

# Ibiquity HD-Radio Forum-Europe II

## Summary of swiss field trial results (Part II)



**HD Radio broadcasting is in high gear.**

Join us for the HD Radio Forum – Europe

2nd Annual  
HD Radio Forum – Europe  
February 19th  
Heidelberg Germany

Heidelberg Marriott Hotel  
Vangerowstrasse 16  
69115 Heidelberg Germany

*Registration deadline:  
January 18th*

Contact Gereon Joachim  
[joachim@ibiquity.com](mailto:joachim@ibiquity.com)  
to reserve a space at  
this important forum



**M.A.Ruoss**

**[MarkusRuoss@RuossAG.ch](mailto:MarkusRuoss@RuossAG.ch)**

**more info:**

**[www.HD-Radio.ch](http://www.HD-Radio.ch)**



# HD Radio™ - field trial in Switzerland

## Agenda:

Introduction / general remarks / motivation

What we did, and what did happen since last year?

HD-Trials elsewhere and Lab-Testing in Europe

Where are the receivers?

What has to be done further?

The added value of FM-HD Radio™

Summary / Conclusions

Questions?





## Introduction / General remarks / Motivation

**DAB+ is the most efficient multiplex-technology available today**

**BUT:**

**This is by far not the best overall solution for regional broadcasters!**

**Regional broadcasters are very important !**  
(politicians confirms this very regularly)

**Therefore it is important to find a consumer friendly, efficient, evolutionary and “low cost” radio digitalization procedure for regional “one program broadcasters“ in Europe**

**Please bear in mind:**

- Real world listeners listen to music and content, in a real world environment, not to dBA
- and for the hypo critiques you never can deliver an off dB's! (or kbs !)

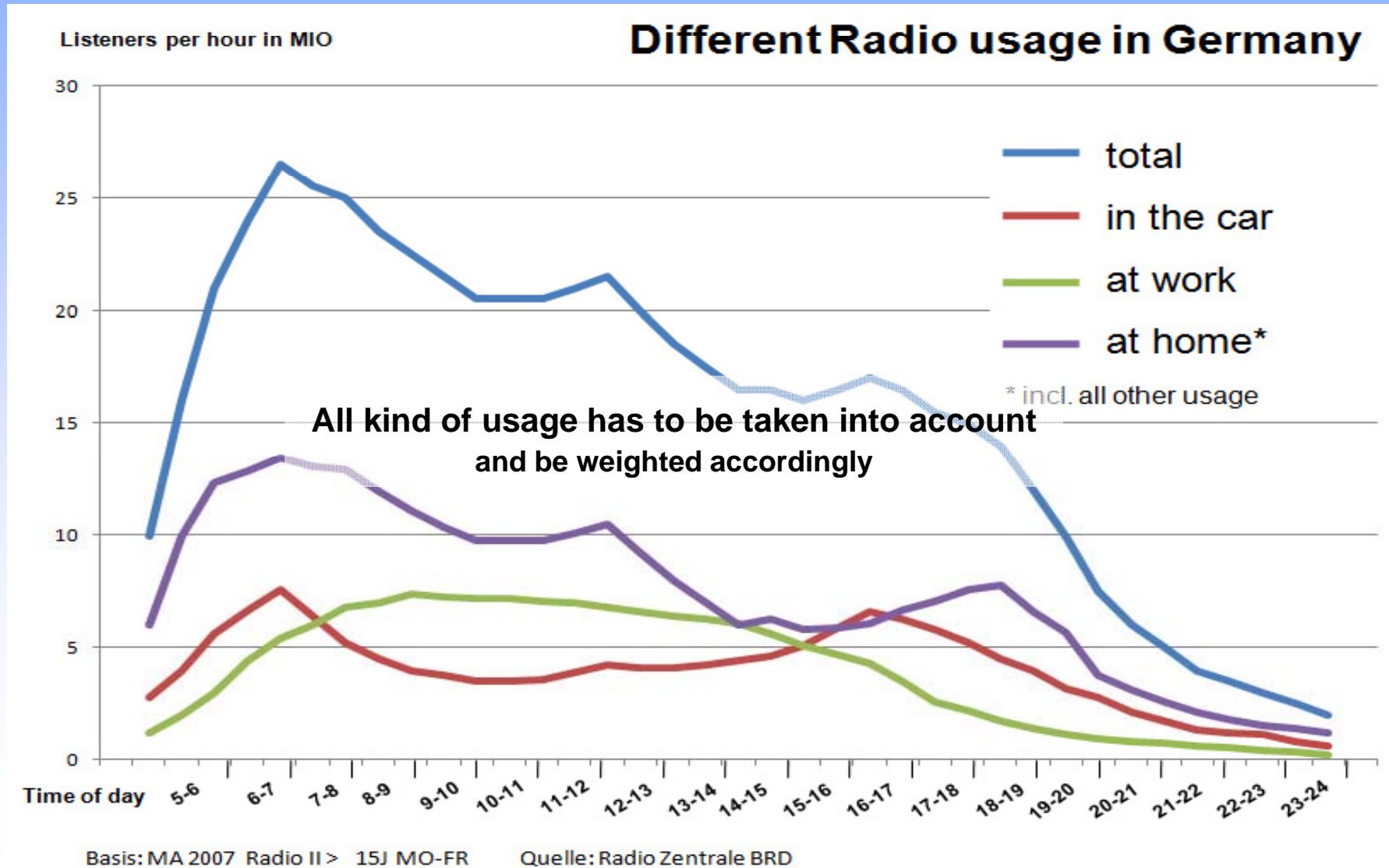
**Lets face it as it is!**

We want a good “digital” FM-Quality not really more/not less (and the real audiophiles are gone from analog radio anyway) and we want no “relevant” damage to the existing listener base, including our “neighbors”



# Introduction / General remarks / Motivation

**Don't forget: Radio is used everywhere and all the time !**



## Introduction / General remarks / Motivation

**FM-Radios are built in, in all new gadgets!  
Even in brand new mobile TV receivers.**

**Sharp, MobileTV Handy**

**iRiver DMB MobileTV**



FM Receiving technology is everywhere and very cheap

There will be no more universal platforms for radio like fm, but:

**Digitalization of the FM Band is a „natural“ step!**

And of course: fm-hd-radio is the appropriate solution !

# What we did since last year

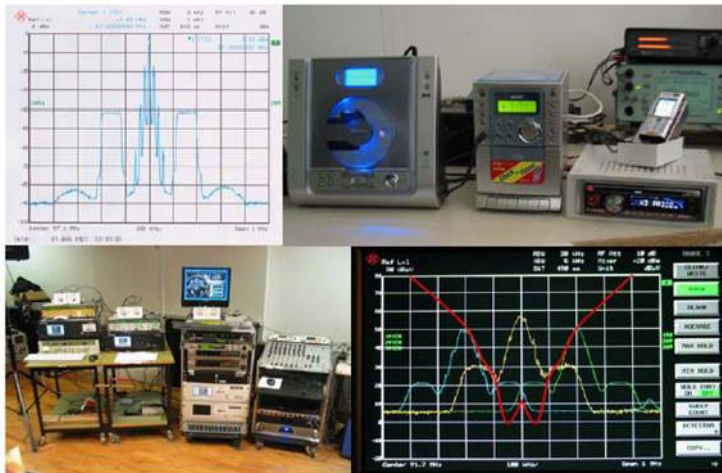
HD Radio in der Schweiz

**RUOSS AG**

CONSULTING FOR CATV AND ELECTRONIC MEDIA

## HD-Radio Feldversuch Schweiz

Zweiter Zwischenbericht zu Händen des BAKOM per Dezember 2007  
von M. Ruoss, Ruoss AG



## Second interimsreport to OFCOM

**Revised Trial Goals**, consists now also International aspects and implementation rules as well as standardization

## Trial Licenses extended till end 2008

- ROBE 88.00, Transmitter Rooterberg
- Krigi 97.10MHz, Translator Luzern
- Mobile 25Watt Licence, any



## What we did since last year

### 2. HD-Radio Days Luzern – Media response

- 200 experts, 13 countries
- News around HD-Radio
- [www.HD-Radio.ch](http://www.HD-Radio.ch)

#### UKW-Digital: «HD-Radio funktioniert.»

5. Oktober 2007

Selbstbewusste Präsentation von HD-Radio in Luzern.

Deutlich mehr Teilnehmer als im vergangenen Jahr verzeichneten die HD-Radio-Tage 2007 am 4. und 5. Oktober 2007 in Luzern. Die Beteiligten des Schweizer Feldtests und die amerikanischen System-Anbieter zeigten sich rundherum optimistisch. Die Zusammenfassung der Veranstaltung an dieser Stelle erfolgt ohne jene Informationen über das Projekt in der Schweiz und jene über die Gründung der Europäischen HD-Radio-Allianz (EHDRRA), hierzu wird auf frühere Rundschreiben verwiesen.



Großes Interesse an HD-Radio

Konrad Vonlanthen von der Schweizer Regulierungsbehörde BAKOM formulierte es als Aussage und nicht als Frage, dass die zukünftige Nutzung des UKW-Bandes digital sein werde, damit auch die lokalen Veranstalter an der Entwicklung des digitalen Radios teilhaben könnten. Welche Technologie sich am Ende durchsetzt, sei unklar, Vonlanthen Vonlanthen ähnlich zurückhaltend wie kurze Zeit zuvor die Bundesnetzagentur bei der APR. Weitergehend merkte Vonlanthen allerdings an, HD-Radio sei wegen des Schweizer Projektes am weitesten, notwendig seien aber weitere "Abklärungen" im Hinblick auf die Störfestigkeit.

#### HD-Radio soll in zwei Jahren in der Schweiz starten

HD Radio™-Technologie erfreut sich markant steigender Nachfrage



In Luzern fanden nach 2006 bereits zum zweiten Mal die HD Radio™-Tage statt. Dieses Jahr konnten die Verantwortlichen des HD Radio™-Feldversuchs in der Zentralschweiz über 200 Fachleute aus 13 Ländern begrüßen. Namhafte Referenten aus Politik und Wirtschaft zeigten die neusten Tendenzen und Entwicklungen in der Digitalisierung des Radios auf. Teilnehmer aus ganz Europa konnten sich zudem vor Ort ein Bild über den HD Radio™-Feldversuch in der Zentralschweiz machen.

#### Feldversuch mit HD Radio™ zeigt kostengünstigen Digitalisierungsweg für die Radios

Donnerstag, 5. Oktober 2007

Radio World

### Europeans Look at HD Radio

By Michael Hadger

**LUZERN, Switzerland** The mounting interest in Europe for HD Radio is attracting the attention of the in-band, on-channel digital radio technology.

The formation of the European HD Radio Alliance and growing participation in energy trials clearly show that digital content is leading to better digital distribution.

More than 200 broadcasters attended the HD Radio conference, held here in Luzern, 4-5 October, to discuss the next steps for a way forward.

#### Nagging questions

Explored by Markus Ruoss, an early adopter and proponent of HD Radio, and supported by iBiquity, by the National Science Foundation (NSF) Innovation and Technology and by BAKOM, the Swiss media regulator, HD Radio Days offered results of testing meant to resolve nagging questions about HD Radio reception and standards in Europe.

All the testing discussed took place in Switzerland, much of it in the Luzern area, where Ruoss established an HD Radio platform for the radio station he owns, Radio Switzerland.

NSF Grants manager Energy Zürich also coordinated technical assistance for the tests, providing content for the national second channel, which occupied 41 slices of the digital signal.

Ruoss introduced his test results by reminding the audience that the FM system used now for decades and still "runs good" overall.

The objective for HD Radio, said Ruoss, is to make "50 percent" of radio listeners happy. "Real world listen

showed the best performance. According to Böhlich, the HD radios performed well because they are built for the best where conditions. "Many car receivers showed far less noise than expected," he said.

More to it, however, perhaps characterized as cheap and still, showed the system performance. A 1998 model stereo tuner had problems, with an HD Radio signal as well.

"Results," said Böhlich, "show a large variation among receivers tested." BAKOM is proposing further testing on in-vehicle car receivers.

VSP President Jörg Bachmann, newly elected chair of the European HD Radio Alliance task, until recently managing director of Energy Zürich, addressed the other realities of HD Radio implementation in Europe.

According to Bachmann, agreeing with most other content, with a lot of "non-radio" noise.

Reproduction of test subjects was by means of an on-air radio broadcast program.

From this testing phase, Ruoss concluded that when FM reception is good, HD Radio reception is also good. "DAB faces the same limitations as FM and HD Radio," he said. But he also said that FM reception does not meet the "set as good as we can."

The topic of Radio Switzerland's test equipment with either a JVC receiver or the Yamaha HD amp received, with test subjects encouraged to drive all over central Switzerland.

Ruoss said all HD Radio listeners were "enthusiastic" about digital substances. "Everybody likes HD Radio's ease of use."

**Digital robustness**  
A system test, using a specially equipped BMW automobile, took place on a Swiss Air Force base shortly to attack an often feared



Jörg Bachmann, Konrad Vonlanthen (OFCOM), Markus Ruoss, and Perry Priestley (iBiquity)



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#### Wege zum digitalen UKW-Radio

Mario Gongolsky

**Big-Bang mit DAB-Plus, drei Senderbedeckungen mit neuen nationalen und landesweiten Radioprogrammen. Jene Kräfte, die eine Digitalisierung des Radios auf die Erfolgsspur biegen könnten, machen scheinbar ernst. Der Lokalfunk und rein regionale Radioanbieter fühlen sich von solchen Szenarien bedroht. Digitale Sendeströme, parallel zum UKW-Signal könnten ein Ausweg sein.**

Besonders das HD-Radiosystem erhält derzeit öffentlichen Auftrieb. In den USA längst eingeführt und in der Schweiz mit guten Chancen zum Regelbetrieb, wird nun auch in Deutschland diese Variante erprobt. Sie erlaubt einen sanften Übergang vom Analog- zum Digital-Radio, weil

#### HD-RADIO Start 2009?

Geht es nach Markus Ruoss, soll Ende 2009 in der Schweiz der digitale Radio-Standard HD-Radio (High Definition Radios) eingeführt werden. Ruoss ist der HD-Promotor in der Schweiz und hat kürzlich das zweite Mal seine HD-Radio-Tage durchgeführt, an denen er sich für die kostengünstige Alternative zur DAB-Technologie (Digital Audio Broadcasting) einsetzte. Ruoss informierte an dem Anlass über seine Feldversuche und die im Sommer 2007 gestartete zweite Testphase.



Er habe mobile und stationäre Empfangsgeräte an ausgewählte Testfahrer in der Zentralschweiz verteilt, um die Alltagstauglichkeit und die Marktchancen des Systems zu prüfen. Anfang des kommenden Jahres will er dann über die Ergebnisse informieren und sich anschliessend um die Zulassung des HD-Standards durch das Bundesamt für Kommunikation (Bakom) bemühen. (rf)

INFO: WWW.HD-RADIO.CH

Das Ringen um die Forcierung des digitalen Radios geht in eine neue Runde. Der bundesweit erste Feldversuch mit HD Radio wird eine Alternativ-Technologie für das digitale Radio prüfen. Zwar wollen die Macher nicht das Aus von DAB befördern, aber der Ansatz zeigt: Digitales Radio wird fortan auf mehr als nur eine Technologie setzen.

**HD Radio DISCOVER IT!**

Eine Vielzahl von Geräten ist zur akustischen Entdeckung bereit. Das US-amerikanische Logo für HD Radio

## Digitalmagazin.info

Heute lesen, was morgen wichtig ist. Nr. 506 / 3.Jg. Mittwoch, 31. Oktober 2007

#### Radio: Europäische Rundfunkanstalten wollen HD-Radio forcieren - European HD Radio Alliance gegründet

Die iBiquity Digital Corporation, der Entwickler der digitalen HD Radio-Technologie, hat die Gründung der „European HD Radio Alliance“ durch die europäischen Rundfunkanstalten bekanntgegeben. Die Organisation soll die Entwicklung der HD Radio-Technologie auf dem ganzen Kontinent fördern und unterstützen. „Etlche Länder in Radio Alliance. „Wir freuen uns auf die Zusammenarbeit, um die Aufmerksamkeit auf die HD Radio-Technologie und deren vielen Vorteile für die europäischen Rundfunkanstalten und Verbraucher zu lenken.“

Das erste Treffen der „European HD Radio Alliance“ fand Anfang dieses Monats im schweizerischen Luzern statt. Dabei wurden folgende Verantwortliche einstimmig gewählt:

- Vorsitzender: Jörg Bachmann, Energy Zurich, Schweiz;

Europa testen oder implementieren gegenwärtig die HD Radio-Technologie. Daher halten wir die Zeit für gekommen, eine Organisation zu bilden, die unsere Erfahrungen gemeinsam nutzt und dazu beiträgt, unsere gemeinschaftlichen Marketing-Anstrengungen zu koordinieren“, erklärte Jörg Bachmann, Vorsitzender der European HD

- Stellvertreter Vorsitzender: Andriy Karpiy, First Ukrainian Radio Group, Ukraine;
- Generalsekretar: Markus Ruoss, Ruoss AG und Radio Sunshine, Schweiz;
- Generaldirektorin: Andrea Sentinelli, Europejskie Radio dia Bialorusi, Polen;
- Schatzmeister: Perry Priestley, iBiquity Digital, USA.

www.ibiquity.com



## What we did since last year

Testbed, equipment and programs

88.0 Mc, Robe, Radio  
Sunshine Main Transmitter

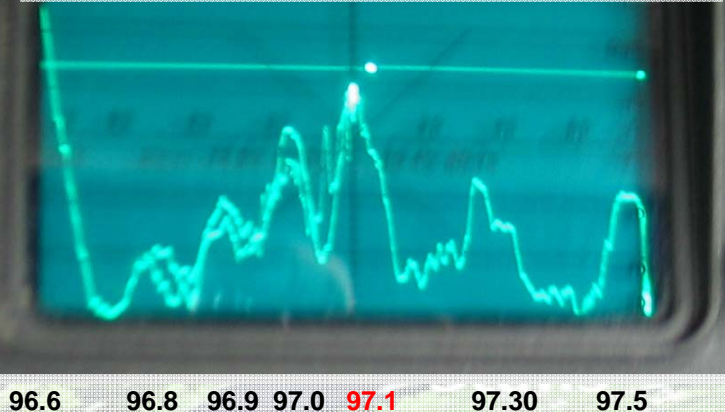
### Content on 88.0 Mc +97.1 Mc

97.10 Mc, Krigi Test-  
Transmitter Lucerne

Sunshine analog	
Sunshine digital	48kbs
NRJ Zurich	48kbs
Voice only/Comedy	23 kbs
PAD	some „kbs“

Operating Mode: Extended Hybrid 120kbs

Location: Meggen-Küssnacht, REF=  
50dBuV



97.00 Strong -100kc Interferer  
97.10 Strong Co-Channel  
96.90 weak - 200kc Interferer  
97.30 average -strong +200kc

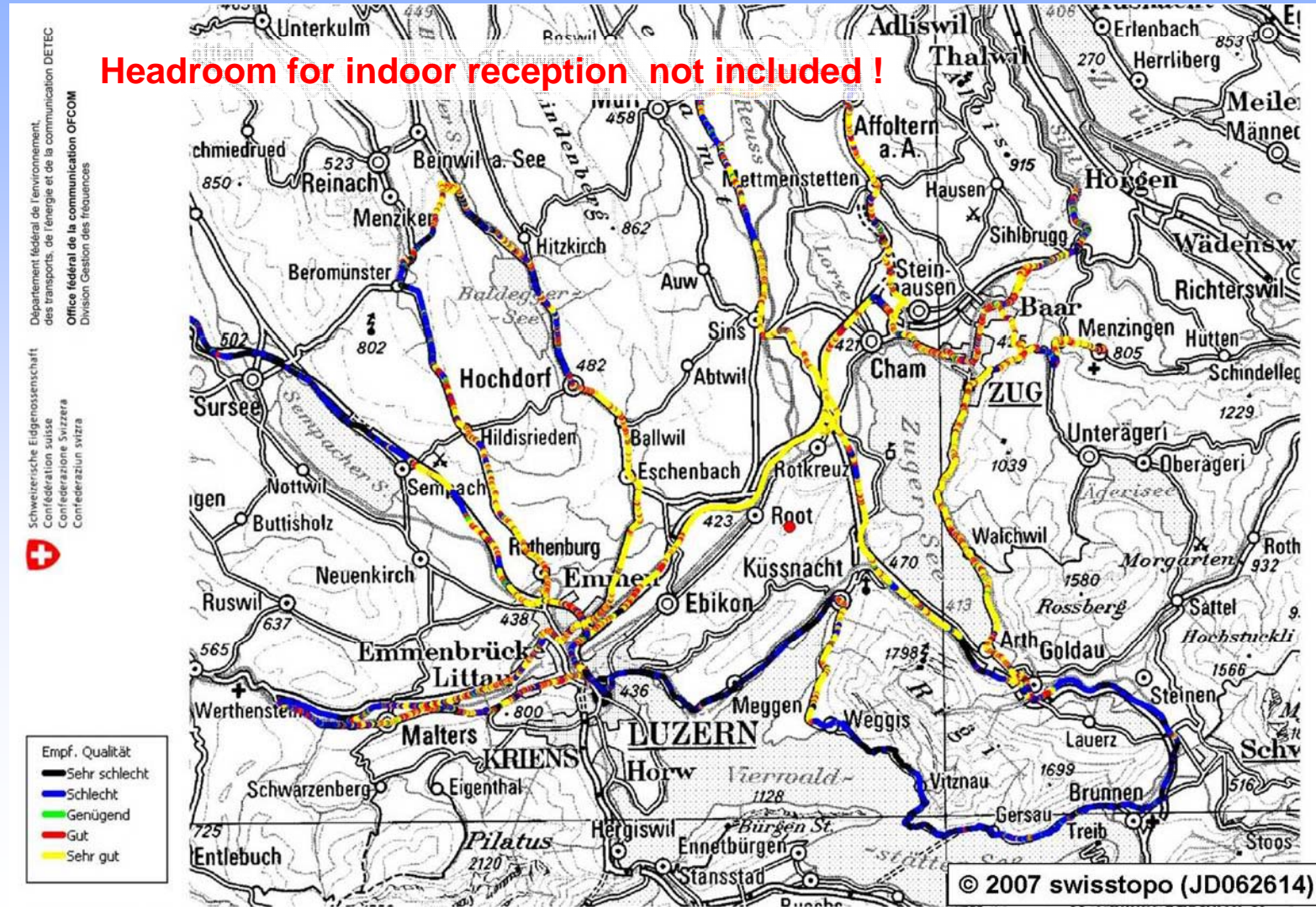




## Test bed and field results (OBB/Digital on/off)!

### Discussion of field results 88.0 TX analog

Headroom for indoor reception not included !

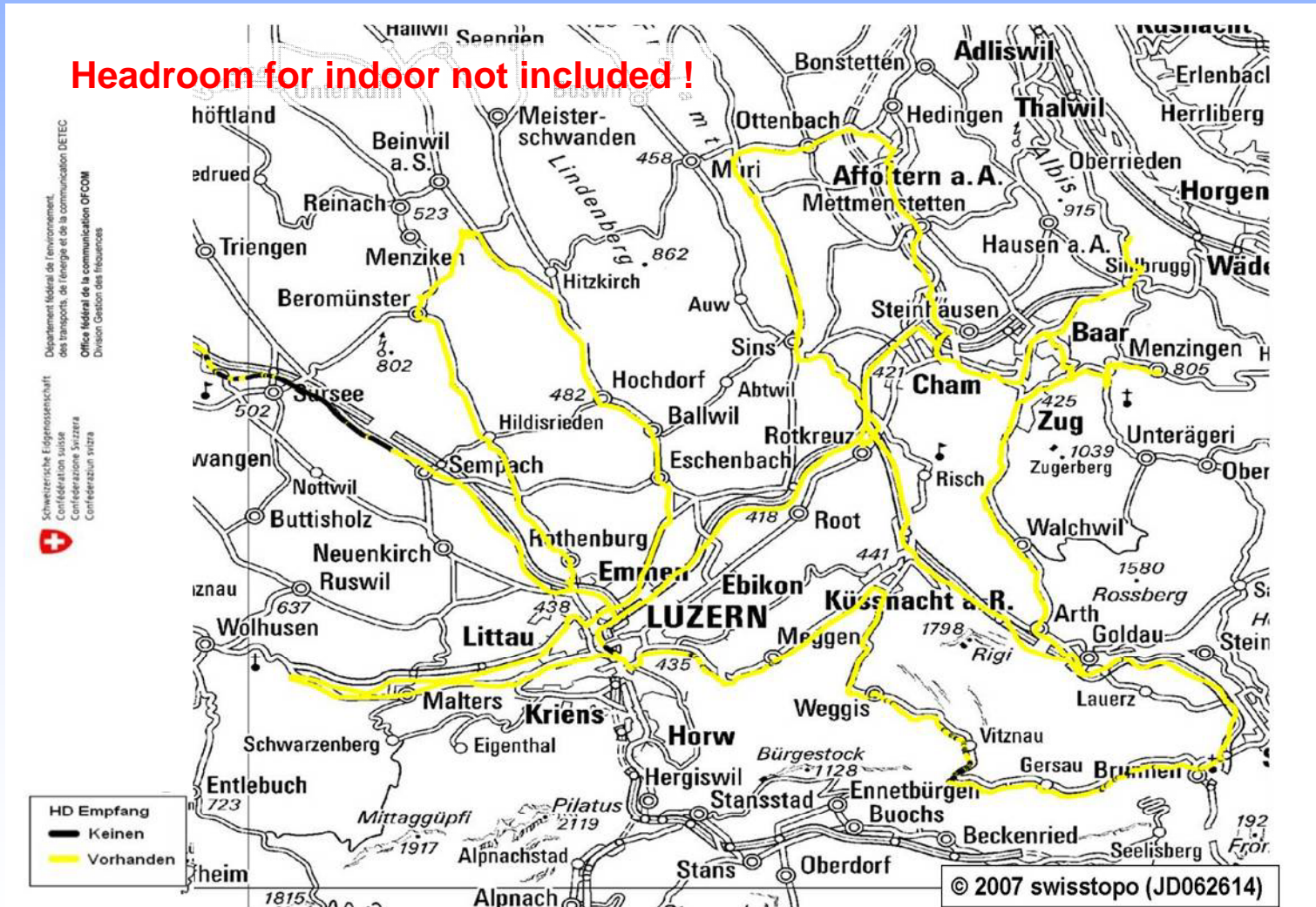




## Test bed and field results (OBB/Digital on/off)!

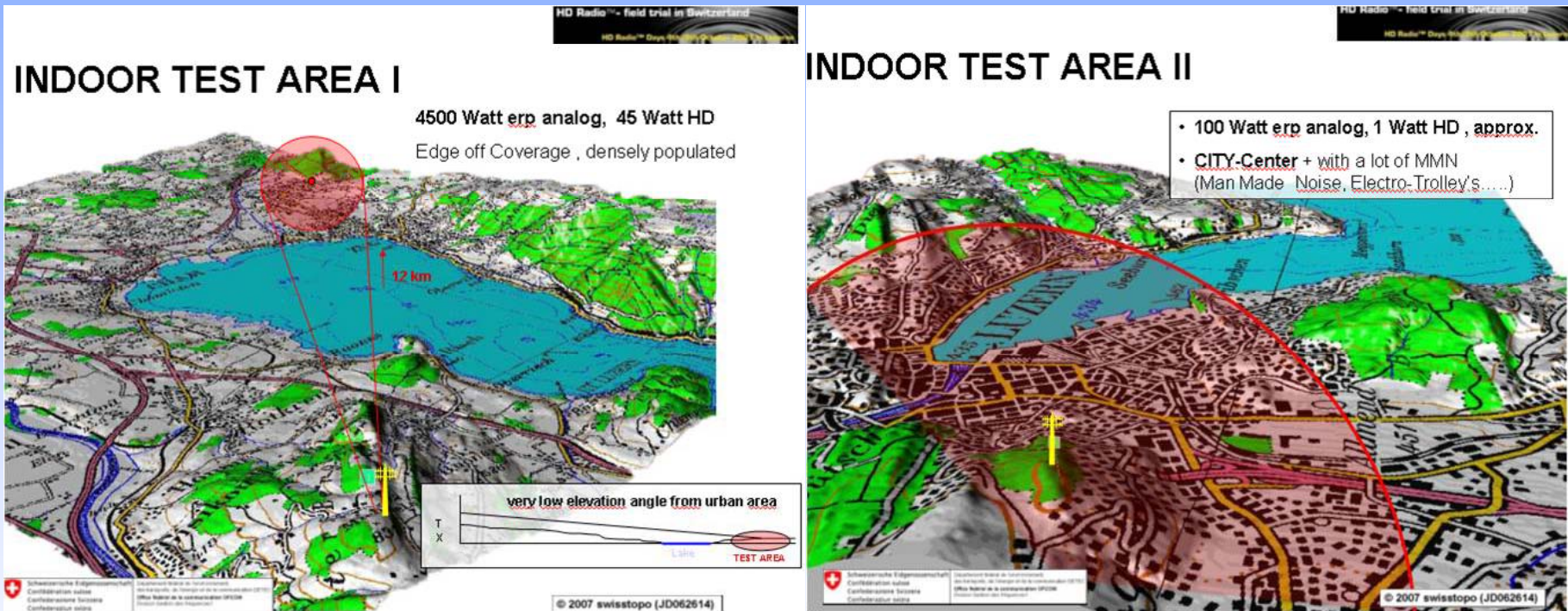
### Discussion of field results 88.0 TX analog

**Headroom for indoor not included !**





## What we did, and what did happen since last year? Indoor + mobile testing with „Radio Sunshine listeners”



Where FM analog is good, HD-Radio is as well !

Typical indoor test receivers:



# What we did, and what did happen since last year?

## Mobile-Testing with listeners of Radio Sunshine



- Used their own cars
- Additional antenna, for easy installation
- Driving all over central Switzerland

### Results In brief:

- all test drivers are “enthusiastic”! about digital robustness
- the Audio quality and the program choice
- “happy” about fringe reception



- Everybody likes the „easy to use“ of HD



## What we did, and what did happen since last year?

### HIGH-SPEED-TEST-LOCATION

**Swiss Airforce Base Emmen**

SPeed	Air Time	Date	Sense	Photo	Site	TYPe	Code	MultaRadar
229km/h	11:26:13	27.07.2007	1	009	085	Car	FLUGPLATZ	

**TX Robe**

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Schweizerische Eidgenossenschaft  
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Département fédéral de l'environnement,  
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Office fédéral de la communication OFCOM  
Division Gestion des fréquences<sup>1</sup>



## What we did, and what did happen since last year?

**Most “technical” arguments “why it does not work in Europe” are in the meanwhile “passed by as non issue”:**

- audio deviation
- audio multiplex power
- RDS-AF
- Host compatibility
- 100/300kc 400kc European Spacing
- robustness of digital operation
- Less programs in the us

**The (actual) single biggest issue in “dispute” seems to be +/- 200Khz interferers in the fringe and overspill area of actual FM networks.**

**It is difficult to “practically hear” this kind of interferences in the field, in built to “best practice” FM networks.**

**In most practical cases, where 200Kc interference can take place, the interfered signal is already distorted from other analog sources, and often below “acceptable” receiving conditions.**

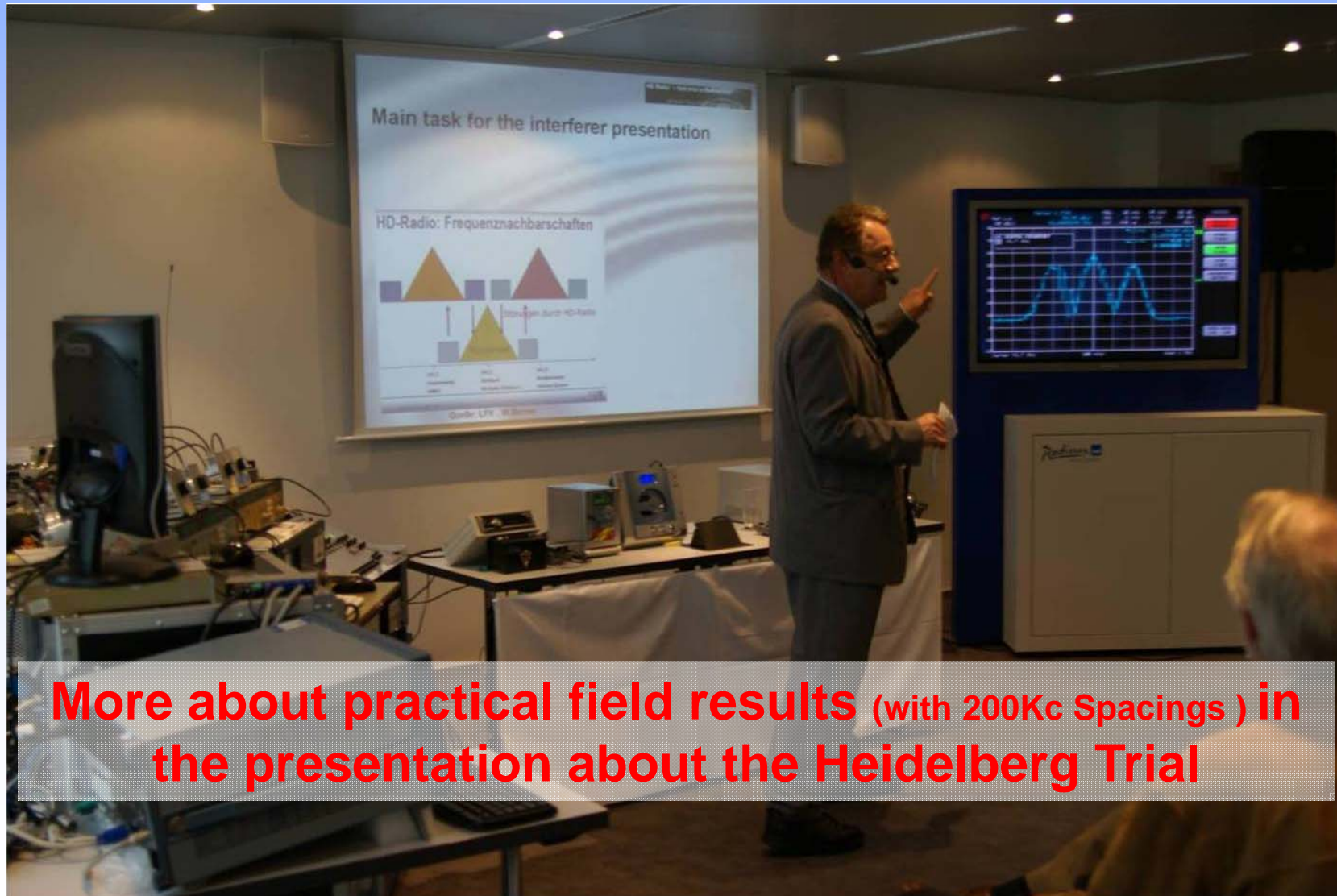
**In the USA there are now 1500 broadcasters on air! Using exactly this kind of frequency spacing. The overall system limit is there the same as in Europe!**

**But it seems that this is still not an off prove for Europe!**

**That’s why we built a complete life multi-interferer simulation:**



## Multi interferer Presentation at HD-Radio days Lucerne



**More about practical field results (with 200Kc Spacings) in the presentation about the Heidelberg Trial**

# Selected Receivers for the Multi- Interferer Simulation

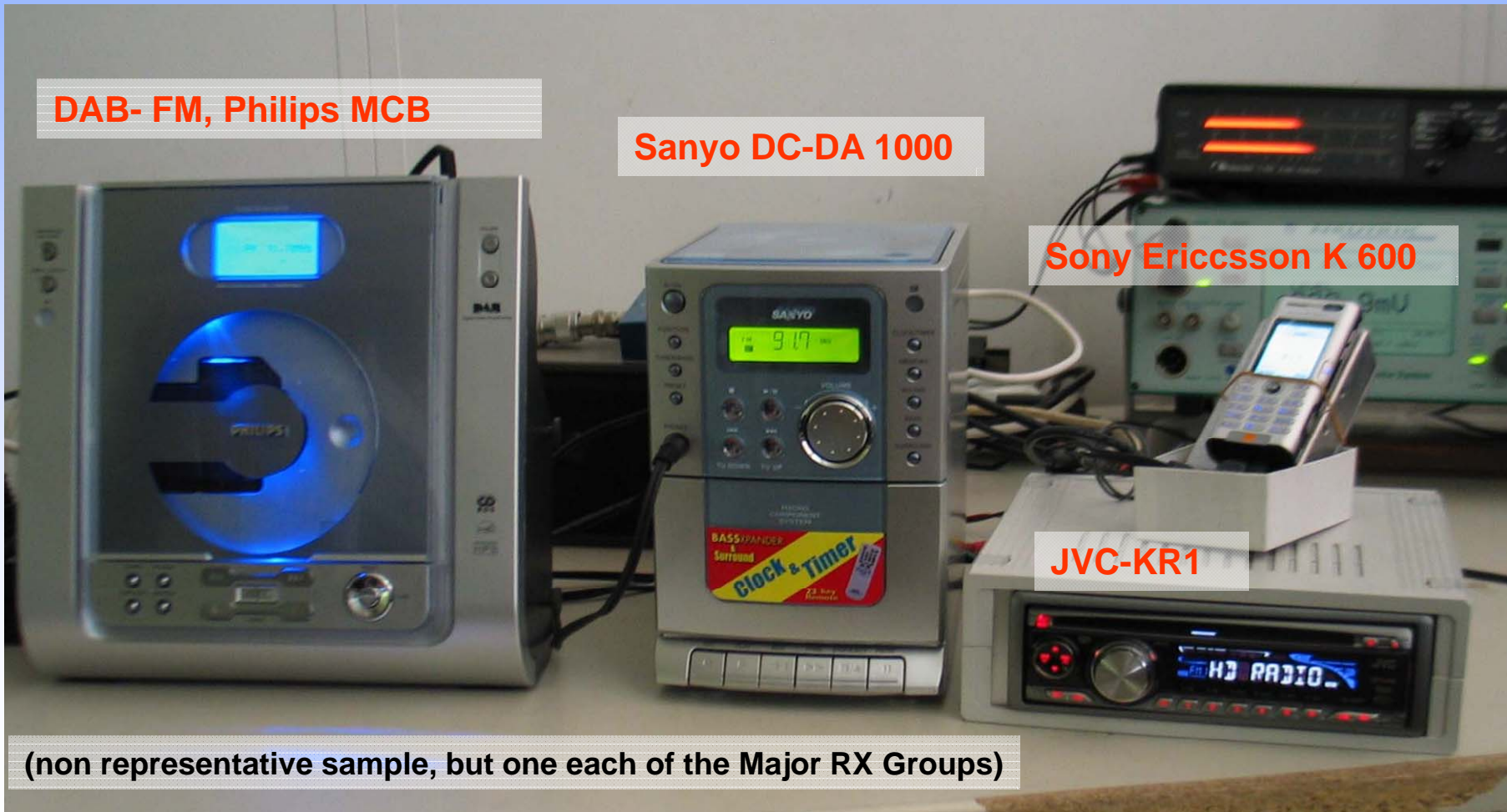
DAB- FM, Philips MCB

Sanyo DC-DA 1000

Sony Ericsson K 600

JVC-KR1

(non representative sample, but one each of the Major RX Groups)

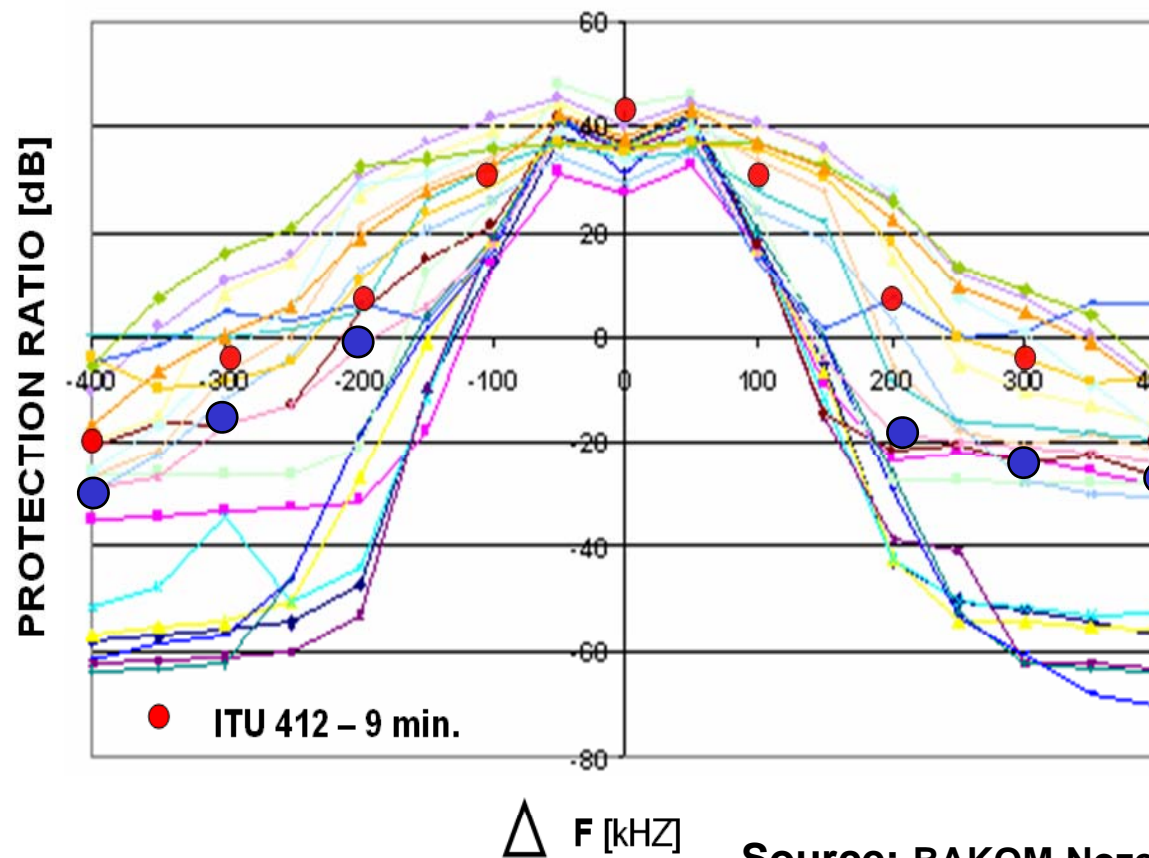




# FM-Receivers are very different!

„Good to Bad Receiver“ can be easy > 1:1000!

(at 200Kc Distance, New CAR to portable Receivers)



Total HD- System-  
Performance limit is given by  
the selected min. Receiver  
performance at +/-200Kc !

Test Receivers and  
Nozema- Study Sample  
(17 Receivers)

DAB/FM Radio

Nozema study ref rx , closest to ITU 412-9

Sanyo DC-DA 1000

Sony Ericsson Cellphone

JVC KR1 Car Radio

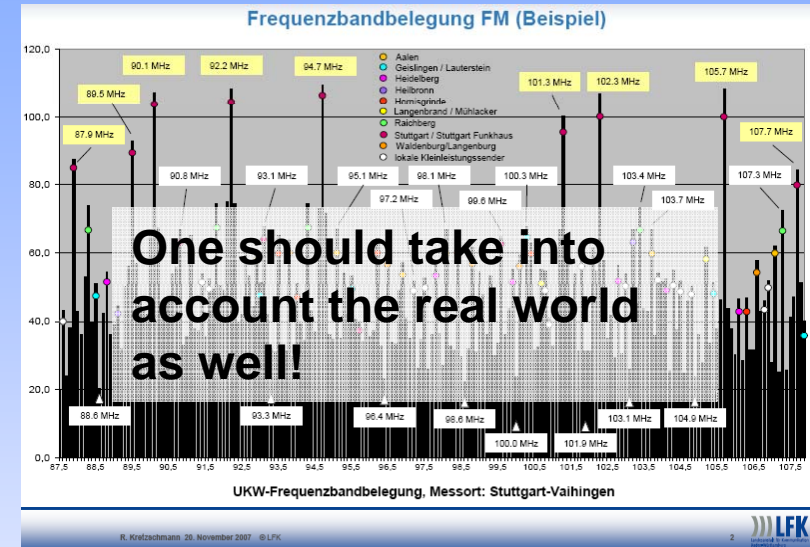
Source: BAKOM-Nozema RX-Study 2002, >56dB SNR only

## Lab-Testing and trials elsewhere in Europe

Almost all lab testing in Europe is done without background noise! (USA does, as well as in the Communications Industry!)

The real FM-World looks different! There is already a lot of background noise! And almost always interference limited networks and Man made Noise.

RF-Spectrum sample Stuttgart Vaihingen



- There is a need to know the accurate “European fm-hd-parameters” to make appropriate decisions on a „formalistic“ basis.
- But lab tests alone, does not give prove of the real world !
- A new set of rules for the digital-anlaog living in the same band, adapted to todays „real world facts“ is a necessity

Actual Field Trials and Lab Testing is also on ist way in:

- Poland      - Ukraine      - more to come soon in ?? Austria .... Berlin ?



## Where are the (european) HD-Radio receivers?



- Hardware receivers becoming software receivers, **this makes it much easier for implementation!**
- The number of “Front Ends” and the number of receiving bands are the predominant cost factors!
- Plenty of receivers in the market at operational start with HD-Radio in Europe! **Also low-cost and mobile receivers!**
- Multiplattform-Receivers will become standard
- We only have to take care of the “European Specialties” like RDS-AF, mains, 100Kc tuning
- „Factory Installed“ HD-Radio“ will soon become standard for New Cars
- Very important Tasks/Meetings:
- FDM/DTVP-Workshop "Digitaler Hörfunk" am 03. 03.2008 BMWi, Berlin
- Automotive industrie is also working on common a multiplattform standard radio receiver platform

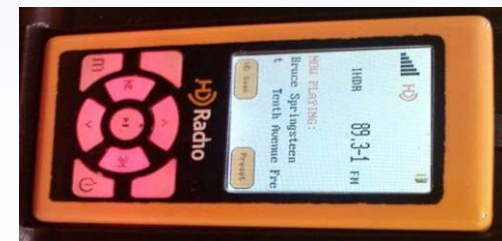
Mobitech CellPhone with HD-Radio, Samsung Chip



Eye Catchers at CES 08

Single SiPort Chip does it all!  
DAB+/FM/HD-Radio/RDS-AF

MP-3 Player mit HD-Radio, SiPort





## What has to be done further?

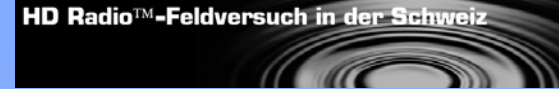
- **Support other Field Trials in Europe**
- **Further study and tests of low cost translators and SFN boosters** (for ON AIR, Tunnels and Cable)
- **Final report for OFCOM, before end 2008**
- **Support for EHDRA on**
  - **ETSI standardization**
  - **Test methods and planning**
  - **“other formalistic hurdles”**
- **Wish list:**
  - Parallel test on same transmitters, with HD and FM Extra**





## The added values of FM-HD Radio™ for users and broadcasters

- Same frequency and same basic FM-infrastructure
- Additional services possible on the “same frequency”
- Better quality of service in the coverage area
- Backwards compatible with FM (simple communication!)
- Slow evolution with little investment for the broadcaster
- And much more “radio innovations” to come! (tagging, data, CAS, and more...)



## Summary/Conclusion ..... **FM-HD-Radio works!**

- The operating experience is positiv . Some more work hast to be done
- The gap between „ works fine in the Field“ and „actual theories and rules“ Has to be bridged.
- FM- HD- Hybrid - Mode can be introduced in Europe in the same way as in the United States, **2009 or a bit later.**
- The influence and the restrictions to the existing FM receiver universe (the real “commercial” listeners!) are very minimal
- **FM-HD-Radio can be the most efficient and economical way to become a digital terrestrial Radio-Broadcaster in Europe** (mainly for one program broadcasters)



# HD Radio™ - field trial in Switzerland

Thank you to all sponsors !

Questions ?



Thank you !

The sponsors

Supported by the Federal Office of Communications OFCOM

Gold sponsors

**RUOSS AG**

CONSULTING FOR CATV AND ELECTRONIC MEDIA

BMW Group



Since end of March 2006 Ruoss AG/Radio Sunshine are running a HD-Radio Field Trial under „real live“ European conditions.

The Trial is financed through sponsoring from the interested Industry and with Support of the Swiss Office of Communications

Bronze sponsors



tamedia:



SANYO



rro.))) Radio Rottu Oberwallis



Please become EHDRA Members !



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des transports, de l'énergie et de la communication DETEC  
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Division Gestion des fréquences

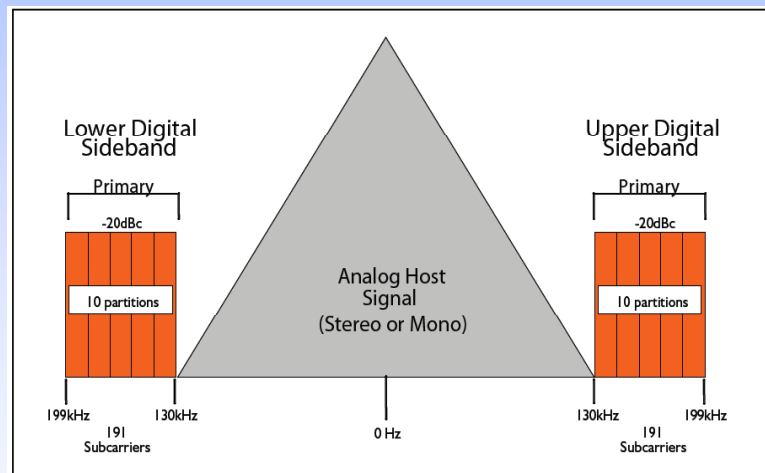
# RESERVE-Ablage



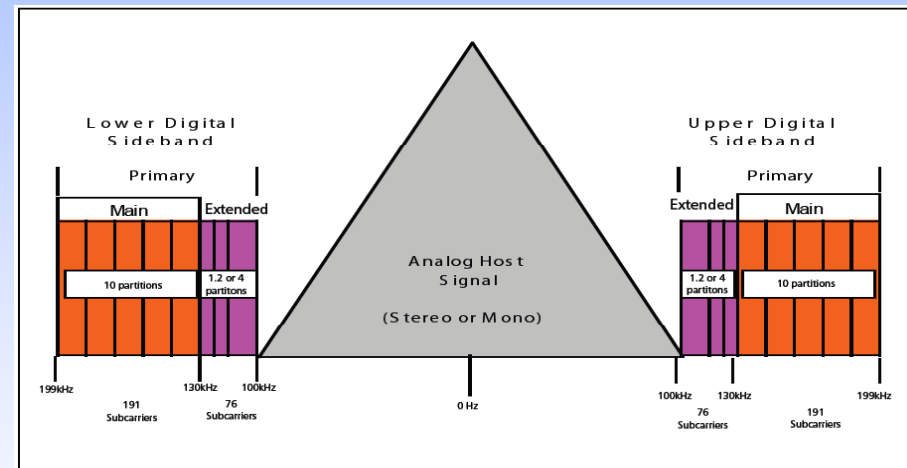
## How does it work, and does it really work?

### FM-HD-Radio-Basic Operating Mode

#### Standard Hybrid-Mode, 96kbs for Audio



#### Extended Hybrid-Mode 146kbs for Audio



- Datarate for audio can be split in up to 5 different program/datastreams (some restrictions apply!)
- Fulldigital mode (long term)