



Modular solution: Flexible cloud enabled IoT controller for multiple applications

web@ctrl1 a cloud enabled IoT controller

The web@ctrl1 routes serial interfaces to Ethernet and connects traditional products to the cloud. Peripheral devices are connected via RS232 / RS485 interfaces or digital inputs. The web@ctrl1 can also read analog values and drive inductive loads with its digital outputs.

web@ctrl1 enables data exchange using serial protocols and control of appliances and machines from a cloud server. Multiple web@IO Devices can transparently route serial connections over long distances using Ethernet/Internet. Additional Interfaces like CAN, I2C, 1-Wire, EIB are available for OEM versions of the product. The web@ctrl1 controller can optionally support Wi-Fi® and Bluetooth® Low Energy, Modbus and DMX Protocols.

The web@ctrl1 features cloud based configuration and supports software distribution to multiple devices via cloud. In contrast to conventional products, which respond to arbitrary connections from the Internet - a circumstance imposing a high security risk - the web@ctrl1 establishes a secure connection to a known cloud server on the local network or the internet. The server then allows to safely connect to the web@ctrl1 using state of the art encryption technology.

This enables private interconnection of multiple controllers and offers sophisticated visualization and services that are not possible with traditional control devices.

Many companies want to add IoT functionality to their products. Applications vary from a sauna, garage door or coffee machine. These companies are experts in developing these products, but have no experience with apps, cloud, databases, secure TCP/IP, and wireless, what is required to enable the Internet of Things (IoT).

home2net offers a flexible solution to enable an IoT use model for traditional products with a custom product specific interface.



Electronic inside a web@ctrl1



home2net development is located in Würth an der Donau, Germany

Design Challenges

The web@ctrl1 had to fit into a European standardized „Rail Mount 1 TE“ housing for industrial appliances. The standard defines the location of power connectors. The biggest challenge was to fit all electronic components into the pre-defined mechanical CAD environment. About one third of the available space was already predefined with connectors.

ESD protection with up to 15 kilovolts and false-polarity-protection requires many ferrites and TVS diodes. These safety and filter components have to be located close to the connectors and they also take another third of the available space of the PCB.

The design challenge is to fit the circuit with power nets (several amps) in the remaining space right next to a fine pitch BGA.

The board outline has only few rectangular corners and all parts have to squeeze into the

remaining space and still meet spacing rules. „The easy-to-use Constraint Manager helps us to manage hierarchical design rules by regions and enables online DRCs as immediate feedback. This is essential to keep up the hardware development speed with the fast software changes in the IoT market.“ said Hans Mühlbauer.

The product itself is modular and can be used for different OEM customers. A small design size and minimum power consumption of less than 500 milliwatts has to ensure safe usage with arbitrary applications even in smallest devices. The net classes and predictable online DRC checks were also important, because sensitive electronics is close to high current switches.

Many assembly variants for different OEMs were handled in OrCAD Capture CIS.



Hans Mühlbauer, CTO of home2net

Due to cost optimization only one layout shall serve different applications for multiple customers. Assembly variants for one PCB layout are managed in OrCAD Capture CIS.

„The OrCAD Productivity Option is used to standardized the manufacturing output flow. Fast and flawless generation of manufacturing documents is essential for time to market“ said Mr. Mühlbauer.

About home2net

home2net is a German enterprise selling secure and easy-to-use smart cloud solutions for use with IoT and smart factory to OEMs. It creates all hard- and software products itself. On top, home2net offers integrated cloud solutions in cooperation with a high availability data center.

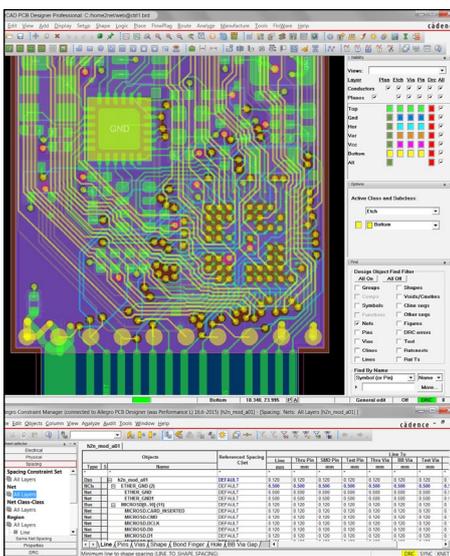
Preferred markets are smart factory products, appliances as well as infrastructure and smart grid solutions. Typical applications cover remote control, remote operation, data logging, remote services and administration as well as remote connections to arbitrary devices and buildings via cloud or APP.

www.home2net.com

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OrCAD PCB Editor: Rigid-Flex IoT controller

Tools used to design

For hierarchical schematics home2net uses OrCAD Capture CIS and as a complete PCB development bundle OrCAD PCB Designer Professional. The most used features during a mainly analog PCB development are the shielding and supply planes and their dynamic healing when routing or moving components. The design rules are entered in the constraint manager and are grouped in net classes for different signals and shapes. Different rules have to be applied to single nets depending on the location of the board. Rules by area manage the huge number of specific rules and exceptions i.e. if you have multiple amps next to a sensitive μ BGA. Design rules in combination with the online DRC provide the user immediate feedback of feasibilities in such a dense and miniaturized design.