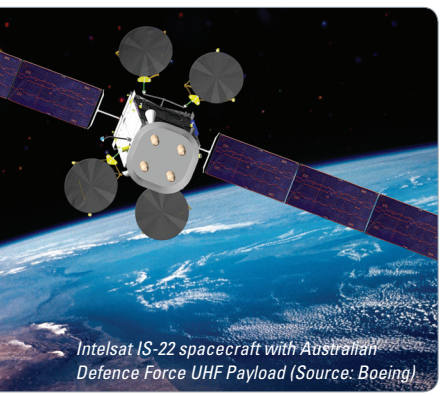
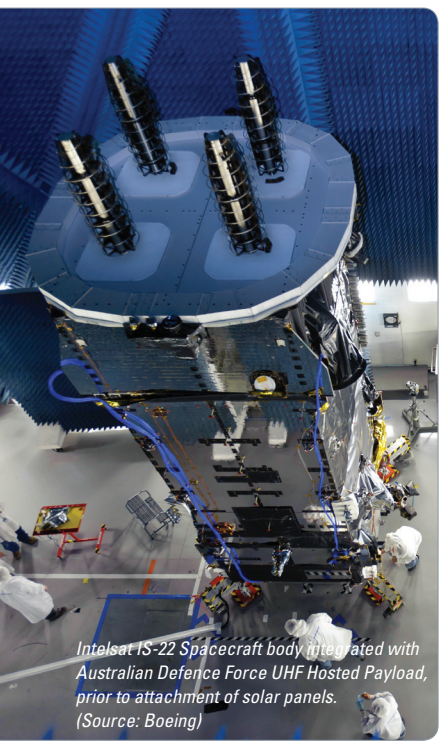
2012: A Milestone in the History of Military Satellite Communications on Commercial Satellites

Don Brown, Vice President, Hosted Payloads, Intelsat General Corporation



Intelsat IS-22 spacecraft with Australian Defence Force UHF Payload (Source: Boeing)



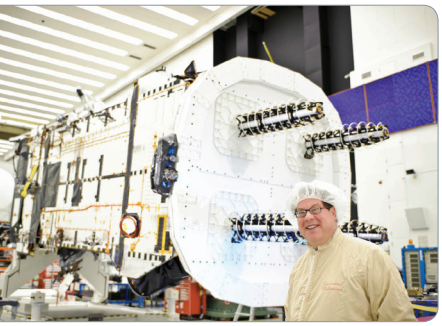
Intelsat IS-22 Spacecraft body integrated with Australian Defence Force UHF Hosted Payload, prior to attachment of solar panels. (Source: Boeing)

There is a long history of collaboration between the commercial and government communications satellite industries. From the earliest days of satellite communications, manufacturers of space systems have served both government and commercial customers. In the last 25 years, however, as the communications satellite operator community has become more and more robust, and the need for wideband satellite communications for militaries has grown exponentially, the role of commercial satellite operators in the provision of military satellite communications has changed.

Commercial satellite operators have historically provided occasional "augmentation" to military systems. Today, however, commercial satellite systems are an integral part of the communications portfolio of militaries worldwide. 2012 was a watershed year in the use of commercial satellite communications by militaries, with the successful completion of a full decade of commercial satellite communications in the service of Coalition forces in Afghanistan and Iraq, and with the launch of a significant tactical communications system for the Australian Defence Force on a commercial Intelsat satellite.

More than 36 years ago, MARISAT became the pathfinder for dedicated military capabilities supported and flown by a commercial operator. Intelsat General and its predecessor, COMSAT General, operated the MARISAT L and UHF fleet for the U.S. Navy from 1976 until the retirement of the last MARISAT in 2009. The success of MARISAT was followed by the launch of the LEASAT UHF fleet for the U.S. Navy beginning in the late 1980s. Intelsat General still operates the last of the LEASAT fleet, LEASAT 5, providing UHF communications over the Asia-Pacific region. Fully dedicated for military users, both MARISAT and LEASAT provided high quality, economical capabilities which utilized the efficiencies of a large communications satellite operator.

The real efficiencies of the commercial communications satellite operator community are in the procurement, as well as the management and operation, of communications satellite systems. Over the last decade, the vast majority of wideband communications used by Coalition forces in Afghanistan and Iraq were provided by commercial satellite operators using commercial C and Ku band transponders. At the height of Coalition operations in the Mid-East, the U.S.



Don Brown of Intelsat General with IS-22 spacecraft and Australian Defence Force UHF Hosted Payload, in Boeing High Bay, December 2011 (Source: Boeing)

Defense Information Systems Agency (DISA) estimated that over 90% of the wideband satellite communications in the theater of operations were provided by commercial operators. Today, even with the drawdown of troops in Afghanistan, and after the end of combat operations in Iraq, commercial operators are providing the majority of the wideband satellite communications used by the military.

Increasingly, broadband communications are essential to the functioning of modern militaries. The enormous space and ground infrastructure built by the commercial satellite industry offers military operators worldwide ubiquitous, cost-efficient transmission of voice, video, and data. The commercial satellite industry has space, ground, and control infrastructure to support the burgeoning broadband requirements of global military and national security organizations. Rather than design and build a satellite (or an entire architecture) for moving information, governments worldwide are leveraging the infrastructure of commercial satellite operators by pursuing a hosted payload.

Illustration: Intelsat Satellite, with UHF Hosted Payload, at Boeing factory checkout. (Source: Boeing)

The key to success in determining the role of commercial systems in military satellite communications is a realistic view of the existing commercial infrastructure and what functions the commercial satellite industry performs especially well, and asking whether it makes sense to rebuild that same infrastructure or duplicate that function for exclusive military use. Governments are discovering that, just because dedicated satellite systems have traditionally provided military satellite communications, this is not a reason to ignore the significant efficiencies offered by leveraging the mature commercial space industry. In traditional military frequency bands – UHF, EHF, and now military Ka – commercial systems are being operated or developed to bring commercial efficiencies to military satellite communication. As MARISAT and LEASAT have shown over the last 30 years, there is no reason that communications in traditional military frequency bands must be operated by the military organizations themselves.

In Europe, Astrium Services (formerly Paradigm Secure Communications) operates the Skynet military satellite system on behalf of the British Ministry of Defence via a long-term agreement. The Skynet 5 spacecraft operates in X and UHF bands, and is military hardened systems. The Skynet satellites were designed, built, and launched by Astrium.

A persuasive element for a commercial

approach is an accurate understanding, by government space and budget planners, of the true life cycle cost of dedicated space systems, including the cost of spacecraft procurement, launch costs, training of personnel, and the significant infrastructure required to fly and to operate space systems over their entire useful life. The true cost of a dedicated satellite system is not the cost of the spacecraft alone!

Commercial partnership enables governments to leverage the substantial investment made by satellite operators in each of the elements – specification, procurement, build, launch, and operations--required to efficiently manage modern space systems. In some cases, such as command-and-control, exclusive military communications networks and usage are essential. In other areas – including many forms of voice, data, and video – it may make sense to establish close partnerships with commercial industry, rather than trying to "reinvent the wheel" or rebuild a similar network that performs the same basic functions as the commercial equivalent.

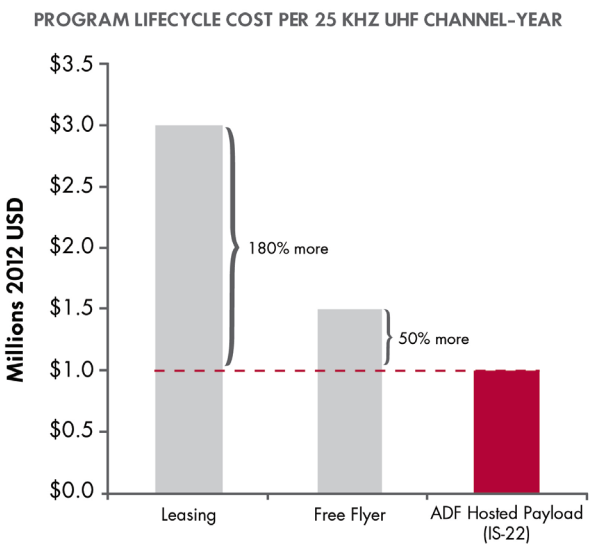
One key distinction is the amount of specialization, or uniquely government or military features, which are desired in a satellite communications system. Another is the "ownership" of a communications satellite asset. In space, "ownership" can be defined, in a practical sense, by the extent of control one has over the operations of the space asset.

Hosted payloads are an elegant solution for both cases. Hosted payloads are dedicated government systems or capabilities "hosted" on commercial satellites. Hosted payloads allow governments to specify unique requirements, and to maintain ownership and control of their space capabilities, while obtaining the efficiencies of commercial satellite procurement and operation. Commercial satellite operators such as Intelsat have significant economic leverage with the spacecraft manufacturing industry, due to the volume of spacecraft which commercial operators such as Intelsat procure.

Commercial satellite operators also have, as a core capability, efficient procurement management teams overseeing the acquisition of complex space systems. Hosted payloads allow governments to take advantage of the commercial operators' economic leverage, and procurement efficiencies, by sharing the cost of the spacecraft bus procurement, launch, and operations across both commercial and hosted government systems.

In 2012, the efficiency of the hosted payload value proposition was conclusively demonstrated by the launch and initial operation—on time and on budget—of a UHF payload for the Australian Defence Force (ADF) on an Intelsat commercial satellite. At the inception of the ADF UHF payload contract, in 2009, the Defence Minister of Australia said, *"The contract leverages an opportunity for Defence to share a commercial satellite at significant cost and schedule savings compared to a dedicated satellite.... Compared to launching its own satellite, Defence will save over $150m through this initiative and is a good example of the types of reforms required to ensure the most efficient use of Government finances."* (Press release by the Minister of Defence, Australia, May 2009)

In March 2012, less than 3 years from contract inception, the ADF UHF hosted payload was launched into orbit on the Intelsat IS-22 spacecraft. The system is in operation today, as specified, providing tactical communications to the Australian Defence Force. In an independent study of the ADF hosted payload procurement, The Avascent Group found that the Australian government enjoyed significant cost and schedule advantages by choosing a commercially hosted payload.



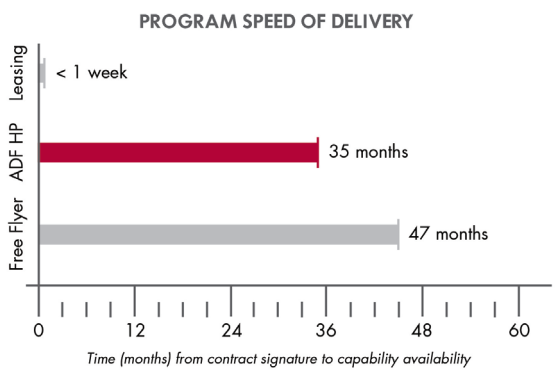
Source: The Avascent Group

As described in the accompanying graphic, the hosted payload was the least expensive way to meet ADF's UHF communications requirements. The Australian Government saved $150 million USD compared with procurement of a free-flyer UHF spacecraft and, according to The Avascent Group study, $613 million USD compared with equivalent leasing structures over the life of the system.

The Avascent Group analysis projected a direct free-flyer UHF spacecraft program cost of $465 million in US dollars, including spacecraft bus and payload ($200M), spacecraft launch ($115M on a Ariane V or Proton), ground infrastructure ($50M), program overhead and operations ($50M), and insurance ($50M). According to Avascent, the $465M reflects the fact that payloads for UHF spacecraft are less common than Ku or C band frequencies, thus increasing the expected payload costs. Dividing the direct cost of the dedicated program by the 20x25kHz UHF channel capability, and then again by 15 years of operations, and the cost derived is $1.55M/year for each 25 KHz UHF channel.

The ADF UHF Payload program cost was projected by Avascent based on the published ADF cost of the fixed price contract in 2012 USD ($317M), divided by 20 channels and then again by 15 years of operations which yields just over $1M/year for each 25 KHz channel. The $317M USD figure was converted from Australian dollars and adjusted for currency exchange rate fluctuations since the original contract was signed in 2009.

The leased cost analysis assumes a spot rate of $3.1M for a one-year lease of a 25KHz channel. That is reflective of prevailing UHF leasing rates, although changes in supply or demand might change this over time.



Source: The Avascent Group

As shown in the graphic above, The Avascent Group also found that the Australian government saved at least an additional 12 months of acquisition time by leveraging Intelsat's mature acquisition organization and choosing a commercially hosted payload. Commercial leasing, if available, provides the fastest access to capability, but does not offer the economy or assured access provided by a government owned hosted payload.

Beyond the economic and schedule advantages of hosted payloads, there are architectural advantages to hosting government and military capabilities on commercial systems. The large, diverse population of commercial satellites offers a means to disperse capabilities across the globe to provide resilient communications capabilities, offering an architecture which is based on many spacecraft, as opposed to the traditional dedicated military satellite system consisting of a handful of high-value assets.

As the demand for communications in service of governments increases, the role for commercial operators will become more essential and complex. Commercial operators will continue to provide commercial C, Ku, Ka, L and X band services to governments worldwide. But the success of hosted payloads, demonstrated by the Australian Defence Force in 2012, will lead the commercial satellite industry to build more specialized systems for governments and militaries globally. Many governments are faced with the combined threat of budget constraints and increasing requirements for communications. The commercial satellite industry has a unique role to play in providing governments new solutions to this dilemma, and hosted payloads will be a key element of the commercial satellite industry's increasing role in military satellite communications.

Don Brown is the Vice President of Hosted Payloads for Intelsat General Corporation, a subsidiary of Intelsat, S.A., the world leader in commercial satellite infrastructure and solutions. Brown leads a team which integrates dedicated government communications, navigation, sensor and scientific systems aboard Intelsat spacecraft. Brown has more than 20 years' experience in satellite communications. Prior to the merger of Intelsat and PanAmSat in 2006, Brown was Vice President of DoD Systems at PanAmSat's G2 Satellite Solutions. Brown has held senior positions with American Mobile Satellite Corp., the Federal Aviation Administration, USA Today Sky Radio, and in the Satellite Systems Division of Federal Express Corporation. Brown has served on the Satellite Task Force of the National Security Telecommunications Advisory Committee to the President of the United States and has served as Co-Chair of the Government Services Working Group of the Satellite Industry Association. He is a graduate of Princeton University.