CASE STUDY ON

Nationwide Early Warning System (NEWS) Project Utilizing Japan's Grant Aid in the South Pacific Region.

November 2023

Communication Department
MEIDECC
TONGA

PURPOSE OF THIS SESSION

-Tonga has introduced the Nationwide Early Warning System (NEWS) under grant of Japanese Government in 2022. The System is being maintained in good condition and operated properly after one year since hand over.

-We would like to introduce on outlines and process of our project as a successful case of the Nationwide Early Warning System in this region for your reference.

Background of the Project

1. According to the World most vulnerable nations list in the Report of World Risk Report 2016 established by United Nations University, Tonga is the Second Risky Country in the world.

2. The 2009 Samoa earthquake and tsunami occurred 29th September 2009, and large tsunami hit Niuatoputapu Island, 9 peoples were died. Based on the this sad issue, we started concerning about capacity improvement of the country against natural hazards such as tsunami utilizing radio spectrum/ICT.

→ We applied APT-J2 (current CI) collaborative study with Japanese team in 2012 to find out the most appropriate solutions for Tongan situation.

Project Summary

Name of the Project:

"The Project for Introduction of Nationwide Early Warning System and Strengthening Disaster Communications"

Purpose of the Project:

- **Contribution to the alleviation of damage caused by natural disasters by making improvements in the facilities/equipment for disaster warning information.**
- **Speed up of information transmission to the general public and expand the transmission range.**

Funding scheme: **Grant aid by the Government of Japan**

Grant amount: **JPY 3,294 million (≒ US$23 million at JPY145/1US$)**

Histroy (Process we Traced)

2012 APT-J2 (C Ⅰ) Collaborative Research JTEC

2013 APT-J3 (C Ⅱ) Pilot System Project JRC JTEC

2015-2016 Proposals for Japanese Grant Aid

2016 Selected as Japanese Grant Aid Project

2017-2018 JICA Preliminary Survey (Outline Design) JTEC

2018-2019 E/N, G/A, Bidding Process JRC

2019-2022 Implementation (Delayed for 2 years due to Covid19)

Problem found and Solutions Recommended in J2(C1)

Problems	Solutions	Project Component in NEWS
Poor communication among Disaster Related Organizations	Emergency Radio Communication system with Repeaters	Component-1
Lack of Early Warning routes for the peoples in Tsunami high risk areas	Early Warning Sound Alert System	Component-2
Low reliability and low quality of Tonga Broadcasting Commission (TBC)'s Medium Wave Radio broadcasting service as the most important early warning routes especially in outer islands	- Rebuilding of TBC's main studio building and transmitter hut. - Introduce latest equipment including MW antenna mast. - Introduce 'FM-Retransmission Stations' in far remote islands for better reception.	Component-3

Three Project Components

3 VHF Repeaters
72 VHF Transceivers

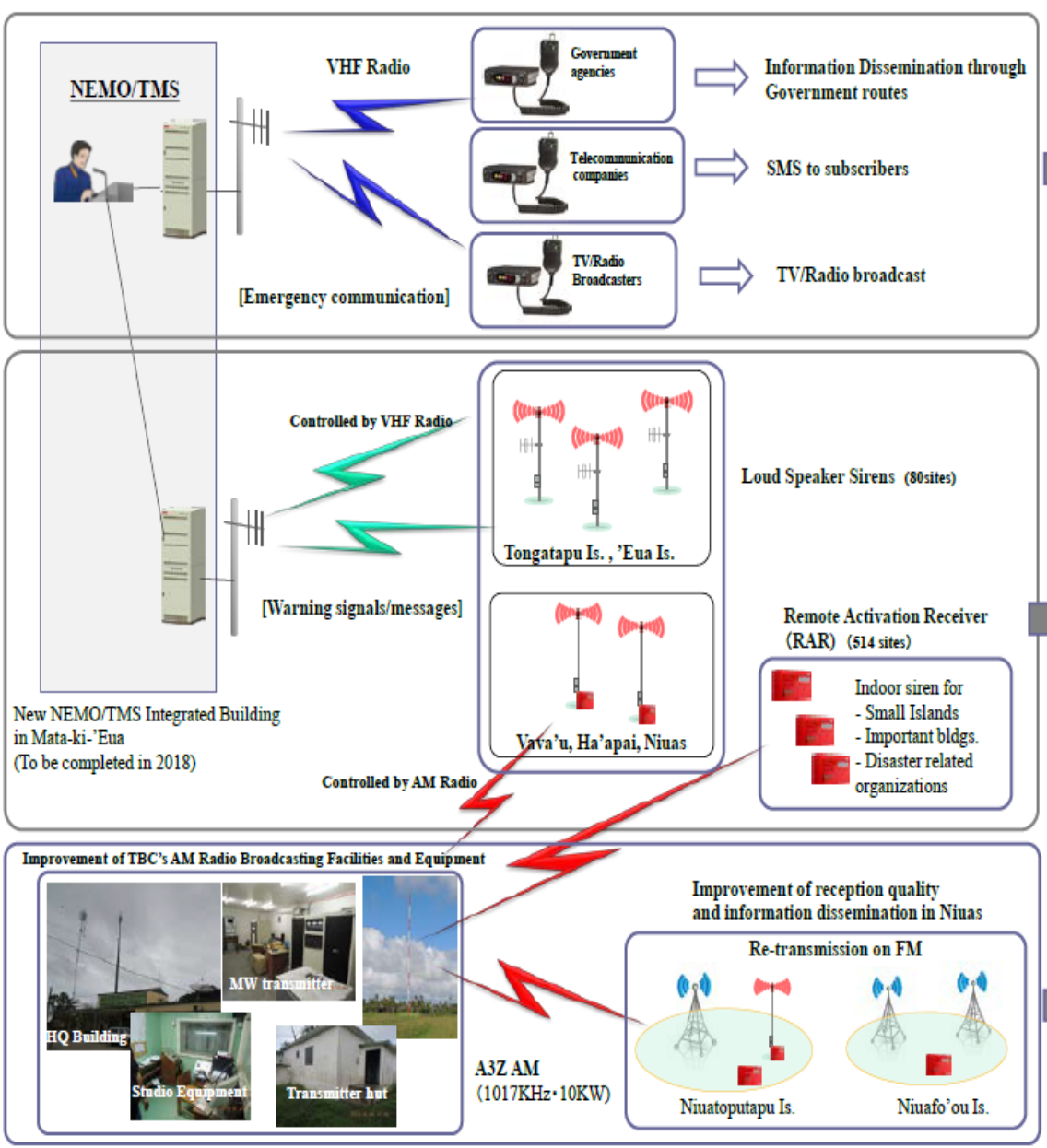
Component-1
[Emergency Radio System]

75 Outdoor Sirens
514 Indoor Sirens

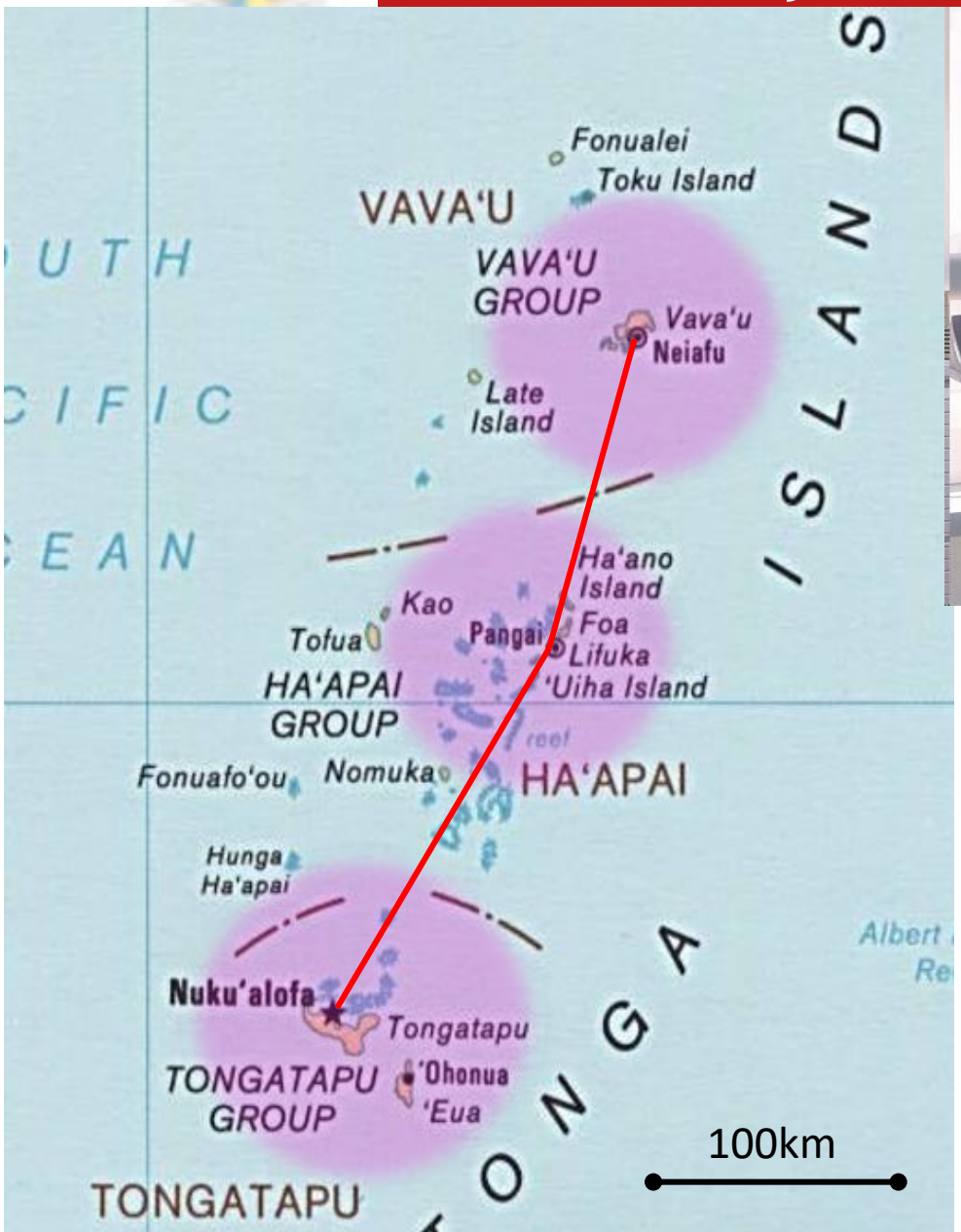
Component-2
[Early Warning Sound Alert System]

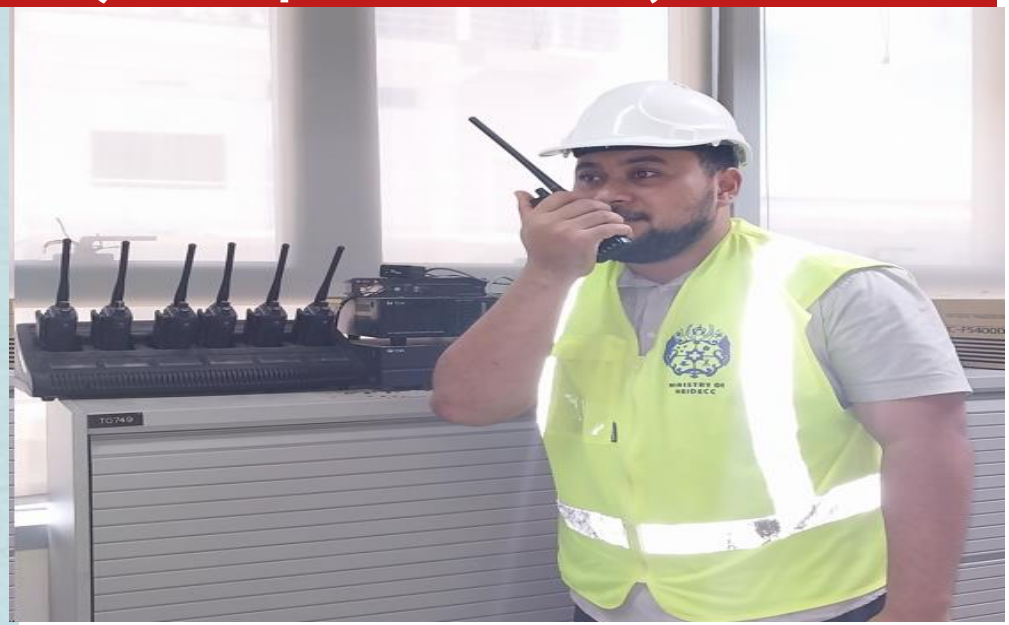
Renew of TBC building and MW systems

Component-3
[MW Radio Broadcasting System]



Outlines of VHF Emergency Radio System (Component – 1)





Wide Coverage

- 3 Digital Repeaters on 40m high tower

- Inter-Island communication available by IP-Link

IP Link for Inter-Island communication

Number of radio terminals

- Base : 15

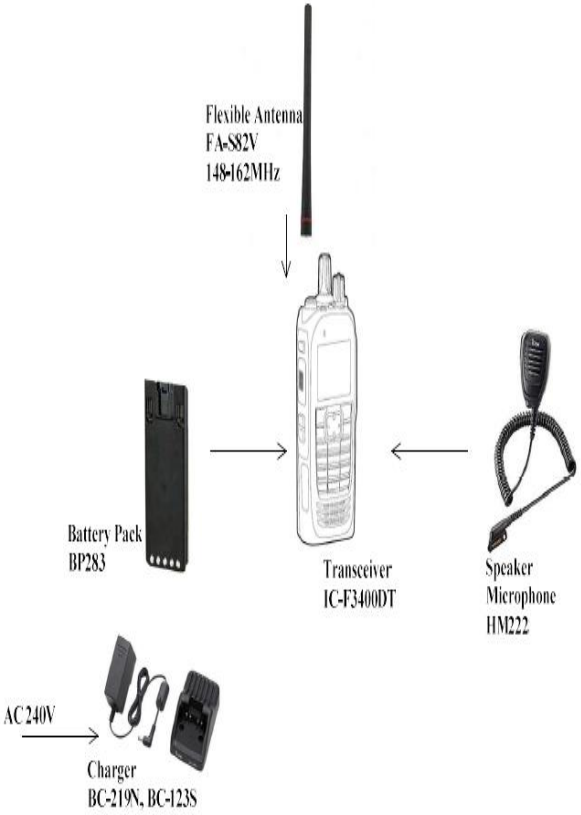
-Vehicle: 19

-Handheld: 38

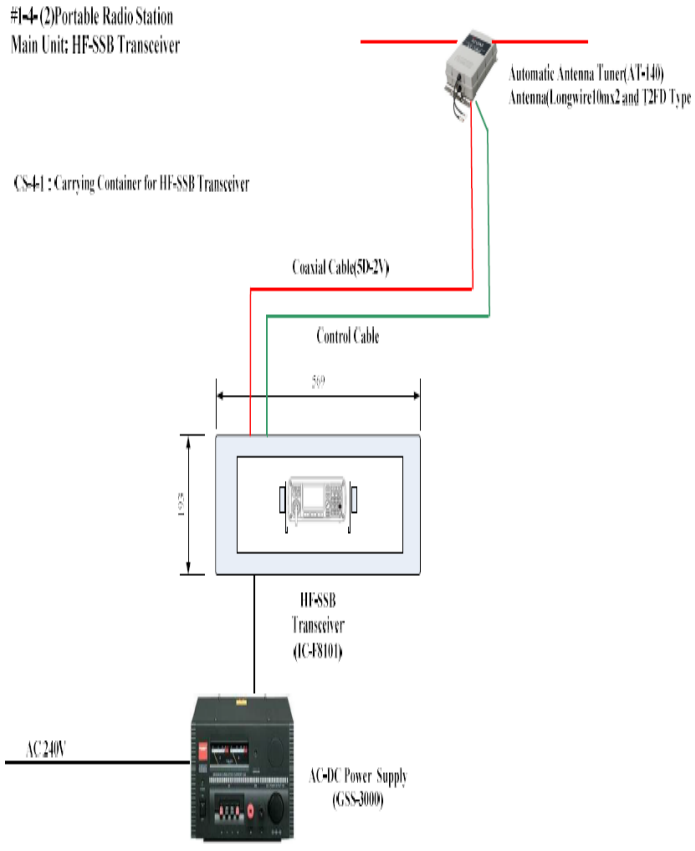
Outlines of VHF Emergency Radio System (Component – 1)

Base Station

Handheld Transceiver

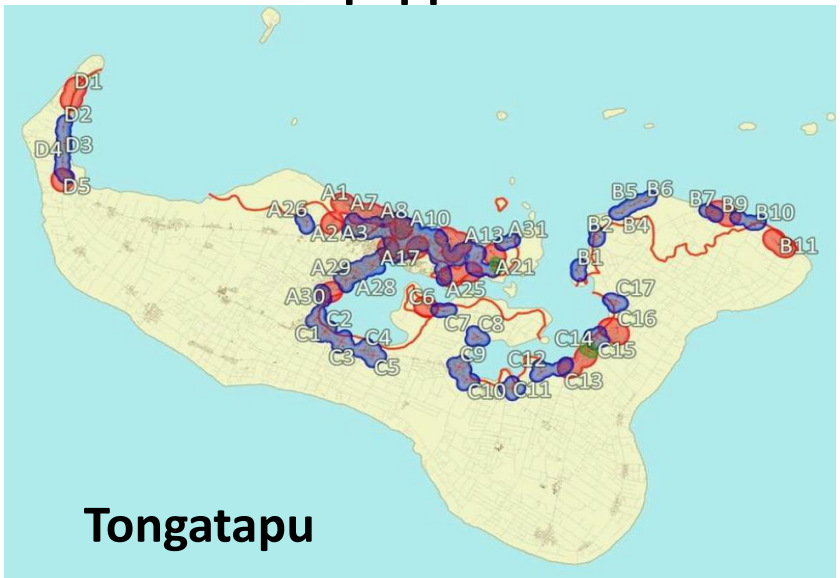


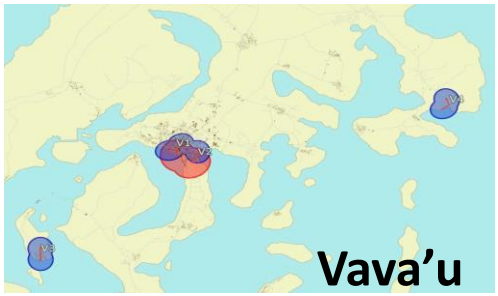
HF-SSB Transceiver

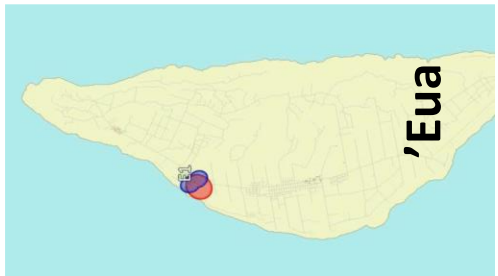


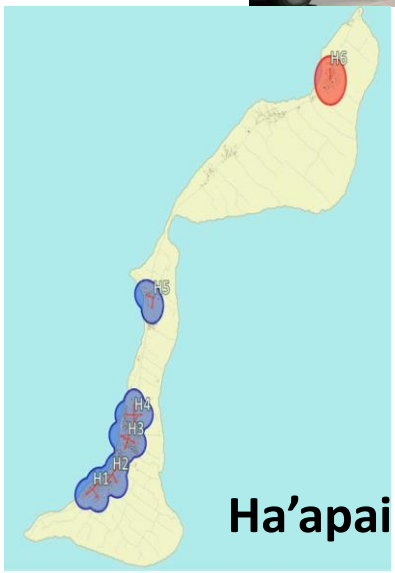
Outlines of Outline of Outdoor Siren System (Component – 2)

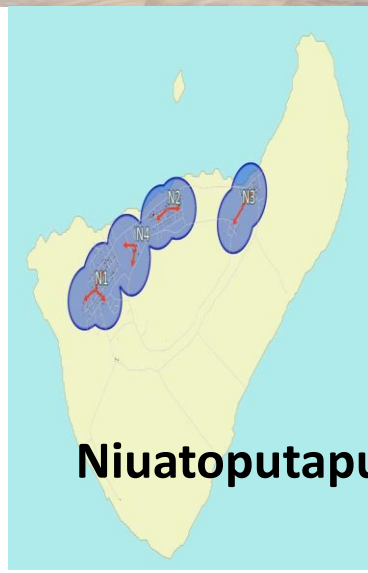
- Controlled by MET office 24/7 duty
- Using VHF (60MHz) for Tongatapu/Eua, MW EWBS Radio for outer islands
- Number of outdoor sirens: 75 locations for tsunami risky areas.
- Type of siren : Audio Speaker (Long range type. Flat wave, High power)
- Sound coverage of each siren: Approx. 500-800m radius
- Local PA equipped for town officer.









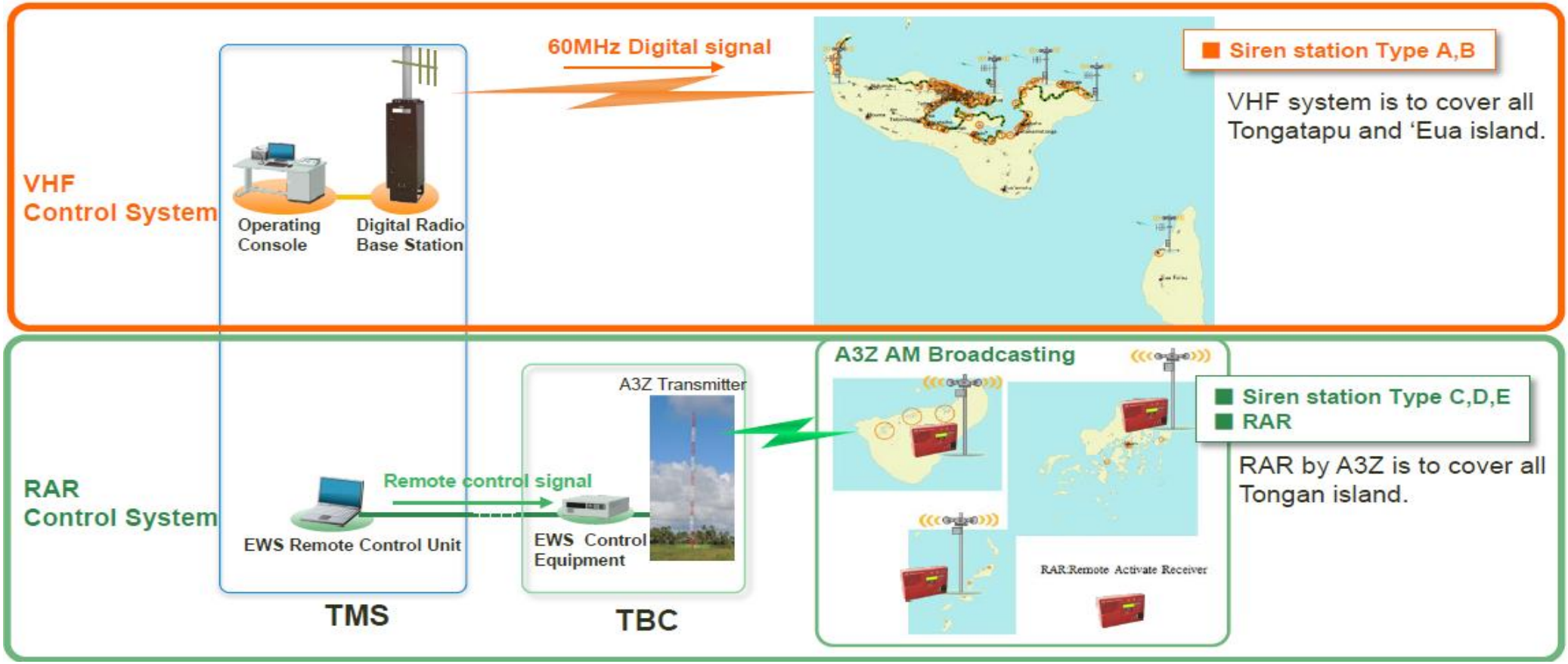


Outlines of Outline of Outdoor Siren System (Component – 2)

1. Summary of the system

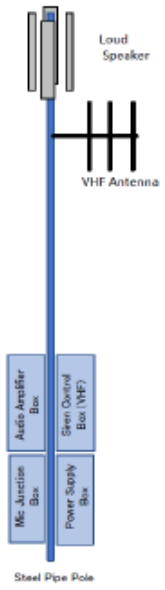
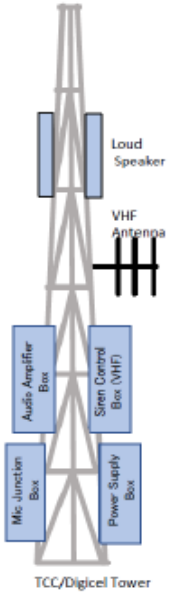
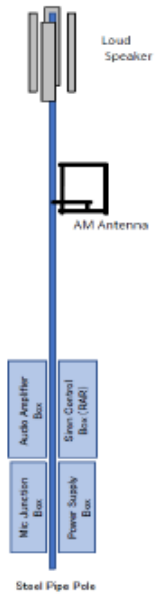
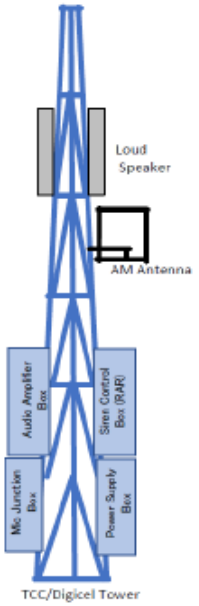
2 Types of Dissemination System

- VHF Control System (for Siren Station in Tongatapu and 'Eua)
- RAR Control System (for Siren Station in Vava'u, Ha'apai & Niuatoputapu and RAR)

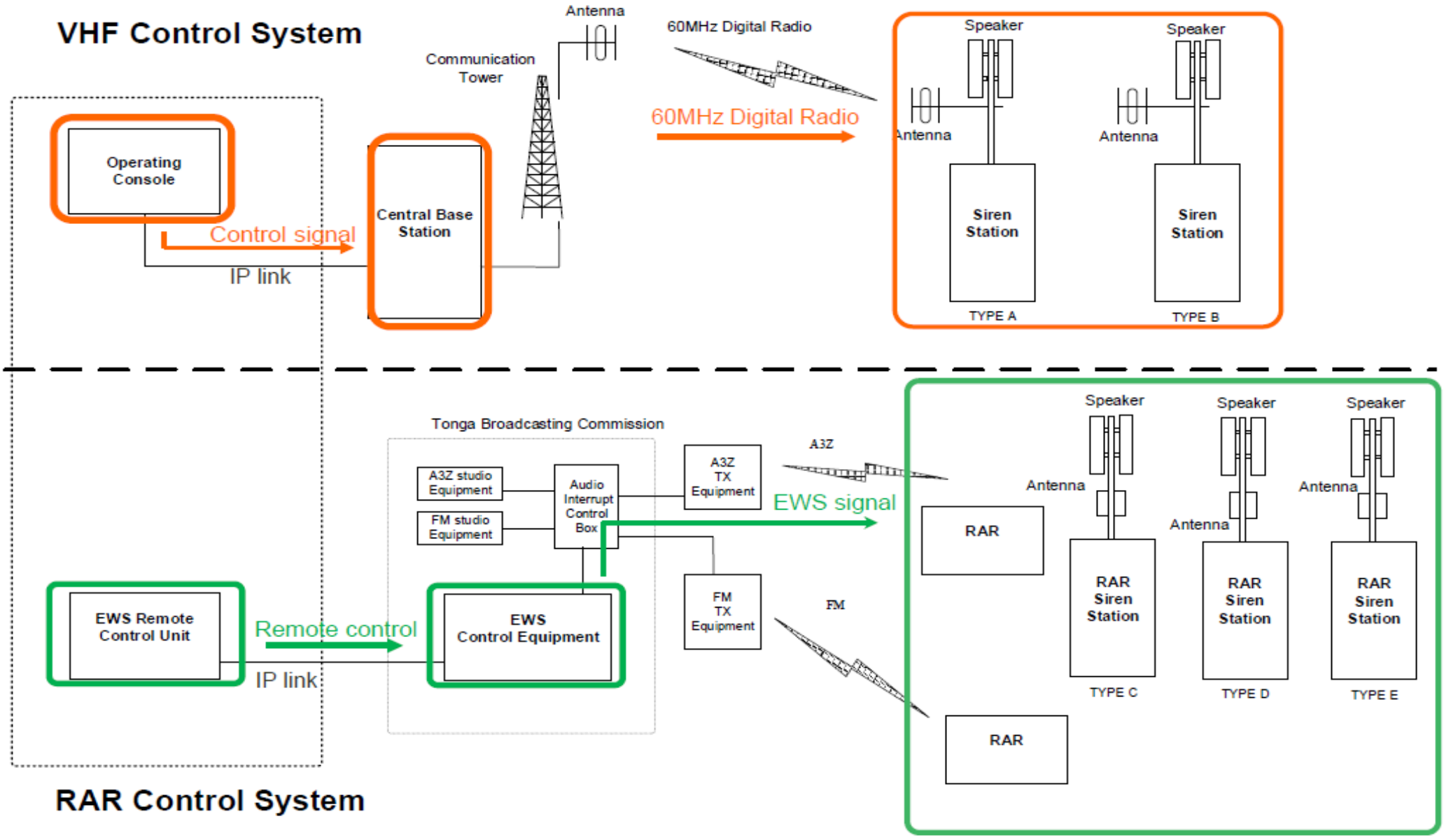


Outlines of Outdoor Siren System (Component – 2)

2. Type of the Siren Station & RAR

Equipment	Siren station Type A	Siren station Type B	Siren station Type C	Siren station Type D/E	RAR
Configuraion					
Activation	VHF control system	VHF control system	RAR control system	RAR control system	RAR control system
Local PA	Available	Available	Available	Available	Not available
Installation	Tongatapu 'Eua	Tongatapu	Ha'api Vava'u Niuatoptap	Ha'api Niuatoptap	To be installed by the Kingdom of Tonga.

Outlines of Outdoor Siren System (Component – 2)



Outlines of Indoor Siren System (Component – 2)

RAR is "In door siren device" which remotely activatable from MET office using Early Warning Broadcasting Signal (EWBS) through AM and/or FM Radio Broadcasting program

- ✔ **Double tuners (one for stand-by mode for EWBS, one for user which can be used in normal time)**
- ✔ **15 kinds of emergency messages and 5 kinds of siren/chime sounds are pre-recorded inside and selectable from MET office when activate**
- ✔ **Rechargeable back-up battery inside for power failure**
- ✔ **Multiple power source (AC240V, DC12V, USB5V)**
- ✔ **External antenna for both AM and FM are included for far remote locations**

Outlines of Indoor Siren RAR (Component – 2)

RAR(Remote Activated Receiver) using EWBS signaling over MW radio broadcasting program for Remote Islands and Indoor locations

500 RARs

TBC MW Transmitter

TBC Studio Bldg.

Studio Master

Inserter

EWS Gen.

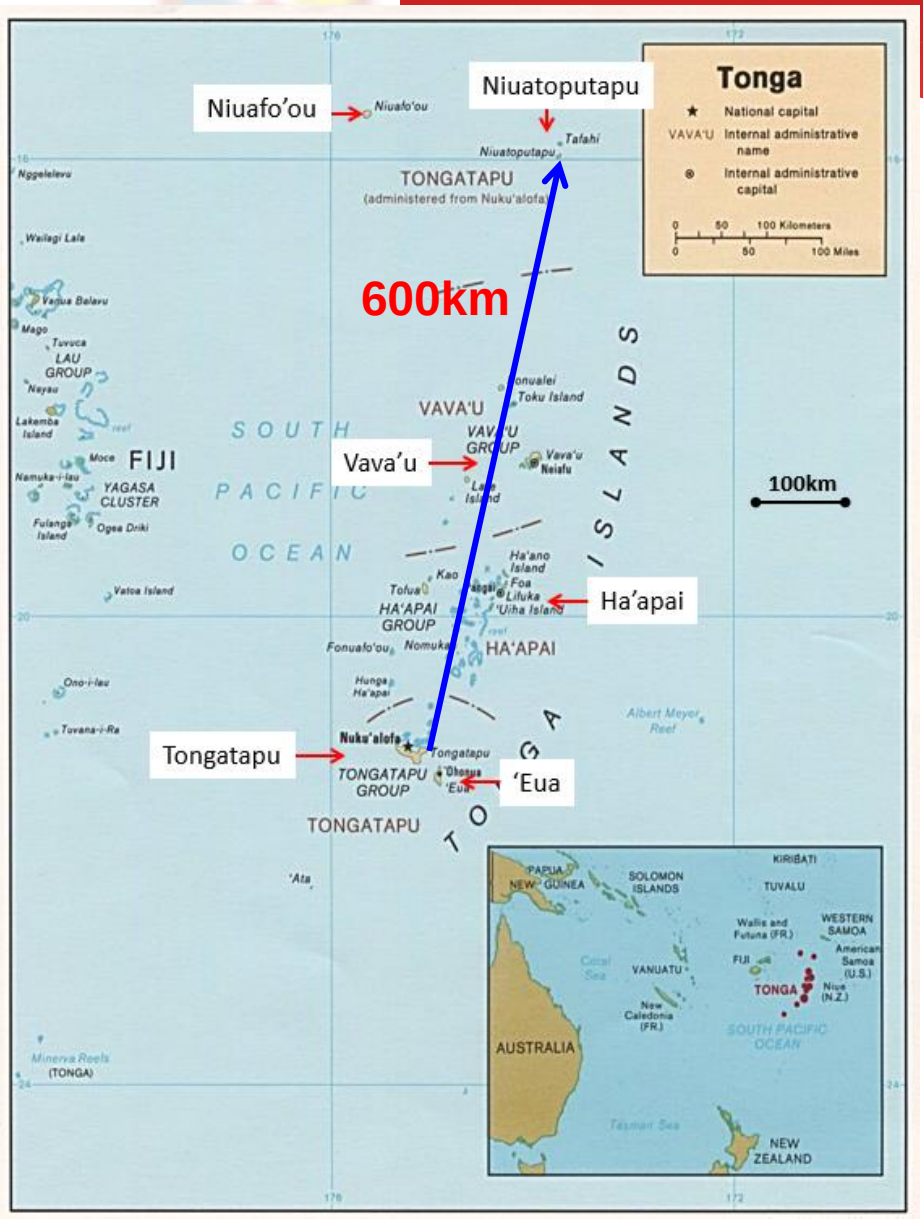
1017KHz
10Kw

Control Signal via IP Link

Operating Console

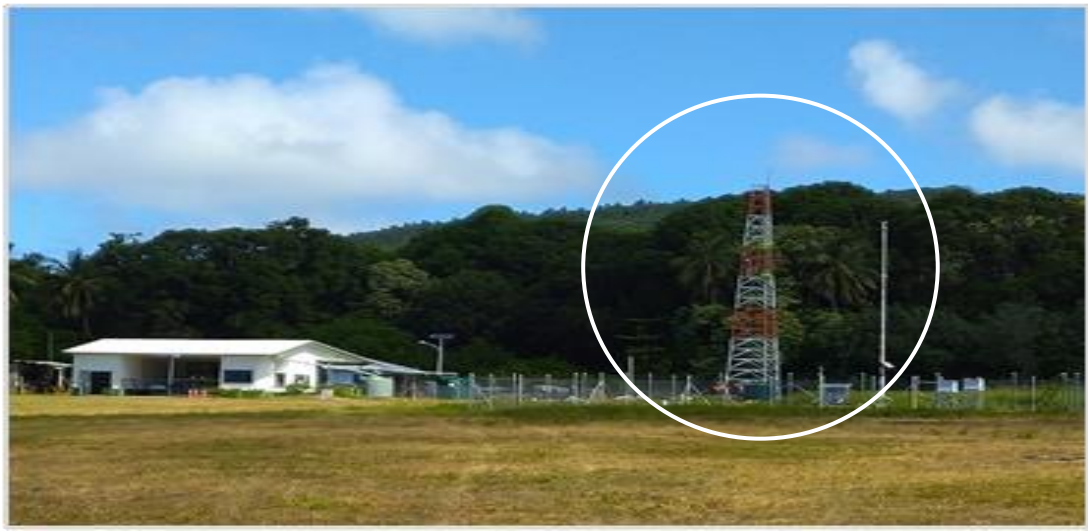
MET Office

Outlines of FM Retransmission System (Component – 3)



FM Retransmission System for Remote Islands to expand MW coverage (over 600km distance)

- **Receive very weak MW signal from main station by high performance Receiver system, and then transmit the detected program in FM within the Islands in low power**
- **Independent solar power supply**



Completion Photos (TBC Building and MW Mast)

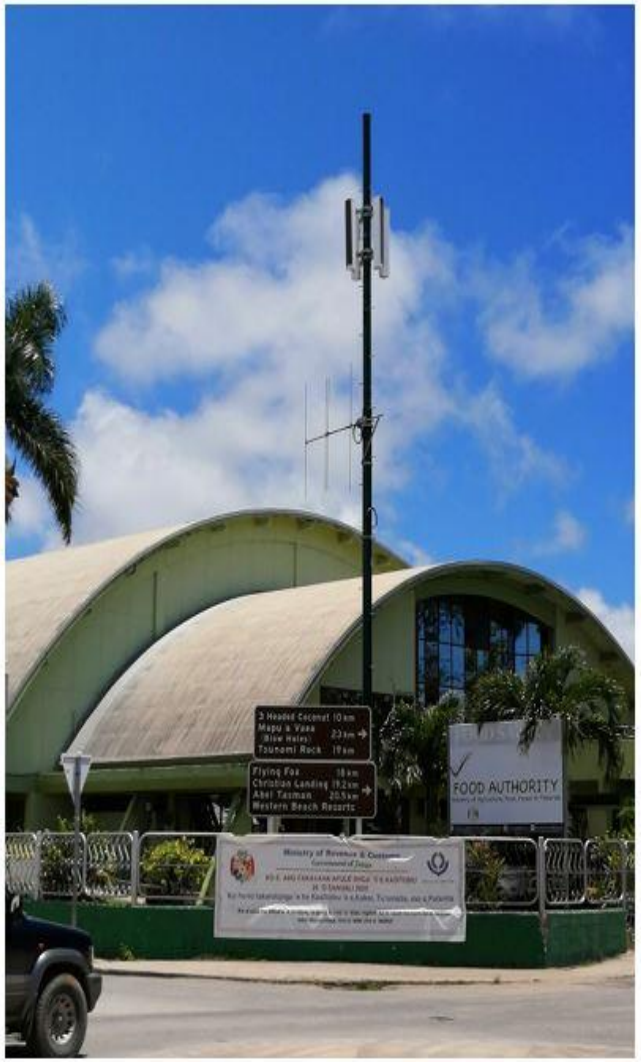
HQ & Studio Building

MW Antenna Mast

MW Transmitter Hut

Completion Photos (Emergency Radio)

Completion Photos (Outdoor Sirens)



Siren Mast (VHF Control)

Siren Mast (RAR Control)

Completion Photos (FM Retransmission Station)

Lessons Learnt

1. **Scheduled Test Operation is essential for the MET staff to familiarize with siren activation without any hesitation.**

- **Monthly siren test (Last Friday of the month. At Noon)**
- **Test is necessary for the peoples awareness**

2. **Scheduled/Steady Maintenance is essential to keep the system always be ready.**

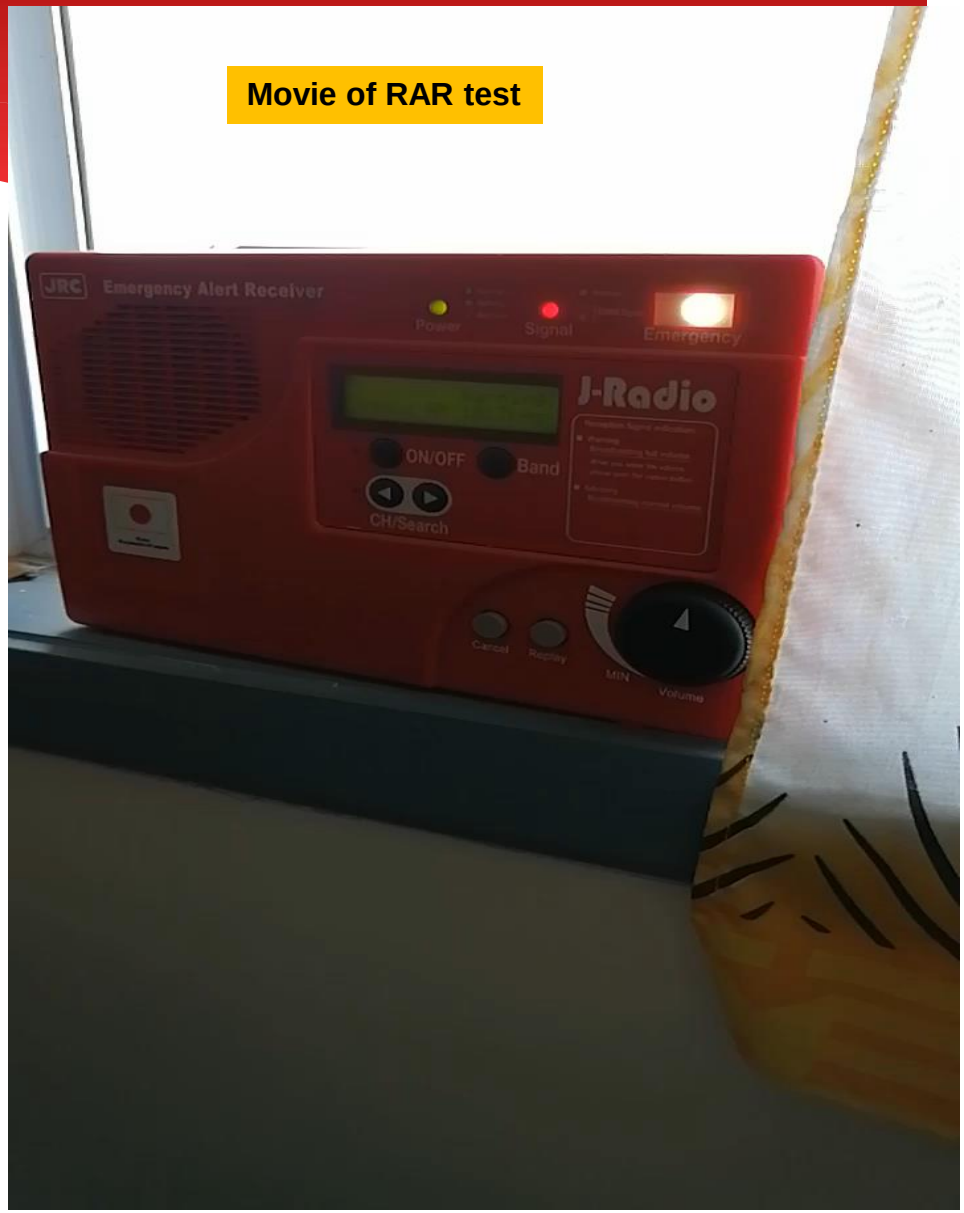
- **Site inspection (once a 6 months)**
- **Secure budget**
- **Establish maintenance team**

Movie of Siren test

NEWS Project
Siren TEST

Digicel square
Kingdom of TONGA
23 SEP 2022

Movie of RAR test



Real Story in Emergency Situation

NEWS was commissioned on 27th September 2022.

Right after the commission,

In the rainy midnight on 11th November 2022 at 11:46 pm

Large earthquake of M7.3 hit Tonga, and PTWC in Hawaii warned Tsunami risk in Tonga

Duty officer at MET office activated all sirens properly

All sirens and RAR activated and advised people to evacuate

Peoples evacuated to safe place successfully

Interesting??? Let's talk more!!!


We are here….


To protect the peoples lives..

MALO ‘AUPITO

And

THANK YOU

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