



NATIONAL RESEARCH FOUNDATION  
PRIME MINISTER'S OFFICE  
SINGAPORE

## JOINT PRESS RELEASE

### **NUS and Singtel establish Corporate Lab to jointly create innovative cyber security solutions for a smarter, safer Singapore**

#### ***Joint initiative part of Corporate Laboratory@University Scheme by NRF***

*Singapore, 24 October 2016* – The National University of Singapore (NUS) and Asia's leading communications group Singtel today launched the NUS-Singtel Cyber Security Research and Development Laboratory (NUS-Singtel Cyber Security Lab) to conduct research, and to develop capabilities and innovative digital solutions to protect individuals, businesses and public agencies in Singapore from a wide range of cyber threats.

The S\$42.8 million joint research laboratory, hosted by the NUS School of Computing, is supported by the National Research Foundation (NRF) Singapore under its Corporate Laboratory@University Scheme. The scheme supports the setting up of key corporate laboratories via public-private partnerships.

The new NUS-Singtel Cyber Security Lab was officially launched today by Mr Teo Chee Hean, Deputy Prime Minister and Coordinating Minister for National Security, and Chairman of NRF Singapore.

#### **Securing Cyber Space for a Smart Nation**

With increasing connectivity and the rise of the digital economy, Singapore and Singaporeans are increasingly reliant on multimedia and information communications technology for economic growth and social development. Unfortunately, these same advanced technologies often have security vulnerabilities that attackers can exploit with increasing frequency and sophistication. This has resulted in high-profile security breaches, data leakages and other cyber attacks that caused severe economic, reputational, and other damaging consequences on individuals, businesses and governments around the world. It is therefore crucial to ensure security of Singapore's key infrastructure, networks, information, websites, applications and end-user devices, as we aspire to become the world's first Smart Nation.

The NUS-Singtel Cyber Security Lab seeks to create a broad spectrum of research capabilities and novel technologies to address cyber security threats. The new laboratory is guided by two objectives. First, the Lab aims to develop novel data analytics techniques that allow IT service providers to detect and respond to

security attacks as they occur in real time. Second, the Lab aims to come up with new approaches to design and implement IT systems that are "secure by design", and thus able to resist a broad array of attacks.

NUS President Professor Tan Chorh Chuan said, "Cyber security is absolutely crucial as Singapore strives to become a smart nation powered by big data and ICT technologies. NUS has identified cyber security as a strategic research area which has strong potential for high impact technology translation, and partnership with industry. We are very excited to partner Singtel, a leader in providing infocomm products and services in Singapore and Asia. With the support from NRF, the NUS-SingTel Lab will develop innovative solutions that enhance the protection of critical data and information systems in Singapore and beyond. This Lab will also enable NUS to attract and train more students to become cyber security professionals, which is currently a key manpower gap for Singapore."

Mr Bill Chang, Chief Executive Officer, Group Enterprise at Singtel said, "Many enterprises are constantly challenged by the fast-evolving and increasingly sophisticated nature of cyber threats. Our collaboration with NUS and NRF will enhance our ability to protect enterprises and governments by developing next-generation cyber security technologies and solutions which we can quickly commercialise through our global footprint of product engineering and development centres. We also aim to attract top global talent to the Lab to groom cyber R&D professionals, and position Singapore as a strategic R&D hub for our global cyber security business."

Professor Low Teck Seng, Chief Executive Officer of NRF Singapore, said, "This is an example of an NRF's funding initiative that strengthens the connection between research and industry, so that R&D capabilities in the universities can be translated into solutions that have direct relevance in addressing national and global needs. Through this collaboration, NUS researchers will work alongside Singtel to translate cyber security research and innovations into technologies and solutions that can be deployed in Singapore, giving us the opportunity to address global challenges on cyber security with our capabilities."

Helmed by Professor David Rosenblum, Provost's Chair Professor in the Department of Computer Science at NUS School of Computing, the NUS-Singtel Cyber Security Lab will conduct research in four critical areas of cyber security. These are network, data and cloud security; predictive security analytics; Internet-of-Things and Industrial Control Systems; and future-ready cyber security systems based on quantum technology. Please refer to [Annex](#) for more details on the research themes of the NUS-Singtel Cyber Security Lab.

Over a period of five years, the NUS-Singtel Cyber Security Lab will host research activities of more than 100 research staff from NUS and Singtel. The laboratory also expects to train some 120 new cyber security professionals from undergraduate to postdoctoral level.

For media enquiries, please contact:

**For NUS**

GOH Yu Chong  
Manager, Media Relations  
Office of Corporate Relations  
National University of Singapore  
DID: +65 6601 1653  
Mobile: +65 96441674  
Email: [yuchong.goh@nus.edu.sg](mailto:yuchong.goh@nus.edu.sg)

**For Singtel**

Sonny PHUA  
Corporate Communications Manager  
DID: +65 6838 6527  
Mobile: +65 8511 7996  
Email: [sonnyphua@singtel.com](mailto:sonnyphua@singtel.com)

**For NRF**

HOH Suk Mun  
Senior Officer, Corporate Communications  
National Research Foundation, Prime Minister's Office, Singapore  
DID: +65 6694 5036  
Mobile: +65 9150 2036  
Email: [hoh\\_suk\\_mun@nrf.gov.sg](mailto:hoh_suk_mun@nrf.gov.sg)

**About National University of Singapore (NUS)**

A leading global university centred in Asia, the National University of Singapore (NUS) is Singapore's flagship university, which offers a global approach to education and research, with a focus on Asian perspectives and expertise.

NUS has 17 faculties and schools across three campuses. Its transformative education includes a broad-based curriculum underscored by multi-disciplinary courses and cross-faculty enrichment. Over 38,000 students from 100 countries enrich the community with their diverse social and cultural perspectives.

NUS has three Research Centres of Excellence (RCE) and 29 university-level research institutes and centres. It is also a partner in Singapore's fifth RCE. NUS shares a close affiliation with 16 national-level research institutes and centres. Research activities are strategic and robust, and NUS is well-known for its research strengths in engineering, life sciences and biomedicine, social sciences and natural sciences. It also strives to create a supportive and innovative environment to promote creative enterprise within its community.

For more information on NUS, please visit [www.nus.edu.sg](http://www.nus.edu.sg).

## **About Singtel**

Singtel is Asia's leading communications and ICT solutions group, providing a portfolio of services from next-generation communication, technology services to infotainment to both consumers and businesses. For consumers, Singtel delivers a complete and integrated suite of services, including mobile, broadband and TV. For businesses, Singtel offers a complementary array of workforce mobility solutions, data hosting, cloud, network infrastructure, analytics and cyber security capabilities. The Group has presence in Asia, Australia and Africa and reaches over 600 million mobile customers in 23 countries. Its infrastructure and technology services for businesses span 21 countries, with more than 370 direct points of presence in 325 cities.

For more information, visit [www.singtel.com](http://www.singtel.com).

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## **About National Research Foundation (NRF) Singapore**

The National Research Foundation (NRF) is a department within the Prime Minister's Office. The NRF sets the national direction for research, innovation and enterprise (RIE) in Singapore. It seeks to invest in science, technology and engineering, build up the technological capacity of our companies, encourage innovation by industry to exploit new opportunities that drive economic growth, and facilitate public-private partnerships to address national challenges.

Under RIE2020, NRF is committed to create greater value in Singapore from our investment in research, innovation and enterprise through 1) closer integration of research thrusts, 2) stronger dynamic towards the best teams and ideas, 3) sharper focus on value creation, and 4) better optimised RIE manpower. Visit [www.nrf.gov.sg/research/rie2020](http://www.nrf.gov.sg/research/rie2020) for more details.

## Key Research Themes of the NUS-Singtel Cyber Security Research and Development Laboratory

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Over the next five years, research staff at the NUS-Singtel Cyber Security Research and Development Laboratory will work towards developing enabling technologies and prototypes under four research themes:

- **Network, Data and Cloud Security:** There is growing interest and demand in the gathering, sharing and analysis of large volumes of data. Efforts under this research theme will focus on the common objective of facilitating secure sharing of information and resources via security services.

NUS will contribute expertise in computer network design, database systems, and data privacy techniques, including new cryptographic mechanisms, to create new services that will allow secured communication and storage of private, sensitive data in the cloud, for both individuals and enterprises.

By integrating advanced technology with its Software-Defined Networking (SDN) capabilities, Singtel would have greater situational awareness of devices and networks. This allows Singtel to detect and mitigate cyber attacks and roll-out cyber security services in a more flexible and scalable manner.

- **Predictive Security Analytics:** Research activities under this theme will involve developing technologies that automate and update organisations' predictive capabilities for early detection of potential network and software threats through analysis of a variety of data streams.

NUS will contribute expertise in machine learning, software security, human behaviour modelling and network domain knowledge to create advanced techniques and tools to enable IT systems to detect security threats and other abnormal activities, such as malicious software intrusion or leakage of data, more accurately and in real time.

With predictive security analytics, Singtel Managed Security Services can receive timely intelligence, and allow its security professionals to quickly take pre-emptive action to thwart any impending cyber threats. Further, through the aid of analytics, enterprises and government agencies will have access to relevant data and information that will help in making more accurate decisions.

- **Internet-of-Things (IoT) and Industrial Control Systems (ICS):** Cyber-physical systems collect and process fine-grained and real-time information from sensors. By integrating the information with computational algorithms and physical systems, enterprises can enhance the capability, performance, and resilience of engineered and industrial control systems. However, these systems are exposed to a wide range of vulnerabilities.

This research theme aims to develop a security platform that allows service providers to monitor, detect, and mitigate threats and unusual cyber activities. NUS will contribute expertise in developing security solutions for cyber-physical

systems, from applications and software to the physical communications medium, to develop future services such as immunity platforms for next-generation defence and protection for Internet-of-Things (IoT) devices and ICS.

Capabilities to protect the collection and exchange of data by various types of sensors will have a wide range of important applications, including smart homes, smart energy grids and smart transportation systems.

Singtel will use advanced machine learning, mathematical models and telemetry data gathered from users, mobile devices or applications and networks to develop predictive threat analysis and intelligence. This would allow Singtel to predict, discover and identify emerging, abnormal security activities before they happen.

- **Future-Ready Cyber Security Systems:** Under this theme, researchers will look into the implementation of quantum technology for communication security.

Traditional security mechanisms will become vulnerable to new attacks as data is vulnerable to cyber eavesdropping by hackers. In addition, current technology is limited as it does not provide true end-to-end data encryption.

At the Lab, researchers will use the quantum properties of light particles to facilitate the secure exchange of digital information in future quantum computers and networks. NUS, which is home to the Centre for Quantum Technologies, will provide expertise in Quantum Key Distribution (QKD), or quantum cryptography, as well as in the design and implementation of quantum-based computation and communication infrastructures.

Singtel will use QKD to deliver encrypted information over its dark/optical fibre network to provide secure communications between intended senders and recipients.