

Appendix 4.2

**Research and development for precise positioning with Artificial Intelligence (AI) during
ionospheric disturbances in low-latitude region in ASEAN
“Project Kick-off Meeting”
Report/Minutes Form**

I. Organizer:

Name:	Prof. Dr. Pornchai Supnithi
Position:	Professor
Institution:	King Mongkut's Institute of Technology Ladkrabang (KMITL), Thailand

II. Program:

Date: 2nd – 4th August 2023

Venue: A Building, School of Engineering, King Mongkut's Institute of Technology Ladkrabang (KMITL), Thailand

Program Agenda:

Wednesday, 2nd August 2023

Participants will arrive Bangkok and check in the hotel from late afternoon to evening.
Canalis Suvarnabhumi Airport Hotel

Thursday, 3rd August 2023

- 08.15 Registration
- 08.30 Welcome speech by Dean of School of Engineering, KMITL
- 08.40 Group photo
- 08.50 Project Introduction/Timeline by Prof. Pornchai Supnithi, KMITL
- 09.10 Member Introduction Presentation (not more than 10 min./ institute)
 - 1. Chiang Mai University
 - 2. King Mongkut's University of Technology Thonburi
 - 3. National University of Laos
 - 4. Institute of Geophysics
 - 5. Cambodia Academy of Digital Technology
 - 6. Institute of Technology of Cambodia
 - 7. National Institute of Information and Communication Technology
 - 8. King Mongkut's Institute of Technology Ladkrabang, Prince of Chumphon Campus

- 9. Le Quy Don Technical University (Online)
- 10. Asian Office NICT, Thailand
- 10.30 Welcome and Administrative Issues by Dr. Hiroshi Emoto (ASEAN-IVO)
- 11.00 Coffee Break
- 11.15 Discussion Time for Role play of each institute, annual progress schedule, budget allocation of each member
- 12.15 Lunch
- 13.30 Hands-on Training session (Precise positioning technique using real-time kinematic (RTK) system) by KMITL
- 16.00 Lab Tour to KMITL's Excellence Center in GNSS and Space Weather Lab
- 16.30 Return to Hotel
- 18.30 Dinner at Suvarnabhumi Suite Hotel

Friday, 4th August 2023

- 09.00 Presentation of the SEALION Project and NICT's SW research by NICT team
- 10.00 Hands-on training session on Total Electron Content computation by KMITL
- 12:15 Lunch
- 12:45 Return to the hotel.

Participants will depart Bangkok from afternoon to evening.

III. Participants:

No.	Name	Organization
1	Somyot Kiatvanijwilai Dean of School of Engineering	KMITL, Thailand
2	Uma Seeboonruang Sn. Vice Dean of School of Engineering,	KMITL, Thailand
3	Varesa Chuwattanakul Vice Dean of School of Engineering,	KMITL, Thailand
4	Watid Phakphisut Head of Telecommunications Engineering Department	KMITL, Thailand
5	Narong Hemakon Former Head of Telecommunications Engineering Department and Space Weather Expert	KMITL, Thailand
6	Pornchai Supnithi Project Leader	KMITL, Thailand
7	Punyawi Jamjureegulgarn	Chumphon campus KMITL, Thailand

8	Kasemsuk Sepsirisuk	Chumphon campus KMITL, Thailand
9	Lin Min Min Myint	KMITL, Thailand
10	Prasert Kenpankho	KMITL, Thailand
11	Jirapoom Budtho	KMITL, Thailand
12	Somkit Sophan	KMITL, Thailand
13	Napat Tongkasem	KMITL, Thailand
14	Thananphat Thankulketsarat	KMITL, Thailand
15	Alisa Kongthon	KMUTT, Thailand
16	Phimmasone Thammavongsy	NUOL, Laos
17	Tick Sengthipphany*	NUOL, Laos
18	Phouthong Southisombath*	NUOL, Laos
19	Tharadol Komolmis	CMU, Chiang Mai, Thailand
20	Witsarut Achariyaviriya	CMU, Chiang Mai, Thailand
21	Phutphalla Kong	CADT, Cambodia
22	Soklay Heng	CADT, Cambodia
23	Sainglong Kaing	ITC, Cambodia
24	Hoang Van Phuc*	LQDTU, Vietnam
25	Nguyen Van Trung*	LQDTU, Vietnam
26	Dung Nguyen Thanh	IGP, Vietnam
27	Ha Thanh Nguyen	IGP, Vietnam
28	Takuya TSUGAWA	NICT, Japan
29	Michi Nishioka	NICT, Japan
30	Septi Perwitasari	NICT, Japan
31	Hiroshi Emoto	ASEAN-IVO, NICT, Japan
32	Nishino Hisanori	Asian Center, NICT, (Thailand)
33	Takahara Minoru	Asian Center, NICT, (Thailand)
34	Phyo C Thu**	KMITL, Thailand
35	Waritsara Rungsawang**	KMITL, Thailand
36	Efren Martin Alban Cuestas**	KMITL, Thailand
37	Gleb Mutasov**	KMITL, Thailand

**Online participant ** Observer*

IV. Summary of the activities corresponding to the objectives

The project kick-off meeting is a vital function for a research project collaborated by many institutes from various countries. Therefore, KMITL planned to organize an on-site meeting with the project members. However, some members joined the meeting through an online platform due to their time constraints. The objectives of the meeting are as follows:

- To familiarize all members with the project description, budgetary and administrative guidelines,
- To discuss how to implement the project and to distribute the tasks among the project members and institutes,

ICT Virtual Organization of ASEAN Institutes and NICT (ASEAN IVO)

- To share ideas and opinions among the project members from different countries.
- To decide the time and location of a next project meeting for project progress discussion.

The revised research plans and share of collaborative research and developments according to the discussion of the meeting are as below,

Overall Timeline

Activity/Deadlines	Apr 2023 - Sept 2023	Apr 2023 - Sept 2023
CRDA Signing	X	
Kick-off Meeting	X	
GNSS receiver purchase and RTK Setup and Test(RTK and TEC Workshop)	X	X
First Progress Meeting/ EPB and Applications Workshop		X
(6-month) Progress Report		November 20th
Annual ASEAN IVO Forum (2023)		X
(1-year) Progress Report		March 15 th 2024

Share of Collaborative Research and Development

Research and Development Description	Subcategories	NICT	KMI TL	CMU	NUOL	CAD T	ITC	IGP	KMU TT	ISI-LQDT U
A To Install GNSS receivers in Cambodia and Vietnam		2	1	-	-	2	1	2	-	-
B To analyze the EPB statistics during the solar maximum and mitigate the EPB effects	a Analyze ionospheric parameters such as foF2, h'F, spread F	2	1	1	1	-	-	2	-	-
	b Analyze TEC and ROTI	2	1	1	2	2	-	2	-	-
	c Mitigate the effects of EPB in positioning system	2	1	-	-	-	-	2	-	-
C To develop forecasting models for	a AI model from VHF radar system	2	1	-	-	-	-	-	-	-

EPB occurrences	b AI model from 2-D TEC map	2	1	-	-	-	-	2	-	-
D To develop and test RTK (Real Time Kinematics) receivers for various applications	a RTK system test	2	1	2	2	2	2	2	-	2
	b RTK base station setup	2	1	-	-	-	1	-	-	2
	c RTK application development	2	1	1	2	2	1	2	-	-
E To identify trends and emerging topics in EPB and RTK research using data mining		2	2	-	-	-	-	-	1	-

- “1” indicates the Party that takes the primary responsibility, and “2”, secondary responsibility.

Detail Project Timeline

	Research and Development Description	Subcategories	Apr 2023 - Sept 2023	Nov 2023 - Mar 2024	Apr 2024 - Sept 2024	Nov 2024 - Mar 2025
A :	To Install GNSS receiver in Cambodia and Vietnam			X	X	
B:	To analyze the EPB statistics during the solar maximum and mitigate the EPB effects	a: Analyze ionospheric parameters such as foF2, h'F, spread F	X	X	X	X
		b: Analyze TEC and ROTI	X	X	X	X
		c: Mitigate the effects of EPB in positioning system		X	X	
C	To develop forecasting models for EPB occurrences	a: AI model from VHF radar system	X	X	X	
		b: AI model from 2-D TEC map ...	X	X	X	X
D	To develop and test RTK (Real Time Kinematics) receivers for various applications	a: RTK system test		X	X	X
		b: RTK base station setup		X	X	
		c: RTK applications in such as agriculture, robotics		X	X	X
E	To identify trends and emerging topics in EPB and RTK research using data mining		X	X	X	

The main purpose of the hands-on training sessions is to disseminate the knowledge of precise positioning techniques such as Real-time kinematics (RTK), and Ionospheric error or total electron content (TEC), as part of the project goals. After the training, the participants are expected to

implement the project activities efficiently in their own institutes and communities.

V. Others



Figure 1. First day of Kick-off meeting



Figure 2. Group photos during the early part of the Kick-off meeting.



Figure 3. Presentation and Discussion by Project leader Prof. Pornchai Supnithi, KMITL

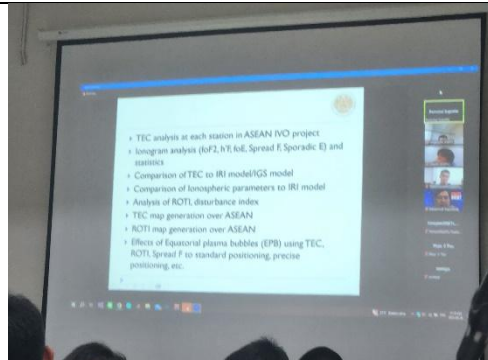


Figure 4. Presentations and Online participants



Figure 5. RTK hands-on training and discussion



Figure 6. Second day of Kick-off meeting



Figure 7. Kick-off meeting's Dinner Reception



Figure 8. TEC Analysis hands-on training and discussion