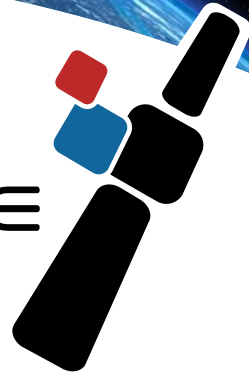




**HOSTED  
PAYLOAD  
ALLIANCE**



# Hosted Payloads: What, Why and How

A guide to commercially hosted government payloads from the Hosted Payload Alliance

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The Hosted Payload Alliance (HPA) is a satellite industry alliance formed in 2011 to increase awareness of the benefits of hosted government payloads on commercial satellites.

[www.hostedpayloadalliance.org](http://www.hostedpayloadalliance.org)



# How to Choose Hosted Payloads

## Missions Suitable for Hosted Payloads

The commercial satellite industry has gained expertise not only from the nearly 30 government payloads undertaken since 1970, but also from a wealth of commercial payloads.

**Communications** to augment existing networks with additional bandwidth, alternate frequencies or geographical diversity

**Earth observation** for scientific applications ranging from hyper-spectral sounding to ozone mapping and ocean color analysis

**Intelligence surveillance reconnaissance** to support intelligence planning, execution and assessment

**Navigation** to provide agencies such as the U.S. Federal Aviation Administration, with the ability to improve the accuracy of GPS-based navigation

**Space Situational Awareness (SSA)** such as collision avoidance and debris monitoring

**Technology test bed demonstrations** such as IRIS (Internet Routing in Space) and CHIRP (commercially hosted infrared payload) for the U.S. Department of Defense

**Weather sensing** for enhanced disaster prediction, observation and response capabilities

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## Hosted Payload Case Studies

Each mission brings new challenges, successes and opportunities to learn. This section provides a sample of the many commercially hosted government payloads. Visit the HPA website at [www.hostedpayloadalliance.org](http://www.hostedpayloadalliance.org) to learn more about each one.

### MISSION TYPE:

#### UHF payload

UHF satellite communications are critical to the Australian Defence Force (ADF) and are widely deployed by the ADF because they enable the use of small, mobile terminals favored by ground, sea and air forces for tactical communications. Unlike many other frequency bands, UHF works well in urban, jungle and mountainous terrain and is indifferent to weather conditions. The Commonwealth of Australia (CoA) executed the most cost-efficient and rapid deployment of UHF capability via a hosted payload onboard the Intelsat 22 (IS-22) spacecraft, enabling the Commonwealth to be a key coalition partner within the Indian Ocean region.

**Sponsor:** Australian Defence Force | **Operator:** Intelsat | **Manufacturer:** Boeing | **Spacecraft:** Intelsat 22 (IS-22)

### MISSION TYPE:

#### Wide-area augmentation system (WAAS)

The Wide Area Augmentation System (WAAS) uses a system of dozens of ground stations in various contiguous United States locations to provide necessary augmentations to the standard GPS positioning navigation signal. WAAS provides capability for the development of more standardized precision approaches, missed approaches and departure guidance for approximately 4,100 runways and hundreds of heliport/helipads in the National Air System (NAS). WAAS also provides capability for increased accuracy in position reporting, allowing for more uniform and high-quality worldwide Air Traffic Management (ATM).

**Sponsor:** U.S. Federal Aviation Administration | **Operator:** PanAmSat, Intelsat, Lockheed Martin | **Manufacturer:** Orbital Sciences | **Spacecraft:** Galaxy 15

## Things to Consider when Planning a Hosted Payload

### Schedule

- ▲ Hosted payloads offer a shorter planning timeframe.
- ▲ Dozens of commercial satellites are launched each year; is there a launch planned to coincide with your payload?
- ▲ Payload security needs to be considered as the payload must be delivered to the satellite manufacturer for integration, test and pre-launch preparation.
- ▲ If the payload is sensitive, additional security may be considered at the launch base during pre-launch preparations.
- ▲ If the hosted payload downlink to ground facilities must be protected, the hosted payload must be designed to address separation of data from the host, and communications security of both the command and mission data.
- ▲ Frequency band of the payload and the host satellite must be compatible.
- ▲ How the hosted payload is isolated from the prime spacecraft will be an important design consideration. If the hosted payload fails, it must not precipitate failures onto the main mission. The design should provide sufficient electrical and logical isolation and do no harm in any failure mode.

### Size and Compatibility

- ▲ Size and weight of the payload will affect the ability of a satellite to host. Generally, smaller payloads are easier to accommodate, but an analysis will be conducted to determine compatibility between a payload and host satellite.
- ▲ Higher percentages of resources and odd volume requirements often require co-design.
- ▲ The hosted payload must be accommodated within the constraints of the host satellite. Considerations include available nadir deck space, internal accommodation of payload boxes or the additional impact on satellite attitude control caused by moving apertures or systems.

#### MISSION TYPE:

##### Wide field-of-view infrared sensor

An example of an infrared sensing hosted payload is the CHIRP (Commercially Hosted Infrared Payload) Flight Demonstration Program, which tested a new type of infrared sensor from geosynchronous orbit. This sensor was integrated onto a commercial satellite and the data it received was transmitted to a ground station for analysis.

**Sponsor:** USAF SMC | **Operator:** SES |  
**Manufacturer:** Orbital Sciences (satellite), SAIC (sensor) | **Spacecraft:** SES-2

#### MISSION TYPE:

##### Internet router

The Internet Routing in Space (IRIS) hosted payload allowed the U.S. Strategic Command (STRATCOM) to integrate terrestrial and space communications nodes through a common network layer protocol, enabling U.S. and allied forces to communicate seamlessly and with increased efficiency and flexibility.

**Sponsor:** STRATCOM | **Operator:** Intelsat |  
**Manufacturer:** SSL | **Spacecraft:** Intelsat 14

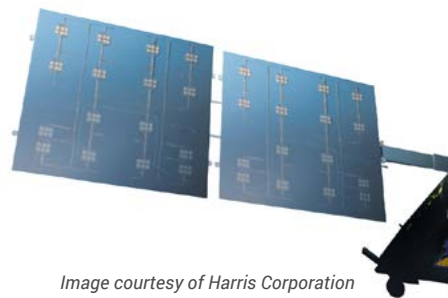
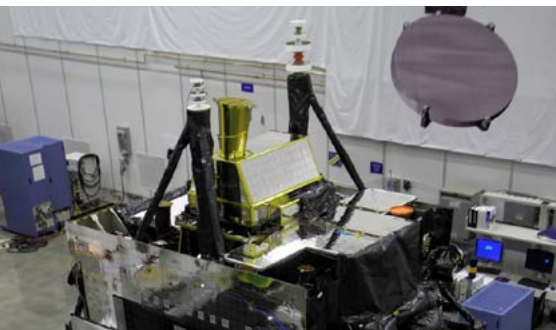


Image courtesy of Harris Corporation

## Ownership

- ▶ Hosted payloads can use existing satellite operations facilities with shared command and control of the hosted payload through the host satellite, or a completely dedicated and separate system operated by the hosted payload owner.

## Interface

- ▶ Generally, simpler is better. Anticipate interfaces to the power and command and data handling systems.
- ▶ Mechanical interfaces must consider the effect of any motion on the spacecraft.
- ▶ Thermal isolation between the hosted payload and the spacecraft can simplify the hosting process.
- ▶ Electromagnetic compatibility should be evaluated early.
- ▶ Electrical: prime power, command and telemetry, mission communications.

## Program Structure

- ▶ The satellite operator generally serves as the prime contractor for the manufacture and integration of the hosted payload.
- ▶ The chosen spacecraft manufacturer is generally responsible for the overall schedule.

## Financial

- ▶ Hosted Payloads leverage existing satellite infrastructure and operations which means not incurring costs such as launch, insurance and operation of the satellite, resulting in significant cost and time savings.
- ▶ Hosted payload pricing includes many factors such as the hosted payload itself, integration costs onto the host spacecraft, shared use of the common systems, insurance, on-ground operations and custom options.

### MISSION TYPE:

#### **Automatic Dependent Surveillance – Broadcast (ADS-B) Communications Signal Receiver**

An example of a navigation hosted payload is the Automatic Dependent Surveillance – Broadcast (ADS-B) Communications Signal Receiver, which allows Nav Canada to track aircraft positions over North Atlantic airspace in real time. The Low Earth Orbit (LEO) satellite is uniquely suited to ensure continuous availability with low latency and update rates suitable for air traffic control.

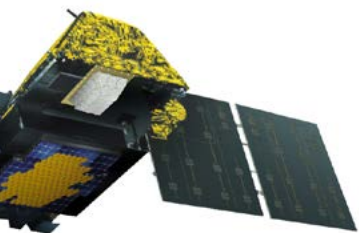
**Sponsor:** Aireon LLC | **Operator:** Iridium |  
**Manufacturer:** Harris Corporation | **Spacecraft:** Iridium NEXT constellation

### MISSION TYPE:

#### **X-band payload**

Anik G1, built by SSL for Telesat Canada, is a Fixed Satellite Services (FSS) multi-mission C-band and Ku-band GEO spacecraft designed to support a variety of applications, including Direct-to-Home television broadcasting in Canada and broadband, voice, data and video services in South America. Anik G1 carries an X-band government communications payload with coverage over the Americas and the Pacific. This is the first commercial satellite to ever have substantial government X-band coverage over the Pacific, making it ideal for naval platforms. The payload, which is compatible with NATO standards, is leased to Astrium Services and supports various government applications such as maritime operations, integrated transit and deployment operations.

**Sponsor:** Telesat Canada | **Operator:** Telesat |  
**Manufacturer:** SSL | **Spacecraft:** Anik G1



# What is a Hosted Payload?

A hosted payload is a portion of a satellite, such as a sensor, instrument or a set of communications transponders that are owned by an organization or agency other than the primary satellite operator. The hosted portion of the satellite operates independently of the main spacecraft, but typically shares the satellite's resources such as power supply and transponders and in some cases, ground systems. The concept of a hosted payload was developed in order to enable government organizations to make use of commercial satellite platforms to reduce costs and create a more distributed architecture for space assets.

## Why Choose Hosted Payloads?

Government agencies can leverage significant commercial investments in space infrastructure and procure more affordable, resilient and timely space capabilities. Choosing to add a hosted payload to a commercial satellite has many benefits for the payload owner:

**Shorter time and increased access to space.** Because the development of an entire satellite system is not required, and due to much shorter commercial timelines, a hosted payload on a commercial satellite can reach space in a fraction of the time (typically 30 to 36 months) than it would take to develop a free-flyer program. Roughly 20 commercial satellites are launched each year, and each one presents an opportunity to add hosted capability.

**Lower cost.** Placing a hosted payload on a commercial satellite costs a fraction of what it costs to build, launch and operate an entire satellite. Cost reductions can result from shared integration, launch and operations with the host satellite.

**Risk reduction.** Hosted payloads offer a powerful method to reduce or mitigate risks associated with program funding, launch delays and operational issues.

**A more resilient architecture.** Hosted payloads enable a more resilient space architecture by distributing assets over multiple platforms and locations. Rather than creating a single exquisite satellite with multiple capabilities that could be a target for adversaries, spreading capabilities over multiple locations provides a more robust space architecture.

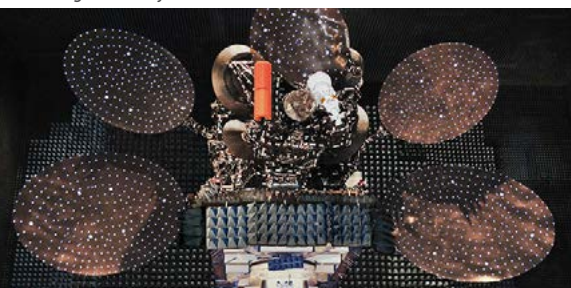
**Operational options.** Hosted payloads have multiple options to use existing satellite operations facilities with shared command and control of the hosted payload through the host satellite, or a completely dedicated and separate system operated by the hosted payload owner.

**Focus on your strengths.** A payload-focused acquisition strategy can result in more consistent payload production rates, thereby stabilizing lower-tier suppliers and focusing development resources on maintaining intellectual capital needed for unique government capabilities.

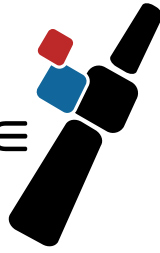
Image courtesy of Intelsat



Image courtesy of SSL



# HOSTED PAYLOAD ALLIANCE



The Hosted Payload Alliance (HPA) is a satellite industry alliance formed in 2011 to increase awareness of the benefits of hosted government payloads on commercial satellites. Composed of satellite operators, satellite manufacturers and system integrators, HPA is a broad-based organization which acts as a source of subject-matter expertise and serves as a bridge between government and private industry to foster open communication between potential users and providers of hosted payload capabilities.

## HPA Executive Members



## HPA Associate Members

Arianespace

Eutelsat America Corp.

Harris Corporation

Intelsat General Corporation

L-3 Cincinnati Electronics