Radio Equipment Directive

General Introduction

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Christian Reimer

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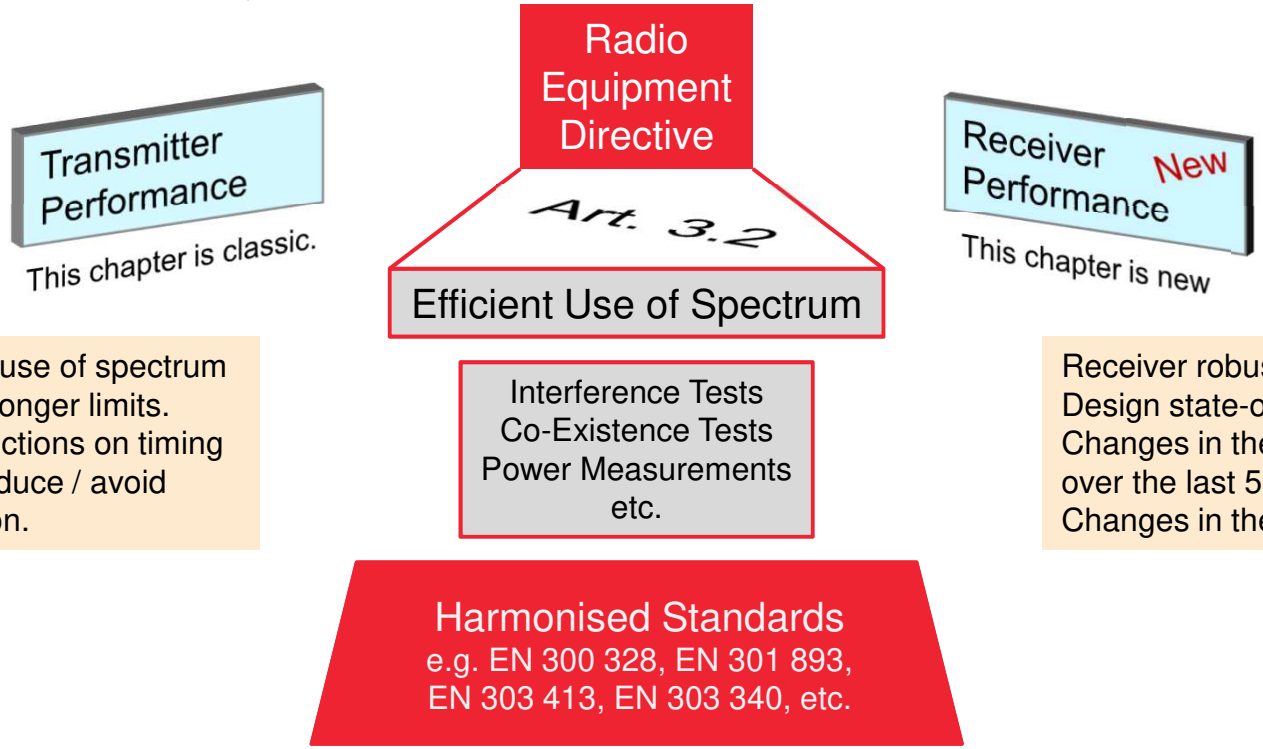
RED: Radio Equipment Directive

2014/53/EU: mandatory since June 2017

Keyword: Regulatory Testing



More efficient use of spectrum can call for stronger limits.
Stronger restrictions on timing behavior to reduce / avoid signal collission.

Receiver robust enough?
Design state-of-the-art?
Changes in the RF environment over the last 5 years?
Changes in the next few years?

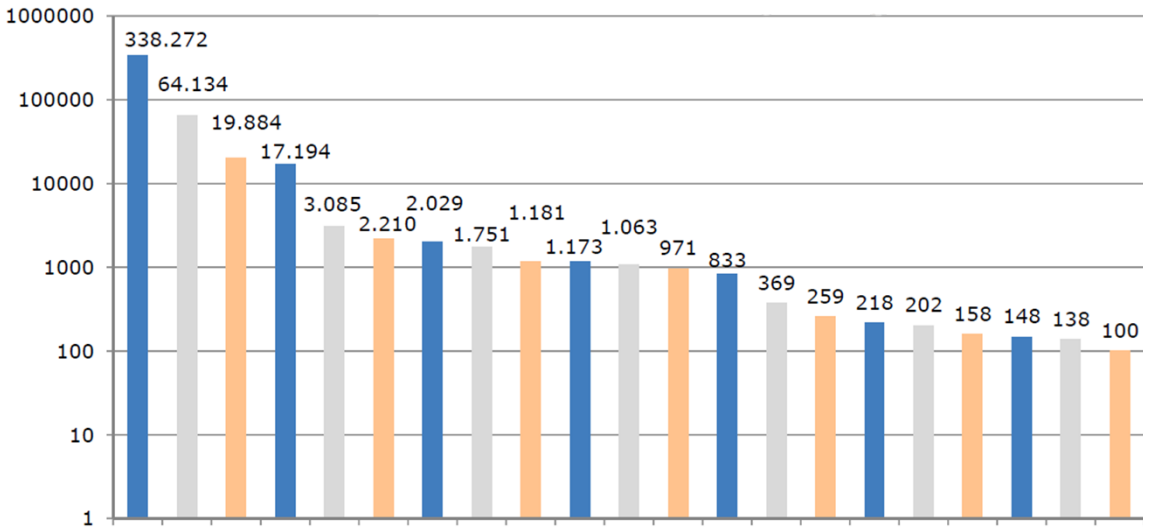
Who cares?

The individual regulator
per EU / EFTA / Candidate / MRA country
can decide market surveillance measures.

The combined group of regulators → e.g. TCAM
can run administrative cooperation campaigns.

Market Surveillance Example

German regulator online trade interventions per product category



Source: BundesNetzAgentur.
Statistik Marktüberwachung 2017

	Rank	Category	Stops of Online Sales
	1	Radio headphones	338,272
	2	Drones / Quadrocopters	64,134
	3	Smartwatches	19,884
	4	Radio transmitters (*e.g. portable FM Tx'*)	17,194
	5	Backup cameras	3,085
	6	Remote-controlled sockets	2,210
	7	Audio mixers	2,029
	8	Hand-held radios	1,751
	9	LED lamps	1,181
	10	e-cigarettes	1,173
	11	Surveillance cameras	1,063
	12	Radio door bells	971
	13	Mobile radios	833
	14	Radio alert systems	369
	15	Bluetooth applications	259
	16	others 1	218
	17	others 2	202
	18	Multimedia equipment	158
	19	Alarm clocks	148
	20	Game pads	138
	21	HDMI switches	100
	22	USB chargers	99
		others 3	284
			455,755

Be aware of Market Surveillance by TCAM / ADCO

Telecommunication Conformity Assessment and Market Surveillance

TCAM

Regulators of…
EU states +
EFTA states +
„candidates“

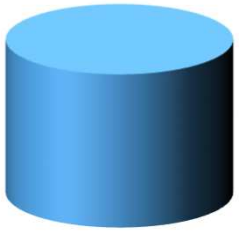
Each regulator can
decide on random checks up to
10 years after market placement
and may ask for

- Test reports
- Declaration of Conformity
- Purchase of radio equipment
- Test of radio equipment
- Notes and calculations done during the risk assessment

Is there a mismatch?
Is there something strange?

Joint Actions

Committee work,
around 3 meetings
per year.



Common Data
including black-list

Administrative Cooperation - RED

ADCO RED

- Trials
- Cross-border surveillance Campaigns
- Conformity assessment cooperation

Extra:

Administrative Cooperation - EMC

No harmonisation on sanctions among the states.

Manufacturer‘s Homework according RED

Declaration of Conformity

Manufacturer
(sole responsible)

DoC

Annex VI

including dated reference to..
harmonized standard or
to other technical specification

EU +
EFTA +
„Candidates“

Notified bodies can be approached for testing, conformity assessment.
NBs must be registered with a number and listed in the „NANDO“ list

Precisley identified combination of radio equipment and software

Combination of Radio Equipment & Software

Conformity Assessment

Precondition | Result =DoC

Art. 17

- Documentation
- Test Reports
- Solutions adopted to meet the essential requirements
- and more

Risk Assessment

DoC = Declaration of Conformity

RED Art. 3

Essential Requirements of Art. 3 are met

yes no

The complete set of documents is ready for an audit-like assessment. Rentention period 10 years

yes *no*

Declaration of Conformity

Manufacturer Name
and address

Reference Number

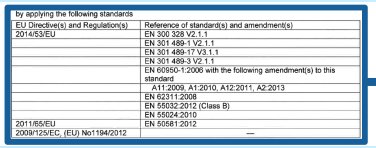
EU Declaration of Conformity

This declaration is issued under the sole responsibility of the manufacturer

We declare, that the product
<xyz>
is in conformity with the essential requirements of EU directive(s)

by applying the following standards

EU Directive(s) and Regulation(s)	Reference of standard(s) and amendment(s)
2014/53/EU	EN 300 328 V2.1.1
	EN 301 489-1 V2.1.1
	EN 301 489-17 V3.1.1
	EN 301 489-3 V2.1.1
	EN 60950-1:2006 with the following amendment(s) to this standard
	A11:2009, A1:2010, A12:2011, A2:2013
	EN 62311:2008
	EN 55032:2012 (Class B)
	EN 55024:2010
2011/65/EU	EN 50581:2012
2009/125/EC, (EU) No1194/2012	—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EN 55024:2010
2011/65/EU | EN 50581:2012
2009/125/EC, (EU) No1194/2012 | —

Date: _____

_____
Signature

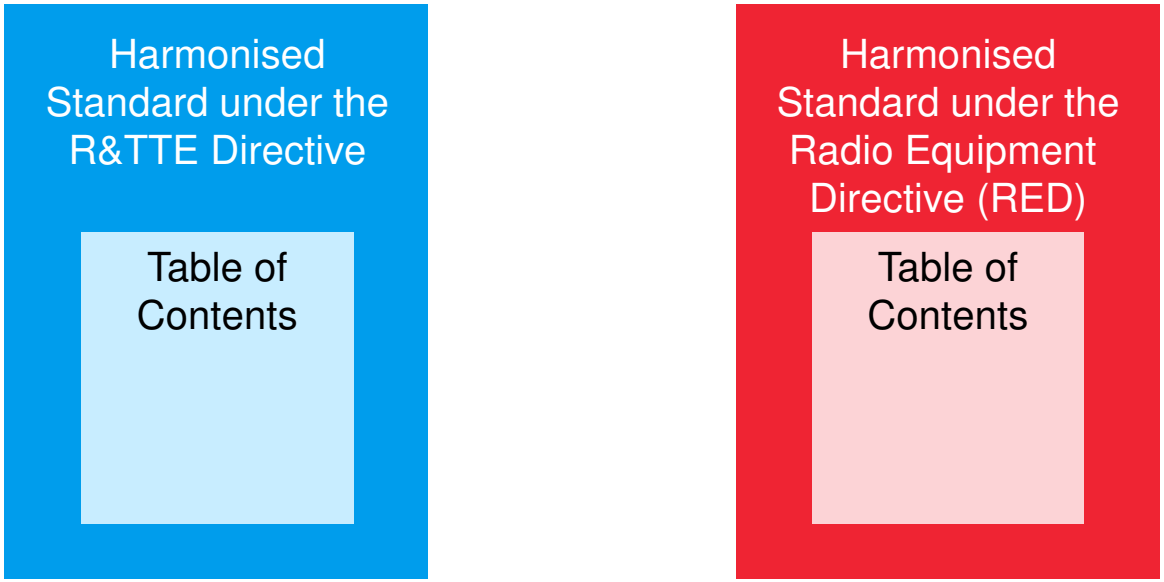
On the radio part…

self-declaration is possible as soon as a harmonised standard is published in the Official Journal of the EU.

See the legally binding statement in the DoC!

Increase of Testing Efforts

Check the standard versions:
The table of contents is a good indicator for testing efforts.



Increase of Testing Efforts

Example: EN 302 567 under Directive 1999/5/EC (R&TTE)

Chapter 5 of a harmonised EN standard under RED (article 3.2) describes the test procedures. The chapter 5 can be taken as a measure of testing efforts.
Take a look at the chapter 5 when changing from R&TTE (old regulatory regime) to RED (new regulatory regime). You can do this kind of effort comparison with any harmonized EN standard that existed under R&TTE.

Increase of Testing Efforts

Example: EN 302 567 under Directive 1999/5/EC (R&TTE)

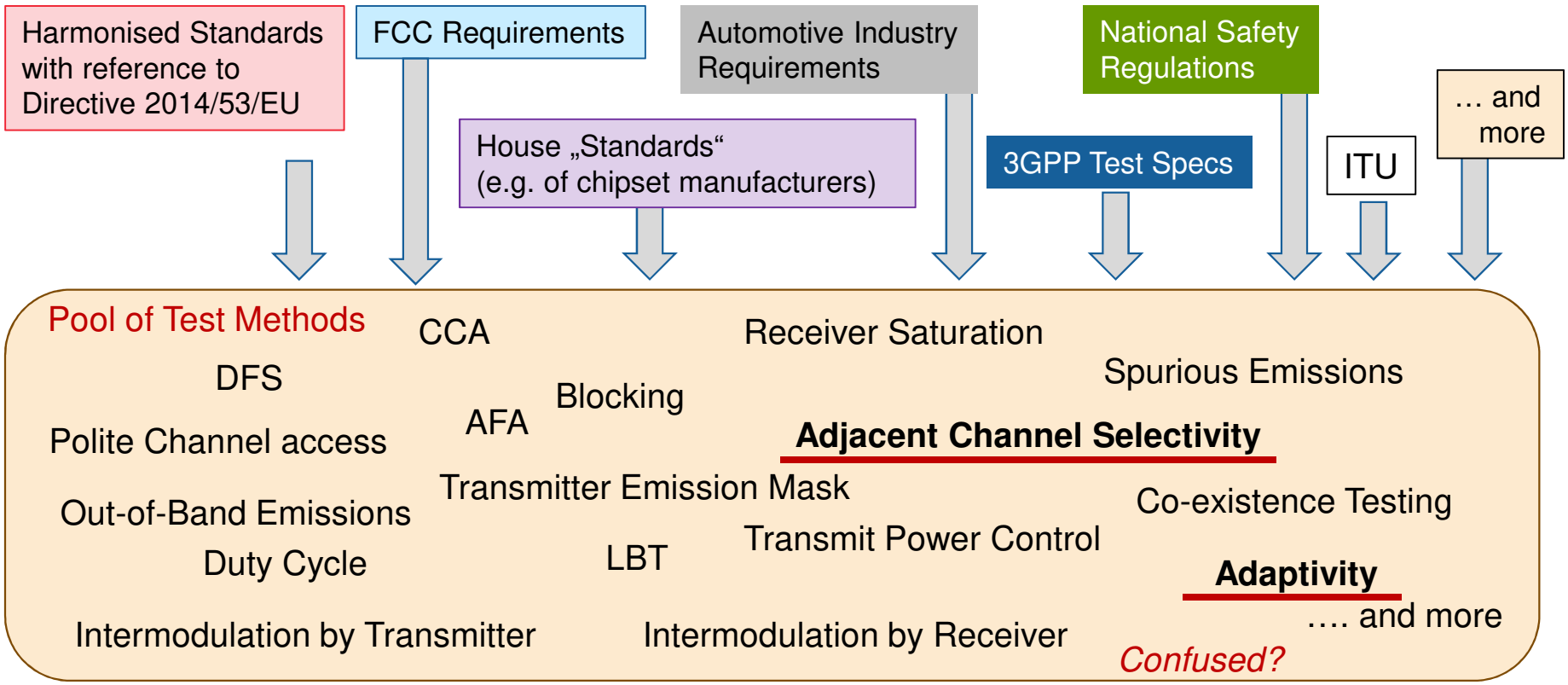
Increase of Testing Efforts

Example: EN 302 567 under Directive 2014/53/EU (RED)

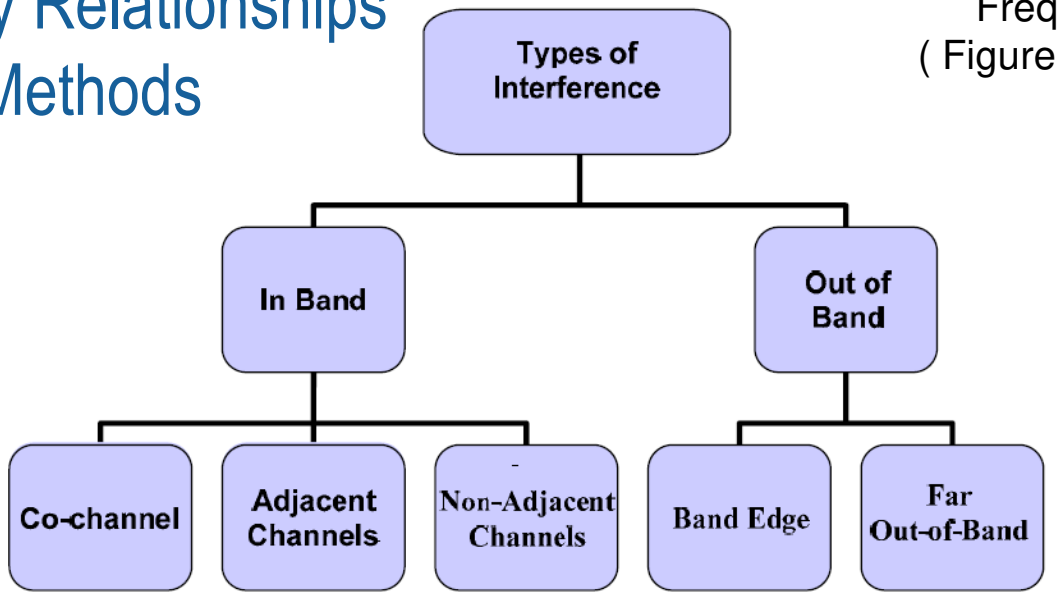
Extended table of contents in the standard

More requirements

Pool of Test Methods



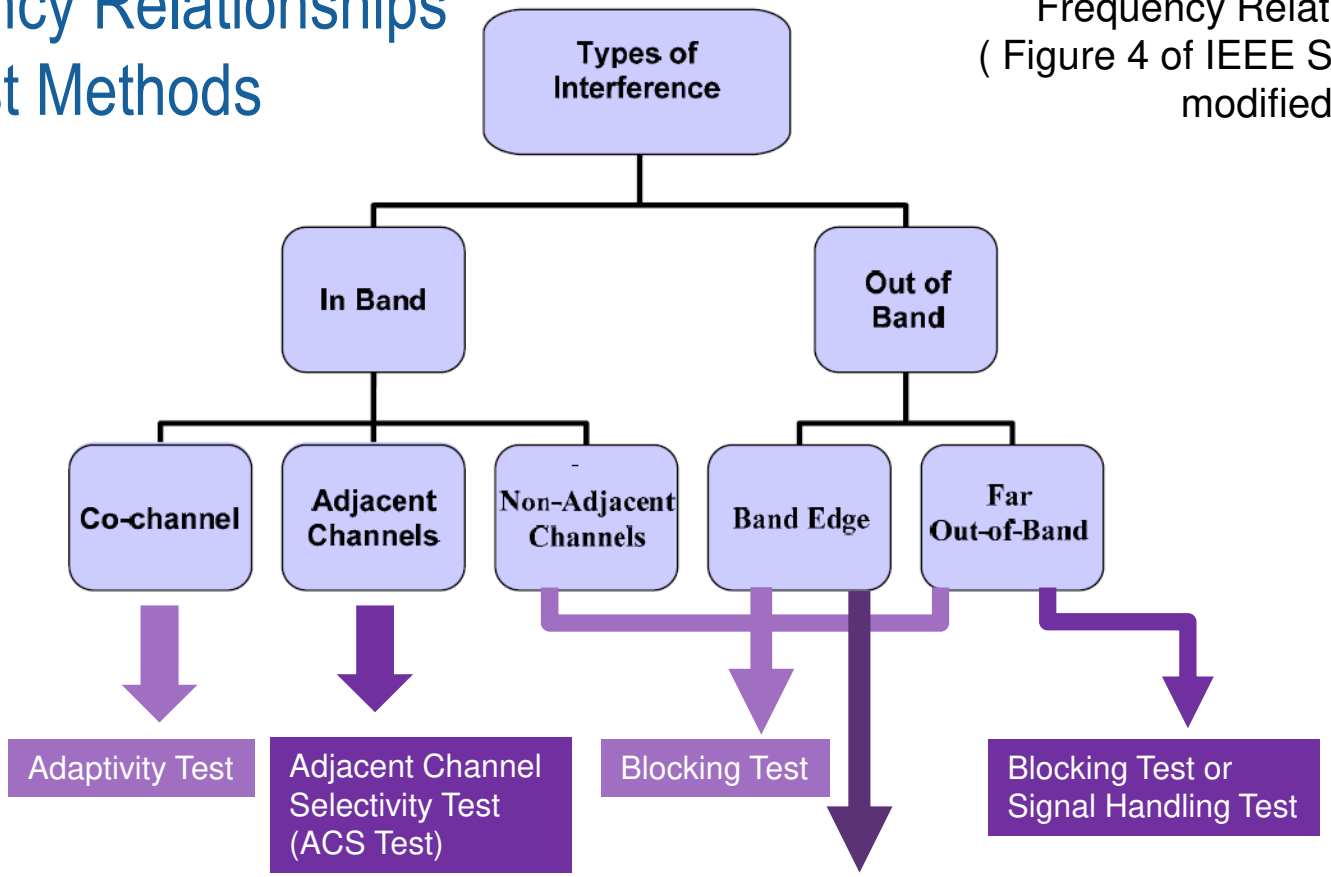
Frequency Relationships and Test Methods



Frequency Relationships
(Figure 4 of IEEE Std 1900.2)

Frequency Relationships and Test Methods

Frequency Relationships
(Figure 4 of IEEE Std 1900.2)
modified



Interference Mechanism

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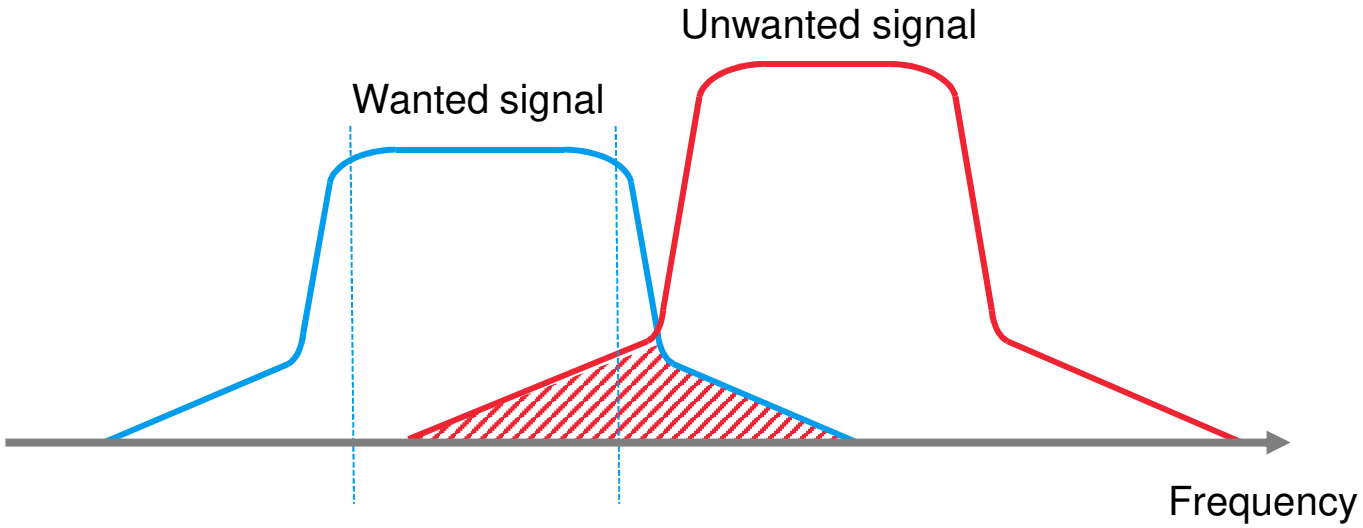
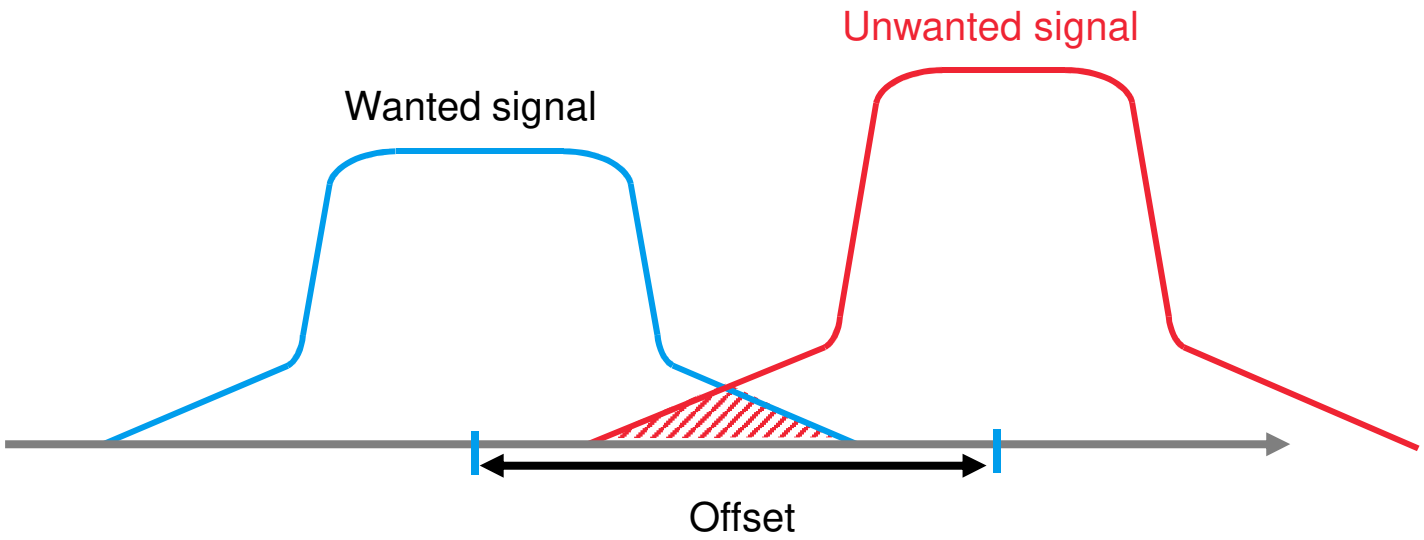
Interference Mechanism



Pattern area: overlap translates into an increased noise level on the wanted receiver side.

Unwanted signal adjacent to wanted signal

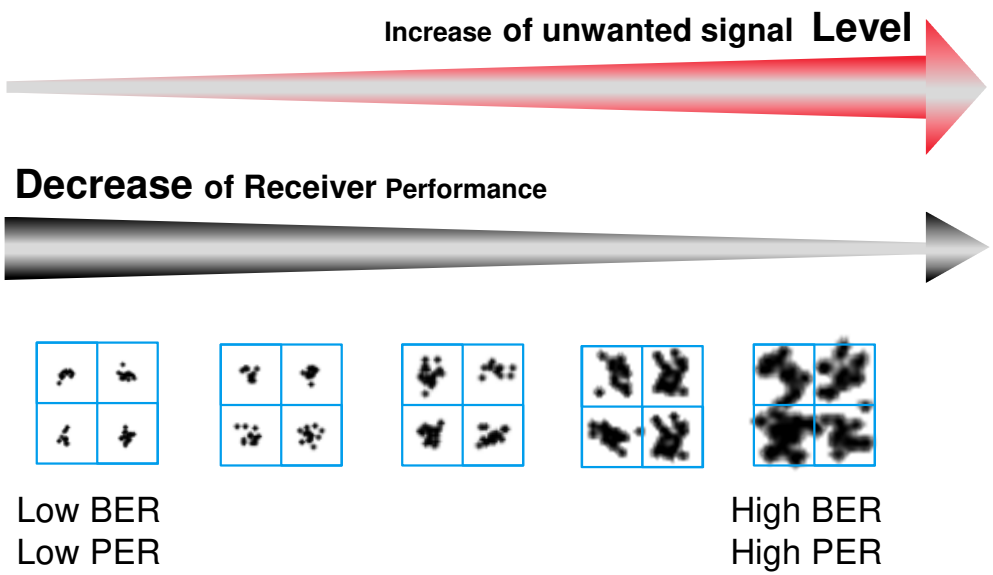
Interference Mechanism



Pattern area: overlap translates into an increased noise level on the wanted receiver side.

Unwanted signal with offset to wanted signal

Receiver under Interference Condition



Wanted signal receiver
= receiver under interference conditions:

Can the receiver handle the interference and provide with a good performance?

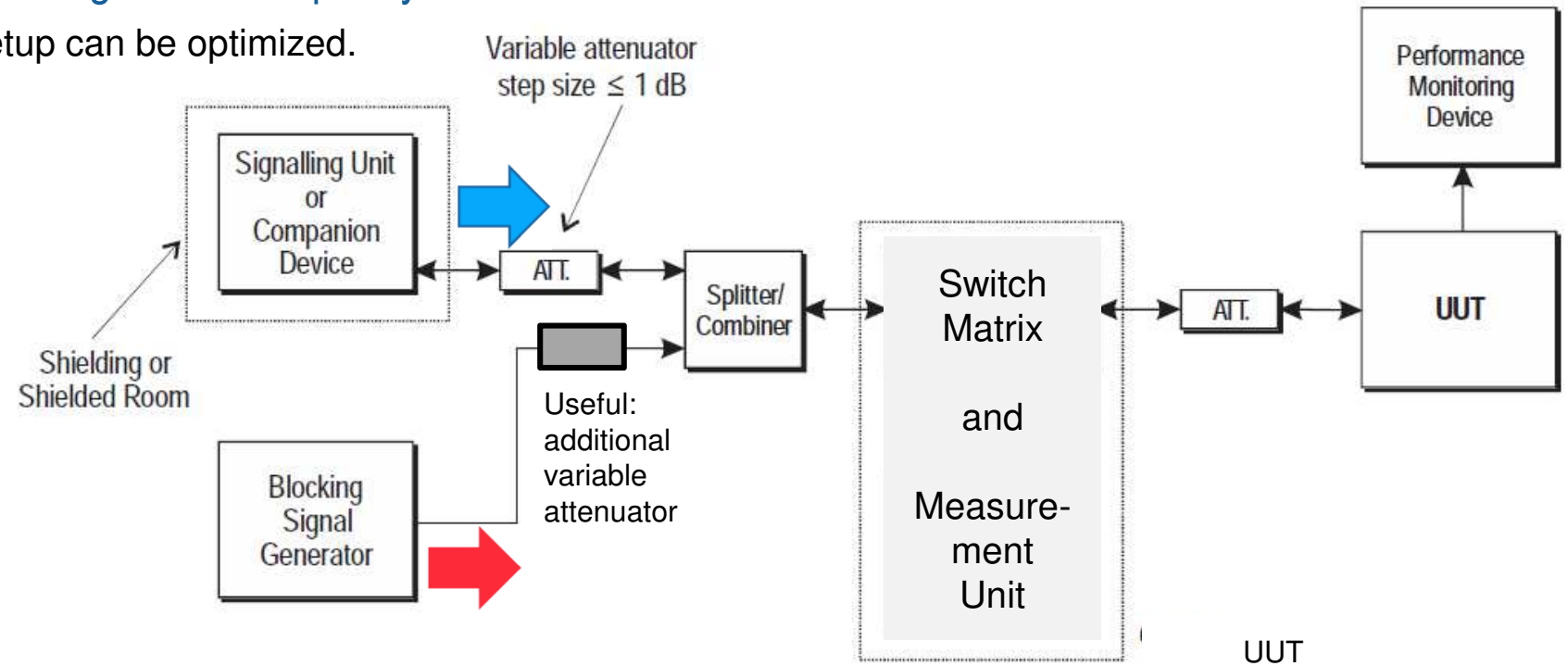
Does the receiver ask for retransmission again and again while the already transmitted data is wasted (pure design)?

Does the receiver support for example a HARQ process and therefore asks for re-transmissions only when necessary (advanced design)?

Receiver under Interference Condition

Blocking Test Example by ETSI BRAN

Setup can be optimized.

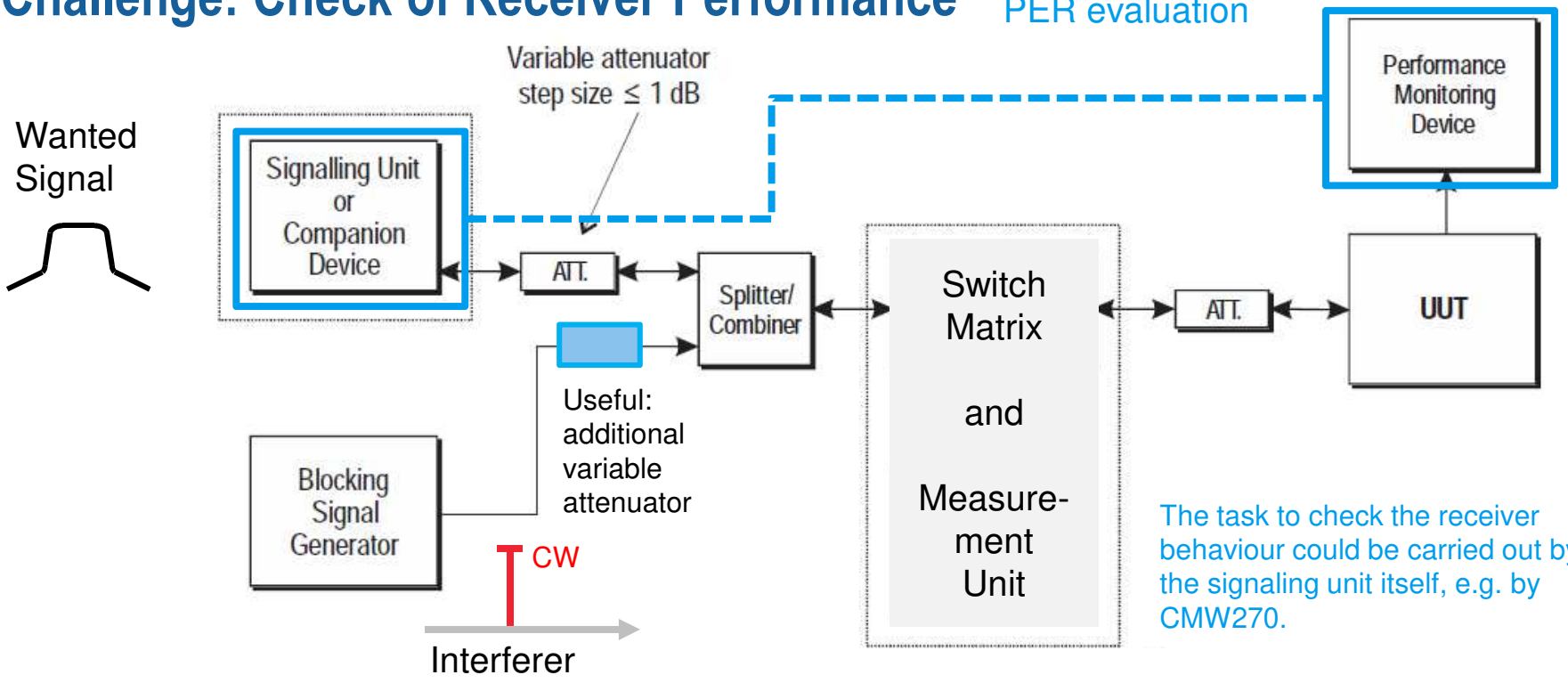


Picture from ETSI TS 103 521 v 1.1.1 with modification

UUT
User Equipment Under Test

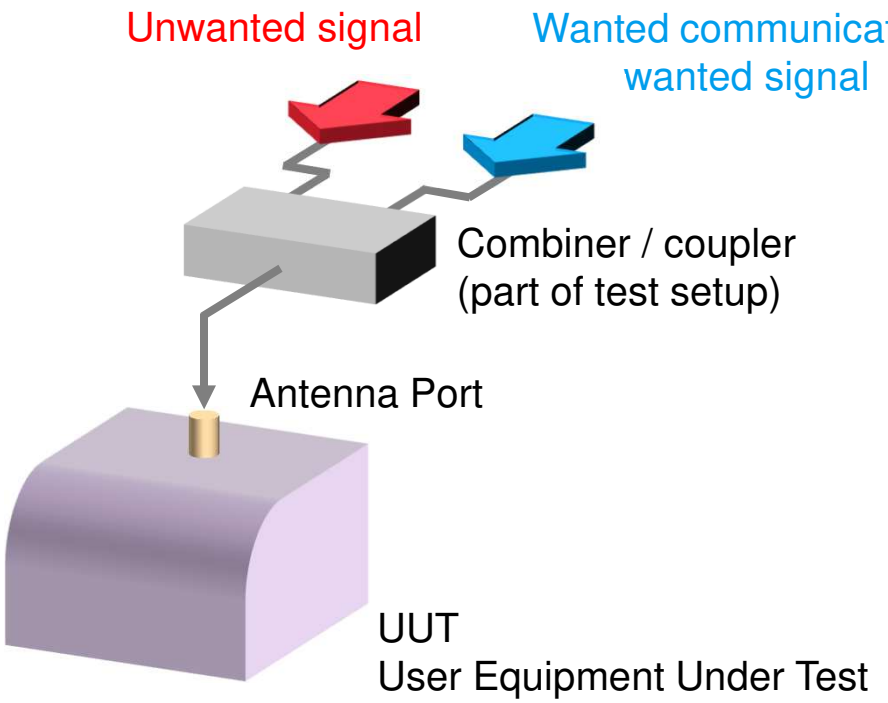
Blocking Test in EN 301 893:
Challenge: Check of Receiver Performance

Tasks handled by signaling unit
e.g. by CMW270 during blocking test
PER evaluation



The task to check the receiver behaviour could be carried out by the signaling unit itself, e.g. by CMW270.

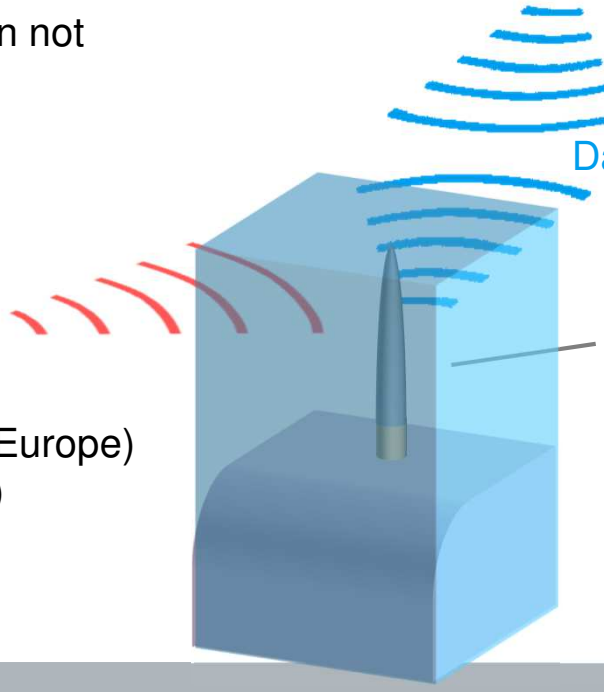
Receiver under Interference Condition



RED Approach allows Wireless Coexistence Tests

Radiated Test

Radiated testing is required
if the antenna is built-in and
if the antenna port can not
be reached.
Suggestion:
immunity test system

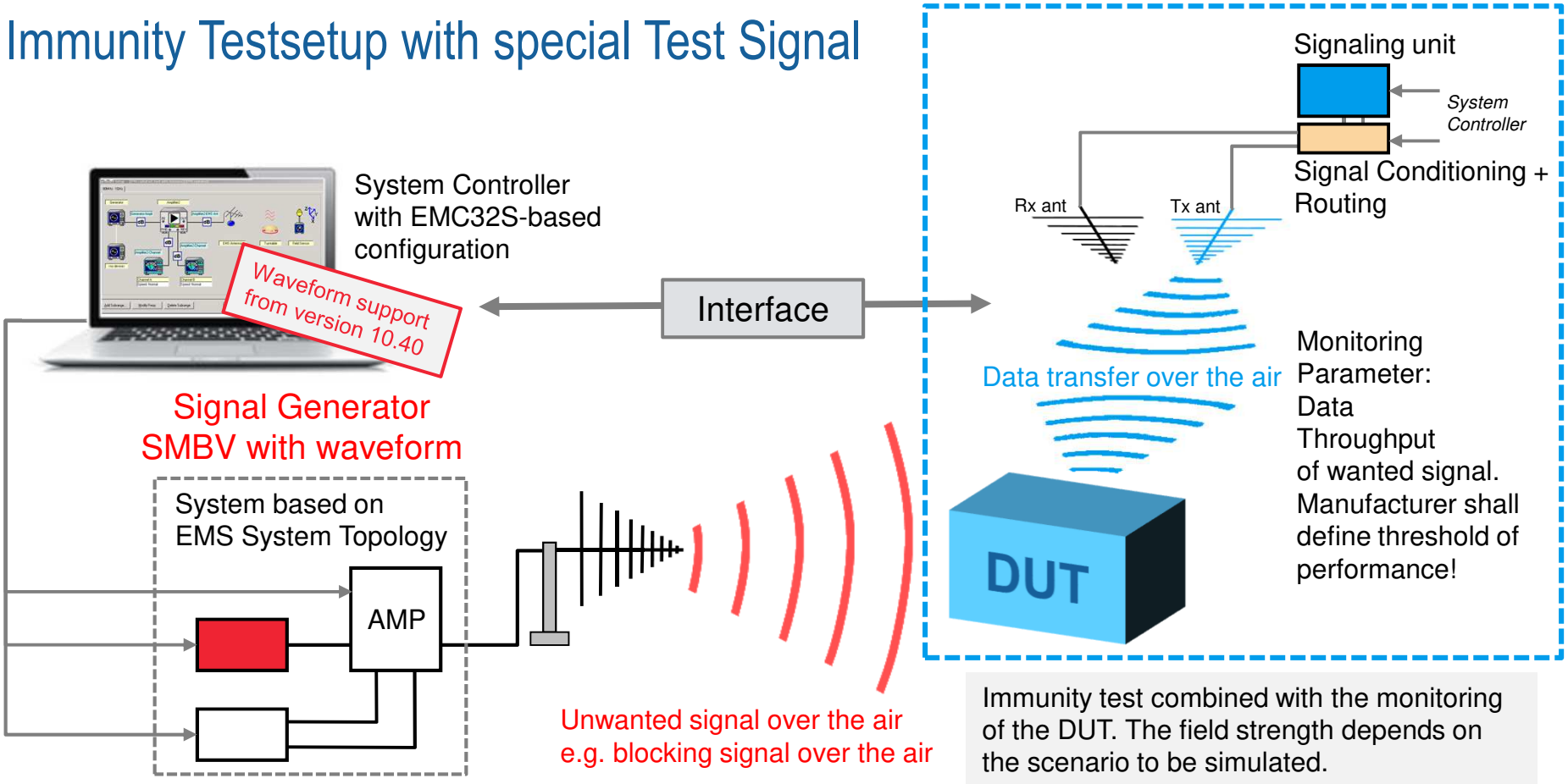


e.g. non-cellular
link maintained by
CMW.
Parmeter to monitor:
PER, BER or NACK

Unwanted signal
Waveform,
LTE uplink (FDD7 Europe)
LTE TDD 41 (USA)

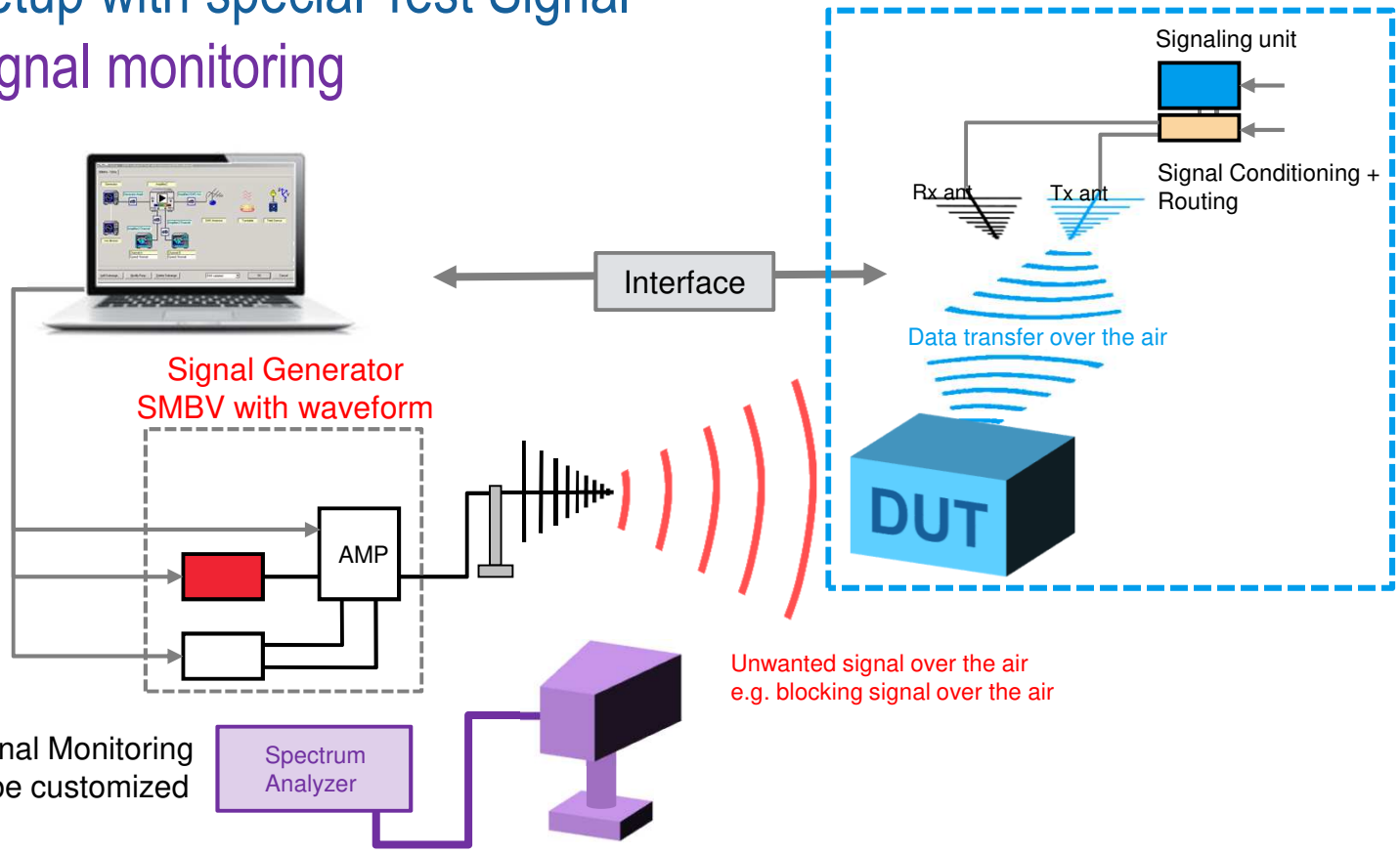
Throughput reported by
the DUT can be used for
the characterization of the
communication quality.

Immunity Testsetup with special Test Signal



Immunity test combined with the monitoring of the DUT. The field strength depends on the scenario to be simulated.

Immunity Testsetup with special Test Signal
Extension for signal monitoring



Field Strength and Power Discussion

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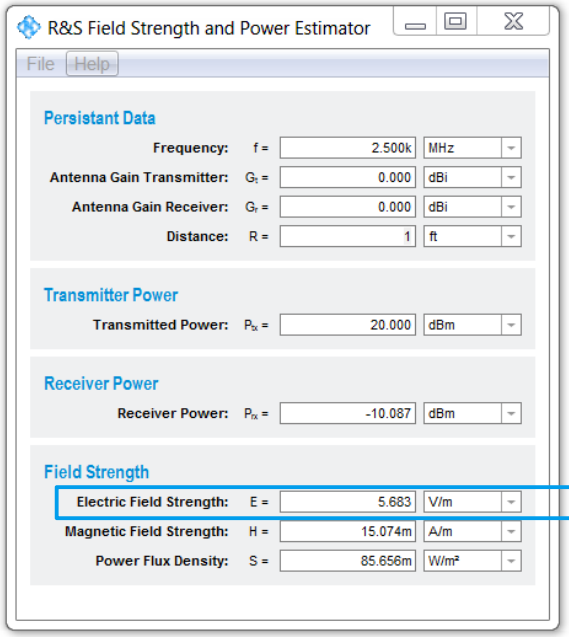
Field Strength and Power Discussion

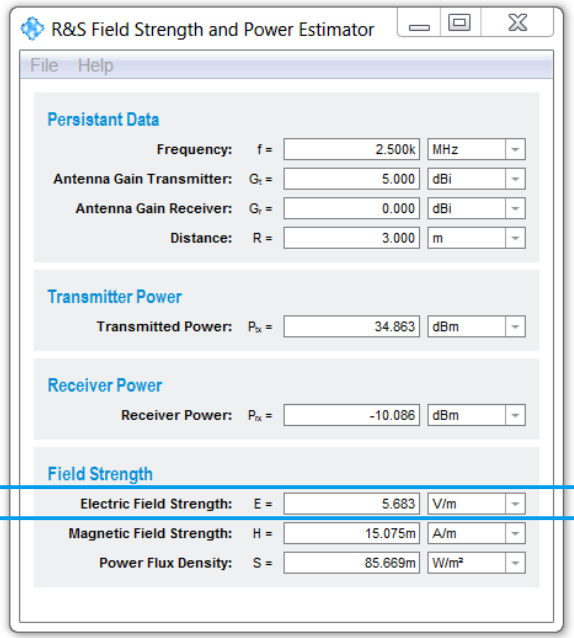
Example

Scenario



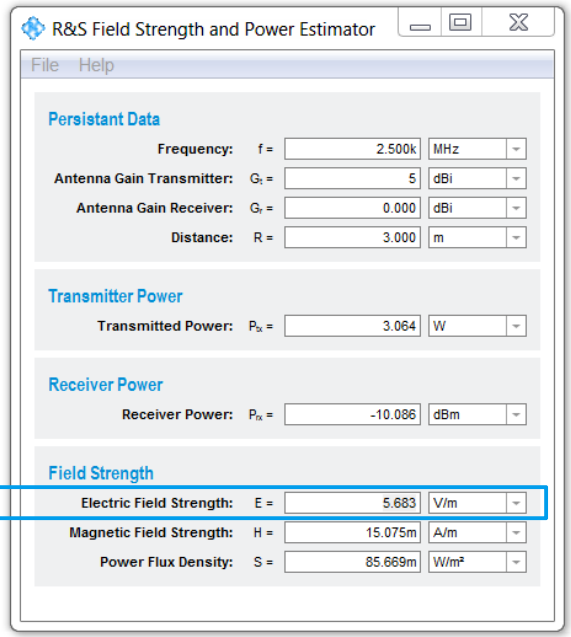
1 ft separation. EIRP (unwanted)
20 dBm at 2.5 GHz

Simulation by immunity system



Keep the field strength. Put in the
setup parameter, e.g. 3 m. Gain 5 dBi.

RMS power level

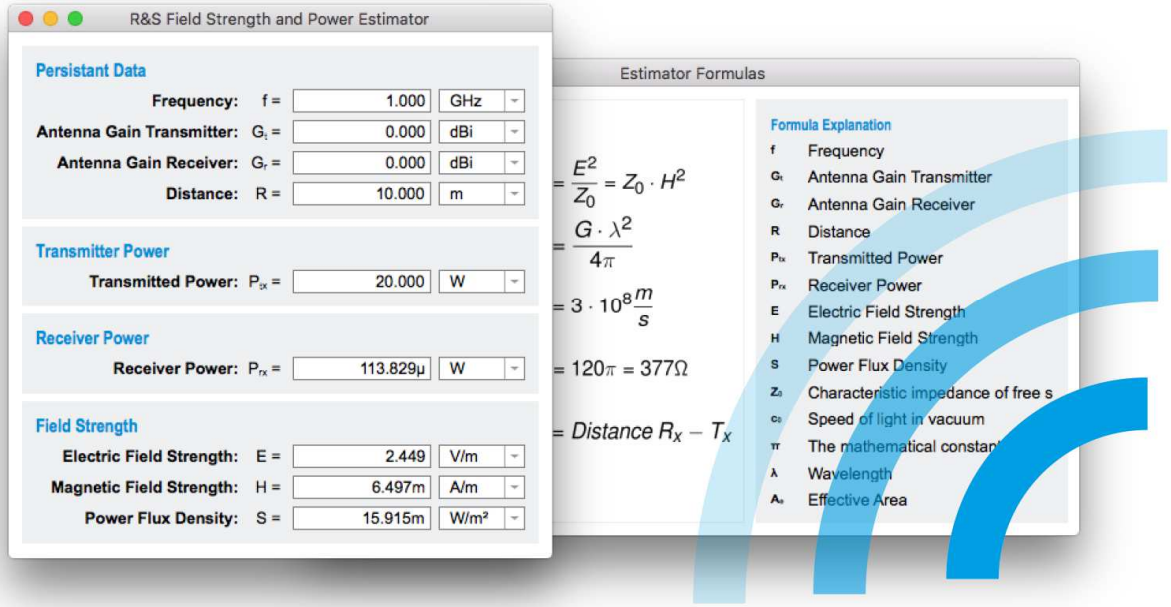


Required power for RMS: 3 Watt.
Additional head room to cope with the PAPR
of the unwanted signal: 8 dB → 19.3 Watt (net).
Losses of 1.5 dB? → 27.3 Watt → select 30 W.

Fieldstrength and Power Discussion

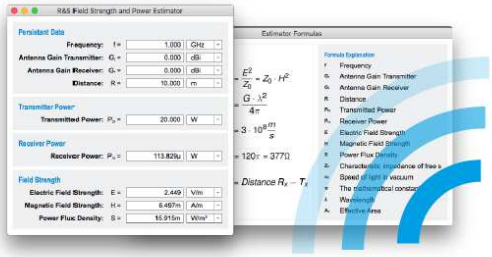
R&S Field Strength and Power Estimator

Application Note 1MA85



Application Note 1MA85

Field Strength and Power Estimator
Application Note



Determining the field strength from transmitted power is not an easy job. Various, quite complicated formulas have to be evaluated correctly. This application note explains how to calculate electric and magnetic field strength, and power flux density. A program associated with this application note helps with the calculation and converts Watts to mW and dBm, V/m to µV/m and dBµV/m as well as A/m to µA/m and dBµA/m. Additional applications are calculation of propagation loss or antenna factor. Smartphone versions of the application software are also available.

Note:

Please find the most up-to-date document on our homepage http://www.rohde-schwarz.com/appnote/1MA85.

This document is complemented by software. The software may be updated even if the version of the document remains unchanged

More than Minimum Performance?

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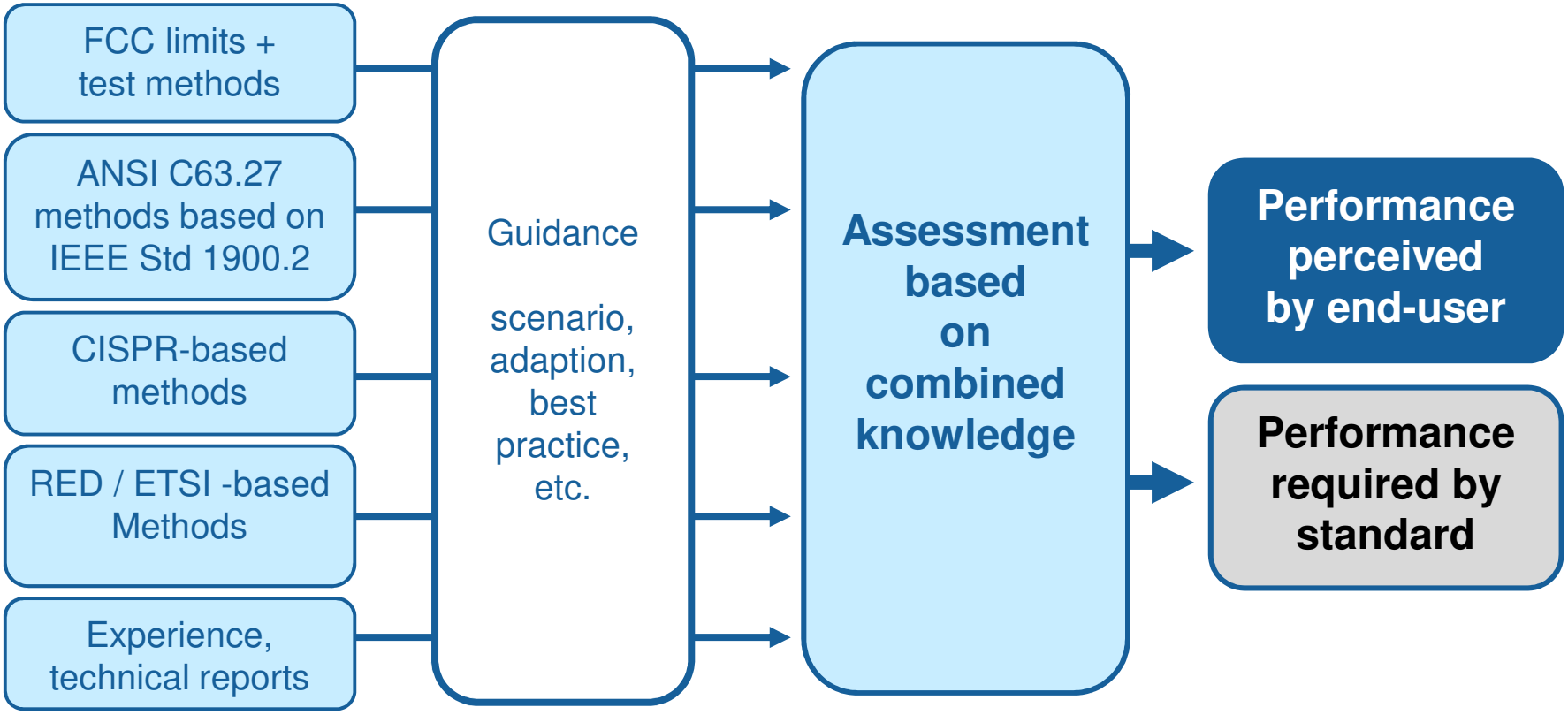
More than Minimum Performance



More than Minimum Performance – Receiver Example

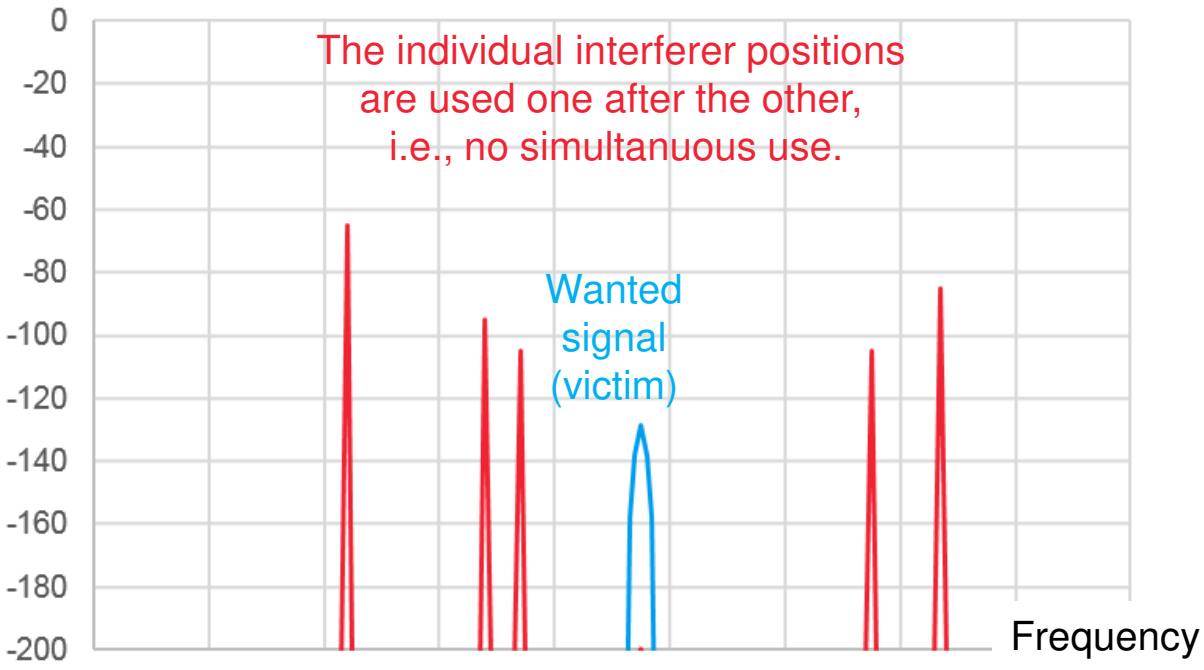
Selectivity: Blocking Tests

Signal level in dBm

Interferer Positions and Levels taken from the table(s) in the standard

One interferer per test result.

Check of receiver performance degradation.



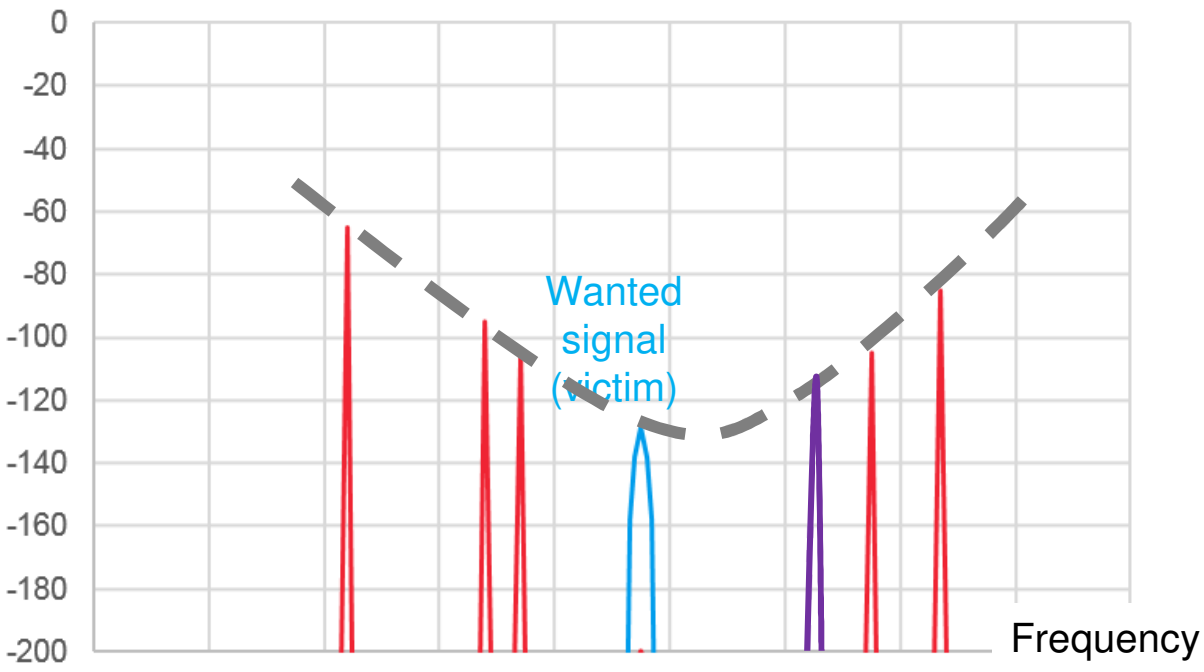
More than Minimum Performance – Receiver Example

Selectivity: Blocking Tests

Signal level in dBm

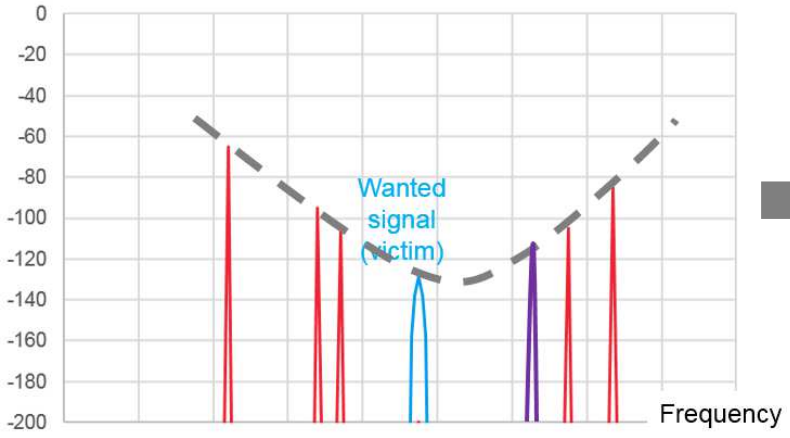
Interferer Positions and Levels taken from the table(s) in the standard

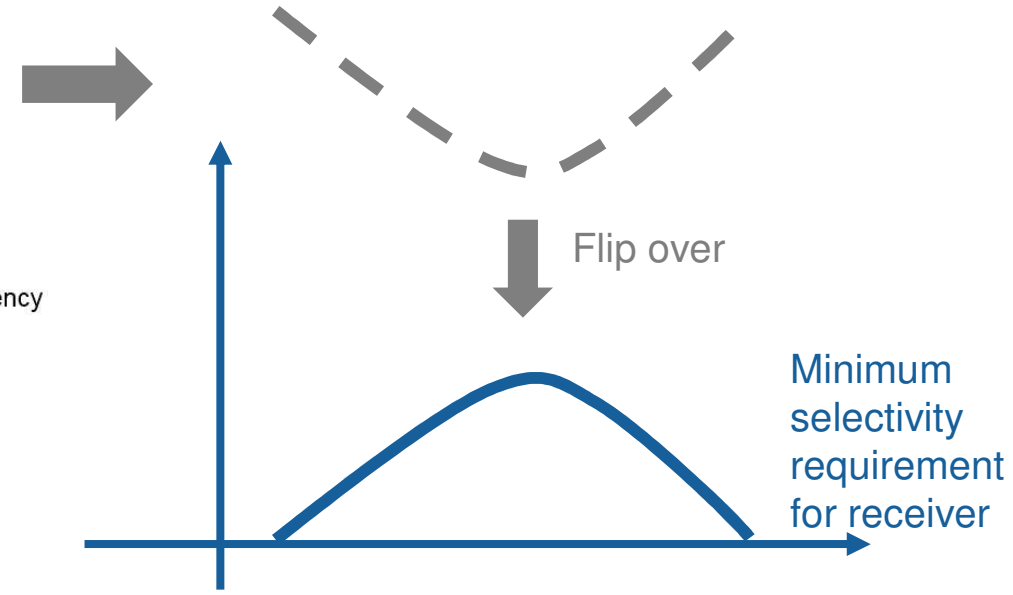
View your intra-system interferer. Does it fit into the pattern?



More than Minimum Performance – Receiver Example

Selectivity: Blocking Tests

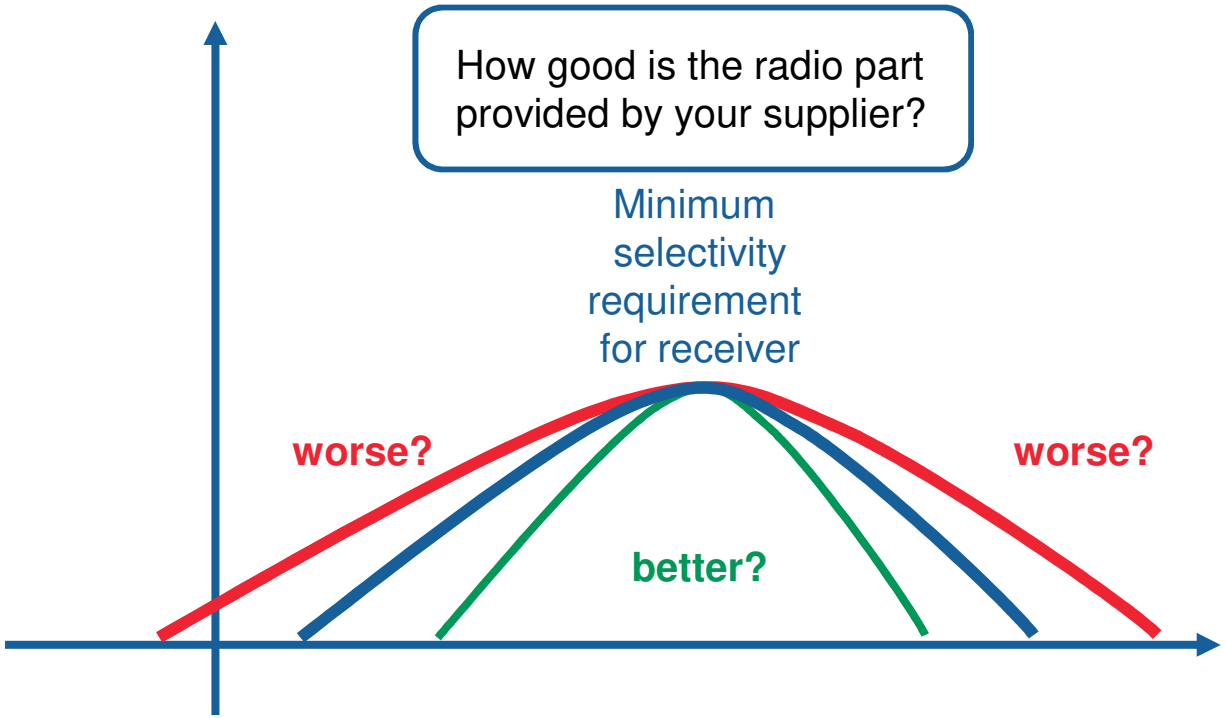




Some standards reflect tough requirements on receiver sturdiness. Some standards requirements look weak in terms of testing the robustness of receivers.
Risk assessment testing allows the follow up on scenarios, that come close to the expected RF environment condition.

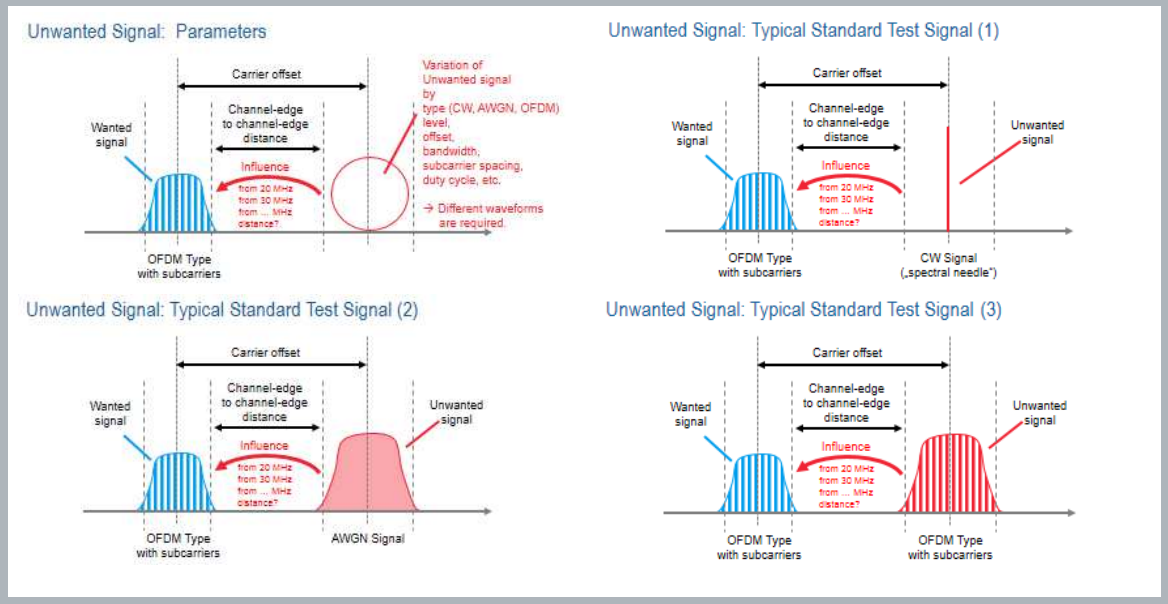
More than Minimum Performance – Receiver Example

Selectivity: Blocking Tests



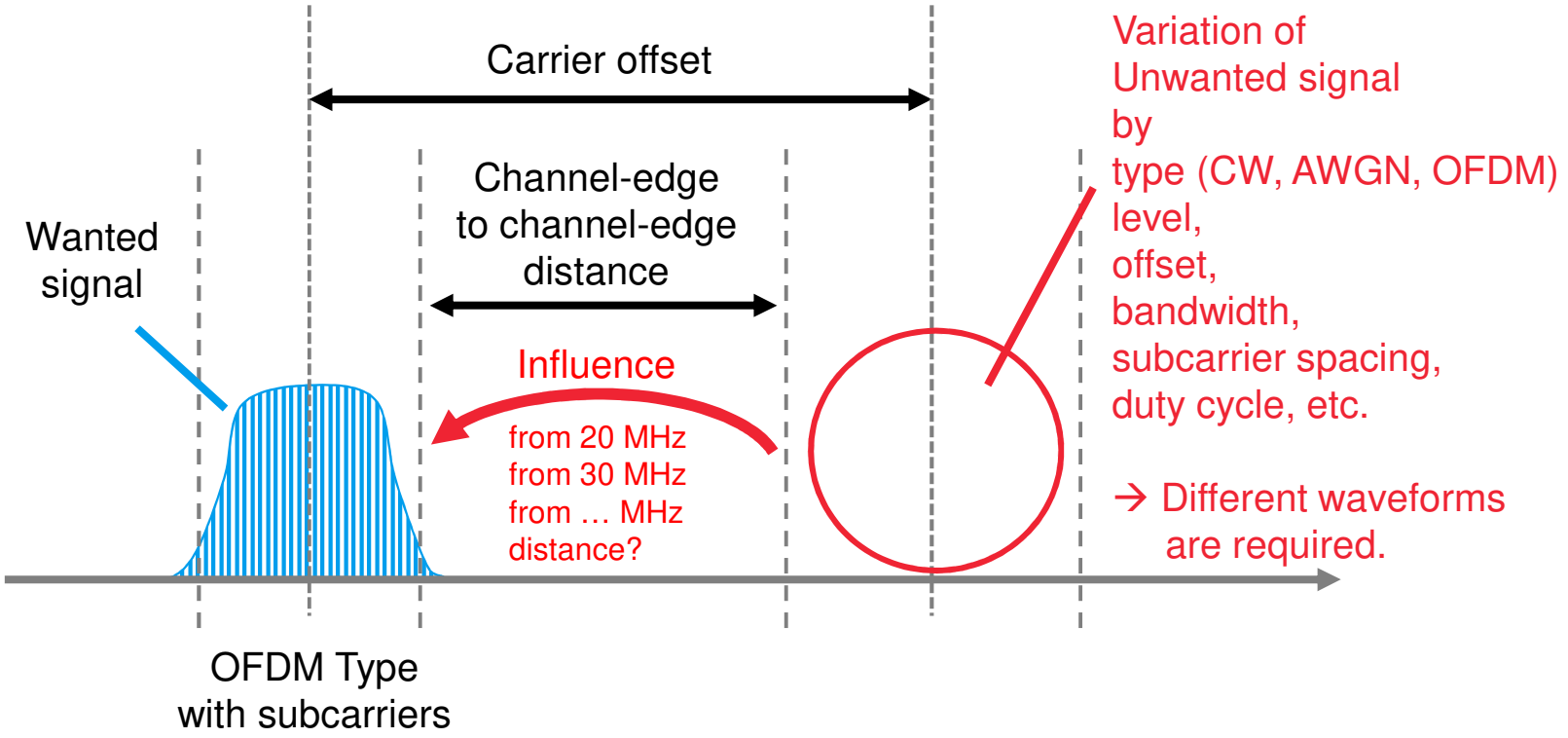
Backup

Variation of Unwanted Signal Parameters

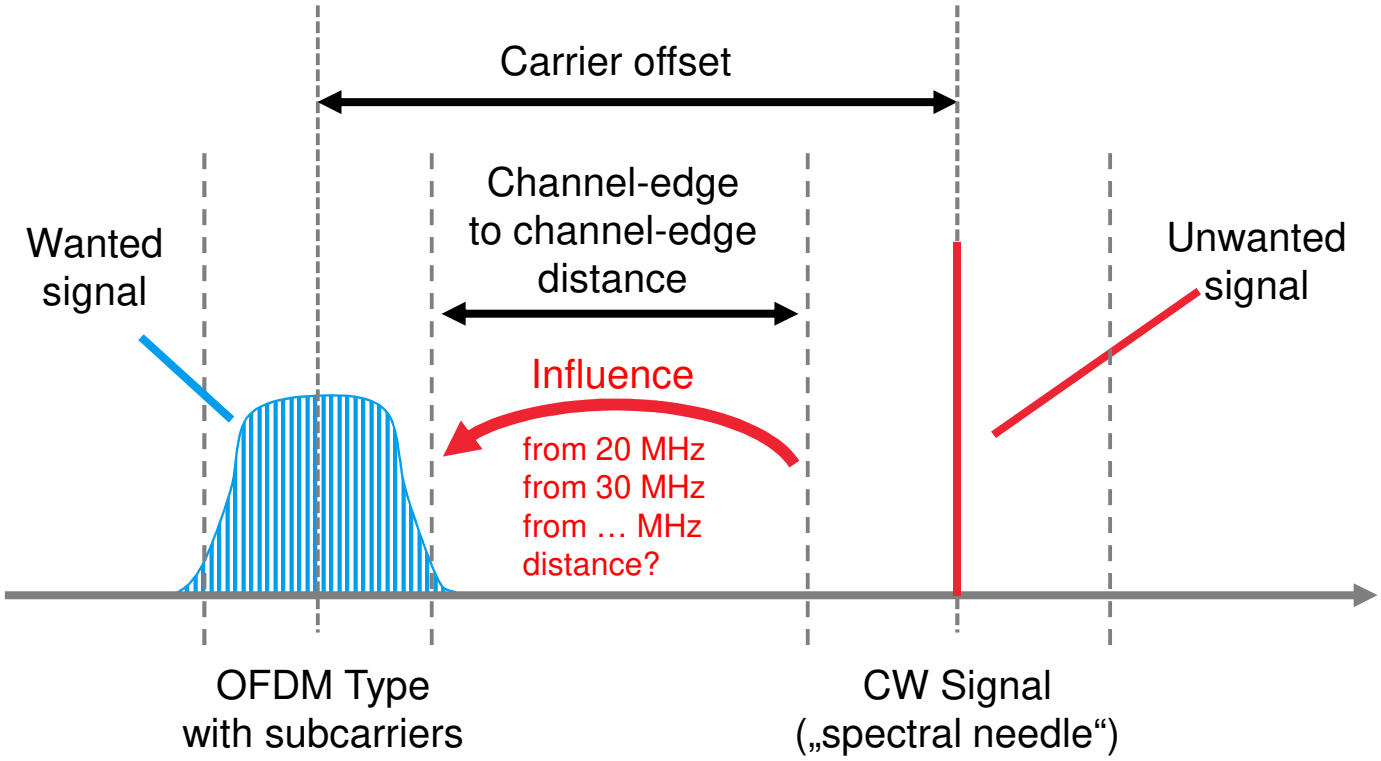


Unwanted Signal Type:
- CW
- AWGN
- OFDM

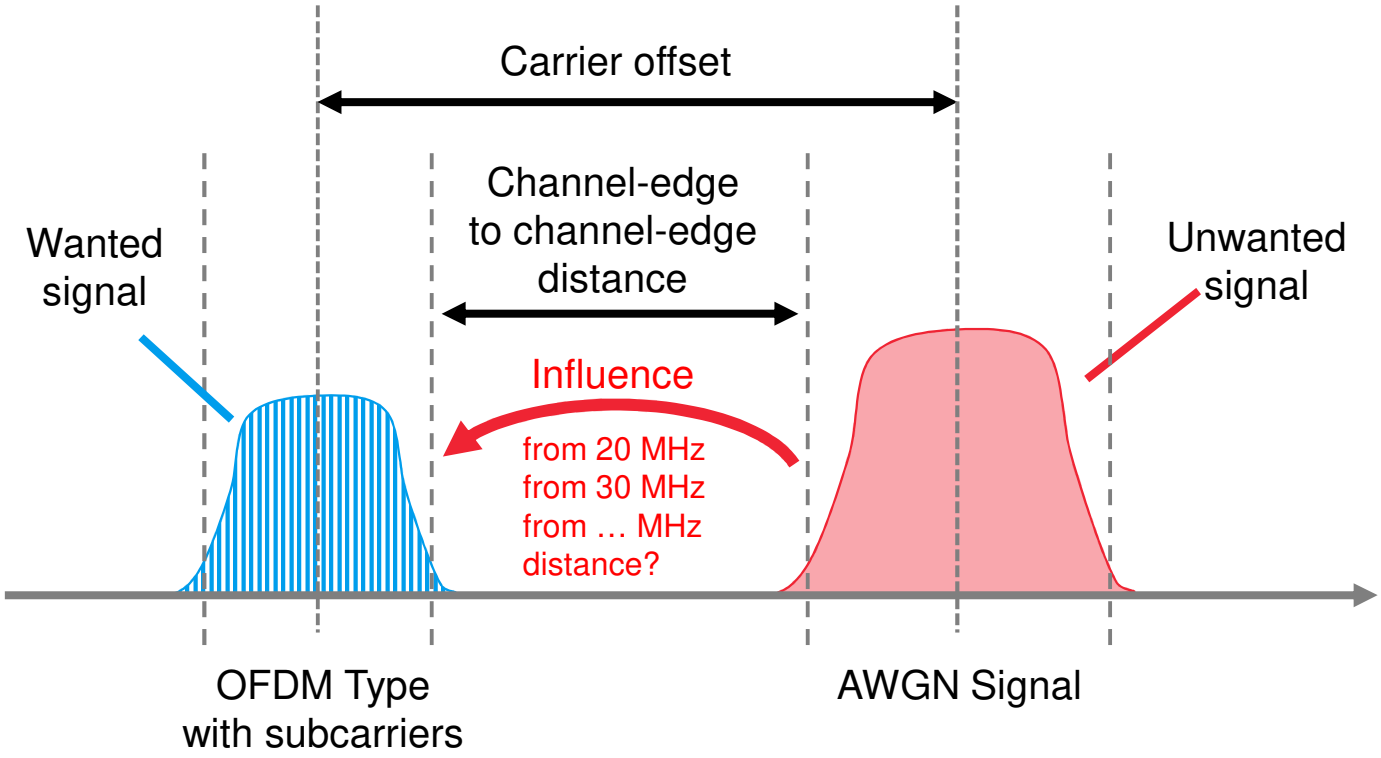
Unwanted Signal: Parameters



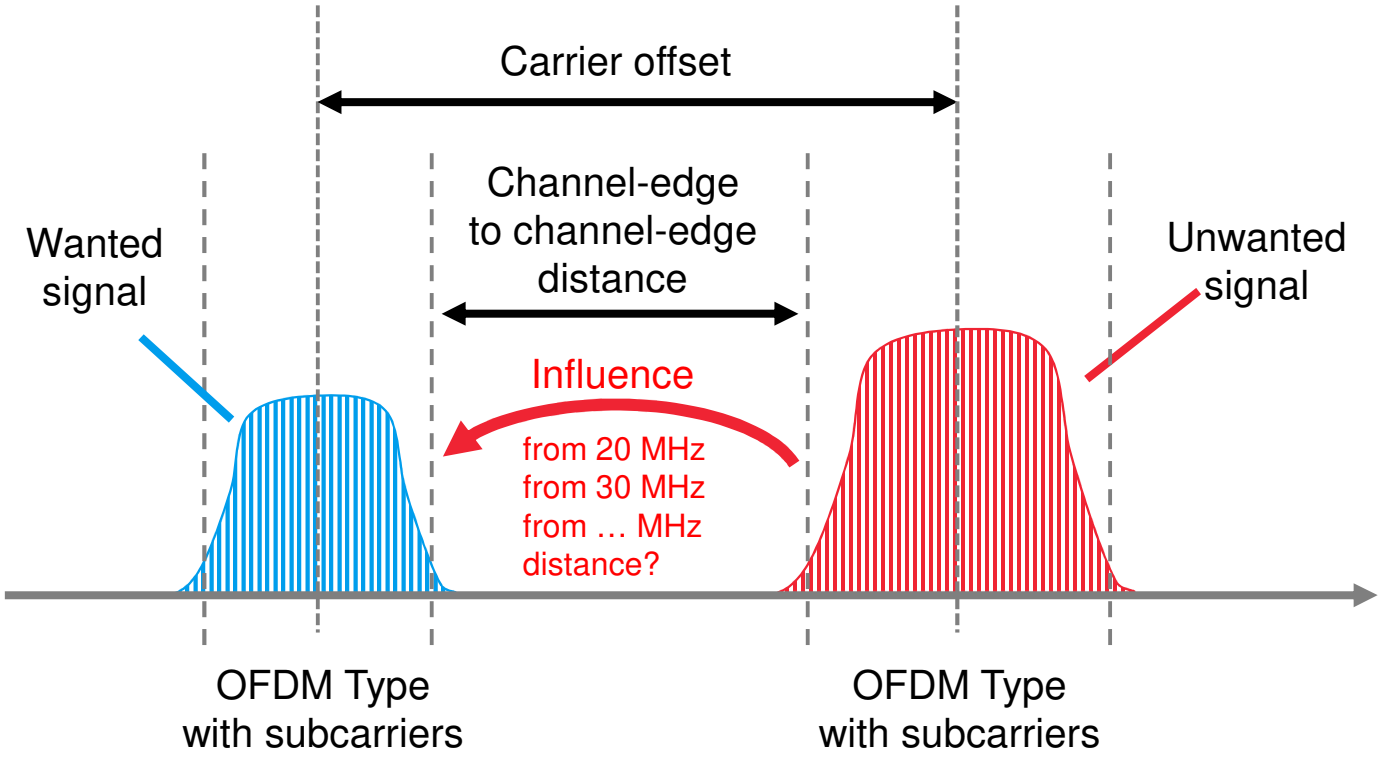
Unwanted Signal: Typical Standard Test Signal (1)



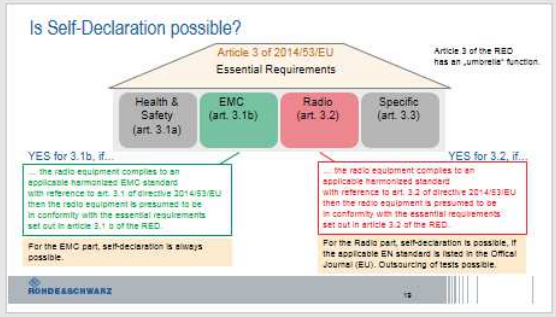
Unwanted Signal: Typical Standard Test Signal (2)

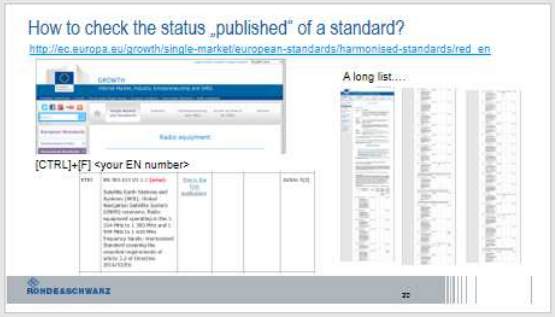


Unwanted Signal: Typical Standard Test Signal (3)

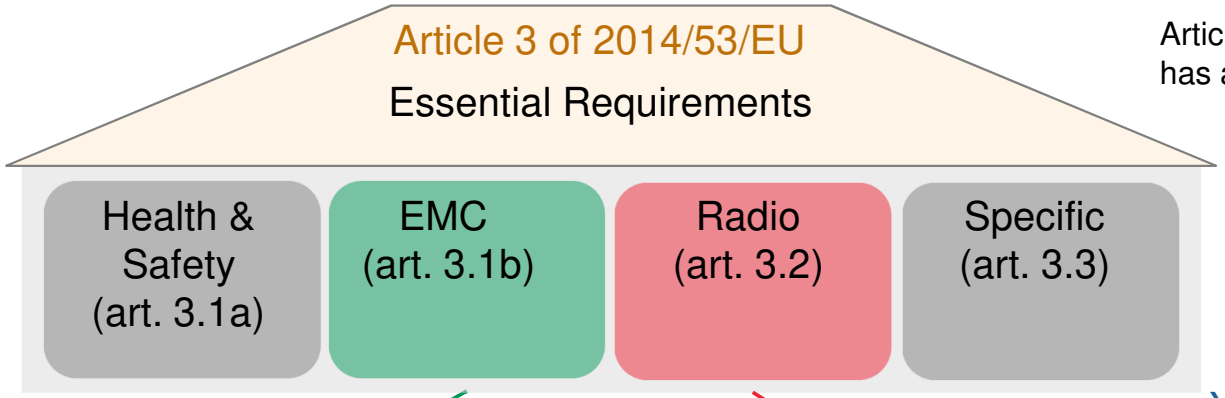


Self Declaration,
how to find a published Harmonised Standard





Is Self-Declaration possible?



Article 3 of the RED has an „umbrella“ function.

YES for 3.1b, if…

… the radio equipment complies to an applicable harmonized EMC standard with reference to art. 3.1 of directive 2014/53/EU then the radio equipment is presumed to be in conformity with the essential requirements set out in article 3.1 b of the RED.

For the EMC part, self-declaration is always possible.

YES for 3.2, if…

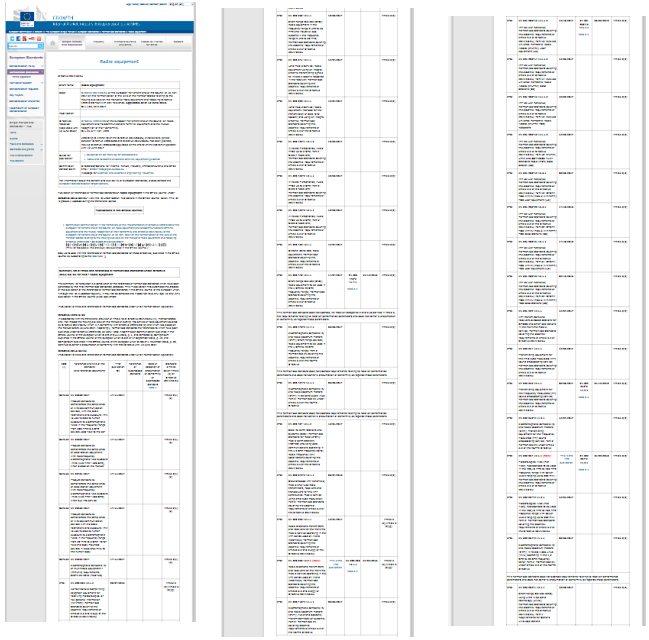
… the radio equipment complies to an applicable harmonized standard with reference to art. 3.2 of directive 2014/53/EU then the radio equipment is presumed to be in conformity with the essential requirements set out in article 3.2 of the RED.

For the Radio part, self-declaration is possible, if the applicable EN standard is listed in the Offical Journal (EU). Outsourcing of tests possible.

How to check the status „published“ of a standard?

http://ec.europa.eu/growth/single-market/european-standards/harmonised-standards/red_en

A long list….



[CTRL]+[F] <your EN number>

ETSI	EN 303 413 V1.1.1 **(new)** Satellite Earth Stations and Systems (SES); Global Navigation Satellite System (GNSS) receivers; Radio equipment operating in the 1 164 MHz to 1 300 MHz and 1 559 MHz to 1 610 MHz frequency bands; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU	This is the first publication			Article 3(2)

Up-to-date Harmonised Standards refer to 2014/53/EU

Reference on title page of standard
Old versions of Harmonised Standards refer to Directive 1999/5/EC
Up-to-date Harmonised Standards refer to Directive 2014/53/EU.

EN 3xx xxx Version Number (Date)

Chapter / Title / EUT Type

Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU

Growing Number of Notified Bodies

Country of NB Registration	Aount of NBs	NB Reg.#					5					10					15
United States	15	0976	0978	0980	0981	0982	0984	1177	1313	1317	1588	1797	1925	2155	2200	2280	
Germany	11	0123	0197	0366	0678	0680	0681	0682	0700	1948	2522	2784					
United Kingdom	10	0086	0168	0359	0673	0888	0889	0890	0891	1942	2783						
Poland	5	1434	1451	1471	1664	2703											
Italy	4	0051	0477	0648	2051												
Spain	3	0370	1909	2031													
France	2	0081	0536														
Denmark	2	0199	0200														
Sweden	2	0402	0413														
Austria	2	0408	0438														
Norway	2	0470	2544														
Netherlands	2	0560	0620														
Greece	2	0848	2537														
Slovakia	2	1293	1299														
Japan	2	1731	1780														
Bulgaria	2	1857	2024														
Finland	1	0598															
Slovenia	1	1304															
Czech Republic	1	1383															
Hungary	1	1413															
Ireland	1	1595															
Canada	1	1622															
Croatia	1	2094															
Malta	1	2559															
Total	**76**																

Status in August 2018

Notified Bodies…

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Notified bodies….

- can qualify (alternative) test methods
- can perform tests
- can do the paperwork
  but do not sign the declaration of conformity
- can sub-contract with test houses (incl. 3rd parties)
  which do not have NB status.
- are not responsible for the risk assessment

In context with the RED, the use of a
draft standard is regarded as
a use of alternative test methods.
Thus a NB has to be involved.

List of Notified Bodies

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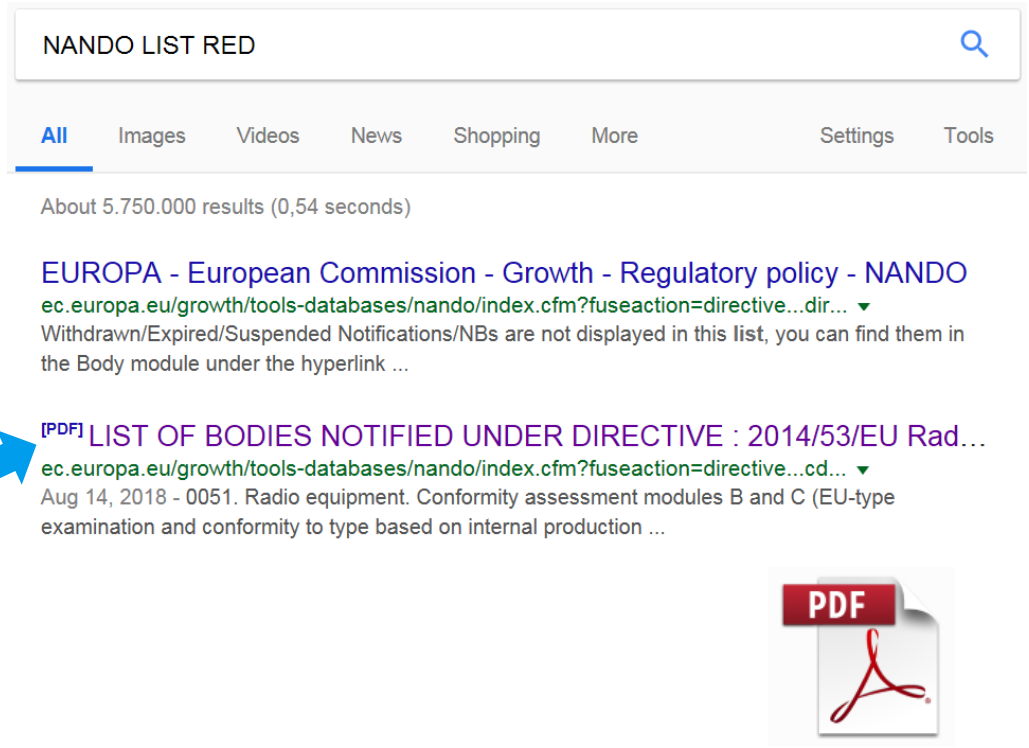
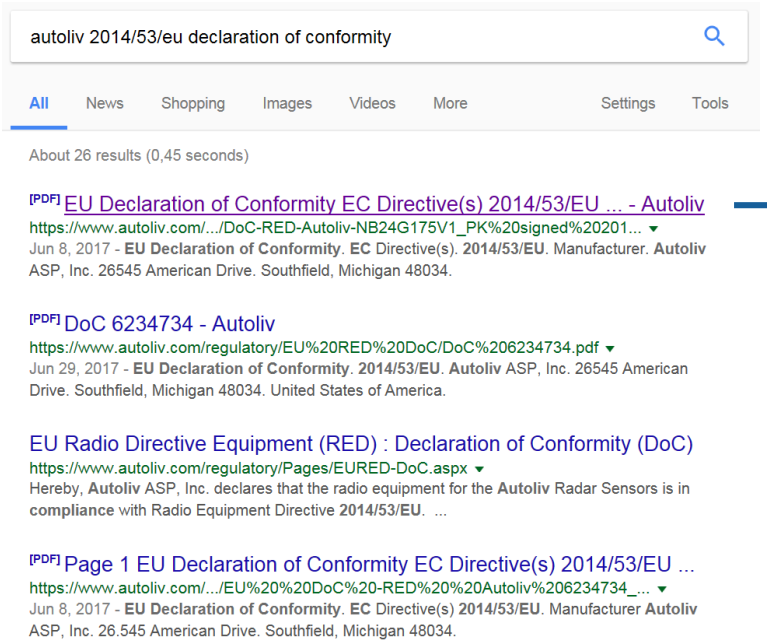


How to find an example of a Declaration of Conformity?

Search: <manufacturer name> + 2014/53/EU + Declaration of Conformity



Autoliv

EU Declaration of Conformity

EC Directive(s)	**2014/53/EU**
Manufacturer	**Autoliv ASP, Inc.** **26545 American Drive** **Southfield, Michigan 48034** **United States of America**
Radio Equipment	Type Designation: **NB24G175V1**
Description / Intended Use	**Narrow Band 1.75 / vehicular radar utilized for object detection applications**
Article 3.2: Applied Radio Spectrum Standard(s)	**EN 302 858 v2.1.1 (2016-12)**
Article 3.1(b): Applied EMC Standard(s)	**EN 301 489-1 v1.9.2 (2011-09), EN 301 489-1 v2.1.1 (2017-03), EN 301 489-3 v2.1.0 (2017-03)**
Article 3.1(a): Applied Health and Safety Standard(s)	**EN 60950-1: 2006 / A2:2013, EN 62479:2010, EN 62311:2008**
Frequency band(s) in which the radio equipment operates	Transceive: **24.05 – 24.25 GHz**
Maximum radio-frequency power transmitted	**Category D – < 20 dBm peak EIRP**

Hereby, **Autoliv ASP, Inc.** declares that the object of the declaration described above is in conformity with the relevant Union harmonisation legislation (**Directive 2014/53/EU**).

This declaration is issued under the sole responsibility of the manufacturer.

Patricia A. Kaye

Patricia Kaye, Project Team Leader – Engineering and Development
Signed for and on behalf of **Autoliv ASP, Inc.**
Southfield, Michigan, United States of America / 8 June 2017

Wich standards are listed under „Article 3.2“?

In this example:
EN 302 858 V 2.1.1

How to find an example of a Declaration of Conformity?

Search: <manufacturer name> + 2014/53/EU + Declaration of Conformity

TORICA Tokai Rika Create Corporation

HEAD OFFICE: 2-3-10, AOI, HIGASHI-KU, NAGOYA 461-0004 JAPAN TEL: 81-52-934-2111 FAX: 81-52-934-2101

EU DECLARATION of CONFORMITY (DoC)

(No. 11604303-A)

This declaration of conformity is issued under the sole responsibility of the manufacturer:

Name: Tokai Rika Create Corporation

Address: 2-3-10Aoi,Higashi-ku,Nagoya,Aichi 461-0004,Japan

We declare that the DoC is issued under our sole responsibility and belongs to the following product.

Object of the declaration:

Product Name: Car audio with DAB radio, DABTK1

Model Name: 347-2021-000, 347-2027-000

Software Ver.: FM: 1.0, AM: 1.0, DAB: 1.1.14.0

Accessories: N/A

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

Radio Equipment (RE) Directive (2014/53/EU)

The following harmonized standards and technical specifications have been applied:

Health & Safety (Article 3.1(a)):	EN 60065:2014
EMC (Article 3.1(b)):	EN 301 489-1 V2.1.1 EN 301 489-3 V2.1.0 (Draft)
Radio Spectrum (Article 3.2):	EN 303 345 V1.1.1 (Draft)

Notified Body performed an EU-type examination in accordance with the requirements of Annex III of RE Directive and issued the EU-type examination certificate.

Notified Body:

UL Japan, Inc. (No. 1731)

4383-326 Asama-cho, Ise-shi, Mie-ken 516-0021, Japan

Certificate No.: ULAR1703004

Signed for and on behalf of:

[redacted]

Place of Issue:

March 13, 2017

Date of Issue:

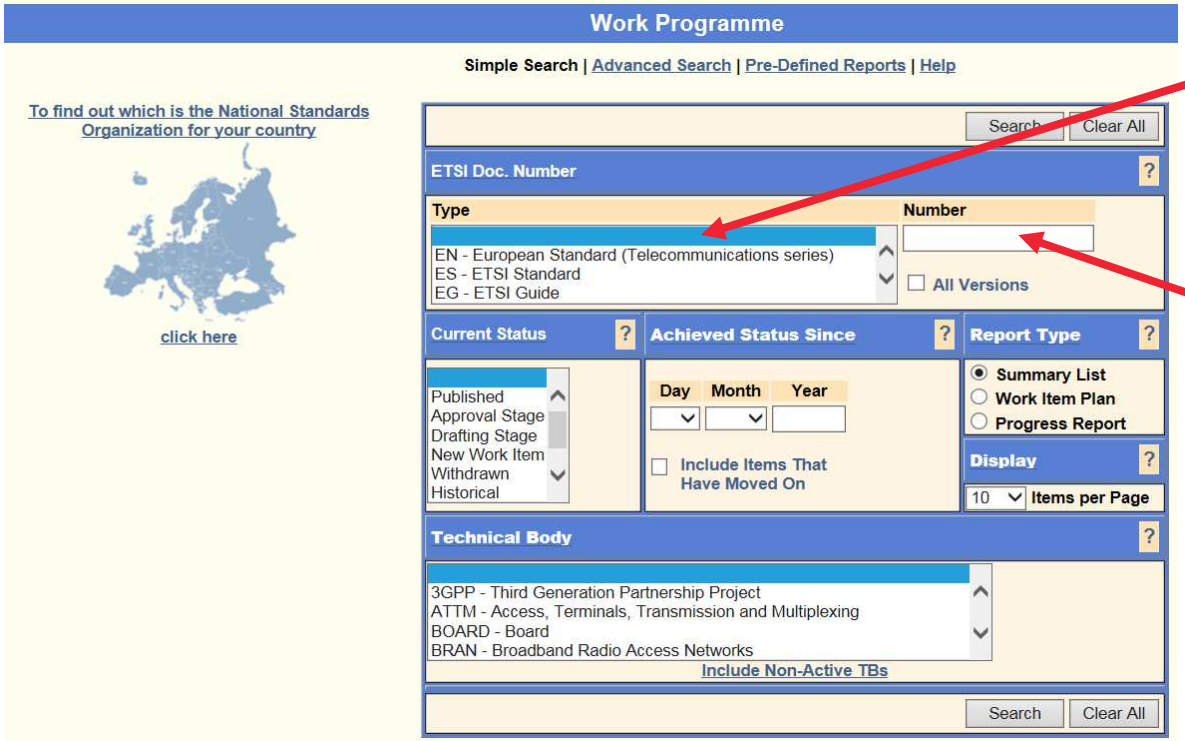
[redacted]

General Manager
Engineering Div.

How to find the „right“ standard version?

Search in the ETSI-Portal

5a



Select prefix „EN“

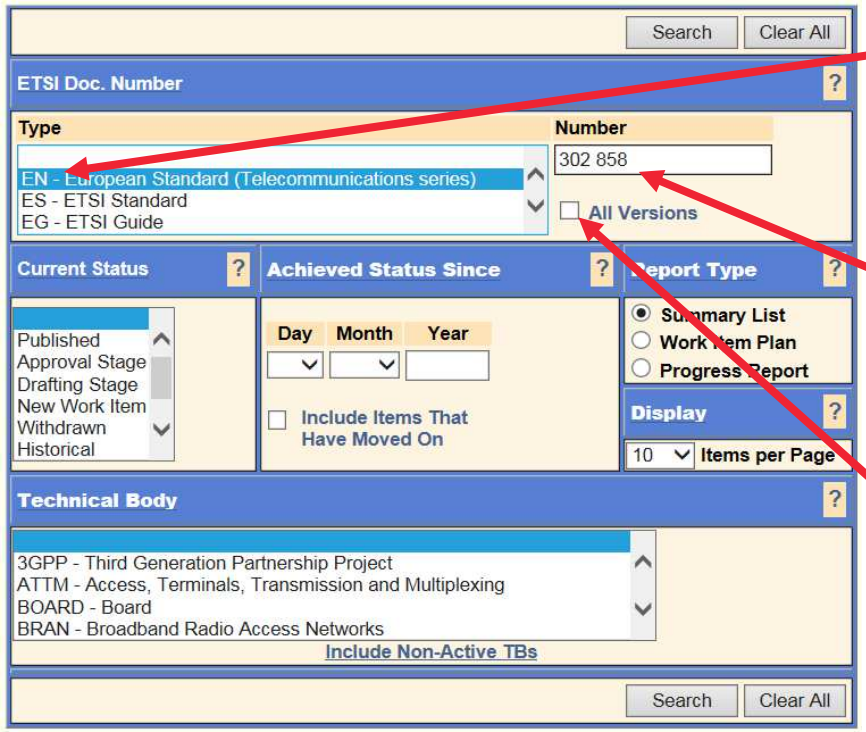
Enter the number:
3 digits
„space“
3 digits:

302 858

How to find the „right“ standard version?

Search in the ETSI-Portal

5b



Select prefix „EN“

Enter the number:
3 digits
„space“
3 digits:

302 858

Activate all versions

How to find the „right“ standard?

Search in the ETSI-Portal

6

2017-08-02 **Work Programme** Version 2.3.3

Simple Search | Advanced Search | Pre-Defined Reports | Help

Work Items with ETSI Document Number of '302 858' of Type 'EN'

View As Work Item Plan | View As Work Item Progress Report

Found **4** Items...
Displaying items **1** to **4** ...

	IDENTIFICATION	TITLE	STATUS
1 FINALIZED	Doc. Nb. EN 302 858-2 Ver. **1.3.1** Ref. **REN/ERM-TGSRR-061-2** Technical Body: ERM TGSRR Directives: **2014/53/EU** Details and Download	**Electromagnetic compatibility and Radio spectrum Matters (ERM);** **Road Transport and Traffic Telematics (RTTT); Automotive radar equipment operating in the 24,05 GHz up to 24,25 GHz or 24,50 GHz frequency range;** **Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive** EN for NB SRR @ 24GHz	**Published** Current Status: Citation in the OJ (2017-06-08)
2 FINALIZED	Doc. Nb. EN 302 858-2 Ver. **1.3.1** Ref. **REN/ERM-TGSRR-061-2_R&TTE** Technical Body: ERM TGSRR Directives: **99/5/EC** Details and Download	**Electromagnetic compatibility and Radio spectrum Matters (ERM);** **Road Transport and Traffic Telematics (RTTT); Automotive radar equipment operating in the 24,05 GHz up to 24,25 GHz or 24,50 GHz frequency range;** **Part 2: Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive** EN for NB SRR @ 24GHz	**Published** Current Status: No more cited in the OJ (2017-06-13)
3 FINALIZED	Doc. Nb. EN 302 858-1 Ver. **1.3.1** Ref. **REN/ERM-TGSRR-061-1** Technical Body: ERM TGSRR Details and Download	**Electromagnetic compatibility and Radio spectrum Matters (ERM);** **Road Transport and Traffic Telematics (RTTT); Automotive radar equipment operating in the 24,05 GHz up to 24,25 GHz or 24,50 GHz frequency range;** **Part 1: Technical characteristics and test methods** EN for NB and WLAM SRR @ 24GHz	**Published** Current Status: Publication (2013-11-22)
4 FINALIZED	Doc. Nb. EN 302 858 Ver. **2.1.1** Ref. **REN/ERM-TGSRR-77** Technical Body: ERM TGSRR Directives: **2014/53/EU** Details and Download	**Short Range Devices; Transport and Traffic Telematics (TTT);** **Radar equipment operating in the 24,05 GHz to 24,25 GHz or 24,05 GHz to 24,50 GHz range;** **Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU** vehicular radar operating in 24 GHz NB range	**Published** Current Status: Delivery to the EC (2016-12-12) Next Status: Citation in the OJ (2017-03-06)

Found **4** Items...
Displaying items **1** to **4** ...
New Query

Any comments or problems with this application? Please let us know...

https://portal.etsi.org/webapp/WorkProgram/PreDefinedReports/QueryForm.asp

How to find the „right“ standard?

Search in the ETSI-Portal

7

2017-08-02 **Work Programme** Version 2.3.3

Simple Search | Advanced Search | Pre-Defined Reports | Help

Details of 'REN/ERM-TGSRR-77' Work Item

	Work Item Reference	ETSI Doc. Number	STF	Technical Body in Charge	Download Standard
	REN/ERM-TGSRR-77	EN 302 858		ERM TGSRR	
	Current Status (Click to View Full Schedule)	**Latest Version**	**Cover Date**	**Standstill**	**Creation Date**
	Delivery to the EC (2016-12-12)	2.1.1	2016-12-12	View Standstill Information	2015-02-19
	Rapporteur	**Technical Officer**		**Harmonized Standard**	
	Andreas John	Igor Minaev		Yes	View Transposition Data

Title	Short Range Devices; Transport and Traffic Telematics (TTT); Radar equipment operating in the 24,05 GHz to 24,25 GHz or 24,05 GHz to 24,50 GHz range; Harmonised Standard covering the essential requirements of article 3.2 of the Directive 2014/53/EU vehicular radar operating in 24 GHz NB range
Scope and Field of Application	HEN covering the technical requirements and measurement procedures for short range vehicular radar operating in the 24,05 GHz to 24,25 GHz or 24,05 GHz to 24,50 GHz range; Revision and merging of current standard parts (EN 302 858-1 and 302 858-2) to cover the essential requirements of article 3.2 of the RE-D.
Supporting Organizations	JSConsulting, Continental Automotive GmbH, Valeo Radar Systems Inc., Hella

	Keywords	Projects	Clusters	Frequencies	Mandates	Directives
	Harmonised standard RADAR RADIO RTTT SRD TESTING		Transportation		M/536	2014/53/EU
Official Journal						
	2016-07-25 butscheidt Draft contributed - V 1.0.1 contributed for Decision in ERM(16)59b012 as Draft Review after PE 2016-07-25 butscheidt A new draft is uploaded - V 1.0.1 with status: Draft Review after PE - with comment: The results of the resolution meeting: successful. The resolution meeting was during TG SRR_25.					

Does R&S have solutions?

≥119 standards with reference to
RED article 3.2 (= radio part)

Additional standards with reference to
RED article 3.1b (= EMC part incl. immunity)

„ YES & NO “

Discussions are required:
- Manual test vs. automated tests
- Conducted testing vs. radiated testing
- R&S as a solution provider vs. R&S as sub-supplier
- Generic approaches vs. dedicated solutions

There is a common set of test approaches in the standards that allow a general approach.

2nd channel e.g. for blocking, adjacent channel selectivity
→ additional SMBV, variable attenuators
General monitoring of the signals (offset, level, OBW) → Analyzer

ROHDE&SCHWARZ

Does R&S have solutions?

≥119 standards with reference to
RED article 3.2 (= radio part)

Additional standards with reference to
RED article 3.1b (= EMC part incl. immunity)

„ YES & NO “

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General monitoring of the signals (offset, level, OBW) → Analyzer

Does R&S have solutions?

≥119 standards with reference to
RED article 3.2 (= radio part)

Additional standards with reference to
RED article 3.1b (= EMC part incl. immunity)

„ YES & NO “

BTC → 3 standards

CMW + CMW run + SMBV → sub-chapters of standards

TS8997 → 2 standards

TS8980 → conducted for LTE-, 3G-, 2G-related regulatory tests.

GNSS solution → 1 standard

Radiated spurious emission setups → RS system integration groups

Radiated power measurements

ITS100 → R&D stopped (1 standard)

R&D work on ATS1000 + 5G test solution
→ we will see what can be re-used
e.g. for automotive RADAR
(1 standard + 3 more)

CMA under preparation → various standards for „analog hand-helds“

Immunity system combined with sensitivity test solution → risk assessment (radiated)

Test solution for automotive RADAR modules

R&S Solutions

Keyword: Regulatory Testing

EN 391 908-2 → UTRA FDD UE

EN 301 908-13: IMT cellular networks, e.g. LTE UE E-UTRA freq bands 1,3,7,8 …

EN 301 511: Global System for Mobile communications (GSM)

R&S®TS8980

R&S® TS8997

EN 300 328 & EN 301 893: Regulatory Test Systems for Wireless Devices 2.4/5 GHz band

frozen

EN 302 571: Intelligent Transport systems (ITS) car-to-car communications (5855 MHz to 5925 MHz)

R&S®TS-ITS100

EN 303 413: Satellite Earth Stations and Systems (SES): Global Navigation Satellite System (GNSS)

R&S®SMW

+

R&S®FSV

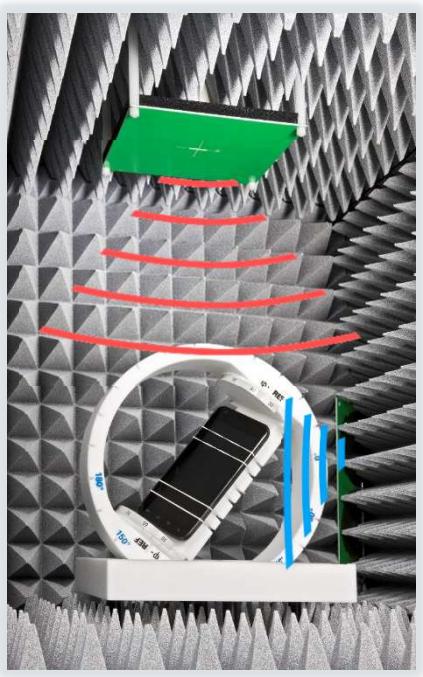
EN 303 345: Sound broadcast receivers

R&S®BTC

Also interesting: TS8980 PRE

RSmall Scale Setup based on DST200

R&S® DST200
R&S® DST-B101
R&S® DST-B102
R&S® DST-B150
R&S® DST-B160
R&S® DST-B165
R&S® DST-B215
R&S® DST-B270



Antenna in the roof
→ unwanted signal

Antenna in the corner
→ wanted signal

Contact Details

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