

ABSTRAK

IMPLEMENTASI *BLOCKCHAIN* BERBASIS *ETHEREUM* UNTUK KEMAMAN DAN VALIDASI DATA *AUTOMATED DEPENDENT SURVEILLANCE - BROADCAST (ADS-B)*

(2025: xv + xx halaman + xx gambar + xx tabel + xx lampiran)

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**PROGRAM STUDI SARJANA TERAPAN TEKNIK TELEKOMUNIKASI
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Sistem *Automatic Dependent Surveillance–Broadcast (ADS-B)* menghadapi tantangan serius terkait keamanan data karena ketiadaan enkripsi dan autentikasi, sehingga rentan terhadap serangan *spoofing*, *replay*, dan *tampering*. Penelitian ini mengkaji implementasi sistem keamanan data penerbangan berbasis *Blockchain* dengan memanfaatkan *smart contract Ethereum*, validasi *MetaMask*, dan *relay node*. Dua arsitektur diuji: sistem *MetaMask* yang mengandalkan otorisasi pengguna, dan sistem *relay* yang mengotomatisasi pengiriman data ke *Blockchain*. Pengujian menggunakan data nyata dari *OpenSky Network* dan simulasi serangan terstruktur. Hasil menunjukkan sistem *MetaMask* mencatat 96 transaksi dalam 97 blok dengan tingkat penolakan serangan 96,8%, sedangkan sistem *relay* mencatat 91 transaksi dalam 212 blok dengan tingkat penolakan 91,0%. Persentase serangan yang berhasil pada *MetaMask* sebesar 3,2% dan pada *relay* sebesar 9,0%. Temuan ini menegaskan bahwa integrasi *smart contract* dan validasi *backend* efektif meningkatkan keamanan data *ADS-B*, meskipun efisiensi pencatatan blok dan adaptivitas terhadap pola serangan baru masih perlu ditingkatkan.

Kata kunci: *ADS-B*, *Blockchain*, *Ethereum*, *MetaMask*, *smart contract*, *spoofing*, *replay*, *tampering*

ABSTRACT

IMPLEMENTATION ETHEREUM-BASED BLOCKCHAIN FOR SECURITY AND VALIDATION OF AUTOMATED DEPENDENT SURVEILLANCE – BROADCAST (ADS-B) DATA

(2025: xv + xx pages + xx pictures + xx tables + xx appendixes)

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The *Automatic Dependent Surveillance–Broadcast (ADS-B) system* faces significant data security challenges due to the absence of encryption and authentication, making it vulnerable to *spoofing, replay, and tampering attacks*. This study examines the implementation of a *Blockchain*-based aviation data security system utilizing *Ethereum smart contracts, MetaMask* validation, and *relay nodes*. Two architectures were evaluated: a *MetaMask*-based system relying on user authorization, and a *relay*-based system automating data submission to the *Blockchain*. Testing employed real data from the *OpenSky Network* and structured *attack* simulations. Results indicate that the *MetaMask* system recorded 96 transactions in 97 *Blocks* with a 96.8% *attack* rejection rate, while the *relay* system recorded 91 transactions in 212 *Blocks* with a 91.0% rejection rate. The percentage of successful *attacks* was 3.2% for *MetaMask* and 9.0% for the *relay*. These findings demonstrate that the integration of *smart contracts* and *backend* validation effectively enhances *ADS-B* data security, although further improvements in *Block* recording efficiency and adaptability to new *attack* patterns are required.

Keywords: *ADS-B, Blockchain, Ethereum, MetaMask, smart contract, spoofing, replay, tampering*