The Philippine Experience with TVWS Technologies

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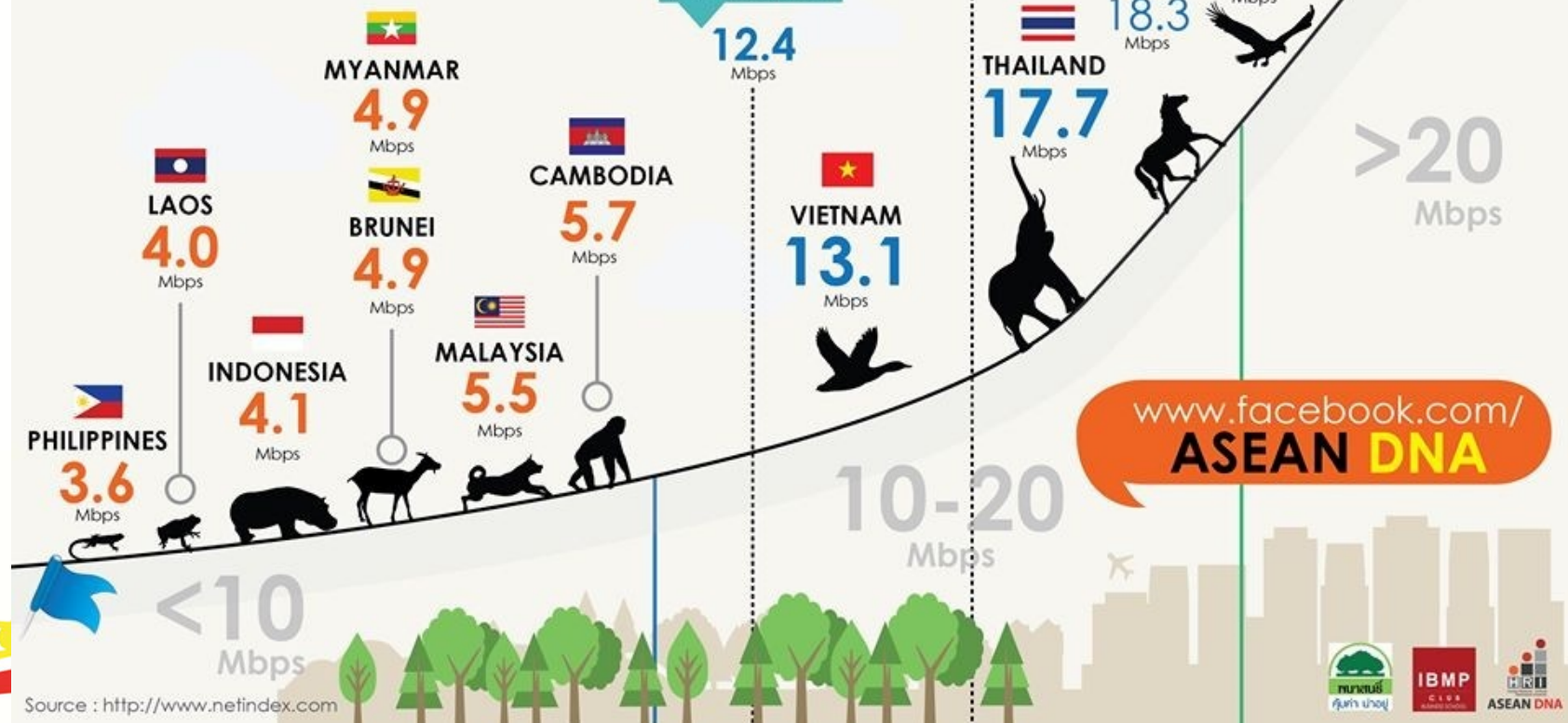
Context: The Philippine Internet Landscape
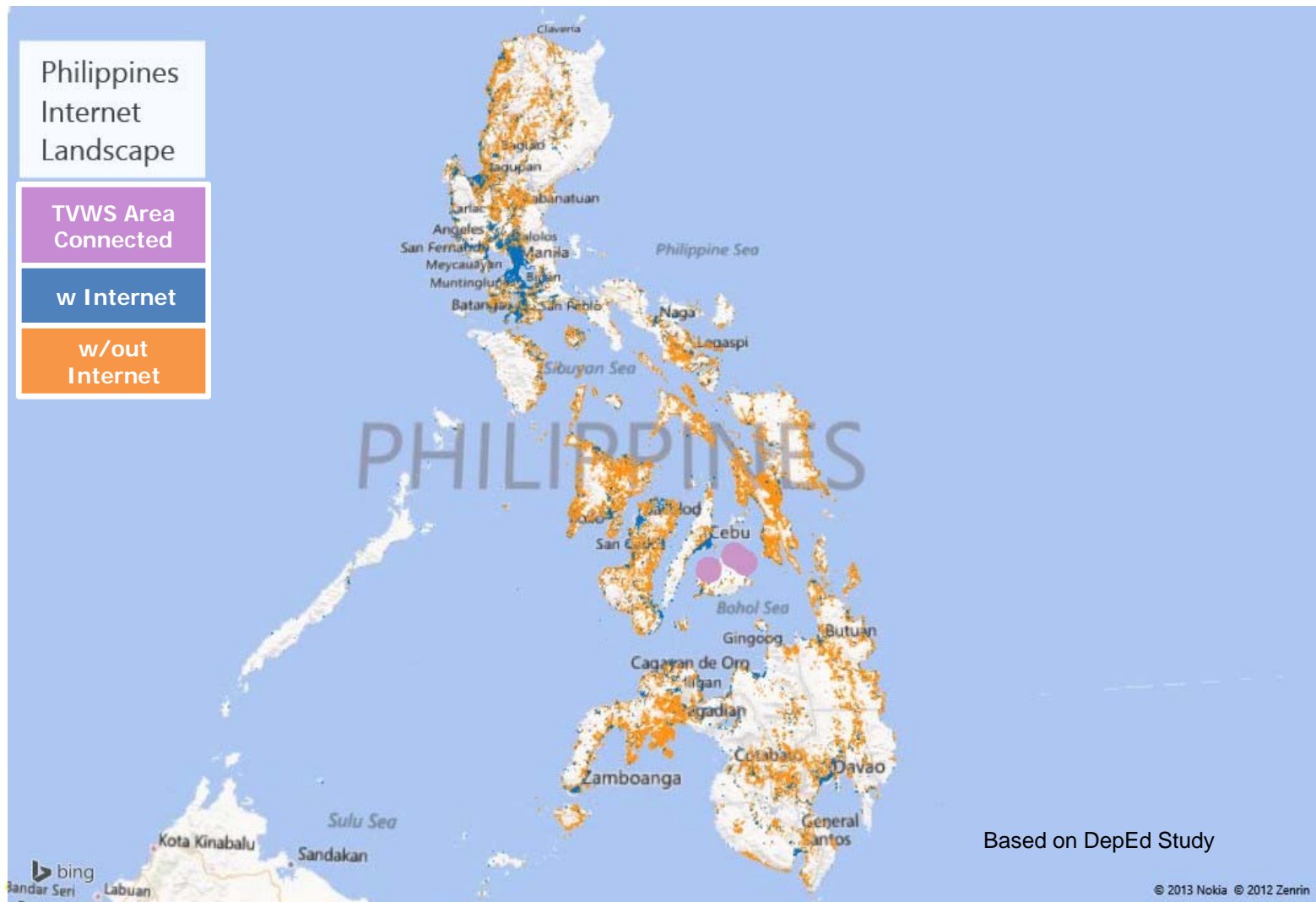
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Philippines
Internet
Landscape

TVWS Area
Connected

w Internet

w/out
Internet

Based on DepEd Study

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CH3   CH6   CH8   CH10   CH12

ABS-CBN   NBN   ABC   GMA   RPN   GMA   IBC
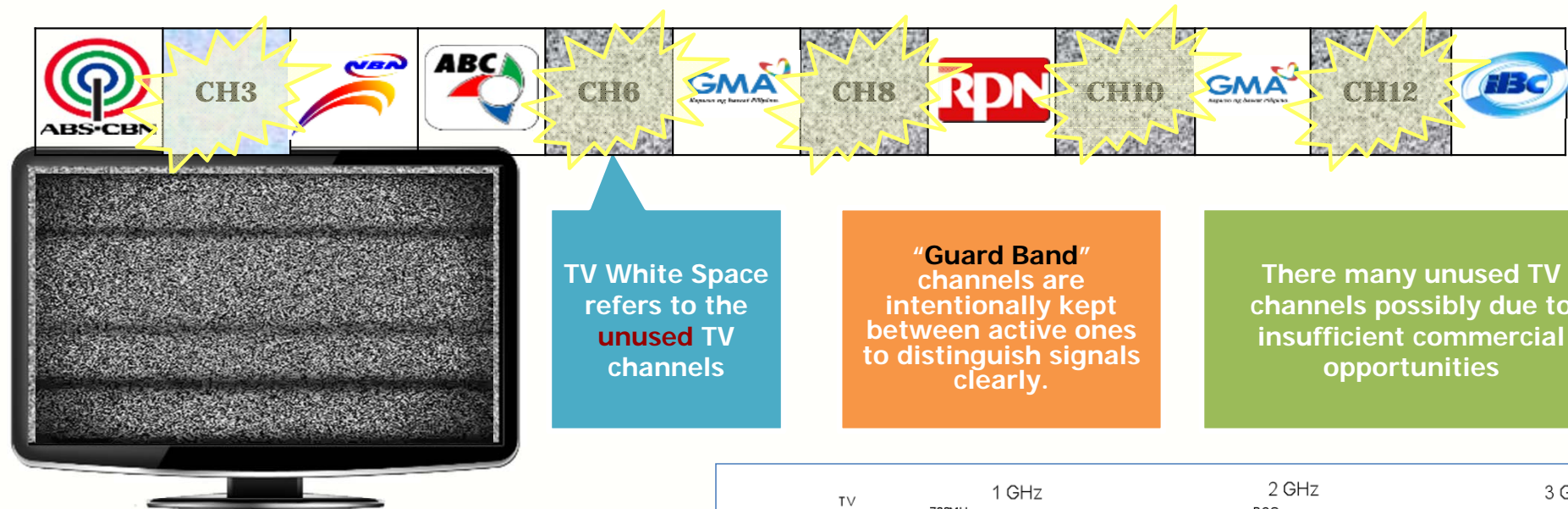
TV White Space refers to the unused TV channels

"**Guard Band**" channels are intentionally kept between active ones to distinguish signals clearly.

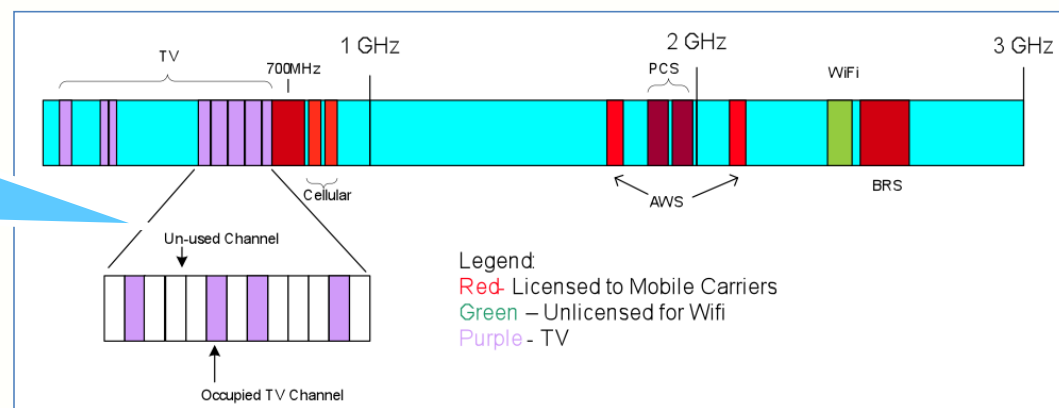There many unused TV channels possibly due to insufficient commercial opportunities

When tuned to these unused TV channels, this displays what looks like "snow" with a hissing sound.

The "snow" and hiss in tech jargon is called *white* noise.

Thus, the term "*white space*".

TV   700MHz   1 GHz   2 GHz   PCS   WiFi   3 GHz

Cellular   AWS   BRS

Un-used Channel

Occupied TV Channel

Legend:
Red- Licensed to Mobile Carriers
Green – Unlicensed for Wifi
Purple - TV

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Why TV White Space.....

TVWS technologies are ready for deployment.

A perfect solution for last mile distribution

IDEAL for the Philippine landscape.

83%

No broadband connectivity in most areas.
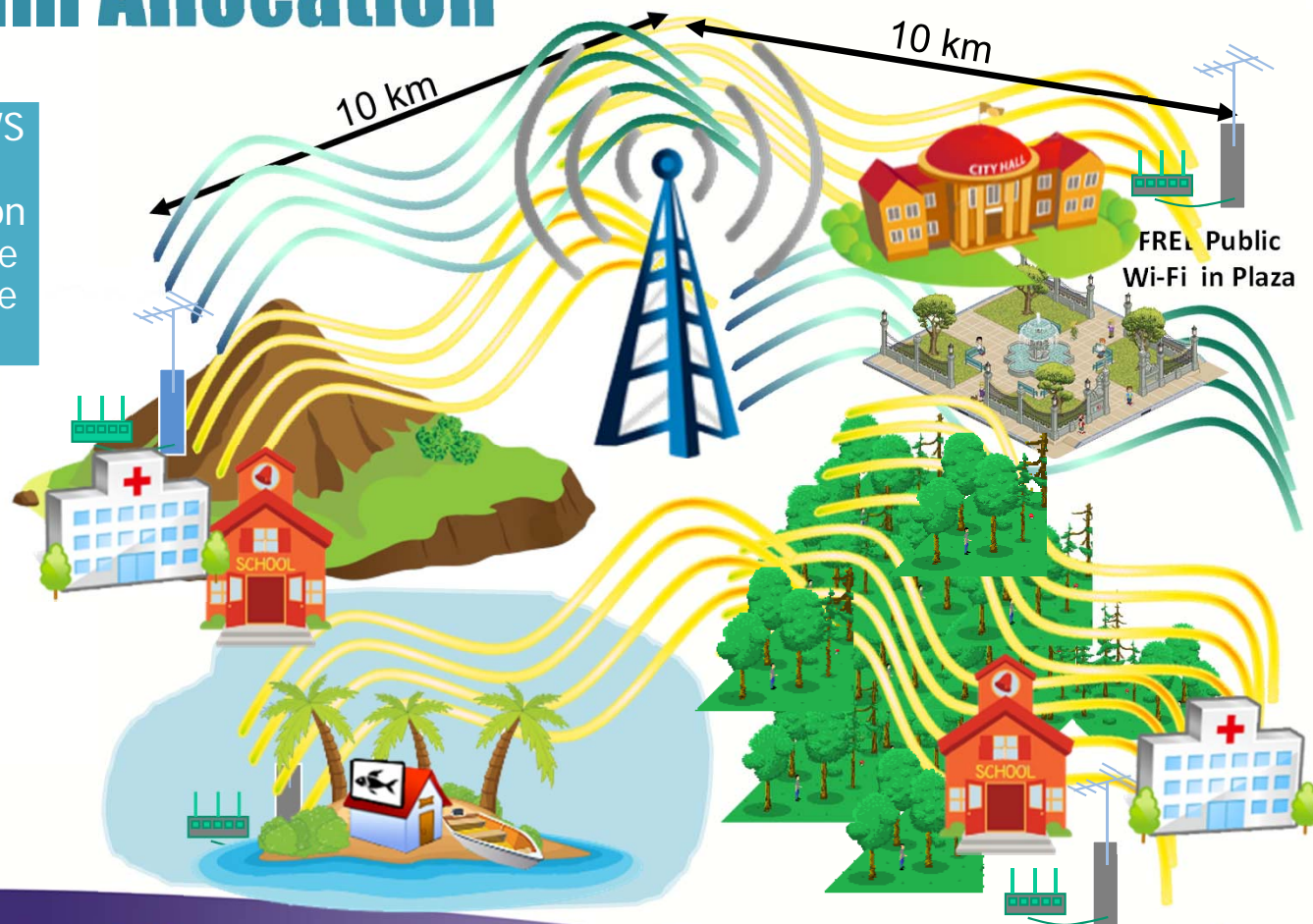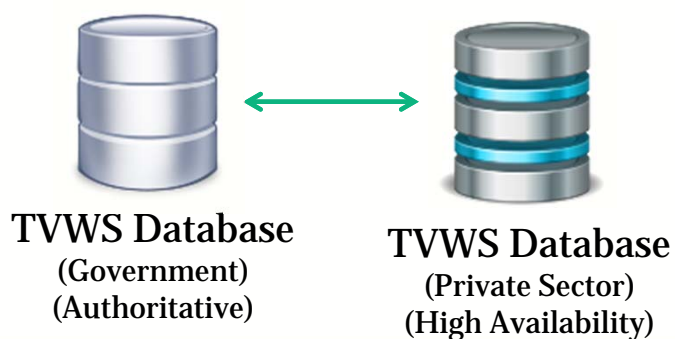No ROI for big ticket infrastructure investments by the private sector.

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Dynamic Spectrum Allocation

A TVWS device queries an online TVWS database service for an empty TV channel to use for particular location on a daily basis or more. By updating the database, the usage of channel can be DYNAMIC.

10 km

10 km

TVWS Database
(Government)
(Authoritative)

TVWS Database
(Private Sector)
(High Availability)

CITY HALL

FREE Public Wi-Fi in Plaza

SCHOOL

SCHOOL

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First Philippine
TVWS Transmission:
May 2, 2012
ADB Annual Meeting
PICC Tent

TVWS Radio Client Antenna

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Multi-stakeholder workshop @ ICTO on Jan 31, 2013

Pilot Project MOU Signing: July 2013
DOST-ICTO, DAR-BFAR, USAID, Microsoft

Turnover of TVWS Network: April 2014

TV White Space BOHOL Coverage

3 Base Station

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Public Schools without Internet

- TVWS Base Station
- TVWS Sites Connected
- w/ Internet
- w/out Internet

BOHOL
100 sq KM coverage
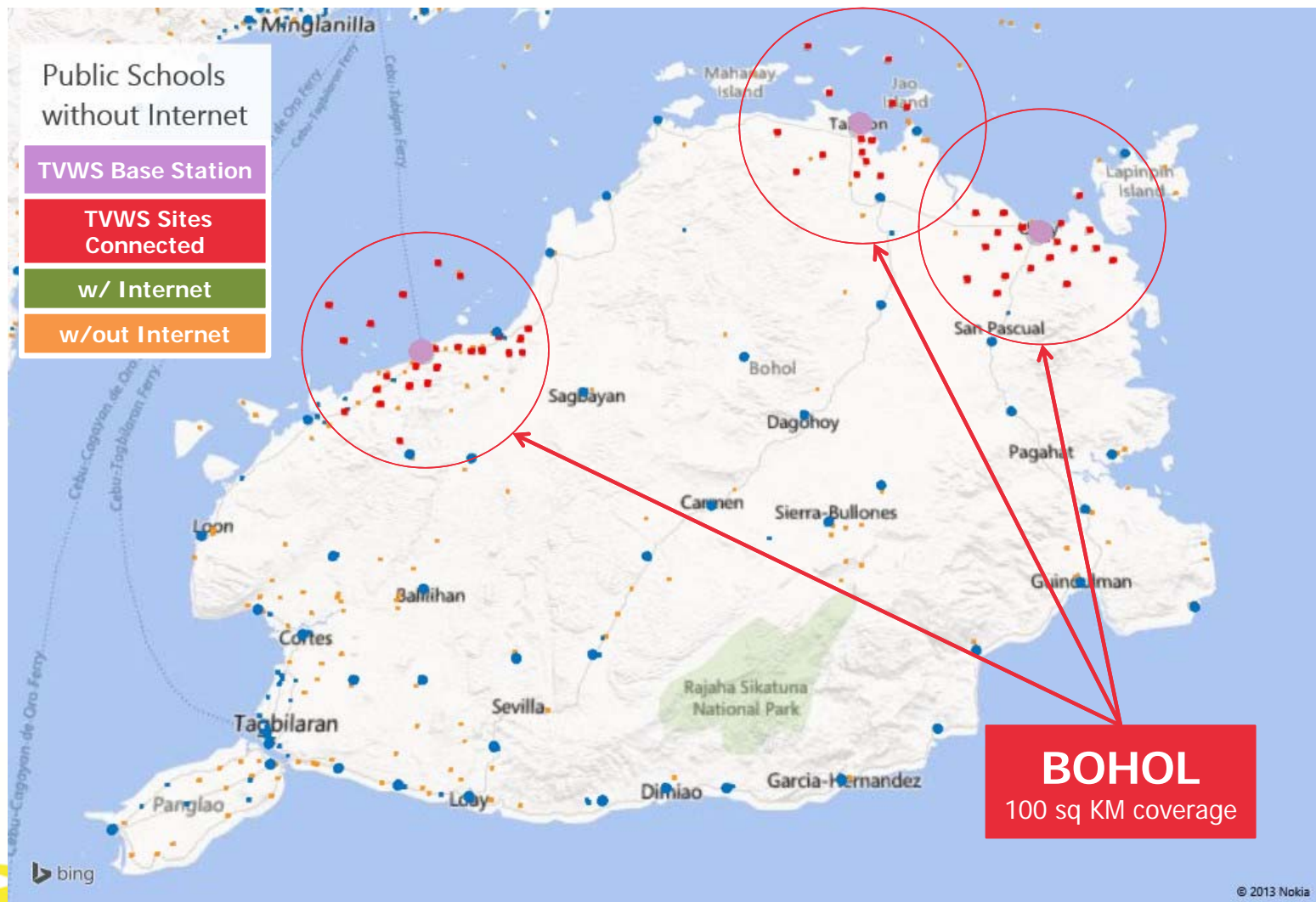
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The
TUBIGON, Bohol
Experience

1 Base Station, 3 CPE's

1 Base Station, 3 CPE Sites
Over 20 Offices Connected w/ FREE Wi-Fi in Pulic Areas
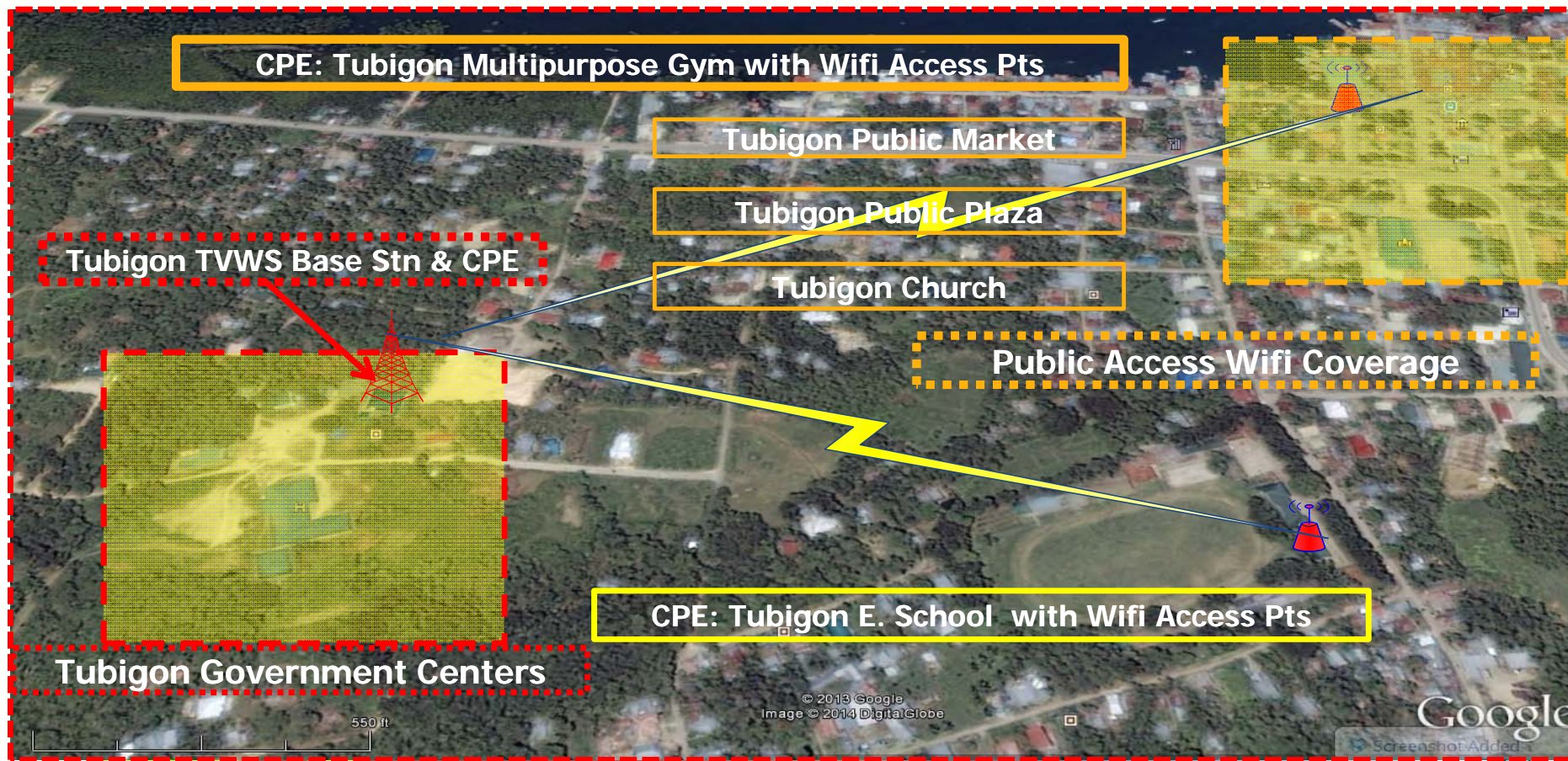
FREE WiFi in Plaza, Market, Church

CPE on Balcony

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1 CPE Radio Coverage for highlighted area

ICTO TVWS Tubigon
Omni Base Station

Rural Health Unit

MCTC

PNP

TESDA

BFP

Mayor's Office

DSWD

Community Hospital

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TVWS base station being installed at comm tower

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TVWS radio at Community Hospital

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FREE PUBLIC Wi-Fi ACCESS SERVICES

urtesy of DOST-ICT Office

(TV White Space Equipment by NITYO)
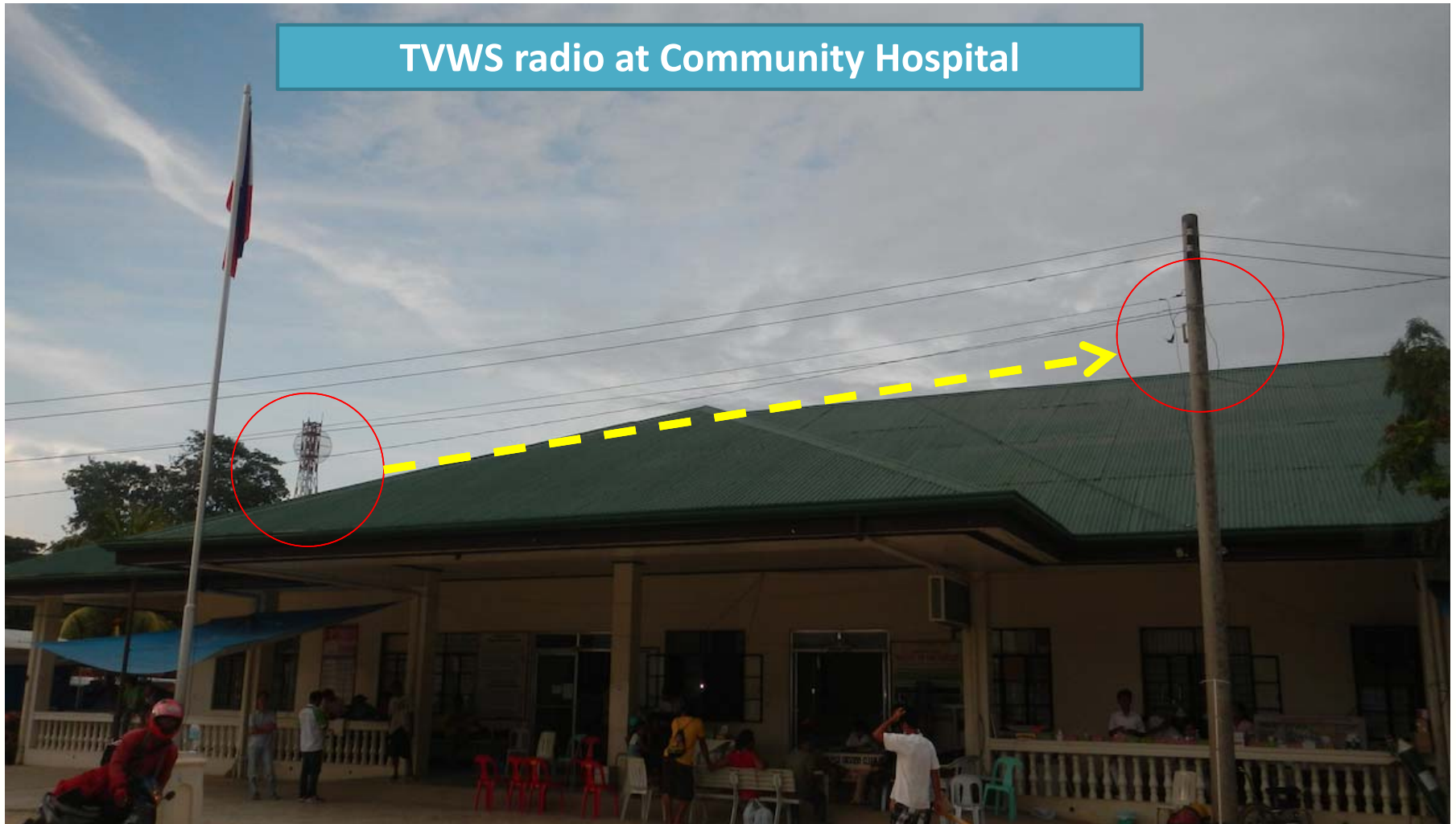
TVWS Connection 9 days after Earthquake

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Connecting the countryside through TVWS

MUNICIPAL NUTRITION CENTER
TUBIGON, BOHOL

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The
PALO, Leyte
Experience

1 Base Station, 2 CPE's

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Deployment Site #2: Palo (November 2013)

- Purpose: Restore connectivity after Typhoon Haiyan/Yolanda
- Coverage: Government Center in Palo, Leyte
- Backhaul provided by DOST thru VSAT (initially) and later switched to Telco network after they had restored their service
- Total Beneficiaries: approx. 4 government agencies
- Number of radios installed: 3 (initially) later expanded to 5
- Radio Supplier: Power Automation
- Installer: Systech
- System Integrator: Nityo

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Location of Palo relative to Tacloban

Palo is approx. 12 km south of Tacloban

Several factors led to the selection of Palo as the site for the TVWS network.

1. Much attention was already being given to Tacloban, so it was decided to look elsewhere.
2. Many government agencies have their regional offices situated in the "government center" which was located in Palo.
3. Given security and electric power concerns, it was decided that the "end points" of the network should all be located in areas that would be under DOST control in order to minimize the risks involved.

TVWS Network Coverage in Palo, Leyte

The three marked points were connected:
1. the base station at the DOST Regional Office (bottom) where the VSAT was located. The internet backhaul was a satellite connection provided by the ITU.
2. a CPE at the Philippine Science High School Office (center), approx. 500m away, the primary users were the administrative staff of PSHS
3. another CPE at the PSHS Campus Dormitory (top), approx. 1000m away, where the first set of users were the Bombero Unidos, a humanitarian group from Spain which sent a team of relief workers to Leyte. They were headquartered at the dormitory for several weeks. The internet connection was used to communicate with other NGOs and with their home base in Spain. When they left, the dormitory was used as temporary housing for the PSHS faculty and their families. The internet connection was used in helping the faculty rebuild their lesson plans and instructional material in preparation for the re-opening of classes in mid-January.

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DOST 8 Regional Office

Philippine Science High School Campus

Setting up the VSAT and TVWS at DOST 8

Three end points of the TVWS network

DOST Region 8 Office (showing solar-powered VSAT) where the base station was located

PSHS Administrative Building (the CPE antenna is the white square in the center of the photo).

PSHS Campus Dormitory

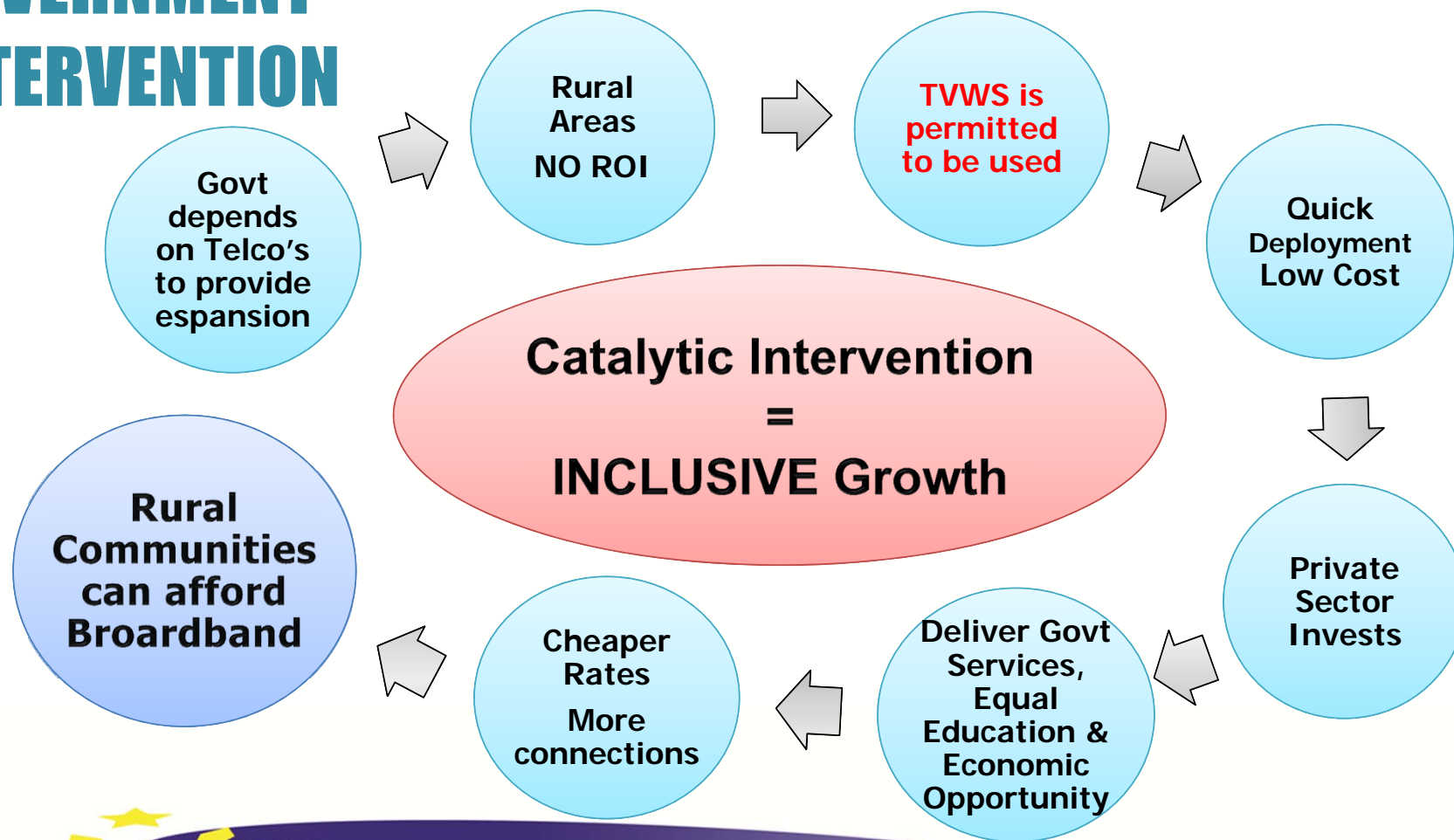**DEPARTMENT OF SCIENCE AND TECHNOLOGY**

Lessons Learned

- Connectivity can be just as important as providing food, water, medicine. Need to re-establish connectivity in hours or days – not weeks.
- First devices up were satellite-based systems; TVWS can be used to widen the reach of these systems. Suitability of TVWS in Disaster Impacted Areas:
  - Greater range – allows the access points to be installed in areas up to several kilometers away from where the VSATs are located (usually the command center). This makes it easier to control the traffic in the vicinity of the command center.
  - Antenna can be located indoors – there were concerns over how to secure the antennas. Thus the ability to locate them indoors, is beneficial. Plus line-of-sight was not required.
  - Easy to Install – aligning the radio antennas was easily done in less than 2 hours
  - Can be run off solar panels
  - Can also be used for peer-to-peer communications (this scenario was not tested though)

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GOVERNMENT INTERVENTION

Govt depends on Telco's to provide espansion

Rural Areas NO ROI

TVWS is permitted to be used

Quick Deployment Low Cost

Catalytic Intervention = INCLUSIVE Growth

Private Sector Invests

Deliver Govt Services, Equal Education & Economic Opportunity

Cheaper Rates More connections

Rural Communities can afford Broardband

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PH TVWS Opportunity

	Rural Areas	NCR & Cebu	Davao
TV Channels, VHF	Ch 2 - 13; 12 channels; 72 MHz BW		
TV Channels, UHF	Ch 21 - 51, 62 - 69; 39 channels; 235 MHz BW		
# Unused Channels after DTTB Migration	24 - 31	18	24
Bandwidth potential @ 22.7 Mbps / TV Channel	**545 – 703** Mbps	408.6 Mbps	**545** Mbps
Bandwidth w/ current technology @ 6 Mbps / TV Channel	**144 – 186** Mbps	108 Mbps	**144** Mbps
Growth potential from technology improvements	**378%**		

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DOST-ICTO Roadmap for TVWS Technology

2013

Pilot 1: Quezon City Science Community
DOST: ICT Ofc, ASTI, PhilVolcs, PAGASA, NTC, selected public schools

Pilot 2: Central Visayas

Public schools

Tele Health

Community e-Centers

Sensor Networks

2014

Pilot 3: Eastern Visayas/Northern or Western Mindanao

Full Deployment: Visayas & Mindanao

2015

Full Deployment: Luzon

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