

*Disclaimer: This is a Romanian to English translation meant to facilitate the understanding of these Terms of Reference. Should differences appear between the Romanian version and the English version, following translation, the Romanian version shall prevail.*

## **SECTION II**

### **TERMS OF REFERENCE**

The *Terms of Reference* are an integral part of the Awarding Documentation and represent the ensemble of the minimum mandatory requirements based on which each tenderer prepares the technical and financial proposals. The provisions of the *Terms of Reference* shall be considered minimum compulsory requirements. In this respect, any submitted tender which deviates from the provisions of these *Terms of Reference* shall be taken into account only if the Technical Proposal ensures a superior quality level to the one provided by the minimum requirements of the *Terms of Reference*. Any tender with inferior technical characteristics than the ones required in the *Terms of Reference* shall be considered noncompliant and shall be disqualified.

#### **1. Scope of tender**

The successful tenderer(s), hereinafter referred to as the Tenderer, shall design, develop, test and implement an interactive application which, based upon the options inputted by the end-users, shall make comparative analyses of the tariff plans existing on the market for the electronic communications services, and shall display results showing the most advantageous tariff plans ranked in order of cost which match the options inputted by the end-users. The comparative information on the tariffs and conditions offered by the providers of publicly available electronic communications services shall be made available to the end-users by means of a web interface designed by the Tenderer and managed by ANCOM. The Tenderer shall also offer technical assistance and training to the ANCOM staff to be further involved in the management and operation of the price comparison tool. If and when necessary, the Tenderer shall attend meetings with the parties involved (industry, users, mass-media) to present the chosen solution. Furthermore, the solution should be scalable, allowing for the increase in time of the number of users, and adjustable, as far as the calculation algorithm is concerned. During the guarantee period, the Tenderer shall offer cost-free assistance for all the failures that occur during the application guarantee period.

#### **2. Features of the interactive application**

The Tenderer shall elaborate a calculation methodology and an application capable to rank for the end-users at least the first 25 most commercially advantageous offers, for each type of product, in order of cost, based upon a set of usage options inputted by the end-users, as well as to provide detailed and updated information concerning each offer included in this rank.

The Tenderer shall detail the proposed calculation methodology and model in the technical proposal.

The interactive application shall ensure:

- the end-users' possibility to access accurate, complete and updated information, according to the legislation in force.
- user friendly and accessible web interfaces for the end-users, the providers of telephone and Internet access services (operators) and ANCOM, including interactive on-line help features, respectively *tooltip* boxes when hovering the mouse over certain items of interest, whereas the fields the user is asked to fill out must be accompanied by explicative information;
- secure storage of operator information;
- authorised access of operators in view of information provision and periodical update, according to the provisions of art.12 and art.13 of the ANCOM President's Decision no.77/2009 on the obligations of informing the end-users, incumbent on the providers of publicly available electronic communications services.

The interactive application should support the following workflow:

- a. Entry of usage options by the end-users and presentation of relevant comparative information;
- b. Setup of commercial offer information by operators and presentation of comparisons, for exemplification, against other offers;
- c. Management by ANCOM staff of the web interface content, configuration of parameters and system settings together with verification of offers entered previously by the operators, offer comparison simulations (the newly entered offers against the ones already live on the web interface) and validation of such offers for use by means of the interactive application;
- d. Elaboration of reports and statistics regarding the activity on the web interface and the behaviour of the users having accessed the application, concerning both the entered parameters of usage pattern of the communications services and the use of the application;
- e. Exchange of messages and information between the ANCOM staff and the operators via the application (e.g. notification of ANCOM concerning the entry of new information by the operators, the operators' warning with regard to the non-validation of the information requiring changes);
- f. The user's possibility to compare directly, in parallel panels, at least 2 offers displayed by the final rank.

### **3. Technical solution of the application**

#### ***3.1. General information***

ANCOM owns a complex IT&C structure consisting of: communications system (VPN, VoIP), VmWare technology-based virtualized environment, security systems, applications, calculation systems and other systems necessary to the ANCOM activity.

#### ***3.2. Technical and functional requirements***

##### ***3.2.1. Security provisions***

### *3.2.1.1. General requirements relating to data security*

The application has a series of specific security requirements in order to ensure the security of data irrespective of their state: transit, processing or storage. The security mechanisms to be included in the solution proposed shall need to be based on good practice rules and concepts in the field, in order to allow the adjustment of the security requirements, while ensuring a high level of security of the handled systems and data. The information stored in the database shall be encrypted, and the access of the users, operators and ANCOM staff shall be well-defined and controlled via security policies.

The system must ensure that the data contained are authentic and were not modified by third entities. These desiderata should be fulfilled due to using the digital signature and building an advanced mechanism for the verification of this type of signatures.

The operators' access to the system functionalities shall be made as follows:

- each operator shall hold a certificate issued by an acknowledged certification authority;
- users designated by each operator shall access the system based on username and password, using https encrypted channels (using the operator's certificate);
- the system functionalities shall be available based on the role associated to the respective user.

The security of the communication environment shall be ensured by using the HTTPS protocol (based on 128bit SSL). In order to allow this type of communication, the server must hold a digital certificate usable for encrypting and signing. The hardware equipment, the operating systems, the software applications, the communications networks and systems must be configured and protected adequately against physical and logical attacks, both inside ANCOM and from outside.

The *AAA (Authentication, Authorization, Accounting)* principle shall be used. Nobody shall have the possibility to do more types of operations than the ones initially attributed, which can be accessed by authentication. In order to be able to verify the manner in which the operators use their rights arisen from the authentication, the logs shall be kept.

Furthermore, several types of accounts for the application, each account having LEAST privileges, shall be defined.

It is critical that the data stored in the database are kept confidential and well-secured. Data security shall be ensured for the data handled usually within the database and for the data stored or carried through the network. Data stored in the database shall be encrypted - information confidentiality being thus ensured - by using the database native option, in a transparent manner for the users. By making use of these options, data stored in tables shall be encrypted to ensure thus the desired security level. To encrypt the information, one of the following algorithms shall be used:

- Triple Data Encryption Standard (3DES).
- Advanced Encryption Standard (AES): 128, 192 and 256 bits.

Security solutions shall be ensured so that data should be inaccessible by anyone except the authorised users. The auditing of these solutions shall be ensured in order to enable the interrogation of the users who update the operator tariffs or the system settings and parameters.

The application shall manage confidential data sets (users' personal data, operators' service packages, some of them maybe officially not-launched yet) and therefore the security system represents a critical aspect of the entire project. Within the tendered solution, the following elements shall be considered:

- Application security;
- Database security;
- Network infrastructure security.

#### *3.2.1.2. Application security*

The tendered solution shall meet the following security requirements:

- Username/account and password shall be required for access to the ANCOM/operator sites. This component is key to ensuring that each operator can access their own data only. Usernames and passwords should be generated by the system and should be encrypted to 128bit. Strict processes shall be used for recovery of username and password;
- Protection against cross-site scripting (XSS) shall be ensured;
- Protection against the code injection technique that exploits the security vulnerabilities which may appear when sending the requests to the database (SQL Injection) shall be ensured;
- CAPTCHA protection shall be ensured. This system shall stop the programmes which may automatically fill in the price comparison tool forms and may thus extract information on the offers, recomposing our database;
- Minimum 128bit Strong Encryption ensuring that all information exchanged between the web server and the operator and ANCOM shall be encrypted with a unique key which is generated per session. This encryption ensures that the information supplied cannot be seen or tampered with in transit;
- The solution shall allow defining user groups and authorising access to functionalities on a group basis. Moreover, the solution should permit the refinement of access up to the user level;
- The actions of the users within the system shall be audited; the tendered solution should allow the dynamic control of the detail level of the audited information, activation/inactivation of the audit, refinement of the audit up to the user level (and user group level).

#### *3.2.1.3. Database security*

As for the database solution, the following security elements shall be taken into account within the tendered solution:

- Database security on the web server needs to ensure that any data which is held on the web server shall be inaccessible by anyone except through authorised use of the application; as well, passwords shall be kept by way of a *hashing (md5/sha)* operation, whereas confidential data shall be kept encrypted;
- *DBA (Database Administrator)* access restriction – one of the main tasks of the Database Administrator is to monitor and administrate the security of the database management system. This involves adding and removing users, managing the database system resources, auditing the database and checking any other security problems.

#### *3.2.1.4. Network infrastructure security*

The Tenderer shall take into consideration the equipment existing within ANCOM in view of ensuring the network infrastructure security.

#### *3.2.1.5. Information auditing and history*

A specialised mechanism to ensure that all the information concerning the monitoring of the users' activity shall be implemented.

For a maximum of flexibility, the auditing and login functionalities are entirely configurable. The operators' actions, as well as the ANCOM staff's actions shall be registered. The results shall be presented in an aggregated and intelligible manner to the system administrator. This creates the possibility to highlight only those actions or events which are relevant, given the prioritization scheme from critical events (such as application errors or authorisation exceptions) to operations corresponding to a regular workflow (such as the editing of an entity or the entry of new registrations).

Each user account is added into the database and the subsequent operations (changes or deletions) shall be added as information regarding that user's identity in the system. Each operation which impacts the data stored in the database is registered along with the following control information: the user that makes the operation, the date and time of the operation, respectively the type of the operation (addition, editing, deletion).

#### *3.2.2. Architecture of the system*

The tendered technical solution shall implement three-tier architecture, according to the model described in Figure 1 below.

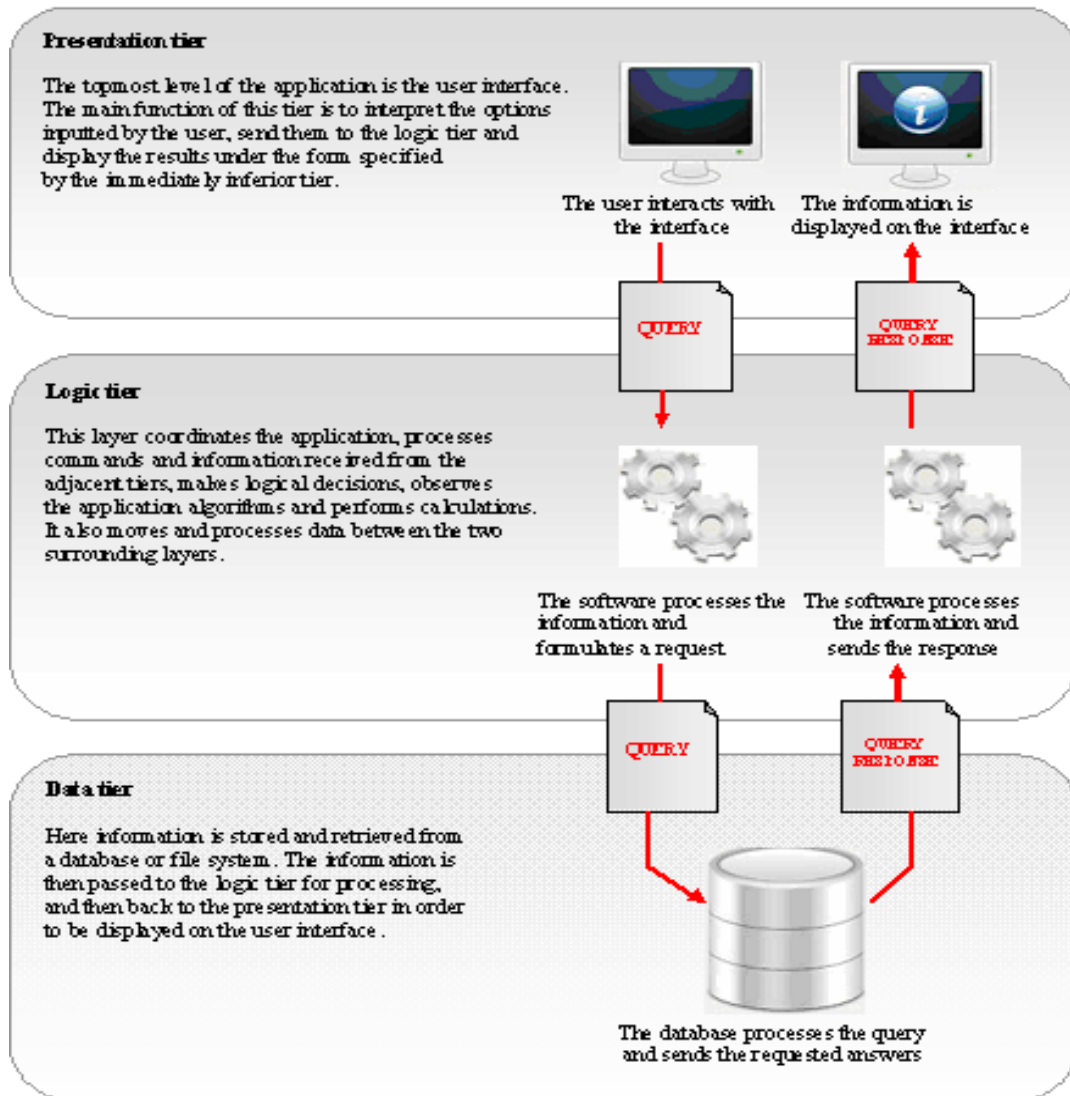


Figure 1. 3-tier architecture model

The application architecture is disposed on 3 layers, according to the 3-tier model (a client-server architecture in which the presentation, the query processing, and the data management are logically separate processes). The 3-tier model is a software architecture and a software design pattern.

Apart from the usual advantages of modular software, with well-defined interfaces, the three-tier architecture is intended to allow any of the three tiers to be modified, upgraded or replaced independently. For example, a change of operating system in the presentation tier would only affect the user interface code.

The three architecture tiers, along with the minimum technical requirements the solution must observe for each of these tiers, are described below.

#### 3.2.2.1. Presentation tier

This is the topmost level of the application and represents the user interface. The presentation tier displays information related to the services offered by the application,

such as searching for the best tariffs in the system, and comparing several offers. The web interface intended for the end-users shall be designed by taking into consideration the ANCOM visual identity elements which are to be made available when developing the web interface.

#### *3.2.2.2. Logic tier*

The logic tier controls the functionality of the application by performing detailed information processing. This tier consists of the processing of requests pulled out from the presentation tier, the elaboration of requests to the information storage tier (namely the database), the receipt and interpretation of responses and their submission in view of display to the superior tier of the user interface.

#### *3.2.2.3. Data tier*

This tier consists of the database server and stores the application information. This tier keeps data independent from application servers or application logics (separation of the information display from the effective data).

### *3.3. Administration*

The ANCOM interface shall support most of the activities consisting, among others, of:

- maintenance of all 3 interfaces;
- verification and validation of the data entered by operators;
- limited changes (addition, modification, parameter share and other equivalent operations);
- generation of reports on the tariff and/or tariff package evolution;
- control over the comments posted on forums and moderation of discussions.

### *3.4. User management and access into the system*

The tendered solution shall mean to impose the security policies in a uniform and centralised manner, to restrict the types of access for each category of users. The security mechanisms to be implemented shall ensure self-service facilities and information confidentiality, this being a critical mission under the tendered solution. The information in such a system must be protected against all threats, in any circumstance, including when carried through the network.

The general objectives of the user management are:

- ensuring the centralized control of the system access and authorising the use of a resource from the system, based on the user profile;
- centralized management of users and of access rights, including administration delegation;
- using a unique interface for managing the users and the security policies;
- automatizing the implementations of procedures and policies that would ensure confidentiality, authentication, integrity and acceptance of system connectivity;
- offering self-service functionalities for the ANCOM staff and operators, including for administration delegation.

The security mechanisms to be implemented shall mean to ensure the confidentiality of information stored in the users' accounts. The information in such a system must be protected against threats in any circumstances, regardless of whether stored on magnetic environments or carried through the network.

In close connection with the aforementioned security principles, security must be regarded as a "mantle" covering and protecting the application for the online taken over of information, the security infrastructure must be a compulsory component of the system and not added at a subsequent time.

The tendered system must ensure, through its modules, the control of access and allow the management of user identity, either operators or ANCOM staff. For the identity management, the solution must offer the following functionalities available to all types of users:

- Registration process
- User profile management
- Closing of account

#### *3.4.1. Registration process*

As regards the process of system registration, the operators and the ANCOM staff shall follow an authentication process.

Upon access into the system, operators shall be able to self-administer (self-service) their editor user accounts and create the accounts of the subordinated users. As well, they shall be able to change the profile data.

If the entered data do not correspond or if the operator's account is not found, this account accessing request shall be automatically routed to a system administrator. This specially designated person analyses and corrects the entered data (eventually by interaction with the respondent) and shall activate the account with the corrected new details. At that time, the respondent shall be notified on the account activation.

#### *3.4.2. User profile management*

By means of the self-service interface, the system users may update their user profile and the profile of the subordinated users.

Each operator shall have a system access generic account. The operator's account shall be administered by a person designated by the operator. This designated person shall also be the contact person in the relationship with ANCOM. At all times, only one administrator account shall be active, for the respective operator.

Apart from the account administration, the application includes an alert and notification system, and thus the users and administrators shall be sent notifications in relation to various actions (alerts, periodic notifications, confirmations and error messages).

#### *3.4.3. Closing of account*

The proposed system shall offer the capability to change the state of an account in the moment the operator holding the respective account ceases its activity.

### **3.5. Infrastructure requirements**



### *3.5.1. IT&C infrastructure existing within ANCOM*

The IT&C infrastructure available within ANCOM has the following features:

- 800 calculation systems, 34 servers and more than 80 specific applications, developed from own and/or external resources and various other commercial applications provided by third manufacturers (Adobe Systems Incorporated, Corel Corporation, Abbyy, Dameware Development, McAfee Inc., CA Technologies, ATDI, Rohde & Schwarz). Their number is continuously changing due to the ongoing projects.
- all the ANCOM locations (Headquarters, Regional Divisions and county offices) are connected via VPN connections on GRE tunnels over the network of a communications operator. The Internet access is made exclusively by means of the Headquarters.
- a telephony system made of a VoIP system connected to PSTN via three PRA flows at headquarters. The three PRA flows enable the routing of 1,000 numbers in such way as to ensure the communications needs for all employees. The conversations between the ANCOM headquarters are done via VPN-based VoIP technology. In addition, the ANCOM locations own each an analogue port connected directly in the PSTN network via the same operator.
- is based on a solution made of a VMware technology-based virtualised environment, with the following components:
  - Virtualization cluster formed from 4 HP DL360 G7 servers, each equipped with two Intel XEON X5670 processors, 2.93 GHz, 6 cores/processor, 64 GB RAM memory (8 modules of HP 8GB 2Rx4 PC3-10600R-9).
  - Virtualization solution management and backup cluster formed of 2 HP DL360 G7 servers, each equipped with an Intel XEON X5670 processor, 2.93 GHz, 6 cores/processor, 16 GB RAM memory (2 modules of HP 8GB 2Rx4 PC3-10600R-9).
  - Storage HP EVA 6400 – storage capacity of approximately 26 TB.
  - Magnetic tape library – HP MSL 4048.
  - Switch FC SAN – HP STORAGEWORKS 8/24 SAN – 2 pieces.
  - Switch Gigabit – HP Procurve 2824 – 2 pieces.
  - Rack HP 10642 G2 + Switch KVM HP 16 ports.
  - Backup software – HP Data Protector.
  - Virtualization software - VMware vSphere 4 Enterprise Plus – 8 CPU.

### *3.5.2. Minimum requirements relating to hardware and software*

The Tenderer shall offer perpetual licences for all software products included in the solution (temporary licence or with limited functionalities as compared to the licences without restrictions for the same products are not allowed).

The Tenderer shall submit a complete technical solution, satisfying all the requirements included in the present technical specifications and all functionalities herein.

Figures 2 and 3 illustrate the hardware architecture, respectively the functional architecture of the application.

The load balancer divides the http/https requests to the two web server nodes.

The application servers shall be installed on the two web server nodes. The web servers shall be thus configured so that each of them could distribute in an optimum manner the http/https requests to the two application servers. The application servers shall be configured in an active-active cluster.

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Where one of the web server machines fails, the system shall further function only by means of the web server that remained active.

The database cluster is made of two servers accessing concurrently the same database, in active-active mode.

The database shall be placed on fiber optic-connected external storage equipment, existing in the ANCOM infrastructure. Both FC (*Fibre Channel*) access ways and the external storage equipment are redundant. Consequently, the database service is expected to remain active including when one of the two database servers fails.

The connection between the web server and the application servers, as well as the connection between the application servers and the database servers are made through the ANCOM internal network (LAN).

The networking hardware equipment (load balancer, firewall, router, wiring termination) requested herein shall be installed in the ANCOM infrastructure in a configuration to be established in the project implementation phase. Furthermore, the configuration of the Ethernet ports on the servers in the context of the ANCOM infrastructure shall be also established in the project implementation phase.

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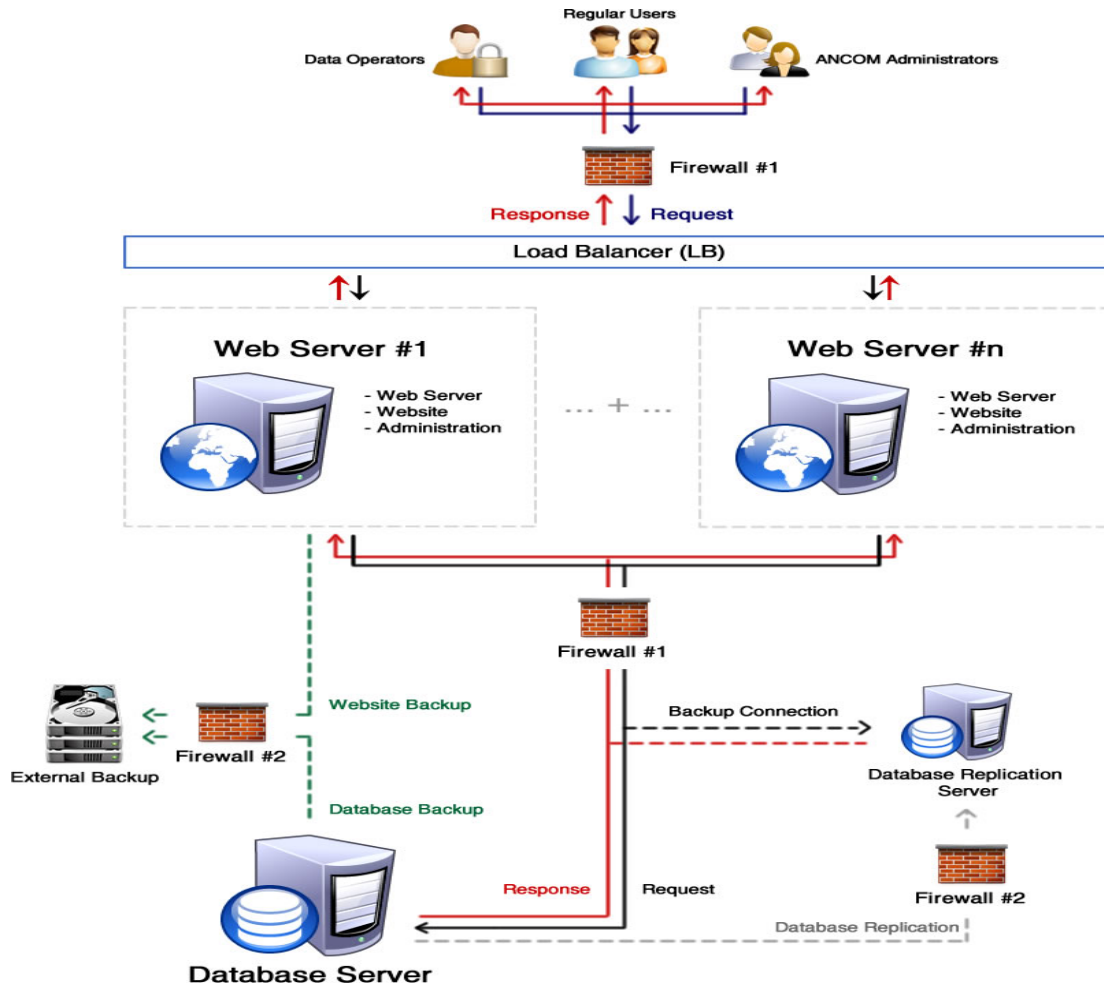


Figure 2. Hardware architecture of the application

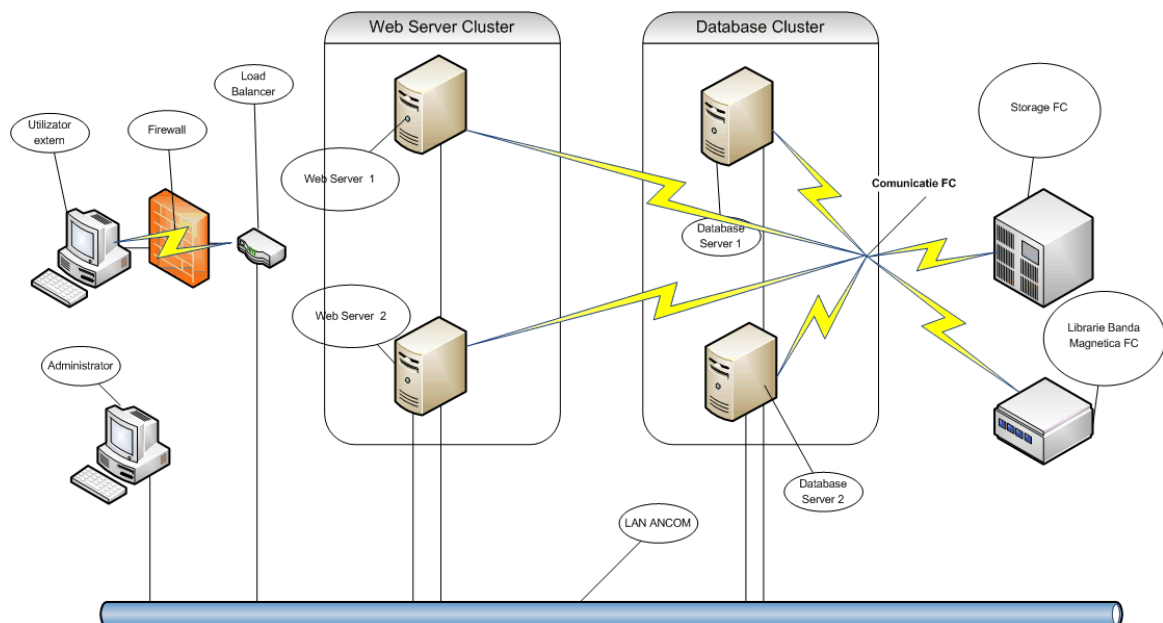


Figure 3. Functional architecture of the system

The main features for each category of infrastructure component are presented below. All requested servers shall be delivered with a pre-installed and licensed operating system. All equipment shall be delivered together with all the necessary accessories for the integration in the existing infrastructure.

#### *3.5.2.1. Minimum requirements relating to hardware*

The delivery of the equipment described below is requested. All equipment shall be delivered with a minimum 3-year on site guarantee. All servers shall be delivered with a FC dual Port adaptor (8 Gbs).

- **1 Router** with the following basic characteristics:
  - Enough memory and power to accept Full Internet BGP routing table with 2 Internet providers at 60Mbps traffic.
  - 4 Ethernet ports.
  - Full Internet BGP Routing Table, IPSec 3DES/AES, VLAN, CLI, EIGRP.
  - NAT, DHCP.
  - Each Port LAN WITH LED: Link (Ethernet connection), FDX (fullduplex), 100Mbps (100Mbps connection).
  - Rack-able 19", maximum 3 U, provided with all the connection elements in the rack.
  - 220 V, 50 Hz, provided with an adequate cable for the drains in Romania.
  - Dual Power Supplies, Redundant Power Supply.
- **2 Firewall** with the following basic characteristics:
  - IPS.
  - State full filtering.
  - Restriction.
  - Black-list.
  - Rack-able 19", maxim 1U.
  - 220 V, 50 Hz, provided with an adequate cable for the drains in Romania.
- **2 Layer 3 Switches** with the following basic characteristics:
  - Rack-able, 19", 1U.
  - Layer 3 (routing capacity).
  - ACL, Port Security, Port Filtering, Mac Overflow.
  - 24 RJ-45 10/100/1000 ports. (IEEE 802.3 Type 10Base-T, IEEE 802.3u Type 100Base-T) 1 port RJ-45 for administration console, 2 ports accepting data transfer on copper or fibre optic (IEEE 802.3 Type 10Base-T; IEEE 802.3u Type 100Base-TX; IEEE 802.3ab 1000Base-T Gigabit Ethernet) or a mini-GBIC slot (to be used with a mini-GBIC transceiver).
  - IEEE 802.3x Control Flow, IEEE 802.3ad Link Aggregation Control Protocol, RFC 1492 TACACS+SSHv1/SSHv2 Secure Shell, IEEE 802.1X Network Login, IEEE 802.1Q VLAN tagging, SNMPv1/v2c/v3, RFC 1493 Bridge MIB, IEEE 802.1s Multiple Spanning Trees, IEEE 802.1AB Link Layer Discovery Protocol, RFC 2138 RADIUS, Secure Sockets Layer (SSL), IEEE 802.1Q VLANs, IEEE 802.1p Priority, SNMP MIB II, RFC 2236 (IGMPv2).
  - interface for the command line; Web browser; a management dedicated channel (serial RS-232C)
  - Minimum 8000 entries in the MAC Table.

- Voltage: 100:127 VAC/200:240 VAC, maximum power: 0.75 A /0.4 A, Frequency: 50/60 Hz.

The minimum requirements relating to the server features are described below.

- **2 web servers:**

- Two last generation processors with 4 cores per processor, particularly made for servers, with a minimum frequency of 2.5 GHz.
- MainBoard with FSB 1333, DDR dual-channel, PCI express, 2 x 10/100/1000 LAN (min 4xUSB 2.0.)
- SAS RAID hardware, 256MB RAM, RAID support 0,1,10, min. 6 SAS ports, hot-swap
- 8 GB DDR min 667MHz FB-DIMM
- 4x 146 GB, 15000 rpm, SAS plus 2x 146 GB, for reserve
- DVD±RW Dual Layer with writing soft included
- SVGA, min 16MB
- Rack mountable case max 4U, 2x min 500W redundant power hot swap, min 6 bay HDD hot-swap

- **1 database server**

- two last generation processors with 4 cores per processor, specially made for servers, with a minimum frequency of 2.5 GHz
- MainBoard with FSB 1333, DDR dual-channel, PCI express, sound, 2x 10/100/1000 LAN, min 4xUSB 2.0
- SAS RAID hardware, 256MB RAM, RAID support 0,1,10, min. 6 SAS ports, hot-swap
- 8 GB DDR min 667Mhz FB-DIMM
- FDD, 1.44 MB floppy (external, on USB 2.0, is accepted)
- 4 x 300 GB SAS, 15.000 rpm, plus 2 x 146 GB SAS, for operating system
- DVD±RW Dual Layer with writing soft included
- SVGA, min 16MB
- Rack mountable case max 4U, 2x min 500W redundant power hot swap, min 6 bay HDD hot-swap

- **1 database replication server**

- two x86 last generation processors with 4 cores per processor, specially made for servers, with a minimum frequency of 3.00 GHz
- MainBoard with FSB 1333, DDR dual-channel, PCI express, sound, 2x 10/100/1000 LAN, min 4xUSB 2.0
- SAS RAID hardware, 256MB RAM, RAID support 0,1,10, min. 6 SAS ports, hot-swap
- 8 GB DDR min 667Mhz FB-DIMM
- FDD, 1.44 MB floppy (external, on USB 2.0, is accepted)
- 4 x 300 GB SAS, 15.000 rpm, plus 2 x 146 GB SAS for operating system
- DVD±RW Dual Layer with writing soft included
- SVGA, min 16MB
- Rack mountable case max 4U, 2x min 500W redundant power hot swap, min 6 bay HDD hot-swap

- **Basic kit for servers:**

- Switch KVM 4 ports
- Keyboard 104 keys

- Mouse with a scroll
- 22" monitor min 1600x1050
- **UPS:**
  - rack-able 19"
  - Capable to support the entire hardware structure in case of an incident (power outages) minimum 15 minutes at maximum upload / full load and 30 minutes at half upload / load
- **Rack:**

Sized for the equipment that must be rack-able and fit within.
- **External storage device:**
  - Rack-able 19", maximum 2 U;
  - LTO – 4;
  - AES 256-bit;
  - 1 TB compressed 2:1;
  - 128 MB Included;
  - 4-Gbps Fibre Channel connect to host or 3 Gb/sec SAS;
  - Dual power source, Redundant sources;
  - 220V, 50Hz, provided with an adequate cable for the drains in Romania.
- **A hardware device compatible with Load Balancing:**
  - Rack-able 19", maximum 1U;
  - Layer 4 & Layer 7 load balancing; Content routing;
  - Server status monitoring; detection of errors/server failure; addition/replacement servers without stopping the system operation; Server weighting, Server maintenance, 1 GB transfer rate on physical environment; Direct Server Return mode;
  - Performance monitoring; SNMP support; Automatic updates, ACL and SSL protection; Real time traffic; Statistics; Automatic save configuration; Automatic discovery; No restrictions on port or server, API (Application Programming Interface); Firmware easy update; Events notification; Firmware easy update; Events notification via e-mail or SNMP; Static routes;
  - http, HTTPS (SSL), SSH, SMTP, IMAP, POP3, RDP (Windows Terminal Services), NNTP, ASP, Audio – video continuous flow presented to the user; Streaming media, DNS, LDAP, RADIUS, TFTP, Other TCP/UDP services;
  - DDos attack prevention, IPS (Intrusion Prevention System), Remote Desktop Protocol (RDP) support, Service level ACL;
  - 2 x Gigabit Ethernet;
  - updates ensured for 3 years;
  - 220V, 50Hz, provided with an adequate cable for the drains in Romania.

#### *3.5.2.2. Communications system*

The architecture of the communications system is presented below:

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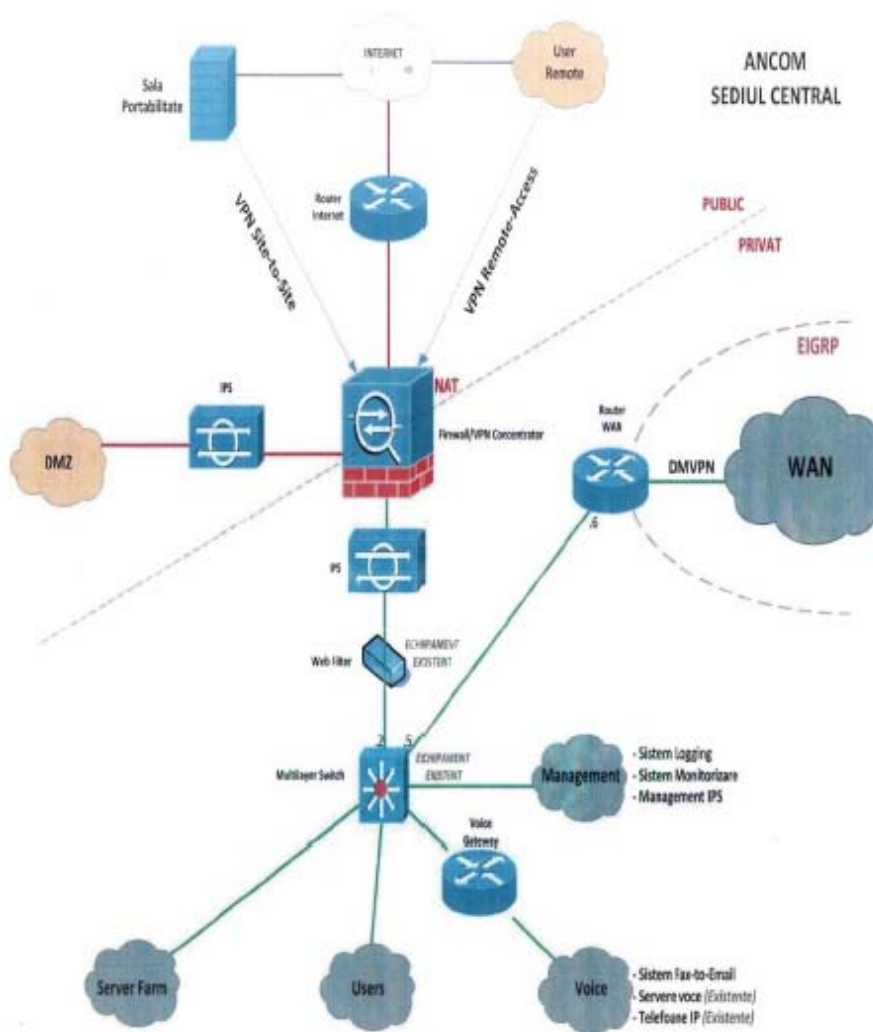


Figure 4. ANCOM communications system

## Sistem comunicatii

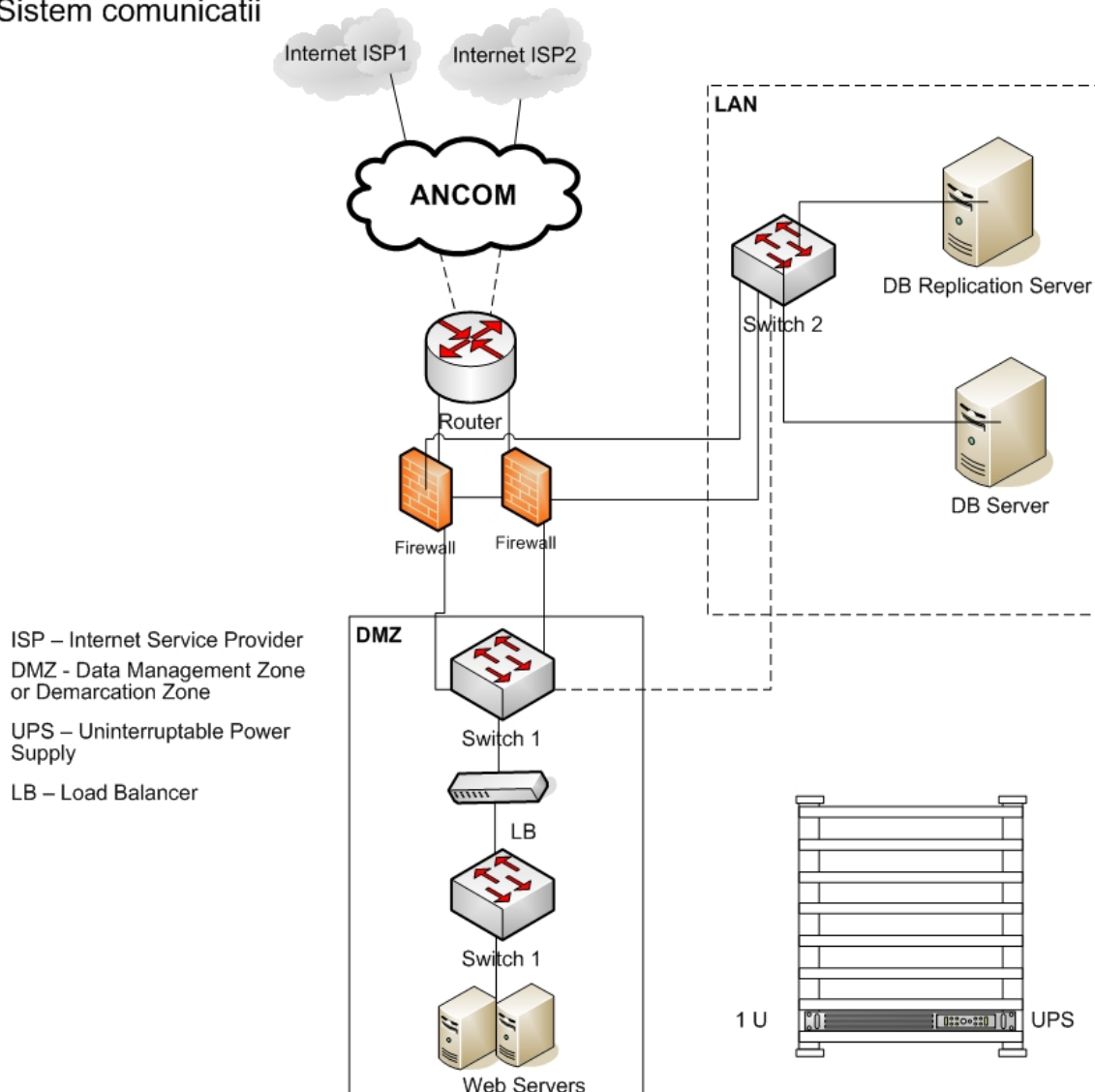


Figure 5. Application communications system

The two diagrams are informative. The final structure (the settings) of the communications system shall be established in the project implementation phase.

The ANCOM's VPN network is structured on two hierarchical levels with three capacity levels and ensures communications such as data transmission, VoIP telephony, fax over IP transmissions (all protocols, including G3, SG3), modem over IP, including V.34 modulation, videoconference transmissions, audio-conference and process data.

Considering that ANCOM holds its own AS (autonomous system) for its HQ which announces 2 classes of IP/24 addresses and another AS for the Number Portability site which announces one class of IP/24 addresses different from the IP addresses classes from headquarters, the BGP protocol is used for the Internet connection, for each of these two locations.



### *3.5.2.3. Minimum requirements relating to software*

For all the servers in the technical architecture, Enterprise operating systems, observing the requirements specified in point *3.5.2.1 Minimum requirements relating to hardware*, shall be delivered. The specifications for each of the software infrastructure products necessary for the service operation are described further on.

The manufacturers must certify that the web server and the application server operate correctly together in the requested configuration. As well, the manufacturers must certify that the application server and the database operate correctly together in the requested configuration. The technical proposal must include the technical documentation of the products to certify these compatibilities.

### *3.5.2.4. Web server*

The delivered web server must observe the following minimum and compulsory requirements:

- offers support for SSL and basic authentication
- allows the extension of the functionalities based on plug-ins or modules
- holds plug-ins to allow for the use as an interface server for the application server
- allows the implementation of a PKI architecture
- communications outside the network must be made both encrypted and visibly, depending on the information type
- offers support for SSL v3
- allows the integration with hardware acceleration solutions for encryption/decryption
- allows operation in reverse-proxy mode
- holds functionalities of URL address rewriting
- holds load balancing mechanisms
- allows the configuration in a high availability mode
- offers support for IPv4 and IPv6
- allows the run of the dynamic content, offering support at least for the PHP, JSP, C/C++ technologies
- allows port tunneling
- offers web cache services
- runs on all major distributions of operating systems present in the market (Windows, Linux, Unix)

The licences for the web server x86/x64 architecture equipment described above shall be delivered.

### *3.5.2.5. Application server*

The application server shall implement one of the mature standards in the market (DotNet, J2EE or other equivalent standards). This standard must have at least 3 major shelf product implementations made by 3 large manufacturers (Oracle Weblogic, IBM WebSphere, JBoss or other large manufacturers).

The application server must fulfil the following minimum and compulsory requirements:

- offers support for the connection to multiple relational database management systems (RDBMS)

- allows the share of Connection Pooling integrated with clustering mechanisms and detection of failures implemented at the database level
- offers mechanisms for grouping the servers in application server clusters in both active-active and active-passive topologies
- allows the temporary stopping of a node in the cluster for maintenance and assistance, the system being meanwhile available for regular activities
- offers dynamic balancing mechanisms for the system load between the resources managed within the same cluster
- offers Scale Out and Scale Up mechanisms
- contains the integrated web server
- allows the run of the application server on all the major distributions of operating systems present in the market: Windows, Linux and UNIX
- allows the installation of new versions of an application, without the interruption of the connected users, ensuring the continuity of the business activity (Zero-Downtime); the old application shall be deactivated only upon closing all active connections at the time of installing the new version
- offers full support for the Java Messaging Service (JMS) standard, 1.0 and 1.1 versions or equivalent
- offers full support for the Java Authentication and Authorization Service (JAAS) standard or equivalent
- offers an administration console for the application servers with capable of configuration change management:
  - blocks a configuration for change;
  - saves a configuration without an effective implementation;
  - resets to a previous configuration;
  - history of changes
- allows the registration, under the form of a command script, of the administration operations performed on a field of applications with the possibility of subsequent use of this field for activities of management and maintenance of the application server
- offers support for the protection against application server overload, using options of reconfiguration of the software resources in cases when the server may no longer accept new processing requests, the system maximum capacity being reached
- includes facilities of self-tuning of the number of concurrent sessions accepted, depending on the load level of the operated system
- is compatible with the specifications of the Java Enterprise Edition 5 standard or equivalent
- offers compatibility with the specifications of the previous standards Java, Java 2 Enterprise Edition 1.4 and Java 2 Enterprise Edition 1.3 or equivalent
- forms a complete technological platform for the installation and execution of dynamic web sites, web services and applications compliant with the J2EE standard or equivalent
- offers full support for the specifications of the Java Servlets 2.3, 2.4 and 2.5 standards or equivalent
- offers full support for the specifications of the JavaServer Pages 1.2, 2.0 and 2.1 standards or equivalent

- offers full support for the specifications of the Enterprise JavaBeans 2.0, 2.1 standards or equivalent
- offers full support for web services, according to the specifications of the WS-I Basic Profile 1.0 and 1.1 standard
- offers full support for web services, using the specifications of the JAX-WS 2.0 and JAX-RPC 1.1 standards or equivalent
- offers support for Simple Object Access Protocol (SOAP) 1.1 and 2.0 versions and SOAP with Attachments API for Java (SAAJ) or equivalent
- allows the data conversion into XML format, using the W3C Extensible Stylesheet Language (XSL) standard
- allows data reading and writing in XML format, using the Document Object Model (DOM) and Simple API for XML (SAX) standard programming interfaces and the Streaming API for XML (StAX) specification or equivalent
- allows to apply security to web services, using the WS-Security and WS-SecurityPolicy standards
- offers full support for the JDBC standard, 2.1 and 3.0 versions or equivalent

Where the Tenderer offers solutions which observe equivalent standards, then the Tenderer shall include in the offer a table of equivalence to clearly show that the tendered solution offers at least all the functionalities offered by a solution compatible with the standards specified before.

The licences for the web server x86/x64 architecture equipment described above shall be delivered.

#### *3.5.2.8. Database server*

The relational database shall fulfil the following minimum and compulsory requirements:

- it must be a database management system based on the relational model
- allows the minimisation of data access conflicts and guarantees the simultaneous data access
- allows the reorganisation, move and redefining of tables, without blocking the activity
- has the possibility to temporarily suspend resource-consuming operations (e.g. massive data load), with their subsequent reset
- offers priority schemes in the accessing of the database, depending on the type of user
- is compatible with the ANSI SQL standard
- offers multimedia data support
- natively allows the storage and management of XML data structures
- offers support for stored procedures and triggers
- offers support for autonomous transactions
- allows defining index tables for rapid access to certain tables
- offers fast restore mechanisms in case of error, at the level of transaction, table or database, without needing to interrupt the database activity
- offers integrated mechanisms in the database for cancelling a committed transaction, without needing to restore from a backup or to maintain copies of data, through user procedures

- allows the direct query from database of the external text files, without needing to previously perform a loading operation in a table from the database
- allows for the limitation of the number of connections to the database by using a database connection pooling mechanism
- offers full support for the use of regular expressions
- allows the recovery of logged transactions in the event of a breakdown (roll-forward)
- holds Unicode UTF-8 support or equivalent
- offers support for the bidirectional replication of data between two database instances
- allows the restriction of access at the level of database objects
- allows the simultaneous implementation of several security policies for the same database object
- offers a list of operations which a group or a class of users may perform
- offers native mechanisms for restricting the users' access at the level of registration and column in a table
- allows the self-tuning of parameters in the event of adding memory, processors and storage space to the system, the base needing to automatically adjust to these changes
- allows saving/restoring and zipping/unzipping data in on-line working regime
- allows the total and/or partial save of the database
- allows the performance of automatic backup in a unitary, centralised and easy-to-administrate form
- allows the performance of backup only for the files that suffered changes from the last backup and for the newly created files
- offers local and consolidated reports on the entire backup environment and backup operations
- allows the registration of all changes of the database in order to permit the recovery of the database (registration of transactions)
- allows the total and/or partial recovery of the database from a time moment specified by the user
- allows saves for one or several spaces allotted to tables, as specified by the database administrator
- allows the run of the database server on all major distributions of operating systems present in the market: Windows, Linux and UNIX
- allows the compression of the data stored in tables in order to minimize the storage space
- allows the execution of multi-table INSERT instructions
- allows the limitation of the number of processors used by the database via own mechanisms, without the additional installation of virtualization software
- includes capacities of automatic optimisation of the SQL instructions, through data indexing or partitioning mechanisms
- offers the possibility to logically partition the large tables to reduce the data access time, using various partitioning criteria (list, range, hash) and combinations of these schemes (range-hash, range-list, range-range, list-range, list-list, list-hash)

- the partitioned tables must offer the indexing facility at global level and at partition level (local indices)
- allows access to information as fast as possible by using various types of indices, such as B-Tree, bitmap, partitioned, function based, domain or similar
- supports the defining of the table reference partitioning, by using the child table as partitioning criterion, if there is a parent-child reference type relationship between two tables, of the same column, after which the parent table was partitioned, without needing the presence of that column in the child table
- offers support for defining the scripts generated by certain events at the level of instruction or registration, allowing for the execution of the respective actions scripted before and after the respective triggering event
- offers a graphical utility for the relational and dimensional modelling of data
- offers the possibility to define analytical queries which would allow to use sets of inter-correlated formulae, identify sets with common frequency, cumulative aggregations, rank and distribution tests or the possibility to change the rows into columns (pivot)
- allows defining index tables where the data are stored together with the index in the same physical blocks, for rapid access to certain tables
- allows the installation of the database on several nodes (active-active cluster architecture) to ensure the tolerance to node breakdowns, the database providing its own clustering software therefor; the cluster nodes must be able to be added/removed dynamically, without the need to interrupt the database
- allows the direct query of tables which should present the data picture as they were at a certain previous moment in time, even if these were subsequently modified, without requiring the restoring from backup or the performance of periodical snapshots

Licences for the two database machines requested above (x86/x64 architecture) shall be delivered.

#### **4. Architecture of the application**

The components of the application are represented in Figure 6 below. The minimum requirement for the qualification of tenderers is to provide and implement the hardware and software components, taking into account the provisions of the present Terms of Reference. The hardware infrastructure must ensure the operation of the application on the software solution proposed by the Tenderer.

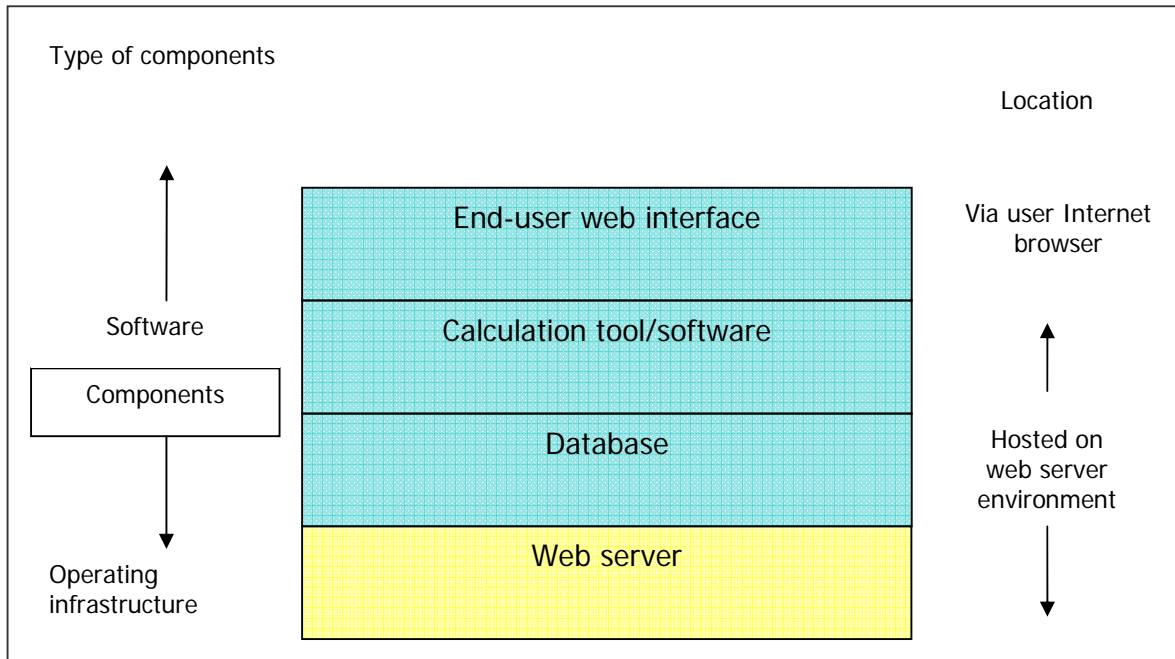


Figure 6. Components of the interactive application

The end-user web interface shall be designed in keeping with the visual identity structure and elements indicated by ANCOM, to be made available to the Tenderer at time of web interface development. As well, the provisions of SOP IEC (*POS CCE in Romanian*) on the visual identity of the projects financed through the Priority Axis 3 "Information Technology and Communications for the private and public sectors", Key Area of Intervention 2 "Developing and increasing the efficiency of electronic public services" Operation 1 "Supporting the setting-up of e-government solutions along with the necessary broadband connectivity (if the latter is needed)".

The main requirement shall be to develop a calculation tool and the required system architecture in order to facilitate the online tariff comparisons for the electronic communications services and the display of the relevant information on the conditions of supply of these services, based on usage details inputted by the users.

#### 4.1. Electronic communications services to be included in the calculation model

The proposed model should facilitate interactive usage based tariff comparisons for the following services which the operators declares that can be provided in a certain geographic area (at national, county, locality level), according to the provisions under Section 2, art.11(2) of Decision no.77/2009:

- Fixed telephony: subscription, fixed-to-fixed national calls (within the operator's individual network or partners' networks, and outside its network), fixed-to-mobile national calls (within the operator's individual network or partners' networks, and outside its network), and calls to a series of international destinations;
- Mobile telephony: subscription/prepaid card, national calls (within the operator's individual network or partners' networks, and outside its network), international calls, SMS and/or MMS (within the operator's individual network or partners' networks, and outside its network), mobile Internet access extra-options;

- Internet (other than over mobile phone): subscription, traffic/time included, bandwidth;
- Service packages, in any combination which includes the services mentioned above.

The operators shall be able to optionally add, in a supplementary field, the commercial offers on the service packages which, apart from the services or combinations of services mentioned before, include the audiovisual programme retransmission service. Subject to the possibility to not include all the offers of packages of services of this type in the market, the proposed model shall also make comparisons between the final prices of the entered packages, in keeping with the services selected by the user (minimum two).

#### *4.2. Database/Comparison tool*

The database shall contain:

- details of all standard public commercial offers, as submitted by operators and validated by ANCOM;
- for fixed telephony and mobile telephony, the calculation tool necessary to generate comparisons of such offers based on the "typical user" profile and specifically inputted usage profiles;
- for Internet and service packages, the calculation tool necessary to generate comparisons of such offers based on the specifically inputted usage profiles.
- other data necessary for the user, operator and ANCOM sites.

The data on the "typical user" profile shall be made available to the Tenderer by ANCOM. The "typical user" profile shall comprise maximum 3 standard usage patterns (Low, Average and High) thus built as to cover the end-users with low, average or high usage of telephone services.

#### *4.3. The end-user site*

##### *4.3.1. Functionalities*

The end-user site shall allow them to evaluate the most convenient commercial offers, suited to their own usage options. The comparisons shall be based on the customized "typical consumer" profile.

As for fixed telephony and mobile telephony, in order to ensure the end-user friendly use, the solution shall optionally provide a comparison based on one of the "typical consumer" usage profiles. The user should be able to manipulate the "typical consumer" profile to better reflect his/her individual usage pattern.

Thus, the users shall input details on their usage details on the chosen service(s) (e.g. payment method, number of called minutes per month, data traffic volume achieved or other indicators), and the interactive application shall display results showing at least the first 25 most advantageous offers ranked in order of cost (calculated per month). The display shall also show other relevant details on the respective offers (for example, number of included minutes or SMS, billing period, contract minimum duration, customer care details).

This shall be a publicly available site. On accessing the site the consumer shall be asked to enter certain sets of parameters, without being neither compulsory nor limited to:

I. Preliminary parameters:

- type of service requested: fixed telephony, mobile telephony, Internet or service packages (minimum two services shall be ticked);
- payment method (where applicable): postpaid, prepaid or both;

II. Usage pattern:

*For telephone services:*

- a) number of minutes to mobile networks (on-net and off-net);
- b) number of minutes to fixed networks (on-net and off-net);
- c) number of SMS (on-net and off-net);
- d) number of MMS (on-net and off-net);
- e) number of minutes to international numbers (to fixed networks, to partner mobile networks, to other mobile networks);
- f) number of minutes, on time intervals, in week-end, to favourite numbers;
- g) number of minutes to voice mail;
- h) MB Internet traffic on mobile phone.

*For Internet access services:*

- a) type of Internet access desired (fixed or mobile Internet)
- b) restrictions (connected permanently or for a certain amount of hours, traffic limit or unlimited traffic);
- c) download/upload speed (minimum).

The parameters above are guiding and aimed at enabling the Tenderer to form an opinion as clear and complete as possible on the requirements of the requested application. The Tenderer should propose the concrete set of parameters only upon analysing the offers of the providers existing on the Romanian electronic communications market. The necessary level of detail should balance needs such as ease of consumer use and understanding, along with the degree to which the information requested can provide a comparison result that presents a reliable representation of each operator's tariff.

As for the service packages, the user shall be asked to choose minimum 2 types of services (fixed telephony, mobile telephony or Internet), and then to enter consecutively the usage pattern for each of the chosen services. At the end, the application shall display the results for the service packages, according to the request.

After inputting the minimum set of information, the user has the option to either (i) go straight to a comparison of tariff offerings, based on the "typical consumer" profile (where applicable), or (ii) enter a greater level of detail regarding their usage pattern prior to requesting a comparison.

The commercial offers shall be displayed to the user in keeping with the inputted information, ranked in ascending order of cost. The displayed rank shall contain information such as:

*For telephone services:*

- a) the provider's name and logo, the name of the tariff plan and the provider's website where the user may find detailed information on this plan;
- b) the contractual arrangement (postpaid or prepaid);
- c) the contract minimum duration, as well as applicable penalties for contract early termination;



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Documentation for the awarding of the public acquisition contract subject to the provision of software programming services for the development and implementation of the project "Online application for comparing the communications offers intended for the end-users" (CPV code: 72212000-4)

d) the tariff of the monthly subscription or value of the prepaid card, as the case may be, as well as the minutes included or the credit initially included in the price, if applicable;

e) the network connection tariff or the service installation tariff, if applicable;

f) the tariffs charged for each category of calls: for national calls, the application shall display the tariffs in keeping with the destination/called network (on the provider's individual network or to other networks/types of networks, specifying the networks/types of networks that may be called), as well as with the time of the day/week when the call is made (peak hours/off-peak hours, with the indication of the corresponding time intervals) or with the types of called numbers (e.g. numbers in a defined group), if applicable; for international calls, the application shall display the tariffs in keeping with the destination areas/countries; as well, it shall show that, for certain categories of numbers, higher than usual tariffs may be applied (e.g. Premium Rate numbers);

g) for mobile telephony, the tariffs for the roaming services (incoming calls, outgoing calls, SMS, MMS), depending on the selected network, time interval (if applicable), as well as on destination (within the visited country, to native country or to another country than the destination or native countries);

h) the service coverage area (localities where these services are available, for fixed telephony, respectively share of the population and share of the territory, for mobile telephony);

i) the invoice payment method;

j) the existing promotional offers, including discounts or cost-free equipment;

k) the working hours of the customer care service.

*For Internet access service:*

a) the provider's name and logo, the name of the tariff plan and the provider's website where the user may find detailed information on this plan, if applicable;

b) the contractual arrangement (prepayment or post-payment);

c) the contract minimum duration, as well as applicable penalties for contract early termination;

d) the tariff of the monthly subscription and the traffic/credit initially included in the price, if applicable;

e) the network connection tariff or the service installation tariff, if applicable;

f) the tariffs charged for equipment lease/provision, if applicable;

g) tariff charged for additional traffic, if applicable;

h) the service coverage area (localities where these services are available);

i) upload/download speed during the maximum traffic time interval (calculated in keeping with the maximum number of users that may simultaneously access the service), as well as the upload/download maximum speed;

j) the invoice payment method;

k) the existing promotional offers, including discounts or cost-free equipment;

l) the opening hours of the customer care service.

If several offers have the same price, the distinction between them shall be made based on other criteria, such as:

*For fixed and mobile telephone services:*

a) the greatest amount of on-net/off-net minutes included in the offer;

b) the greatest amount of on-net/off-net SMS included in the offer;

- c) the lowest on-net/off-net price per minute, after exceeding the amount of minutes included in the offer (if applicable);
- d) the highest amount of included Internet traffic volume;
- e) the newest offers.

*For the Internet access services:*

- a) the highest download/upload speed;
- b) the traffic volume included in the offer;
- c) the newest offers.

These criteria are presented for information purposes, as the exact criteria shall be established following the finalisation of the calculation model.

The information display mode shall be jointly decided by the Tenderer and ANCOM.

When displaying the results of the requested comparison, the application shall offer the users information regarding the date when the operators made the last update to the offer. The tariffs obtained by the user as a result of the requested comparison shall be thus displayed so as to enable the user to identify easily all the additional costs of the tariff package subjected to analysis (e.g. the equipment tariff or the installation tariff), as well as all the services composing the respective tariff, in the case of the service packages. Furthermore, the users shall be able to express their opinion on the offers of electronic communications services, by posting messages on a free discussion forum, moderated the ANCOM representatives.

The application shall provide a newsletter subscription module to enable the sending of notifications on the updates operated by ANCOM (introduction of new facilities into the application; addition, modification or deletion of certain modules or other similar operations). The users shall be able to subscribe selectively to these notifications, by choosing the field in relation to which they wish to receive information (mobile telephony, fixed telephony, Internet or service packages).

#### *4.3.2. Access*

The end-user site shall be public and shall not require any access or authentication restrictions. Furthermore, the system shall allow the creation of user accounts to access various facilities, such as saving the results of the made queries or accessing the forum.

### *4.4. The Operator site*

#### *4.4.1. Functionalities*

The operators shall enter the information on their tariffs and conditions for the supply of electronic communications services via a dedicated secure connection. The fields offered by this interface shall allow the entry of a set of compulsory information and the addition of optional information.

Each authorised provider of telephone and Internet access services shall enter their tariff information to the database via their own private secure extranet. The operator shall use this site to submit offer information to ANCOM who then review and activate the information for use on the public site.

The application should allow the operator to modify, update or inactivate (the offer is no longer available, but remains in the system to ensure traceability and provide

statistics and analyses) the offers entered on its site. As well, the operator may establish a validity period for the offer, after which the offer shall automatically become inactive. All the operations performed by the operators shall be signed with a qualified digital certificate.

The operator shall be able to use its interface as a "test-bed" to compare tariff options under development against tariff options that are live on the public site, in advance of submission to ANCOM.

As soon as the operators enter such an offer, ANCOM shall receive a notification in order to validate the offer and upload it onto the end-user site.

#### *4.4.2. Access*

The operators shall be connected to the application in a secure way, by using qualified digital certificates, installed on the machines from which the web application is accessed. The authentication shall be dual-factor, involving the entry of a username and password and the submission of the digital certificate. Each operator shall be allocated a username and a password which allow private and secure access. In addition, the operator shall be the only one able to access or manipulate its tariff information. All the changes made by the operators shall be digitally signed. These measures ensure the control, integrity and authenticity of the data, as well as the non-disclaimer of the performed operations.

Usernames and passwords should be encrypted to 128bit. Strict processes shall be used for recovery of username and password.

If a user does not work with the system while logged in for 15 minutes, the session shall automatically end.

The Tenderer shall ensure the security requirements for the sites/connections presented under point 3.2.1.

#### *4.5. The Authority site*

##### *4.5.1. Functionalities*

The Authority site is also a private site where ANCOM may verify and validate all offer information submitted by operators for publication, along with content management of the user site. The web interface should allow at least:

- the visualization of the information entered by the operators and the rejection of the information if this is incorrect or requires modifications/completions;
- the performance of simulations which should entail both the newly introduced offers and the offers live on the public site;
- the validation of the data entered by the operators prior to their activation, and their submission for public use on the end-user site;
- the alteration of the user site content (e.g. the elaboration of the texts posted on the site, modification of the help feature content, update of the "news" rubric, display of certain announcements and periodical notices or notices generated by specific events);
- the operation of changes to the comparison tool, including as regards the value of the parameters and of the system settings;
- the moderation of the discussion forum;
- the generation of reports (and graphics) on the tariff evolution, itemized by types of services and time intervals;

- the search/identification of tariff packages valid at a certain date or on certain time intervals and/or of a certain operator.

#### *4.5.2. Access*

Similarly to the operator site, each ANCOM authorised user shall be allocated a username and a password which allow private and secure access. The user's unique password ensures all information remains confidential. Usernames and passwords should be generated by the system and should be encrypted to 128bit. Strict processes shall be used for recovery of username and password. Access to the system shall be done from the ANCOM internal network. Access policies to regulate this matter shall be implemented.

A filter shall be used within the forum which shall automatically stop from publication the messages containing an improper language. As well, the ANCOM users who shall have the right to moderate the forum should be able to modify or delete certain messages.

If a user does not work with the system while logged in for 15 minutes, the session shall automatically end. At least one minute before automatic disconnection, the user who does not actively use the application shall be warned that the session shall end, by means of transmitting a standard message, via a notification window.

The Tenderer shall ensure the security requirements for the sites/connections presented under point 3.2.1.

#### *4.6. Provisions on the features of the operators' offers in the market, which should be addressed by the requested application*

The proposed solution should address the broad range of the features of the public offers currently available, but not limited to:

- tariffs differentiated by on-net, respectively off-net calls;
- tariff options with inclusive minutes or call credit that may or may not be carried forward to the next billing period(s) if unused;
- promotional tariffs for a specified period of time, upon the expiry of which, standard tariffs shall apply;
- option with inclusive minutes and additional services included, for example, options with special tariffs, with SMS/MMS included;
- tariff options for bundles of products and services, such as reduced tariffs for Internet access, in case of using the same operator for the provision of telephone services;
- minimum tariff per call or special conditions under which the respective tariff is applied (e.g. when a reduction of the tariff per minute is offered, after a number of minutes within the same call), if applicable;
- call initiation tariffs, if applicable, or minimum billing unit;
- charging methods (e.g. per second or per minute, per 10KB or 1MB);
- differentiated tariffs depending on the time of the day or days of the week;
- discounts applied depending on the traffic volume;
- loyalty discounts where the end-users receive discounts when they stay with a service provider for a particular period of time;
- discounts for particular bill payment methods, i.e. direct debit;

- preferred numbers where the user can avail of discounted or free calls to the respective numbers.

In designing the solution to cater for the range of offers in the market, the Tenderer shall need to balance complexity and usability considerations, in particular, to ensure that users and operators can understand and easily use the site (via the various interfaces) and that any assumptions necessary to implement the calculation tool can be developed without creating an undue burden in terms of data collection.

In striking this balance between usability and complexity, the Tenderer should ensure that the solution proposed:

- provides a reliable ranking of operator tariffs, depending on the parameters presented at point 4.3.1. Initially, the tariffs shall be displayed in Euro, but the application must include options of displaying the tariffs in Lei or US Dollars. As for the offers whose tariffs are expressed in other currencies than the one displayed, the application shall automatically make the conversion before displaying the results, at the automatically extracted BNR official exchange rate, displaying both the value and currency of the display and the initial/original one;

- maintains sufficient comparison between tariff options so as to ensure for the end-user a result as relevant as possible, following the options inputted by the user;

- does not allow for unfairly manipulating the results to ensure better positioning.

The Tenderer shall detail, in the analysis phase, how it proposes to integrate the tariff features/structures into the calculation tool, in particular:

- a description of the offer feature and its relevance and impact on the calculation tool, user site, operator site, and development of the 'typical profile' or other areas of the overall solution proposed.

- how any assumptions necessary for integration of the tariff feature into the comparison tool can be modelled and how any burden in terms of data gathering to support any such assumptions can be minimised

#### *4.7. Requirements relating to the technology used*

The tendered solution shall implement the following minimum technical requirements:

- It shall be based on client side scripting technologies – AJAX, CSS, Javascript;
- The site content shall be optimized at least for the following browsers and for their following versions: Internet Explorer 7.x, Firefox 3.x, Opera 9.x, Chrome 10.x, Safari 5.x., or subsequent versions.
- It shall include an optimized content for mobile terminals (handset, smartphones, netbook, tablet or other similar devices) with the following features:
  - directs the users who access the application site from their mobile to the specific version;
  - redirects to the full version of the application mobile site
  - uses valid markup in the internal structure of the site;
  - uses a XML header, a DOCTYPE and the due encoding;
  - uses a linear layout, minimises the left-to-right navigation and organises the information on a single column;
  - minimises the use of tables;
  - minimises the page size

- separates the content code from the presentation code (CSS);
  - uses ALT tags.
- the site should be totally developed by using the CSS, [X]HTML, pure "box modelling" standards, exceptionally tables. Pages validated according to the w3c.org standards;
- indexes the key words, the page title, the content, the link titles for a better performance;
- the content of the pages should be able to be accessed on any operating system Windows, Mac OS and Linux;
- Dynamic HTML/CSS support
- allows support for the audiovisual content.

#### *4.8. Performance requirements*

The following performance requirements must be fulfilled by the tendered solution:

- the average loading time of a page that only offers basic information: 1-5 seconds, depending on the user's connection type;
- the average loading time of a page that contains information processing and offer comparisons: 5-15 seconds, depending on the complexity of the request;
- average number of concurrent users: at least 5,000 for the user site, at least 20 for the operator site and at least 10 for the ANCOM site;
- minimum number of requests/minute: at least 1,000 for the user site, at least 10 for the operator site and at least 5 for the ANCOM site;
- the capacity to support at least 20 internal users with various administration roles;
- 99.9% availability (or 24/7 exclusively in the maintenance periods);
- the capacity to respond in a reasonable time to at least 50,000 unique visitors per month for the end-user site and 1,000 unique users for the operator site and the ANCOM site;
- the capacity to support long periods of heavy traffic;
- allows the support for the provision of video and audio flows.

The Tenderer shall present the tests to be performed in order to ensure the compliance with the performance requirements.

#### *4.9. Requirements relating to the optimization of the site display*

- the site should be totally designed according to the CSS, [X]HTML standards;
- indexes the key words, the page title, the content, the link titles for a better performance;
  - Page Caching – to allow via a cache system to keep the page so that if there is a request for the same page it could display it faster;
  - Load Balancing – to allow loading the content of more servers

#### *4.10. Interoperability requirements*

- Content Syndication (RSS) – Integration of the RSS subscription for the news transmission;

- news or events warning programme by e-mail;
- multi-linguistic support (UTF-8, UTF-16 or other equivalent formats);

#### *4.11. Design requirements*

- The Tenderer shall present at least 3 different layouts for the first page, the site and the sub-sites, observing the visual identity of the application and the branding features (the related specifications and key elements shall be made available to the Tenderer by ANCOM);
- The site design shall meet all the visual identity requirements presented in the Visual Identity Manual (VIM) of the Sector Operational Programme Increase of Economic Competitiveness (SOPIEC)
- all the pages, except for the first one, shall have the same basic design. The sub-sites shall be differentiated by using a design derived from the basic one. The design shall observe the brand manual made available by ANCOM;
- colours: The Tenderer shall use a standard range of colours for the text, backgrounds, animated gifs with a view to ensure the multiplatform compatibility, according to the brand manual and to the VIM SOPIEC, to be made available by ANCOM;
- fonts: The Tenderer shall use a family (families) of fonts in order to ensure the legibility of the text, irrespective of the navigator or of the platform on which it runs, according to the brand textbook to be made available by ANCOM;
- images: The Tenderer shall optimize the images for visualization. The exceptions shall be specified by the beneficiary (the images intended for the mass-media).

#### *4.12. Usability requirements*

- The Tenderer shall observe the following requirements:
- the site navigation part shall not hold more than 20% of the page;
  - all pages shall contain a *printer friendly*, *back to top* and *send to a friend* option;
  - the information resulted from the offer comparison shall be able to be saved in a *PDF* document which can be downloaded by the user by means of a *save the results* additional option;
  - the site map shall have two formats: one for visitors, in an accessible form, and one for the main search engines (at least Google, Yahoo, Bing) in XML file (sitemap.xml);
  - different ID for the Romanian and English pages;
  - font sizing options;
  - the administrator shall be able to monitor the frequency of page visualization and usage (accessing) by the users and to identify the trajectory of the clicks in view of analysing the web interface ergonomics.

#### *4.13. Requirements relating to content optimization*

- The Tenderer shall observe the following minimum requirements:
- The tendered technical solution should prove the performance of content optimization for the most used search engines (at least Google, Yahoo, Bing and other equivalent search engines).

- The Tenderer shall ensure the promotion of the interactive application by means of the most used search engines (at least Google, Yahoo, Bing).

The two requirements above shall be observed so that, upon the search of dedicated key words, the portal is found among the first 10 returned results.

#### *4.13.1. On Page optimization*

- ANCOM shall define the key words or phrases, in keeping with the suggestions and recommendations of the Provider;
- using Meta tags for page description;
- including defined key words in the TITLE tags from all pages;
- using H (Heading) tags in a logical way for the intuitive presentation of the content sections;
- using the valid markup in the site internal structure;
- using a XML header, a DOCTYPE and the due encoding;
- separating the content code from the presentation code (CSS) and the script code (Javascript);
- using ALT tags for images;
- minimising the use of tables;
- implementing a sitemap generation automatic system, according to the requirements and standards imposed by [www.sitemaps.org](http://www.sitemaps.org).

#### *4.13.2. External optimization*

- implementing a campaign of raising relevant links to the application site and building an optimization report;
- presenting a long-term SEO optimization strategy for keeping and improving the current positions in the indices of the search engines in parallel with the attraction of new relevant links to the application site.

All the elements of the SEO report shall be upheld at the end of the project by a document of SEO suggestions, recommendations and guidelines.

#### *4.14. Support requirements*

The Tenderer shall provide free of charge technical support during the entire duration of the price comparison tool implementation.

##### *4.14.1. Training*

The activity of training the ANCOM personnel shall be carried out by the specialised personnel of the company developing the interactive application and shall include an assessment and the drawing up of a report (to include the strategy and curriculum) over the training needs of the ANCOM experts, in the fields relevant to this project. Proper training of the ANCOM experts shall be done, especially 15 persons by means of *on-the-job* training, to be carried out at the same time with the activities and possibly being considered as part of these activities, as the case may be, or by other professional training means, if this shall be the case, according to the assessment of the training needs. The training shall aim at increasing qualifications as regards the economical and technical aspects related to the proper operation of the application. The



*on-the-job* training is to be carried out mainly by assisting the ANCOM experts during all the stages of the project development, and especially during the design, development and maintenance of the application itself.

Sub-activities:

- On-site training of the ANCOM staff during the development of the application, in view of administration and maintenance
- Develop online Help materials for the users and the services providers

The following are estimated as the results of the training activity:

- 15 trained persons
- online Help materials for users and service providers.

The training of external users shall be carried out directly through the system, by providing information on the functionalities by means of the available online manuals and the contextual Help feature.

#### *4.14.2. Guarantee and maintenance*

The guarantee period for the hardware systems is of minimum 3 (three) years.

The guarantee period for all basic software (operating system, database system, web system etc.) is the standard one provided by the manufacturer of the respective software.

The guarantee period for the tariff comparison application shall be minimum 2 (two) years. For the guarantee period, one shall take into consideration the corrective maintenance (bug corrections and installation of patches with corrections on the production platform).

All operations necessary for the application to operate within the parameters specified herein must be ensured during the guarantee periods.

During the guarantee period of the software applications (except for the basic software), a detailed plan for the delivery of the versions generated by the corrective maintenance activities must be drawn up. To this end, the working hours and the maximum resolving time shall be taken into consideration.

During the guarantee period, in case requests occur, technical personnel, specialised in operational services for implementing the provided software and hardware solution, shall be made available at the location where the system is installed.

#### *4.14.3. Provisions for the guarantee period*

Minimum operational services to be provided during the guarantee period:

- technical support, in the following cases:
  - uncertainties regarding the manner of using the provided software and hardware solutions;
  - identify and verify the causes of a failure or an error;
  - correct the fault or the error and repair its cause.
- duration for answering in case of incidents. An incident may be notified anytime during 24x7x365 days. A specialist shall take over the incident, shall carry out the diagnose and, together with the beneficiary, shall establish the severity of the incident.

When an incident is notified, the answering duration depends on the priority of

**NATIONAL AUTHORITY FOR MANAGEMENT AND REGULATION IN COMMUNICATIONS (ANCOM)**

Documentation for the awarding of the public acquisition contract subject to the provision of software programming services for the development and implementation of the project "Online application for comparing the communications offers intended for the end-users" (CPV code: 72212000-4)

the incident, as follows:

1st Priority	Critical impact at system level	2 hours
2nd Priority	Non-critical impact at system level	4 hours

If the priority of the incident is not specified, it shall be implicitly considered to be of 2nd Priority.

- duration for solving the incidents. After the severity level is set, the necessary actions for solving the incidents shall be made within the following time intervals:

Table no. 3.

<b>Level of severity</b>	<b>Definition</b>	<b>Interval for repair or finding an alternative solution</b>	<b>Duration of the final resolution (since the incident is notified)</b>
<i>1st Severity</i>	<i>A critical component of the system is not operational and this problem causes the full loss of the services. Activity cannot be continued in a reasonable manner and the situation represents an emergency. A 1st degree severity may have one or more of the following characteristics: Corrupted Data; A critical functionality is not available; The system has blocked and caused unacceptable or undefined delays as regards answers or resources; The system fails repeatedly even after attempts to restart it or other equivalent operations.</i>	<i>Monday – Saturday, between 0:00 – 24:00</i>	<i>Maximum 8 hours (final resolution or alternative solution). The alternative solution shall ensure continuation of the normal activity, in a reasonable manner, until a final resolution may be provided.</i>
<i>2nd Severity</i>	<i>There exists a critical problem that seriously affects the system or its operation and causes significant losses in functionalities. No alternative solution is available; nevertheless, operation may still continue in a restrictive manner and the problem could be temporary.</i>	<i>Monday – Thursday, between 8:30 – 17:30 and Friday between 8:30 – 14.30</i>	<i>Maximum 2 working days (final resolution or alternative solution). The alternative solution shall ensure continuation of the normal activity, in a reasonable manner, until a final resolution may be provided.</i>
<i>3rd Severity</i>	<i>The problem causes minor losses in functionalities. The impact is</i>	<i>Monday – Thursday,</i>	<i>5 working days</i>

**NATIONAL AUTHORITY FOR MANAGEMENT AND REGULATION IN COMMUNICATIONS (ANCOM)**

Documentation for the awarding of the public acquisition contract subject to the provision of software programming services for the development and implementation of the project "Online application for comparing the communications offers intended for the end-users" (CPV code: 72212000-4)

	<i>minor, operation is not affected, but there exists a problem which needs to be resolved. Resolution means questioning and developing an answer, advice, opinion or correction, or an alternative solution or way to assist the problem.</i>	<i>between 8:30 – 17:30 and Friday between 8:30 – 14.30</i>	
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- dedicated technical support services, provided only by specialists accredited (authorised) by the manufacturer of the technology during the guarantee period, in accordance with the requirements below:
  - The support service must provide professional technical assistance related to the installation and operation of the software and hardware products, while keeping the information systems available and reliable, helping to achieve project goals, productivity increase and investment value maximising.
  - The technical support service shall provide fast and effective support for all the products. The key characteristics include:
    - Diagnose and permanent solving of the problems, by means of access to technical information and proper assistance;
    - Real time solutions, by means of permanent access to technical expertise;
    - A wide array of technical resources – including libraries of technical solutions and the ability to connect to them and keep track of the technical assistance requests;
    - Support account management – by means of a dedicated technical account manager.

The following are to be made available for the hardware equipment and software products provided:

- Free of charge interventions upon beneficiary's request, in case of faulty operation of the equipment mentioned in the contract;
- In case certain faults in the server or the software (basic software and applications) operation are reported, the Tenderer's manner of answering/resolving must be as above;
- The beneficiary may be notified as follows:
  - by means of the electronic mail system (to an e-mail address made available by the Tenderer);
  - by means of a telephone call made by the client to a dedicated number made available by the Tenderer;
  - by means of a facsimile message made to a dedicated number made available by the Tenderer (optional)
  - additionally, the Tenderer shall designate a manager responsible for managing the technical incidents.
- If, in case of hardware failures, the repair is not possible within the abovementioned terms, the Tenderer shall make available to the client equipment

**NATIONAL AUTHORITY FOR MANAGEMENT AND REGULATION IN COMMUNICATIONS (ANCOM)**

Documentation for the awarding of the public acquisition contract subject to the provision of software programming services for the development and implementation of the project "Online application for comparing the communications offers intended for the end-users" (CPV code: 72212000-4)

with similar technical characteristics in order to ensure continuous operation of the system until the failure is resolved.

The Tenderer must ensure a maintenance period, even after the guarantee periods expire, so that the system operation is ensured for at least 5 years after the final acceptance. To this end, the maintenance services shall be provided by the implementing company, based on a separate contract, concluded in accordance with the legal provisions regarding public acquisitions, as regards the information application maintenance as well as the provision of the updates and changes necessary for the applied modules; estimates amount to 2% of the value of the applications afferent for the first 3 years, since the hardware guarantee is ensured during these 3 years; subsequently, the maintenance costs are assessed to reach 2% of the total investment. The technical proposal must include the Tenderer's commitment to ensure maintenance under the above conditions.

In its technical tender, the Tenderer shall present the methodology and the resources allocated in view of ensuring the guarantee.

The Tenderer shall provide the buyer with the source code and the intellectual ownership right over it, the right to amend related to the developed software application, the licences for the possible software used from third parties as well as the entire documentation afferent to the application.

The Tenderer shall make available to the buyer an operational manual and a manual describing the structure of directories, the tables and the significance of the information stored in the respective tables, the scheme of the links and relations among the tables. Also, a manual for the application management and a manual for the installation and configuration of equipments shall be made available. All manuals shall be provided in the Romanian language and, where this is not possible, they shall be delivered in the English language, at least 1 printed set and 1 set in electronic form.

## **5. Implementing the software application – minimum mandatory requirements**

### *5.1. Terms for development and implementation*

The Tenderer has the obligation to deliver all the services that form the object of the acquisition (including the training of ANCOM personnel) within maximum 200 (two hundred) calendar days after the signing of the contract.

In view of providing the services, the Tenderer must observe at least the activities and sub-activities of the project, as they are depicted below:

No.	Activity/Sub-activity
1	Analysis

**NATIONAL AUTHORITY FOR MANAGEMENT AND REGULATION IN COMMUNICATIONS (ANCOM)**

Documentation for the awarding of the public acquisition contract subject to the provision of software programming services for the development and implementation of the project "Online application for comparing the communications offers intended for the end-users" (CPV code: 72212000-4)

1.1	Assess the electronic communications providers' tariff plans
<b>2</b>	<b>Design</b>
2.1	Identify the optimum calculation algorithm
2.1.1	Elaborate the draft solution and simulation
2.1.2	Test the draft solution
2.1.3	Consult the providers
2.1.4	Determine the final solution
2.2	Finalise the overall and detail design of the solution, by exactly specifying the afferent software and hardware components
<b>2.3</b>	<b>Finalise the design process</b>
<b>3</b>	<b>Implementation</b>
3.1	Elaborate the software solution for the implementation of the algorithm
3.2	Elaborate the online forms necessary for the application to operate
3.3	Design the web page
3.4	Design the provider interface and the administration interface
3.5	Design the discussions forum
<b>3.6</b>	<b>Installation and configuration of the network infrastructure</b>
<b>3.7</b>	<b>Installation and configuration of basic applications on the acquired servers</b>
3.8	Install in the production environment (deployment on the hardware platform)
<b>4</b>	<b>Test the application</b>
4.1	Test the interactive application
4.2	Acceptance test in the production environment
<b>5</b>	<b>Solution acceptance</b>
<b>6</b>	<b>Training</b>
6.1	On-site training of the ANCOM personnel, during the application development, for the purpose of administration and maintenance
6.2	Develop online Help materials dedicated to users and providers of services

ANCOM shall provide the Tenderer with any information which are available and are necessary for the proper provision of the services that form the object of the acquisition,

within maximum 5 (five) working days after a request therefor is received. In case the information required by the Tenderer are not directly available to ANCOM, the above mentioned response deadline may be extended according to the deadlines under the legislation in force.

### *5.2. Requirements for testing the solution*

The system testing is to be carried out upon finalising the application implementation, for the purpose of verifying the observance of the requirements herein. Testing shall be carried out during the normal working hours at ANCOM, in the presence of the designated technical team, based upon a test plan proposed by the Provider and mutually agreed with the ANCOM team. As part of the technical proposal, the Tenderer must describe the methodology, the procedures and the test instruments to be used for proving the conformity of the system, in its entirety, with the requirements herein. Depending on the software test instruments presented, points shall be or shall not be awarded, according to the evaluation criteria presented under point IV.2.1 of Section 1 – Acquisition Data File, as they are widely acknowledged and used by IT specialists or developed by the Tenderer using its own resources. In case the technical proposal does not include the above mentioned description, including the specific presentation of the software test instruments to be used, the tender shall be rejected as noncompliant.

Testing shall be made in such a way that its results show conformity with all the requirements regarding the functionalities and performance of the system in its entirety (hardware and software). In case errors are noticed during testing, the procedure shall be fully repeated after performing the corrections deemed necessary by the Provider, until all nonconformities considered by ANCOM as not acceptable are eliminated.

Acceptance.

Where considered necessary, partial acceptance minutes shall be concluded (upon equipment delivery, basic software delivery and installation, carrying out tests or other similar situations).

Final acceptance shall follow the final testing and shall be based on the partial acceptance statements of facts.

## **6. Other requirements**

The **locations for providing the services** are the ANCOM premises in Bucharest, 2 Delea Noua Street, sector 3 - 030925 and in Bucharest, 4 Lucian Blaga Street, building M110, sector 3 - 031072.

The Tenderer shall ensure the proper licensing for all the tendered technological platforms, in close connection with the hardware solution and the licensing policy of the manufacturers.

The hardware and software components shall be installed at the beneficiary's premises.

The Tenderer shall deliver to ANCOM the solution fully operational.

The following documents, but not limited to, shall be delivered:

- Analysis documentation approved by the beneficiary;

**NATIONAL AUTHORITY FOR MANAGEMENT AND REGULATION IN COMMUNICATIONS (ANCOM)**

Documentation for the awarding of the public acquisition contract subject to the provision of software programming services for the development and implementation of the project "Online application for comparing the communications offers intended for the end-users" (CPV code: 72212000-4)

- Full and updated design documentation;
- The installation kits;
- Installation, configuration and administration documentation;
- Technical documentation for the design of each project component;
- Documentation regarding the use of the solution;
- The design plan;
- The training plan;
- Training materials.

The documentation shall be updated in case changes occur.

The documentation shall be provided in the Romanian language. Where this is not possible, it shall be delivered in the English language.

All documents are to be sent to ANCOM for validation. ANCOM is to respond within 10 working days.

For the acceptance of a certain activity, it is mandatory that the documents related to the respective activity are finalised (updated and accepted by ANCOM).

The Tenderer shall include in the tender a description of the deliverables.

The Tenderer has to obligation to submit to ANCOM, no later than the date of the final acceptance, the source code and the entire documentation related to the site, the operation manual (with content updates), the manual describing the structure of directories, the tables and the information stored in the respective tables, the scheme of the links and relations among the tables, as well as the conformity statement.

All licences necessary for the functioning of the application within its normal parameters, on an unlimited duration, must be ensured by means of the tender. The operation of the application within the parameters specified herein must not imply additional licensing costs after acceptance.

The signing of the final acceptance statement of facts shall certify that all services that form the object of the contract have been provided, according to the provisions herein, including, without limitation, the drawing up of the software application, its installation and proper functioning (equipment included) and the receipt of the materials and of the source code.

The ownership right including all the patrimony intellectual ownership rights over the global application developed (without including the commercial platforms embedded in the solution) shall be transferred to ANCOM, together with all the afferent unlimited licences, at the time when the final acceptance minute is signed without any objections. The technical proposal must include the specific commitment of the Tenderer regarding the observance of this requirement.

**NATIONAL AUTHORITY FOR MANAGEMENT AND REGULATION IN COMMUNICATIONS (ANCOM)**

Documentation for the awarding of the public acquisition contract subject to the provision of software programming services for the development and implementation of the project "Online application for comparing the communications offers intended for the end-users" (CPV code: 72212000-4)

**Annex to the Terms of Reference**

<b>No.</b>	<b>Technical evaluation criteria</b>	<b>Offered values*</b>
1.	Project implementation total period	
2.	Server equipping with RAM memory	
3.	Server equipping with bay HDD hot-swap, allowing for changing the disks without shutting down the servers	
4.	Server equipping with network ports	
5.	Alignment of the external device of magnetic tape data storage to the latest generation of the LTO standard	
6.	Application extended guarantee period	
7.	Testing method	

\*The offered period/value/method shall be specified

Note: The information under this document shall be read during the opening of tenders meeting and shall be specified in the opening of tenders minute.

Date of filling in .....

**TENDERER,**

\_\_\_\_\_  
**(authorised signature and stamp)**