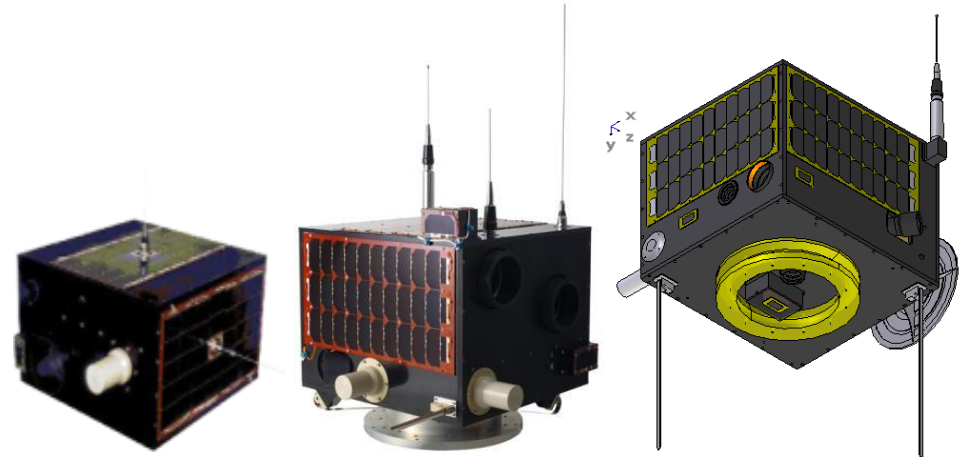
PROGRAM PEMBANGUNAN SATELIT DAN UPAYA PENCAPAIANNYA

Suhermanto
Pusat Teknologi Satelit, LAPAN



Daftar isi

1. Program pembangunan Satelit LAPAN,
2. Capaian dan Upaya penguasaan Teknologi Satelit,
3. Seri Satelit Eksperimen LAPAN,
4. Pembangunan Stasiun Bumi TT&C dan Penerima Data Misi,
5. Jaringan Stasiun Bumi Kendali dan Akuisisi Data Satelit,
6. Spesifikasi Stasiun Bumi Satelit LAPAN,
7. Status filing Satelit LAPAN-A2 dan A3,
8. Pemikiran awal untuk transisi Misi ke satelit Semi Operasional.

PROGRAM PEMBANGUNAN SATELIT LAPAN

07.2005
LAPAN-TUBSAT/A1
57kg, Video camera,
Launch by ANTRIX, ISRO;
at, January 10, 2007.

01.2007

08.2012
2014
LAPAN-A2
74kg, AIS, APRS, Digicam,
Launch by ANTRIX, ISRO;
First Quarter 2014

2014
2015
LAPAN-A3
80kg, AIS, APRS, Imager,
Launch by ANTRIX, ISRO

2017
LAPAN-A4
100kg, Imager exp
(visible & Near Infrared),
Will be Launched by China

2019
LAPAN-A5
100kg, SAR exp
With Chiba University,
Will be Launched by JAXA

2025
Operational Remote Sensing Satellite
Developed by Indonesia

Experimental Satellite
(A Series)

Remote Sensing Satellite
(B Series)

2018
LAPAN-B1

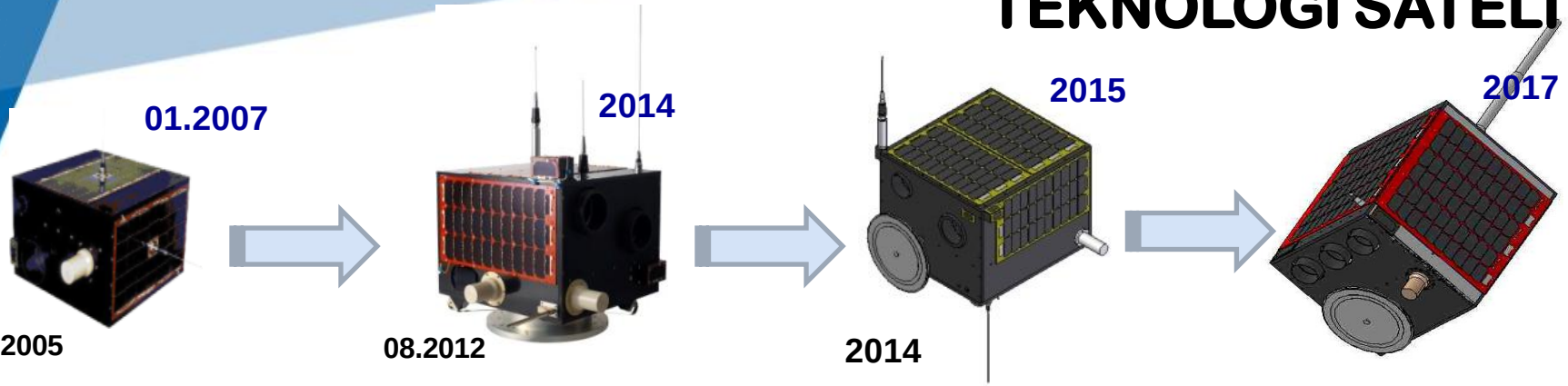
2018
LAPAN-C1

Communication Satellite
For tele-education and
Meteorology
(C Series)

Operational Satellite
Developed by foreign
Satellite Manufacturer

Pengkajian 2003 | Eksperimen 2015 | Operasional

CAPAIAN DAN UPAYA PENGUASAAN TEKNOLOGI SATELIT



LAPAN-A1/ TUBSAT	
Mission	TOT, Demonstration of Tech, Surveillance
System	Co-Op (w/TUB)+OJT
Bus	Co-Op (w/TUB)+OJT
Payload	Co-Op (w/TUB)+OJT
AIT	**TU Berlin (Jerman)**
Ground Station	Design, Operate and upgrage by
Sub-sistem Test	-

LAPAN-A2/ ORARI
Surveillance, AIS, Amateur Comm for disaster mitigation
Led by / Consult with IRE-Berlin
Procure+ Integrated by
Procure+ Integrated by
Rancabungur
Licensing, SatCoord Design & operate 3 GS
Attitude control system test platform & flight proofing of the Reaction Wheel LPN-001

LAPAN-A3/ LISAT
Visible Imager Experiment, AIS, Magnetometer Experiment
Led by / Consult with IRE-Berlin
Procure+ Integrated by
Procure+ Modified+ Integrated by
Rancabungur
Licensing, SatCoord Design & operate 3 GS
High rate downlink data in X-band (105 MBps) & fligh proof-ing of Star Sensor LPN-001

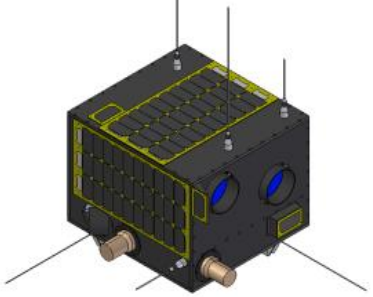
LAPAN-A4
Visible Imager Exp Verification , AIS, Infrared Imager Exp.
Led by / Consult with ???
Procure+ Integrated by
Procure+ Modified+ Integrated by
Rancabungur
Licensing, SatCoord Design & operate 4 GS
TT&C and downlink data in International standart Freq. alocation (S and X-band)

SERI SATELIT EKSPERIMEN LAPAN

LAPAN-A1 / TUBSAT

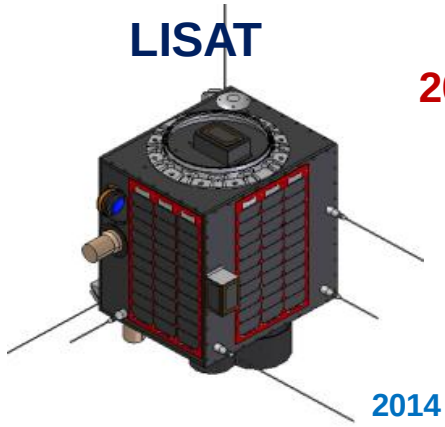
2003 — 07.2005

LAPAN-A2 / ORARI



01.2007 — 08.2012

LAPAN-A3 / LISAT



2014 — 2015

Mision	Video Surveilence	Earth Surveilance, maritime moni-tor ing, Amateur Communication	Experimental remote sensing, mari-time monitoring, Amateur Comm.
Payload	Analog Video Camera, Low resolution VideoCam	Digital Space Camera, Analog Video Camera, AIS, APRS	4 band pushbroom imager, Hi res DigitalCam, AIS, APRS
Spectral resolution	Kappa PAL Camera (752 x 582 pixel)	Digital Camera (2048 x 2044 pixel) Analog Camera (752 x 582 pixel)	450 - 520 nm; 520 - 600 nm; 630 690 nm; 760 - 900 nm
Spatial resolution	5 m (3,5 km swath), 200m (80 km swath)	4 m (7 km swath), 5 m (3,5 km swath)	18 m (100 km swath) atau 10 m (75 km)
Orbit	635 km, 97,6 deg	650 km, 8 deg, Near-Equatorial	650 km, 97,6 deg
Data TX, TT&C	S-Band : 2220 MHz, UHF : 437,325 MHz	S-Band : 2220 MHz, UHF : 437,325 MHz	X-Band : 8116 - 8284 MHz, UHF : 437,325 MHz
Downlink rate	5 Mbps	5 Mbps	105 Mbps
Total weight	55 kg	74 kg	80kg
Dimension	450 x 450 x 270 mm	500 x 470 x 360 mm	500 x 500 x 700 mm

Program Pembangunan Stasiun Bumi TT&C dan Penerima data Misi

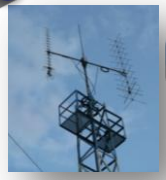
Instalasi antena Φ 3m utk penerima multiband Biak (2013)

Instalasi antena TT&C S-band di Parepare (2017)

Upgrade penerima data GS Rumpin dan Rancabungur (2011)

Fasilitas GS Satelit mikro di Rumpin (2005)

Upgrade Antena Orbital 3m Φ, untuk TT&C S-Band di Rancabungur 2015

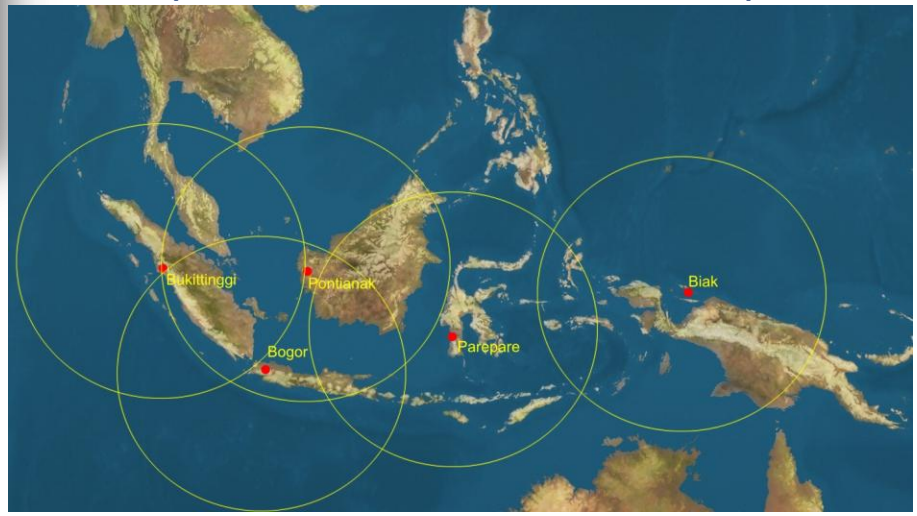


TT&C UHF di Rumpin, Rancabungur dan Biak (2005 – 2008)

TT&C S-band Φ 11m BIAK II Kerjasama LAPAN-ISRO 2005

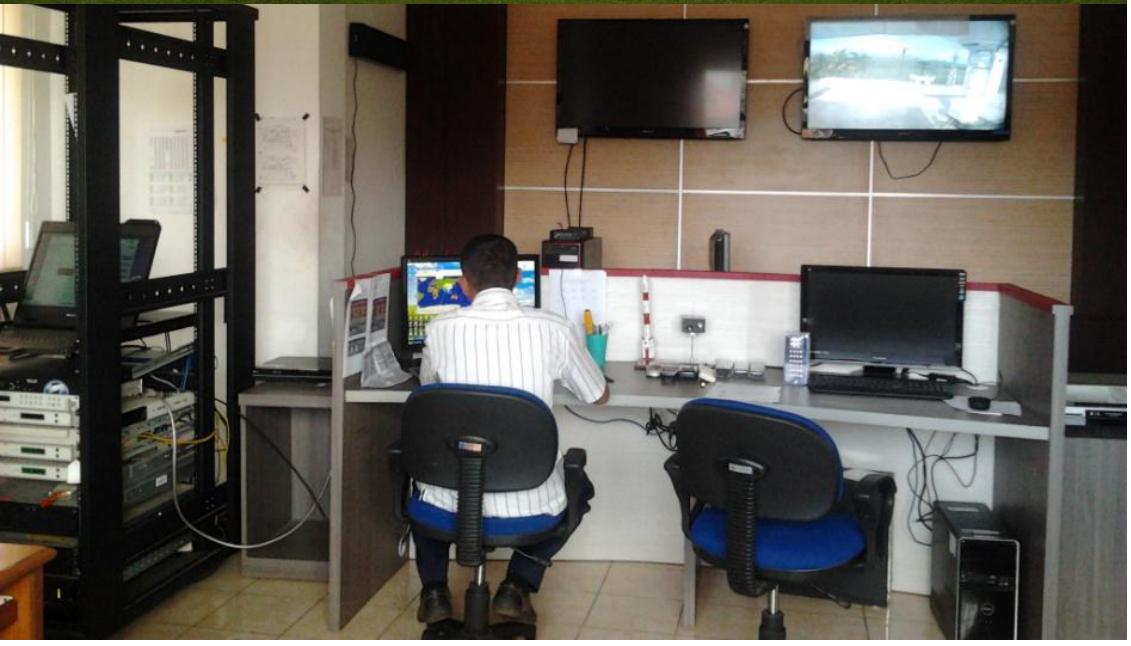
TT&C S-band Φ10m BIAK I Kerjasama LAPAN-ISRO 1997

LOKASI STASIUN BUMI SATELIT LAPAN
(STASIUN BUMI UTAMA DAN PENDUKUNG)



JARINGAN STASIUN BUMI KENDALI DAN AKUSISI DATA SATELIT

STASIUN BUMI : RANCABUNGUR – BOGOR



Location:

- Latitude : 06 ^{O} 32’ 01” South
- Longitude : 106 ^{O} 42’ 52” East
- Elevation : 100 Meter

Activities:

- Control and acquisition of TLM data and Payload data of LAPAN Satellite.
- *Satellite Mission Operation and Health Analysis*, satellite attitude control, TLM data and payload data analysis.
- Ground Segment technology Research

Technical Specification:

- 3 meter dish with elevation over azimuth positioner and Program track system
- 3 band feed system (X, S dan L band)
  - X- Band = 7800 – 8500 MHz
  - S- Band = 2200 – 2260 MHz
  - L- Band = 1685 – 1710 MHz

STASIUN BUMI : RUMPIN – BOGOR

- **Location:**
  - Latitude : 06° 22’ 07” South
  - Longitude : 106° 38’ 00”East
  - Elevation : 100 m
- **Activities:**
  - Satellite operation in daily basis
  - EOS satellite data reception (Terra, Aqua, NPP)
  - Ground Station support for LAPAN satellites
  - Ground Station support for Hires data reception
- **Technical Specification:**
  - 6.1 meter dish with conical scan tracking mode and Auto as well as Program track system supported.
  - Dual feed (S and X band) system , 7700 – 8400 MHz dan 2200 – 2500 MHz

STASIUN BUMI : BIAK- PAPUA

- **Location:**
  - Latitude : 01° 17’ 01” South
  - Longitude : 136° 10’ 17” East
  - Elevation : 100 m

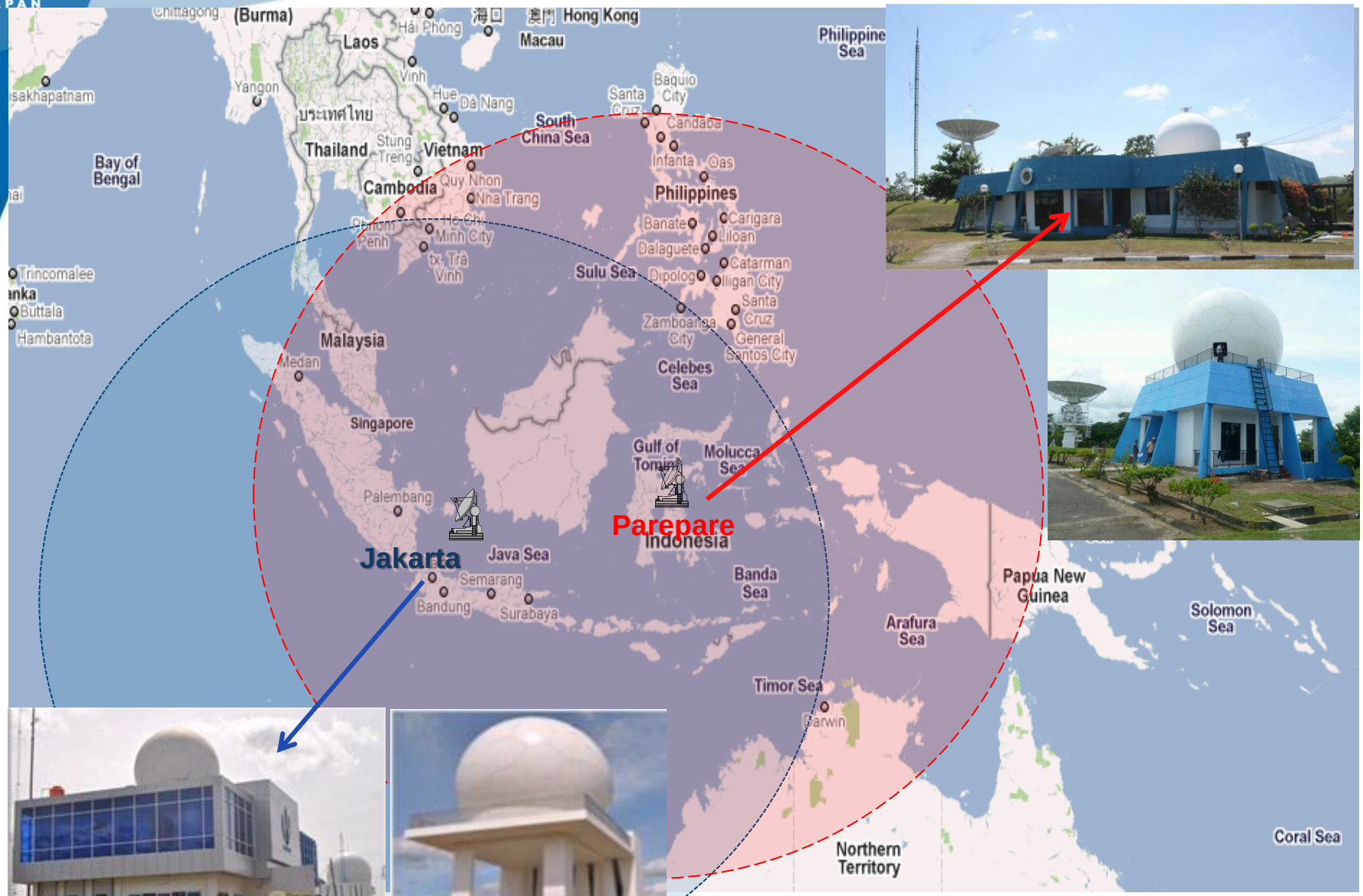
Activities:

- Receiving live analog video from LAPAN-TUBSAT satellite in S-band frequency
- UHF TTC station for LAPAN-TUBSAT using 437.325 MHz
- Satellite Operation Cooperation LAPAN-ISRO (India)

Technical Specification:

- 11 and 10 meter dish with monopulse tracking mode and Auto as well as Program track system supported.
- Dual feed S/C band (11 m/10 m)
  - C-Band = 6 – 6.5 and 4 – 4.5 GHz
  - S-Band = 2025 – 2150/2200-2300 MHz
  - New L/S/X Band antenna system (selesai akhir 2013)

SINERGI OPERASI STASIUN PENERIMA UNTUK AKUISISI DATA SATELIT RESOLUSI TINGGI



Inpres No 6 tahun 2012

SISTEM OPERASI MULTI MISI STASIUN BUMI SATELIT LAPAN

- AKUISISI DATA SATELIT LOWRES (TERRA, AQUA, NPP, NOOA, METOP)
- AKUISISI DATA TLM & DATA MISI SATELIT LAPAN
- SUPPORT LEOP DAN IOT SAT LAPAN
- MASTER ANALISIS KESEHATAN SATELIT (SCC-SATELIT LAPAN)
- RISET TEKNOLOGI SATELIT

NATIONAL AND INTERNATIONAL TT&C GROUND STATION NETWORK

DATA TELEMETRI SATELLT

SATELLITE CONTROL CENTER (RANCABUNGUR)

SATELLITE OPERATION COORDINATION (TT&C) ACTIVITIES

SATELLITE OPERATION AND GROUND STATION MAINTENANCE TEAM

MISSION OPERATION AND HEALTH ANALYSIS TEAM

RESEARCHER & ENGINEER

BIAK GROUND STATION

- AKUISISI DATA SATELIT LOWRES (TERRA, AQUA, NPP)
- AKUISISI TLM DAN DATA SATELIT LAPAN
- SUPPORT PELUNCURAN SATELIT LAPAN & INDIA

GROUND SEGMENT DEVELOPMENT PROJECT TEAM

RUMPIN GROUND STATION

- AKUISISI DATA SATELIT LOWRES (TERRA, AQUA, NPP)
- AKUISISI DATA LDCM
- TTC DAN AKUISISI DATA SATELIT LAPAN

GROUND STATION FACILITIES FOR RESEARCH SUPPORT (RANCABUNGUR)

PAREPARE GROUND STATION

- AKUISISI DATA SATELIT HIRES (LDCM, SPOT)
- AKUISISI DATA SATELIT LOWRES (TERRA, AQUA, NPP)

DATA LOW DAN HIRES

DATA SATELIT RESOLUSI RENDAH (METEOROLOGI)

BANK DATA LAPAN

UNIVERSITAS (IPB - JARDIKNAS)

Status filing Frekuensi Satelit LAPAN-A2 & A3

Kronologi Filing LAPAN-A3 Satellite network :

- 16 Des 2011, Pusteksat mengajukan pita-X (8200-8300) MHz untuk Akuisisi data dan TTC Satelit (Up/Down link) menggunakan UHF (437-438)MHz.
- 14 Feb 2012, Hasil rapat koordinasi Frek LAPAN–A3 digeser ke ➔ (8250-8350) MHz.
- 18 April 2012, Submit usulan Filing LAPAN-A3 Sat ke BR-ITU via Kominfo.
- Juli 2012, Perbaikan data filing Lapan-A3.
- 14 Nov 2012, Submit filling update bandwidth LAPAN-A3 Sat menjadi 168 MHz, dengan alokasi pada (8116-8284)MHz ➔ diterima BR-ITU: 12.12.2012
- Status menjadi API (*Advance Publication Information*) sesuai BR-IFIC (*International Frequency Information Circular*) No. 2744, tanggal 14.05.2013

No	Orbital Position	Special Section Num	Receipt by the BR-ITU	Published by BR-ITU	Remarks
1.	*LAPANSAT Non-GSO*	*Part II-S*	*10/08/2011*	*BR-IFIC 2701 10/08/2011*	*Naik status ke Part II-S (Notifikasi)*
2.	*LAPANSAT Non-GSO*	*Part III-S Notificaiton*	*10/05/2012*	*BR-IFIC 2669 18/05/2010*	*Anotofikasi Part III-S Paska Korsat*
3.	**LAPAN-A3 N-GSO**	**API/A/7287**	**12/12/2012**	**BR-IFIC 2744 14/05/2013**	**Publish Filing by ITU**

PRINSIP KERJASAMA DAN PEMBINAAN TEKNIS

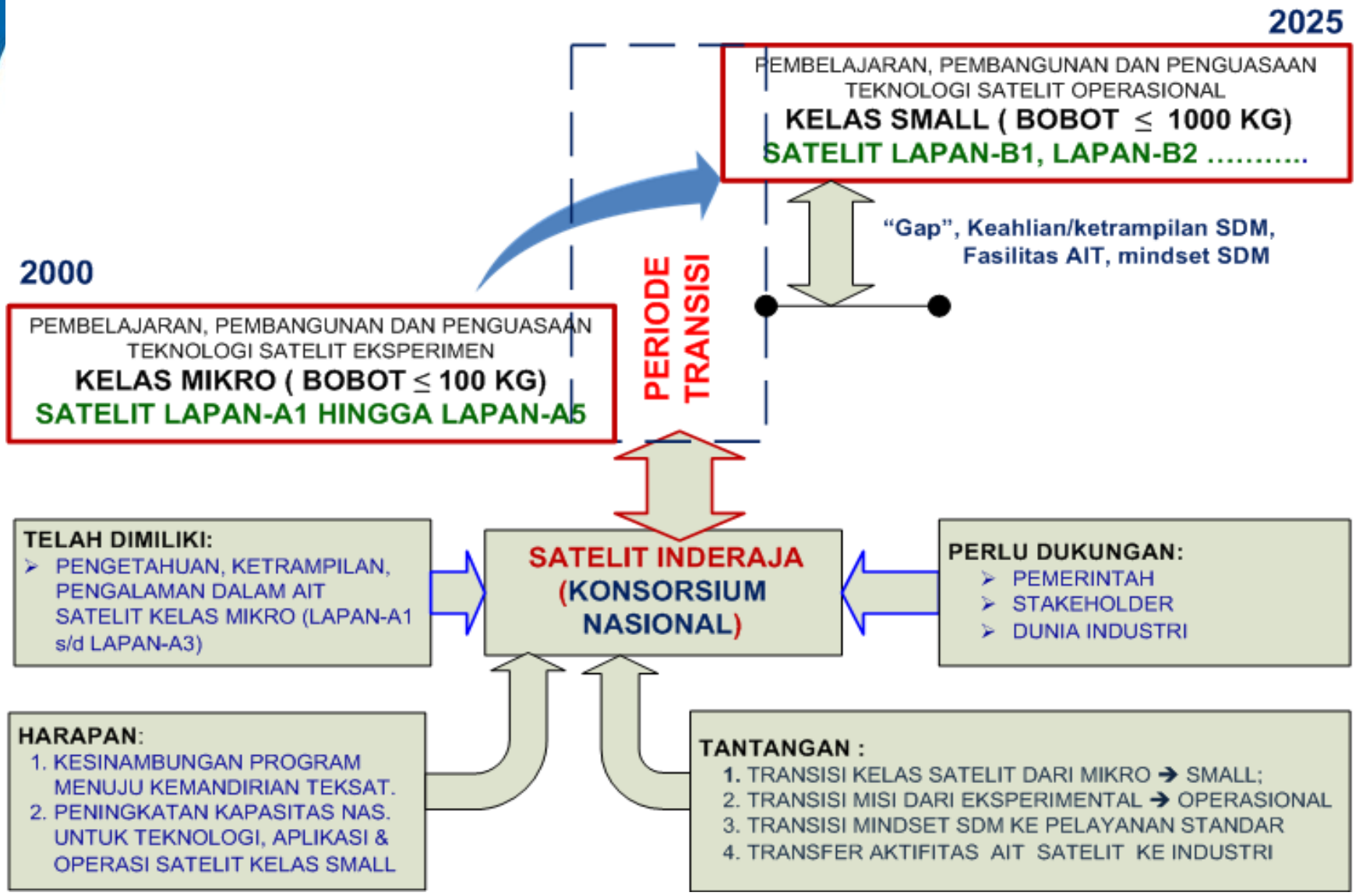
KERJASAMA

- Bertujuan untuk percepatan litbangyasa Satelit, baik dengan dalam maupun luar negeri, ➔ sesuai roadmap satelit
- Melengkapi fasilitas AIT satelit kelas < 100kg, untuk mendukung fungsi pembinaan teknis di bidang Satelit.
- Membangun sinergi positif untuk :
  - Pembangunan algoritma aplikasi data satelit LAPAN,
  - Percepatan pembangunan satelit Nasional dengan berbagai pihak: Lembaga/ Institusi riset, Universitas, Industri, Swasta, dll,
- Mengarahkan pelaksanaan AIT satelit non-eksperimental dengan mengikuti pola “Konsorsiun Roket Nasional”,

PEMBINAAN TEKNIS masih terbatas untuk,

- Pembimbingan/training AIT satelit,
- Pembimbingan untuk perizinan frekuensi dan prosedur peluncuran satelit,
- Pembimbingan/training operasi stasiun bumi (TT&C dan akuisisi data satelit)

PEMIKIRAN AWAL UNTUK TRANSISI MISI KE SATELIT SEMI-OPERASIONAL



Terima kasih atas perhatiannya

Perspektif GS

Lapan-A2/A3 Rumpin