

# HayTag™ by Haystack

## DASH7 IoT Networking Anywhere, on Anything



### Basic Features:

Integrated OpenTag/DASH7 RTOS

Bounding Dimensions: 48 x 38 x 8 mm

Solar charging system needs just 2 hours of sunlight to run for up to 10 days.

DASH7 communication range up to:  
1km in USA, 2km EMEA & China

DASH7 adaptive data rate: 7-106 kbps

### DEPLOY ANYWHERE

The HayTag uses DASH7™ wireless connectivity, so you can use it virtually anywhere in the world without violating spectrum regulations.

### DEPLOY ON ANYTHING

At only 48x38x8mm and weighing less than most coins, even items as small as your keys can be used with HayTag.

### NEVER REPLACE BATTERIES

HayTag uses a cutting-edge solar charging system that reaches full capacity with just 2 hours of sunlight. At full charge, it can run up to 10 days in total darkness, or indefinitely in typical indoor lighting.

### BUILT FOR CUSTOMIZATION

Inside each HayTag is a sophisticated microcomputing platform that runs the OpenTag DASH7 RTOS. Deliver applets, content, firmware revisions, or even Arduino-style sketches to HayTag over-the-air.

### Complete DASH7 Featureset:

- All channels, all data rates, all encodings supported
- Includes high-accuracy RTC for time-stamping and TDMA networking
- Implements all native DASH7 protocols: Advertising, Datastream, Query, and ALP (NDEF)
- Support for AES cryptography of data transferred over-the-air and data stored on Haytag

### Enhanced Haystack Featureset:

- High performance wireless error correction technology based on NASA's Voyager technology
- Indoor/Outdoor Real Time Location System features (RTLS)
- Support for UDP/IPV6 IoT applications
- Over-the-air upload of applets, content, configuration changes, firmware revisions
- **Optional Modules:**
  - Wiring module supports applets written as Arduino-style sketches
  - Public-key cryptography module, using RSA or ECC
  - LZ0 module for compressing log files and large over-the-air datastreams

### Tech Specs:

- **Power usage:** 30 - 100  $\mu$ W depending on network load
- **Multichannel DASH7 Wireless interface on 433 MHz ISM band**  
Link budget: 112 dB (Americas, Korea, Japan), 122 dB (EMEA, China), 122 dB (Australia, NZ)
- **CPU performance: automatic speed throttling**  
5 DMIPS slow mode, 16 DMIPS normal mode, 30 DMIPS burst mode
- **Built-in sensors: temperature, ambient light**
- **Additional interfaces available to OEM designers:**  
SWD, 1x I2C/UART/SPI, 1x Analog input, 4x GPIO

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HayTag OEM module, front and back

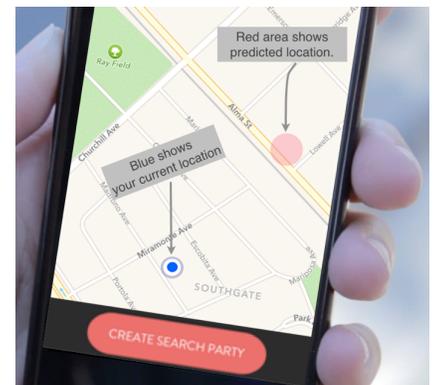
## Indoor/Outdoor Real-Time Location (RTLS)

Haystack's technology provides users with precise location coordinates of IoT devices located indoors or in challenging outdoor environments. While Haystack technology can be easily paired with GPS for standard outdoor location duties, Haystack also offers two unique, non-GPS location modes when GPS is not available or practical: (1) Real-Time Location System (RTLS) mode using rapidly-deployed triangulation infrastructure, (2) Wide Area Guided Location (WAGL) mode requiring only a single tag and single mobile reader (see iOS Wireless Gateway).

For RTLS mode, Haystack deploys low cost triangulation tags as location infrastructure. Location is geometrically derived between an asset tag and the triangulation tags and once resolved, the tag reports its position to the long range network. This approach minimizes the amount of connected networking infrastructure, labor, and maintenance required in an RTLS deployment as virtually all location infrastructure is deployed as battery powered tags at fixed locations, with no requirement for wiring or internet backhaul.

For WAGL mode, as the mobile reader gets closer to the tag, the accuracy of the location continuously improves using Haystack's geometric trilateration. The software graphical user interface shows the location as a shaded circle that becomes smaller as the predicted accuracy of the location increases. WAGL is especially good for allowing a user to find some asset that is not moving, or does not move quickly, and it can work without the need for any infrastructure at all. WAGL is an excellent complement to GPS-based IoT devices that may be located indoors or in other environments where GPS may be unreliable.

- ▶ An attendant must find a car in a parking lot
- ▶ A mechanic must find parts and equipment in a warehouse
- ▶ A rancher must find a specific cow somewhere on his ranch



Above:  
Haystack iOS location software.

Below:  
Haystack iOS Wireless Gateway