# Welcome to the First Ridgeway RT

Chilton Village Hall

Barry Lewis G4SJH

## Welcome and Our Bands in the Spotlight

**Programme**

| | |
|---|---|
| 10am: | Doors open |
| 10am to 11am: | 'Show and Tell', test equipment and trading (inc. BATC Shop) |
| 11am to 11.30am: | Welcome and short talk by Barry G4SJH (RSGB Microwave Manager) on 'Our Bands in the Spotlight' |
| 11.30am to 12.30pm: | Talk and demonstration by Dave G8KHU and Dave G1TVL on some of the problems encountered with getting JT4 going on the 122GHz band (this is a follow-up to the MRT talk in 2024) |
| 12.30pm: | Lunch break and time for a chat |
| 12.30pm to 3pm: | 'Show and Tell', test equipment and trading continues (inc. BATC Shop) |
| 3pm: | Close |

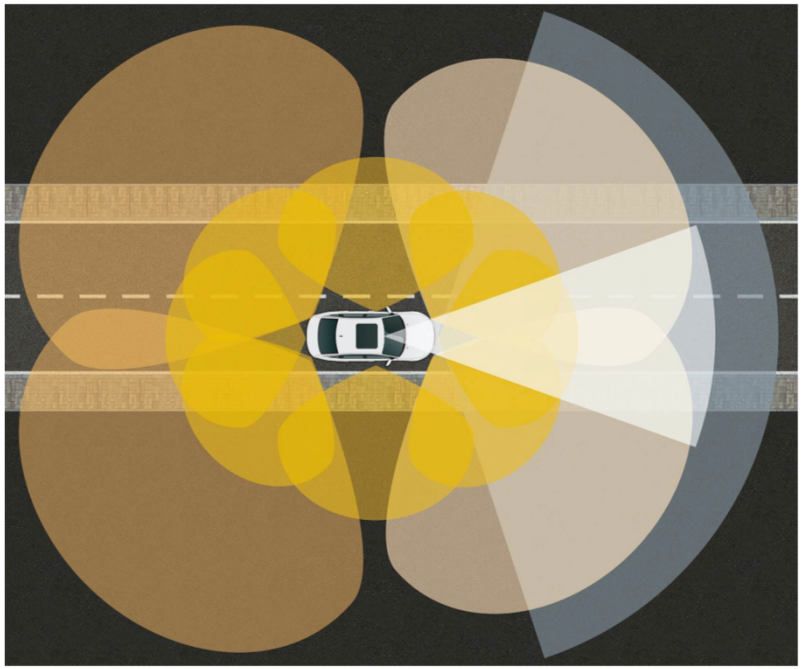
# Ridgeway Round Table #1

- Conceived in the back of the RSGB Convention SIG Room and the “Southern Counties Microwave Mafia”.
- Objective - to create an event attractive to newcomers showcasing:
  - Operational microwave equipment
    - We have: 3.4GHz TVTR, 122 GHz, 24 GHz WaveLab, 10 GHz TVTR, ……
  - Emphasising the self-construction opportunities
  - Test equipment both surplus and homebrew
- Why?
  - Because we need new people on these bands!

# But also.....

- Regulations are addressing new applications in security and vehicle safety using frequency bands we use.
  - Four examples of recent work in CEPT follow
- ITU-R and WRC agenda items are looking towards the higher millimetric frequencies.
- Commercial users and governmental (and regional) objectives increasingly shine a light on microwave and millimeter wave frequencies.

# Vehicle Radar 77-81GHz (Ref: ECC Report 350)



Example for the coverage range of radar sensors at one vehicle to achieve 360 degrees coverage

| Radar sensor category | Modulation Bandwidth | max. mean PSD e.i.r.p. (during $T_{on}$) | max. mean e.i.r.p. (during $T_{on}$) |
|---|---|---|---|
| Long Range Radar | Up to 1 GHz | 20 dBm/MHz | 40 dBm |
| Mid Range Radar | Up to 2 GHz | 7 dBm/MHz | 37 dBm |

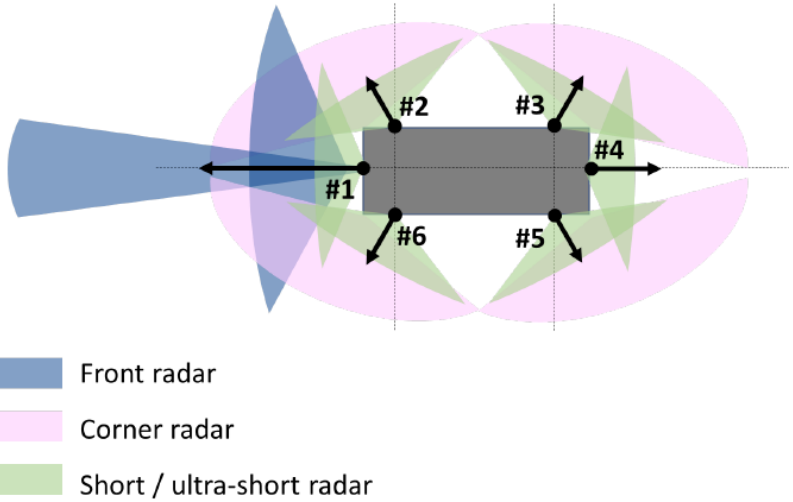
Long Range Radar in SSB BW = -5.5 dBm/2.7kHz e.i.r.p

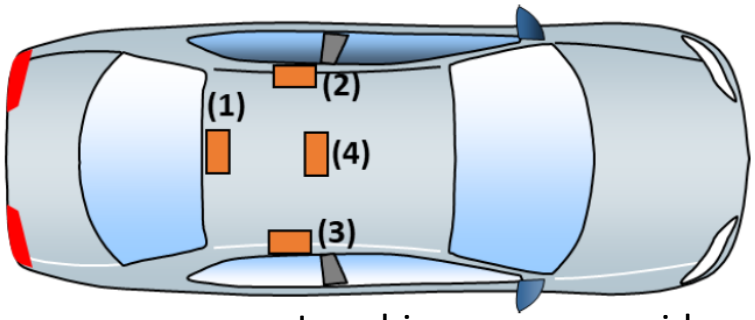
| Radar sensor category | Modulation Bandwidth | max. mean PSD e.i.r.p. (during $T_{on}$) | max. mean e.i.r.p. (during $T_{on}$) |
|---|---|---|---|
| Short Range radar | Up to 4 GHz | -3 dBm/MHz | 30 dBm |
| Ultra Short Range Radar | Up to 4 GHz | -3 dBm/MHz | 30 dBm |

Analogue Chirp or digital OFDM technologies. 4 GHz chirp in 20us repeated for 5ms every 100ms.
Probably sound like a (brief) low frequency buzz.

MCL calculations, taking into account the vertical delta between both radar and Amateur Service antennas, reveal separation distances between 0 km and 35.7 km.

# UWB Vehicle Radar (Ref: ECC Report 351)




In-cabin sensors considered too.

The following frequency ranges are considered:

- 122.25-130 GHz;
- 134-141 GHz;
- 141-148.5 GHz.

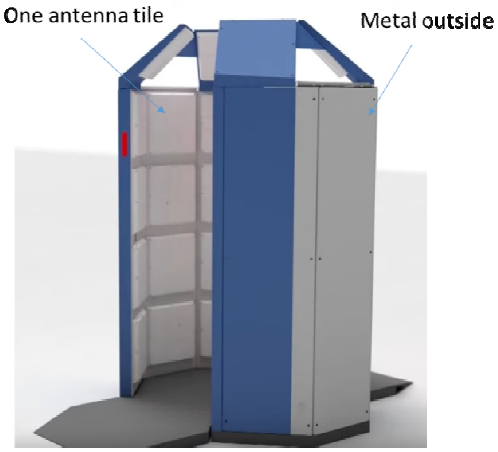
Front Radar BW = 1 GHz; Max e.i.r.p 40dBm.
Corner Radar BW = 4 to 7 GHz; Max e.i.r.p 20 dBm.
Short Range Radar BW = 4 to 7 GHz; Max e.i.r.p 20 dBm.

For Front Radar MCL calculations, taking into account possible vertical delta between both radar and Amateur Service antennas, reveal separation distances between 0 km and 14.5 km.

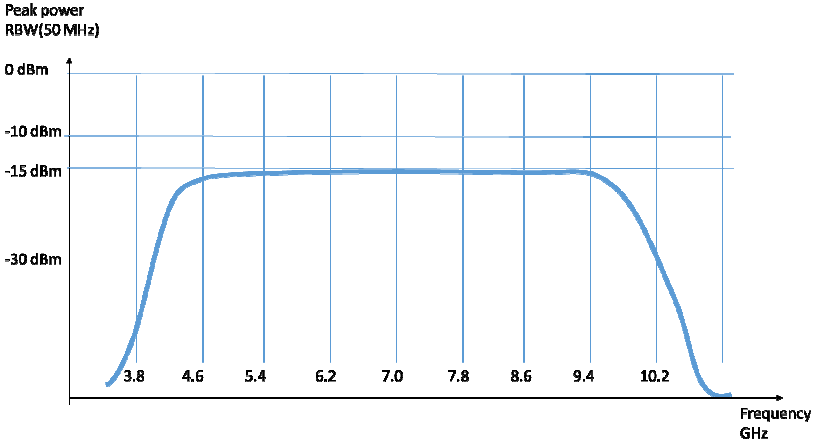
For Corner Radar MCL calculations, taking into account possible vertical delta between both radar and Amateur Service antennas, reveal separation distances between 0 km and 4.6 km.

But coexistence considered possible due to the low probability of persistent main beam alignment.

# UWB Microwave Scanners 3.6 – 10.6 GHz (In drafting)



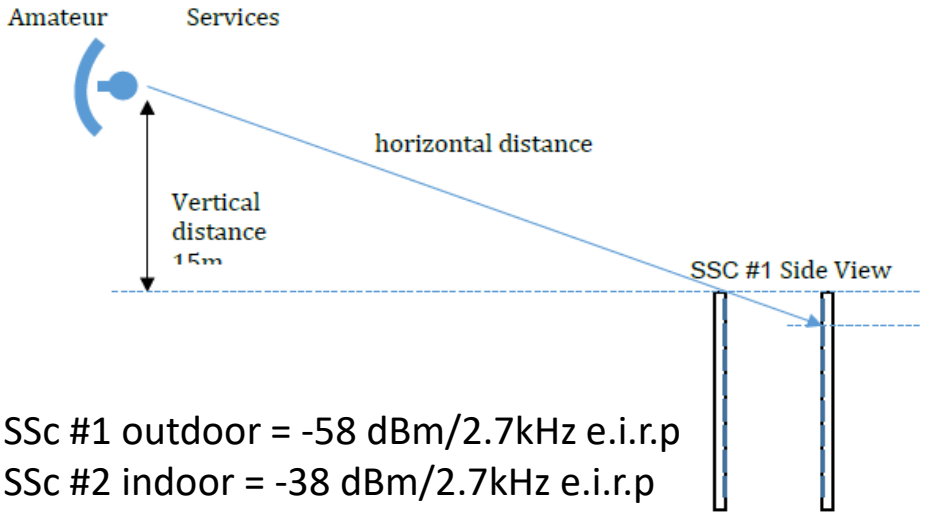

Maximum peak e.i.r.p spectral density of -15 dBm/50 MHz



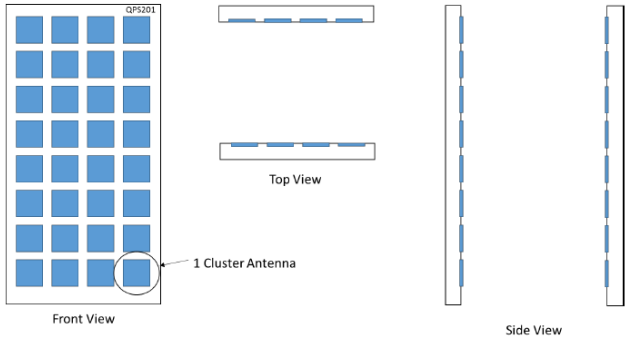

| Parameter | Value |
|---|---|
| Number of transmitting antennas per panel | 224 |
| Number of transmitting antennas per panel – H polarization | 112 |
| Number of transmitting antennas per panel – V polarization | 112 |
| Number of receiving antennas per panel | 448 |
| Number of receiving antennas per panel – H polarization | 224 |
| Number of receiving antennas per panel – V polarization | 224 |
| Number of antenna tiles per SSc | 28 |
| Number of transmitting antennas per tile | 8 |
| Number of receiving antennas per tile | 16 |
| Physical aperture size | ~6,4 m² |
| Beam width of an antenna (horizontal and vertical) | ~40° |
| Pulse frequency range | 3.6 GHz – 9.6 GHz |
| Pulse packet | ~1.25 us |
| Pulse centre frequency | 6.6 GHz |
| Pulse repetition frequency | 12 MHz |
| Polarization | 0° (H polarization) and 90° (V polarization) |

Tentative results at 5.6 GHz indicate outdoor interference possible in the main beam up to 100m. For indoor this reduces to 14m.

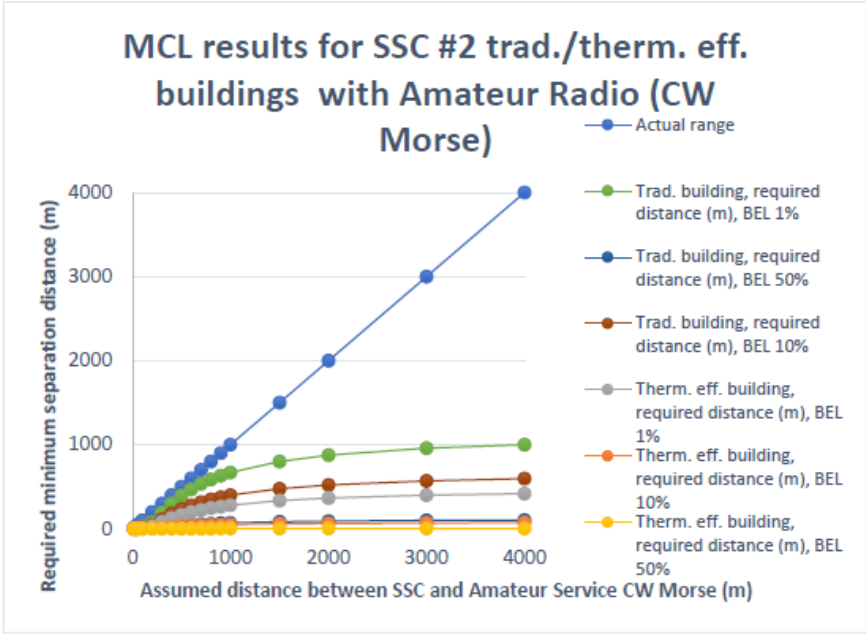
# Security Scanners 60-82GHz (Ref: ECC Report 344)




SSc #1 outdoor = -58 dBm/2.7kHz e.i.r.p
SSc #2 indoor = -38 dBm/2.7kHz e.i.r.p




| MCL Parameters | |
|---|---|
| SSc #1 e.i.r.p. | 7 dBm |
| SSc #1 BW | 10 GHz |
| SSc #2 e.i.r.p. | 19 dBm |
| SSc #2 BW | 1.5 GHz |



# Recent Ofcom Initiatives

- Shared Spectrum Access
  - Has been enabling small scale licenses for any interested party to provide local access or networking since 2019.
- Includes spectrum in the bands: 2390-2400 MHz, 3.8-4.2 GHz, 1800 MHz and 26GHz spectrum.
- From Jan 25, constraints liberalised in a number of aspects but importantly:
  - The range 2320 – 2340 MHz was added allowing up to 20MHz wide systems.
  - Currently indoor only but there have been requests for temporary outdoor installation.

# In ITU-R – WRC related items

- The WRC-27 Agenda has a number of items considering millimetre wave bands:
  - **AI 1.8**: New service allocations in the frequency range 231.5-275 GHz and new radiolocation allocations in the range 275 – 700 GHz.
  - **AI 1.15**: Lunar communications and scope includes consideration of parts of the 2.4 GHz and 5.6GHz bands allocated to the amateur services.
  - **AI1.13:** Considers “direct to terminal” mobile satellite comm’s. The 2.3GHz band falls into the scope.
- WRC-31 already has a tentative agenda item 2.1 considering new allocations including for amateur and amateur-satellite, in the range 275-325 GHz.

# In ITU-R – Study Groups

- WP5A is drafting a new work item:
  - Report on Experimental Activities in the Millimetric Wave Bands by Stations of the Amateur Service.
  - Currently contains info on 240 GHz and above.

# Finally – 23cms!

- CEPT is drafting a European regulation (ECC Decision):
  - Covers only 1258 – 1300 MHz part of the band.
  - The technical measures proposed are exactly those developed in the ITU-R and Recommendation M.2164.
  - Once published (probably around mid 2025) national regulators will take the next steps.
  - An ECC Decision is not binding on regulators but is a strong influence.

## Thanks – that's it!!!

# Reminder of ITU-R Recommendation M.2164

For Broadband:
1 255.76-1 256.52 MHz: e.i.r.p. = 24 dBW/150kHz (Assuming 18dBi antenna = 50W/2MHz)
1 256.52-1 258 MHz: e.i.r.p. = 21 dBW/150 kHz (Assuming 18dBi antenna = 25W/2MHz)

Low mW level power only.
In effect Amateur operation suppressed

Maximum e.i.r.p = 17 dBW at 15 deg elevation up to 26.8 dBW at 55 deg and above for Amateur Satellite. 1260-1262 MHz

50W Tx power agreed.
Narrow band.

150W Tx power agreed.
Plus 500W for EME above 15 deg elevation and >30dBi antenna. Narrow band.