



WORKING PAPER

SATELLITE DISTRIBUTION SYSTEM OPERATIONS GROUP (SADISOPSG)

THIRTEENTH MEETING

Dakar, Senegal, 27 to 29 May 2008

Agenda Item 6: Development of the SADIS

6.4: Alternative SADIS 2G hardware

EVALUATION OF THE ALTERNATIVE SADIS 2G HARDWARE

(Presented by the SADIS Provider State)

SUMMARY

This working paper presents a final evaluation of the NetSys SADIS Transcoder (NST) as an alternative to existing SADIS 2G hardware.

1. INTRODUCTION

1.1 The group will recall that at its last meeting, it formulated Conclusion 12/18 calling for the SADIS Provider State to undertake an evaluation of the alternative SADIS 2G hardware (called the NetSys SADIS Transcoder or NST) being developed by NetSys International (Pty) Ltd.

1.2 Conclusion 12/18 comprised four parts. Namely, for the SADIS Provider State to:

- a) clarify the expected certification standards, market place and mean-time between failure of the NST unit;
- b) complete final evaluations of the operational capability of the alternative SADIS 2G hardware offered by NetSys within a real-time environment;
- c) provide a summary report of the findings in b) to the SADISOPSG Technical Development Team; and
- d) on completion of the actions called for in a) to c) above, assess, in co-ordination with the SADISOPSG Technical Developments Team, the desirability, or otherwise, of recommending that the alternative SADIS 2G hardware be brought into the commercial workplace.

1.3 The group will be pleased to learn that the SADIS Provider State has addressed all of the elements of Conclusion 12/18, with details to follow.

2. BACKGROUND

2.1 In late-June 2007, the SADIS Provider (UK Met Office) took delivery of a NetSys SADIS Transcoder (NST) from NetSys International (Pty) Ltd. in South Africa. The intention was for the Met Office to undertake a final evaluation of the operational capability of the alternative SADIS 2G hardware offered by NetSys within a real-time environment.

2.2 Accordingly, the NST, simply a pre-installed printed circuit board (PCB) housed within a standard Linux (desktop) PC, was installed within the Met Office IT Workshop environment by August 2007. The NST system was configured to run in parallel with the existing VADOS Systems MegaPAC installed at the Met Office. A Y-connector was used to split the modem output to both the VadEDGE (MegaPAC) unit and the NST unit. The Met Office was then able to monitor the performance and operational capability of the NST unit in real-time, including performing a number of management tests to measure the units ability to handle disable and enable commands (issued by the Met Office), and the maintaining of a disable state command over a power outage.

3. CERTIFICATION STANDARDS, MARKET PLACE AND MEAN-TIME BETWEEN FAILURE OF THE NST UNIT

3.1 NetSys intends to offer the NST only as part of a complete SADIS 1G to SADIS 2G upgrade package comprised of low-noise block (LNB), satellite modem, lightning protection kit, NetSys workstation, printer, UPS and the necessary visualization software and services to provide pre-flight MET briefings.

3.2 At present, NetSys offers a Dell Precision T3400 N-Series PC as the workstation. It is equipped with a second disk containing all the necessary software as a cold backup. NetSys believes that not only is the cost reduced by using the Fedora Core Linux O/S, but the possibility of virus attack is virtually eliminated when the system is connected to the Internet – as would be required to make use of the SADIS FTP backup facility.

3.3 To cater for an extended period of use, a heavy-duty printer such as the HP LaserJet 4250dtn is used to produce flight documentation of high quality. An APC Smart-UPS (1500VA) supplies both the computer and demodulator with regulated, clean power. In the event of a low battery indication, the PC will automatically shut down.

3.4 Thus, the deliverables of the proposed NetSys package is envisaged to be:

- a) VSAT receiving equipment, including Satellite Demodulator and NetSys Transcoder & cables; 40 Meter CT233 Coax Cable; C-Band LNB; and Surge/Lightning Protection;
- b) Workstation, including: Dell N-Series-T3400 525W Intel Core 2 Duo E6750 (2.66GHz, 4MB,1333MHz); APC Smart-UPS SUA1500i; and HP LaserJet 4250DTN - Q5403A Printer; and

- c) Software License: nsWAFS – unified server and client.

3.5 *Training:* Computer Aided Instruction – an Audio/Visual presentation intended as a self-paced learning medium, leading the pupil with step-by-step instruction and presenting examples using canned as well as live data.

3.6 *Services:* Although the intention is to provide a package that is entirely user installable, NetSys will also offer a turn-key commissioning service comprised of supply, installation, training and switchover of the SADIS 2G solution with a NetSys engineer on-site for one week on average (one day installation, two days training, one day acceptance testing and one day monitoring). Remote support and maintenance over the Internet for a period of eighteen months after acceptance is included in the package.

3.7 *Certification standards:* In view of the high cost of certification and the expected limited, low volume of use, the NST has not been submitted for regulatory compliance testing by NetSys. However, through adherence to well established grounding and shielding techniques, the product has been designed and manufactured in conformance with the most stringent electromagnetic emissions and immunity CE and FCC standards such as:

- a) Safety: EN 60950-1;
- b) Immunity: EN 55024 (CISPR 24); and
- c) EMC: EN55022, CISPR 22 & FCC Part 15, ICES-003

3.8 *Mean Time Between Failure:* A NST has been under test at the South African Weather Services for more than eighteen months and a further two units at NetSys and at Exeter since the middle of 2007 without a single failure. Given that the Quaint E1WIZ4H PCB is used in a number of other products which have been deployed in the field for more than two years without any reported malfunction, NetSys is confident that the MTBF of the NST is, as a minimum, on a par with that of any of the commercially available PC Network Interface Cards and should well exceed one million hours.

4. EVALUATION OF THE OPERATIONAL CAPABILITY OF THE NST WITHIN A REAL-TIME ENVIRONMENT

4.1 An NST unit has been operating in a real-time environment at the UK Met Office since August 2007. The unit has been operating without a single hardware or software failure since installation (in excess of 6 months).

4.2 In September 2007, the Met Office performed the inaugural round of management tests of the NST unit. The intention of these tests was to evaluate the ability of the unit to:

- a) appropriately handle disable (DIS) and enable (ENA) commands transmitted by the Met Office over the SADIS 2G satellite broadcast; and
- b) maintain a DIS state command transmitted by the Met Office over the SADIS 2G broadcast over the course of a power outage.

4.3 During the first round of tests, the Met Office was able to confirm the ability of the NST to satisfactorily handle elements a) and b). Within 10 seconds of the DIS command being issued by the

Met Office, the ingestion of SADIS 2G data halted across all three data channels (GRIB, OPMET and T4). Equally, within 10 seconds of the ENA command being issued, the NST unit began to ingest with WAFS data.

4.4 In order to test the retention of the DIS command over a power outage (element b)), the Met Office issued the DIS command, waited until data ingestion stopped, then shut-down the NST unit using an appropriate command sequence. The power to the unit was disconnected and then re-connected after about 30 seconds. Upon reboot and reloading of the application software, the unit had indeed maintained the DIS state over the power outage, with no data ingestion occurring. The ENA command was then issued to the NST, and data began to flow again into the unit. At first, data ingestion was not 100% “clean”. However, this is not an uncommon occurrence after DIS-ENA routines and a quick soft-reboot of the unit allowed data to flow again cleanly.

4.5 During subsequent tests performed by the Met Office during the latter stages of 2007 and early 2008, the Met Office encountered some difficulties in remotely managing the unit. The Met Office is of the firm belief that these difficulties are not related to the operational capability of the NST, but are instead as a result of changes to the Met Office firewall or the Y-connector used to route the incoming data feed into the NST unit.

4.6 Whilst work on the Met Office firewall was recently completed, some minor configuration aspect may still be preventing the reception of the DIS/ENA command strings off the satellite. Testing with VADOS Systems (which support the kill-revive utility) has confirmed that the DIS/ENA command string *is* being successfully transmitted from the Met Office in Exeter to the satellite uplink facility at Whitehill. Furthermore, there is nothing to suggest that the command is not making it successfully over the sky. Investigations with the firewall, and the Y-connector, are expected to be complete by April, whereupon the Met Office will perform further management tests of the NST unit and will report to the SADISOPSG.

5. SUMMARY REPORT OF THE FINDINGS

5.1 A summary report of findings was submitted by the SADIS Provider State to the Rapporteur of the SADISOPSG Technical Development Team on 5 March 2008.

6. ASSESSMENT OF THE DESIRABILITY OF RECOMMENDING THAT THE NST BE BROUGHT INTO THE COMMERCIAL MARKETPLACE

6.1 In co-ordination with the SADISOPSG Technical Development Team, the SADIS Provider State notes that:

- a) the NST unit has been operating in a real-time environment at the Met Office without any hardware or software issues for in excess of 6 months;
- b) the Met Office has been able to successfully manage the NST unit remotely in an operational environment on at least one occasion; and
- c) the comprehensive information has been provided by NetSys regarding NST deployment and certification standards.

If similar results can be achieved from further management tests performed by the Met Office in March and April 2008 (and in time for reporting to SADISOPSG/13), it is suggested that this alternative SADIS 2G hardware be bought into the commercial marketplace.

6.2 Accordingly, the SADISOPSG is invited to formulate the following draft decision:

Decision 13/.. —Alternative SADIS 2G hardware

That, in view of the final evaluation by the SADIS Provider State, in co-ordination with the SADIS Technical Development Team, of the NetSys SADIS Transcoder (NST) as an alternative to existing SADIS 2G hardware, it is desirable for the NST to be bought into the commercial marketplace.

Note 1.— The SADIS Provider State to inform NetSys International (Pty) Ltd of this decision, as soon as possible, and in any case no later than 30 June 2008; and

Note 2.— The SADISOPSG Secretary, based on information from the SADIS Provider State, place guidance on the SADISOPSG website by 30 June 2008, informing members of this alternative SADIS 2G hardware.

7. ACTION BY THE SADISOPSG

7.1 The group is invited to:

- a) note the information in this paper; and
- b) decide on the draft decision proposed for the group's consideration.

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