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CONFERENCE REPORT

26th IEEE Symposium on Computers and Communications (ISCC) Athens, 5-8 September 2021

Tutorial on APRS™ (Automatic Packet Reporting System) Networks

By Miroslav Skoric, IEEE Austria Section

The 26th IEEE Symposium on Computers and Communications (ISCC) 2021 was held in Athens, Greece, from 5 to 8 September 2021. Because of the COVID-19 pandemic, it was uncertain until just a few days before whether ISCC would be held in person, hybrid, or fully virtual. It was also unknown whether the meeting would take place at the University of Piraeus in the case of a face-to-face (F2F) event. That produced some further uncertainty for those who planned to travel to Greece, related to accommodation options, local transportation in pandemic times, and so on.

Finally, it was announced that the F2F session of IEEE ISCC 2021 on 8 September would have been held at the Hotel Electra Palace, in the center of Athens, co-located with the inaugural edition of the new ComSoc *IEEE International Mediterranean Conference on Communications and Networking* (*IEEE MeditCom 2021*), 7–10 September 2021, which was postponed from the previously planned date in July. The F2F sessions of the two conferences were held in two nearby rooms at the Electra Palace. According to the new governmental directives, which were valid from 6 September 2021 until 13 September 2021, all meeting participants must have had a COVID-19 vaccination certificate or a proof of recovery from Covid-19. All other participants had to attend the meeting virtually (through live streaming).

ISCC hosted three half-day tutorial sessions: two of them were scheduled as online presentations, while the third, "Hardware & Software Options for Experimenting with APRS™ Networks," was performed in person by Miroslav Skoric from IEEE Austria Section and Manos Darkadakis, former president of RAAG (the Radio Amateur Association of Greece).

The Amateur Packet Reporting System (APRS) is a wireless predecessor of the Internet of Things (IoT). Some say that APRS became the first functional IoT much before the term IoT "became fancy." It appeared in early 1990s as an amateur radio system for multilateral informing on what was going on in a geographical area, and has been continually upgraded with new features.

APRS includes weather-related information, movable objects information (car traffic), road works, nearby gasoline stations, announcements for incoming radio amateur gatherings, home locations of "hams," repeater frequencies, and so on. The primary purpose of APRS was to help radio enthusiasts who traveled through unknown territories (say foreign countries, or remote states/provinces in a large country) to feel comfortable by looking at the display of their mobile (vehicle) transceivers (or even handheld amateur radios) without any need for cell telephony or Internet providers. The system uses a single VHF radio frequency across a continent, so there is no radio channel change after crossing national borders.

Miroslav Skoric (left) and Manos Darkadakis (right)

Manos Darkadakis introducing Greek amateur radio

During approximately an hour and a half, the speakers introduced the audience to technical requirements for prospective new participants in this amateur radio positioning system. A small technical display included VHF and HF radio stations, an antenna tuner, GPS/GNSS receivers, *packet radio* and *pactor* modems, as well as various computer software. Even though it was initially planned, a real-time experimentation and practical demo was not possible because of uncertainties related to the conference venue and possibilities for temporary antenna installation. M. Darkadakis informed the audience about the actual amateur radio practices in Greece, and introduced local APRS activities. Among those was his own weather station at his home in the center of Athens. M. Skoric reported on experimental results that were obtained by a temporary amateur radio setup at a hotel room in Piraeus during the preceding week.

(Continued on next page)

ISCC2021/*Continued from page 1*

The test station in Piraeus included VHF and HF radio transceivers, antennas, and a GPS (GNSS) receiver that collected and then re-transmitted the operator's temporary location to the air. That enabled both local (Greek) and remote (international) participants in the APRS network to learn about the "new" station in Greece and benefit from its existence. For example, that APRS setup was attached to a portable email server for amateur radio messages, which could be used as an alternative email provider — particularly in cases of emergency such as earthquakes, cyclones, and floods.

Miroslav Skoric
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Miroslav Skoric presenting APRS experiments

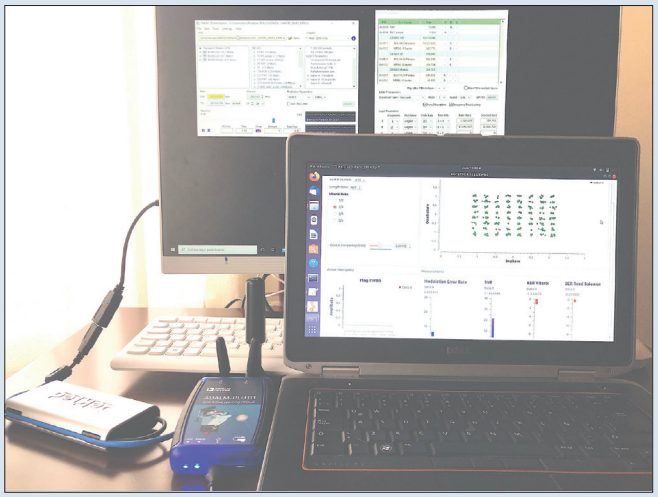
CHAPTER REPORT

Evaluation of Emergency Warning Broadcast System (EWBS) for Digital Terrestrial Television in Ecuador

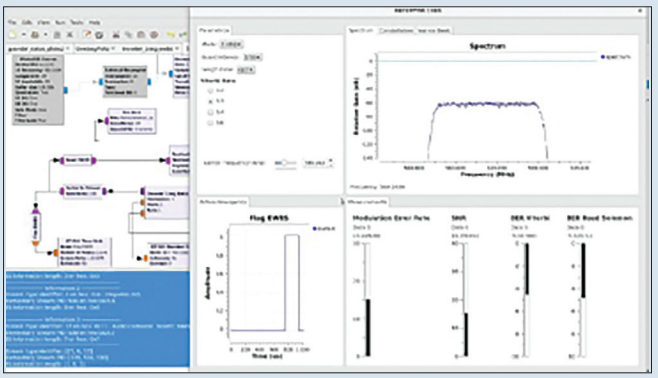
By Román Lara, IEEE ComSoc Ecuador Chapter Chair, and Gonzalo Olmedo, Universidad de las Fuerzas Armadas – ESPE, Ecuador

Currently, most ComSoc Ecuador Chapter members belong to academia (88/158), and the majority of active members are developing several research projects for Ecuador's benefit, and we will try to present these works. We take this opportunity to present the work related to early warning systems, because Ecuador is one of the South America countries crossed by the so-called Cordillera de los Andes mountain range. It is located in the Pacific Ring of Fire, which is one of the most complex volcanic intensity locations in the world due to the tectonic plate collision between Nazca and South America, which today still continues to generate high seismic activity. Natural risks are attributed to geological, hydrometereological, and antropics phenomena. Hydrometereological and geological phenomena are the most important natural risks in Ecuador; they have caused a vast amount of human lives and material losses.

Because of this, human beings have developed various warning methods for their protection to reduce losses and increase survival opportunities. One of the most recognized early warning systems worldwide is implemented in radio and television



EWBS portable laboratory



Receptor SDR-EWBS

receivers with the Emergency Warning Broadcast System (EWBS), launched in Japan in September 1985 and used for the first time in 1987. In 2003, EWBS was implemented in the Japanese ISDB-T digital terrestrial television standard.

Since 2010, Ecuador has been working on migrating from analog television to digital television with the international ISDB-T standard, which was defined by Japan and Brazil, also known as ISDB-TB. Several ComSoc Ecuador members in conjunction with the digital television laboratory of the Universidad de las Fuerzas Armadas — ESPE have been working continuously on projects focused on the implementation of the ISDB-TB system.

Quito City carried out emission tests of the EWBS emergency alert system by a commercial channel's transmission signal on the UHF band. For these tests, a group of researchers from ComSoc Ecuador and ESPE implemented an EWBS server, where the physical locations to be alerted were configured, using area codes, as well as the edition of the alert message that will be displayed on television superimposed on the video and audio signal of the programming. The server reconfigures the program-specific information tables (PSI), which are multiplexed with the transport stream (TS) of the channel's programming, and their BTS-type output is sent through a microwave link upon activation of the EWBS system to the modulator located on Cerro Pichincha for broadcasting. The configuration of the server was initially carried out through a remote desktop to the EWBS server located in the television station, activating the emergency alert signal in the receivers located in the city with a delay of less than one second.

In 2019, several ComSoc Ecuador members in conjunction with ESPE, the University of Cuenca, and the Technical University of Machala developed an EWBS server and remotely controlled interactivity through a platform that sends emergency messages using the Standard Alert Protocol (CAP) in a spatial data infrastructure (SDI) to optimize risk management processes.

(Continued on Newsletter page 4)

WORKSHOP

Workshop on Data Management in Connected Environments for Sustainable Development and Environmental Protection, September 2021, Panama

By Yessica Sáez and Héctor Poveda, Universidad Tecnológica de Panama, IEEE ComSoc Panama Chapter

The Workshop "Data Management in Connected Environments for Sustainable Development and Environmental Protection" was a hybrid event organized by the Universidad Tecnológica de Panamá (UTP), the University of Pau et Pays de l'Adour (UPPA), and the École Nationale Supérieure d'Électronique, Informatique, Télécommunications, Mathématique et Mécanique de Bordeaux (ENSEIRB-MATMECA). This event had the collaboration of the IEEE Computer Society (CS), Panama Section, and the IEEE Communications Society (ComSoc) Panama Section, and was financed by the Innovative Projects Solidarity Fund ARCHAC of the Service for Cooperation and Cultural Action for Central America (SCAC). This workshop aimed to identify and promote technological solutions to problems related to environmental management and sustainable development.

The workshop was an activity to promote the creation of the France-Central America Multidisciplinary Research Center. It was held on 16 and 17 September, 2021 (both in person and via Zoom), and featured keynote speakers and technical presentations on the latest technological developments and innovations in fields that drive the utility and potential of connected environments.

During the first day of the workshop, Mr. Héctor Montemayor, President of the Universidad Tecnológica de Panamá; Mrs. Chloee Foyer, First Counselor of the French Embassy in Panama; and Mr. Paulo Pais, Regional Advisor of the Cooperation and Cultural Action Service for Central America were in charge of the welcome ceremony, highlighting the importance of this type of event. The first keynote presentation was given by Dr. Yannis Manolopoulos from Open University of Cyprus. During his presentation, Dr. Manolopoulos presented state-of-the-art methods for point of interest (POI) recommendations based on deep learning techniques. Following this presentation, six works were presented, including "IoT Data Sharing Management," "Robots and Connected Environments," "Acoustic Monitoring System Based on Lora," among others.

The second day featured two keynote speeches. The first keynote speaker was Dr. Ernesto Damiani from Khalifa University, UAE. Dr. Damiani presented a survey on some microservice frameworks, highlighting the problems of controlling resource utilization and power consumption. The second keynote presentation was given by Dr. Esma Aïmeur, from the University of Montreal, Canada, who highlighted the urgent need for privacy-preserving measures on three fronts: the technical, regulatory, and human sides. During this second day of the workshop, there was also a technical session with four short talks related to the main theme, where topics such as expert systems, machine learning, and long short-term memory network applications, among others, were addressed.

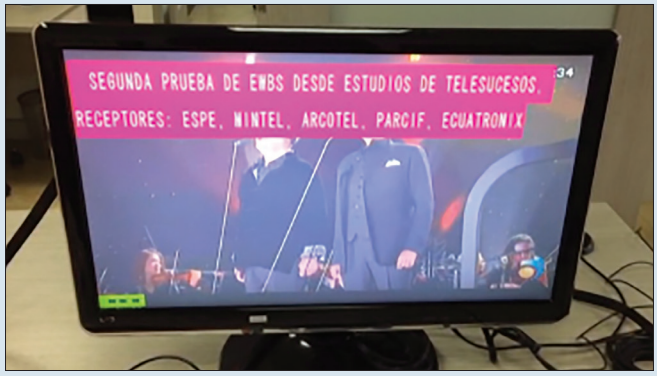
During both days, each of the keynote and technical presentations was followed by a question-and-answer session moderated by IEEE ComSoc Panama Section members. This event had the participation of around 75 people, including students, professors, and researchers from Panama, Colombia, Canada, Italy, France, and other countries.

EWBS/*Continued from page 2*

During 2020 and 2021, ComSoc members and ESPE have been working on development projects for receivers that configure the reception of the EWBS system to be replicated to other internal or communal networks, considering the starting scenario of the system deployment, where there are a few receivers and a single television station that transmits the emergency signal. The first project was based on a commercial ISDB-T decoder with EWBS connected to a Raspberry Pi card that includes an Asterisk server, which is connected to the university telephone exchange, and at the moment of receiving the emergency signal replicates the telephones connected to the two telephone exchanges through the INFORMACAST function to the entire university community.

To monitor the EWBS signal from the air and replicate the message sent by EWBS broadcast, an ISDB-T receiver was implemented in a low-cost software-defined radio architecture, ADALM-PLUTO, from Analog Devices. The receiver performs the function of the analyzer of the physical and transport layers, decoding the area codes and the superimposed message. The alert is retransmitted through an internal network, fulfilling the gateway function and sending it to devices connected to the network.

At the beginning of this year, the government of Japan, through the Ministry of Telecommunications and Information Society of Ecuador, sent test equipment of the EWBS system to Ecuador, which was evaluated in the digital television laboratory of ESPE, and consists of an EWBS signal inserter in the ISDB-TB remultiplexer stage and different types of receivers, such as



Reception of the EWBS signal in Quito

display panels, set-top boxes, and gateways. The inserter has the advantage of working on a platform that allows the configuration of red, yellow, and green emergency types. The latter is used to send constant information to the display panels found in mass transportation, airports, and other places with high traffic.

The collaborative work among ComSoc members and several universities in Ecuador, and the support of the Japanese government will be a significant contribution to consolidate the implementation of the EWBS system in countries that have the International ISDB-T standard and other digital television standards which are already being developing for the new generation of digital terrestrial television.

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