EXECUTIVE SUMMARY

The Commonwealth Spectrum Management Forum 2018 was held from 04 to 06 September 2018 in Balaclava, Republic of Mauritius. Representatives from several member countries, as well as private organisations, attended the Forum. The event was held at an opportune moment, when member countries were finalizing their country positions in view of the upcoming World Radiocommunication Conference 2019 (WRC-2019).

Various aspects of spectrum management including spectrum harmonisation strategies and planning, commercial aspects of spectrum and new advances in technology and innovation were covered during the three-day forum. The level of the panel discussions and questions from delegates brought a high level of diversity and dynamism to the Forum proceedings, and enlightened all delegates present. The Forum hence concluded with the desired results and outcomes.

The tone of the conference was set during the opening ceremony when the representatives of the MTCI and ICTA as well as those of the Commonwealth Telecommunications emphasised on the importance of spectrum management. All the speakers during the opening ceremony stressed on the fact that the Commonwealth Spectrum Management Forum 2018 was an opportunity for all participants to assess the current spectrum management methodologies in their respective countries and to evaluate them against best international practices. Day 1 focussed mainly on spectrum harmonisation, planning, policy and regulatory strategy as well as the commercial aspects of frequency spectrum. Deliberations during Day 2 were mostly geared towards technology and innovation while Day 3 tackled the issue of spectrum efficiency with topics such as Digital Broadcasting Switchover. The Forum concluded with discussions on the preparation for WRC-19.

The ultimate aim of ICTs is to benefit the society at large. Development in technology has enabled drastic improvement in internet connectivity and bandwidth over both fixed and wireless networks. Upcoming 5G technology is expected to encompass fixed, mobile, Wi-Fi as well as satellite networks and has the capability to provide connectivity even to the most remote places on land, in the sea or in the air. Broadband connectivity is in turn a critical enabler for socio economic development.

In order to cope with increasing demand on spectrum, a shift from static to dynamic spectrum allocation is expected to happen in future. Dynamic spectrum allocation is possible when spectrum management is automated and all spectrum allocations are known. Hence, data analytics may be used to ensure the reuse of the available spectrum without any interference, for instance using TV Whitespaces to connect remote places that were previously not connected.

OPENING CEREMONY

Opening remarks were made by the Director of Ceremonies, **Ms. Nandini Bhooneshwari Kissoon-Luckputtya**, Deputy Permanent Secretary, Ministry of Technology, Communication and Innovation, of the Republic of Mauritius who welcomed the guests and delegates on behalf of the Ministry of Technology, Communication and Innovation. Other participants at the Head Table for the opening ceremony were:

Mahmad Aleem Bocus (Chairman, Information and Communication Technologies Authority, Mauritius) - Welcome address.

Joaquin Restrepo (Chief of Outreach and Publication Services Division, International Telecommunication Union (ITU) on behalf of Mr François Rancy, Director, Radiocommunication Bureau, ITU – Goodwill Message.

Gisa Fuatai Purcell (Acting Secretary General and Director of the ICT Development Department, Commonwealth Telecommunication Organisation) - Secretary-General's Address.

The Honourable Yogida Sawmynaden (Minister of Technology, Communication and Innovation, Republic of Mauritius) – Keynote Address

In his address, Mr Bocus welcomed all delegates present and gave an overview of the tasks performed by the ICT Authority. He explained how key decisions, such spectrum allocation to 3G services in 2004, opening of IMT 1800MHz frequency band for 4G services in 2012 and re-farming of the 900 MHz to accommodate UMTS services, made by the ICT Authority have brought about innovative technologies in Mauritius. Upcoming developments and innovations are, according to him, expected to further drive the demand for spectrum up. He therefore stressed on the fact that Mauritius and the ICT Authority must continuously work towards satisfying this expected growth in spectrum demand.

Mr Restrepo presented a brief overview of the digital society and economy. He further explained that spectrum is a resource that should be utilized efficiently for the common good of all citizens worldwide. He further added that, global consensus and spectrum harmonisation is highly desirable to accommodate new technologies.

Ms Purcell, congratulated Mauritius for hosting the CTO Spectrum Management Forum 2018 and provided a brief explanation on the importance of the Spectrum Management Forum event for the efficient use of the natural spectrum resources especially with the upcoming technologies of 5G and IoT.

Finally in his keynote address, the Honourable Yogida Sawmynaden, Minister of Technology, Communication and Innovation affirmed that the vision of the Mauritian Government is to transform Mauritius into a high income generating country by 2030 by focusing on innovation across all sectors and making use of latest ICT developments. The Honourable Minister stressed on the fact that advances made in ICT particularly the development of low power wireless sensors could be used for the monitoring of the vast Mauritian maritime exclusive economic zone. He also elaborated on some examples of projects in the pipeline such as ICTA/IBA merger and the launch of the Cube satellite. He then declared the Forum Open.

SESSION ONE: HARMONISATION STRATEGY AND PLANNING

Chair: **Basebi Jacqui Mosinyi**, Acting Spectrum Management Deputy Director, Botswana Communication Regulatory Authority, Republic of Botswana

Panellists:

Radhacharan Shakya, Senior Adviser, ICTA, Republic of Mauritius

Joaquin Restrepo, Chief of Outreach and Publication Services Division, ITU

Jerome Louis, Director Engineering, ICTA, Republic of Mauritius

Bashir Patel, Global Spectrum Regulatory Policy, EMEA Satellite Operator's Association (ESOA)

Edmund Fianko, Deputy Director, Engineering, National Communications Authority, Republic of Ghana

Key points and Important Outcomes:

- Mauritius inspite of being a small country is a leader in the ICT sector for the region as attested by international ICT indices. The ICT sector is the 3rd pillar of the economy and represents 5.6 percent of the national GDP. The mobile penetration, internet penetration and broadband penetration has been constantly increasing In Mauritius. The health of the ICT Industry has also been improving as attested by increasing profits for operators, decreasing tariffs and increasing choice and quality of service to consumers. The experience of Mauritius regarding the spectrum allocation to mobile services since 1989 till was presented.
- The aim of ICTs to benefit the society at large. All economic sectors and activities in most countries are dependent on ICTs. Government policy is geared towards creating a positive environment.
- Technology neutrality approach adopted in Mauritius and Digital dividend has created more opportunities for mobile operators for the provision of innovative and better services to customers.
- Opportunities for Mauritius resulting from technology convergence include the merger between the ICT and broadcasting regulators leading to an opportunity to a review of the legal framework, including revamping of the licensing framework and introduction of spectrum auctioning and innovative mechanism for spectrum allocation.
- Technical opportunities for Mauritius include the availability of the Digital dividend, and possibility of using TV white spaces, the convergence of services & technologies, M2M communications and IoT /IoET, 5G technology, the introduction of Digital Audio Broadcasting (DAB), the allocation of available spare spectrum and the introduction of smart cities.
- Spectrum Management Challenges in Mauritius include coping with the issues of Limited and Saturated Market, Meeting expectations of stakeholders, Fast growing technology, keeping

pace of regulatory framework with technology and the requirement of new spectrum management and continuous re-farming of frequency band aligning to latest technical evolution

- The way forward for Mauritius is to go for Unified Licensing and Technology/Service Neutral spectrum allocation, devising an innovative mechanism for spectrum allocation, introduction of Spectrum Trading, sharing and Leasing, introduction of new technologies so as to fulfill the aim of meeting the vision of the Government in making Mauritius a Smart Island and ICT hub for world community.

- Importance of Spectrum Harmonization and aligning national spectrum policies with those recommended internationally to achieve rapid launch of new bands and economies of scale

- Benefits of Spectrum Harmonization include reduction in the cost of hardware, global roaming, reduction in the complexity of the radio design, reduction in interference with adjacent services and helps managing cross-border interference.

- The International telecommunications Union encourages global spectrum harmonization and helps to achieve same through the World Radiocommunication conferences and endeavors to Strike the right balance between the spectrum requirements of all radio communication services

- There are several frequency bands under study for WRC-19 for the provision of broadband connectivity and 5G (IMT-2020) services.

- DSA is the real-time adjustment of spectrum utilization in response to changing circumstances and objectives. DSA might be performed through radio stations with some degree of intelligence, and capability to interact with spectrum use environment, and adjust its operation in conformity; e.g., Cognitive Radio, Software Radio, Database Radio, Adaptive Coding and Modulation, etc.

- Worldwide participation at ITU WRCs drives consensus-based decisions that all nations can rely on.

- Proper spectrum planning and harmonization is required in order to ensure that existing spectrum is fully utilized for current and new services.

- While spectrum harmonization at a global level represents many benefits, a right balance need to be struck between spectrum harmonization and technology neutrality.

- The lack of spectrum harmonisation coupled with wireless pervasiveness resulting from radio modules being incorporated into a large number of products (phones, cameras, routers, remote controls, toys, televisions, refrigerators, smart home devices etc…) represent a challenge for effective spectrum management.

- Two cases studies experienced in Mauritius were presented.

- Proper regulatory framework and planning is required for innovative services and technologies such as OTT, spectrum trading and the use of TV white spaces

SESSION TWO: HARMONISATION STRATEGY AND PLANNING

Chair: **Ronnie Aiolupotea**, Assistant Regulator, Office of the Regulator, Independent State of Samoa

Panellists: Velamah Cathapermal, Chief Legal and Regulatory Affairs Officer,Mauritius Telecom

George W Kasangaki, Spectrum Engineering and Authorisation, Uganda Communications Commission

Professor Armstrong Idachaba, Director Broadcast Monitoring, Nigerian Broadcasting Commission, Republic of Nigeria

Key points and Important Outcomes:

- The fact that the Internet is embedded in everything and everywhere, the increase in the number of smart devices, the demand for broadband services is expected to increase exponentially in the future.
- All economic sectors, including the financial sector, are expected to rely even more heavily on the ICT sector in view of the development regarding Artificial Intelligence, Fintech and Blockchain.
- All these factors are expected to drive the demand for spectrum and for more effective spectrum management by regulators. Also the convergence of television and communications requires strong regulation in order to manage both the content aspect and the communication infrastructure.
- Two international spectrum management model available to regulators to choose from:

  o Command and control

  o Market oriented

- Most regulators have traditionally used the 'Command and control' model. However, mobile operators are more in favour of a 'light touch' approach whereby regulations are desired to be service and technology neutral. Operators are also in favour of regulators becoming more pro-active and more adaptive to technology whereby spectrum needs of mobile operators are taken care of in a timely and efficient manner.
- In Nigeria, the regulator has already implemented media and telecommunication converged licensing. Nigeria has a high number of active users (150 Million subscribers) compared to a population of 180 Million inhabitants. Nonetheless, there is a significant number of the population that cannot afford internet connectivity mainly because of poverty. Strong focus is provided by the Government to promote local content online and efforts are being made to democratize the access to internet to all segments of the population.
- Tanzania has a strong regulation with separate regulation for spectrum, online content, and OTT licensing. Therefore, it was easy to implement convergence. They also have a directing national policy from the government that sets the direction of ICT services in Tanzania. The

regulator also performs a quarterly monitoring of the quality of service to ensure that services being offered by operators are according to norms. Tanzania conducted a successful auctioning process for allocation of spectrum in the 700MHz band in which consultants were appointed for conducting same.

SESSION THREE: APPLICATIONS AND SERVICES

Chair: Shongwe Salebona, Spectrum Monitoring Officer, Kingdom of Eswatini

Panellists: Shivendra Nautiyal, Chief Technology Officer, Emtel, Republic of Mauritius

Robert Ravi Arokianathane, Senior Advisor of ICT, Ministry of Information & Communications Technology, Republic of Uganda

Key points and Important Outcomes:

- Broadband is a critical enabler for socio economic transformation process. However, the penetration rate of Internet and broadband especially in the rural has remained low.
- Increasing mobile broadband penetration has a significant impact on a country's economy. Mobile broadband is the already the main broadband access medium.
- The Mobile Telecom sector continues to offer unprecedented opportunities for economic growth in both developing and developed markets and the demand for data and mobile broadband is expected to grow exponentially with the increasing use of OTT services, implementation of Internet of things (IoT) and the setting up of Smart cities. Broadband connectivity is the enabling foundation, for various e-services and the infrastructure on which these services can be universally delivered.
- The switch from analog television to digital-only platforms by television broadcasters and the fact that digital television needs less spectrum than analog television has caused 168 MHz of spectrum that was previously used for broadcasting to be freed in the 700 and 800 MHz frequency bands. This freed up spectrum is referred to as the 'Digital Dividend' and is either available or expected to be available for the operation of IMT systems.
- This Digital Dividend is extremely efficient for operators to provide enhanced broadband connectivity for rural areas with good indoor penetration. Hence the available spectrum needs to be efficiently managed and allocated in a transparent manner which reflects its true value to meet the future needs of mobile broadband.

SESSION FOUR: COMMERCIAL OPPORTUNITIES

Chair: Bashir Patel, Global Spectrum Regulatory Policy, ESOA

Panellists: Nitin Sapra, Senior Manager, Spectrum & Policy-South Asia, GSMA
   Radhacharan Shakya, Senior Advisor, ICTA, Republic of Mauritius

Key points and Important Outcomes:

- The price of spectrum directly impacts the price of services offered by operators. Hence when setting the price of spectrum Governments and regulators must consider public and commercial benefits, considering the fact that revenue derived from spectrum can be very useful for the governments of developing countries.
- Study on spectrum pricing in developing countries by the GSMA has shown that there is a large variation in the price of spectrum in developing countries. Factors that drive high spectrum prices are: auction design, artificial scarcity, lack of spectrum roadmap. It has also been observed that spectrum costs up to three times more in developing countries than in developed countries when the prices are adjusted for GPD.
- High spectrum prices are linked to higher mobile tariffs, reduced 4G coverage and lower speeds. High spectrum prices therefore threaten affordable, high quality mobile broadband.
- Best practices for spectrum pricing include fairness in the interest of the general public and commercial operators, avoid limiting the supply of mobile spectrum, publishling long-term spectrum award plans and hold open consultations.
- Governments therefore should prioritise improved mobile broadband services above revenue maximisation and set modest reserve prices and annual fees, and rely on the market to determine prices in the interest of the general public and the country.
- Another area of consideration is substitutability where spectrum in one band may not be substitutable with that in another band for instance when comparing mobile services bands and satellite services.

SESSION FIVE: IMPLEMENTATION AND DEPLOYMENT

Chair: Dr Rooba Yanembal Moorghen, Permanent Secretary, Ministry of Technology, Communication and Innovation, Republic of Mauritius

Panellists: Joaquin Restrepo, Chief of Outreach and Publication Services Division, ITU

      Rai Busgeet, Chief Technology Officer, Mauritius Telecom

      Edmund Fianko, Deputy Director, Engineering, National Communications Authority, Republic of Ghana

Key points and Important Outcomes:

- Mobile networks have evolved from 1G (Analog) to 5G in the span of 25 – 30 years. For over 30 years, the International Telecommunications Union (ITU) has been developing the standards and spectrum arrangements to support International Mobile Telecommunications (IMT).
- Global standards and harmonized frequencies have enabled massive economies of scale, hence driving down the prices of handsets, global roaming and the development of innovative applications and services.
- The next generation of mobile network, that is 5G networks are expected to provide a substantial increase in bandwidth and speed and a decrease in latency hence enabling the 'Everything smart / Everything connected' to become reality. The use of MIMO technology and self-organizing core networks as well as availability of enough spectrum and a robust fibre backhaul are considered important to enable the successful implementation of 5G networks.
- The IMT-2020 standardization process at the level of ITU and World Radiocommunication Conferences is ongoing and additional spectrum is expected to be allocated to mobile communication by WRC-19 in line with RESOLUTION 238 of WRC-15.
- WI-FI technology has also constantly evolved over the last 25 – 30 years. While WI-FI Networks require lower CAPEX to be deployed, these networks provide limited ubiquity, higher latency and less connected devices as compared to 5G networks. In the future 'connected world' Wi-Fi and 5G are expected to be complementary rather than competing technologies.
- There is a need for member countries to coordinate and harmonize at the level of WRC-19 so that additional globally harmonized spectrum for broadband mobile networks is made available.
- It has been also found that IPv6 addressing scheme is a prerequisite for 5G networks and it is a challenge to convince end users to shift from IPv4 to IPv6 given that these users are more comfortable with the use of the IPv4 addressing scheme.

SESSION SIX: TECHNOLOGY AND INNOVATION

Chair: Radhacharan Shakya, Senior Advisor, ICTA, Republic of Mauritius

Panellists: Bashir Patel, Global Spectrum Regulatory Policy, ESOA

Pather Amoordalingum, Chief Executive Officer, Multi Carrier Mauritius Ltd

Edmund Fianko, Deputy Director, Engineering, National Communications Authority, Republic of Ghana

Key points and Important Outcomes:

- The Future 5G network is expected to be a network of networks whereby multiple technologies are used and complement each other to create an ICT ECOSYSTEM. Satellite technology is expected to "blend in" to the overall 5G Ecosystem.
- Even if satellite networks do not provide the same performance as terrestrial communications services, satellite communications may be relied upon in instances when access to conventional terrestrial communications is not available or when these terrestrial communications networks fail.
- Major advances and innovation in satellite technologies have occurred during the past years thus enabling new verticals and services being offered. Satellite strategies are adapting to the growing end user expectations.
- Connectivity to everybody wherever is desired there should be satellite integration in 5G Ecosystem from the start in order to achieve the aim of heterogeneous networks and services.
- A Shift from static to dynamic spectrum allocation is expected to happen in the future hence existing legislations must be revamped in order to cater for this shift. It is important for regulators to understand what is actually being deployed, where and when to be able to dynamically manage the spectrum through the use of a central database.
- It is also important for regulators and satellite service providers have to work together with local partners to address the issue of unauthorized satellite user terminals. Agenda item 1.5 of WRC-19 addresses the issue of unauthorized satellite user terminals.

SESSION SEVEN: TV WHITE SPACE DEPLOYMENTS

Chair: **Joaquin Restrepo**, Chief of Outreach and Publication Services Division, International Telecommunication Union.

Panellists: **Pather Amoordalingum**, Chief Executive Officer, Multi Carrier Mauritius Ltd

Rajesh Rai, Chief Technical Officer, Mahanagar Telephone Mauritius Limited (MTML)

Salomão David, Coordinator of the TV White Spaces Project, National Institute of Communications of Mozambique (INCM)

Basebi Jacqui Mosinyi, Deputy Director Spectrum Management, Botswana Communication Regulatory Authority

Key points and Important Outcomes:

- While many Digital opportunities are available to the world's urban developed population, around 50% of the world population mainly residing in rural areas of the developing are not connected. This phenomenon is referred to as the 'Digital divide' .These unconnected areas need to be provided with affordable connection to the Internet.
- TV white spaces, that is the unused spectrum in the UHF broadcasting band, may be used to provide connectivity to these rural regions for setting up of both access and backhaul networks. Spectrum available in TV White Spaces provide good coverage and indoor penetration as well as efficient energy consumption, given the requirement of less cell sites. TVWS may be used for both rural and urban broadband deployment, deployment of Public Safety Communication systems, education and training projects and other personal consumer applications.
- Pilot tests regarding the use of TV white spaces have been conducted in many African countries. Trials and deployment have been done in both rural and urban areas.
- However, the fact remains there still is a need to build a business case for TVWS in Africa, given the challenges being faced. These challenges include proper database management, interference avoidance for primary users and other secondary users, no protection for TVWS users and educating people about the technology. There is a need for proper framework and regulations to take care of these challenges so that TVWS networks may be effectively deployed.
- Mozambique has successfully implemented a TVWS network mainly for non-commercial applications. The management of the geo location database has been outsourced to private providers.

SESSION EIGHT: DATA AND DATABASE MANAGEMENT

Chair: **Robert Ravi Arokianathane**, Senior Advisor of ICT, Ministry of Information & Communications Technology, Republic of Uganda

Panellists: **Tony Harris**, Regional Director, TCI International

                    Trilok Dabeesing, Director Information Technology, ICTA, Republic of Mauritius

Key points and Important Outcomes:

- Spectrum database management is not a new concept. Data analytics may be applied to innovative spectrum management so that effective spectrum monitoring and analysis may be achieved. This in turn will enable efficient and timely assignment of spectrum, pricing compliance, fast interference resolution and effective detection of illegal transmissions which will foster trust in the regulator.
- A shift in paradigm is being noted regarding spectrum sharing techniques for mobile networks. Artificial intelligence and machine learning techniques are being applied to spectrum management in order to develop automated spectrum management systems in developing countries.
- Data analytics applied to spectrum management enhances productivity and business gain. Moreover if all spectrum allocations are known, sharing and reuse of spectrum without any interference is possible. Automated spectrum management also provides the possibility of identifying and analysing behavioural data and patters which can be used as input to spectrum planning.
- The automated spectrum management system consists of several databases that hold much information about spectrum users, frequencies, licences, fees, interference complaints, etc. it thus enables the automatic production of management reports and dshboards.
- Mozambique learned from the OFCOM experience to identify suppliers of commercial equipment that provides connectivity using TV Whitespaces. Database and Sensing mechanism were employed to minimise risk of interference. The requlator controlled where TV whitespaces can be deployed and which frequencies can be used by publishing a white spaces deployment plan. Hence, the Mozambique regulatory authority succeeded to make use of TV whitespaces to provide connectivity to remote areas which were previously not connected.
- Databases with integrated signal analysis provides the possibility of recording signals of interest based on modulation criteria, for example detection of drones near airfields.
- Nonetheless, spectrum usage information is only as good as the data provided by the monitoring nodes.

SESSION NINE – SPECTRUM ISSUES FOR THE DIGITAL BROADCASTING SWTICHOVER (DSO)

Chair: Salomão David, Coordinator of the TV White Spaces Project, INCM, Republic of Mozambique

Panellists: George Kwizera, Deputy Director of Spectrum, Rwanda Utilities, Regulatory Authority

      Kamal Tamawa, Spectrum Policy Manager, Sub-Saharan Africa, GSMA

      Professor Armstrong Idachaba, Director Broadcast Monitoring, Nigerian Broadcasting Commission, Republic of Nigeria

      Pather Amoordalingum, Chief Executive Officer, Multi Carrier, Mauritius Ltd

Key points and Important Outcomes:

- Case studies of the digital migration process and the allocation of digital dividend in Rwanda, Kenya, Mauritius and Nigeria were presented.
- New services and applications as well as affordability of devices are the main factors that are driving the demand for data up.
- The digital dividend frequency bands are considered very useful for mobile operators since these frequency bands enable better coverage and indoor penetration. The benefits of the digital dividend band also include faster speeds achieved due carrier aggregation. Further more Sub 1GHz bands are considered to be ideal to IoT Development.
- However, it is important for Broadcasting Digital to first migrate so that spectrum is available in the 700 MHz and 800 MHz frequency band for allocation to broadband mobile operators. Funding of the Digital Broadcasting switchover remains a major challenge for most countries, especially developing countries.
- There is a need to plan well ahead for spectrum usage after consultation with all stakeholders especially operators and allocate enough resources to these operators so that they can deploy their networks. It is also important to educate people and create consumer awareness for them to use the connectivity being provided.
- Spectrum planning should take into account regional as well as global harmonization as well as financial considerations.
- All converged media industry (Telecommunication Service providers and Broadcasters) must collaborate and work together.

SESSION TEN: STATUS AND PREPARATION FOR WRC

Chair: Gisa Fuatai Purcell, Acting Secretary-General and Director of the ICT Development Department, CTO

Panellists: **Steve Jones**, Senior Manager - Spectrum Management, Avanti Communications Group
George Kwizera, Deputy Director of Spectrum, RURA, Republic of Rwanda
Basebi Jacqui Mosinyi , Acting Deputy Director Spectrum Management, Botswana Communication Regulatory Authority, Republic of Botswana
Ronnie Aiolupotea, Assistant Regulator, Office of the Regulator, Independent State of Samoa
Joaquin Restrepo, Chief of Outreach and Publication Services Division, International Telecommunication Union
Kamal Tamawa, Spectrum Policy Manager, Sub-Saharan Africa, GSMA

Key points and Important Outcomes:

- The key WRC-19 Agenda Items were reviewed during this session. CTO member countries were urged to participate in WRC-19.
- One likely outcome of WRC-19 is that more than 20 GHz of spectrum may be made available for 5G.
- Main challenges faced by least developing countries and benefit that they can draw from 5G technologies were also discussed during this session.

CLOSING CEREMONY

Mahmad Aleem Bocus, Chairman, Information and Communication Technologies Authority, Mauritius
Gisa Fuatai Purcell, Acting Secretary General and Director of the ICT Development Department, Commonwealth Telecommunication Organisation
Bharati Ramrekha (Information and Communication Technologies Authority), Rapporteur
Prakash Nahullah (Information and Communication Technologies Authority), Rapporteur

Mr Prakash Nahullah recalled the highlights of the three day Commonwealth Spectrum Forum 2018. Thereafter, in her closing address, Ms Gisa Fuatai Purcell of the CTO, thanked participants for their presence at a very rewarding conference and expressed her gratitude to the Government of the Republic of Mauritius for hosting the CTO event. Mr Mahmad Aleem Bocus, on behalf of the host country, then formally closed the Forum.

CONCLUSION

The Forum succeeded in giving to all participants a very useful insight into the challenges and opportunities of effective spectrum management in developing countries. The panel discussions and debate around important topics such as spectrum harmonisation strategy and planning, policy and regulatory strategy, as well as technology and innovation brought valued contributions and provided a profound appreciation of the importance of effective spectrum management.

The Forum started with discussions focussing on the importance of effective spectrum management as a pre-requisite for the emergence of innovative services such as 5G, IOT and smart cities. There is a need for a harmonised regulatory strategy taking into account the convergence of broadcasting and communications. While there were varying views on the need for additional spectrum for mobile services and decreased spectrum needs for broadcasting, there was a consensus on the need for transparency when allocating spectrum given that spectrum prices directly affect the price and affordability of services proposed by operators.

Day 2 focussed mostly on the technological advances in the field of ICTs. The evolution from the first generation of mobile communications to the upcoming fifth generation (5G) was presented. Industry experts also presented technological progresses and innovations in satellite communications. All experts and delegates agreed that the 5G ecosystem would encompass both terrestrial and satellite communications networks.

Dynamic spectrum allocation, using databases and sensing mechanisms, is expected to gain momentum in the future. Hence, Regulators are expected to adapt to this paradigm shift in spectrum management. The initiative of the Mozambique Regulatory Authority for a successful deployment of a TV White space network to provide connectivity to previously unconnected remote areas was applauded.

Finally, the Forum closed on Day 3 following discussions around the digital dividend band migration in developing countries. Regulators and policy makers were urged to thoroughly consult with all stakeholders for effective spectrum planning and allocation. There was also a call for all CTO member countries to participate actively in the discussions of WRC-19.

Finally, the importance of global spectrum harmonisation across all member states was emphasised upon. The Commonwealth Spectrum Management Forum 2018 successfully geared participants to focus on fair distribution of spectrum resources amongst all stakeholders to bridge the digital divide. The use of technology and innovation in the management of spectrum was also encouraged.