

ATM Adapters

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Abstract: The important telecommunications technology is Asynchronous Transfer Mode (ATM). ATM is capable of handling all types of traffic (voice, video, and data). Since that date researches and projects begin about the possibilities of construct and then handling of ATM networks with their different technologies and services. The Department of telecommunication in the University of Technology Brno starts to reach that evolution by development the projects of flexible ATM network. One of these projects is this project which has a title of Program Control of ATM Cards which will serve Constant Bit-Rate (CBR) of ATM multimedia network. CBR implies the voice service of ATM multimedia network. The project construction is consists of the connection between the electrical source of voice (Telephone set) and multimedia ATM device (PC with an ATM adapter card). Theoretically this connection is easy but from the practical point of view requires some important equipment's which will be suitable to obtain the good results. There is question. Is it practically possible for a PC to become as multimedia device by means of ATM, which means that PC will send and receive voice, data, and video in the same time? This paper which is written by the project will help to answer this question.

Key-Words: - ATM, Adapter, CBR, Novell Netware, Workgroup , Network, Application Program Interface (API)

1 Introduction:

The aim of this paper is to change the previous logical to physical structure with investigation the results and possibilities of that connection.

First connection is between PCM 30U device and Router device. PCM 30U is frame generator, which convert the analogue voice signal of telephone set to digital form within the framework of PDH (Plesiochronous Digital Hierarchy). Typical PDH signals are based on PCM 24 or PCM 30, we used the PCM 30 based with E1 frame of 2Mb/s.

Second connection is between Router device (Cisco 1010) and ATM PC adapter (OLICOM PCI 155 adapter). The router is already configured as a task of paper and it is able to convert the E1 frame to suitable

ATM transmission cells. The main part in this project is the connection between the router and PC ATM card (adapter).

2 ATM adapters

ATM adapters are the interface cards plugged into a computer typically in a workstation or PC bus. The information from the computer is transfer to external devices via the ATM interface card. The function of the ATM adapter is to adapt the data to the ATM format (Cells) for routing through the ATM network without any additional protocol conversion delay. This interface card puts in appropriate Virtual Path Identifier (VPI) and Virtual Channel Identifier (VCI) values in the ATM cell. The ATM PCI 155 adapter is a full-sized printed circuit board that fits in the

expansion slots of Peripheral Component Interconnect (PCI) local bus computers and provides a high bandwidth, dedicated full-duplex connection to an ATM network. Combined with the supplied adapter drivers and higher layer communication protocols the adapter lets our application programs communicate across an ATM network using ATM Adaptation Layer 5 (AAL5). The drivers implement LAN emulation, Classical IP (RFC 1577) and Multiprotocol Encapsulation (RFC 1483) over ATM protocols, thus making it possible to migrate existing LAN applications to ATM. Depending on the configuration parameter the emulated LAN can be either Ethernet or Token-Ring. The drivers include ATM Forum complaint signalling (UNI 3.0 and 3.1) which simplifies the creation of emulated LANs.

2.1 Operational Modes

The Olicom drivers can operate in a multimode of different network modes. The following ATM network operational modes are supported:

- *LAN Emulation over ATM, version 1.0, as defined by the ATM Forum.

- *Classical IP (Internet Protocol) and ARP (Address Resolution Protocol) over ATM as defined by the IETF Network working Group in RFC 1577 (Request For Comments) and RFC 1755.

- *Multiprotocol Encapsulation over ATM Adaptation Layer 5, as defined by the IETF Network Working Group in RFC 1483.

The drivers can be configured to run only one of the listed modes or all combinations. The default operational mode is LAN Emulation.

2.2 Driver Program Control

For each operating environment an additional wrapper module will be required, which translates between the

ATM module API and the standard system driver API such as Novell ODI. The ATM module is designed such that it can execute in the operating system Kernel mode and can be linked to the wrapper module. It requires a small set of OS support functions for dynamic memory allocation, Linear to physical address translation, timer function support etc. The user module and the ATM module manage the following objects:

- *Traffic profiles, described in ATM module's table, and describing traffic characteristics for channels.

- *Virtual Channels Connections VCC which are known by the user module, the ATM module, and the hardware.

VPI/VCI pair identifies VCCs in cells.

The data units passed between the user module and the ATM module are called Service Data Units (SDU). They are also sometimes called frame since in many cases they will be equivalent to LAN frames. The majority of the ATM module API functions are activated via the control ATM module entry point LlatmApi, using a standard event block. This function is the only entry point initially known by the user module.

In order to transmit and receive data a VCC must be setup. When a VCC is established the user module must expose few (call-backs) functions which are called by the ATM module. The addresses of the functions are passed in an event block.

2.3 Initialisation, Open and registering an Adapter

The ATM module must be controlled by control plane events in order to initialise, register and open an ATM adapter.

EvLmeModInitialize:

When receiving an EvLmeModInitialize request, the ATM module will obtain configuration parameters using compiled constants. It must not access adapter hardware at this point and consequently

cannot check if configuration parameters can be supported by the adapter.

EvLmeModOpenAtm

An **EvLmeModOpenAtm** request will cause the ATM module to initialise internal data structures to the extent possible without accessing adapter resident information.

EvLmeModRegisterAdapter

When **EvLmeModRegisterAdapter** is invoked, the adapter specified Adapter ID, will be reset (if physically present), and configuration and burned-in information read from it. The **t-REGISTER-ADAPTER-PARAMS** structure passed in the call will be updated accordingly. Requirements for dynamically allocated memory for the adapter being registered is computed and returned in the confirmation.

EvLmeModAddAdapter

EvLmeModAddAdapter causes the ATM module to finalise adapter specific initialisation. Before invoking this event, the user module must have mapped shared memory areas into the virtual address space.

EvLmeModOpenAdapter

As the final step before an adapter is ready for data transfer, **EvLmeModOpenAdapter** must be invoked to initialise the adapter. After calling **LmeModRegisterAdapter** and before calling this function, the user module must have registered the interrupt routine with the operating system. For support of diagnostic programs, it is possible to request the ATM module to initialise an adapter to perform loop back at specific points.

2.4 Close Down and Termination

The **EvLmeModCloseAdapter** request will cause the ATM module to reset the adapter hardware and clean up internal data structures. The ATM module may reject the request, if bound communication Endpoints and/or active Traffic Profiles exist. When close has been confirmed, ATM module and adapter is ready to

accept and execute a new **LmeModOpenAdapter** request.

EvLmeModTerminateAdapter

EvLmeModTerminateAdapter cause the ATM module to clear any references to dynamically allocated memory for the specified adapter.

EvLmeModTerminate

An **EvLmeModTerminate** request will make the ATM module reset any ATM adapter that is not already in a reset state. The ATM module is not required to accept any requests after confirmation of this one. The ATM module must release any operating system resources that it may have obtained.

3 Modes of ATM adapters

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5 VCC Management

The user module sends and receives data through a communication Endpoint, which is established through invocation of the LlatmBind function and deleted through LlatmUnbind. A communication endpoint is mapped onto a particular VCC. VCCs can be created in several ways:

- ❖ Through management action- in a permanent virtual channel environments the ATM switch can be configured for VCCs with particular identifiers.
- ❖ Through signalling- in a switched virtual channel environment, the user module may contain the signalling code, which dynamically establishes channels. Since signalling itself uses VCCs, there are some VCCs which by convention are default open in a switch.

6 Program Operation

The previous events are important for programming the ATM cards by meaning of API and the help of C language. We used Watcom Software under Operating System Windows NT to construct and compile the program, -See Appendix A-. When the program is run, the ATM card will control and configured.

The program will find the number of adapter in the computer, which contain the ATM card, allocate the place in the memory, and find the physical address in I/O unit. During the operation the program will allow the user to setting the Framing mode, Peak rate, Framing length and VPI/VCI numbers. The program will account the current receive speed and current transmit speed. To be sure that the program is working successfully we run the program and see that it receive the number of bits in Mbps. When we make the loop in the router which connect to the PC card we see also that the number of receiving bits is the same of numbers of transmit bits.

The configuration of our ATM card is: SONET mode, Peak rate and Frame length are changeable, but the number of VPI/VCI is depending on the router. In our ATM card we use 0/37 of VPI/VCI.

7 Conclusion

The problem of this paper is program the ATM adapters to serve the revolution of Broadband telecommunications in the Department of Telecommunications than to obtain the best results and then distributed around the globe to serve the human requirements and save the time of human. We install the connection between the equipment and we put the ATM adapters inside the PC, then we start to create the program of ATM adapters by Application Program Interface (API) then we run the program and we investigate that it run successfully without any errors or troubles. After ATM adapters is operate in classical LAN we conclude that LAN

Emulation is created and we will not need the higher protocol of LAN to allow ATM adapter to work in classical LAN so that enough to configure the ATM adapter and bring some network elements like routers in our experimental to install LAN ATM network by meaning of LAN Emulation. We can understanding that the specific purpose of LAN Emulation is to emulate a traditional LAN (Ethernet and Token Ring) in order to reuse the existing layer 3 protocols such as IPX, IP, SNA and NetBEUI on an ATM emulated LAN. LAN Emulation's functions are to solve the incompatibilities between LANs and ATM. Finally, the program control is done to configure the ATM adapters and then it will be able to work under classical LAN conditions to transmit/receive ATM cells, which contain the certain information to/from, other destination/source without need to the higher protocol of LAN.

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