

Tech focus

This month's focus is on communications.

Network-centric communications key attribute of new aircraft

A new 737 signals intelligence (SIGINT) aircraft recently announced by **Boeing** can be used for advanced network-centric communications, as well as airborne intelligence, surveillance, and reconnaissance (ISR).

"We think this affordable variant not only provides the **U.S. Defense**

Department with options for current and future airborne ISR requirements, but also is adaptable to any international SIGINT mission sets," said Tony Parasida, Boeing Vice President for Maritime Systems.

The new SIGINT aircraft concept is a variant of its 737-based P-8A Multi-mis-

sion Maritime Aircraft, which is currently being developed for the **U.S. Navy**.

According to Parasida, the 737 SIGINT will leverage the P-8A's advanced mission system architecture, mature design, and contractor logistics support and training systems approach. "For customers, that means reduced operating and maintenance costs over the entire life cycle of the system," he said.

Boeing says the aircraft will have increased mission capability, operational readiness, and combat radius compared with legacy aircraft. It is designed in such way that payload capacity can easily be increased or upgraded to accommodate future customer requirements.

Boeing's Maritime Systems Industry team, currently working on the P-8A program, will be involved with the 737 SIGINT variant as well. Additional partners likely will be added to the team to help address future customer requirements. P-8A team members include **Northrop Grumman, Raytheon, Smiths Aerospace, and CFM International**. The P-8A, a military derivative of the 737-800 aircraft, is the Navy's replacement platform for the P-3C. Its primary mission is to provide persistent anti-submarine warfare.

Patrick Ponticel



Northrop Grumman, Raytheon, Smiths Aerospace, and CFM International are among the companies working with Boeing on the new 737 SIGINT aircraft.



Source: Boeing

Networking improvements from Raytheon

Raytheon demonstrated new mobile ad-hoc networking (MANET) capabilities during recent field exercises at Fort Benning, GA. Improvements in a network's ability to establish itself, in its ability to heal itself through data-rate adaptation, and in its ability to fully integrate operations with legacy communications equipment via the network were seen. All three improvements support network-centric operations by assuring that soldiers have seamless communications.

The improvements were realized under a partnership between Raytheon and the **Defense Advanced Research**

Projects Agency's Advanced Technology Office as part of the Future Combat Systems Communications program. They provide a MANET system designed to enable ground and airborne on-the-move (OTM) and on-the-halt network-centric operations. The new MANET capabilities overcome current problems that soldiers encounter with long-range, mobile, networked communication and the ability to work with legacy radio systems.

Raytheon's self-forming communications solution establishes autonomous networks OTM and in real time from the moment that soldiers turn on their ra-

dios. Today, establishing network connections can take hours, and maintaining those connections at long distance can be very difficult.

The self-healing adaptive data rate technology solution allows soldiers to move in and out of a network without disrupting it. The solution continuously maximizes the data rate through the network based upon the quality of the link. This enables a network to be available and to remain connected across larger distances.

Patrick Ponticel

ISR aircraft project woes lead to program cancellation

The **U.S. Army's** cancellation of a next-generation Intelligence, Surveillance, and Reconnaissance (ISR) aircraft because of engineering problems leaves the Army and **U.S. Navy** dependent on old technology in terror war zones such as Iraq and Afghanistan for the foreseeable future. The best the Bush administration and Congress will be able to do is find funds to upgrade the Army's aging Guardrail Common Sensor and the Airborne Reconnaissance-Low (ARL) systems and the Navy's EP-3E Aries, the three planes that were supposed to be replaced by the new Aerial Common Sensor (ACS) starting in 2008.

Guardrail and ARL are essentially a mix of ad-hoc legacy systems that are neither fully networked nor integrated. Neither do they have the ability to self-deploy nor the sensors to detect and locate targets in depth. The first of the old aircraft were supposed to be taken out of service starting in 2012.

The 38 and 19 ACS planes the Army and Navy were supposed to start buying in 2008 were to feature onboard battle command and communica-

tions links such as Link-16, the type of high-speed radio used to link the Army's Patriot missile batteries, and Joint Tactical Radio, a software-based (as opposed to conventional hardware-based) system that would have allowed the Army and Navy planes to communicate. The sensors were to provide better and faster indications and warnings data, improved situational development/awareness, increased force protection, robust battle damage assessment, and the preponderance of non-line-of-site (NLOS) targeting support for future weapons systems.

Lockheed Martin, the contractor on the program, used what is called a parametric analysis to determine that the ACS electronics would fit in an **Embraer ERJ-145**. But that analysis turned out to be erroneous. "Our understanding is that the ACS problem was largely driven by something as simple as a significant underestimation of connecting cables and racks for the mission equipment, due to 'bad parametrics,'" said Rep. Curt Weldon (R-Pa.), Chairman of the House Armed Services subcommittee on Tactical Air and Land Forces.

Tim Rider, spokesman for the Army's Communication and Electronics Command, said the Lockheed Martin engineering analysis looked at the ratio between the size, weight, power, and cooling needs of the communication and sensor systems, and then projected the length and mass of materials that would be needed. The wiring on a plane such as the ACS can have a mass of several thousand pounds, Rider explained. Lockheed found out in early 2005, during the design phase, that the wiring needs were far above what it had initially projected, and that a larger airframe than the Embraer ERJ-145 would be needed. That, of course, would have markedly increased the cost of each plane.

President George Bush proposed as part of his fiscal 2007 budget, which starts September 30, 2006, that the Army spend \$208 million to upgrade the Guardrail and ARL. But Rider said that no matter how the Guardrails and ARLs are souped up, they will never measure up to the ISR capabilities the ACS was supposed to have.

Stephen Barlas

New technology allows much faster onboard data transfer

Data Device has developed a new data bus technology that uses a tactical aircraft's existing wiring to transfer electronic data up to 120 times faster than current data bus technology, according to **Boeing**, which is working with Data Device on the technology.

Called HyPer-1553, the technology increases the bandwidth between aircraft subsystems, making aircraft so equipped more effective in meeting the demands of the network-centric operational environment of the future. Another advantage of the technology is that it will allow aircraft systems to be upgraded for future combat environments much faster and affordably than with other high-data-rate options.

The new technology is a high-performance version of MIL-STD-1553, the current military standard data bus. HyPer-1553 is similar to Digital Subscriber Line technology that is used



Source: Boeing

The Boeing F-15E1 Advanced Technology Demonstrator takes off from Lambert International Airport in St. Louis for testing of the HyPer-1553 data bus technology.

to expand the data-carrying capability of ordinary telephone lines.

"HyPer-1553...is particularly well suited for applications in which it is difficult or impossible to add or replace wiring," said Steve Wilson, Boeing Phantom Works lead engineer for the project. "And because it operates in parallel with existing MIL-STD-1553

data buses, upgrades can be done incrementally, which further expands the options for upgrading the war-fighting capabilities of current and future aircraft."

Data Device, Boeing, and **Honeywell Aerospace** demonstrated HyPer-1553's capabilities during a flight test aboard the Boeing F-15E1

Advanced Technology Demonstrator aircraft in St. Louis late last year. The test involved transmitting imagery between a rugged computer mounted in the forward equipment bay of the F-15E and a modified Joint Direct Attack Munition mounted on a wing pylon station. A Data Device circuit card was

mounted to a Honeywell general-purpose processor board on either end of the interface.

The results showed that HyPer-1553 transferred data at 40 Mbit/s in parallel with MIL-STD-1553 data being transferred at 1 Mbit/s. The team also transferred data at 40, 80, and 120 Mbit/s

on a second bus dedicated to the higher-speed data.

"HyPer-1553 technology's increased performance, reduced downtime, and relative low cost of implementation add up to a very innovative and affordable solution for our customers," Wilson said.

Patrick Ponticel

Advanced EHF satellite program on schedule

Lockheed Martin will build a third spacecraft for the Advanced Extremely High Frequency (Advanced EHF) program constellation under a \$491 million contract from the **U.S. Air Force**.

Development of the first Advanced EHF satellite is progressing on schedule, the spacecraft core structure recently being delivered to Lockheed Martin's Mississippi Space & Technology Center for integration with its propulsion subsystem. The second spacecraft is close behind in production.

Advanced EHF satellites will provide global, highly secure, protected, and survivable communications for all warfighters serving under the **U.S. Department of Defense**, according to Lockheed Martin. The Advanced EHF succeeds the Milstar system, whose capabilities were cited by the U.S. Department of Defense as essential to the U.S.-led coalition's success in Operation Iraqi Freedom. Advanced EHF will provide greater total capacity and offer channel data rates higher than that of Milstar communications satellites. The higher data rates permit transmission of tactical military communications such as real-time video, battle-



Advanced EHF satellites will provide global, highly secure, protected, and survivable communications for all warfighters serving under the U.S. Department of Defense.

field maps, and targeting data.

"This production contract reflects the Air Force's strong commitment to providing the warfighter with assured communications connectivity," said Julie Sattler, Lockheed Martin's Advanced EHF Program Vice President. "The team is completely focused on achieving mission success on this vital program and we look forward to delivering this critical capability to our customer."

Lockheed Martin Space Systems is the prime contractor for the program. It is providing a militarized version of its flight-proven A2100 spacecraft bus and the mission control segment, which will

consolidate Milstar and Advanced EHF satellite control and communication resource planning into a single, modernized mission control system.

Northrop Grumman Space Technology is the payload integrator and provider of the payload processors, nulling antennas, the inter-satellite cross-links, RF antenna equipment, and phased-array antennas. Advanced EHF satellites will also feature an electric propulsion system provided by **Aerojet**. The Advanced EHF program is managed by the MILSATCOM Joint Program Office.

Patrick Ponticel

Airline selects RC communications enhancement

Rockwell Collins (RC) will supply its eFlight information-management solution to **Singapore Airlines**.

eFlight is an end-to-end solution for airlines that enables secure exchange, processing, storage, and retrieval of information among airborne and ground equipment throughout the entire operational chain. For Singapore Airlines, eFlight will replace paper-intensive manual processes with electronic

database and document management services.

"The eFlight advanced solution that we're delivering to Singapore Airlines will provide enhanced electronic information between the aircraft and ground operations, which translates into faster turn times and meaningful cost savings," said Mark Harris, Vice President, eFlight, for Rockwell Collins.

Under the terms of the agreement,

Rockwell Collins will implement Class 1 Electronic Flight Bags (EFBs) on Singapore Airlines' **Boeing 747s**, and will work with Boeing to provide applications for Class 3 EFBs on their airlines' 777 fleet. Rockwell Collins will also implement the eFlight ground system to support information delivery to Singapore Airlines' fleet and to their back office systems.

Patrick Ponticel