Covert Channel Based on Quasi-Orthogonal Coding

Tytuł
Covert Channel Based on Quasi-Orthogonal Coding

Typ publikacji
Artykuł

Rok
2023

Data dokładna
2023

Autorzy słownie
Zbigniew Piotrowski, Jan M. Kelner

Autorzy
Grzesiak Krystian

ISBN/ISSN
ISSN 2079-9292

Informacje dodatkowe
Electronics, 2023, 12 (10), 2249, ISSN 2079-9292
doi: 10.3390/electronics12102249
Abstract: The paper presents a method of creating a hidden channel using a signals' superposition. According to this idea, a transmitter simultaneously sends overt and covert (secret) signals, whereby the overt signal is a carrier for the covert one. Due to the need to ensure a low probability of detection for covert communication, the covert signal should have low power. This implies a number of problems relating to its correct reception. This is similar to non-orthogonal multiple access (NOMA) systems, where the collective signal is a superposition of signals with different powers dedicated to different users. In this case, the successive interference cancellation (SIC) process is used in the receiver for the separation of the component signals.

SIC requires accurate channel estimation. Even a small channel estimation error causes a significant increase in bit error rate (BER), performance degradation, or connection loss for covert transmission. This is due to the residual signal, i.e., the remnant of the cover signal after an imperfect SIC operation. The paper proposes a method of transforming (i.e., encoding) the applied hidden signal in such a way that the residual signal in the receiver is quasi-orthogonal to the hidden signal. The proposed model is based on appropriate sorting and, compared to methods with fixed constellation points, provides the covert channel with a low BER while maintaining high protection against detection as measured by the Kolmogorov–Smirnov distance. The proposed solution was tested using the USRP-2920 software-defined radio platform.

Keywords: security, steganalysis, cover channel, steganography, undetectability

Powiązane publikacje

-

Adres url strony

https://www.mdpi.com/2079-9292/12/10/2249

Plik