

## COMPLETION REPORT

### **Comparative study on the Development of TV White Space Management Practices (COST-Wise-MAP) in Japan, the Philippines, and Singapore**

Lawrence Yasay Materum(+1)  
Associate Professor  
ECE Department,  
De La Salle University

Television White Space (TVWS) is a temporally and spatially unused spectrum of television (TV) broadcasting frequency channels. TVWS is generally unlicensed, so access to it could be free. It is also globally harmonized since TV channels are standard worldwide. Using TVWS makes long-range and excellent in-building penetration of wireless signals possible. Thus, enormous TVWS wireless connectivity becomes possible, like bringing down the digital divide between urban and rural areas in accessing the Internet, and broader sensing of environmental and societal data for monitoring, safety, and disaster-risk reduction and response. Generally, the entrant or secondary spectrum user's white space (WS) devices in TVWS communications systems utilize relatively low output power, strict adjacent channel emissions, and frequent access to a database to obtain channel allocation when an incumbent or primary spectrum user frees it up. Aside from the global harmonization of spectrum for TVWS, other targets yet to be harmonized include per-country regulations, geo-databases, and propagation models. Such harmonization is necessary to achieve worldwide adoption of TVWS communications and international commercial success. Otherwise, a small market for TVWS communications due to inoperability and high WS device cost due to low demand would be a consequence. Engineering-wise, interference and coexistence issues are significant considerations among the regulatory bodies and the industries they interact with within the technical realm. The development of TVWS management practices then is thus essential.

Human forces among TVWS stakeholders, namely those from the regulatory, industry (incumbent and entrant spectrum users; standardization bodies), and the market, are prominent in bringing TVWS communications systems towards success or failure. While, indeed, TVWS stakeholders in each nation could adopt or develop their TVWS regulation and usage based on a TVWS standard, future WS devices are envisioned to manage how to utilize the spectrum and available resources best. Nevertheless, given the significant investments in existing TV broadcasting equipment and its growing industry, future TVWS communications systems would not happen so soon and become widespread. However, a transition to such is expected to happen, but how?

By performing a comparative study of the development of TVWS management in Japan, the Philippines, and Singapore, the results indicate that technical harmonization is in place among these countries, including the United States and the United Kingdom. Moreover, the outcomes point to similar purposes, philosophy, and policy-making processes, though not entirely disjointed. In an optimal setting, the transition to a better TVWS system in terms of its technology prowess, equitable regulation, and mutually intangible and economic welfare to its stakeholders best happens sustainably. Achieving that transition in a scenario with differing national regulations and other stakeholder interests for spectrum and telecommunications management could result in disharmony, delayed adoption of the TVWS system, and a cycle toward bureaucracy. Thus a transition scheme tool that considers TVWS stakeholders for future TVWS systems was developed.

Publication of the Results of Research Project:

Verbal Presentation (Date, Venue, Name of Conference, Title of Presentation, Presenter, etc.)

Thesis (Name of Journal and its Date, Title and Author of Thesis, etc.)

"Development of a material for gauging sustainable transitions towards adoption and implementation of television white space communications systems," H.A. Calinao, L. Materum, J. Takada, E. Trinidad, K. Homma, K. Ota, S.A. Mazlan, & S. Rambat, *International Journal of Emerging Technology and Advanced Engineering*, pp. 39—57, vol. 11, no. 12, 2021.

"A survey and comparison of TV white space implementations in Japan, The Philippines, Singapore, The United Kingdom, and The United States," M.G. Ante, J.A. Molina, E. Trinidad, & L. Materum, *International Journal of Advanced Technology and Engineering Exploration*, pp. 780-796, vol. 8, no. 80, Jul. 2021

Book (Publisher and Date of the Book, Title and Author of the Book, etc.)