



UNIVERSITY OF NOVI SAD TECHNICAL FACULTY "MIHAJLO PUPIN" ZRENJANIN



ITROCONFERENCE^{7.0}
INFORMATION TECHNOLOGY AND EDUCATION DEVELOPMENT



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INFORMATION TECHNOLOGY AND EDUCATION DEVELOPMENT



PROCEEDINGS

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With this publication, the CD with all papers from the International Conference on Information Technology and Development of Education, ITRO 2016 is also published.

INTRODUCTION

This Proceedings of papers consists from full papers from the International conference "Information technology and development of education" - ITRO 2016, that was held at the Technical Faculty "Mihajlo Pupin" in Zrenjanin on June 10th 2016.

The International conference on Information technology and development of education has had a goal to contribute to the development of education in Serbia and the Region, as well as, to gather experts from natural and technical sciences' teaching fields.

The expected scientific-skilled analysis of the accomplishment in the field of the contemporary information and communication technologies, as well as analysis of state, needs and tendencies in education all around the world and in our country has been realized.

The authors and the participants of the Conference have dealt with the following thematic areas:

- Theoretical and methodological questions of contemporary pedagogy
- Personalization and learning styles
- Social networks and their influence on education
- Children security and safety on the Internet
- Curriculum of contemporary teaching
- Methodical questions of natural and technical sciences subject teaching
- Lifelong learning and teachers' professional training
- E-learning
- Education management
- Development and influence of IT on teaching
- Information communication infrastructure in teaching process

All submitted papers have been reviewed by at least two independent members of the Science Committee.

There were total of 163 authors that took part at the Conference from 15 countries, 4 continents: 96 from the Republic of Serbia and 67 from foreign countries such as: Macedonia, Bulgaria, Slovakia, Russia, Montenegro, Albania, Hungary, Italy, India, Rumania, Bosnia and Herzegovina, USA, Egypt and Nigeria. They were presented 82 scientific papers; 42 from Serbia and 40 from the above mentioned countries.

The papers presented at the Conference and published in Proceedings can be useful for teachers while learning and teaching in the fields of informatics, technics and other teaching subjects and activities. Contribution to the science and teaching development in this Region and wider has been achieved in this way.

The Organizing Committee of the Conference

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Cable Distribution Systems - an Essential Element of the Global Information Society

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Abstract - Not long ago, before the advent of cable operators, here in Macedonia, especially in the smaller towns in this area in the developed countries was overwhelming. In Shtip were able to follow only two or three programs in the Macedonian Television. Later, in the nineties of the last century, there have been two more programs to private local television stations. Admission to these programs is done through external antennas. Nevertheless, due to the specific configuration of the terrain and tall buildings, it was not possible quality reception of TV programs in all parts of the city. On the other hand, this way of receiving television programs by external antennas (and several antennas for each family) and brings other problems. Among other things, in terms of aesthetic appearance of buildings resemble a "forest" of antennas.

With the advent of cable operators, this picture changes significantly. At the beginning of its development, the cable operators only offered a service to its customers - analog TV.

Today, cable operators offer more services, i.e. services, and are called Multi Service Operators (Multi service operator - MSO). They invest in quality and expensive equipment that receive and distribute to end users a number of TV and radio channels with high quality. Users however, relatively inexpensive monthly fee can enjoy the quality of TV channels, radio channels, internet, telephony and other interactive services. Today through KDS can carry more than 70 (seventy). Analog television and radio programs as well as a much larger number of digital TV and radio channels. Additionally through KDS enables fast digital communication, access to high-speed, broadband Internet and fixed telephony. Modern cable distribution systems represent a form of electronic communication networks. Electronic communications networks other than cable can be partially or completely wireless.

I. INTRODUCTION

Cable television began to be used back in 1948 in a small town in the state of Pennsylvania in the United States. The system then was called Community Antenna Television (CATV). Residents had a problem with reception of TV stations because the place on all sides was surrounded by

hills. The signals from several antennas mounted on top of a hill near the town using coaxial cables are passed on to interested families. At the beginning of its development, cable distribution networks were built only with a coaxial cable. Somewhere around 1976 they began to use optical cables to transmit signals; initially in very small quantities and only in very long sections of the network. Furthermore, the development of technology, a growing percentage of the network is built with optical cables and additional optical elements such much better in terms of coaxial network. The advantage of optical technology is evident both in terms of attenuation of signals that are transmitted through the network, and in terms of interference caused by surrounding RF radiation.

Using optical cables enables transmission of signals with much higher quality compared to the wired network coaxial. Because optical cables have very little attenuation of signals, the transmission of signals possible much larger distances.

Signals from the main station using optical cables are transferred to certain locations - nodes (node). Between the main station and optical nodes, information is transmitted using a modulated laser beam through optical cables and further between nodes and end users, the information is transmitted using RF signals over conventional coaxial cables or coaxial network. An optical node is used to serve a number of users. This type of network is called a hybrid optical-coaxial network (Hybrid FiberCoaxial network or HFC network). In this configuration was first used in 1987. As you progress technology in future optical segment KDS will increasingly expand at the expense of the coaxial part of KDS until the final extrusion of the coaxial part of the network when the entire Cable Distribution Network from the main station to the

end users will be optic (FTTH - Fiber-To-The-Home).

II. CABLE DISTRIBUTION SYSTEMS

The term cable distribution systems (KDS) means transmission of signals from the main station to the multitude of end users via coaxial cable network. Popular name for this system in our country is a Cable Television in the US called CATV-Community Antenna Television. Nowadays most of the cable networks based on HFC technology (English: Hybrid Fiber Coaxial network – Hybrid Optical coaxial network) so the term will mean KDS-HFC network. There are several types of cable distribution systems (KDS), which in recent years become versatile. Through Cable Distribution Systems to customers transmitted more services i.e. services. For example, analogue and digital TV and radio channels, high speed broadband and telephony. Also introduced services such as "Pay to watch" (PPV-Pay per View) and "Video content on-demand" (VOD-Video on Demand). The possibility of choice of a growing number of television and radio programs as well as the possibility of rapid mutual digital communication carries with it the possibility of faster overall transmitters that broadcast programs are listed in various countries, citizens were forced to ask for several external antennas, amplifiers, switches and other devices in order to provide better reception.

Nevertheless, due to the specific the terrain and tall buildings, it was quality reception of TV programs in all parts of the city. On the other hand, this television programs by external several antennas for each family) and brings other problems. Among other things, in terms of aesthetic appearance of buildings resembling a "forest" of antennas. With the advent of cable operators, changes significantly. At the development, the cable operators service to its customers - analog TV. Today, cable operators offer more services, i.e. services, and are called Multi Service Operators (Multi service operator-SO). They invest expensive equipment that receive and distribute to end users a number of TV and radio channels channels with high quality. Users however, relatively inexpensive monthly fee can enjoy the quality of TV channels, radio channels, internet, telephony and other interactive services. Today through KDS can carry more than 70 (seventy!) Analog television and radio programs as well as a much larger number of digital TV and radio channels. Additionally through KDS enables fast digital communication, access to high-speed, broadband Internet and fixed telephony. Modern cable distribution systems represents a form of electronic communication networks. Electronic

communications networks other than cable can be partially or completely wireless.

III. CONCEPTION CABLE DISTRIBUTION SYSTEM

Cable Distribution System can be broken into two parts: 1. The main station of the State Security Committee (external and internal part), 2. development of society. With its interactive capabilities, cable distribution systems today an essential element of the global information society. Not long ago, before the advent of cable operators, here in Macedonia, especially in the smaller towns in this area in the developed countries was overwhelming. In Stip were able to follow only two or three programs in the Macedonian Television. Later, in the nineties of the last century, there have been two more programs to private local television stations. Admission to these programs is done through external antennas. Since antennas via Distribution network of KDS.

A. Home station of KDS - inner part

For transmitting signals from analog TV programs, digital TV programs and other information via Cable distribution network first, this information shall be affixed (modulate) the electromagnetic radio waves (RF=Radio Frequency) which are used as "carriers" of useful information. Inside the main station on KDS used devices to process signals received from the antenna reception system as well as production of internal audio-video information), then their conversion, switching, (possibly reinforcement) and associating in a complex frequency multiplex signal. Before putting into the distribution network of KDS. There are multiple ways of processing the signals received from the antenna system.

B. Professional main station on KDS for many users

In large systems that have tens of thousands of users in one or more cities with a shared main station, it is absolutely understandable use of a system of the highest possible quality. In professional high quality main station first, signals from the antenna reception system using tuners (tuners) or set-receivers (receivers) are demodulated to receive audio and video signals from TV programs that we want to convey. Audio-video signals, if necessary, can be held in the devices which control the intensity and color tone of the audio signal, or the contrast, brightness and color of the image.

This way of processing to change TV standard (for example, the SECAM PAL) of the desired channel before being put in the network. In addition, it is possible to use the decoders for encrypted programs. Also, the audio-video signals, it is

possible inserting various audio or video image information in any channel which is transmitted through the system. Except for commercial use, this is especially important in terms of quick information on various possible dangers or the like, when is invaluable rapid notification to customers and react.

Further audio-video signals are kept in modulators where they modulate the carrier RF signal with a frequency in the frequency range from 33.15 to 41.15 MHz (RF carrier tone: 33.4 MHz and RF carrier image: 38.9 MHz) which is called inter frequency. At this level filtering is performed using a special piezoelectric crystal filters called "SAW" filters using that receives the signal with a lateral belt, while the other lateral strip is suppressed (Vestigial side band). This is in order not to disturb the adjacent channel after the signal is converted to one of the channels in the frequency range 112-860 MHz. Also between ends frequency signal applied automatic gain control and get clean between frequency carrier signals at a constant size regardless of the size of the signal in the antenna. Furthermore, this between frequency signal is converted into one of the channels in the frequency range 112-860 MHz. Finally, the modulated RF signals from all channels are merged into a single multiplexed RF signal is amplified, and plays in the network of Cable Distribution System.

Modern cable systems except Distribution transfer TV programs and allow the transmission of Internet, telephony and other interactive services to its users. Transmission on the Internet, the main station connection is established to the global Internet network through at least two solid interconnecting lines of at least two Internet providers. This is done so users do not remain without internet in case you break one link to the Internet provider. The flow of traffic on the Internet providers to Cable Distribution System goes through powerful edge router (edge router), for example "Cisco edge router 7609"

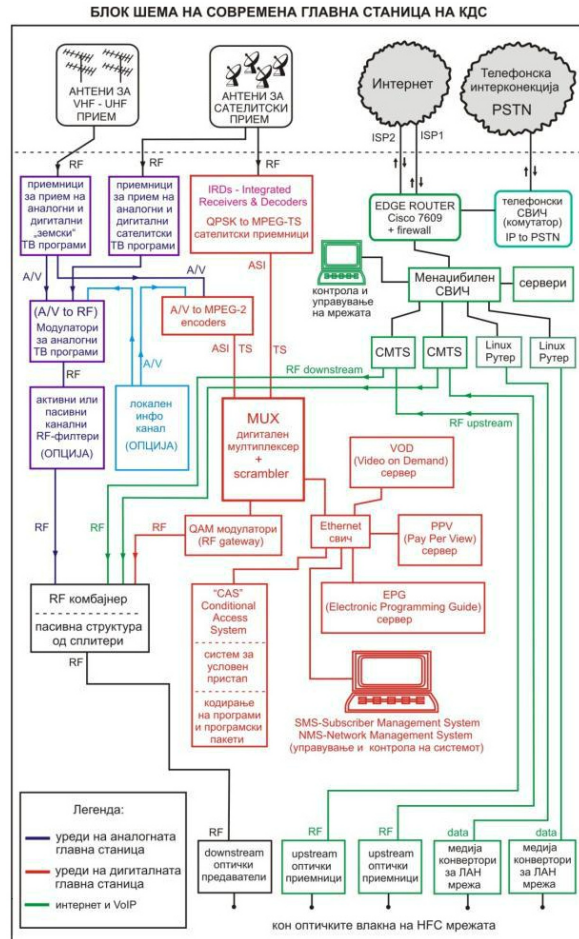


Figure 1. Scheme of Modern Cable Distribution System

Overall Internet traffic through Cable Distribution System is managed through a major "core router" (English: core router) and many others too powerful routers and switches managed (switches). Here are just a few of the functions performed by these routers together with the management switches: Provide connectivity to the global Internet network providers via the Internet; Distribute Internet traffic and caring for smooth load on the network;

Determining the connection speed for each of the users; Prioritize different types of Internet traffic; Filtering of Internet traffic; Monitoring of Internet traffic; VLAN settings; Provide backup onto the network etc. "Backup route".

Other electronic devices as an integral part of the main station in the area of Internet traffic: DHCP server (necessary in all networks); Mail server (optional); FTP server (optional); Web server (optional); Server network multiplayer "game server" (optional).

For users who use the internet through docsis technology (distribution of the Internet via coaxial cable and cable modem for users) to the main station and sub-stations are installed and CMTS (Cable Modem Termination System) devices and receiver signal from the return path (upstream), which explained later in this book (under docsis-internet).

Fixed telephony Cable Distribution System is transmitted via Internet in the form of special VoIP packages. This technology is known as "IP-Telephony" or "VoIP" (VoIP = Voice over IP). In the main station of the Cable Distribution System is required to install a device called a telephone switch "IP-to-PSTN" (Public-Switched Telephone Network). This device converts and route IP-based calls through traditional phone signals classic phone system. Among other things, switch phone records and charged all phone calls generated by the users in order then appropriate to charge through monthly bills.

IV. CONCLUSION

One of the basic conditions for the smooth operation of Cable Distribution System is a quality power supply system with electricity. If the power failure in the main station, all users connected to the system will be affected. Therefore, it is necessary to use the system for uninterrupted power supply (UPS-Uninterruptible Power Supply). There are various types of devices for uninterruptible power supply. Common to all is that use accumulators at a time of electricity is automatically recharged and are complementing. In case of power failure,

uninterruptible power system, energy-filled draws from the batteries without any power interruption.

It is necessary to properly sized UPS-system depending on the strength of the devices in the main station or the power consumption of these devices. However, batteries can provide electricity for the operation of the main station only a short (limited) time. For longer power outages from the city network, it is the purchase of a generator of electricity. Generator commonly used diesel fuel for its work. Power generator should be slightly higher than the power of devices that are connected to work through it.

During a power failure, power generation automatically. In the time between power failure and the inclusion of the generator, the main station devices are powered by batteries of the UPS-system. On such a way is provided continuously, main power station with the power required. When working with components and devices that use electricity should be given necessary attention. Some devices use high voltage which can be lethal if not handled properly.

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