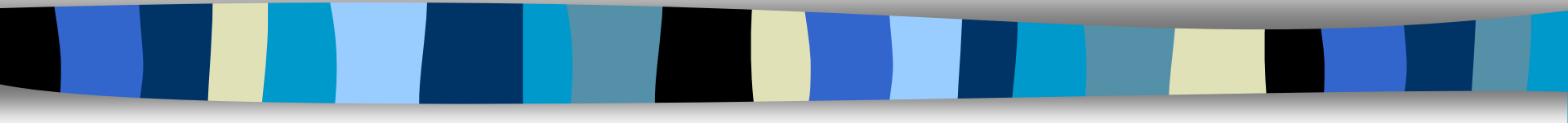


S53WW

TK0C 2016 – kako in zakaj tako!



RIS 2017

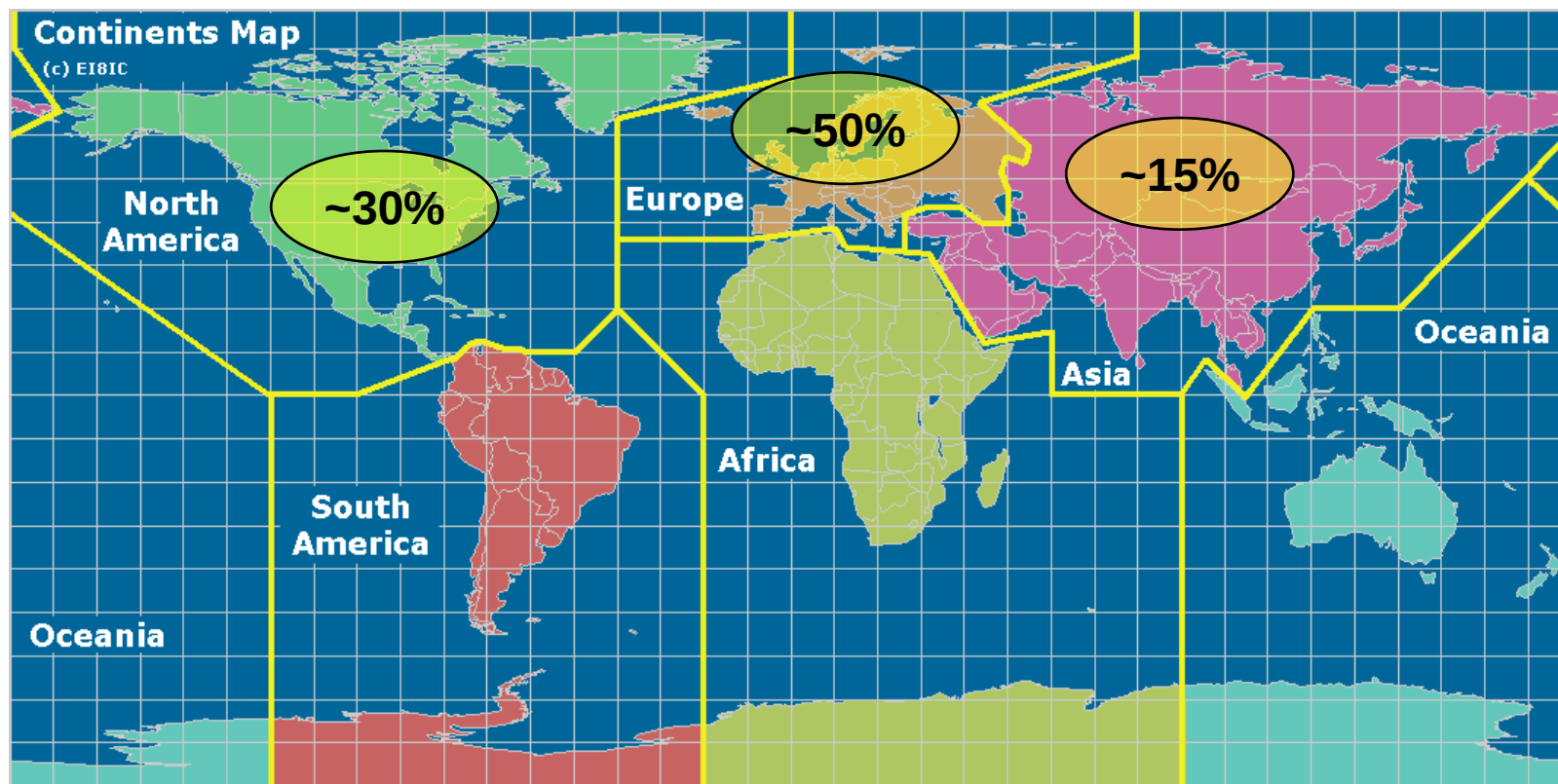
Ljubljana

04.02.2017

CQ WW DX točkovanje:

- zveza z istim kontinentom 1 točka
- zveza z drugim kontinentom 3 točke
- množilci so DXCC in CQ cone

➤ **Rezultat = število točk * število množilcev**

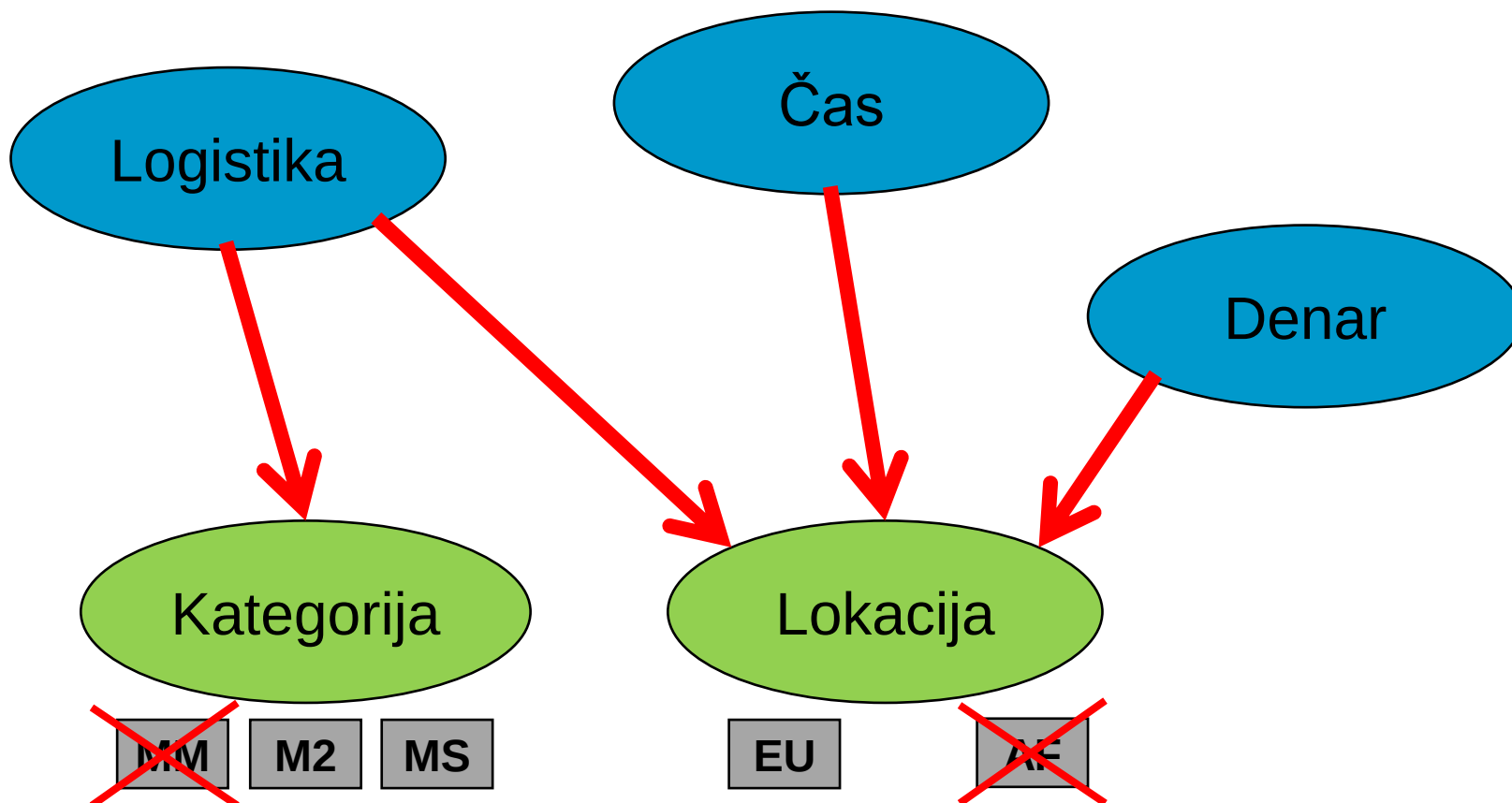


Vrsta odprave:

- „Greenfield“: elektrika + kabelski internet

Omejitve:

- Logistika: en kombi in največ 2 avtomobila
- Čas: manj kot 10 dni
- Denar: manj kot 500€ na osebo

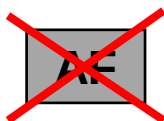


10 OPS / 9 dni



Lokacija

EU



en kombi



Korzika - redek množilec in polno morja

dva avta



„Greenfield“





~~MM~~

M2

MS

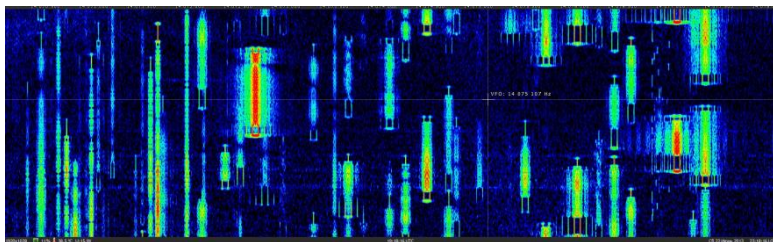
- Dva banda naenkrat
- Pravilo 8x menjave banda na uro

- En band naenkrat
- Ena MULT postaja
- 10 minutno pravilo

Kako narediti čimveč zvez in čimveč množilcev?



čas



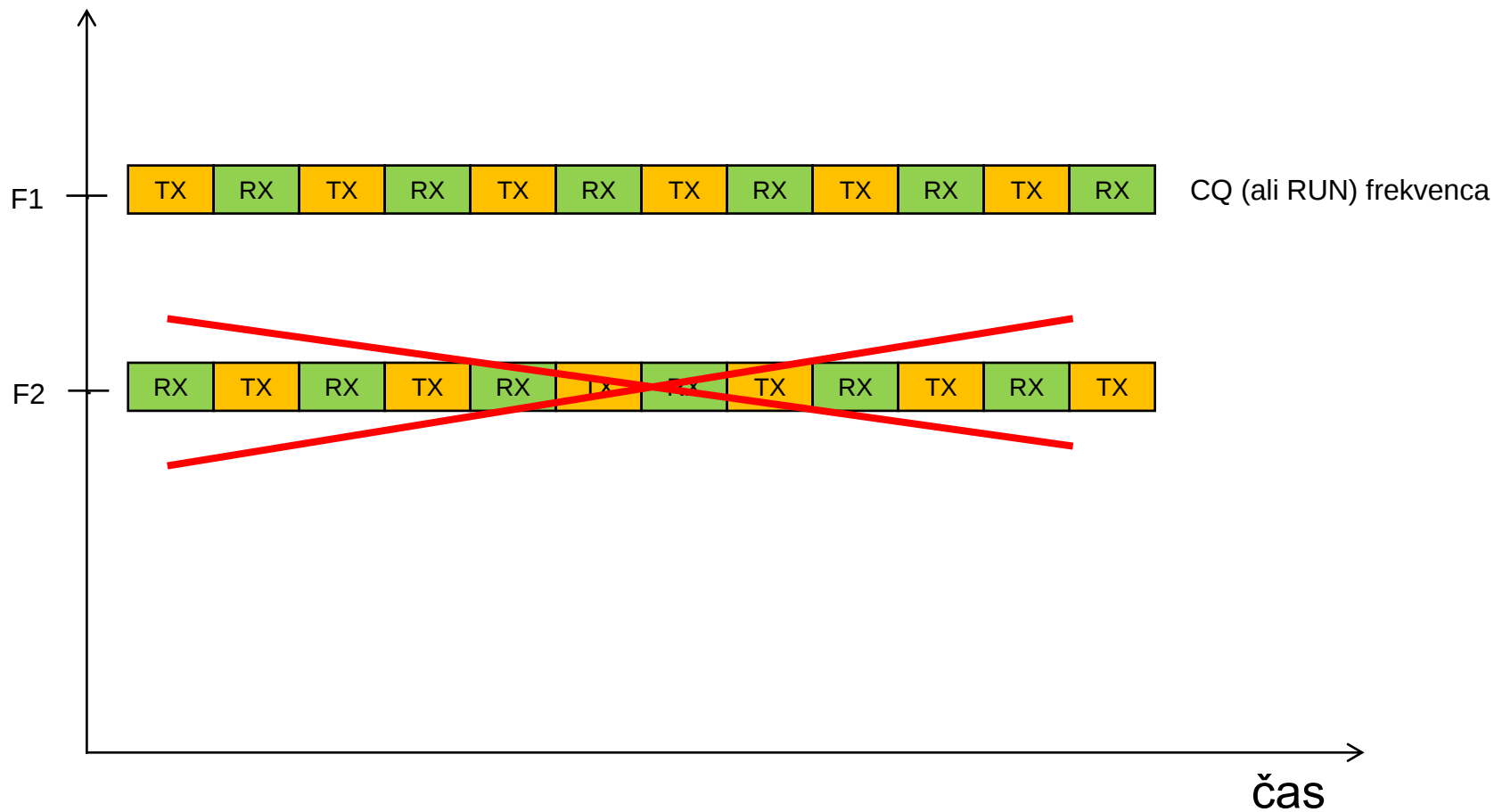
frekvenca



prostor

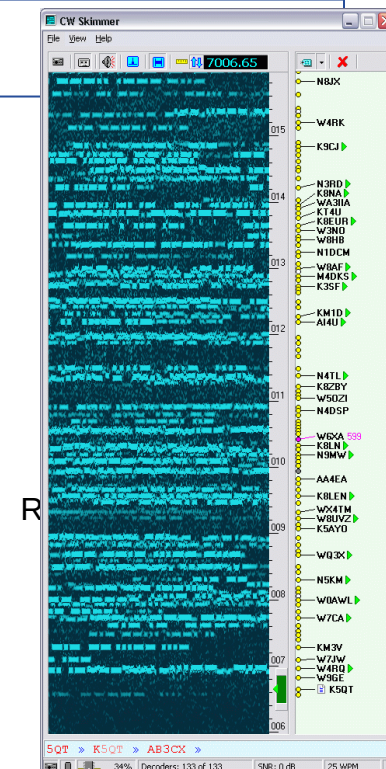
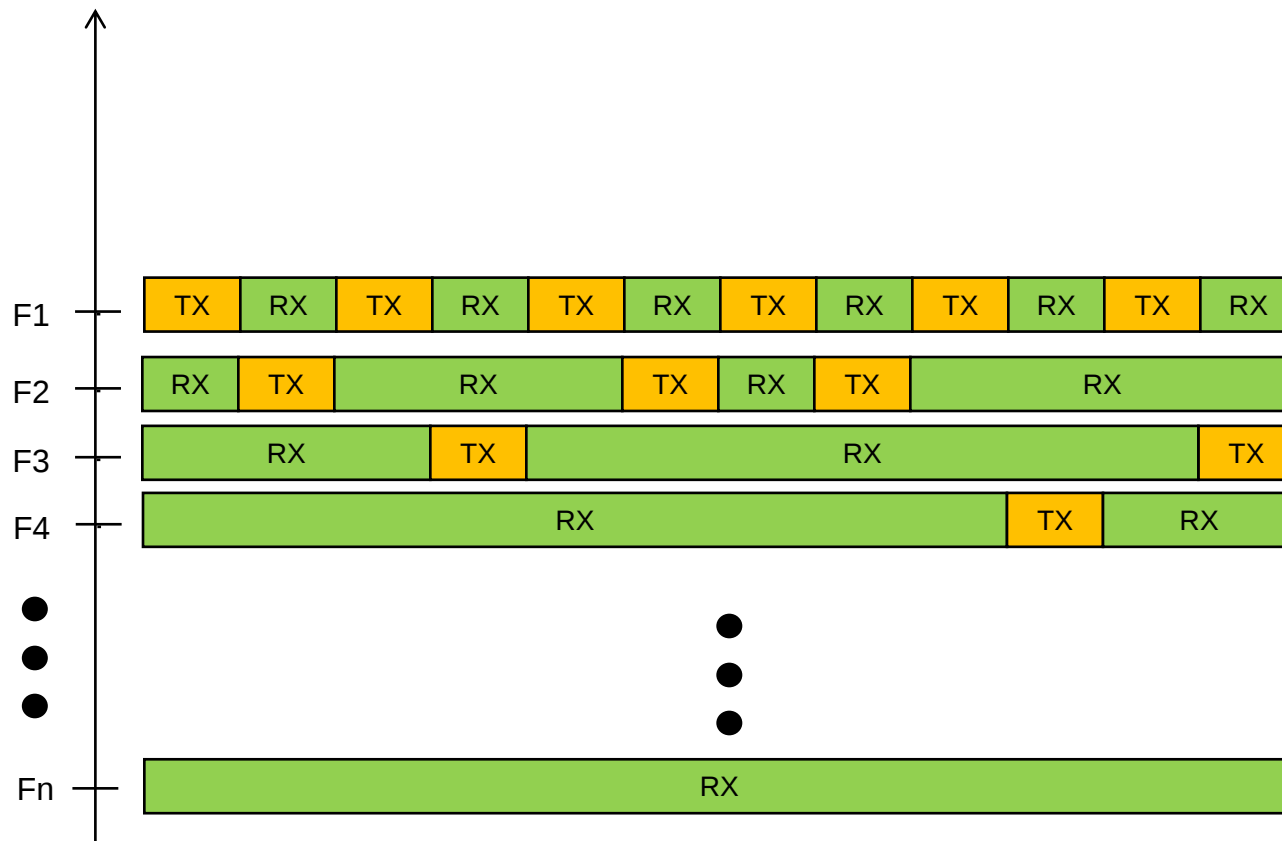
Frekvenčno-časovni prostor

frekvenca



Frekvenčno-časovni prostor

frekvenca



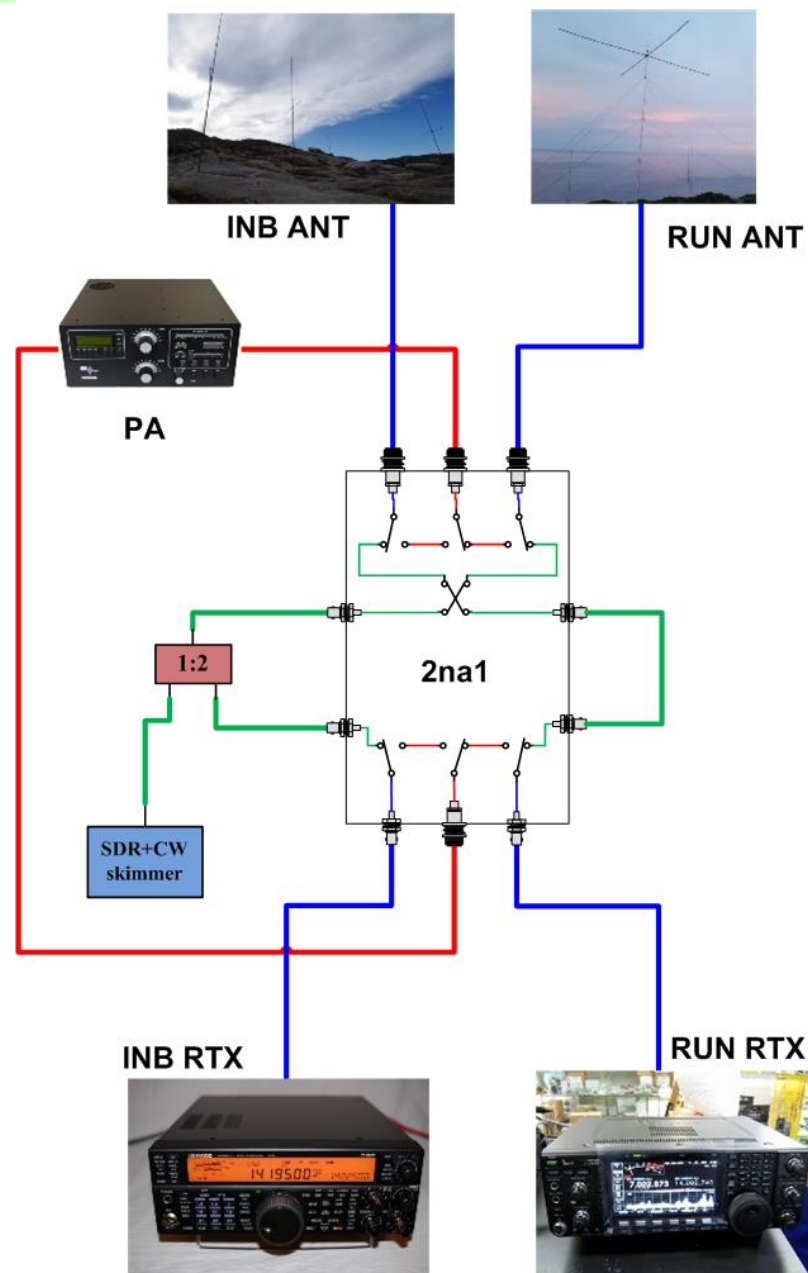
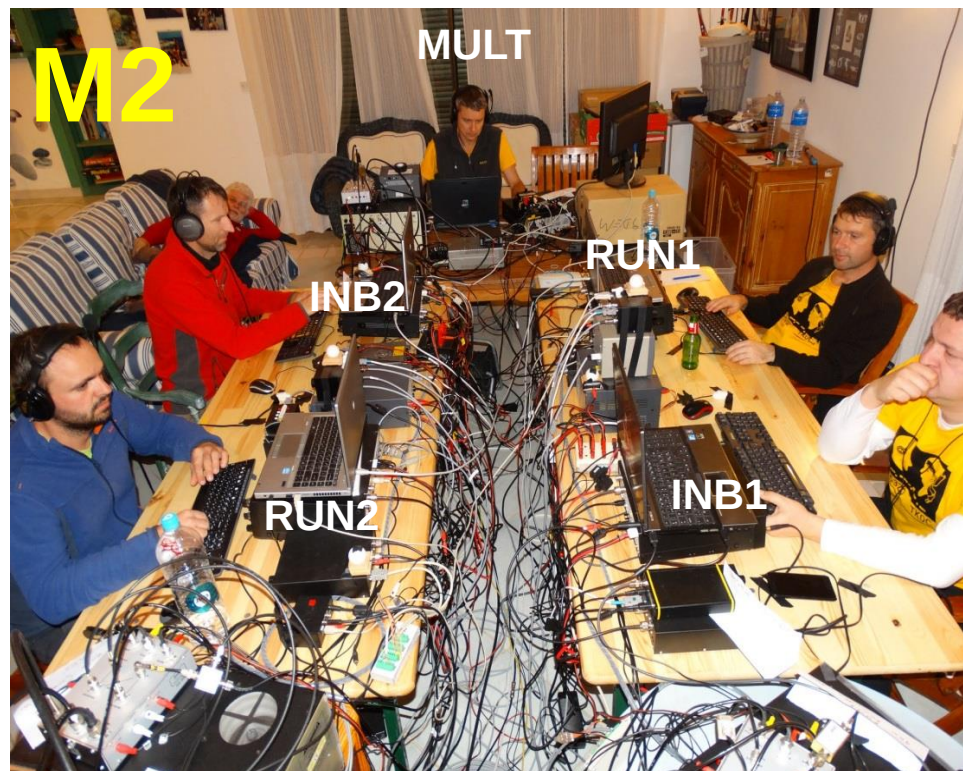
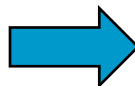
INBAND postaje

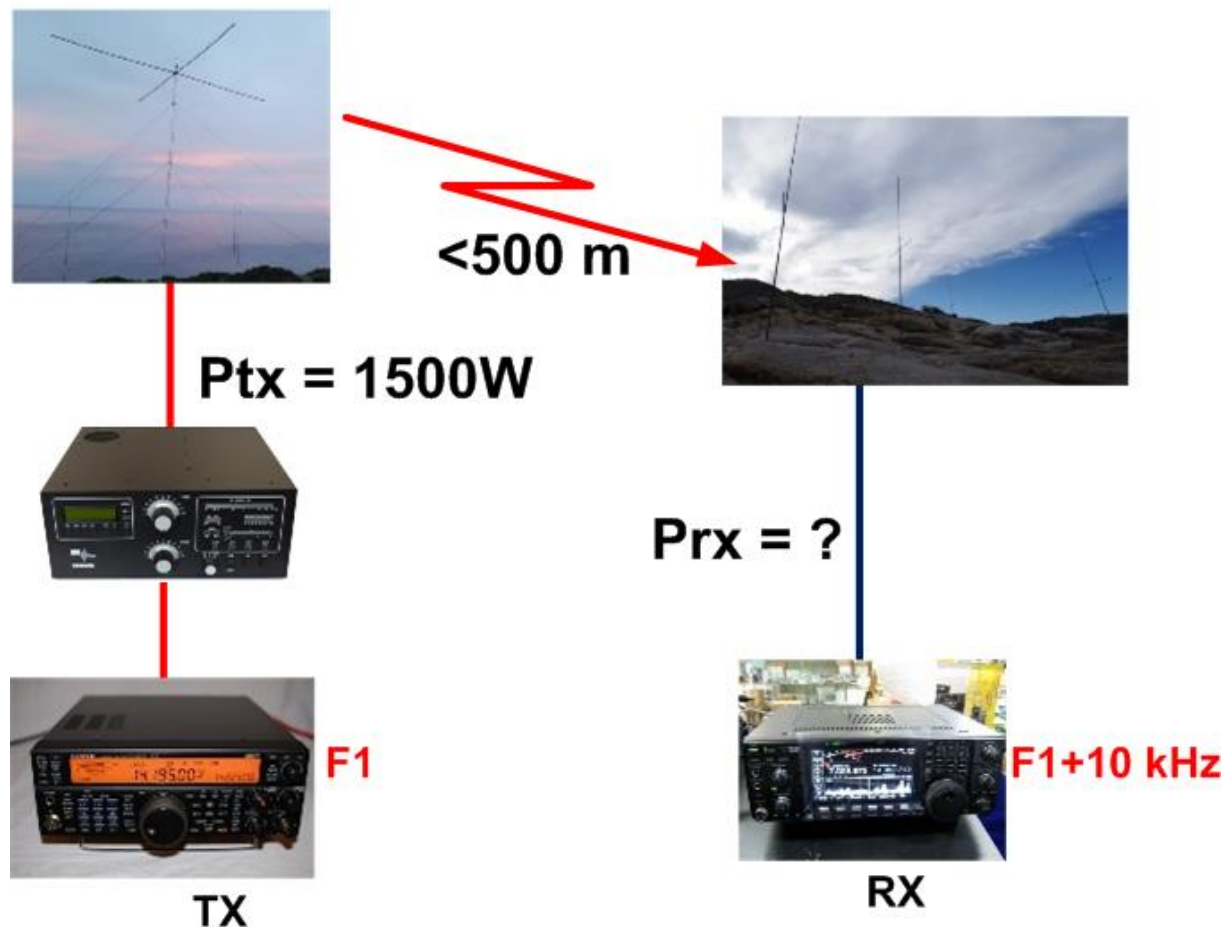
čas

100 kHz banda in 500 Hz kanali → 200 frekvenčnih kanalov
→ 1 RUN + 199 INBAND postaj

Osnovna postavitev (2x):

- RUN postaja
- 1x INBAND postaja
- Skupen PA
- RUN antenna
- INBAND antenna
- SDR+CW Skimmer
- 2na1 (QSO generator) box





Izolacija med dvema dipoloma na razdalji 10 valovnih dolžin je okrog 40dB.

Je 40 dB dovolj?

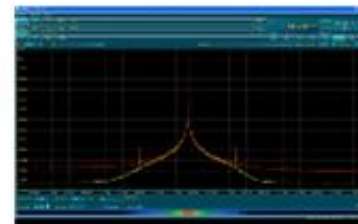
Podvojitve razdalje prinese samo cca. 6 dB dodatne izolacije!

Je 46 dB dovolj?

Meritev relevantne izolacije?



Ptx = 10W



SDR sprejemniki zelo natančno merijo nivo vhodnega signala.
$$\text{Izolacija (dB)} = 40\text{dBm} - \text{Prx(dBm)}$$

Kaj torej pravi sprejemnik?

S kakšnim nivojem ga skurimo?

Primer:

- 1500 W oddajne moči
- 40 dB izolacije med antenama (faktor 10000)
- **Prx = 0,15 W (= S9 + 95 dB)**



Je +22 dBm (150 mW) na vhodu v sprejemnik preveč?

- Le do okoli cca. 1 mW sprejemnik še deluje v linearnem načinu (brez ATT in LNA)
- 150 mW verjetno sprejemnika še ne poškoduje (je pa močno prekrmljen!)

ARRL izvaja meritve do +10 dBm, RSGB do +20 dBm.

Kako ocenimo kako močan signal še prenese naša postaja?

Relevanten podatek je „Blocking dynamic range“.

TS-590s@5kHz: -131 + 141 = +10 dBm

Receiver Dynamic Testing

Noise floor (MDS), 500 Hz bandwidth,
default roofing filter:*

	Preamp Off	Preamp On
0.137 MHz	-130 dBm	-137 dBm
0.505 MHz	-132 dBm	-140 dBm
1.0 MHz	-114 dBm	-122 dBm
3.5 MHz	-130 dBm	-139 dBm
10.1 MHz	-132 dBm	-139 dBm
14 MHz	-131 dBm	-139 dBm
28 MHz	-133 dBm	-143 dBm
50 MHz	-130 dBm	-143 dBm

Gain compression, 500 Hz bandwidth,
default roofing filter:*

	20 kHz offset Preamp off/on	5/2 kHz offset Preamp off
3.5 MHz	140**/136 dB	140**/120 dB
10.1 MHz	138/136 dB	125/111 dB
14 MHz	141**/136 dB	141**/121 dB
28 MHz	140/120 dB	125/109 dB
50 MHz	130**/141 dB	130**/127 dB

**Exceeded figures indicated; test results shown measured with +10 dBm maximum output from test fixture.

IC-7600@5kHz: -131 + 113 = -18dBm

IC-7600@20kHz: -131 + 121 = -9dBm

Receiver Dynamic Testing

Noise floor (MDS), 500 Hz bandwidth:

	Preamp off	1	2
0.137 MHz	-124	-126	-129 dBm
0.505 MHz	-130	-138	-141 dBm
1.0 MHz	-130	-138	-141 dBm
3.5 MHz	-131	-139	-141 dBm
14 MHz	-131	-139	-141 dBm
50 MHz	-132	-141	-143 dBm

Gain compression, 500 Hz bandwidth*

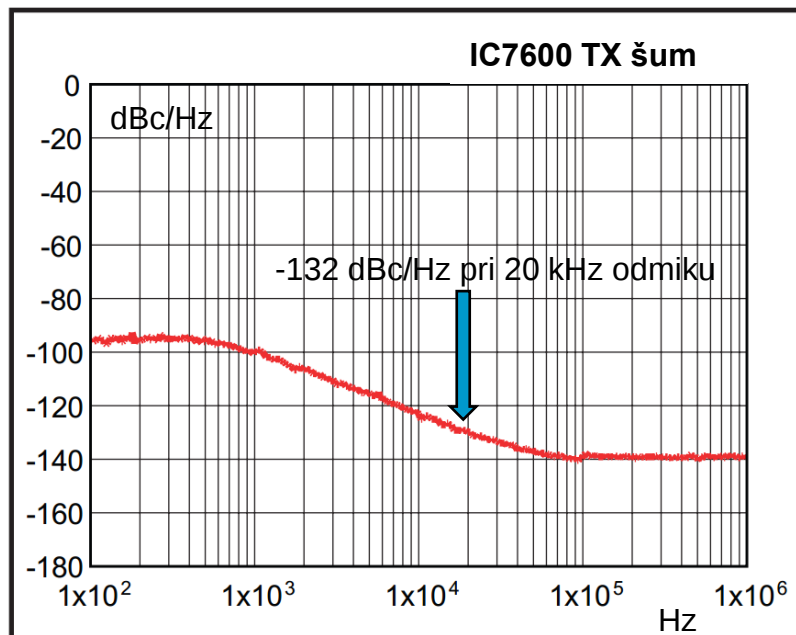
	20 kHz offset Preamp off/1/2	5/2 kHz offset Preamp off
3.5 MHz	121/122/117 dB	111/99 dB
14 MHz	122/123/120 dB	113/102 dB
50 MHz	119/121/120 dB	105/98 dB

	RECIPROCAL MIXING 500Hz BW			BLOCKING PREAMP OFF		
FREQUENCY OFFSET	Rx1 1.9MHz	Rx1 21MHz	Rx2 16MHz	Rx1 2.7kHz ROOF	Rx1 500Hz ROOF	Rx2 2.7kHz FILTER
1kHz	95dB	89dB	AGC blocks	-77dBm	noise limited	-80dBm
2kHz	98dB	95dB	79dB	-45dBm	+15dBm	-43dBm
3kHz	104dB	98dB	83dB	-16dBm	+15dBm	-12dBm
5kHz	112dB	107dB	87dB	> +20dBm	+16dBm	-6dBm
10kHz	117dB	111dB	98dB	> +20dBm	> +20dBm	+2dBm
15kHz	117dB	113dB	104dB	> +20dBm	> +20dBm	+8dBm
20kHz	119dB	115dB	106dB	> +20dBm	> +20dBm	+10dBm
30kHz	119dB	116dB	108dB	> +20dBm	> +20dBm	+11dBm
50kHz	119dB	118dB	110dB	> +20dBm	> +20dBm	+12dBm
100kHz	119dB	119dB	112dB	> +20dBm	> +20dBm	+13dBm

TS-590s@5kHz: >+20 dBm

Kaj pa fazni šumi?

- Oddajni šum → odvisen od faznega šuma TX LO
 - Recipročno mešanje → odvisno od faznega šuma RX LO
- Oba pojava dvigata šum sprejemnika



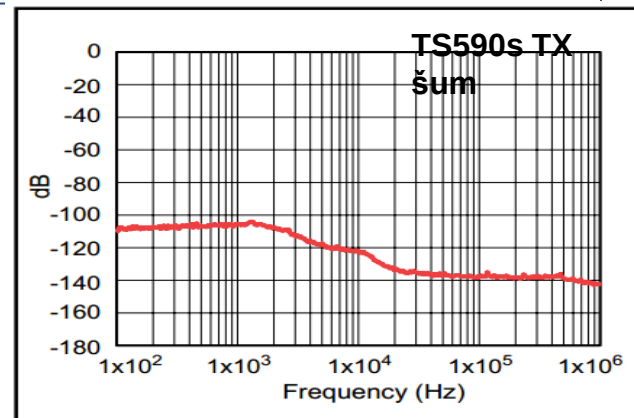
20 kHz odklik:

$P_{rx} = -9 \text{ dBm}$ (1 dB gain compression)

$P_{\text{šum}} = -9 - (132 - 27) + 3$

$= -114 \text{ dBm} \rightarrow \sim S2$

Kar je 17 dB nad šumom sprejemnika!



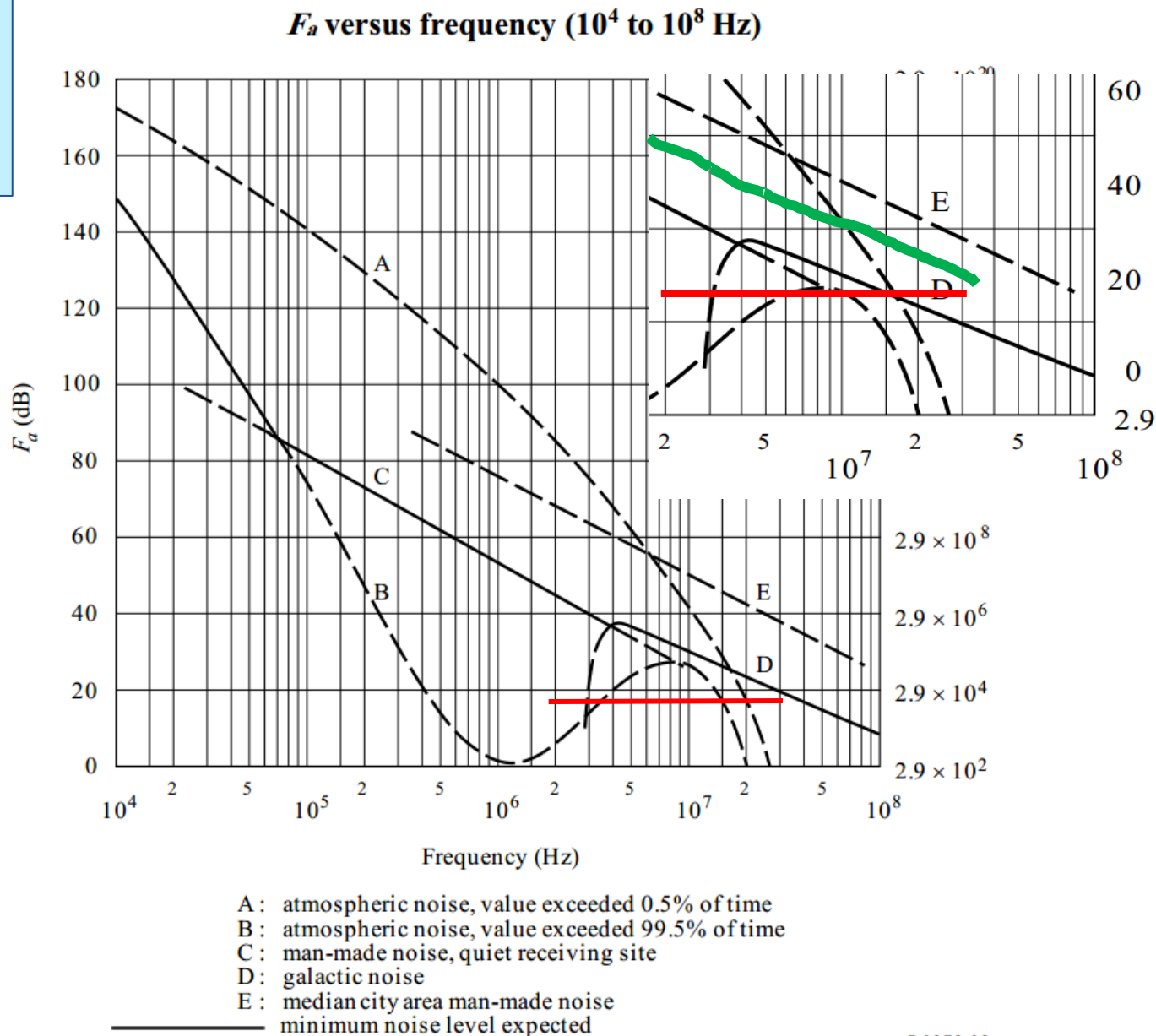
Reciprocal mixing (500 Hz BW): Not specified. 20/5/2 kHz offset: -105/-91/-82 dBc.

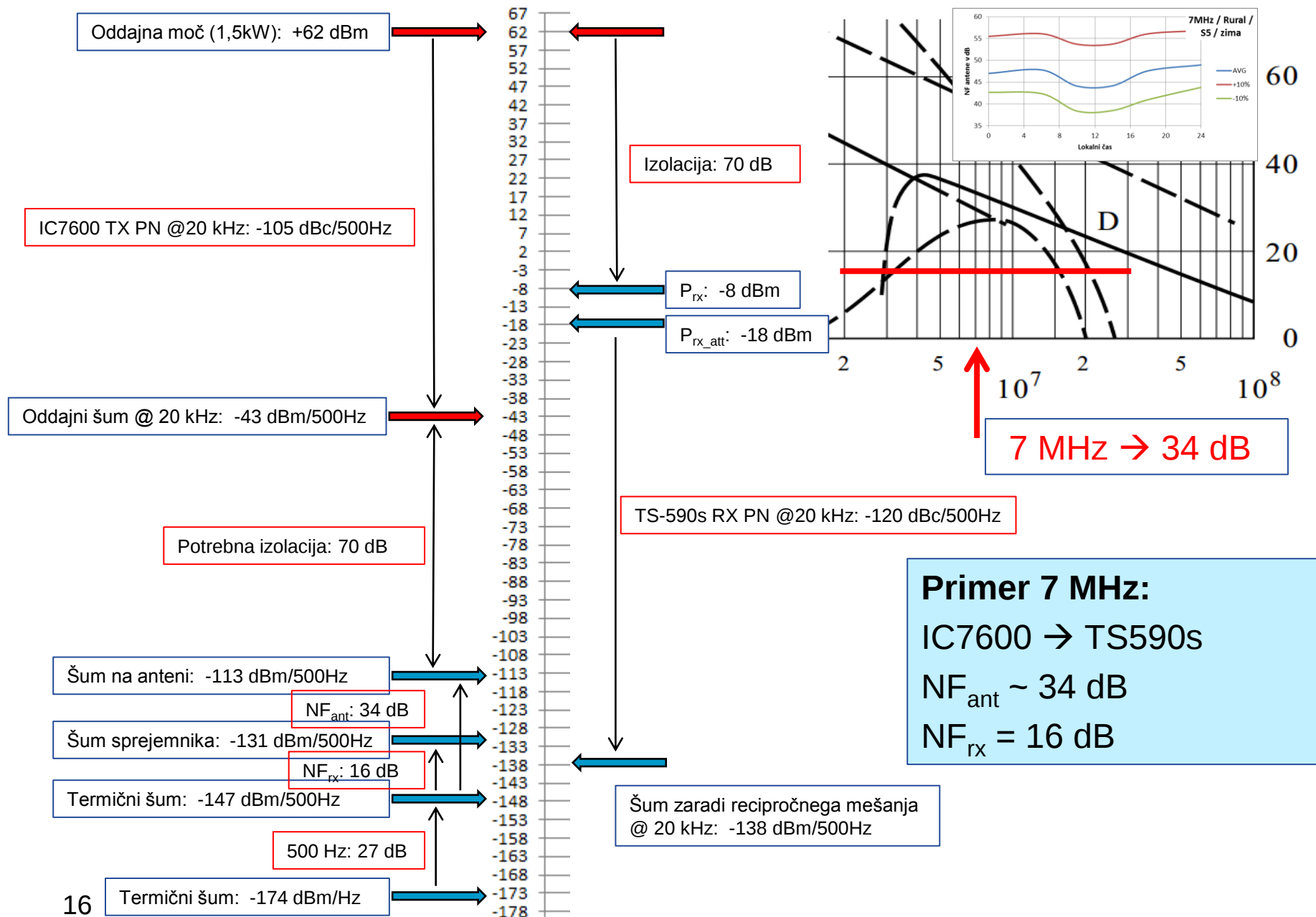
Reciprocal mixing (500 Hz BW): Not specified. 20/5/2 kHz offset: -120/-106/-91 dBc.

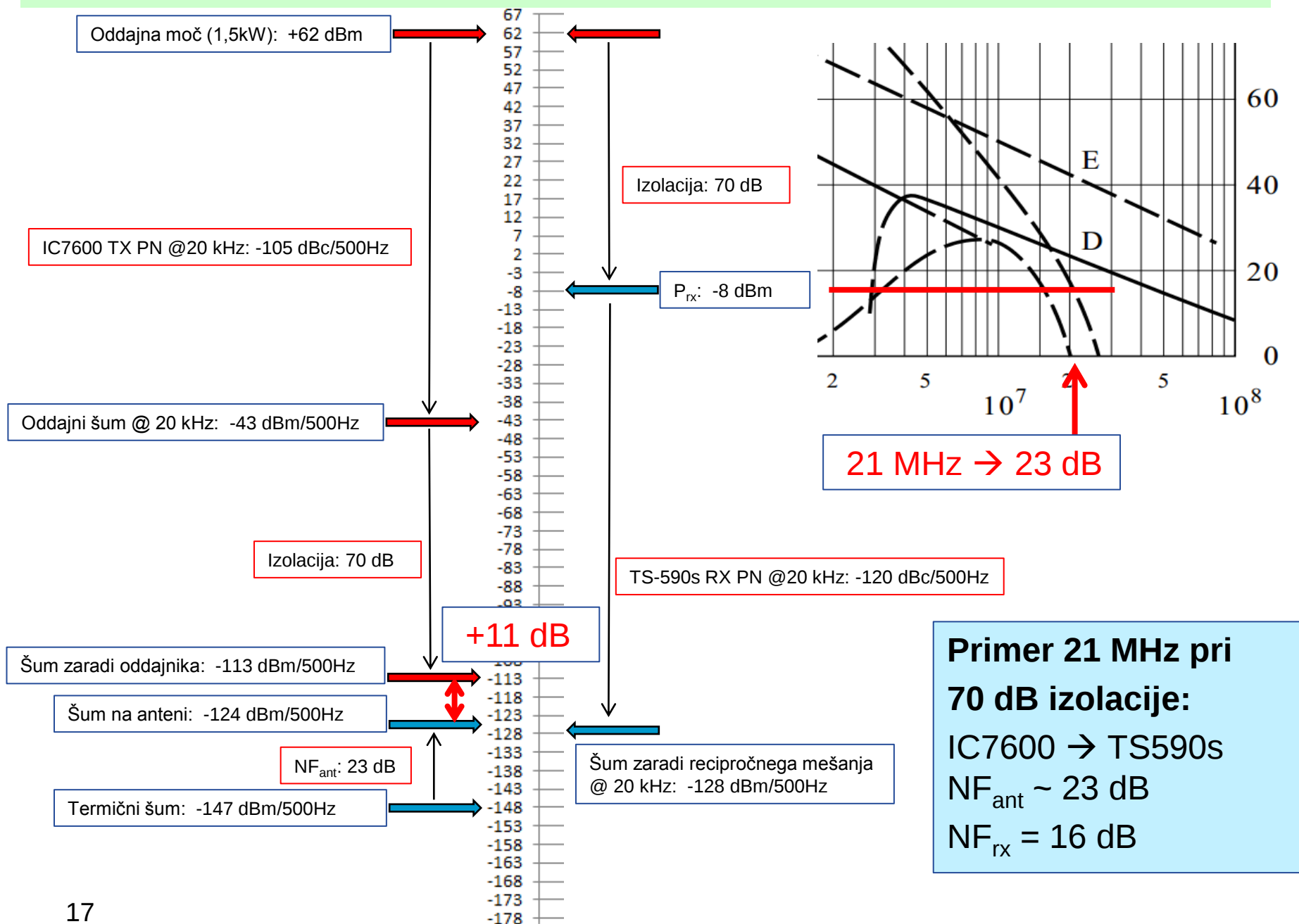
Šum antene

10 kHz do 100 MHz

ITU-R P.372 (Radio Noise)



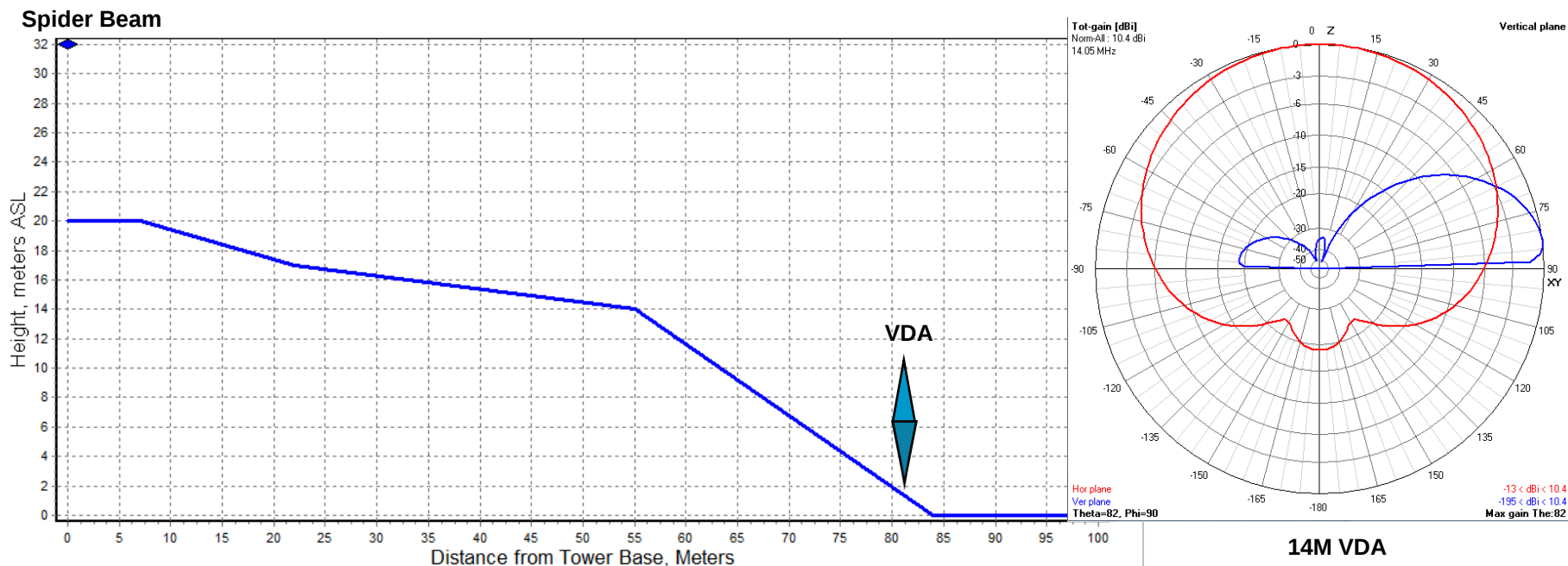






Izmerjene izolacije med antenami:

- SB1 <--> SB2 **~55...80 dB** (14M/21M/28M) (> 80/82/90 dB)
- SB1 <--> VDA **~73...81 dB** (14M/21M/28M) (> 80/82/90 dB)
- 4SQ <--> 2V **~70 dB** (7M) (> 62 dB)



Kaj pa 160m in 80m?

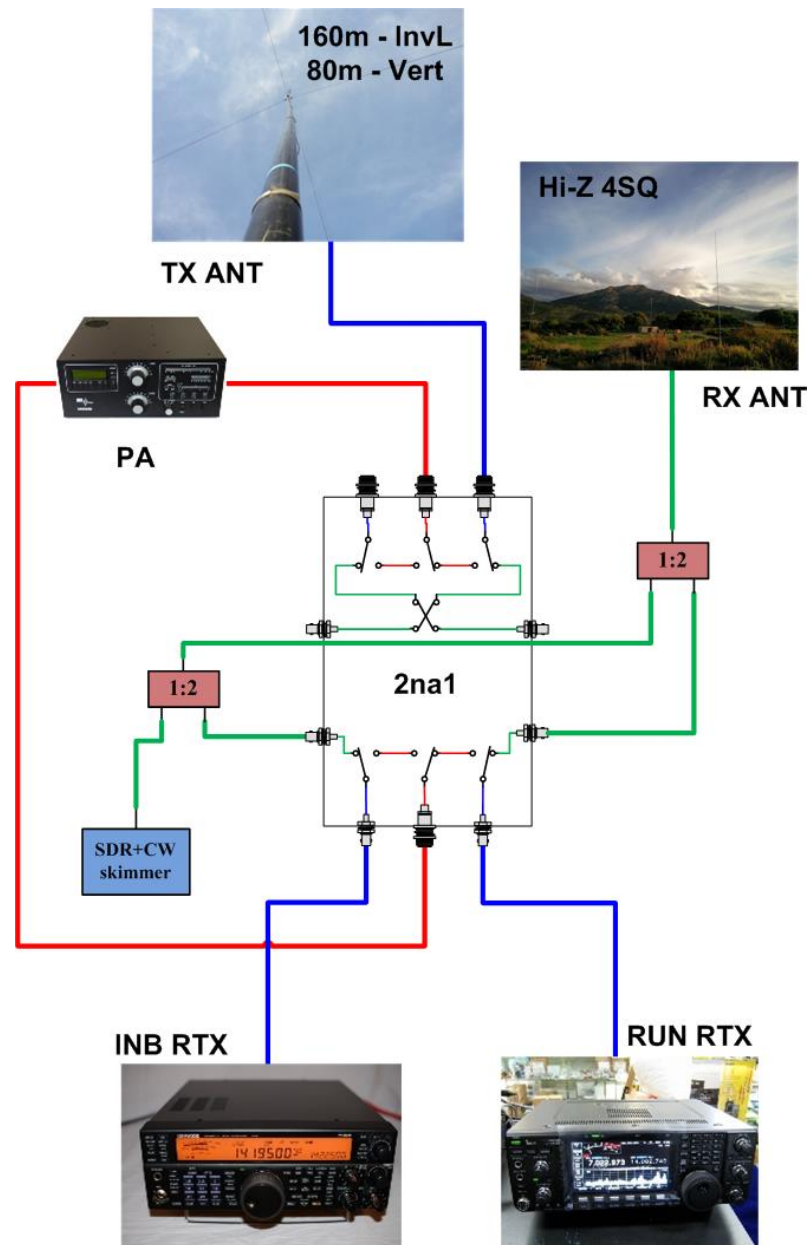
Večina oddajnih anten ni primernih za sprejem.

Atmosferski in industrijski šum prevladujeta:

- >60 dB @ 1.8MHz (na vertikalki)
- >50 dB @ 3.5MHz (na vertikalki)
- 20 ... 30 dB ATT na RX
- 20 ... 30 dB manj izolacije med antenama

Izmerjene izolacije do Hi-Z 4SQ:

- 80m Vert ~40 dB - 136m
- 160m InvL ~50 dB - 195m
- 40m 4SQ NE ~50 dB - 176m



WW

Multi-Op Two-transmitter

CN2R.....29,284,580
 CR3W.....29,278,260
 PJ4A.....23,480,468
 PJ4Q.....21,719,204
 PZ5V.....19,527,768
 TK0C.....18,368,042
 ZD8W.....17,936,160
 TC3A.....17,918,656
 J70BH.....15,712,380
 AH0K.....15,586,410

Band	QSOs	Zones	Countries
160:	923	19	80
80:	2466	34	117
40:	3728	40	152
20:	3276	39	143
15:	1577	37	140
10:	117	11	39
Total:	12087	180	671

EU

Multi-Op Two-transmitter

TK0C.....18,368,042
 EA2EA.....13,963,230
 9A7A.....13,137,742
 ES9C.....12,619,200
 YT5A.....12,443,552
 IB9T.....11,392,004
 HG7T.....11,239,200
 SN8B.....9,491,391
 DL1A.....8,785,400



TNX es 73 de
Robi/s53ww
&
TK0C 2016 team

