



AMSAT-UK

Spectrum Forum Meeting – Saturday 29th October 2016

Spectrum Report – Amateur-Satellite Service

About AMSAT-UK

AMSAT-UK represents the interests of amateur satellite operators in the UK and is at the forefront of amateur satellite construction.

The thrill of communicating via satellites orbiting in space has led amateurs to develop stations for the VHF, UHF and Microwave bands when they may not have otherwise done so. Having established a satellite capable station many have gone on to discover the fascination of terrestrial DX working, so helping generate more activity in these allocations which are sometimes overlooked by amateurs who start out on the HF bands.

The FUNcube project

FUNcube-1 continues to operate nominally with both education outreach and amateur transponder modes in use.

FUNcube-2, the payload on UKube-1 is also operating with both transponder and telemetry downlinks. The UK Space Agency declared the main mission of this spacecraft to be ended about a year ago.

FUNcube-3, the payload on QB50p1, is about to be declared operational in transponder mode. This is likely to operate for approximately 30 minutes in every orbit due to power budget limitations.

The AMSAT-UK payload on the ESEO microsat project has reached Engineering Model stage and this has been delivered to the prime contractor for test and verification. It is hoped that the project may reach orbit in late 2017.

The AMSAT-UK team is also working, in collaboration with AMSAT-NL, on a number of other CubeSat transponder projects and details of these will be made available in the forthcoming weeks.

Lunar Communications Pathfinder Spacecraft

AMSAT-UK is proposing a redundant communications facility for telemetry and also a transponder using a 144 MHz downlink (or possibly 435 MHz) with a 1260 MHz uplink for experimental use by radio amateurs.

For Educational Outreach we are additionally proposing WJST-X beacon to provide low data rate telemetry directly to schools. This should require only quite simple ground station antennas operating with an SDR Dongle.

We are also examining the possibilities of using 2.4 GHz and/or 10 GHz for these functions.

International Space Station

AMSAT-UK (together with BATC) members led on the Amateur Radio on the ISS (ARISS) Schools contacts programme during the Principia mission to the ISS. Ten high profile school contacts took place coordinated with the UK Space Agency as part of the overall Principia Educational Outreach programme. These contacts resulted in considerable publicity in the press and TV.

Of particular note was the use on the 2395 MHz HamTV transmitter to bring live Digital ATV of Tim Peake direct into schools.

To receive the HamTV signals at the schools, a specially configured Land Rover was used. This vehicle provided a self-contained reception facility and included its own antenna mast, satellite dish and receiving equipment as well as a 5.6 GHz network link to stream the received video from the Land Rover to the contact site.

Additionally the management and staff of Goonhilly Earth Station (GES Ltd), the historical satellite ground station based at Goonhilly in Cornwall, along with the Satellite Applications – Catapult organisation, provided access to one of the 3.8m low earth orbiting satellite tracking dish to the ARISS-UK Team. This dish was equipped with the additional hardware to receive and decode the HamTV signals and networking equipment to stream the video signals across a secure internet connection to the school so that the video could be displayed for the contact

For the Principia mission school contacts, Martin Lynch & Sons Ltd, one of the main Amateur Radio distributors in the UK, loaned the ARISS-UK team a JVC Kenwood TS-2000X transceiver.

Microwave Transponder Satellites

There is optimism that there may be several satellites carrying amateur radio microwave transponders launched into high (> 25,000 km) Earth orbits and Lunar orbits in the next few years.

Two amateur radio Phase 4A microwave transponders will be flown on a Qatar geostationary satellite [Es'hail-2](#) which is expected to launch mid-2017; this will be the first time that amateur transponders have been put into geostationary orbit. The satellite will be positioned at 25.5 degrees East and will provide coverage of one third of the globe from Brazil to Vietnam.

A 250 kHz wide linear transponder will cater for SSB and CW communications

- 2400.050-2400.300 MHz Uplink
- 10489.550-10489.800 MHz Downlink

An 8 MHz wideband digital transponder will cater for Digital ATV and similar modulations schemes

- 2401.5-2409.5 MHz Uplink
- 10491.0-10499.0 MHz Downlink

AMSAT-NA is developing an amateur radio [Phase 4B payload](#) for a geosynchronous satellite. The potential footprint could extend over the US from the Mid-Pacific to Africa with coverage at times of the British Isles and parts of Western Europe.

The proposed frequency plan for the spacecraft is:

- Uplinks: 5655-5665 MHz
- Downlinks: 10455-10465 MHz

In 2015 the space frame for the [Phase 3E satellite](#) was transferred from Germany to Virginia Tech in the USA for further construction; testing and preparation for eventual launch to High Earth Orbit (HEO). It is expected it may carry a 5 to 10 GHz transponder similar to that to be flown on the P4B geosynchronous satellite. Development is waiting for a suitable launch opportunity to be identified.

AMSAT-NA plan to fly 5 GHz to 10 GHz transponders on the [Heimdallr satellite](#) which will go into orbit around the Moon.

Spectrum

The Amateur-Satellite Service allocation at 2400-2450 MHz has become unusable for satellite downlinks in urban areas due to the high level of interference from WiFi and other licence exempt devices operating in the band. The high noise floor means the ISS Digital ATV downlink has to operate outside the ITU satellite allocation on 2395 MHz in accordance with Article 4.4 of the [ITU Radio Regulations](#).

In some countries administrations have sought to protect Licence Exempt devices operating in the band by imposing severe power restriction on amateur operations. Replacement spectrum for 2400-2450 MHz is urgently required.

It remains an aspiration that the Amateur-Satellite Service allocations at UHF and Microwaves should align with the weak-signal sections of the bands. In particular it is desirable that the European Common Frequency Allocation Table Footnote ECA17 sub-bands, **3400-3410 MHz**, **5660-5670 MHz** and **10360-10370 MHz** along with **50-51 MHz** and a new 10 MHz wide L-band segment become available to the Amateur-Satellite Service for both Earth-to-Space and Space-to-Earth communications.

Annual Colloquium

AMSAT-UK's 2016 Colloquium was held at the Holiday Inn, Guildford. The British Amateur Television Club (BATC) provided a webcast live to a world-wide audience. Video of the presentations are available on the [AMSAT-UK YouTube Channel](#).

Other Activities

On October 14, 2016 the AMSAT-UK [FUNcube Yahoo Group](#) had 3832 members, the [Twitter Account](#) 5875 followers and the [AMSAT-UK Facebook Page](#) having 2669 likes.

The [FUNcube Satellite Yahoo Group](#) had 3848 members while the [FUNcube SDR Pro-Plus Group](#) had 2125 members.

AMSAT-UK hosts the [Amateur Satellite Frequency Coordination Status](#) pages for the IARU. These pages give details of the many Amateur Radio satellite projects under development.

AMSAT-UK October 2016
<http://www.amsat-uk.org/>

