

Circuit switching vs packet switching technology for data transmission within networks

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ABSTRACT

Data networks are developed to tackle the challenges of sharing information in large amounts between the users. A plenty of data networks are established to facilitate information exchanging process. computer networks are the first version of this development which made an interface between a group of computers and permits them a facility of sharing the information and peripheries. In this paper, content base transmission of data as well as the Radio access packet network are being discussed.

Keywords: Packets blocks, circuit switching, wireless, realtime communication

INTRODUCTION

With help of local area network, set of computers had become sharing same printer and same applications installed in the server computer. Networks by whole are managed by supper computer called as server. This supper computer is nothing but one of the hosts that existed in the network and might reserve some qualities such as higher storage and higher random access memory. [1]

First computer network called as local area network was interfaced using a coaxial cable which grant it a capability of connecting a limited number of computers. Hence after, the interfacing of computer networks has further developed as broadband cables (twisted pairs cables) are invented with the RG 45 interfaces. The twisted pairs cable grant additional hosts (capacity) to the computer network [2].

Channels are essential terminology in networks and communications context; it is considered as data path or medium that allow data to propagate along with their overheads from the source to destination. In computer communications, channels are differed from each other especially after development of wireless communication. So-to-say, two kind of channels can be recognized in communication and computer networks namely wire channels and wireless channels [3].

Wireless communications have taken large scaled development in communication systems as more standard of network had come into light such as mobile networks and cellular communication. Furthermore, another special type of networks has developed to exchange data over short or particular know area, this called as adhoc networks [4].

This kind of wireless networks are mostly seen in short range communications between laptops, mobile handsets. Adhoc networks are further developed to be used in vehicular communication and specifically used for intelligence transportation system enhancement. In this chapter, packets generation and propagation methodology are being discussed, furthermore, concept of adhoc networks and routing of packets are discussed also [5].

SWITCHING NETWORKS

Data is generated from the source and busted to destination through the channel (wire or wireless). The voyage of data from source to destination is not smooth so that data will remain stable and safe until it reaches destination. Considering that network is consists of several nodes as in Figure 1; those nodes are communicating with each other by wireless channel [5].

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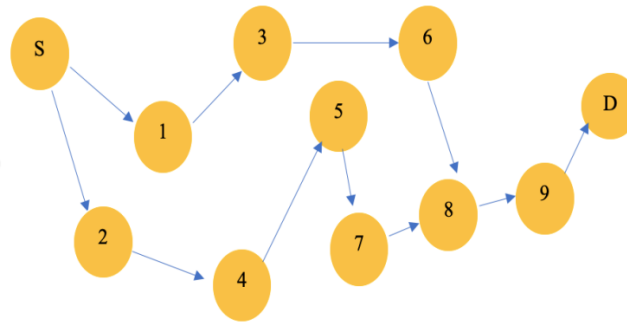


Figure 1: Depict of number of network node along with their interfaces (channels).

Firstly, data to be generated at the source node, this node can be any node among the others in the same network which is willing to communicate other node (called as distinction) by transmitting its data to it with help of channel. Data can be generated from the sensors integrated to the node.

Two types of payload can be recognized from the networks more likely, payload related to the data itself which producible by sensors attached to the nodes and other payload called as signaling payload which include routing information and all guidance required to route the data within network till it reaches the destination.

Further, data can be propagated in the network by either of following technologies:

CIRCUIT SWITCHING

Data in every node can be headed to the destination as one go type crossing all the nodes which might be exist in their way as illustrated in Figure 2. it is known that data may suffer from network degradation factors such as nose of jitter phenomena and hence the train of data sent from source node to destination node might get impacted by the said degraders which leads to information loss [6].

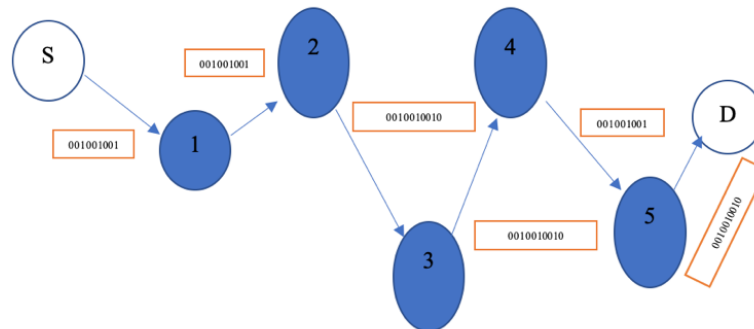


Figure 2: Circuit switching network (ordinary procedure).

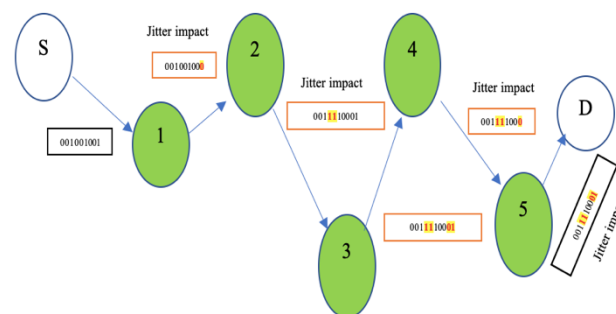


Figure 3: Circuit switching network (Jitter impact).

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Figure 3. demonstrates the impact of jitter on the data in circuit switching network which changes the data bit and hence the data reaches destination may have a lot of error which degrade the system performance.

PACKET SWITCHING

The new terminology of networks data transmission is called packets switching network. This kind of data transmission involves breaking down the data bulks into smaller blocks called as packets. So, instead of sending the whole data at once, it can be sent as a series of block (packets) that heading to destination through several paths (routes) as shown in Figure 4. packets are taking different routes in the network reaching the destination and once all packets reach destination, data re-fabrication may begin them to recover the same form of transmitted data. This method of data transmission is developed to prevent noise and jitter phenomenon of the data burst. So, if noise of any kind of interference hits the data stream in case of circuit switching network, it might destroy the entire data. On the other hand, if data is broken into smaller blocks as in Figure 4. and sent to destination in many streams. In case of packet switching network, if noise or any other interference hits one packets, it cannot affect the whole data, it is also pave the road to recover original data information as recovery of small part of data is much easier then recovering the entire data [7].

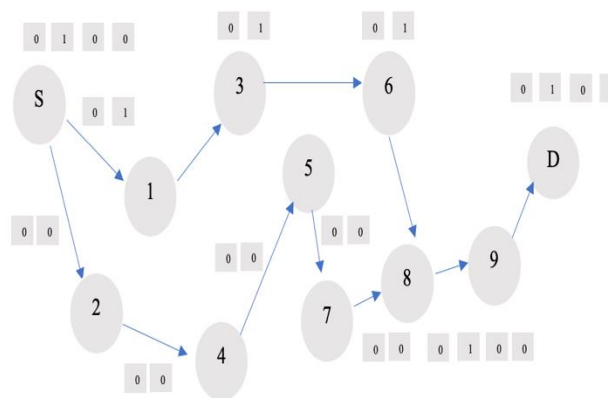


Figure 4: Packet switching technology for data transmission.

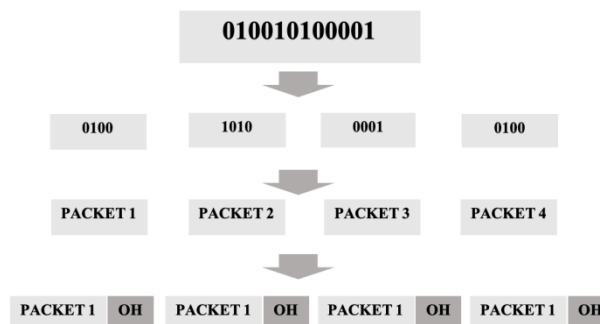


Figure 5: Packet generation process and overhead appending.

In order to understand how data is routed inside the network it is important to discuss the so call overhead or data overhead as depicted in Figure 4. This term is referred to the information appended by the routing algorithms in every node on the data entering that node. The content of this overhead can be listed in below:

1. Request number: referred to the number of packets that demanded by the node. In other word, it refers to the next packets required by a source node to be sent by the source node. This number is allotted to each packet and considered as packet identification number to recognize the packets and to reconstruct the data in the destination for retrieving the same sequence of packets at the source.
2. Acknowledgment number: referred to the packets receiving numbing which conforms the reception of packets.
3. Flag: refers to kind of packets more likely if that is queued packet or dropped or retransmitted.
4. IP address: in most of wireless applications, Internet protocol is used to rout the data into network and hence it allots four octets number more likely 23.50.22.10 to the rout that packet need to flow for reaching the destination.

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5. MAC address: it's a combination of numerical as well as alphabetical values that refers number of network device used to rout the data and this is allotted to the packets in their overhead for security and authentication purpose. This address is allotting to packets by their medium access protocol.

The above information is appended to each packet while they travel from source to destination and however, the packet final form will be seem as shown Figure 5.

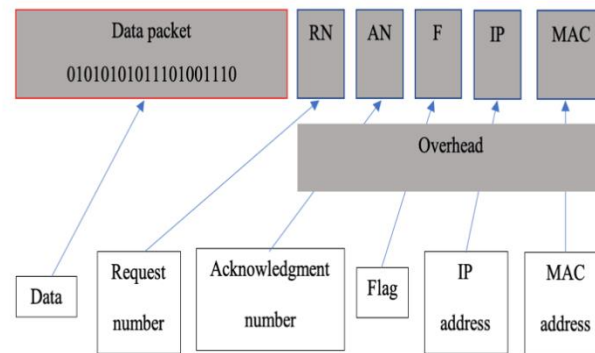


Figure 6: Packets structure which shown the contains of data and overhead

REFERENCES

- [1] T. Jeyaprakash, "A Tactical Information Management System for Unmanned Vehicles Using Vehicular Adhoc Networks," 2013 4th International Conference on Intelligent Systems, Modelling and Simulation, IEEE, 2013.
- [2] N. Islam, " A Novel Approach to Service Discovery in Mobile AdhocNetwork," 978-1-4244-2152-7/08/\$25.00©C2008IEEE.
- [3] P. Tomer, "An Application of Routing Protocols for Vehicular Ad-hoc Networks," 2010 International Conference on Networking and Information Technology, IEEE.
- [4] A. Nayyar, "Flying Adhoc Network (FANETs): Simulation Based Performance Comparison of Routing Protocols: AODV, DSDV, DSR, OLSR, AOMDV and HWMP," 978-1-5386-3060-0/18/\$31.00 ©2018 IEEE.
- [5] V. K. Tripathi, "Secure Communication with Privacy Preservation in VANET- Using Multilingual Translation," Proceedings of 2015 Global Conference on Communication Technologies(GCCT 2015), IEEE.
- [6] N. Karyemsetty, "Design and Deployment of Vehicle Tracking System in VANETs using Xbee Pro: Prototype Model," 2015 International Conference on Communication Networks (ICCN), IEEE.
- [7] A. Rahim, "Relevance Based Approach with Virtual Queue for Vehicular Adhoc Networks," COMSATS Institute of Information Technology, Islamabad, Pakistan & IEEE.

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