

# Sentinel Asia Step3 System To Provide Data Quickly



6<sup>th</sup> Joint Project Team Meeting  
1<sup>st</sup>&2<sup>nd</sup> November 2018, Awaji, Japan

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# Outline of Sentinel Asia Step3 System

# Renovation of Sentinel Asia (SA) System



Present “SA Step2 System” will be renovated to be “SA Step3 System” to be more easy use.

https://sentinel.tkscc.jaxa.jp/sentinel2/topControl.jsp

UserID: gues9999

SENTINEL ASIA Sentinel Asia

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WEB GIS

Welcome To Sentinel Asia Web Site

Sentinel Asia is a voluntary basis initiative led by the APRSAF (Asia-Pacific Regional Space Agency Forum) to support disaster management activity in the Asia-Pacific region by applying the WEB-GIS technology and space based technology, such as earth observation satellites data.

Emergency Observation

Wildfire Monitoring

Flood Monitoring

MT SAT Imagery

Capacity Building

Library

Emergency Observation

12/Oct/2018 Tropical cyclone in United Arab Emirates

28/Sep/2018 Earthquake in Indonesia

17/Sep/2018 Typhoon in Vietnam

15/Sep/2018 Typhoon in Philippines

05/Sep/2018 Earthquake in Japan

29/Aug/2018 Flood in Myanmar

27/Aug/2018 Flood in Vietnam

25/Aug/2018 Flood in Taiwan

09/Aug/2018 Flood in India

29/Jul/2018 Flood in Thailand

more...

Current Topics

27/Sep/2018 October 2018 News from Sentinel Asia Project Office link...

31/May/2018 Next Sentinel Asia Web (trial version) updated link...

more...

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https://sentinel.tkscc.jaxa.jp/sentinel2/MB\_HTML/Announce/TRIAL/index.html

SENTINEL ASIA Sentinel Asia

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News

2018-10-10  
Sentinel Asia activated for Cyclone in Oman and UAE

2018-09-28  
Sentinel Asia activated for Earthquake in Indonesia

2018-09-17  
Sentinel Asia activated for Typhoon in Vietnam

2018-09-15  
Sentinel Asia activated for Typhoon in Philippines

2018-10-10  
Cyclone in Oman and UAE

Emergency Obs. Request Information

UAE

Disaster Type: Cyclone

Country: Oman and UAE

Occurrence Date(UTC): Later 2018-10-10

SA activation Date(UTC): 2018-10-10

Requester: MBRSD/National Emergency and Crisis and Disasters Management Authority

Escalation to the International Disaster No.

SLIDE Number:

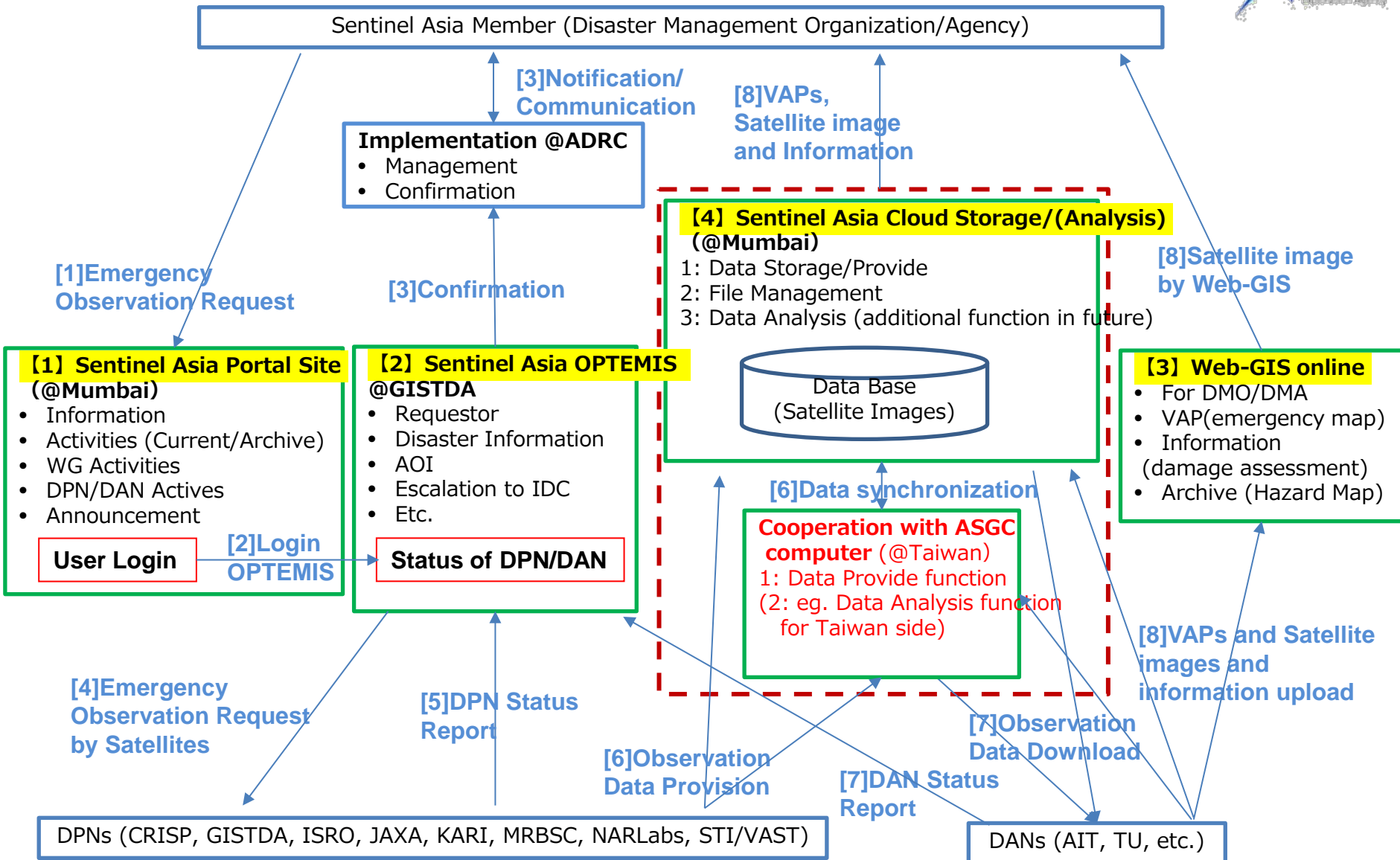
Disaster Situation

Tropical Cyclone (Luban) is gathering strength in the Arabian Sea and could threaten Oman, according to Amr Arboin, Misk-based Weather Underground. Luban is forecast to strengthen into the equivalent of a Category 1 hurricane by mid-to-late week, said Weather Underground, quoting a report from the U.S. Joint Typhoon Warning Center. The tropical cyclone is then expected to weaken to a tropical storm by the weekend when it makes its closest approach to Oman, which could bring dangerous flooding threat, said the report which was authored by Linda Lam.

# EO Response Flow on Sentinel Asia Step3 System



Disaster occurs



OPTEMIS: Operation Planning for Thailand Earth observation MISSION

ASGC: Academia Sinica Grid Computing Centre

# [1] “Sentinel Asia Portal Site” system



Browser address bar: [https://sentinel.tksc.jaxa.jp/sentinel2/MB\\_HTML/Announce/TRIAL/index.html](https://sentinel.tksc.jaxa.jp/sentinel2/MB_HTML/Announce/TRIAL/index.html)

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Partners: GISTDA, ISRO, JAXA, Sentinel Asia Constellation, Sustainable Cities and Communities, KARI, MOHAMMED BIN RASHID SPACE CENTRE

News


- 2018-10-10 Sentinel Asia activated for Cyclone in Oman and UAE
- 2018-09-28 Sentinel Asia activated for Earthquake in Indonesia
- 2018-09-17 Sentinel Asia activated for Thypoon in Vietnam
- 2018-09-15 Sentinel Asia activated for Thypoon in Phillipines

Twitter: Sentinel Asia (@SentinelAsia) Sentinel Asia is activated in anticipation of the Cyclone "Luban" approaching to the Arabian Peninsula. [Peninsula.gulfnews.com/news/gulf/oman...](https://www.gulfnews.com/news/gulf/oman...)

Cyclone Luban for...

2018-10-10 **Cyclone in Oman and UAE**

Emergency Obs. Request Information



Disaster Type: Cyclone  
Country: Oman and UAE  
Occurrence Date(UTC): Later 2018-10-10  
SA activation Date(UTC): 2018-10-10  
Requester: MBRSC/National Emergency and Crisis and Disasters Management Authority  
Escalation to the International Charter: No.  
GLIDE Number:

Disaster Situation

Tropical Cyclone Luban is gathering strength in the Arabian Sea and could threaten Oman, according to Ann Arbor, Mich.-based Weather Underground. Luban is forecast to strengthen into the equivalent of a Category 1 hurricane by mid-to-late week, said Weather Underground, quoting a report from the U.S. Joint Typhoon Warning Center. The tropical cyclone is then expected to weaken to a tropical storm by the weekend when it makes its closest approach to Oman, which could bring dangerous flooding threat, said the report which was authored by Linda Lam.

Login OPTEMIS for EOR

It dispatches of SA activities.

<https://sentinelasia.org>

# 【2】 “Sentinel Asia OPTEMIS” system



SENTINEL Asia Sentinel Asia Satellite Acquisition Feasibility Emergency Request Form Create an account Login

Send Request  
Emergency Request Form

1 SELECT A SATELLITES 2 FEASIBILITY

START (00:00 UTC) END (23:59 UTC)  
Start Date End Date

TYPE OF DISASTER  
All x

OPTICAL SAR

Low Resolution

- AQUA
- NPP
- SENTINEL-3A
- TERRA

Medium Resolution

- LANDSAT-8
- SENTINEL-2A
- THAICHOTE
- VNREDSAT-1

High Resolution

- DEIMOS-2
- GEOEYE-1
- WORLDVIEW-2
- WORLDVIEW-3

ALOS-2

CSK-1

CSK-2

CSK-3

CSK-4

RADARSAT-2

SENTINEL-1A

Compute Select All

Clear Update Satellite

35.57021 : 151.875

1000 km

1000 mi

Leaflet

GISTDA has developed the OPTEMIS that is ‘Satellite Operation Supporting Tool’ to support a satellite operation plan for GISTDA’s duties. Now GISTDA will provide a modified OPTEMIS for Sentinel Asia. It has functions;

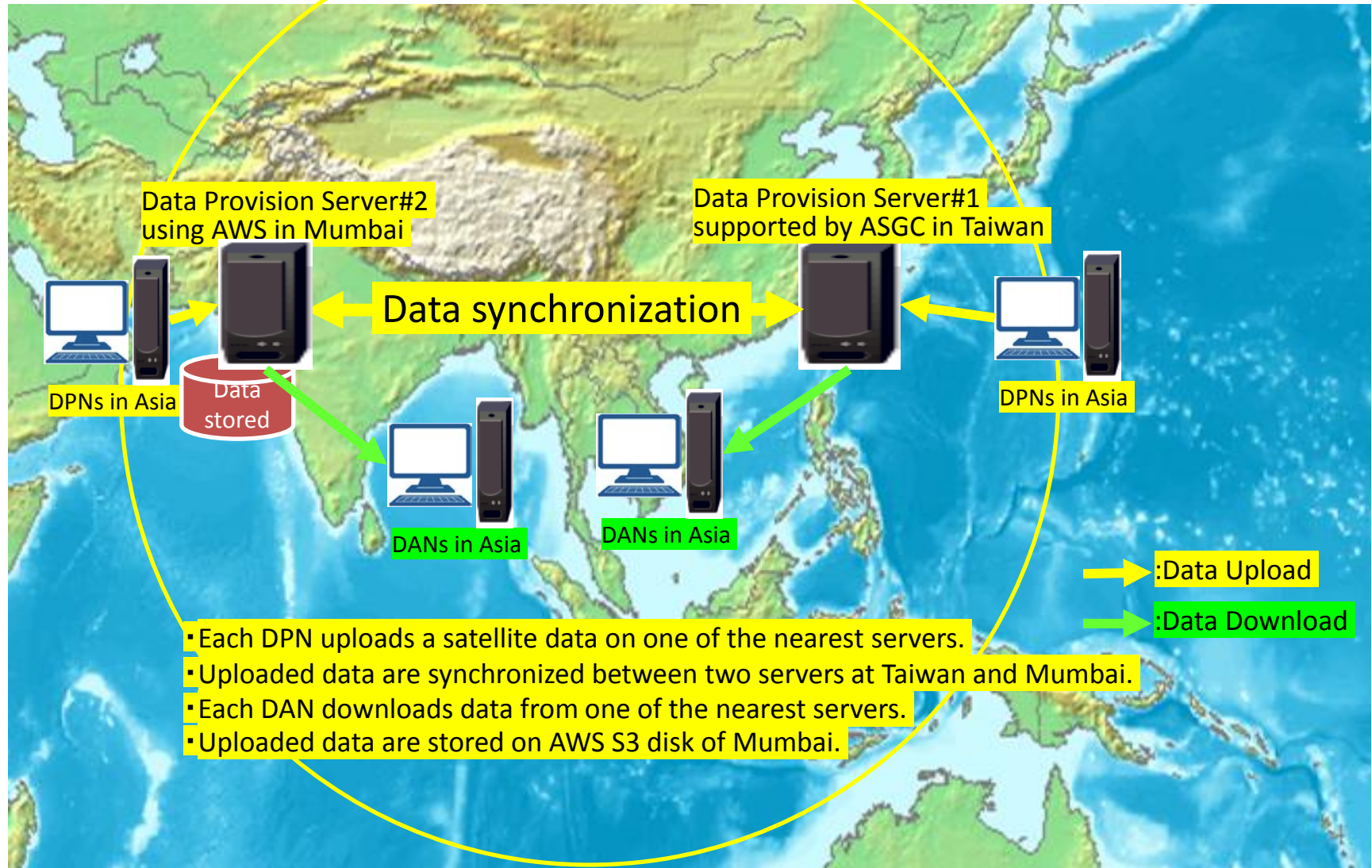
- EOR on Web
- Visualization on the status of DPN & DAN activities.



# 【4】 “Sentinel Asia Cloud Storage/(Analysis)” system



This SA Cloud Storage will be implemented to provide a satellite data quickly.





Sentinel Asia Cloud Storage to solve the data provision issue; taking much time

# Satellite Data will be more helpful for Disaster Response



The satellite data that could cover the wide area are more helpful for a disaster response activities. We need to handle them more timely and efficiently so that the regional disaster management agency could grasp a whole of damaged situation and take a necessary actions rapidly.

When human uploads a satellite data, it might take much time, on the other hands, Machine uploads a satellite data, it could reduce this time. Because Machine can work all the time.

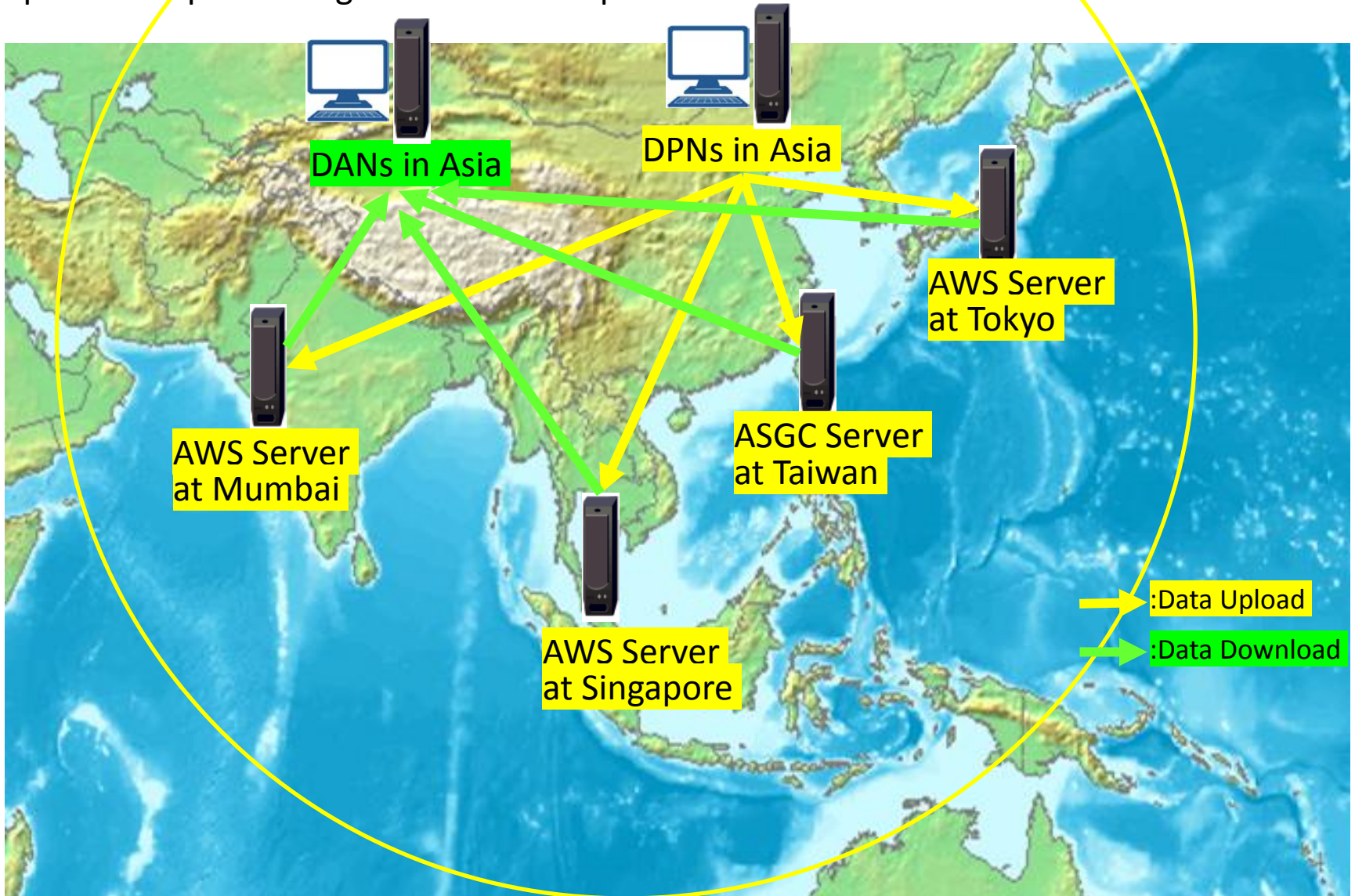
Data Provision Way	Data Provision Mean Time after Observation
(1) A temporary AWS system by Machine to Machine. To give priority to provide data fast, JAXA as DPN has been using this system. <u>Next SA Step3 system adopts a New AWS fully in 2019, so that we can provide data automatically.</u>	2h10m(±1h06m) ALOS-2 data provision time in 2018, as of 22 Oct.
(2) Present SA Step2 system by Human operation. First DPN uploads data on this system, next DAN gets it from this system. <b>It takes a time to provide data by Human operation. Big Issue.</b>	1.7days ALOS-2 data provision time in 2017

Sentinel Asia Step3 system will be implemented under the following basic idea:

- (1) Machine to Machine(M2M) system with a less human operation to provide a satellite data quickly.
- (2) Collaboration with SA member to be a sustainable SA activities.

# Data Provision Speed Test using 4 Servers

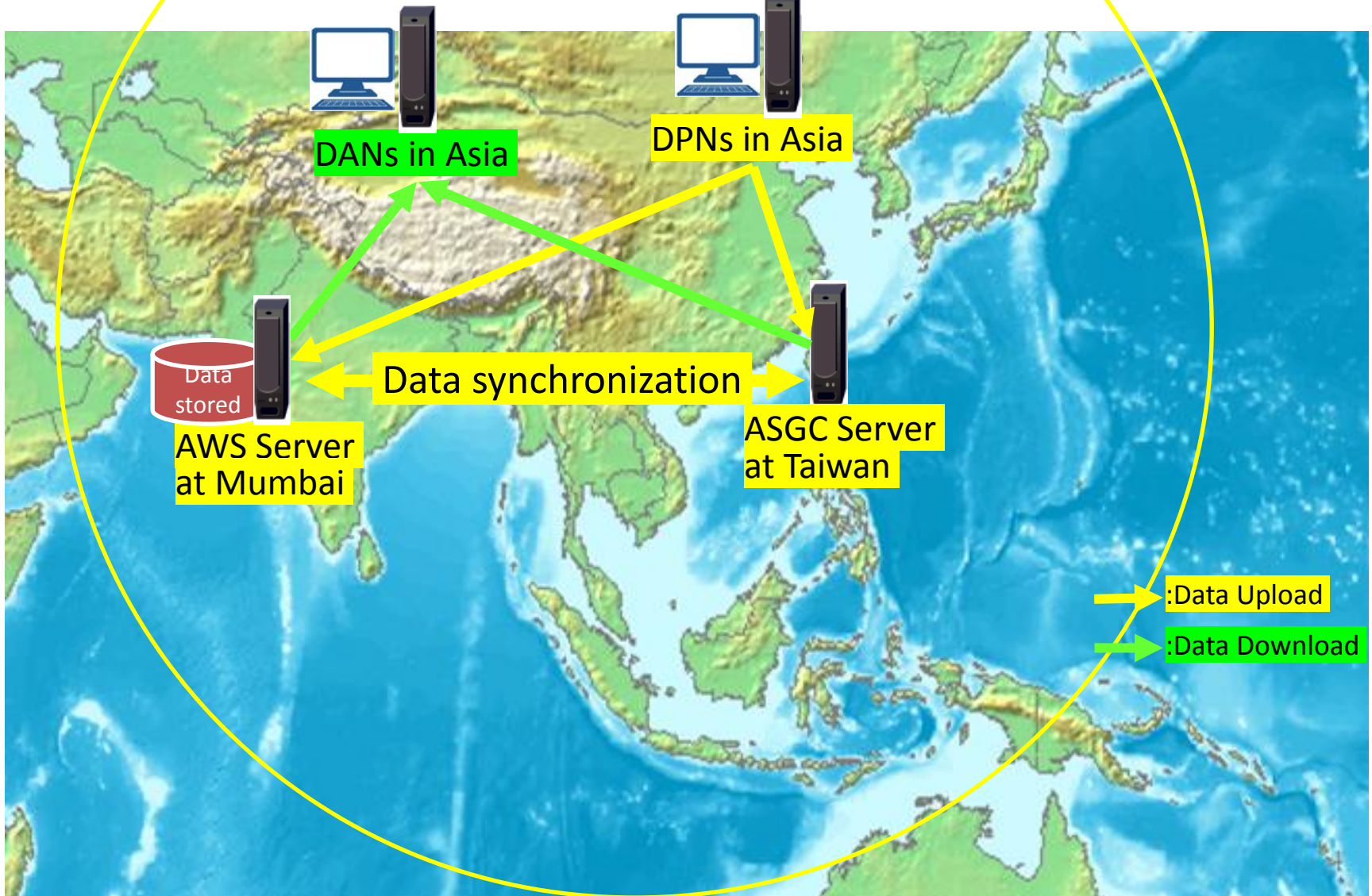
JAXA as DPN has been using a temporary AWS Cloud Computer to provide ALOS-2 data quickly. But to start using SA's Cloud Computer fully, JAXA and ASGC had measured the data provision speed using 4 servers in cooperation with DPNs and DANs.



# 2 Data Provision Servers Configuration



According to the data provision test results(refer to Appendix) and a Basic Idea (M2M operation and to-be-sustainable system) for SA Step3 system, "SA Cloud Storage" will adopt 2 Data Provision Servers configuration with the cooperation of ASGC. One AWS server has a S3 disk to store a satellite data and VAPs.



# Estimated Data Provision Time on SA Cloud Storage System

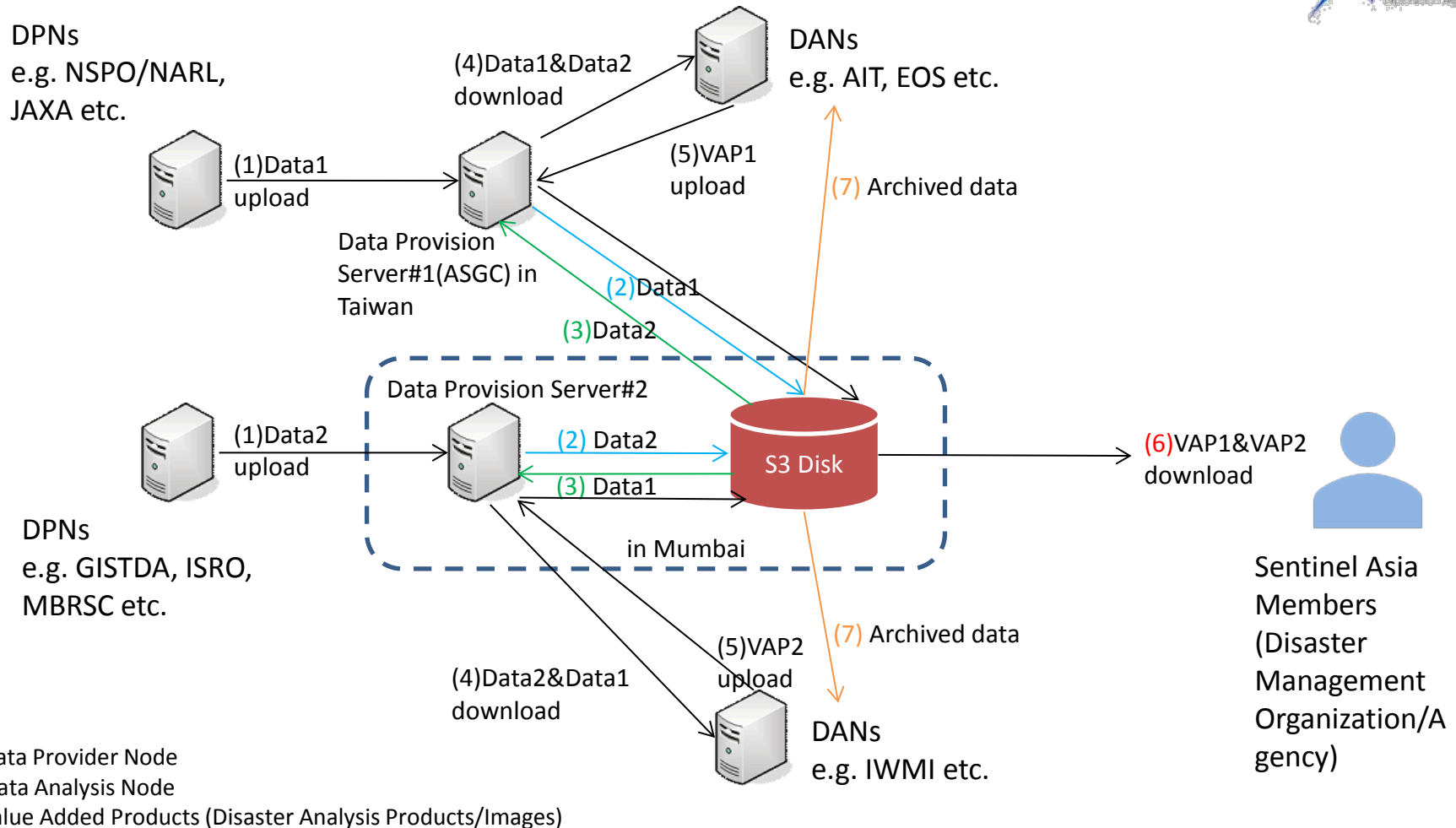


According to the performance test results(refer to Appendix), 10GB data provision time could be estimated.

The estimated time listL				
DPN->	->Server->	->DAN	Total Time	Estimated Upload and Download Time
JAXA->	->Server#2(Mumbai)->	->NSPO/NARL	302min.	=13min.(=10GB/104.6Mbps)+27min.[*1]+262min.(=10GB/5.1Mbps)
JAXA->	->Server#1(Taiwan)->	->NSPO/NARL	17min.	=13min.(=10GB/104.6Mbps)+4min.(=10GB/350.8Mbps)
NSPO/NARL->	->Server#2(Mumbai)->	->JAXA	63min.	=9min.(=10GB/165.7Mbps)+27min.[*1]+27min.(=10GB/50.1Mbps)
NSPO/NARL->	->Server#1(Taiwan)->	->JAXA	61min.	=9min.(=10GB/165.7Mbps)+52min.(=10GB/25.9Mbps)
GISTDA->	->Server#2(Mumbai)->	->NSPO/NARL	307min.	=46min.(=10GB/29.1Mbps)+261min.(=10GB/5.1Mbps)
GISTDA->	->Server#1(Taiwan)->	->NSPO/NARL	77min.	=46min.(=10GB/29.1Mbps)+27min.[*1]+4min.(=10GB/350.8Mbps)
GISTDA->	->Server#2(Mumbai)->	->AIT	138min.	=46min.(=10GB/29.1Mbps)+92min.(=10GB/14.7Mbps)
GISTDA->	->Server#1(Taiwan)->	->AIT	123min.	=46min.(=10GB/29.1Mbps)+27min.[*1]+50min.(=10GB/27.7Mbps)
GISTDA->	->Server#2(Mumbai)->	->IWMI	78min.	=46min.(=10GB/29.1Mbps)+32min.(=10GB/42Mbps)
GISTDA->	->Server#1(Taiwan)->	->IWMI	1978min.	=46min.(=10GB/29.1Mbps)+27min.[*1]+1905min.(=10GB/0.7Mbps)
JAXA->	->Server#2(Mumbai)->	->AIT	118min.	=91min.(=10GB/14.7Mbps)+27min.[*1]
JAXA->	->Server#1(Taiwan)->	->AIT	63min.	=13min.(=10GB/104.6Mbps)+50min.(=10GB/27.7Mbps)
JAXA->	->Server#2(Mumbai)->	->IWMI	72min.	=13min.(=10GB/104.6Mbps)+27min.[*1]+32min.(=10GB/42Mbps)
JAXA->	->Server#1(Taiwan)	->IWMI	1918min.	=13min.(=10GB/104.6Mbps)+1905min.(=10GB/0.7Mbps)
NSPO/NARL->	->Server#2(Mumbai)->	->AIT	127min.	=9min.(=10GB/165.7Mbps)+27min.[*1]+91min.(=10GB/14.7Mbps)
NSPO/NARL->	->Server#1(Taiwan)->	->AIT	85min.	=9min.(=10GB/165.7Mbps)+49min.(=10GB/27.7Mbps)
NSPO/NARL->	->Server#2(Mumbai)->	->IWMI	68min.	=9min.(=10GB/165.7Mbps)+27min.[*1]+32min.(=10GB/42Mbps)
NSPO/NARL->	->Server#1(Taiwan)	->IWMI	1988min.	=9min.(=10GB/165.7Mbps)+1979min.(=10GB/0.7Mbps)

[\*1]Data transfer time between Server#2(Mumbai) and Server#1(Taiwan) is estimated as 27min.(=10GB/50Mbps). Data transfer performance is assumed as ca. 50Mbps minimum, because JAXA achieved this speed for Server#2(Mumbai) in the first performance test.

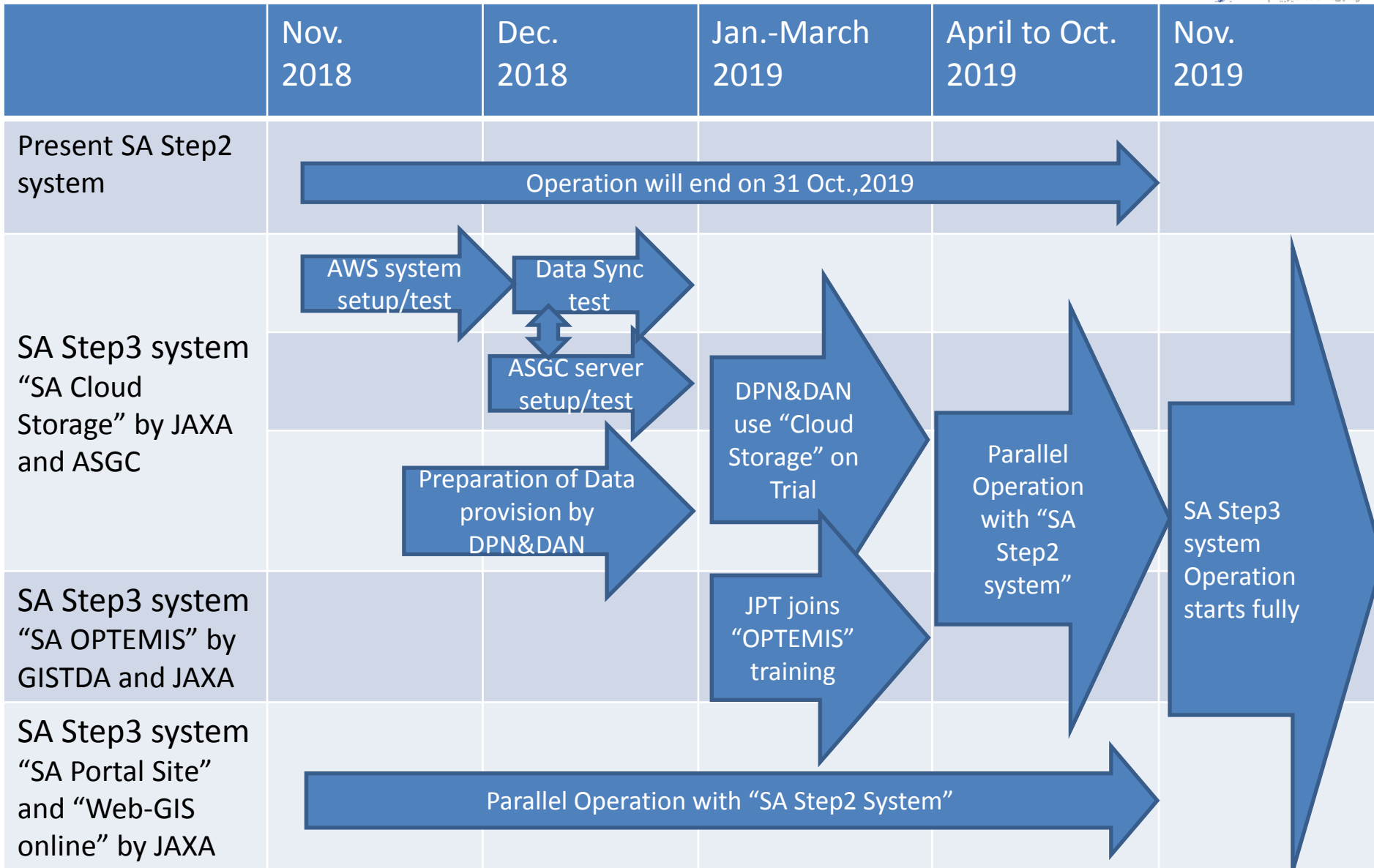
# Data Provision Flow on Sentinel Asia Cloud Storage System



- (1) Each DPN puts a Satellite data to the nearest server by SFTP
- (2) Each server puts a Satellite data to S3 disk by HTTPS(443) for data synchronization. Put data are stored as archived data.
- (3) Each server copies a Satellite data on S3 disk by HTTPS(443) for data synchronization
- (4) Each DAN gets a Satellite data from the nearest server by SFTP
- (5) Each DAN puts VAPs to the nearest server by SFTP
- (6) SA members get VAPs by HTTPS
- (7) DAN can download the archived satellite data on S3 disk using a CloudBerry Explore & AWS account.

# Schedule of Sentinel Asia Step3 System and Request for your cooperation

# Schedule of Sentinel Asia Step3 System





# Requests for your Cooperation



**【1】** Data Provision way will be changed. DPNs and DANs need to use SFTP client software to put and get a satellite data.

The necessary documents and account to use “Sentinel Asia Cloud Storage” will be prepared.

Could you please participate in “Preparation of Data Provision” so that you can use “Sentinel Asia Cloud Storage”.

**【2】** “Sentinel Asia OPTEMIS” will be provided by GISTDA. The necessary account to access “OPTEMIS” will be prepared.

Could you please join the “OPTEMIS” use training.

JAXA will announce JPT members the detail information to prepare to use “Sentinel Asia Step3 System”.

## Appendix

### Data Upload/Download Speed Results

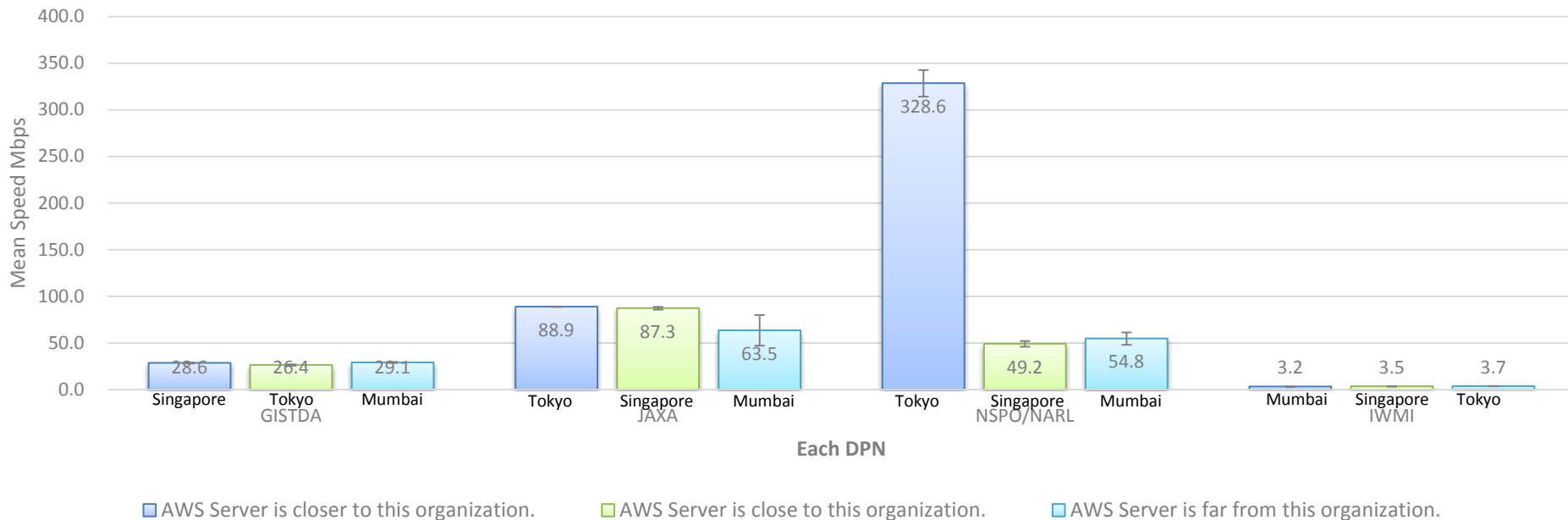
- First test done from 7<sup>th</sup> to 16<sup>th</sup> February, 2018
- Second test done from 16<sup>th</sup> to 27<sup>th</sup> April, 2018

Thank you for your cooperation

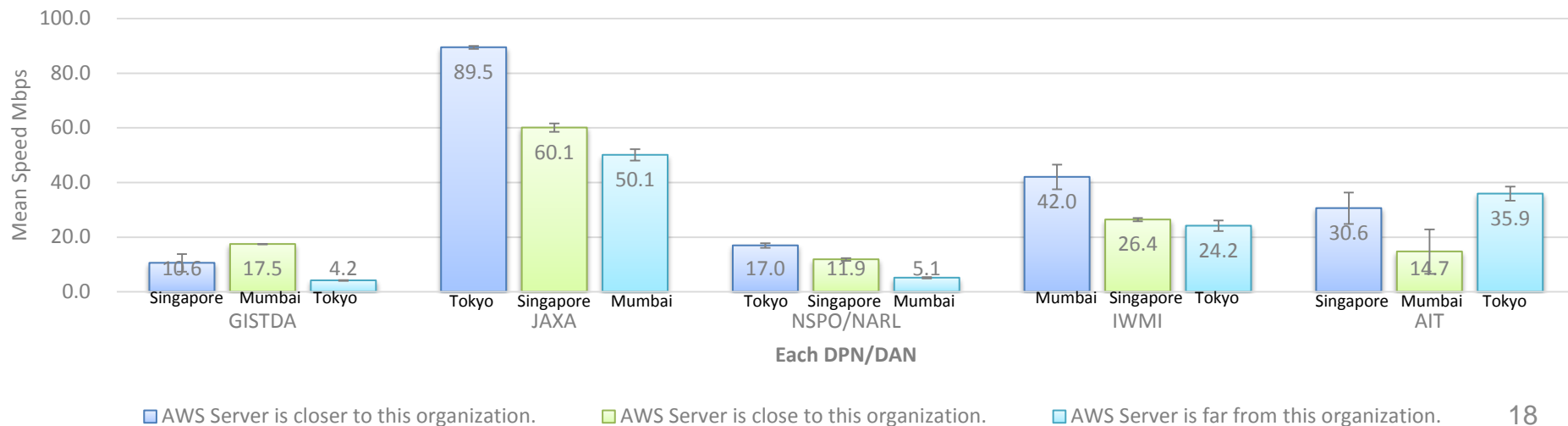
# The First Test Data Upload/Download Speed Results



300MB Data Upload Mean Speed from each DPN to each of 3 AWS servers



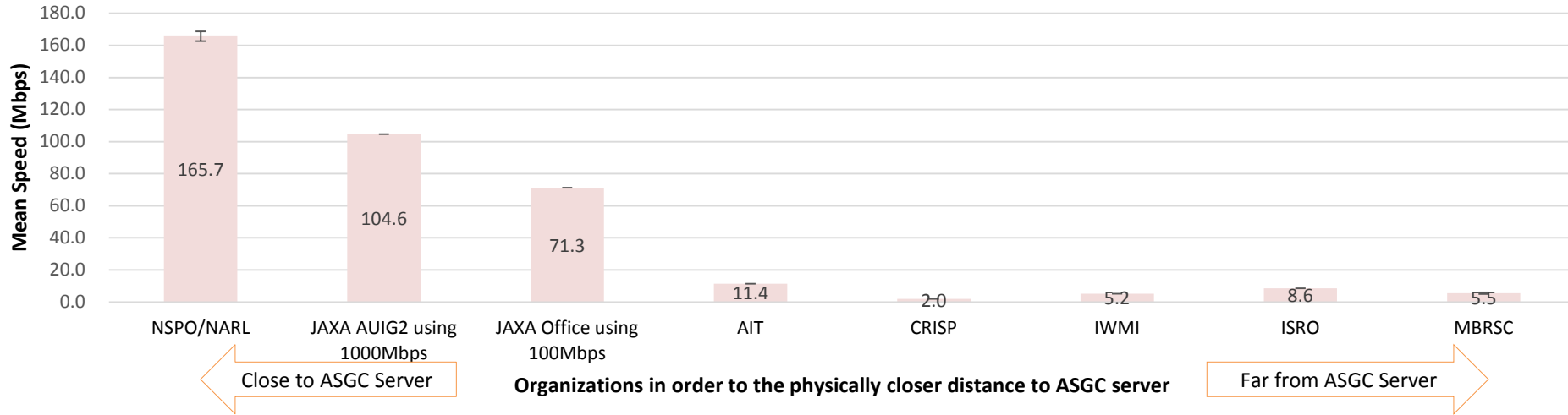
300MB and 1000MB Data Download Mean Speed from each of 3 AWS servers to each DPN/DAN



# The Second Test Data Upload/Download Speed Results



## 1GB Data Upload Mean speed and Standard error to ASGC server (Mbps)



## 1GB Data Download Mean speed and Standard error from ASGC server (Mbps)

