The 2nd International Conference on Applied Mathematics, Modeling and Computer Simulation
(AMMCS 2022)
Paper CS310

Random Access Mechanism Based on Priority Discrimination in Internet of Things

Abstract

The prioritized random access mechanism has been researched in this paper. The current situation of large-scale node multiple access in the Internet of Things leaded to channel congestion and increased blocking rate. In M2M communication, there were a large number of nodes trying to RA. In this case, serious physical random access channel overload would occur, making it even difficult to access the network. Nodes spent a lot of time accessing the network, and even given resource management schemes could not guarantee acceptable end-to-end latency meet QoS guarantees. So, the traditional method has greater limitations in supporting different QoS in M2M communication, It would also have an unimaginable impact on the web, Therefore, it was necessary to propose a scheme to reduce the access delay while ensuring the success rate, The current priority-differentiated random access mechanism needed to consider how to match with the new features of M2M services. The reasonable random access scheme and efficiently manage the resource and allocated the channel were designed in the system where the traditional H2H service and the new M2M service coexist. The weights of different services were obtained by modeling and simulation. Therefore, by setting different threshold detecting preamble index matching service type and calling different back-off indexes to reduce the access collision, so as to optimize the random access mechanism. This study could make the node indicate its priority in the access process, and reduced the conflict and access delay. Under 5G communication technology, this solution would be widely used.

PRA scheme

Assuming that the machine node was fixed, the PRA scheme consisted of five steps. The first step was forward synchronous code transmission, the second step was RAR message transmission, the third step was TA matching, the fourth part was scheduling transmission, and the last step was competition solution .

Conclusion

This study made the access delay of high-priority nodes the shortest, but the access delay of low- priority nodes was much shorter than that of conventional schemes. In the case of higher priority nodes competing more fiercely, their access latency would increase, and lower priority nodes would increase more, so lower priority leading indexes were more strictly excluded. So this study shown thatif we give up the low-priority nodes, we could reduce the access delay of the high-priority nodes. However, the scheme only focused on collision probability and accessed delay, and even a few downlink data distribution would have an unimaginable impact on future cellular IOT scenarios with a large number of MTCD. So how to reduce the base station load, and further reduce the total load in the network continues to need further research.The network scenario considered in the dynamic preamble allocation strategy is relatively simple, in the follow-up work can further consider the coexistence of multiple delay types of MTC equipment scenarios. In addition, multiple access methods can be compared with the proposed strategies.