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Implementation of ICT in Border Management in Republic of Macedonia

Keywords: Integrated Border Management (IBM), Information System of Integrated Border Management (ISIBM), National Coordination Center of Integrated Border Management (NCCIBM).

Abstract: Presentation of the implementation of information and communications technology in the information system of IBM in the Republic of Macedonia. It is implemented by the Government of the Republic of Macedonia as a non-government project.

Information System of Integrated Border Management - ISIBM

The Information System for Integrated Border Management (ISIBM) has been developed to satisfy the needs of IBM. By applying ISIBM, the National Coordination Center for Border Management is capable of: coordinate activities related to border management, to exchange data and information between national authorities responsible for border management, to coordinate activities in emergency situations, to coordinate activities in cross-border cooperation related to border management.

The implemented hardware and software solutions are ongoing with modern trends in information technology, which can solve the integration and communication between heterogeneous information systems. ISIBM provides a platform for exchanging information between institutions involved in the IBM, without affecting the mechanisms of control, data protection and the right of access to data.

ISIBM works and collaborates with different operating systems, database systems and applications developed with different development tools.

The current solution is consistent with the recommendations for IBM for the Western Balkans from January 2007. It uses the communication structure of the Ministry of Internal Affairs, which is upgraded to meet the demand of the ISIBM. The telecommunication structure provides good performance and security, since there is VPN support by the routers as part of the hardware. Service-oriented architecture provides great flexibility and independence in the means of software development within each institution. Therefore if the specifications of the ISIBM are followed, all the institutions have the freedom for future IT development of their own system without harming the functionality of the ISIBM.

Information and communication system for integrated border management is a system that links institutions through one single information and communication system and defines the data that can be exchanged between the institutions.

ISIBM uses mediation points to ensure compatibility while exchanging data and thus enables communication between systems which usually operate on different platforms, different application solutions, different communication solutions, different databases from different vendors etc.

Autonomy of the information structure and development within the Institution

The data that are kept separately by each institution, remains within the information system of the institution that takes care for them and their safety. Databases are located at each institution and each of them is responsible for its own data. ISIBM is not interfering in the work of institutions. Within the institutions there are application solutions that have access to the database of the respective institution. ISIBM can access data through an understandable interface in these application solutions.

Role of ISIBM

The ISIBM system does not allow storing same data on two different locations, therefore avoiding the possibility to have same data with different values on different locations. ISIBM only controls and coordinates data and information exchange. The exchange of data between institutions is not direct, but passes through a procedure of validation and approval. During transmission of information through the ISIBM system, logging of activities occurs. While logging, ISIBM is not making a copy of the data, but it records what type and form of data are transferred, which institution is the source of the data, which institution and person are the destination of the data and which legislation allowed the exchange of data. ISIBM does not interfere in the internal work of the institutions, but provides mechanisms to control and exchange data and information at cross-institutional level.

Institutions that are connected to ISIBM system run on different platforms, communication solutions and databases. Each institution is responsible for their own databases, therefore there is no joint database for all institutions, but rather the data is distributed in different geographical locations. The only database for which ISIBM is responsible is the database which provides a description of services used, methods of use, time and users, but never the data itself. ISIBM uses understandable interface in the application solutions of the respective institutions, in order to access data. The interfaces used by the ISIBM are defined as web services, and the architecture is presented as service oriented (SOA).

Architecture ISIBM

ISIBM is based on Service Oriented Architecture (SOA). SOA is an architectural approach or style for constructing complex software systems through a set of universal interrelated and interdependent blocks, called services. For these services there are protocols that describe how communication must be done. Service is an independent unit of functionality that is available only through a formally defined interface. The services are characterized by abstraction, reusability, autonomy, formal agreement, poor connection, ability to be found and composition. The SOA block

plays one of the following roles: service provider, service broker or service claimant. The messages are in XML format.

Telecommunication architecture

The solution for the telecommunication network is based on the existing microwave PDH/SDH network of the Ministry of Internal Affairs. With an appropriate update, this network is used as a backbone network for the information system of IBM. In most parts the backbone network has a physical ring topology. This type of topology allows possible alternate communication path in case of failure of one of the nodes of the backbone architecture. The connection of the central institutions is carried through fiberoptic cables, and the connection of the border posts through wireless transmission. In the following figure we can see the graphical layout and description of the system. The telecommunication network of ISIBM is planned to provide connectivity to departments of institutions involved in IBM placed on various locations across the country, but primarily to border crossings and institutions in Skopje. Within this infrastructure, it is provided a connection to the NCCIBM, to the institutions involved in IBM and fourteen border crossings, including the airports in Skopje and Ohrid.

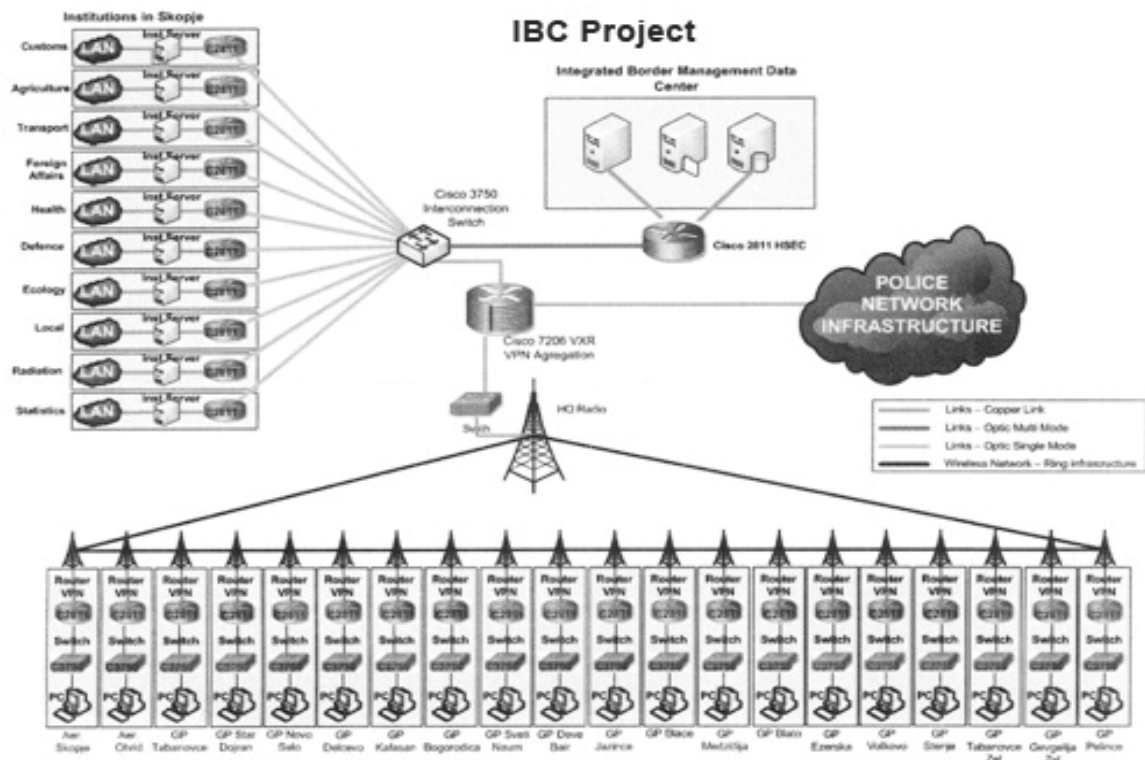


Figure 1 - Description of the ISIBM Support System

The Support System is divided into information part and communication part. The information part deals with the types of users, user functionality, the service-oriented architecture of the system, technical requirements, nonfunctional requirements by the system for IBM, security requirements by the system for IBM, as well as procedures for providing safer restart in case of failure of the system for ISIBM.

The communication part defines the logical and physical architecture of the telecommunication network of ISIBM, the technical solution for the backbone network and the access points, the security aspects of the solution, QoS, management of the telecommunication network of ISIBM, IP addressing, as well as the phases and scenarios for the construction of the communication system.

Security solutions of ISIBM

ISIBM guarantees high rank security by implementing solutions such as Firewall and VPN.

Firewall as a solution represents dedicated device or software that runs on a hardware device within the network, which checks the data traffic passing through the network and rejects or allows traffic to pass through the network based on some pre-set rules. This will prevent intrusions into the private network. All border routers in the local networks and all the central locations of institutions in Skopje contain firewall functionalities. VPN on the other hand provides a mechanism for encryption and encapsulation of private data between different locations, thus enabling reliable transmission through an intermediary network. For each institution in the network of IBM there is a separate VPN. The VPN connection between a local network of institutions on a border crossing and local network on a central location is established via border routers on both sides.

Connected Institutions

Institutions connected with the ISIBM system are: Ministry of Internal affairs, Ministry of Finance - Customs Administration, Ministry of Agriculture - Administration for Veterinary and Phytosanitary Inspection, Ministry of Health - Department of Food, Ministry of Transport and Communications, Ministry of Foreign Affairs, Ministry of Defence, Ministry of Environment and Physical Planning - Department for Environment, Ministry of Local Self-Government, Department of Radiation Safety, Ministry of Health - State Sanitary Inspection, Ministry of Health - the Drug Bureau, State Statistical office.

For example, the Ministry of Foreign Affairs provides data from the national visa information system linked to Integrated Border Management, i.e. data for identifying aliens who were issued visas. Veterinary Administration offers information on generating reports for animals. Customs Administration offers information on transit of goods, information on permits for import and export.

Conclusion

ISIBM provides greater control, security, as well as making the flow of people, vehicles and goods across the state borders much more faster and easier than before. This system provides effective coordination, ease of exchange of data and information, including greater integration in the border management of the state authorities.

The system architecture is flexible and allows a certain degree of software and hardware scalability. The systems software can be upgraded if some institutions find it necessary. A software upgrade for reports and report builders is preferable. New engineering teams in coordination with the contractor of the system must be trained constantly, for flawless maintenance of the ISIBM system.

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