HACKING FOR HUMANITARIAN DISASTER RESPONSE

TYPHOON YOLANDA

DUSTIN LI

DO SOMETHING AWESOME

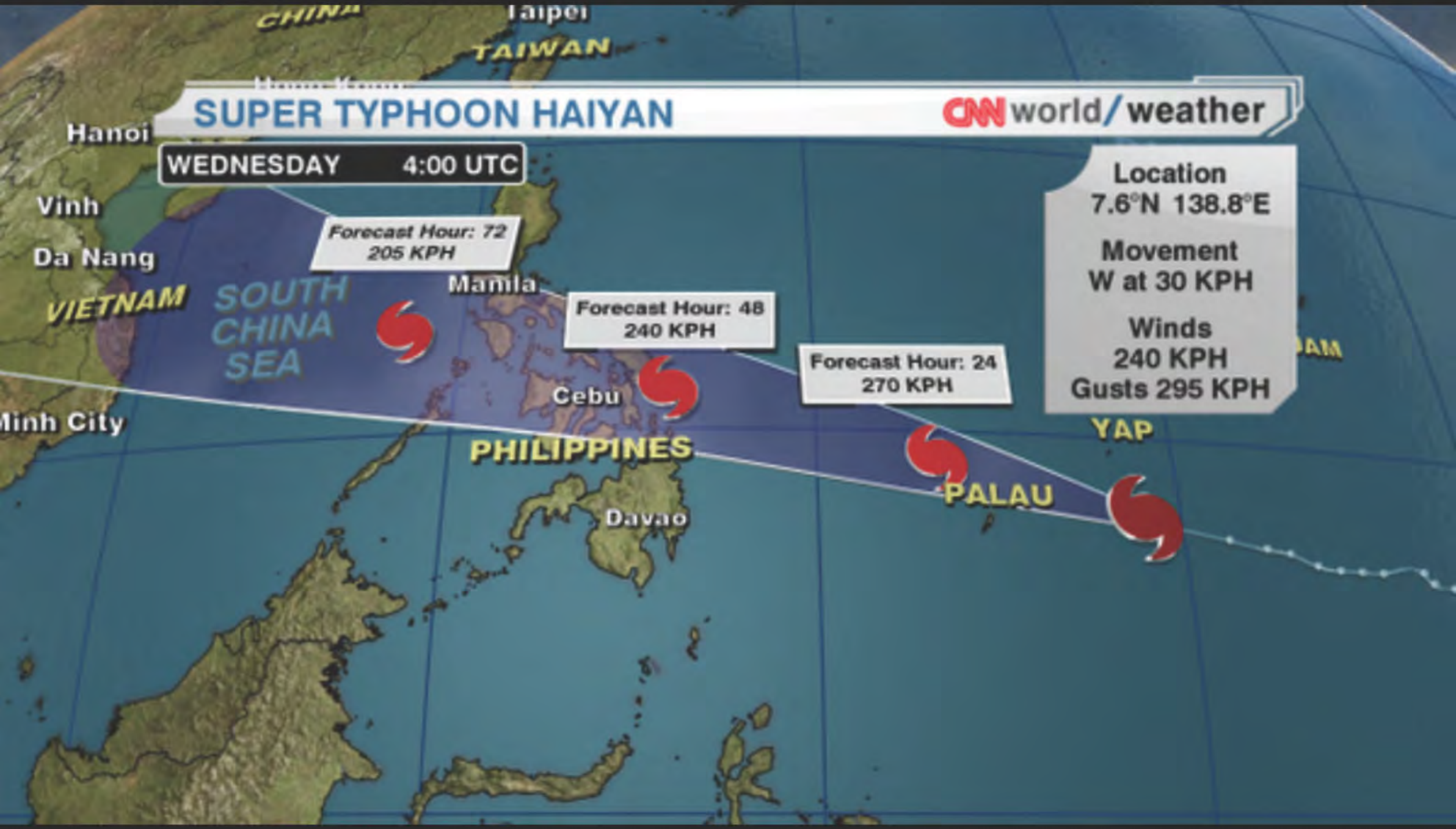
‘HACKING’
AS IN, THAT’S A TOTAL HACK

ACRONYMS (WFP, ETC, NGO) DISCLAIMER

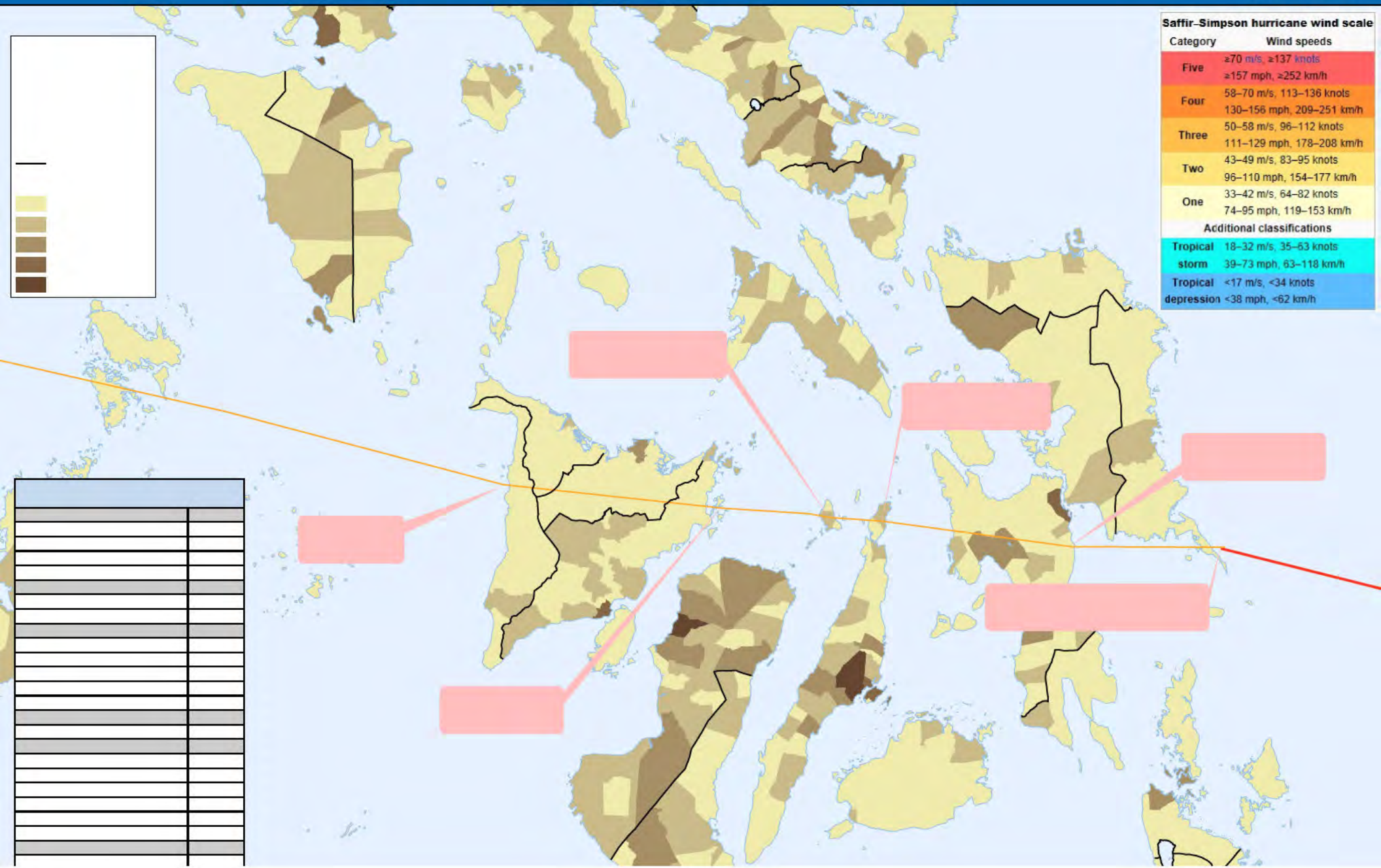
WFP
World Food Programme
wfp.org

etc
EMERGENCY TELECOMMUNICATIONS
CLUSTER

TYPHOON BUILD-UP



OCHA


Saffir–Simpson hurricane wind scale
Category
Wind speeds
Five
≥70 m/s, ≥137 knots
≥157 mph, ≥252 km/h
Four
58–70 m/s, 113–136 knots
130–156 mph, 209–251 km/h
Three
50–58 m/s, 96–112 knots
111–129 mph, 178–208 km/h
Two
43–49 m/s, 83–95 knots
96–110 mph, 154–177 km/h
One
33–42 m/s, 64–82 knots
74–95 mph, 119–153 km/h
Additional classifications
Tropical storm
18–32 m/s, 35–63 knots
39–73 mph, 63–118 km/h
Tropical depression
<17 m/s, <34 knots
<38 mph, <62 km/h

PLAN INTERNATIONAL

STORM SURGE

DEVASTATION
KEVIN FRAYER/GETTY IMAGES

DEVASTATION
DONDI TAWATAO/GETTY IMAGES

DEVASTATION

ERIK DE CASTRO/REUTERS

DEVASTATION

ERIK DE CASTRO/REUTERS

DEVASTATION
AARON FAVILA/ASSOCIATED PRESS

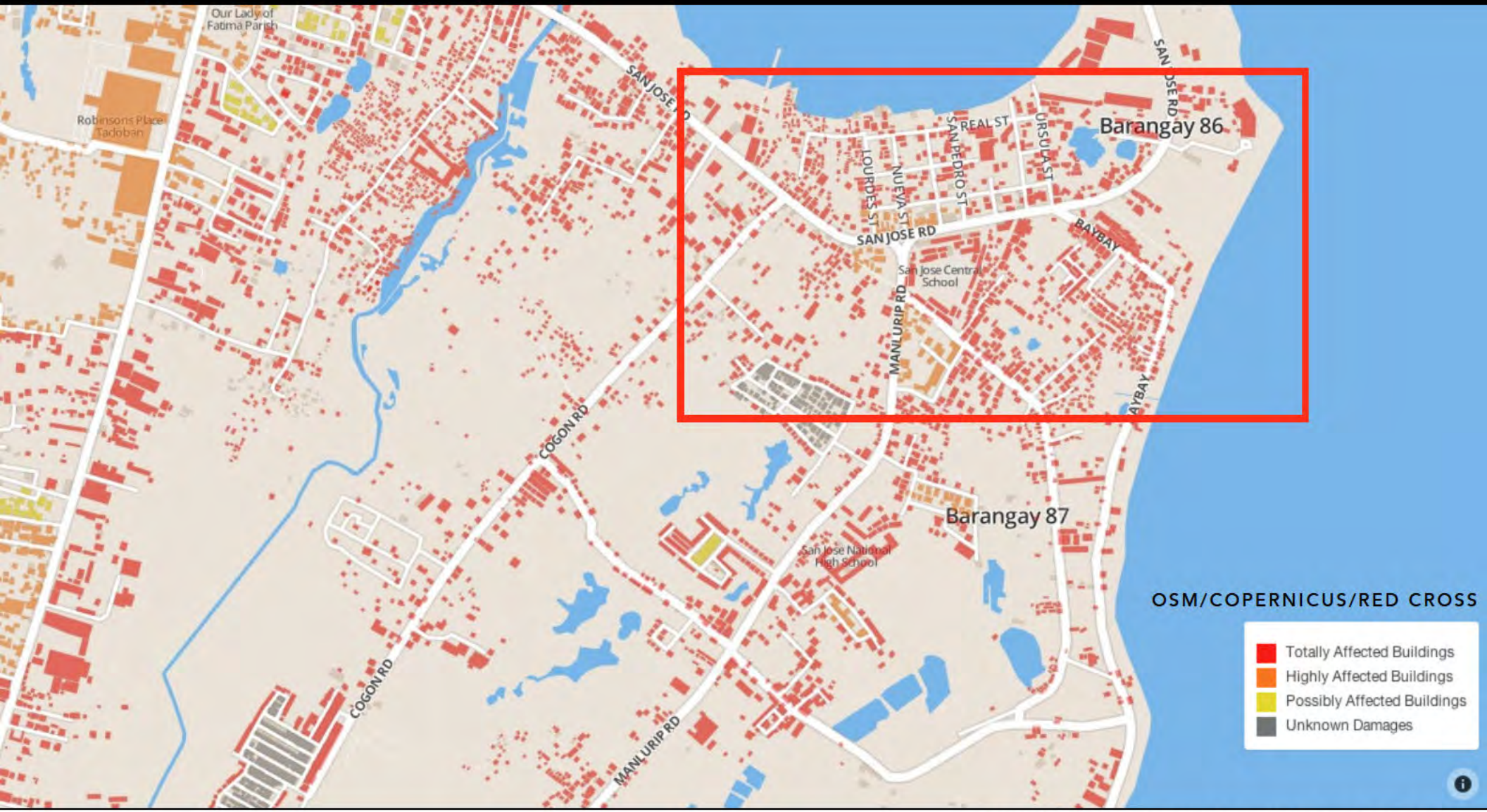
WALLY SANTANA/ASSOCIATED PRESS

TACLOBAN

MAPPED DAMAGE

TACLOBAN

MAPPED DAMAGE



14.1 million affected
4.1 million displaced
1.1 million damaged houses
6,201 reported dead
1,785 reported missing

–OCHA SITREP, JAN 28 2014

HOW DO YOU RESPOND?

HOW DO YOU RESPOND?

MEDICAL
WATER
SANITATION
HYGIENE
FOOD
SHELTER

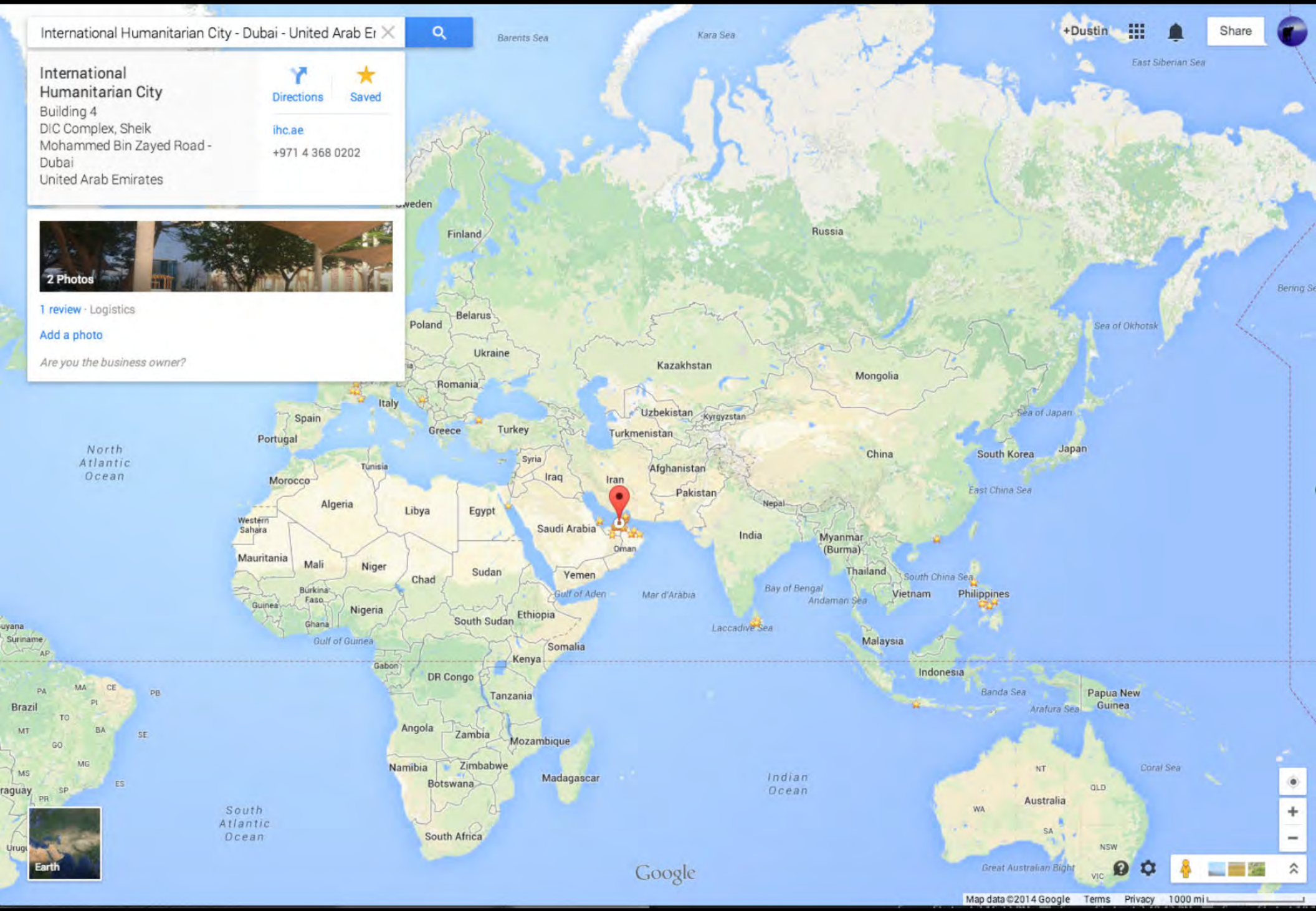
COMMUNICATION

etc

EMERGENCY TELECOMMUNICATIONS

CLUSTER

INFERNO BETA


International Humanitarian City - Dubai - United Arab Er
International Humanitarian City
Building 4
DIC Complex, Sheik Mohammed Bin Zayed Road - Dubai
United Arab Emirates
Directions
Saved
ihc.ae
+971 4 368 0202
2 Photos
1 review · Logistics
Add a photo
Are you the business owner?
+Dustin
Share
Barents Sea
Kara Sea
East Siberian Sea
Finland
Russia
Poland
Belarus
Ukraine
Kazakhstan
Mongolia
Romania
Italy
Spain
Portugal
Greece
Turkey
Uzbekistan
Kyrgyzstan
Turkmenistan
Sea of Okhotsk
Sea of Japan
China
South Korea
Japan
North Atlantic Ocean
Morocco
Tunisia
Syria
Iraq
Iran
Afghanistan
Pakistan
East China Sea
Algeria
Libya
Egypt
Nepal
Western Sahara
Saudi Arabia
India
Myanmar (Burma)
Oman
Mauritania
Mali
Niger
Chad
Sudan
Yemen
Thailand
South China Sea
Gulf of Aden
Mar d'Arabia
Bay of Bengal
Andaman Sea
Vietnam
Philippines
Burkina Faso
Guinea
Nigeria
Ghana
South Sudan
Ethiopia
Laccadive Sea
Gulf of Guinea
Malaysia
Somalia
Kenya
Gabon
DR Congo
Indonesia
Tanzania
Banda Sea
Papua New Guinea
Arafura Sea
Brazil
Angola
Zambia
Mozambique
Namibia
Zimbabwe
Botswana
Madagascar
Indian Ocean
Coral Sea
Australia
South Atlantic Ocean
South Africa
Great Australian Bight
Earth
Google
Map data ©2014 Google
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Privacy
1000 mi

etc

EMERGENCY TELECOMMUNICATIONS

CLUSTER

etc
EMERGENCY TELECOMMUNICATIONS
CLUSTER

etc

EMERGENCY TELECOMMUNICATIONS CLUSTER

FITTEST

WFP

wfp.org

World Food Programme

DRC DANISH REFUGEE COUNCIL

NRC NORWEGIAN REFUGEE COUNCIL

World Vision

MSB Swedish Civil Contingencies Agency

Red R AUSTRALIA

emergency.lu

Technisches Hilfswerk

dsb Directorate for Civil Protection and Emergency Planning

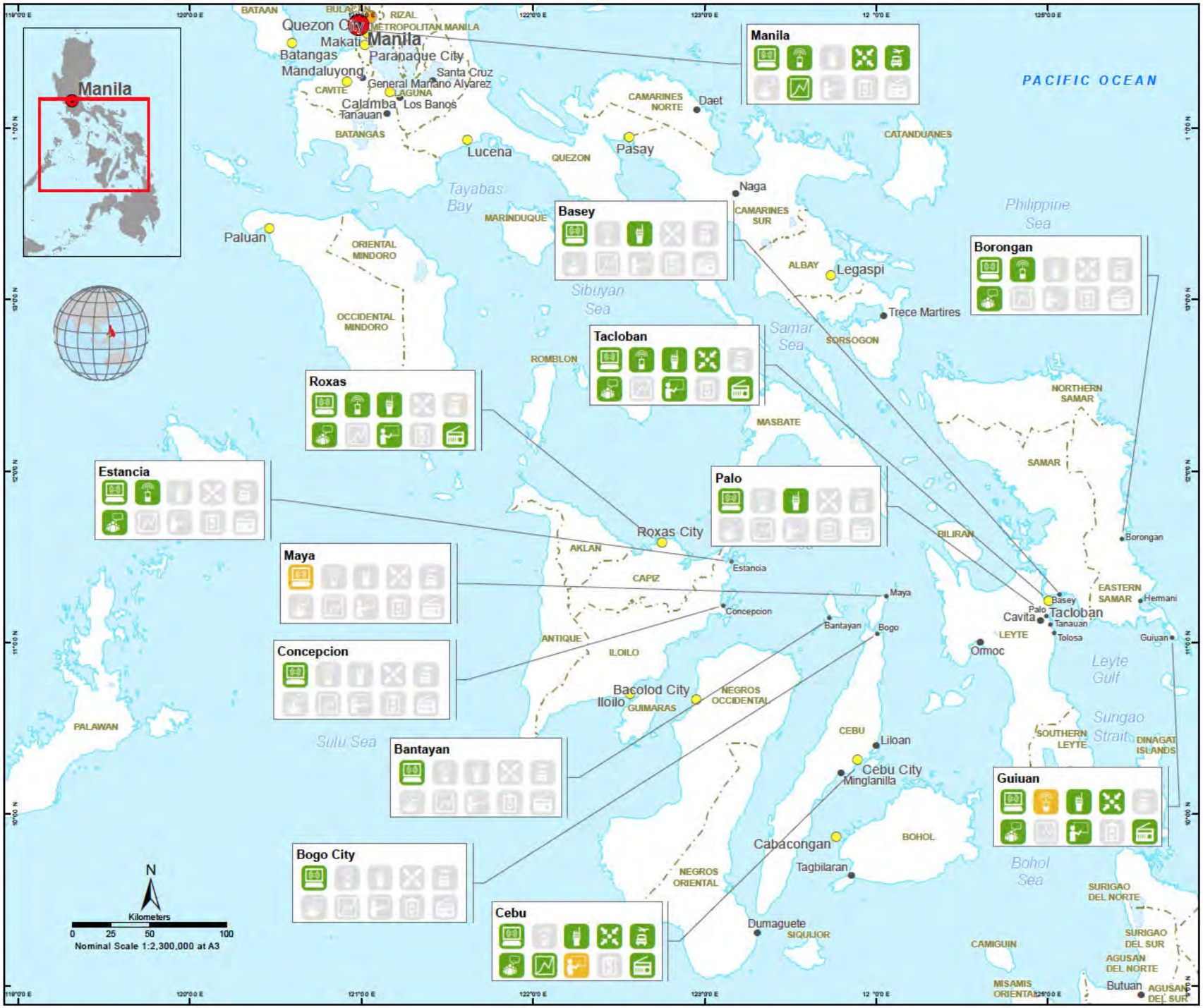
Irish Aid Department of Foreign Affairs An Roinn Gnóthaí Eachtracha

FCI FRANCE COOPÉRATION INTERNATIONALE

ERICSSON

tsf TELECOMS SANS FRONTIÈRES Communications for life

NetHope WIRING THE GLOBAL VILLAGE



World Food Programme

etc Emergency Telecommunications Cluster

Emergency Telecommunications Cluster (ETC)

Typhoon Haiyan Operation, Philippines, January 20th 2014

The ETC was activated in the Philippines to provide timely, predictable and effective communications services to support the humanitarian community responding to the Typhoon Haiyan (known locally as Yolanda) crisis.

- National Capital
- Major Town
- Intermediate Town
- Small Town
- Village
- First Level Admin Boundary

ETC Services

- Internet
- ICT Helpdesk
- Phone/ Voice
- Information Management
- Radio
- Radio Training
- Coordination Hub
- Assessment Mission
- Logistics Hub
- Radio Programming

- Services being provided
- Planned services
- No service

Key Contacts

ETC Coordinator: *John Bursa*

Philippines.ETC@wfp.org

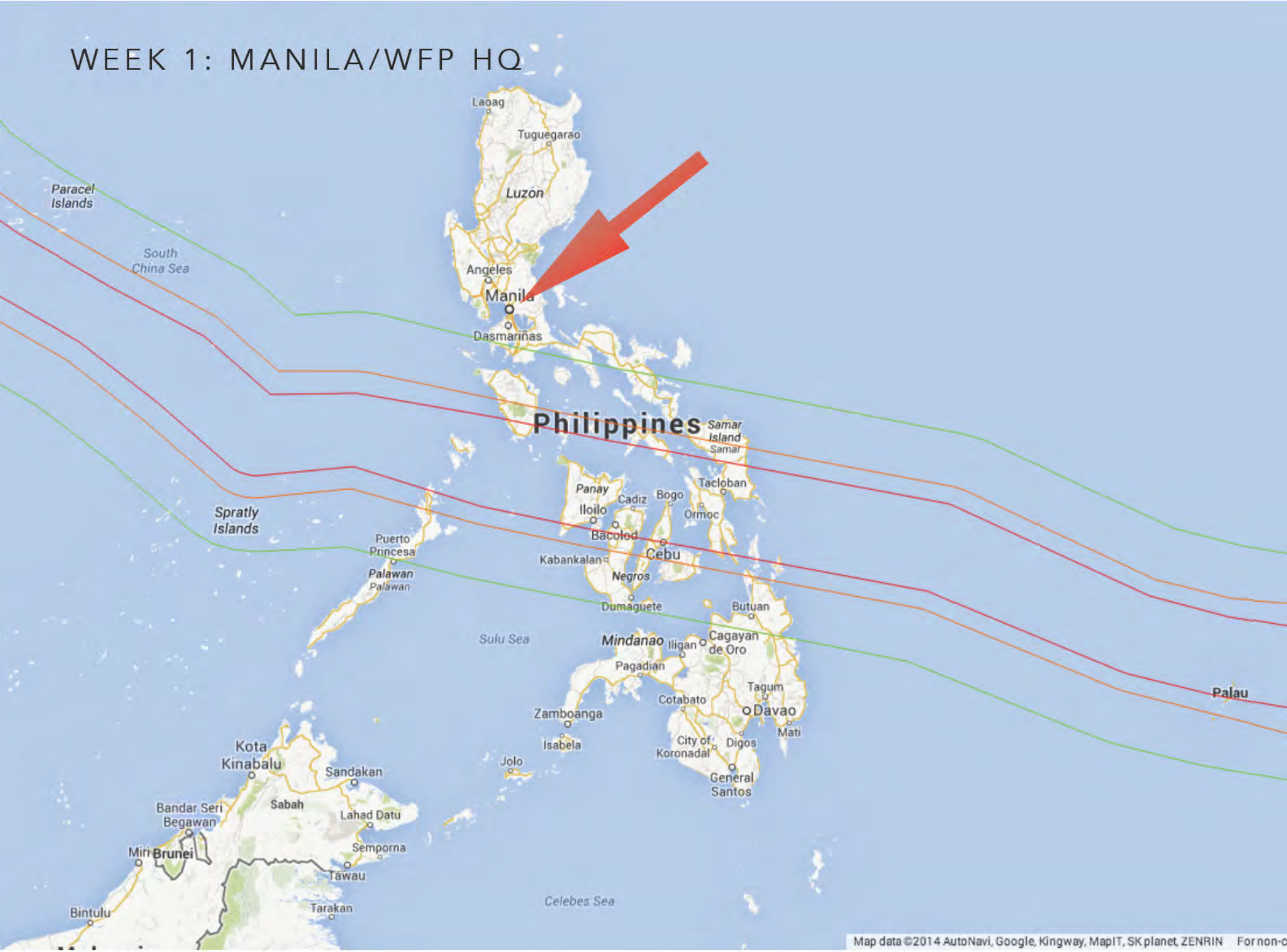
Date Created: 20 Jan 2014
Map Num: PHL_ETC_TyphoonHaiyanOperation_A3L
Coord.System/Datum: Geographic/WGS84

Data Sources: UNGIWG, Geonames, WFP, ETC

The boundaries and names and the designations used on this map do not imply official endorsement or acceptance by the United Nations.

Map prepared by OMEP GIS
Email: maps@logcluster.org
Website: ETCluster.org

WEEK 1: MANILA/WFP HQ



WEEK 1: MANILA

ICT SUPPORT

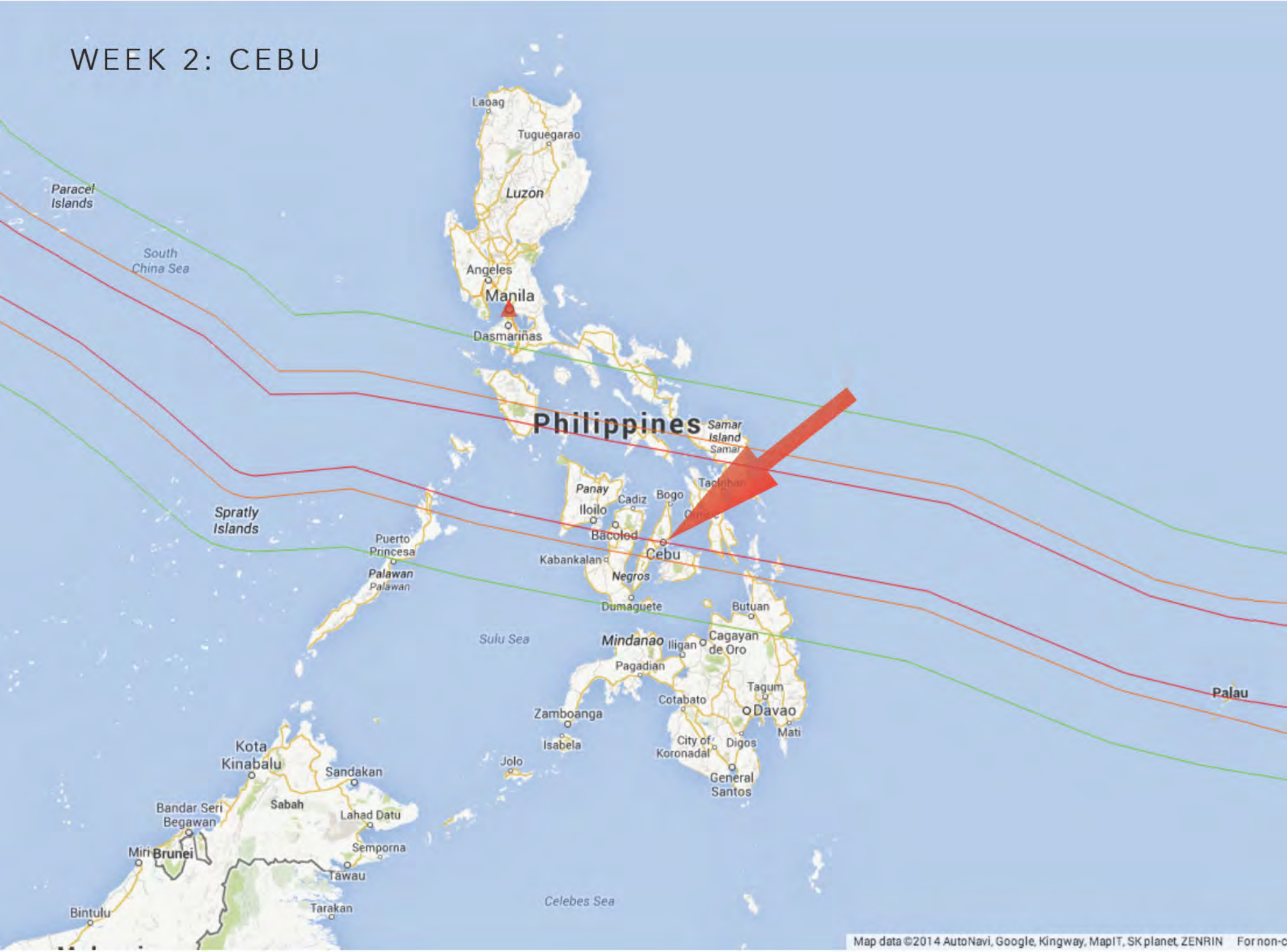
WEEK 1: MANILA

ICT SUPPORT

WEEK 1: MANILA

ICT SUPPORT

WEEK 2: CEBU


Laoag
Tuguegarao
Luzon
Paracel Islands
South China Sea
Angeles
Manila
Dasmariñas
Philippines
Samar Island
Samar
Panay
Cadiz
Bogo
Iloilo
Bacolod
Cebu
Kabankalan
Negros
Dumaguete
Spratly Islands
Puerto Princesa
Palawan
Palawan
Sulu Sea
Mindanao
Iligan
Cagayan de Oro
Butuan
Pagadian
Tagum
Cotabato
Davao
Mati
Zamboanga
Isabela
City of Koronadal
Digos
Jolo
General Santos
Palau
Kota Kinabalu
Sandakan
Sabah
Bandar Seri Begawan
Lahad Datu
Miri
Brunei
Semporna
Tawau
Tarakan
Bintulu
Celebes Sea
Map data ©2014 AutoNavi, Google, Kingway, MapIT, SK planet, ZENRIN For non-c

CEBU

UNITED NATIONS
WORLD FOOD PROGRAMME
P.O. BOX 506003, HUMANITARIAN CITY, BUILDING NO.2, DOHA STREET, DUBAI, U.A.E.
TEL: +971 4 3681383, FAX: +971 4 3681381
DIPLOMATIC CARGO
TO: PLANTATION BAY RESORT & SPA, MARI GONDON, MACTAN ISLAND CEBU
DISPATCH DATE: 06 DEC '13
(A) WB NR
ATTN. M DIRKSEN
MNL EK 0334

CEBU-ROXAS
UNITED NATIONS HUMANITAR
ICE
UN
-AFH
World Health
Organization
mondiale de la Santé

CEBU-ROXAS
UNITED NATIONS

WEEK 3-6: ROXAS/PANAY ISLAND

ROXAS

ETC presence

WFP suboffice

WFP SUBOFFICE

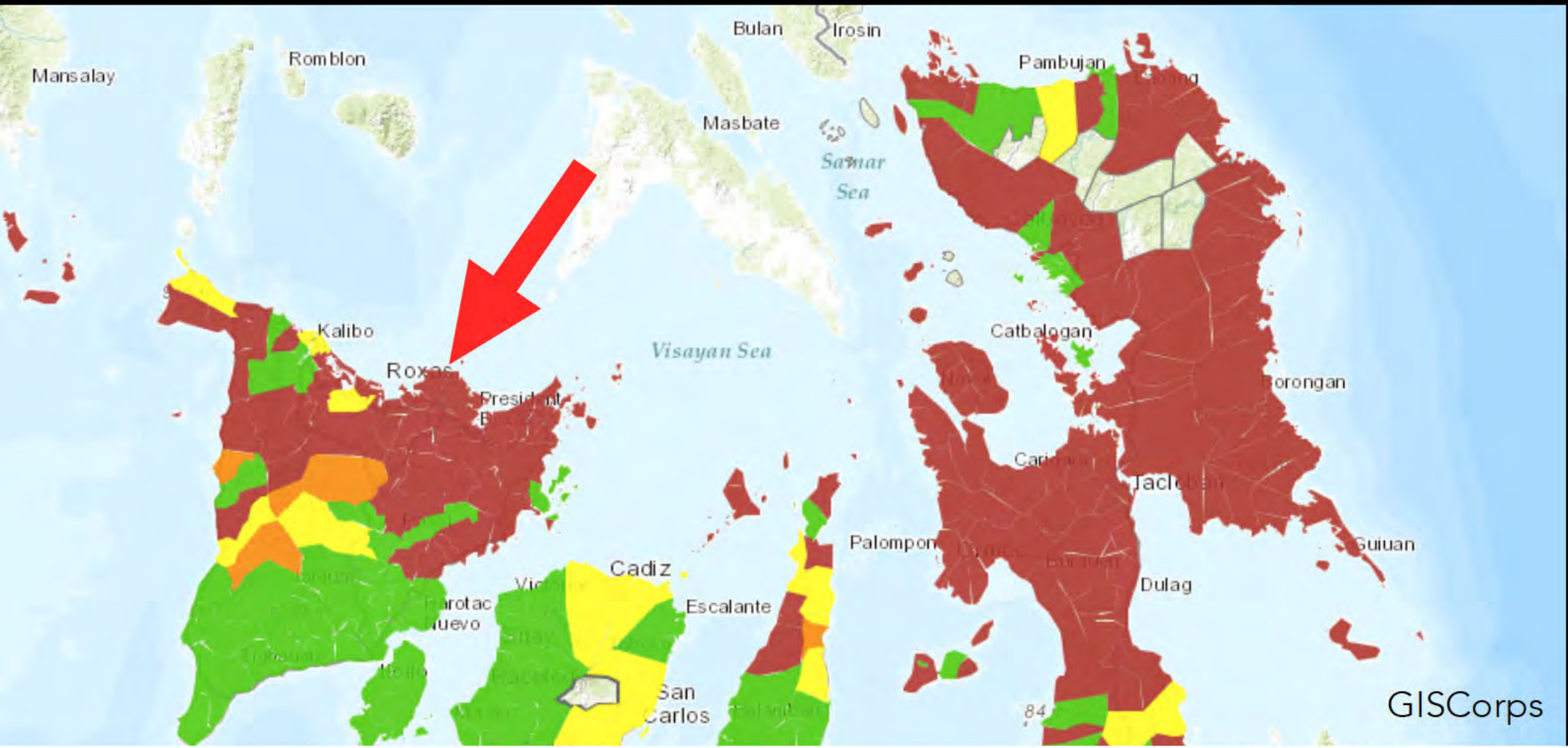
WFP SUBOFFICE

WE ARE NOT GOOD AT
BUILDING PREFABS

GETTING INTERNET

"We have no service to that area."

–LOCAL ISPS



GETTING INTERNET

GETTING INTERNET

GETTING INTERNET

GETTING INTERNET

1. Diagnose the issue

GETTING INTERNET

1. Diagnose the issue
2. Fabricate power cable
3. String it up
4. Generator install/fuel
5. Keep locals happy
6. Be nice to ISP

VERY SMALL APERTURE TERMINALS (VSATS)

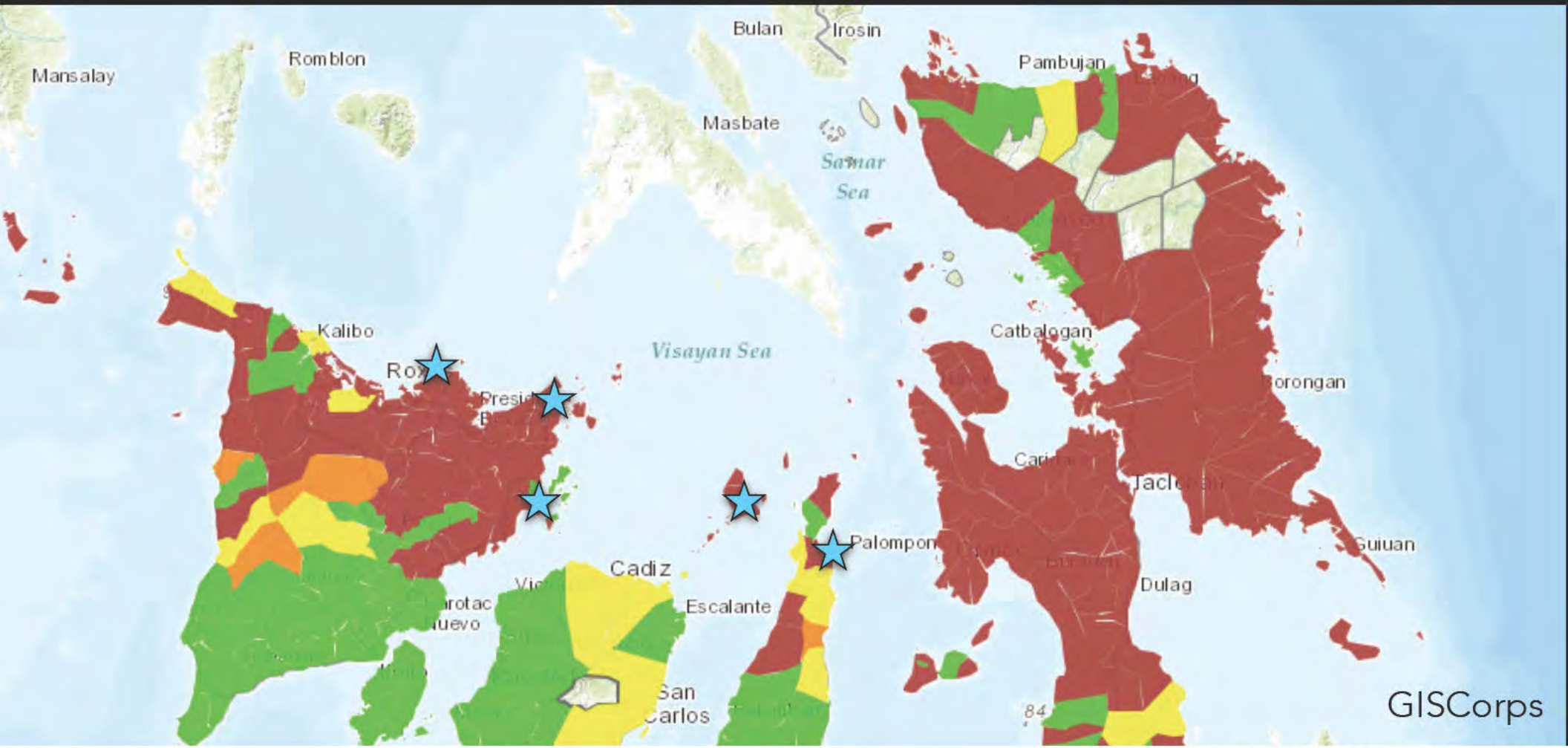
- For areas with no local connectivity
- Heavy
- Expensive
- PITA

VSAT

- Unobstructed view
- Assembly
- Power
- Aim
- Rotate
- Lock down
- Weather proofing
- 1-dB compression
- Cross-polarization check

"We have no service to that area."

–LOCAL ISPS



BRITISH TELECOM VSAT

- C-band
- 2.4 m “lightweight” dish
- 800 kg in 8 cases (dish only)
- 0.75-1.5 Mbps bandwidth (burstable 3 Mbps)

iDIRECT 5000 SERIES
SATELLITE ROUTER
iDIRECT
TECHNOLOGIES
CISCO
riello UPS
DALOVISION
DLSON

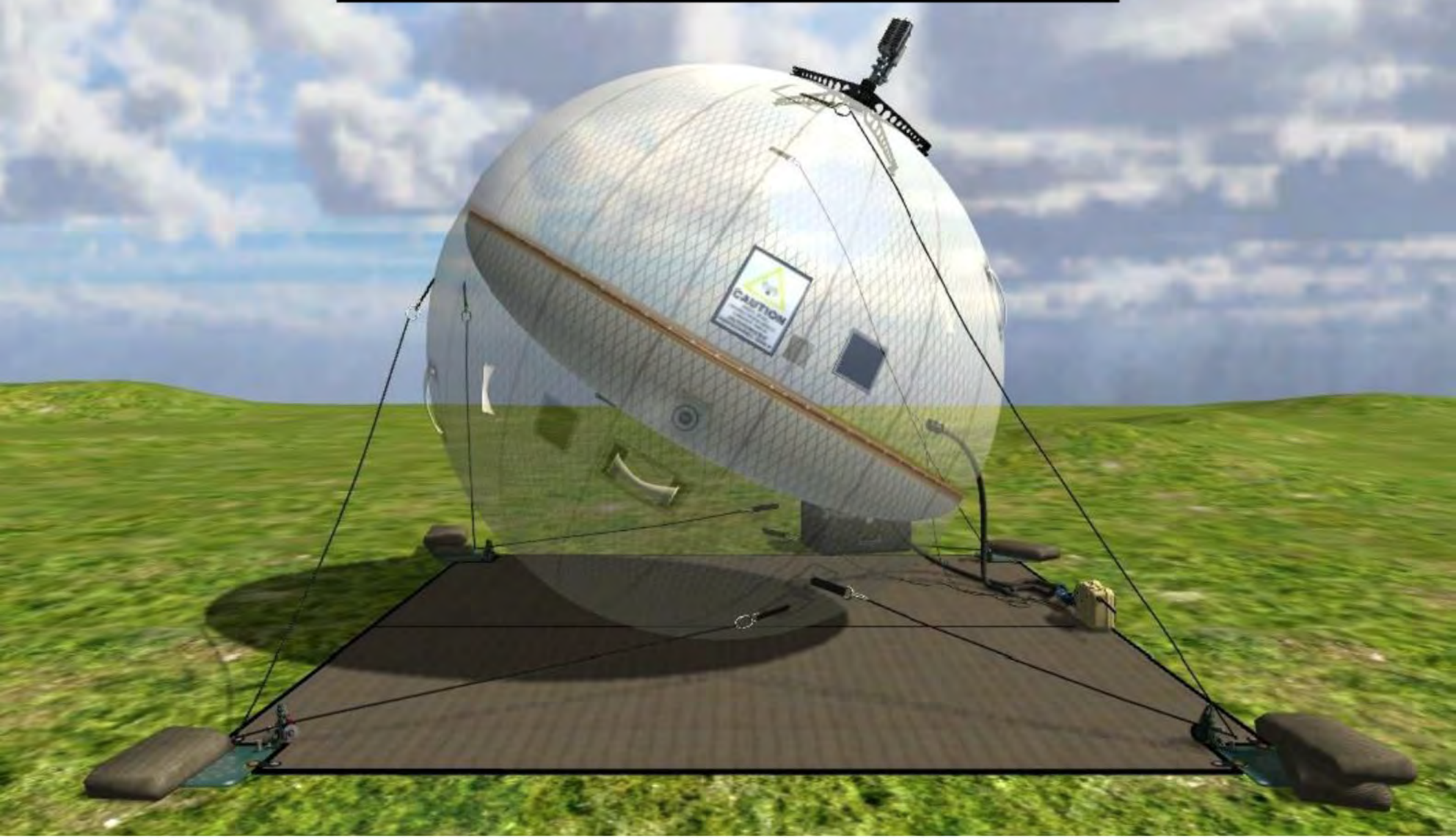
GATR VSAT

- Ku-band
- 2.4 m dish
- Inflatable!!!
- 157 kg in 7 cases (everything)
- 2 Mbps bandwidth

GATR

GATR Antenna Structure

Differential Pressure	0.15 inches of H2O
Radome Pressure	**2.5 inches of H2O**



GATR

ETC
Emergency
Telecommunications
Cluster
emergency.lu
SES
your satellite company

GATR

HITEC Luxembourg S.A.
5, rue de l'Eglise
L-1458 Luxembourg
HITEC
LUXEMBOURG
PSTN
LINE 1
LINE 2
TX
RX
LAN FE 0
LOCAL ISP GE 0
SERVICE SWITCH
MODEM
INCOMING LINES
NETWORK
ROUTE
CONSOL
(RS23
emergency.lu
NoSaCo® Rapid
by
HITEC
LUXEMBOURG

NETHOPE VSAT

- Ku-band
- 1.8m conventional dish
- 106 kg (dish only), cargo transport
- 1 Mbps bandwidth

TOLA AN/SAVE THE CHILDREN

RANGER VSAT
EMC VSAT

TEAM/GROUP COMMS

VHF

TEAM/GROUP COMMS

VHF

- For frequent communication
- Not reliant on GSM
- Limited by line of sight
- Repeaters extend coverage

KAREN BARSAMIAN/ETC

"What the crap?"

-GUY HANGING OFF A TOWER

HAULING GEAR

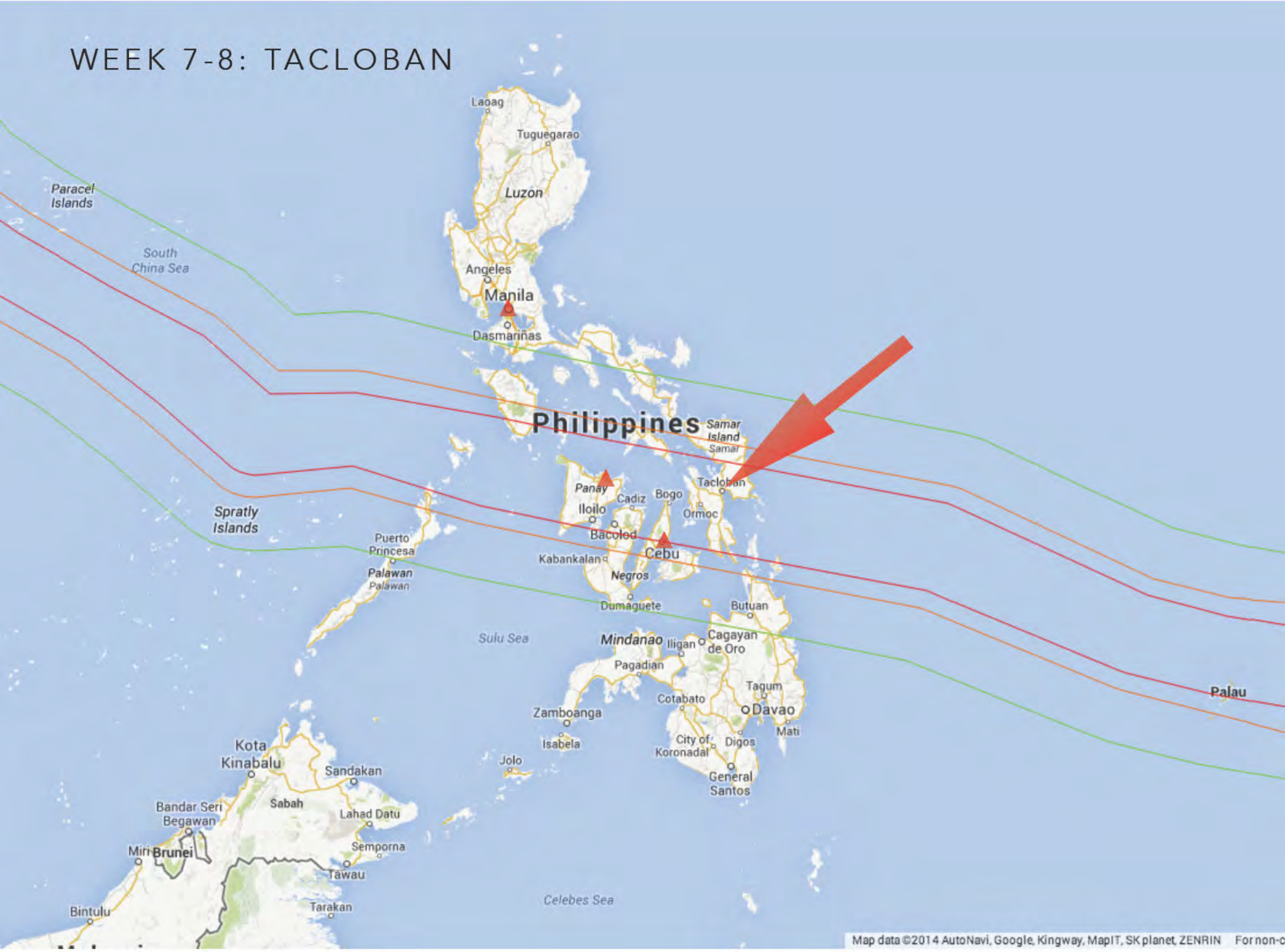
- 40 kg batteries (4x)
- 8x solar panels
- Generator
- Drill
- Mounting gear
- (Food?!)

Dept. of Transportation and Communications
MT. SUPO RELAY STATION

Yolanda - Self.Conference unexpose.key - June 2, 2014

MOTOROLA
MOTOROLA
KENWOOD

WEEK 7-8: TACLOBAN



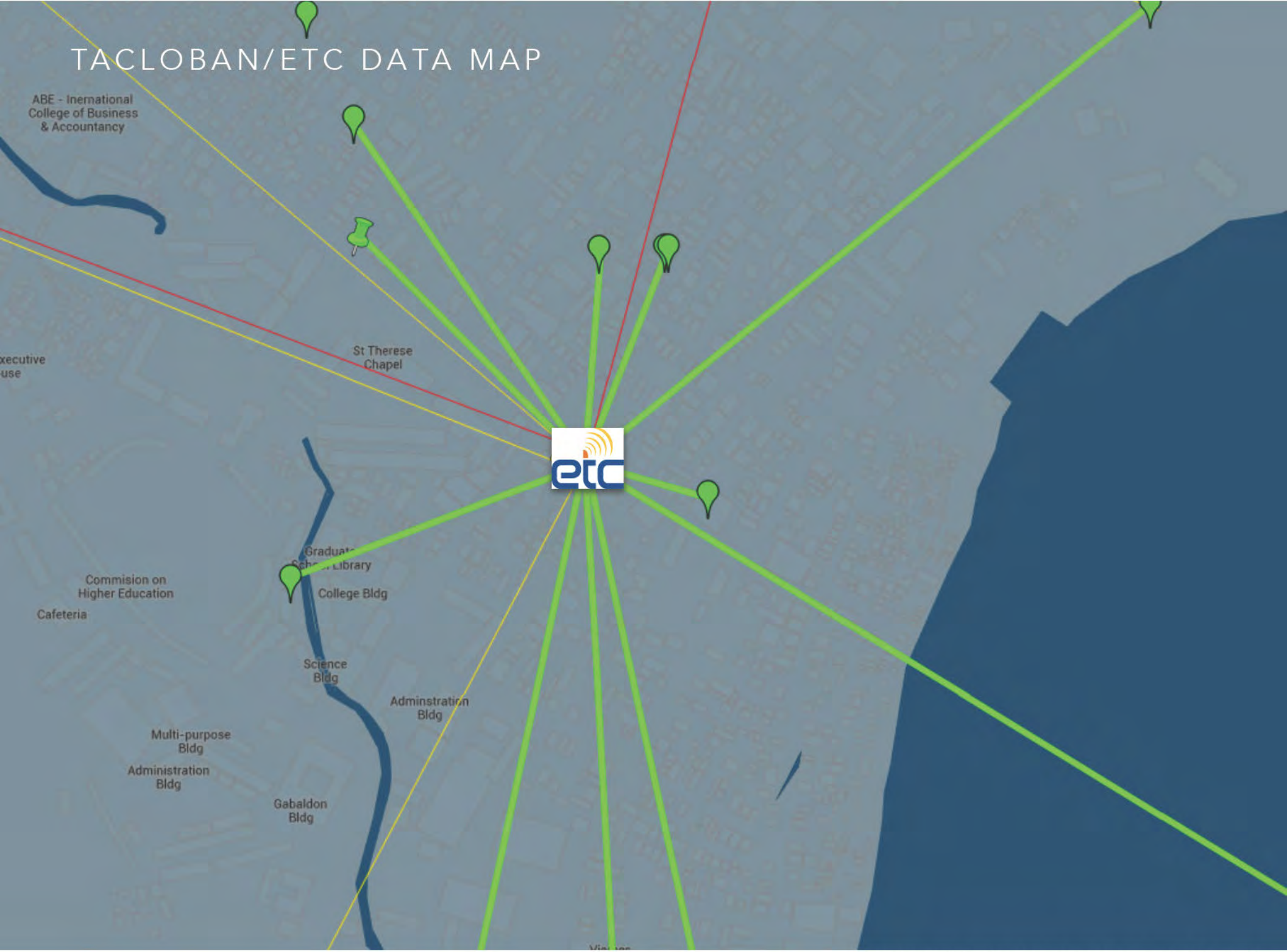
WEEK 7-8: TACLOBAN

WEEK 7-8: TACLOBAN

TACLOBAN

- Hard hit
- Chaotic
- Serving ~3000 humanitarian workers
- Focus primarily on data network - wireless ISP

TACLOBAN/ETC DATA MAP



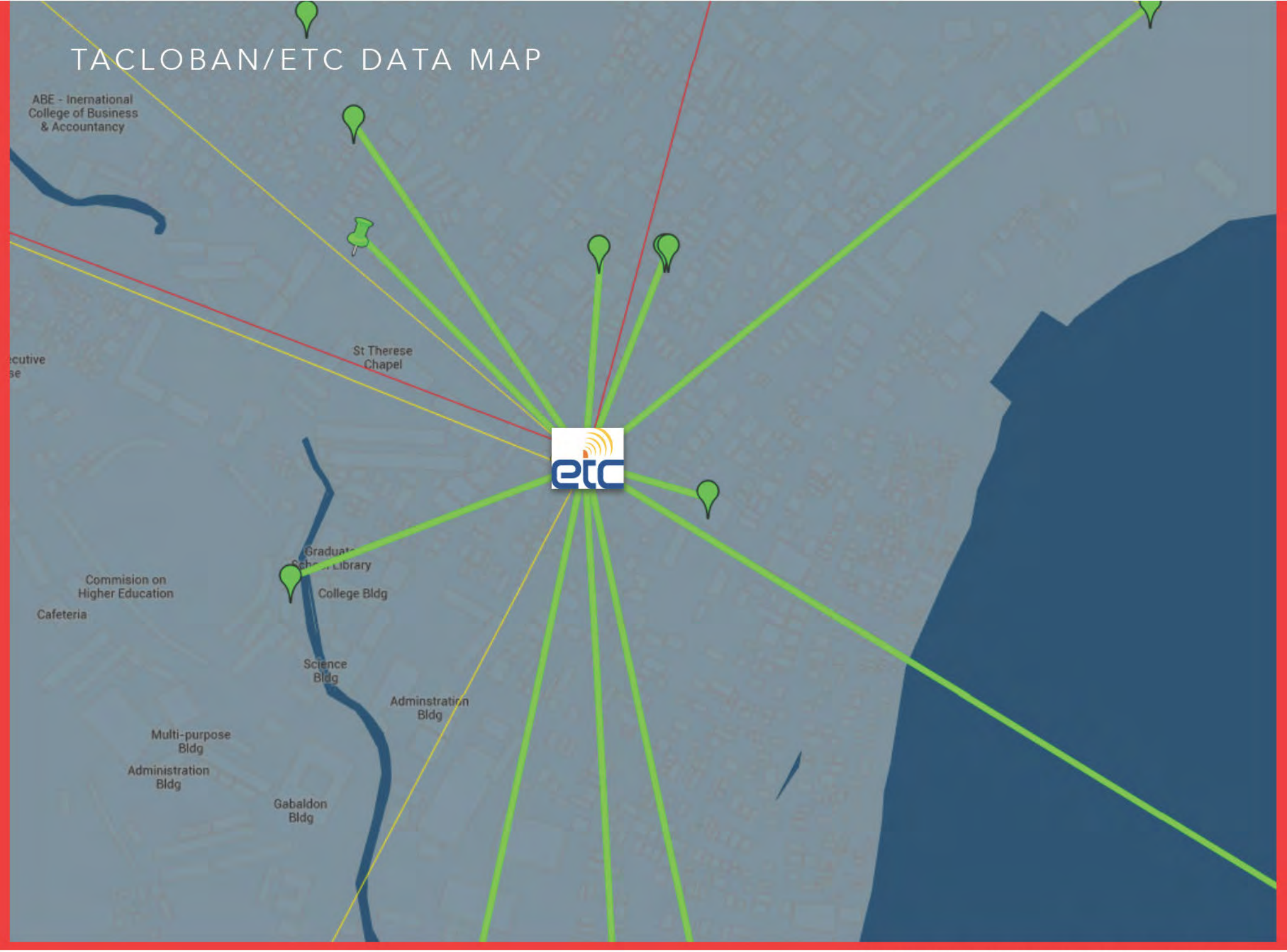
BESTANK

BESTANK
BST-500
BelAir

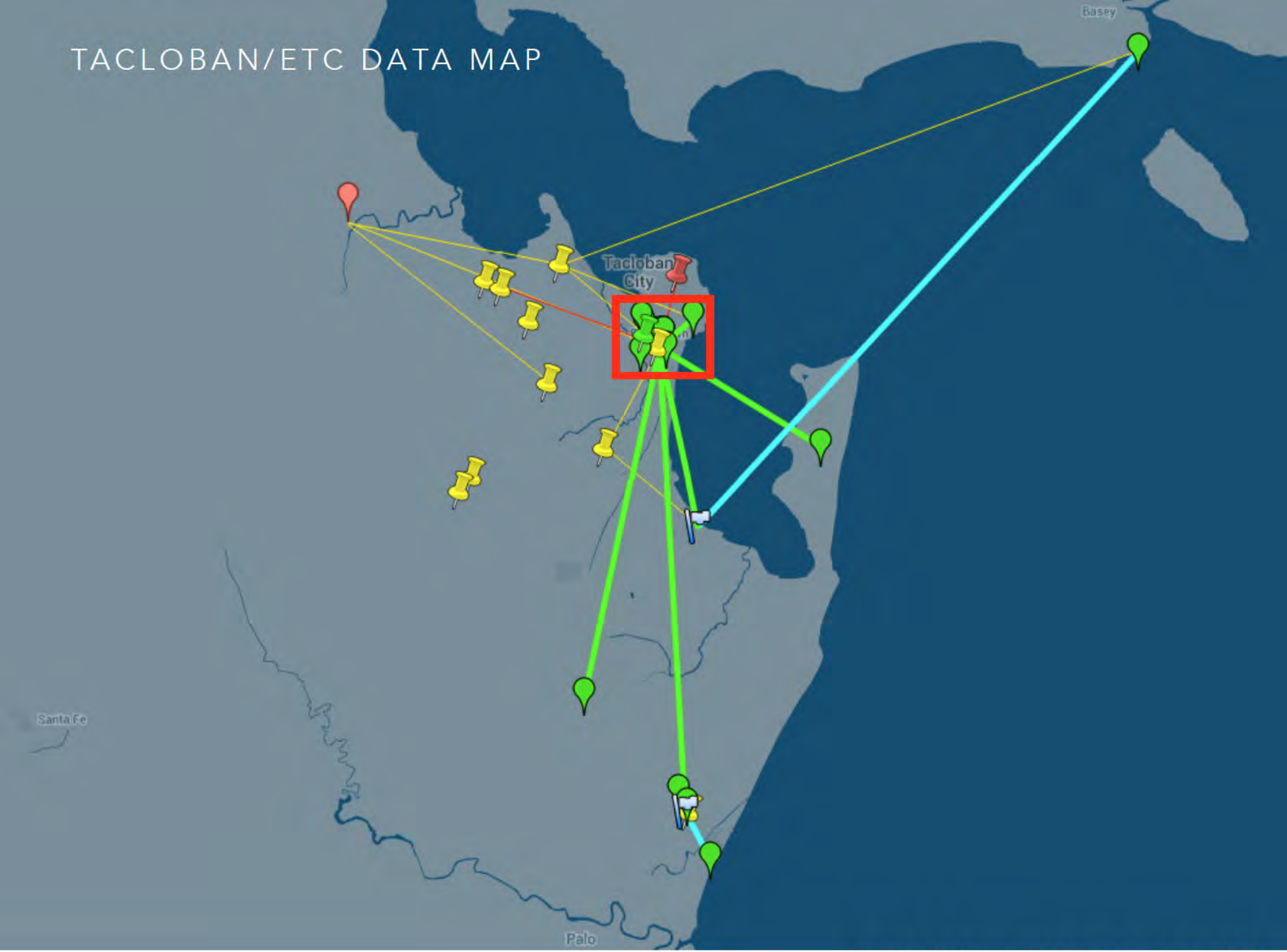
etc
EMERGENCY TELECOMMUNICATIONS
CLUSTER
BSU

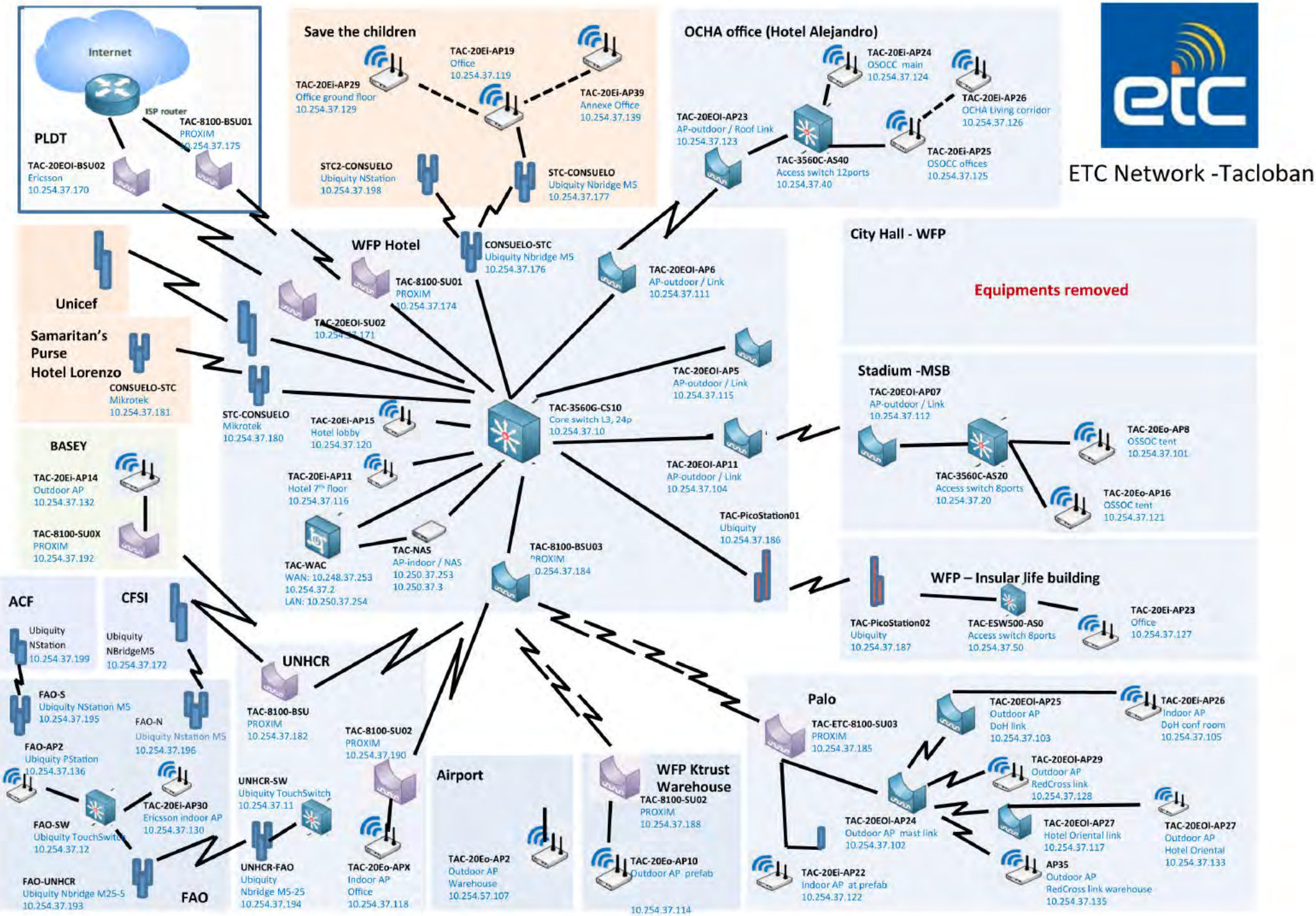
etc
EMERGENCY TELECOMMUNICATIONS
CLUSTER
BSU

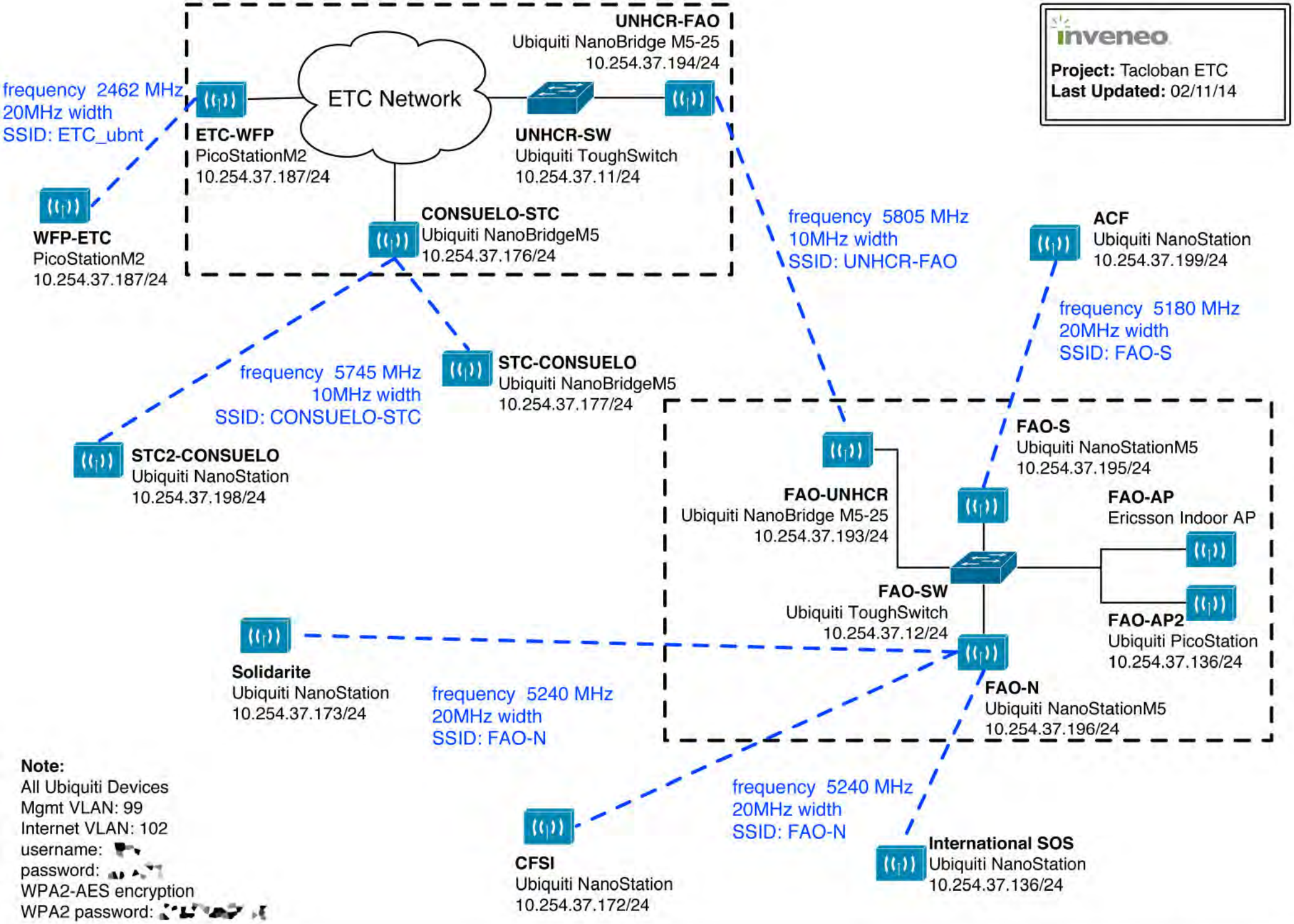
TACLOBAN/ETC DATA MAP



TACLOBAN/ETC DATA MAP




ETC Network -Tacloban
Internet
ISP router
PLDT
TAC-8100-BSU01
PROXIM
10.254.37.175
TAC-20EOI-BSU02
Ericsson
10.254.37.170
Save the children
TAC-20Ei-AP19
Office
10.254.37.119
TAC-20Ei-AP29
Office ground floor
10.254.37.129
TAC-20Ei-AP39
Annexe Office
10.254.37.139
STC2-CONSUELO
Ubiquity NStation
10.254.37.198
STC-CONSUELO
Ubiquity Nbridge M5
10.254.37.177
OCHA office (Hotel Alejandro)
TAC-20Ei-AP24
OSOCC main
10.254.37.124
TAC-20Ei-AP26
OCHA Living corridor
10.254.37.126
TAC-20EOI-AP23
AP-outdoor / Roof Link
10.254.37.123
TAC-3560C-AS40
Access switch 12ports
10.254.37.40
TAC-20Ei-AP25
OSOCC offices
10.254.37.125
Unicef
WFP Hotel
CONSUELO-STC
Ubiquity Nbridge M5
10.254.37.176
TAC-8100-SU01
PROXIM
10.254.37.174
TAC-20EOI-SU02
10.254.37.171
TAC-20EOI-AP6
AP-outdoor / Link
10.254.37.111
City Hall - WFP
Equipments removed
Samaritan's Purse
Hotel Lorenzo
CONSUELO-STC
Mikrotek
10.254.37.181
STC-CONSUELO
Mikrotek
10.254.37.180
TAC-20EOI-AP5
AP-outdoor / Link
10.254.37.115
TAC-20Ei-AP15
Hotel lobby
10.254.37.120
TAC-3560G-CS10
Core switch L3, 24p
10.254.37.10
Stadium -MSB
TAC-20EOI-AP07
AP-outdoor / Link
10.254.37.112
TAC-20Eo-AP8
OSSOC tent
10.254.37.101
TAC-3560C-AS20
Access switch 8ports
10.254.37.20
TAC-20Eo-AP16
OSSOC tent
10.254.37.121
BASEY
TAC-20Ei-AP14
Outdoor AP
10.254.37.132
TAC-8100-SU0X
PROXIM
10.254.37.192
TAC-20Ei-AP11
Hotel 7th floor
10.254.37.116
TAC-20EOI-AP11
AP-outdoor / Link
10.254.37.104
TAC-PicoStation01
Ubiquity
10.254.37.186
TAC-WAC
WAN: 10.248.37.253
10.254.37.2
LAN: 10.250.37.254
TAC-NAS
AP-indoor / NAS
10.250.37.253
10.250.37.3
TAC-8100-BSU03
PROXIM
10.254.37.184
WFP – Insular life building
TAC-PicoStation02
Ubiquity
10.254.37.187
TAC-ESW500-AS0
Access switch 8ports
10.254.37.50
TAC-20Ei-AP23
Office
10.254.37.127
ACF
Ubiquity
NStation
10.254.37.199
CFSI
Ubiquity
NBridgeM5
10.254.37.172
UNHCR
TAC-8100-BSU
PROXIM
10.254.37.182
FAO-S
Ubiquity NStation M5
10.254.37.195
FAO-N
Ubiquity Nstation M5
10.254.37.196
FAO-AP2
Ubiquity PStation
10.254.37.136
TAC-20Ei-AP30
Ericsson indoor AP
10.254.37.130
FAO-SW
Ubiquity TouchSwitch
10.254.37.12
FAO-UNHCR
Ubiquity Nbridge M25-5
10.254.37.193
FAO
UNHCR-SW
Ubiquity TouchSwitch
10.254.37.11
UNHCR-FAO
Ubiquity
Nbridge M5-25
10.254.37.194
TAC-8100-SU02
PROXIM
10.254.37.190
TAC-20Eo-APX
Indoor AP
Office
10.254.37.118
Airport
TAC-20Eo-AP2
Outdoor AP
Warehouse
10.254.57.107
WFP Ktrust Warehouse
TAC-8100-SU02
PROXIM
10.254.37.188
TAC-20Eo-AP10
Outdoor AP prefab
10.254.37.114
Palo
TAC-ETC-8100-SU03
PROXIM
10.254.37.185
TAC-20EOI-AP25
Outdoor AP
DoH link
10.254.37.103
TAC-20Ei-AP26
Indoor AP
DoH conf room
10.254.37.105
TAC-20EOI-AP29
Outdoor AP
RedCross link
10.254.37.128
TAC-20EOI-AP24
Outdoor AP mast link
10.254.37.102
TAC-20EOI-AP27
Hotel Oriental link
10.254.37.117
TAC-20EOI-AP27
Outdoor AP
Hotel Oriental
10.254.37.133
TAC-20Ei-AP22
Indoor AP at prefab
10.254.37.122
AP35
Outdoor AP
RedCross link warehouse
10.254.37.135

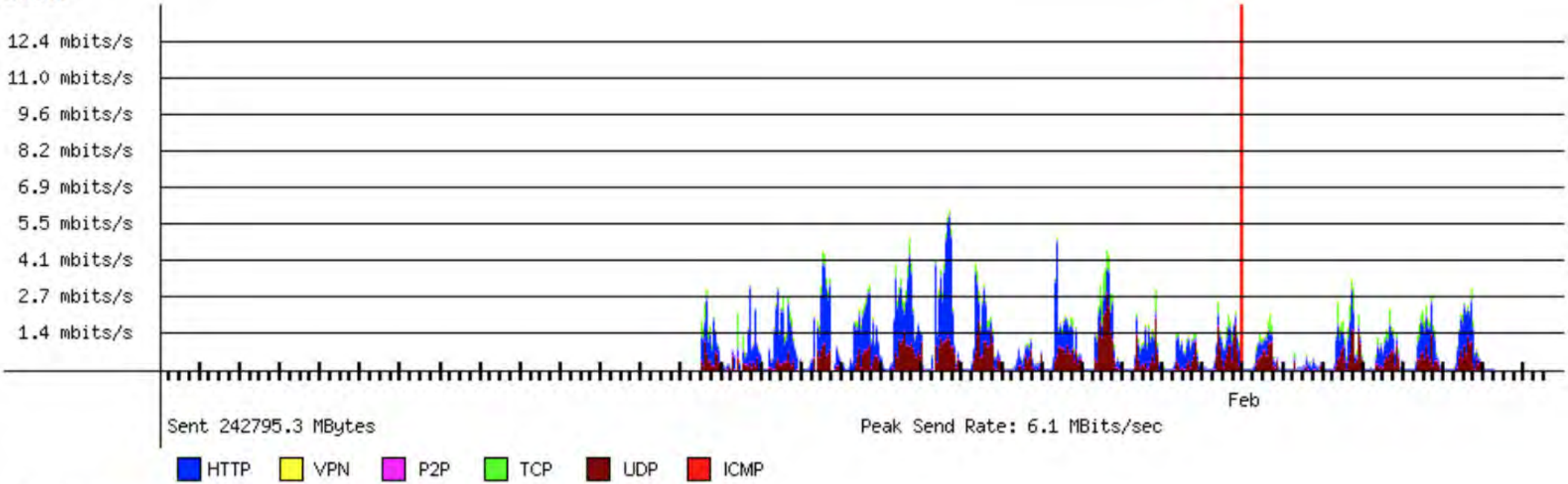

inveneo
Project: Tacloban ETC
Last Updated: 02/11/14
ETC Network
UNHCR-FAO
Ubiquiti NanoBridge M5-25
10.254.37.194/24
frequency 2462 MHz
20MHz width
SSID: ETC_ubnt
ETC-WFP
PicoStationM2
10.254.37.187/24
UNHCR-SW
Ubiquiti ToughSwitch
10.254.37.11/24
WFP-ETC
PicoStationM2
10.254.37.187/24
CONSUELO-STC
Ubiquiti NanoBridgeM5
10.254.37.176/24
frequency 5805 MHz
10MHz width
SSID: UNHCR-FAO
ACF
Ubiquiti NanoStation
10.254.37.199/24
frequency 5180 MHz
20MHz width
SSID: FAO-S
frequency 5745 MHz
10MHz width
SSID: CONSUELO-STC
STC-CONSUELO
Ubiquiti NanoBridgeM5
10.254.37.177/24
STC2-CONSUELO
Ubiquiti NanoStation
10.254.37.198/24
FAO-S
Ubiquiti NanoStationM5
10.254.37.195/24
FAO-UNHCR
Ubiquiti NanoBridge M5-25
10.254.37.193/24
FAO-AP
Ericsson Indoor AP
FAO-SW
Ubiquiti ToughSwitch
10.254.37.12/24
FAO-AP2
Ubiquiti PicoStation
10.254.37.136/24
Solidarite
Ubiquiti NanoStation
10.254.37.173/24
frequency 5240 MHz
20MHz width
SSID: FAO-N
FAO-N
Ubiquiti NanoStationM5
10.254.37.196/24
Note:
All Ubiquiti Devices
Mgmt VLAN: 99
Internet VLAN: 102
username:
password:
WPA2-AES encryption
WPA2 password:
frequency 5240 MHz
20MHz width
SSID: FAO-N
CFSI
Ubiquiti NanoStation
10.254.37.172/24
International SOS
Ubiquiti NanoStation
10.254.37.136/24

Irish Aid
Government of Ireland
Rialtas na hÉireann
Ericsson Response
ERICSSON

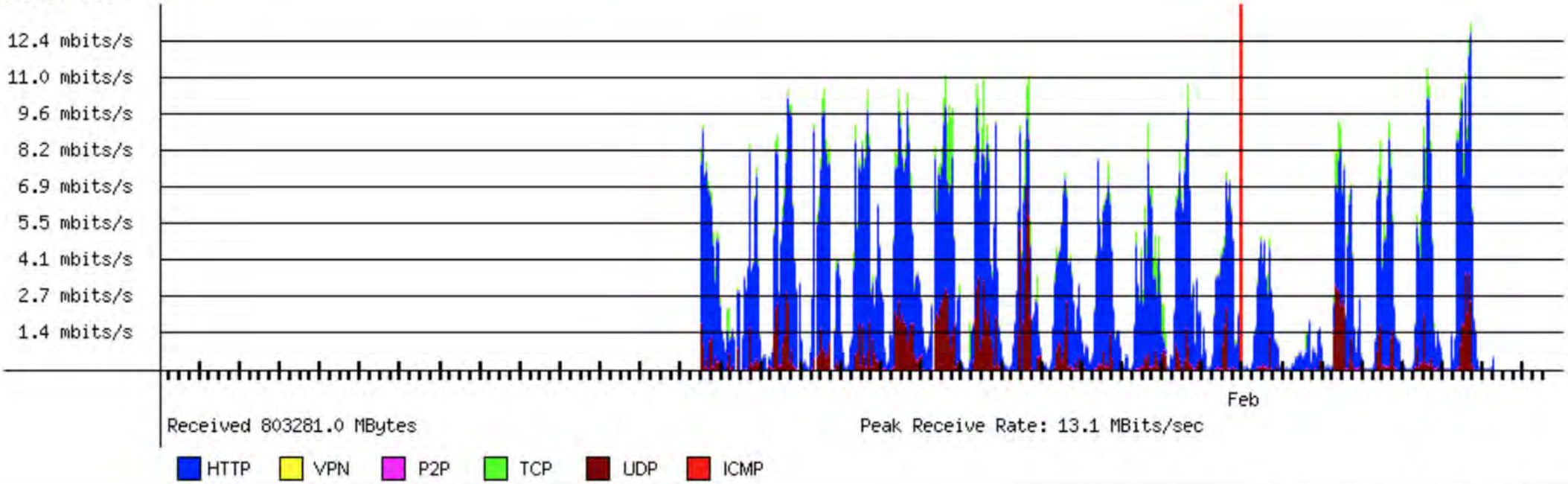
AP
NAS

(Top) Total - Total of all subnets

Send:

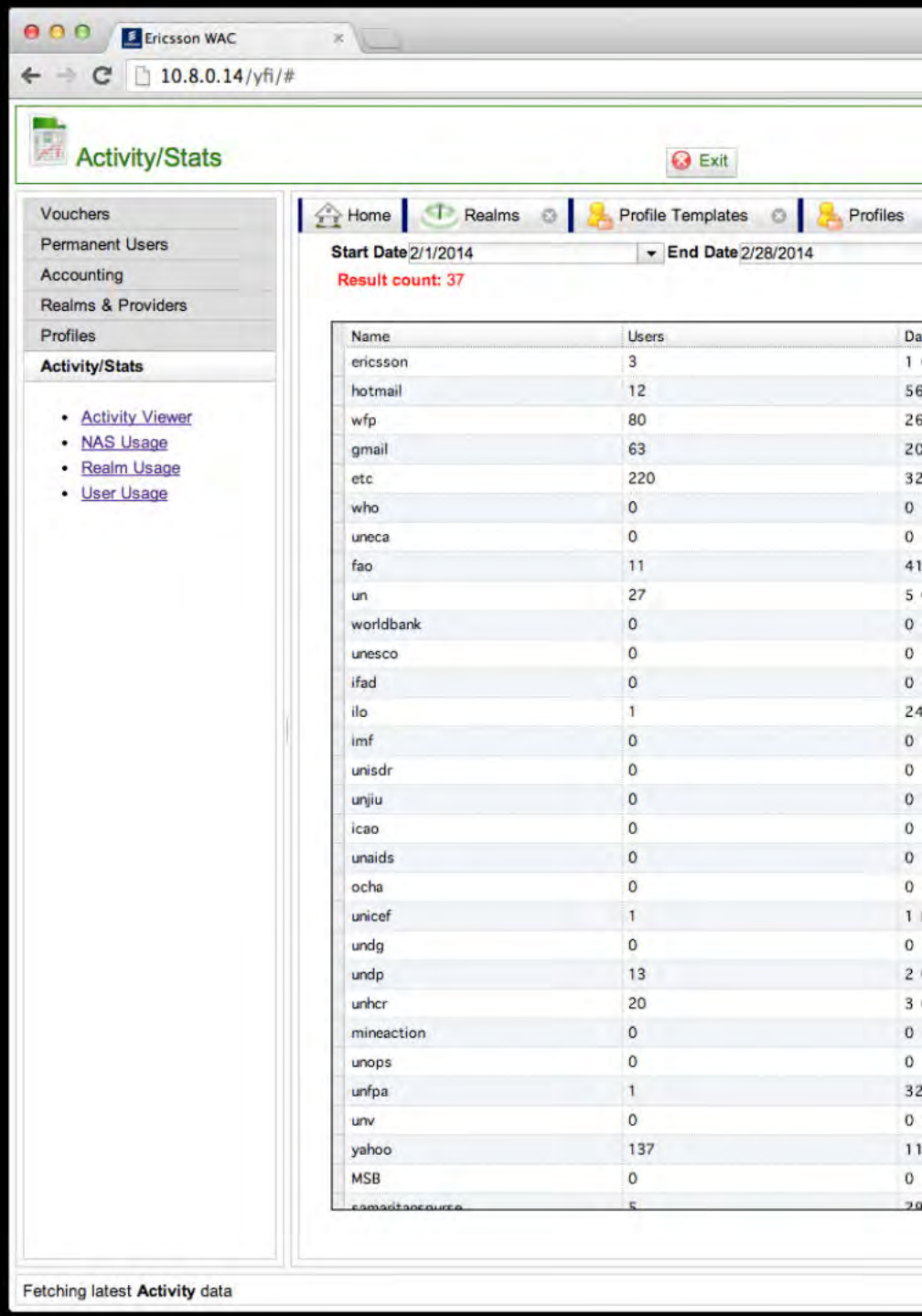


Received:



WIDER V4

- Provides:
  - User authentication
  - Bandwidth management
  - Networking services
- Not quite production ready**



SmokePing Latency Page

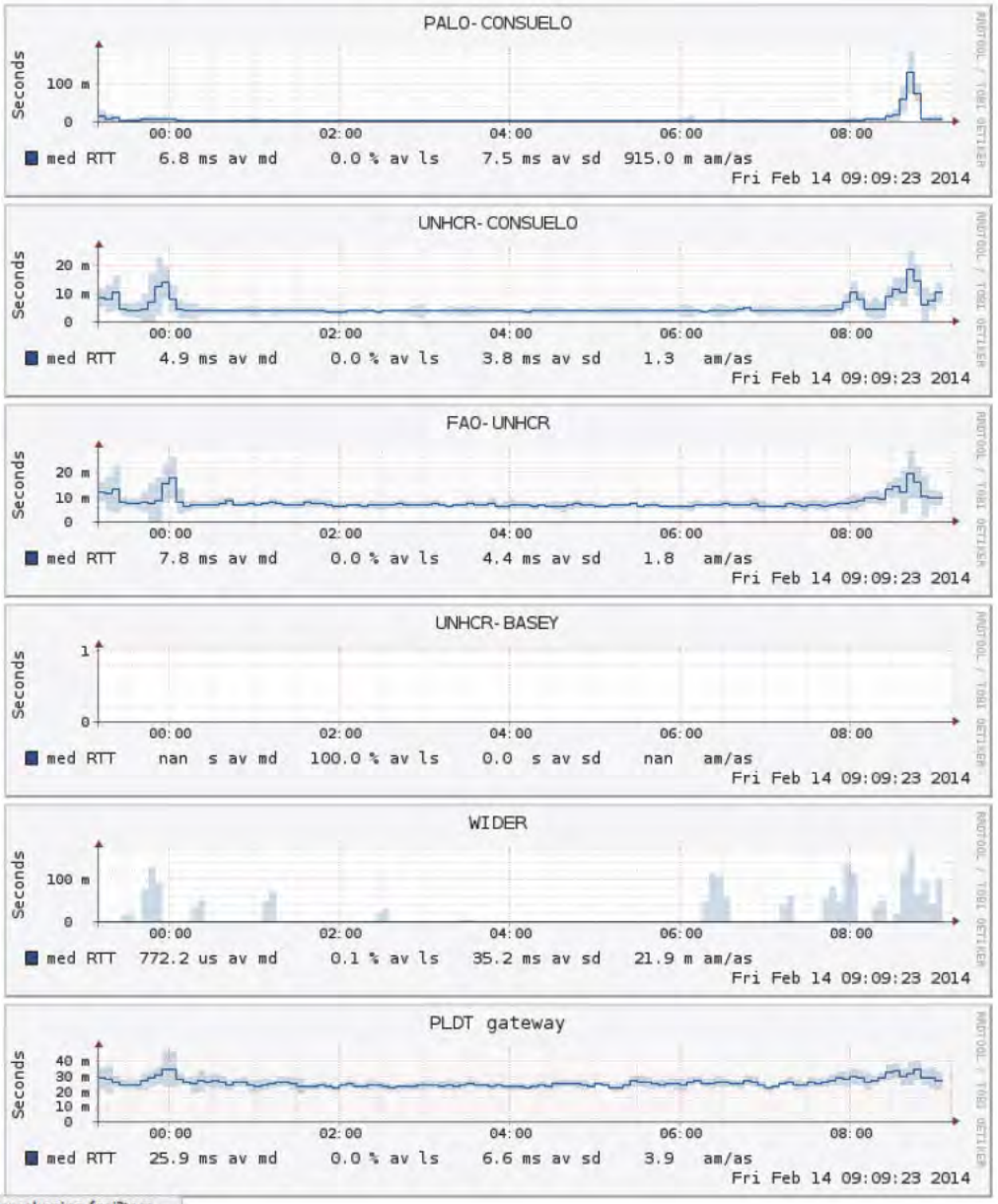
tacloban.inveneo.net/smokeping/smokeping.fcgi?target=ETCNetwork

SmokePing Targets:

Filter:

- Charts
- Internet
  - ETCnet Critical
    - PALO-CONSUELO
    - UNHCR-CONSUELO
    - FAO-UNHCR
    - UNHCR-BASEY
    - WIDER
    - PLDT gateway
  - ETCnet non-critical
  - ETCnet Palo APs

Critical Hosts on the ETC Network



Maintained by Tacloban ETC

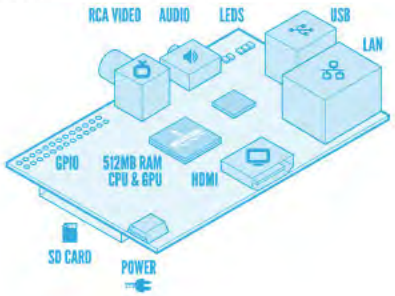
Running on SmokePing-2.6.8 by Tobi Oetiker and Niko Tyni

smokeping

RRDtool logging & graphing

tacloban.inveneo.net/smokeping/smokeping.fcgi?targ...

RASPBERRY PI MODEL B



Tacloban ETC | Trello

https://trello.com/b/wqBMmnk4/tacloban-etc

Boards | Trello | Dustin Li

Tacloban ETC ETC - Yolanda | Private | Subscribed | Show sidebar

WIDER Design Improvements...

- Add agencies to WIDER
- Increase the DHCP space
- WAC UX: failure should redirect users to WAC IP rather than previous URL
- WIDER logout doesn't work
- Add admin contact info in confirmation email — RS
- Find a replacement for bandwidthd
- Add contact details for registration "ask administrator" — MA
- WIDER WAC Backup — MA
- Add monitor of lists of agencies to see who is unregistered

Add a card...

If we ever have time...

- Increase participation @ ETC cluster meetings - I think not many people know about it. — RS
- Reroute UNICEF & Hotel Wireless through WAC — SP
- Fix IFRC logs AP
- Send an email to all unregistered users — FW
- Get harness from Roxas
- Network - Fix ETCmanagement DHCP router address
- Admin - Get ETC stickers and cards — RS
- Request for a shared mailbox for ETC to keep an history (TBD)

Add a card...

TO DO

- Network - Insular life 7 K Trust link — SP RS FW
- WIDER - Clone WAC — SP
- Electrical - Get 3rd UPS running for WAC — NG
- Electrical - Equipment grounding — SP NG
- Termination - Customer Sites — RS
- Evaluation/Add - New Sites — RS
- Network - Check why we are dropping pings to WAC occasionally — FW
- Inventory - Do an Ericsson inventory

Add a card...

DOING

- Network - Figure out where bottlenecks are — SP MG FW
- Radio - Program vehicle radios — MG
- PLDT redundant connection — SP MA FW
- Get updated network map printed — MG
- Network - Recover management interfaces for BSUs/SUs — SP FW
- Electrical - Inventory list from Noel and handover — RS NG

Add a card...

Watching/Waiting/Blocked

Add a card...

DONE!

- Evaluation
- Sitdowns
- Ubiquity - Sam — Feb 9
- Radio - Tr program r
- Electrical - UNHCR U
- Electrical - City Powe — Feb 6
- Network - failure
- Network - bandwidth using from
- Network a Palo mast camp

Add a card

CHALLENGES

LIMITED SLEEP

240V, 60 HZ

WIND BLOWS

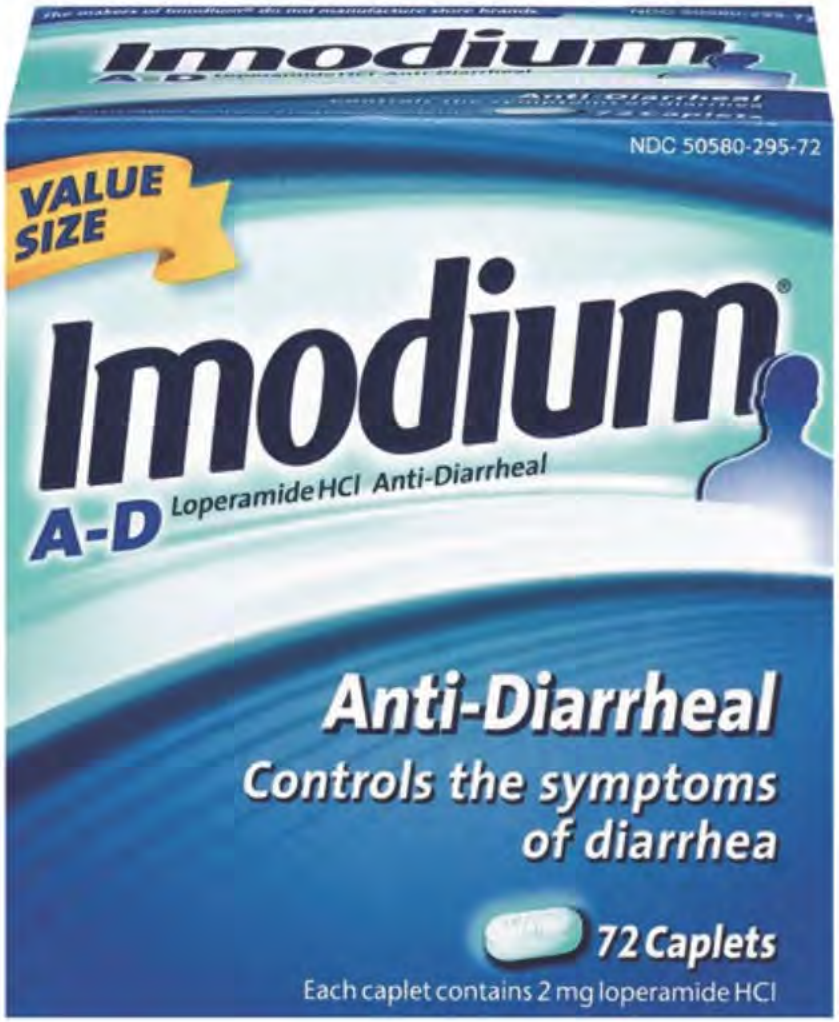
BEING PART OF UNITED NATIONS/WFP

WFP

wfp.org

World Food Programme

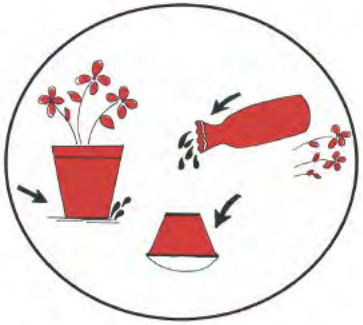
PHYSICAL RISKS



World Health Organization
Regional Office for South-East Asia

STOP DENGUE NOW!

You can get dengue through the bite of an infected mosquito. The dengue mosquito breeds in clean, stored, uncovered water.



Remove stagnant water from your surroundings

Empty and clean water storage containers weekly

Wear long-sleeved, full length clothing and use mosquito repellant

Seek early treatment if you have high fever, nausea and bodyache.

SUSPECTED POLIO

1. NAME: [...]
2. AGE: 18 years, turning 19 March of next year
3. Was diagnosed with "polio" at a local hospital when she was "very young."
4. FATHER'S NAME: [...]

They are currently at NSPC Evacuation Center, Estancia, Iloilo

LESSONS LEARNED

- Wifi gear: Ubiquiti
- Google knows everything - including how to drive a motorbike
- Radio towers are unique jungle gyms
- Don’t use Dropbox to sync spreadsheets (or other data that change frequently)
- You can get paid to do this!

THINGS WE COULD IMPROVE ON

- Long range links via TV whitespace (hi, Microsoft!)
- Network authentication/bandwidth control/core services (IP, DNS)
- VHF antenna deployment
- Access point standardization/preconfiguration
- LTE
- Interfacing with local service providers, assisting in recovery

HOW YOU CAN HELP

- Donate (e.g. to Inveneo)
- Volunteer (ETC, Red Cross)
  - Mali
  - South Sudan
  - Syria
  - Central African Republic
- Research
  - Prevent disaster
  - Mitigate impact
  - Improve response

QUALIFICATIONS

WINDOWS CORPORATE IT

SOFTWARE DEV
@ STARTUP

VIKING

RADIO
FIRMWARE

DO SOMETHING AWESOME

HTTP://ICTEMERGENCY.WFP.ORG/
SELF@DUSTIN.LI