

# Routing in Mobile Wireless Networks for Realtime Multimedia Applications- Reuse of Virtual Circuits

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**Abstract**--Routing places an important role in determining the quality of service in wireless networks. The routing methods adopted in wireless networks have many drawbacks. This paper aims to review the current routing methods used in wireless networks. This paper proposes an innovative solution to overcome the problems in routing. This solution is aimed at improving the Quality of Service. This solution is different from others as it involves the reuse of the part of the virtual circuits. This improvement in quality of service is important especially in propagation of multimedia applications like video, animations etc. So it is the dire need to propose a new solution to improve the quality of service in ATM wireless networks for multimedia applications especially during this era of multimedia based applications.

**Keywords**--Packet buffering, Routing Table, Virtual Circuits (VC)

## I. INTRODUCTION

ACCORDING to [2] the routing methodology is based on both datagram and Virtual circuit. This may help in avoiding the delay. But it is unnecessary to follow both methods.

Routing proposed in [3] which has two phases The first phase is the construction phase which is used in initial set of roots and the second phase is maintenance phase which ensures loop free routing in case of topological changes. In most of the literature available, every time new VCs are created from source to destination whenever connection is required. In our solution, we proposed to reuse part of the old VCs along with the newly created VCs.

## II. ROUTING IN MULTIMEDIA APPLICATIONS

When multimedia applications have to be propagated in synchronous mode, there is always degradation in the quality of transmission. For Eg: When a real time video is viewed due to fluctuations in the speed of transmission a lag in the video quality could be felt.

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So the asynchronous mode i.e.ATM based transmission is the best solution for the multimedia applications. But the current routing methods adopted in the wireless networks are not very efficient as there is a delay in propagation, reduced QoS in video due to loss of cells during transmission.

## III. PROPOSED SOLUTION TO OVERCOME THE ROUTING PROBLEMS IN ATM

The solution that this paper proposes is based on utilizing part of the old virtual path. In our proposal, every base station maintains a routing table, which has two sections, namely list of paths and the second one is list of prospective shortest paths. Each cell has a memory to buffer the packets while changing VCs. In the figure 1 it is assumed the mobile node is in Cell 1 whose station is BS1. The data is transmitted from cell 1 after establishing the virtual circuit BS1-BS2-BS5-BS6-BS8- BS10. This virtual circuit has been established as the available shortest VC between cell 1 and cell 10 is not available. The shortest VC is BS1- BS2- BS5-BS7-BS10

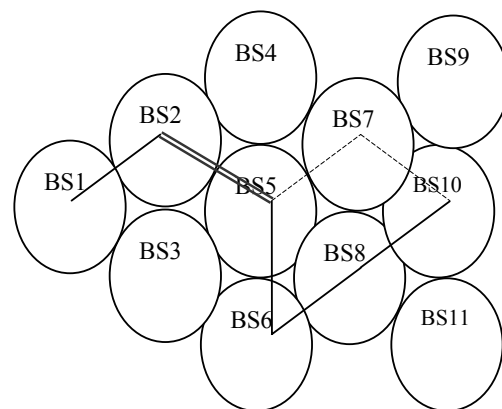


Fig. 1: Sample of the VCs Creation

TABLE I  
ROUTING TABLE MAINTAINED BY THE BASE STATIONS

Base station Number	Possible paths	Requested shortest paths
BS1	BS1 - BS2	BS1 - BS2
	BS1 - BS3	
BS2	BS2 -BS3	BS2- BS5

	BS2-BS4	
	BS2-BS5	
	BS2-BS1	
BS3	BS3-BS5	
	BS3-BS6	
	BS3-BS2	
	BS3- BS1	
BS4	BS4 – BS5	
	BS4- BS7	
	BS4 –BS2	
	BS4 –BS1	
BS5	BS5-BS7	BS5- BS7
	BS5-BS8	
	BS5- BS6	
	BS5- BS2	
	BS5- BS3	
	BS5- BS4	
BS6	BS6 –BS3	
	BS6- BS5	
	BS6-BS8	
BS7	BS7- BS4	
	BS7-BS5	BS7- BS10
	BS7- BS9	
	BS7- BS8	
	BS7- BS10	
BS10	BS10- BS7	
	BS10 – BS8	BS10-BS7
	BS10-BS11	
	BS10-BS9	

IV. RE-USAGE OF THE PART OF OLD VC WHEN THE MOBILE NODE TRAVELS IN THE SAME CELL

In the figure 1 if the data transmission between Cell 1 and Cell 10, the VC that is used currently as mentioned before is BS1-BS2-BS5-BS6-BS8-BS10. But the routing table maintains the information about the shortest VC. When the preferred shortest path is free then the existing VC is terminated and a new VC is established. In our proposed solution we consider to reuse part of the old VC which was in use. For example in the figure 1 the mobile is in Cell 1 and it follows the VC until BS5. When it reaches BS5 there are two options one is to choose BS7 which is the shortest path to reach BS10 or to continue BS6 to reach BS10 which is the already established VC. BS5 maintains the routing table in which the availability of the possible routes are dynamically changed as per the mobility of the mobile node. In this method, also when the data is transmitted each cell has a memory to buffer the data packets, so as to avoid the delay in transmission.

If the preferred shortest path is available then the new virtual path is created and added to old existing VC. Once the new VC is established the part of the old VC, which is, not needed will be terminated. The base stations will handle the termination process. The successive or the predecessor base stations will inform the base station. Assuming that in the example the preferred shortest path is available then the new VC will be BS1-BS2-BS5-BS7-BS10

V. ROUTING ADOPTED WHEN THE MOBILE NODE HANDS OVER TO OTHER CELLS

Let us assume that the mobile node switch to cell 3 then it cannot no more use part of the VC which is BS1-BS2-BS5. So a new VC is established between Cell 3 and Cell 5 which is BS3- BS5 and the part of the VC BS1-BS2-BS5 is terminated. From BS5 now the mobile unit may continue with the part of the old VC which BS5-BS6-BS8-BS10 or on the other hand if the preferred shortest path is available then a new VC from BS5-BS7-BS10 is established. Once this new VC is established automatically part of the old VC, which is BS6-BS8-BS10, will be terminated. If the bandwidth is not available to choose BS7 then the path will be on the same VC which BS6-BS8-BS10. Whenever the bandwidth at BS7 is available then the shortest VC will be created.

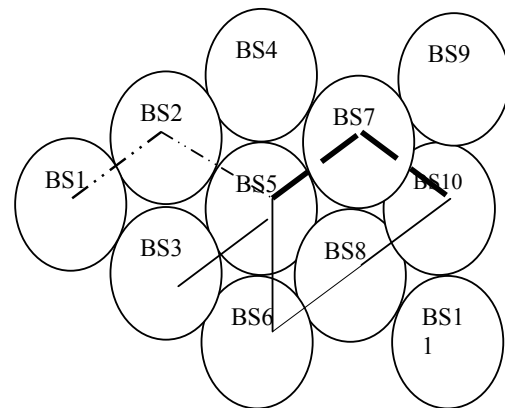


Fig. 2: Routing in case of mobile node travels from one cell to another.

VI. ALGORITHM FOR ROUTING

*If shortest path available establish VC else*  
*Establish next best VC and store the preferred shortest path information in routing table*  
*If mobile node is in same cell*  
*If the preferred shortest is available then*  
*Establish a new VC*  
*Terminate part of the Old VC.*  
*Update the routing table*  
*Buffer the data packets.*  
*IF mobile node is switched to another cell then*  
*Establish the new VC through the existing old VC*  
*Terminate the part of old VC.*

## VII. CONCLUSION

The proposed solution in establishing VCs can help to avoid delay in real-time data transmission because part of the same VCs is used. Moreover, the performance can be increased due to packet buffering in cells. This proposed approach reduced the VC establishment time and leads to improve Quality of service in mobile wireless ATM networks. This can help in better transmission method for realtime multimedia applications.

## REFERENCES

- [1] Bing Zheng et. al(1999).” Traffic management of Multimedia over ATM networks. IEEE communications magazine. Volume: 37, Issue:1 Page(s): 33-38.
- [2] T.W.Chen et.al (1997). “*Qos Routing Performance in Multihop, Multimedia Wireless networks*”. Los Angeles, CA. Proceedings of IEEE ICUPC '97.
- [3] Chunhung Richard Lin& Mario Gerla (1995). “*A distributed architecture for multimedia in dynamic wireless network*”s. University of California,Los Angeles, CA. Proceedings of IEEE GlobeCom'95, pages 1468--1472, November 1995.
- [4] Stuart D. Milner et. al (2001). “*Routing and Mobility performance in wireless base station networks*”. Proceedings of OPNETWORK .
- [5] Xukai Zou et. al.(2002)“*Routing Techniques in wireless Ad Hoc Networks –classification-comparision*”. Proceedings of the Sixth World Multiconference on Systemics, Cybernetics, and Informatics—SCL.