

ASEAN IVO Project 2017

Project Title:

A Hybrid Security Framework for IoT Networks

Project Progress Report

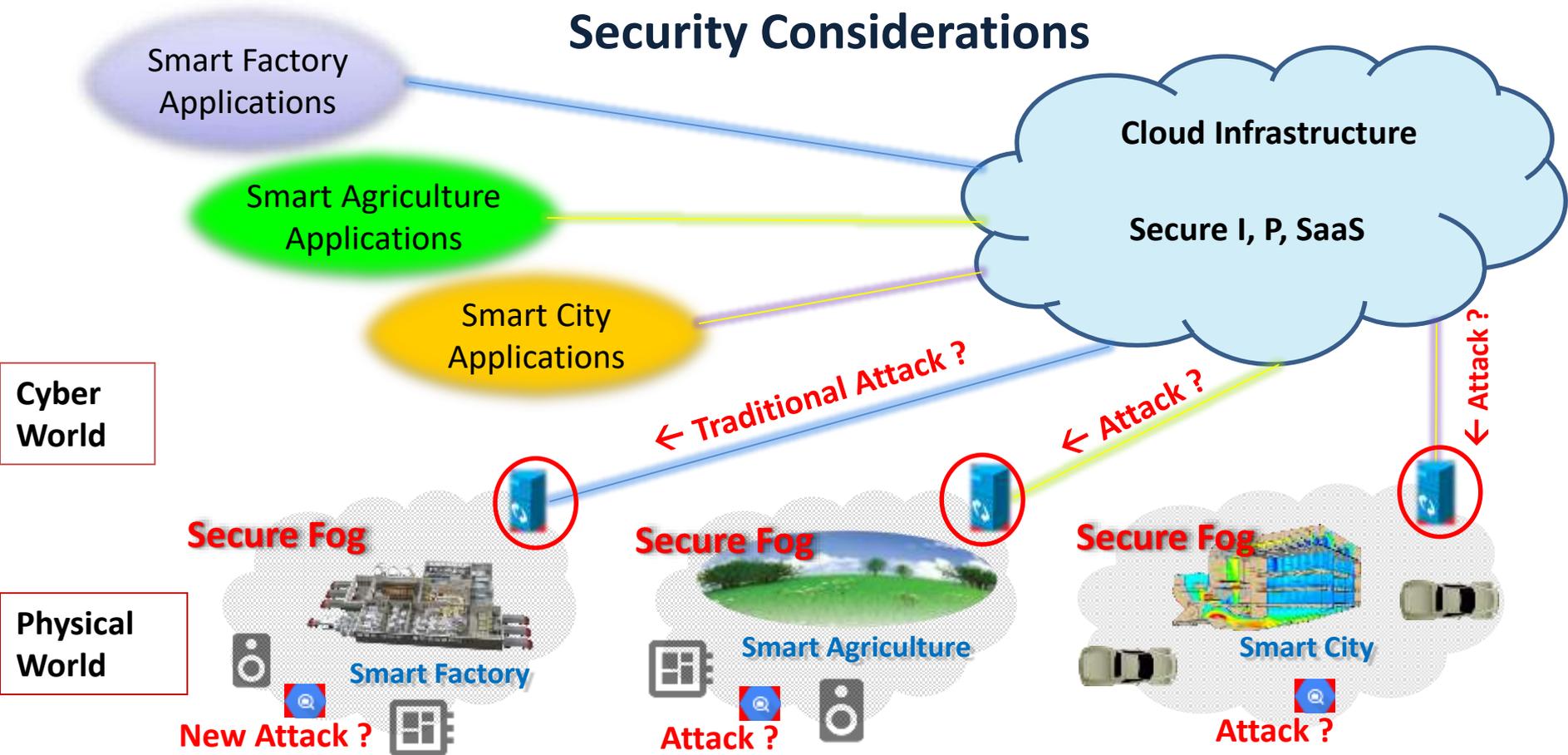
Project Members:

- PTIT (Vietnam): Prof. Hai (others: Dr.Minh, Dr.Dau, MSc.Thang, Dr.Duy,...)
- NECTEC (Thailand): Dr. Chalee (others: MSc.Ekkachan, Mr. Phitak,...)
- MIMOS Bhd (Malaysia): Dr. Choong (others: Dr. Kok, Mr. Chrishanton,...)
- HUST (Vietnam): Prof. Thu
- NUCE (Vietnam): Dr. Nga (others: MSc. Phong, MSc.Duong, MSc. Quang,...)
- NICT Security Labs (Japan): Dr. Ryoichi (invited advisors: Dr. Takahashi, Dr.Inoue)
- NES /NEC (Japan): Dr. Tamoyuki Kuroda

Presenter: Prof. Dr. Dr.Sc. HOANG Dang Hai

Brunei, 24.11.2017

A Small View of connected IoT networks and Applications: Security Considerations

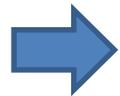


Secure Fogs: Scalable perimeter, device Identity Management / authentication
 Secure Cloud – Fog (Gateway) (C2F), secure Fog-to-Fog (F2F),
 Secure Device-to-Device (M2M) => Lightweight solutions
 Security Levels of devices (S-Labels)
 Cross-layer architecture (Vertical, Horizontal)

Desired Project Outcomes

- **To achieve scientific goals:**

- A Hybrid customizable Security Framework for IoT Networks
- A Platform for IoT Monitoring and Detection System
- A Platform for Multimedia IoT Gateway using security framework
- Case-studies: screen-sharing in Classroom (smart office, smart school), Pollution monitoring



Publishing common papers, Joint workshops.

Sharing expertise knowledge between project members

Contribution to technology push / market pull development

- **To create an open research collaboration between project members and NICT:**



Creating the links between institutions / researchers

Exchanging researchers of institutions

Promoting ASEAN IVO research results

Project Plan

First Year (04/2017 – 03/2018)

Action	Activities/ Deliverables	Month											
		Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan 2018	Feb 2018	Mar 2018
1	Kick-off meeting				25- 26 July								
2	Report on requirements, use cases	Preliminary Study											
3	Report on system design					Setup Experiments	Preparing for Labs						
4	System installation							Preparing for Labs					
5	Development, experiment and evaluation					theoretical works							
6	Workshops/ seminars				W			W	W	W	X	W	
7	Papers						1 st Paper					X	
8	1 st Project Report								prep				



Workshop we organized



Workshop we had presentations

Project Progress

- **Kick-off meeting: 25 – 26 July, 2017, Hanoi, Vietnam**
- **Attendees: 16 persons** (2 NICT, 2 NECTEC, 2 MIMOS, 10 PTIT, HUST, NUCE)
- **Objectives:**
 - Overall project proposal presentation by Project lead (motivations, objectives, overall system architecture and budget)
 - ASEAN IVO project procedure by NICT.
 - Expertise and proposal presentation by members (NECTEC, MIMOS, HUST, NUCE and PTIT)
 - Work packages, deliverables and timeline planning
 - Budgetary, process and legal guideline
- **Presentation:**
 - ASEAN IVO project procedure (Dr. Hiroshi Emoto, NICT)
 - 8 Reports of project members (NICT, PTIT, NECTEC, MIMOS, HUST, NUCE).
 - 1 Invited presentation: Dr. Takeshi Takahashi (NICT)
- **Discussions:**
 - Commit for work packages, deliverables of each team
 - Plan for further research works
 - Plan for publications/timeline
 - Other issues



Project Progress

- **Research works of Teams in Vietnam (from April – November 2017)**

- Research works on the contents:

- + Study on IoT security issues

- + Study on architecture design of Fog networks, security level

- + Study on issues of security monitoring, attack and anomaly detection, log collection and analysis.

- + Study on identity management, lightweight protocol issues, authentication and watermarking techniques.

- + 1 Paper for ICTC 2017.

- + 1 Presentation at Security Day workshop in Hanoi

- **Meeting with NES in PTIT Hanoi: in 26-27 September 2017**

- Discussion for cooperation on IoT security

- **Preparing for Labs (Oct – Dec 2017)**

- Labs for log collection, analysis

- Labs for attack monitoring

- Labs for IoT network simulation

- **Seminar with security teams of some universities in Vietnam (Security Day, 8 Oct. 2017)**

- Discussion on hot security topics in a connected world

Project Progress

- Paper to ICTC 2017 (IEEE)

ICTC2017 Final Program (Technical Paper Sessions)

October 18 (Wednesday), 2017

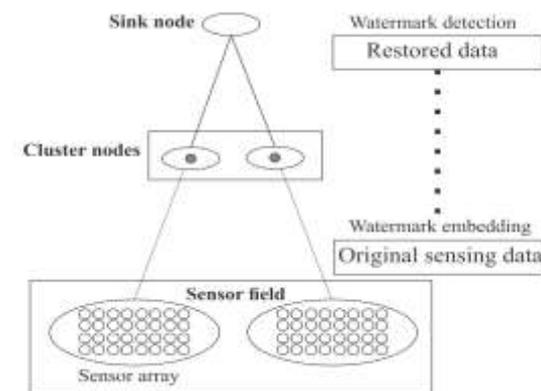
I-1.4 A Study on the Sensor Network Authentication by Utilizing a Brownian Motion Behavior

Minh H.T, Nguyen L.T, Tra N.T and Hai H.D (Posts and Telecommunications Institute of Technology, Vietnam)

Key idea: Sensor nodes identification. Identity Management. Authentication using watermark

Contribution:

- Novel authentication Scheme based on digital image watermarking technique for sensor nodes.
- Watermark data is formed utilizing the natural movement of Brownian sensor nodes.



Watermarking Scheme

Project Progress

• Research works of Team NECTEC

- Joint NECTEC-NICT Workshop [at NECTEC Annual Conference in Bangkok](#) on 11 September 2017
NICT Cybersecurity Lab (CSL) presented NICTER/Daedalus and NECTEC presented IoT Security.
- Dr. Takahashi and two engineers (NICT) visited NECTEC and installed NICTER at NECTEC between 2-3 August 2017.
- Two NECTEC researchers (Mr. Ekkachan and Mr. Phithak) visited NICT Lab between 25-27 September 2017 and discuss about ongoing results and further activities.
- Workshop at NICT for NECTEC on Network Security.

• Results

- Completed installation of NICTER/Daedalus sensors in NECTEC infrastructure.
- Completed Setting up NETPIE, IoT test platform.
- Working on a solution for IoT device connected to corporate WIFI network. Using NICTER/Daedalus to detect and alert darknet and malware (ongoing).
- just submitted a paper "Usable and Secure Cloud-based Biometric Authentication Solution for IoT Devices" authored by NECTEC and NICT (Dr.Takahashi and Dr.Inoue), to IEEE NOMS2018 Taiwan, April 2018.
- 1 presentation at Cyber Defense NECTEC-NICT workshop in Bangkok, 14-15 November 2017.

• Further activities of Teams NECTEC

- Proposal of a workshop
- Integration for a common paper about the whole framework.

Project Progress

• Research works of Team MIMOS Bhd

- Working on development of a Multimedia IoT gateway.
- For managing the issue of unintended participants, the team has started the following:
 - Securing WiFi access with WPA password control (Completed)
 - Designing and implementing central control to moderate accessibility and presentation flow (Ongoing)
 - Session management and access control (First half 2018)
 - Background traffic management to secure bandwidth usage for main presentation stream (First half 2018).
- The R&D work on tackling the issue of unauthenticated content will be started in second half of 2018.
- Publication: planning to present at 3rd International Conference on Computer and Communication Systems, April 27-30 in Nagoya, Japan.
 - :: The Multimedia IoT gateway as a whole, discuss on both the software architecture and design, then highlight the security concern with some PoC implementation in an experimental approach

Project Progress

- **Research works of Teams HUST, NUCE**

HUST:

- Study on protocol architecture design for the gateway from IoT network to cloud.
- Study on transmission protocol design.
- Preparing for paper submission.

NUCE:

- Study on Experiments, sensor test-bed (lightweight, data transfer method).
- Study on Identity issues, authentication methods.
- Preparing for paper submission.

Project Plan (to the end of the first year)

From November 2017 – March 2018

Action	Activities/ Deliverables	Month												
		Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Jan 2018	Feb 2018	Mar 2018	
1	Survey research									Yellow				
2	Labs preparation										Green	Green	Green	Green
5	Development, experiment and evaluation										Blue	Blue	Blue	Blue
6	Workshops/ seminars										Light Blue			X
7	Papers										Grey	Grey	Grey	Grey

- **Expected in the 1st project year: Until April 2018**

- At least 03 papers more → total 4 papers in the 1st year.
- One researcher exchange for project members → total 2 researcher exchange in the 1st year.
- One workshop more for project members → Total 4 workshops in the 1st year

A Hybrid Security Framework for IoT Networks

Summary of desired Scientific Goals

- **Hybrid Security Framework**

- Security Levels for Fogs, IoT devices
- Secure Fogs using scalable perimeters
- Mapping mechanism for IoT Fogs

- **Development of lightweight solutions for:**

- Secure data acquisition (identity, privacy)
- Secure data transmission/forwarding (identity, authentication)
- Access control, monitoring, detection

- **IoT Network Monitoring**

- A NICTER/NETPIE Platform for IoT Monitoring, detection of attacks
- Watermarking for network/software
- Data set building for attacks

- **Development of case-study**

- A Multimedia IoT Gateway platform for secure cross-platform screen sharing (Smart Office)
- IoT device authentication (using MAC address), Identity management
- Test-bed for secure IoT data collection (example of Vehicle traffic data acquisition).



Thank you !

Questions ?