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Services and Their Customization for a DVB-S Network (The REPOSIT Project)

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The evolution of the DVB standard and its application over satellites (DVB-S) is one of the most significant technological developments in wireless communications. DVB-S platforms are not only media to broadcast TV programs to a large number of viewers; their characteristic of combining MPEG-2 TV and IP services into the same transport stream allows DVB-S to construct a flexible service integrated networking infrastructure, able to connect distribution nodes, service providers, and end users to each other.

With distribution nodes providing connectivity to end users via various types of access networks, time-varying traffic will be generated, so a fixed and static allocation of bandwidth between nodes does not permit optimum satellite spectral efficiency. Real-time dynamic management of the bandwidth is mandatory in order to enhance the capability of DVB-S platforms as a networking infrastructure, allowing optimized provision of heterogeneous traffic types in respect to the available spectrum.

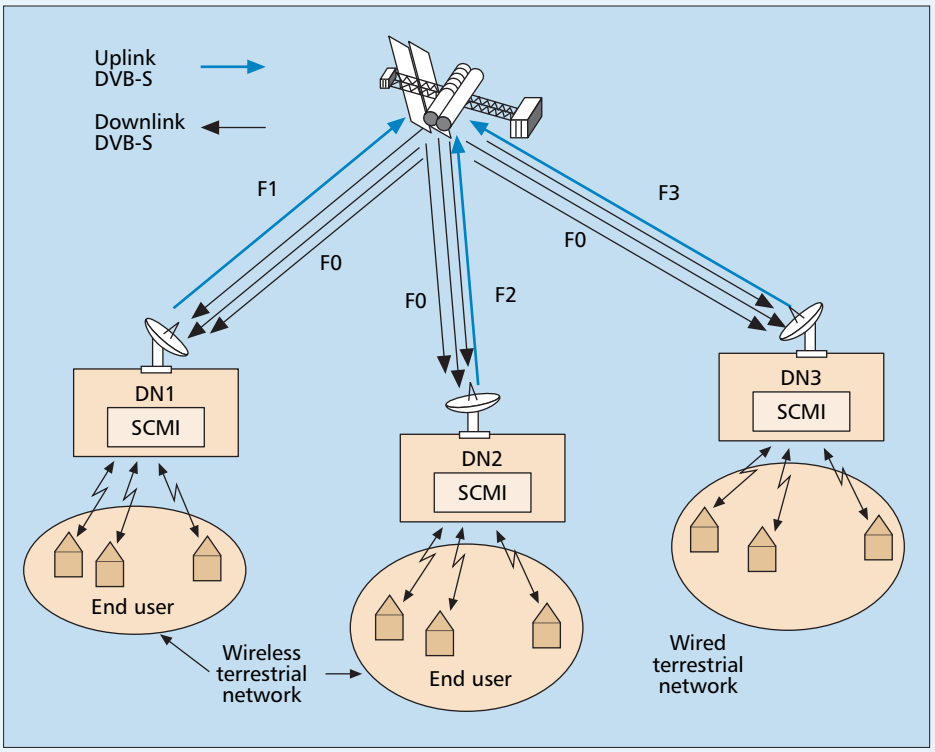

Figure 1. *REPOSIT Network Configuration.*

This is the key objective of the Eropean Union Real Time Dynamic Bandwidth Optimization in Satellite Networks (REPOSIT) Project, IST-2001-34692 [1]. It is intended to define, implement, demonstrate, and validate a spectrum-efficient interactive satellite DVB-S network, applying a real-time dynamic management scheme for the available bandwidth, supporting a variety of heterogeneous bit rate services, like interactive TV, Internet, and multimedia services. The network connects terrestrial distribution nodes and is tested, demonstrated, and validated over an actual satellite (Bird 3). Both the downlink and uplink are based on DVB-S technology. An overview of the REPOSIT network configuration is shown in Fig. 1. The project includes the implementation, testing, and validation of the overall network performance for three characteristic types of terrestrial networks: DVB terrestrial (DVB-T), wireless LAN (WLAN), and asynchronous digital subscriber line (ADSL) [2].

The REPOSIT Consortium partners are TEMAGON (Greece), NCSR "Demokritos" (Greece), Alcatel Space (France), THALES MULTIMEDIA (France), Centre National d'Etudes Spatiales CNES (France), Ecole de Mines de Nantes/Armines (France), OPTIBASE (Israel), and the Universidad de Cantabria (Spain) This allows and ensures consideration of technical, commercial, and research aspects during the development of the project, including future commercialization of the network.

The University of Cantabria Contribution to the REPOSIT Project

As a partner of the REPOSIT Consortium, the University of Cantabria contributes to the REPOSIT project with two key tasks: the design and development of a service customiza-

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tion module (SCM) and the provision of an IP-based service set implemented as a telelearning platform.

The SCM, running in each distribution node, enables end users to access the REPOSIT services. It provides an access control system to ensure that only authorized users get access to the network and its available services. The SCM includes functions for subscribing and unsubscribing services provided by the network, and registration to the different services for billing functions in future commercial use. Hence, end users can access only the set of services previously subscribed. Information about services in a distribution node is automatically replicated to the other nodes. In addition, each SCM within each distribution node manages services and user profiles so that some end users with a high profile are assigned a high bit rate, while low-level profile end users are assigned a lower bit rate for using services in the REPOSIT system.

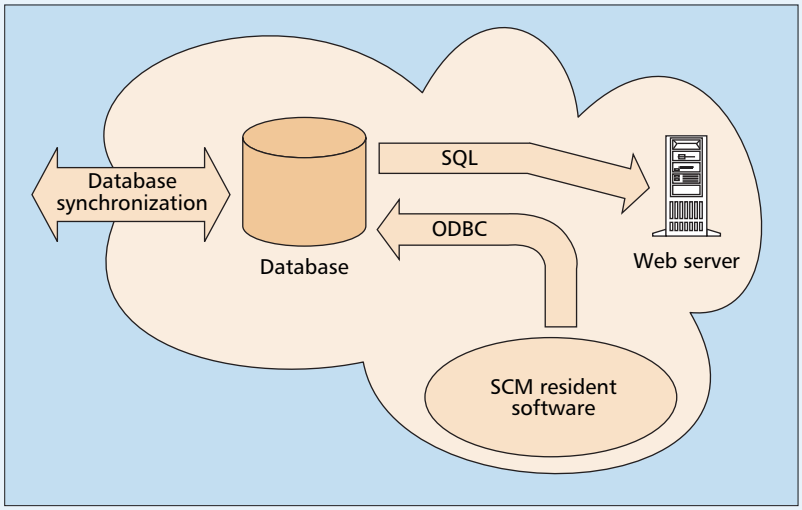

Figure 2. *SCM block diagram.*

The SCM is implemented as a Web-based application (Fig. 2). It is composed of:

- An HTTP server that manages all end users requests, including server scripts (PHP) for added security and interactivity
- A relational database management system (RDBMS) that stores all the services and user profiles
- A resident software that performs the bridge between the REPOSIT dynamic bandwidth management system (DBM) and the RDBMS

For testing purposes a set of different services must be provided. For this reason, UC provides a telelearning tool, named Tele-Educación en Dicom (TEDDI) [3], originally implemented for internal use in the Communication Department as an auxiliary tool for teaching activities [4]. TEDDI is a Web-based environment with specific applications like teacher-student and student-student communication facilities, document sharing, delivery and collection, video streaming, and remote calculation, all based on standard TCP/UDP/IP applications [5]. A modified version of TEDDI is also used as a framework tool for real-time access to industrial laboratory equipment with robotic units provided by Ecole de Mines de Nantes, France

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Digital Bridges: Developing Countries in the Knowledge Economy

By John Senyo Afele, 2003 Idea Group Publishing (www.idea-group.com), 212 pages

Review by Madanmohan Rao (madan@inomy.com)

While much literature on the role of knowledge has tended to focus on business benefits and scientific research, *Digital Bridges* addresses the impact and potential of new technologies like the Internet on knowledge activities and cultures of emerging economies.

The material is divided into eight chapters, covering issues ranging from indigenous educational systems and appropriate technologies to private sector partnerships and health informatics. The editing, layout, and writing style could do with considerable improvement, however.

John Senyo Afele is an African-Canadian originally from Ghana, and has served in the United Nations, Global Knowledge Partnership, and International Program for Africa.

Access to global knowledge and generation of local knowledge can empower local groups to build secure livelihoods and make contributions to the wealth of global knowledge, Afele begins.

What is the relation between ICT connectivity and knowledge flows? Should the use of ICTs in developing countries be approached in a "gradualist" or radical manner? Are knowledge networks leading to information asymmetry and increasing concentration of power? How can developing nations overcome the digital divide as well as the knowledge gap and ingenuity gap? How can they move beyond passive surfing to active creation of meaningful livelihoods and assets? How can marginalized countries prevent the downward spiral of insecurity? Will digital bridges merely allow others to siphon off the knowledge of local communities?

Answers to these questions may be generated by globally networked knowledge communities, who have the opportunity to form partnerships, continually learn and relearn, and extend international development agencies into global development communities. New ICTs like the Internet have been the principal driver for unprecedented development models, focusing on creativity and collective problem solving.

Community knowledge clusters have emerged in different parts of the world, such as Digital Cities (Europe), Connecting Canadians (Ottawa), Smart Communities (California), and Multimedia SuperCorridor (Malaysia).

Challenges to such theories of local prosperity in the developing world lie in increasing the local knowledge quotient in economic models, creating bidirectional flows of goods and

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Developments of the Telecommunications Regulation Framework in the Western Balkans

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Over the last few years, the Western Balkan countries (Albania, Bosnia and Herzegovina, Croatia, Former Yugoslavia Republic of Macedonia [fYRMacedonia], Serbia, and Montenegro) have started an effort that involves a complete transition of their political, social, and economic structure in order to build a democratic political system and a free market economy.

In the field of telecommunications, stimulating policies are being implemented in order to foster this sector's activities and create liberalized markets in the region, which will be aligned with the European ones. Nevertheless, this effort cannot be successful without the establishment of an adequate regulatory environment. Toward this direction and under the framework of the European Telecommunications Directive, the majority of the governments have proceeded to create independent regulatory authorities. The authorities' role is to implement the best policy practices and support the development of a credible regulatory regime, which will boost investments in the sector and promote public confidence in the market through transparent regulatory and licensing processes. The purpose of this article is to present an overview of the regulation and institutional framework of the telecommunications sector in the Western Balkans.

Albania

In Albania the first step toward an open telecommunications market was made in 1998 with the creation of the Telecommunications Regulatory Agency (TRA), which is responsible for licensing privately owned broadcasting stations and telecom services of all types. The object of this self-financed entity is to guarantee and safeguard public interests, and create a transparent legal and regulatory environment. In June 2000 the introduction of the Law for Telecommunications led to the liberalization of the Albanian telecom market, where a regulatory regime that promotes open competition has been put in action. This law sets some licensing regulations, including licensing of rural operators, Internet service providers, and so on. The radio spectrum was allocated consistent with international standards, and licensing arrangements encouraged the entry in the market of two GSM operators, AMC (Cosmote Greece and Telenor Norway) and Vodafone Albania. As a result, the telecom market lost its monopolistic character and incumbent networks face open competition as new carriers are taking advantage of these arrangements to offer services to the public. Furthermore, the Albanian ICT strategy for 2004–2008 that was approved on 2003 is based on the guidelines prepared by the Stability Pact.

Croatia

The Telecommunications Act of 1999 created in Croatia an Independent Authority whose responsibility was to regulate the telecommunications sector. In 2001 the Telecommunications Act was amended; additionally, a set of guidelines was produced for the provision of telecommunication services, thereby regulating the duration of particular concessions and introducing standards for telecom services. In 2001 amendments reinforced the legal, structural, and operating status of the independent regulatory authority, the Telecommunications Council (TC), which until then was unable to perform any significant intervention in the spectrum of responsibilities. The TC is autonomous to perform its jobs specified by law, and is responsible for its work to the Croatian National Parliament and the Government of the Republic of Croatia.

The liberalization of the telecommunications market in Croatia concluded its designated Stage I of liberalization by joining the Marakesh Act on the foundation of the World Trade Organization. Stage II was completed on 31 December 2002, when the exclusive rights of Hrvatske Telekomunikacije on real-time voice transmission and respective infrastructure rollout expired, and the market was opened to new service providers in the fixed network. Stage III will be completed with the unbundling of the local loop, which will take place at the beginning of 2005.

Bosnia-Herzegovina (BiH)

Because of the duality that exists in the state structure of the BiH the institutional framework in ministerial level is complicated. Each of the two entities' governments has its own Ministry of Transport and Communications. Both ministries act under the umbrella of the Ministry of Civil Affairs and Communication of the BiH government. Each entity's ministry is responsible for communication systems, radio communications, infrastructure, coordination policy management, and other work under its jurisdictions. The country's ministry is responsible for the same issues, but its jurisdiction concerns international aspects. Among other issues, the Communications Law of 2002 has competence on the radio frequency spectrum, telecommunications infrastructure, telecommunications services, market competition, numbering, and the existence of the Communications Regulatory Agency (CRA). The CRA is an independent institution with country-wide jurisdiction, responsible for regulating telecommunications, broadcasting and frequency spectrum management. The Communications Law was developed along European Union policy lines with the support of the International Telecommunication Union (ITU). The legal framework does not specifically deal with the liberalization of telecommunications, although the government has indicated its interest in privatizing the telecommunications operators. However, the Law on Competition has been adopted at a governmental level.

fYRMacedonia.

In fYRMacedonia, the Ministry of Transport and Communications and the Telecommunications Directorate (TD) regulate the activities in the telecommunications field. The TD issues licenses for telecommunications activities, and controls the prices and quality of services in accordance with the provisions of the Telecommunications Act that defines the existence of the public telecommunications operator with rights and duties for basic services provisions. At the same time it sets out the conditions for involvement of new operators for all other value-added services. There is also a regulatory authority that, although it is claimed to be independent, is highly influenced by the Minister of Transport and Communications. The national operator has a monopoly in fixed voice telephony, both local and domestic calls, until the end of 2004. International calls and provision of voice services to closed user groups are partially liberalised, while data transmissions, value-added services, Internet services provision, equipment provision, and mobile communications with two GSM operators are fully liberalized.

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BOOK REVIEW/*(cont'd from page 2)*

ideas, preserving indigenous knowledge, overcoming colonized mindsets, devising education systems relevant to newly independent countries and not on their former colony status, retaining local talent, institutional capacity building, and increasing research output.

At the operational level, basic reliable connectivity to the internet is a challenge in many African countries. Care should be taken to build local knowledge capacities and avoid the perpetuation of dependency or intellectual atrophy. A sense of momentum and urgency is needed to address these concerns.

Development agencies should invest in people for their own development through knowledge partnerships. Information from modern and indigenous knowledge domains should be spliced. Local communities should be viewed as knowledge banks.

ICT-enabled development applications include online educational services, digital libraries, geographic information systems (GIS), telemedicine, agricultural information systems, bio-informatics, e-business, e-commerce for exports, m-commerce, toxin databases, e-government, digital news, and online activism.

A key challenge will be "splicing modern knowledge and ancestral wisdom." Connectivity to the global knowledge grid is important for this judicious blend, but so is the need to evolve local development models and not clone wholesale models from outside. Formal and informal networks will be needed, as well as local models of knowledge transfer like oral storytelling.

Countries that have succeeded in this regard include Malaysia, which now accounts for 51 percent of the world's palm oil production even though the oil palm was introduced to Malaysia from Africa only in 1870, thanks to an intensive research program in developing and deploying new agricultural techniques. Another example is India, which has successfully created a strong ICT industry.

Many other developing countries are still to reach critical mass for harnessing the benefits of ICTs. The diaspora populations of developing countries can play a key role in this regard through networked citizenship, lobbying campaigns, and creation of digital linkages to overcome the "imagination gap." A good exemplar here is AfricaOnline.

Platforms like the Internet, digital libraries, and brainstorming toolboxes help create the interacting spaces for groups to groom ideas and nurture knowledge communities. An important role is played by the facilitators of such spaces. These range from online communities to local telecenters. The "knowledge for development" philosophy should be open to change and new ideas, and reflected in news media coverage as well.

The book also mentions many organizations working on digital bridges projects, such as Volunteers in Technical Assistance, Canadian International Development Agency, Swiss Agency for Development and Cooperation, Global University System, World Bank's infoDev programme, ITU, World Links for Development, African Virtual University, International Food Policy Research Institute, various organizations based in Africa, and innumerable mailing lists.

"Building a viable information culture is both a local and global responsibility," according to Afele.

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WESTERN BALKANS/*(cont'd from page 3)*

Serbia-Montenegro

In Serbia-Montenegro the regulatory environment is in a transitional phase as the whole political and economical framework. Although the two republics (Serbia and Montenegro) operate under a common federation, new rules in the telecommunication sector have not been implemented at a federal level. After a two-year debate, the Telecommunications Law was adopted by Serbia in 2003, and its enforcement should provide legal grounds for radical reform in this sector. The new Law was developed in line with EU determining conditions and ways of conducting operational activities and defining the Telecommunications Agency (TA). The TA is an independent regulatory body with a wide range of responsibilities such as regulation, coordination, development, tariff regime, and maintenance of information systems; it also issues licenses for public telecommunication networks and services, broadcasting licenses, and technical approvals. It is worth mentioning that Kosovo, part of the Montenegro territory, which is under United Nations supervision, has established an independent regulatory body and will launch two GSM licenses.

Conclusion

The regulatory framework in the Western Balkan countries needs efforts made on further integration and alignment with the European framework. In this direction, organizations such as the United Nations Development Program, Stability Pact, and the Southeastern Europe Telecommunications and Informatics Research Institute (INA) focus part of their activities on the exchange of experiences between the related European Agencies and the regulatory authorities of these countries, in order to implement best policy practices in the telecommunications regulation framework.