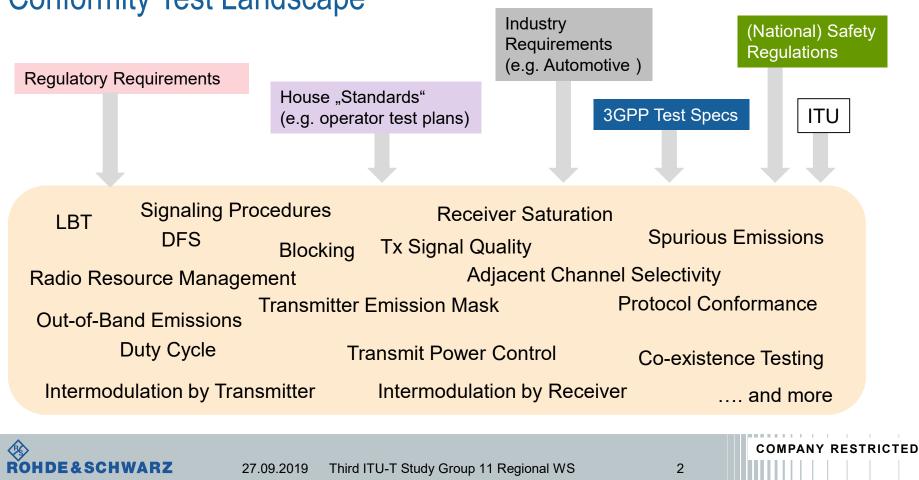
Third ITU-T Study Group 11 Regional Workshop for Africa on "Counterfeit ICT Devices, Conformance and Interoperability Testing Challenges in Africa" Tunis, Tunisia 30 September 2019

Mourad Belmrissi Technical sales manager

#### **ROHDE&SCHWARZ**

Make ideas real

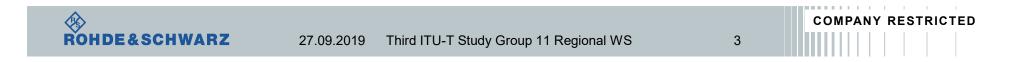




#### **Conformity Test Landscape**

## Basic Conformity Areas for cellular/non cellular device

- EMC/EMI Conformance
- Radio Transmission and Reception Conformance
- Protocol Conformance
- Radio Resource Management
- OTA (Over The Air) Performance Testing
- SAR specific absorption rate
- RF Exposure Conformance
- Power consumption requirements
- Location Based Services / Emergency call
- Application Testing



## **Conformity Assessment for Mobile Phones**

- Regulatory Requirements / Market Introduction
  - RED (Radio Equipment Directive), EC Europe
  - MIC, Japan
  - FCC, USA
  - ...
- Industry Certification Groups
  - GCF (Global Certification Forum)
  - PTCRB
- Operator Test Plans and Network Approval



## **Problems with Counterfeit Mobile Phones**

- ∎ Low RF performance
- Unwanted Emissions
- Poor/Wrong Antenna Design
- Faulty or outdated protocol implementation
- ∎ Heating / Battery safety
- Missing RF Exposure measures
- Wrong Cell and Parameter Reporting
- Identity (IMEI Duplication)



## **EMC/EMI** Conformance

- Main topic is the conformance assessment for Unwanted Emission
  - Basic Requirements → ITU Recommendation SM.329
  - National Regulation
  - Radiated Requirement and Test
- Focus: Disturbance of other services
  - Not a metric for the service performance of a device
- Often the only coverage in tests for admission to a local market



# Conformance for radio transmission and reception / OTA performance

- Radio transmission and reception conformance defines the minimum RF characteristics and minimum performance requirements for mobile phones.
- Typical parameters are:
  - Maximum Transmission Power / Power dynamics
  - Unwanted Emissions
  - Modulation Quality
  - Receiver Sensitivity
  - Demodulation and Throughput Performance
- OTA performance includes the performance of the antenna of the device (Tx and Rx)
  - Total Radiated Power
  - Total Integrated Sensitivity
  - Overview in ITU-T contribution T17-SG11-C-0174



#### Specs...

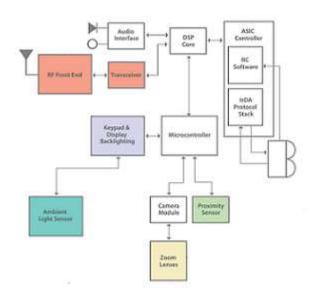
■ The specs are good harmonized over all instances . ETSI/EN/3GPP

∎ 2G: TS51-010 chapter 12/13

- ∎ 3G: TS34-121 Chapter 6,7
- 4G: TS36-521 Chapter 5,6,7
- 5G: TS38-521 Chapter 6,7



#### What is tested



#### ∎ Transmitter:

- 1. TX max Power
- 2. OCB
- 3. ACLR
- 4. EVM

#### Reciever:

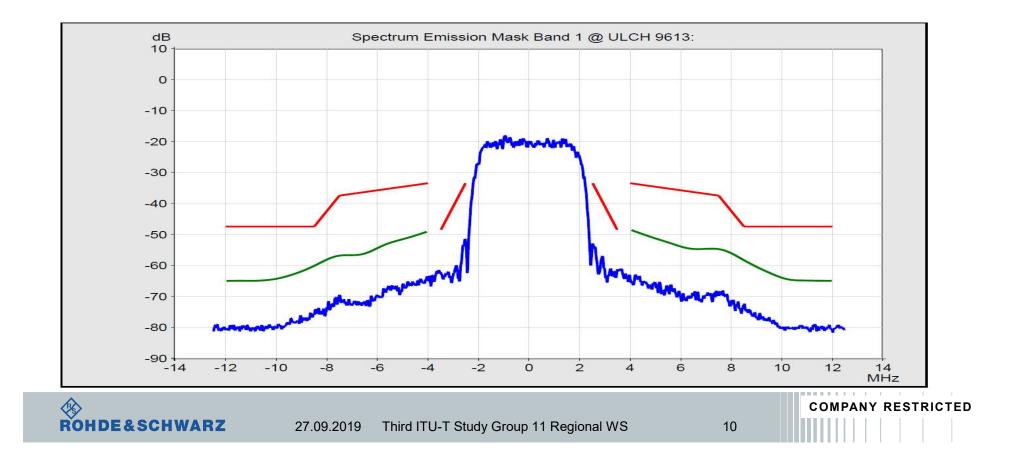
- 1. Sensitivity
- 2. ACS

#### I Performance:

1. Blocking



## Typical conformity tests



#### Have a look on a test report

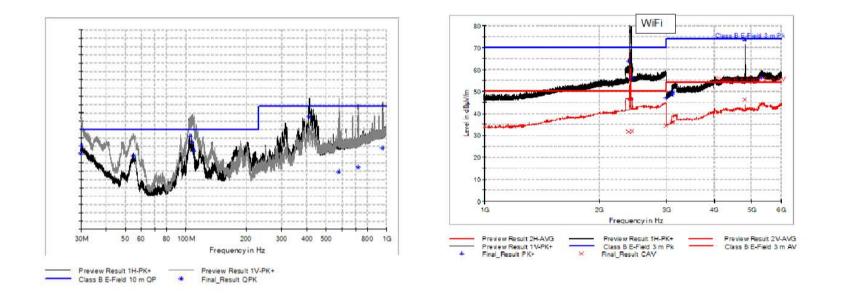
#### Check test reports

	ROHDE&SCHWARZ Measurement Report		Measurement Report
	Measurement Report		Steasurement Report
	8817081712:0613		19/25/2017 11-48
Report Info:		Report Info:	
Device Under Test:	Barreni Batur 6A pro	Device Under Ter	
Perities	The second second	Serial No. (Dec. D	
Serial No. (Dec. IMEI):		Test Plant	C1/Contributionment/Decement/CMIRtun Files/My Test Plans/30/30_999/01M-GPR5-EGPR5_000_TestSet.pap
Test Plan:	C:Over/Domasser/Decamers/CMWina Flat/My Tex Plant/30/IF/CDMA_BANDL_3GPP exp	Unert	Instrument
Users	Instances	Comment	
Comment		Test Executive:	RAS CMRma 1.8.0.35 (Inte)
Test Essentives	RAS CMEIna 1.8.10	Instrument ID 1:	RobdothTechnology, CMW (1201.0003);55/100346,3 7 10
Instrument ID 1: Optimus	Read-Management/CHFLIST INTERLISTICAL CONFERENCE OPERCENTER, CONFERENCE OPERCENTER, CONFERENCE OPERCENTER, CONFERENCE OPERCENTER, CONFERENCE OPERCENTER, DESTRUTIONE, DESTRUTI	Optime:	Birdel, Birdel, Carles Linda, Carles Linda, Carles Carles, Carles, Carles, Linda, Harris, H
	KTINI, KTINI, KTINI, KTINI, KTINI,	Summary:	
ammary:		Summary: Test Start Time:	10/23/2017 11 48 40
Test Start Time:	00/17/2017 12:20:33	Test End Time:	10/33/3017 11:50:41
Test End Time:	IB-1173017 13-00-06	Total Test Time:	00.02.01
Total Test Time:	40.33.53	Weinkted Text To	96-62-61
Weighted Text Time:	003259	Tests Passed:	857
Tem Paned:	105	Texts Fulled:	
Tests Failed:	1	Number of Tests:	345
Number of Texts	101	Leven	
Ermen		Warnings	



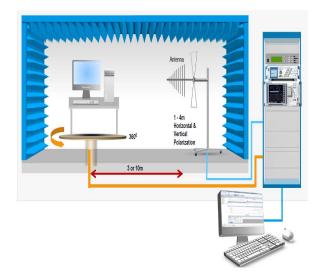
## EMC test: EMI Measurement radiated and conducted

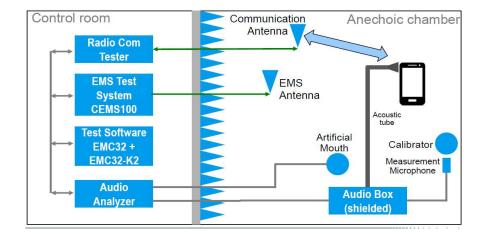
#### Searsh for unwanted emissions





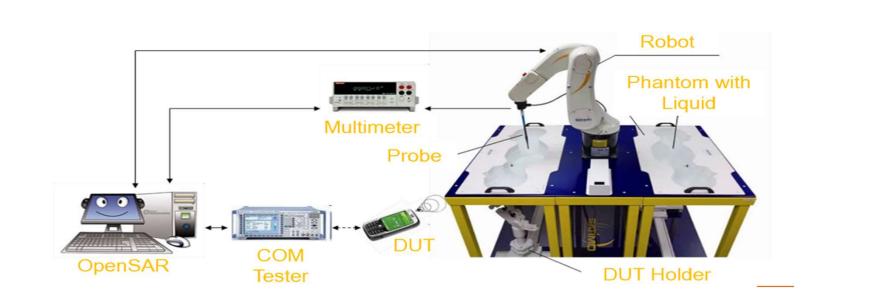
## EMI/EMS setup example





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#### SAR tests



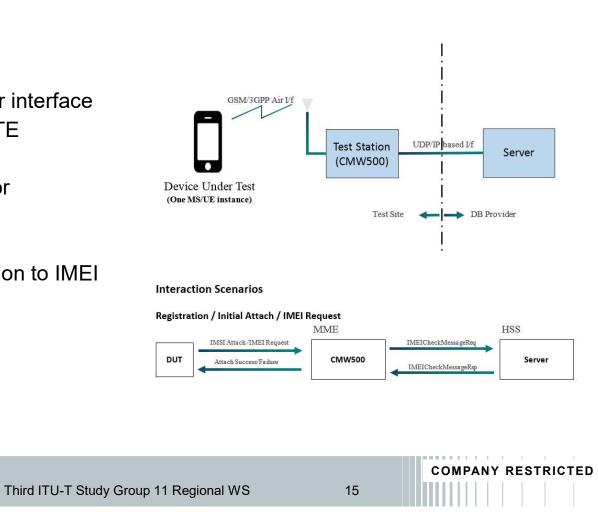


#### **IMEI** verification

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- IMEI procedure as per 3GPP air interface
  - GSM/WCDMA/TD-SCDMA/LTE
- Independent of network operator
  - Operation with Test-UICC
- Automation possible Connection to IMEI Database

27.09.2019



## **Protocol Conformance**

- Protocol and signaling conformance testing checks the conformant implementation of the radio protocol.
- Usually this is designed that the different test purposes per radio layer and the relevant procedures are tested.
- Essential for correct protocol function with the network
  - Transport Format Selection
  - Priority Handling
  - Data Transfer (ARQ Function)
  - Security
  - NAS (Non Access Stratum) procedures
  - ....
- Example of a LTE RRC (Radio Resource Control) procedure
  - TC 9.1.4.2 "Identification procedure, IMEI requested" \*

#### \* as per ETSI TS136.523-1 \* OMPANY RESTRICTED ROHDE&SCHWARZ 27.09.2019 Third ITU-T Study Group 11 Regional WS 16



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