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Original Network Simulator

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Comparison between original network simulator and ns-3 simulator

In this file, comparison between original network simulator and ns-3 simulator is shown.

1 Scenario of the network simulation

Figure 1 shows an example of the multi-hop networks, which is an object in the scenario. The string topology as shown in Fig. 1 is one of the typical multi-hop network topologies. It is assumed that the carrier-sensing distance is twice as long as transmission one. This is because network operations with this assumption are similar to those with RTS/CTS (Request to Send/Clear to Send) handshake [1]. When the transmission distance is the same as the carrier-sensing distance, network throughput is obviously quite low because of hidden-node problems, which is outside of the analysis object. It was confirmed by actual equipment measurements that it is not a special assumption [2].

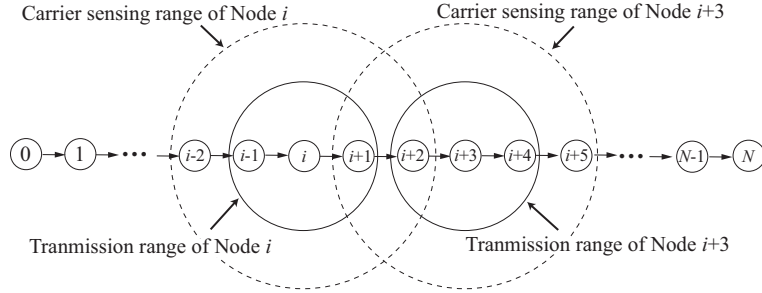


Figure 1: String-topology multi-hop network.

Table 1 gives system parameters, which are based on the IEEE 802.11a standards [3].

Table 1: System parameters for simulations and experiments

Data rate	18 Mbps
ACK bit rate	12 Mbps
Transmission range	60 m
Carrier sensing range	115 m
Distance of each node	45 m
ACK	32 μ sec
Payload size	200 bytes
SIFS time ($SIFS$)	16 μ sec
DIFS time ($DIFS$)	34 μ sec
Buffer size (K)	100 frames
slot time(σ)	9 μ sec
CW_{min}	15
CW_{max}	1023
Retransmission limit(L)	7

2 Comparison between original network simulator and ns-3 simulator

Figure 2 shows end-to-end throughput of one- and two-hop networks as a function of offered load. In one- and two-hop networks, no hidden node collision occurs. It is seen from Fig. 2 that the results from original network simulator agree with that from ns-3 simulator completely.

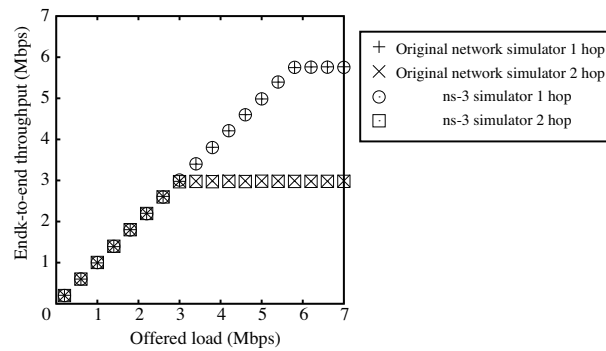


Figure 2: End-to-end throughput of one-and two-hop networks as a function of offered load.

References

- [1] K. Xu, M. Gerla, S. Bae, “Effectiveness of RTS/CTS handshake in IEEE 802.11 based ad hoc networks,” *Ad Hoc Networks*, vol. 1, no. 1, pp. 107-123, July 2003.
- [2] M. Inaba, Y. Tsuchiya, H. Sekiya, S. Sakata, K. Yagyu, “Analysis and expression of maximum throughput analysis in wireless multi-hop networks for VoIP application”, *IEICE Trans. on Communications*, vol. E92-B, no. 11, pp. 3422–3431, Nov. 2009.
- [3] IEEE Computer Society LAN MAN Standards Committee, “Part 11: Wireless LAN medium access control (MAC) and physical layer (PHY) specifications,” IEEE Std 802.11 - 1999, Aug. 1999.