International Civil Aviation Organization

Sixth Meeting of CNS/MET Sub-Group of APANPIRG

Bangkok, Thailand 15-19 July 2002

Agenda Item 4: Air-ground Communication

AVAILABILITY OF AMSS IN ASIA PACIFIC REGION (AMSS FUNCTION OF MTSAT; HOT STAND-BY SATELLITE SYSTEM)

(Presented by Japan)

SUMMARY

This paper present the availability of AMSS, and proposes methods to realize highly reliable AMSS in Asia Pacific region. The keys for it are as follows,

1) Hot stand-by satellites system that will be realized by MTSAT
2) Every AESs should be requested to register every satellites and Ground Earth Stations that are available for AMSS.

1. INTRODUCTION

1.1 JCAB has been working on MTSAT project to construct highly reliable hot stand-by satellite system. Due to the importance of AMSS, redundancy has been designed into the space segment and earth segment to ensure that the operational system satisfies requirements in terms of reliability. The mechanism for hot stand-by operation is shown in an attached paper of the working paper. MTSAT 1-R is scheduled for launch in the summer 2003, and the Ground Earth Stations (GES) dedicated for the satellite which is equipped at Kobe Satellite Center and Hitachi-ota Satellite Center have been ready to operate since 1999. MTSAT 2 is scheduled for launch in 2004, and the dedicated GESs are under construction at the Satellite Centers. The satellites will become operational nine month after the launch. In order to provide highly reliable AMSS, the satellites are designed as hot stand-by satellites each other. MTSAT will also contribute to improve both safety and capacity in Asia Pacific regions by providing coverage via global and spot beams. This is shown Figure 1 below.

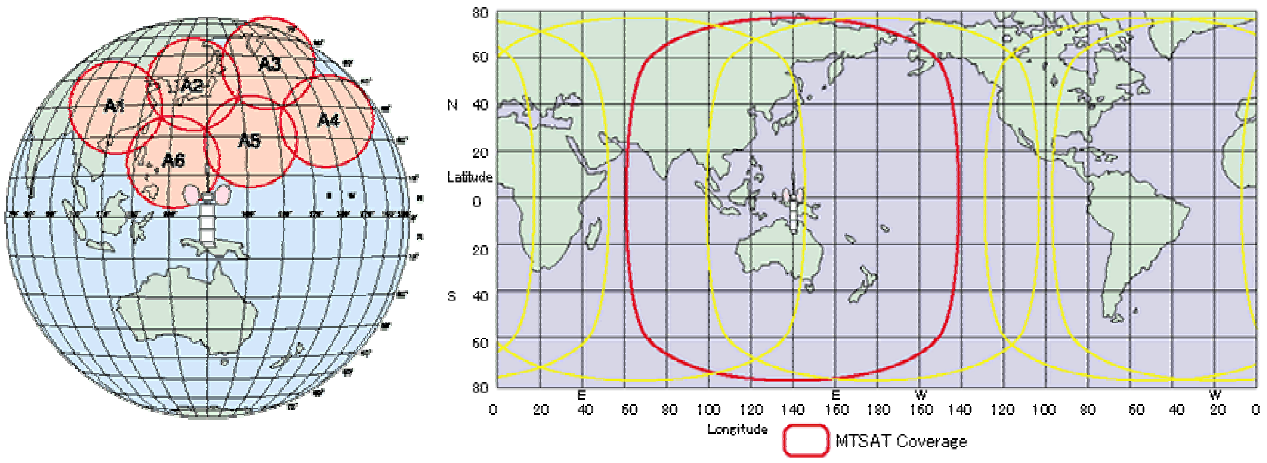


Figure 1 - MTSAT Spot and Global Beam Coverage

2. DISCUSSION

2.1 The longitudinal separation minima between airplanes in the oceanic airspace are based on time (i.e. 15 minutes), and it will be reduced to ADS-bases longitudinal one (i.e.50NM or 30NM etc.) when ADS/CPDLC by AMSS is operational in the area. Since ADS-based longitudinal separation requires the AMSS, it will be concerned that the separation minima shall be changed from 50NM or 30NM to 15 minutes if the airplanes lost AMSS. HF communication could be use as a back up system for AMSS, however it is considered that HF will not appropriately cope with a lot of airplanes, and this case will happen in the failure of satellite.

2.2 Since MTSAT will be operated as a hot stand-by system, the stand-by satellite will take over the communication link before the AESs are forced to log-off, and then the AESs will not suffer from any disruption of the communication link to the satellite. However, should malfunction of satellite happen, the AESs will be forced to log-off from the satellite, and then the AMSS will be taken over to the other satellites which are available in the area. For instance, it will be from Inmarsat POR to MTSAT or Inmarsat IOR.

2.3 Although there will be four satellites available in Asia Pacific region after MTSATs are operational, this will not always result in increasing the availability of AMSS for the AESs. Because a satellite or a GES can be useful only when an AES registers it in the owner's preference table.

2.4 According to the AMSS SARPs, AESs commonly have a programmable owner preference table by which there may be preferential selection of certain system, satellites, and/or GESs and communication requirements. There are several criteria by which preferential selection for log on can be made; e.g. service provider identity, cost, service options. If this capability were misused (e.g. to exclude particular systems, satellites or GESs) safety could be derogated due to restricted availability of alternate/diverse communication paths. If exclusion is permitted in an AES owner's preference table, it should be verified that the safety communication availability for that aircraft's installation are met. Therefore, every AESs are strongly requested to register every satellites and GESs that are compliant to ICAO AMSS SARPs.

3. CONCLUSION

3.1 Two MTSAT satellites and four GESs will be operated as hot stand-by systems to support aeronautical safety services.

3.2 MTSAT will surely increase the availability of AMSS in Asia Pacific region.

3.3 The exclusion of particular systems, satellites, or GESs in the owner's preference table in the AES shall not be permitted.

4. RECOMMENDATION

The meeting is invited to note the conclusion of this working paper.

Attachment: Operational Concept of MTSAT System with Two Satellites

Operational Concept of MTSAT System with Two Satellites

1. Features of the System

(1) Physical Configuration

Two hot satellites (positioned at 140 E and 135/145 E) with four hot GESs (two GESs located at Kobe and Hitachi-Ota respectively by means of the site diversity).

(2) Logical Configuration

One satellite ID, one oceanic region ID and one GES ID. This means only one Psid and one Psmc channel in the system.

(3) Radio Link

Service link : L band with one Global Beam and six Spot Beams.

Feeder link : Ku or Ka band with spot beam.

(4) ICAO AMSS SARPs compliant. Full inter-operable with INMARSAT aero-AESs.

(5) L Band Sharing Scheme

L band assigned for MTSAT is shared between Primary GESs and Secondary GESs. The Primary GESs are configured by GES#1(Kobe) and GES#2(Hitachi-Ota), and the Secondary GESs are configured by GES#3(Kobe) and GES#4(Hitachi-Ota).

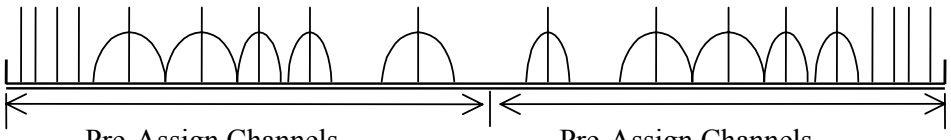
(6) Inter-Station Communication

GESs at Kobe and GESs at Hitachi-Ota are connected by dedicated terrestrial line or satellite link to make sure and quick GESs or satellite switch-over.

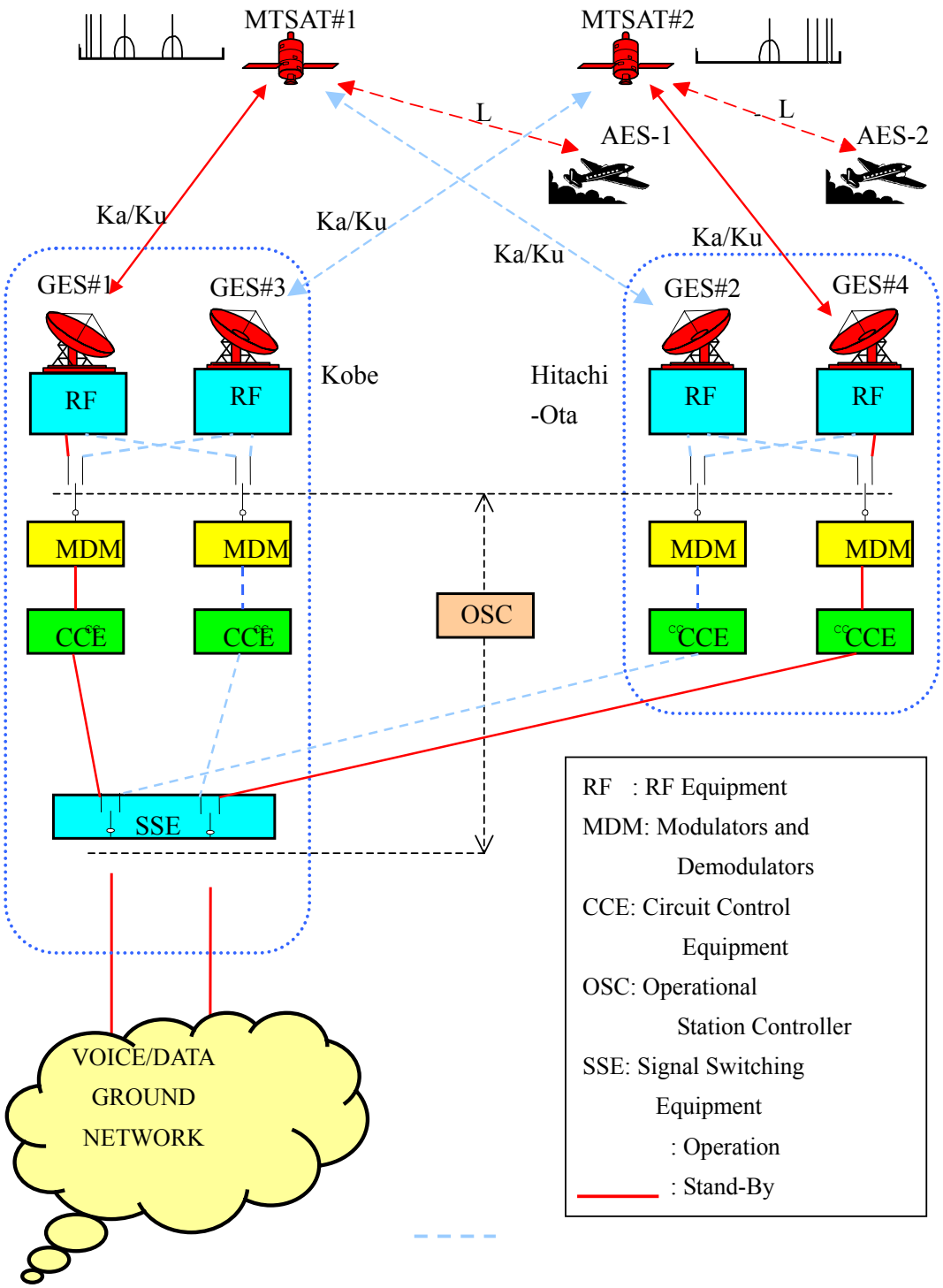
(7) Switch-over Time

GES or satellite switch-over is activated automatically by the equipment failure, and is performed within 6 seconds after occurrence of failure to keep the AESs logged-on to MTSAT system.

2. Channel Plan in Service link (L band)



3. System Block-diagram



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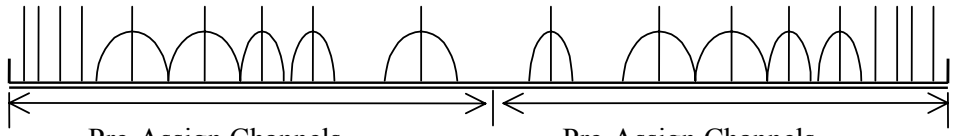

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