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Village Level Protocol

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Abstract

Here in this paper we have proposed for a protocol to be implemented at the village level. As at the village level as there are few agencies to be contacted at village level so this uses a local label addressing of 4 bits to support 16 agencies with 3 bits Time to live header which checks weather a packet is reached or not. Thus being small packet size this protocol is faster and able to support fast network service at village level.

Keywords: Labels, Time to Live, routing , sequence control , flow control

Introduction

A communications protocol is a system of digital rules for message exchange within or between computers.

Communicating systems use well-defined formats for exchanging messages. Each message has an exact meaning intended to provoke a particular response of the receiver. Thus, a protocol must define the syntax, semantics, and synchronization of communication; the specified behavior is typically independent of how it is to be implemented.[6] A protocol can therefore be implemented as hardware, software, or both. Communications protocols have to be agreed upon by the parties involve.To reach agreement a protocol may be developed into a technical standards.[4] A programming language describes the same for computations, so there is a close analogy between protocols and programming languages: protocols are to communications as programming languages are to computations.

Messages are sent and received on communicating systems to establish communications. Protocols should therefore specify rules governing the transmission. In general, much of the following should be addressed:

- *Data formats for data exchange*. Digital message bitstrings are exchanged. The bitstrings are divided in fields and each field carries information relevant to the protocol. Conceptually the bitstring is divided into two parts called the *header area* and the *data area*. The actual message is stored in the data area, so the header area contains the fields with more relevance to the protocol. Bitstrings longer than the maximum transmission unit (MTU) are divided in pieces of appropriate size.
- *Address formats for data exchange*. Addresses are used to identify both the sender and the intended receiver(s). The addresses are stored in the header area of the bitstrings, allowing the receivers to determine whether the bitstrings are intended for themselves and should be processed or should be ignored. A connection between a sender and a receiver can be identified using an address pair *(*sender address, receiver address*)*. Usually some address values have special meanings. An all-*1*s address could be taken to mean an addressing of all stations on the network, so sending to this address would result in a broadcast on the local network. The rules describing the meanings of the address value are collectively called an addressing scheme.
- Address mapping. Sometimes protocols need to map addresses of one scheme on addresses of another scheme. For instance to translate a logical IP address specified by the application to an Ethernet hardware address. This is referred to as address mapping.
- Routing. When systems are not directly connected, intermediary systems along the *route* to the intended receiver(s) need to forward messages on behalf of the sender. On the Internet, the networks are connected using routers. This way of connecting networks is called internetworking.
- Detection of transmission errors is necessary on networks which cannot guarantee error-free operation. In a common approach, CRCs of the data area are added to the end of packets, making it possible for the receiver to detect differences caused by errors. The receiver rejects the packets on CRC differences and arranges somehow for retransmission.
- *Acknowledgements* of correct reception of packets is required for connection-oriented

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communication. Acknowledgements are sent from receivers back to their respective senders.

- *Loss of information - timeouts and retries*. Packets may be lost on the network or suffer from long delays. To cope with this, under some protocols, a sender may expect an acknowledgement of correct reception from the receiver within a certain amount of time. On timeouts, the sender must assume the packet was not received and retransmit it. In case of a permanently broken link, the retransmission has no effect so the number of retransmissions is limited. Exceeding the retry limit is considered an error.
- *Direction of information flow* needs to be addressed if transmissions can only occur in one direction at a time as on half-duplex links. This is known as Media Access Control. Arrangements have to be made to accommodate the case when two parties want to gain control at the same time.
- *Sequence control*. We have seen that long bitstrings are divided in pieces, and then sent on the network individually. The pieces may get lost or delayed or take different routes to their destination on some types of networks. As a result pieces may arrive out of sequence. Retransmissions can result duplicate pieces. By marking the pieces with sequence information at the sender, the receiver can determine what was lost or duplicated, ask for necessary retransmissions and reassemble the original message.
- *Flow control* is needed when the sender transmits faster than the receiver or intermediate network equipment can process the transmissions. Flow control can be implemented by messaging from receiver to sender.

Getting the data across a network is only part of the problem for a protocol. The data received has to be evaluated in the context of the progress of the conversation, so a protocol has to specify rules describing the context. These kind of rules are said to express the *syntax* of the communications. Other rules determine whether the data is meaningful for the context in which the exchange takes place. These kind of rules are said to express the *semantics* of the communications.[1]

Advantages of this Protocol

Taking important agencies which have a frequent interaction with villagers like tehsil, co-operative societies, gramin banks, police stations etc. assuming them to be maximum at 16 we set our protocol for 4 bits where combination of each bit will represent some society so there will be maximum upto 2^4 that is 16.[5] Considering a small village of uttarakhand we have make our assumption where networks have been reached upto tehsil level through their project of SWAN and all these agencies been connected with tehsil . We had proposed a protocol to be implemented to connect the village from these agencies through label forwarding. Prior to this we have MPLS which is also a label forwarding protocol ,but it supports more bits for its destination (20 bits) and also having extra bits for services(3bits) and for stack for more than one service(1bit)[2]. So, the protocol proposed in this paper will contain less bits as compared to protocols we had earlier and thus make forwarding faster than other protocols. Apart from this we can make static routes but with enlargement of village families that will become cumbersome to again and again implement routes for all new families. So , to overcome this problem we proposed this protocol which Is faster than other protocols and even dynamic in nature.

Village Level Protocol

Here we are proposing a protocol which can be implemented using NS2 simulator, or qualnet simulator or OPNET simulator. This protocol consists of 12 bits , which are further distributed as 4 bits for label and 8 bits for time to live(TTL).[3]

4 bits label	8 bits time to live (TTL)

Where 4 bit label are used to represent 16 societies through which frequent communication of villagers is needed. Each societies are associated with specific sequence of bits as follows:

Bits combinations	**Specified agency with associated label**
0000	Co-operative society
0001	Gramin bank
0010	Police station
0011	Sugarcane samiti
0100	Post office
0101	Panchayat

And so on..

A particular sort of label is attached with the incoming packets within the network, which tell the destination for the given packet. A separate label table is generated which tell the label for particular destination and attach that particular label for that packet along with the path for next hop if there is.

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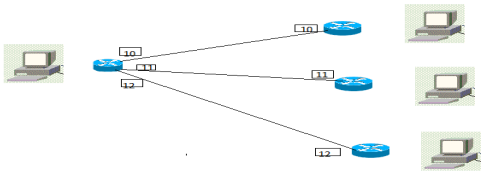

Conclusion

Here we had proposed a protocol which works at village level to communicate with 16 main sectors through which they had to co-operate frequently. This protocol is faster and easier than others protocol and even dynamic in nature. The packet size used in this protocol is smaller than that used in other protocol. Thus, can be provide as a backbone for the connectivity of villages with others and also to enhance them with networks.

Future Work

We can connect it with mobile messaging service so that as the user from village send request through this protocol the message can be pop-up on the message of the same and also a software can be implemented to update same information after regular interval so that villagers can get update at regular intervals. Thus can create e-village proposal for literate india where all things can be done via internet based.

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