Indonesia’s Equatorial Orbit Twin Satellites for Space-based Safety Application in the Disaster Mitigation and Relief Effort

National Institute of Aeronautics and Space – LAPAN
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Satellite-based system for Safety Application in Disaster Warning/Mitigation/Relief Management in Indonesia

- Early/oncoming disaster warning (by earth and satellite based sensors that read indication of oncoming disaster with communication satellites conveying the early warning and distress calls),

- Detection and assessment of damage in disaster areas (images from earth observation satellites),

- Disaster mitigation and relief (combination of communication, navigation and remote sensing satellites to support and coordinate the disaster mitigation and relief efforts).

- Rehabilitation of disaster affected areas (images of earth observation satellites for new land use planning);

- Recurring disasters in Indonesia: earthquake, tsunami, volcanic eruption, floods, land slides, draught, forest fires, and technology failure (accidents that causes human fatality, suffering, property damage or pollution).
LAPAN’s next micro-satellite: Twin Satellites: LAPAN-A2 & LAPAN-ORARI

LAPAN-A2 and LAPAN-ORARI satellites developed based on the space proven LAPAN-TUBSAT satellite bus;

Both LAPAN-A2 and LAPAN-ORARI satellites are developed using same satellite bus and structure (twin satellites), with individual and complementary mission payloads.

LAPAN-A2 satellite payload:
- HDTV color video camera;

LAPAN-ORARI satellite payload:
1. 3-band multi-spectral imager
2. Amateur radio communication
   - Automatic Position Relay System (APRS);
   - Analog voice repeater.
LAPAN-A2 Satellite Description

Primary Mission:
Support disaster management by earth observation (video surveillance), also for land use, natural resources and environment monitoring, as well as moon observation.

Objective:
First satellite design, integration and test in Indonesia. Near equatorial earth orbit for obtaining more frequent daily satellite orbit overpass over Indonesia.

Orbit:
Near Equatorial Low Earth Orbit (LEO), at between 6 to 8 degree inclination and altitude 650 km. Planned launch as auxiliary payload on Antrix/ISRO PSLV mission for Astrosat launch on second quarter of 2011.

Payload:
Video camera Kappa PAL for 80 km width ground coverage.
Video camera Kappa HDTV for high resolution satellite color video observation.
Ground resolution: 6 m
Ground coverage: 11 x 6 km video frame.
LAPAN-TUBSAT satellite high resolution video capture of SURABAYA shipyard in 2008
LAPAN’s 1st microsatellite: LAPAN-TUBSAT
Object Search Capability

Singapore airport 2007

Flight direction

Maneuver direction
LAPAN-ORARI Satellite Description

Primary Mission:
Support disaster management by amateur radio communication, as well as earth observation (multi-spectral remote sensing) for land use, natural resource and environment monitoring.

Objective: First satellite design, integration and test in Indonesia. Near equatorial earth orbit for obtaining more frequent daily satellite orbit overpass over Indonesia.

Orbit:
Near Equatorial LEO, at between 6 to 8 degree inclination and orbit altitude 650 km. Launch on second quarter 2011 (same as LAPAN-A2 satellite launch).

Payload:
Indonesian Amateur Radio Organization (ORARI) communication payloads:
2. Amateur radio analog voice communication relay.

Video camera PAL RGB for 80 km width coverage.

3 band multi-spectral imaging camera
Ground resolution: 24 m
Ground coverage: 154 km swath width
Band 1: 525 - 605 nm
Band 2: 630 - 690 nm
Band 3: 750 - 900 nm

Attitude Determination Instrument (ADI) laser beam beacon.
Integrated Disaster Mitigation Monitoring with LAPAN Equatorial Orbit Satellites

- **LAPAN-A2 satellite**
- **LAPAN-ORARI satellite**

**Communication Channels**:
- Video Images
- Voice Broadcast Via VHF
- Text Message Via UHF (Multi Users)

**Ground Stations**:
- LAPAN Ground Stations
- ORARI/BNPB Ground Stations
Low Inclination LEO

LAPAN-A2 and LAPAN-ORARI satellites to be launched 2011 (with Indian Astrosat mission); the orbit shall be 650 km circular at inclination of 80°
THANK YOU

LAPAN
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