Pemodelan kompatibilitas spektrum unmanned aircraft system (UAS) dan fixed service (FS) di frekuensi 12,2-12,5 GHz untuk mendukung kondisi blos = The Spectrum compatibility model of unmanned aircraft system (UAS) and fixed service (FS) at 12,2-12,5 GHz to support blos requirement / Naufan Raharya

Naufan Raharya, author

Abstrak

[Tesis ini membuat model kompatibilitas atau frequency sharing antara Unmanned Aircraft System (UAS) dan Fixed Service (FS). UAS adalah sistem pesawat tanpa awak yang terdiri dari pengendali dan wahana udara yang dikendalikan. UAS memiliki kondisi BLOS dan LOS. FS adalah sistem komunikasi terrestrial antar dua titik di permukaan Bumi. Kompatibilitas antara FS dan UAS dimodelkan dengan interferensi antara dua sistem tersebut. Skenario interferensi tersebut diamati ketika UAV (Unmanned Aerial Vehicle) atau UA (Unmanned Aircraft), wahana udara yang dikendalikan, berada dalam kondisi BLOS dan terbang diantara sistem FS. Skenario interferensi ini terdapat dua macam, yaitu interferensi dari UAV ke FS dan interferensi dari FS ke UAV. Kompatibilitas antara FS dan UAS yang direpresentasikan oleh UAV dibutuhkan untuk mendukung operasi BLOS. BLOS (Beyond Line of Sight) diperlukan karena sinyal dari UACS (Stasiun Pengendali Pesawat tanpa Awak) memiliki keterbatasan dalam kondisi LOS (Line of Sight). Keputusan akhir dalam penetapan pita frekuensi untuk UAS ditentukan pada WRC-15 di tahun 2015. Spektrum BLOS direncanakan dengan memanfaatkan pita frekuensi dari FSS (Fixed Satellite Service). Hal ini berarti bahwa UAS akan menggunakan satelit sebagai sarana sistem kendali dalam kondisi BLOS. Masalah utama dari penyebaran UA (Unmanned Aircraft) atau UAV (Unmanned Aerial Vehicle) adalah kompatibilitas dengan sistem yang incumbent. Alokasi spektrum FSS di region 3 ITU (Asia dan Oceania) berada di pita frekuensi 12,2- 12,5 GHz. Frekuensi ini terbagi dengan sistem FS (Fixed Service). Simulasi dilakukan untuk menyelidiki interferensi dari emisi pengirim FS ke penerima UAV. Hasil simulasi menunjukkan bahwa interferensi dari FS ke UAV dan sebaliknya (vice versa) tidak melewati batas (threshold). Implikasinya frekuensi 12,2-12,5 GHz aman digunakan untuk UAV.;This thesis creates the compatibility model or frequency sharing between Unmanned Aircraft System (UAS) and Fixed Service (FS). UAS is a unmanned aerial vehicle system that consists of the control station and the controlled vehicle (UAV or UA). UAS has BLOS and LOS condition. FS is the terrestrial communication system between two points or more on the earth surface. The compatibility between FS and UAS is modeled by the interference between those two systems. The interference path is observed when the UAV (Unmanned Aircraft Vehicle), the controlled vehicle, has been in BLOS condition and flies above the FS tower. The interference scenario in this thesis has two conditions, the interference from UAV to FS and the interference from FS to UAV. The Compatibility of FS and UAS (represented by UAV) is required to support BLOS (Beyond Line of Sight). The BLOS condition is required since the signal is often bounded in LOS condition. The final decision in the establishment of UAS frequency band is determined in WRC (World Radiocommunication Conferece)-15 in 2015. The BLOS spectrum is planned to use FSS (Fixed Satellite Service) frequency band. The main problem of the unmanned aircraft (UA) or unmanned aerial vehicle (UAV) deployment is the compatibility with the incumbent system. The allocation of FSS spectrum in the region 3 (Asia and Oceania

Region) is in the band 12.2- 12.5 GHz. This frequency band is shared with the frequency of FS (Fixed Service). The simulation is conducted to investigate the interference from the FS emission into the UAV receiver. The results of simulation present that the interference from the FS to UAV and vice versa will be harmless as it does not exceed specific threshold. This suggests that the 12,2-12,5 GHz frequency band is safe for UAS Application, This thesis creates the compatibility model or frequency sharing between Unmanned Aircraft System (UAS) and Fixed Service (FS). UAS is a unmanned aerial vehicle system that consists of the control station and the controlled vehicle (UAV or UA). UAS has BLOS and LOS condition. FS is the terrestrial communication system between two points or more on the earth surface. The compatibility between FS and UAS is modeled by the interference between those two systems. The interference path is observed when the UAV (Unmanned Aircraft Vehicle), the controlled vehicle, has been in BLOS condition and flies above the FS tower. The interference scenario in this thesis has two conditions, the interference from UAV to FS and the interference from FS to UAV. The Compatibility of FS and UAS (represented by UAV) is required to support BLOS (Beyond Line of Sight). The BLOS condition is required since the signal is often bounded in LOS condition. The final decision in the establishment of UAS frequency band is determined in WRC (World Radiocommunication Conferece)-15 in 2015. The BLOS spectrum is planned to use FSS (Fixed Satellite Service) frequency band. The main problem of the unmanned aircraft (UA) or unmanned aerial vehicle (UAV) deployment is the compatibility with the incumbent system. The allocation of FSS spectrum in the region 3 (Asia and Oceania Region) is in the band 12.2- 12.5 GHz. This frequency band is shared with the frequency of FS (Fixed Service). The simulation is conducted to investigate the interference from the FS emission into the UAV receiver. The results of simulation present that the interference from the FS to UAV and vice versa will be harmless as it does not exceed specific threshold. This suggests that the 12,2-12,5 GHz frequency band is safe for UAS Application]