Welcome to the

IARU Monitoring System

Working Group Meeting

17. Sept. 2017

Peter Jost
HB9CET

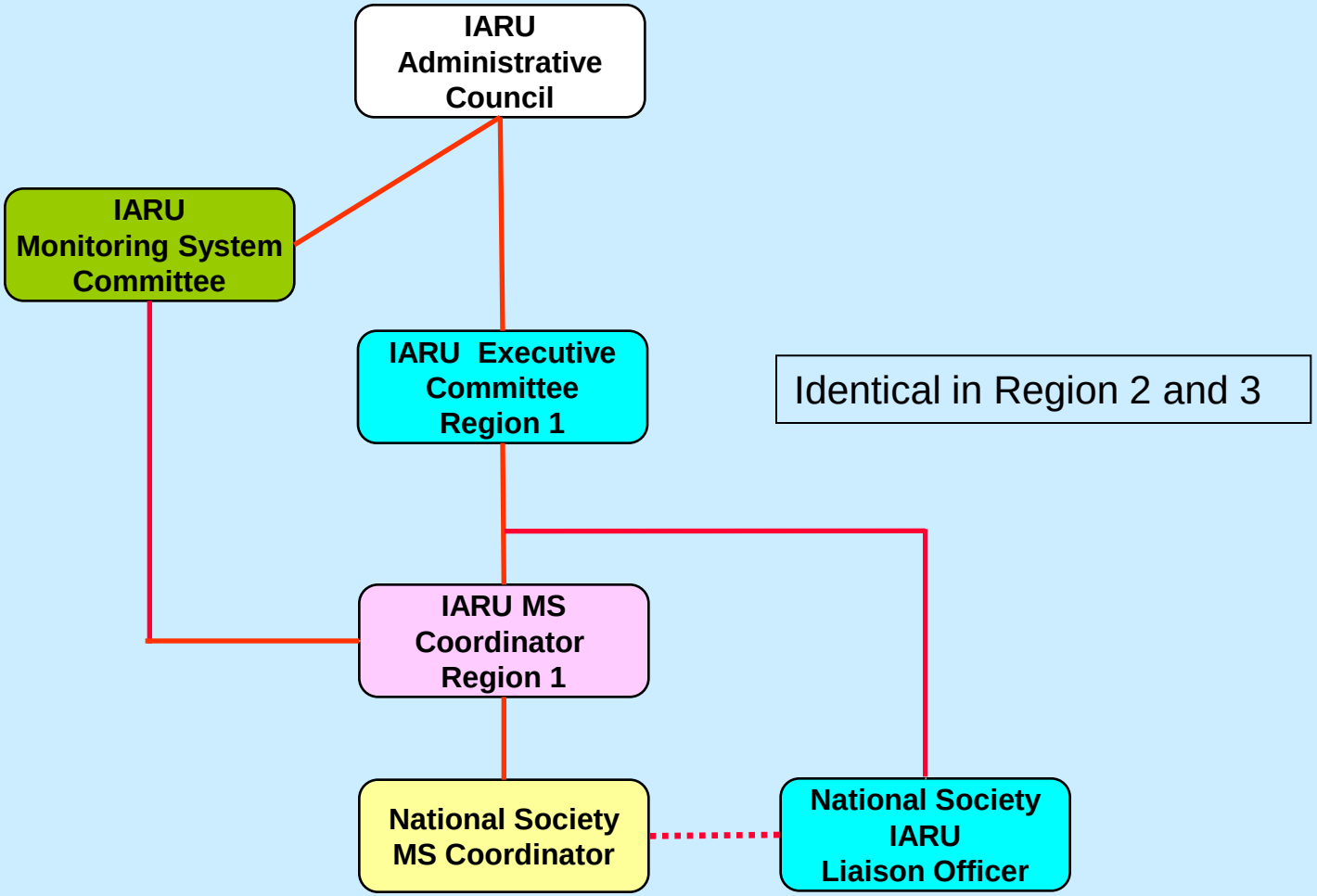
- **IARU MS (R1) Vice Coordinator**
- **USKA Monitoring Coordinator**
- **USKA Liaison Officer to Swiss OFCOM**

Topics of the presentation

- IARUMS R1 structure and member societies
- Short history
- Intruders – an overview
- Our possibilities
- Military transmissions
- Hard- and Software
- Information + Communication within IARUMS R1
- Must we modernize ?

The IARU Monitoring System (R1)

Structure:



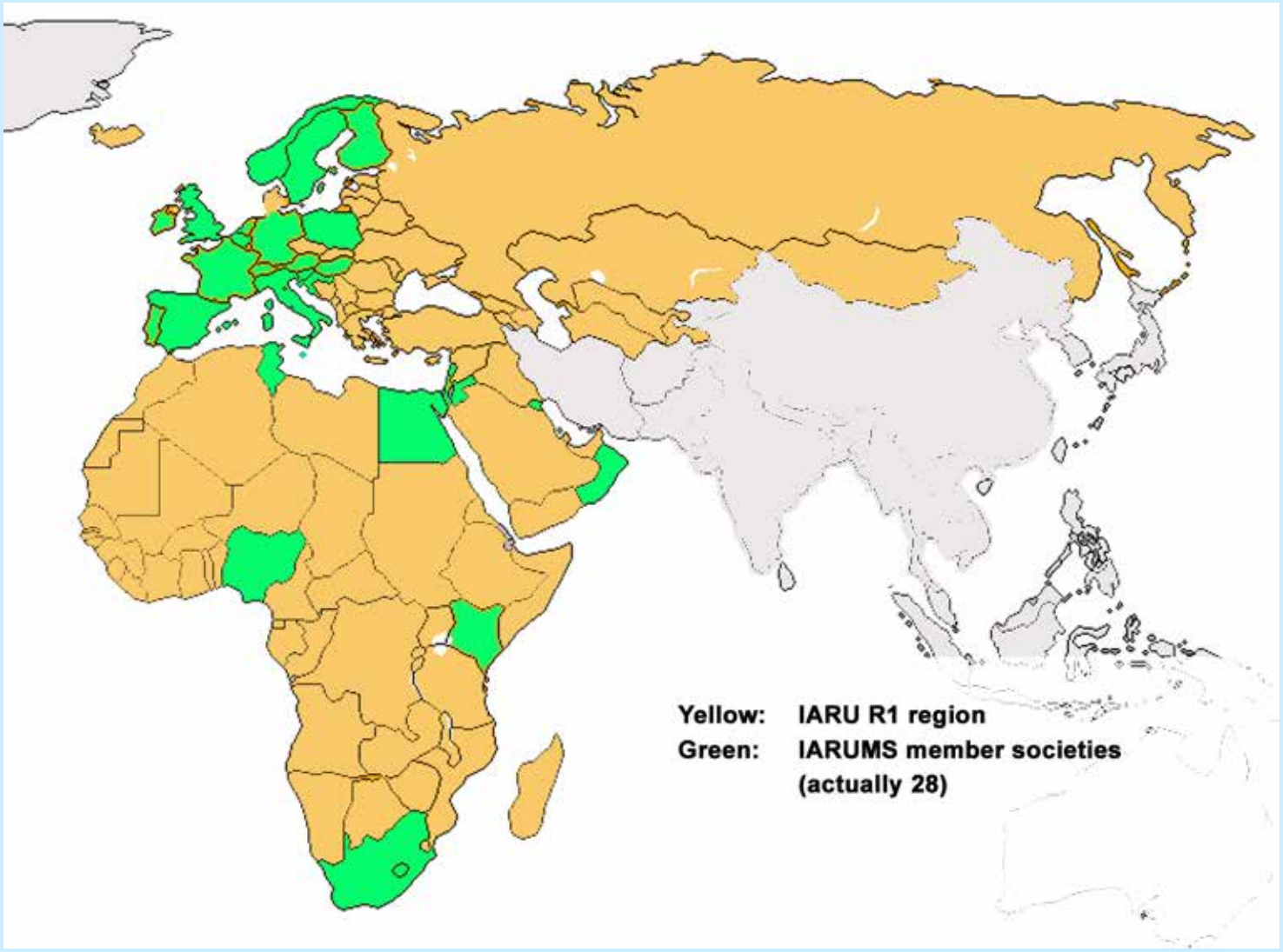
The R1 Monitoring Team

28 members, updated September 8th 2017

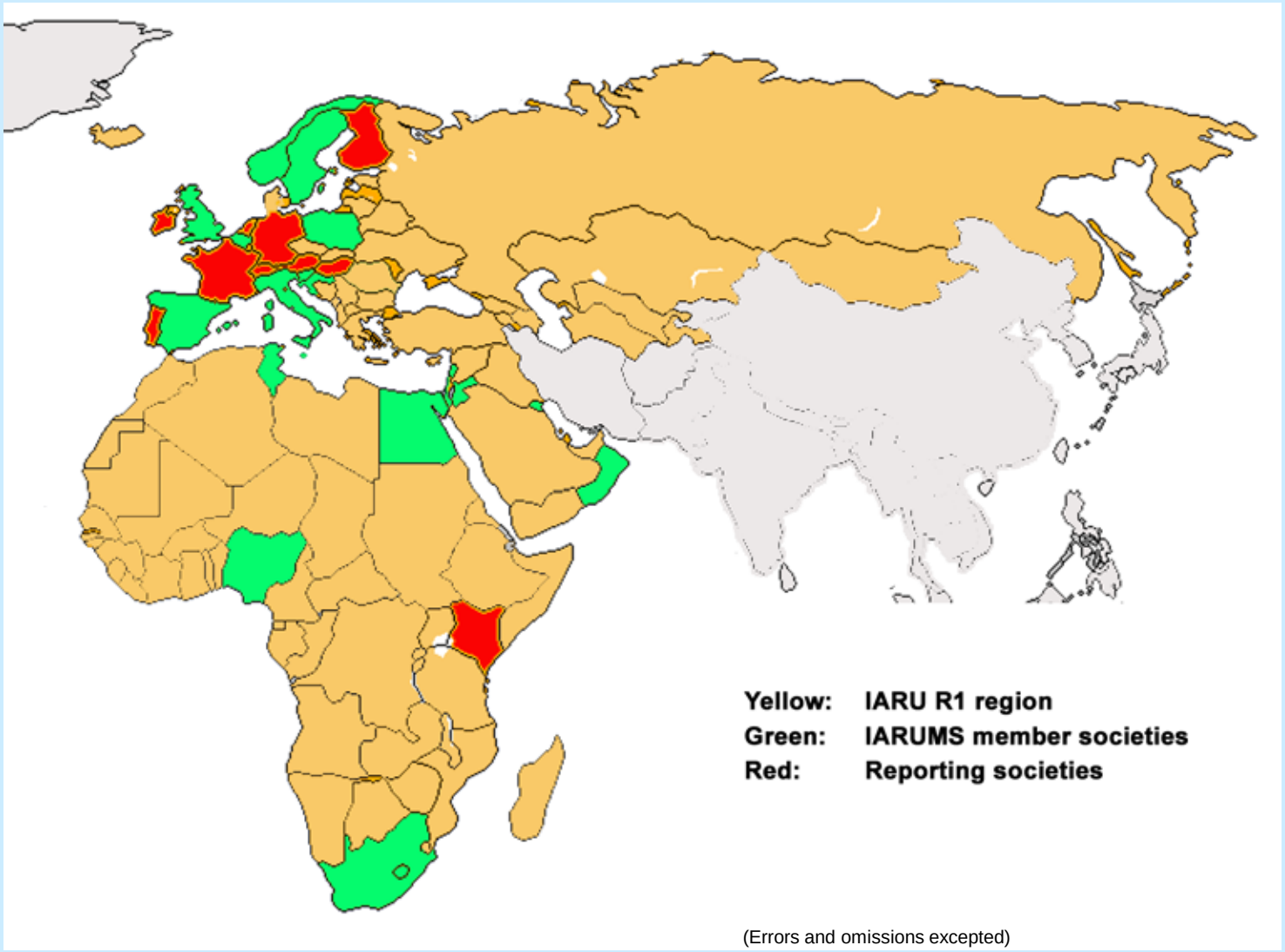
ARI	Italy	PZK	Poland
ARSK	Kenya	RSGB	Great Britain
ARAT	Tunisia	RAL	Lebanon
DARC	Germany	REF	France
EARA	Egypt	REP	Portugal
HRS	Croatia	ROARS	Oman
IARC	Israel	SARL	South Africa
IRTS	Ireland	SRAL	Finland
KARS	Kuwait	SSA	Sweden
MARL	Malta	USKA	Switzerland
MRASZ	Hungary	UBA	Belgium
NARS	Nigeria	URE	Spain
NRRL	Norway	VERON	Netherlands
OEVSV	Austria	ZRS	Slovenia

(Errors and omissions excepted)

IARUMS R1 today



IARUMS R1 today



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- Intruders are everywhere - overview
- Our possibilities
- Military transmissions
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- Information + Communication within IARUMS R1
- Must we modernize ?

History

Reason to found an **"Intruder Watch"** was the Cold War and it's high number of disturbing signals in our bands

History of IARUMS (R1)

- **1959** RSGB (Radio Society of Great Britain) started a national "**Intruder Watch**"
- **1966** ARI, OeVSV, SSA, RSGB, UBA and USKA agreed to exchange Intruder information's
- **1972** IARU R1 established an "**Intruder Watch** " (1982 renamed into IARU Monitoring System IARUMS - **why**?)
- **1999** IARU R1 Resolution 99-4 Lillehammer **"**Terms of reference for the IARU Monitoring System" defined the function of IARUMS
- **2011** IARU R1 **Resolution 11-1** Sun City (in force) Terms of reference for the IARU Monitoring System (replaced 99-4, some small modifications)

Our functions

(Based on the terms of reference)

- **We inform and report to the team-members and societies**
- **We are not a "Radio-Police" !**
- **We do not observe licensed Ham's !**
- **No ECM (electronic countermeasures)**
- **We do not jam ! (illegal)!**
- **We are not responsible for EMC matters**

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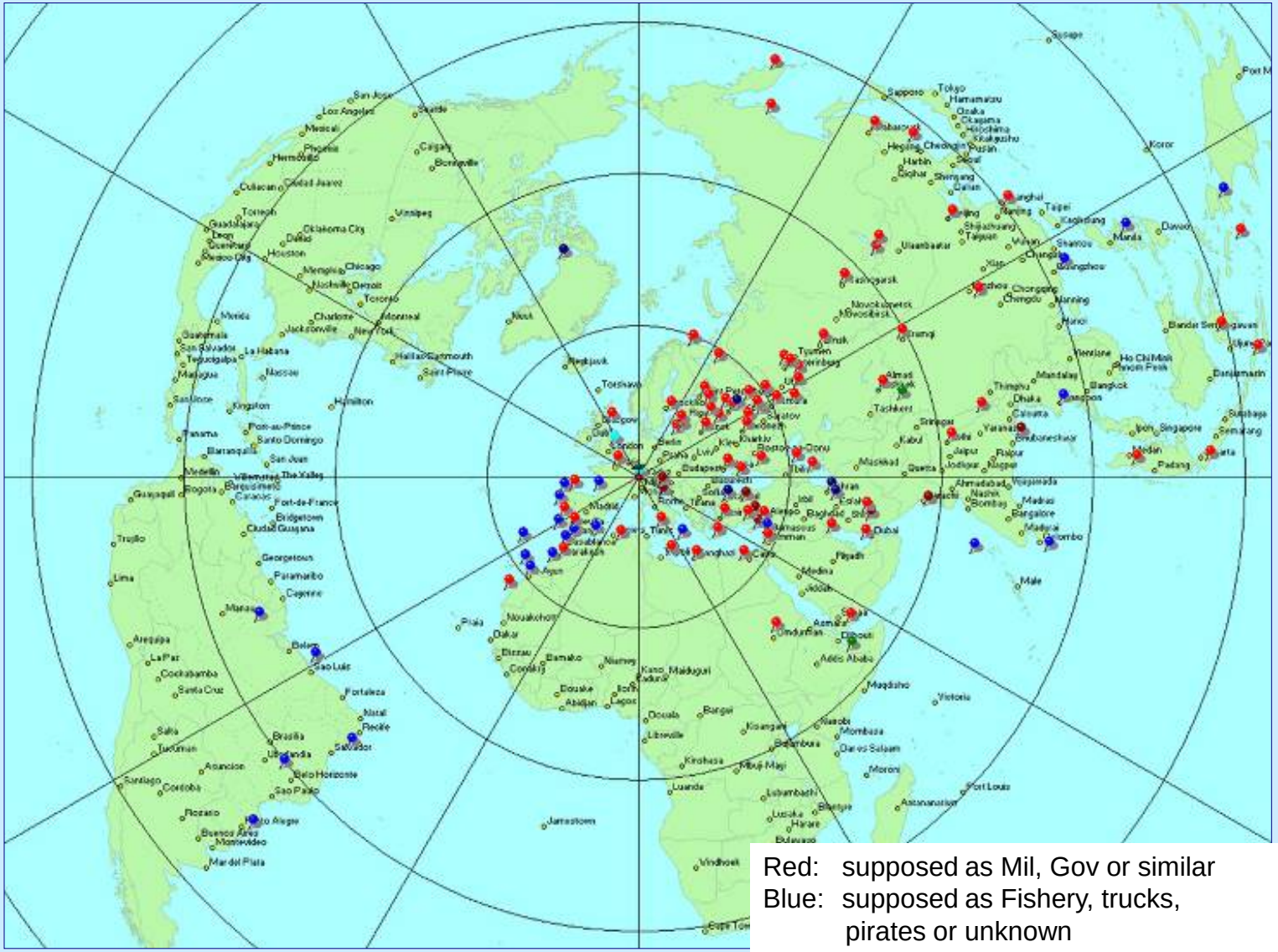
Intruders are everywhere



Red: supposed as Mil, Gov or similar
Blue: supposed as Fishery, trucks, pirates or unknown

(Errors and omissions excepted)

Intruder – who are these stations?

- **Military**
- **Fishery**
- **Taxi**
- **Radio-Pirates**
- **Broadcast**
- **Who else ?**

Big variety of intruder signals

- **Radiotelephony** in J3E, H3E R3E, F3E, Scrambler
- **Radio buoys in** FSK, PSK, A1A
- **Digital emissions**
  in FSK, MFSK, PSK, MPSK, OFDM
  - Military especially CIS States, seldom NATO
  - Many unidentified networks
- **OTHR radar systems** (**O**ver **t**he **H**orizon **R**adar)
  - Military (rapidly growing)
  - Civilian systems (e.g. marine research)
- **Radio broadcast stations**
- **IM Products + Splatter**

Fishery and other pirates

- Fishery and other pirates (e.g. truckers) are a problem in many parts of the world.

  They feel free to use any free frequency they find.

  They don't care who is the legal user of whatever frequency

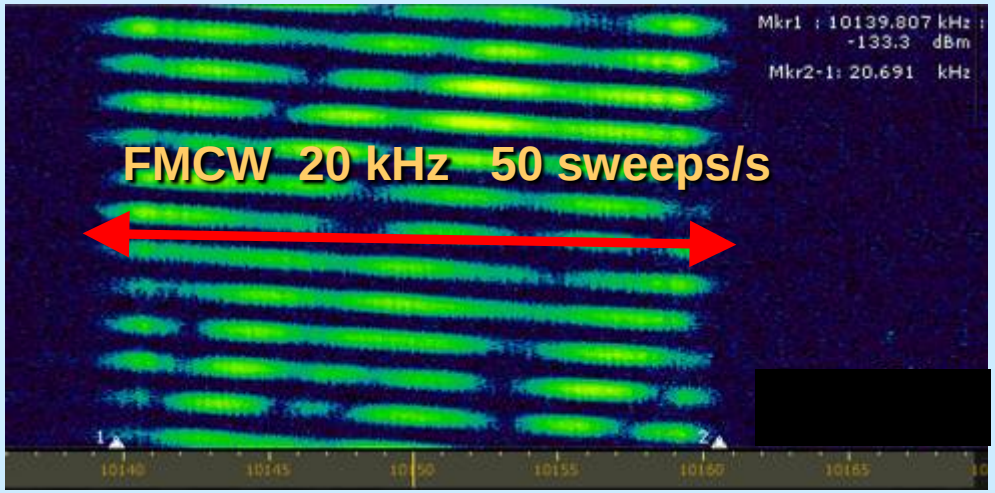
- It's not that they don't know it's illegal. Their typical view is that if nobody is using a frequency at a given time, why shouldn't they use it?

- They say that the marine bands are too crowded, so they prefer to use little-used frequencies - such as ours.

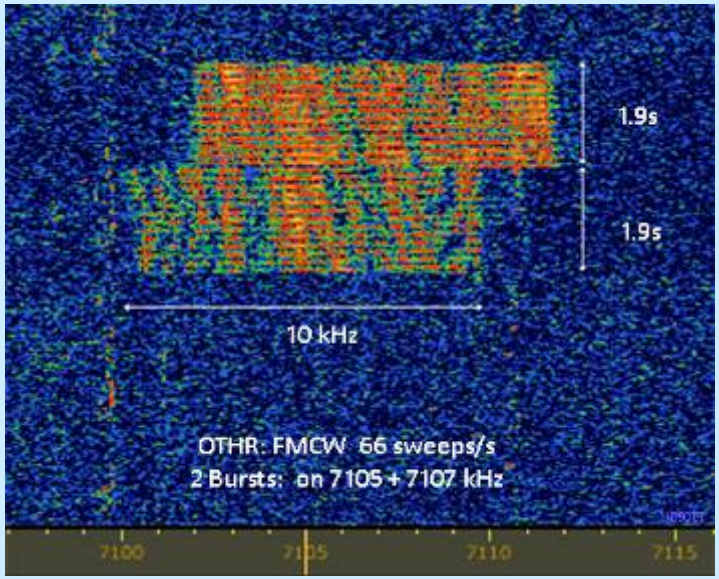
- If a frequency consistently has a high usage by its legal users, fishery and other pirates will avoid it.

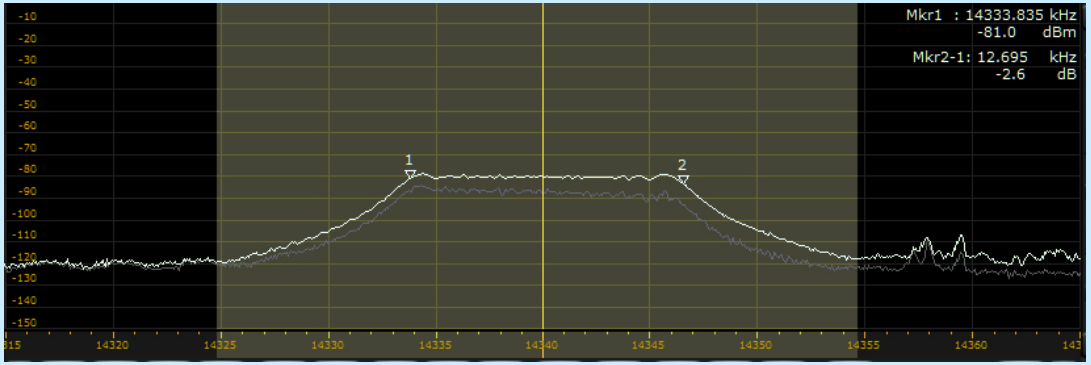
- **The only thing we can do would be to use our bands so intensely, that we crowd out the pirates. Unfortunately we don't have that level of activity.**

Bothersome OTHR Radar's

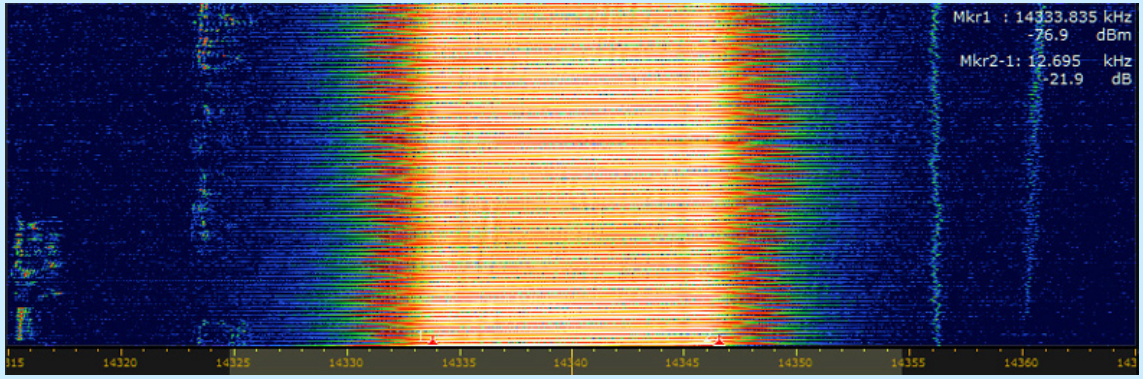


- Military systems from many states (rapidly growing)
- Civil research systems

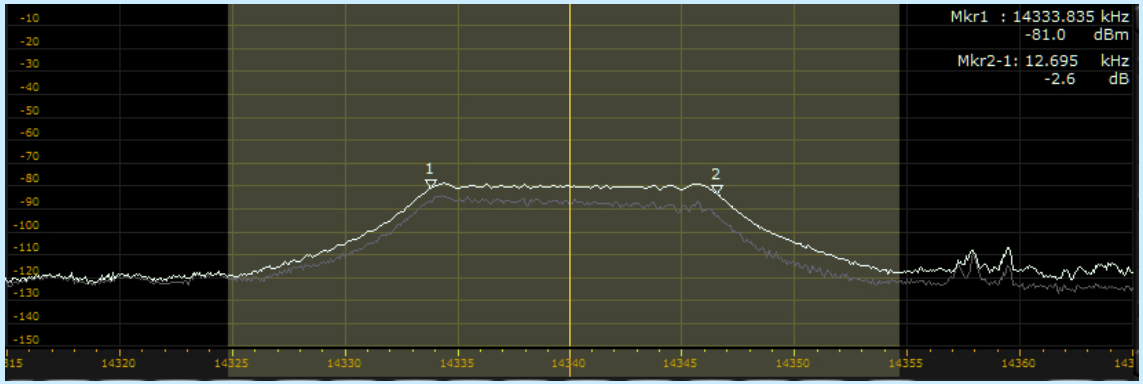




OTHR "Contayner 29B6" (RUS)



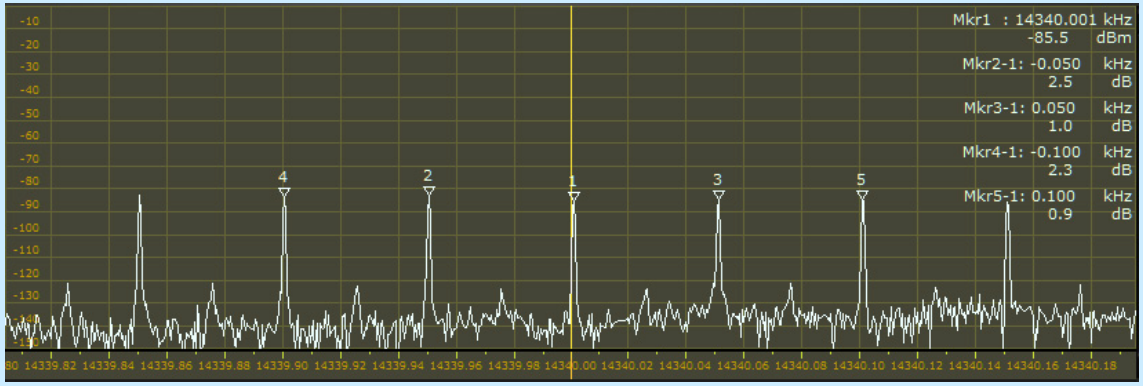
Sonagram



Spectrum

Bandwidth ~ 13 kHz

Disturbing > 30k



Sweeprate

50 sweeps/s FMCW

Screenshot Perseus SDR

OTHR "Contayner 29B6"

QTH: **Tx near Gorodets**

Rx near Kovylkino

(Greater area of Nishny Novgorod)

A next station is under construction in the Russian Far East.
It is expected that it will start operations in 2018.
It is assumed that more stations are planned

Sources : **IHS Jane's Defence Weekly; globalsecurity.org; wikipedia.org**

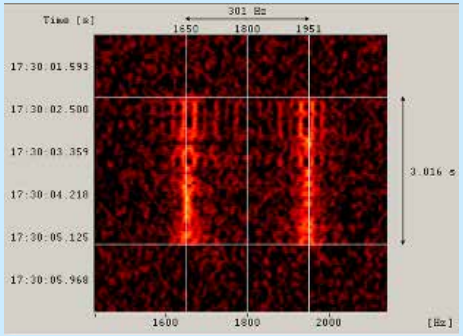
Radio Beacons on 10m

Oceanographical measuring buoys

Measures wave height, wave direction, surface current, water temperature etc.

GPS for buoy monitoring and tracking through Radio link

F1B 81.9 Baud 140Hz Shift

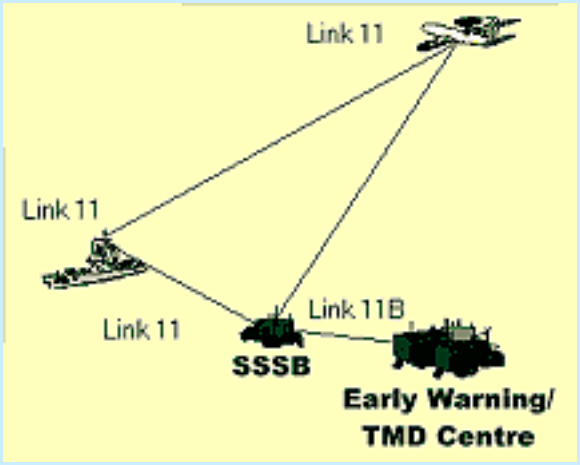


GPS Fishery buoys

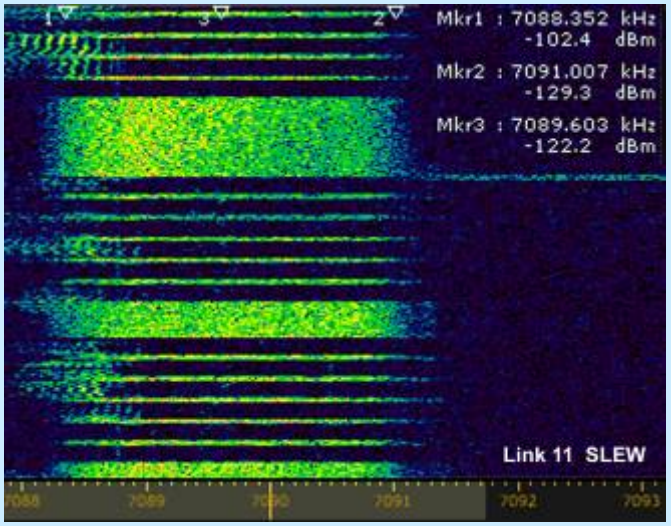
GPS position for tracking fishing nets, maybe other data

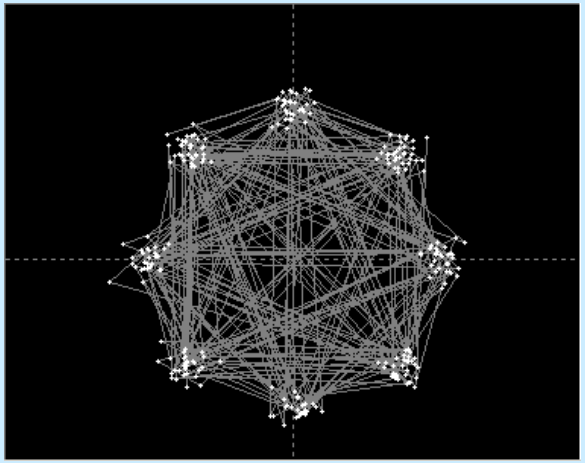
F1B 51 Bd 300Hz Shift
short bursts only

Link 11 SLEW



Link 11 SLEW, Single Ton 1800 Hz - 8-PSK modulated, ca. 2400 Hz wide, found in 40m and 20m band

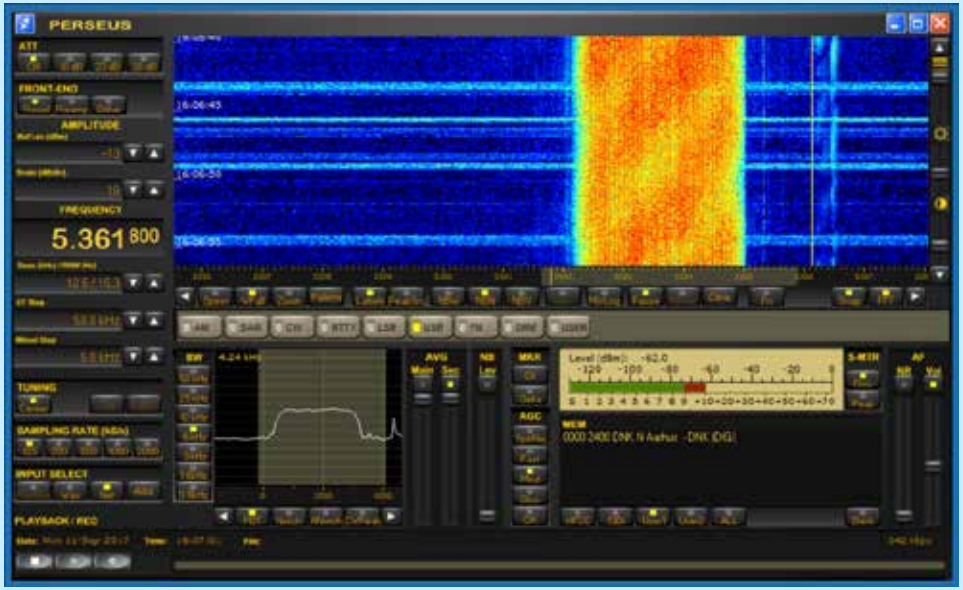


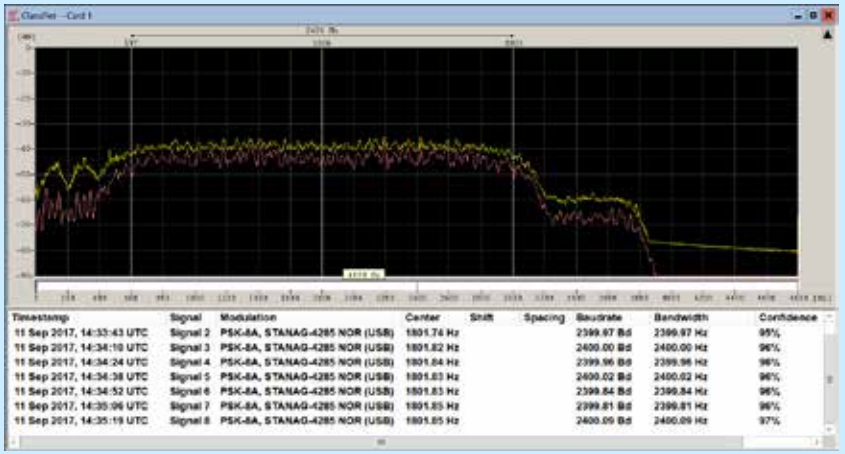


5361.8 kHz: This is NOT an Intruder

60m Band = Amateur only secondary !

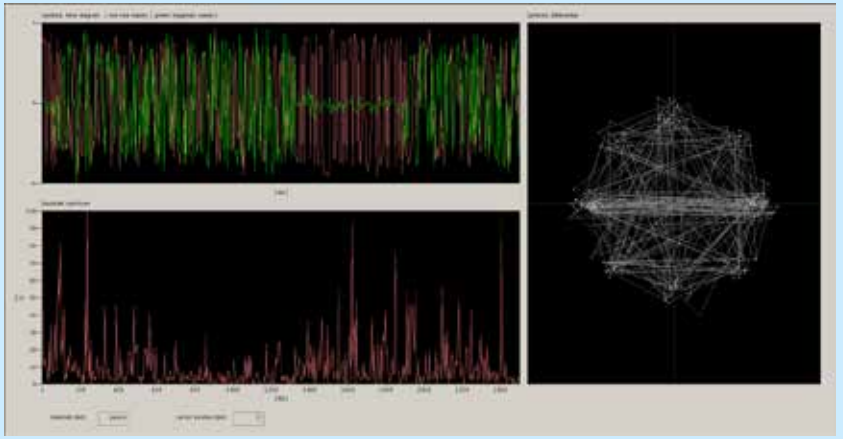
Live analyzis with W-Code Wavecom Decoder





Timestamp	Signal	Modulation	Center	Shift	Spacing	Baudrate	Bandwidth	Confidence
11 Sep 2017, 14:33:43 UTC	Signal 2	PSK-8A, STANAG-4285 NOR (USB)	1801.76 Hz			2399.97 Bd	2399.97 Hz	95%
11 Sep 2017, 14:34:10 UTC	Signal 3	PSK-8A, STANAG-4285 NOR (USB)	1801.82 Hz			2400.00 Bd	2400.00 Hz	96%
11 Sep 2017, 14:34:24 UTC	Signal 4	PSK-8A, STANAG-4285 NOR (USB)	1801.84 Hz			2399.96 Bd	2399.96 Hz	96%
11 Sep 2017, 14:34:38 UTC	Signal 5	PSK-8A, STANAG-4285 NOR (USB)	1801.83 Hz			2400.02 Bd	2400.02 Hz	96%
11 Sep 2017, 14:34:52 UTC	Signal 6	PSK-8A, STANAG-4285 NOR (USB)	1801.83 Hz			2399.84 Bd	2399.84 Hz	96%
11 Sep 2017, 14:35:06 UTC	Signal 7	PSK-8A, STANAG-4285 NOR (USB)	1801.85 Hz			2399.81 Bd	2399.81 Hz	96%
11 Sep 2017, 14:35:19 UTC	Signal 8	PSK-8A, STANAG-4285 NOR (USB)	1801.85 Hz			2400.09 Bd	2400.09 Hz	97%

Result from W-Code Classifier



W-Code Classifier Phase-Plane

QRG: 5361.8 kHz (VFO USB)

Mode: 1800Hz single tone 8-PSK modulated 2400Bd

Signal: STANAG 4285

From: Aarhus (Denmark) reported as DNK - NAVY

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Our possibilites

- **We only monitor, analyze and report to the authorities. They will continue to deal with the matter !**
  So it is very important that you have a good liaison to your OFCOM !

- **We do not have own IARU direction finders or tracking systems**

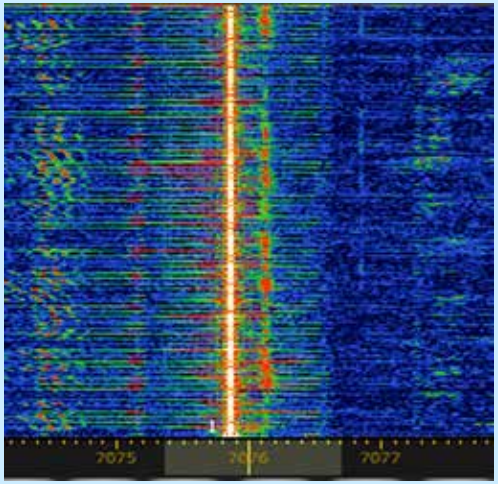
- **Neither Jamming systems nor any other counter measurements are allowed) !**

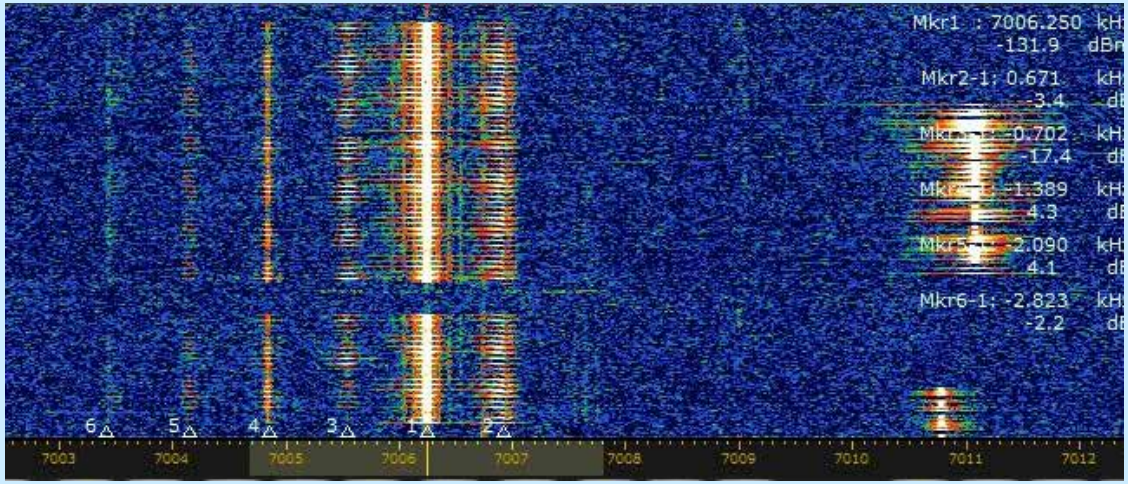
- **The only thing we can do is using our bands as intensely as possible.**

Don't jam !

- **Do not jam other emissions**
- Jamming is absolutely illegal + punishable **!**
- Neither for IARU Monitoring members nor private persons allowed **!**
- **The injustice of others does not create any right to brake the law !**

Screenshots shows a jammer (fast dots in A1A) over a F1B emission)





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ITU Convention: **Military transmissions**

ARTICLE 48: Installations for National Defense Services

Special Provisions for Radio rules in regard to transmissions from the military

202.1 ***Member States retain their entire freedom with regard to military radio installations !***

203.2 *Nevertheless, these installations must, so far as possible, observe statutory provisions relative to giving assistance in case of distress and to the measures to be taken to prevent harmful interference……. ".*

204.3 *Moreover, when these installations take part in the service of public correspondence or other services governed by the Administrative Regulations, they must, in general, comply with the regulatory provisions "*

Military transmissions (Radio Regulations)

ITU RR, European and national regulations are containing allocations (read also footnotes) which we have to observe:

- **European Common Allocation Table (ECA Table)**

RR Region 1 Allocation and RR footnotes applicable to CEPT	*European Common Allocation and ECA Footnotes*	*ECC/ERC harmonisation measure*	*Applications*	*Standard*	*Notes*
3500 kHz - 3800 kHz					
AMATEUR FIXED MOBILE EXCEPT AERONAUTICAL MOBILE 5.92	AMATEUR FIXED MOBILE EXCEPT AERONAUTICAL MOBILE 5.92 ECA36	ERC/REC 70-03	Amateur Inductive applications Land military systems Maritime communications Maritime military systems	EN 301 783 EN 300 330 EN 300 373	 Within the band 148.5 kHz - 30 MHz

ECA36	A frequency band, which has been harmonised by NATO and NATO member nations for military use as defined in the NATO Joint Civil/Military Frequency Agreement (NJFA) 2014. Note: A public version of the NJFA 2014 is expected to be provided by NATO to ECO by the end of 2016.

5.92	Some countries of Region 1 use radiodetermination systems in the bands 1606.5-1625 kHz, 1635-1800 kHz, 1850-2160 kHz, 2194-2300 kHz, 2502-2850 kHz and 3500-3800 kHz, subject to agreement obtained under No. 9.21. The radiated mean power of these stations shall not exceed 50 W.

Footnotes

ITU RR footnotes

40m Band: (7000-7050, 7100-7100, 7100-7200)

5.140	Additional allocation: in Angola, Iraq, Somalia and Togo, the frequency band 7000-7050 kHz is also allocated to the fixed service on a primary basis. (WRC-15)
5.141	Alternative allocation: in Egypt, Eritrea, Ethiopia, Guinea, Libya, Madagascar and Niger, the band 7000-7050 kHz is allocated to the fixed service on a primary basis. (WRC-12)
5.141A	Additional allocation: in Uzbekistan and Kyrgyzstan, the bands 7000-7100 kHz and 7100-7200 kHz are also allocated to the fixed and land mobile services on a secondary basis. (WRC-03)
5.141B	Additional allocation: in Algeria, Saudi Arabia, Australia, Bahrain, Botswana, Brunei Darussalam, China, Comoros, Korea (Rep. of), Diego Garcia, Djibouti, Egypt, United Arab Emirates, Eritrea, Guinea, Indonesia, Iran (Islamic Republic of), Japan, Jordan, Kuwait, Libya, Mali, Morocco, Mauritania, Niger, New Zealand, Oman, Papua New Guinea, Qatar, the Syrian Arab Republic, Singapore, Sudan, South Sudan, Tunisia, Viet Nam and Yemen, the frequency band 7100-7200 kHz is also allocated to the fixed and the mobile, except aeronautical mobile(R), services on a primary basis. (WRC-15)

Footnotes

ITU RR footnotes

20m Band: 14250-14350

5.152	Additional allocation: in Armenia, Azerbaijan, China, Côte d'Ivoire, Georgia, Iran (Islamic Republic of), Kazakhstan, Uzbekistan, Kyrgyzstan, the Russian Federation, Tajikistan, Turkmenistan and Ukraine, the band 14250-14350 kHz is also allocated to the fixed service on a primary basis. Stations of the fixed service shall not use a radiated power exceeding 24 dBW. (WRC-03)

17m Band: 18068 - 18168

5.154	Additional allocation: in Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, the Russian Federation, Tajikistan, Turkmenistan and Ukraine, the band 18068-18168 kHz is also allocated to the fixed service on a primary basis for use within their boundaries, with a peak envelope power not exceeding 1 kW. (WRC-03)

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SDR receivers – optimal for Monitoring

The numerous remote-controlled receivers, especially SDRs in networks are optimal for monitoring purposes, e.g.

- **Perseus** still phantastic !
- **Rfspace** various models
- **Winradio** various models
- **KiwiSDR**
- **Colibri SDR**
- **Web-SDR's** (e.g. Uni Twenthe)

- and many many others (rapidly growing)

Do you own a remote capable SDR ?

Please make it available on the network !

It is a valuable and very important tool for the monitoring system

Perseus remote network worldwide

The number of rx changes almost daily (40 - >60)

Inexpencive Software

It doesn't always have to be caviar

For many purposes, freeware or low-cost shareware programs are perfect, e.g. :

- **Spectran** http://www.sdradio.eu/weaksignals/spectran.html
- **Sigmira** www.saharlow.com/technology/sigmira
- **Signals Analyzer** http://signals.radioscanner.ru (not freeware)
- **MultiPSK** http://f6cte.free.fr
- **SpectrumLab** www.qsl.net/dl4yhf/spectra1.html
- **Audacity 2.1.x** http://www.audacityteam.org/download/
- **PC-ALE** http://hflink.com/pcale/

and many others (use search engines)

Professional Expert Software

Just a very small overview:

- **Wavecom** www.wavecom.ch
- **go2signals** www.procitec.de
- **Hoka** www.hoka.com
- **Krypto 500** www.comintconsulting.com/products
- **Medav** www.medav.de
- **Plath** www.plathgroup.com
- **Rohde & Schwarz** www.rohde-schwarz.de

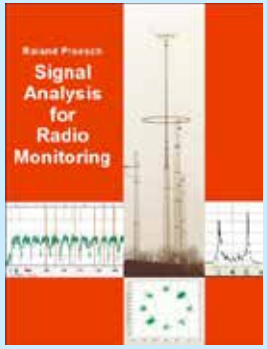
and many many others

But all not cheap !

Expert Literatur

Only a very small selection

- **R. Prösch DF3LZ**
  - **Technical Handbook for Radio Monitoring**
  - **Signal Analysis for Radio Monitoring**
  - **www.frequenzmanager.de/th.html**
- **Ch. Rauscher** (Rohde & Schwarz)
  - **Fundamentals of Spectrum Analysis**
  - Book; as PDF free of charge at: **www.heuermann.fh-aachen.de** ¢ Diverse
- **Nils Schiffhauer DK8OK**
  - **Many books and youtube videos**
  - **Professioneller Kurzwellenfunk**
  - **Kurzwellenempfang heute**
- **Dave Adamy**
  - **Electronic warfare (several books)**
  - **EW 101, EW 102, EW 103**; and more



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IARU MS Informations

Many Informations may be found here:

- **IARUMS R1 + DARC** **www.iarums-r1.org**

- **IARU Monitoring System:**

  - www.iaru-r1.org > **Monitoring System**

  - www.iaru-r2.org > **Monitoring System** (temporarily offline)

  - www.iaru-r3.org > **Monitoring System**

Reports

We publish:

- Latest News:
- Monthly Newsletter

Sent by e-mail as pdf to many recipients and also available from IARUMS Homepage as free download

Similar from R3 at IARUMS R3 website

kHz	UTC	DD	MM	ITU	IDENT	MODE	BD	SH	DETAILS
7000.0	1604	10	12			J3E-U			spanish, several stations
7000.0	1655	10	12		T3Z	MFSK8	125	1750	MIL 188-141A, ALE

- Informative but static and rapidly outdated
- No analyzes, no statistics possible
- Should be modenized

Information exchange by E-Mail

- **intruderalert @ iaru-r1.org**
  goes to all coordinators and many other interested persons

- **iarums-coordinators @ iaru-r1.org**
  goes only to the R1 coordinators

- E-Mail adresses of all R1 coordinators are published under https://www.iarums-r1.org/

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Must we modernize ?

e.g.

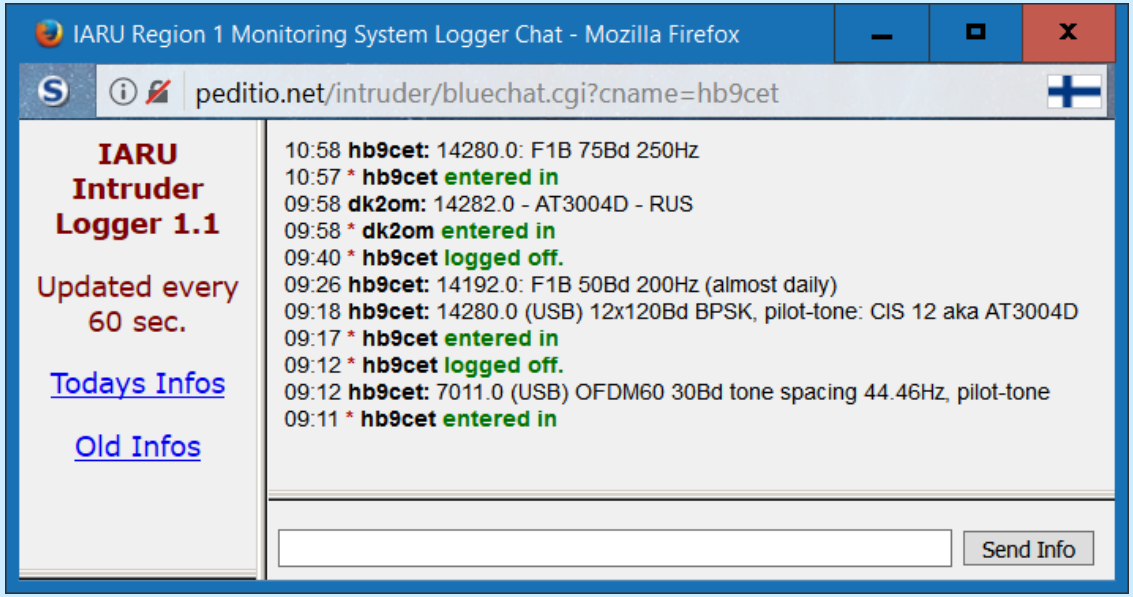
- **Datasharing e.g. via a dropbox (pictures, audio and/or I/Q-files etc.)**
- **Social media like Twitter, yahoo group, or many others ?**
- **Skype meetings (like the EMC working group does) ?**
- **Other modern possibilities ?**

Must we modernize ?

My idea: a real-time online Logger and Intruder Database
(with the structure as our written monthly reports)

What we have today:

- **Reports as pdf (from Word)**
- **Online Logger http://peditio.net/intruder/bluechat.cgi excellent but text only, not analyzable, no search**
- **Only a few coordinators use it L**



Must we modernize ?

Why do we need it ?

Many amateurs and even coordinators are aware that they are suffering from strange signals but have difficulties to identify a signal.

A modern online Logger combined with a real-time database could be very helpful.

Viewable for everybody (but editable only for registered users)

Advantages :

- **always up to date (if we all make our real-time entries !)**
- **fully sortable**
- **allowing individual statistics**
- **various filters**
- **access user Id + password protected (on various levels, different rights)**

Not easy to build up, we need some IT assistance and probably also some money from IARU (or a sponsor) Who may help?

Must we modernize ?

Discussion

Personal information

- We, Wolfgang Hadel and I agreed, that we will continue together in our functions for the next years as long as health permits.

Wolfgang Hadel,	DK2OM	IARUMS Coordinator
Peter A. Jost,	HB9CET	IARUMS Vice-Coordinator

We cannot do everything alone. If we will realize a modernization, we need also expert support – please assist us !

- Peter, HB9CET also continues as USKA Monitoring Coordinator

The End

Many thanks for your interest and attention

