AMSAT-UK

Spectrum Forum Meeting – Saturday 3rd November 2012

Spectrum Report – Amateur-Satellite Service

Spacecraft

The past year has seen AMSAT-UK working on two satellite projects FUNcube-1 and FUNcube-2 on UKube-1.

FUNcube-1 Satellite

The **AMSAT-UK FUNcube-1 satellite** has the primary goal of enthusing and educating young people about radio, space, physics and electronics. It is designed to support the educational Science, Technology, Engineering and Maths (STEM) initiatives and provide an additional resource for the GB4FUN Mobile Communications Centre. FUNcube will carry a 1200 bps BPSK telemetry beacon and a 435/145 MHz linear transponder for SSB/CW communications.

Much work has been undertaken by a number of volunteer members of AMSAT-UK to develop the hardware and software for this project over the past three years.

The satellite is expected to be launched in April 2013 and will be õoperatedò by AMSAT-NL (see below regarding the UK Outer Space Act).

FUNcube-2 on the UKube-1 Satellite

AMSAT-UK was approached by the UK Space Agency to provide a set of FUNcube boards for use in their first satellite **UKube-1**. A set of boards that will provide a 1200 bps BPSK telemetry beacon and a 435/145 MHz linear transponder for SSB/CW communications has been supplied. The satellite is expected to be launched in March 2013.

The UK Outer Space Act

The UK Outer Space Act 1986 was introduced with large commercial and government satellites in mind. This legislation imposes unrealistic requirements on small satellite projects, additional costs can be £50-60,000 for each year of a satelliteõs life. If a UK group or individual were to procure a satellite launch anywhere in the world without fully complying with the act they would be subject to prosecution.

AMSAT-UK has, together with other organisations, been in contact with the UK Government for over 2 years now in an effort to resolve this issue.

In May 2012 the UK Space Agency **issued a consultation** seeking views of stakeholders on proposed changes to the Outer Space Act 1986. The key aspects of the consultation are the proposals to waive the capped liability and insurance requirement for in-orbit operation of any satellite

that meets the criteria of a CubeSat and to remove the requirement for unlimited indemnity from their operators. The proposed changes have been welcomed by AMSAT-UK and if adopted should enable UK registered CubeSat projects to start.

Other Projects

CANcube Satellite. During the late summer, ESA put out a call for proposals for CubeSat projects for launch on the VERTA programme of test flights for the VEGA launcher. AMSAT-UK in conjunction with the Cranfield University in Bedfordshire submitted a response for a dual mission spacecraft. Presently ESA is waiting for the outcome of the Ministerial Meeting scheduled for November 2012 before going forward on any projects.

FUNcube Dongle SDR. The **FUNcube Dongle** (FCD) SDR is the "ground segment", or a radio receiver designed to allow anyone to try their hand at reception of satellites like FUNcube anywhere on Earth as part of a global educational collaboration project collecting information from space. With almost continuous coverage of 64 MHz through to 1700 MHz the FCD rapidly found many alternative applications even before the launch of the spacecraft themselves.

Earlier this year the Scottish company which made the tuner chip went into administration and supplies dried up. A new design, the **FUNcube Dongle Pro Plus**, has now been developed by Howard Long G6LVB. This new version features coverage of the LF/MF/HF bands in addition to VHF/UHF and became available at the end of October. Initial reports of its performance have been very satisfactory.

Spectrum Availability

In October 2012 a CubeSat **FITSAT-1** with a downlink on 5840.0 MHz was deployed from the International Space Station. This is the second CubeSat to make use of the 5830-5850 MHz Amateur-satellite Space-to-Earth allocation.

Unfortunately this allocation is remote from the terrestrial weak signal segment at 5760 MHz and much of the existing equipment for this band is unable to receive 5840.0MHz.

In the early 1970ûs 5650-5670 MHz was allocated by ITU for Earth-to-Space links only. AMSAT-UK would like to see this allocation amended to permit Space-to-Earth communications.

A similar situation will occur with the satellite **CAS-2A2** which plans a downlink in the Amateur-satellite 10450 MHz allocation. This is remote from the existing weak-signal segment at 10368 MHz.

It is 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 EU17 sub-bands 3400-3410 MHz, 5660-5670 MHz and 10360-10370 MHz along with 50-51 MHz become available to the Amateur-satellite Service for both Earth-to-Space and Space-to-Earth communications.

Interference

The Amateur-satellite Service, like the Amateur Service, suffers interference from both unlicensed users and licensed users unaware of the band plan.

Of particular concern has been the proliferation of Italian FM and D-STAR repeater outputs in the 145.8-146.0 MHz satellite segment. This issue was mentioned in AMSAT-UKûs 2011 report and it still continues. The **IR0CK repeater** on 145.850 MHz is just one example, it is blocking the uplinks of two

amateur radio satellites.

International Space Station

In Italy work has been progressing on the **HamTV project** that aims to have a 2400 MHz Digital Amateur TV (DATV) system along with a 2400 MHz 100 milliwatt CW beacon.

The DATV system will allow automated transmissions more or less permanently. The content of these DATV transmissions will be uploaded from the ground through existing channels and transferred to the Video Beacon on request. This function will also be used for educational purposes. Moreover, astronauts could record footage and load it into the Video Beacon for automated transmission.

AMSAT-UK is supporting this development and expects to be directly involved with the development of the required ground segment.

2012 Games

AMSAT-UK was glad to see that Ofcom were able to avoid the use of the satellite uplink frequencies in 435 MHz during the Olympic and Paralympic games and we wish to express our thanks to the RSGB team involved in negotiations with Ofcom.

Annual Colloquium

AMSAT-UKôs 2012 Colloquium was again held at the Holiday Inn, Guildford. It attracted a high proportion of overseas visitors from North America and across Europe.

During the two day event, presentations were made on a variety of amateur satellite related projects and technical discussions between amateur satellite builders and users continued late into the evening.

The Radio Society of Great Britain (RSGB) supported the event by providing the new GB4FUN Radio Communications Demonstration Centre that proved popular with attendees. The RSGB book stall was run by the Region 9 Manager Dr. Alison Johnston G8ROG.

Once again thanks to the British Amateur Television Club (BATC) the event was webcast live to a world-wide audience and using the BATC chat facility viewers were able to submit questions to the presenters.

Video of the presentations are available via the **AMSAT-UK website**.

UK Space Conference

AMSAT-UK attended the UK Space Conference in Coventry that was opened by the Minister for Universities and Science, David Willetts MP. A presentation about FUNcube was given in the **CubeSat stream**.

Other Activities

AMSAT-UK had a stand at the 3 day **Association for Science Education Conference** in Liverpool, January 5-8, to show the potential of the FUNcube satellite as a teaching tool.

The **AMSAT-UK FUNcube Yahoo Group** has attracted over 3700 members.

AMSAT-UK hosts the **Amateur Satellite Frequency Coordination Status** pages for the IARU. It gives details of the many Amateur Radio satellite projects under development.

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http://www.amsat-uk.org/