

112 年委託研究報告

「依據最新國際與產業標準研擬電信管制射
頻器材及電信終端設備技術規範委託研究採
購案」

精簡英文版本

委託機關：國家通訊傳播委員會

執行單位：財團法人電信技術中心

中華民國 113 年 2 月

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依據最新國際與產業標準研擬電信管制射頻器材及電
信終端設備技術規範委託研究採購案

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受委託單位

財團法人電信技術中心

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中華民國 113 年 2 月

計畫摘要

關鍵詞：行動衛星服務、MSS、違法監聽設備、Stingray、IMSI Catcher、Rogue Base Station (RBS)、False base stations (FBS)、無人機干擾設備、C-UAS、MIMO、ADR

一、 研究緣起

鑒於無線通訊技術快速發展，本研究透過廣泛蒐集國際組織因應新興射頻器材技術標準發展趨勢，研析瞭解各國針對行動衛星服務、監聽設備、無人機干擾設備、基地臺 MIMO 檢驗技術管理規定，以及消費爭議訴訟外紛爭解決機制，同時蒐集國內廠商意見，據以對既有技術規範提供精進修訂建議，以利通傳會未來修訂我國相關規定及配套措施。

二、 研究方法及過程

本研究依據各委託辦理工作項目，採用文獻分析法、個案研究與比較分析法，並規劃辦理座談會議蒐集國內現況及產官學等意見，最終整合各研究方法與工作項目的產出，提出我國就案關行動衛星服務、監聽設備、無人機干擾設備、基地臺 MIMO 檢驗技術管理規定，以及消費爭議訴訟外紛爭解決機制之管理建議。

三、 重要發現

(一) 衛星通信業務

未來單一網路在於整合現有行動衛星服務（MSS）、地面行動通訊網路（包含 PCS），以衛星覆蓋彌補網路通訊盲區實現太空補充地面涵蓋（SCS）。此外 ESIM 隨著低軌衛星技術成熟與商業化，實現海、陸、空全面網路通訊服務之願景。

(二) 違法監聽設備

監聽設備可分為兩種類型的設備，包括被動式監聽設備的 IMSI Catcher 和主動式監聽設備的基地臺模擬器。被動式監聽設備的 IMSI Catcher 通常不會傳輸任何信號，它會擷取無線信號，並將這些信號進行解碼或解密，以進行追蹤。主動式監聽設備的基地臺模擬器，發送強於周圍合法基地臺的信號，讓範圍內的行動裝置與合法基地臺斷訊，並與基地臺模擬器建立新的連線。

(三) 無人機干擾設備

美國對反無人機系統技術有制定相關法規，其中將可合法使用無人機干擾設備的權力，授權給國防部、國土安全部、司法部及能源部的部長們，由他們分配或指派下屬單位使用無人機干擾設備，並與交通部進行協調，例如使用干擾器可能造成飛航安全或民航機運作的疑慮前，應與聯邦航空管理局長協調；本研究除研析美國法規外，整理我國目前對違法干擾設備，進行管制及罰款的條例，並參考美國在合法使用無人機干擾技術或設備的法規，提出具體建議。

(四) PLMN ALL 與 IS ALL 技術規範是否應納入 MIMO 檢測項目

我國 PLMN ALL 及 IS ALL 技術規範之法源為 3GPP 38.521 的 UE 一致性規範及 3GPP 38.141 的基地臺一致性測試，其中對於 MIMO 各項測試為性能測試 (Performance Test)，屬於終端設備製造商或行動服務提供商之產品特性與品質，非我國檢測項目所在意的電信干擾疑慮。

(五) 電信消費爭議之訴訟外紛爭解決機制 (Alternative Dispute Resolution, ADR)

國家通訊傳播委員會依電信管理法第 20 條第 1 項，指派通信業者共同成立「電信消費爭議處理中心」(以下簡稱電消中心)，針對小額電信爭議案件提供申訴與調處管道。針對手機瑕疵之認定，建議電消中心建置專業人員資料庫並於申訴調處時指派技術人員提供意見，以有效公正處理糾紛。

四、 主要建議事項

(一) 立即可行建議

1. PLMN ALL 與 IS ALL 技術規範是否應納入 MIMO 檢測項目

本研究蒐集國內儀器商與終端商意見，並研析我國 PLMN ALL 與 IS ALL 技術規範之 3GPP 參考技術規範，以及 3GPP、FCC 及 ETSI 對於 MIMO 檢測項目之功率限制，並調查 FCC ID 資料庫中 iPhone 14 之測試報告的檢測標準文件，認為我國 PLMN ALL 與 IS ALL 技術規範目前不需要納入 MIMO 檢測項目。

2. 電信消費爭議之訴訟外紛爭解決機制 (Alternative Dispute Resolution, ADR)

電信載具(如手機)雖由電信業者與手機業者共同與消費者簽訂服務及買賣契約,該等契約於實務上可認定為聯立契約,性質上應同其存續或消滅。故手機瑕疵及維修爭議應可納入「電信消費爭議處理中心」之範圍。「電信消費爭議處理中心」調處人可採雙專長制,其中一位為專業技術人員,以提高調處之成功率。此外可參考醫療爭議調處,由調處委員擔任主席,並依電信消費爭議處理機構設立與監督管理辦法第14條規定,聘任有經驗之學者、專家做為第三方公正人士。

(二) 中長期性建議

1. 衛星通信業務

針對通訊干擾與頻譜使用競合,本研究綜合 FCC 相關提案、文獻、訪談內容,提出以下建議:

- 一、衛星通訊服務推動以公益性考量
- 二、監理法規宜尊重商業自由機制
- 三、立法規範 VMES 推動及管制

2. 違法監聽設備

參考美國關於緊急警報系統規則修正案的情況說明書,要求基地臺業者提供非法存取報告、制定網路安全風險管理計畫,以及傳輸足夠的身份驗證資訊來防止錯誤訊息傳輸;參考美國與日本,違反禁用條款,

均處以重罰與不採用監聽設備取得的證據；依循專案核准方式，申請第一級電信管制射頻器材進口、申報及封存。

3. 無人機干擾設備

本研究彙整美國之無人機干擾設備相關條款，如 10 U.S. Code § 130i、6 U.S. Code § 124n 及 50 U.S. Code § 2661，參考上述條款可依法對無人機威脅採取干擾行動的單位，建議我國可授權使用無人機干擾設備之政府單位，並依據我國製造輸入及申報管理辦法第三章第 7 條第 8 項，申請第一級電信管制射頻器材進口以專案核准方式，向通傳會申請，且干擾設備具危險性，因此須定期回報、用途及狀態等相關管制規定。

ABSTRACT

Keywords: Mobile satellite service, MSS, Illegal surveillance device, Stingray, IMSI Catcher, Rogue Base Station (RBS), False base stations (FBS), Drone Jammers, C-UAS, MIMO, ADR

1. Study Background

In view of the rapid development of wireless communication technology, by extensively collecting information on how international organizations address the development trend of emerging radio frequency device technology standards, this study aims to analyze and understand the management regulations for mobile satellite service, surveillance devices, drone jammers, base station MIMO test technology, as well as the alternative dispute resolution for consumers in various countries. This study also collected the opinions from domestic manufacturers to provide improved revision recommendations for existing technical specifications so as to facilitate the National Communications Commission's future revision of Taiwan's relevant regulations and supporting measures.

2. Research Methods and Processes

Based on the various entrusted work items, this study employs literature analysis, case study, and comparative analysis, while also organizing symposiums to collect the information about current domestic situation and opinions from industry, government, and academia. With the integration of various research methods as well as the output from work items, we have eventually proposed management recommendations for Taiwan's technology

management rules on mobile-satellite service, surveillance devices, drone jammers, base station MIMO tests, and alternative dispute resolution.

3. Important Findings

(1) Satellite communications services

The vision of a future single network is to integrate the existing mobile satellite service (MSS) and terrestrial mobile communication network (including PCS), and to achieve supplemental coverage from space (SCS) by covering the network communication blind spots through satellite coverage. Furthermore, with the maturity and commercialization of low-earth-orbit (LEO) satellite technology, ESIM realizes the vision of comprehensive network communication services for land, sea, and air.

(2) Illegal Surveillance Devices

Surveillance devices can be classified into two types: the passive IMSI Catchers, and the active base station simulators. IMSI Catchers are passive devices. They typically do not transmit any signals. They capture wireless signals and then decode or decrypt them for tracking purposes. Base station simulators are active devices. They transmit signals stronger than the surrounding legitimate base stations, causing mobile devices within the range to disconnect from the legitimate base stations, and to establish new connections with the base station simulators.

(3) Drone Jammers

The United States has formulated relevant regulations on Counter-Unmanned Aircraft Systems (C-UAS) technology, which authorizes the legal use of drone jammers to the secretaries of the U.S. Department of

Defense, Department of Homeland Security, Department of Justice, and Department of Energy. They can assign their subordinate units to apply such jammers while coordinating with the Department of Transportation. More specifically, they are required to coordinate with the Director of the Federal Aviation Administration before using drone jammers that may raise concerns related to aviation safety or civil aviation operations. In addition to analyzing U.S. regulations, this study compiles existing regulations in Taiwan related to the control measures and penalties for illegal drone jammers, and provides specific recommendations by referencing U.S. regulations on the legal use of drone jamming technology or equipment.

**(4) Research on Amendment of PLMN ALL and IS ALL
Technical Specifications for MIMO Test Items**

The legal basis for the technical specifications of PLMN ALL and IS ALL in Taiwan are the UE conformance specification of 3GPP 38.521 and Base Station Conformance Testing of 3GPP 38.141, among which the various MIMO tests are performance tests regarding the product characteristics and quality of terminal device manufacturers or mobile service providers. These are not the telecommunications interference that Taiwan's testing items are concerned about.

**(5) The Alternative Dispute Resolution (ADR) for
Telecommunications Consumer Disputes**

In accordance with Article 20, paragraph 1 of the Telecommunications Management Act, the National Communications Commission has assigned telecommunications enterprises to co-establish the "Telecommunications Consumer Mediation Center" (TCMC) as a complaint handling & mediation channel for small-value telecommunications disputes. Regarding the

determination of mobile phone defects, it is recommended that TCMC create a professional personnel database and assign technicians to provide opinions during complaint & mediation processes to ensure effective and fair dispute resolution.

4. Main Recommendations

(1) Immediate Actionable Recommendations:

A. Research on Amendment of PLMN ALL and IS ALL Technical Specifications for MIMO Test Items

This study gathered the opinions from domestic instrument vendors and terminal vendors, then analyzed the 3GPP reference specification of Taiwan's PLMN ALL and IS ALL technical specifications, as well as the power limitations on the MIMO test items imposed by 3GPP, FCC, and ETSI. This study also examined the testing standard documents of the iPhone 14 testing report from the FCC ID database, which indicates that it's currently unnecessary to incorporate Taiwan's PLMN ALL and IS ALL technical specifications into the MIMO test items.

B. The Alternative Dispute Resolution (ADR) for Telecommunications Consumer Disputes

The service providers and mobile phone operators jointly sign the service and sales contracts of telecommunications carriers (such as mobile phones) with consumers, so these contracts can be regarded as joining contracts in practice. The existence or termination of such contracts should be under the existence or termination of the companies that have signed the contracts. Therefore, disputes related to smartphone defects and repairs should be included within the mediation scope of the TCMC. The

designation of TCMC mediators should follow the dual specialties principle. One of them should be a professional technician in order to increase the success rate of mediation. In addition, the medical dispute resolution can be a reference, where the mediator serves as the chairman, and third-party neutrals shall be selected from among experienced scholars and experts in accordance with Article 14 of Regulations Governing the Establishment, Supervision and Management of Telecommunications Dispute Resolution Institutions.

(2) Medium to Long-Term Recommendations

A. Satellite communications services

For the cooperation regarding communication interference and spectrum usage, this study integrated relevant FCC proposals, literature, and interview content to propose the following recommendations:

1. Promote satellite communication services based on public welfare considerations
2. Supervision regulations should respect the mechanism of commercial freedom
3. Introduce legislation for VMES promotion and control

B. Illegal Surveillance Devices

It is recommended to reference the situation summary of the U.S. Emergency Alert System rules amendment and require base station operators to provide reports of illegal access, establish cybersecurity risk management plans, and transmit sufficient authentication information to prevent the transmission of false messages; It is recommended to follow the practices in

the U.S. and Japan, imposing heavy penalties for violations of prohibitions clauses, and ensuring no evidence obtained through surveillance devices will be used; It is also recommended to implement a project approval process for applying for the import, declaration, and storage of Class 1 controlled telecommunications radio-frequency devices.

C. Drone Jammers

This study summarizes the relevant U.S. provisions for drone jammers, such as 10 U.S. Code § 130i, 6 U.S. Code § 124n, and 50 U.S. Code § 2661. After referencing the agencies that are allowed to take interference actions against drone threats in accordance with the above provisions, it is recommended that the Taiwanese Government authorize the use of drone jammers in certain government branches, and implement a project approval process for applying to National Communications Commission for Class 1 controlled telecommunications radio-frequency devices under Chapter 3, Article 7, Paragraph 8 of the Administrative Regulations on Manufacturing, Import and Report of the Controlled Telecommunications Radio-Frequency Devices. Given the potential dangers associated with jammers, regular reports shall be required, while the relevant usage and status shall be restricted in accordance with regulatory provisions.