



ITU News
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New world, new radio

Evolution, innovation, connection



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World Radio Day: New world, new radio

By **Houlin Zhao**, [ITU Secretary-General](#)

■ On 13 February 2021, the International Telecommunication Union ([ITU](#)) joins the global community to celebrate radiocommunications – currently the world's most widely consumed medium.

Radio and TV broadcasts as well as wireless access to the Internet provide a 24-hour a day real-time valuable source of information. They reach far and wide across borders, allowing for increased diversity, where all voices can be heard.

On the occasion of World Radio Day 2021, the United Nations Educational, Scientific and Cultural Organisation ([UNESCO](#)) calls on us to celebrate this event's 10th anniversary and the more than 110 years of radio.

Throughout our 156-year history, ITU has played a crucial role in advancing radiocommunications by establishing and updating the

international treaty governing the use of the radio-frequency spectrum and satellite orbits.

The Radio Regulations, now in their 115th year, ensure that the use of the radio-frequency spectrum is rational, equitable, efficient, and economical – while aiming to prevent harmful interference between different radio services.

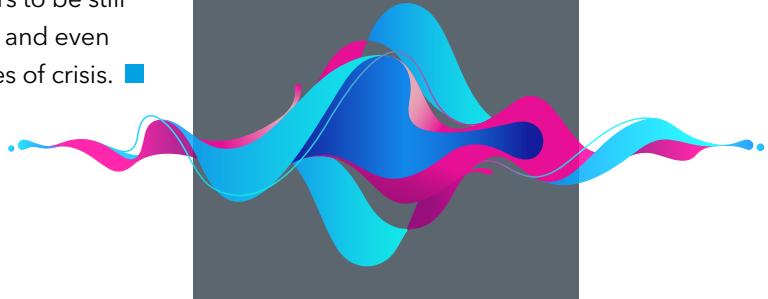
This edition of the ITU News Magazine dedicated to World Radio Day looks at the history and resilience of radio. It also features articles about why radio matters, radio's crucial role in emergency communications, and the various tools and activities in our daily lives that rely on a well-regulated radio-frequency spectrum.

Read on to see how this traditional form of communication has evolved over the years to be still standing very strong, and even more so in these times of crisis. ■



“Radio and TV broadcasts as well as wireless access to the Internet provide a 24-hour a day real-time valuable source of information.”

Houlin Zhao



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Editorial

1 World Radio Day: New world, new radio

By Houlin Zhao, ITU Secretary-General

Celebrating the resilience of radio

4 Celebrating the resilience of radio

By Mario Maniewicz, Director of the ITU Radiocommunication Bureau

Evolution: Radio's resilience through the ages

7 10 things you didn't know rely on the ITU Radio Regulations

11 115 years of ITU radiocommunications

13 Why World Amateur Radio Day is key to highlight crucial services

Connection: Broadcast radio helps save lives

17 Radio's key role in crisis and emergency situations

By Paolo Lazzarini, Vice Chair of the ITU Radiocommunication Sector (ITU-R) Study Group 6; David Hemingway, Vice Chair of ITU-R Working Party 6A; and Ben Poor, Project Manager at the European Broadcasting Union (EBU)

21 The value of broadcast radio in an emergency

Connection: Radiocommunications across regions

25 Amid rising sound broadcasting demand, Africa paves the road to more FM stations

By John Omo, Secretary-General of the African Telecommunications Union (ATU)



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All photos are by ITU unless specified otherwise.

28 Ham radio and emergency comms: Filling the United States Geological Survey 'donut hole'
By Adam Davidson, W9AS

34 How the UAE's robust ICT infrastructure brought over 1 million students online amid COVID-19
By Hamad Al Mansoori, Director-General of the Telecommunications Regulatory Authority (TRA), United Arab Emirates

38 Developing spectrum management capacity across the Asia-Pacific Region
By Aamir Riaz, Programme Officer, ITU Regional Office for Asia and the Pacific

41 ITU Regional Forum addresses opportunities and challenges of 5G implementation in Europe
By Jaroslaw Ponder, Head of ITU Regional Office for Europe

Inclusion: A more diverse world of radiocommunications

45 Why the 2020 World Radiocommunication Seminar plenary was open to everyone
By Mario Maniewicz, Director of the ITU Radiocommunication Bureau

48 NOW4WRC23: Inspiring a new generation of women in radiocommunications

52 Girls can love math, but teachers need to help them believe. Here's why.
By Joanne Wilson, Deputy Director of the ITU Radiocommunication Bureau

Innovation: Radiocommunications for a resilient future

58 Long history, bright future: Geostationary satellite innovation on the rise

63 115 years and counting: ITU Radio Regulations updated

66 AI and machine learning for a 5G world: Meet the champions of the ITU AI/ML in 5G Challenge

71 Finally, 5G (IMT-2020) is a global standard



Celebrating the resilience of radio

By **Mario Maniewicz**, Director of the
ITU Radiocommunication Bureau

■ **World Radio Day** celebrates the unique power of radio to touch lives and bring people together – even amid crises, disasters, and emergencies.

Observed every year on 13 February, it is also a day to raise awareness among the public and the media of broadcast radio's importance; to encourage decision makers to enhance

access to information through broadcast radio; as well as to improve networking and international cooperation among broadcasters. This year marks over 110 years of radio.

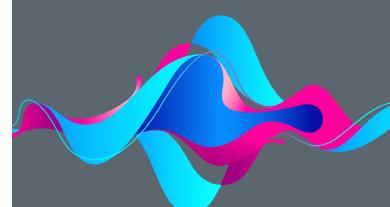
This year's World Radio Day is particularly significant, given the role that radio broadcasters continue to play in the battle against COVID-19. As the fight against the pandemic continues, radio has been a close companion for many, with broadcasters curating trustworthy information, fighting misinformation, and providing much-needed entertainment during lockdowns. Perhaps most important of all: broadcast radio has enabled children and adults alike to access distance education for uninterrupted learning.

Improving communications and access to information and communication technologies (ICTs) – including broadcast radio – by harmoniously developing telecommunication and radiocommunication tools and processes lies at the heart of ITU's work.



This year's World Radio Day is particularly significant, given the role that radio broadcasters continue to play in the battle against COVID-19.

Mario Maniewicz



Throughout our 156-year history, ITU has played a crucial role in advancing radio by establishing and updating international regulations on the use of the radio-frequency spectrum and satellite orbits.

ITU is the custodian of the global treaty on spectrum management known as the [ITU Radio Regulations](#). This treaty facilitates equitable access to and rational use of spectrum, ensures the availability of frequencies provided for distress and safety purposes, and promotes interference-free operations of radio-communication systems.

The Radio Regulations cover fixed and mobile radio services, satellite systems, radio and TV broadcasting, radionavigation, meteorological monitoring, space research and Earth exploration, as well as amateur radio services. They also prescribe how radio equipment and systems must operate to ensure efficient and effective coexistence and utilization of today's increasingly crowded airwaves.

As we celebrate the 10th World Radio Day, let's take a closer look at ITU's contribution to radio with the theme "New World, New Radio" in mind.



EVOLUTION:

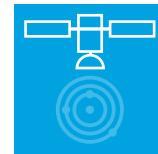
Experiments with radio transmission began over 175 years ago. In 1895, the Russian professor Alexander Popov sent and received a wireless signal across 600 metres. In 1901, Guglielmo Marconi sent the first transatlantic radio signal from southwestern England to Newfoundland, Canada. It was not until 1906 that Aubrey Fessenden made the world's first broadcast of voice and music.

Since its inception, radio broadcasting has developed into one of the most popular media, with the important social role of disseminating information, entertainment, and educational material to vast audiences. For over a century, broadcast radio has been a trusted source of information in times of crisis.

Radio broadcasting has also adapted to the rapidly evolving technological landscape and remains one of the most dynamic, reactive, and engaging media.

ITU provides a platform from which radiocommunication experts develop recommendations which enable countries to efficiently operate their radio broadcast systems.

Some of these recommendations include transmission standards for FM sound broadcasting, systems for terrestrial digital sound broadcasting to vehicular, portable, and fixed receivers, and use of international radio for disaster relief (IRDR) frequencies for emergency broadcasts.



INNOVATION:

A variety of innovative satellite technologies present the new frontier to expand the reach of radio. Satellite communications already provide affordable connectivity to people in rural and remote areas.

Every four years, delegates from ITU Member States gather for the World Radiocommunication Conference to deliberate and agree on ways to expand access to the radio spectrum. Decisions taken at the conference are key in enabling countries to harness the wide area coverage, reliability and resilience offered by emerging technologies. The portability of radio receivers gives it an advantage over other types of media that require an individual's full attention, such as television or print.

“

Satellite technology promises to make radio an enduring, innovative form of media accessible everywhere and to everyone.

”

Mario Maniewicz

Recent years have seen new technologies expanding radio's reach. Whereas yesterday's radio was simply a transistor on our kitchen tables, nowadays the radio is a standard accessory in our cars and embedded in our smartphones.

Satellite technology promises to make radio an enduring, innovative form of media accessible everywhere and to everyone.



CONNECTION:

One of ITU's primary mandates is to ensure interference-free operations of radiocommunication systems worldwide. We also strive to ensure protection from harmful interference to frequencies reserved for distress and safety purposes. In times of emergency and disasters, radio broadcasting is one of the most powerful and effective ways of delivering early warnings and alerting the public to save lives. Timely, relevant, and practical information to people impacted by a disaster or emergency is a vital form of humanitarian assistance.

Broadcasting is particularly useful in situations where physical access is difficult and aid responders may take several days or weeks to reach affected communities. Appropriate information and advice, delivered in a user-friendly way, can help

people cope with the crisis and mitigate immediate threats to their well-being.

Direct communication via radio can also help to reduce the sense of isolation and helplessness that crisis-affected communities and individuals often experience.

As the world and radio change together, ITU will continue to serve as the steward of global airwaves, ensuring we can connect to one another safely, sustainably, and innovatively for centuries to come. ■





10 things you didn't know rely on the ITU Radio Regulations

By ITU News

■ In early 2020 the latest edition of the [ITU Radio Regulations](#) was published.

When it comes to allocating radio frequencies, the Radio Regulations are the ultimate tool. They ensure that the use of the radio-frequency spectrum is rational, equitable, efficient, and economical – all while aiming to prevent harmful interference between different radio services.

But did you know just how many technologies rely on spectrum, and by extension, the Radio Regulations – some of which we use every day? Read on to discover some of the most important tools and activities that rely on a well-regulated radio-frequency spectrum.

When it comes to allocating radio frequencies, the Radio Regulations are the ultimate tool.

Despite the rise of digital radio, broadcast radio remains one of the most vital means of distributing information and entertainment.



Television

Whether terrestrial (analogue or digital) or satellite-based, broadcast television is among the most popular means of informing and entertaining the public. Even if the end user's TV is connected via terrestrial broadcast TV or cable, a substantial amount of TV content has been distributed by satellite, which relies on the use of the radio-frequency spectrum.



Broadcast (FM or AM) radio

Despite the rise of digital radio, broadcast radio remains one of the most vital means of distributing information and entertainment. This is especially true across the African continent, where it has been argued that "[FM radio reigns king](#) of the media industry."



Mobile and smartphones

Cellular communications have been transformative since the mid-1980s to the present, and are expected to continue connecting people, things, data, applications, transport systems and cities in smart networked communication environments. Advances in cellular technology are expected to transport huge amounts of data much faster, reliably connect an extremely large number of devices and process very high volumes of data with minimal delay.



WiFi

Most wireless Internet access happens through WiFi, which nowadays can be found in every computer and in all smartphones for setting up private access points. Radio local area networks (RLANs) including WiFi have been widely used for Internet connectivity, data delivery and for off-loading mobile traffic to reduce the amount of data carried on cellular networks. In addition, satellite services aim at increasing WiFi connectivity, whether by providing access to broadband communications to unserved rural communities, or to passengers on aircrafts, on ships and on land, or by expanding the backhaul of terrestrial networks.



Space exploration

There is no space exploration without radiocommunications. Spacecraft couldn't make it to the Moon, let alone the Sun, Saturn or beyond without the means of communicating with mission controls millions of miles away.

And that communication happens through – you guessed it – radio waves!



Communications and safety at sea

Radiocommunications play a key role in the safety of maritime traffic. The Global Maritime Distress and Safety System (GMDSS) developed by the International Maritime Organization (IMO) and ITU operates using both terrestrial and satellite radio technologies on board ships and on shore. The system alerts shore-based rescue and communication personnel via the coast radio station in cases of distress and emergency and notifies vessels in the vicinity of survivors to provide the necessary assistance.



Safe air travel

It would be virtually impossible to travel safely by air without protecting the radio channels used by aircraft for both navigation

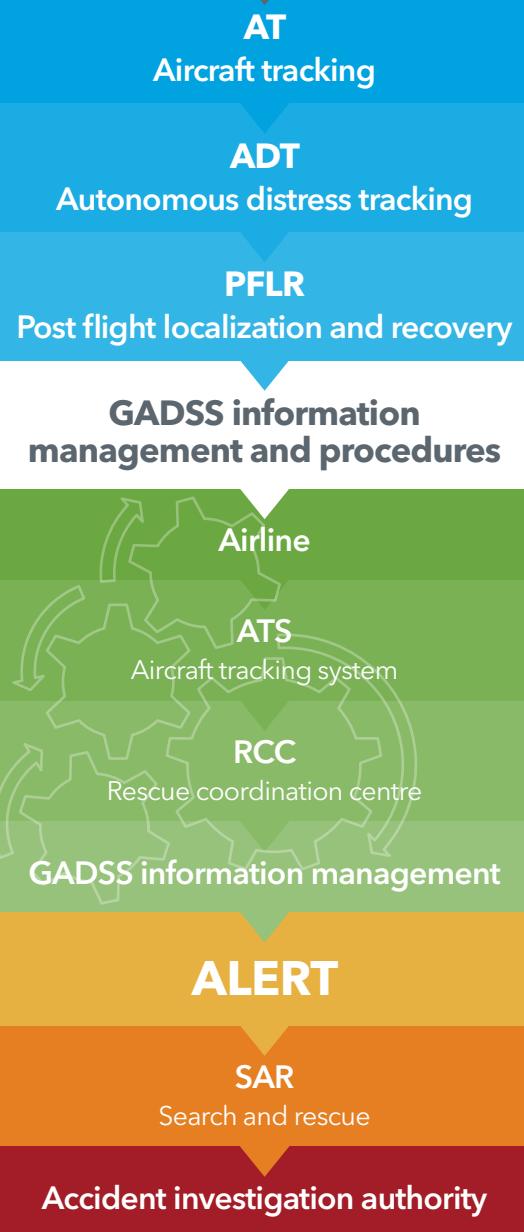
and air traffic control. The Global Aeronautical Distress and Safety System (GADSS) addresses all phases of flight under all circumstances, including at times of distress. It maintains an up-to-date record of each aircraft's position and, in case of a crash, forced landing or ditching, the locations of survivors, the aircraft and recoverable flight data recorders. The GADSS was modelled after the long-standing GMDSS which has been supporting safety at sea for decades.



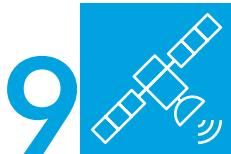
Weather forecasting and Earth observation

Checked the weather before you went out today? That information came to you thanks to Earth-observation satellites, which enable the forecast that will affect your day. Earth observation is also essential in measuring the impact of climate change – the impacts of which we are experiencing more often in our daily lives. Measuring its impact is key to the future of humankind. Those measurements also depend on Earth-observation satellite systems, powered by the radio-frequency spectrum.

High level overview of the Global Aeronautical Distress and Safety System – identifying the main functions



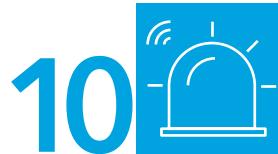
Source: Global Aeronautical Distress and Safety System (GADSS) Concept of Operations (Version 6.0)



9 Global Navigation Satellite Service (GNSS)

Did you use the navigation system in your car on your last road trip? Then you have used a GNSS system (see video), which makes it possible to determine your car's position, and to track it as it moves from one location to another. GNSS also enables the creation of world maps, as well as the possibility to take precise time measurements.

 [GNSS system video](#)



10 Emergency communications and response

Radio goes where newer technologies often cannot. This makes it extremely effective in delivering information to rural and remote areas, which can even save lives in emergency situations such as [earthquakes](#), or the current COVID-19 pandemic. Radio has also played a key role in the [Australian bushfire response](#), helping responders to keep local populations up-to-date and coordinate and execute evacuation plans.

Though invisible, perhaps now you can see how radiocommunications are really everywhere.

Through the Radio Regulations, ITU will continue to ensure the aforementioned and many other services and networks remain compatible, interoperable, and free from harmful interference to or from adjacent services. ■

An indispensable treaty spanning 115 years

Though invisible, perhaps now you can see how radiocommunications are really everywhere. In fact, as radio-based technologies evolve and become more sophisticated, the world's airwaves are becoming increasingly crowded.

Over 40 radiocommunication services are now governed by the Radio Regulations, the indispensable treaty ITU has maintained for 115 years.



The 2020 Radio Regulations

The 2020 Radio Regulations are available in all six of ITU's official languages. Electronic versions of the Regulations can be downloaded free of charge. To download or order the ITU Radio Regulations (2020 edition) in your preferred language, click [here](#).

115 years of ITU radiocommunications

1906

First international radio conference

The 1906 [International Radiotelegraph Conference](#) is held in Berlin, establishing the first regulations governing radio (today called the Radio Regulations) – what becomes a cornerstone of ITU's mission to facilitate communication worldwide.

1912

Titanic tragedy prompts common wavelength for radio distress signals

In response to the Titanic tragedy, the [1912 International Radiotelegraph Conference](#) agrees on a common wavelength for ships' radio distress signals, and establishes [SOS Morse Code](#).

1932

New name for ITU

A merge of the International Telegraph Convention and the International Radiotelegraph Convention into a single [International Telecommunication Convention](#) reflects ITU's mission to include all communication technologies.

1933

Radio signals from space

The detection of radio waves from space in 1933, heralds the field of radio astronomy, which later becomes part of ITU's responsibilities in supervising the use of radio spectrum. See the [ITU Space Services Department \(SSD\)](#).

1947

ITU joins the United Nations' family

Joining the [UN](#), and the creation of the International Frequency Registration Board ([IFRB](#)) by the International Radio Conference in Atlanta City, marks the beginning of ITU's vital role in the overall management of the radio-frequency spectrum.

1957

Dawn of the space age

A small satellite called Sputnik is launched in 1957. Six years later, in 1963, ITU holds an extraordinary administrative conference for space communications. In 2016 ITU hosts the Global Conference on Space and the Information Society ([GLIS](#)).

1979

The need for upper frequency bands

Due to congestion in the lower radio frequency bands the World Administrative Radio Conference of 1979 ([WARC-79](#)), a diplomatic marathon lasting over three months, stimulates the development of the upper frequency bands, especially above 20 GHz.

1992

The ITU Radiocommunication Sector is born

The Consultative Committee on International Radio (CCIR), established in 1927, is renamed as ITU's Radiocommunication Sector ([ITU-R](#)). ITU-R ensures rational, equitable, efficient and economical use of the radio-frequency spectrum by all radiocommunication services.

1993

ITU responds to a wireless world

ITU first agrees radio-frequency spectrum allocations for 2G mobile telephony at the [World Radiocommunication Conference held in 1993 \(WRC-93\)](#).

1994

ITU approves first standard for digital audio broadcasting

2006

From analogue to digital television

2012

Towards IMT-Advanced mobile (5G)

2015

Radio spectrum allocated for global flight tracking

2016

ITU celebrates 110 years of the Radio Regulations

2017

90th Anniversary of the ITU-R CCIR/Study Groups

2019

Advanced radiocommunication technologies

2020

The fifth generation of mobile communications (5G)

2021

Updated Radio Regulations

Research into Digital Audio Broadcasting (DAB) for radio began in 1981 – and the first [standard](#) for the technology is approved by ITU in 1994. See the ITU's [Broadcasting Services Division](#).

ITU sets a deadline of June 2015 for the switchover from analogue to digital terrestrial television in Africa, the Middle East and Europe as well as the Islamic Republic of Iran. [See video](#).

ITU agrees specifications for [IMT-Advanced](#) – a global platform on which to build the next generation of interactive mobile services (commonly known as 5G). See ITU's [Focus Group on IMT-2020](#).

Following missing Malaysia airlines flight MH370, the World Radiocommunication Conference 2015 allocates the [frequency band 1087.7-1092.3 MHz](#) in the Earth-to-space direction to enable transmissions from aircraft to satellites, to increase future air safety.

See the entire [digital collection](#) of the Radio Regulations since 1906, and read more about the ITU Radiocommunication Sector ([ITU-R](#)).

The 90th Anniversary of the CCIR/Study Groups coincides with the anniversary of the signing on 25 November 1927 of the Final Acts of the International Radiotelegraph Conference in Washington, 1927, which created CCIR.

The decisions reached at the World Radiocommunication Conference 2019 (WRC-19) enable the introduction of new advanced radiocommunication technologies and the protection of existing services. Here are the [WRC-19 outcomes](#).

ITU announces its completed evaluation of an important ITU Radiocommunication Sector (ITU-R) Recommendation: "Detailed specifications of the radio interfaces of IMT 2020." IMT 2020 specifications for the fifth generation of mobile communications (5G) will be the backbone of tomorrow's digital economy.

The updated [Radio Regulations](#) comes into force on 1 January 2021. The Radio Regulations is the world's only international treaty governing the global use of radio-frequency spectrum and satellite orbits.



Experiments with radio transmissions started over 175 years ago.

Watch the [video](#).





Why World Amateur Radio Day is key to highlight crucial services

World Amateur Radio Day is observed on 18 April. Timothy Ellam, President of the International Amateur Radio Union ([IARU](#)) shares his views on why the day is important and how amateur radio plays an important role in improving lives worldwide.

What is the significance of this day to your association and members?

Every April 18, radio amateurs worldwide take to the airwaves in celebration of World Amateur Radio Day. It was on this day in 1925 that the International Amateur Radio Union (IARU) was formed in Paris.

Amateur radio experimenters were the first to discover that the short-wave spectrum – far from being a wasteland – could support worldwide propagation. Amateur radio pioneers met in Paris in 1925 and created the IARU to support amateur radio worldwide.

Since its founding, the IARU has worked tirelessly to defend and expand the frequency allocations for amateur radio. Thanks to the support of enlightened administrations in every part of the globe, radio amateurs are now able to experiment and communicate in frequency bands strategically located throughout the radio spectrum.

More about the amateur radio through the decades [here](#).

“

Today, amateur radio is more popular than ever, with more than 3 000 000 licensed operators.

”

Timothy Ellam

From the 25 countries that formed the IARU in 1925, the IARU has grown to include over 160 member-societies in three regions. IARU Region 1 includes Europe, Africa, the Middle East, and Northern Asia. Region 2 covers the Americas, and Region 3 is comprised of Australia, New Zealand, the Pacific island nations, and most of Asia.

The International Telecommunication Union ([ITU](#)) has recognized the IARU as representing the interests of amateur radio.

Today, amateur radio is more popular than ever, with more than 3 000 000 licensed operators.

April 18 is the day for all of amateur radio to celebrate and tell the world about the science

we can help teach, the community service we can provide and the fun we have.

Today, digital dominates every aspect of global communication. Where does amateur radio fit in today's communication ecosystem?

■ Amateur radio still makes use of the oldest form of digital communications: Morse Code, or continuous wave (CW). In addition, the amateur service utilizes a number of digital modes for weak signal HF and VHF/UHF propagation including many which have been developed by radio amateurs, such as Nobel Prize winner, Joe Taylor, K1JT.

Over the years, the amateur service has been at the forefront of developing new modes of communication and will continue to do so in the future.

In what ways are you seeing amateur radio operators contributing to the fight against COVID-19?

■ Radio amateurs have a long history of community service. You will find radio amateurs involved in emergency communications and working with emergency services to provide communication when required. This is as true

in developing countries as it is in developed nations.

Radio amateurs come from all walks of life and I know many are participating in the community to serve us during this time of crisis whether that is in the medical services or helping keep supply chains open. In these days of social isolation, radio amateurs have also been contacting those who are shut in to check on their welfare and just to pass the time of day. Amateur radio offers a unique way for us to maintain our social contacts while remaining physically separate from each other.

Many radio clubs and national societies are activating local repeater and other emergency communication networks to be prepared should the need for their services arise. Now is a good time to get on the air to exercise our equipment, our skills, learn something new by trying a new band or mode, and expand our circle of friends. In fact, since the start of the current pandemic, there has been an unprecedented interest in the amateur service by the public and many of our member-societies are offering on-line courses to help them get licensed.

During a disaster, amateur radio operators can be vital first responders. What support do they provide to the affected communities and what role do they play in disaster risk reduction efforts?

■ Radio amateurs have a long and proud history of providing communications to alleviate suffering in the wake of natural disasters. With only a low-power HF transceiver, an automobile battery, and a piece of wire for an antenna, a skilled operator can establish communication from almost any location. Amateurs use their VHF and UHF allocations for many applications including local networks that operate independently of the commercial telecommunication infrastructure and continue to function when regular communication links are disrupted or overloaded.

Amateurs have the equipment, the skills, and the frequencies necessary to create expedient and efficient emergency communication networks under poor conditions. They are licensed and pre-authorized for national and international communication.

And all of this comes at no cost to the served agency, whether that is an arm of government or a disaster relief and mitigation organization. We have developed a [guide](#) for our member-societies to assist them in helping provide support.

How is your Union's collaboration with ITU important to improving lives worldwide?

■ IARU was admitted to the work of the CCIR, the forerunner to today's ITU Radiocommunication Sector ([ITU-R](#)), in 1932 and has been contributing to the work of ITU ever since.

As a Sector Member, IARU participates fully in the relevant [ITU-R Study Groups](#) and Working Parties. This makes us one of the longest-serving Sector Members in ITU.

IARU is also a Sector Member of the ITU Development Sector ([ITU-D](#)) and participates actively in [Study Group 2](#) on issues related to disaster communications and human resource development. We have also worked with many ITU initiatives including emergency communication workshops,

Amateurs have the equipment, the skills, and the frequencies necessary to create expedient and efficient emergency communication networks under poor conditions.

Timothy Ellam

the smart sustainable development model and joint IARU/ITU training sessions for regulators, to name a few.

We are pleased that ITU recognizes the value of the amateur services in times of crisis and we are equally proud to assist ITU with the goal of improving lives.

Our association is looking to remake amateur radio for the 21st Century.

“

We recognize very well that what amateur radio means to one generation does not mean the same thing to a younger generation.

”

Timothy Ellam

We find now that the world moves at a much faster pace and the demands on radio spectrum require us to move quickly and to adapt and work with other communication services. We recognize very well that what amateur radio means to one generation does not mean the same thing to a younger generation.

IARU is actively engaging through programmes such as Youngsters on The Air ([YOTA](#)) to ensure that there is a next generation of amateur radio enthusiasts.

What are some of the plans that you have?

■ The amateur service has changed and will continue to change. We have always adapted to new communication challenges and been among the first to embrace new technology. We will continue to do so.

We are looking forward to embracing new communication techniques and utilizing our spectrum above 144 MHz for networking and linking amateurs during communication emergencies.

One thing that will not change is our interest in advancing the art and science of radiocommunications as we move into the next century. ■



**Interview with
Timothy Ellam,
President, IARU**



Radio's key role in crisis and emergency situations

By **Paolo Lazzarini**, Vice Chair of the ITU Radiocommunication Sector ([ITU-R](#)) Study Group 6; **David Hemingway**, Vice Chair of ITU-R Working Party 6A; and **Ben Poor**, Project Manager at the European Broadcasting Union ([EBU](#))

■ Many people compare the pandemic we are still experiencing to a world war; millions affected, global involvement, and new kinds of crises and emergencies. Across the world we are having to reconsider our priorities and needs. What was once considered essential in many places has become unavailable.

Lockdowns are still in place in many countries, intensifying our human need for proximity and social contact. Long-distance travel is practically forbidden, and a large part of industrial activity has stalled.

In the COVID-19 context, all forms of media and communication are playing a major role in helping people feel less alone and closer to each other. Amid a global pandemic, radio is showing its flexible ease of use for everyone.

“

To meet these new challenges, radio broadcasters have had to reinvent the way they produce their content.

”

Paolo Lazzarini,
David Hemingway
and Ben Poor

“

Fortunately, the shift to remote production and contribution has long been anticipated by many broadcasters.

”

Paolo Lazzarini,
David Hemingway
and Ben Poor

Fortunately, the shift to remote production and contribution has long been anticipated by many broadcasters. Recent years have seen many projects devoted to creating tools to liberate journalists and other content producers from their offices and studios.

The ability to be where the story is more rapidly, or to reach out to isolated communities more easily, has been of vital importance to public service broadcasters and others.

For example, low-cost and lightweight backpacks that allow journalists to immediately connect to the studio wherever there is viable mobile connectivity have ensured radio's resilience for trusted news gathering despite the emergence of social-media platforms.

Broadcasters banding together

Radio studios themselves have become increasingly decentralized, with the possibility of coordinating and producing programmes equally well wherever the contributors are – potentially not even in the same location.

The major challenge for radio during the current global crisis that began in 2020 was that a three-to-five-year strategy needed to be implemented within a matter of weeks. Creating a consistent environment for large numbers of producers, working from their own homes, brought both technological and logistical challenges.

Working through the European Broadcasting Union ([EBU](#)), in exchanging best practice, collaborating on projects, and lending expertise and resources, public service broadcasters in Europe were able to easily identify what worked, and what wasn't working quite so well – rapidly iterating through the challenges to find solutions that could be more widely applied. In this sense, the real value of broadcasters working together for the benefit of their audiences and wider society is clear.

The flexibility of broadcast radio has played a significant role in filling the lack of face-to-face contact and keeping people company in the most difficult moments such as during lockdown. One example is what [Vatican News](#) did to improve domestic and international services.

Meeting new challenges

To meet these new challenges, radio broadcasters have had to reinvent the way they produce their content. The limits imposed by the virus, such as physical distance and the need for personal protective equipment (PPE), have added a layer of complexity to the production chain and to the management of broadcast studios, productions, and facilities.

In many cases, radio programmes produced in different places have needed reassembling before broadcast. This has also been the case during live events where field journalists have often had to do their job from home.

All events involving the Pope have been live broadcast in six languages using all possible distribution channels: from the most advanced digital technology to the more traditional analogue. The culmination of this is represented by the live broadcast of "Statio Orbis" in March 2020 during which the Pope prayed for the entire world.

Dispelling disinformation on digital radio

The British Broadcasting Corporation (BBC) has worked to become a trusted source of accurate information about the coronavirus by serving audiences with basic information, as well as challenging some of the dangerous COVID-19 misinformation that continues to circulate.

BBC World Services launched two different programme segments:

Coronavirus Global Update has two editions of five minutes a day for direct transmission, for partner stations and as a [podcast](#). The segment is now carried by 14 radio partners across ten countries and 12 digital players including [Apple](#), [Spotify](#), and [Tuneln](#).

BBC World Service has a short news bulletin format, [BBC Minute](#), run by many partners with young and music-oriented audiences. The BBC Minute team started a bulletin specifically on the COVID-19 outbreak in mid-February 2020. It was offered to partners and then extended to two bulletins a day. As the outbreak escalated into a pandemic, more radio stations started to air the bulletin, today aired by 39 radio partners across 25 countries. There are also versions in Spanish with services in other languages being planned.

Radio as a lifeline

Traditional radio represents another effective medium of communication – communication in an emergency. As reported by one of the missionaries released in Africa in May 2020 following a two-year kidnapping, thanks to a small short-wave radio he was able to listen to BBC and Vatican Radio programmes.

This allowed him to hear news from the world and "remain in touch" with home despite his difficult situation.

Coronavirus Global Update



BBC Minute



At the outset of the pandemic, the United Nations Educational, Scientific and Cultural Organization (UNESCO) produced visuals, graphics and social media messages to counter disinformation, fight discrimination, and promote best practices. UNESCO contacted the High Frequency Co-ordination Conference (HFCC) and asked it to advise HFCC, Arab State Broadcasting Union (ASBU), and Asia-Pacific Broadcasting Union (ABU) members that a series of short audio spots in different languages about the coronavirus pandemic was available to be broadcast on shortwave.

Amid COVID-19, local radio has provided a lifeline service to people experiencing pandemic-related difficulties. The economics of radio mean that it can be more closely targeted to local populations than other media. Moreover, audiences turn to local voices when they need reliable information about their immediate surroundings – especially with lockdown measures differing in various areas of a given country or region.

In response to the COVID-19 pandemic, the BBC made temporary changes to its local radio network in England, introducing several more localized services that give the opportunity to offer extra news and information to local audiences when and where needed. This was accomplished by re-purposing existing AM (MF), and DAB transmitting networks to address the new services to their target audiences.

“Amid COVID-19, local radio has provided a lifeline service to people experiencing pandemic-related difficulties.”

Paolo Lazzarini,
David Hemingway
and Ben Poor

It was the biggest response the BBC has ever had to a local radio campaign ([read more](#)).

100 years on – still providing a vital service

2 November 2020 marked the 100th anniversary of the world's first commercial radio broadcast, from KDKA in Pittsburgh in the United States of America, relaying the results of the presidential election.

100 years later, radio still provides a vital and irreplaceable service to many around the world. And particularly in emergency situations such as pandemics, radio continues to reach people in ways that no other media can. ■



The BBC's local radio campaign

A graphic for the BBC's local radio campaign. It features a purple background with white icons of a microphone, a telephone, and a speaker. The text "MAKE A DIFFERENCE" is prominently displayed in white and orange letters at the bottom.



The value of broadcast radio in an emergency

By ITU News

■ "It was a kind of silence that is deafening – the radio broke through it, somehow. To hear the music and another voice, in the middle of the night ... made me able to hang in there for one more night ..." a [resident of Tacloban, Philippines, said after Typhoon Haiyan](#), one of the most powerful tropical cyclones ever recorded.

In the aftermath of the disaster, which killed over 7000 people, left millions of people without homes and destroyed major areas of agriculture, the impact of radio could not be understated.

First invented in 1895, radio – one of the first forms of mass communications – continues to play an important role in today's increasingly digital society.

In times of emergency and disasters, radio broadcasting is one of the most powerful and effective ways of delivering early warnings and alerting the general public by broadcasting before the disaster occurs so people can evacuate to safe places and save their lives.

Mijke Hertoghs

Head, Environment and Emergency
Telecommunications Division, ITU

"In times of emergency and disasters, radio broadcasting is one of the most powerful and effective ways of delivering early warnings and alerting the general public by broadcasting before the disaster occurs so people can evacuate to safe places and save their lives," said Mijke Hertoghs, Head of [ITU's](#) Environment and Emergency Telecommunications Division.

In the initial hours in the aftermath of a disaster, people need to be informed so that they understand what is happening and assess how they, their families and friends can receive support.

At the beginning of 2020, radio played a key role in the [Australian Bushfire response](#), helping responders to keep local populations up-to-date and coordinate and execute evacuation plans.

"Our standard advice is that in an emergency, people should make sure they've got a transistor radio with fresh batteries because the Australian Broadcasting Corporation, our national broadcaster, also has an emergency broadcasting role. Throughout the bushfires, they've been

broadcasting regularly information about where bushfires are, where the affected areas are.

They've been passing on information from the State's fire agencies, advising people as to when they should leave or whether it's too late to leave, those kinds of things," Paul Fletcher, Australia's Minister for Communications, Urban Infrastructure, Cities and the Arts told ITU in an interview (listen to the podcast featuring a range of voices on emergency telecommunications).

Broadcasting appropriate information and advice through services such as radio is particularly useful when physical access to an area is difficult. But these kinds of services can also help people cope with the disaster until help arrives on-site.

One such service is First Response Radio ([FRR](#)), whose mission is to put emergency radio broadcasts on the air within 72 hours of a disaster. Teams are located in four major hubs throughout South-East Asia – the Philippines, Indonesia, India and Pakistan – to ensure rapid response.



The organization trains local teams – both professional and amateur – to use simple broadcasting equipment over a five-day training programme. The equipment is designed to fit into a suitcase and weighs just 23 kg so it can easily fit into the hold luggage of an international flight.

“

And that's what makes it possible for them to get into the field and on the air in 72 hours: because they're local.

”

Mike Adams

International Coordinator,
First Response Radio

"There is no international team coming from London. The local team has the equipment; they've been trained how to use it, they decide when they need to deploy. And that's what makes it possible for them to get into the field and on the air in 72 hours: because they're local.

Locally empowered to speak the local language, ready to deploy according to local conditions and the local disasters," Mike Adams, FRR International Coordinator, told ITU.

"We take people with no radio background and within a couple of days, they're making radio shows and doing live interviews."

FRR teams have responded to 32 disasters in the last 15 years, including major flooding in India in 2008, Typhoon Haiyan in 2013, and the 2015 Nepal earthquake.

Diversity of content

Working with government and non-government organization (NGO) responders on the ground, the teams disseminate disaster-relief information to the local populations – water and food distribution points, sanitation and hygiene tips, housing information – but blend it with a mix of entertainment.

"In times of emergency and disasters, radio broadcasting is one of the most powerful and effective ways of delivering early warnings and alerting the general public by broadcasting before the disaster occurs so people can evacuate to safe places and save their lives," said Mijke Hertoghs, Head of ITU's Environment and Emergency Telecommunications Division.

"We're serving the community that is affected by the disaster, and that changes the focus of the content," Adams said.

During the response to Typhoon Haiyan in the Philippines, the FRR radio teams provided a blend of information and comfort to those affected by the disaster.

"We were the first voice and it built a really solid relationship with the community and provided not just information about the response, but just provided a friend like a voice that was always there... Research showed later, the fact that people tuned into the radio station helped them heal from the trauma and the stress and all the mental health challenges of that disaster."

ITU's role

ITU supports Member States in preparing them to become more resilient to disaster by ensuring the rational, equitable, efficient and economical use of the radio-frequency spectrum for all phases of a disaster, from preparedness to recovery, and by assisting them with the development and implementation of national emergency telecommunication plans, including spectrum management for land and space.

"Every country has a system of licensing radio stations and we cannot ignore that. We have to work within this ITU established structure globally," said Adams.

ITU's **Radiocommunication Study Groups** carry out studies related to the continuing development of radiocommunication systems used in disaster mitigation/relief operations. The ITU Radiocommunication Sector (**ITU-R**) is also invited to pursue studies on the further identification of suitable frequency bands that could be used on a global/regional basis for public protection and disaster relief (PPDR), as well as on facilitating cross-border circulation of equipment intended for use in emergency and disaster relief situations – the second of these tasks being reinforced by the Tampere Convention on the provision of telecommunication resources for disaster mitigation and relief operations.

The ITU Telecommunication Development Sector (**ITU-D**) has issued guidelines for national emergency telecommunications plans (see the guide) to help national authorities and policy-makers to develop a clear and flexible framework to ensure vital telecommunication networks and services remain online during emergencies or in the aftermath of disasters.

As part of ITU's work on emergency telecommunications, ITU produces a series of recommendations, manuals, reports, among other products, which highlight the need to enhance preparedness measures to enable the use of reliable and resilient information and communication technology (ICT) networks, platforms and services, such as radio broadcasting for disaster management. ■



ITU Guidelines for national emergency telecommunication plans 2020

This guide is an invaluable aid to increase preparedness of the emergency communication sector for when disasters strike. It outlines the key steps and phases of planning, designing, conducting and following up of an emergency simulation exercise, with templates, checklists and guidance to assist in running a simulation, and other resource materials.



[Download here.](#)





Amid rising sound broadcasting demand, Africa paves the road to more FM stations

By John Omo, Secretary-General of the African Telecommunications Union ([ATU](#))

■ Radio is of paramount importance to the whole world, and even more so to developing countries. This has been true since the first transmissions of public radio broadcasting were emitted in 1920.

Radio goes where newer technologies cannot. It is an extremely effective way of delivering information in rural and remote areas where information can educate, and even save lives in emergency situations such as during the current pandemic.

Listeners are tuning into radio stations to receive the latest news and recommendations on how to prevent the spread of COVID-19.

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As the use of radio services in Africa grows, an increasing demand for additional frequencies follows.
”

John Omo



Note: This article was adapted from opening remarks given at the Optimization of the GE84 (FM Plan) Workshop for Africa for the Second Coordination Group (CG2).

“

Many would agree that FM radio still reigns as king of the African media industry.

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John Omo

As radio is more affordable than other forms of technologies, together with the growth of community radio, information and culture becomes more accessible to all.

Where FM radio reigns

Many would agree that FM radio still reigns as king of the African media industry. It remains a key information and communication technology (ICT) service delivering immense socio-economic value across the continent. Yet, in many countries, the expansion of FM radio is hampered by the lack of FM frequencies.

As the use of radio services in Africa grows, an increasing demand for additional frequencies follows.

In response, the ITU Radiocommunication Bureau ([BR](#)), in collaboration with the African Telecommunication Union (ATU), launched a project for the optimization of the GE84 Plan for African countries in South Africa in July 2019. The project aims to achieve an efficient and equitable use of the 87.5–108 MHz (FM) band for analogue sound broadcasting and to identify new frequencies to FM broadcasting in 54 African countries.

While some countries have commenced national programmes and initiatives to optimize their FM plans, the project aims to take a coordinated continent-wide approach to ensure the plan generates optimal outcomes.

This approach is borrowed from the successful optimization of the GE06 (DTT) Plan which was executed on a coordinated continental approach and resulted in the “Second Digital Dividend” spectrum (the 700 MHz band International Mobile Telecommunications (IMT) spectrum)).

GE84 work plan: First milestone achieved

According to the original work plan, the GE84 optimization should have been accomplished via a series of physical multilateral frequency coordination meetings. Such meetings include training the designated experts on the compatibility software developed by the ITU Radiocommunication Bureau and adopting the optimization approach with common criteria.

However, this original work plan has been changed. Indeed, in view of the global concern about the COVID-19 pandemic and the current restrictions imposed by many countries on meetings and travel, it was decided to start with 3-day online workshops for the four African Coordination Groups.

“

Through this project, the hope for FM radio in Africa remains alive.

”

John Omo

From analogue to digital

Optimizing the GE84 Plan intends not only to respond to the increasing demand in analogue sound broadcasting, but also to enable and facilitate the introduction of digital radio in Band II.

In 2021, three frequency coordination meetings have been planned to get all African administrations to adopt common technical criteria and conditions for mutual agreements, submit their frequency requirements, run compatibility analyses and mutually coordinate their stations.

Through this project, the hope for FM radio in Africa remains alive.

We are excited at the possibility of having new usable channels that will allow for its expansion and sustainability.

Recognizing the role of ITU

My sincere thanks to the ITU Radiocommunication Bureau for developing software tools to assist in the compatibility analysis exercise, in searching for the most suitable frequency channels and in the application of different propagation models in the calculations, including maps, visualizations, and graphic illustrations.

ITU has also provided software tools with two ITU Radiocommunication Sector ([ITU-R](#)) propagation models, one of which contains terrain data. These tools, available for all countries, can be utilized for more accurate interference analyses to facilitate discussions between countries and successfully coordinate their frequencies.

Together with ITU, the ATU is firmly committed to support all African countries in this project and beyond, regardless of their size, state of economy and varied needs, paying particular attention to the requirements of the least developed, landlocked and the small island States. Together, we are on the same frequency and share the right energy for Africa's ICT development journey. ■

“

These tools, available for all countries, can be utilized for more accurate interference analyses in order to facilitate discussions between countries and successfully coordinate their frequencies.

John Omo





Ham radio and emergency comms: Filling the United States Geological Survey 'donut hole'

By Adam Davidson, W9AS

On July 2nd 2020, shortly before midnight local time in Hawaii, a dozen amateur radio operators did something nobody had ever done before – something that shows the best in amateur radio and could herald a transformation in the role "hams" (another name for amateur radio operators) can play in emergencies.

The Hawaii hams felt an earthquake and sent detailed reports that were immediately used by the United States Geological Survey (USGS) to assess the magnitude and damage done by this latest tremor. Their reports used a special e-mail programme, Winlink Express, that operates through high-frequency radio even when normal communication channels are down.

In the best ham tradition, it all came about through volunteer operators solving problems for an agency in need.

Adam Davidson



Note: This article is republished with permission of the author and the Amateur Radio Safety Foundation, Inc.

It wasn't the biggest earthquake. At M4.6, it woke a lot of people up, gave them a startle, but did minimal damage. The significance of the event was that it proved – once again – that amateur radio operators had found yet another way to play a crucial role in identifying and responding to emergencies.

In the best ham tradition, it all came about through volunteer operators solving problems for an agency in need. It's easy to see how this solution will save lives

when there is – as there will be – more devastating earthquakes and responders are operating blind because of something called "the donut hole".

The danger of donut holes

The donut hole, as seismologists call it, is far more serious than its name suggests. David Wald, a seismologist at USGS, explained that while there are many mechanical seismic sensors around the United States and

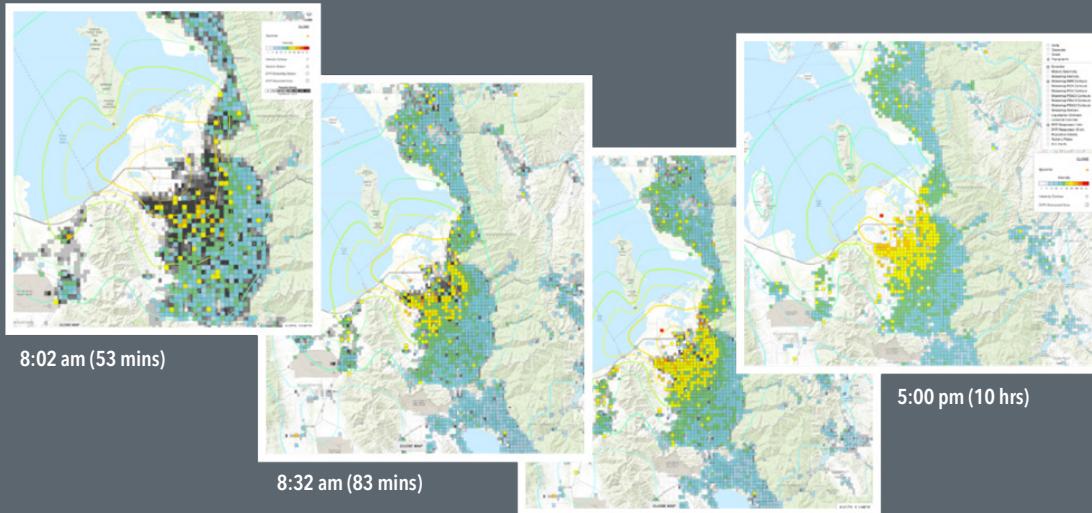
the world, earthquake recovery requires the prompt response of human beings.

Seismic sensors can't be everywhere. But, by definition, people are always in the zones of damage that most concern emergency responders and, as Wald says, "humans are remarkably good at detecting shakes and identifying damage." The issue is getting the observations of those people into the hands of the seismologists and emergency responders.

Example of Did You Feel It (DYFI) "donut hole" for the M5.7 Magna, Utah earthquake that affected Salt Lake City, United States. Note the early-on gap in reporting the most strongly shaken area that gets later filled in.

Image courtesy of USGS.

DYFI data entries filled in area of strongest shaking last!



DYFI = Did You Feel It? – The USGS system for gathering seismic intensity data from the public.

Wald heads the USGS's "[Did You Feel It?](#)" programme. People who feel an earthquake are encouraged to go to the USGS website and fill out questions. They are asked to identify location, time, the level of movement, and the kind of damage – picture frames knocked over? Drywall cracked?

These individual reports, aggregated, provide a remarkably detailed and scientifically significant set of data. Most crucially, people are able to report damage in a way that seismic sensors can't. "The most important thing is the damage," Wald said. "Especially the damage at the centre."

This is the core problem that the Winlink/USGS collaboration addresses. "We get a lot of reports from the periphery of an earthquake," he said. "But we get very few from the centre, where the most damage is." Thus: the donut hole. People right near the centre of an earthquake often lose electric power, cell service, and are in a state of panic.

The last thing they're thinking about is the need to send a report to the USGS.

“
The last thing they're thinking about is the need to send a report to the USGS.
”

Adam Davidson

Hams to the rescue – with the help of ICTs

Wald was wrestling with this "donut hole" problem and communicating with seismologists in Europe who face a similar issue. How could the USGS figure out how to get people close to the centre of an earthquake to report what they feel? Put another way: how could they identify a group of civilians who are spread around the world and who have training and an interest in sending emergency reports and have the equipment to do so even when the power and phone service goes down?

Wald, and his colleague, Vincent Quitoriano, were frustrated with no solution in sight when a remarkable thing happened. They received an e-mail from a ham.

Oliver Dully, K6OLI, lives in Pasadena, California. In late May 2020, after a minor earthquake nearby, he wondered if anybody at the USGS knew about ham radio and the fact that there are hundreds of thousands of people, worldwide, with deep knowledge, great communication equipment, and a strong desire to help in times of crisis. He sent a blind e-mail to the USGS that happened to arrive precisely when it was most needed. Quite quickly, he was on a video chat with Wald and Quitoriano. The USGS team knew a tiny bit about amateur radio, and had seen hams help out during earthquakes. But they had not, before Dully's note, thought of them as the obvious solution to the donut hole problem.

Wald says that Dully quickly convinced him. "Hams usually have backup generators, they think about communications, they are prepared to send out messages even during crises," Wald said.

In addition, since each message would include a call sign, "It gives us more confidence in the data, knowing it comes from people who sign it," he said.

Dully is District Emergency Coordinator for Los Angeles (LA) Amateur Radio Emergency Service®, and had worked closely with the Winlink development team on a special form for LA-area hospitals.

Dully called Mike Burton, XE2/N6KZB, who manages the forms writing process for Winlink. Burton immediately brought in Greg Kruckewitt, KG6SJT, who does the hard work of designing forms.

Connecting hams to emergency communications when all else fails

Winlink is the primary tool used to send written information through high-frequency radio for the amateur radio community as well as for governments agencies worldwide. For decades, it has allowed hams and emergency response officials to communicate over short or long distances when the Internet, cell towers, and other forms of contact are disabled.

It works all over the world, all the time, and requires no infrastructure other than that provided by amateur radio operators themselves. As a result, many emergency planners see Winlink as a crucial backup when all else has failed. The USGS partnership brought a new capability to Winlink, one that is likely to make it even more in-demand.

The Winlink development team has a large library of forms that allow hams to enter information or transmit messages in the specific format needed by whichever agencies are involved in a particular emergency event. Before the USGS partnership, these forms had always been designed for manual use. A ham enters information into a form and sends it. The form is eventually given – electronically or in hard copy – to a person at an agency, who then manually enters the data into their system.

Burton and Kruckewitt realized this process could be too slow for the USGS's needs. The entire point of having reports from earthquake sites is to allow immediate response. The USGS has a [website](#) that any person can use to submit reports that are immediately entered into databases where they are available

to seismologists and emergency responders who can use the information to plan their rescues.

If the Internet were down, hams could send their reports through Winlink but then the details would have to be manually entered. In a typical large earthquake event, USGS expects dozens, even thousands of reports. It would take hours or days to enter all that information. It would only be available long after it served any use.

An innovative pilot partnership with life-saving potential

Kruckewitt, with Winlink, and Quitoriano, with USGS, came up with a new idea. They would redesign the way Winlink forms work so that the reports would be automatically entered into the USGS database, available immediately.

The two men spent hours every day for several weeks building this capability into Winlink. Kruckewitt is a retired kindergarten teacher, not a computer programmer. But he is a ham, so he taught himself how to code the forms.

The results are remarkable. Any agency or amateur radio Winlink user who has experienced an earthquake can quickly call up the "Did You Feel It" form and answer the questions: where are you? What happened?

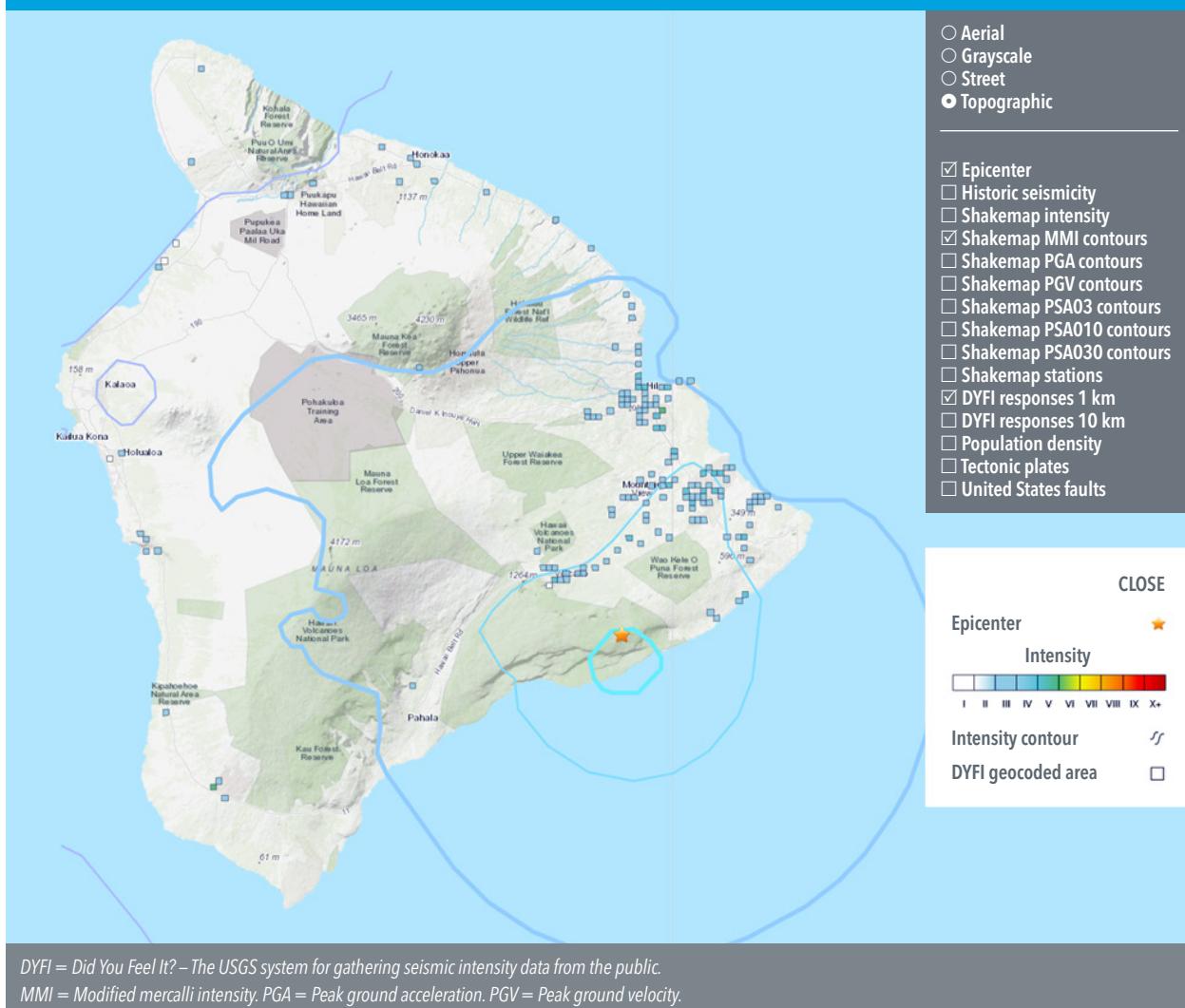
How strong was the shaking? Did you notice the swinging of doors? Did objects rattle, topple over, or fall off shelves? Etc.

If the Internet is working, they can send the form through telnet.

If it's not, they can use radio transmission. The USGS welcomes reports from all over the world, not just the United States. And there are Winlink receiver stations within contacting distance of most HF rigs.

Example of DYFI-AYES data for the July 4, 2020, M4.3 earthquake 13 km south of Fern Forest, Hawaii.

Image courtesy of USGS.



“

The two men spent hours every day for several weeks building this capability into Winlink.

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Adam Davidson

The Winlink/USGS/LAX ARES partnership happened stunningly quickly. Dully sent his original e-mail in late May 2020.

By the end of June the project was ready to be tested. Dully arranged for several groups, including a group of hams in Hawaii, to send test messages into the USGS system. By complete coincidence, the M4.6 earthquake was felt in the midst of this test. So, days before the programme was formally launched, it was used in a real-world event. Then, on Sunday, 5 July, 2020, it was made available to the world.

Kruckewitt says he now knows how to do the hard work of making forms available to databases. Burton says this is transformational for Winlink and its users.

It means that Winlink is even more helpful to partner agencies, since messages and forms can now be designed to be automatically entered into emergency communication databases without requiring human intervention.

Burton is already speaking with several other partner agencies about amending forms or creating new ones. He expects that, once word gets out, he will find many other people like David Wald, folks involved in emergency response who are eager to have quick, reliable, automated reports from amateur radio operators. ■





How the UAE's robust ICT infrastructure brought over 1 million students online amid COVID-19

By **Hamad Al Mansoori**, Director-General of the Telecommunications Regulatory Authority (TRA), United Arab Emirates

It was “learning as usual” until the United Arab Emirates (UAE) confirmed 27 active cases of COVID-19 on 3 March 2020. To curb the spread of the virus amongst children and young people, the Ministry of Education (MoE) took immediate action by bringing forward the spring break and by closing educational institutes for two weeks, starting from 8 March. The MoE also decided to provide education remotely for the following two weeks, with the intention to resume regular learning in schools and colleges thereafter.

Fast forward to the start of the 2020-21 academic year in August 2020 and most students were still learning from home. Government schools began running a home-teaching programme called “Learn from Afar” while private schools started using digital platforms such as Google Classroom, ClassDojo, Seesaw, Teams and Zoom.

“
Almost overnight, the UAE successfully moved 1.2 million students online.
”

Hamad Al Mansoori

The Department of Education and Knowledge in Abu Dhabi and Knowledge and Human Development Authority in Dubai launched specialized portals, [Activity Platform](#) and [In This Together Dubai](#), to support remote learning.

Almost overnight, the UAE successfully moved 1.2 million students online.

The vital role of ICT infrastructure

How the UAE managed this is no mean feat. A raft of supporting initiatives was launched with the aim of maintaining the availability, affordability and accessibility of information and communication technology (ICT) infrastructure and digital services, thereby supporting the continuity of learning from home.

Free Internet data via mobile phone to enable distance learning. The UAE's Telecommunications Regulatory Authority (TRA) informed the telecom service providers to provide free data packages to families without home Internet, so that children could access distance learning.

Enabling applications to support distance learning. In coordination with the telecom service providers, the TRA enabled several applications that were previously unavailable in the country.

Network capacity enhancement and re-engineering. The TRA urged telecom service providers to enhance their network capacity, perform network re-engineering when required, and to implement any necessary changes as soon as practicable in order to facilitate the success of distance learning.

Enhancing digital skills through free online training. To help people to make the best use of their time at home, the TRA provides online training through its virtual academy called [TRA Virtual Academy](#). The platform offers interactive, online training courses on trending topics of business, technology and soft skills around-the-clock for free.

Suspending the deactivation of mobile services. The TRA instructed telecom licensees to suspend the deactivation of mobile services for those who could not provide renewed documents to ensure service continuity. This, in turn, helped students learning from home.

“

The UAE's Telecommunications Regulatory Authority informed the telecom service providers to provide free data packages to families without home Internet, so that children could access distance learning.

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Hamad Al Mansoori

Promoting security awareness through digital campaigns. The TRA led the efforts of raising public awareness on the implications of COVID-19 on cybersecurity and the safe ways of learning from home through online sessions and videos presented to students in schools and to their families.

Increasing fixed broadband speed to 100 Mbit/s. The TRA increased the speed of fixed broadband to 100 Mbit/s (megabits per second) to facilitate high Internet speeds and to ensure the best quality of video and voice calls and sharing files online for a smooth distance learning experience.

Activating a satellite operations centre. The UAE Government developed a satellite operations centre that provided free satellite services to ensure students in remote areas of the UAE had access to the Internet at all times and could thereby continue their education.

Building on 20 years of ICT investment

The foundation of these overnight successes was laid down about two decades ago. At the turn of the century, the UAE launched [Dubai Internet City](#) followed by [Dubai Media City](#) to support technology companies in the country as well as boost technological advancements and economic growth throughout the region. Later, in 2005, [Dubai Silicon Oasis](#) was established. Today, there are several free zones in the UAE that promote ICTs, stretching from

The TRA increased the speed of fixed broadband to 100 Mbit/s (megabits per second) to facilitate high Internet speeds.

Hamad Al Mansoori

Abu Dhabi and Dubai to Sharjah and Fujairah.

The UAE Government further invested in ICTs through the TRA's ICT Fund, Centre of Digital Innovation ([CoDI](#)) and various eLearning and mLearning programmes. Launched in 2007, the primary role of the ICT Fund is to allocate financial resources to projects that develop the UAE's capabilities in the field of ICT. By 2014, the ICT Fund invested more than AED 1.6 billion in various projects including in education and space technologies.

CoDI was launched by TRA in 2013 to make the UAE a smarter and digitally transformed nation. It currently facilitates various capacity building and research

and development activities resulting in knowledge-generating products and services, primarily in ICTs.

Pre-pandemic online education in the UAE

Several eLearning, mLearning and distance learning programmes were in force in the UAE long before the emergence of COVID-19. For instance, the [Madrasa](#) eLearning platform offers 5000 videos in general science, math, biology, chemistry and physics for students from kindergarten to grade 12. Launched in 2018, the free online platform is accessible for over 50 million Arab students around the world through the Madrasa app.

Another example is [Duroosi](#), which means "my studies" in Arabic. Duroosi is a YouTube channel launched by the UAE Ministry of Education in partnership with Etisalat and Google. The channel provides hundreds of tutorials on a variety of subjects based on the national curriculum for Grade 11 and 12 students with an aim to help families cut the high cost of private tuition. See [video](#) (in Arabic language).

Hamdan Bin Mohammed Smart University is the first MoE-accredited eLearning academic institution in the UAE. Launched in 2002, it offers online studies through state-of-the-art innovative technologies such as the Virtual Learning Environment, Smart Campus and mobile learning. The university has designed, developed and implemented

flexible and responsive platforms to facilitate learners' access, interactivity and learning as well as the ability to track their progress throughout their studies.

A bright spot in the future of digital education in the UAE is the opening of **42 Abu Dhabi**, a coding school that claims to have "no classes, no teachers and

no fees." Students will learn in a self-directed manner and mentor one another through projects and internships. 42 Abu Dhabi is one of the 20 international campuses of the 42 programme, first launched in Paris in 2013. The Abu Dhabi campus plans to welcome students in February 2021. (See [video](#)). ■

 The 42 Abu Dhabi coding school with ZERO teachers, tuition, classes, or restrictions





Practical competition to find radio-frequency interference emitting sources during the 2017 Spectrum Engineering and Cross-border Radio Frequency Coordination Training in Xi'an, Shaanxi Province, China.



Developing spectrum management capacity across the Asia-Pacific Region

By **Aamir Riaz**, Programme Officer, [ITU Regional Office for Asia and the Pacific](#)

■ Last year, we witnessed dramatic changes in the way we live and work due to COVID-19.

Our global dependence on digital technology seemed to skyrocket almost overnight, as many of us were forced to switch from offline to online modes of work and life.

At the same time, the value of resilient and reliable digital infrastructure and networks has never been clearer or timelier,

especially given the rapid roll-out of 5G networks and services across the globe.

The real 'hidden heroes'

Information and communication technologies (ICTs) have been called the "hidden hero" of the COVID-19 pandemic. But perhaps even more "hidden" are the people supporting the efficient and effective management of ICT infrastructure and networks.

This is particularly apparent when it comes to the management of spectrum, an increasingly precious natural resource in our digital era.

The efficient and equitable use of the radio spectrum resource not only supports rapid responses to disasters and emergencies such as COVID-19, but also helps sustain and scale up the digital transformation efforts of entire countries – and their future generations.

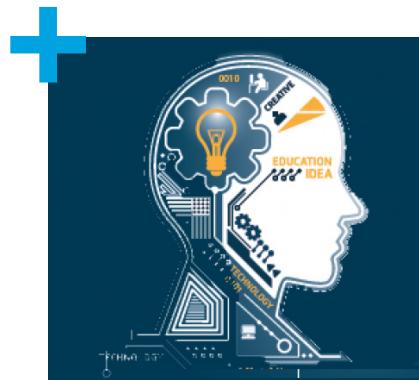
Governments can achieve the efficient management of spectrum by establishing the national spectrum management and radio frequency (RF) monitoring processes. They create a technical and regulatory envelope within which command-and-control procedures can operate successfully and safely.

Free spectrum management training

In order to support such efforts and build required capacity, [ITU's Regional Office for Asia and the Pacific](#) has been collaborating with the State Radio Monitoring Center Testing Centre ([SRTC](#)) of China's Ministry of Industry and Information Technology ([MIIT](#)).

ITU and SRTC organized practical training on issues related to spectrum management and radio-frequency monitoring free of charge.

As part of the ITU Centres of Excellence (CoE) for the Asia and the Pacific region, the Centre has succeeded in training nearly 1000 participants over the years.



Centres of Excellence

The ITU Centres of Excellence (CoE) initiative is one of ITU's key training delivery mechanisms.

CoE networks have been established in a number of regions including Africa, the Americas, Arab States, Asia-Pacific, Commonwealth of Independent States (CIS) and Europe.

Under the umbrella of the [ITU Academy](#), these regional networks are brought together into a single global network sharing expertise, resources and capacity-building know-how in telecommunications and ICT training/education.



[Read more here.](#)



The two-week course on spectrum management and radio-frequency monitoring in August 2020 saw 358 participants from 58 countries.

Aamir Riaz



In 2020, due to COVID-19 restrictions, the training was organized online which has proven effective to encourage participation from all over the world.

The two-week course on spectrum management and radio-frequency monitoring in August 2020 saw 358 participants from 58 countries, covering not only Asia and the Pacific, but also the Americas and other regions.

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The ITU Academy platform created a digital space for discussion and knowledge sharing through online forums.

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Aamir Riaz

The active engagement and enthusiasm of the participants was palatable, with an average of 45 questions asked per session.

In addition, the [ITU Academy](#) platform created a digital space for discussion and knowledge sharing through online forums created by both tutors and participants.

To continue responding to the increasing demand and requests for support in spectrum management and the capacity development, ITU is planning to provide demand-driven technical assistance, tailored specifically for the region.

The ITU Academy training courses

ITU designs and develops standardized training programmes and resources corresponding to ITU main areas of activity.

Training programmes include the Spectrum Management Training Programme, Quality of Service Training Programme and ICT and Climate Change Training Programme.



To browse all ITU Academy training activities, visit the [online catalogue](#).



Participants during a field visit to an SRTC monitoring station during the CoE training on Spectrum Management and IMT-2020 Radio Technology Application in Harbin, Heilongjiang Province, China in 2019.

By enhancing the knowledge, expertise and capacity in spectrum management and radio-frequency monitoring, ITU is helping not only to address the immediate needs of connecting people with affordable access to the

Internet, but also advancing digital transformation, with resilient, robust, and reliable networks for the future. ■





ITU Regional Forum addresses opportunities and challenges of 5G implementation in Europe

By Jaroslaw Ponder, Head of [ITU Regional Office for Europe](#)

“Just as 4G deployment was carried out across Europe with a strong focus on leaving no one behind, it is now our duty to ensure that an enabling regulatory environment sustains the deployment of 5G in a way that connectivity is leveraged by all and for all,” said Doreen Bogdan-Martin, Director of the Telecommunication Development Bureau at the ITU, as she welcomed participants of the [ITU Regional Forum for Europe on 5G strategies, policies, and implementation](#) held last October.

The event was one of several milestones of the [ITU Regional Initiative for Europe](#) on broadband infrastructure, broadcasting and spectrum management.

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The event was one of several milestones of the ITU Regional Initiative for Europe on broadband infrastructure, broadcasting and spectrum management.

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Jaroslaw Ponder

Organized with the support of the Chancellery of The Prime Minister of Poland (KPRM), the Forum was opened by H.E. Marek Zagórski, Poland's Secretary of State Government Plenipotentiary for Cybersecurity, who called for "connecting the unconnected" and "bridging the digital divide" as priorities in the context of Sustainable Development Goal (SDG) [No. 10](#) on reducing inequality.

Zagórski went on to highlight Poland's achievements in the provision of high-quality connectivity towards an Internet Society by 2025, and called for the urgent need to address misinformation around 5G in Europe and beyond.

The Forum gathered 260 delegates from over 70 countries and featured high-level representatives of ITU Europe regional administrations, including delegates from the KPRM and from the German government, which at the time held the Presidency of the Council of the European Union (more about Germany's presidency of the Council of the European Union in 2020 [here](#)).

The virtual meeting also hosted representatives of international and regional organizations such as the World Health Organization

(WHO), International Commission on Non-Ionizing Radiation Protection (ICNIRP), the European Broadcasting Union (EBU), the Nordic Council of Ministers, Eastern Partnership Electronic Communications Regulators Network (EaPeReg), the Body of European Regulators for Electronic Communications (BEREC) and a number of national regulatory authorities and information and communication technology (ICT) ministries from both European Union (EU) and non-EU countries as well as important industry associations such as the European Telecommunication Network Operators' Association (ETNO), the EMEA Satellite Operators Association (ESOA), the European Competitive Telecommunications Association (ECTA), [DIGITALEUROPE](#), and [GSMA](#).

5G strategies and implementation dynamics

More than 50 speakers provided participants with a comprehensive overview of the status of 5G rollout, focusing on regional and national strategies and policies as well as other ongoing implementation challenges relevant to stakeholders in the Europe region.

Regional organizations and industry associations followed by discussing key priorities for the region, including the importance of international cooperation, industry collaboration, and regulation.

Jaroslaw Ponder

The first day of proceedings saw context-setting interventions from the ITU Telecommunication Standardization Bureau (TSB) and the ITU Radiocommunication Bureau (BR), both of whom recognized excellent ITU cross-sectoral collaboration. Regional organizations and industry associations followed by discussing key priorities for the region, including the importance of international cooperation, industry collaboration, and regulation creating the necessary incentives for 5G deployment to deliver social and economic impact as well as the challenge of radio-frequency electromagnetic fields (RF-EMF).



The economic contribution of broadband, digitization and ICT regulation: Econometric modelling for the ITU Europe region

This new report is a global econometric analysis of robust and reliable data resources to measure the impact of fixed and mobile broadband and digital transformation on the economy as a whole. It also focuses on the impact of broadband, digital transformation and policy and regulatory frameworks on the growth of markets for digital services in the Europe region.



Download the report [here](#).

Sessions 2 and 3 offered a detailed picture of the status of 5G implementation both in EU and non-EU countries. Administrations and national regulatory authorities recognized the importance of the transition to 5G converging towards the notion of "connecting everyone and everything" and reiterated how international cooperation must ensure a consistent deployment of 5G across the region, especially in context of the post-COVID economic recovery.

In his second day keynote, 2020 BEREC Vice-chair Jeremy Godfrey highlighted the importance of sustainability and resilience in the post-COVID-19 world, saying that regulation will mean finding new ways to unlock investment and innovation towards 5G.

From the 5G commercialization and market development perspective, industry representatives from satellite, mobile and equipment providers noted in Session 4 that efforts and expectations should be placed in the business-to-business (B2B) rather than in the business-to-customer (B2C) segment, and should focus on innovation-driven public-private partnerships as well as on the industrial Internet of Things (IoT) environment enabling the

emergence of 5G applications and ecosystems.

During the Forum's final session on the challenge of increasing public concern about RF-EMF, it was widely agreed that the focus should shift from the scientific evidence, which is already there, to elaborating new strategies for 5G and EMF risk communication, as some countries have already undertaken.

New publications, upcoming priorities and next steps

In the context of the Forum, and to prioritize topics for future consideration at the regional level, the ITU Office for Europe announced the publication of two background papers.

One includes a series of country profiles on [5G implementation dynamics in 18 non-EU countries in the Region](#), featuring the implementation of 5G strategies, frequency allocation, EMF regulation as well as private sector trials and commercialization at the country level. The country profiles are designed to act as a reference for decision makers and as a platform to monitor progress in reducing intra-regional gaps.

The other background paper on 5G and electromagnetic fields (EMF) responds to concerns of administrations observed across Europe by referencing scientific evidence and recommendations as well as outlining key challenges and open questions, including misinformation and the social and economic cost for societies resulting from holding back 5G. The paper aims to support administrations in their efforts to elaborate communications on 5G at the national level.

All in all, the event showcased ITU cross-sectoral collaboration in the service of safeguarding digital inclusion, sustainable economic development and advancing the ITU Regional Initiative for Europe on broadband Infrastructure, broadcasting and spectrum management.

The outcomes of this Forum will also serve as reference points for Study Groups across ITU, from [Development](#) to [Standardization](#) to [Radiocommunication](#).

5G Techtritory Baltic Sea Ecosystem Forum

Building on the outcomes of this Regional Forum,

the “5G Techtritory” Baltic Sea Ecosystem Forum, co-organized by the ITU Office for Europe, provided an additional platform in 2020 for over 1000 stakeholders to strengthen the Baltic ecosystem for 5G implementation.

A series of high-level debates were supplemented by practical case studies by policymakers, heads of major industry organizations, business leaders, and other stakeholders highlighting the latest progress in 5G global commercialization, its related innovative business models, and potential 5G cross-border projects. Areas of focus included smart mobility, smart cities, smart media and entertainment, and industry 4.0.

All stakeholders are invited to join ITU’s workstreams dedicated to 5G and to learn more about its implementation in the Europe region. One way to start is by reading the [Outcome Report](#) of the ITU Forum on 5G Strategies, Policies and Implementation, where you will discover more details about the topics covered. The Forum’s proceedings and presentations can be found [here](#).



ITU Regional Forum for Europe on 5G strategies, policies, and implementation

The event provided an opportunity to address the status of implementation of 5G strategies across Europe and the key challenges surrounding 5G implementation. Key topics covered by the workshop included:

- ▶ Regional 5G Strategies and policies
- ▶ National 5G Strategies and policies in EU countries
- ▶ National 5G Strategies and policies in non-EU countries
- ▶ 5G implementation: Private sector developments and commercialization
- ▶ 5G implementation: EMF and other challenges



Read the [Outcome Report](#).



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Why the 2020 World Radiocommunication Seminar plenary was open to everyone

By Mario Maniewicz, Director of the [ITU Radiocommunication Bureau](#)

Just over a year ago, we concluded [WRC-19](#): the 2019 World Radiocommunication Conference. The decisions of the conference opened the opportunity for introducing new and advanced radiocommunication systems.

WRC-19 also paved the way to connect the world using innovative terrestrial and space-based communication technologies, including 5G, high-altitude platform stations, and constellations of non-geostationary orbit (NGSO) satellites.

The digital revolution is continuously opening doors to a variety of new applications that are spurring greater interest in, and demand for, the limited spectrum and orbital resources.

“

It is our role to inform all individuals and organizations about the Radio Regulations, the international standards that govern these systems, and how to implement them.

”

Mario Maniewicz



This article has been adapted from opening remarks at the ITU World Radiocommunication Seminar (WRS-20).

This increased demand requires that effective spectrum management processes be implemented.

The allocation of radio frequencies, the sharing, and harmonization of their use for different purposes, is done through an international treaty called the [Radio Regulations](#). These regulations ensure that the use of the radio-frequency spectrum is rational, equitable, efficient, and economical, while aiming to prevent harmful interference between different radio services.

From understanding to implementation

For more than a century, the Radio Regulations have governed the global use of radio-frequency spectrum and associated satellite orbits. ITU also develops international standards that ensure radiocommunication services adhere to minimum technical requirements and operate without interference.

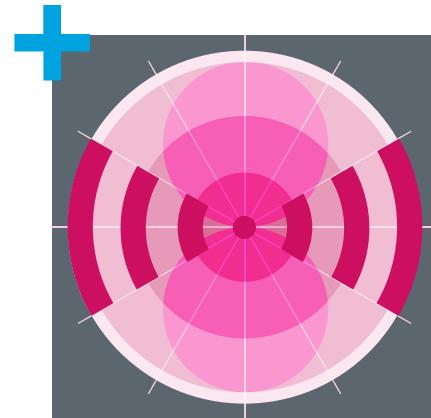
Understanding how to implement these regulations and standards at national level is critical to building robust digital ecosystems that promote access to next-generation technologies.

This is why, for the first time ever, we have opened the plenary sessions of this year's World Radiocommunication Seminar ([WRS](#)) to everyone, no matter whether they are members of ITU or not. We are thrilled that more and more people are using and deploying radiocommunication systems. And it is our role to inform all individuals and organizations about the Radio Regulations, the international standards that govern these systems, and how to implement them.

This way, next time an agency, company or university plans to launch a new radiocommunication system, for example a small satellite, they will know the framework and rules that enable governments worldwide to obtain and maintain rights to use spectrum in order to operate their radiocommunication networks without causing or suffering from [harmful interference](#).

What was to be expected at WRS-20?

ITU organizes World Radiocommunication Seminars ([WRS](#)) on a biennial basis, to complement the cycle of Regional Radiocommunication Seminars ([RRS](#)).



The ITU organizes World Radiocommunication Seminars (WRS) on a biennial basis, in complement to the cycle of Regional Radiocommunication Seminars (RRS). WRS deal with the use of the radio-frequency spectrum and the satellite orbits, and, in particular, with the application of the provisions of the ITU Radio Regulations.



More about the World Radiocommunication Seminar (WRS-20) [here](#).

World Radiocommunication Seminars deal with the use of the radio-frequency spectrum and the satellite orbits, and the application of the ITU Radio Regulations.

Hosting a global virtual event means we must go the extra mile to accommodate participants in different time zones, which is why WRS-20 was presented twice each day. The first session was held for participants in the Asia-Pacific, and East and Southern Africa Regions, while the second was presented for the Americas, Europe, Commonwealth of Independent States (CIS), Arab States and West Africa regions. Recordings of the seminar sessions were also made available on the event website.

During the first week, the plenary sessions covered the basics of spectrum management at national, regional, and global levels. We reviewed the ITU Radio Regulations as updated by WRC-19, overviewed the regulatory framework for terrestrial and space radiocommunication services, and updated participants on the current activities of the ITU Radiocommunication Sector (ITU-R) [Study Groups](#).

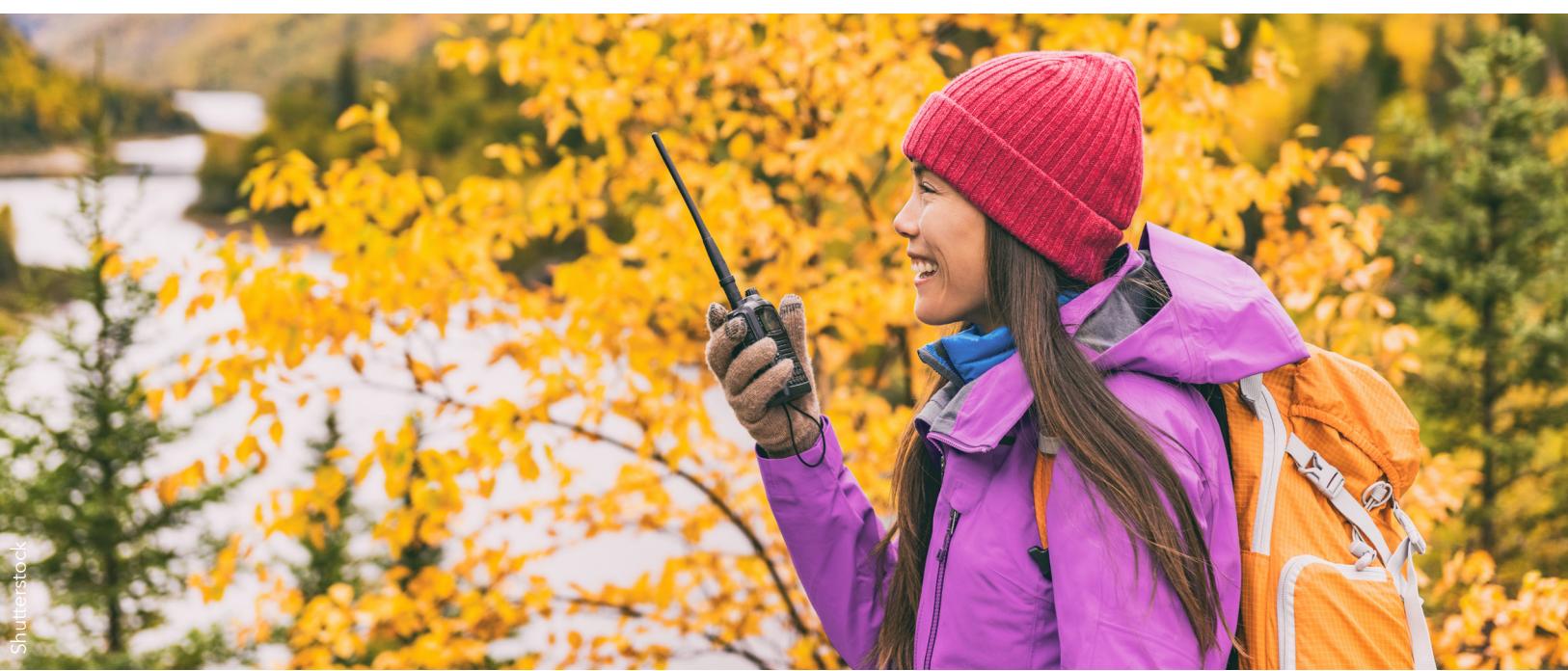
The second week, limited to ITU members only, featured basic training workshops on how to use ITU-developed tools for frequency notifications and technical examinations. Hands-on exercises enabled participants to master both the procedures and the software that ITU-R uses to process filings. Participants were be able to alternate between space and terrestrial services and between lectures and practical sessions.

How to get involved

I am also delighted to announce the launch of a new programme called Network of Women for WRC-23 ([see video](#)), and I invite you to join this initiative aimed at increasing gender parity in the work of the ITU Radiocommunication Sector and in the information and communication technology (ICT) industry, in general.

I hope you all enjoyed the 2020 World Radiocommunication Seminar. For those entities that have yet to join ITU, I invite you to become a member and participate actively in our work as a Sector Member, Associate or Academia.

For our current members, I wish you great success in your work to implement systems in accordance with the Radio Regulations as you continue to produce tangible benefits to connect people everywhere. ■



NOW4WRC23: Inspiring a new generation of women in radiocommunications

By ITU News

■ 25 years ago, the world adopted what is considered the most progressive blueprint ever for advancing women's rights: the [Beijing Declaration and Platform for Action](#).

The world has also embarked on a Decade of Action to achieve the 2030 Agenda for Sustainable Development, which includes Sustainable Development Goal (SDG) [No. 5](#) on gender equality.

But we have a long way to go yet, especially in the information and communication technology (ICT) sector. According to a UNESCO [report](#), women continue to be under-represented in science, technology, engineering and mathematics (STEM) studies.

Only 35 per cent of STEM students in higher education globally are women.

Only 35 per cent of STEM students in higher education globally are women.

When it comes to increasing these numbers in the world of radiocommunications, the Network of Women for WRC-23 (#NOW4WRC23) initiative at ITU is taking on the gender equality challenge in a bold way.

Radiocommunication Sector was adopted during [WRC-19](#) in Sharm-el-Sheikh, Egypt.

As a follow-up to the implementation of the WRC-19 Gender Declaration, the Radiocommunication Advisory

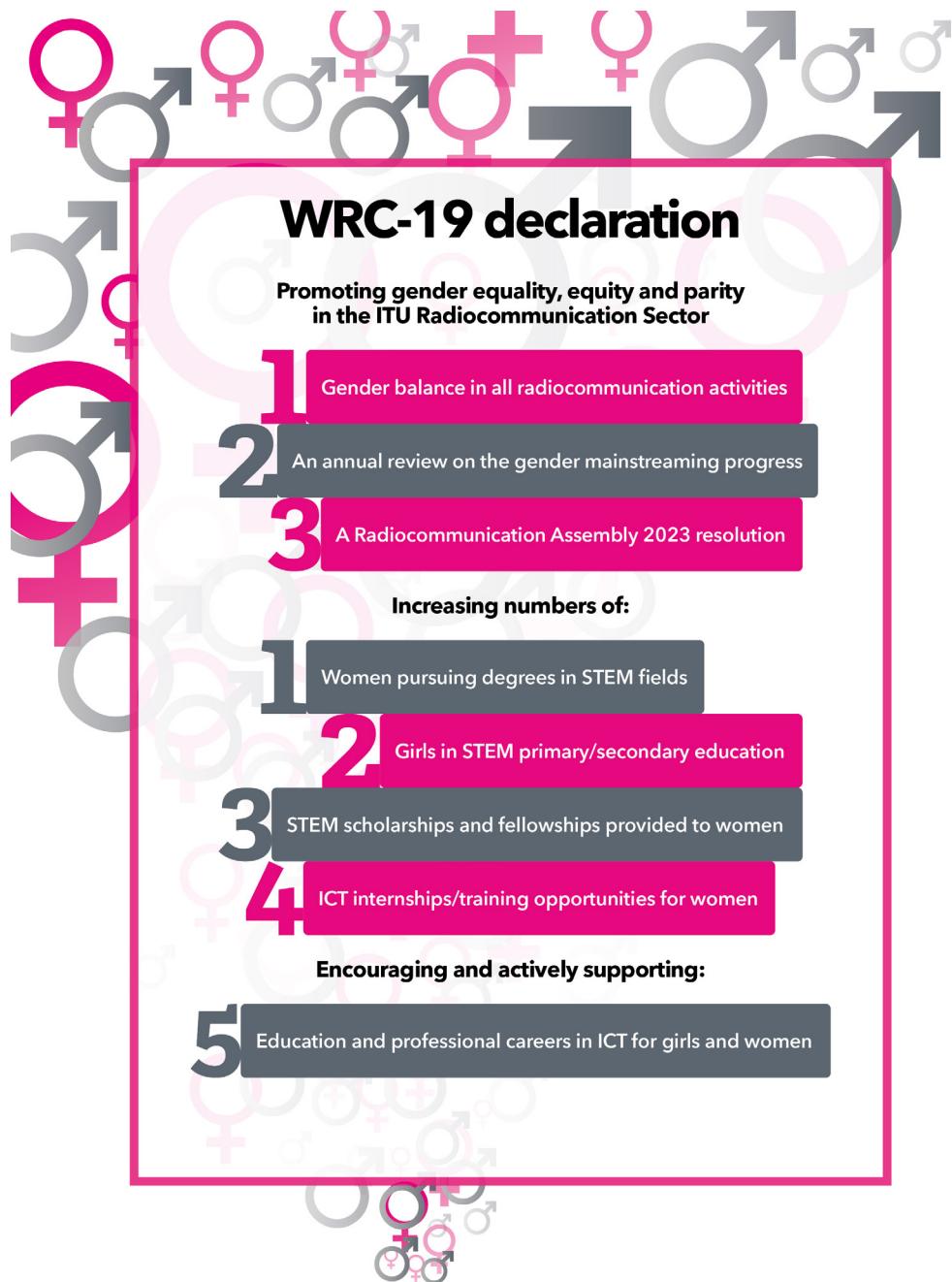
Group ([RAG](#)) – which reviews ITU-R priorities and strategies – established a [Correspondence Group on Gender](#) to consider how to initiate and implement the Declaration before the next [Radiocommunication Assembly](#) (RA-23).

What is NOW4WRC?

Inspired by the [We Lead initiative](#), NOW4WRC aims to increase the number of women participating in and taking on leading roles, such as committee chairs and conference chairs, in the technical conferences of ITU's Radiocommunication Sector ([ITU-R](#)).

The main objectives of the initiative are three-fold: to strive for gender balance among delegates, to prepare women delegates in key roles for the upcoming World Radiocommunication Conference (WRC-23), and to grow the ITU women's community in terms of contributions to the crucial conference and the technical field of radiocommunications, in general.

A major milestone was reached in 2019, when an official [Declaration](#) to promote gender equality, equity and parity in the work of the ITU



In her own words

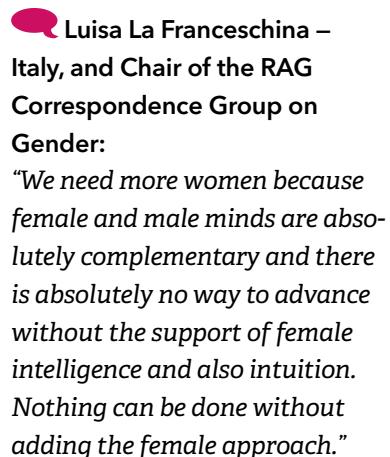
Here's what women contributors to NOW4WRC had to say about the initiative's role in achieving gender equality in the radiocommunications world:

 **Cindy Cook – Canada:**
"I believe the Declaration was a great first step in raising awareness on gender issues in the ITU–R. Now we must carry that momentum forward. There [are] a couple of things in the Declaration that are tangible [and] we can take next: the drafting and approval hopefully, at RA-23, of a Resolution on Gender Equality, Equity and Parity in the ITU–R."

 **Sahiba Hasanova – Azerbaijan:**
"I would like to thank all Member States who worked hard for [the] adoption of this Gender Declaration. The aim of this Declaration is to encourage a large participation of women to attend ITU–R meetings and conferences as women chairs and vice-chairs. As a follow up [to the] WRC-23 Declaration we need more women and mentors to help more women and encourage them to be chairs and vice-chairs of ITU–R."


I see the Radiocommunication Sector benefiting immensely from gender mainstreaming and the empowerment of women through ICT. In this Decade of Action for the 2030 Agenda, we must accelerate women's participation in the digital economy if we are to meet UN Sustainable Development Goal 5 on achieving gender equity.

Mario Maniewicz
 Director, ITU
 Radiocommunication Bureau


Luisa La Franceschina – Italy, and Chair of the RAG Correspondence Group on Gender:
"We need more women because female and male minds are absolutely complementary and there is absolutely no way to advance without the support of female intelligence and also intuition. Nothing can be done without adding the female approach."

Exceeding 30 per cent

Another key aim of the NOW4WRC23 initiative is to exceed the 30 per cent threshold of women in key roles at ITU-R meetings and conferences, which is deemed necessary to effect tangible change.

 **Luciana Camargos – Brazil:**
"The delegations need to send more women. 20 per cent of women delegates is not very high. Unless the delegations themselves commit to send more women to the meetings, it's going to be difficult to overcome that barrier. That effort needs to come from the countries."

 **Carol Wilson – Australia and Chair of ITU-R Study Group 3:**
"I think it's important to have the broadest representation of everyone with talents and skills in an event like the WRC or in the ITU–R meetings. I think that we need the widest number of experts that we can get and that we need to draw not just from men but from women as well. I know many women who have a lot of skills and background and technical expertise to offer to this process."

 **Chantal Beaumier – Canada, Chair of the Radio Regulations Board (RRB):**

"In Canada we've always made an effort from the government side at the very least to have strong representation from women and all my colleagues that have been involved in ITU-R activities. It starts with the national delegations, administrations and regulators encouraging these women to participate in the meetings. For those that actually come to the meetings there is a lot of great talent out there and great potential to assume our

responsibilities. We're certainly pleased at the RRB we've seen there is more women representation on the committee on the Board so we hope it will continue. But there is still a lot of work to do there is no doubt."

 **Basebi Jaqui Mosinyi**

– Botswana:

"We are available as the Network of Women to mentor you through all the processes which are quite complicated. So, come close so that we are able to assist you and launch you even further. We are here to assist."

The NOW4WRC23 initiative has the strong support of Mario Maniewicz, Director of the ITU Radiocommunication Bureau, who said: "I see the Radiocommunication Sector benefiting immensely from gender mainstreaming and the empowerment of women through ICT. In this Decade of Action for the 2030 Agenda, we must accelerate women's participation in the digital economy if we are to meet UN Sustainable Development Goal 5 on achieving gender equity."

NOW4WRC23 is open to participation by any representative of an ITU Member State, ITU-R Sector, including SME or Academia, Member or ITU-R Associate and active participation is strongly encouraged. ■

 **Network of Women – Making sure all the doors are open**



More about the initiative and get involved [here](#).



Girls can love math, but teachers need to help them believe. Here's why.

By Joanne Wilson, Deputy Director of the [ITU Radiocommunication Bureau](#)

■ Let me tell you a story.

Once upon a time, there was a little black girl in an inner-city public school in Washington, DC: JoJo.

She was a good student and, like all children with promise, JoJo was regularly asked the question: "What do you want to be when you grow up?"

In Kindergarten, she wanted to be a nun, but as the years went by, and she learned more about the world, she also thought about becoming a park ranger, an astronomer, a lawyer and so on.

“

Considering the challenges that women of colour experience in their careers, JoJo was very fortunate that she had mentors and sponsors who believed in her.

”

Joanne Wilson



The following article is an adapted version of remarks at the United Nations Headquarters in New York for the 5th International Day of Women and Girls in Science Assembly: "Investment in Equality in Science, Technology and Innovation in the Era of Digitalization for Sustainable Development."

But how likely was it that the little black girl in an inner-city public school would follow one of the fascinating science, mathematics, technology and engineering (STEM) fields?

According to the statistics on gender, it was not very likely.

The importance of a supportive learning environment

However, what we also know is the importance of a supportive learning environment, especially during the early years of life, and that exposure to hands-on activities, practice of spatial and language skills, and equal treatment of boys and girls can help inspire girls' interest in and desire to pursue a STEM career.

Luckily, JoJo had great parents and loving and progressive teachers at her schools.

In her elementary school, the teachers started a math club where they introduced the kids to different number systems, showed them how to have fun with mathematics, and provided the opportunity for JoJo to discover that she really liked math and was good at it.

So she kept taking the most advanced math classes.

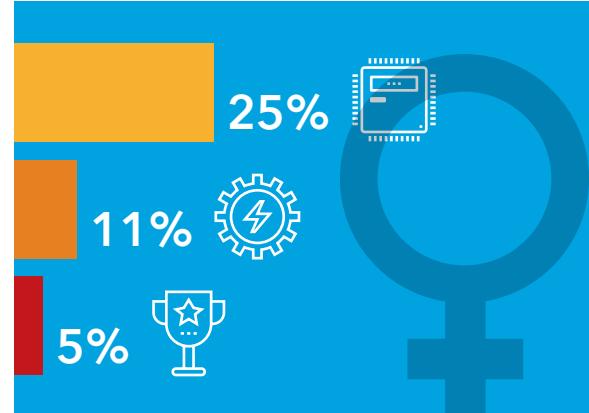
In the 11th grade, JoJo's math teacher submitted her students' applications to MIT's Minority Introduction To Engineering (MITE) programme. JoJo was accepted.

In the 12th grade, the Principal at JoJo's high school opened a Calculus class for only three students, waiving the rule of establishing a dedicated class only if there were 15 or more students.

So by the time she graduated from her inner-city public high school, JoJo was ready to pursue engineering in university. She was successful and went on to earn a Master of Science degree in electrical engineering from Stanford University.

Graduating in engineering gives no assurance of a STEM career

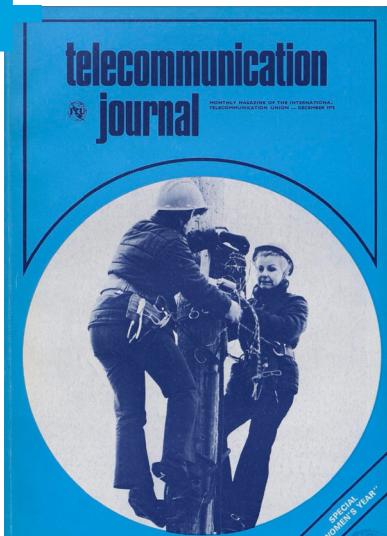
But our story has not ended. Graduating in engineering did not assure a long or successful STEM career, not even an engineering degree from Stanford. In fact, 40 per cent of women who earn engineering degrees never enter or pursue the profession.



Yet JoJo went on to pursue a career in information and communication technology. She was a minority in the labour market, where women held only 25 per cent of computing jobs, 11 per cent of engineering jobs, and only 5 per cent of leadership positions in the technology sector as a whole.

Considering the challenges that women of colour experience in their careers, JoJo was very fortunate that she had mentors and sponsors who believed in her, promoted her to managerial and director levels, and put her forward for new opportunities.

JoJo's story is my story. But, my story is not unique. It is the story of the men and women who enter and are successful in the STEM fields.



A glance back to 1975 – International Women's Year

How was the telecommunication sector for women back in 1975?

Take a look inside this historical edition of the ITU News Magazine (then the Telecommunication Journal) Special Women's Year Edition for insights from women engineers from another era.



[Accessible here.](#)

Sometime early on, we developed a love for mathematics and science; sometime in grade school years we were introduced to STEM fields. Some teacher or teachers supported our sense of confidence that we had what it took to have a successful and fulfilling career. Some managers and corporate leaders mentored, coached and sponsored us.

Gender parity in ITU – work still needed

Today, I am the Deputy to the Director of the Radiocommunication Bureau in the International Telecommunication Union (ITU), the United Nations specialized agency for information and communication technologies. ITU has been making progress, but more work is still needed to achieve gender parity and balance in the different Sectors of the Union.

In 2019, the World Radiocommunication Conference gathered more than 3400 delegates representing 163 countries and 129 other entities in Sharm-el-Sheikh, Egypt.

Women made up only 18 per cent of the delegates participating in the conference, which was up from the meager 12 per cent of the World Radiocommunication Conference (WRC) delegates in 2000.

The ITU conference that recognized the importance of gender equality

WRCs are hugely important conferences that shape the future of telecommunications globally and impact the future world economy.

However, in the midst of that very important event and led by the ITU's "Network of Women", the WRC recognized that the limited progress toward gender equality was an equally important matter that needed to be addressed.

So, in addition to its normal decisions revising the international treaty on Radio Regulations, the conference adopted its first ever "*Declaration on Promoting Gender Equality, Equity and Parity in the ITU Radiocommunication Sector*." The conference declared that ITU Member States and Sector Members:

- Should urgently undertake active measures to increase the number of girls receiving primary and secondary education in mathematics and science that is sufficient to prepare them for undergraduate degrees in STEM fields, particularly in electrical engineering and computer science, which are critical for the development of ICT.
- They should encourage the adoption of proven measures to increase globally the number of women pursuing academic degrees at all levels in STEM fields, particularly those related to ICTs.
- They should substantially increase the number of scholarships and fellowships provided to women pursuing academic degrees at all levels in STEM fields, particularly in electrical engineering and computer science.
- That by 2023, (the next WRC) Member States and Sector Members should substantially increase the number of internships, training opportunities and summer jobs available for women pursuing academic

degrees in fields related to the development of ICT. And...

- They should encourage and actively support ICT education for girls and women, and support all measures that will help prepare them for a professional career in ICTs.

Global challenge

When we celebrate the International Day of Women and Girls in Science, our global challenge is to ensure that all young women have a supportive childhood and have access to experiences that will lead them to successful academic and professional STEM careers.

I echo the call to action issued by the Gender Declaration of the WRC-19. The key to achieving gender equality in the STEM fields starts with ensuring that all our children, particularly young women, have the appropriate academic preparation and childhood experiences for them to pursue future STEM careers.

It's been a real privilege to listen to the various speakers before me and particularly to listen to our younger delegates.

“

We also take this opportunity to call for greater support of the grade school teachers who inspire, encourage and support girls' dreams to become the next generation of STEM professionals.

”

Joanne Wilson

Quality teachers – key to inspiring and influencing future STEM students

Reflecting on my own life's experience, I must echo the message of HRH Prince Zain El-Hashemite who talked about the importance of teachers and the teaching profession. He is right!

We must recognize that they, along with parents, have a profound capacity to shape the next generation of scientists and engineers. They influence – intentionally or unintentionally – who will pursue STEM fields.

Access to quality teachers will determine who – male or female – will be prepared to pursue STEM fields. And, to the extent education shapes the whole person, they will influence the character of the future workforce and whether it will be a more or less attractive environment where women will both collaborate and compete with their male peers.

Toward that end, we also take this opportunity to call for greater support of the grade school teachers who inspire, encourage and support girls' dreams to become the next generation of STEM professionals.

Personally, I would like to take this opportunity to recognize my elementary school teachers who started our Math Club, and to dedicate this presentation to the loving memory of Mrs Estelle Feeling, my 11th grade math teacher who submitted my application to the MITE programme, and Mr James Curry, my high school Principal who approved a Calculus class for only three students.

I am forever grateful to them and to all the teachers of Davis Elementary School, Kelly Miller Jr High and HD Woodson Sr High who shaped and set me on my path in life. ■



ITU's Digital Skills Assessment Guidebook

This guidebook can be used to determine the existing supply of a digitally skilled cohort at a national level, to assess skills demand from industry and other sectors, to identify skills gaps, and to develop policies to address future digital skills requirements. A must-have for policy-makers and other stakeholders.



Access the guidebook [here](#).

Maritime Manual 2020

This manual is a reference document that notes all the relevant rules or provisions from the ITU Radio Regulations that deal with maritime issues.

It provides the operational procedures that should be followed by a ship station or a coast station in case of a distress situation.

It also provides all the rules and procedures of the Global Maritime Distress and Safety System (GMDSS) – a collection of radio communications procedures and their supporting radio systems, which support maritime safety and the rescue of ships or crew during distress situations worldwide.

The publication is now available for purchase, in both multilingual (Arabic, Chinese, English, French, Russian and Spanish) CD and paper formats.

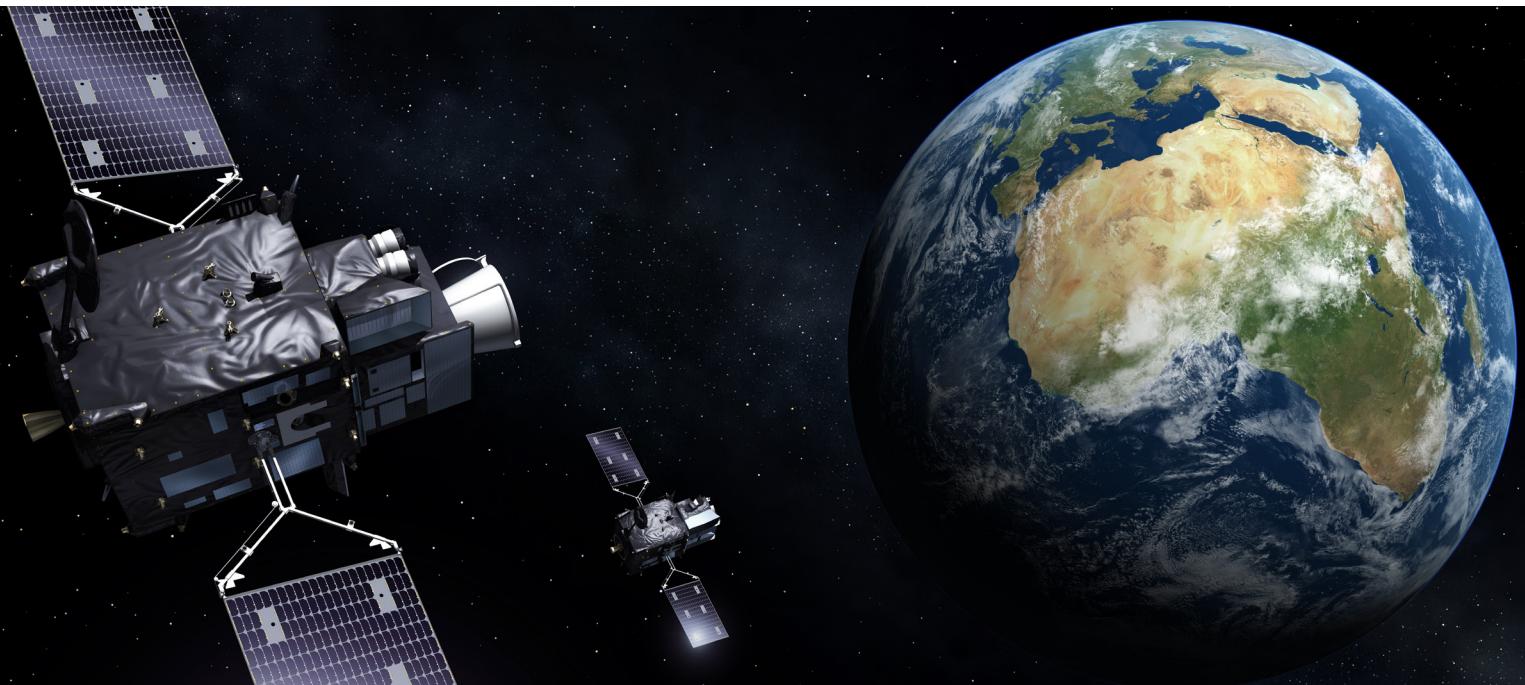
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Long history, bright future: Geostationary satellite innovation on the rise

By ITU News

■ The satellite industry continues to buzz with promise and possibility. In 2020 alone, a record number of over 1000 satellites were deployed according to [industry analysts](#), with dozens more expected to launch before the end of 2020.

At this timely moment came the third installment of ITU's [satellite webinar series](#), which enjoyed an audience of over 1500 participants from more than 120 countries, said ITU Radiocommunication Bureau Director Mario Maniewicz during his opening remarks.

The webinar focused on systems in the geostationary-satellite orbit (GSO), which refers to satellites that operate from 36 000 kilometres (km) above Earth, where they appear fixed in the sky when observed from the ground.

GSOs have a long history from the first launch over the Atlantic in the 1960s for interoceanic telecommunication.

Mario Maniewicz
Director, ITU
Radiocommunication Bureau



Episode #1



Interference to satellite systems: preventing or protecting?

This webinar addressed key topics related to harmful inference affecting the space ecosystem, including cases affecting scientific measurements, denying delivery of broadcasting content, unauthorized use of satellite transponders, interrupting mobile or fixed services, and altering the satellite radionavigation information.



Watch the recorded [video](#).



Main highlights and takeaway, [here](#).

Presentations from the webinar, [here](#).

"GSOs have a long history from the first launch over the Atlantic in the 1960s for interoceanic telecommunication," noted Maniewicz. "Today, they are reaching every single populated corner of the globe."

GSO-relevant WRC-19 decisions

Nelson Malaguti, moderator and Counsellor from ITU Radiocommunication Sector ([ITU-R](#)) Study Group 4 (Satellite services), reviewed two crucial decisions made during the 2019 World Radiocommunication Conference ([WRC-19](#)) related specifically to the technical and regulatory conditions under which GSO satellites can operate.

The first was the use of additional frequency bands for earth stations in motion ([ESIM](#)), which communicate with GSO satellites to connect moving platforms like vessels or planes typically beyond the reach of terrestrial networks, resulting in a total of "2.5 GHz in the downlink and in the uplink in all regions worldwide," said Malaguti.

"This is a significant achievement if we look at the results of the last two WRCs," he added.

ESIM contribute to Sustainable Development Goal (SDG [No. 9](#) – Industry, Innovation and Infrastructure) by enabling broadband connection of people on ships, aircraft and land vehicles and ensuring their safety, security and comfort while on the move.

This WRC-19 decision will increase the use of and foster the development of ESIM, while providing appropriate protection to other GSO and non-GSO systems, as well as terrestrial services, explained Malaguti.

The second decision was the allocation of the frequency band 51.4-52.4 GHz to the fixed-satellite service (FSS) for geostationary satellite use, providing an additional 1 GHz of spectrum for supporting gateway links for very high-throughput satellites.

Tripling down

Following the previous two WRCs and the recently announced WRC-23 agenda, "satellite operators are responding with investments of billions of dollars," said Daryl Hunter, Chief Technology Officer at Viasat. This positive response from operators is also demonstrated by "a tripling down of satellite activities in the 28 GHz band," he added.



Episode #2



Non-geostationary satellite systems: entering into the era of broadband service delivery

This webinar addressed an overview of WRC-19 decisions followed by presentations from satellite operators to update the participants on the new regulatory framework. It also shed light on current debates ahead of WRC-23 and the benefits that these systems will bring to society in the near future.



Watch the recorded [video](#).



Main highlights and takeaway, [here](#).

Presentations from the webinar, [here](#).

Echostar Vice President of Regulatory Affairs Kimberly Baum agreed, noting how satellite broadband revenue and subscribership grew by 19 per cent and 10 per cent last year. "By 2026, Northern Sky Research (NSR) predicts 10 million GSO broadband subscribers globally," Baum noted, adding how this growth is occurring as operators bring more satellites to the market.

"There is a good chance you have already used a Ka band GSO ESIM service if you have flown on commercial air service," pointed out Hunter, highlighting how in-flight connectivity (on-board Wi-Fi) relies on GSO satellite services.

According to Viasat, there are now more connected devices than passengers, with annual ESIM flights exceeding 1.83 million last year.

GSO satellites and related equipment also seem to have "tripled down" in size, with design and technology innovations shrinking building-sized communication panels to about the size of a microwave. "Gateways themselves have also shrunk from 11 metres to around two metres," pointed out Hunter. "We are operating as small as

30-centimetre ESIM mounted on the tail of some small aircraft," he added, noting how Viasat thinks it can get smaller with spread-spectrum techniques.

Flexibility, integration and mission extension

Flexible, high-throughput satellites are high on operators' innovation agendas, with Intelsat Vice President of Spectrum Strategy Hazem Moakkit sharing plans for the launch of software-defined satellites. These new designs enable operators to change frequencies, move beams, shape coverage and manage power on each satellite, offering "unparalleled flexibility in terms of providing services and surgically targeting areas where you need capacity," explained Moakkit.

Jonas Eneberg, Vice President of Regulatory Engineering at Inmarsat agreed, noting how dynamically adjusting deployment of satellite capacity makes its operation much more efficient. "Compared to LEO constellations, flexible GSO satellites are more efficient because they can avoid having capacity in coverage areas where there is low traffic demand," he explained.



Episode #3



Geostationary satellite systems: a world of innovations 36 000 km high

WRC-19 allocated new frequency bands and updated a number of regulatory procedures concerning geostationary satellite networks. Presentations at this webinar provided an overview of these decisions, updated participants on the future innovations and priorities that satellite operators are envisaging in view of the current changing context, and informed future discussions in preparation for WRC-23.



Watch the recorded [video](#).



[Presentations from the webinar, here.](#)

Another exciting advancement is the possibility to extend the life of GSO satellites, which normally have a lifespan of around 15 years, according to Moakkit. Earlier this year, Intelsat and Northrop Grumman achieved a historical milestone with the industry's first life extension vehicle bringing another commercial satellite back into service.

"When satellites go out of service, it is not because their electronics stop operating but because the satellite runs out of propellant," he explained. "This is one way to keep using satellites that improve the business case, and the efficiency of the overall business offering."

Crucial to the success of software-defined satellites is the integration and upgrade of traditional architecture, said Moakkit, noting how "satellite technology will go from hardware-based and proprietary to standards-based and virtualized." The emphasis will fall increasingly on service and value in the form of managed solutions and applications, instead of selling MHz and Mbit/s, Moakkit said. Software-defined satellites aim to get closer to customers for more flexibility, shorter-term commitments, and seamless connectivity, which is what customers expect now, he added.

Expanding affordable connectivity

One of the more important uses of GSO broadband satellites is powering community Wi-Fi in underserved areas by placing a VSAT antenna on a central location in a town, such as a government building or store. The modem is connected to a Wi-Fi access point to provide broadband connectivity to customers in a 100-metre radius.

Retailers can then sell data packs to the public, or the service could be subsidized by the government and offered for free, as in the Curacao, Brazil, example shared by Baum. Northern Sky Research (NSR) predicts that by 2027, 40 per cent of overall revenue from satellite broadband will be from this kind of community Wi-Fi hotspot, pointed out Baum.

Hunter shared the example of Viasat Community Internet, which is aiming to offer broad coverage in remote places with limited connectivity, what he referred to as "0G service – where people have to drive to get coverage." Claiming that Viasat can drop connectivity into that kind of location within a day, Hunter noted that "Ka band coverage and capacity are key" to making that happen.

In Brazil, for instance, many people lack Internet outside large cities. The telecommunication company Telebras is working with Viasat to connect every Brazilian, he added.

Learning to live together

As spectrum is a limited natural resource, it needs to be shared among different types of services and even different types of satellite constellations, such as low-Earth orbit (LEO) and medium-Earth orbit (MEO) systems which are non-geostationary (non-GSO) by definition.

An audience poll revealed that the main challenge for GSO satellite operators is staying competitive with non-GSO systems whose sharing capacity is increasing, which might explain why 53 per cent of webinar viewers felt that GSO systems should continue to benefit from the regulatory advantage contained in the [Radio Regulations](#).

While panellists agreed that sharing spectrum is necessary to make use of current and future innovation in satellite technology, they pointed out difficulties when it comes to GSO site coordination or time-sensitive activities.

"We can deploy a new broadband terminal in two days. To do that, we don't have time to go through a site coordination process," said Baum. "We need access to spectrum for those user terminals that isn't shared so that we can deploy quickly in a given country."

GSOs and WRC-23

The use of additional frequency bands for ESIM communicating with GSO space stations in the fixed-satellite service (FSS) will be considered at the next World Radiocommunication Conference in 2023 – globally and for all regions, reminded moderator Malaguti.

The second GSO-relevant agenda item deals with the provision of satellite-to-satellite links in a different set of bands, as Maniewicz pointed out. "ITU-R Study Group 4 is evaluating ways to improve space-to-space communications including with GSO satellites so growing traffic demand can be absorbed by inter-satellite links," he explained.

"Among those links are GSO stations where you establish links with non-GSO satellites – a very interesting agenda item

New generations of high-throughput satellites and new services are going to benefit the global customer base.

Daryl Hunter
Chief Technology Officer, Viasat

for the next conference," added Malaguti. Eneberg of Inmarsat agreed, highlighting how there is definitely a market for GSO providers serving non-GSO satellites through inter-satellite links, with a lot of interest from non-GSO operators.

Looking ahead, "new generations of high-throughput satellites and new services are going to benefit the global customer base," affirmed Hunter, suggesting a bright future and more innovations to come. ■



115 years and counting: ITU Radio Regulations updated

By ITU News

The International Telecommunication Union (ITU) last year released an updated version of the world's only international treaty governing the global use of radio-frequency spectrum and satellite orbits: The [Radio Regulations](#).

Entered into force on 1 January 2021, the latest edition of the ITU Radio Regulations are the result of a four-year process that culminated in four weeks of exhaustive international negotiations held at the World Radiocommunication Conference (WRC-19) in Sharm-el-Sheikh, Egypt.

"The publication of the Radio Regulations is the culmination of the hard work and intense deliberations that took place during WRC-19," affirmed ITU Secretary-General Houlin Zhao. "Efficient and economical use of the naturally limited radio-frequency spectrum is key to ensuring we bring the benefits of connectivity and digital transformation to people everywhere. The ITU Radio Regulations are a vital vehicle for this endeavour."

Efficient and economical use of the naturally limited radio-frequency spectrum is key to ensuring we bring the benefits of connectivity and digital transformation to people everywhere. The ITU Radio Regulations are a vital vehicle for this endeavour.

Houlin Zhao
ITU Secretary-General

Why the Radio Regulations matter

The electromagnetic spectrum can be divided into different segments, called “frequency bands”. Radio frequencies can be thought of as natural resources of the global commons, much like land or water. Their finite nature means they must be allocated to different radio services through specific coordination procedures.

When it comes to allocating radio frequencies, including sharing, and harmonizing their use for different purposes, the Radio Regulations are the ultimate tool. They ensure that the use of the radio-frequency spectrum is rational, equitable, efficient, and economical – all while aiming to prevent harmful interference between different radio services.

The ITU Radio Regulations also play an important role in promoting access to affordable broadband for all. “In a rapidly evolving digital wireless world, the Radio Regulations provide an opportunity for all countries to develop innovative ways to promote access to affordable universal next-generation broadband technologies,” highlighted Mario Maniewicz, Director of the ITU Radiocommunication Bureau.

Over 40 radiocommunication services covered

While radio frequencies are used by many diverse applications, from terrestrial to satellite systems, maritime to aviation, radio and TV broadcasting, space research and more – some frequencies are better suited to a specific type of communication application than others and some applications can only be carried out in specific frequency bands due to their unique propagation characteristics.

Moreover, with radio-based technologies advancing at a rapid clip, the world’s airwaves are becoming increasingly crowded. That is where the Radio Regulations come in: over 40 radio communication services are now governed by them. The regulations are designed to both protect existing radio services while enabling the introduction of new and enhanced services.

The Radio Regulations have played a part in the actual development of many applications, from short wave and FM radio to digital television broadcasting, Wi-Fi and Bluetooth to satellite positioning (e.g. GPS, Glonass, Galileo or Compass) and satellite television reception.

“

In a rapidly evolving digital wireless world, the Radio Regulations provide an opportunity for all countries to develop innovative ways to promote access to affordable universal next-generation broadband technologies.

”

Mario Maniewicz

Director, ITU Radiocommunication Bureau

Today, billions of people watch TV through both terrestrial television broadcasting and broadcast satellite services with their associated satellite dishes, in respective frequency bands that have been allocated globally by the ITU Radio Regulations.

While they may not be as visible in most of our daily lives, the Radio Regulations also play a key role in enabling satellite imagery and Earth resource monitoring, space research, meteorology, maritime and aeronautical transport and safety, as well as civil protection and defence systems.

Updating the Radio Regulations: A vital process

Making sure the Radio Regulations reflect the changing demand for spectrum use is essential. Their use dates all the way back to 1906, when the first International Radio Telegraph Convention was signed in Berlin, Germany.

Since then, the Radio Regulations have evolved over 115 years and 37 subsequent revisions and innovations into the 4-volume treaty of more than 2000 pages. They now cover frequencies ranging from 8.3 kHz to 3000 GHz, with internationally agreed governing principles on which the rights and obligations of ITU's 193 Member States to use the spectrum and satellite orbit resources are based.

"We have published the 2020 ITU Radio Regulations within the agreed time-frame, despite the challenges posed by the global COVID-19 pandemic," remarked ITU Radiocommunication Bureau Director Mario Maniewicz on the publication's release on 15 September 2020. "My heartfelt congratulations to all those that have contributed to this great success."

The 2020 Radio Regulations are available in all six of ITU's official languages. Electronic versions of the Regulations can be downloaded free of charge. The traditional four-volume boxed set, as well as a multi-lingual DVD will be available for purchase in the coming weeks.

To download or order the ITU Radio Regulations (2020 edition) in your preferred language, click [here](#). ■



Your software solution to navigate Article 5 of the ITU Radio Regulations

The Radio Regulations comprise four thick volumes. That's why a software has been created for you to easily search its content as well as perform specific calculations and modelling algorithms. It is a standalone application that does not require a network or Internet connection.

Built around a relational database model, the software enables users to extract and modify the National Table of Frequency Allocations for a given geographic area (country), based on the corresponding "International Plan" which results after combining the information contained in Article 5.



Read more about the software [here](#).

Order the software [here](#).



AI and machine learning for a 5G world: Meet the champions of the ITU AI/ML in 5G Challenge

By ITU News

■ It all started with an idea: how might ITU create a community that can produce tangible impact in the field of artificial intelligence (AI) and 5G for the communication industry?

After all, emerging and future networks hold the promise of an even more interconnected and intelligent world, with their potential to support a burgeoning global ecosystem of connected devices.

Why hold this Challenge?

As more and more data and computing power emerge, it is important to identify and solve some of the real-world problems confronting network operators so that 5G can reach its full technical potential in terms of speed and efficiency.

The good news?

Solutions driven by AI and machine learning (ML) can help optimize communication networks as the so-called “revolutionary evolution” unfolds.

These can range from supporting 5G networking functions, to dealing with interference, to evaluating the intelligence level of a network.

Over the course of the past year, more than 1300 problem-solvers from 62 countries worked to solve different network problems using AI and ML.

23 problem statements were contributed by industry and academia in Brazil, China, India, Ireland, Japan, Russia, Spain, Turkey, and the United States, and these “regional hosts” offered resources and expert guidance to support participants in addressing their challenges.

The Challenge also provided an opportunity to apply the AI/ML toolkit provided by new ITU standards, as well as to demonstrate and validate these new ITU standards.

Dealing with data difficulties

Throughout the year, participants had to deal with a series of obstacles, explained Thomas Basikolo, AI/ML Consultant at ITU. Different time scales, noisy and dynamic network environments, and limited computing resources are just a few of them, he said.

One of the major hurdles had to do with data, a critical input for any AI/ML system. Which data and where? How to label? Is it trusted? Are real data sets available?

These are all questions challenge participants had to ask, explained Basikolo.

“In research they often use synthetic data – but real-world data can be difficult to find,” he added.

Fast forward to yesterday, when not one but two teams were awarded first prize. The 10 winning and runner-up teams each presented their innovative solutions tackling network challenges with AI/ML, achieving global recognition and also sharing in a prize fund of 20 000 Swiss francs.



Meet the Gold Champions

The first-place prize was awarded to two teams from China Mobile Shandong and China Mobile Guizhou, both of whom developed innovative solutions to the problem statement on optimizing network topology.

“

Existing network topology planning does not fully consider the increasing network traffic and uneven network link capacity utilization, resulting in difficult topology optimization and increasing investments in network construction.

”

Zhang Yiwei

Team Weeny Wit

“Existing network topology planning does not fully consider the increasing network traffic and uneven network link capacity utilization, resulting in difficult topology optimization and increasing investments in network construction,” said Zhang Yiwei from Team Weeny Wit, whose members include Han Zengfu, Wang Zhiguo, Wu Desheng and Li Sicong. They used traffic forecasting and topology optimization to drive their solution.



The ITU AI/ML in 5G Challenge was organized with the support of promotion partners LF AI & Data, NGMN and SGInnovate; Gold sponsor the Telecommunications Regulatory Authority of the United Arab Emirates; and Bronze sponsors Cisco and ZTE.

According to Xi Lin from Team No Boundaries, “telecommunications [have] become an indispensable part of our lives” but transmission remains a challenge “since some [links] are overloaded, and some have a lot of capacity.”

Together with Gang Zhouwei, Rao Qianyin, Feng Zezhong and Guo Lin, Lin created a solution based on the ITU Y.3172 architecture, the Breadth First Search (BFS) algorithm and a “greedy algorithm.” Their innovation was able to solve 16 overloaded links in Kaili City (Guizhou, China) Lin said, adding that his team’s proposal saves time, resources, and improves traffic management.



Silver winners take second place

The silver prize was also awarded to two teams, the first being Team Al-Maglev from the Institute of Computing Technology at the Chinese Academy of Sciences. Team members Yuwei Wang and Sheng Sun worked on a problem statement about deep neural network (DNN) inference optimization and came up with an efficient dynamic partition algorithm.

The second-place prize was shared by Salzburg Research, Austria, whose team members Martin Happ, Jia Lei Du, Matthias Herlich, Christian Maier, and Peter Dorfinger aimed to solve the prediction of mean per-packet delays across networks. They presented a RouteNet modification for estimating these network delays with algorithmic scheduling.



Bronze for third prize winners

Taking the third-place prize, Team Imperial_IPC1 from Imperial College London presented their solution of “neural network-based mmWave beam selection utilizing LIDAR data.” Team members Mahdi Boloursaz Mashhadi, Mikolaj Jankowski, Tze-Yang Tung, Szymon Kobus, and Deniz Gunduz collaborated to solve an important problem related to the physical layer of modern communication networks by improving beam selection.

“
We can automatically detect network and device failures caused by COVID-19.
”

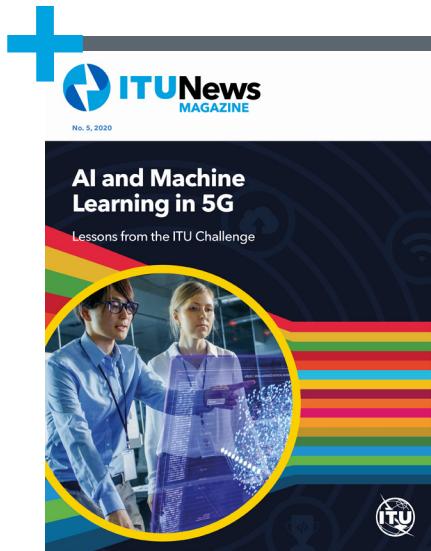
Fei Xia

Team UT-NakaoLab-AI

Sharing the bronze prize was Team UT-NakaoLab-AI from the University of Tokyo, Japan. Teammates Fei Xia, Aerman Tuerxun, Jiaxing Lu, and Ping Du presented their “analysis on route information failure in IP core networks by network functions virtualization (NFV)-based test environment.”

“We can automatically detect network and device failures caused by COVID-19,” said Fei Xia.

Their group focused on a solution that was high-performing, practical and reliable, he added.



To learn more about the challenges and opportunities of adding AI/ML solutions to 5G and future and networks, and the value of new ITU standards in support, be sure to download and read the ITU News Magazine.



Accessible [here](#).

Fourth prize runners up

The following runner up teams were awarded fourth prize:

1 Team IEC_Research, Instituto Tecnologico de Santo Domingo (INTEC), Dominican Republic (Juan Samuel Perez, Wilmer Quinones, Amin Deschamps, Yobany Diaz)

Solution: Radio link failure (RLF) prediction using weather information.

Predicting radio link failure correctly can result in less network downtime and reduced service degradation for network subscribers, explained team lead Juan Samuel Perez. His team trained a decision tree-based model, opting for simple data pre-processing and highly interpretable predictions that offer actionable information for a network operator.

2 Team BeamSoup (Matteo Zecchin, Communication Systems Department, Eurecom, France)

Solution: AI-aided mmWave beam selection for vehicular communication.

"We provide an ML model that combines different data modalities and predicts quality of the communication beams," Zecchin said.

3 Team ATARI, University of Antwerp and Universidad de Antioquia (Paola Soto, David Goez, Natalia Gaviria, Miguel Camelo)

Solution: A graph neural network approach for throughput prediction in next-generation wireless local area networks (WLANs).

The solution applies AI/ML to predict performance in view of the challenges created by high densities of Wi-Fi users and the need to navigate increasingly crowded spectrum.

4

Team Link Busters, NEC Corporation, Japan

(Dheeraj Kotagiri, Anan Sawabe, Takanori Iwai)

Solution: An augmented model for radio link failure prediction.

This team looked at weather forecasts, with lead Dheeraj Kotagiri suggesting that when it comes to real-world data, we cannot rely on AI/ML models alone.

"We have to augment [ML] with data pre-processing conventional knowledge on radio and networks to predict link failures," explained Kotagiri.

His team's approach involved 80 per cent data pre-processing and 20 per cent random forest – a machine learning method that is often used to make predictions by constructing a multitude of decision trees.

What's next?

This Grand Challenge enabled an atmosphere of collaboration and brings new opportunities for industry, academia, and especially small and medium-sized enterprises (SMEs) to influence the evolution of ITU standards, said ITU Secretary-General Houlin Zhao.

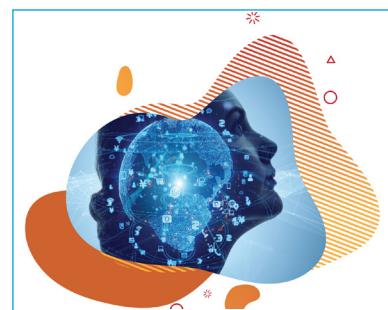
The Secretary-General referred to IMT-2020/5G systems as the "backbone of tomorrow's digital economy."

To continue nurturing the collaborative atmosphere, Vishnu Ram OV from the recently concluded [ITU Focus Group on machine learning for 5G and future networks](#) shared his wish list for 2021. He called for more open data, equal access to computing resources and AI/ML tools for machine training and testing, and a distributed ecosystem featuring "a bigger, better, and braver focus on the problems in the 5G arena."

How to get involved

The data repositories used in the ITU AI/ML in 5G Grand Challenge can be found [here](#).

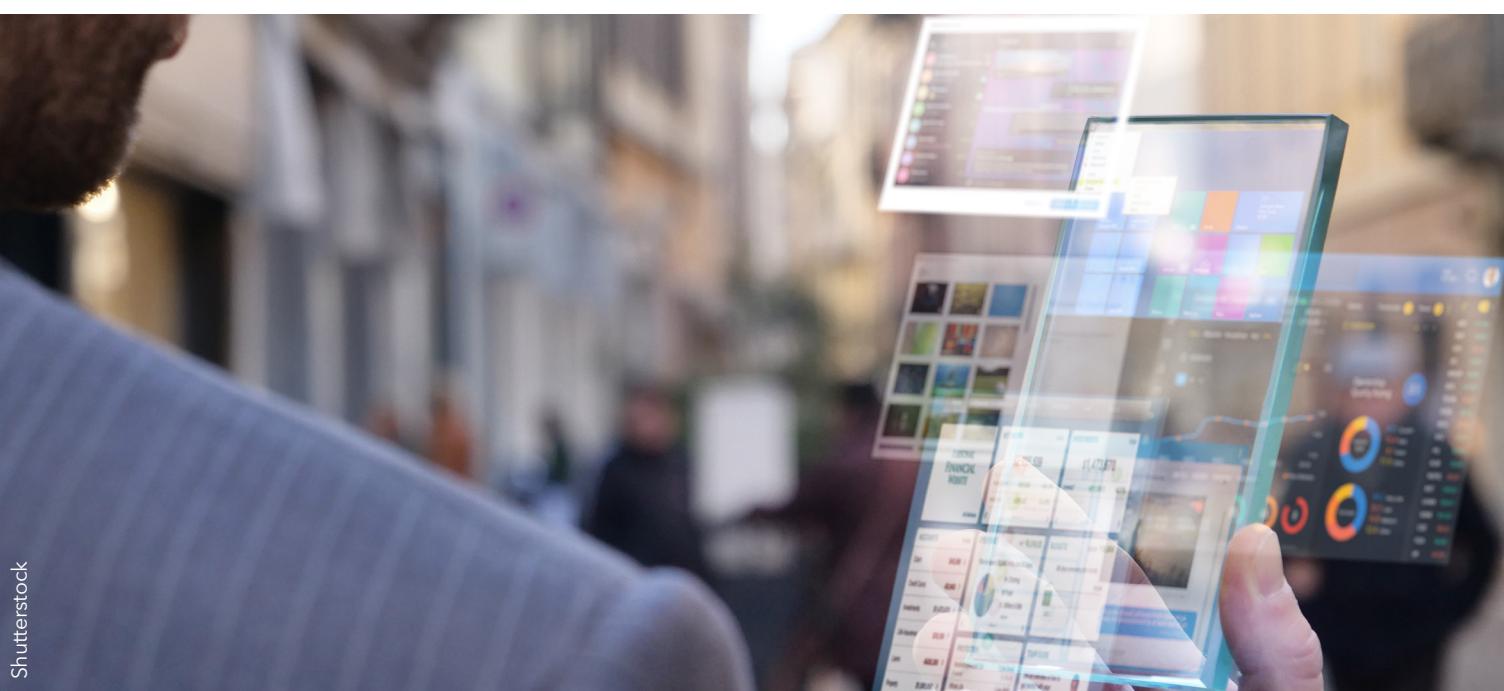
During the Finale, ITU invited submissions to an upcoming special issue of the ITU Journal on Future and Evolving Technologies ([ITU J-FET](#)) focused on AI/ML in 5G and future networks.



See the [Call for Papers](#) (deadline: 22 February 2021). ■



Here's the [ITU AI/Machine learning in 5G Challenge webpage](#).



Finally, 5G (IMT-2020) is a global standard

By ITU News

■ The ITU Radiocommunication Sector ([ITU-R](#)) has recently published [Recommendation ITU-R M.2150](#) titled "Detailed specifications of the terrestrial radio interfaces of International Mobile Telecommunications 2020 (IMT-2020)".

Following the evaluation of various radio technology candidates for IMT-2020 at the end of last year, the newly published Recommendation represents a set of terrestrial radio interface specifications which have been combined into a single document.

The development and approval of this IMT standard will support several use cases that leverage the advantages of 5G.

For instance, it will contribute, amongst many other things, to accelerating the response time of autonomous vehicles and will enable new and more realistic augmented/virtual reality (AR/VR) experiences.

The development and approval of this IMT standard will support several use cases that leverage the advantages of 5G.

Understanding the IMT process

A solid grasp of the IMT process is key to understand the significance of the latest 5G developments at ITU. The process consists of 4 main phases:

1. "ITU-R Vision" and definitions.
2. Minimum requirements and evaluation criteria.
3. Invitation for proposals, evaluation, and consensus building.
4. Specification, approval, and implementation.



Note: The results of these procedural steps are documented in [ITU-R Recommendations](#) and [ITU-R Reports](#).

The "ITU-R Vision" set out at the beginning of each IMT process defines what is needed to be accomplished. After that, candidates who want to support that vision may start developing functional technology that meets those requirements.

This unique global framework serves as a forum for discussion and agreement on the capabilities of new radio technologies.

Once the standardization bodies have submitted IMT candidate technologies, the evaluation process begins. This is done in a collaborative process between ITU Member States, equipment manufacturers, network operators, standards development organizations (SDOs) and the academic community.

This unique global framework serves as a forum for discussion and agreement on the capabilities of new radio technologies.

One of the key features of the IMT process is its ability to ensure that the various radio interface technology candidates are handled in a neutral way.

Once the radio interface has been finalized and consensus has been reached, the process then concludes with approval and implementation.

What's in the latest Recommendation?

The current version of this Recommendation on IMT-2020 specifications ([Recommendation ITU-R M.2150](#)) contains three radio interface technologies: "3GPP 5G-SRIT"; "3GPP 5G-RIT" and "5Gi". Those technologies are the basis for the implementation of 5G networks around the world. After a period of seven-eight years of hard work across the industry, the evaluation of these three IMT-2020 technologies has culminated in an approval from ITU's 193 Member States.

Two more radio interface proposals, submitted by ETSI (TC DECT) Forum and Nufront, have been granted an exceptional review within the IMT-2020 process extension. If, based on consideration of additional material, they successfully complete the evaluation process they will be included in a subsequent revision Recommendation ITU-R M.2150.

5G – Fifth generation of mobile technologies [video](#)



5G: An economically viable evolution

When a specific radio interface technology (RIT), or a set of radio interface technologies (SRIT), is approved it will be considered to be part of the IMT family (IMT-2000, IMT-Advanced, IMT-2020) of radio interfaces for which there are frequency bands identified within the ITU Radio Regulations.

Just as we learned in the journey of mobile from 3G to 4G, the transition from one generation to another will be incremental, with early deployments starting at 5G

radio and leveraging existing 4G network infrastructure.

In fact, the 4G evolved packet core (EPC) will coexist with the 5G core for quite a while, enabling operators and enterprise customers to take advantage of 5G features such as network slicing and user plane flexibility.

5G NR (New Radio) wireless mobile communications will bring higher data rates, reduced latency, and greater system capacity. The first implementation of 5G NR uses existing 4G LTE infrastructure in a non-standalone (NSA) mode. A full standalone

(SA) mode that does not rely on LTE will follow later.

To facilitate the smooth evolution from 4G LTE to 5G NR, the 5G NR standard offers the possibility of adapting to existing LTE deployments and sharing the spectrum used exclusively by LTE today. The enabling mechanism, known as "dynamic spectrum sharing" (DSS), allows 5G NR and 4G LTE to coexist while using the same spectrum and as such allowing network operators a smooth transition from LTE to 5G NR – presenting one option for an economically viable evolution.

Towards 2030 and beyond

When it comes to future developments beyond IMT-2020, the work has just started. In 2021, it is expected that ITU-R will define the schedule for future revisions of Recommendation ITU-R M.2150, to accommodate future improvements to the standards, as well as the possibility of introducing new IMT-2020 radio interfaces. Looking even further ahead, [ITU-R Working Party 5D](#) has already started to examine future technology trends for "IMT towards 2030 and beyond".

This work could include anticipating new use cases for IMT and subsequently the identification of any gaps, as well as new technical enablers necessary in the 2030 time-frame.

Once again, the tried-and-tested IMT process will be applied, starting with a clear vision and definition phase. After the ITU-R Vision towards 2030 and beyond states what is needed with the next 10 years in mind, many standardization bodies (e.g. 3GPP etc.) will then define and develop fitting functional technologies for the next generation of IMT.

Working Party 5D (WP 5D) has invited organizations within and external to ITU-R to provide inputs for its June and October meetings in 2021, which will help the development of the

Working Party 5D has invited organizations within and external to ITU-R to provide inputs.

forthcoming report "Future Technology Trends towards 2030 and beyond." A first draft of this new report contains a list of driving factors in the design of IMT technology, as well as a list of possible technologies to enhance the performance and precision of both the radio interface and radio network.

The report is very likely to also include technologies for native artificial intelligence (AI)-based communication.

ITU relies on its membership – both Member States and Sector Members – as well as on external organizations from standardization bodies to academia to research institutes, to contribute to this important work.

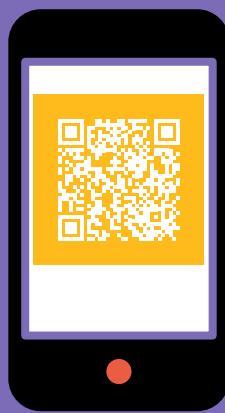
This successful cooperation has been practised for decades and ITU now looks forward to continuing this shared journey so that all may benefit from a globally valid standard.

Joining ITU means actively participating in this exciting challenge of driving innovation in the telecommunication sector within and beyond 5G. ■

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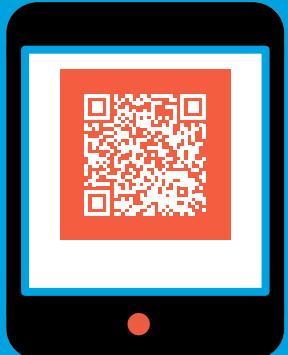
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