

UK Microwave Group

Report to RSGB Spectrum Forum



Introduction to UK Microwave Group

The UK Microwave Group (UKuG) represents the interests of amateur radio enthusiasts who operate on frequencies above 1.0GHz. The UKuG is open to membership from both the UK and overseas microwavers. The UKuG is now 20 years old, having been formed at the Martlesham Microwave Roundtable in November 1999 and it is affiliated to the RSGB. Current membership stands at over 500 members with the majority being from the UK. There are members from most European countries as well as the Americas, Japan, Australia and New Zealand. An elected committee looks after the interests of the membership.

Events supported during 2019

Each year a series of specialist amateur radio microwave meetings; Microwave Round Tables are organised by local radio clubs and societies and supported by the UKuG. The oldest established event (Martlesham) held at the BT research laboratory has now been run annually for 40 years. In 2019 two new round tables were organised (Cardiff and West Midlands) bringing the total to seven; covering England, Wales and Scotland. These events are well supported by the membership and usually included a series of technical presentations, access to professional test equipment and members selling or exchanging useful microwave components.

Club and outreach

The UK Microwave group has overlapping interests with BATC and AMSAT-UK, where those Groups use the amateur microwave allocations. For example, with the launch of the commercial Es'Hail 2 (OSCAR 100) geostationary satellite in late 2018 and the subsequent release of the 2.4GHz uplink to 10GHz downlink transponders for amateur narrow band and for wide band use, has seen a rapid increase in amateurs becoming operational on these microwave bands. Additionally UKuG/BATC members have continued to experiment with DATV on the mm wave bands increasing the distance on 76GHz over which Full HD pictures have been exchanged to 25km and to over 35km with reduced bandwidth digital TV at power levels of a few mW.

The group has members on the Spectrum Forum (chaired by one of our members), Propagation Studies Committee, Contest Committee, EMC Committee, ETC Committee, Examination Standards and Audit Committees, IARU Committee, and one of our members chairs the Technical Forum.

Members have again visited a number of radio clubs and societies to present talks on microwaves including four talks on the latest developments in amateur mm wave techniques. The Group membership also provided several speakers at the RSGB convention again covering microwave and mm wave communications.

This year saw the 50th anniversary of the Apollo 11 moon landing. To celebrate the part that Goonhilly played in 1969 in relaying pictures from the Indian Ocean geostationary satellite to the UK and the rest of Europe of the first moon walk, a large public event was hosted by Goonhilly Earth Station. Members of the UKuG put on a public demonstration of Earth-Moon-Earth (EME) communication using the 5.7GHz band and the 32m diameter dish at Goonhilly to a public audience of several thousand people.

Technical Support and loan equipment

To support amateur microwave operation, which is sometimes seen as a difficult and expensive part of the hobby, the Group has several 'loan' systems available for members to use. These are for 5.7, 10(2), 24 and 76GHz. These loaner systems are very popular, always out on loan and have, in some cases, a waiting list. The 76GHz system has been used for the world records using DATV on that band.

The UKuG also supports the amateur microwave band beacon network by sponsoring the build of new beacons and upgrades with financial help to purchase equipment, help with beacon applications and advice on system deployment. Since the last report several new beacons have become operational but at the same time some beacons have had to be taken off air. The loss of beacons (and beacon sites) is usually due to amateur usage of sites no longer being seen as 'compatible' with the commercial interests of the site owners. The presence of a UK and European beacon network provides microwave enthusiasts with consistent, known, signals to allow receive equipment optimisation. Many of the UK's microwave beacons now transmit digital modes, enabling them to be received at long distances under extreme weak signal conditions.

Our free-to-members (including free postage) chip bank has thousands of surface mount components for members to use in their construction. The chip bank expands by thousands of parts each year, mainly due to member donation. In the period January to October 2019 a total of 82 requests for components were serviced. This is more than double the number in the whole of 2018. The increase was due mainly to the activity created by the launch of QO-100 and the development of an up converter by G4EML. The chip bank was taken to two of the roundtables this year where more items were distributed and donations of semiconductors and other items, including mixers and amplifiers, were received.

The UKuG has established regional representatives in G, GW, GM and GI, to assist local members in each of those regions with matters pertaining to amateur microwaves. In addition, a list of members willing to provide assistance to others, (particularly newcomers), for example in providing access to test equipment, is published in Scatterpoint, the UKuG's regular publication.

Publications

UKuG members write several of the regular columns in RadCom, write for Practical Wireless and regularly contribute technical articles and the European activity reports for DUBUS magazine.

Scatterpoint

The e-newsletter of the Group, under the Editorship of Roger, G8CUB, is published at least ten times a year and continues to attract top-line technical articles as well as being a comprehensive repository of reports of activity.

Copies of the monthly magazine are available to members via 'Groups.io' links. Older issues are available from the UKuG web site (issues for 2019 will become available at the end of December 2019). An annual index is produced for members.

Scatterpoint carries a regular activity report column, compiled by John, G4BAO, which has detailed reports from members of their activities on the microwave and millimetre bands, illustrating the breadth of propagation modes and modes of operation in regular use. These reports cover Wideband, Narrowband and Machine Generated Modes (MGM) activity used for both local and DX operations as well as reports of amateur television on the microwave and mm wave bands and microwave Earth-Moon-Earth communication.

Group web presence

The Group has established a Wiki, which continues to be populated with amateur microwave related material. The UKuG has an increasing number of microwave related videos on its YouTube video channel. The Twitter feed @UKGHZ attracts many likes and retweets, highlighting innovation such as long-distance QSOs on the 47, 76 and 122, 134 and 241GHz mm Wave bands. Our main website, microwavers.org, also provides listings for Operating Firsts/DX records, chip bank stock updates, regularly updated beacon maps and a rolling events calendar.

- Web: <https://www.microwavers.org/>
- Wiki: <https://wiki.microwavers.org.uk/>
- Twitter: <https://twitter.com/UKGHZ>
- YouTube: <https://www.youtube.com/c/UKMicrowaveGroup>

Our sister site, Beaconsport.UK, created and run by UKuG member G8APZ, continues to be very popular with DXers from VHF upwards. Although the domain had to be changed last year from .EU to .UK due to upcoming changes after Brexit, the site has continued to be widely used by microwave operators throughout Europe. It provides an extremely useful resource for the monitoring of propagation conditions and allows beacon keepers to see how well their beacon is being heard.

Operation

The amateur radio microwave bands continue to be under threat from many different commercial radio organisations who would wish to use them for mobile broadband and other activities. Of particular concern at the moment is the future access to the 1.3GHz band which is an amateur secondary allocation, shared with radar systems and radio navigation systems, in particular Galileo. It is likely that WRC19 will agree to studies being carried out to determine what protection systems like Galileo will need to provide uninterrupted service and which could impact on the amateur service.

The RSGB administers NoVs for the use of the 2300-2302MHz additional band and for use of frequencies above 275GHz.

A regular and popular 'Digifest' activity was introduced during 2018. This Wednesday evening event continues to attract many users who arrange contacts using various digital modulation modes on 1.3GHz and higher.

The amateur bands above 100GHz have been increasingly used by radio amateurs. On the 2nd August 2019 the first successful two way contact on the 288GHz band took place between G8CUB/P and G0FDZ/P over a distance of 175m. By the 12th September the distance had been increased to 1.25km.

The number of UK amateurs now using Earth-Moon-Earth (EME) communication has increased sharply during the last few years due mainly to the use of digital modes such as JT65, JT4 and QRA64 and it is now routinely possible to work stations on, at least, the 1.3GHz band whenever the moon is above the horizon whilst using small antenna systems. Besides 1.3GHz, UK stations are active on EME on all microwave bands up to 24GHz.

UKuG Contests and Awards

During 2019 the UKuG scheduled contests on fourteen Sundays, covering eleven microwave bands up to 248GHz. There were over a hundred entries across the bands, the most popular being the 1.3 and 10GHz bands. Operation on the higher bands is exclusively by portable stations due to the necessity of line of sight or near line of site propagation and the very low power levels available.

The UKuG presents trophies annually to recognize the achievements made by microwave operators in a number of different areas. These awards are made at the UKuG AGM at the Martlesham Round Table each April. The awards are for the meritorious contributions in the previous year.

- The G3BNL Trophy is presented for innovation or technical development of microwave equipment or techniques, in honour of Les Sharrock, G3BNL. The 2018 recipient was Neil Smith, G4DBN.
- The G3EEZ Trophy is presented for contributions to microwave communications, in honour of Alan Wakeman, G3EEZ. The 2018 recipient was Tony Horsman, G0MBA for his continuing support of microwave beacons in North Essex.
- The G3VVB memorial trophy is presented for the best microwave home project exhibited at a microwave roundtable, in honour of Cyril James, G3VVB. The 2018 recipient was Dave Crump, G8GKQ.

A number of trophies are also presented each year related to operating on the various microwave bands during the series of cumulative contest organised by the UKuG with both open and restricted (low power) sections being recognised

The UKuG each year nominates who should be awarded the prestigious Fraser Shepard, GM3EGW award presented by the RSGB. This award is for research into microwave applications to radio communications.

The Future

The use of software defined radio (SDR) has become common on HF and VHF frequencies but until recently SDR systems capable of operating at microwave frequencies has not been a reality. Now relatively cheap systems such as the LimeSDR and Adalm Pluto systems are available giving transmit and receive capabilities up to 6GHz. The UKuG has recently introduced the 'Hayling Project' which will use a microcomputer to provide the user interface and encoding to drive SDR units capable of generating and receiving microwave frequencies to form the basis of a (multiband) microwave transceiver. The detailed specifications and requirements are yet to be decided and once they are software will be written and hardware selected. Hayling will require the addition of external hardware such as filters, preamplifiers, power amplifiers and antennas to make a complete system; these will be developed as the project progresses over the coming years. It is hoped that the Hayling project will emulate the success of the BATC Portsdown DATV system leading to an increase in microwave activity.

A recent article in the German DUBUS magazine describing a 122GHz transceiver system based on a radar IC has led to significant interest around the world and particularly amongst UK microwavers. The production of ready-made PCBs is being arranged by the Australian authors with a large number being purchased by UK amateurs. It is expected that there will be a significant increase in activity on the 122GHz band in the UK in the next year or two.