1st International P-NET Conference

The Intelligent Building

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0. Contents

1. Introduction: In 1990 Ultrakust has begun to build a new factory-building. We decided to use the latest technology to make it comfortably in a way that protects our enviroment, too. The **system** which has to controll our building has to fulfil a lot of other points.

1.)   The whole system will not be static. In future the company will expand or new facillities will be necassary. So the system shall easily to be changed or expanded.

2.)   The information the system has to work with, is spread all over the grounds of our factory. So the system should effencently collect and distribute the information all over these grounds

3.)   There is a lot of information, which the system has to process.

4.)   The surroundings are very hard. So the communication has to work in such bad sourrounding.

5.)   There are a lot of different signals the system has tu "understand".

6.)   The system has to be devolped effecently.

All these points are fulfiled by **P-NET**.

2. Hardware

If you use the controller PD3000, you can build your communication and processing system very freely. So the system can be created very closely to your needs. In our system several cells are created, which are able to communicate to each user. Each of these cells are complete, this means that one cell can also work for his own.

In our system we use 6 'outer' P-NET rings, which are equivalent to the cells. Each cell is ordered to a special part of our building. An 'inner' P-NET ring is used to do the communication between the cells. In the 'innere' ring there also is the GCS-system from PROCES-DATA and a PC.

The PC is connected to a database. So it is possible that every body who has rights (protected by a password) is able to manipulate functions on the P-NET system.
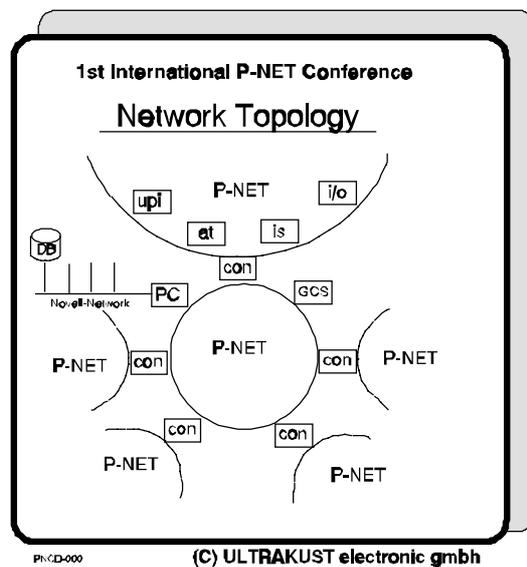
The 'outer' rings contain all the slaves. In the following list all the slaves are listed. The maximum amount of slaves in one ring is 75.

3. Local Functions

In real time processing you always should build autonomous cells which can do some work for their own. This concept is realized in different stages.
A P-NET ring is one kind of these cells.

An other kind of these cells is the digital I/O-Box 6864/01 from ULTRAKUST. This I/O-BOX is specially developed for our building. It is a P-NET slave wich easily can be programed.
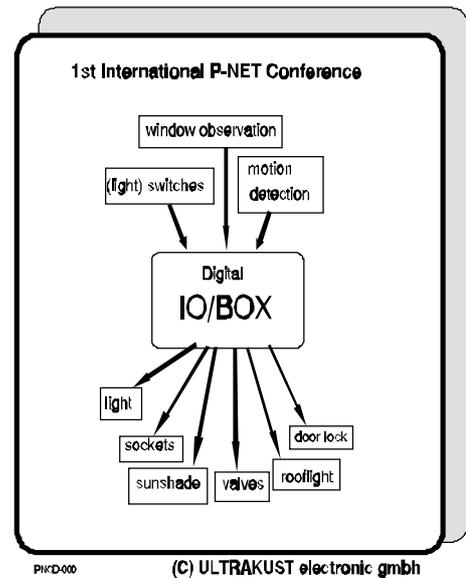

Example:

> You can connect a light button (input) to light (output) of the I/O-BOX. So you can switch the light on and off with the button, without having any P-NET activity. Naturally you can overlay these functions by P-NET. So many functions are connected to this I/O-BOX

4.) Database

In this project there is a lot of information we have to manage. The best way to do this is to use a database system. We use the database system "xtrieve" + "xql" from Novell. This database is a relational databasesystem. The database can be accessed by a menu-programm (xtrieve) delivered by Novell or it can be accesed by a self written program using sql commands. This program can be written in many programming languages like (Turbo-Pascal, Basic, "C", ...).


So first the informations to the project are collected in the database system by using the program xtrieve. These information are:

1.) Number of devices (switches, tempeatur sensors, valves,...)
2.) Number of p-net Slaves
3.) the connecting of devices to P-NET slaves.
4.) logical functions (addmitance control, switches controlled by time)
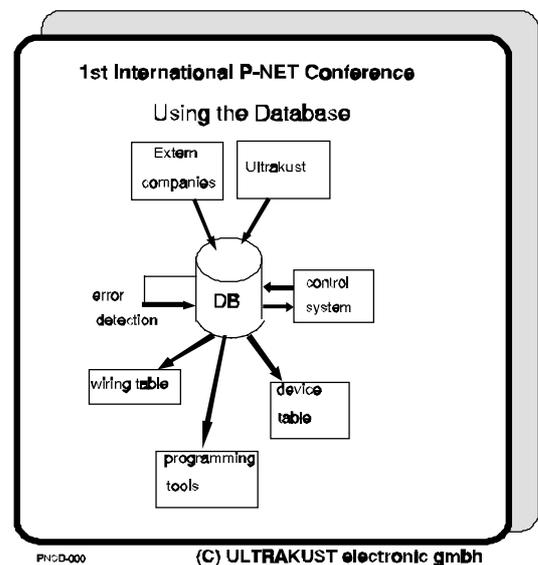
After collecting the information, we first have generated lists to say the electricans and the heating engineers how to build our system. I have also used the information of the database for me own while programming. For some special features I have generates some program code in Proces-Pascal. This code are lists (array), which are interpreted by a task written in Process Pascal. The third way of using the information of the database is access to the database while the system is running.

If we would design our system in a way that the database has always to be present, then the time while the system is availabel will be decrease. This also would be an contradiction to the concept of cells. So we decide that the connection between the database and our system must be a loosly one. So sometimes, normally one time a day (at midnight) the new information is copied from the database to our system. After this the system can update its information.
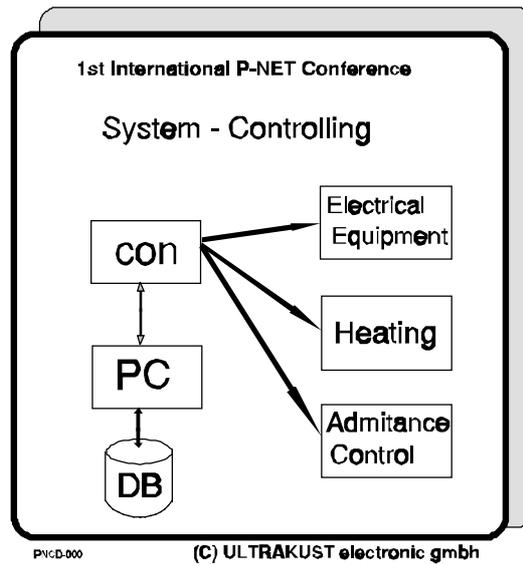
In this way we implemented the following features in our system: