Grant reference number:	CANov2016010
Name of recipient	Dr William Liu
Name of organisation *(if applicable)*	Auckland University of Technology
Name, date and location of conference attended	IEEE Global Communications Conference (GLOBECOM) 2017, 4-8 December 2017, Marina Bay Sands, Singapore.
Amount of funding received	*$ 3000*
Budget details	*List a breakdown of any expenditure to date and compare it with your expected expenditure* The actual cost of accommodation (3 nights): 1142.51 NZ$, and the original budget is 1000NZ$. The actual cost of accommodation (3 nights) was 1142.51 NZ$ which was slightly higher than the original budget of 1000NZ$. This is mainly caused by the fluctuated exchange rate (i.e. NZ$ vs SG$) and also an Offshore Service Margins fee (23.5 NZ$) was charged on my Visa Card by ASB Bank. While the return flights cost was saved because I had scheduled this conference trip with my other business trip (paid by my school) for oversea teaching in Ho Chi Minh City, Vietnam. The teaching period was just before the conference period, thus I had requested the Orbit travel agent to schedule Singapore as the transit stopover from Ho Chi Min City to Auckland.
What were the highlights of the conference?	I had been invited by the IEEE Communications Society (ComSoC) Technical Committee on Green Communications & Computing (TCGCC) to give a presentation on the 5G for rural and low-income areas (5G4RL) initiative in their annual general meeting (AGM) in GlobeCom17. This initiative is co-led by Associated Professor Luca Chiaraviglio (at the University of Rome Tor Vergata, Italy) and myself. Dr Chiaraviglio had firstly presented our previous work (in 2016) documented in a journal paper [1] published in IEEE Communications Standard Magazine. Secondly I had presented the recent 5G4RL case study on New Zealand

[2] and also briefly reported the Data Intensive Computing and Communications for Sustainable Development (DICC4SD) workshop [3] in ITNAC2017 in Melbourne and Rural Connectivity Challenges Workshop [4] in NetHui2017 in Auckland. There were 25+ audiences attended who are most academic and researchers as well as a couple of experts from telco industrials. They were very interested on the 5G4RL initiative, especially on our new proposed 5G+SDN+UAVs based network architecture and its affordable and environment-friendly features. During my presentation, I had introduced InternetNZ and also acknowledged (with sincere thanks) this InternetNZ conference grant which enables me attending GlobeCom17. Some discussions on other potential rural access solutions (e.g., power line and visual light communications, wireless mesh networks etc.) to improve NZ connectivity was also conducted. Overall my presentation went very well and the discussions/feedbacks are very informative and valuable, and we have incorporated them to enrich our 5G4RL work.

My 5G4RL update (including the presentation and also related documents) has been deposited online at http://goo.gl/8NpwZW and publicly accessible. I had also widely distributed it among IEEE TCCGCC and TCBD (Technical Committee on Big Data), and NZIRF mailing lists to share our 5G4RL initiative, project experience and learning with wider communities.

[1] Chiaraviglio, L., Blefari-Melazzi, N., Liu, W., Gutiérrez, J.A., van de Beek, J., Birke, R., Chen, L., Idzikowski, F., Kilper, D., Monti, P. and Bagula, A., 2017. Bringing 5G into Rural and Low-Income Areas: Is It Feasible?. IEEE Communications Standards Magazine, 1(3), pp.50-57.

[2] Villapol, M., Liu, W**.,** Gutierrez, J., Chiaraviglio, L., Sathiaseelan, A., Wu, J., Bagula, A., Qadir, J., Song, J., Zhang, W., Gregory, M., and Wu, J. (2017) Connecting the Unconnected 10% of New Zealanders by 2025: Is a MahiTahi Approach Possible? Second International Workshop on Data Intensive Computing and Communications for Sustainable Development. Proceedings of the 27th International Telecommunication Networks and Applications Conference (ITNAC), Melbourne, Australia, November, 2017

[3] IEEE Data Intensive Computing and Communications for Sustainable Development workshop: http://www.itnac.org.au/2017/workshopdicc.html

[4] NetHui 2017 Rural Connectivity Challenges session: https://livestream.com/accounts/4547920/events/7909401/videos/165717004

Moreover, the Keynotes are always the most shining part of the GlobeCom conference. This year, Professor Teck Seng Low, who is Chief Executive Officer and
National Research Foundation and Prime Minister's Office Singapore, had given the 1st keynote on Powering a Smart Nation through Digital Technologies. He had reported the Singapore's transformation into a Smart Nation which is riding on the key digital capabilities in areas including data analytics, sensors and IoT devices, automated technologies, and cybersecurity. His keynote speech discussed the digital enablers and platforms that power a smart city, and how

	investments into research have helped them developing solutions to ensure the sustainability and vibrancy of Singapore as a Smart Nation. Another keynote is Asha R. Keddy who is the Vice President of Client and Internet of Things Businesses and Systems Architecture Group, the General Manager of Next Generation and Standards at Intel Corporation. She gave a talk on *Making 5G a Reality*. She had talked from the wearable devices, robots and autonomous vehicles, to smart cities, telemedicine and agriculture, there is a need for more real-time information and this connectedness is placing unprecedented demands on wireless networks. A new generation of optimized networks and devices are gearing up 5G to meet the essential speed, latency and energy efficiency requirements for these experiences. More details of these keynotes can be found in http://globecom2017.ieee-globecom.org/content/keynotes and these examples of smart nation transformation in Singapore could be referenced into our New Zealand's digitalization research and development.
What were the lowlights of the conference?	The GlobeCom is one of the flagship conferences of IEEE ComSoc, and another one is ICC. It is a very large conference and usually 3000+ people are attended. The conference is very well organized and the keynotes/technical papers/tutorials/industrial workshops are always with high quality. The only pity is the time constraint that I have to miss some sessions since it runs 10-12 sessions in parallel through 4 days.
Was their media coverage or media-worthy content at the Conference?	The media coverage (i.e., conference publicity) was mainly related to in-house communications of IEEE Communications Society (ComSoc) events and publications which are well recognized by the IEEE research and industrial communities. All information in this report should be publicly available