(S//SI//REL) Shift to Software Demodulation in Misawa Expands Collection, Saves Money

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*(S//SI//REL) Editor's summary: The SIGINT site in Misawa, Japan, is now using **software** demodulation to process many low-data-rate signals, thereby freeing up expensive **hardware** demodulators to concentrate on the more demanding processing tasks. This approach is expected to both save millions of dollars and to allow the site to collect more SIGINT than was ever possible before.*

(S//SI//REL) SIGINTers at the Misawa Security Operations Center (MSOC) and Fort Meade* have developed the ability to demodulate dozens of low-rate satellite signals using software stored on a single Dell 2950 server. This initiative, known as WORDGOPHER, currently enables simultaneous processing of up to forty-eight 64kbps phase-modulated carriers on a single server. The approach essentially negates the requirement for significantly more expensive hardware demodulators to handle these signal types.

(S//SI//REL) WORDGOPHER is poised to save both the site and the extended enterprise millions of dollars over the course of the next five years. This cost savings will accelerate other developments and open a viable avenue to expand the MSOC's collection posture consistent with DIRNSA's "collect it all" challenge.**

How WORDGOPHER Has Been Used at MSOC (S//REL)

(S//SI//REL) Current antenna resources provide MSOC with access to over 8,000 signals on 16 targeted satellites. As is the case with most FORNSAT facilities, collection of these signals is limited by a finite inventory of hardware, in this case approximately 400 demodulators. It is estimated that WORDGOPHER can take on processing of nearly 1,000 low-data-rate systems, which will free up valuable resources and increase throughput of the station. WORDGOPHER should bolster the site's collection ability at a fraction of the cost of conventional hardware.

(TS//SI//REL) [redacted] This effort has already saved the enterprise over $300,000 dollars -- the amount it would have cost to purchase additional hardware modems. [redacted].

How WORDGOPHER Was Developed (U//FOUO)

(S/SI//REL) MSOC worked together with the S33123 FALLOWHAUNT team and obtained a 90% solution for the WORDGOPHER demodulator using previously developed software. Using S2B-procured hardware, MSOC integrated the code/hardware into the site infrastructure for processing of additional signals. This combined software and field programmable gate array (FPGA) solution works best on links less than 2 Mbit/sec. The bit snap uses FPGA technology on an ICEPIC digital capture card, while the actual demodulation is performed in software. The demodulated bits are sent to WEALTHYCLUSTER using SHAREDVISION's Data Distribution Service (DDS) protocol.

Future Plans (U)

(TS//SI//REL) In the future, MSOC hopes to expand the number of WORDGOPHER platforms to enable demodulation of thousands of additional low-rate carriers. As an example, [redacted]. These targets are ideally suited for software demodulation. Additionally, MSOC has developed a capability to automatically scan and demodulate signals as they activate on the satellites. There are a multitude of possibilities, bringing our enterprise one step closer to "collecting it all."

(S//SI//REL) MSOC would like to thank the FALLOWHAUNT team, SHAREDVISION, FORNSAT, and the Office of China and Korea for their support of this effort.

(U//FOUO) Questions? Contact [redacted], Resident Signals Engineer, MSOC.

(S//SI//REL) View of racks at Misawa	(S//SI//REL) Close-up view of WORDGOPHER at the MSOC

(S//SI//REL) View of the racks at Misawa (left) and a close-up view of the WORDGOPHER servers.

(U) Notes:

* (S//SI//REL) Specifically, SID's Office of China and Korea (S2B) and Mobile Satellite Services (S33123) collaborated on WORDGOPHER.

** (S//SI//REL) The Director announced his "collect it all" goal in a Director's Message in February 2007.

*** (TS//SI//REL) The People's Republic of China (PRC) MFA VSAT network is a global network used for digital-network intelligence (DNI), voice, and fax communications spanning seven satellites. It operates between the PRC MFA Headquarters in Beijing and over 200 PRC embassies and consulates worldwide.