**The Opening Ceremony of the 33rd Annual Conference and Trade Exhibition of CANTO** took place on July 16, 2017, at Hard Rock Hotel and Casino in Punta Cana, Dominican Republic.

**Master of Ceremonies Mr. Elon Parkinson** welcomed the delegates including the Hon. Gaston Browne, Prime Minister, Antigua and Barbuda; the Hon. Melford Nicholas, Minister of Information, Broadcasting, Telecommunications & Information Technology, Antigua and Barbuda; Dr. the Hon. Andrew Wheatley, Minister of Science, Energy and Technology and sponsors including headline sponsor Huawei. His remarks were followed by a digital presentation of the national flags of CANTO members and the singing of the CANTO song. **Mr. Ian Blanchard**, Action Coach, CILC delivered a spirited invocation.

**Ms. Teresa Wankin, Secretary General, CANTO** extended her gratitude to the attendees for being part of the CANTO Punta Cana experience. She spoke of the transformative nature of social media, and in that regard, she highlighted the ability of the CANTO app and the Hard Rock Hotel app to provide delegates with an immersive conference experience. The Secretary-General noted that CANTO embraced a holistic approach to setting the ICT agenda alongside stakeholders, with CANTO serving as the agent of change. This inclusive approach allowed the region to benefit from its caliber of members and continued to facilitate the development of a better strategy for the region.

Underscoring the theme "Reimagining ICT as a Tool for National Growth and Development with focus on Big Data, Internet of Things, Artificial Intelligence and Cyber security," Ms. Wankin touted CANTO's leadership role in the region facilitating the networking of the movers and shakers of ICT. The organization's role struck a balance between the political will of governments and the economic growth of its members.

Ms. Wankin noted that CANTO's exhibition allowed a peek in the future and gave stakeholders a unique opportunity to experience innovation in person. The various fora and social elements of the forum coupled with CANTO's collaborative nature allowed stakeholders to share experiences while maintaining the human element of engagement.

Paying tribute to the location, **Mr. Julian Wilkins, Chairman, CANTO,** welcomed delegates in Spanish and English. He spoke of his experience working at the Antigua and Barbuda utilities company in the early days of cell phone usage on the twin island nation. He noted how cell phones went from being synonymous with wealth to being accessible to persons of all economic backgrounds. He also noted how the changing regional telecommunications landscape went from regulated brick and mortar operators to OTTs, faceless, distant entities which did not invest in the countries in which they operated.

Mr. Wilkins underscored his commitment to CANTO and expressed pride in his election to a second term as Chairman of CANTO's board.

The Chairman provided a brief update on the work of the Caribbean ICT collaborative committee which had the mandate to make recommendations to governments [on key ICT issues] via the ITU. Draft papers of the committee were in the process of being finalized.

Mr. Wilkins reminded delegates of the historic industry-led code of practice signed by 30+ operators. He also highlighted the collaboration between the disaster committee and ECLAC to strengthen telecoms.

The Chairman lauded the service of former CANTO vice Chairman  Mr. Leon Williams and recognized the efforts of former chair Mr. Thomas Duce and former vice chair Ms. Karen Bevin.

**Mr. Nelson Guillen,** Dominican Republic, INDOTEL welcomed delegates to his country and underscored the importance for ICT in forming a more prosperous and inclusive society.

**Mr. Charles Che**, Vice President of the Caribbean Region, Huawei highlighted the successful partnership between Huawei and regional operators. He also highlighted top Huawei projects including Singapore's smart nation project and Dubai's smart system.

**The Hon. Gaston Browne,** Prime Minister of Antigua and Barbuda stressed the importance of ICT, fueling creativity and driving productivity. He spoke of government incentives for operators

including tax-free holidays. He shared an anecdote of the power of social media, two lives saved by rallying the public via Facebook. He commended the operators for providing the high quality cutting edge services at affordable cost. He informed delegates that CARICOM had approved a draft work plan for the region as a single ICT space.

The remarks were followed by dance performances by local dance duo, Caribe Baila. The ceremony concluded with a vote of thanks by **Ms. Rochelle Cameron**, Vice Chair, CANTO.

**Ministerial Breakfast: sponsored by Cable and Wireless Communications**
*Chair: Denise Williams, Cable and Wireless*
*Keynote: John Reid, CEO, Cable and Wireless Communications*

Ms. Denise Williams welcomed the keynote speaker John Reid who described Cable and Wireless as a resilient organization benefitting from a combination of the rich legacy of C&W, the spirited and entrepreneurial Columbus Communications, and the international reach and expertise of its new parent company Liberty Global. He extolled the strength of its Caribbean leaders such as Gary Sinclair, head of the Caribbean division and Euan Fannell, head, Corporate Affairs.

Mr. Reid described C&W as a responsible corporate entity and major employer, one with a history of investing in Caribbean communities with numerous initiatives to improve networks, systems and platforms underpinned by a people agenda. In more than 150 years, C&W's network infrastructure in the region was extensive, from laying the first transatlantic cable, to being the first to bring a 100% digital experience, to investing in local and international content and the channels to access them. Cable and Wireless had also deployed its fiber network in both smaller islands and larger territories. In addition to upgrading to VDSL, the company was pursuing strategic investments. He highlighted the company's venture with local telecommunications entity Marpin in Dominica which resulted in the introduction of multi-platform digital video product to more markets.

Mr. Reid informed the attendees of his company's introduction of 4G LTE mobile services across 9 markets. He underscored that Cable and Wireless was the only company making investments to ensure that technology reached rural, remote communities. This included the introduction of hybrid technology to bring the broadband experience to underserved areas.

Cable and Wireless had also invested in athletes participating in the 2017 Flow CARIFTA Games as well as Mr. Kirani James, Grenadian Olympic gold medalist.

The keynote speaker highlighted the company's investment in indigenous content including the production of Caribbean Tales, Caribbean Next Top Model and incubator programs for local film makers focusing on Caribbean content.

Additionally, Cable and Wireless had pursued investments in apps created for the Caribbean lifestyle:

- Flow Lend, a mobile credit loan app;
- Flow Kids, an educational interactive, fun app for children of all ages;
- Flow Sports App, which allowed customers to access premier international sporting content,
- FlowRio2016Extra which delivered the most exclusive Olympic content available in the region
- Flow study app for students prepping for CAPE/CSEC

Other Cable and Wireless ventures included the launch of C&W Insights, an online portal that gave local markets visibility on key performance metrics. The company employed the Net Promoter Score which indicated the company's performance from the perspective of its customers. A percentage of employee compensation was based on this metric. Cable and Wireless had noted an improvement in its NPS.

Mr. Reid also informed attendees of his company's preparation for 5G in the Caribbean starting with Antigua and Barbuda. Phase 1 was in progress. If successful, Antigua and Barbuda would be the first 5G ready country in Caribbean.

**Ministerial Roundtable 1: Sponsored by C&W**
**Moderator:** *Rochelle Cameron, CANTO, Vice Chair*

**Keynote: Joe So, Huawei, CTO, ICT solutions**

Mr. So delivered a presentation which centered on Huawei's Caribbean-style smart city initiative. He noted that cities faced numerous challenges including city governance in the face of natural and man-made disasters; ensuring livelihoods in the face of regional educational imbalance and poor healthcare; protecting environmental ecology and ensuring industry development. He noted that cities contain more than half of the world's population while only occupying 2 percent of Earth's surface.

A smart city would be one with efficient city governance, high quality public services and sustainable economic development. The Huawei representative explained that New ICT was the key to the creation of a smarter city. He underscored the inevitability of smart cities, noting that the phenomenon was not a trend but rather a race for the most innovative competitors.

The Huawei CTO extolled the advantages of a smart city initiative for the Caribbean. Tourism was instrumental to the economies of many Caribbean nation. Consequently, smart tourism, with its national broadband and green initiatives, would make for a safe city. Smart tourism would also lead to smart agriculture and smart healthcare among others.

Mr. So provided the meeting with an illustration of the Huawei Smart City Solution framework with network, cloud, platform and smart application. He underscored that Huawei was the best partner for developing a smart city and that the company worked with its partners to build a

sustainable system. He highlighted numerous Huawei smart city initiatives including Nigeria's e-government, Smart Maldives and Uzbekistan e-education.

**Feature: Garfield Sinclair, President, Caribbean, C&W Caribbean**

Mr. Sinclair underscored C&W's commitment to investing in the region and  underscored the importance of collaboration as the new leadership. He noted that Cable and Wireless investment in the Commonwealth youth games 2017 and its investment in young Caribbean film makers. Within the company itself, Cable and Wireless employees could take advantage of Jumpstart, a middle management development program. He pointed out the introduction of innovative technology and the superior sub sea and land fiber optic of Cable and Wireless. Noting the changing regulatory environment, Mr. Sinclair called for a collaborative approach to enacting policies to create a facilitating environment.

**Panel Discussion**

**Hon. Marlon Penn, Junior Minister, Trade and Investment Promotion, BVI**

**Hon. Andrew Wheatley, Minister of Science, Energy and Technology, Jamaica**

**Hon. Catherine Hughes, Ministry of Communications, Guyana**

**Hon. Darcy Boyce, Minister of State with responsibility for Telecom, Barbados**

The ministers provided the following **country status updates:**

**Guyana**

Noting that Guyana was a traditionally agricultural country, the Hon. Catherine Hughes explained that her government recognized the need to transform its economy through ICT. There were numerous challenges including the large size of the country (83,000 square miles), its dense coastal population and its remote villages. The migration to the cities included teachers moving to the city for work. Online learning could be a solution to this outward migration. E-health could also serve as a solution to reaching remote communities. For indigenous communities with products to sell, ICT hubs could transform entrepreneurial activity. The e-government network was established to reach citizens. As part of the initiative, 101 schools (including 3 university campuses) were provided with  access to free internet.

**Jamaica**

Underscoring the importance of ICT as a pillar for economic growth, the government of Jamaica set a target of 5 percent economic growth in 4 years. Hon. Wheatley added that ICT would be employed to improve efficiency and interaction with citizens. If well executed, ICT initiatives would allow citizens to move away from being consumers of technology to being innovators of technology. It would also create a level playing field. He expressed the desire to see partners innovate without reliance on government regulation. The government of Jamaica was in the process of putting in place regulation to incorporate ICT in culture, cyber security and the financial and technology sectors.

**BVI**

The government of BVI launched its one-government initiative two years ago. The government also launched an e-government platform and revitalized its legislative platform through CARICOM EGRIP. The BVI has launched its textbooks online. Additional initiatives included telemedicine, health tourism, smart communities and a business incubator to be launched by the end of this year.

**Barbados**

The minister expressed concern that there was no central data base for health, education and immigration. Without such a database, it was difficult to share and learn best practices with other countries. Hon. Boyce pointed out the redundancy in region with 15 CARICOM governments and 15 different immigration/education systems. He recognized the role for carriers and companies to let countries know what technologies they had and where the government should be driving that discussion. He emphasized the need for more targeted efficient government practices and private sector. He concluded by stating that Barbados would not succeed if the region did not succeed.

In the ensuing discussion, the meeting made the following observations:

**On cyber security legislation -**

The Jamaica representative lauded Jamaica's cyber security response team and noted its collaboration with international partners. In 2015, Jamaica enacted its cyber crimes bills. A review of said bill would be necessary to accommodate evolving technology. The minister called for more regional collaboration and expressed willingness to share Jamaica's legislative experience with cyber security. He advocated for a cyber awareness campaign to educate citizens on ICT best practices.

The meeting also recognized the need for private sector involvement in legislative drafting of cyber security laws.

**On regional collaboration -**

Collaboration was paramount given the small populations of the Caribbean. The CTU and CANTO enabled collaboration. It was suggested that CTU/CARICAD could serve as a central repository of individual country actions.

Guyana was working on its cyber-crime legislation as well as its spectrum and frequency management. The government looked to Jamaica's approach in these areas for guidance.

**On an approach to OTTs-**

The meeting recognized the need to be open to innovation while developing an approach to OTTs. The BVI offered zero corporate tax to its operators in order to ease the financial burden of competing with untaxed OTTs. The Jamaican government had steered away from employing a protectionist approach. While it was suggested that infrastructure should be leveraged to benefit all including, OTTs and customers, the meeting was reminded that framework came at a cost to regulated operators.

**On Guyana's approach to current spectrum policies-**

Guyana ended the existing monopoly and moved forward with liberalization. The country was now in the process of examining pricing structure and the development of a new agency. The old frequency management unit would come under this new agency. A consultant hired to further this process was reviewing Jamaica's approach to its spectrum management and pricing policy as well as reviewing other best practices in order to develop a suitable approach to Guyana.

**On incentives to current operators in region-**

Concern was expressed on asking governments to yield revenue.  The Barbados representative pointed out that operators in the country were given a better deal than most, including exemption from duties. Operators also retained the option of requesting a waiver from the ministry of finance vis-à-vis any new projects. No complaints had been received about spectrum management pricing.

The C&W representative remarked that any incentives offered would need to be revisited given the new competitive landscape.

**On big data/artificial intelligence of things-**

The meeting recognized the advantage of having a single ICT space for CARICOM with Caribbean countries being able to share their various expertise. Big data would provide an opportunity for the region to develop effective solutions.

In Guyana, the focus has been on creating ICT hubs and bringing access to remote areas with satellite. Talks were underway with GTT and ATN. In the long term, options were being discussed to bring fiber to coastal Guyana and to serve the northern state of Brazil. The Guyana government has signaled that the country was open for investment.

The meeting was reminded of the need to encourage youth who challenge conventional wisdom and to provide support and opportunities for those brave innovators who have risked failure.

**On the advanced universal service fund-**

Jamaica has undertaken the primary school initiative. The initiative allows for the provision of tablets and access to the central repository housed at the Ministry of Education. Another initiative entailed providing wifi in major city centers including remote areas.

**On the importance of telecommunications as a ministry portfolio-**
The BVI junior minister underscored the importance of internet connectivity in the financial services sector and stressed the need for online government services.

The Barbadian minister informed the meeting that his ministry portfolios included energy and immigration. He lobbied for technology to be better integrated into government services to ensure foster renewable energy and develop green economies. He also noted that technology should be used to fight crime.

The minister of Guyana explained that the government had made a concerted effort to foster and invest in innovation by the youth by establishing a hackathon. The government bought the app developed by the winning group. For the country's 50th anniversary celebrations, a group of young persons developed an app and the government purchased the rights to that app.

The government of Jamaica has established a blueprint to integrate ICT. The government also provided students with free access to educational material.

**Panel Discussion: Can telcos take advantage of the disruptivedigital economy (DDE)?**
**Moderator : Javier Rua, ICT Legal Council**
**Panelists:     Shernon Osepa, Internet Society (IS)**
**                     Veena Rawat, GSMA**
**                     Jose Otero, 5GAmericas**
**                     Delroy McClean, CWC**

**On the survival of telcos-**
The IS representative believed that telcos should get acquainted with and take advantage of the Disruptive Digital Economies (DDE). Refusing to adapt to DDE could result in the extinction of telcos.

The CWC representative informed the meeting that CWC embraced models of internal disruption. The company held its employees in the highest regard and invested in its human resources by conducting internship programs. Using a structured human resource program allowed CWC to understand employees' motivations and desires and allowed the company to use technology to remove barriers as they were encountered in the organization.

The 5GA representative stressed the need to appreciate the political, historical and cultural contexts in any discussion of technological development. In many territories, decision-making took place out of the country. For e.g. decisions for the USVI were made in Washington, DC.

The Bahamas was lauded for its investment in its human resources. The 5GA representative explained that the digital economy should be integrated in all aspects of day to day existence. In order to achieve digitalization, countries should source funding and invest in infrastructure which could handle increased traffic and heavier applications. There was a paradigm shift from individuals to smart islands with more people being interconnected.

The GSMA representative informed the meeting that the institution had published a paper on ideal spectrum ranges for 5G. He noted that telcos were the driving force behind the digital economy and that operators were evolving to the realities they faced. He pointed out that 10 percent of the population remained without coverage. The largest growth in digital economy took place in the Caribbean, Latin America and Sub Saharan Africa.

**On the regulatory approach to OTT-**

The CWC representative explained that in e-commerce, the company was influencing the population to take advantage of the regulation. He noted that end users were not so focused on what spectrum was but rather on the actual applications i.e. telemedicine, e-commerce, security. Synchronicity was a requirement for data sharing. He proffered that telcos should determine a means to harness external disruption.

**On the ICT single space-**

The meeting made the following observations:

- Applying ECTEL's approach to the EU was proffered as an option.
- The importation of machines should not be at a premium cost given their role in country's development.
- The region should not fall prey to populist political goals for e.g. giving out computers but not investing in the requisite ICT infrastructure.
- It was noted that the EU adapted its regulation to address the disruption.

- Expert agencies should be staffed with experts in the relevant fields. Too many agencies suffered from lack of relevant technical expertise among staff.
- All stakeholders would benefit from a better understanding of the internet ecosystem.
- Providers should find ways to use their networks to their advantage. OTTs were exploiting networks to their financial advantage.

In conclusion, it was noted that many opportunities existed in the Caribbean's digital economy. Collaboration among stakeholders was paramount for progress. Harmonization among countries was important both at the regional and global levels. Telcos should take advantage of the disruptive digital economy and focus on barriers. Telcos should be flexible in any approach and should invest long term planning, specifically, developing a road map for regulations and spectrum management.

**Panel discussion: 5G Technology and the Potential Benefits to providers in the Caribbean**
**Moderator David Cox**
**Tim Burke, Vice President, Strategic Technology, Liberty Global**

The Liberty Global representative explained that with regard to wireless technology evolution, each generation of wireless technology took a significant amount of time to get established. Once established, each generation enjoyed a period of usage, starting with analogue, then GSM, followed by WCDMA and now LTE. Each generation of technology required increasing bandwidth. Spectral efficiency improved. (Hertz = unit of spectrum)

LTE and 5G Enabling technologies were accompanied by increasing cell density as well as advanced arenas and better modulation. Cell size coverage varied with frequency. He noted that higher frequency spectrum was being aggressively deployed. New mobile phones handled both FDD and TDD modes across many frequencies. 5G was a unified specification serving diverse requirements and use cases. 5G higher frequencies created technical challenges. He highlighted Antigua's Fixed Wireless Trial with LTE Advanced and 5G.

**In response to a question on the Caribbean's regulators facilitating the commercial viability of 5G,** the Liberty Global representative declared the company's preference for a light touch regulatory environment given that such an approach has been proven to stimulate competition. He noted that having an aggressive and affordable availability of spectrum was optimum.

**In response to question on the future of fixed line networks if broadband can be wirelessly delivered,** the Liberty Global representative acknowledged that the likely reality would be a complementary mix of the two, with the best element eventually winning out. The economic factors would factor in the race.

**In response to question on the transformative nature and social impact of the new technology in the Caribbean context,** the Liberty Global representative noted that the catalyst to any transformation would be education on the benefits of broadband speeds to the general population. He stressed the need to bridge the digital divide between rural and urban communities**.**

**The Future of the Digital economy: Is it really digital?**
**Renato Osato, Vice President, Customer Business Executive, Amdocs**

In her presentation, Ms. Osato recognized that there were three forces shaping the communications market: digital economy; digital technology; digital customer. The fourth wave of disruption was cognitive intelligence. She explained that digital technologies were open and scalable technologies enabling business and customer transformation. She noted that half of CSPs new digital services originated from partnerships and investment. Today's digital customer was more complex with varying complexities which should be understood and catered to.

With more CEOs appreciating the value of going wireless, companies should be able to retain customer loyalty by use of the Higher Net Promoter Score. Several challenges hindered digital

transformation including lack of funding, available skills, management support; explosion of new services and complexity of new processes.

## Digicel Ministerial Breakfast on Government ICT Offerings

- **Frank O'Carroll, Digicel Business**
- **Paul Acton, Digicel Business**
- **Martin Carroll, Digicel Business**

The Digicel Business representatives delivered presentations which highlighted the role of Digicel in the regional telecommunications ecosystem. Recognizing that Caribbean countries, even combined, were small on global stage, they stressed the need for operators to work with the countries in which they invested.

The meeting was reminded that Digicel's investment in the Caribbean began fourteen years ago. The Digicel representatives acknowledged that the company benefitted from competition which facilitated the fulfillment of its promise to rapidly transform the landscape by building three large networks from scratch and delivering high speeds.

Selecting Digicel for CARCIP had kickstarted the ICT revolution in Grenada, Saint Lucia and St. Vincent and the Grenadines. Lot 1 would connect 100 percent of government buildings. There would be no digital divide as schools would share identical experiences. The Digicel representatives noted that the operator had successfully rolled out fiber networks in 7 countries. Its CARCIP tender was a three-year development to deliver a first class network.

In the discussion that followed, Digicel representatives explained that the timeframe for the project was estimated at 9 months for a physical roll-out to offices, schools and various institutions.  At this point, the core work was completed with the next steps involving individual country contextualization. Digicel also vouched for being able to decrease cost per megabyte by 1000, the scale of the project allowing countries to benefit from operating as a collective. They

underscored that costs borne at present would go toward modernizing this world class infrastructure. Digicel was asked to consider a tiered approach to costing for schools bearing in mind that government was the largest customer for the operators in the region. Engagement with building schools included ensuring that students had access to the right content. Digicel indicated that the company would deal with each ministry individually. Each individual was dealing in a non-scale environment. Digicel acknowledged core distance did impact value. Technically fiber had little effect on distance (effect can be measured in microseconds.) Commercially, there would be a small increase in cost. However, Digicel's key focus was leaving no institution/person behind.

With regard to network ownership, this would be determined in partnership with Digicel and the government. Under the CARCIP project, the general framework involved Digicel building and operating networks with government. Ownership was shared between the government and Digicel. The Digicel representative assured the meeting that the company was committed to doing what was right for each market.

T**echnology Feature**
**Emerging Trends in Telecoms and its impact on regulations for small island states - Dr Paul Golding, Associate Professor and Dean, University of Technology, Jamaica**

Dr. Golding delivered a presentation which examined the following current dynamics in the regional telecommunications sector and focused on the impact of these trends on regulations in small island states:

- Drivers of consolidation and convergence

- The emergence of new distribution technologies

- Pressures on margins

- Consumer preferences for bundles

- The change in balance of power between content and

He recalled that the General Agreement on Trade in Services (GATS) signaled a major shift in the international and regional telecommunications sectors. The Basic Agreement on Trade in Services (BATS) put forth a new paradigm in telecommunications regulation in the Caribbean region. Recent advances in technology and the new market dynamics were disrupting the telecoms sector and threatening the role of regional telecommunications regulators.

Among the drivers for change were the IoT, smart cities, convergence of media, ubiquity of connections, cryptocurrencies and Industry 4.0.

Market trends included pressure on margins (ARPU), roaming revenue's steep decline due to OTTs like WhatsApp and Apple Facetime and customers' preference for bundles. Convergence was another trend forcing change in the sector. Networks, media and technologies, previously separate elements, were now seamlessly cohering into one. The lines between media and networks blurred as companies from these realms consolidated assets and developed an endosymbiotic relationship. Other market trends included market diversification as the new regulatory model, net neutrality and privacy issues in the context of hacking.

Content was a new source of power with operators like Flow creating channels or obtaining the rights to major sporting events such as the 2016 Rio Olympics.

Other issues included the small size of the regional economy and the cost of regulation and institutional design as well as competition versus regulation. Regulations to focus on included IPv6, privacy, coverage and performance obligations, transparent access to new entrants and infrastructure sharing. Vertically integrated operators also must contend with the question of hindering new technologies in the form of OTTs and the role net neutrality would play in this decision.

Ultimately, while operators faced challenges, their infrastructure was their greatest asset. The next question will be whether legislation should be harmonized and authorities merged.


**Panel Discussion: Regulating for the converged economy**


**Session Chair: Philippe DeFraigne, Cullen International**

- **Opal Neil, Director, Regulatory Affairs, Cable and Wireless Communications**

- **Kieran Meskell, Head of Regulatory Affairs, Digicel Group**

- **Vikram Raval, Senior Policy Director, Technology Regulation, GSMA**

- **Giovanni King, Bureau of Telecommunications and Post, Curacao**

- **Jose Ayala, Head of Government and Industry Relations, Ericsson**


The contributors discussed how the small size of the region coupled with the different needs of each country produced barriers to outside investment. However, it was noted that investment would pour in once the potential for profitability was recognized. It was to the advantage of the smaller economies of the region to harmonize their legislation and at minimum, have governments willing to collaborate in order to gain leverage as players on the telecoms stage.

Also brought to the fore was the challenge of judiciary lag, i.e., not what the regulator failed to do but what the independent judiciary failed to do.

The Meeting was briefed on ECTEL, the regulatory body for 5 Eastern Caribbean states, which was currently finalizing the Eastern Caribbean Communications Bill. The bill was follow-up legislation to the Telecoms Act in 2000 which paved the way for liberalization in the islands.

Urgency was needed in any approach and any strategy should be based on regional analysis from regional telecommunications experts such as Dr. Golding. Also to be considered was having less regulation.

The meeting also recognized the achievement of St Kitts and Nevis which had recently received two awards for its 2016 advancements in ICT based on 11 factors dealing with use and access.

**FCC Update - Federal Communications Commission Trends and its Impact on the Region**
**Rachael Bender, Legal Advisor to FCC Chairman**

Ms. Bender stressed the need for smart strategies and solutions. She informed participants that Congress had opted to engage with stakeholders in Caribbean. At the GSR-17, the FCC bureau staff agreed to collaborate with ECTEL on initiatives to close digital divide. She noted that the most difficult communications challenge was in rural, sparsely populated areas. FCC Chair Ajit Pai visited more than 24 global communities to learn of connectivity challenge in those areas.

To create a competitive free market for communications, the FCC has cut red tape and removed regulatory barriers that slow the pace and increase the cost of network deployment. She explained that making it easier to install wired and wireless broadband infrastructure would result in private companies deploying more wired and wireless broadband infrastructure. The FCC has launched proceedings to help broadband providers access utility poles, site wireless infrastructure, and transition from yesterday's copper networks to modern fiber networks. The Commission has approved a plan allowing a company to use satellites in low-Earth orbit to provide high-speed broadband. This could be a promising option for those living in hard-to-serve areas.

By participating in public-private partnerships facilitated through competitive bidding, the FCC provided direct funding (through the Mobility Fund and Connect America Fund) that leveraged—not displaced—private capital expenditures.

Using spectrum auctions, the FCC harnessed market forces to efficiently use spectrum. The FCC allowed for flexible use of spectrum, clearing a path for technological development and implementation.

**Ministerial Roundtable 2: Digicel Sponsored**

**Moderator: Julian Wilkins, CANTO Chairman**

- **Keynote: Investment, Friendly Regulation and Policy - Dr. George Serentschy, Huawei**
- **Feature: Corinne Philip, Legal and Regulatory, Digicel**
- **Hon. Melford Nicholas, Minister of State and Information, Antigua and Barbuda**
- **Hon. Alvin Dabreo, Minister of Agriculture, Lands, Forests and Fisheries, Grenada**
- **Hon. Vincent Byron, Attorney General and Minister of Justice, Legal Affairs and Communications, St. Kitts and Nevis**
- **Hon. Paul Lewis, Minister of Communications, Works and Labour Montserrat**

- Keynote: Investment, Friendly Regulation and Policy - Dr. George Serentschy, Huawei

In his presentation, Dr. Serentschy stressed that gigaband infrastructure was the key pillar of a digital society. Investment friendly regulation should redefine broadband from 25mbps to gigaband; promote digital innovation; use subsidies such (as the USO) for digital innovation; create reference and competition and encourage investment. In terms of redefining the broadband benchmark, the ITU recommended 200 MHz per operator by 2020.

The following views were expressed in the ensuing roundtable discussion:

The meeting was reminded that CARICOM heads of government were pro single ICT space in the region in a bid to reduce redundancy and costs. All agreed that providers should keep pace with ICT while keeping broadband accessible and affordable. In order to maximize the use of ICT, countries should digitize and monetize local content and take advantage of the Diaspora market.

In order to fully exploit ICT, research and analysis should be at the fore of any strategy. Additionally, ICT education (including coding) should be integrated as early as possible in school curricula.

Montserrat's 2016 ICT plan had been updated to 2021 following broad consultation to enhance ICT culture in the public and private sectors. Additionally, infrastructure was being upgraded to allow interested players to participate.

St. Kitts and Nevis had recently received two awards for its 2016 advancements in ICT based on 11 factors dealing with use and access. The St. Kitts and Nevis representative credited much of the country's success in the investments in the country by operators CWC and Digicel. The population of St. Kitts and Nevis also possessed a high level of ICT education which attracted business and created a society that appreciated the value of ICT. St. Kitts and Nevis now had an 80 percent penetration rate. Additionally, the government of St. Kitts and Nevis had launched an official portal to deliver government services.

In the context of ECTEL and the Telecommunications Act, the five Eastern Caribbean member states were seeking consensus in adapting the current legislative framework to present day realities.

It was agreed that OTTs should be held accountable in the provision of data protection. The primary concern should be the security of sensitive information including medical records, immigration files, government records, taxes and education records. The meeting debated the quandaries of seeking legal redress in cases of defamation involving OTTs. Individual governments should conduct cyber security campaigns to educate and empower citizens. Governments should also take additional preventative measures to ensure data protection. Montserrat was pursuing legal amendments to prosecute cyber criminals.

Caribbean countries should send requisite representation to international bodies to ensure our voices/votes are counted in processes that impact us. In this regard, the meeting stressed the need

to have regional representation at upcoming meetings of international bodies addressing spectrum management.

**Session 3: Multi-play and Content Strategies**
**Chair: Rochelle Cameron, CANTO Vice Chair**
**Keynote: Romano Solano, Sales Director, ZTE**

Mr. Solano delivered a presentation which characterized 5G as the connected society enabler. Highlights of the presentation are as follows:

- 5G would make mobile technology even more essential than it is today.

- It would have an impact similar to the introduction of the automobile or electricity.

- 5G would fully realize its economic benefits in 2035.

- In the US, 5G has the potential of producing more than 12 trillion Dollars.

- It would affect every industry of the global economy.

- By 2035 it will support 22 million jobs.

- To make 5G a reality, the following were essential:
    - unified standards
    - cross-boundary collaboration
    - persistent innovation
    - commercial practice

As a transformative enabler, 5G was positioned as the best choice for building a world of IoT, from real-time surveillance to environment monitoring to smart grids. Preparing for 5G would require global unified standards. Cross-boundary collaboration would breathe vitality into the telecommunications industry. Epitomizing this collaboration was the 5G Automative Association (5GAA) consisted of 47 members bringing together key players in the automative and communications industries. The association's objective was to integrate smart solutions within

the automative industry. 5G had the potential to drive innovation in the commercial arena with strategic collaboration with customers.

**Enabling a Connected Communications System - Chris Forte, Cyient**

Mr. Forte presented an overview of Cyient's business model which included key services in product engineering, process engineering, design led manufacturing, networks operations and geospatial. With more than $472 million in revenue ($65m operating profit) and a market presence in North America, the Caribbean, Europe, the Middle East, Africa as well as Asia and the Pacific, Cyient's 13,800 employees served numerous industries including energy, aerospace/defense and healthcare.

With expertise in developing comprehensive communications strategies, Cyient was able to reduce operational cost by a minimum of 5% by visualizing outages and the downstream effect and directing technicians to the specific outage. The Cyient team was also skilled in disaster recovery, using available technology to correlate weather activity to network outages.

Mr. Forte presented an overview of i-CommsWorld, the application which produced an intelligent view of a network, facilitating more thorough insight into business operations by integrating both the network and operations. Consequently, the application allowed for more control over: network management, workflow orchestration, field operations and dashboard reports. The application was accessible on the web as an HTML 5 based browser-independent application. As a mobile app, i-CommsWorld was a hybrid application combative to android, iOS and Windows. The i-CommsWorld platform took both OSS and BSS data, usually maintained separately, and assembled them into a cohesive view of a network.

**Embedded SIM (eSIM) - Jose Luis Horna, CEO, Converlogic**

**Mr. Horna** gave a brief overview of the SIM's evolution from mini SIM to MFF2. The eSIM is made of the same material as traditional SIM. Launched in March 2015 for M2M, GSMA eSIM was initially oriented for B2B but moved to B2C in 2016. Its first commercial application was in the Samsung Watch S2. The eSIM is non removable dedicated secure hardware. The user can switch between carriers by using the menu. The SIMAlliance delivered profile interoperable

format on June 2015. In 2020, the eSIM market is projected to be dominated by automative applications.

**Content and Multiplay Strategies - Christopher Gordon, Head of TV Customer Value Propositions, CWC**

**Disruption**

Mr. Gordon recalled the traditional pay ecosystem consisting of content aggregators/creators feeding into a value chain of distributors which delivered the content to customers. OTTs had disrupted the ecosystem, changing customer behavior and business models. Consumers now tend to consume content from near free to paid internet subscription services versus traditional OTAs and pay TV services. Customers, in particular millennials, were also using their computers, tablets and phones to consume content. OTTs were categorized as content streaming players (Netflix); VoIP messaging players (WhatsApp); ecosystem players (Google); contextual players (Facebook).

**Strategies to Adapt to Disruption**

To adapt to the disruption, operators were advised to undertake new business models: offer slimmed down TV packages to better target customer segments; make content available as part of your mobile/broadband subscription and to experiment with various models based on market dynamics.

Adaptation would also require innovation: increasing content availability on multiple devices; delivering personalized recommendations and offering additional payment methods capitalizing on prepaid subscriptions in markets.

Finally, operators were also advised to address content as a means to mitigate disruption. Strategies would include the use of live sports, local content and other relevant content as a significant differentiator. Content rights should evolve to optimize breadth and depth per market. Operators should also invest strategically to offer exclusive content in various markets and partner with and integrate the best third party content into ecosystems.

**Mike Antonius, Acting CEO, Telesur and Frederick Morton, Tempo**

The Meeting learned that Tempo, described as the premier content producer in the Caribbean, has engaged in a partnership with Telesur of Suriname. Telesur understood that Caribbean people were interested in seeing themselves on a quality platform. In order to build a quality platform, Telesur would need a subscription rate. Telesur also embraced customer feedback which indicated that broadband speeds should be increased.

**Shamir Saddler, CEO, SMART TERM**

As CEO of Smart Term, Mr. Saddler offered his company's expertise in school and human resource management systems; e-learning and content authoring; and powerful analytics. With a presence in more than 5 countries, Smart Term offered free consultations and employed top software engineers and data scientists. Smart Term provided a content marketplace making Caribbean content available to all. Smart Term is urging partnerships in schools. It takes 2 weeks to get a school running on its platform.

All agreed that the future of ICT was in business analytics. The IT professional of the future was the one who could analyze the data and use quantitative methods to reveal social interactivity.

**Panel Discussion: CWIC Caribbean Women in ICT CEO's ForumModerator: Teresa Wankin, Secretary-General, CANTO**

- **Karen Bevans, Director, Belize Tourism Bureau**
- **Janice Sutherland, CEO, Antigua and Barbuda and Montserrat, Digicel**
- **Delleriece Hall, Country Manager Turks and Caicos, CWC**
- **Anuskha Sonia, CEO, Spang Makandra**

Ms. Bevans recognized the challenges for women in a male-dominated ICT environment. However, women could also benefit from unique opportunities presented by ICT ventures. For example, AirBnB was driving female entrepreneurship. There were more female hosts than male hosts and women earned 10 billion a year. AirBNB was more democratic than most industries which required references and referrals. Uber allowed female drivers the flexibility in their work schedules (opting for safer hours)

Women in the Belizean tourism industry benefited from the Belize app where hair braiders could post their services on the app. Belize also set up a virtual trade show which was a less costly forum for Belizean tradespersons to promote their services. Women in ICT still battle gender inequality. Young women are more vulnerable to being victims of revenge pornographic posts.

In the ensuing discussion, the following views were expressed:

*On their "Oh Wow CEO" Moment -*

Recalling her journey to becoming the first female CEO of Turks and Caicos CWC, Ms. Hall encouraged women in ICT to not limit themselves by their skill set. She noted that she managed engineers despite not having an engineering degree herself. Ms. Sonia agreed, adding that women had to find their voices and be assertive in their quest up the ladder. Ms. Sutherland advised women to bring their own style to the role rather than imitating their male predecessors. While women were derisively called "emotional," Ms. Sutherland reimagined the descriptor as one of empowerment where being in touch with one's emotions allowed for a more intuitive approach to work place relationships. Women were advised to pull up other women through the ranks. An each-one-bring-one approach was necessary in a patriarchal society. For Ms. Bevans, her oh wow moment was getting the respect of her male employees.

*On the top qualities of a CEO-*

1. Perseverance and diligence: women had to work harder and be more persistent in their journey.
2. Leadership: women had to lead by example and take the hit for the team.

3. Experience: earn something from every role that you've undertaken.
4. A support system: the panelists all praised their family members for supporting their choices. For those who were married, it was helpful to be in partnership with spouses who pushed them to climb the corporate ladder.
5. Be prepared: prepare a game plan for the inevitable objectification of the male gaze which often came from superiors.
6. Use social media to network.
7. MacGyver it: take a page out of the male rule book and wing it. You do not have to know everything about a job in order to be successful. Some lessons will be learned on the job.
8. Be a pioneer and promote diligent women: don't be threatened by another woman's success. No one stayed in any one role in perpetuity.
9. Stay true to oneself: being who you were got you the job.
10. Be wily: use your smarts to get ahead.

*On empathy being perceived seen as chaos-*

Emotional intelligence should be valued given that it allowed the individual to be more open to solutions. However, emotions should not lead decision making.

*Progress made by women in ICT in the Caribbean-*

Panelists were optimistic with the progress but still recognized the hurdles facing women in ICT.

*On the challenge of being breadwinners-*

A strong support system for some included supportive husbands. Additionally Ms Wankin noted that her daughter was her biggest champion having seen her mother break barriers.

*Addressing violence in the Caribbean-*
A CCTV network in Antigua and Barbuda has assisted with crime.

Other initiatives included having neighborhood watch via WhatsApp and publishing email bulletins of news reports.

*Advice to women-*
Develop a relationship with your boss and deliver on your work.

*Progress at CANTO-*
10 years ago, the CANTO board was an old boys club. Now 5 out of 9 board members were women and a woman was Secretary-General. According to CANTO Chair Julian, it was the most productive CANTO board he had experienced.

**Session 8: Regional Development in ICT**
**Chair: Delreo Newman, CANTO Director**

- Hon. Melford Nicholas, Minister of State and Information, Antigua and Barbuda
- Leadership for Innovation, Araceli Castaneda, Director of Leadership Studies, Public Utility Research Centre
- Values of Smart Nations - Tang Zilong, Huawei
- Paul Acton and Frank O' Carroll, Digicel
- Update on Caribbean Telecommunications Union (CTU) - Selby Wilson, CTU
- ICANN Regional Developments

**Hon. Melford Nicholas, Minister of State and Information, Antigua and Barbuda**
Hon. Melford Nicholas informed the meeting of the developments made in the twin island nation of Antigua and Barbuda. He noted that among the government's objectives in employing ICT was to transform government operations from a paper-driven to a digitized bureaucracy, to facilitate citizens' access to government services/information, to improve government's security of its IT assets and to make government operations more efficient. Among its initiatives, the government's ICT transformation included automation to its Inland Revenue Services, immigration, electoral system and land registry. Automation of the civil registry and public hospitals/clinics were in the works. The government had also created an online citizen's portal

which would facilitate driver license renewal among other things. The portal also provided access to information on bills, laws and the gazette as well as a directory of government offices/agencies.

**Leadership for Innovation, Araceli Castaneda, Director of Leadership Studies, Public Utility Research Centre (PURC)**
The PURC representative stressed the importance of innovation in an ICT world. He noted that innovation was necessary in order to reimagine ICT as a tool for national growth and development. With innovation came risk: at best, one-fifth of start-ups in Silicon Valley were successful. The successful start-ups set the pace for others in the game. Those hoping to avoid risk by not innovating were setting themselves up for failure.

There were 3 key methods of innovation, the first being innovation on the existing. The work of engineers, technicians and economists led to constant improvement on an existing product or service which was what allowed Google search engine to be the industry giant it was. The second type of innovation was the innovation on what was knowable. Understanding the customers difficulties and designing solutions was the work of psychologists and marketing experts. The third type of innovation was innovation into the unknown, i.e., creating products that customers were not aware that they wanted. This would be the work of artists anticipating the needs of customers.

Ms. Castaneda explained how to create company culture which encouraged innovation by allowing for failure. He recommended appreciating not just "best practices" but encouraging the exploration of "next practices." The latter allowed for advancement into unknown territory. He embraced the wisdom of [asking] "why" which enabled innovators to learn from analysis of experiments, both successful and unsuccessful.

The PURC representative further explained how leadership was more than just having persons follow the leader. Leadership involved mobilizing people to tackle difficult problems. A leader should be just at ease stirring the imagination of his employees as he was steering them to advancement.

**Values of Smart Nations - Tang Zilong, Huawei**

The Huawei representative detailed the advantages of smart tourism to all stakeholders. The convenience of online book and e-map navigation made travel less stressful for tourists. For a business, the employment of ICT provided a more credible and professional delivery of services. The government benefitted from smart management and improvement to overall security. Huawei was able to deliver a number of smart tourism initiatives included increased connectivity, Intelligent Sense Alert (for improved surveillance); Mobile Media Share for faster emergency response, unified management via a tourism management center which allowed for improved city security and smart management.

**Paul Acton and Frank O' Carroll, Digicel**

The Digicel representatives championed the various advantages of ICT development including a high speed fibre network infrastructure and economic and educational development. The Digicel digital transformation has seen the company demonstrate its world class connectivity and affordable service in more than 32 markets in the region. The Digicel experience now included subsea fibre, digital content, satellite and advertising.

**Update on Caribbean Telecommunications Union (CTU) - Selby Wilson, CTU**

The CTU representative informed the meeting of the institution's role in being a voice of the Caribbean at international fora. He listed the CTU's numerous initiative including the ARCIP broadband project, government networks including the Commonwealth of Dominica, Grenada and Saint Kitts and Nevis and being the lead entity on the region's single ICT space roadmap. The  governments of CARICOM were dedicated to developing a roadmap which would make the Caribbean more competitive on the global stage by eliminating roaming charges, providing digital support CSME, fostering a conducing investment environment and advancing e-government. Mr. Wilson illustrated the major milestones of the roadmap from 2017-2021. In August, collaboration ICT committees would be submitted.

**ICANN Regional Developments**

The ICANN representative provided an update on the institution's regional developments which included the completion of the IANA stewardship transition. It was noted that the US government had always intended to hold a temporary role in the DNS, and that the latter would be better served by the multi stakeholder approach of the private sector. The transition would allow for the continued enhancement of the internet's operational capability. ICANN also stewarded the ICANN59 policy forum in June 2017 in Johannesburg, South Africa.

The Meeting was also informed of ICANN's progress with performing the Root Zone DNS Security Extensions (DNSSEC) Key Signing Key (KSK) rollover. The rollover would ensure that the appropriate infrastructure could support key change in case of emergency. It was noted that this change had never before occurred at the root level. The KSK rollover had to be carefully managed so as not to disrupt normal operations. Operators were warned that if they had enabled DNSSEC validation, they should update their systems with the new KSK to help ensure trouble-free Internet access for users. More details were available at https://icann.org/kskroll

**Session 9: Cyber Security Trends in 2017 and Beyond**
**Chair: Melesia Sutherland, CANTO director**

- **Craig Pink, CWC**
- **Ric Leung, Huawei**
- **Susan Hamlin, ARIN**
- **Trevor Forrest, 876 Solutions**

**CWC**
Mr. Pink provided an operator's view of cyber security. He noted that cyber security was a growing business. Operators had to analyze and determine the biggest perpetrators and targets of cyber-attacks. The biggest targets were ISPS, applications, subscribers and devices. Subscribers should be well versed in cyber security in order to thwart an attack. The CWC representative illustrated various means by which service providers should mitigate cyber-attacks by adopting a strategy which would support the customer. Service providers should employ multiple layers of perimeter protection which would include but not limited to sink holes, firewalls and advance

malware protection. Ultimately, cyber-attack prevention was less costly than cyber-attack recovery.

**Huawei**

Mr. Leung delivered a presentation on cloud sandboxing against persistent attacks. Unlike traditional defenses, cloud sandboxing could enable defense against advanced attacks. He explained the advantages of the defense system: rapid deployment; ecosystem partnerships, threat visualization and network-wide detection. Huawei's cloud sandbox was active in China and Germany. Plans were underway to deploy the defense in Ireland, Japan, Australia and North America.

**ARIN**

As the American Registry for Internet Numbers, the institution's roles in internet security involved promoting database accuracy, domain name system security and resource certification. The Registry's current focus was to promote IPv6 transition awareness by targeting ISPs, content providers, and various industry sectors; continue advocacy of community-based multi-stakeholder policy development model in Internet governance; continue ARIN online interface/functionality enhancements per user feedback and staff experience and improve services based on customer survey results.

**876 Solutions**

The Meeting was informed of the tremendous cost of cybercrime ($80 billion in 2016), making a small but not insignificant dent in GDP. In the age IoT, the mobile botnet has emerged as the new threat vector. The ubiquity of mobile phones (2 billion globally) and IoT devices (10-15 billion) transformed mobile botnets into a weapons of mass destruction. Mr. Forrest listed numerous actions which could mitigate against these digital WMDs. Increasing cyber security awareness; preventing the unauthorized installation of malware; intercepting outbound malicious activity were just a few of the solutions offered. Participants were also advised of the development a hybrid solution that included on-premise detection and **DDoS mitigation** with **cloud-based DDoS protection** for volumetric attacks. In order for cyber security

to be effective, all stakeholders should be involved in the development and application of preventative measures.

The Chairman informed the meeting that CANTO had written a paper for its members which addressed the regulatory response to cyber security in the Caribbean. Members were encouraged to bring awareness of cyber security to customers and staff.