ITU Training Course on
“Homologation Procedures & Type Approval Testing for Mobile Terminals for ARB Region”

Tunis, Tunisia, 17–22 March 2014
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Part 1 : Tunisian approach in terms of type approval, conformity and technical control
I. One-stop shop Establishment
II. Approval procedure
III. Conformity control procedure
IV. Technical control procedure
In order to simplify administrative and technical procedures of conformity of telecommunication equipments and to provide a single interface for importers and manufacturers, a one stop shop was created under CERT.
I. One-stop shop Establishment

CREATION

- Created under the Research and Studies Telecommunications Center (CERT)
- Following the Decree N° 2639 of July 21th, 2008.

MISSION

Provide administrative authorizations for electronic equipment and communication systems in following cases:

- Importation (*for public use*)
- Commercialization
ARCHITECTURE
The One-stop shop is composed of the following offices:

- Administrator
- Research and Studies Telecommunications Center Office (CERT)
- Electronic Certification National Agency Office (ANCE)
- National Frequency Agency Office (ANF)

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ARCHITECTURE
The One-stop shop is composed of the following offices:

a- The administrator Office:

In charge of the following internal offices:
- Orientation
- Cash desk
- Storage
- Coordinater

Mission:
- Coordination with the different offices
- Dispatching files/requests
ARCHITECTURE
The One-stop shop is composed of the following offices:

b- The Research and Studies Telecommunications Center Office (CERT):

- Delivers to the administrator the test reports generated by the Type approval Lab.
- Sends files for treatment to the Type approval Lab.
ARCHITECTURE

The One-stop shop is composed of the following offices:

c- The National Frequency Agency Office (ANF):

- Responsible for the study of files related to radio communication equipments (using radio frequency)
ARCHITECTURE
The One-stop shop is composed of the following offices:

d- The Electronic Certification National Agency Office (ANCE):

- Responsible for the study of files related to the equipment and electronic systems containing data encryption means.
- Delivers to the administrator:
  □ Approval certificates
  □ Importation or commercialization authorizations


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II- Approval procedure

REGULATORY FRAMEWORK

The approval procedure of the telecommunications equipment is organized by the following laws and decrees:

a. Laws:
- Law No 2001-1 of January 15th, 2001 related to the promulgation of telecommunications code.
  - Article 32: are subject to preliminary approval, the telecommunications terminals imported or manufactured in Tunisia and intended for commercialization or public use, intended or not intended to be connected to the public telecommunication network.

b. Decrees:
- Decree No 2001-830 of April 14th, 2001, related to the approval of telecommunication terminals and the radio communication terminals.
- Decree No 2008-2639 of July 21st, 2008, fixing the conditions and the procedures of importation and commercialization of encryption means or services through the telecommunication networks.
REGULATORY FRAMEWORK

The approval procedure of the telecommunications equipment is organized by the following laws and decrees:

c. Orders:

- Order of the Communication Technologies Minister on February 11th, 2002 related to the approval of the National Frequency Plan

- Order of the Industry and technology Minister of November 22th, 2011, setting the maximum power and the limit of the radio range of equipment of low power and limited range
TYPE APPROVAL APPLICANT

- The application for approval of telecommunications equipment may be submitted by the manufacturer, its agent, or an approved importer for commercial use.

EQUIPMENTS SUBJECT TO TYPE APPROVAL

- Any telecommunications equipment to be connected directly or indirectly to a public telecommunication network.

- Any telecommunications equipment having undergone changes, subsequent to its approval, that made him not compliant with the technical specifications on the basis of which it has been approved, *(new approval is needed).*
EQUIPMENTS SUBJECT TO TYPE APPROVAL

a- Equipment type:
- Telecommunications terminals,
- Cryptographic means,
- Radio terminals.

b- Source:
- Imported from abroad,
- Made in Tunisia.

c- Destination:
- Commercialization,
- Public use.
TECHNICAL FRAMEWORK

The type approval aims to:

Check the conformity with the requirements of the regulation and standards (Tunisian and International).

These requirements cover:

- The safety of users,
- The safety of staff operating in public telecommunications networks,
- The protection of the public telecommunications networks,
- The optimum use of the radio spectrum.
CERTIFICATE OF APPROVAL

Every telecommunication equipment should be subject of an individual request for certificate of approval taking into account the following identifications:

- Product Type,
- Product Brand,
- Product Model.

-The validity of the type approval certificate is three years from the date of grant.

- The certificate of approval of a telecommunications terminal is nominative; specific for each company and can not in any way be used by a third party.

- Every terminal equipment must be approved before any import transaction for trade.
II- Approval procedure

GENERATION OF THE CERTIFICATE OF APPROVAL

Approval certificates are issued by the one stop shop of the CERT after evaluation of various stakeholders namely:

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II- Approval procedure

STEPS FOR OBTAINING A CERTIFICATE OF APPROVAL

The application for a certificate of approval of a telecommunications equipment consists of two files divided as follows:

- Submission of a “Removal for approval Application”, including the following documents:
  - Application Form (Delivered by CERT),
  - Invoice,
  - Certificate of origin or equivalent,
  - Packing list,
  - Arrival notice,
  - Technical specifications.

Deadlines
24 hours from the date of submission of a complete request.
II- Approval procedure

STEPS FOR OBTAINING A CERTIFICATE OF APPROVAL

The application for a certificate of approval of a telecommunications equipment consists of two files divided as follows:

*b-Submission of “Approval Certificate Application” including the following parts:

- Application Form (Delivered by CERT),
- Copy of the authorization of removal for approval,
- Technical documents: specifying the interfaces contained in the equipment,
- User manual,
- Tests Report,
- Conformity Certificate,
- Specimens of the equipment to be approved.

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*Deadlines 10 days / per organization from the date of filing of a complete request of approval.
III - Conformity control procedure

1-Equipments subject to conformity check

- Telecommunications terminals,
- Radio communications terminals.

2-Type of use:

- Natural person
- Legal person

3-Type of tests:

- Functional test,
- Measurement on the test bench,
- Check of characteristics.
4-Conformity Requirements:

- Conform to the technical requirements of interworking with the public telecommunications network.

- Conform to the rules of use and operating frequency.

- Conform to the standards and standard required for the proper operation of the product.
5-Steps for obtaining a certificate of conformity:
The application for “Certification of Conformity” of telecommunications equipments consists of two files divided as follows:

*a-Submission of an application for withdrawal for conformity, including the following parts:*
- Application Form (Delivered by CERT),
- Invoice,
- Certificate of origin or equivalent,
- Packing list ,
- Arrival notice ,
- Technical documentation,
- Commitment Form,
- ANF Approval (for radio terminal equipments).

**Deadlines**
24 hours from the date of submission of a complete request.
III- Conformity control procedure

5-Steps for obtaining a certificate of conformity:
The application for “Certification of Conformity” of telecommunications equipments consists of two files divided as follows:

- **Submission of an application for certification of conformity with the following parts:**
  - Form,
  - Copy of the authorization of withdrawal for conformity,
  - Technical documentation,
  - User manual,
  - Equipment.

*Deadlines
10 days / per organization from the date of filing of a complete request of conformity certificate.*

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IV- Technical control procedure

Importation of some telecommunications equipment is subject to the operation of technical control that consists of:
- Checking of conformity of the samples compared to the product already approved.
- Measurement on the test bench.

Importer must fill of following conditions in advance:
- The Product have to be already approved on the name of the importer itself,
- Has a suitable license (permit of importation).

The approval type is determined by the nature of the equipment, there are 3 categories:
- **Radio Type**: TR (Transmitter / Receiver, Access Point, Mobile Terminal …)
- **Cable Type**: TF (Fixed phone, switchboard,… )
- **Data Type**: TD (Fax, Modem, Router,…)

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Steps for obtaining an authorization of release for consumption:

- Authorization for provisional removal
- Authorization for consumption

**Step 1:**
Request for an authorization for provisional removal:
- Directly at the one stop shop
- From the website (virtual one stop shop)

**Step 2:**
- Study The file
- Generation of the Authorization for provisional removal
- Customer proceed to the removal of its goods for the store in its premises
IV- Technical control procedure

Steps for obtaining an authorization of release for consumption:

**Step 3:**

* Deposit of a request for an "Authorization for consumption."
  - Directly at the one stop shop
  - From the website (virtual one stop shop)

* CERT controller performs:
  - Inspection,
  - Taking samples
  - Dispatching to the laboratory for analysis and testing
IV- Technical control procedure

Steps for obtaining an authorization of release for consumption:

Step 4:

Issuance of the final decision by the One Stop Shop after receiving the results of analyzes of samples:

- Imported product in conformity with the product already approved
  ⇒ Authorization for consumption

- Imported product not in conformity with the product already approved
  ⇒ Choose one of the following decisions:
  - Refoulement of goods
  - Destruction of goods
  - Re-approval of the product
Application
The application for “authorization of release for consumption” of telecommunications equipments consists of two files divided as follows:

*a-Submission of an application for of a provisional authorization of removal including the following parts:*

- Application Form (Delivered by CERT),
- Invoice,
- Certificate of origin or equivalent,
- Packing list,
- Arrival notice,
- Approval Certificate,
- Suitable agreement.

**Deadlines**
24 hours from the date of submission of a complete request.
IV- Technical control procedure

Application

b-Submission of an application form of “authorization of release for consumption” including the following parts:

- Application Form (Delivered by CERT),
- Copy of the provisional authorization of removal APE,
- Customs goods declaration,
- Payment receipt,
- Serial numbers list.

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03 days / per organization from the date of taking samples
“thank you for your attention :)”

Chokri.benhajyahia@cert.mincom.tn
Part 2: Electronic procedures of approval and technical Control
Plan

- Objective
- Introduction
- Procedures
- Customer management demand
- Information system
- One Stop Shop online services
- Statistics
- Conclusion
Objective

✓ Define and describe procedures,
✓ Control of approval procedures,
✓ Study and process of demands,
✓ Define and understand information system,
✓ Introduce procedure in an information system
✓ Automate procedure,
Control and examination organisms play a major role in security of property and of persons. They are involved in many areas of control such as: Industrial, electrical installations, welding, snap-on apparatus, food processing industry, health, environment, building, tourism, information and communication technology (ICT).
In this context, the One-Stop Shop of Information and Communication Technology has been created by decree 2639 on 21 July 2008 in order to provide administrative authorizations dealing with import operations and commercialization systems.
I- Introduction

It includes representatives of various stakeholders working in the field of Information Technology and Communication, it is composed of the following offices:

☑ Office of Research and Studies Telecommunications Center (CERT),

☑ Office of National Frequencies Agency (ANF),

☑ Office of the National Digital Certification Agency (ANCE),
a) Definition

In terms of approval and technical control, procedure is an orderly and formal description of series of operations and instructions to make the relevant system, consistent, shared, reliable, and credible. It specifies in particular:
II- Procedure

✓ Different tasks and their modalities of execution,
✓ The respective responsibilities of the different dealers or operators,
✓ The methods of establishment of the different documents necessary for administrative, financial, accounting, operational and technical management,
✓ Modality control at every stadium of the system information.
II- Procedure

b) Advantages

Written procedures, validated and integrated in business applications allows each agent to:

- Act with perfect knowledge of the system,
- Process documents according to the pre-defined conventions easily,
They represent also

✓ An efficient tool of training for newly recruited, transferred or appointed provisionally employee

✓ A written support for the execution of daily’s agent tasks

✓ A means of self control tasks for agents

✓ Monitoring tools for internal and external auditors
a) Type of products subjected to approval and to technical import control

Are subject to the prior approval, telecommunications terminals intended for commercialization or public use, whether imported or manufactured locally and radio terminals intended to be connected or not to a public telecommunications network.
III- Customer management demand

subject to the prior approval (examples)
The imported telecommunication terminals and equipments can be subject to a Technical Control Compliance with standards and national or international technical regulations.
b) Customer’s request types

- Removal for approval authorization
- Approval certificate
- Removal for conformity authorization
- Certificate of conformity
- Provisional authorization for removal
- Authorization of consumption
c) Processing procedures

III- Customer management demand

- Demand
- Preliminary study
  - Demand admissible
    - Additional information
    - Depth study
      - Specific Treatment
        - Sub procedure Removal
        - Sub procedure Approval
        - Sub procedure Provisional authorization for removal
        - Sub procedure Authorization of consumption
      - Giving notice
        - Customer
c) Processing procedures (Example)

**PHSAE I: Electronic processing at orientation**
Verification and transmission of files submitted by customer via online services to the coordinator.

**PHASE II. Electronic processing at Coordination**
Depth study and transmission of digital and paper file to the One-Stop Shop manager.
c) Processing procedures (Example)

PHASE III. Electronic processing at the One-Stop Shop manager

Validation and electronic transmission of the file to Type Approval Lab (CERT Las) and to the head office of the National Digital Certification Agency (ANCE) followed by a physical transfer of the file to the index unit.
c) Processing procedures (Example)

PHASE IV. Processing at Type Approval Lab

✓ Retrieving of demands of the Authorization of consumption from the indexing unit,

✓ Levy with double sampling for CERT and ANCE,
c) Processing procedures (Example)

✓ Deposit samples relating to the treatment by CERTLabs to the store of the One-Stop Shop against receipt,

✓ Deposit of samples related to the treatment by ANCE lab against receipt,
c) Processing procedures (Example)

✓ Transfer of a copy of the receipt validated by responsible of store of the ANCE to the indexing unit responsible.

PHASE V. Treatment at Store

Qualitative and quantitative check followed by an immediate insertion of information related to the samples in the application.
PHASE VI. Processing at the ANCE office

✔ Delivery of samples to the store of One-Stop Shop upon signature of the head office of the National Digital Certification Agency corresponding to the delivery after quantitative and qualitative samples verification.
c) Processing procedures (Example)

- Insertion of scanned certifications and their corresponding data in the application,

- Presentation of certificates of compliance to the responsible of indexing unit through a receipt already signed by the responsible of the store after verification of data and their reliability on the application.
d) Customer’s samples management

An organization of technical control or a measurement laboratory should have a store in its places to take delivery of samples taken by the inspector or deposited directly by the importer.
d) Customer’s samples management

The reception of these samples, their stocking, their return and all the input and output movements have to be managed by a written procedure.
d) Customer’s samples management

The automation of this procedure using a Workflow included into a module of management of samples will provide a quick access to the various locations of products.
III- Customer management demand

d) Customer’s samples management

The responsible of the store must index the locations of samples while creating zones (zones of products object of requests of approvals, a second zone reserved for articles object of requests of conformity, a third one for those of technical import control).
d) Customer’s samples management

The place of warehousing of samples must be a sure place secured and monitored by surveillance cameras. It is primordial that it is not wet or basement to preserve the proper functioning of the product and to avoid any flood disaster.
d) Customer’s samples management

The IT management module of these samples should include mandatory fields such as:

✔ The type or designation,
✔ The brand name,
✔ The model,
✔ The quantity,
d) Customer’s samples management

- The customer name,
- The serial number,
- The folder reference,
VI- Information System

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VI- Information System

a) Definition

An information system (IS) is a group organized by resources (hardware, software, personnel, staff, data and procedures) who allows to collect, to regroup, to classify, to deal and to broadcast information in a given environment.
a) Definition

The perimeter of the term Information System can vary from an organization to other and can cover, depending on circumstances, all or part of the following elements.
VI- Information System

- Data base entreprise,
- Tool of Customer Relationship Management,
- Business applications,
- Network infrastructure,
- Data servers and storage systems,
- Application servers,
- Security device.
VI- Information System

b) objectives

The information system coordinates the activities of the organization. It is the vehicle of communication in the organization. Besides, IS represent all resources and systems (persons, material, software) organized for following objectives:
VI- Information System

✓ The optimization of the processes of management

✓ The coherence and homogeneity of information (the single file articles, the single file clients, etc.) who allows to respect norms,

✓ Integrity and uniqueness of the information System,

✓ Sharing the same information system facilitating internal communication or mobility.
VI- Information System

b) Business Applications

1. Objectives

- Computerize and automate approval and technical control processes,
- Ensuring the effectiveness and speed of processing customer requests,
- Ensure transparency of approval procedures and technical control,
b) Business Applications

- Reduce the time required for the clearance of samples,
- Guarantee an adequate service and a better quality,
- Favour communication between colleagues,
b) Business Applications

✓ The implementation of an integrated risk management at each technical control agency to optimize system controls.

✓ The establishment of a local and online database of approval regulations and technical control.
b) Business Applications

✓ Ensure a quick and secure access to data.

These objectives should be achieved while ensuring compliance with national regulations and without prejudice to the interests of customers.
2. **Role**

The different applications of the One-Stop Shop besides their simplicities use, they were developed in order to ensure:

- Customer Management Applications,
- Management of additional information,
b) Business Applications

✓ Management of customer samples,
✓ Management of requests processing delays,
✓ Management of tasks of different stakeholders,
✓ Electronic Document Management,
b) Business Applications

3. Modules to be integrated

✓ Consultation of regulation,
b) Business Applications

✓ Statistics and reporting,
b) Business Applications

✓ Workflow to ensure traceability,
b) Business Applications

✔ Security,
VI- Information System

b) Business Applications

✔ Backup,
b) Business Applications

☑ Search module,
VI- Information System

b) Business Applications

3. **Modules to be integrated**

- Consultation of regulation,
- Statistics and reporting,
- Workflow to ensure traceability,
- Risk management,
- Security,
- Backup,
- Search,
a) Introduction

The ICT one-stop shop instituted in the Centre of Studies and of Research of Telecommunications (CERT) gives to its customers and to the various partners (control organism) multitude benefits and services across customer service, partner and working available at the level of its site web https://guichetunique-tic.cert.tn.
a) Introduction

It ensures high flexibility and ease of use for the customer request deposit, consultation, and tracking.
b) Use cases

Electronic deposit of removal for approval request

 Depositing an online request can be made only after authentication by entering the user name and password.
1. Electronic deposit of a file withdrawal for approval
The customer achieves his space automatically. To create a new request he is called to click on the appropriate button.
1. Electronic deposit of a file withdrawal for approval
1. Electronic deposit of a file withdrawal for approval
In continuation the customer is required to introduce product information
1. Electronic deposit of a file withdrawal for approval
Once this is done, customer is required to attach relevant documents introducing references and corresponding dates.
1. Electronic deposit of a file withdrawal for approval
To guarantee more fluidity of its online services, the One-Stop Shop has provided a sub section to add more useful attachments that the customer. The customer can then attach these documents after selecting their names and introduce their references and dates.
1. **Electronic deposit of a file withdrawal for approval**
For this stadium the customer is ready to pre-deposit his file by pressing on the button to record “Enregister le dossier”.

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1. **Electronic deposit of a file withdrawal for approval**
Once the customer proceeds to confirmation, an automatic mail will be sent to him pointing out the success of the operation of store of the request.
1. Electronic deposit of a file withdrawal for approval
The monitoring of this request is made by pressing “Dossiers en cours de validation” button in section MONITORING OF FILES
1. Electronic deposit of a file withdrawal for approval
1. Electronic deposit of a file withdrawal for approval.
IV- Statistics

Nbre of deposited request on the One-Stop Shop
From: 01/01/2013 To: 31/12/2013

- Nbre of deposited request:
  - 2022 at 25% (Déposées directement au GU-TIC)
  - 4481 at 55% (Déposées via le WEB)
  - 1491 at 18% (Déposées via TTN)
  - 102 at 1% (Parvenues du ministère de commerce)
  - 100% (Nbr total demandes déposées au GU-TIC)

Channal of request of deposit

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IV- Statistics

Processing delays
From 01/01/2013 To 31/01/2013

- Delai (jour)
- Monthly average
- Cumultative average
- Objectifs

Type de demande
Following a well-written set of procedures helps employees to do all aspects of their jobs independently,

They are also sets of instructions that employees follow to ensure carrying out specific tasks thoroughly and consistently
✓ By following procedure, even the newest employee can learn quickly about how the organism operates and why,

✓ Procedures are reviewed and updated periodically to reflect changes.
Thank you for your attention
Part 3: APPROVAL OF TELECOMMUNICATIONS TERMINALS: PROCEDURES, TESTS AND MEASUREMENTS
Plan

- Objective
- Introduction
- Procedure
- Approval Methodology
- Different types of devices
- Standards
- Tests and measurements
- Measuring devices
- ISO17025 accreditation
- Recommendations
- Conclusion
Detail procedures, administrative and technical mechanisms related to the activity of Type Approval of telecommunications terminals
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 including telecommunications networks with all their components, and having defined a national frequency plan must have, obviously, a telecommunications terminal approval body.

The approval process ensures conformity of telecommunications terminals connecting to the Access Network with the requirements of the country's network, national and international standards and to national frequency plan.
The approval is the set of control operations and necessary tests, by which CERT ascertains and certifies that a representative sample of telecommunications terminal equipment or radio equipment complies with regulations, standards and technical specifications.
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 Equipment: Any telecommunications system that uses radio frequencies for wave propagation in free space.
Definition of compliance

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 public use).
Approval is always followed by a process of technical control during importation (border), on the basis of a certificate of approval, which ensures the compliance of imported products with the samples approved.
Approval aims to:

- Verify compliance of terminal equipment or radio equipment with needed requirements
- User safety
- Security of staff operating in public telecommunications networks
Objective

- Protection of networks and information exchanged
- Optimum use of the radio spectrum.
- Interoperability of the terminal equipment with the network and with other terminals accessing same service.
Approval Methodology

- The customer presents the product to be approved to the One Stop Shop (OSS)
- The OSS examines the administrative request of the customer, then it transmits it to Type Approval Lab (CERTLABS)
A second preliminary engineering study is made by CERTLabs experts that includes:

➢ Verification of technical specifications of the equipment presented
➢ Verification of certificates of compliance and report tests of the manufacturer
➢ Verification of the smooth functioning of the equipment presented
➢ The definition of the tests to be performed

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Tests and measurements

Generation of Approval report

Elaboration of the approval certificate (fail or pass) based on the recommendations in the written approval report

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

- Radio Components
- 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 ....)
Different types of devices

- 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
<table>
<thead>
<tr>
<th>Bande de fréquences</th>
<th>Puissance rayonnée max ou champ max / portée max</th>
<th>Norme Européenne ou norme internationale équivalente</th>
<th>Largeur du canal</th>
<th>Applications</th>
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</thead>
<tbody>
<tr>
<td>26,312 - 26,474 MHz</td>
<td>40 mW / 100m</td>
<td></td>
<td>12.5 KHz</td>
<td></td>
</tr>
<tr>
<td>41,312 - 41,475 MHz</td>
<td>20 mW / 100m</td>
<td></td>
<td>12.5 KHz</td>
<td>Postes téléphoniques sans cordon</td>
</tr>
<tr>
<td>46-49 MHz</td>
<td>50 mW / 100m</td>
<td></td>
<td>--</td>
<td></td>
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<tr>
<td>1880 - 1900 MHz</td>
<td>10 mW / 100m</td>
<td></td>
<td>2 MHz</td>
<td></td>
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<tr>
<td>6765 - 6795 kHz</td>
<td>42dBμA/m à 10m</td>
<td>EN 300 330</td>
<td>--</td>
<td>Equipements non spécifiques : Ils regroupent différents types d'applications sans fil, notamment de télécommande et télécontrôle, télémétrie, transmission d'alarmes et de données. Ils ne doivent en aucun cas permettre la transmission de la voix.</td>
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<tr>
<td>26,957 - 27,283 kHz</td>
<td>10 mW / 10m</td>
<td></td>
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</tr>
<tr>
<td>40,66 - 40,7 MHz</td>
<td>10 mW / 100m</td>
<td></td>
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<tr>
<td>433,05 - 434,79 MHz</td>
<td>10mW /20m</td>
<td>EN 300 220</td>
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NB : Les équipements de télécommande n'utilisent pas la bande (40.66 -40.7) MHz.
<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Emission Level</th>
<th>Standard</th>
<th>Frequency Limit</th>
<th>Remarks</th>
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<tbody>
<tr>
<td>868.6 - 869.4 MHz</td>
<td>10 mW / 50 m</td>
<td>EN 300220</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>869.65 - 869.7 MHz</td>
<td>25 mW / 100 m</td>
<td>EN 300330</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>9 - 59,750 kHz</td>
<td>72 dBμA/m à 10 m</td>
<td>EN 300220</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>59,750 - 60,250 kHz</td>
<td>42 dBμA/m à 10 m</td>
<td>EN 300330</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>60,250 - 70 kHz</td>
<td>69 dBμA/m à 10 m</td>
<td>EN 300330</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>70 - 119 kHz</td>
<td>42 dBμA/m à 10 m</td>
<td>EN 300330</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>119-135 kHz</td>
<td>66 dBμA/m à 10 m</td>
<td>EN 300330</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>135 - 148,5 kHz</td>
<td>42 dBμA/m à 10 m</td>
<td>EN 300330</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>3155 - 3400 kHz</td>
<td>13,5 dBμA/m à 10 m</td>
<td>EN 300330</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>13 553 - 13 567 kHz</td>
<td>42 dBμA/m à 10 m</td>
<td>EN 302291</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>170 - 181,5 MHz</td>
<td>10 mW / 50 m</td>
<td>EN 300422</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>196,6 - 200,2 MHz</td>
<td>10 mW / 50 m</td>
<td>EN 300422</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>470 - 790 MHz</td>
<td>50 mW / 50 m</td>
<td>EN 300422</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
<tr>
<td>863 - 865 MHz</td>
<td>10 mW / 50 m</td>
<td>EN 300422</td>
<td>25 KHz</td>
<td>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 antivol, d'identification automatique d'articles, de commande sans fil et de pêage routier automatique.</td>
</tr>
</tbody>
</table>

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

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.
Among the tests and measurements performed during the approval of a telecommunication terminal:

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

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Functional test

During the approval, all telecommunication terminals are subject to functional tests in terms of commissioning and testing of the product and its smooth functioning.
The test bench of a GSM terminal consists of three essential components:

- Simulator test radio (e.g., Agilent 8960)
- Computer
- A test application installed on the computer (e.g., WTM)

A link between these components is necessary.

USB / GPIB
Measuring devices

Agilent Technologies 8960 Series 10

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

Agilent Technologies 8960 Series 10

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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 (Wavetek 4107)
Measuring devices

Wavetek 4107

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Measuring devices

Wavetek 4107

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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.
Among the things to check:

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

Spectrum Analyzer

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Measuring devices

Spectrum Analyzer
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.
Measuring devices

Power meter

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SAR (Specific Absorption Rate) characterizes the power absorbed by a unit mass of body tissue. It is expressed in watts per kilogram (W / kg). This value quantifies the peak exposure level (when the equipment transmits at full power) user to electromagnetic waves.
With regard to mobile phones, the French regulations set by Decree No. 2003-961 of 8 October 2003 and the RTTE Directive imposes a SAR in less than $2 \, \text{W/kg}$ head. For other terminal equipment (not used at the head) regulations require a SAR of less than $2 \, \text{W/kg}$ and $0.08 \, \text{W/kg}$ for whole body trunk.
## Other measures

### S.A.R

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Secteur d’application</strong></td>
<td>International</td>
<td>Europe</td>
<td>Etats-Unis</td>
</tr>
<tr>
<td><strong>Gamme de fréquence</strong></td>
<td>100kHz-10GHz</td>
<td>10kHz-300GHz</td>
<td>100kHz-6GHz</td>
</tr>
<tr>
<td><strong>SAR moyen sur le corps entier</strong></td>
<td>0,08W/kg</td>
<td>0,08W/kg</td>
<td>0,08W/kg</td>
</tr>
<tr>
<td><strong>SAR local sur une masse de référence</strong></td>
<td>2W/kg</td>
<td>2W/kg</td>
<td>1,6W/kg</td>
</tr>
<tr>
<td><strong>Masse de référence</strong></td>
<td>10 g</td>
<td>10 g (cube)</td>
<td>1 g (cube)</td>
</tr>
<tr>
<td><strong>SAR local pour les mains, poignets, pieds et chevilles</strong></td>
<td>4W/kg</td>
<td>4W/kg</td>
<td>4W/kg</td>
</tr>
<tr>
<td><strong>Masse de référence</strong></td>
<td>10 g</td>
<td>10 g (cube)</td>
<td>10 g (cube)</td>
</tr>
<tr>
<td><strong>Seuil de densité de puissance ((W/m²))</strong></td>
<td>f(MHz)/200</td>
<td>f(MHz)/200</td>
<td>f(MHz)/150</td>
</tr>
<tr>
<td><strong>Seuil de champ électrique (V/m)</strong></td>
<td>1,375 f(MHz)⁰⁵</td>
<td>1,37 f(MHz)⁰⁵</td>
<td>-</td>
</tr>
<tr>
<td><strong>Seuil de champ magnétique (A/m)</strong></td>
<td>0,0037 f(MHz)⁰⁵</td>
<td>3,64.1 0~ f(MHz)⁰⁵</td>
<td>-</td>
</tr>
</tbody>
</table>

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SAR determination requires the use of an intrusive probe, which makes experiments on living beings. Laboratories performing these steps, all using the same test procedures defined by CENELEC (European Committee for Electrotechnical Standardization). The phone is adhered to a "ghost", a dummy head having liquid filled propagation properties identical to those of the human brain waves. Then transmits at full power in various orientations. In practice, the actual exposure level is generally less than this value. The sensors measure the power absorbed by the head and trunk through the electric field or temperature.
Other measures

S.A.R

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**S.A.R**

**Step 1:**
The radio is placed in maximum emission in several nominal positions of use. The measurement is carried out on a phantom of which represents the inner surface shape of the face.

*Note:* the liquid equivalent to biological tissues are composed of a mixture of chemicals simulating the dielectric behavior of tissue to different frequencies of common use.
S.A.R

Step 2:
The measurement is performed using an electric field sensor which provides the module of the three components of the field in the phantom in a regular mesh thereof.

*Note:* Before any series of measurements, calibration bench is doubly controlled in part by measuring a reference phone and secondly by measuring a calibrated phantom plane dipole. Additional checks are also performed daily (property of liquids ...).
S.A.R

To give an order of magnitude of the emissions

A comparison between some SAR equipment, knowing that the maximum values are obtained on the phone to 900 MHz:

- Cell phone ~ 700 mW / kg
- Wired Headset ~ 60 mW / kg
- Bluetooth ~ 7 mW / kg

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Electromagnetic compatibility (EMC) is the ability of a device or an electrical or electronic system, to operate in its electromagnetic environment satisfactorily without producing itself intolerable electromagnetic disturbances to anything that is in this environment. Good electromagnetic compatibility describes a state of "good electromagnetic neighborhood":

- Limit the level of unwanted emissions from the device, to not interfere with radio reception or other equipments
- Be adequately immunized against interference from other equipment, or more generally the environment.

Electromagnetic and radio noise are the result of all electrical currents inducing a multitude of fields and spurious signals.
Two types of problems can occur:
- emitted interference
- immunity

There are two modes of propagation of EM waves:
- radiation
- conduction
Standards will therefore define four types of tests:

- Disturbances from conduction
- Disturbances from emitted radiation
- Conducted immunity
- Radiated immunity
Other measures

E.M.C

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Other measures

E.M.C

Emission Rayonnée

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Other measures

**E.M.C**

Emission conduite

- Cage de Faraday avec absorbants
- Récepteur
- Banc de test
- EST
- RSIL
- Alimentation
- Cage de faraday de mesure
Other measures

E.M.C

Immunité rayonnée

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Other measures

Immunité conduite

E.M.C
ISO / IEC 17025 is the global standard for calibration and testing laboratories. The reference document used is that published in 2005 by the concerned organization.
There are two main clauses in ISO / IEC 17025: management requirements and technical requirements.

Management requirements are related to the operation and effectiveness of the system of quality management within the laboratory and the requirements of this clause are similar to those of the ISO 9001 standard.

The technical requirements cover the skills of the team, the testing methodology, equipment and quality reports on the results of tests and calibrations.
ISO/IEC 17025 Requirements for Testing Laboratories

Sampling
- Sampling plan & sampling documentation

Sample Handling
- Sample identification & protection of sample integrity

Testing
- Monitoring the quality of test results

Test Reports
- Test conditions & test results, with estimated uncertainty

Record Maintenance
- Ensure record integrity & security

Compliance across all workflow steps
- Validation of analytical methods & procedures
- Equipment calibration testing & maintenance
- Qualification of material
- Traceability
- Control of nonconforming testing
- Qualification of personnel
- Controlled environmental conditions
- Written procedures

Compliance across the laboratory
- Documentation control, corrective & preventive actions, complaint handling, supplier & subcontractor management, non-conflicting organizational structure, internal audits
ISO 17025 accreditation

Management requirements

1. Organization
2. Management system
3. Documentary checks
4. Review of requests, tenders and contracts
5. Subcontracting of tests and calibrations
6. Purchasing services and supplies
7. Customer Service
8. Claims
9. Control calibrations and / or non-compliant testing.
10. Improvements
11. Corrective actions
12. Preventive actions
13. Control recordings
14. Internal audits

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Technical requirements

1. Staff
2. Housing conditions and environmental
3. Of testing and calibration methods and method
4. Validation
5. Equipment
6. Measurement Traceability
7. Sampling
8. Handling of calibration and testing elements
9. Quality assurance of test results and calibration
10. Reporting of results
Steps Towards ISO/IEC 17025 Accreditation

Start Investigation Phase
- Project Owner and Team
- Define Scope
- Learn Standard Requirements
- Gap Analysis & Task List
- Estimate Costs and ROI
- Management Decision

Start Implementation Phase
- Implementation Teams
- Select Accreditation Body
- Develop Documentation
- Training
- Internal Audit & Corrections
- Pre-assessment & Corrections
- Accreditation Audit

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In the **study phase**, information is collected to determine if accreditation is economically reasonable and generally follows the following steps:

1. Management allocates funds and resources to the study.
2. Management refers to a project manager. Ideally, this person should have experience of laboratory operations, business sense, a good understanding of quality systems and excellent communication skills.
3. The project manager must recruit a project team with the assistance of management. The team members must come from the laboratory management, quality assurance of financial services, human resources, training and documentation.
4. The project team determines the scope of accreditation considered. This may include all the calibrations and/or in laboratory tests or only part of them.
5. The project team study in detail the requirements for accreditation. The main source is the ISO / IEC 17025, with the advice of external experts.

6. The project team develops a list of requirements. This list should include all the necessary documents for the standard.

7. The project team prepare a gap analysis comparing the requirements to what is already available and implemented. A gap exists where the policies, processes and existing procedures are not fully compliant with the requirements.
8. Using the results of the gap analysis, the project team develop the list.
9. The project manager with the help of an external consultant performs a global cost estimate for implementation of the ISO / IEC standard. Costs are compared to the estimated tangible benefits resulting directly from obtaining accreditation.
10. The team make an estimate of the return on investment in both the short and long term.
11. Management decides to accept or reject these proposals and whether to proceed with the accreditation process.
Once the decision to apply for accreditation to ISO / IEC 17025 plug, laboratory studies, designs and realizes the preparatory documentation for the accreditation assessment. A typical implementation proceeds according to the following steps:

1. The project manager as team implementation in different areas. It is very important that all services involved are represented in the teams at all levels of management.
2. The project manager looking for a notified body and chooses the one that best fits the needs of the laboratory.
3. Teams develop documentation such as procedures under the supervision of the project manager.
4. The project manager sets up the training of the team.
5. The quality assurance department conducts an internal audit and, if necessary, initiates corrective actions.
6. The notified body chosen performs a pre-assessment.
7. The project manager initiates Corrective actions.
8. The notified body carries out an accreditation audit.
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
Recommendations

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

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The approval process in a country is a very necessary step for 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 for investors and traders. 

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