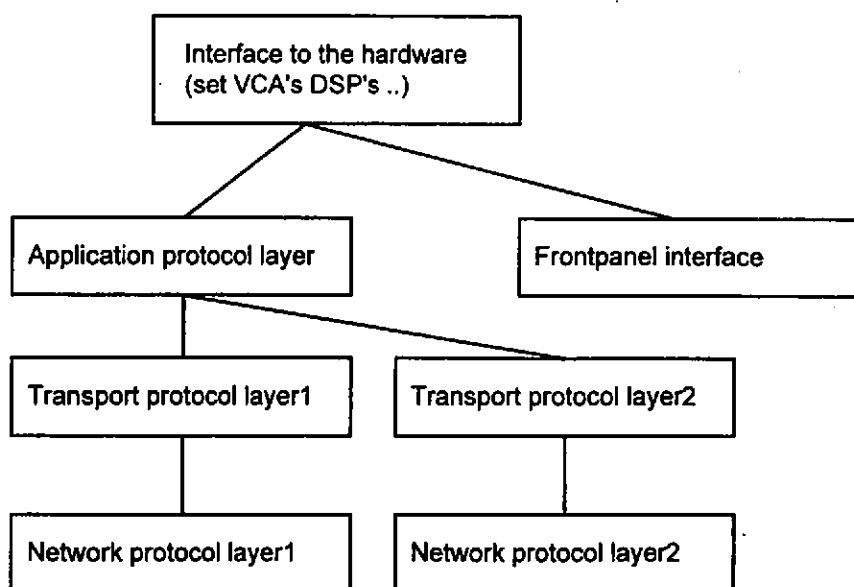
4. IMPLEMENTATION PROBLEMS

When implementing complex protocols on embedded systems such as effects units it is important to consider the structure of the software. Several remote devices might try to control or monitor the device at the same time and it might be the responsibility of the device to keep these remotes updated when information change.

4.1 Using high level language

When implementing advanced protocols it is a great advantage to use high level languages such as 'C'. First of all the code becomes more portable than is possible with e.g. assembler, further the developer might be able to reuse all or part of the code from previous projects. The high level languages also makes it possible to make structured code encapsulating the different layers of the implementation.

4.2 Layered model for implementation



The figure shows a possible structure for implementing an effects unit with sound systems control. The implementation of the interface to the analog or digital hardware is separated from the communication and protocol specific implementation. The protocol implementation is again split into logical parts. In the above example two different protocols are implemented. One of them could be MIDI and the other one could be the future AES protocol. The protocols might share layers as in this example. This structure makes easy to add new protocols and to maintain the the code.

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5. FINAL COMMENTS

In the near future there will be a new standard for sound system control. To be prepared for the new protocol it is important to monitor the work of the SC-10 closely. This document gives a few hints how to structure software to be prepared for this standard.

