CHAPTER TWO

LITERATURE REVIEW

Literature Review

2.1 Background:

Out the basic operations of the Web. TCP/IP is also used on many local area networks (LAN). Internet Protocol (IP) is the method used to route information to the proper address. Every computer on the Internet has to have its own unique address known as the IP address. Every packet sent will contain an IP address. Protocol is a set of rules governing the format and meaning of frames, packets, or messages that are exchanged by peer entities within a layer. Protocols are used for communications between entities in systems, Entities use protocols in order to implement their service definitions .The key elements of a protocol are: Syntax which Include Time data formats and signal levels, Semantic which includes control information and error handling.

Protocols are established by international agreement and ensure that computers everywhere can talk to one another. There are a variety of protocols for different kinds of information and functions**.** This article will discuss some of the common protocols that the average PC user is likely to encounter. Protocol is way to communicate with the network. There are two types of protocol such as: Routing Protocol &Routed protocol, routing protocol: used to find the path in network. Routed protocol used to carry user traffic such as: data, email, etc.

The common protocols such as: TCP/IP "TCP (Transmission Control Protocol) and IP (Internet Protocol) is normally used to refer to a whole suite of protocols, each with different functions. This suite of protocols is what carries showing where it is supposed to go**",** UDP "User Datagram Protocol" is used together with IP when small amounts of information are involved. It is simpler

than TCP and lacks the flow-control and error-recovery functions of TCP. Thus, it uses fewer system resources. ICMP "Internet Control Message Protocol" used for diagnostic and management purposes. It is also used by Ping and Trace route, SMTP "Simple Mail Transfer Protocol "is the most common protocol for sending mail.POP "Post Office Protocol "is the most common protocol used by PCs for receiving mail, HTTP "Hypertext Transfer Protocol" defined the format for communication between web browsers and web servers, (FTP) "File Transfer Protocol" used for uploading files to a Web site. It can also be used for downloading from the Web but, more often than not, downloading is done via HTTP. ARP "Address Resolution of Network Protocol" used for resolution of network layer address in to link layer address, also critical function in multiple access network, used for converting a network address to physical address.
RARP" Reserve Address Resolution Protocol" used for diskless computers to determine their IP address using the network. DHCP "Dynamic Host Configuration Protocol" used on internet protocol (IP) networks for dynamically distributing network configuration parameters. RIP" Routing Internet Protocol" used user datagram protocol (UDP) as it transport protocol and is assigned the reserved port number [1].

2.2 Related work:

Existing approaches to automatic synthesis of protocol converters mostly lack formal foundations and either employ abstractions that ignore crucial low level behaviors, or grossly simplify the structure of the protocols considered. We present a state-machine based formal model for bus based communication protocols, and precisely define protocol compatibility, and correct protocol conversion [2].

In early [3] work protocols were represented as state machines and their cross product was used to construct a converter. This work was highly innovative but preliminary. This approach was later extended [4, 5] in and is the foundation of our work. In [6, 5] a formalism for modeling protocols using synchronous FSMs and an algorithm for wrapper synthesis are proposed. It distinguishes between control and data signals, and methods for dealing with mismatched data types and clock periods are suggested but not integrated into the given algorithm. In [4] a product of FSMs is again used to construct protocol converters, and the product is optimized to increase bandwidth. An alternative to converter synthesis is to use a standard communication scheme and to map disparate protocols into this scheme, as presented. Such template-based solutions are not specific to the protocols being interfaced and hence, not optimal if the solution includes constraints such as pre-defined buffer sizes or an un avoidable latency overhead as in [7] and in some cases might not be practical. A third approach is to decompose protocols into smaller operations and combine operations to obtain a converter, as presented in [8] and recently in [6]. Passerone et al. [9] specify mismatched synchronous protocols as regular expressions [10].

D' Silva extended that work by formally modeling control and data separately, using buffers, and dealing with the problem of data mismatch explicitly [11].

Very recently, that work was developed further by Avnit who improved the underlying formal model, added formal definitions of compatibility and of correctness, and developed algorithms to implement the formal model. They use their formal correctness definition to drive the pruning algorithm that iteratively removes `invalid' states and transitions from the product automaton until a' fixed point' is reached. The resulting

converter is called the most general converter .Work not yet carried out by the authors includes removing all unreachable states from their most general converter, optimizing the converter in terms of size for example.

2.3 protocol converter review:

Now a day's many industries are using different types of protocols to show data on computer. For this purpose different modules are used which increases the hardware complexity and cost. This project PROTOCOL CONVERTER is helpful to overcome these problem different types of protocols such as Manchester, UART and I2Cconverted to the USB format which is compatible to the laptops which is the major application .By using different components such as PIC microcontroller 18F452, LCD, Personal computer, Max 232, DB9 connector converted to the USB format [12].

Universal Serial Bus (USB) is an industry standard that defines the cables, connectors and communications protocols used in a bus for connection, communication, and power supply between computers and electronic devices.USB has effectively replaced a variety of earlier interfaces, such as serial and parallel ports, as well as separate chargers for portable devices [13]. USB input output formats are shown in figure2.1.

FIELD	SYNC	PID	DATA	CRC	EOP

Figure2.1 USB Frame format

A universal asynchronous receiver/transmitter, abbreviated UART, is a piece of computer hardware that translates data between parallel and serial forms. UARTs are commonly used in conjunction with communication standards such as EIA, RS-232, RS-422 or RS-485. A UART is usually an

individual (or part of an) integrated circuit used for serial communications over a computer or peripheral device serial port. UARTs are now commonly included in microcontrollers. UART input output formats are shown in figure2.2.

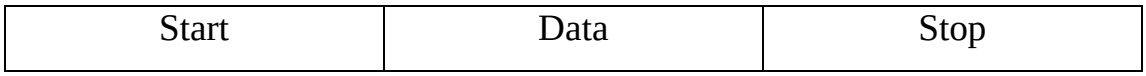

Figure2.2 UART Frame format

Today, at the low end of the communication protocols, we find I2C (for 'Inter-Integrated Circuit', protocol). This protocol is well-suited for communications between integrated circuits, for slow communication with on-board peripherals [14]. I2C bus input output formats are shown in figure2.3.

Figure2.3 I2C bus Frame format

This study proposed the design of a low cost protocol converter because of reduced hardware complexity. This is capable of receiving different data formats (Manchester, UART, and I2C) and converts data into USB format for notebook computer [15].

In [17] a serial to Ethernet converter is a small electronic device which can convert Ethernet TCP/IP packets to either RS232, RS485 or RS422 serial data signals and vice versa. It is also sometimes called a serial device server and it comes in several different shapes and sizes; here are a few examples of what it can look like:

Standard DIN mount Multi-port Wireless

As you can see from above images a serial Ethernet converter can have one serial port or it can have multiple serial ports, up to 25 ports or more. The standard panel mount serial Ethernet converter is most common but it is also available with DIN mounts so it can easily be installed on a standard DIN rail. It is also available as a wireless converter in which case the TCP/IP packets are transmitted over a IEEE 802.11a/b/g network link. Some serial Ethernet converters only has a RS232 interface and some has a RS232 and a RS485 interface, yet others has all 3 interfaces (RS232, RS485 and RS422) built in.

Most commonly it is used for connecting a serial RS232, RS485 or RS422 device such as a serial printer, barcode scanner, scale, GPS, sensor or any other consumer or industrial device with a serial interface, to a computer over a standard LAN network as shown in Figure2.4. The advantage of this is obvious; you will be able to control, monitor and communicate with your serial device remotely from a central computer. No need to walk all the way down to the other end of the factory to check your serial device.

Figure2.4: Application diagram [17]

The circuitry inside the converter can convert IP/TCP packets to serial data and also convert serial data to IP/TCP packets, so it works in both directions.

Before you can start using the converter you need to install driver software on your computer. This driver software is also called virtual COM software because it creates a virtual COM port in your computer's Device Manager when the converter is connected to your computer. Virtual COM software is usually included with the converter, at least if you buy from a reputable seller.

Figure2.5: serial to Ethernet converter

In figure2.5 [18] the EDW-100 is a serial to Ethernet converter designed to allow RS-232, RS-422 and RS-485 serial devices to communicate via TCP/IP Ethernet networks. DIP switches are used for configuration of RS-422/485 as well as for Ethernet port settings; the password protected web interface is used for all other settings. Diagnostic information can be accessed via a Telnet session with more basic information offered on LEDs.

In this project we discuss two type of Packets : Ethernet Packet and RS-232 Packet.

Ethernet is a type of cabling that connects multiple computers together as shown in figure2.6. Ethernet is a type of standard used in local networks that defines how signals cross the wires. This signal enables the

communication between computers, routers and hubs. Ethernet has become a common part of cable installation for the advantages it brings over other topology architecture.

Figure2.6: Ethernet cable

An Ethernet crossover cable is a type of Ethernet cable used to connect computing devices together directly. It is most often used to connect two devices of the same type: e.g. two computers (via network interface controller) or two switches to each other. By contrast, patch cables or straight through cables are used to connect devices of different types, such as a computer to a router (or network switch or hub).

The Ethernet protocol is made up of a number of components, such as the structure of Ethernet frames, the Physical Layer and its MAC operation. it is the most popular LAN technology in the world. It is an easy, relatively inexpensive way to provide high performance networking to all different types of computer equipment. Ethernet is difficult to change, the load of Ethernet increased number of collision therefore efficiency decreases, no priority mechanism in Ethernet and minimum size of packet.

The RS-232 serial communication protocol is a standard protocol used in asynchronous serial communication. It is the primary protocol used over modem lines. It is the protocol used by the MicroStamp11 when it communicates with a host PC. It formally defines the signals connecting between DTE "data terminal equipment" such as computer, terminal, and DCE "data circuit terminating equipment" as shown in figure2.7.

Figure2.7: R-S232 cable

The RS-232 is commonly used in computer serial ports. The RS-232 serial port was once a standard feature of personal computer used for connections to modems, printers, data storage.

The cost of RS-232 is simple to implement. The limitation of RS-232 such as: Noise and crosstalk, low line length, low data rates. Data transfer within a system is generally in parallel. All the bits of the data word are

transferred in parallel at the same instant. In some cases, particularly in transferring data over long distances, it is preferred to transfer the data in serial form. The data word from a transmitting system is converted to stream of bits by parallel to serial conversion, and one bit at a time is transferred on a single line to a receiving system. At the receiving end, the word is reconstructed by serial to parallel conversion. The speed of data transfer in serial communication is specified by baud.

Transmission of a character starts with a start bit (logic 0), followed by the character bits (LSB first), a parity bit and ends with one or two stop bits (logic 1). This is referred to as one frame. Process of adding the start, parity and stop bits with character bits is referred to as framing. When no character is sent, the transmitter outputs logic high. The line remains in logic 1 (idle state) till the transmission of next character begins with another start bit.

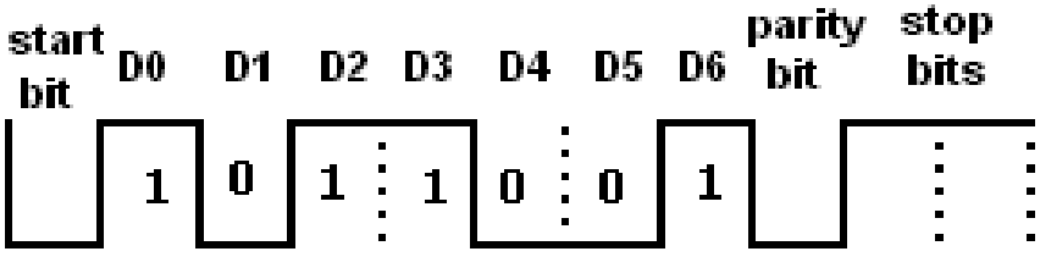

Figure2.8: Asynchronous data transmission format.

Figure 2.8 shows transmission of a 7-bit ASCII character ‘M’. The parity bit is included in the frame for the receiver to check errors that may occur during transmission. The bit is made 0 or 1, so that the number of 1s in the character plus the parity bit is always odd in odd parity systems or even in even Parity systems.

Two types of weaker conditions: Logical connectivity and physical connectivity. Logical connectivity is a stronger condition than physical

connectivity and is useful for checking if there are processes along the physical path between numbers of protocol which must interoperate but which do not implement a common protocol.

Physical connectivity is a necessary condition for logical connectivity. While logical connectivity is a necessary condition for condition. Also we have two types of converters are presented: Memory less converters and finite-state converters.

Serial ports may use either of two types of connectors. The 25-pin DB-25 connector has been used by previous-generation computers. Newer computers use the 9-pin DB-9 connector. For the serial ports of computers male connectors are used, and for the serial ports of peripheral devices female connectors are used [19].

Table 2.1: Signal assignments to the DB-25 connector pins of the serial port.

Pin	**Signal**	**Meaning**	**In Out**
1	PG	Protective Ground	
2	TD	Transmit Data	Out
3	RD	Receive Data	In
4	RTS	Request To Send	Out
5	CTS	Clear To Send	In
6	DSR	Data Set Ready	In
7	SG	Signal Ground	
8	CD	Carrier Detect	In
20	DTR	Data Terminal Ready	Out

22	RI	Ring Indicator	In

To reduce the space occupied by the serial port connector, the DB-25 connector has been replaced with a smaller connector, the 9-pin DB-9 connector as shown in Figure2.9.

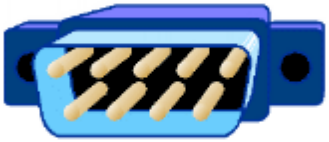

Figure2.9: The DB-9 connector used for the serial ports of IBM PC computers.

Table 3.2 shows the serial port signal assignments to the DB-9 connector pins [19].

Table3.2. Signal assignments to the DB-9 connector pins of the serial port.

Pin	**Signal**	**Meaning**	**In** **Out**
1	CD	Carrier Detect	In
2	RD	Receive Data	In
3	TD	Transmit Data	Out
4	DTR	Data Terminal Ready	Out
5	SG	Signal Ground	
6	DSR	Data Set Ready	In
7	RTS	Request To Send	Out

8	CTS	Clear To Send	In
9	RI	Ring Indicator	In

Laptops doesn't have serial port, different type of data formats is not applicable so for compatibility to the laptop USB is provided, because it has different data rates (high speed 480Mbps, medium speed 12Mbps and Low speed is 1.5Mbps).

Serial ports are still used in applications such as industrial automation systems, scientific instruments, point of sale systems and some industrial and consumer products as shown in Figure2.10 [19].

Figure2.10: Serial Port.

Some notebook computers now being manufactured do not have a serial (RS232) port, such as Dell Latitude LS and Sony Vaio. The serial ports are being replaced with the USB (Universal Serial Bus) interface.

Modern computers without serial ports may require serial-to-USB converters to allow compatibility with RS 232 serial devices as shown in Figure2.11.

Figure2.11: serial to USB cable