



GTPRN July 2020 Newsletter

Welcome to the GTPRN July 2020 newsletter.

We have the privilege this issue to have several exclusive contributions for GTPRN by high profile telecom policy practitioners and academics. This include Prof. Jennifer Manner on technology neutrality. Prof. Manner is quite active on the academic and professional levels, and even when it comes to movie making. I did enjoy the most her book ‘Spectrum Wars’ which is a must-read to understand what happens the behind of scenes at WRCs.

We have also an interesting and very timely contribution by Prof. Jason Whalley on the impact Covid-19 on ICT industry. Prof. Whalley has done a lot for the telecom policy community during the last years via supervising students, reviewing papers, editing journals, and managing conferences.

In this issue, we continue our review of the ITU different study groups activities, and we focus on the activities of the ITU-R Study Group 7 responsible of science services in preparation for WRC-23. This is summarized by Mr. Mohamed Abd El Hassib, Vice Chairman of ITU-R Study Group 7 (Science Services), and one of the few experts in the field outside of NASA and ESA.

We invite you to provide us with your views on what to include on the list of research topics on spectrum management as was suggested by Dr. David Reed last month whether by commenting directly on the [post](#) or by contacting us. We have received comments that the focus should not be solely on mobile services, but also on non-mobile and non-terrestrial technologies.

An interesting paper entitled ‘Co-developing digital inclusion policy and programming with Indigenous partners: interventions from Canada’ by Dr. Rob McMahon was recently published in the Internet Policy Review journal. The article won the 2020 Meheroo Jussawalla Research Award at PTC-20 and it is

now available here. Another well-drafted article is by Judge and PhD student Abdelmohssen Sheha in Lexis-Nexis MENA Revue with a focus on interconnection and it is available here.

If you are not a LinkedIn user, I suggest you reconsider that given the excellent articles available there by Prof. William Webb. You can check his latest article entitled ‘The Ideal Telecommunications Network’ here. A webinar was held last month to discuss a very interesting study on ‘Convergence in Media and Telecom in the face of COVID-19’ by Prof. Gérard Pogorel, Professor of Economics and Management-Emeritus, Telecom Paris, and Mr. Augusto Preta, Founder and CEO ITMedia Consulting, Rome. The study can be found [here](#) and the video recording of the webinar is available [here](#). PolicyTracker, the spectrum management newsletter, will conduct a webinar on 15th of July on the 6 GHz debate, and registration is available [here](#).

With respect to telecom policy conferences, this a reminder for PTC-21, which is confirmed to be in the period of 17-20 January 2021. The deadline for paper abstracts is soon, 10th of July 2020. Prior to PTC-21, the IEEE will hold an important event, IEEE Summit on Communications Futures on 16th January 2021 in the same venue. The event is one of the few where the technical and policy sides of technologies are explored as part of the recent IEEE initiatives in the last years (e.g. IEEE Future Directions). More details can be found here. Another interesting IEEE event is the 2020 IEEE Global Conference on AI and IoT (GCAIoT) which will be a hybrid conference; virtual and physical in Dubai, UAE in the period from 12 to 15, December 2020.

TPRC-48 is confirmed to be in the period of February 19-20, 2021, and it has several attractive papers and panels as shown here. The International Symposium on Advanced Radio Technologies (ISART) will be held virtually in the period of August 10–13, 2020, and has the theme ‘5G Spectrum and a Zero-Trust

Network’. More details can be found [here](#). Another important conference is the IEEE Virtual World Forum on Internet of Things 2020 with several activities over the following months as shown [here](#).

With respect to telecom policy journals, the IEEE IoT Magazine has a CFP for ‘Smart IoT Solutions for Combating COVID-19 Pandemic’ with the deadline on 15th of July 2020. Furthermore, the June 2020 issue (Volume 51) of Information Economics and Policy Journal is now available online [here](#).

We are very pleased to introduce to you two telecom policy experts who have kindly joined our GTPRN editors’. The first is Mr. Arzak Khan, an internet governance and cyber security expert, who is one of the few in his region that have an impact in practice on the telecommunication sector. Mr. Arzak has been always keen to invest his knowledge back towards his country, Pakistan, for the benefits of the people. The second is Mrs. Rolla Hassan, Senior Manager, Internet Policy Analysis at the NTRA of Egypt, which has a double experience in spectrum management and internet governance. This has provided her with a wider scope in telecommunication policy in addition to her PhD study on technology management. Feel free to check their impressive bios at this issue.

Finally, it is with great sorrow to announce that Prof. Howard Williams has passed away last month. Prof. Williams is one of the pioneers when it comes to telecommunications policy with several seminal contributions, and his legacy will live on through tens of his students around the globe. This issue is dedicated to Prof. Howard Williams. May his soul rest in peace.

Take care, stay safe and well.

Mohamed El-Moghazi

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A Tribute to Professor Howard Williams



Prof. Williams is one of the pioneers when it comes to Telecom Policy, and through the program he established in the University of Strathclyde, Master of Communication Management (MCM), he became the Godfather for many students around the globe who several of them have taken the lead in the telecom industry.

Prof. Williams held a chair at Graduate Business School, University of Strathclyde, and he worked as an economist and lead policy advisor for international organizations including the European Commission (DG InfoSoc), the World Bank and the Internet Governance Forum.

As one of his students, I must mention that I owe him and the MCM program almost everything for making me what I am today, similar to tens of other students, mostly from developing countries.

The legacy of Prof. Williams will continue through his students and publications.
May his soul rest in peace.

Despite of all his pain, he was trying to keep in touch with all his student. Below is a quote from his last message on FB.

“I sometimes find it hard to respond to everyone who writes but let me say having your messages is very encouraging and very supportive - so thanks and apologies for slow replies.

Please pass this on to other MCM friends in case they have not seen this message.

Love to you all

Howard”

Bridging the Digital Divide Requires Technology Neutral Solutions

Jennifer A. Manner

Senior Vice President, Regulatory Affairs, EchoStar/Hughes

Many global leaders from Presidents to Telecommunications Ministers and regulators, have voiced their commitments to solving the digital divide. However, delivering on that promise, requires government funding. Despite these good intentions to ensure all people across the globe have access to broadband, the funds to do so are limited and must be utilized efficiently and on a cost-effective basis to help achieve the goal of universal broadband across the United States.

For example, across the United States, 80% of the population lives on just 3% of the land, and 20% of the population lives on the other 97%. Other countries have similar breakdowns. Deploying terrestrial technologies, such as fiber, is easy in densely populated places like cities and highway corridors. But as the population density decreases in more rural portions of a country, these technologies become increasingly costly to deploy. In these areas, non-terrestrial technologies, such as satellite and even high altitude platforms, like balloons, make more economic sense. These technologies can provide wide area coverage without the deployment of costly terrestrial infrastructure and are able to provide the broadband speeds and services that are demanded across the country.

These very real economics must be considered. If funding for the universal deployment of broadband services across the globe were unlimited, then everyone could have fiber. Yet, the reality is that funding is limited. If a terrestrial technology were offered with a preference -- without regard to cost -- there simply will not be enough funds to reach everyone, especially in the more rural and remote areas of the globe. For example, the cost to extend broadband to a cluster

of 10 rural locations that are 1.5 miles from the nearest fiber node would be about \$95,000 (including materials, labor and equipment). Deploying satellite to those same 10 locations would be approximately \$5000.

This is a pivotal moment. As seen by the pandemic for everything from work to school to government to health care, access to broadband is no longer a luxury; it is an important part of the socio-economic fabric of the United States. We would fail the world if we choose to only fund terrestrial-based broadband services, because the funding – and therefore the service – would only stretch so far. Proven broadband alternatives, including non-terrestrial technologies, such as satellite, exist and must be part of the solution endorsed by the government leaders. When we make funding decisions on a technology neutral basis, we can ensure people across the globe win the race to solving the digital divide.



Jennifer A. Manner is Senior Vice President of Regulatory Affairs at EchoStar Corporation/Hughes Network Systems LLC where she is responsible for the company’s domestic and international regulatory and policy issues, including spectrum management, 5G, IoT and market access. Prior to this, Ms. Manner was Deputy Chief of the Office and Engineering and Technology and before that Deputy Chief of the FCC's Public Safety and Homeland Security Bureau where she has had a focus on broadband and other related issues. Ms. Manner previously worked as a Principal at ZComm Strategies LLC.

Before that, Ms. Manner was Vice President of Regulatory Affairs at SkyTerra Communications, LLC, where she handled the company's domestic and international regulatory and policy issues. Before joining SkyTerra, Ms. Manner served as Senior Counsel to FCC Commissioner Kathleen Abernathy with responsibility for wireless, international and new technology issues. Ms. Manner joined the Commissioner's office after working at MCI Communications

Corporation, later WorldCom, Inc., as Associate Counsel for Foreign Market Access and then as International Wireless Services and Director of International Alliances. Prior to this position, Ms. Manner was an associate in the Communications Group at Akin, Gump, Strauss, Hauer and Feld, L.P. Before joining Akin, Gump, Ms. Manner was an Attorney-Advisor at the FCC.

Ms. Manner has served as an adjunct professor at Georgetown University Law Center and the Washington College of Law at American University. Ms. Manner has published several books on telecommunications issues including on spectrum and foreign market access, and has written numerous law review and magazine articles. Ms. Manner holds and has held key leadership roles including in Satellite Industry Association the US ITU Association, the EMEA Satellite Operators Association, in study groups at the International Telecommunications Union including ITU-R Task Group 5/1, as well as serving in leadership roles in federal advisory committees, including as Chair of Working Group 4B on Network Timing Alternative on the Communications Security, Reliability and Interoperability Committee and Chair of Working Group 4, Regulatory Issues of the World Radiocommunication Advisory Committee, as well as Vice Chair of the International Trade Advisory Committee and the International Telecommunications Advisory Committee 8 and a member of the Commerce Spectrum Management Advisory Committee. Ms. Manner is also a member of the Advisory Board of Geeks Without Frontiers. Ms. Manner also has served on numerous U.S. delegations to international treaty negotiations.

Ms. Manner received her B.A. from the State University of New York at Albany, from where she serves as Co-Chair of the Alumni Board of the Rockefeller College of Public Affairs and was awarded the Outstanding Alumni in Political Science Award. She received her J.D. cum laude from New York Law School and LL.M. with distinction from Georgetown University Law Center. Ms. Manner is admitted to practice in Washington, D.C., New York and Connecticut.

Ms. Manner has also been named as one of the 100 Most Powerful Women in Media and the Internet by Cablefax for 2018, one of the top 2017 and 208 100 Broadband and Media attorneys by CableFax, one of the most powerful women in the world by CableFax in 2018, and was awarded the EchoStar 2013 Most Valuable Player Award, the 2012 FCC Public Safety and Homeland Security Bureau's Chief's Meritorious Service Award, the 2012 Distinguished Alumni Award in Political Science from the Rockefeller College, State University of New York at Albany and the 2011 Wireless Communications Association International's Government Service Award.

Ms. Manner, a film-maker, was a finalist for her movie at the 2018 Cannes Film Festival and has under production her latest film, When Wire Was King, The Transformation of Telecommunications, expected for release in 2020.

Under-appreciated operators?

Jason Whalley

Professor of Digital Economy at Newcastle Business School, Northumbria University, Newcastle, UK

With the spread of Covid-19 around the globe, a new normal emerged as governments sought to tackle the virus. International travel stopped, schools were closed, all but essential retail ceased and many organisations moved online with their employees working from home. Covid has wrought enormous damage, in terms of the number of deaths that have resulted as well as its socio-economic impact.

While Covid-19 has wrought devastation to some parts of the economy, other parts have prospered. According to a recent article in the Financial Times, 100 companies have seen their stock-market value rise by at least \$8.2 billion between the start of the year and the middle of June 2020 (Financial Times, 2020). With increases of more than \$200 billion apiece, the top three companies were Amazon (\$401.1 billion), Microsoft (\$269.9 billion) and Apple (\$219.1 billion). The products and services provided by these companies are aligned with the demands of the pandemic and the ‘new normal’ that has emerged – Amazon’s online retailing provided many consumers with a way to purchase whatever they needed as shops were closed, and allowed retailers to generate sales and distribute the goods via its logistical network. And not only did many companies switch to Microsoft Teams to satisfy their meeting needs, but the relatively diversified nature of Microsoft meant that it benefited in other ways, such as through increased demand for its cloud services as well Xbox, its (online) gaming business.

But what other companies have thrived? With the move online, technology companies have prospered. Zoom, which many people had not heard of at the start of the year but which is now on the verge of becoming a noun, has seen its

capitalisation grow by \$47.9 billion, while Facebook has added \$85.7 billion. Those companies providing some form of content, which may be TV shows and films (e.g., Netflix), video games (e.g., Activision Blizzard) or music (e.g., Spotify), are also prominent among the 100 companies listed, as are e-commerce companies (e.g., JD.Com, Shopify).

Less prominent on the list of companies identified by the Financial Times are those that design or manufacture the equipment that others use. Just three companies fall into this category, namely, Nvidia (\$83.3 billion), ASML (\$27.3 billion) and Advanced Micro Devices (\$11.6 billion). This would seem to suggest that the market rewards those who use technology rather than those who develop or manufacture it. In contrast, American Tower, which builds and operates masts around the globe, which is an arguably a less glitzy activity, added \$15.2 billion in market capitalisation.

Conspicuous by their absence are telecommunications operators, either fixed or mobile. There is only a single telecommunications operator listed among those companies identified by the Financial Times: T-Mobile. This US-based mobile operator has seen its value rise by \$59.7 billion, reflecting the completion of its long-discussed merger with Sprint on the one hand and the increase in demand for communication services due to Covid on the other. But this rise is surprising, especially when the performance of other operators is taken into account: the share price of many operators, including T-Mobile's two main rivals in the United States, have fallen over a comparable period. The share price of AT&T has fallen by 22%, and Verizon by 'just' 7% (Business Insider, 2020).

Determining why the market valuation of T-Mobile has risen so much detracts from the wider point, namely, that only one operator is identified by the Financial Times. Given the widespread move online that Covid brought about, it is reasonable to expect that the increased demand for their services would result in

more operators being included among the top 100. That this has not occurred reflects the increasingly difficult position that many operators find themselves in. The provision of a telecommunications infrastructure is expensive. The network needs to be built and then maintained, not least to ensure that it can meet the demands placed on it. On the other hand, consumers view the telecommunications network as a means to connect them with the services and products that they want to consume. Many users will not think twice about their operator until their access to the Internet is somehow interrupted or the prices they pay dramatically increase.

But operators are integral part of today's new normal. They have provided users with a pipe that allows them to shop online, watch a TV show on Netflix, work from home and communicate with their colleagues, friends and family. And networks coped with the resulting increase in traffic – in the UK, for example, Openreach reported that traffic on its network increased by 28.58% between the weeks commencing 24 February and 20 April 2020 in London to 112.37 PB (ISP Review, 2020), while Vodafone said that its mobile voice traffic increased by 42% in the first couple of weeks after lock-down was imposed in the UK (Petty, 2020). Without the infrastructure that operators have provided, and the opportunities that this afford, lockdown would have been very different and perhaps difficult for many. The key role played by operators means that as governments begin to consider the post-Covid economy, a number of interwoven issues will need to be addressed.

Firstly, how can operators be encouraged to invest in their networks? As operators are squeezed between users and online companies, there is a clear need to ensure that they are able to earn a sufficient return to fund their investment activities. As working from home is likely to become far more widespread after pandemic restrictions are lifted, these investments will not only need to improve the quality

of existing infrastructure but also expand network coverage to those areas currently lacking it.

Related to this is a second issue, can operators be encouraged to accelerate their switch to new technologies? It is only a matter of time before fibre based fixed and 5G based mobile networks become the norm, but could operators be persuaded to make this change faster than previously planned? Governments will undoubtedly have a role to play in this decision, but so will the operators themselves as they seek to craft a business model that makes sense for their particular set of circumstances. The experience of operators in countries, such as the UK and US, suggest that developing a successful business model that combines connectivity – the ‘pipe’ – with content is easier said than done. Thus, the third issue that is likely to be extensively discussed is what business model should operators adopt? Should they focus on the pipe, or develop business models that combine connectivity with (potentially) more lucrative products and services?

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Dr Jason Whalley is Professor of Digital Economy at Newcastle Business School, Northumbria University, Newcastle, UK. His research focuses on the interaction between technological change, regulations and market structures. Dr Whalley has published extensively on the mobile telecommunications industry, often in conjunction with Professor Peter Curwen, while with others he has published on the Internet of Things, the provision of broadband in rural and remotes areas as well as telecommunications in the Himalayas. Dr Whalley is editor of Digital Policy, Regulation & Governance, and vice-chairman of the International Telecommunications Society.

ITU-R Study Group 7 (Science Services)
Mohamed Abdel-Hassib
SG 7 Vice-Chairman

The Radiocommunication Study Group 7 (ITU-R SG7) for the Science Services was created through a structural reorganization in 1990 at the Düsseldorf CCIR Plenary Assembly.

ITU-R SG7 addresses technical issues related to specific disciplines under the umbrella of science services. “Science services” refer to the standard frequency and time signal, space research (SRS), space operation, Earth exploration-satellite (EESS), meteorological-satellite (MetSat), meteorological aids (MetAids) and radio astronomy (RAS) services. ITU-R SG7 has four working parties that are specialized in four working areas.

The first working party of ITU-R SG7 is WP7A which covers standard frequency and time signal services, both terrestrial and satellite. Its scope includes the dissemination, reception and exchange of standard frequency and time signals and coordination of these services, including the application of satellite techniques on a worldwide basis.

The goals of WP 7A activities are to develop and maintain ITU-R Recommendations and Reports in the TF Series and Handbooks relevant to standard frequency and time signal (SFTS) activities, covering the fundamentals of the SFTS generation, measurements and data processing. These ITU-R Recommendations are of paramount importance to telecommunication administrations and industry, to which they are first directed. They also have important consequences for other fields, such as radionavigation, electric power generation, space technology, scientific and meteorological.

The second working party of ITU-R SG7 is WP7B which is responsible for the transmission and reception of telecommand, tracking and telemetry data for space

operation, space research, Earth exploration-satellite, and meteorological satellite services. It studies communication systems for use with manned and unmanned spacecraft, communication links between planetary bodies and the use of data relay satellites. WP 7B enables both scientific studies and technology programmes by intelligent use of the radio-frequency spectrum.

WP 7B develops and maintains the Recommendations to enable sharing of the limited orbital and spectrum resources. The technical and operational characteristics of spacecraft are also studied, defining the preferred frequency bands, bandwidths required, protection and sharing criteria for spacecraft, and orbital locations for data relay satellites. The resulting SA Series ITU-R Recommendations and Reports assist administrations, national space agencies and industry in the planning of systems that share frequency allocations used by space radio systems. Space research, by the very nature of its remote operations, is critically dependent on the radio spectrum for the conduct of its activities.

In WRC-19, WP7B has succeeded in the assigned agenda items, to establish in-band power limits for earth stations operating in the mobile-satellite service, meteorological-satellite service and Earth exploration-satellite service in the frequency bands 401-403 MHz and 399.9-400.05 MHz; and to facilitate use of the bands 137-138 MHz (space to Earth) and 148–149.9 MHz (Earth to space) by the space operation service associated with short-duration mission satellite systems. WP 7B is responsible in preparation for WRC-23 on topic related to upgrade space research service in the frequency band 14.8-15.35 GHz.

The third working party of ITU-R SG7 is WP 7C which covers remote sensing applications in the Earth exploration-satellite service (EESS), both active and passive, systems of the MetAids service, as well as ground based passive sensors, space weather sensors and space research sensors, including planetary sensors.

The objectives of WP 7C activities are to develop and maintain ITU-R Recommendations, Reports and handbooks relevant to remote sensing in Earth-exploration and meteorological activities. This includes the assessment of spectrum requirements and protection criteria for the above services and the establishment of sharing criteria with other services. The resulting RS Series ITU-R Recommendations are of paramount importance to administrations, international and national space agencies, as well as industry.

WP 7C is responsible in preparation for WRC-23 on topics related to new secondary allocation of EESS (active) around 45 MHz, new primary frequency allocations to EESS (passive) in the frequency range 231.5-252 GHz, spectrum requirements for space weather sensors and Protection of EESS (passive) in the frequency band 36-37 GHz from non-GSO FSS space stations.

The Fourth working party of ITU-R SG7 is WP 7D which covers the radio astronomy service. Its scope includes radio astronomy and radar astronomy sensors, both Earth-based and space-based, including space very long baseline interferometry (VLBI). Radio Astronomy observations involve the detection of extremely faint radio signals from the cosmos over the whole radio spectrum, and therefore require the most sensitive radio telescope systems. Such systems are very susceptible to radio frequency interference from other radio services and hence careful management of the radio spectrum is of extreme importance to radio astronomy.

Study Group 7 and its working parties develop ITU-R Recommendations (www.itu.int/pub/R-REC), Reports (www.itu.int/pub/R-REP) and handbooks (www.itu.int/pub/R-HDB-21) that are used for development and ensuring non-interference operation of space operation, space research, Earth-exploration and meteorological systems (including the related use of links in the inter-satellite service), radio astronomy and radar astronomy, dissemination, reception and

coordination of standard-frequency and time-signal services (including the application of satellite techniques) on a worldwide basis.



Muhammed Abdelhaseeb is the Vice-Chairman of Study Group 7 of Radiocommunication Sector in International Telecommunication Union (ITU-R). He serves as Director for Radio Spectrum Assignments in the Egyptian National Telecommunication Regulatory Authority (NTRA). He joined NTRA since 2005 as junior spectrum management engineer. He started participation in the activities of ITU-R since 2007 as a member of the Egyptian delegation to the World Radiocommunication Conference (WRC-07).

His active participations in ITU-R activities since 2007 was the driver to be nominated as Vice-Chairman for ITU-R SG7 by the Egyptian Administration and the Arab spectrum management group (ASMG). At WRC-19, he was selected to be Vice-President for Committee-3.

Muhammed earned a bachelor degree in telecommunications and electronics engineering form Ain Shams University in 2005. In addition to that, he had a master of Telecommunications (MSC) form Cairo University in 2018.

Arzak Khan



Arzak Khan is internet governance and cyber security expert having extensive experience in ICTs, broadband development and e-governance project management of globally recognized identity management and social safety net programs. He is also founder of Internet Policy Observatory Pakistan a leading think tank providing researchers, governments, regulators, operators, multilateral institutions, development agencies and community organizations with the information and analysis required to develop innovative and south centric policies for modern age cyber technologies.

The focus of most of his recent research has been on the expansion of internet access, dark side of technological changes and unintended consequences of “connectedness”. His upcoming book “Cyber war the next threat to the national security of Pakistan” raises the critical linkage of mass surveillance, artificial intelligence to the national security of Pakistan. He has also conducted various studies examining the impact of the digital divide in global south, growing use of internet connected devices in Pakistani society and role of new media in civic and political participation.

Arzak holds a Master degree in Communication Management from Strathclyde Business School, Glasgow, United Kingdom as a Chevening Scholar. He is also receiver of various prominent awards such as Media Policy Fellowship from University of Oxford in United Kingdom, DiploFoundation Policy Fellowship in Internet

Governance. Ministry of Foreign Affairs, Sweden ICT4D scholar award to study globalization, development and ICT4D. PhD award from Lillehammer University College Norway to research in “mediatization social and cultural change”. Arzak also received an award from UTS International Geneva, Geneva Internet Platform, and United Nations Conference on Trade and Development (UNCTAD) for participating in digital commerce course to discuss the emerging digital policy issues such as cross-border data flows, data localisation, cybersecurity, consumer protection and the implications of emerging technologies for global digital trade.

Arzak also served as Advisory Board Member for London based Global Partner Digital Cyber Security Capacity Building programme for Global South. He has also been invited by the Ministry of Foreign Affairs, Kingdom of Netherlands as Cyberspace expert at Global Conference on Cyberspace. He has also assisted UN Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression of framing guidelines for use of AI and its impact on freedom of opinion and expression. Currently he is working on the expansion of shrinking civic spaces in South Asia using innovative technologies.

Rolla Hassan



Rolla is currently Senior Manager, Internet Policy Analysis in Telecom Services, and Planning Sector at the Egyptian National Telecom Regulatory Authority (NTRA). Rolla is a member of the Governmental Advisory Committee (GAC) in ICANN. She is deeply involved in global and regional activities related to Internet policy.

Throughout her 15 years of work experience career at NTRA, Ms. Rolla Hassan has been involved in many activities including the study regarding the DNS Egyptian domain name system market, in addition to the re-planning process of Digital Terrestrial TV in the UHF band and digital switchover.

Rolla Hassan holds an MSc degree in electronics and telecommunication Engineering from Arab Academy for Science, Technology, and Maritime Transport (AAST) Egypt. Ms. Hassan is currently working on her Ph.D. in Management of Technology (MoT) at Nile University (NU).