

Airborne platforms and the greater network

Roger Smibert, president and CEO of **HISS**, explores the development of mission systems on military aircraft, which are fast becoming mission platforms in their own right.

Military aircraft have come a long way in the past 100 years. The display instruments were analogue, sensors were compasses and basic gyros, while surveillance systems were binoculars and telescopes. When such craft were 'missionised', they were fitted with guns, bombs and crop-dusting equipment. Communication was limited to clipped verbal discussions, and perhaps light and smoke signals. A network was a few basic maps and notepads, and the effective theatre was limited to the range that information could be coordinated via these media.

More precise navigation and display systems were introduced as technology advanced. Mission systems were expanded to include long-range sensors. Meanwhile, external communications were upgraded to secure digital multiband for both voice and data. Today, even video information is fully digitised, as is all data flowing through the aircraft, whether it originates from the avionics or mission equipment. Advances in signal, graphics and image processing allow a single airborne platform to engage in complex surveillance missions, communications intelligence, signals intelligence, electronic counterwarfare, search and rescue, and tactical support.

Solving the data dilemma

With such power in the air, there is an even greater need to provide secure real-time voice and data communications to other airborne, ground and marine-based assets and command centres. Initially, serial data was transmitted via narrow-band radiofrequency links, or on microwave side-bands, with the centre frequency reserved for analogue video transmission. With the development of video digitisation and compression, video became data as well, as did digitised audio. Coded orthogonal frequency division multiplexing microwave systems significantly improved the quality and resiliency of digital video transmission, and diversity receiving systems allowed the use of multiple antennas to further stabilise signal quality.

Low-cost GPS devices and inertial measurement units, along with precision motion control, allowed for high-accuracy antenna-pointing systems, enabling increased bandwidth in air-to-ground airborne satcom solutions. A high-powered airborne workstation can process large volumes of data in real time, and appear to a remote site as nothing more than an IP node on a computer network.

Such advances now allow airborne platforms to play a more intimate role in a larger network of fixed and mobile sensing platforms that can be commanded for active mission support. Command centres with 'God's eye' operational environments can monitor what a remote aircraft can see in real time, and



The past century has seen aircraft evolve into fully fledged mission platforms.

merge that information with a range of geo-referenced, temporally and tactically coordinated data from multiple sources. The new challenges are bandwidth, compatibility, security, link reliability and network stability. Developing a precise standard across the network for critical tags as geo and temporal referencing is also an issue.

A growing platform

Sensor technologies will continue to advance in capability and precision. Display technologies will continue to develop in resolution, speed and contrast, allowing airborne operators to more effectively absorb and interact with information. Active peripherals will demand tighter integration with both airborne sensing and processing systems, and remote command centres.

Integrating such subsystems into stable, flexible and resilient architectures that collect and merge data into a secure and accessible network is the next task for aircraft integrators. To be successful, they must also be masters of the external communications and processing environments to be able to provide airborne platforms that are able to fully integrate into the greater command network.

As a result of the digitisation and power of airborne mission systems, aircraft are becoming mission platforms orientated to the site of operations. Meanwhile, mission platforms are becoming part of a network of sensing and operating nodes managed from central command centres. The design of communication infrastructure is the key to network effectiveness and stability, and the design of the architecture on an airborne platform must be compatible with that of the greater network. ■

Further information

HISS
www.hiss.ca





WORLD CLASS SURVEILLANCE SYSTEMS INTEGRATION



HISS Inc.

Corporate Office
Engineering Design, Program Management
& Sales
385 The West Mall, Suite 259
Toronto, Ontario, Canada M9C 1E7
Tel. 1-416-622-2618
Fax. 1-416-352-6013

HISS EMIRATES LLC

Operations, Service, Training & Sales
P.O. Box 31672
Abu Dhabi, United Arab Emirates
Tel. +971 (0) 2 558 9117
Fax. +971 (0) 2 558 9442

FIS Inc.

Operations, Integration, Training & Sales
8536 SW St. Helens Drive, Suite C
Wilsonville, Oregon, U.S.A. 97070
Tel. 1-503-570-4244
1-503-570-4277
Fax. 1-503-570-4288

HISS UK

Sales Office
23 Barming Road, Watlington
ME18 5BD, Kent, United Kingdom
Tel. +44 (0) 1622 814742