



SSA

Föreningen

SVERIGES SÄNDAREAMATÖRER

Swedish member-society of the IARU and the NRAU

VUSHF frequencies in Sweden.



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Information

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This document is intended to be a working document for SSA with respect to frequencies above 30MHz. The intention is to bring a snapshot of the status as general information so corrections, comments and improvements can be discussed and added. All comments are welcome and please use the email address (sm6ean@ssa.se) for feedback and input.

The document will (for now) be accessible under the SSA web page (www.ssa.se) under the section "VHF/UHF/SHF", and the folder "Bandplaner".

This document is based upon several public documents from ITU, CEPT and national administrations. Some links have been collected below and this list will be expanded as useful links are identified;

Updated text has a **yellow marking**.

CEPT/ECC

<http://www.cept.org/ecc/groups/ecc/wg-fm>

ECA table **June 2016** available as on-line or PDF. Search for "ECA Table" on Internet.

PTS, Sweden

- PTS collection of links:
<http://www.pts.se/sv/Privat/Radio/Amatorradio/Regler-och-lankar/>
- Swedish regulation on Amateur Radio PTSFS 2015:4
- http://www.pts.se/upload/Foreskrifter/Radio/PTSFS-2015_4-undantag.pdf

Swedish Law

- Lag (2003:389) om elektronisk kommunikation <https://lagen.nu/2003:389>



50MHz

Current status

Sweden: 50-52MHz, 200W, Primarily Land Mobile, Amateur secondary
SSA have had discussion with PTS on higher power. Russia have requested lower power.

CEPT: 50-52MHz, Primarily Land Mobile, Amateur secondary

Issues

WRC: WRC-19 AI 1.1 Resolution 658. "to consider an allocation of the frequency band 50-54 MHz to the amateur service in Region 1, in accordance with Resolution 658"

Target condition

IARU: 50-54MHz common world-wide.

Action plan

IARU: Preparation for WRC-19 started.



70MHz

Current status

Sweden: PTS view has been that this is a primary band for Land Mobile and Fixed radio. Temporary permits on individual channels, depending on geography, can be issued.

Land Mobile use in the 69,0-69,2 MHz band was proposed to be license exempt to offload license exempt allocation in the 155MHz band¹ and is now included in PTSFS 2015:4.

The band is increasingly used by CB radio in addition to the PMR use. Some radio amateurs are starting to use the band.

SSA: Seeking acceptance for some international coordinated channels within the CEPT recommendation.

IARU: -

CEPT: Primary: Fixed and Mobile. Amateur radio as secondary service in ERC Rep025: "Within the band 69,9-70,5MHz." with footnote ECA9: "CEPT administrations may authorize all or parts of the band 69.9-70.5 MHz to the amateur service on a secondary basis."

Issues

PTS see 70MHz as a non-amateur radio band.

Target condition

Some internationally coordinated channels available for Swedish amateurs.

Action plan

Meeting with PTS.

¹ "Konsekvensutredning i fråga om Post- och telestyrelsens föreskrifter om undantag från tillståndsplikt för användning av vissa radiosändare", PTS Dnr: 15-2524, 2015-03-16



144MHz

Current status

Sweden: 144-146MHz. 1000W. Primary user.

CEPT: 144-146MHz. Amateur and amateur satellite primary user.

Issues

No known issues.

Target condition

Action plan



432MHz

Current status

Sweden: 432-438MHz, 1000W. Primary user.

CEPT: 430-440MHz. Amateur and amateur satellite primary user.

WRC: CPG15-PTA4, AI10:” to review the allocations in frequency bands between 410 – 960 MHz in order to enable the development and introduction of new mobile and fixed wideband applications, and if necessary consider additional spectrum allocations, in accordance with Resolution YYY (WRC-15)”

Issues

EC

- EC initiated study during 2015; “Identification of the market of radio equipment operating in license-exempt frequency bands to assess medium and long-term spectrum usage densities” including the following frequency bands: 400 – 446 MHz, 863-870 MHz, 2.4-2.483 GHz, 5 GHz, 8.5-10.6 GHz, 13.4-14 GHz, 17.1 – 17.3 GHz, 24-27 GHz, 59-64 GHz.

Target condition

Action plan

Monitor WRC progress.

1296MHz

Current status

Sweden: 1240-1300MHz, 1000W. Radio localisation, Radio navigation primary users. Amateur secondary user.

CEPT: 1240-1300MHz. Earth exploration-satellite and radiolocation primary users. Amateur secondary user.

WRC: Current amateur bands outside of WRC15 discussions.

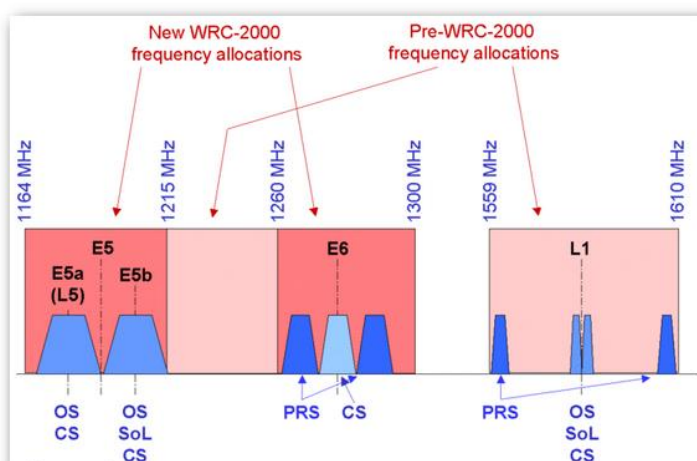
Issue

Foreseen issue regarding co-location with navigation satellites (GNSS) and high power amateur radio stations.

GNSS: China: Compass ~1268 MHz centre +/-

Europe: Galileo allocated 1260-1300 (primary user)

The *commercial service* is realized with two additional signals in the 1278.75 MHz band plus also the capability to include commercial data within the open signals. The *Public Regulated Service* is realized by two signals, one in the 1575.42 MHz band and the other in the 1278.75 MHz band. These signals are encrypted, allowing the implementation of an access control scheme.



Japan: QZSS ~1260-1300 MHz similar to Galileo-E6

Russia: GLONASS 1237-1260 (primary user)

CEPT: GLONASS Within the band 1237.8-1253.8 MHz

Galileo Within the band 1260-1300 MHz

IARU: Note that whilst GNSS is Primary, the Radiolocation Service (Radars) have greatest priority. This results in weak GNSS signal levels that unfortunately make them vulnerable to wide bandwidth interference sources (such as ATV Transmitters)

Target condition

Discussion around alternative allocation 1300-1310MHz. No current actions known.

Sweden: 1300-1350 Military, radio location,

Action plan

Monitor WRC progress.

2320MHz

Current status

Sweden: 2400-2450MHz, max 100mW fed to antenna. (PTSFS 2014:5)

- PTS issue temporary 6 month permits 2320-2321 MHz, 1000W.

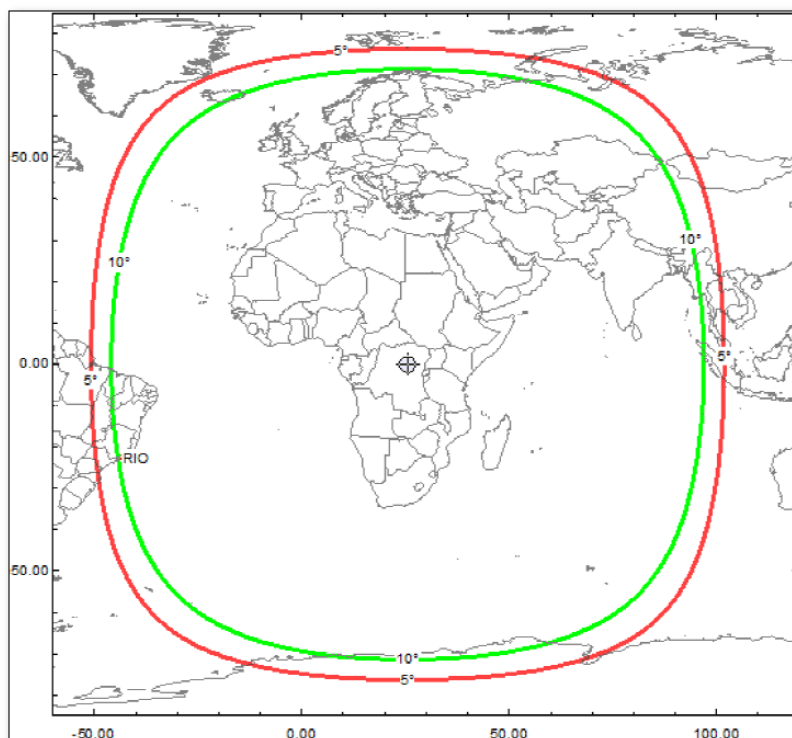
CEPT: 2300-2450MHz. Fixed and mobile allocation primary users.

Issue

- The band 2300 – 2400 MHz is **under** reallocation and national allocation is foreseen to be made through a Licensed Shared Access (LSA) approach (ECC report 205). It is **expected that use by the military and Swedish Space Corporation can be handled in some geographical areas.**
It is currently not clear what LSA will mean in practice.
- **Band 2400-2450: Communication with the first ever geo-stationary satellite to be launched during 2017. Link budget recommend output power of 10W with 0,75m dish.**
AMSAT presentation: <https://www.itu.int/en/ITU-R/space/workshops/2015-prague-small-sat/Presentations/Eshail-2.pdf>

Uplink (EOC, SFD = -106 dBW/m2)		Downlink (EOC)	
Freq	2.4 GHz	Freq	10.5 GHz
Dish size	0.75 m	TWTA output power	100 W
Ant gain	23.64 dBi	OBO	6 dB
HPA Output Power	10 W	On-board losses	1.5 dB
Uplink path losses	1.5 dB	S/C Ant. Gain	17 dBi
Ground EIRP	32.14 dBW	S/C EIRP	29.5 dBW
		Power sharing	50 channels
		S/C EIRP per channel	12.5 dBW
Earth-S/C distance	41126 Km		
Free Space Loss	192.3 dB	Free Space Loss	205.1 dB
95% availability att	0.12 dB	95% availability att	0.55 dB
S/C G/T	-12 dB/K	Ground Sta. G/T	13.98 dB/K
C/N0	56.3 dBHz	C/N0	49.4 dBHz
Channel Bw	2.5 KHz	Channel Bw	2.5 KHz
C/N per user (PEP)	22.3 dB	C/N per user (Avg.)	15.4 dB

Transponder		Freq. Band	Polarization	Central Freq. (MHz)	Transponder Bandwidth
NB	Uplink	S-band	RHCP	2400.175	250 KHz
	Downlink	X-band	LVP	10489.675	
WB	Uplink	S-band	RHCP	2405.5	8 MHz
	Downlink	X-band	LHP	10495	



CEPT:

- **CEPT Report 56:**

- **8 SHARING SCENARIOS FOR THE COEXISTENCE BETWEEN WBB AND AMATEUR SERVICE**

- **8.1 SCENARIOS FOR THE AMATEUR SERVICE**

As defined in ECC Report 205, LSA excludes concepts such as “opportunistic spectrum access”, “secondary use” or “secondary service” where the applicant has no protection from primary user(s). Therefore LSA cannot be applied to the Amateur Service in the band 2300-2400 MHz. However, it is recommended to take into account the sharing options as described in section 8.2 below.

- **8.1.1 Deployment assumptions for the amateur service** The frequency band 2300-2400 MHz is allocated to the Amateur Service on a secondary basis by ITU Radio Regulations in all three ITU regions.

The operational characteristics of amateur stations operating in the 2300-2400 MHz range vary significantly. However based on the IARU Region-1 VHF Managers Handbook [15] and studies for ECC Report 172, they can be categorised as:

- Long range weak-signal reception of Narrowband Terrestrial (e.g. CW, SSB, digimodes) and EME (Earth-Moon-Earth - Moonbounce) operation - notably in the harmonised sub-band 2320-2322 MHz, including propagation beacons;
 - Some additional narrowband activity in the 2300-2305 MHz range, including long range EME (EarthMoon-Earth - Moonbounce) contacts with North America;
 - Data, multimedia, and TV repeaters (point-to-point links and area systems) in other parts of the band. Activity levels vary with propagation conditions and peak when national or international contests, or other activity events, are scheduled.

- **8.2 OPTIONS FOR SHARING**

ECC Report 172 found that regarding Radio Amateur systems in the 2300-2400 MHz band, operating as a secondary service, it was shown that the required MCL (Minimum Coupling Loss) can be achieved by various mitigation techniques.



Where authorised, licence conditions for amateurs already require secondary non-interference operation in the 2.3GHz band. In practice, the options are typically based on directional antennas, time, frequency and geographic sharing, as well as coordinated assignments by administrations of unattended systems such as propagation beacons or repeaters. The duty cycle of individual amateur transmissions can also be assumed to be quite low and is typically on a listen-before-transmit basis.

Current examples of shared access are based on where amateurs share with other incumbent services such as wireless cameras (PMSE) or airborne telemetry. For example:

- In the Netherlands where there is significant PMSE usage in the band, there is a regularly used notification system by the administration that restricts amateur transmissions at defined times and radii when PMSE usage needs priority.
- In the United Kingdom where amateurs are required to share on a non-interference basis, Ofcom have recently defined geographic zones, field strength limits and times of day around certain sites to protect airborne telemetry use, as well as migrating amateurs out of the core 2350-2390 MHz sub band which will be made available to WBB (and making a new provision for amateur usage in the 2300-2302 MHz band edge). Amateur users of the 2.3GHz band have also been requested to register their details with Ofcom to facilitate email notifications.

Further consideration required to assess whether these approaches are applicable for a shared use of the band with WBB, taking into account the expected dense usage of the band by WBB.

When WBB is deployed, it is also feasible that compatibility could be achieved with low density narrowband amateur activity choosing to near the band edges where administrations implement WBB power or frequency restrictions or guard bands - for adjacent Wi-Fi compatibility for example.

In accordance with Radio Regulations Article 1.56 - amateur service is a radio communication service for the purpose of self-training, intercommunication and technical investigations carried out by amateurs, that is, by duly authorised persons interested in radio technique solely with a personal aim and without pecuniary interest - in some countries it is forbidden by law that radio amateurs act on a commercial basis.

Target condition

- 2320-2321, or 2300-2301, with high power
- 2400-2450 Allow max 10W output power using antenna elevation over 20 degrees.

Action plan

- Waiting for PTS response on LSA clarification
- Monitor WRC progress.

- 3400MHz

Current status

Sweden

- TRA-ECS, block in line with 2008/411/EG. Fixed and Mobile Radio, Fixed – satellite.
- PTS issue temporary permits 3400-3401 MHz, 1000W.

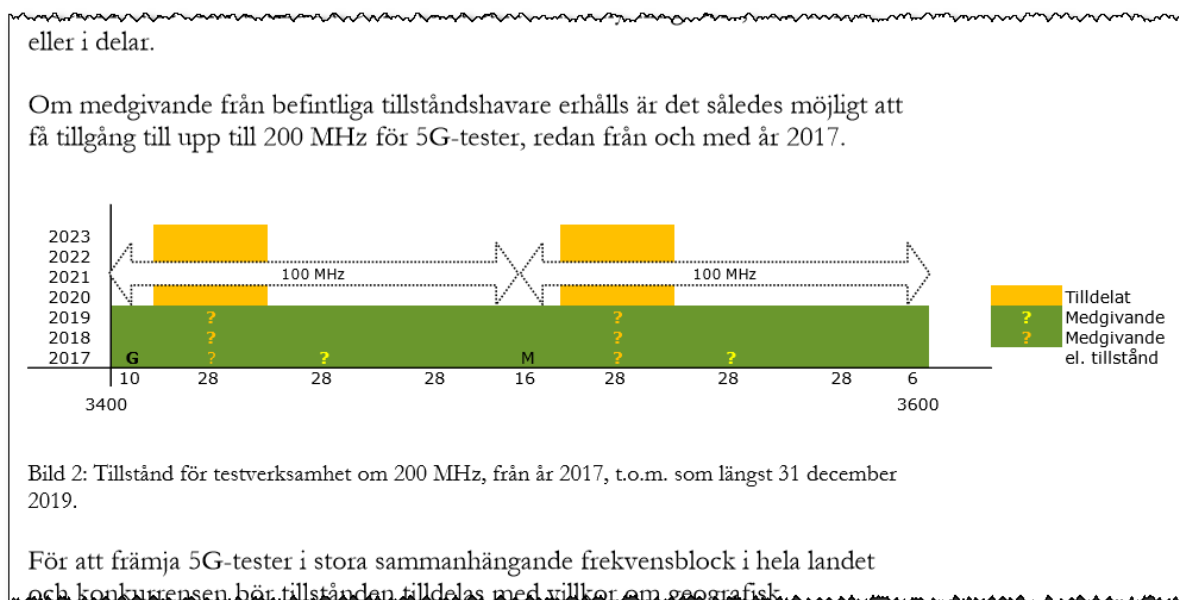
CEPT:

- 3400-3410MHz. Fixed, satellite and mobile primary users. Amateur secondary basis.
- ERC Report 25, Footnote ECA17: In the sub-bands 3400 - 3410 MHz, 5660 - 5670 MHz, 10.36 - 10.37 GHz, 10.45 - 10.46 GHz the amateur service operates on a secondary basis. In making assignments to other services, CEPT administrations are requested wherever possible to maintain these sub-bands in such a way as to facilitate the reception of amateur emissions with minimal power flux densities.

Issues

Sweden:

- 3,4 GHz is not seen as an amateur radio band, contradicting CEPT ECC/DEC(07)02
- **PTS is announcing 5G test allocation from 2017 up to Dec.31 2019.:**



EC:

- 2014/276/EU: "COMMISSION IMPLEMENTING DECISION"... on amending Decision 2008/411/EC on harmonisation of the 3400-3800 MHz frequency band for terrestrial systems capable of providing electronic communications services in the Community"
- Key wording "...requires Member States to make available the 3 400-3 800 MHz frequency band under the terms and conditions of Decision 2008/411/EC and, subject to market demand, to authorise the use of this band by 31 December 2012 without prejudice to existing deployments of services and under conditions that allow consumers easy access to wireless broadband services."

CEPT:

- ECC Decision (11)06 "Harmonised frequency arrangements for mobile/fixed communications networks (MFCN) operating in the bands 3400-3600 MHz and 3600-3800 MHz" (Decision "...CEPT administrations shall designate the frequency bands 3400-3600 MHz and 3600-3800 MHz on a non-exclusive basis to mobile/fixed



communications networks (MFCN), without prejudice to the protection and continued operation of other existing users in these bands ...”)

- ECC Report 203 “Least Restrictive Technical Conditions suitable for Mobile/Fixed Communication Networks (MFCN), including IMT, in the frequency bands 3400-3600 MHz and 3600-3800 MHz” propose the principals for future use of the band 3400 to 3800 MHz. Amateur radio is not listed as a current user while national administrations do mentions Amateur Radio.

In the report TDD and FDD systems are discussed where a TDD allocation will use the band fully, while a FDD system will have guard bands (e.g. 3400 to 3410 MHz in the lower end).

Target condition

- 3400-3401 with high power

Action plan

Understand implementation of LSA

5,7GHz

Current status

Sweden 5,65-5,85GHz, 1000W.

CEPT:

- 5,65-5,85GHz. Mobile and radiolocation primary users.
- ERC Report 25, Footnote ECA17: In the sub-bands 3400 - 3410 MHz, 5660 - 5670 MHz, 10.36 - 10.37 GHz, 10.45 - 10.46 GHz the amateur service operates on a secondary basis. In making assignments to other services, CEPT administrations are requested wherever possible to maintain these sub-bands in such a way as to facilitate the reception of amateur emissions with minimal power flux densities.
- ERC Report 25, ECA23 In the sub-bands 5660-5670 MHz (earth to space), 5830-5850 MHz (space to earth) and 10.45-10.50 GHz the amateur-satellite additionally operates on a secondary and non-interference basis to other services. In making assignments to other services, CEPT administrations are requested wherever possible to maintain these allocations in such a way as to facilitate the reception of amateur emissions with minimal power flux densities.
- Update of ERC/REC 70-03 with Wireless Industrial Applications (WIA) in the band 5725-5875 MHz and 0,4W is ongoing. New ETSI standard: EN 303 258.

- Draft ECC Report 244 (Doc SE(16)006A4):

"_Compatibility between RLAN and the Amateur (5725 – 5850 MHz) and Amateur satellite (space to Earth, 5830-5850 MHz) services.

Detail studies have not been performed so far. However some preliminary consideration of the three main categories of radio amateur usage (narrowband, data and amateur satellite) for both directions has been made that may provide guidance for future work (along with ECC Report 206 **Fel! Hittar inte referenskölla.**). This includes an initial identification of relevant mitigation techniques.

Whilst some scenarios and directions may require further study, it has already been found that compatibility is achieved between Amateur Satellite downlink transmissions and RLAN receivers."

Details in §3.5, §10.

"...This may require further study, for which the following mitigations can also be considered:

- a. Amateur narrowband stations are relatively low density and transmit times.
- b. Frequency separation can be applied considering that frequencies inside and outside the 5725-5875 MHz band are available for RLAN; whilst the amateurs will stay centered on 5760 MHz."

Issues

EC:

- Initiative to strengthen and protect the WLAN service has been issued. Basic decision: 2005/513/EC: "*The purpose of this Decision is to harmonise the conditions for the availability and efficient use of the frequency bands 5 150-5 350 MHz and 5 470-5 725 MHz for wireless access systems including radio local area networks (WAS/RLANs).*" (Documents regarding extension of the bands??)
- EC initiated study, see 432MHz.

WRC: WRC-19, Resolution 239. AI 1.16 b) "to conduct studies with a view to identify potential WAS/RLAN mitigation techniques to facilitate sharing with incumbent systems in the frequency bands 5 150-5 350 MHz, 5 350-5 470 MHz, 5 725-5 850 MHz and 5 850-5 925 MHz, while ensuring the protection of incumbent services including their current and planned use"



PTS:

- AI 1.16
 - Stöd för allokering till mobil radio i banden 5350-5470 MHz och 5725-5850 MHz under förutsättning att kompatibilitet/delning är möjligt.

IARU:

- Currently no planned action

Target condition

Maintain allocation for amateur wide band communication as well as high power narrow band communication 5760 - 5761MHz.

Action plan

- IARU action?
- Monitor CEPT progress.

10GHz

Current status

Sweden 10,0-10,5GHz, 1000W. Fixed, mobile and radiolocation primary users. Amateur secondary.

- PTS decision Dnr: 11-4937, 2011-12-09. 10210–10294 and 10560–10644 MHz allocated for

Tillstånd	Upplänks-bandet (MHz)	Nedlänks-bandet (MHz)	Tillståndshavare
1	10210–10238 (10210-10224 i Hallands och Gotlands län)	10560–10588 (10560-10574 i Hallands och Gotlands län)	HI3G Access AB
2	10238–10266 (Utom Hallands och Gotlands län)	10588–10616 (Utom Hallands och Gotlands län)	HI3G Access AB
3	10266–10294 (Utom Hallands och Gotlands län)	10616–10644 (Utom Hallands och Gotlands län)	Ej tilldelat

Tillstånden gäller från och med dagen för detta tilldelningsbeslut den 9 december 2011 till och med 31 december 2035.

- FMV and Swedish Defense is currently using the bands 8500-10210 MHz and 10294-10500 MHz for radar, and will be doing so for foreseeable future. Propose to ITU WRC15 to maintain the protection for Radiolocation and Radio navigation in the bands.

CEPT: 10,0-10,5GHz. Fixed, mobile and radiolocation primary users. Amateur secondary.

Issues

Sweden:

- New commercial radio link sub-bands proposed, implementation unclear. The narrowband activity centres are currently untouched.

CEPT:

- Proposal for the following agenda item to be included in the draft agenda for WRC-19. To review the frequency bands between 6.5 and 100 GHz and consider additional spectrum allocations to the mobile service on a primary basis and identification of frequency bands, and related regulatory provisions, to facilitate the development of terrestrial mobile and fixed broadband applications, in accordance with Resolution [6.5-100 GHz] (WRC-15). Doc: CPG-PTA(15)037, 8/1 2015, CPG-PTA(15)009 30/12 2014.

EC:

- EC initiated study, see 432MHz.

WRC: WRC15

- Action Item 1.12: to consider an extension of the current worldwide allocation to the Earth exploration-satellite (active) service in the frequency band 9 300-9 900 MHz by up to 600 MHz within the frequency bands 8 700-9 300 MHz and/or 9 900-10 500 MHz, in accordance with Resolution 651 [COM6/18] (WRC-12);



Target condition

If discussions arise, a proposal may be to follow the ERC Report 25, Footnote ECA17 and ECA23 with the sub-bands 10.36 - 10.37 GHz and 10.45-10.50 GHz.

Action plan

Monitor WRC progress.



24GHz

Current status

Sweden

- 24,0-24,05GHz, 1000W. Primary use Amateur radio.
- 24.05-24.52 GHz Radio localisation primary user, Amateur secondary user.

CEPT:

- 24,0-24,05GHz. Amateur and amateur satellite primary users.
- 24,05-24,25GHz Radiolocation primary user.

Issues

WRC: WRC15

- Action Item 1.10: to consider spectrum requirements and possible additional spectrum allocations for the mobile-satellite service in the Earth-to-space and space-to-Earth directions, including the satellite component for broadband applications, including International Mobile Telecommunications (IMT), within the frequency range from 22 GHz to 26 GHz, in accordance with Resolution 234 [COM6/16] (WRC-12)

PTS

- Studies of future needs and sharing is required before any decision can be taken.

CEPT

- CEPT sees difficulties, in particular in sharing, for MSS allocations within the frequency range 22-26 GHz and does not support such additional allocations under this Agenda Item. Further to this agenda item CEPT does not see a need for additional spectrum and therefore requests justification for possible spectrum allocations for the MSS in the band 22-26 GHz.
- See 10GHz for 6,5 to 100GHz study proposal.

EC:

- EC initiated study, see 432MHz.

Target condition

Secure a primary segment for Amateur radio

Action plan

- Monitor WRC progress.



47GHz

Current status

Sweden 47,0-47,2GHz, 1000W. Primary use amateur radio

CEPT: 47,0-47,2GHz. Amateur and amateur satellite primary users.

Issues

WRC-19: AI 1.13, Resolution 238, section d, 2: "31.8-33.4 GHz, 40.5-42.5 GHz and 47-47.2 GHz, which may require additional allocations to the mobile service on a primary basis"

Target condition

T.b.d.

Action plan

- Monitor WRC progress.

76GHz

Current status

Sweden

- 75,5-81,0GHz, 1000W.
 - Amateur radio primary user 77,5-78 GHz, secondary elsewhere in the band.
- Radio astronomy and radio location primary users 76,0-77,5 GHz

IARU

- Proposed activity center 75976.2 MHz (used in the UK). 76032.200 narrow band center in some countries (not preferred)

CEPT:

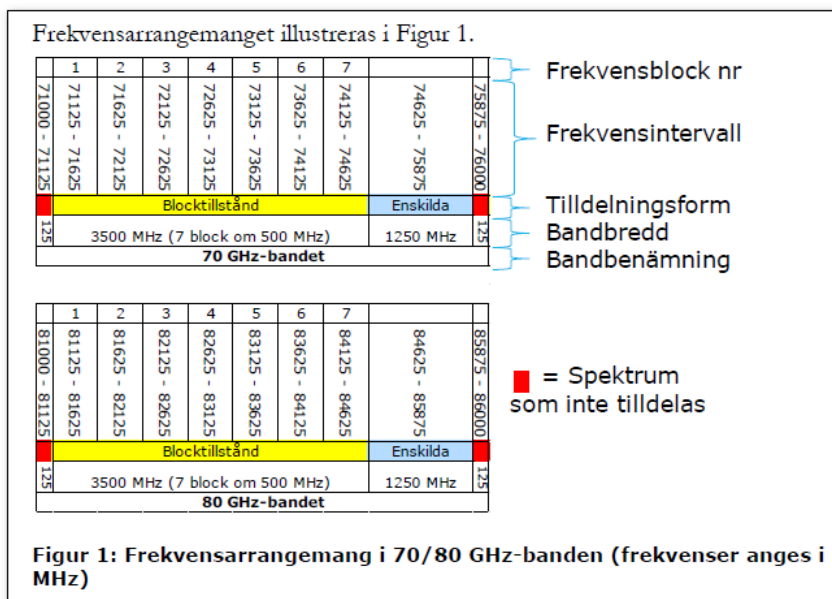
- 75,5-77,5GHz. Amateur secondary user.
- 77,5-78 GHz Amateur primary user.
- 78,0-81,0GHz. Amateur secondary user.

Issues

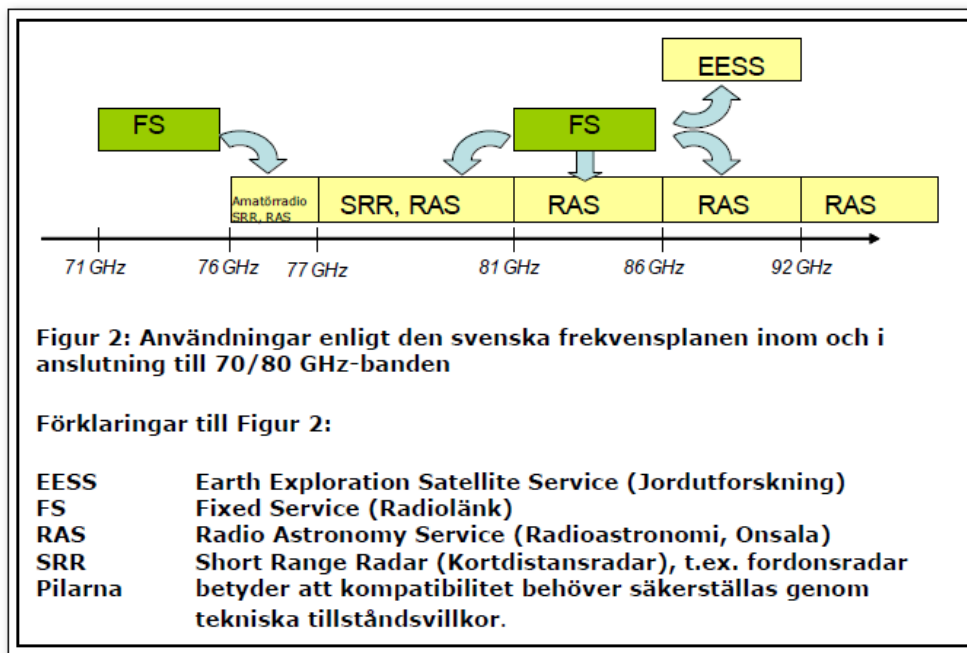
Sweden

- Public request around commercial allocation for 70/80 GHz band, and possible re-allocation of other services into the 76-77 GHz sub-band.

Links (4G backbone 71-76 & 81-86GHz).



Re-allocation:



CEPT:

- See 10GHz for 6,5 to 100GHz study proposal.
- Draft for obstacle detection helicopter radar made and report expected 2016.

Target condition

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Action plan

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122GHz

Current status

Sweden 122,25-123,0GHz, 1000W. Amateur secondary.

CEPT: 122,25-123,0GHz. Fixed and Mobile primary user. Amateur secondary user.

Issues

No known issue.

Target condition

Action plan



134GHz

Current status

Sweden 134,0-141,0GHz, 1000W.

- 134,0-136,0GHz. Amateur primary user.
- 136,0-141,0GHz. Amateur secondary user.

CEPT:

- 134,0-136,0GHz. Fixed Amateur primary user.
- 136,0-141,0GHz. Fixed Amateur secondary user.

Issues

No issues known

Target condition

Action plan



241GHz

Current status

Sweden 241,0-250,0GHz, 1000W.

- 241-246,0GHz. Amateur secondary user
- 248,0-250,0GHz. Amateur primary user.

CEPT:

- 241-246,0GHz. Amateur secondary user
- 248,0-250,0GHz. Amateur primary user.

Issues

No issues known

Target condition

Action plan



275 - 3000 GHz

Current status

Sweden: No information

CEPT: Not allocated. May be used by both active and passive services