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Performance Evaluations of Multimedia Services over Ricean Fading Channel-based MANETs

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Abstract. Mobile Ad-hoc Networks have had increasingly attentions because of their abilities to connect nodes without relying on pre-existing network infrastructures. The wireless communication links in the mobile ad-hoc networks are very unreliable and are easily and frequently broken because of mobility, interference, channel fading and the lack of infrastructure. In this paper, we evaluate the performance of video streaming service with two ad-hoc routing protocols such as AODV and DSR in the presence of Ricean fading channel.

Keywords: MPEG4, AODV, DSR, RICEAN FADING

1 Introduction and Motivations

Mobile Ad hoc networks (MANETs) are infrastructure-less networks composed of wireless mobile nodes that cooperate with each other in disseminating connectivity information. Multimedia applications are expected to become more prevalent over MANETs in the near future. Moving Picture Expert Group version 4 (MPEG-4) gives better performances by comparing to MPEG-1 and MPEG-2.

To route data efficiently, we need routing protocol that can effectively react to the dynamic environment of the MANETs. Dynamic Source Routing (DSR) [1] is the example of reactive routing protocol that is based on the concept of source routing. Ad hoc On Demand Distance Vector (AODV) protocol [2, 3] is another example of reactive protocol. AODV protocol adopts the concept of the traditional routing tables; one entry per destination. This is in contrast to DSR protocol, maintaining multiple route-entries cached for each destination.

Wireless channels are mostly suffering from the low bandwidth and high bit error rate due to noise, interference, unpredictable user mobility, and multipath fading channels. However, no paper evaluates the performances of multimedia traffics such as MPEG-4 over MANETs with the multipath fading channels and routing protocols. Therefore, we are motivated to evaluate the performances of MPEG-4 streaming services over the multipath fading channels in MANETs.

2 Results and analysis.

All simulations are performed in Network Simulator 2 (NS2) version 2.29 [4], IEEE 802.11-based protocol defined in [5] is used for the MAC layer protocol. In addition, IEEE802.11a-based physical layer is used, which is standardized in [6].

We analyzed the Impact on End-to-End Delay and throughput in the presence of Ricean fading by varying the number of nodes from 10 to 50 in the fixed communication area of 1km x 1km. It is observed that AODV protocol provides consistent behavior on MPEG-4 streaming service in term of delay. On the other hand, the delays with DSR protocol are not acceptable in most of cases except the case with 10 nodes. Throughputs of the AODV and DSR protocols are similar with all node density for MPEG-4 transmission. AODV protocol shows better throughput if there is no fading.

We also evaluate the impact of the size of communication areas and impact of node speeds on packet delivery ratio as well as delay for multimedia streaming. In general, as the size of the communication area increases, there is a decrease in packets delivery ratio as well as delay for multimedia streaming. In the case of AODV protocol, the packet delivery ratio decreases as the node speeds increases from 10 to 30 m/s. However, for the speed from 40 to 50 m/s, there is no change in the packet delivery ratio. DSR protocol provides better performance in the MPEG4 streaming service than that AODV protocol does for all the cases. DSR protocol provides higher end-to-end delay in MPEG4 packet deliveries than AODV protocol does in all cases.

3 Conclusions

In this paper, simulation study show that AODV protocol provides shorter end-to-end delay in MPEG4 streaming service than DSR protocol while DSR protocol provides higher packet delivery ratio. During the analysis, we also observe the impact of the size of the communication areas and the speeds of nodes on the packet the delivery ratio and conclude that in both scenarios, DSR protocol provides better performance in the service than AODV protocol does in term of the packet delivery ratio.

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