Event Report:

SUMMARY

Convened by the Commonwealth Telecommunications Organisation (CTO) and hosted by the Malaysian Communications and Multimedia Commission (MCMC), the **Commonwealth Broadband Asia Forum 2016** was held on 21 – 23 September 2016 in Kuala Lumpur, Malaysia, under the theme '*Connecting Smart Communities'*.

The Commonwealth Broadband Asia Forum 2016 opened on 21 September 2016 at the Kuala Lumpur Convention Centre to examine concerns over the implementation of broadband plans by the Commonwealth member countries. It also included discussions and exchanges of views between the regulators and industry players on disruption of the digital ecosystem on traditional telecommunications business model, and how the industry is managing solutions to overcome and embrace the challenges. The Forum also looked at the issues of broadband affordability, maximizing customer experience, the changing role of telecommunications companies as integrated solutions providers, the need for more cross-sector collaborations as well as efforts on the transformations of Smart Villages, Smart Communities and Smart Cities across the Commonwealth member countries.

Over the two days, the Forum was attended by 442 delegates from 11 countries, including the United States, Brunei Darussalam, Bangladesh, United Kingdom, Kenya, South Africa, Japan, Sierra Leone, Singapore and Hong Kong. A total of 36 speakers from 30 institutions from Malaysia and abroad, including MCMC and the Ministry of Communications and Multimedia Malaysia, contributed to the discussions at the Forum. This report details the outcomes of the Forum.

SESSION 1: NATIONAL BROADBAND PLANS (PART 1)

Many countries are in various stages of implementation of their national broadband plans and many more will embark on their respective plans in future. The National Broadband Plans *underpin national policies and strategies of countries and provides a framework for broadband infrastructure coverage and benefits to consumers.*

Importance of National Broadband Strategies towards the Development of a Nation by the International Telecommunication Union (ITU)

- ITU recently released the State of Broadband 2016 Report on the distribution status of fixed and mobile broadband subscriptions according to the regions by the end of 2016 and their estimated figures. The Asia-Pacific region has the highest shares in both fixed (49%, 432mil) and mobile (48%, 1755mil) broadband subscriptions compared to the Americas, Europe, Africa and Arab States. Although the shares of fixed and mobile broadband distribution in the AP region are almost the same, they do not represent the same penetration rates.
- Broadband plays a vital role in improving global sustainable development by supporting the provision of basic human needs such as education and healthcare, helping to lift people out of poverty through e-commerce and job growth, monitoring climate change and planetary processes, and bridging the digital gender divide.
- In September 2015, the UN Member States and UN General Assembly formally agreed on the new Sustainable Development Goals (SDGs) and set out a global agenda for development based on economic prosperity and sustainability, social inclusion and environmental sustainability known as the 2030 Agenda for Sustainable Development. It was acknowledged that the spread of ICT, broadband and global interconnectivity has great potential to accelerate human progress.
- Status of countries with National Broadband Plans in 2016- 151 (77%) with a Plans, 7 (3.6%) are planning to introduce Plans and 38 (19.4%) without a Plan.
- Research conducted by the Broadband Commission suggested that the introduction and/ or adoption of a National Broadband Plan is associated with 2.5% higher fixed broadband penetration and 7.4% higher mobile broadband penetration on average.
- A good National Broadband Plan should broadly, 1) make the case for broadband specific to the needs and economic structure of a country based on thorough contextual market analysis and benchmarking; 2) escape 'silo thinking' and apply across a range of different sectors; 3) be developed in consultation with a broad range of stakeholders; 4) consider the vital issue of enforceability and execution- enactment of the Plan, monitoring and implementation; 5) take into account demand and supply side considerations; 6) have a timescale around 3-5 years to allow accurate predictions in a fast changing industry; 7) be technology-neutral; 8) contain detailed, measurable goals and strategies to allow evaluation of progress; 9) address related legislations- privacy and data protection, security and digital signatures, rights of way, interoperability, etc.; and 10) strike a balance between high-level strategic direction and details. The Plan should allow implementing agencies some flexibility in its implementation.

National Broadband Plan of Bangladesh by the Ministry of Post, Telecommunications and Information Technology, Bangladesh

- The present government of Bangladesh is in its second term and is continuing National Broadband Policy which was introduced in 2009.
- Bangladesh has a geographic area of 147,570 sq. km with a population of 160.2mil. It is the 9th largest mobile phone market based on current subscription.
- Bangladesh's Vision 2021 aims to achieve a middle income country by leveraging on ICT by 2021. The Digital Bangladesh targets to achieve digital government, connected citizen, human resource development and IT industry promotion. The ICT industry targets for Vision 2021 include USD5bil industry export, 5% of GDP contribution and 2mil sector employment.
- In terms of connectivity status, Bangladesh is experiencing 82% teledensity, 130mil mobile subscription, 64mil (39%) internet subscription and 12% broadband penetration.
- The National Broadband Policy in 2009 started with 128Kbps broadband speed. Today, almost all mobile operators are providing a minimum of 512Kbps broadband speed.
- Broadband definition for Bangladesh has been changing since the National Broadband Plan 2009. In 2009, the minimum broadband speed was 128Kbps, it was increased to 1Mbps in 2013 and 5Mbps in 2016, under the new National Telecommunications Policy 2016.
- The connectivity goals of the National Telecommunication Policy 2016 include tele-penetration (90% by 2018, 100% by 2021), internet penetration (45% by 2018, 65% by 2021), broadband penetration (20% by 2018, 40% by 2021, 60% by 2025), optical fiber presence in all districts, Upazilas and unions, wireless broadband in all Upazilas and unions, and optical fiber in households (20% by 2021, 50% by 2025).
- Broadband supply side ecosystem- international connectivity (submarine cable, terrestrial cable and satellite links), domestic backbone (5 Nationwide Telecommunication Transmission Network service providers), wired access network (499 ISP licensees), and wireless access network (3 Broadband Wireless Access operators, 5 cellular mobile operators providing 3Gbroadband service nationwide).
- Other planned measures for fast deployment of broadband include promoting inter-platform competition, ensuring spectrum availability for wireless broadband (particularly in 700MHz and lower bands), expansion of the scopes of infrastructure sharing, functional separation of the vertically integrated services, incentives for infrastructure development through Social Obligation Fund (USOP), and allowing technology/ network neutrality.
- Driving demand for broadband networks and services through infrastructure development, services, applications and content, and users. Ongoing and planned measures to develop broadband ecosystem include promoting OTT services, fostering the adoption of cloud based services, switchover to digital broadcasting by 2018, establishment of hi-tech parks in different parts of the country and developing s strong business process outsourcing ecosystem.

National Broadband of Singapore by the InfoComm Development Authority, Singapore

- Broadband connectivity in Singapore is very much about the infrastructure, wired and wireless.
- In the late 80's, the government of Singapore invested in a fully digital telephone network capable of delivering far greater speeds than the 9600bps that was in demand then.
- In mid-90's, the government invested in upgrading the telephone and cable TV networks to broadband, delivering far greater speeds than the 56Kbps that was in demand.
- The desired outcome of the National Broadband Network (NBN) is to achieve 1) Ultra-high speed access network that is able to provide a minimum access speeds at 50Mbps uplink and 100Mbps downlink per end user connection, scalable up to 1Ggbps speed capacity and more; 2) Pervasive nationwide coverage that ensures all businesses are able to innovate and gain productivity; and 3) Competitive prices for wholesale and retail broadband services.
- Open Access is the way forward. The key objectives of the NBN are to promote competition in fixed line telecommunications market, and encourage Open Access environment where industry players have more options to adopt models to suit their businesses and respond to market needs which will lead to long-term competition and vibrancy in the country. This will ensure that the consumers and businesses benefit from lower prices and innovative services.
- The decision to restructure the industry was undertaken after extensive study and yearlong consultation with the industry. IDA studied overseas deployments with varying models of separation in the UK, Canada, Sweden, Italy and the Netherlands.
- The NBN has achieved nationwide fiber coverage since mid-2013, and fiber is continued to be deployed to new residential and non-residential buildings. The Universal Service Obligation is placed on the NBN NetCo.
- There are more than 1mil NBN subscribers today, and the base has multiplied many-fold since Jan 2012 (100,000 subscribers). There is a growing proportion of consumers on 200Mbps or higher bandwidth plans.
- Promotion of wireless broadband via the Wireless@SG which has been rolled out across 10,000 Wi-Fi hotspots island wide. It provides free Wi-Fi access of 5Mbps and currently attracts 2mil active users of which more than 90% sign on using the EAP-SIM authentication. The government of Singapore went into a partnership with the industry on a federated system that allows the users the flexibility to register with any operator and enjoy free access at any hotspot island wide. Moving forward, Singapore aims to enhance connectivity by delivering four times more hotspots (20,000) by 2018.
- Singapore is trying to encourage more competition in the cellular mobile space. Presently, there are 3 mobile service providers and Singapore foresees that the market is able to support an additional provider. In this regard, Singapore has set aside the 900MHz and 2.3GHz spectrum for the fourth player, allowing exclusive auction to interested bidders. 3 parties have submitted interest and proposal and the same are currently undergoing evaluation by the government.

- Singapore is also embarking on Heterogeneous Network (HetNet) trials. HetNet refers to a model of ubiquitous interoperable wireless access technologies to achieve endless connectivity. A HetNet is made up of a well-tuned mix of large mobile base stations and smaller mobile base stations known as small cells comprising different wireless technologies, such as cellular and Wi-Fi. Advantages of HetNet include seamless connectivity and mobility from Wi-Fi to 4G, offload and traffic steering mechanism, and consistent data session experience as end users travel towards their destinations on board the busses.
- Singapore's Smart Nation vision is part of its broadband connectivity objectives. It operates based on the Sensor Network and Smart Nation Operating System that is capable to establish resilient wired and wireless connectivity to sensors, sensors and probes that are to sense, capture and register environmental information, and an operating system to process, fuse and share data with agencies.

Interactive Panel Discussion

- The National Broadband Plans and the SDGs go hand in hand. The Plans should be compatible to support the SDGs. The Plans are one of the means to achieve the SDGs.
- Different definitions of broadband speeds- the minimum speed of 256Kbps was started in 2010 and defined by the Broadband Commission. As technology evolves (IoT, Smart Cities, etc.), the broadband speeds should follow suit and increase to meet the demands. Each country should be left to define its own broadband target according to its resources and needs.
- It is important that broadband is provided at an affordable rate to benefit the SMEs.
- The biggest challenges of developing a National Broadband Plan include leadership to implement the Plan, and getting the people to adopt emerging technologies and overcoming their challenges.

SESSION 2: BROADBAND INFRASTRUCTURE SOLUTIONS

The future of broadband hinges on revolutionising the infrastructure and network architecture to move towards ultra-broadband network architecture. For this, the two major stakeholders, namely the public sector including regulatory authorities and the private sector, will need to collaborate to realise the vision, strategies and broadband infrastructure solutions. It is pertinent to devise a strategy that is robust yet flexible enough to take into account future technologies. The new infrastructure must go beyond technical standards, coverage, and quality of services. It should take into account of the dynamism of the relevant market and the disruptive forces, and be consumer centric.

The challenges in the next generation of broadband networks lie in successfully creating business strategies from service innovation. For this, there must be a clear vision for how the world will be inter-connected and by asking questions such as

whether there are differences between next generation of broadband network for fixed and mobile services.

Compatible networks and standardisation is crucial to sustained growth in order to reap the benefits; however, there remain technological gaps to be bridged. Coordination between national standards and international best practices may be what it takes.

Laying the Foundations for Future Growth in Rural Areas by AT&T

- One of the cost characteristics to build the broadband infrastructure in rural areas is sacrificing speed for coverage. The lower the density, the higher the average cost of service. There are similar cost characteristics for the rural areas across the globe which can be addressed by, 1) driving down the cost, and 2) drive up the revenue.
- In deciding, it is important to consider the user expectations and use of the broadband.
- In 2014, the Federal Communications Commission (FCC) experimented by introducing the FCC Connect the America Fund. It essentially replicated the cost and revenue characteristics of high density urban areas to that of the rural areas. The FCC experimented at public-private partnership that provided a subsidy for rural areas that highlights the difference between fiber service, available wireless technology and allows a competitive bidding process.
- The FCC spends about USD10bil annually on 4 main components of the Fund- 1) high cost fund (now known as the Connect America Fund (CAF) that provides targeted, efficient support for broadband-capable speeds in high-cost rural areas), 2) lifeline (subsidized low income), 3) rural healthcare (a targeted fund to connect healthcare providers in rural and urban areas), and 4) e-rate (for schools and libraries).
- In 2015, AT&T accepted USD427mil. per year from the CAF to offer service in 18 states for the next 6 years. AT&T does so by using the fixed wireless internet service which is a licensed spectrum that the company owns that targets the rural areas to provide wireless local loop. AT&T is committed to ensure 1Mbps download and 10Mbps upload speeds. These will be able to cover Standard Definition and some High Definition services. In doing so, AT&T plans to either build antennas, add fixed wireless technology service on its existing cell towers or build new towers.
- At the first stage, it is crucial for AT&T to offload the traffic from wireless to fixed line. AT&T plans to get the traffic onto fiber networks as quickly as possible because it is the lowest cost per unit technology today. However, it is incumbent to have significant economies of scale to cover the cost of building the fiber networks.
- Despite the need of technology, there is also the need for public policies that allows foreign investments and opportunities for return nett investment.
- Important to consider-1) regulatory transparency, 2) establishment of processes for distributing funds, 3) technology neutrality, 4) performance based requirements (price, latency, through put, quality of service, etc.), 5) competitive bidding process, 6) promoting Cross Border Data Flows, 7) consumer protection

from the customers' perspectives and opportunities for recourse, 8) level playing field, and 9) opportunity of market access.

Next Generation Broadband: Opportunities and Challenges by the Telecommunications Research Project Corporate (TRPC)

- Digital trade is transforming markets- economies now have access to global customers; growth of Business-to-Business and SMEs because of digital efficiency and cost-effective delivery of products and services; and creation of new Global Value Chain by new digital trade which facilitates growth of businesses in more territories.
- What is required for a successful transition to Digital Economy- interconnected networks, and interoperability of applications and content across different platforms and networks. These factors combined will provide the ability to diversify the range of communications, products and services that are able to be delivered on IP-based networks. This, if achieved, will lead to economies of scale and scope.
- 5 important things to consider in transforming into the Digital Economy and minimizing the digital gap- coverage, what needs to be covered, the mix (fixed or mobile), speed and quality of network.
- Enabling competition is the way to get there. 3 models of competition: 1) Full structural separation which involves separate ownership of previously commonly owned division (e.g. Singapore, Mongolia, Australia and AT&T); 2) Functional separation of infrastructure and retail business lines (e.g. British Telecom); and 3) Accounting separation between infrastructure and retail business (e.g. HK Telecom).
- To consider how to regulate and who to regulate the digital ecosystem. To also consider how to change from regulatory enablement to promotion.
- Platforms- networks link multiple organisations via transaction or ongoing ties; communities add shared identity and governance; ecosystems link firms that provide complementary goods and services; platforms combine a technical architecture with an ecosystem.
- Measurement of the Digital Economy- to decide what to measure, how to measure and who to call hold for accountability.
- Recommendations- 1) To see infrastructure as a contribution to economic growth rather than as a source of state revenue; 2) The key is innovation higher up the stack and cloud is the key to this, and high speed broadband connectivity is the precondition; 3) Competitive entry of network service providers through dark fiber, leased circuits, licenses to use own facilities, rights of ways, key to to remove infrastructure bottlenecks; 4) State divestiture and public-private partnerships beyond the incumbent; 5) Transparency in licensing, spectrum allocations and interconnection; and 6) Rethink regulation as appropriate to smart cities/ smart nation.

3 Keys for Ultra-Broadband Development: C-E-O by Huawei (South Pacific Region)

- 3 dividends in ultra-broadband development- 1) Population Dividend (Connect), 2) Video Dividend (Content), and 3) Digital Dividend (Cloud).
- To move national broadband network into the next stage, 3 major challenges and opportunities need to be addressed- 1) How to connect the larger population in which the major building block for this is the cost; 2) How to enrich the content to attract more subscription to higher bandwidth and reap the benefits of broadband; and 3) How to tap on the Digital Dividend and drive the Digital Economy. The challenge for this stage is how to provide a much better on-demand network to tap the cloud opportunities.
- Enlarging penetration and addressing cost- there are currently 1.1bil households globally unconnected to broadband and cost is the major factor in connecting said households and ensure deeper penetration. In China, the end-to-end cost to roll out fiber-to-the-home is about USD200 (at 28.9% penetration rate) and it costs USD1350 to do so in South Africa (at 0.06% penetration rate). There are several ways to reduce cost- 1) support from the government through the national broadband network; 2) friendly policy and regulations to encourage investments by operators; 3) sharing of infrastructures, especially in developing countries for example the difficulty in getting rights of way (Indonesia); and 4) utilizing innovative technology solutions.
- Improving experience- video resolutions have been evolving. Video resolution evolution will be driving bandwidth usage at home. Huawei uses the U-vMOS index to benchmark user experience by taking into consideration the quality (vs. distortion), interaction (vs. latency) and impairment of view point. Developing countries should consider providing better content and experience in driving broadband uptake. Looking ahead, Virtual Reality (VR) is becoming common and has made VR gaming devices to be affordable. In this regard, the VR will require a much higher bandwidth, at least 750 Mbps, to get a decent VR experience.
- Expanding cloud services- more operators are launching cloud services and this trend is irreversible. Microsoft now delivers all of its services through cloud. This technology requires good broadband infrastructure.
- In moving the national broadband into the next phase, a country needs to address the issues of cost, enhance users experience and deliver a true on-demand network.

Interactive Panel Discussion

- MEASAT is a regional satellite operator based in Malaysia. The company was established in 1992 and since then, it has the capacity of 6 satellites to serve the Asian and African regions. One key part of the business is serving the broadcast needs in the Asia-Pacific region. To date, there are more than 100 channels on MEASAT and it is the leader for the distribution of High Definition television channels in the region. It also hosts the first 2 linear 4K channels for the distribution in Asia. Apart from the Malaysian market, MEASAT is also serving 2 other key markets- India and Indonesia. There are about 20mil dishes that point to its satellites. Being a Malaysian-based company, MEASAT plays a key role in providing infrastructure for ICT companies in Malaysia. It supports the celcos in the provision of mobile backhauling, provides VSAT services to enterprises and other VSAT providers, and it works closely with MCMC to narrow the digital divide

in rural areas given the key characteristics and ability of satellite coverage. Recently, it deployed broadband services to 438 villages in the rural areas of Sarawak, Malaysia within 2 months. This was a good example of how satellite is able to complement the fiber while waiting for the terrestrial services to arrive in a location. In 2011, MEASAT ventured into the African region and now works with various service providers in the region to provide broadband connectivity to the countries such as Kenya, Tanzania, Nigeria, etc.

- U Mobile is fourth biggest telecommunications operator in Malaysia. It was given the opportunity to have the lower spectrum in 1800 MHz and 900 MHz recently. U Mobile believes in active network sharing is the way to go in a country like Malaysia, which bears quite a substantial demography and geographic coverage. U Mobile was the first to provide nationwide domestic roaming in GSM. Together with Maxis since 2011, U Mobile was the first in Asia to do the RAN sharing which has resulted in its 30% network coverage in rural and suburban areas in Malaysia. Having experienced the success of network sharing, U Mobile calls for the regulators to promote active network sharing among its operators in areas where business case is questionable and to reduce CAPEX in rolling out the network.
- USP projects should be a concerted effort between the telecommunications providers/ operators, regulators, vendors as well as the energy industry.
- The coverage issues need to be balanced with the capacity issues.
- 2 major factors to be considered in measuring the success of mobile broadband development and health of infrastructure- 1) Spectrum, and 2) Site resources. Indonesia has around 100 sites to serve 1 mil. population, the Philippines has about 80, Malaysia has about 200 to serve 1 mil. population, Singapore has 400 sites to serve the same no of population, while Japan and Korea have about 1200 sites to serve their population. Limited number of sites to install the base stations affects coverage and speed. It is therefore important for the regulators to consider opening up more site resources. Indonesia utilizes its many convenient marts as the base stations. Other resources such as bus stands, lamp posts, etc. can be considered as useful as technologies evolve and will move away from needing huge towers. Regulators should consider allowing the operators to utilize these resources to significantly speed up deployment of network.
- Site resources is a major bottleneck in achieving successful and healthy mobile broadband development in the Asia-Pacific region.

SESSION 3: POLICY AND REGULATORY ISSUES

From the monopolistic state of communications to the gradual privatisation of the telecommunication industry, the role of the policy maker cum regulator has changed concurrently. The function of the regulator is now separated from the policy maker whereby the policy maker only makes the law and the regulator only regulates the industry.

The Changing Role of the Regulator by the Boston Consulting Group (BCG)

- Between the end of the 19th to early 20th century, telecommunications infrastructure was offered for grab to be explored and developed by any interested party. In the US, it was estimated that there were between 200-300 telecommunications operators. As a result, redundant infrastructure reached its limit and there was a substantial issue on interoperability.
- This resulted in the rise of a "natural monopoly" introduced by Theodore Newton Vail, president and chairman of AT&T (1910). As infrastructure is very scale sensitive, it needs to be done by 1 body which resulted in a monopoly. This gave rise to the 1 system, 1 policy and universal access.
- In 1934, FCC agreed and moved to standardize regulations of scaling up of telecommunications infrastructure, in the hope of guarantying interoperability.
- The case of Hush-A-Phone vs US proved the theory wrong. Interoperability is allowing different parts of the system to innovate while maintaining the interoperability. The first industry stacking happened in 1952 and it continued to evolve in the 1990's.
- The change was brought about by technology which exponentially decreases transaction costs between the different infrastructure layers to enable connectivity. It shifted the industry from a vertical to horizontal stack, which resulted in the restructuring of the business of the telecommunications industry.
- The horizontal stack (which was sanctioned in 1994 by the ITU as the way how the telecommunications industry should operate) consists of network infrastructure provider (cable, copper, spectrum, etc.), followed by enablement platforms that provide services (payment, data, identification, etc.), applications and content (OTT, television, applications, etc.) and finally, the customers who are able to change their preferences of infrastructure and content providers as all the layers are now interoperable.
- This resulted in the change of the regulator's role- to shift the logic from managing the monopoly in a vertical line to managing different stacks that have different rules. The rules for the bottom stack differ from the ones for the top. The rules for the bottom stack relate to scale and the natural monopoly; while the rules for the top of the stack the rules based on the innovation while maintaining a robust infrastructure.
- The however gives rise to the value paradox, when value started migrating from the bottom to the top. From 2009 – 2014, it was found that the market value of the main telecommunication players stayed more or less the same, while the market value of the OTT players doubled.
- Despite this, the logic remains that the OTT service will not be viable without reliable infrastructure below it.
- Boundaries between the stacks are starting to blur, as well as boundaries between the offline vs digital worlds.
- The new paradox is the ultimate stage of convergence of the real, physical and digital worlds. Example- a 3D print of medical implants, which brings about positive benefits to life, as opposed to a 3D print of an automatic gun, which could threaten life safety. This results in meaningless borders when there is no difference between the physical and digital worlds. However, the physical and digital worlds are still regulated differently to date.
- Regulators should move towards co-regulation- the cooperation between different mindsets and sectors- cross sector regulations.

- The 6 simple rules for cooperation- To understand what others do; To reinforce integrators; To increase the total quantity of power; To increase reciprocity; To extend the shadow of the future; and To reward those who cooperate.

Catalyzing Broadband Ecosystem Growth through Innovative Local Solutions by iflix

- Innovation always comes from outside. Example- the ride sharing applications/ innovation is the result of issues on public transportation services. The beauty of technology is going from having a simple idea to a fast execution.
- iflix started 2 years ago as a mere conversation and an idea, and as a result of technology, it launched its service 16 months ago in Kuala Lumpur and the Philippines. To date, iflix has a total of 1 million activated users across Malaysia, Thailand and the Philippines by the end of 2015. iflix is now available in 6 countries and plans to expand its service to 18 countries by the end of 2016.
- According to the GSMA, 1.5bil populations in the emerging market are connected to the Internet for the first time. As smart phone prices decrease, these new Internet users are expected to be owners of smart phones. It is expected that 70% of new mobile Internet traffic is going to video applications.
- However, the current issue is not only about expanding broadband coverage but more importantly, broadband coverage not equivalent to usage. According to the GSMA, this is due to lack of awareness, shortage of locally relevant and meaningful content, and affordability barrier. This is the area that iflix saw worth solving.
- In the video entertainment space, there is a global OTT giant that believes in a one size fits all, rolled out across 190 markets but the contents offered only appeal to a small niche segment of the global market. Another example is that while the iPhone may be the widely used in developed markets, its market share in emerging markets is barely 10% and 90% of users are on Androids due to affordability issue.
- iflix saw an opportunity to create a different model that is tailored and executed locally to each of its markets, and that it is different from the traditional pay TV incumbents who utilize legacy networks that are costly. It recognizes itself as the solution of affordability issue of content. USD6.2bil is spent by the consumers on pirated content, both physically and (increasingly) digitally because traditional services are simply beyond the affordability range of the consumers.
- By 2020, mobile networks will still be predominantly on 2G and 3G bands. As such, iflix is using innovation to allow live streaming of long-form videos at sub 1 Mbps bandwidth speed on an existing 3G network. The average iflix content speed today is at 667 Kbps. It creates a service that aggregates voluminous hours of video contents onto an application that is accessible, and curated for local preferences of the region. iflix allows downloadability of its content so that the video consumption could be made offline or on low bandwidth Wi-Fi connection, as well as working with its telco partners to offer free data charge to download its content during off-peak hours.
- By being local, it allows iflix to understand its customers. Affordability can be achieved with multi-market scale.

- Local presence should be encouraged- to continually dialog with regulators, to locally register corporate entity to contribute to the GST/ VAT, to localize customer service and stronger enforcement on piracy.

The Future of Regulation: Implications of the Evolving Digital Ecosystem by the GSM Association (GSMA)

- The digital ecosystem value chain in 2015 is made up of 5 elements- content rights, online services, enabling technology and services, connectivity and user interface, and underpinned by 37 sub-categories.
- To assess the role of the government and international organisations in promotion and regulating the complicated digital ecosystem.
- The importance of the digital ecosystem to the global economy. The estimate overall financial value of the digital ecosystem is USD3.5 trillion in 2015, which is 4% of the gross world product. The largest proportion is around the online services (50% of the total value chain).
- In general, the core role of the ICT regulators is to support effective, healthy and sustainable competition. In most categories of the value chain, there are the winning and losing parties. In a number of categories, there is a trend towards a small number of players capturing a disproportionate share of the value compared to the rest due to lack of capability, limited global reach and shortage of resources to generate positive economic return. Many of the larger Internet players have established multi-category ecosystems through deepened consumer engagements in 1 category and branching out into the others.
- All around the world, internet connectivity is moving from fixed to mobile.
- From a regulatory perspective, what is happening today is the emergence of an ecosystem modular in nature- to ensure digital technologies work and create value for businesses and the consumers- cloud services give rise to e-commerce, financial service, IoT, fixed and mobile communications. Together combined, they deliver a platform.
- This impacts regulation. Regulation needs to evolve to reflect the ecosystem.
- The other issue is that the different parts of the ecosystems are competing with each other.
- Disruption- companies compete on the basis of their ability to create new products, enter new markets, and apply new technologies at lower cost.
- Challenges and issues to be addressed- converging digital ecosystems, where many different components that were once separate are now becoming inter-dependent on each other, but at the same time competing with one another. This creates a number of challenges- high level of complexity, very rapid market change, compliance cost and barriers, and regulatory distortion.
- Today's regulations are static. Need to regulate on the basis of actual impact issues, not the anticipated ones.
- Convergence in regulations needs to consistent with innovation. Some services are subject to different regulations based on the type of firm they are or what technology they use.
- Regulations should be based on markets not on structures.
- The overall goal should be the creation of an improved environment for innovation.

- 3 key principles to future regulation- 1) A functionality based approach. To drive an agenda for regulating according to function despite legacy of market structures, to be technology agnostic and to regulate on the basis of the nature of the service; 2) To employ dynamic regulation. To allow the market to determine the regulation, to enforce after the fact (ex-post) and not before (ex-ante); and 3) Reform from the bottom up. To regulate on the basis of outcomes regardless of legacy approaches, and to take current regulation into account during implementation rather than design.
- Putting principles into practice into the areas of access regulation, market entry, privacy and data protection, merger review, spectrum management, and availability and affordability.
- Key takeaways- to ponder of the arrangement that we currently have is optimal. Regulators need to equip the network operators to innovate, to compete and to be part of the wider digital value chain. To deliver that, the regulators need to adopt the 3 principles that are essentially recognitions of the way the digital ecosystem is operating today. We are dealing with functions and not market structures, dynamic ecosystems where disruption is changing the way services are delivered and how the companies compete, and regulations for outcomes and performance-based.
- Need to identify the best ways to achieve the regulatory objectives regardless of the legacy regulatory regime and approach.

Interactive Panel Discussion

- To deal with the digital economy shift through 2 big foundations- good infrastructure and the right talents. To allow permisionless innovation, while maintaining cultural elements and acknowledging local environment.
- Need of funds, government adopts the change. In Kenya- unified licensing framework, spectrum charging mechanism (tax reduction), 100% spectrum free waivers for investment in locations identifies as access-gap areas.
- Expectations from the regulators- promote different cultures, facilitate inter-country/ cross-border access.
- Mobile Connect- an identity solution, an authentication service via the mobile by several operators.
- Cross-sector regulations between ICT and financial sectors- real examples in AP, Africa and European regions- Central Bank of Kenya and Communications Authority of Kenya collaborate on the mobile money transfer service. Real world vs. digital world- conversations need to happen between the regulators, especially with the financial sector. Cross-sector regulation is far harder done than said, to attempt the sandboxing exercise on a more on-going and larger basis.
- Incentive is at some point overly used- governments to relook at providing incentives at every problem.
- Regulators to work with the industry. Regulatory equivalence across the region.

SESSION 4: INCLUSION IN THE INTERNET ECONOMY

Efforts to bridge the digital divide have always played catch-up with rapid advances in technology. A reconsideration of existing plans and strategies will result in a more inclusive internet economy with equal opportunities for individuals, groups and nations.

ICT for Smart Villages by the Centre of Development Studies, University of Cambridge

- To date, there are 1.1bil people living without access to electricity, 3bil people without access to clean cooking stoves which results in 4.3mil deaths per year.
- The Sustainable Development Goals (SDGs) are aimed at providing solutions to these issues by 2030- to ensure universal access to affordable, reliable and modern energy services, to increase substantially the share of renewable energy in the global energy mix, and to double the rate of improvement in energy efficiency.
- Energy access is one of the main enablers of most the SDGs. For instance, it would help in achieving zero hunger as a third of the food produced globally goes to waste. It is the result of unavailability of energy in many rural areas to preserve the food. The reasons for food wastage differ in various parts of the world. In developed countries, food is wasted after it is purchased. In developing countries, food wastage starts mostly at the harvest level.
- There is a need for a rural analogue to the Smart Cities as 47% of the world's population and 70% of the world's poor live in rural villages.
- The focus of the Smart Villages Initiative is to shift the balance of opportunities towards the rural areas. Despite the availability of access to technology, there is a shortage of getting the access into the hands of the people in the rural areas. Additionally, there is a need for enabling conditions.
- Key features of the Smart Villages Initiative- 1) To provide access to key services (education, health, clean water and sanitation). ICT connectivity plays an important role in enabling this; 2) To foster entrepreneurship in provision and use of energy services. To capture more on the agricultural value chain and create new businesses in the rural areas; 3) To participate in governance processes through ICT connectivity at local, regional and national levels.
- The main building block that is missing in the rural areas in South Africa and Asia is access to modern energy. Energy access is necessary to tap into the opportunities offered by improvements in ICTs. Numerous examples from agriculture, health and education.
- The focus of the Smart Villages Initiative is to provide sustainable local energy solutions for rural communities.
- Sought policy advice and views from the frontline of the challenges of village energy provision for development and how they can be overcome.
- Engagement with key players in 6 regions (East Africa, SE Asia, South Asia, South America, West Africa and Central America)- scientists, entrepreneurs, villagers, NGOs, financers, regulators and policy makers- to find out the barriers and possible solutions to the issues.
- Need to come together to form a cross sectoral cooperation. The Smart Villages Initiative is a partnership between Cambridge and Oxford, and funding from several countries and NGOs.

- The underlying premise is to maximize social benefits. To understand the requirements of each of the rural sectors for the SDGs to be appropriately applied to.

Helping the Unbanked: The Benefits of Mobile Money Payments by the ITU

- Access to finance is consistently identified as one of the top determinants of poverty with a strong and statistically significant effect.
- In 2011, 51% of the world's adult population has account with 2.5bil who are unbanked. In 2014, the figures were improved- 62% of the world's adult has an account while 2bil remain unbanked.
- Out of the 2bil unbanked population, 1.6bil has mobile phones.
- In pursuit of low-income customers, mobile network operators have created extremely large low cost distribution networks to sell airtime. This enables the mobile network operators to launch mobile money services. They become branches/ agents that provide cash in and cash out services to consumers at a fraction of a cost.
- Digital financial inclusion includes mobile banking (banking services delivered through mobile phones in which a bank account is required), and digital financial services (financial services offered by banking institutions, other traditional financial service organisations or non-bank providers through the mobile phones and other digital means without the requirement of a bank account- eg: digital/ mobile money, over-the-counter services, mobile insurance, mobile credits, mobile savings).
- Digital financial inclusion is the use of ICTs and non-bank retail channels to extend the delivery of financial services to the unbanked.
- The digital financial services ecosystem and its players- users (consumers, businesses, government agencies and non-profit groups who have needs for digital and interoperable financial products and services); providers (banks, other licensed financial institutions, and non-banks who supply the services through digital means); financial technical and other infrastructure providers; and policies, laws and regulations that enable the service delivery in an accessible, affordable and safe manner.
- A study by the World Bank identified barriers to financial inclusion on the demand side- affordability (high interest rates for loans, high premium of insurance products and minimum balances required by the banks); awareness and understanding; accessibility (especially to the low income users); desirability (many products are not design according to the need of the low income users).
- Examples of success stories on financial inclusions- M-Kopa in Kenya, Tanzania and Uganda. It is a solar electricity and television service provider to 300,000 homes in which payment can be made in instalments via the mobile phones; Mobile microinsurance in the Philippines- Globe G-Cash by the Globe Telecom. It is a loyalty based hospital insurance scheme, offered to qualified G-Cash recipients who receive remittance from family members working abroad. For every remittance made, the beneficiary is entitled to a free 30-day insurance coverage; Tigo Ghana, a loyalty based life insurance scheme covered a pre-paid subscribers and one family member free insurance coverage for every USD13 spent in a calendar month.

- On sectoral collaboration, ITU has initiated regional forums/ engagements on digital financial inclusion in Malaysia and Egypt in 2015 and 2016, respectively.

Smart Communities and Smart Villages: Initiatives of Inclusion by the Malaysian Communications and Multimedia Commission (MCMC)

- Smart Community is the building block to developing a connected nation, in line with the agenda of Transforming ASEAN: Moving towards Smart Communities.
- A fundamental initiative to realize the migration to Smart Cities is the development of Smart Communities.
- Malaysia designed the programme back in 2014, inspired by the Smart ASEAN agenda.
- Objectives- to improve quality of life using ICT, to empower community in raising their competitiveness regionally and globally, to generate creativity and innovation culture amongst the community, and to realize the benefits of using ICT for productivity.
- Smart Communities create hubs of innovation that connect people with information and tools to make better decisions that improve quality of life.
- Key principles- 1) Bottom up approach- to consider the community needs and requirements to ensure sustainability; 2) Infrastructure improvement- platforms for connectivity; 3) Local content and application development- to integrate ICT elements and leverage on new media; 4) Top down leadership- the roles of local authorities as decision-maker and support; 5) Collaboration with institutions- to harness talent and extend expertise in the ICT field; 6) Local champions- the catalyst in driving the continuous involvement of community; and 7) Replicability, scalability, reachability and sustainability- an innovative model.
- To balance the bottom up approach and top down leadership.
- The components- ICT infrastructure, local champions, strategic partners, cutting edge devices, KPI, security and data protection, content and applications, institutions and target community.
- The 1Malaysia Internet Center (PI1M)- to provide collective communications access to underserved areas and people; to improve socio-economic and human capital development; to bridge digital divide between urban and rural areas; and to promote the use of ICT in building a knowledgeable society.
- The PI1M- built on the Hub and Spoke concept that provides access to WiFi hotspots at an average bandwidth of 20 Mbps in rural and remote areas that have no access to Internet facilities. There are a total of 718 PI1M operating nationwide, as of August 2016.
- The PI1M has been identified to perform 6 core transformational elements- knowledge repository, creative innovation, collaboration, business/ entrepreneurship, learning and education and change.
- PI1M as the platform for digital inclusion- access to Internet, digital literacy training module and entrepreneurship/ soft skills development.
- Outcome: Development of local talents, connectivity, collaboration on the flood management system for the East Coast, collaboration between the locals and private sector.
- Critical success factors and lessons learned- 1) Commitment and readiness of multiple local champions, 2) Strong public private sector collaboration, 3) Early

quick wins in communication coverage and application development, 4) Institutional support at district, state and federal levels, and 5) Operational efficiency via continuous project follow through and funding.
- Future plan- to go into Smart State, Smart Nation and eventually Smart ASEAN.

Interactive Panel Discussion

- Mobile Money Transfer services in Kenya: Started in 2007 when the banked population was only 19% and mobile coverage at 70%. To date, the banked population has grown to 75.3%, subscription of 31mil currently using the Mobile Money Transfer services and 162,000 agents nationwide. The volume of transfer is about USD2.7bil per month. People are using the services to make payments of utility bills, interbank money transfers, ATM withdrawals, and many others.
- The need to access market failure through regulatory and policy interventions.
- The issue with regulation is that it is only waking up to the challenge and that it fails to acknowledge that changes are taking place. An example is the economic crisis in 2007- it may not be a failure per se but more of a question of how does regulation catch up to the disruptive technologies. The regulators in East Africa and West Africa are still unable to catch up with the evolution of the home solar market system.
- One way to mitigate possible market failure is by identifying the community needs and requirements, before introducing and deciding on the technology deployment.
- To consider the vulnerable groups and special needs community into the financial inclusion.

SESSION 5: SPECTRUM OPPORTUNITIES THROUGH THE DIGITAL DIVIDEND

The latest developments on spectrum give rise to major considerations to reap the digital dividend. Current developments in various regions and the initiatives/ collaboration between regulators in the analogue-to-digital switchover process need to be shared for better knowledge and decision making.

Enabling Digital Societies by the Telenor Group (Asia)

- Telenor is a global company with the aim to enable digital transformation of societies. It has 210mil subscribers and 90% is from Asia.
- Market based allocation mechanisms benefit all. When an operator looks at spectrum, it considers the affordability- the maximum it can pay for the spectrum and when the pricing comes out, the operator looks at how much of the spectrum that goes upfront to the government. The remaining portion of the spectrum allocated for the operator will be used for better technology and innovation deployment of the networks. The government benefits from this directly through the taxes and fees paid by the operator, and indirectly from the economic

development brought about through job creation and opportunities and delivery of innovative products.

- As the operator looks at spectrum being allocated, it is fairly important for all the players to acknowledge the fact that it is an economic circle that needs to be continued in a healthy fashion so that it could result in the actual affordability of products and services to the consumers.
- 5G trends driving the next generation- rapid increase in the number of internet-connected devices and inevitable reduction in the prices of devices, more consumption of data and rapid increase in data traffic, and high expectations on speed and connectivity by the consumers. For the consumers, 5G simply means more speed at affordable rates.
- For the operators, this simply means as there are more technologies coming in, new investments need to be made to ensure that they are able to deliver the high expectations of the users with the spectrum. 5G technologies will be heterogeneous- made up of large and small cells, some networks will be running on 4 technologies- 2G, 3G, 4G and 5G, it will almost certainly introduce a new radio interface and that investments will be costly and funding might be a challenge in many markets.
- Measures necessary to facilitate a successful introduction of 5G- regulatory conditions must be 5G friendly: 1) Reduction of spectrum scarcity; 2) Promotion of effective and sustainable competition; 3) A market based allocation and pricing method and level playing field principles; 4) Harmonization of spectrum- different types of spectrum can be used for different kinds of technologies, spectrum needs to be technology neutral to allow flexibility for deployment; 5) Reduction of investment risk; and 6) Realistic revenue and price expectations. affordability, spectrum harmonization, technology neutral
- To realise digital societies, a close coordination between private sectors, government and regulators is needed.
- Private sector- to invest in high speed networks, to introduce innovative services and competitive prices, to ensure protection and appropriate use of consumer data, and to contribute to digital literacy and online safety.
- Government- to promote converging policy frameworks for digital services at cross sector, to facilitate conducive legal, tax and regulatory framework, to digitalise key public services, to strengthen ICT education and digital inclusion, and to empower local entrepreneurs.
- Regulator- to oversee and enforce legal playing field for fair competition, to ensure harmonization of frameworks and allocate spectrum for further growth, and to educate consumers of safe and secure internet usage.

The Digital Dividend: Maximizing Returns from a Common Approach by the GSMA

- The Digital Dividend in Asia-Pacific refers to the APT 700 MHz Band Plan that was identified between 2008 - 2010. It is implemented in various countries in the AP region. The use of the Band Plan is dependent on the switchover from analogue to digital TV. The ongoing digitalization of TV has created a unique opportunity to reallocate the spectrum bandwidth in North America, Latin America and the AP region.

- Allocation does not mean actual use. At the end of 2015, there are about 64 countries around the world have committed to use the digital dividends. To date, there are about 24 countries in the AP who are committed to allocate the spectrum to mobile. However, the critical issue is there is a difference between allocation and actual release per use. So far in the AP, Australia, New Zealand, Taiwan, South Korea, Japan and Papua New Guinea are the adopters; the Philippines, Singapore and India have imminently released the spectrum to mobile. Nevertheless, there has been less progress in terms of actual implementation in parts of Asia than anywhere else in the world. The question is what is the imperative to implement it now? The answer is the growth of 4G.
- 4G use is growing at a substantive rate in the AP region. In terms of the overall number of connections, the AP countries will be experiencing double-digit percentage of growth in 4G connections in almost every key Asian market over the next 4 years.
- Moving forward to 2020, networks will need more spectrum. The trend is driven by the ongoing investments by the operators, falling device prices and growing consumer appetite for high speed mobile broadband.
- Relatively, there is low proportion of 4G connections that are going to grow over in the next few years. Countries are trying to adapt in a number of ways- some are allocating the digital dividends offering a higher frequency band to 4G, some are re-farming or re-allocating existing spectrum and some are off loading their traffic for making their networks dead set.
- Spectrum is a finance resource. Mobile networks have limited space, if too much traffic arrive at once they become congested.
- As a result, in the increase in high speed network coverage and smart phones adoption, the GSMA projects over 1bil mobile connections in the next 4 years in the AP region of smart and huge surge in data demand. The monthly mobile data traffic in the AP region was at 1600 PB in 2015, and is expected to reach 13700 PB by 2020. Globally, the mobile data traffic in 2015 was at 3700 PB and will increase to 30600 PB per month in 2020.
- This reflects the fundamental change in the way people use mobile networks to access online services and connect with each other. The new generation smart phone users will send and receive far more data than they ever did before. This means they will require more bandwidth. All of this points back to the need of more spectrum.
- This issue can be resolved with the harmonization of spectrum. Through the harmonized allocation, governments can help drive down the prices of mobile devices through economies of scale, enable roaming and analyze international interference by having the essential APT Band Plan in place in as many countries as possible.
- Another issue is that there are still substantive mobile broadband gaps and digital divide. Assessments on the coverage issue by the GSMA in 2014 showed that there were 1.2bil people in the AP region who were active users of the mobile internet made mostly of the young generation; 1.5bil covered by fast networks but were not online due to cost, literacy, awareness and perception; 1.1bil were not covered by 3G or 4g network, who live mainly in the rural areas.
- The digital dividend can play a substantive role in addressing the issue because of its propagation characteristics. Lower frequencies provide extended coverage

at lower cost as they require fewer base stations to cover an area. This changes the business model for operators when building the networks. The higher bands capacities are used successfully by many AP countries to deliver 4G.

- Will the digital dividend be enough to meet demand? GSMA conducted a study in partnership with Huawei on the implications of growing use of data after spectrum allocation. The study showed that in Asia, on average, each country will need a total of 1600-1800 MHz to be allocated to mobile by 2020. The country requirements vary according to population concentration that will directly impact on how much and what kind of spectrum are needed. At present, no country in Asia has more than 695 MHz and this calls for a significant need for additional spectrum allocation. It could come from the digital dividend or other bands (2.5GHz-2.69GHz, 3.4GHz-3.6GHz).
- Looking forward to 5G, Asia is expected to be a leader in 5G because of supportive governments and ambitious targets. 5G is expected to be commercially and successfully launched in South Korea, Japan and China by 2020.
- International coordination efforts- the ASEAN ICT Masterplan 2020 contains a commitment to develop a Guidelines for ASEAN Spectrum Regulatory Cooperation; the Asia-Pacific Telecommunity (APT) promotes harmonization of spectrum across the AP region; the APEC Telecommunications and Information Working Group's Strategic Action Plan 2020; and the APEC Ad Hoc Steering Group on the Internet Economy that addresses a number of cross-cutting issues on the digital economy.
- Beyond harmonizing allocation, there are other issues to be looked at in a far more holistic way across countries, including the ways in which spectrum is allocated- 1) Spectrum pricing- lower penetration rates is the result of excessive pricing, and lower network quality and rates growth in coverage due to high prices; 2) Auction design- high reserve prices can lead to worse broadband service, and incorporating best practice principles to minimise risk of auction failure; 3) Timing- countries that release spectrum earlier have higher mobile penetration uptake, and harmonized approach and speedy broadband clearance result in confidence for the device manufacturers; and 4) License duration and obligations- 4G coverage is best when spectrum licenses are awarded over a longer timeframe, and the EU has recently proposed 20 year+ periods to build operators confidence to invest, deploy and seek ROI.

Spectrum Allocation: Key Considerations Moving Forward by the TRPC

- Recent spectrum developments in the AP region- Malaysia launched the National IoT Strategic Roadmap, Singapore auctioned spectrum for fourth telecommunications operator in Q3/ Q4, the Philippines' SMC sold 700 MHz assets to Globe and PLDT, Thailand recently concluded 4G auction but yet to allocate 700 MHz, Vietnam is yet to formally launch 4G and Myanmar's 2600 MHz action is delayed. Facebook is building wireless Internet service using unlicensed 60 GHz and WiGiG; Intel and Qualcomm are partnering on WiGiG technologies.
- Regional spectrum harmonization- ASEAN Spectrum Policy Forum, Frequency Assignment Committee (FACSMAB) for Singapore, Malaysia and Brunei, Border Communication Coordination Meeting (BCCM) between Singapore and Indonesia,

and Trilateral Coordination Meeting (TCM) between Indonesia, Malaysia and Singapore.

- Unlicensed spectrum empowers IoT- using unlicensed spectrum for innovation. Enabling the use of unlicensed spectrum to provide connectivity for IoT, rural mobile broadband to enable smart city plans, rural internet connectivity and free Wi-Fi hotspots. 90% of Windows devices are connected to WiFi.
- Mobile identity- linking personal IDs with mobile phones can help usher in digital economy aspirations by allowing users easier access to services through their phones. Can be used for e-commerce, e-government services, mobile financial services, etc. helps to reduce terrorist activities, identity theft, etc.
- Dynamic Spectrum Access (DSA) is the means by which cognitive radios detect available unused spectrum for use. DSA shares spectrum on an unlicensed secondary system with licensed primary systems. Shared spectrum yields an annual global economic benefit of at least USD270 mil per annum. An example of DSA is the TV White Space.
- Spectrum is limited and demand is rising for mobile internet, IoT, etc. Most spectrum in most places is unused most of the time and the DSA uses the unutilized frequency bands. There is no interference with the primary licensed transmissions and it manages spectrum dynamically and efficiently.
- DSA can be materialized through scale and database. To turn DSA into a sustainable commercial business, everyone in the telecommunications value chain will need to be involved substantially (chip makers, antenna, etc.). The business case with the database will need to be resolved by expediting harmonization of the spectrum.
- Global harmonization for mobile broadband- at the WRC-15, the ITU allocated the 694-790 MHz band for ITU region-1 for mobile broadband, following similar decisions in 2007 for Region-2 and Region-3. It follows the APT 700 MHz band plan for mobile broadband. The GSMA found that the digital dividend in the AP region worth an estimated USD1trillion in GDP by 2020.
- ASEAN targets- ASEAN analog switchover (ASO) timeframe target is between 2015 – 2020, and the ASEAN ICT Masterplan 2020 includes the aim commitment to harmonize telecom regulations and develop Guidelines for ASEAN Spectrum Regulatory Cooperation.
- ASEAN is developing a Study for the Development of a Regulatory Framework for Information Sharing among Databases in ASEAN. The study aims to examine and prepare the information and options for the development of a draft regulatory framework to enable information sharing among dynamic spectrum databases in ASEAN, with a view to optimize spectrum usage for newly emerging technologies and strengthen cross-border spectrum management and coordination.
- The study will take stock the domestic policies on dynamic spectrum allocations and licensing regimes; take stock of domestic policy on spectrum database sharing/ information sharing; and formulate options for a regional regulatory framework for information sharing among dynamic spectrum databases.
- Key issues for consideration- cross-border coordination, enforcement against rogue services, harmonizing the use of 700 MHz band mobile broadband, recognizing the different priorities for spectrum across the ASEAN Member States, and being open to future technologies and uses.

Interactive Panel Discussion

- Government's role in balancing the demands of the consumers and the needs of the operators. Whenever there is a market base allocation of spectrum, the operator looks that the maximum it can pay and afford. Whenever spectrum is being bought or sold, if the value chain appreciates and understands that has a huge cost towards what the operator will then need to spend into services that come after. Understanding that makes a big difference in how the spectrum is priced. If the pricing is done in a way that not all the money is taken as spectrum charges upfront, there are a lot of other opportunities for the government to receive taxes and other fees, more innovated services can be presented and delivered. It is clearly that whenever new spectrum is priced, there is a need to balance between pricing and allocation of spectrum as this will impact pricing to end consumers.
- There are varieties of objectives that the regulators aim to achieve out of spectrum auction and allocation. There are regulators who set revenue maximization as their primary objective and that is counter-productive- investment will not happen at the rightful pace that it needs, high prices for internet services, etc.
- The market indicators for spectrum pricing- how much spectrum is needed to deliver services, the duration, where is the penetration level now- data and voice, how much more can be delivered, the cost of technology to be implemented to rollout the service, harmonization, etc.
- TV White Space and unlicensed spectrum- there is unused spectrum in the bands and necessary separation between TV channels. In using the technology, it is not necessary to cause issues with the organisations that are licensed to use spectrum.
- A lot of mobile operators have been at the forefront in changing the world for developing countries. Looking to the future, there are a few things that are happening- battle of frontage, optimizing investment vs future returns, balance of the needs vs service quality and continuously servicing the needs for consumers is not an easy thing.

SESSION 6: NATIONAL BROADBAND PLANS (PART 2)

Malaysia's Broadband Plan: Success and Challenges by the MCMC

- Malaysia's telecommunication industry outlook as of Q4, 2015- 77.3% household broadband penetration, 44.1mil cellular subscriptions, 27.8mil mobile broadband subscriptions, 3.1mil fixed broadband subscription and 143.8% cellular penetration rate.
- The national broadband penetration rate has been increasing steadily from 55.6% in 2010 and Malaysia aims to achieve 95% broadband penetration rate by 2020.
- The National Broadband Policy aims to- 1) Enhance Malaysia's position as a global ICT and multimedia hub; 2) Expand the communications network to ensure more equitable access to info and services; 3) Strengthen and enhance information

- security; and 4) Bridge the digital divide. Through these, Malaysia will be able to move up in the economic value chain.
- To achieve the objectives, Malaysia came up with the National Broadband Strategy in 2008. The strategy was divided into Supply and Demand. Under Supply, the strategy is further segregated into Broadband for General Population (BBGP) and High Speed BB (HSBB).
- BBGP is provided to the suburban and rural areas which are the areas of Universal Service Provisioning (USP) and Universal Service Obligations (USO) where there is a mix of technologies in terms of infrastructure and where the average connection is available up to 2Mbps.
- HSBB implementation focuses around the state capitals, industrial areas and development regions. The government came into the Public Private Partnership arrangement for infrastructure roll out with Telekom Malaysia. Connection speed exceeds 10Mbps.
- On the Demand side, MCMC addresses the issues on awareness, attractiveness and affordability.
- In 2010, MCMC developed the National Broadband Initiative. Major projects undertaken included the 1Malaysia Netbook (distribution of 1.5mil netbooks with affordable broadband package to identified target group), wireless coverage for village areas (provision of 4000 wireless broadband coverage at identified village areas), Community Broadband Centers (provision of broadband internet access facilities up to 2Mbps for rural communities), and telecommunication towers built for the rural areas (1000 towers will be built to increase cellular coverage to 97% population coverage).
- The 10th Malaysia Plan (2011 – 2015) aimed to expand digital infrastructure to improve broadband penetration. For HSBB Phase 1, there were about 1.8mil ports installed and each port is able to provide between 10Mbps – 100Mbps. BBGP fiber length reached about 2653km. Various projects were rolled out under the Universal Service Provisioning fund including the Wi-Fi connections in villages, internet community centers, netbook distribution and cellular towers. At the end of 2015, Malaysia achieved 77.3% household broadband penetration.
- Through the 11th Malaysia Plan (2016 – 2020), Malaysia aims to achieve coverage, affordability and quality of digital infrastructure through- 1) 95% broadband coverage in populated areas; 2) 100Mbps broadband speed for all households in state capitals and selected high impact growth areas; 3) 20Mbps broadband speed in 50% household in suburban and rural areas; 4) reduction of broadband cost to 1% of GNI broadband; 5) improve competitiveness through collaboration between state governments and local authorities on the planning and deployment of digital infrastructure; and 6) strengthening infrastructure for Smart Cities.
- The targets of the 11th Malaysia Plan have been further integrated into the Communications and Multimedia Action Plan 2016 – 2020.
- Broadband expansion project updates as of 31 August 2016- 1) Government funded- about 1.9mil connections available under the HSBB Phase 1, 213,566 connections available under the HSBB Phase 2 and 2653 km of fiber length under the BBGP; 2) USP funded- 160,688 connections available for fixed line broadband expansion, 3215 sites for mobile broadband coverage expansion, 480km fiber option network expansion, 718 1Malaysia Internet Centers, 4323 community Wi-Fi sites and 79km submarine fiber optic network (SKR1M).

Broadband Policy in Japan by the Ministry of Internal Affairs and Communications, Japan (MIC)

- Improvement state of broadband infrastructure in Japan- Japan has reached 99.98% ultra-high speed broadband penetration (55.94mil households) and 99.9% broadband penetration (55.95mil households). It is still quite challenging in remote islands.
- Fixed line- as of the end of Dec. 2015, there are 27.6mil fiber-to-the-home (FTTH) subscribers (4.7% increase from 2014).
- Mobile broadband- as of the end of Dec. 2015, there are 82.8mil LTE subscribers (33.7% increase from 2014). Broadband Wireless Access reaches 35.2mil subscribers.
- Japan formulated policy targets for broadband deployment- 1) In 2001, e-Japan Strategy was formulated to connect 30mil households to high speed internet and 10mil households to ultra-high speed internet in 5 years; 2) From 2005 – 2015, Japan upgraded the targets gradually via the IT New Reform Strategy. It targeted and has achieved all households will have access to ultra-high speed broadband by 2015. Japan is currently working on improving the ultra-high speed broadband coverage in some disadvantaged areas.
- The Basic Act on the Formation of an Advanced Information and Telecommunications Network Society 2000 provides the division of collaborative roles among the government, local public entities and private sector. Burden sharing between government, local public entities and private sector.
- In principle, the private sector plays the leading role in the formation of an advanced information and telecommunications network society.
- To support the deployment of ultra-high speed broadband infrastructure, the central government provides 1/3 subsidies for the installation cost of optical fiber lines and accessories to local governments that have areas under disadvantageous conditions such as sparsely populated areas and remote islands. The local governments usually loan the installed optical fiber lines and accessories to telecommunications carriers using the facilities to provide public facilities and local residents with internet services.
- Mobile data traffic shows an increase of approximately 13 times from 2011 – March 2016. Japan targets that its mobile traffic speed will be 10,000 times faster in 30 years and aims to reach 5G.
- Key capabilities of 5G- 1) Ultra high speed data transmission (eMBB) at 10Gbps for peak data rate (100x current LTE); 2) Ultra low latency at 1ms (1/10 of current LTE); and 3) Massive machine type connection (mMTC)- connection density of 100 devices per km.
- 5G is expected to create a new market as a key infrastructure of IoT.
- In implementing its 5G Roadmap towards 2020, Japan exercises 3 activities for 2020 and beyond- 1) Support activities by the Fifth Generation Mobile Forum (5GMF); 2) Research and developments on 5G technologies through collaborations between the government, industry and academia; 3) Standardization of activities at the ITU and 3GPP.
- Japan will undertake the 5G system trial to test radio access, networks and applications in Tokyo in 2017.

- The Next-generation Mobile Service Action promotes the projects planned from 2017 and onwards to achieve 5G services in 2020 ahead of the rest of the world- 1) Wireless IoT project that support a large number of simultaneous connections; 2) Ultra broadband project that support ultra-high speed mobile broadband; and 3) Next generation ITS project that ensures ultra-low latency.
- Radio Policy 2020 Council Report- research and development for the realization of a pilot model, development of 5G test beds, securing global frequencies and promotion of international standardization and international expansion.
- New services brought about by IoT, Big Data and Artificial Intelligence in healthcare, ICT education, farming and smart cities.
- Challenges of achieving social changes- data utilization and application, human resource development and ICT infrastructure development.
- Charter for the Digitally Connected World agreed at the G7 Summit in Apr 2016: G7 ICT Strategy- 1) Promote access to ICT; 2) Strengthen international collaboration to promote free flow of information, privacy protection and cybersecurity; 3) Foster innovation; 4) ICT to address global challenges and opportunities; and 5) Strengthen comprehensive international cooperation and collaboration.

National Broadband Plan of Kenya by the Communications Authority of Kenya

- The Kenyan National Broadband Plan 2013 – 2017 is led by the Communications Authority of Kenya, supported by the Global Broadband Innovations with funding from the USID. It also involves the Ministry of Information and Communications, Vision 2030 Secretariat, e-Government Directorate and Kenya ICT Board.
- The Plan provides a lift between Kenya's vision and its aspiration to attain knowledge based economy driven by high capacity national broadband network by 2030.
- The Plan has 5 ecosystems- 1) infrastructure, connectivity and devices, 2) content applications and innovation, 3) capacity building, 4) finance and investment, and 5) policy and legal issues.
- Targets are to achieve 5 Mbps broadband speed for rural areas and 40 Mbps broadband speed for urban areas.
- Today, about 5.6mil of Kenyans are not covered by broadband access. There exist huge gaps in 2G and 3G broadband services coverage. 485 sub-locations in Kenya are still uncovered by 2G and only 17% of the land is covered by 3G.
- The Plan will extend the fiber optic network in the country to about 60,000km to connect all the counties in Kenya, and to extend the wireless networks to cover 485 currently unserved by broadband coverage.
- The Plan will also support the extension of devices to all primary and secondary schools in Kenya, which is further supported by the Connectivity Roadmap.
- The Plan also supports the development of content applications and innovation, capacity building in terms of creating digital literacy in the country targeting schools and the ministries.
- The broadband connectivity will enable telemedicine by connecting all the health facilities nationwide, protection of intellectual property rights, inclusion of persons with disabilities and security of data.

- The Plan will ensure that the Universal Service Fund is operationalized and provision of adequate spectrum for mobile services.
- To realize the Plan by 2030, it is estimated that Kenya will require about KES210bil.

Interactive Panel Discussion

- Looking at the current gaps for 2G broadband connection in Kenya, the government is taking a deliberate policy to give spectrum fee waivers for the licensees to rollout infrastructure in the country.
- In supporting the developing countries, the government of Japan has been working with various international organizations such as the ITU and APEC to assist develop countries in their broadband deployment projects. It also has several biotech programs with countries through the Japan Industry Cooperation Agency (JAICA). Japan sees the need to work with various countries on the service development of new technology and opportunities despite being a leader in communications infrastructure development.
- In managing the issue of ageing population in Japan, the government of Japan is developing special software for the ageing community, modifying public amenities for the elderly, and received contributions from the private companies

SESSION 7: FINANCING BROADBAND ROLLOUT

Nationwide broadband coverage is essential for the economic and social development of a country and many countries have initiated infrastructure rollouts with various models of collaboration and financing with the private sector.

Successful Use of Universal Service Funds by the Universal Services and Access Agency of South Africa (USAASA)

- South Africa broadband strategy and plan is called the SA Connect Policy.
- USAASA is a state-owned entity under the Ministry of Telecommunications and Postal Services, South Africa. An agency of state and implements the policy thereof.
- The broadband challenges in South Africa- infra gap from Census Points (2011)
- SA Connect Policy Targets- to achieve 100% 10 Mbps broadband speed by 2020, connectivity at schools, health facilities and other government facilities.
- Fixed and mobile broadband initiatives led by the industry- target for connection of fiber- to-home to reach 360,000 active subscriptions by 2019, access to 3G and LTE mobile broadband.
- Population coverage in SA is a challenge as there is a huge population in rural landscapes that is not covered by 3G. Policy and regulatory calls will be based on geographical coverage.

- The SA broadband strategy includes initiatives that are aimed at facilitating and stimulating the expansion of broadband infrastructure and in this regard, the ministry has developed a business case to aggregate government demand for broadband. The implementation will be achieved through a 2-phase approach in which Phase 1 targets 8 district municipalities and Phase 2 targets 44 district municipalities. Funding has been allocated for this project, however due to huge shortfall, SA requires more funds to complete the plan. The ministry is discussing said issue with the SA National Treasurer.
- Free Wi-Fi deployment initiatives that target different major metros in SA and there is funding dedicated to the plan.
- Mandated players for the broadband infrastructure development project include the USAASA, NEMISA (a training institute), SITA (a state information agency) and Broadband Infraco (a state agency responsible for the infrastructure rollout and backhaul).
- Universal Service Obligations are imposed on the licensees and targets 5200 schools for a period of 5 years. There is a steering committee set up to monitor the USO implementation and it involves a number of stakeholders including the Ministry of Education, that has developed an offline and online monitoring tool for data usage at the provinces before the national rollout takes place.
- Digital Opportunity Strategy was developed to stimulate the uptake and usage of ICTs to build an inclusive information society.
- USAASA manages and administers the Universal Service and Access Fund (USAF).
- ICASA, the regulator, collects 0.2% of annual turnover of the licensees. Within 30 days, ICASA will then transfer the money to the National Treasurer, and the Parliament will appropriate funding allocated for the USAF to the USAASA based on its presentation of strategy and business case.
- USAASA is mandated to channel the USAF to promote universal service and access for the broadcasting and telecommunications sectors. This includes the promotion of digital migration of the terrestrial broadcasting service. USAASA is mandated to fund the manufacturing and production of set-top boxes that have been subsidized by the government for the needy communities. USAASA has identified about 5mil households that have been subsidized with the set-top boxes.

Certainty and Sustainable: The Keys to Incentivising Long Term Broadband Infrastructure Investment by Axiata

- Axiata is a regional telecommunications operator group that operates in 10 countries across Asia. Axiata has been a long term investor in Asia and has contributed a total of USD45bil into the countries where it operates and invests in infrastructure.
- Axiata is focused on 3 core pillars that address all aspects of the digital economy- 1) Digital communications and connectivity; 2) Enabling infrastructure and platforms; and 3) Digital applications and services.
- Our industry is now facing a "scissor curve" challenging traditional business models and network investment economics. This refers to the decoupling of broadband bandwidth usage growth (at 50% annual growth per year) and what industry must offer to the customers, and the ARPU/ revenue growth which is largely flat. Projecting forward into the infrastructure investment for the next 5-

10 years, the telecommunications companies will need to achieve cost production of significant magnitude in order to maintain constant margins in the industry.

- What is driving this includes high smartphone penetration rate (50% in the Asian region today and will reach 100% in the next 5 years), and social media broadcasting demand where data has substantially taken over voice (4K and 360 videos which will drive the 5-10 Mbps user experience today to 1Gbps as a noble end point experience in 5 years' time, and eventually 1Gbps user experience in the next 10 years).
- This brings about a huge infrastructure investment and effectively 35 times growth of bandwidth that needs to be delivered to the customers. To maintain constant usage while the customers pay relatively the same or slightly more, the telecommunications companies will need to achieve 30 times cost production per bit that travels around their network.
- Axiata foresees that in the next 10 years, the telecommunications companies will be serving customers around 60 GB per month on mobile and 500 GB per month for an overall converged mobile, fixed and Wi-Fi.
- The new data-led reality is that network and industry economics more strongly favour economies of scale, with implications for financing and shareholder return. This is supported by the trend of telecommunications revenue and profit growth slowing in Asia and globally over the past 10 years. The telecommunications companies are operating in a hyper invested climate but facing falling revenue and profit growth.
- The telecommunications companies are looking at making prudent investments around infrastructure.
- In order to achieve that, there are 4 key dimensions of certainty and sustainability that the industry is focusing on- 1) Regulatory frameworks (license pricing rationalization, industry specific taxation, converged regulation approach); 2) Return on Investment (sustainable market structures and supportive regulations such as spectrum pooling/ trading, active NetCo, mergers and consolidation rules); 3) Access to capital (liquidity and depth of local capital markets, currency stability and hedging instruments); and 4) Ability to launch news services (certainty of spectrum availability and allocation, FinTech related licensing for telecommunications operators, spectrum re-farming and neutrality for upgrading to more efficient technologies).
- Key takeaway- certainty and sustainability are the keys to incentivizing telecommunication operators to invest long term in telecommunications infrastructure, particularly broadband.

Funding Method in High Speed Broadband Service: Telekom Malaysia's Perspective by the Telekom Malaysia (TM)

- In supporting the Malaysian government's national broadband initiatives, TM started with the public-private partnership agreement since 2008 and to date.
- TM has grown significantly in terms of broadband capacity. TM has undertaken to convert 282 exchanges nationwide to support the high speed broadband (HSBB) and there are around 2.1mil broadband ports deployed nationwide.

- Funding is supply and demand driven. Supply driven is initiative implemented by the government and TM play the role to ensure infrastructure are in place in areas that have been confirmed.
- TM is looking at maximizing the use of copper in supporting new technologies. This is to ensure that TM's previous investments in copper could be leveraged on.
- From 2008 – 2016, the TM's average broadband speed has been increased from 2Mbps to 20Mbps, and up to 30Mbps, 50Mbps and 100Mbps in certain areas. 7800TB traverse through the network per day in the country. 45% of the traffic goes to the US, 11% goes to Europe and 9% goes to North Asia.
- 50% of TM's subscribers go on video and music streaming. About 43GB of video streaming per second traffic goes across the traffic.
- The challenges are to continue to invest in infrastructure and keeping up with new technologies due to the change in consumer data consumption.

Interactive Panel Discussion

- AT&T spends about USD16bil - USD20bil a year of capital expenditure on maintaining, investing and expanding the network- copper, fiber, spectrum and the applications that go over the mediums. AT&T's global network consists of about 100mil miles of fiber optic cables landing in about 160 countries. Over its global network, AT&T sees about 120 petabytes (PB) of data traffic per day. Acknowledging that the demand is present, is the revenue there that we can have the opportunity to go after to cover the cost- ROI? Incentivizing broadband infrastructure investment model is unique to each market. In this regard, the governments may consider either to go along determining the appropriate rate of capital for the companies which will result in heavily regulated regime, or the competition policy approach which will ensure stability and sustainability. The TPP addresses a lot of the fundamental issues- government stability, market access, base stations, spectrum policy, etc. There is bound to be gaps in government policy, therefore it would be wise for the governments to come up specific targeted policies, for instance subsidy for the low income users, government as the procurement for schools or hospitals' broadband infrastructure projects and private sectors to compete for the projects, etc.
- Sharing economy models. Partnerships and sharing of infrastructure are important when the purpose is to add value to the society. Axiata is involved in the sharing economy in different ways- developing models for agents to sell (multi-level agent), investing in 26 digital companies and brands resulting for instance music applications.
- Monetization of the assets and its implication on broadband deployment. It was decided that tower infrastructure naturally links itself to be a shared resource and can lend itself as a standalone facility, contributing to sustainable businesses.
- Governments need to partner with the operators in stimulating user demands, which will in turn reduce the cost of communications. Industry should take responsibility and be involved in policy making taking into consideration beyond own interests.
- The industry needs certainty and sustainability- long term plans for spectrum-licensing, allocation, active management around market structure, etc.

- The telecommunications providers could not afford to stand alone and need to collaborate in order to avoid ending as a dump pipe.
- Regulators need to re-evaluate their role and approach to regulation requirements, to either micro manage the services and deployment, or encourage competition and protect consumers.
- The TPP has a digital economy focus with 24 technology-specific provisions that promote investments in the entire ecosystem, not only infrastructure.
- Proposal for ASEAN to have a unified licensing approach.

SESSION 8: DIGITAL SERVICES, E-GOVERNANCE AND THE DIGITAL ECONOMY

ICT and the Internet have brought about a structural change in commercial transactions. For businesses, e-commerce improves efficiency by enlarging the scope of the market and by lowering operating barriers and costs. For consumers, e-commerce confers benefits by providing information on goods and services, helping consumers locate sellers, facilitating price comparisons, offering convenient delivery, and allowing them to purchase easily via a computer or mobile device wherever they are. This session will discuss factors contributing to a successful implementation of digital services.

e-Governance in Bangladesh: Keynote Address by HE Tarana Halim State Minister, Posts and Telecommunications Division, Ministry of Posts, Telecommunications and Information Technology, Bangladesh

- Digital Bangladesh is an integral part of Vision 2021 introduced by the present government focuses on 4 priority areas- 1) Developing human resources ready for the 21st century; 2) Connecting citizens in ways more meaningful to them; 3) Taking services to every citizen's doors; and 4) Making the private sector and market more productive and competitive through the use of digital technology.
- Research shows that only 10% increase in broadband speed in an emerging economy can increase GDP growth by 1.4%. Broadband creates job opportunities in many different ways.
- Target is 40% broadband penetration by 2021. The growth of telecommunications sector in Bangladesh from 2008 to 2016- 46mil mobile subscribers in 2008 and 130mil subscribers in 2016; 4mil internet subscribers in 2008 and 64mil internet subscribers in 2016.
- A densely populated economy such as Bangladesh can better served through ICTs. Implementation of e-governance can ensure fast, effective and better services to the citizens through which transparency and accountability can be attained. It can help the government to go green by effective management of natural resources, adding substantially to the environment.
- Government in different sectors can provide benefits in the form of new employments, better health and education, knowledge sharing, skills development and capacity building for sustainable development. It stimulates

economic growth and promotes social inclusion of disabled and vulnerable sections of the society through e-governance.

- Introducing of e-services eliminates the middle man and thus saves resources- time, money and energy.
- Bangladesh has become the 3 most dynamic countries in the AP region alongside Australia and Mongolia as acknowledged by ITU's Global ICT Development Index.
- Under e-Administration, all public information is made accessible in Bangla language through electronic means and mobile phones. All gazettes and notifications are published online.
- Bangladesh has a national portal which is a gateway to 25,000 websites of all government officers. It has 1.2mil content and generates 90mil hits per month. The portal embeds key information pertaining to agriculture, education, health, law, human rights, human resource development, social safety, environment and disaster management, tourism, history, natural and archeological sites, business and entrepreneurship, public representatives, and other information of public interest.
- Service portal books have been published of 37 government departments. E- tendering has helped to ensure transparency in government procurement process. Service innovation fund is allocated for innovative efforts, where the government has financed 90 projects thus far. Schemed development training is ongoing. Around 72,000 service providers have been trained to provide e-services. Call centers play the role to disseminate information on latest agricultural information to the farmers.
- Through e-health, free health information is disseminated to the citizens throughout 482 districts and sub-districts hospitals. Tele-medicine services are provided from 43 hospitals and 30 union digital centers.
- E-tendering has improved transparency in the bidding and purchase processes. E-portal is used for online certified copies of land properties. ICT industry has targeted USD5mil industry export within 2021, 5% of GDP contribution and 2 mil sector employments. ICT Division has completed training of 68,000 men and women and will undertake to train 74,000 more.
- Huge investment in the education sector. Has established 20,000 multimedia classrooms and target to reach 65,000 within 2021. Teachers' portal is a platform used by the teachers in the multimedia classrooms to consult each other issues and solutions.
- Contribution of 1% of the annual revenues of the MNOs is utilized for connectivity of the hard to reach areas.
- Financial inclusion is a big phenomenon in Bangladesh presently. Private entities, private banks and the National Bank of Bangladesh have taken the initiative to enable financial services to the unbanked. For this, agent banking has been recently introduced. Through mobile banking, BDT6bil is transacted daily. Rural e-commerce activities have started through 5200 digital centers, transformed the post offices to digital post offices called e-post offices, and introduced e-money transfer systems and postal cash account. Almost 9500 post offices are engaged in providing social safety net benefits to the grass root population at their doorsteps.

Regulations for the Digital Economy by Axiata

- With the increase of OTT players, the digital economy and value chain have become very complex and global- content rights, online services, enabling technologies and services, connectivity and user interface.
- Mobile operations are now a small part of the overall ecosystem.
- The World Economic Forum has coined the digital ecosystem as the Fourth Industrial Revolution. ASEAN Economic Community was established in late 2015 and it aims to achieve economic and social cooperation.
- The digital economy has the potential to add up to USD1trillion to the ASEAN GDP over the next 10 years.
- The 5 policy considerations to enable digital economy in ASEAN- 1) Broadband revolution; 2) Mobile financial services and e-Commerce; 3) Trust and security; 4) Local digital economy; and 5) Digital innovation.
- Challenges to the sector are considerable. Revenue from traditional voice and SMS service is static and falling. OTT substitution will affect future ability reinvest into network and innovative services. In Malaysia, 12.3% reduction in total SMS revenues and ARPU getting connectivity in rural areas in 2014; 1.3% decrease of total voice revenues and ARPU in 2014.
- Declining growth in operator voice and SMS revenues will accelerate to -6% annually in the 5 years to 2025, reflecting continuation of the current migration of communications to IP messaging platforms, and will become more substitutive as smartphone penetration rises.
- Today's economics of operating in a mobile network is very challenging. Business case for infrastructure investment in rural areas becomes unviable. 50% sites in rural areas serve less than 10% revenue.
- The debate on level-playing field- same rules regardless of difference in technology or business model for services that are functionally or economically substitutable- business model, licensing, taxation, privacy and security and consumer protection.
- There are increasing trends by policy makers to capture OTTs and non-traditional providers under revised/ new national laws and regulations. Addressing this will meet long-term interest of consumers, promote digital innovation and ensure MNOs will be liable to reinvest into the network; ensure international OTTs with relaxed rules will not impair the development of local OTTs; and ensure government to a certain extent will continue to have control over content, application services and consumer data.
- Most enforcement cases and examples are based on competition and tax evasion, but issues on licensing is expected to increase.
- Mobile Financial Services can contribute to the financial inclusion agenda. There are more people having a mobile phone than a bank account.
- Axiata is ready to support and play its part to grow digital economies, pushing for cashless societies, smart cities, borderless digital services and financial inclusion.
- The rapid innovation that characterizes the internet and digital economy is an exciting opportunity for countries to accelerate their economic development and leapfrog into the Fourth Industrial Revolution. Areas for consideration include equivalence- "same service, same rules" as the basis for regulation regardless of the differences in technologies or business models; building trust and security- national e-identity system to authenticate online transactions; and catalyse and

build- mobile financial services allow both bank-led and non-bank-led models to work, mandating interoperability between service providers and open up bottlenecks that prevent greater adoption.

Digital Enablement: Bridging the Digital Divide by Huawei (South Pacific)

- China's Internet+ plan transforms businesses- manufacturing, finance, government, medical, agriculture, police, health, transportation, etc. The real outcome of the Internet+ plan is to move from "made in China" to "create in China" slogan.
- This plan has a far-reaching application and enhances inclusiveness towards and equitable society, and accelerates human capital development.
- However, reality is the digital dividend is not equally distributed. Social divide may be increasing as our lives go digital.
- Government 2.0- digital transformation of the government. Digital has 3 characteristics- 1) the reproduction of an exact copy of goods and services; 2) the cost of delivery is marginally zero; and 3) instant delivery of goods and services.
- Strategy to move into the e-Government phase- strategy is delivery. The government has to deliver the services when and wherever they are needed, almost instantaneously. Taking examples from Google, Airbnb, etc- the more they are used, the better the service gets.
- A study shows that USD30-40mil can be saved when government services are conducted online. E-government and digital enablement brings massive dividends to citizens, especially the low income earners.
- 3 steps to transform the government- 1) Changing the shape of the governmental structure (vertical vs. horizontal, RACI matrix, local vs. central); 2) Language; and 3) Process (procurement, sandboxing and ecosystem partners).
- Moving forward, user needs have to be placed at the start of a digital policy direction, followed by delivery/ rollout.
- The government digital enablement is not about creating websites and applications alone but more importantly, it is about transformation.

E-conomy South East Asia: Unlocking the USD200bil Opportunity in South East Asia by Google Malaysia

- A research that Google embarked with the Temasek Singapore in late 2015 to identify how big is the digital economy in South East Asia (SEA), where are we at and what can we be.
- The study was developed using 4 independent data sources- 1) Proprietary Google data; 2) Temasek's own research; 3) Expert interviews with various parties to validate search findings (start-ups, banks, analysts, industry experts, etc.); and 4) Secondary data sources on economic development indicators (World Bank, UN, McKinsey, Euromonitor, etc.).
- Geographically, the research scope consisted of 6 ASEAN countries- Indonesia, Malaysia, the Philippines, Thailand, Vietnam and Singapore.
- 3 primary research sectors- 1) First-hand e-commerce sites (online shopping); 2) Travel (online spend on airlines, hotels and ride hailing services); and 3) Media

(online spend on gaming and ads). The 3 sectors represent the size and opportunity for the SEA region in the digital space.

- At present, SEA is the fourth largest internet market in the world with 260mil online users. 3.8mil people are coming online every month and this is driven by 700mil mobile connections in the region (130% of the overall population). More and more of the mobile connections are coming from smart phones, and this is still representative of only 46% of the total population with access to the internet. Future growth will be significant.

- SEA is expected to be the fastest growing internet market in the world at 14% growth rate. 480mil internet users from the SEA region by 2020.

- Indonesia as a country is going to be the fastest growing nation in the world in terms of people going online at 19% growth rate over the next 5 years.

- The study indicates that the digital economy in the SEA region today is valued at USD31bil, made up of the 3 sectors. It is expected to grow 6.5 times to USD200bil in the next 10 years. A significant portion of that will be made up of e-commerce and travel (90%), and gaming and online ads (10%).

- The 5 key systemic elements that will be driving growth and changes of the digital economy in the SEA region- 1) Thriving young population. 70% of the population in SEA is under the age of 40 (vs. 57% in China). The young people in SEA today are digital natives who know and understand what it means to go online; 2) Increase in the internet speed and penetration. At present, only 46% of the SEA region has access to the internet and it is expected to grow to 80% by 2025. The internet speed is expected to increase with more investments being put into the region's internet infrastructure; 3) GDP growth. As a region, SEA is already bigger than India in terms of GDP at USD2.5 trillion and that is expected to grow at 5.3% in the next 10 years. The region will have more disposable income with more to spend online; 4) More conducive payment ecosystem. Currently, the preferred mode of payment is to buy online and pay cash on delivery (COD). This will change with more conducive payment ecosystems to encourage and reduce the barriers for the people to move to online purchases and payments; 5) Lack of store access in the SEA region, especially in the Philippines and Indonesia where they are scattered across many islands and therefore the number of retail stores per capita is a lot less than the developed markets (a third of the US). This enhances reception of e-commerce by the people with more disposable income.

- By 2025, all SEA countries will have an e-commerce market valued at more than USD5bil each. The e-commerce sector in Indonesia is expected to be valued the highest at USD46bil, which translates into 62% of the e-commerce space in the SEA region (currently at 31%, equivalent to USD1.7bil). Vietnam, Thailand and Malaysia will all be sizeable markets, ranging between USD8-11bil. Singapore's e-commerce will be more than USD5bil, larger than the casino industry.

- In terms of online travel, hotels and airlines will make up the majority of the total online travel space by 2025, reaching USD90bil (15% CAGR). The ride-hailing service will grow 5 times in the next 10 years.

- The online media space is expected to increase by 5 times, reaching USD20bil by 2025 (18% CAGR). This will be largely driven by online ads and gaming. Google is seeing the trend today- 1mil subscriber on a YouTube channel belonging to a Malaysian (Cartoon Hooligan). Online and mobile gaming is huge in the SEA region with multiple popular games across various age groups.

- Unlocking the USD200bil opportunity in the SEA region will require USD40-50bil of investment in the next 10 years as the region is underinvested.
- Investment level in SEA is lagging India, although SEA has a larger GDP growth than India. As a region, SEA only receives about a fifth of the funding that India is getting despite being a bigger digital economy force than India.
- USD40-50bil investment in the SEA region will contribute to GDP growth at 5.3% by 2025.

Interactive Panel Discussion

- Golden Gate Ventures is an early-stage venture capital firm that currently invests in 35 companies across SEA since 2011. The firm invests in internet & mobile startups across many sectors, including e-commerce, payments, marketplaces, mobile applications, and software as a service (SaaS) platforms.
- E-identity or Know Your Customer (KYC) is the biggest imperative for digital trade. Government and service providers need to know who they are dealing with. The banking sector has a better KYC process. KYC could be implemented in various ways including a centralized system. Most importantly, there needs to be a policy that clearly identifies how the process is to be implemented and who shall be responsible for its implementation.
- It is difficult to implement KYC for the unemployed community. KYC can utilize data from the telecommunication operators, social media accounts and email addresses. In this regard, Big Data is becoming more important and there are various reverse engineering processes of these data to enable KYC.
- Measures that can be taken in balancing security and monetary gains- sandbox exercise between startups and the banks to mitigate disruption impact and allows the government to have control over security (Singapore), integration of the mobile SIM and national ID card (Bangladesh).
- It costs about USD8-10 to verify a person. It is a costly and massive task to identify each citizen, but it has to begin. Technology can be utilized to enable KYC- singular password requirement for multiple services, etc. It would be an undertaking by the government, and can consider combined efforts with the private sector.
- The digital economy includes a wide spectrum of things. To consider the impact of O2O, the role of startups, protection of consumers, policy and regulatory responses, KYC and security, helping the telecommunications operators to monetize infrastructure investment, balancing regional equivalence and cultural differences, light touch approach to regulation of new technology and innovation, and pragmatic public-private partnerships on pro-innovation policies.

SESSION 9: SMART CITIES- THE ESSENTIAL ELEMENTS

It was reported that more than half of the population of the Earth now live in urban areas (United Nations, 2012). The number of "Smart Cities" have grown, boasting broadband networks and other smart infrastructure, 24/7 availability of utilities like

electricity, power and water, and efficient use of ICT to transform how we live, work and play.

The ITU defines a Smart Sustainable City as an innovative city that uses information and communication technologies (ICTs) and other means to improve quality of life, efficiency of urban operation and services, and competitiveness, while ensuring that it meets the needs of present and future generations with respect to economic, social, environmental as well as cultural aspects.

Cloud Computing Solutions for Investment in Knowledge Capital by Fujitsu (Malaysia)

- The digital waves: First Wave- the internet (connected and online); Second Wave- mobile internet (real-time, anywhere); Third Wave- IoT (convergence of physical and digital); and Fourth Wave: Artificial Intelligence (AI) and robotics (knowledge and automation). The transformation causes disruption to the way the traditional businesses used to operate.
- Solving global challenges- people will have the potential to achieve breakthroughs unthinkable previously through empowerment with digital- growth, urbanization, aging, environment, food and disasters.
- Challenges brought about by the digital ecosystem- leadership and talent, security, complexity and adoption.
- Fujitsu's Human Centric vision- putting people at the center of everything.
- 3 elements: 1) Human empowerment (quality of life, acquisition of knowledge and skills, etc.); 2) Connected infrastructure (e.g. smart homes, smart cars, etc.); and 3) Creative intelligence (e.g. AI, information analysis, security and privacy, etc.)
- Hybrid IT is the new reality of IT- integration, orchestration and service. Projections by Gartner on Hybrid IT- 75% of IT organisations will have bimodal capability by 2017, 25% brokered services will be external by 2017, increase from only 5%, 20% organizations will be using Hybrid Cloud by 2018, and 74% of organizations plan to use Hybrid IT as a core element of delivery.
- Realizing a Smart Nation- a collaboration between Fujitsu, A*STAR (Agency for Science, Technology and Research of Singapore) and Singapore Managements University. High performance computing for the purpose of research by organizations and universities, including realizing a Smart Nation. Examples: Fujitsu's high performance computing and algorithms analyze data from a living laboratory on the SPATIOWL for dynamic mobility managements in Singapore; Fujitsu's cloud and Augmented Reality (AR) technology help Metawater water and sewerage management in Japan; and Panasonic Corporation uses cloud-enabled home appliances for a better lifestyle

Creating Leading Smart City Environments: Challenges and Opportunities by Ericsson (Malaysia)

- Ericsson has envisaged the era of a networked society, where individuals and businesses realize the full potential and values of the ICTs.
- A Smart City is a city that utilizes ICTs to create a sustainable environment, moving towards a resilient environment.

- 70% of the world's population is expected to live in cities by 2050. To date, more than 80% of the populations in America live in cities, while migration from rural to urban is currently at 40% - 50% in Asia and Africa.
- With population migration explosion, issues are inevitable- Water: 1.8bil will experience water scarcity by 2025, quality of water; Transportation: 2bil vehicles will be on the road in the world by 2035, congestion, pollution, accidents.
- 3 transformative technologies that play key role in transforming cities- mobile, broadband and cloud.
- Ericsson's Smart City vision: 1) Efficient City- integrated transport and smart energy management; 2) Safe City- connect city functions such as police and fire to improve safety; 3) Economic City- advanced ICT supports innovation and job creation; and 4) Resilient City- disaster and emergency management services improved by ICT.
- The horizontal architecture of the emerging smart sustainable cities (Nanjing, Barcelona and Rio de Janeiro): 1) Physical assets; 2) Connectivity management; 3) Asset and device management; 4) Service and information management; and 4) Operation center management.
- Key consideration of deploying a successful Smart City programmes: 1) Agreed vision, strategy and targets; 2) Create informed and networked governance structures; 3) Develop organizational capacity to handle new and complex technologies; 4) Engage all relevant stakeholders; and 5) Forge and foster long-term partnerships with wide-range stakeholders, beyond only technology partners.
- Ericsson's 2016 Networked Society City Index ranks the relation between the Triple Bottom Line (Social, Economic and Financial) and ICT maturity. The finding shows that the more ICT-mature a city is the more benefits it receives. Out of the 41 cities ranked, the Top 10 include: #1Stockholm, #2 London, 3# Singapore, 4# Paris, #5 Copenhagen, #6 Helsinki, #7 New York, #8 Oslo, #9 Tokyo and #10 Seoul.
- Moving forward, Ericsson made 3 predictions on the future of Smart Cities: 1) It is not the institution that will drive urban progresses but the people; 2) How we view wealth is going to change. The focus will be on shared values and how does one generate values for others; and 3) Networking organizations. The access to human resources will be much easier.

Interactive Panel Discussion

- Research Management Centre, Multimedia University Malaysia (MMU): The universities' key role is to prepare human capital and talent by working closely with the industry. This prepares good, dynamic, creative and innovative talent to meet the industry's expectations. Additionally, it is equally important to prepare the existing workforce to adapt to the new digital ecosystem. In preparing to develop Smart Cities, the focus should not only be placed on the technology but more importantly the sustainability of the technology.
- Citizen-centric solutions make up the Smart Cities.
- It is the prerogative of a country to define the focus areas of a Smart City and putting technologies in place to counter the issues faced in a locality. It would depend on the needs of a particular city and its level of complexity and maturity-

early or late adopter of ICTs. The first consideration must be to improve livelihood of the people and to then consider the cost factor in developing Smart Cities.

- The countries in Asia can succeed in developing Smart Cities by finding out what works and what doesn't, and to collaborate in exchange of knowledge and experience with the other regions.
- The government needs to look at the data security issues and measures on the use of cloud computing in developing Smart Cities in Asia.
- The focus areas of human capital development in addressing the needs of Smart Cities- fundamental research at the university level, application and further development by the industry research partners and commercialization and deployment by the industry distributor partners. To understand the needs within the community, and then move on to technology as the solution.