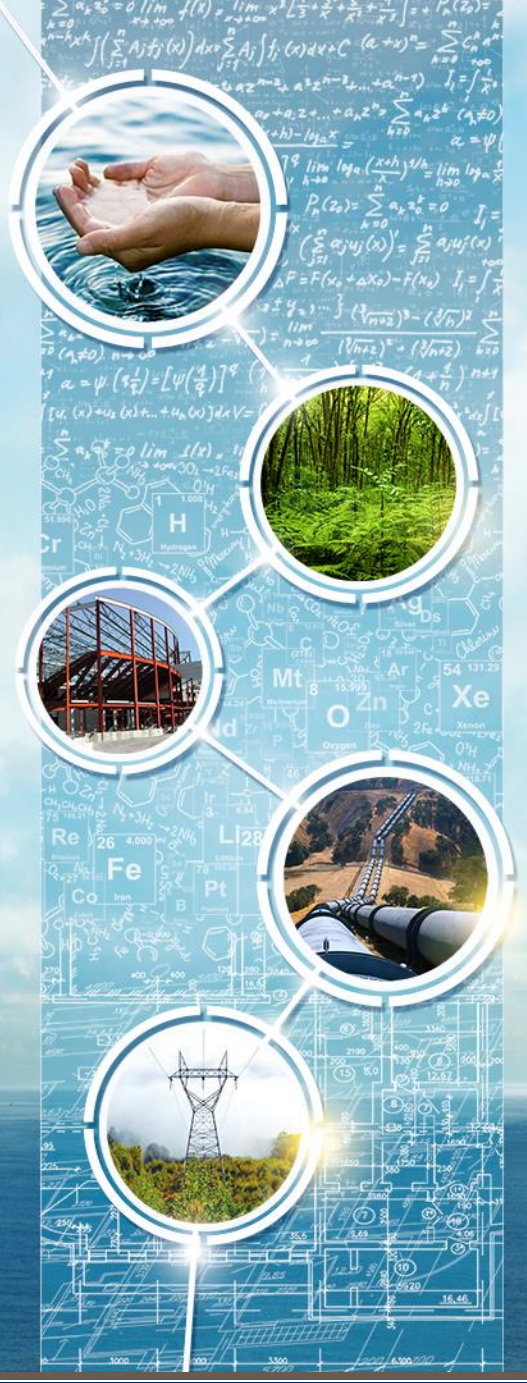

Licensing and Opening the Market for New Technologies

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Agenda

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- Definition and history of Licensing
- Why Governments use Licensing
- Role of Licenses and Spectrum
- Classes of Licenses
- License Exemptions
- Spectrum Licenses
- Unlicensed Spectrum
- Spectrum Sharing
- Additional Policy Tools
- Conclusion

Definition

- A telecommunications license authorizes an entity to provide telecommunications services or operate telecommunications facilities.
- Licenses also define the terms and conditions of such authorization, and describe the major rights and obligations of a telecommunications operate
- The license provides all stakeholders, including consumers, competitors and the government with a clear understanding of what the operator is and is not permitted or required to do.
- While the terms “license”, “concession” and “franchise” may be defined differently in the laws of different countries, these terms generally refer to the same basic concept.
  - In the context of telecommunications regulation, they all refer to a legal document granted or approved by a regulator or other government authority that defines the rights and obligations of a telecommunications service provider.

History of Licenses

- In the "old' regime, licensing or authorizing an operator to provide service or install a network was a discretionary act, and lack of a clear licensing regime either prevented operators from entering markets or increased the risk factor of their investments.
- Historically, state- owned incumbent operators provided telecom services on a monopoly basis in most markets.
  - Their operations were treated as a branch of the Government and so licenses were not considered necessary.

History of Licenses (continued)

- Licensing is a relatively recent development in many telecommunications markets.
- Licenses for new entrants in telecommunications markets are frequently granted by means of a competitive licensing process, which involves the selection of one or more operators from a group of applicants.

Why Governments use Licenses

- Governments use a license mechanism for ten reasons
  - Regulating Provision of an Essential Public Service
  - Expansion of Networks and Services and Other Universal Service Objectives ---
    - Network roll-out and service coverage obligations are often included in licenses.
  - Privatization or Commercialization
  - Regulating Market Structure ---
    - Measures to increase competition but also to limit market access.
  - Establishing a Competition Framework
  - Allocation of Scarce Resources

Why Governments Use Licenses (continued)

- **Generating Government Revenues –**
  - Licensing of operators and of radio spectrum can provide significant revenue to the Government
  - An auction for new licenses can generate one-time revenues.
  - Annual license fees often provide a continuing source of revenue to fund the operations of the regulator, or for other purposes.
- **Consumer Protection**
  - Conditions relating to consumer protection.
  - Such conditions may relate to price regulation, billing practices, consumer complaint mechanisms, dispute resolution, limitations of liability for service defaults, and mandatory services to consumers (e.g. directory services, operator assistance and emergency services).

Why Governments Use Licenses (continued)

- Regulatory Certainty –
  - By clearly defining the rights and obligations of the operator and the regulator, a license can significantly increase confidence in the regulatory regime.
  - Regulatory certainty is a critical element of the licensing processes where the aim is to attract new operators and investment.
  - Regulatory certainty on key issues (such as interconnection, price regulation and competitive safeguards) will promote success of privatization and initiatives to promote new market entry.
  - Uncertainty will reduce investor interest.

Spectrum Licensing

- Spectrum Licenses
  - Many telecommunications services require an authorization to use radio frequencies, or spectrum.
  - Spectrum licenses that are required to provide a service are often granted as part of an individual licensing process.
- There are several different mechanisms for licensing spectrum
  - Comparative Evaluation Processes
  - Lotteries
  - Auctions

Spectrum Licensing (continued

- Comparative Evaluation Processes
  - Under a comparative evaluation approach, the regulator decides which company is assigned the relevant spectrum.
  - Provides an approach for choosing among multiple applications that are substantially equal.
    - It also allows regulators to match specific sectoral objectives with the operators in charge of achieving them.
  - Minimum qualification requirements generally include evidence of financial resources, technical capability and commercial feasibility of the relevant spectrum application.
  - Selection criteria may include proposed tariffs, coverage (geographical and in terms of users), network rollout targets, quality and range of service commitments, and efficient use of frequencies.

Spectrum Licensing (Continued)

- **Lotteries–**
  - Provide a fast, inexpensive and transparent approach for selecting from similar or equally qualified applicants.
  - Lotteries should generally be preceded by a formal qualification and criteria process to select lottery participants.
- **Auctions**
  - are increasingly used by regulators to grant spectrum licenses to the highest bidders.
  - In the case of auctions, the market ultimately determines who will hold the spectrum licenses
  - The process may involve one round or several rounds and the highest bidder wins
  - In Universal Service, a reverse auction process is used, where the lowest bid is the winner.

Selection Criteria

Selection Criteria	Advantages	Disadvantages
Comparative Evaluation – based on subjective assessment by the regulator of applications based on a list of qualitative and/or quantitative criteria	• Maximum flexibility and discretion to select the most attractive application • Allows applicants to focus on factors they believe are important and to convince regulator accordingly	• Non-transparent • Subject to accusations of bias or corruption from losing bidders which are hard to refute and damage regulatory credibility • Risk of confusion among bidders who may not clearly understand regulatory priorities
Pure Auction – selection from among qualified bidders based on the highest financial bid	• Maximum transparency • Market efficiency – license awarded to the bidder which values it most • High bidder will have strong incentive to roll out service quickly to recover its cost • Suited to licensing in competitive markets	• Payment of fee can divert financial resources from service provision to auction fees (government revenue) • Encourages applicants to minimize resources devoted to other important priorities (i.e. rollout, coverage etc.)

Source: Telecom Regulation Handbook, Module 2, World Bank

Selection Criteria (continued)

Selection Criteria	Advantages	Disadvantages
Pure Auction – selection based on quantitative criteria, relating to the service (i.e. time required to meet roll-out target, commitments on maximum prices for consumers)	• Same as above • Regulator can focus bidder resources on service development or other priorities as opposed to government revenues	Encourages applicants to minimize resources devoted to priorities which are not selection criteria, unless they make business sense
Combined auction/comparative selection via weighted formula	• A compromise option which has many of the benefits of both auction and comparative selection • Applicants are awarded points based on selection criteria	Difficult to develop a sound formula that compares "apples to apples" • Compromise has disadvantages of both comparative selection and auctions • Less transparent than pure auctions

Source: Telecom Regulation Handbook, Module 2, World Bank

Licensing

- Traditionally, the number of licensed voice telephony or broadcasting operators has been limited.
- Previously, authorization and licensing of service providers was based on the type of service (voice, data, and video) or technology (cellular, fixed telephony, terrestrial broadcasting).
- However, in a converged setting, it is difficult to maintain these boundaries because of overlaps, broadcasters are offering telecom services (Internet, voice), while telecom service providers (e.g. phone companies) are offering broadcasting services (IPTV).
- Further, cellular operators are providing mobile television services
- Other providers are offering shows only available on the Internet.

Types of Licenses

- There are seven classes of licenses
  - Individual
  - Class
  - Registrations
  - Notifications
  - Open Entry
  - Social Purpose
  - Experimental

Classes Of Licenses

- Individual Licenses are the most complex
  - Require the regulator to consider each license individually and conduct a competitive selection process or auction
  - Usually a customized and detailed license document
  - Frequently granted through some form of competitive selection process
  - Useful where:
    - a scarce resource or right is to be licensed (e.g. spectrum)
    - the regulator has a significant interest in ensuring that the service is provided in particular manner (e.g. where the operator has significant market power)

Classes of Licenses (continued)

- In recent years there has been a trend away from granting individual licenses to granting Class Licenses that authorize the provision of telecom services of the same type, regardless of who provides these services.
  - This is due to increased competition, increased flexibility in the type of licenses issued, the proliferation of service providers, and the convergence of the ICT sector and new innovative services and technologies coupled with telecom reform and deregulation.
- In this mode, there are no licensing process or qualification requirements
- Useful where an activity is technically caught within the definition of activities subject to regulation but where there is no justification for imposing license requirements

Classes of Licenses (continued)

- Class Licenses are less complex
  - Require only an approval process for a broad category of service.
  - Issued without competitive bidding and are available to all qualified applicants who meet certain eligibility criteria established by the Regulator
  - Normally contain provisions relating to consumer protection and other essential requirements
  - Set out the basic rights and obligations and regulatory provisions to the particular class of service being offered.
  - Allow for Service obligations to be applied to class licenses for extra comfort and protection of the Government

Unified Authorizations

- Unified Authorizations
  - Technology and service neutral
  - Allow licensees to provide all forms of services under the umbrella of a single authorization, using any type of communications infrastructure & technology capable of delivering the desired service.
  - In most countries, unified authorizations are issued as individual licenses.
  - However, in some countries, the process for issuing the unified authorization blends aspects of general authorization processes and competitive licensing regimes.
    - These hybrid processes can best be described as noncompetitive individual licensing processes:
    - while applicants do not compete for a limited number of authorizations, they must meet a variety of criteria to qualify for a license and their applications are subject to close regulatory scrutiny.

Multi-service authorizations

- Multi-service authorizations
  - Allow service providers to offer multiple services under the umbrella of a single authorization, using any type of communications infrastructure & technology capable of delivering the services in question
  - Technology neutral -- like unified authorizations
  - More limited than unified authorizations -- licensees are permitted to provide any of a designated set of services, but not all services
  - Issued as general authorizations or as individual licenses.
  - Not uncommon to have both general authorization & individual license regimes for multi-service authorizations

Licensing (continued)

- Many regulators and policymakers have already modified their licensing regimes from the traditional one-service or technology license to a technology neutral, simplified set of licensing categories, and in some cases, a unified (single) license or market entry procedure for all technologies and services.
- Many countries are combining this simplification with the introduction of flexible licenses that use a technology and service neutral approach to determine the rights and obligations granted by the licenses.
- These update the obligations for Interconnection, numbering, universal service and consumer protection rules to the new environment of convergence
- Along with a new licensing structure, it is also necessary to simplify market entry procedures as well as to simplify the administrative requirements for all telecom operators.
- This involves modifying general authorization to allow more services to be provided

Classes of Licenses (continued)

- Registration requires the operator to formally register with the regulator before operation of the service, but do not require approval.
  - Notification requires the operator simply to notify the regulator of the service, but no regulatory approval is necessary.
- Open entry is the most flexible and requires neither notification nor registration.

Create new License Classes

- Despite the opening up of licensing there still remains a significant portion of the country that has no connectivity
- These are often rural or remote areas of the country where carriers are not interested in providing service or where the current Universal Access programs have not worked
- Many solutions have been tried over the years but have not been successful.
- As such, there is an increasing interest in exploring alternative strategies for reaching the unconnected.
- Innovations in low-cost communication technology have created new possibilities for the development of affordable, locally owned and managed communication infrastructure.

- As a result, a growing number of communities and small, local and regional operators have taken a more pragmatic approach, using off-the-shelf low-cost commodity networking equipment to provide themselves and others with Wi-Fi, GSM and fiber connections.
- The growth of Community Networks in many areas has led to a rethinking of the licensing regime to help create New License Classes and a relaxation of some of the regulatory requirements to spur the growth of Community Networks

Spurring New Networks

- Easing Regulatory Requirements
  - Unlike for-profit, commercial entities, community networks often lack the resources and wherewithal to navigate complex legal requirements and associated costs.
  - Other licensing requirements require applicants to satisfy a minimum net worth requirement to demonstrate their ability to deploy the network. These also should be relaxed.
    - India, in some instances, has required applicants to demonstrate a net worth of at least Rs 100 crore ($15.4 million) to participate in spectrum auctions.
  - Regulators frequently assess application fees, entry fees, and licensing fees to spectrum holders.
    - These fees often prevent communities—many serving fewer than 3,000 end users—from obtaining spectrum.
  - Fixed fees, as opposed to variable, income-based fees, can be particularly cost-prohibitive for community network operators

Spurring New Networks (continued)

- Tax and Fee Exemptions
  - Governments should similarly consider exempting community networks from various tax, regulatory and licensing, and import fee requirements as they get started, and consider reduced fees as they develop and based on their operational model
- Enhanced Transparency
  - Regulators can greatly assist community networks by providing clear guidance on the specific policies and regulatory requirements (and exemptions) for community networks.

Social Purpose Licensing

- One example of innovative licensing is a “social purpose” license. This is a license granted in rural unserved or underserved areas to non-traditional network operators, such as community network operators.
- By setting aside spectrum for non-traditional operators, regulators can remove the competitive barriers to spectrum access and prioritize spectrum for social-use purposes.
- Social purpose licensing has proven to be tremendously successful in launching community networks.
  - Community networks refer to telecommunications infrastructure deployed and operated by a local group to meet their own communication needs.
  - They are the result of people working together, combining their resources, organizing their efforts, and connecting themselves to close connectivity and cultural gaps

Social Purpose Licensing (continued)

- Mexico is at the forefront of innovative, social purpose licensing.
  - In 2015, the Mexican communications regulator, Instituto Federal de Telecomunicaciones (IFT), amended its frequency plan to set aside 2 x 5 megahertz of spectrum in the 800 MHz band for "social" use.
  - To qualify for a social-use license, applicants must demonstrate that the spectrum would be used to service communities of 2,500 people or less, or communities located in a designated indigenous region or priority zone.
  - These reforms have already resulted in new community networks and concessions being granted.
    - Non-profit organization Rhizomatica, for example, relies on social purpose licensing to develop community networks in indigenous regions around Oaxaca, Mexico—areas that have typically garnered little interest from incumbent operators.

- The goal of many of these community network projects is to increase access to mobile telecom services to the over two billion people without affordable coverage and the 700 million with no coverage at all
- They plan to do this by combining regulatory reform, community involvement, and the application of new technologies to connect people and communities to services proven to increase access to information, development and, ultimately, quality of life.
- Also to contribute to an enabling policy and regulatory environment for local access at national, regional and global levels.
- Integrate gender analysis into all aspects of project implementation and support women's participation in community-based connectivity initiatives (cross-cutting objective).

Experimental Licenses

- Experimental licenses are another way to provide communities direct access to spectrum.
- Experimental licenses authorize the licensee to test and develop new technologies and services, while protecting incumbent services against harmful interference.
- India & Mexico has both issued experimental licenses for community network projects.
  - In 2016, for example, the Indian government issued eight experimental licenses in the 470-582 MHz band to carry out experiments of TV White Space-type rules and regulations
  - Mexico's IFT awarded experimental licenses to organizations like Rhizomatica for community network

Experimental Licenses (continued)

- Experimental licenses are generally temporary.
  - However, many community networks find that while experimental licenses help them establish their operations, they also run the risk of the experimental license taking considerable time to be transformed into a more permanent license
- Longer term licensing solutions would be optimal—like the social-purpose licenses

License Exemptions

- License Exemptions
  - Brazil has eliminated licensing requirements for providers with fewer than 5,000 users.
    - Eligible providers must notify the government of their intent to provide service and comply with certain equipment authorization rules.
    - However, they are not required to obtain a service license.
  - In Nigeria, private use of Wi-Fi spectrum is exempt from licensing fees and requirements, but commercial use is not.
  - In South Africa, operations in the 5725-5875 MHz Industrial, Scientific and Medical (ISM) Apparatus band are exempted for all uses.
- These and similar approaches could work in other countries as well—freeing small community networks to operate on a largely unrestricted basis subject to reasonable protections for incumbent operators.

Spectrum Rural Licenses

	Country	Argentina	Bahamas	Bolivia	Brazil	Canada	Chile	Colombia	Costa Rica	Ecuador	USA	Honduras	Mexico	Nicaragua	Paraguay	Peru	Dominican Republic	Uruguay
Regulation	Specific license for rural areas				●			●		○			●	●		●		
	Community operator	●		●				○					●	○				
	Simplified license for rural areas				●	●								●		●		
	State operator		●	●	●													●
	Social coverage obligations		●		●			●	●	●			●		●	●	●	●
Access to the spectrum	Discount to services in rural areas	●	●		●			●		●						●		
	Direct allocation for social purposes				●								●				●	
	Secondary use	●			●	●		●			●							
	Unlicensed and/or license-free bands				●	●		●		○	●	●				●		
Access to resources	Subsidies for operators (funding)	●			●	●	●		●	●				●	●	●	●	
	Support for communities	●				●	●			○	●	●	●					

Table 1: Implementation of Recommendation UIT-D19 en la región | ○ Under study.
Prepared by the authors based on the answers obtained according to Decision 274 of CITEL and from other sources, cited in Appendix 2.

Licensing

- As with licensing regimes, new advanced technologies and converged services that use spectrum are demanding more flexible and service/technology neutral frameworks
- Need to keep in mind that spectrum management is about addressing the problems of potential interference between different licensed users, which is why regulators have created different classes of licenses.
- Consideration should also be given to whether there should be flexibility in spectrum allocation to take full advantage of new services and new technologies for existing services that may evolve with time.
  - A technology- or service-neutral approach to spectrum use might be another good option to consider.

Spectrum Licenses

- Traditional regulations have led to inefficient use of spectrum.
  - Exclusive Licenses:
    - Traditional licensing favors exclusive use, as opposed to shared use.
    - Exclusive use licenses provide one licensee unfettered use of a particular swath of spectrum.
    - This can result in large portions of spectrum being unused or underutilized.
  - Broad Licenses:
    - Many licenses cover large geographic areas; however, the incumbent service providers that have the rights to these broad licenses may not have the economic incentives to build out their networks to utilize fully all of the spectrum licensed to them.
    - This also can result in large portions of spectrum being unused or underutilized.

Unlicensed Spectrum

- Unlicensed Spectrum
  - This spectrum does not require a license or license exemption.
    - Users may operate in this spectrum with minimal regulatory requirements and without the need to pay the high costs of obtaining a spectrum license, subject to power limits and other conditions intended to mitigate interference to other services.
    - Unlicensed users generally lack exclusive use of the spectrum and may be subject to interference from other users of the spectrum.
  - A spectrum commons, sometimes referred to as unlicensed spectrum, is a part of the spectrum that is free from centralized control where anyone can transmit without a license

Unlicensed Spectrum

- There are varying approaches by regulators for managing the unlicensed but regulated spectrum commons ranging from imposing license and permits constraints to few if any constraints at all beyond technical specifications.
- Spectrum use policies that are related to license free spectrum especially for rural applications should be reviewed to facilitate the deployment of technologies that use these frequencies for universal access or other projects.
- In some countries, a more liberalized approach towards spectrum management has evolved resulting in considerable innovative approaches in the use of Wi-Fi, WiMax, Ultra-wideband (UWB), White Spaces bands.

Spectrum Innovation: Increasing Access To Broadband

- Other ways to expand connectivity within the country are:
  - Encouraging the development of license exempt technologies, for example, White spaces, Delay Tolerant Networking, Mesh networks, CubeSats, WiFi, WiMAX and other wireless technologies.
  - Facilitating the use of unlicensed spectrum to reach rural and remote areas and also for deploying applications
  - Increasing and encouraging the deployment of and experimentation with local access networks using new wireless and wireline technologies, such as, but not limited to, White Spaces, Mesh Networks, WiFi, WiMAX, SCPC DAMA and PLC
  - Creating specific national local access licenses for remote and rural applications to advance connectivity for the un connected, using USF fees

Mesh Networks

- A **mesh network** (or simply meshnet) is a local **network** topology in which the infrastructure nodes (i.e. bridges, switches, and other infrastructure devices) connect directly, dynamically and non-hierarchically to as many other nodes as possible and cooperate with one another to efficiently route data from/to clients.
- Mesh networks can relay messages using either a flooding technique or a routing technique. With routing, the message is propagated along a path by hopping from node to node until it reaches its destination. To ensure that all its paths are available, the network allows for continuous connections and reconfigures itself around broken paths, using self-healing algorithms.
- A mesh network whose nodes are all connected to each other is a fully connected network. Fully connected wired networks have the advantages of security and reliability: problems in a cable affect only the two nodes attached to it.

History and examples

- Wireless mesh radio networks were originally developed for military applications, such that every node could dynamically serve as a router for every other node.
- In that way, even in the event of a failure of some nodes, the remaining nodes could continue to communicate with each other, and, if necessary, to serve as uplinks for the other nodes.
- NYC Mesh, is an examples of an urban community network.
  - It connects apartments, small businesses, schools and entire buildings to the Internet using wireless routers and fiber.
  - These individual “nodes” connect to “hubs” and “supernodes,” where they have specialized gear to keep the network running even through emergencies.

Spectrum Sharing

- Spectrum sharing encompasses several techniques – some administrative, technical and market-based.
- Spectrum can be shared in several dimensions; time, space and geography.
- Spectrum sharing typically involves more than one user sharing the same band of spectrum for different applications or using different technologies.
- When a band already licensed to an operator is shared with others it is known as *overlay spectrum sharing*.
  - For example a spectrum band used for TV distribution in one geographical area could be used for an application such as broadband wireless access in another area without any risk of interference, despite being allocated on a national basis

Spectrum Sharing (continued)

- Spectrum sharing can be achieved through technical means and through licensing arrangements.
- Advancements in spectrum sharing allow for more efficient use of spectrum and create greater opportunities for community access networks, which could operate on a secondary basis in already-licensed spectrum to connect unserved or underserved areas.
- Some countries are exploring increasingly innovative ways to share spectrum, known as “dynamic spectrum sharing.”

- Policy makers should allow and create incentives for spectrum sharing by supporting spectrum sharing research and testing of new devices and services.
- Regulators should also ensure that each spectrum user’s rights and obligations are clearly defined, and that multiple uses of the spectrum are compatible

White Spaces

- In telecommunications, white spaces refer to frequencies allocated to a broadcasting service but not used locally
- A white-spaces device" (WSD) is a device intended to use these available channels.
  - WSD are designed to detect the presence of existing but unused areas of airwaves, such as those reserved for analog television, and use these airwaves to send signals for Internet connectivity.
- On November 4, 2008, the FCC voted 5-0 to approve the unlicensed use of white space
- Singapore's Regulator is the second regulator in the world to have TV White Space regulated, ahead of UK and Canada.
  - The Singapore efforts were driven mainly by the Singapore White Spaces Pilot Group (SWSPG). The Institute for Infocomm Research subsequently spun off Whizpace to commercialize TV White Space radio using strong IPs that were developed in the institute since 2006.

- In July 2013, West Virginia University became the first university in the United States to use vacant broadcast TV channels to provide the campus and nearby areas with wireless broadband Internet service.
- Also in July 2013, the Port of Pittsburgh evaluated White Space spectrum for enhancing inland waterway safety and utility with telecommunications equipment provider Metric Systems Corporation of Vista, California.
- Canada, Namibia, Kenya, South Africa, and Argentina have current pilots running

White Spaces (Continued)

- Both Microsoft and Google have been using White Spaces to extend broadband access to rural areas, both in the US and elsewhere.
  - However, in the US these have only been done on a trial basis and only in limited bands for short range applications.
  - It is hoped that TV white space will be able to provide affordable broadband service to rural America
  - Extending the internet to rural areas through underground cables is expensive: It can cost $30,000 per mile for fiber-optic cable and $1 million to run cable under a river.
  - White Spaces can do this at a fraction of the cost
- All agree that White Spaces alone cannot be the magic bullet that solves the problem, but it is an integral piece of the puzzle just as Google's Project Loon is another piece of the puzzle

Additional Policy Tools

- Many incumbent service providers lack the economic incentive to build out their networks in rural communities and those located in mountainous and other geographically challenging regions.
- Another tool for policymakers, in addition to providing direct spectrum for community networks, is that they could should facilitate indirect access through secondary market transactions.
  - Secondary market transactions increase the efficiency of spectrum usage.
  - By adopting policies that support secondary market transactions, governments can enable spectrum leases and other arrangements that place spectrum in the hands of communities.
- Flexible licensing policies can also allow for community-based networks to partner with incumbent operators to provide service for profit.

White Spaces Trials

- In June 2011 in the UK, Microsoft, using technology developed by Adaptrum & backed by a consortium of ISP's and tech companies, launched one of the largest commercial tests of white space Wi-Fi.
  - These applications were demonstrated under a highly challenging radio propagation environment with more than 120 dB link loss through buildings, foliage, walls, furniture, people etc. and with severe multipath effects.
- In 2017, Microsoft further expanded their research to show that small cell LTE eNodeB's could be used to provide cost effective broadband to affordable housing residents.
- Since then, Microsoft has been using white spaces to deliver Broadband access in rural areas of Kenya, Namibia, Argentina, and in rural areas of the US
- Google has been experimenting with white space in South Africa

Additional Policy Tools (continued)

- Regulators should consider developing incentives to encourage incumbent licensees to allow low-cost, secondary market access to community operators.
  - Regulators could, for example, credit licensees for the deployment of the lessees.
    - For example, if the regulator imposes geographic or population coverage milestones on the incumbent licensee, it could credit the licensee for the community network coverage enabled by the sharing of spectrum
- Network operators might be willing to share their licensed spectrum with community networks through a lease or other secondary market agreement.
  - For example, in Rwanda, for example, wholesale service provider Vanu Rwanda was assigned spectrum and works with companies like Airtel Rwanda and others who are committed to serving rural areas.

Conclusion

- In conclusion, there are many ways to incentivize companies to build out telecom services throughout the country
  - Using technology neutral licenses,
  - Focusing effort, where appropriate to issuing unified licenses
  - Create incentives for smaller networks to operate
  - Streamlining or eliminating onerous regulatory requirements, especially those that are not applicable to small, community-based networks.
  - Providing Tax, Customs, Regulatory, and Licensing Fee Exemptions.
  - Enhancing Transparency. Regulators should provide clear, public guidance on the specific policies and regulatory requirements (and exemptions) for community networks.
  - Pursue Innovative Approaches to Providing Spectrum Access

Thanks

Questions, Comments, Suggestions

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