Studi analitikal dari dampak mobilitas node pada skema koordinasi MAC multichannel standar IEEE 1609.4 = Analytical study of the impact of mobility node on the mac multichannel coordination scheme of the IEEE 1609.4 standard

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Abstrak

[ABSTRAK
Intelligent Transportation System (ITS) adalah salah satu teknologi yang mengintegrasikan antar sistem informasi dan teknologi komunikasi dengan infrastruktur transportasi, kendaraan, dan pengguna jalan. Salah satu implementasi teknologi Intelligent Transportation System (ITS) adalah Vehicular Ad Hoc Network (VANET). VANET merupakan sistem komunikasi kendaraan yang mendukung untuk komunikasi Vehicle to Infrastructure (V2I) dan Vehicle to Vehicle (V2V). Sebagai bagian dari Intelligent Transportation System (ITS), komunikasi kendaraan dalam jaringan VANET dapat lebih efektif dalam menghindari kecelakaan dan kemacetan lalu lintas dari pada jika setiap kendaraan mencoba untuk memecahkan masalah ini secara individual.
Standar IEEE 1609.4 didefinisikan sebagai mode operasi Multikanal jaringan VANET pada lapisan Medium Access Control (MAC) yang terdiri dari tujuh kanal frekuensi yang berbeda, yaitu satu kanal CCH178 akan dialokasikan untuk Control Channel (CCH), yang digunakan sebagai kanal publik untuk aplikasi keamanan yang relevan di jalan. Enam kanal ya ng lainnya dialokasikan untuk Service Channel (SCH), yang digunakan sebagai kanal untuk menangani layanan multimedia dan yang tidak berhubungan dengan keamanan di jalan. Salah satu permasalahan dalam penjaminan kinerja pada IEEE 1609.4 adalah tingginya mobilitas node kendaraan dan perubahan lintasan yang berbeda. Hal ini menyebabkan delay yang tinggi dan throughput yang rendah. Peningkatan kinerja pada standar IEEE 1609.4 dapat dilakukan dengan optimasi pada proses sinkronisasi interval kanal CCH dan SCH.
Pada disertasi ini dikembangkan model baru Markov chain yang bertujuan untuk meningkatkan kinerja sistem koordinasi kanal dinamis pada standar multikanal IEEE 1609.4 terhadap pengaruh anomali kinerja, slot anomali, efek Doppler, fading Nakagami dan AWGN. Perbaikan kinerja yang dilakukan terhadap pengaruh diatas adalah dengan menggunakan nilai awal optimal Contention Window (CW). Penentuan nilai awal CW akan mempengaruhi kinerja yang dihasilkan pada model Markov chain yang digunakan. Nilai awal optimal CW didapatkan dari hasil distribusi node di setiap zone dengan menggunakan distribusi Poisson.
Dari hasil simulasi dan evaluasi kinerja yang dihasilkan, dapat dianalisa bahwa model DCF yang diajukan pada disertasi ini dapat menurunkan nilai delay transmisi CCH terhadap adanya kanal propagasi Nakagami dengan rata-rata (mean) sebesar 16.84 %. Selanjutnya, dapat disimpulkan bahwa kinerja yang dihasilkan pada model Markov chain dengan menggunakan nilai awal optimal CW didapatkan meningkatkan nilai Aggregate Throughput sebesar 42.53% dibandingkan dengan model yang diajukan oleh Wang. Sedangkan model DCF yang diajukan meningkatkan nilai probabilitas transmisi paket WAVE Service Advertisement (WSA) terhadap fenomena anomalous slot dengan persentase kenaikan rata-rata (mean) sebesar 11.35 %. Selanjutnya, dapat dianalisa bahwa model DCF yang diajukan meningkatkan nilai interval waktu dari akses

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ABSTRACT
Intelligent Transportation System (ITS) is one of the technologies that integrate information systems and communication technologies with transportation infrastructures, vehicles and road users. One implementation of the Intelligent Transportation System (ITS) is Vehicular Ad Hoc Network (VANET). VANET is a vehicle communication system which supports Vehicle to Infrastructure (V2I) and Vehicle to Vehicle (V2V) communication. As a part of the Intelligent Transportation System (ITS), vehicles communication in VANET networks can be more effective in avoiding accidents and traffic congestion than if each vehicle try to solve this problem individually.
The IEEE 1609.4 standard is defined as the multichannel operation mode of VANET on Medium Access Control (MAC) layer. One of the problems in guaranteeing the performance of the IEEE 1609.4 is the high vehicular node mobility and different trajectory changes. These cause high delay and low throughput. Services Quality assurance to the IEEE 1609.4 standard can be done using optimizing the synchronization process of CCH and SCH channel intervals so that delay can be reduced and throughput saturation of SCH channel can be increased.
In this dissertation a new model of the Markov chain will be developed which aims to evaluate the performance of dynamic channel coordination system on the IEEE 1609.4 multichannel standard against performance anomalies influences, slot anomalies, the Doppler Effect, Nakagami fading and Additive White Gaussian Noise (AWGN). The performance improvements that is done to the effect above is to use the optimal initial value of Contention Window (CW). This is consistent with previous studies that have been done, the determination of the initial value of Contention Window (CW) will affect the resulting performance of the used Markov chain model. Optimal initial value Contention Window (CW) is obtained from the distribution of nodes in each zone by using the Poisson distribution.
From the simulation and performance evaluation results, it can be concluded that the DCF model in this dissertation can reduce the CCH transmission delay against the propagation channel Nakagami with an average of 16.84%. Moreover, it can be concluded that the performance of the resulting Markov chain model using the optimal initial value obtained CW increases value Aggregate Throughput of 42.8% against the effects of the anomaly performance. Meanwhile, the probability of packet transmission WSA influenced by anomalous slot with the percentage of mean increases approximately 11.35 %. Furthermore, it can be analyzed that the DCF model proposed result is the time interval CCH access contention influenced by anomalous slot with the percentage of mean increases approximately 11.31%;Intelligent Transportation System (ITS) is one of the technologies that integrate information systems and communication technologies with transportation infrastructures, vehicles and road users. One implementation of the Intelligent Transportation System (ITS) is Vehicular Ad Hoc Network (VANET). VANET is a vehicle communication system which supports Vehicle to Infrastructure (V2I) and Vehicle to Vehicle (V2V) communication. As a part of the Intelligent Transportation System (ITS), vehicles communication in VANET networks can be more effective in avoiding accidents and traffic congestion than if each vehicle try to solve this problem individually.
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