

SPACE COMMUNICATIONS AND NAVIGATION SYMPOSIUM (B2)
Mobile Satellite Communications and Navigation Technology (5)

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INTERFERENCE CALCULATION METHODOLOGY AND ANALYSIS ON SATELLITE UPLINK IN
SATELLITE-TERRESTRIAL INTEGRATED MOBILE COMMUNICATIONS SYSTEM**Abstract**

Currently, satellite-terrestrial hybrid communications systems have been studied and developed. In Japan, the RD project on such hybrid mobile communications system for cellular phone (called STICS) has been carried out. The interference estimation is the key issue for the system design of STICS to realize the frequency band sharing between satellite and terrestrial link. This paper proposes a detailed calculation methodology on aggregate interference level received at the satellite caused by huge number of cellular phones using terrestrial link. The basic concept of the methodology is that the service area is divided in many grids, and that the interference power from cellular phones using terrestrial link in each grid is calculated by using the number of active terminals, transmit power, propagation loss, etc. The following parameters are in consideration; traffic distribution of terminals using terrestrial link, transmit power in terminal, propagation loss depending on location (outdoor/indoor), rate of active terminal location (outdoor/indoor), etc. To evaluate the effectiveness of the methodology, we analyzed the aggregate interference level from terrestrial cellular phones in the scenario such that the terrestrial cells are located on Japanese islands and satellite multi beams on Japanese islands/sea area. Measured and statistical values are used as input values for aforementioned parameters. Calculated aggregate desired and undesired signal ratio (D/U) received by the satellite varies depending on the satellite beam location; D/U is small in the satellite beam near metropolitan area with high terrestrial traffic, high in the satellite beam on the sea area without terrestrial traffic. Average D/U indicates that the frequency band sharing between satellite and terrestrial link is possible. From these results, we conclude that this calculation methodology is useful in estimation of the interference level in STICS.