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# INCENTIVISE

## *Introducing Non-Geostationary Satellite Constellations Test Deployments to Improve Internet Services*

**Joel S. Marciano, Jr., Ph.D.**

Director General



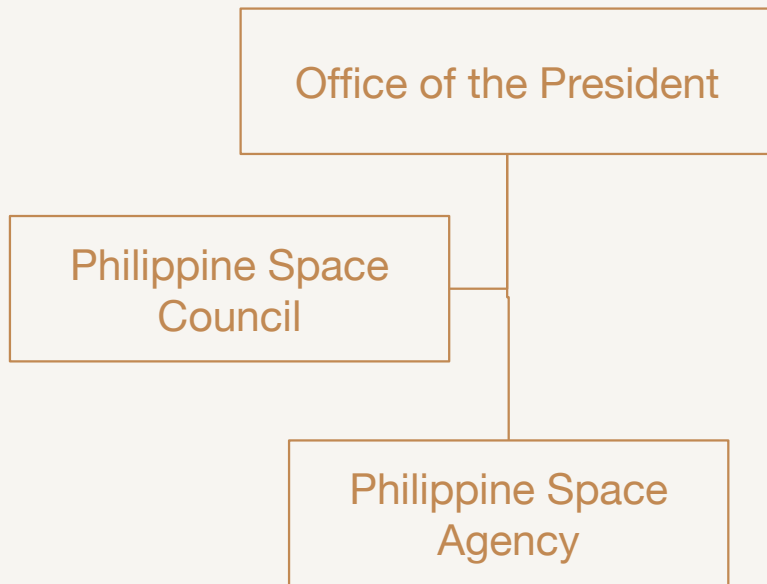
**PhilSA**

Assessing the Promise of LEO Satellites in Accelerating Rural Connectivity and Closing the Digital Divide

17 March 2022

# Republic Act 11363 “Philippine Space Act”

An Act Establishing the Philippine Space Development and Utilization Policy and Creating the Philippine Space Agency, and for Other Purposes



**Key Development Areas for SSTA Development**

## Upstream

- Satellite dev't: assembly, integration, test (AIT)
- Ground systems eqpt & satellite ops
- Launch systems, vehicles & services

## Downstream

- Satellite data & services: Earth observation, telecoms, navigation,
- Value-add services: AI/computing, decision support systems

## End users

- Consumers, gov't, industry, non-profit
- Various sectors: defense & security, agriculture, marine, energy, transport, etc

System & Infra

Operations

Data & Processing

Advanced Products & Services



**\$17.4B**

Satellite Manufacturing & Launch Services

**\$253.3B**

Space Data & Systems Utilization

**\$366B**

Global Space Economy (2019 Bryce Reports)

Government Budgets & Human Space Flight (non-satellite Industry): **\$95.2B**

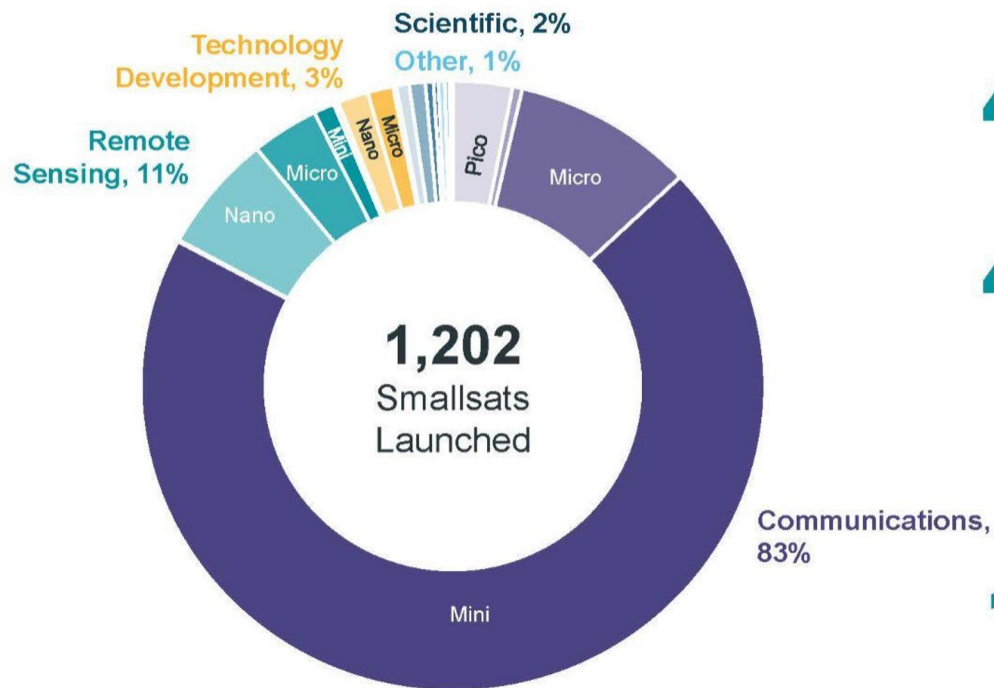
# We are living in the *Space Economy*



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# Trends in Small Satellites

## 2020 Smallsat Highlights

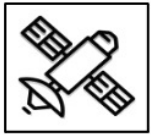


**40%** of all smallsats launched in last 10 years launched in 2020

**43%** of total upmass represented by smallsats in 2020

**68** launches in 2020 carried smallsats

**14%** of smallsats launched on small/micro launch vehicles in 2020



# Space Infrastructure

Space-based assets



Diwata-1 (2016-2020)



Diwata-2 (2018)



Maya-1 (2018-2020)



Maya-2 (2021)

## Small satellites



# Ground Infrastructure

Capacity to host and download the data



PEDRO Center Quezon City (DOST-ASTI)



Iloilo Ground Receiving Station (Soon)



PEDRO Davao Ground Receiving Station

COARE Facility Quezon City (DOST-ASTI)



Address  
**Digital Divide**  
through SSTA

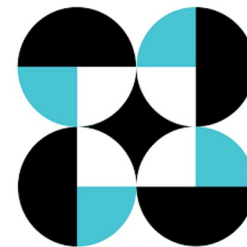
Promote Local  
**Space Industry and**  
**SSTA Ecosystem**  
Development



**DICT**  
DEPARTMENT OF INFORMATION AND  
COMMUNICATIONS TECHNOLOGY



**PhilSA**





# INCENTIVISE

- **Open call** for new **Satellite Internet Operators (SIO)** to conduct test deployments in the Philippines
- **Supports EO 127 s. 2021** with new satellite options (**downstream**)
- Opens doors to **space-adjacent** companies (**upstream**)
- **Research and development** objectives
- Draws attention to current **relevant telecommunications regulations**
- NGSO companies have sent **Letters of Intent**

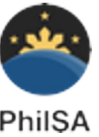


**Open Call for  
INCENTIVISE**

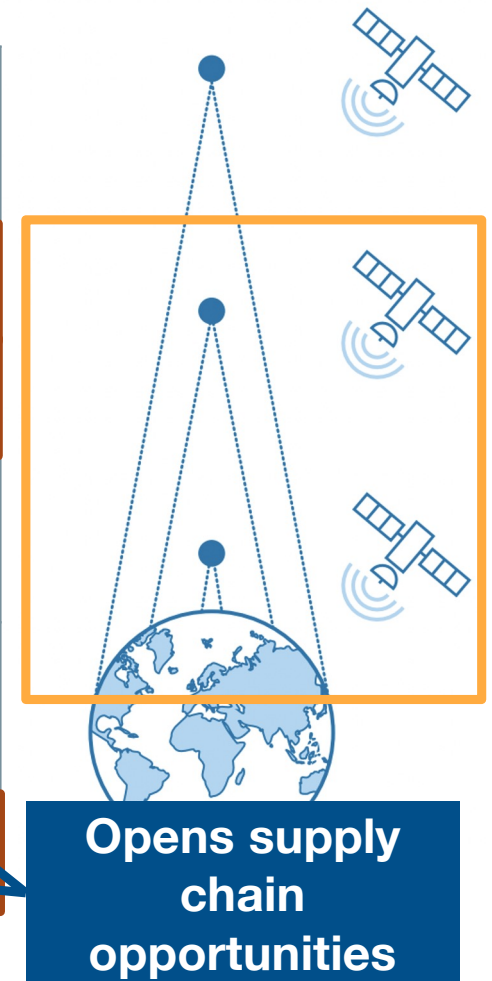
**Introducing Non-Geostationary Satellite Constellations Test Deployments to Improve Internet Services**

Operators of NGSO Satellite Internet Operators (SIOs) are invited to participate. See caption for more details.

# “New Space” Technologies



Features	LEO LOW EARTH ORBIT	MEO MEDIUM EARTH ORBIT	GEO GEOSTATIONARY ORBIT
Altitude (km)	~600	~3,000	~36,000
Latency (ms)	<50	~150	~600
# of Satellites to Span Globe	Up to thousands	5 - 30	3
Cost per Satellite	~\$500k - \$45M	\$80M - \$100 M	~\$100M - \$400M
Lifetime (years)	5 - 10	10 - 15	15 - 20

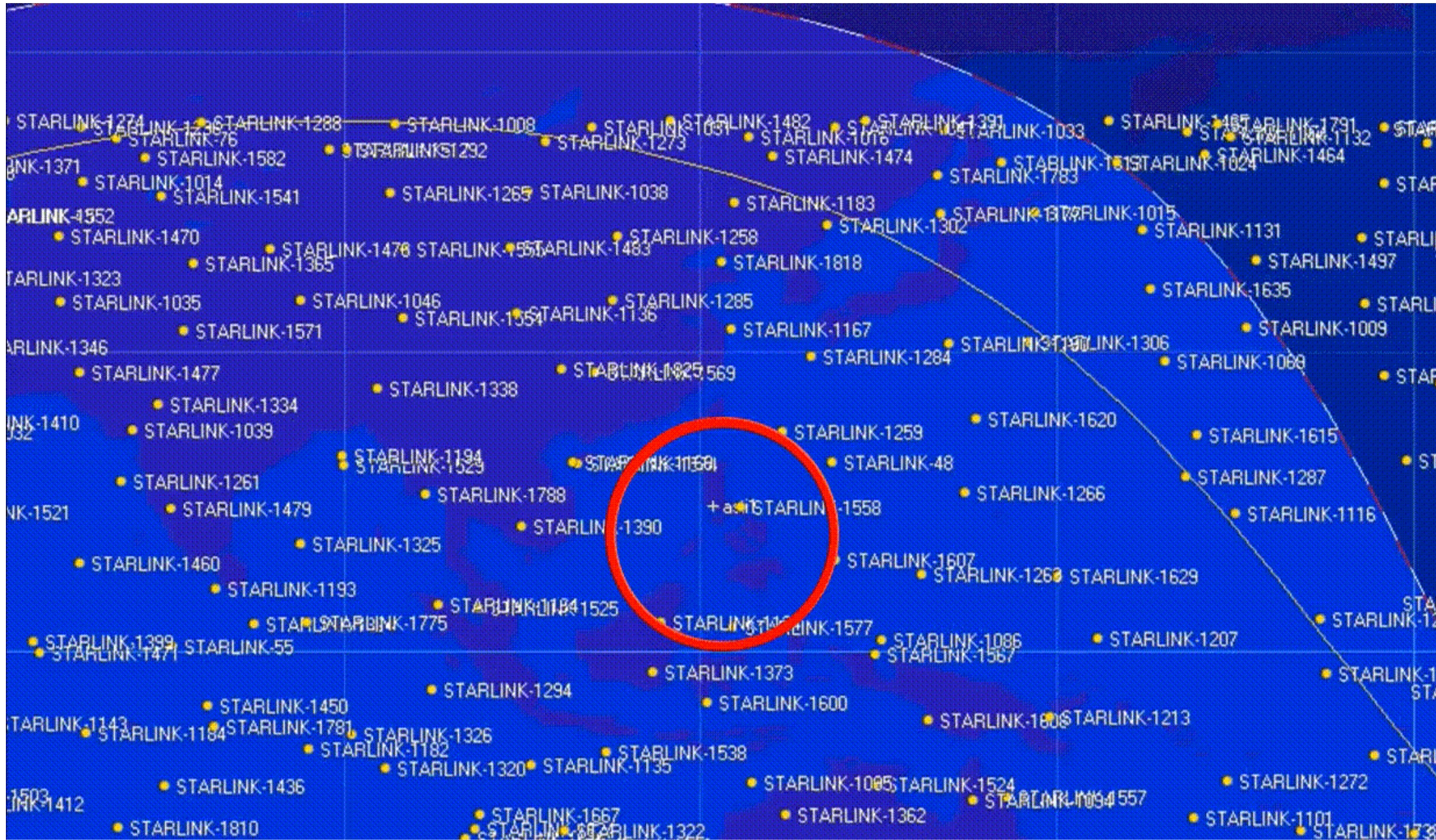


**Opens supply chain opportunities**

Information & Image Source: *Last Mile Internet Connectivity Solutions Guide*, ITU Development Sector (2020), page 71.

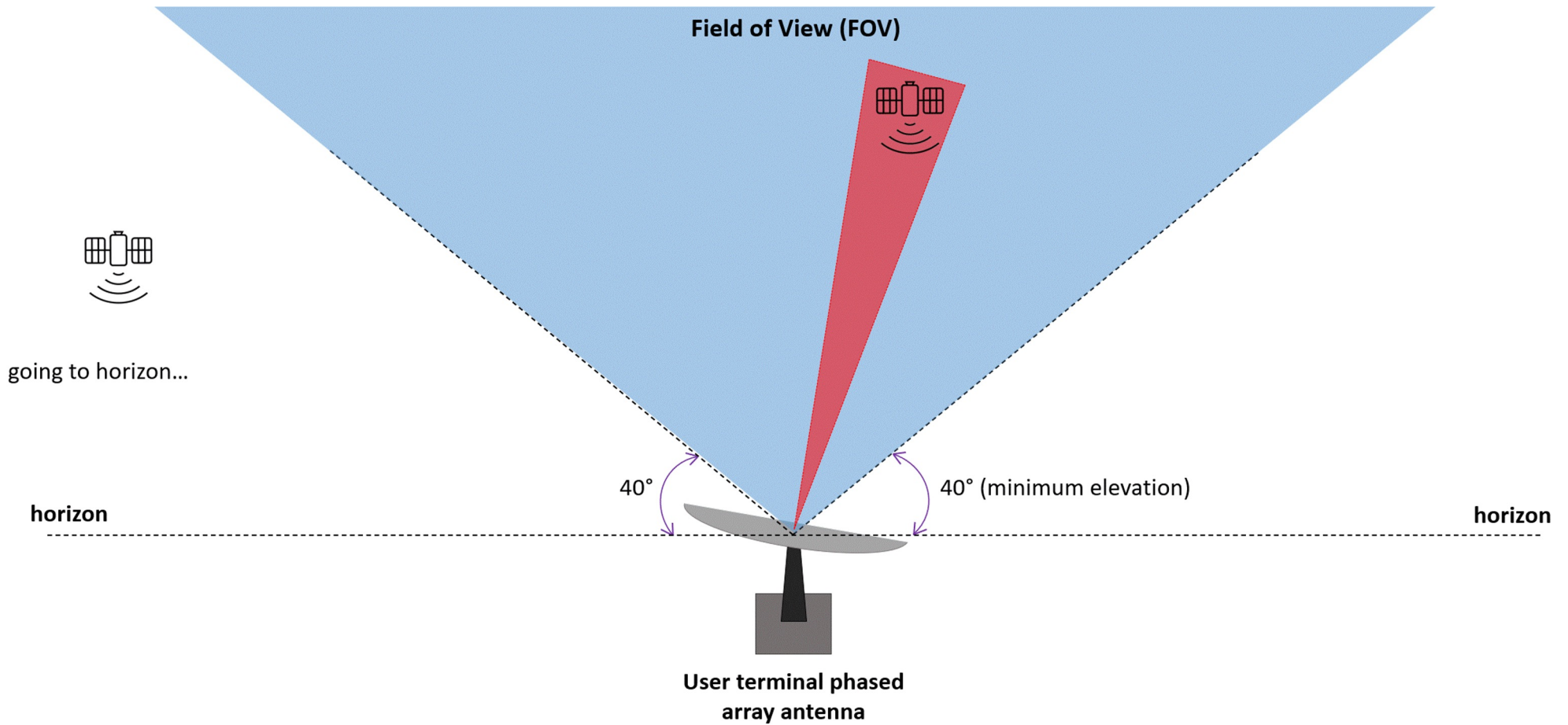


# Example: Starlink Satellite Constellation





# LEO Satellite Internet: Perspective from the ground



# LEO Internet Satellites Tracker

<https://philsa.gov.ph/spacedata/project/leo>



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SATELLITE INTERNET AVAILABILITY | SPACE DASHBOARD

Satellite Constellation

OneWeb Starlink

Active Satellites  
394  
as of Mar 15, 2022 01:19:13 pm

Min. Elevation  
Indicate inclination of satellite

40 GO

No value No value

How to use

1. Click preferred project logo on the left.
2. Relevant research and development outputs will show depending on the selected project.
3. Turn on or off slider to show data for each theme.
4. Click marker or any pin.
5. Wait for the images and information to load.
6. Hide or unhide drawer using the close icon on the upper left.
7. To display map layers, click slider on the overlays.

OKAY, GOT IT!

Leaflet | © OpenStreetMap contributors © CARTO

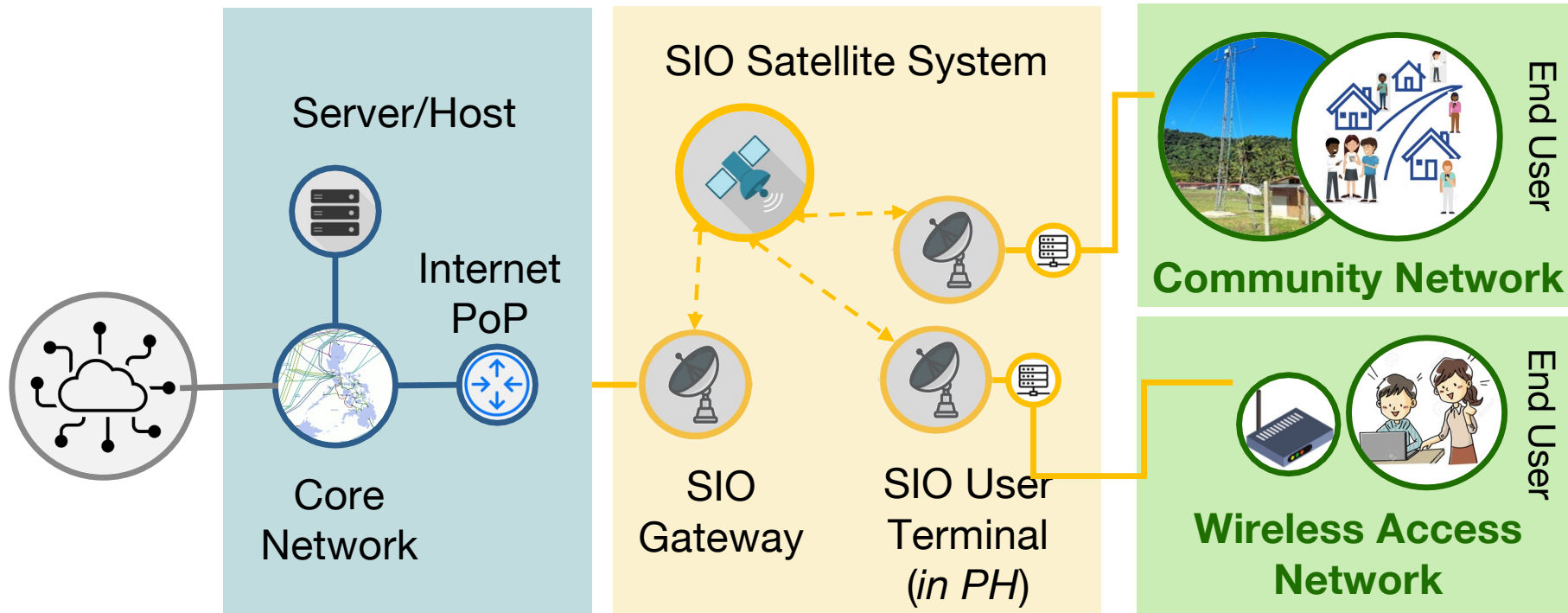
# “Availability”

- Simply counting the # of satellites that pass overhead in a given area at certain minimum elevation
- Necessary, but not sufficient, condition for establishing a connection
- Actual connection, its quality and speed, depends on other factors, such as, among others:
  - Satellite and ground network uptime
  - Availability of the Internet gateway (GW)
  - Weather conditions

# INCENTIVISE Open Call



- \*NGSO: Non-geostationary satellite orbit
- \*SIO: Satellite Internet Operator
- \*PoP: Point-of-Presence



The Rest of the Internet

PoP and Core Network

SIO "bent pipe"

Remote User Segment

Observers





## Feedback from target end users in remote Community in Aurora, a potential site for test deployment



*“Nung bagyong Ulysses (Nov 2020), tatlong araw kami walang komunikasyon sa LGU, kahit mga radyo namin walang signal. Kung may malakas na internet, mabilis ang coordination sa LGU habang bumabagyo at pagkatapos. Ma-access rin namin ang PAGASA weather database para makakuha ng sapat na impormasyon ukol sa paparating na bagyo para kami ay makapaghanda.” -Mr. Dela Cruz, DRRM Officer*



*“Kapag may internet dito, hindi na namin kailangan bumyahe sa bayan tuwing enrolment para magamit ang DepEd online platform. Minsan dun (sa bayan) kami natutulog pag maraming kailangan i-submit na report o may online conference. Gayun din ang mga highschool students, sa kanilang bahay mismo maka-attend sila ng online classess. Magamit rin namin sa pagtuturo”*

*- Teacher Jason*



# Bridging the Digital Divide & Building the Local Space Industry Through Internet Satellites

EO 127 s.2021

New Space  
Technologies

*Enabling Factors*

**INCENTIVISE**

*PhilSA Program*

*Outputs and Outcomes*

Technology  
Validation

Expanded Market  
Entry and Access

Enabling Rural  
Community Networks

PH  
Space  
Dev't  
Fund  
(PSDF)

**Bridge the Digital Divide  
Through SSTA**

Remote  
Learning

Financial  
Inclusion

National  
Security

DRRM

Telehealth

**B3iS: Promote Local  
Space Industry Dev't**

Knowhow  
Transfer &  
Retention

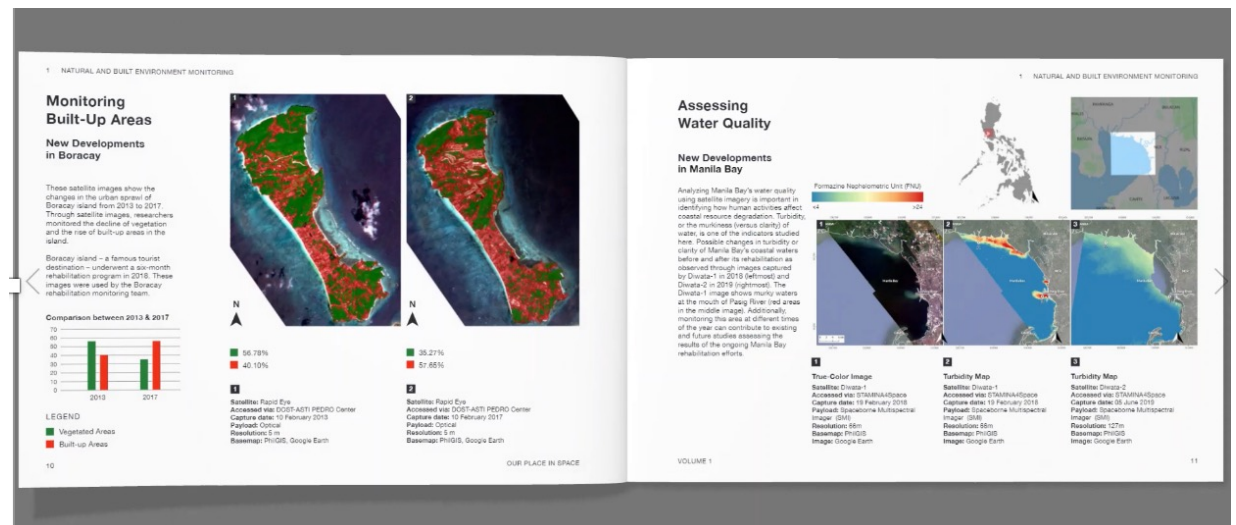
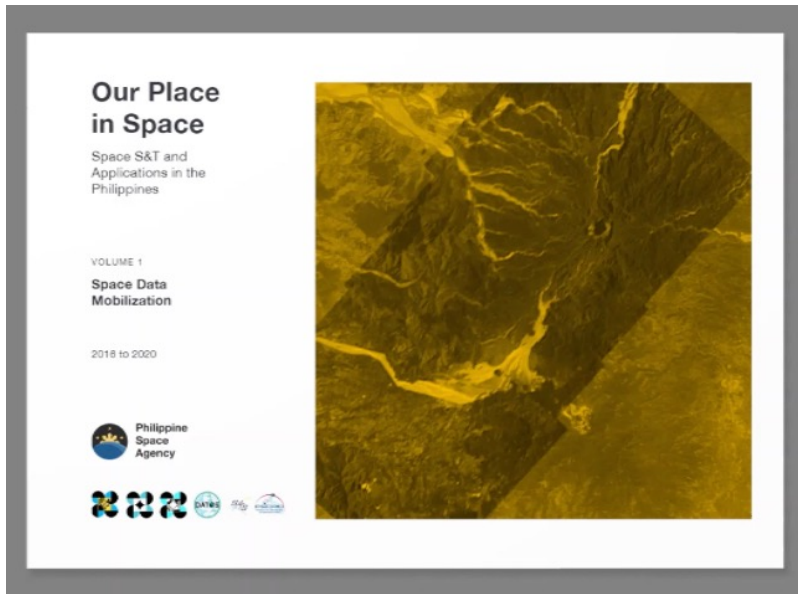
Local Design &  
Manufacturing  
Opportunities



# Our Place in Space

<https://philsa.gov.ph/our-place-in-space-foreword/>

- Volume 1  
Space Data Mobilization
- Volume 2  
Space Technology
- Volume 3  
Capacity-building, Outreach and Sustainability



## Our Vision

The PhilSA envisions a Filipino nation **bridged, uplifted, and empowered** through the peaceful uses of outer space.

## Our Mission

We will promote and sustain a robust Philippine space ecosystem that **adds and creates value in space for and from Filipinos and for the world.**

# Thank you for your attention.



# PhilSA

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