

無線電轉發站 加強海域安全

Off-air Repeater Station Enhances Maritime Safety

機

電工程署致力以最新的應用科技，協助客戶解決問題。最近的例子是向香港海關建議設置「無線電轉發站」，這是本港首項同類設施，能為偏遠海域提供無線電覆蓋，消除通訊盲點。新的轉發站有助打擊海上走私活動，大大提升了本港的海域安全。

這項目是「統一數碼通訊平台」（統一平台）優化計劃的一部分。我們受委託為該優化計劃提供設計和管理服務。統一平台是香港警務處為保障公眾安全而設立的跨部門無線電通訊系統。除了香港警務處，香港海關、醫療輔助隊、消防處、衛生署及保安局都是統一平台的當前用戶。一旦發生事故，各用戶部門便可透過統一平台作更好的協調，進行聯合行動，從而節省時間和提升資源調配效率。

為促進海事安全，加強執法以打擊非法活動，實有迫切需要擴大統一平台的海上覆蓋面。該平台的地面覆蓋雖已相當廣泛，但海域覆蓋仍見不足。

「無線電轉發站」有助消除統一平台的部分海域盲點，為用戶帶來裨益和便利。轉發站既創新又具成本效益，儘管在設計過程中遇到很多困難，例如電源、接駁、頻譜、電磁干擾和現場安裝的問題等，但最終都能成功落實。

我們為「無線電轉發站」採用現有的室內覆蓋設計，並首次應用「干擾抵消系統」，節省百份之百的頻譜資源。同時，由於我們利用現有建築物裝設轉發站，無須加建，大大減少建築廢料和對自然環境的破壞。

為記錄和分享裝設「無線電轉發站」的經驗，我們撰寫了論文，參加香港工程師學會的「年輕工程師/研究員傑出論文獎2014」比賽。該文與機電署另一篇關於香港交通燈系統的文章，已同時入選以刊登於香港工程師學會期刊 *HKIE Transactions*。

EMSD is committed to helping customers solve any problems by applying cutting-edge technology. A recent example was recommending to the Customs and Excise Department (C&ED) to install an innovative off-air repeater station, the first of its kind in Hong Kong, to provide radio coverage for critical communication in remote seawater areas which were previously blind spots. The new station has helped combat smuggling activities, greatly enhancing security on local waters.

The project was part of the improvement work of the Unified Digital Communications Platform (UDCP), for which we were engaged to provide design and administration services. UDCP is a shared system developed by the Hong Kong Police Force (HKPF) for critical radio communication among government departments for public safety. In addition to the HKPF, the C&ED, the Auxiliary Medical Service, the Fire Services Department, the Department of Health and the Security Bureau are the current users of UDCP. UDCP enables user departments to better collaborate and undertake joint operations, saving time and allocating resources more efficiently.

In view of the increasing demand for maritime safety and law enforcement against illegal activities, there is an imminent need to improve the sea coverage of UDCP, which already has extensive coverage on land but limited coverage at sea.

Our work on the off-air repeater station has helped eliminate part of the UDCP blind spots at sea and benefitted its users. The outdoor station is innovative and cost effective, and was successfully implemented in spite of the many difficulties such as power supply, connectivity, frequency spectrum, electromagnetic interference and on-site installation challenges.

We applied to the station the existing concept of indoor coverage design and used for the first time an Interference Cancellation System (ICS), thereby saving 100% of the spectrum resources. Construction waste and damage to the natural environment were also much reduced during project implementation, as the existing building was utilised and no additional structure had to be built.

To document and share the project experience, we made a submission to the HKIE Outstanding Paper Award for Young Engineers/Researchers 2014. The paper was accepted together with another EMSD paper on Traffic Signal System for publication in the *HKIE Transactions* journal.

我們將嶄新的「干擾抵消系統」技術應用到新的「無線電轉發站」，以改善「統一數碼通訊平台」的海上覆蓋面，大大增強本港的海域安全和執法工作。

We applied the latest technology of ICS to the new off-air repeater station to improve UDCP sea coverage on local waters, greatly enhancing maritime safety and law enforcement.

