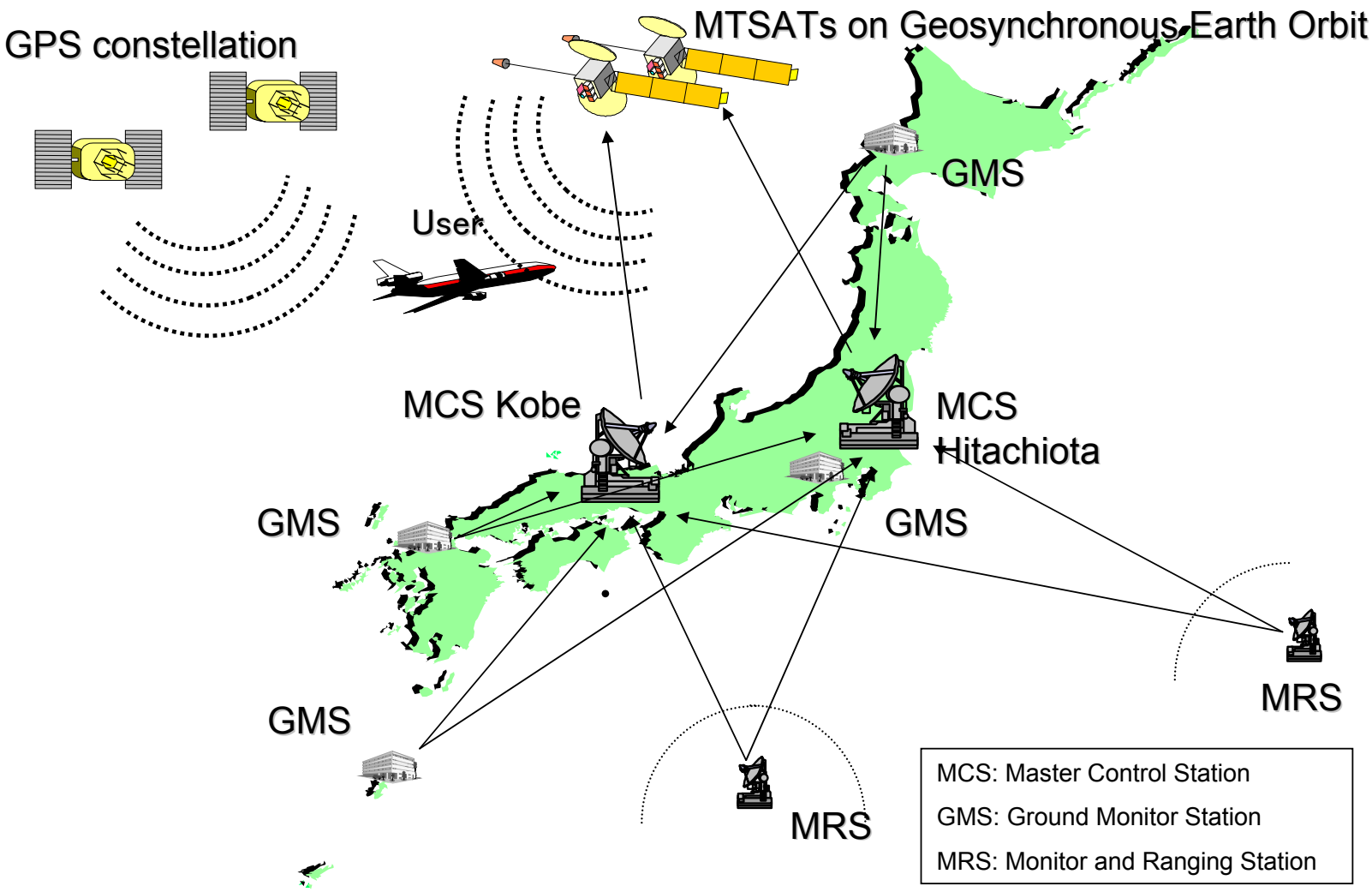
Overview of MSAS

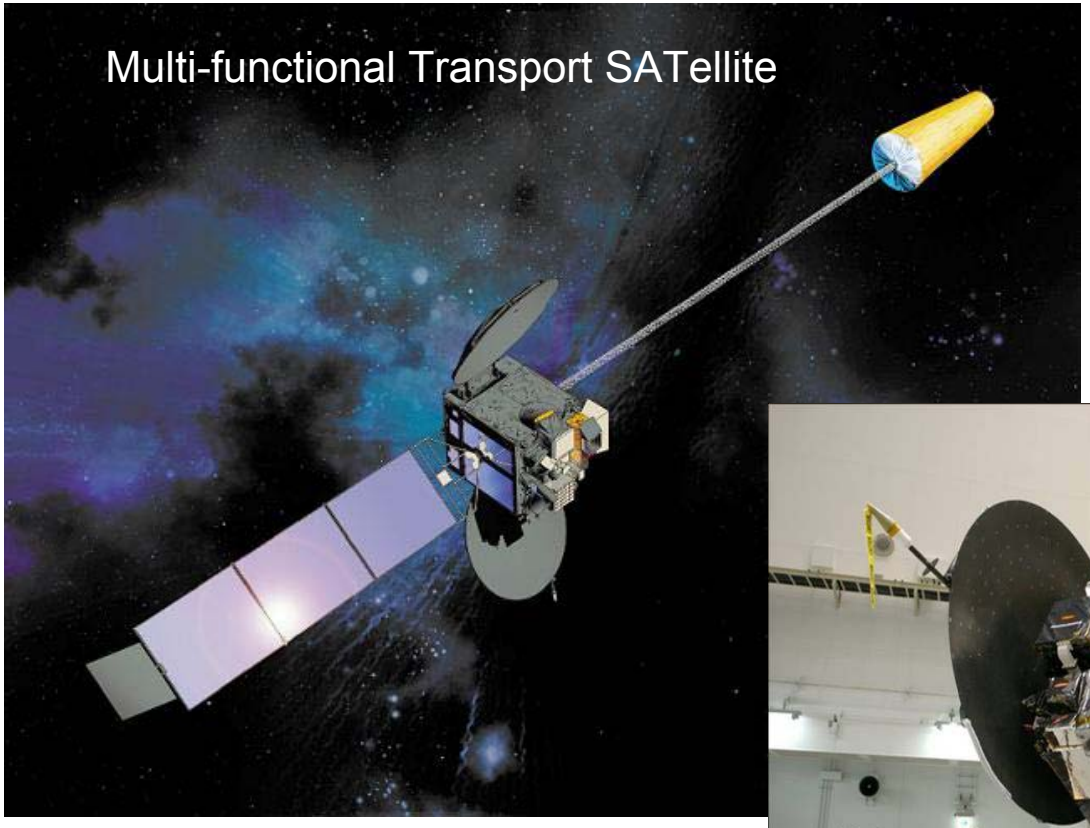
MTSAT Satellite-based Augmentation System
For ICG-3

Office of Aeronautical Satellite Systems
ATS Engineering Division
Japan Civil Aviation Bureau

1. Configuration of MSAS

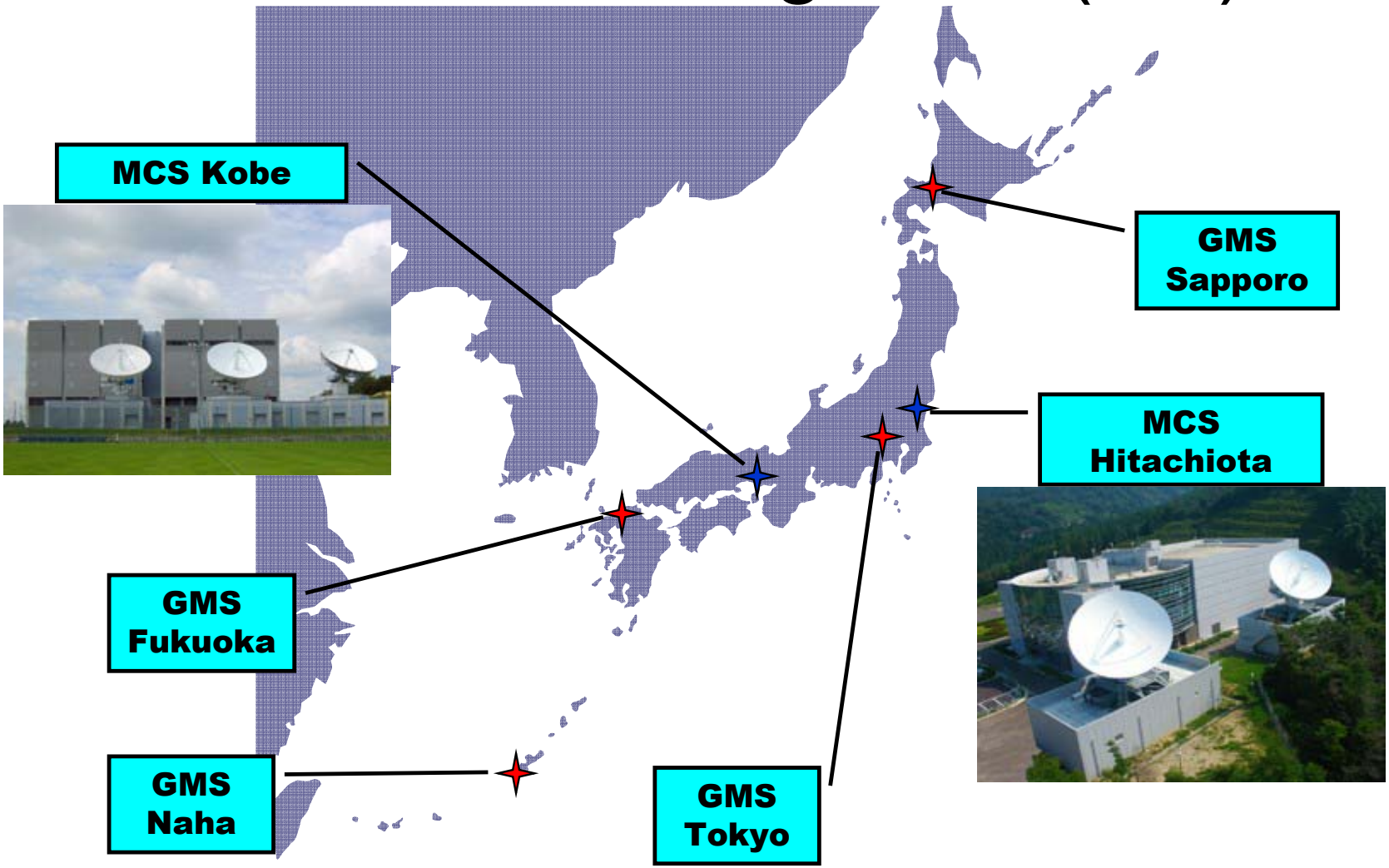


1. A. Space Segment(1/2)
MTSAT-1R @140E

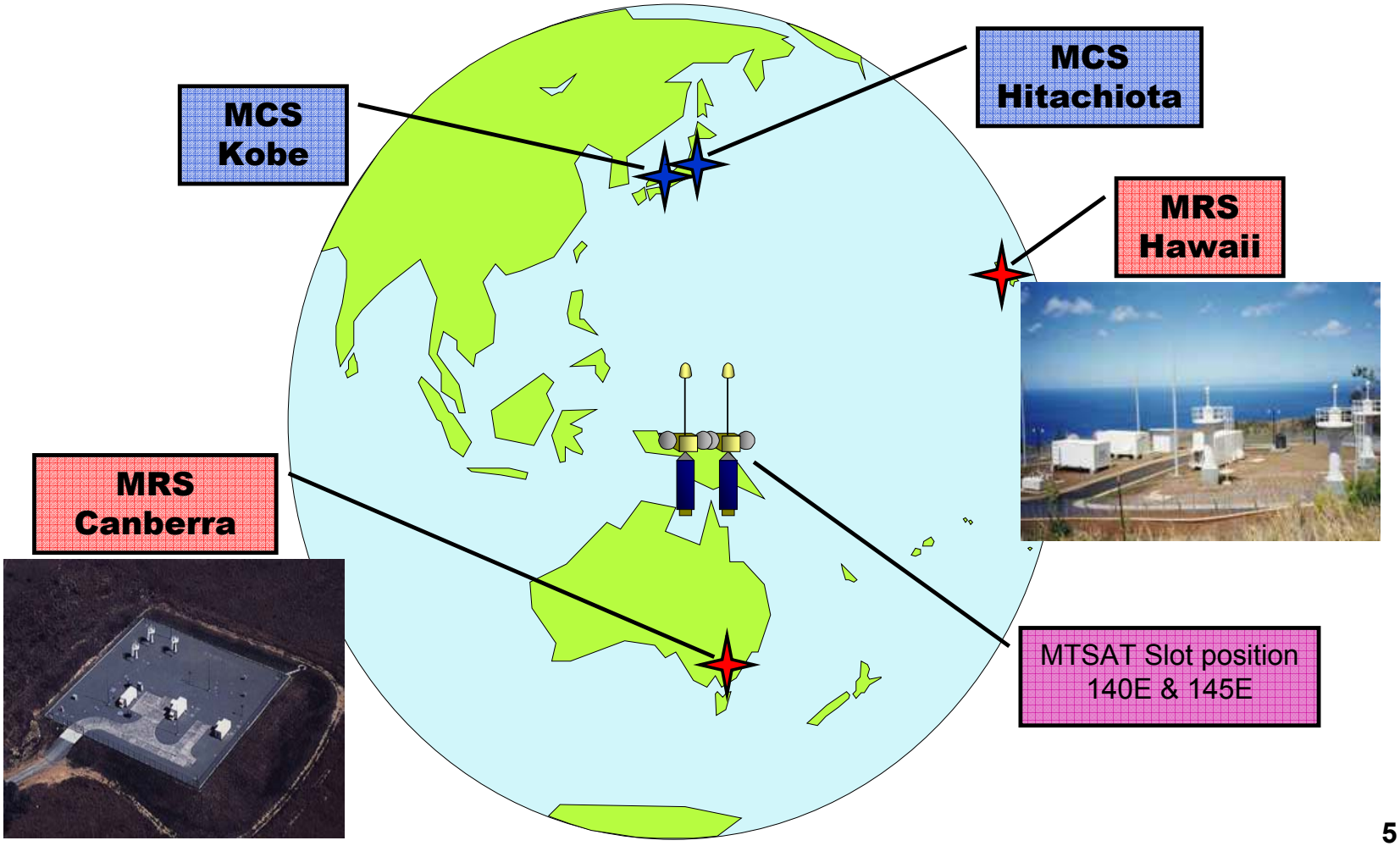


1.A. Space Segment(2/2)
MTSAT-2 @145E

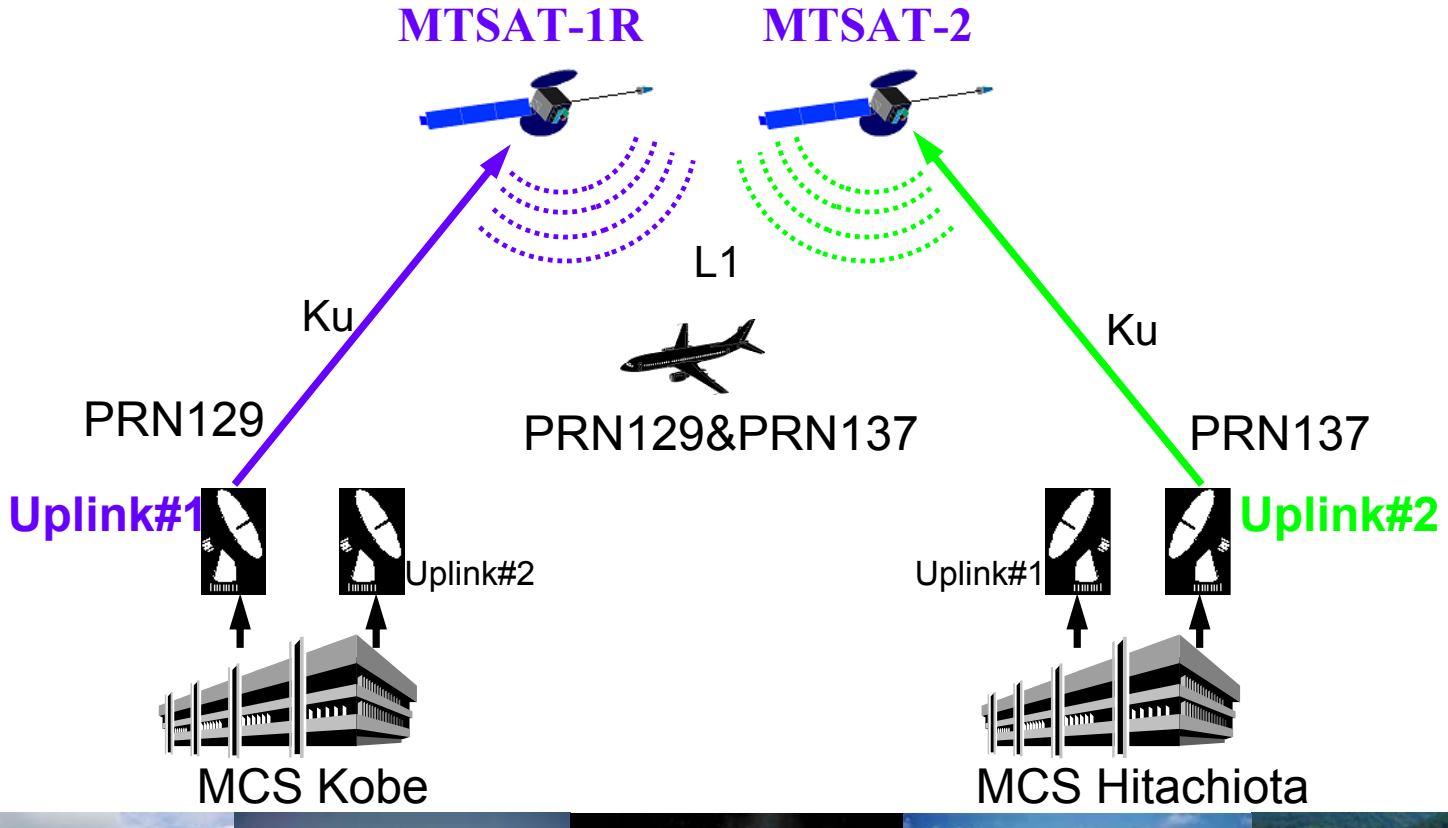
1.B. Ground Segments(1/2)



1.B. Ground Segments(2/2)



1.C. Signals –PRN code



1.C. Signals -specifications

- Signal characteristics are compliant with ICAO SARPs (See paragraph 3.7.3.4.4.)
  - Frequency ; L1 1575.42MHz
  - Band width ; 2.2MHz
  - 500 BPS FEC
  - Signal strength on the earth surface >-161dBw
- Planned signals
  - Band width expansion for L1
  - L5 signal



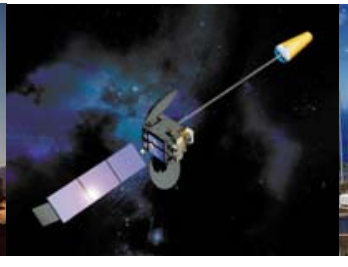


1.D. System time and geodetic reference frame

- MNT(MSAS Network Time)
  - Difference from GPS time is always kept less than 50ns (nano-second).

- WGS-84 is used.





1.E. Performance
-Required & observed-

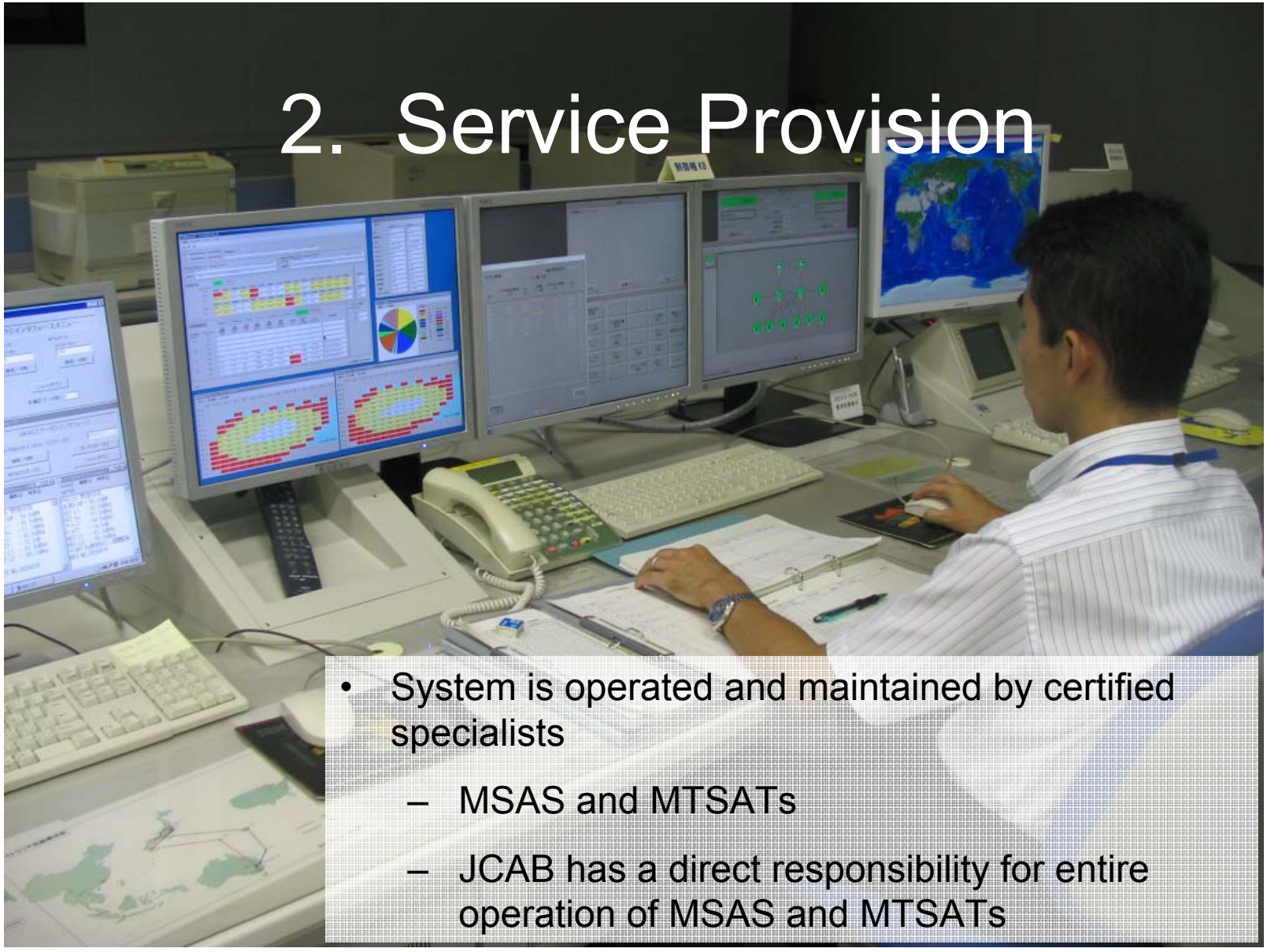
For Non-precision approach

- Horizontal Accuracy (95%)
  - Required : Less than 220m (with SA on)
  - Observed value is less than 2.2m
- Integrity (Probability of HMI)
  - Required : Less than $1x10^{-7}$/hour
  - Fault Tree Analysis leads $0.903x10^{-7}$/hour
- Availability
  - Required : More than 99.9%
  - Observed : 99.926%

2. Service provision

- Service for air navigation
  - 24hours a day, 7days a week
  - Operational Information is provided as NOTAM
    - Service Interruption, degradation of service
  - Use for En-route through Non Precision Approach phase of flight
    - Performance improvement plan is now under consideration

2. Service Provision



- System is operated and maintained by certified specialists
  - MSAS and MTSATs
  - JCAB has a direct responsibility for entire operation of MSAS and MTSATs

3. Compatibility & Interoperability

- Compatibility and interoperability are achieved by those activities;
  - Participating and discussing on the SBAS Technical Interoperability Working Group (IWG).
  - Participating and discussing on the ICAO Navigation System Panel meeting (NSP).

4. GNSS Spectrum Protection Activities

- A. National-level spectrum regulation is achieved by other ministry.
- B. Interference detection and mitigation work also.

End of presentation