Using_CW_Net.doc

User's Guide

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CableWorld

CW-Net

How to use the CW-Net system?

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User's guide to the CW-Net data transmission and device controller system

1. Introduction

By developing the CW-Net data transmission and device controller system, CableWorld Ltd. got in a position to provide its customers with a transport stream processing system of very high degree of freedom and very wide usability. The basic idea of the system and the design of the devices is very simple, but the user's initial steps need some support, because using the system requires

- *basic knowledge in the computer technology,*
- *basic knowledge in building computer networks, and*
- *basic, later higher and higher knowledge in the digital television technology*

all at the same time. CableWorld Ltd. does its best to achieve that the most possible customers can use the CW-Net controlled devices and the most possible customers can extend the scope of use of these devices by own designed software and own built hardware.

In the first part of this guide we assume, that the customer has already some idea of the system, he is just going to try or put in operation some devices, and needs little advices, useful hints only, for doing the job successfully. This description can be used to get acquainted with the system and plan the first applications also without devices.

2. First steps at starting

After unpacking the devices, it turns out that these devices with except for some LEDs do not include controls and displays on their front panels; after switching on the power, there is no possibility to establish any manual contact with them.

In order to set up and operate the CW-Net controlled devices, a controller computer is also required. Therefore CableWorld Ltd. has in its product range computers prepared and configured for this purpose, but we reckon also with the users' wish to use their own computer especially notebook computers. In the following section we are going to discuss how to prepare an own computer for controlling the CW-Net.

3. Choosing the computer

For controlling the CW-Net no special computer is needed, but for the right functioning it must be configured precisely. For those, getting acquainted with the system right now, it is highly recommended to start with a new computer.

Those having already built a working system and know the main steps may undertake to match the system any computer.

No matter if the computer is new or has already been used for some purpose, it should be known, that the data rates sent over the CW-Net are approximately the hundredfold of that used in the everyday Internet surfing. The set ups used with the Internet e.g. firewalls and similar software cannot be used here, because they slow down the computer very much.

During developing the system we mainly used Intel motherboards with P4/2.8 GHz processor, therefore we recommend to purchase such or better computer. These types have worked without problems. Computers with lower performance can also be used, even with 1 GHz processors many tasks can be solved.

Another important issue beyond the speed of the processor is the size of the RAM. 2×256 MByte RAM is already sufficient, but 1×256 MByte is scarcely enough.

The connection to the CW-Net system occurs in 100 Mbit/s full duplex mode via the RJ45 Ethernet socket of the computer's network card, therefore the existence of this socket is necessary. Moreover, it is advantageous to have a screen driver, which causes little loading to the processor.

4. Setting up the computer

For developing companies we recommend to use the Windows XP Professional operation system but for operating the CW-Net the Home Edition is sufficient either. For companies experienced in computer technology and software design, we do not want to give advices; they will easily solve these tasks.

Establishing the CW-Net network can be started after the operational system and the basic pieces of software have been installed.

In the Control Panel/Network Connection create a local network with clicking "Create a new connection", then click "Set up a home or small office network". This will be the CW-Net. On the Local Networks/Properties (right mouse button)/General page highlight the "TCP/IP protocol" line and click the "Properties" button on which the dialog panel for setting the computer's IP address appears. Click the „Use the following IP address" radio button and write in the "IP address" box e.g. the 10.123.13.201 value. On clicking the „Subnet mask" box, it will be filled in automatically. To close the session click OK.

Instead of 201 any value between 1 ... 254 is allowed to be set, with except for 101. However we recommend to set addresses for computers above 200, and for devices in the range below 200, but this is not compulsory. Technician experienced in building computer networks can give support and information in these questions.

Note: With computers, which can be switched on also through their network cards, it often occurs, that changing the IP address will not be fulfilled, in spite of displayed so. With this kind of computers switching off and starting the computer again is not enough. For solving the problem, pull the plug of the power cord from the mains outlet and wait until the capacitors discharge (1-2 minutes). Now, when starting the computer again, setting the IP address will be fulfilled in reality. At troubleshooting remember this possibility as a final solution!

5. Installing the CableWorld software

For installing the SW-4800 CW-Net Principal software, download from the "Software" page of the www.cableworld.hu web site the setup_SW_4800.exe file. On running this exe file, the software installs in the usual way and creates on the desktop an icon, for starting the software. If the offered settings are accepted, the CableWorld software creates the CableWorld folder in the C:\Program Files library and installs here. Within this, the elements of the SW-4800 install in the SW_4800 folder. If necessary, remove the installed programs using „Add and Remove Programs" in the Control Panel.

6. Establishing the first contact with the device

For establishing the first contact with a CableWorld product, an RJ45 to RJ45 crossover cable is delivered with each of them. Connect the device through this cable to the computer. The network manager module of the computers is usually set to „Auto" mode, which usually does the job. However, if in „Auto" mode the computer switches about between different modes, set the 100 BaseT Full Duplex fixed mode.

Some seconds after connecting the cable, the „LINK" green LED on the device's front panel starts to light, indicating that the connection between computer and device has been established.

If the connection has been established at the required 100 Mbit/s data rate, the yellow „ACT" (Active) LED starts also to light. The blinking of the yellow LED indicates that the computer and the device communicate with each other.

The most frequent errors:
- The green LED does not light, because the connection was made with straight or defective cable, or the computer is not set to 100 Mbit/s data speed.
- The yellow LED does not light, because the computer is not set to 100 Mbit/s data speed or the cable is defective or has poor quality.

7. Setting the IP address of the device

Communication with a connected device can only be made if we know its IP address. Each command will be sent out to some IP address, and response can only be expected if there is a device at this address. In the previous section we set the computer to 10.123.13.201 and the CableWorld devices are delivered set to 10.123.13.101 thus there is no objection to the communication.

Clicking its icon, run the SW-4800 CW-Net Principal software. The IP addresses of those devices you would like to work with are to be enrolled on the roll down list in the right upper corner window of the graphic panel. The IP address 101 cannot be removed from the list so that a newly connected device can always be addressed. Edit the list using the „Add" and „Remove" buttons so that it includes all necessary IP addresses (only). In the 1.0 version of the software also the IP addresses 102 and 103 are put on the list just to make an origination for the list. Both of these addresses can be removed. For further details click the "Help" button. Between the Hungarian and English version select with the "Contents" button.

The desired device can be addressed by clicking its IP address in the roll down list. On this, the address of the addressed device is shown in the window and the communication is now going on with this device. The response of the device is shown in the message field in the middle of the panel. The CW-Net Principal software queries and displays the type number and the serial number of the device only.

Expediently try to address the device with IP address 101. In case of no answer click the „Auto Search" button, on which the software sends out a query command to each address of the 0 ... 255 range thus the address of the device in question can be get known.

If even after this the device does not answer, the error can be in the CW-Net (defective cabling, wrong computer setting), or the device is programmed to an address outside the 10.123.13.x range (x = 0 ... 255). For resetting the device from <u>any</u> IP address to the factory default IP address, the use of the SW-4841 ASI to IP & IP to ASI Converter software is needed.

Until you cannot read out the type number and serial number of the device using CW-Net Principal, it is not worth-while going further, the other pieces of software will not function either!

After having succeeded in establishing connection with the device, exercise reprogramming the IP address. If necessary, use the Help of the software.

Until working with a single device only, the IP address 101 will serve. However operating multiple devices, each of them must be set to different addresses. It is practical to reserve the address 101 for enrolling new devices, and not to operate a device at this address.

8. Testing the speed of the computer

Real-time processing of the transport stream is a much larger task for the computer than operating a text processor or running an Internet browser. Let's look at how to evaluate the suitability of the computer for the job.

Connect to the computer a device, which can send transport stream in the computer. In fact, nearly each of the devices (TS Analyzer, TS Remultiplexer, ASI to IP Converter etc.) is able to do that, it has only to be considered, which input or output of the device is connected internally to its Ethernet converter board (how its input selector is set). With the ASI to IP Converter and the one-input TS Analyzer this question does not emerge, at other devices the way of controlling the internal selector will be discussed later.

Install the SW-4890 Computer Performance Tester software as described earlier. From a QPSK demodulator or other signal source lead ASI signal to the input of the device, and run the software.

As learned earlier, to do that, the IP address of the QPSK demodulator or other signal source has to be set in the graphic interface panel of the software. And now, to start the first real job, click the „Get Sample" button. With green light and errorless sampling you can be pleased, and expect that the further procedures will work right, too. Should the sampler indicate loss of data, do not be upset, let the previous procedure finish and display the evaluation, then repeat sampling. The most common cause for error at sampling is that at starting sampling the computer starts also a communication with the device and during this time it does not receive the incoming sample. With repeated samplings, communication between computer and device become shorter and shorter, and the sampling becomes better and better. This kind of error causes the data loss always in the forepart of the sample, thus the percentage of error, shown in the display, will be larger at smaller samples and smaller at larger samples.

Most pieces of our software process the errorless part of the sample only, thus most measuring can be performed also with a smaller loss of data.

The most frequent cause for error in sampling is the enabled state of the firewall, or some other protection. Do not wonder if for disabling the firewall, a „not recommended" setting has to be selected. For controlling the CW-Net, this is the right setting! Also get accustomed to the multiple warnings given out by the Windows and to its threatening with danger. Remember, the CW-Net is not connected directly to the Internet thus the computer is not in danger, but the Windows cannot know this fact.

Following the description in the instruction manual check up the extent the computer is loaded by receiving the transport stream. After sending out the „Send TS" command, the computer receives the sample implanted in IP packets and writes them in its memory. If even this simple task loads the computer considerably (by any chance in 100%), the computer cannot be expected to work later free of error with these high data speed. The low data processing performance of the computer can be caused also by unnecessarily running software and wrong settings. Prior to take another computer, check up if the computer is kept down by enabled firewall or running other software.

During developing we experienced, that most up-to-date computers could easily be set up to this high-speed data processing. A new computer (or a reinstalled operation system) can always easily be configured. In turn, at computers having worked for years, installed with a couple of pieces of software it is very difficult to find out what slows down the computer.

Do your best at setting up the computer so that it fulfils both tests of the Computer Performance Tester as well as possible. This software will seldom be needed further, but remember, it is suitable for testing switches and other devices, too.

Now using an Ethernet analyser, users experienced in the computer technology can already study the working of CW-Net, the structure of the instructions and the system of data transmission. Sitting in front of the Ethernet analyser look at the description in the CW-Net.pdf file and identify the structure of the instructions.

The most difficult task in establishing the CW-Net system is configuring the computer. Until sampling the TS does not succeed regularly free of error, something is wrong with the computer.

With some percent of data loss, a couple of settings and measurements can still be performed, but further working without problems cannot be expected; the low speed of the computer will cause difficulties. If the computer is not capable of getting samples, or sampling occurs with very large data loss, the computer should be pronounced to be unsuitable for the job.

CableWorld offers also the computers for the CW-Net, but suggests using the own computer, or to buy the computer in the own country with software adjusted to the local environment. Especially in case of the notebook machines (CW-4892 DataChief) we recommend to purchase only samples from CableWorld.

In case of 19"-os computers (CW-4891 DataBoss) we suggest our foreign customers to purchase from CableWorld the hardware only and purchase and install the basic software on their own, in order to avoid language problems.

For our domestic customer we undertake delivering in both versions installed, since we purchase the computers domestic thus no language problems arise with the software.

9. First steps at studying the transport stream

Among the jobs made using the CableWorld system, the most expressive is analysing the transport stream. Just after having made the initial set-up let's obtain ourselves some pleasure by analysing the programs in the transport stream used for the settings. Among the pieces of software the most complicated is the SW-4811 Transport Stream Analyzer, which needs much care also at installation. Prior to installation, check if the computer is installed with some kind of media player (e.g. WinDVD4, -5, Power DVD, or similar). If not, install some of them; this software is usually given with the computer, only the installation disk has to be found. In the second step, check if the DirectX 9b, or a higher version is installed. In most cases it has already been installed, or it can be found on any of the installation disks. The latest version can also be downloaded from www.microsoft.com.

In the third step install the SW-4811 TS Analyzer software and run it. The „Input Selector" page includes a selector control row. Set the IP address of the connected device. On clicking the „Query" button the applicable radio buttons of the selector appear live. If a Transport Stream Analyzer is at disposal, observe how the front panel LED display changes on switching over the input selector. Select one of the inputs and save this state with clicking the "Store Input State" button below the switch row.

The instruction manual of the TS Analyzer software is to be found in its Help. Without going into details now, after setting on the "Visual Test" page the video and audio PID values of a program contained in the connected transport stream and clicking the "Play" button, a particular feature of the system, playing programmes from the transport stream can be enjoyed. For listening to the sound track, connect a multimedia monitor or external loudspeakers. When using notebook, turning up volume is needed only.

As a relaxation switch on the Task Manager again, and look up how much the computer's processor is loaded by playing the TS. With perfect playback, this measurement has no importance, but the loading of the processor should not reach the 80-100 % range.

10. Controlling more than one device

After the initial successes the user will certainly have the wish to control more than one device and perform more complex tasks. Obtain an Ethernet switch of good quality. Such devices are mostly available with 16, 24 and 32 inputs, and can be built in 19" rack. When preparing to more complex tasks, purchasing even the 1 Gbit/s version is advisable. Simple switches designed for home networks although have 100 Mbit/s mode, most of them are not capable for perfect transmission of the vast amount of data carried by the TS.

When using switch, discard the crossover cables to be used for direct connections, and connect the first device to the switch with straight cable. All further steps of building the connection is identical with that described in the introduction; more details find in the CW-Net.pdf file.

When connecting the second device, it must be assured that two devices with the same IP address will not be connected to the switch. Prepare an IP address assignment plan, and use this to set the IP addresses of the devices, then connect them to the switch. If connecting to the switch the devices one by one, the IP addresses can be set through the switch, too.

Prepare to working with a system consisting of multiple devices. It is recommended to make a drawing of what has been built up or what should be built up.

11. The input selectors of the devices

All inputs and outputs of the devices connected to the CW-Net constitute a large matrix.

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The devices are accessed by their IP addresses, and their input and output connectors through the input selectors. Figure 1 shows the general structure of the devices.
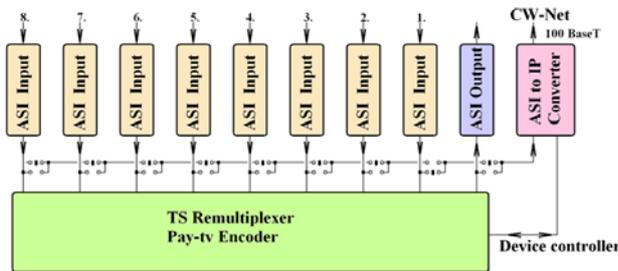

Figure 1
Structure of the input selector of the devices

Programming the selectors is made through the CW-Net. There are device families (e.g. TS Analyzer), where the actual state of the selector can be seen on the front panel display, and where the state cannot be seen on the device (e.g. TS Remultiplexer). For controlling the selectors, the „Input Selector" page of the SW-4811 TS Analyzer software can be used universally.

The total number of the selectors' switchings is not limited; this makes them suitable to be used in automatic measuring systems, too. The state of the selector can be saved in EEPROM, in order to load the desired state when powering the device after a switch-off. Since for the EEPROM the total number of re-writings is limited to 100000, for this operation a particular instruction is provided in the instruction set of the CW-Net.

In CableWorld's system the input selectors of the devices allow to analyze, store or continuously test any of the inputs or outputs of any of the devices with any pieces of the software.

As it was already mentioned, even the TS remultiplexer is suitable for testing the performance of the computer, when used with the Computer Performance Tester software. For this, set the input selector of the TS Remultiplexer in the proper position, e.g. using the SW-4811.

In the CW-Net system full duplex mode is used so that simultaneously with transmitting the transport stream in one direction, in the other direction the instructions can be sent out to control the devices. For inexperienced users at the beginning, it is recommended to establish the control of one the device, and to transmit one transport stream at a time. With sufficient experience, the user can undertake even the most complicated tasks, to transmit the data streams through and through; even if he makes a mistake, he can easily correct it.

With beginners, one of the most frequent errors is that one or more devices are left in sending TS state that produces not expected effects and overloads the network unnecessarily. Sending TS mode can be stopped with both the SW-4890 and the SW-4841 software.

12. The software system of CW-Net

After the initial steps, having become acquainted with the general structure of the devices it can be realized that CableWorld's system manages digital television technology in a comprehensive way. Mid-2005, when starting the sales of the devices of the system, CableWorld offers a product family along with a software package, which is well utilizable, and provides unique facilities and advantages. Further developing of the system, in both hardware side and software side is going on, and further devices will be brought out continuously.

In the first part of this instruction guide general questions were discussed only, no concrete problems were shown and solved. In spite of that, you may have seen how universal the particular pieces of software can be used at any connection point without the need of changing the cabling of the system. For the usability of the software to any device and for drawing our users into designing software, we keep the system open in the software side and available for any interested user; our software is made free available for our customers. We hope, your first experiences with the system will be positive and we can reckon you as adherent of the system.

This approach of the design of the devices resulted in a great similarity among the devices; in many cases the devices can take over each other's job. The user may realize these possibilities, and may discover further opportunities offered by the system later only, therefore we call the attention to them in our advertisements with following wording:

When you purchase a CableWorld Transport Stream Remultiplexer, you get a Transport Stream Analyzer free. This analyser is delivered built in the Remultiplexer.

Those who want to make an even better deal, we tell that they get additionally an ASI to IP Converter and an ASI Selector free. These are also built in the Remultiplexer.

At last we thank you for your efforts to study our system. Should you have further questions at any involved field, we are at your disposal with pleasure at cableworld@cableworld.hu.

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