全文摘要

物聯網技術發展時間較早，隨設備佈建之普及、已陸續有各項商業服務開始提供；另在 5G 部分，自 2018 年開始，已陸續有國家完成 5G 頻譜釋照或預計於 2019 年、2020 年釋照，釋照及監理相關機制包含共享之推動、覆蓋義務設定、垂直場域服務模式等，亦是各國討論重點，隨技術標準之成熟，物聯網及 5G 產業將加速發展，因此需持續關注國際發展動態及我國產業需求。研究團隊主要透過標竿調研方式，調研英、德、美、日、韓、中、星等國物聯網及 5G 技術、應用、監理發展趨勢，並透過訪談及座談會等方式，掌握我國發展需求，以提出適合我國物聯網及 5G 產業發展及監理政策。

在物聯網部分，由於發展已相對成熟，目前國際上討論較多，主要係著重在物聯網資安議題的強化，由於物聯網設施數量的大幅增加，但是因為單一感測設備價格低廉、生產廠商品質不一，因此容易成為資安的漏洞。國際上多透過提供資安指南、設備資安檢驗、以法規規範禁止使用相同預設密碼等措施，來改善物聯網資安品質。而我國現亦已有經濟部工業局及國家通訊傳播委員會共同發起「物聯網資訊安全標章認證計畫」，進行物聯網設備驗證。

在 5G 發展議題部分，現各國主要在進行頻譜規劃及釋照作業的執行，或透過試驗計畫方式，進行各種創新服務之早期測試。我國現亦已初步完成潛在釋出頻段規劃，預計有 3.5GHz 頻段共 270MHz、28GHz 頻段共 2500MHz。本次釋照中垂直場域服務被視為重要議題，從相關法規來看，未來垂直服務業者可透過競價、租用、MVNO 方式取得資源，亦有可能規劃專用頻段以促進產業發展。針對釋照及監理機制部分，研究團隊建議仍持續推動被動式共享以促進業者建設，為順利完成效率釋照，沿用兩階段 SMRA 小區塊虛擬位置競價，為可能之方式，但因本次釋照區塊數較多，且 3.5GHz 預定釋出頻段的鄰頻亦有可能作垂直場域專用頻譜，因此大區塊、實際位置的方式，仍亦納入探討當中；競價機制部分，若欲加快競價效率、降低業者因競價標的數量多而產生出價作業困難，則可能由 SMRA 改為 CA 機制進行拍賣。覆蓋義務上，由於目前 5G 商業模式未明，且釋出頻段

較高，不適合設定覆蓋義務，以免影響業者建設意願。

Abstract

As the technology of IoT and 5G evolve with the popularization of IoT device, several commercial services have been released. Meanwhile, some countries have completed the 5G spectrum releases in 2018, while others have planned to do so in the years to come. In addition to the auction mechanism, network coverage requirements, industrial vertical service model and network sharing regulation are also
issues discussed among benchmark countries.

In order to provide the appropriate suggestions for IoT and 5G development in Taiwan, we need to keep track of both global trend and local needs. The research team has adopted benchmark study and also held two forums and several interviews. UK, USA, Germany, Japan, Korea, Singapore and China are the main research targets. The latest IoT and 5G developing and regulatory strategies have been collected and analyzed.

With regard to IoT, the information security issues have been on the table internationally. As the number of IoT devices rises, the devices have become vulnerable to cybersecurity attacks due to poor quality of sensors. To improve the IoT information security, issuesing information security quidelines, conducting information security inspection on equipments are the most common strategies recently. In Taiwan, NCC and the Industrial Development Bureau have also jointly promoted "the IoT information security verification program" for the equipment security certification.

With regard to the 5G development, spectrum release has been under progress among many countries with test plans for innovation services. Taiwan has planned to release 270MHz spectrum in 3.5GHz as well as 2500MHz spectrum in
28GHz. Industrial vertical services model has been an emerging issue for 5G development. Currently, Industrial vertical service provider could get access to spectrum by joining the bidding or being an MVNO vendor. To

assign a dedicated spectrum for industrial vertical service usage or not is also a topic undergoing.

Other 5G managing issues are discussed below. The research team recommends facilitating the passive infrastructure sharing for reducing cost for 5G network deployment. In order to achieve efficient spectrum release, the two-stage SMRA auction with small and virtual blocks aopted last time could be a default mechanism. Nonetheless, due to the large number of blocks available, along with the possibility of adjacent spectrum to the 3.5GHz block used for the industrial vertical services, the auction format with large blocks is still under consideration. On the other hand, the SMRA format may still be shifted to CA in order to speed up the auction process. In terms of coverage obligation, the team concludes that it is unsuitable to make such obligations due to the uncertainty of 5G commercial development status, and because of the physical limitation of 3.5GHz and 28GHz. A serious coverage obligation might affect the cability of MNO to deploy 5G network.