Relay Station Network Based on Low-power Wide-area Network (LPWAN) Technologies for Disaster Management

Background :

The loss of communication network is especially vital when the disasters are taking place because data under those situations are crucial either for analytics or strategic planning, such as rescue or evacuation. Thus, a backup telecommunication channel is mandatory in this case.

Targets:

We propose a relay station network as a solution to such situations. The relay station network consists of an array of relay stations that their only function is to forward the received data to the next station until the data reach the destination (base) station.

Speaker: Dr. Kanokvate Tungpimolrat
National Electronics and Computer Technology Center, Thailand

Relay Station Network Based on Low-power Wide-area Network (LPWAN) Technologies for Disaster Management

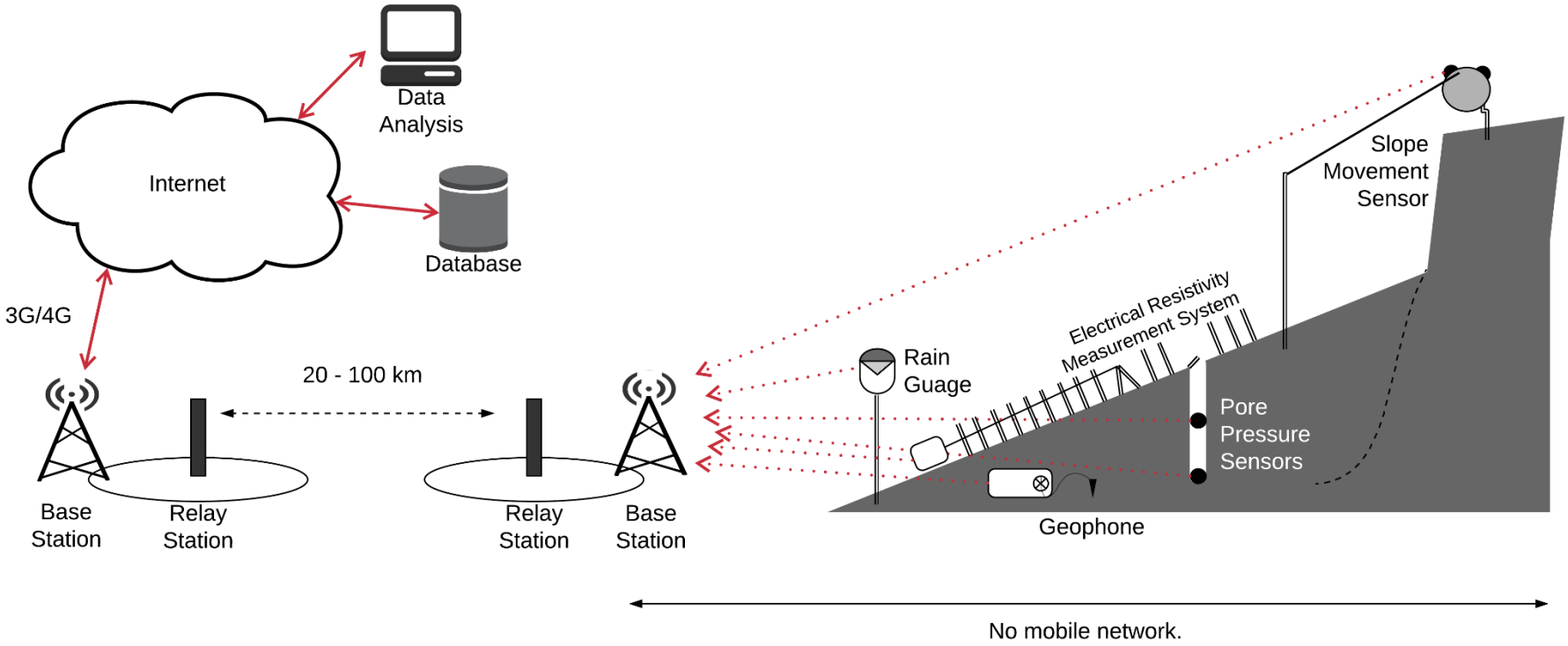
Project Members :

National Electronics and Computer Technology Center (NECTEC)
Chiang Mai Governor's Office
National Institute of Information and Communications Technology (NICT)
Universiti Teknology Brunei (UTB)
Mapua University
Advanced Science and Technology Institute (ASTI)
National University of Laos (NUoL)
Technology Computer and Electronics Institute (TCEI)
University of Computer Studies, Yangon (UCSY)

Project Duration : 2 years (Jun 2019 – May 2021)

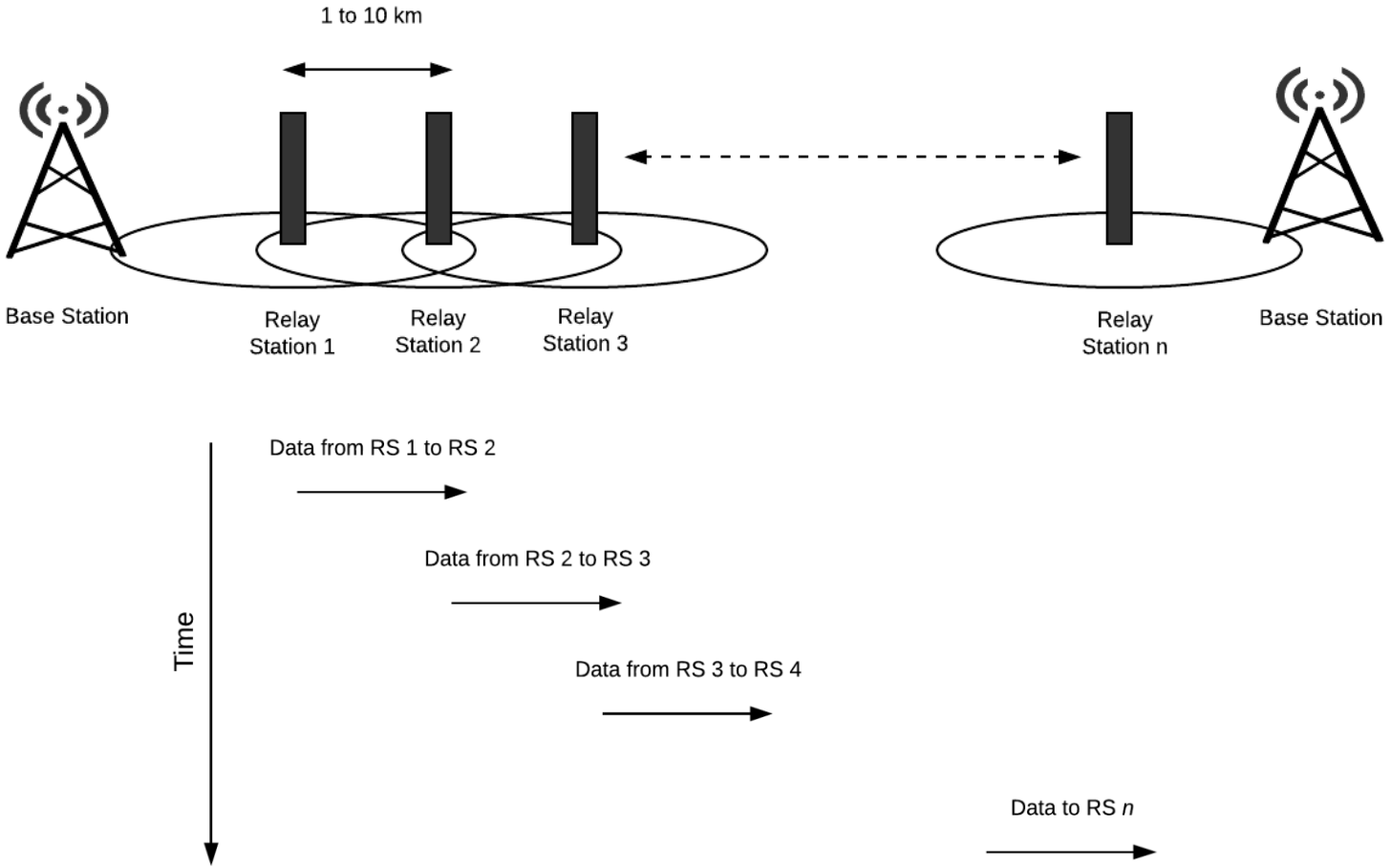
Project Activities

System Overview



Project Activities

System Overview



Project Activities

Kick-off Meeting

31 July - 1 Aug
UCSY & Thaton Computer University, Myanmar

Objectives

- To introduce all participants the project details.
- To exchange information regarding expert domains of each partner.
- To exchange information regarding frequency allocation in each country.
- To brainstorm and discuss the technologies used in this project, work breakdown, contributions, publications and action plans.
- To visit a landslide-prone area in Myanmar
- To visit Thaton Computer University
- To draft the CRDA (and hopefully, to finalize it).

Project Activities

Project Activities

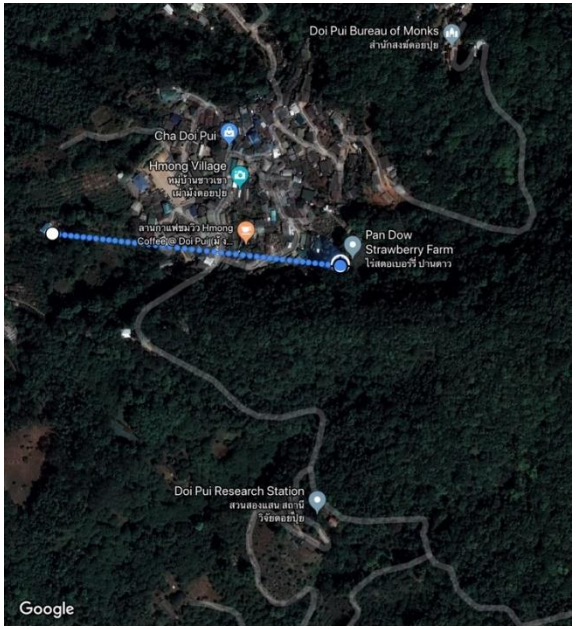
Kick-off Meeting

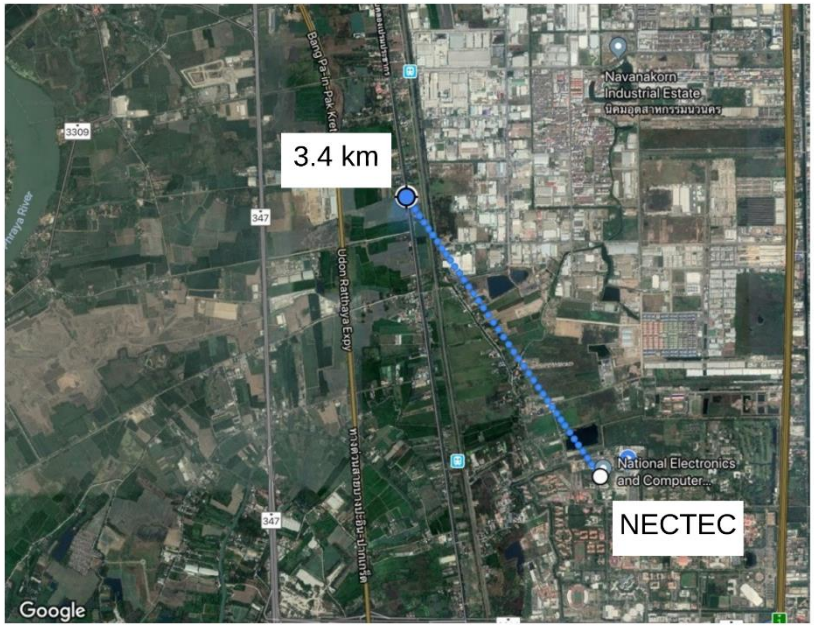
Landslide area visit and Thaton university visit

R&D results

Preliminary Experiment

Communication distance between two LoRa nodes at Doi Pui, Chiang Mai, Thailand

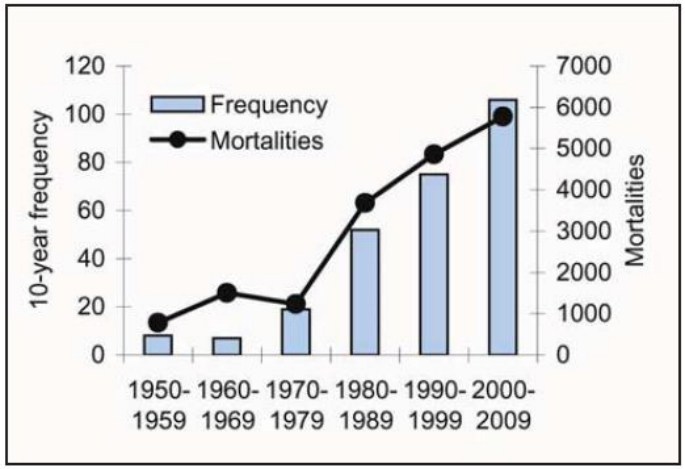


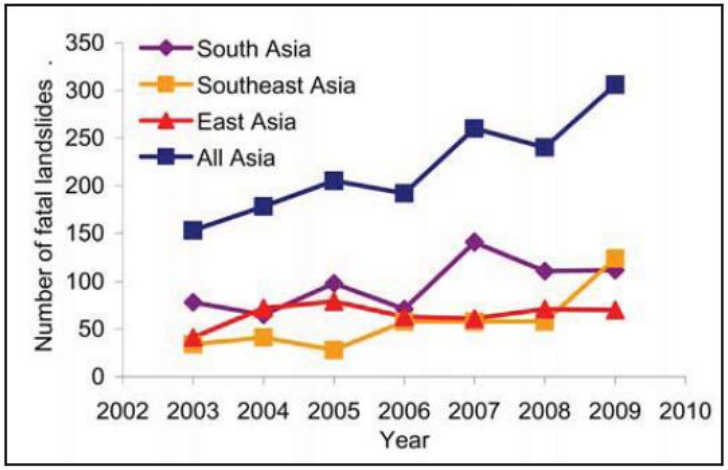


Societal Impact:

A direct social impact of this project has two folds.

- When we want to monitor environmental parameters in very rural areas where 3G/4G networks are not available and where electricity transmission via powerlines is out of reach, especially when the parameters could be triggers for disasters, a low-power-and-long-range communication channel is required. In such a case, the benefit of the proposed relay station network is crystal clear because, in order to send data from one station to another, each relay station is expected to operate by using only solar power.
- As it is known that under disaster situations (such as earthquakes or landslides) there is a high chance of losing the 3G/4G networks, and they are out of service in the areas where the disasters take place.





Source: UN

Conclusion:

Activities that have been done so far

- Preliminary experiments
- Kick-off meeting

Objectives according to the plan (as stated in the proposal)	Actual status
1. To introduce all participants the project details	Done
2. To exchange information regarding expert domains of each partner	Done
3. To exchange information regarding radio frequency allocation in each country	Done
4. To brainstorm and discuss the technologies used in this project, work breakdown, contributions, publications and action plans (for example, design plan, purchasing plan, implementation plan, installation plan and testing plan)	Partially done[1]
5. To visit a landslide-prone area in Myanmar and to visit Thaton Computer University	Done
6. To draft the CRDA	Done[2]

Future works

Year	Activity	Month											
		01	02	03	04	05	06	07	08	09	10	11	12
2019	The kick-off meeting (Myanmar)												
	2nd meeting (Thailand) (End of NOV)												
	Collect comments on CRDA from each party												
	Submit CRDA to NICT												
	Designing (NICT & NECTEC)												
2020	3rd meeting (Laos)												
	4th meeting (Philippines)												
	Implementation												
	Installation												
	Field test in Thailand												
	Field test in Japan												
	Data collection and analysis												
	Publication												
2021	Data collection and analysis												
	Publication												
	The final meeting (UTB)												

- Design and Implementation of relay stations
- Field survey and gathering requirement for solar system implementation
- Field survey for installation locations
- Field test and data collection