



APPROVAL OF TERMINALS TELECOMMUNICATIONS: PROCEDURES, TESTS AND MEASUREMENTS

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Objective >>>> CERT

Know all procedures and administrative and technical mechanisms related to the activity of approval of telecommunications terminal in CERT.

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- Objective
- Plan
- Introduction
- Procedure
- *Approval Methodology*
- Different types of devices
- Standards
- Tests and measurements
- Measuring devices
- ISO17025 accreditation
- Recommendations
- Conclusion



- Every modern country organizes the local telecommunications sector via organizations and definite regulations.
- Telecommunications Standards and procedures for local country must be consistent and aligned with the organizations and international standards of regulation in the sector.



- Each country includes a telecommunications network with all these components, and has a national frequency plan must have a process approval of telecommunications terminal .
- The approval process ensures conformity of telecommunications terminals involved requirements of the country's network ,national and international standards and to plan local frequency



Approval definition

The approval is the set of control operations and necessary tests, in which the CERT ascertains and certifies that a representative sample of telecommunications terminal equipment or radio equipment complies with regulations, standards and technical specifications in force.



Approval definition

- Are subject to approval any terminal equipment or radio installation to be connected to a public network.
- Terminal equipment : Any device, any system or group of system, designed to be connected to an endpoint of a network and transmits, receives or processes telecommunications signals.
- Radio installation : Any telecommunications system that uses radio frequencies for wave propagation in free space



Definition of compliance

Representing all operations that focus on the verification of the compatibility of the technical characteristics of the equipment with the technical requirements of interworking with public telecommunications networks and rules for use and operating frequency, it is intended for individual people (Equipment imported for own requirements).



Definition of Technical Control

Approval is always followed by a process of technical import control (border) , on the basis of a certificate of approval, which ensures the compliance of imported products relative to the equipment sample approved by CERT.



Objective

Approval is to:

- Verify compliance of terminal equipment or radio equipment with the essential requirements that apply
- User safety
- Security personnel operating public telecommunications networks



Objective

- Protecting networks and information exchange control and management associated.
- Proper use of the radio spectrum.
- The ability to operate the terminal equipment on the one hand, with the network and, on the other, with the other terminal equipment to access the same service.



- The customer presents the product to be approved in G.U
- The G.U examine the administrative record of the customer, then it transmits the project for laboratory tests and measurements of CERT



Another preliminary engineering study is made on the project by the lab technicians that includes:

- Verification of technical specifications with the material presented
- Verification of certificates of compliance and report tests of the manufacturer
- Verifying the proper operation of the equipment presented
- The definition of the tests to be performed



- Tests and measurements
- Development of Approval report
- Elaboration of the approval certificate positive or negative based on the recommendations in the report written approval
- Closing project



Each telecommunication network contains components of different types that each include several types of equipment:

- Components Radio
- Transmission components
- Switching components
- Computer components



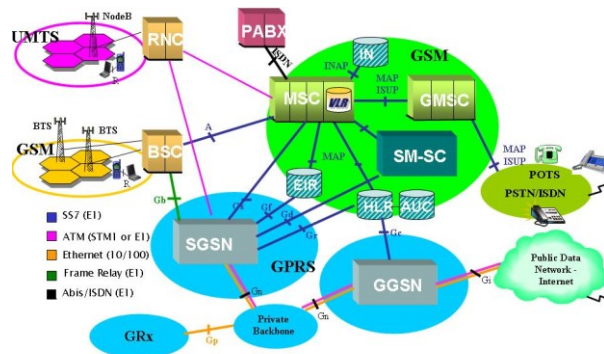
Each telecommunication network also contains different types of connections:

- The wired links
- Radio links
- Optical links

A telecommunication terminal may interface with the telecommunications network via one or more connections types



Different types of devices >>>>



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Different types of devices >>>>



- Fixed terminals:
Fixed terminals of a telecommunication network are wired terminals, IP terminals, ADSL terminals ... (The telephones, routers, modems)

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➤ Mobile terminals:

Mobile telecommunications terminals occupy a very wide and extensive range

These terminals can be transmitters / receivers, Bluetooth, WIFI, GSM, HSDPA, UMTS, GPS, geo-location equipment, the signal converter equipment



Define:

- Frequency bands allocated to radio equipment
- The maximum power and fields allowed
- The occupancy rate of the spectral band

Ensuring coexistence between different users of radio waves



Bande de fréquences	Puissance rayonnée max ou champ max/ portée max	Norme Européenne ou norme internationale équivalente	Largeur du canal	Applications
26,312 - 26,474 MHz	40 mW / 100m		12.5 KHz	Postes téléphoniques sans cordon
41,312 - 41,475 MHz	20 mW / 100m		12.5 KHz	
46-49 MHz	50 mW / 100m		--	
1880 - 1900 MHz	10 mW / 100m		2 MHz	
6765 - 6795 kHz	42dBμA/m à 10m	EN 300 330	--	Equipements non spécifiques : Ils regroupent différents types d'applications sans fil, notamment de télécommande et télécontrôle, télémessure, transmission d'alarmes et de données. Ils ne doivent en aucun cas permettre la transmission de la voix. NB : Les équipements de télécommande n'utilisent pas la bande (40.66 -40.7) MHz.
26,957 - 27,283 kHz	10 mW / 10m		--	
40,66 - 40,7 MHz	10 mW / 100m		--	
433,05 - 434,79 MHz	10mW /20m	EN 300 220	--	



868,6 - 869,4 MHz	10mW / 50m	EN 300220	25 KHz	Alarmes		
869,65 - 869,7 MHz	25 mW / 100m					
9 - 59,750 kHz	72dBμA/m à 10 m	EN 300 330	--	Matériels à boucle d'induction: Ils regroupent les systèmes d'immobilisation de véhicules, d'identification des animaux, de détection de câbles, de gestion des déchets, d'identification des personnes, de contrôle d'accès, les capteurs de proximité, les systèmes antivols, d'identification automatique d'articles, de commande sans fil et de péage routier automatique.		
59,750 - 60,250 kHz	42 dBμA/m à 10 m		--			
60,250 - 70 kHz	69dBμA/m à 10 m		--			
70 - 119 kHz	42dBμA/m à 10 m		--			
119-135 kHz	66dB μA/m à 10 m		--			
135 -148,5 kHz	42dBμA/m à 10 m		--			
3155 - 3400 kHz	13,5 dBμA/m à 10 m		--			
13 553 - 13 567 kHz	42 dBμA/m à 10 m		EN 302 291		--	
170 - 181,5 MHz	10m W / 50m		EN 300 422		--	Microphones sans fil et aides à l'audition
196,6 - 200,2 MHz	10m W / 50m				--	
470 - 790 MHz	50m W/50m	--				
863 - 865 MHz	10.m W / 50m	EN 300 422 EN 301 357	--			



Bande de fréquences	Puissance rayonnée max ou champ max/ portée max	Norme Européenne ou norme internationale équivalente	Largeur du canal	Applications
0.050 - 0.130 MHz	500m W / 100m	--	--	Traduction simultanée
0.125 - 0.134 MHz	42 dBμA/m à 10m	--	--	Dispositifs d'identification (RFID)
13.553 - 13.567 MHz	60 dBμA/m à 10m	EN 300 330	200 KHz	
865 - 868 MHz	2 Wp.a.r. / 10m	EN 302 208		
9-315 kHz	30 dBμA/m à 10m	EN 302 195	--	Implants médicaux à faible puissance
315 - 600 kHz	- 5 dBμA/m à 10m	EN 302536	--	
401 - 402 MHz	25 μ W p.a.r.	EN 302 537	25 KHz	
402 - 405 MHz	25 μ W p.a.r.	EN 301 839	25 KHz	
405 - 406 MHz	25 μ W p.a.r.	EN 302537	25 KHz	
2 400 - 2 483,5 MHz	100mW / 100m	EN 300 328	--	Equipements des réseaux locaux radioélectriques de transmission de données à l'intérieur des bâtiments
5150 - 5350 MHz	200m W / 100m	EN 301 893	--	
24.05 - 24.25 GHz	100m W	EN 300 440	--	Système d'information routière et radars à courte portée destinés aux véhicules
76-77 GHz	55 dBm/MHz p.i.r.e	EN 302 372	--	



Definition

By applying the appropriate standard and with a set of measuring instruments and test benches, we ensure the conformity of the equipment under test, submitted for approval, compared to standard that supports them



Measurements

Among the tests and measurements performed during the work for approval of a telecommunication terminal is quoted:

- Verification of the frequency band
- Measuring the frequency error
- Measurement of the emitted power
- Measurement of reception levels
- Measure BER (bit error rate)
- Measuring internal impedance



Functional test

During the work of approval all telecommunication terminals are subjected to functional tests in terms of commissioning and testing of the product and its proper functioning



Agilent Technologies 8960 Series 10

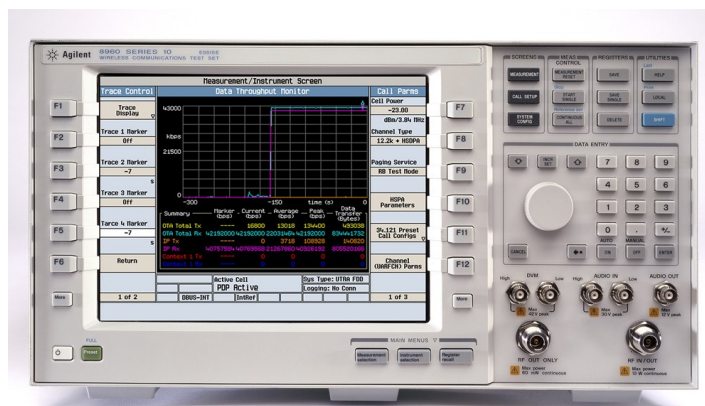
The meter for approval testing of a GSM terminal consists of three essential components:

- A radio test simulator (eg Agilent 8960)
- A computer
- A test application installed on the computer (eg WTM)

A link between these components is necessary
USB / GPIB

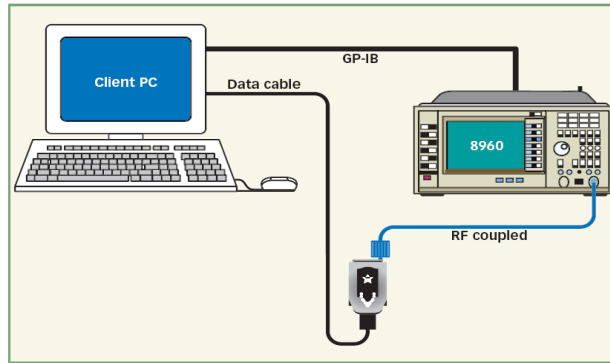


Agilent Technologies 8960 Series 10





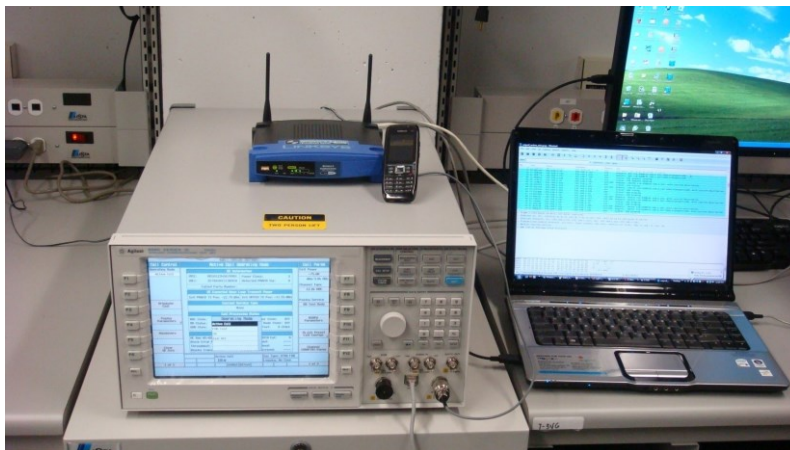
Agilent Technologies 8960 Series 10



6. A practical external PAVT measurement system is based on the Agilent 8960 wireless-communications test set.



Agilent Technologies 8960 Series 10





Wavetek 4107

As for the approval of a GSM terminal, technical control testing requires a radiated radio simulator mode, it's not conducted mode and we take a minimum number of tests can be done to a terminal (Wavetek 4107)



Wavetek 4107





Wavetek 4107



Spectrum Analyzer

A spectrum analyzer is a measuring instrument for displaying the different frequencies contained in a signal and their respective amplitudes. The signals can be of various types: electrical, optical, acoustic, radio



Spectrum Analyzer

- A digital spectrum analyzer used to measure the voltage of electric signals in the frequency domain. The measurements can range from a few tenths of Hz to several tens of GHz.
- For the approval of telecommunications terminal a spectrum analyzer (0-60GHz) can support all types of products to be approved



Spectrum Analyzer

Among the things to check a measurement curve of a spectrum analyzer are:

- The frequency band
- The transmission power
- Channel spacing
- The number of channels



Spectrum Analyzer

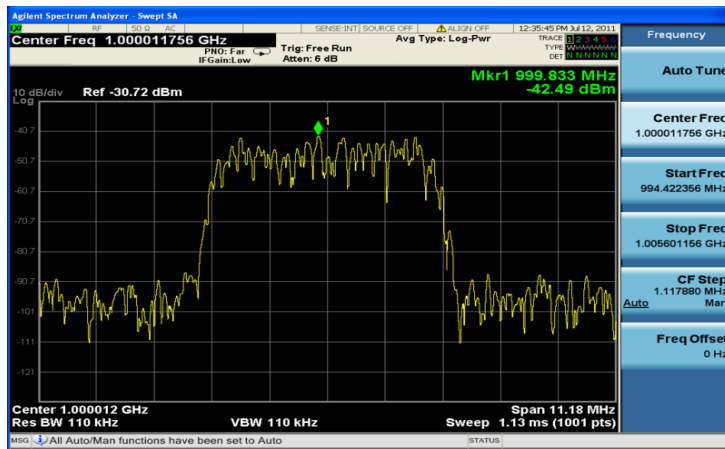


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Spectrum Analyzer



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Power meter

- The power meter is a device that measures the electrical power consumed by a receiver or supplied by an electric generator.
- The power meter is used in Approval activities to measure the minimum and maximum output power for Radio equipment



Power meter





The foundation of a certification service must be overwhelming followed by three other services: standardization, technology monitoring and training, quality

- Service standards: it ensures the development and monitoring of standards and national and international requirements. It develops very specific reports to be followed by laboratory technicians



- The technology watch service and training which provides:
 - 1- Monitoring of all new technologies
 - 2- The annual plan development training for laboratory technicians
- Service quality: it ensures the implementation and updating of approval procedures and preparation means accreditation and ISO.



The approval process in a country is a very necessary step and that the safety of the state, final consumers and the proper functioning of its telecommunication network.

But it must not be an economic and regulatory obstacles via investors and traders.

So we must put this project in place with flexible and reliable procedures.



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