PERFORMING OF SOC DATS INTERFACE TEST WITH MODEM/BB

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ABSTRACT: DATS will connect with IMPS and LHGS to perform the reception of sensor data and the transmission of user's meteorological data, LRIT and HRIT. MODEM/BB will perform the de-commutation of received sensor data as MI and GOCI raw data according to VCID before sending them to MI and GOCI IMPS, respectively. Especially, MODEM/BB in SOC needs to be connected to six clients that consist of the primary and backup IMPS of MSC, KOSC and SOC. On the other hand, LRIT and HRIT delivered from LHGS are encoded as VITERBI and modulated by MODEM/BB. Considering sensor data transmitted from COMS, the assumed format and size of CADU are described in this paper. Finally, results related to the status of received LRIT and HRIT by frame synchronizer in user station are also described.

KEY WORDS: COMS, SOC, DATS, IMPS, LHGS

1. INTRODUCTION

COMS, to be launched in 2008, will be the first geostationary observation satellite in KOREA. It has three major missions like meteorological service, ocean monitoring, and Ka-Band satellite communications. SOC (Satellite Operation Center) which is one of four COMS ground segments provides a capability of mission operation and satellite control. It also performs backup MI (Meteorological Imager) and GOCI (Geostationary Ocean Color Imager) data processing even under the MSC (Meteorological Satellite Center) and KOSC (Korean Ocean Satellite Center) are normally working. SOC will be located within the existing KARI ground station and operated by KARI. SOC will be composed of primary SGCS (Satellite Ground Control System) for satellite operation and backup IDACS (Image Data Acquisition and Control System) for MI/GOCI data processing. MSC will be consisted of primary IDACS for MI data processing and backup SGCS for satellite operation. KOSC will have only IDACS for GOCI data processing. IDACS provides the capability of receiving and pre-processing raw MI/GOCI data and re-transmitting processed MI data to satellite as a format of LRIT (Low Rate Information Transmission) and HRIT (High Rate Information Transmission). IDACS consists of three subsystems like DATS (Data Acquisition and Transmission Subsystem), IMPS (IMage Pre-processing Subsystem), and LHGS (LRIT/HRIT Generation Subsystem). These subsystems need to be connected each other to perform IDACS function. In this paper, test for SOC DATS interface is described. Firstly, configuration of interface between DATS and IMPS/LHGS is described. Next, test configuration including definition on the format and size of test data is illustrated. Finally, size and frame continuity of data saved at each client and user station are summarized.

2. DATS INTERFACE

Figure 1 shows the interface configuration of IDACS.

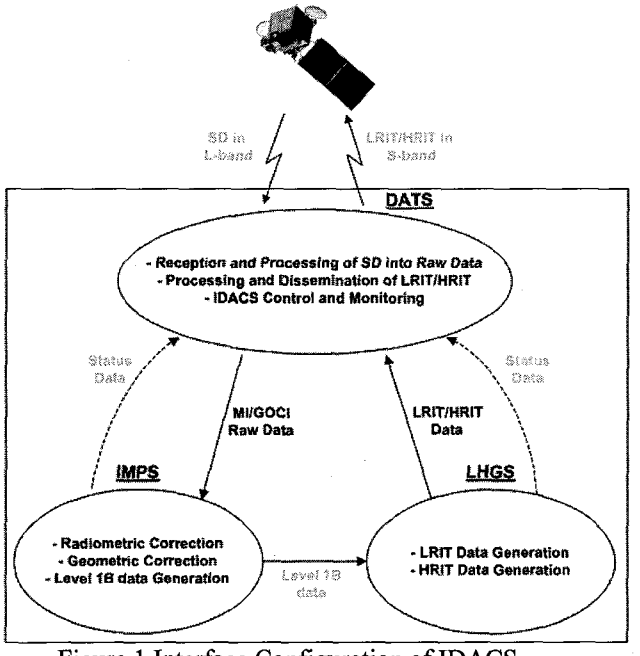

Figure 1 Interface Configuration of IDACS

DATS receives SD (Sensor Data) in L-Band and de-commutes it as MI/GOCI raw data by using MODEM/BB. MODEM/BB which is heart of DATS performs de-commutation of SD by searching VCID (Virtual Channel ID) in VCDU (Virtual Channel Data Unit) of MI/GOCI raw data. These MI/GOCI raw data are input into IMPS via TCP/IP for radiometric/geometric correction and level 1B data generation. On the other hands, level 1B data generated by IMPS is routed into LHGS. LHGS generates LRIT/HRIT data from level 1B data and sends them to MODEM/BB in DATS through TCP/IP. DATS process LRIT/HRIT data and transmits LRIT/HRIT signal to satellite for user's meteorological data dissemination.

DATS provides IDACS control and monitoring function with receiving status data of IMPS/LHGS. This paper is focusing on the interface for MI/GOCI raw data and LRIT/HRIT data.

3. TEST CONFIGURATION

Figure 2 shows the test configuration for MI/GOCI raw data and LRIT/HRIT data interface.

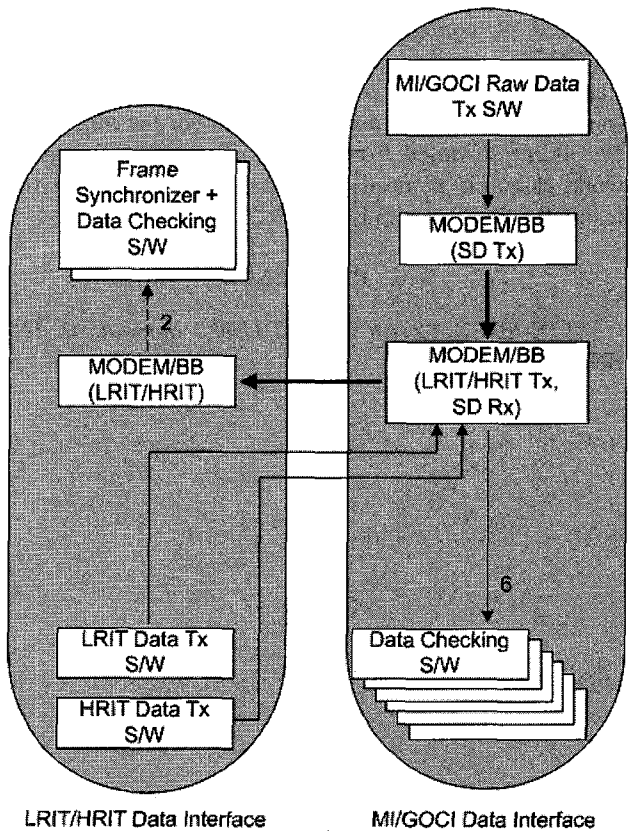

Figure 2 Test Configuration

In figure 2, the interface media is expressed as three types of connecting line. Namely, one is thin arrow for TCP/IP, the other is thick arrow for 70MHz IF-Band, another is dot arrow for data/clock in TTL. Test configuration is divided as two, one is LRIT/HRIT data interface and the other is MI/GOCI data interface. To simulate SD in IF-Band, MI/GOCI Raw Data Tx SW in figure 2 is input test data into MODEM/BB (SD Tx) via TCP/IP. Then, MODEM/BB performs QPSK modulation like MODCS in satellite and routes SD in IF-Band into MODEM/BB (LRIT/HRIT Tx, SD Rx) which acts as receiver in normal operation. As mentioned above, this MODEM/BB performs demodulation, Reed-Solomon decoding, and de-commutate by using VCID. Total 6 of clients with data checking S/W represent interface with primary and backup IMPS in SOC, MSC, and KOSC, respectively. On the other hand, LRIT/HRIT is input into MODEM/BB (LRIT/HRIT Tx, SD Rx) via TCP/IP for baseband processing like VITERBI encoding and modulation. LRIT/HRIT in IF-Band are delivered to MODEM/BB (LRIT/HRIT) which represents user's receiver in MDUS (Medium-scale Data Utilization Station) and SDUS (Small-scale Data Utilization Station). Actually, MODEM/BB (LRIT/HRIT) seems to be over-specification to process LRIT/HRIT. To check the counter in first frame received after frame synchronization, more similar device such as cost-effective frame synchronizer. LRIT/HRIT is input into frame synchronizer as a status of data/clock in TTL level. Figure 3 shows the format and size of test data.

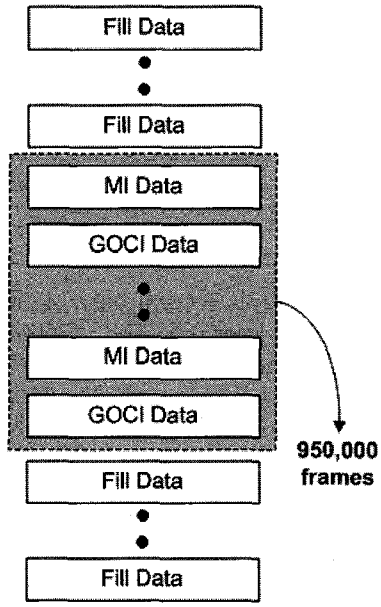

Figure 3 Format and Size of MI/GOCI Test Data

The format of SD has not been finalized in MODCS preliminary design, MI/GOCI data frame, as shown, is crossed with considering worst case to MODEM/BB. The number of frames for MI/GOCI data is 95,000 frames. Fill, MI/GOCI data has equally 4 bytes of attached sync marker, 6 bytes of VCDU header, 1094 bytes of VCDU data zone, and 160 bytes of Reed-Solomon code. VCID for de-commutation is implemented in VCDU header. From the view of transmission time, the length of MI/GOCI frame corresponds to about 25.8 minute with assuming 6.2Mbps of datarate. In the case of LRIT/HRIT, frame consists of 4 bytes of attached sync marker, 6 bytes of VCDU header, 886 bytes of VCDU zone, and 128 bytes of Reed-Solomon code. Total frame size is assumed as full disk image with 30% of compression rate for HRIT and 48% of compression rate for LRIT. As a result, the size is assumed as 102495 frames for HRIT and 5248 frames for LRIT in this paper.

4. TEST RESULTS

Table 1 show the size and continuity of MI received by 3 clients. The other 3 clients for GOCI reception show the same results of MI clients.

Table 1 Size and Continuity of MI received by 3 clients

1st Client (size/continuity)	2nd Client (size/continuity)	3rd Client (size/continuity)
475000/Yes	*475000/Yes*	*475000/Yes*
475000/Yes	*475000/Yes*	*475000/Yes*
475000/Yes	*475000/Yes*	*475000/Yes*
475000/Yes	*475000/Yes*	*475000/Yes*
475000/Yes	*475000/Yes*	*475000/Yes*
475000/Yes	*475000/Yes*	*475000/Yes*
475000/Yes	*475000/Yes*	*475000/Yes*
475000/Yes	*475000/Yes*	*475000/Yes*
475000/Yes	*475000/Yes*	*475000/Yes*
475000/Yes	*475000/Yes*	*475000/Yes*

Because three clients receive only MI data by using VCID, total size needs to be 475000, normally. Continuity means the frame counter in VCID header is continuous. From the above results, MODEM/BB is verified that it has a capability of sending MI/GOCI raw data to 6 IMPS with lossless frame.

Table 2 Result of LRIT/HRIT Data Interface

LRIT Receiving		HRIT Receiving	
Size/ Continuity	Number of First Frame	Size/ Continuity	Number of First Frame
5242/Yes	*6*	*102492/Yes*	*3*
5248/Yes	*0*	*102495/Yes*	*0*
5245/Yes	*3*	*102495/Yes*	*0*
5245/Yes	*3*	*102495/Yes*	*0*
5245/Yes	*3*	*102495/Yes*	*0*
5248/Yes	*0*	*102495/Yes*	*0*
5248/Yes	*0*	*102495/Yes*	*0*
5245/Yes	*3*	*102495/Yes*	*0*
5245/Yes	*3*	*102495/Yes*	*0*
5248/Yes	*0*	*102495/Yes*	*0*

The LRIT/HRIT frame saved by frame synchronizer is continuous. However, the number of first frame is not always 0 but 3 or 6. Thus, LHGS needs to include idle pattern prior to the first frame in LRIT/HRIT data. This idle pattern will be used for the identification of frame in frame synchronizer.

5. CONCLUSION

This paper describes the test configuration and result for the interface of DATS. DATS needs to send raw MI/GOCI data to IMPS for radiometric/geometric correction and receive LRIT/HRIT data from LHGS for the transmission of user's data to satellite. Configuration consists of two parts, one is for LRIT/HRIT data interface and the other is for MI/GOCI data interface. To simulate dual-IMPS in three ground segment, six clients are included in configuration. Under 1Gbps of network, MI/GOCI data is received by six clients without any frame loss. The frame of LRIT/HRIT received user's frame synchronizer is also continuous but the number of first frame is varied from 0 to 6. Thus, considering the worst case, LHGS needs to prepare idle frame to avoid losing the first frame in LRIT/HRIT.

6. REFERENCE

[1] IN-SNEC, *Cortex CRT-NT User's Manual*, ref. IN-SNEC.DTU 100042