

Outer Space and White Space: Promoting the Efficient Use of These Resources

*Sylvia Ospina, JD, LL.M.**

This paper will explore the benefits of utilizing TV white spaces (TVWS), and the development of new, low-cost technologies and services that can be used to maximize their use, both in outer space and on Earth.

“White space” refers to certain radio frequencies previously used by TV broadcasters that are now available due to the change-over from analog to digital transmissions. Their use may be licensed or unlicensed, depending on the frequency bands used, and the national regulatory entities in charge of assigning spectrum use. They may be used for a variety of services, ranging from inexpensive broadband services, to location-based services, and monitoring the movement of goods and people.

Several major corporations, such as Microsoft and Google, already have run pilot programs and reached agreements with a few governments in Africa and Asia to use “white spaces” for broadband communications in rural areas, while the International Telecommunication Union (ITU) has undertaken studies on how best to utilize these frequencies.

Several issues arise regarding the use of white spaces: whether the radio frequency spectrum (RFS) previously used for television broadcasting should be licensed, subject to “soft” licensing, or unlicensed. Should white spaces be “reserved” for the provision of broadband communications in under-served areas, thus helping to bridge the digital divide? Could satellite communications and other space-related activities benefit from the use of these radio frequency bands?

Another important question relates to privacy rights, as “white space” frequencies are used for location-based services, and thus may be used to collect information on persons using or merely having wireless communication devices in their possession. While these data may help the marketers, conflicts

* S. Ospina & Associates-Consultants, POB 141814, Coral Gables, Florida 33114, sospina@bellsouth.net

could arise regarding the extent and control of data that could be easily available.

This paper explores some of the legal issues that are likely to arise with the use of white spaces, and their implications for emerging economies. Ultimately, should and could white space be used for the benefit of mankind?

1 Background and Definitions

Information and Telecommunications technology, whether related to satellites, the use of the radio frequency spectrum (RFS), TV transmissions, earth stations, internet access, etc., has changed dramatically in the last few years. Although the transition from analog to digital use of radio frequencies is not recent, the conversion has freed parts of the RFS, the so-called ‘white spaces’, which can be used for satellite (and terrestrial) broadband transmissions.¹

Broadband is a term usually considered to be synonymous with a high-speed connection to the internet. While there is no single definition of broadband, the term itself is technology neutral. Broadband can be delivered by a range of technologies including Digital Subscriber Line (DSL), fiber optic cable, powerline networking, long-term evolution (LTE), Ethernet, Wi-Fi or next generation access.²

White spaces (WS) refer to frequencies allocated to a broadcasting service but not used locally. National and international regulatory entities assign different frequencies for specific uses, and usually license the rights to broadcast over radio bands or channels.

Another definition of WS is “a portion of spectrum in a band allocated to the broadcasting service and used for television broadcasting that is identified by an administration as available for wireless communication at a given time in a given geographical area on a *non-interfering and non-protected basis* [emphasis added] with regard to other services that may have higher priority at the national level.”³

In brief, WS are the gaps in spectrum between broadcast television channels,⁴ due to the transition to digital television that has freed up large areas between

¹ http://en.wikipedia.org/wiki/National_broadband_plans_from_around_the_world. Visited 4 July 2014.

² Ibid.

³ <http://www.itu.int/en/ITU-R/study-groups/workshops/RWP1B-SMWSCRS-14/Pages/Presentations.aspx>, note 3. Jose Costa, (Ericsson), Vice-Chairman, SG 5, Chairman, WP 5A, “Cognitive Radio Systems (CRS) Studies within ITU-R SG 5 (Terrestrial Services).” Presentation at ITU-R SG 1/WP 1b Workshop: Spectrum Management Issues On the Use of White Spaces by Cognitive Radio Systems. (Geneva, 20 January 2014).

⁴ Duncan McLeod, “How ‘white spaces’ could change the world”, <http://www.techcentral.co.za/how-white-spaces-could-change-the-world/40394/>, 19 May 2013. Visited 23 July 2014.

about 50 MHz and 700 MHz. In turn, digital transmissions can be "compressed" into fewer channels, allowing for more transmissions.⁵

What to do with the potentially available white spaces? Should their use be licensed, unlicensed, or subject to "soft" regulations? Should the national regulatory entities designate their use, or should they wait for the International Telecommunication Union to define these terms, and incorporate them in the ITU Radio Regulations (ITU-RR) frequency allocations?

2 The ITU, Its Various Study Groups and Working Parties on White Spaces (WS)

The ITU has convened several Study Groups, Working Parties and held several workshops on WS, involving a variety of nations, ranging from those with many television networks to those with only a few TV systems, trying to answer some of the issues raised. During the 2014 ITU-R Study Group 1/WP 1b Workshop, results of some of the ITU's studies as well as case studies were presented by engineers as well as by regulators.⁶

One presenter noted that, while certain terminology is clearly defined in the ITU's database, other terms such as "white space (spectrum)" and "TV white space," are not included.⁷ These terms are currently under further study by the ITU's Coordination Committee for Vocabulary (CCV).⁸ Shaw also notes that the lack of clear definition leads to questions as to whether they are regulated under the ITU-RR, and what measures could be taken at the national level.⁹

Further, Shaw considers that "rather than expectations of large amounts of *white space* [emphasis in original] the reality is better described as a sort of *grey mush* [emphasis in original] of noise from distant broadcasting sources and other sources of radio frequency emissions nearby...This will reduce... the reliable reception of broadcasting across service areas."¹⁰ In brief, the definitions of WS and TVWS are still in flux, and their utility under debate.

Meanwhile, the ITU continues its studies and attempts to define these terms, convening meetings of the ITU-UNESCO Broadband Commission for Digital Development¹¹, as well as the World Summit on the Information Society

⁵ [http://en.wikipedia.org/wiki/White_spaces_\(radio\)](http://en.wikipedia.org/wiki/White_spaces_(radio)). Visited 4 July 2014.

⁶ <http://www.itu.int/en/ITU-R/study-groups/workshops/RWP1B-SMWSCRS-14/Pages/Presentations.aspx>, note 3.

⁷ John Shaw, UK Consultant, "Opportunistic Use of Spectrum: Horn of Plenty or Pandora's Box?" Presentation at ITU-R SG 1/WP 1b Workshop: Spectrum Management Issues On the Use of White Spaces By Cognitive Radio Systems. (Geneva, 20 January 2014), note 3.

⁸ Ibid.

⁹ Ibid.

¹⁰ Ibid.

¹¹ The Broadband Commission for Digital Development, established in May 2010, is a joint initiative of the ITU and UNESCO, and aims at promoting broadband

(WSIS).¹² All are attempting to reduce the “digital divide,” and looking at better use of spectrum resources, including WS.¹³

At the national level, regulatory entities and service providers are engaging in pilot or “test” programs, and promoting the benefits of WS to reach rural and underserved areas in their countries. A look at some of these initiatives follows.

3 White Spaces and National Regulatory Entities

Even in developed countries, such as the United States (USA) and the United Kingdom (UK), several regions are very under-served, and lack access /connectivity to the internet and basic telephony services. In the USA, the Native American tribes living on Indian reservations lack connectivity to the internet and to other wireless services, as a result of, and resulting in, high unemployment and poverty rates, as well as in high connection rates, if and when they can get them.¹⁴

The lack of access to communications in Native American tribal reservations led the Federal Communications Commission (FCC) to establish an Office

connectivity to underserved areas of the world. Its goals are similar to those of the FCC’s National Broadband Plan, but encompass the world, not only one country. Its most recent progress report, “Universalizing Broadband” was presented to the UN General Assembly in September 2013. www.broadbandcommission.org/. Visited 14 July 2014.

¹² The World Summit of the Information Society (WSIS) is part of the UN’s Millennium Development Goals, and together with the Broadband Commission, aims at using information technologies for sustainable development and bridging the digital divide. “Outcome Document”, 2013 WSIS Forum. <http://www.itu.int/wsis/implementation/2013/forum/documents/outcomes.html>. Visited 14 July 2014.

¹³ See Joaquín Restrepo, “ITU White Paper on Managing TVWS”, School on Applications of Open Spectrum and White Spaces Technologies, ITU-ICTP, Trieste, Italy, March 2014.

¹⁴ Therese Bissell, “The Digital Divide Dilemma: Preserving Native American Culture While Increasing Access to Information Technology on Reservations.” Bissell’s analysis concludes that “[M]any obstacles exist that prevent technical development on reservations. The lack of information technology on reservations puts Native Americans at a disadvantage when they seek education or employment, for without access to such things as computers and the Internet, they often lack the tools and technical experience needed for many of today’s jobs.” *Journal of Law, Technology & Policy*. Vol. 2004, pp. 129-150. <http://www.jltp.uiuc.edu/archives/bissell.pdf>. Since 2004, the situation has improved slightly, according to Gerry Smith’s article “On Tribal Lands, Digital Divide Brings New Form of Isolation.” http://www.huffingtonpost.com/2012/04/20/digital-divide-tribal-lands_n_1403046.html. Visited 8 July 2014.

for Native Affairs and Policy (ONAP) in 2010, a recommendation included in the FCC's National Broadband Plan, which was released in March 2010.¹⁵ The National Broadband Plan was issued "to set out a roadmap for initiatives to stimulate economic growth, spur job creation and boost America's capabilities in a number of areas and includes sections focusing on economic opportunity, education, health care, energy and the environment, government performance, civic engagement and public safety."¹⁶ The Plan and its Executive Summary¹⁷ stress the need to make efficient use of the limited spectrum resources, and the use of white spaces is seen as a potential solution to freeing up 500 MHz of the RFS available.¹⁸ Further, the FCC's Plan's section on Spectrum Analysis includes details on the use of white spaces for mobile communications.¹⁹

Some authors consider the FCC's 2010 National Broadband Plan as crucial to new ways of using the spectrum resources, opening the way to new technologies, new uses, that ultimately will benefit rural, underserved areas.²⁰ These authors also consider the FCC to be a pace-setter, to be emulated by other regulators.²¹

In the Preface to "TV White Spaces: A Pragmatic Approach", Prof. Eric Brewer writes: "We are in the middle of a great transformation from a world in which spectrum is protected by strict provisioning, whether used or not, to a world in which it is protected in essence by technology...TV Whites Spaces offer ... new approaches to rural connectivity...[T]here is more than one possible solution on how best to use this spectrum for rural connectivity: the policy sets some basic rules, but does not actually dictate the solution. This is a critical characteristic of the modern approach."²²

But, as Brewer cautions, "a strong political will is necessary to fight the traditional incumbent license holders, and the politicians who are keen on auctioning the spectrum for short-term economic gain, rather than long-term use of the spectrum."²³

Since 2010, the FCC has granted licenses and/or certifications to several entities, some of which are to provide broadband to the Native American

¹⁵ Federal Communications Commission (FCC) Tribal Initiatives, <http://transition.fcc.gov/indians/>.

¹⁶ <http://www.fcc.gov/national-broadband-plan>.

¹⁷ <http://transition.fcc.gov/national-broadband-plan/national-broadband-plan-executive-summary.pdf>.

¹⁸ *Ibid.*, p. xv.

¹⁹ <http://transition.fcc.gov/national-broadband-plan/spectrum-analysis-paper.pdf>.

²⁰ E.Pietrosemoli and M.Zennaro, editors, "TV White Spaces: A Pragmatic Approach", ICTP- The Abdus Salam International Centre for Theoretical Physics T/ICT4D Lab, publisher (2013). Available online at <http://wireless.ictp.it/tvws/book/tvws.pdf>.

²¹ *Ibid.*

²² Eric Brewer, Preface to "TV White Spaces: A Pragmatic Approach", note 20.

²³ *Ibid.*

Tribes.²⁴ Others, like Carlson Wireless Technologies' *RuralConnect*, aims to use TVWS system with Spectrum Bridges' TV white spaces database.²⁵ According to one author, Carlson's *RuralConnect* product is a fixed wireless broadband system, authorized to transmit over white spaces in the UHF TV band (470-698 MHz), which were opened up by the FCC in 2010 for unlicensed public use.²⁶

Despite its progress and adoption of more flexible approaches to the use of the RFS, the FCC notes in its National Broadband Plan's Executive Summary that the United States lags behind many advanced countries in the adoption of broadband technology.²⁷ In particular, the Native American tribes are still underserved, and still waiting for greater connectivity via basic telephone services and via the internet. Other minorities that are underserved include the elderly, people on limited incomes, and ethnic minorities.²⁸

4 Europe, Africa and Microsoft

In Europe, the United Kingdom has been testing a pilot project for several months, with the participation of Microsoft, Google, Nuel and other entities that eventually formed a consortium in Cambridge, England.

OfCom, the UK's telecom regulator issued a "consultation" in 2013, to determine how WS technology could be deployed in the UK. Some 20 organizations have joined the pilot project, to test how it can be applied to urban wi-fi, rural broadband and low-data traffic management systems in the UK.²⁹

Microsoft also has engaged in a pilot project in Kenya, using WS to connect more people to broadband communications.³⁰ According to Paul Garnett,

²⁴ See, for example, FCC'S designation of Standing Rock Telecommunications, Inc., as an eligible telecommunications carrier throughout the entire Standing Rock Sioux Reservation. FCC MO&O, FCC 11-102, WC Docket 09-197, released: June 22, 2011.

²⁵ Tammy Parker, "Carlson, Neul separately tout TV white space achievements." <http://www.fiercewireless.com/tech/story/carlson-neul-separately-tout-tv-white-space-achievements/2014-01-15>. Visited 8 July 2014.

²⁶ Ibid. Also see <http://www.carlsonwireless.com/solutions/tv-white-space-rural-broadband/tv-white-space-faq.html> for this company's capabilities.

²⁷ FCC National Broadband Plan, note 16, p. xi.

²⁸ See Pew Internet Project, "The State of Digital Divides: Three Technology Revolutions", describing with graphs three major technology revolutions: broadband access, mobile connectivity via cell phones and tablets, and the social media, such as Facebook and Twitter. Data are as of Nov. 2013. www.pewinternet.org/three-technology-revolutions/. Visited 13 July 2014.

²⁹ Liam Tung, "Microsoft, Google joins TV white-space broadband road test", 13 Oct. 2013. <http://www.zdnet.com/uk/microsoft-google-joins-tv-white-space-broadband-road-test-7000021505/>.

³⁰ Lance Harris for *African Enterprise*, "Microsoft eyes white spaces to bring broadband to rural Kenya." February 6, 2013. <http://www.zdnet.com/microsoft-eyes-white-spaces-to-bring-broadband-to-rural-kenya-7000010897/>. Visited 14 July 2014.

Director of Microsoft's Technology Policy, Kenya is ideal for this pilot project, since broadband penetration is about 2%, due to the high cost of data services.

Garnett notes that legal and regulatory barriers prevent wider deployment of affordable broadband, and encourages telecom policymakers to move away from promoting exclusive-use licensing in favor of a mix of exclusive-use and non-exclusive spectrum access approaches across a variety of spectrum bands.³¹ (Similar recommendations are made by the authors of "TV White Spaces: A Pragmatic Approach").³²

According to Microsoft, by promoting dynamic spectrum access, and spectrum made available on a non-exclusive basis, regulators could reduce broadband costs, spur innovation and increase competition. TVWS is the first "globally harmonized opportunity" to use dynamic spectrum access technologies and techniques."³³

The subject of "Licensing of TV White Space Networks in Kenya" was broached in a different forum by Mohamed A. Haji, Communications Commission of Kenya (CCK).³⁴ He also spelled out the conditions under which TVWS may be used in that country.

In brief, equipment used should be type-approved by the CCK prior to installation and use; use of the TVWS should not cause interference with any protected radio service. The CCK will evaluate the trial / pilot programs, and then decide what further measures it will take or require of the entities seeking to commercialize this service in Kenya, while taking into account results of ITU studies on WS.³⁵

In the Republic of South Africa, trial tests using TVWS were carried out, resulting in several policy recommendations: one is to recognize that TVWS and data-based access to spectrum can deliver wireless broadband to end users, especially in hard to reach, rural areas. Another is to recognize the value of spectrum sharing as a means of making more efficient use thereof. Other recommendations include promoting TVWS equipment standards; to adopt a regional approach to license-exempt managed access to spectrum, and an international harmonized approach to certification.³⁶

³¹ Harris, note 30, quoting Garnett.

³² E.Pietrosemoli and M.Zennaro, editors, "TV White Spaces: A Pragmatic Approach", note 21.

³³ Paul Garnett, as quoted by Lance Harris, note 30. *See* also note 69, regarding other Microsoft projects.

³⁴ Mohamed A Haji, Presentation at ITU-R SG 1/WP 1b Workshop: Spectrum Management Issues On the Use of White Spaces by Cognitive Radio Systems. (Geneva, 20 January 2014), note 3.

³⁵ *Ibid.*

³⁶ Arno Hart, TENET (National Research and Education Network ("NREN") of South Africa); Google partner in Cape Town, South Africa. Presentation at ITU-R SG 1/WP

Will regulators adopt more flexible approaches to the use of TVWS, as recommended by the companies involved in these pilot projects? Microsoft is one among many entities favoring regulatory changes that would allow this technology to be deployed more broadly in several continents.³⁷

5 Satellites, Broadband, and Cellular Backhaul

Satellites play a role in delivering broadband not only in rural Africa, but in other regions of the world. According to one company, “Satellite remains a viable and competitive option for bringing cellular [mobile phone] service to remote and rural areas. Satellite technology has a number of positive attributes that make it a perfect solution for supporting the cellular [mobile phone] industry: [it] offers ubiquitous coverage with high reliability; [it] can be installed quickly; [it is] cost effective to operate and maintain.”³⁸

In Africa, a project supported by the European Space Agency (ESA) is showing how satellite communications can help farmers, voters and educators in several different countries in that continent. Satellite terminals provide Internet connectivity, with solar panels and batteries (where needed), laptops, tablets, a projector with screen, and loudspeakers. This project, called Sway4edu, is the initiative of Openet Technologies, an Italian firm, working with Luxembourg's SES and supported by ESA's Advanced Research in Telecommunications Systems program. This project also is making use of radio service to inform farmers, workers and the general population of the Democratic Republic of Congo on several issues, such as food security, rural and farmer subsistence, and climate change.³⁹

According to one company, mobile telephone operators are relying on satellite cellular backhaul to deliver mobile services to rural markets.⁴⁰ This trend is driven by two factors: universal service obligation(s), and the need to

1b Workshop: Spectrum Management Issues On the Use of White Spaces by Cognitive Radio Systems. (Geneva, 20 January 2014), note 3.

³⁷ See “Microsoft and its partners announce new affordable access projects on four continents: TV white space technology further demonstrates social and economic impact and commercial feasibility.” May 13, 2014 press release. <http://www.microsoft.com/en-us/news/press/2014/may14/05-13tvwspr.aspx>.

³⁸ idirect, Inc., “Cellular Backhaul Applications”. <http://www.idirect.net/Applications/Cellular-Backhaul.aspx>. Visited 8 August 2014.

³⁹ Farm News, 3 June 2014, “Satellites Improving Lives in Rural Africa.” Online publication: http://www.seeddaily.com/farm_news.html. Could it be that satellite radio services will have as much impact in the lives of farmers and other rural workers as the small transistor radios had when they were introduced in the late 1950s?

⁴⁰ Carol Patton, “Cellular Backhaul: Remote Possibilities,” quoting Michael Darcy, CEO of K-Net. VIA SATELLITE magazine, August 2013, p. 17.

remain profitable by tapping into new markets, such as the rural markets in developing countries.⁴¹

While many service providers consider that satellites may be the least expensive way for mobile phone companies to provide communications in rural and remote areas,⁴² others do not agree. For example, satellites are being used in New Zealand to provide broadband services to remote areas with low population density, although their use might be more costly than using other technologies.⁴³

One service provider urges satellite operators to “think beyond the broadcaster’s mindset and bring flexibility in their...hard-wired bandwidth agreements...to better align themselves with future cellular operators growth.”⁴⁴ In brief, rural connectivity via satellite is not only feasible, but profitable, not only in Africa, but in the USA, according to iDirect.⁴⁵

In the USA, the FCC has proposed the use of a terrestrial broadband network in parts of the Mobile Satellite Service (MSS) spectrum. Specifically, the FCC is proposing changes to its rules, to allow Globalstar, the satellite company, to deploy a low-power terrestrial network, and to allow spectrum use by both licensed and unlicensed devices.⁴⁶

In the north, rural and underserved communities in Alaska also are benefitting from satellite-based broadband and internet connections for distance education and telemedicine, thanks to an agreement between Alaska’s General Communication, Inc. (GCI), and Intelsat, for extended C- and Ku-band capacity on two Intelsat satellites.⁴⁷ It seems that this agreement is in the spirit of the FCC’s 2010 National Broadband Plan, to provide broadband services to rural, underserved areas of the United States while making better use of white spaces.

In Latin America, CITEC, the Communications Directorate of the Organization of American States (OAS), has been studying the use of TVWS for several years. In 2013, the Canadian Delegation to CITEC presented a

⁴¹ Ibid., quoting Jose del Rosario, Northern Sky Research, Manila.

⁴² Ibid, p.18.

⁴³ Jonathan Brewer, “TV White Space Technology for Rural Telecommunications: Community Examples”, *telco2_white space study_* 22 Aug. 2012, p.33. www.telco2.co.nz.

⁴⁴ Carol Patton, note 40, quoting Hamid Nawaz, COO of Supernet Limited, Pakistan, p.19.

⁴⁵ Ibid, p.19. A recent article by Mark Holmes, “Emerging Markets: A Gold Mine for Cellular Backhaul,” supports the view of a promising future for cellular backhaul. *VIA SATELLITE* magazine, June 2014, pp. 12-17.

⁴⁶ FCC, IB Docket No. 13-213, FCC 13-147, Federal Register Doc. No. 2014-03618, Vol. 79, No. 33 (Wed., Feb 19, 2014). Proposal to Enable Operation of a Terrestrial Broadband Network in Certain Mobile Satellite Service Spectrum.

⁴⁷ Intelsat press release, Oct. 31, 2013. www.marketwatch.com/story/gci-agrees-to-extended-capacity-on-the-intelsat-fleet-for-service-to-rural-alaska-2013-10-31. Visited 8 August 2014.

proposal for the “development of principles for the radiocommunication aspects of the national broadband plans.”⁴⁸ Whether or not this proposal will be implemented remains to be seen.

In Colombia, HISPASAT, the Spanish satellite operator, has teamed up with Hughes Technology Networks to provide broadband communications to rural areas in that country. HISPASAT has a joint project with NEC of Japan, and Hughes was chosen to install its HX system in more than 600 kiosks, as part of the Colombian government’s *Vive Digital* project.⁴⁹

Eventually, the Colombian government seeks to install more than 6000 kiosks in rural areas, for the delivery of high-speed internet, bringing educational, telemedicine, and agricultural information to currently underserved areas. *Vive Digital*, a four-year plan begun in 2012, aims at reducing poverty and at increasing employment, since studies have shown that access to the internet is key to promoting social development.⁵⁰

White spaces in Brazil, the most populous country in South America, are Microsoft’s “target” in order to improve (and increase penetration of) broadband services in that country.⁵¹

Other countries in South America also have projects and plans to bring broadband to rural residents, and broadband services have increased in Latin America at a rate of 16 to 18 percent annually.⁵² However, many countries lack the necessary infrastructure to expand coverage at reasonable costs, and the high costs are a deterrent to users. Another deterrent is a lack of coordination between the public and private sectors in developing a national digital agenda: “It is essential to have the right regulatory frameworks...to

⁴⁸ OEA/Ser.L/XVII.4.2 ,CCP.II-RADIO/doc. 3204/13, Proposed Modifications to Document CCP.II-RADIO/doc. 3132/12 rev.1, DRAFT RECOMMENDATION, PCC.II/REC. XXX (XIX-12). (Document submitted by the delegation of Canada to CITELE).

⁴⁹ “Hughes Technology Selected by HISPASAT to Bridge Digital Divide in Rural Colombia.” Hughes Network Services, news release, May 20, 2014. *See also* <http://blog.executivebiz.com/2014/05/hugo-frega-hughes-hispasat-team-for-colombian-internet-access-project/>. Visited 18 July 2014.

⁵⁰ “La revolución digital que vive Colombia.” <http://www.vivedigital.gov.co/logros/>. (Ministry of Information Technologies and Communications) (MINTIC, acronym in Spanish). The Colombian government set up a Connectivity Directorate in 2012, incorporating the 1998 “Compartel” plan, which aims at promoting internet access and connectivity, and universal service, particularly in underserved regions of Colombia. (*See* <http://www.mintic.gov.co/portal>).

⁵¹ Telegeography, 31 March 2014. <http://www.telegeography.com/products/commsupdate/articles/2014/03/31/microsoft-targets-white-spaces-to-improve-brazilian-broadband/>.

⁵² “IDB launches DigiLAC, a new platform for measuring broadband penetration in Latin America.” Inter-American Development Bank (IADB) news release, 14 May 2014. <http://www.iadb.org/en/news/news-releases/2014-05-14/index-that-measures-broadband-penetration,10816.html>.

encourage competition, transparency and the legal security needed to stimulate the necessary investment.”⁵³

Thus, we seem to come full circle: the FCC’s 2010 National Broadband Plan viewed as, and acting as pace-setter for other national plans in different continents. Yet, in many countries, including the United States, service to rural and underserved communities is still lagging.

According to a report of the National Telecommunications and Information Administration (NTIA), part of the Dept. of Commerce (DOC), “Despite increases in access, rural areas and tribal lands still lag significantly behind urban communities in broadband availability. Nearly all Americans living in urban areas have access to broadband service... compared to rural areas where broadband service is available to only 89 percent. On tribal lands, basic wired broadband is available to 54 percent of the population, which is an increase from 45 percent in June 2011.”⁵⁴

In conclusion, despite some progress, much remains to be done in order to bring internet and broadband services, via satellite or other means, to underserved areas in the USA, and in many other countries, at affordable prices.

6 White Spaces and Privacy Issues

Access to broadband and internet, and use of white spaces involves use of specific locator devices, which raises questions regarding privacy rights, although this may be a moot point, due to the growth of social media, such as Facebook, Twitter, inter alia, and the proliferation of ‘smartphones’. One regulator, however, the U.K.’s OfCom, has been requested to be more specific regarding privacy rights.⁵⁵

In the Open Rights Group’s (ORG) response to OfCom’s consultation, it noted that “[d]evices making use of white space will be required to share information with other parts of the infrastructure... 'slave' white space devices will share information with the 'master' white space device; the master white space device with white space device databases. This could include unique device identifiers and location details. Added together this information, depending on the nature and extent of the use of a given device, could be a significant pool of information.”⁵⁶

⁵³ Ibid.

⁵⁴ Anne Neville, Director, State Broadband Initiative, “Working to Provide a Better National Broadband Map”, February 20, 2014. <http://www.ntia.doc.gov/blog/2014/working-provide-better-national-broadband-map>. Visited 8 August 2014.

⁵⁵ <https://www.openrightsgroup.org/ourwork/reports/ofcom-white-space-device>. 11 January 2013. Visited 8 August 2014.

⁵⁶ Ibid.

According to ORG, OfCom's consultation does not address the issue of "how securely the information is held, for how long, and by whom, also raising significant privacy and data protection concerns."⁵⁷ The ORG recommends that "OfCom should define and address the privacy implications of the white space proposals, since "there may be a constituency of potential users who perceive requirements for white space devices unduly privacy invasive." It recommends that "OfCom consult with other civil society groups and regulators, including ... the relevant European policy makers."⁵⁸

The European Union (EU) has been concerned with data protection and privacy rights for many years: in 1995, the European Commission issued a Directive on data protection, and in 2012 it instituted a framework reform for data protection, providing the EU Member States with the most protective regional legal framework in the field of data protection, according to the European Union Agency for Fundamental Rights.⁵⁹

On 13 May 2014, the EU Court of Justice issued a ruling on the use and protection of personal data, and the "right to be forgotten." The EU Regulation will ensure that personal data is protected in the EU Member States, and will set forth specific rules for the transfer of personal data outside the EU.⁶⁰

The data protection Regulation is also a "wake-up call" to businesses, which have lost data, or seen their security safeguards breached; they cannot afford to ignore the new legal measures that will become law for the EU Member States, once the EU Parliament and Council of Europe agree on it.⁶¹ The EU Regulation will place stronger restrictions on companies' data protection policies and systems, and will be applicable to search engines (e.g. Google) located outside the EU. It also shifts the burden of proof from the consumer to the company collecting the data, that it is still relevant or necessary.⁶² Once it is passed, this Regulation will become law in each EU Member State, replacing the 1995 Directive.⁶³

⁵⁷ Ibid.

⁵⁸ Ibid.

⁵⁹ The European Union Agency for Fundamental Rights (FRA) is one of the EU's decentralized agencies. <http://fra.europa.eu/en/theme/information-society-privacy-and-data-protection>.

⁶⁰ See Factsheet on the "Right to be Forgotten" ruling (C-131/12). http://ec.europa.eu/justice/data-protection/files/factsheets/factsheet_data_protection_en.pdf.

⁶¹ Ibid.

⁶² Ibid.

⁶³ Chloe Green post, 21 August 2014. <http://www.information-age.com/industry/uk-industry/123458394/eu-regulation-time-act-corporate-data-protection#sthash.BHMM3wC0.dpuf>.

While many constituents are pleased with the new Data Protection reform, others are not. The mobile operators, represented by the GSM Association, stated that new rules will conflict with existing ones for mobile operators, restricting their use of traffic and location data and having to comply with separate requirements for customer consent.⁶⁴

Others consider that the restrictions will affect the deployment and use of new technologies demanded by consumers, and will affect job growth in the EU.⁶⁵ The European Parliament, however, believes that an appropriate balance between conflicting interests and rights has been achieved, and that the new regulations will be of benefit to the persons who want to assert their right to be forgotten.⁶⁶

In the USA, the FCC's National Broadband Plan, does not seem to address the issue of privacy rights, but it's not only the FCC that seems to make light of the plethora of private information that will be available to marketers and other companies that amass data on individuals, and profit from their use of the data, or their selling them to other entities.

One author posits that perhaps in the near future, as individuals (users / consumers) become aware that their privacy is being exploited, the big social media entities will become more concerned about privacy issues.⁶⁷ One question arises: will government intervention, as occurred in Europe, be required to protect an individual's privacy rights, or will there be some kind of uprising on the part of individuals, such as their tuning out of Facebook and other social media? All of them have stated privacy policies, but these keep changing, and perhaps are not always adhered to.⁶⁸

The opening up of white spaces, and the new devices to utilize them, such as the locators needed to find a usable white space, and not cause interference, also help locate the individual using the device, information that may be used for other extraneous, even nefarious purposes.

Is it surprising that corporations such as Microsoft, Facebook, Google, and others, are so keen on promoting the use of whitespaces, to bring internet and other broadband services not only to underserved, rural areas in industrialized countries, but also to developing countries? They may seem to

⁶⁴ Frances Robinson, "Reactions to European Parliament Vote on New EU Data-Protection Laws", 12 March 2014.
<http://blogs.wsj.com/brussels/2014/03/12/reactions-to-european-parliament-vote-on-new-eu-data-protection-laws/>.

⁶⁵ Ibid.

⁶⁶ See Factsheet on the "Right to be Forgotten" ruling (C-131/12), note 59.

⁶⁷ Jonathan Salem Baskin, "Privacy Issues Could Threaten The Future Of Commercial Social Media." *Forbes Magazine*, 5/28/2014.
<http://www.forbes.com/sites/jonathansalembaskin/2014/05/28/privacy-issues-could-threaten-the-future-of-commercial-social-media/>. Visited 16 August 2014.

⁶⁸ Ibid.

be bringing “salvation” in the form of wireless connectivity to these underserved areas, but perhaps these companies see them merely as potential markets to be exploited to enhance their revenues?

Yet, in countries where the government is still the major provider of communication services, the inroads made by private, foreign companies may be perceived as a threat to the incumbent service providers and operators, a threat to the government’s control of communications – and to its revenues. But in order to provide services, the private sector – foreign or national companies - still needs the approval of the local regulators.

As noted earlier, Microsoft views certain African countries- Kenya and Ghana - as ideal in which to establish pilot programs using white spaces.⁶⁹ The white spaces available would be managed using a location-based spectrum database.⁷⁰ Once the user of the spectrum can be located, that user can be targeted for other services, and information on the user can be sold or made available to marketers and other entities, with or without the user’s knowledge or consent.

That this is an area of concern is evidenced in the attempts of regulators to curtail access to information published in the social media, without imposing onerous restrictions. But the regulators may be facing a losing battle in their quest to stem the use of private information for marketing purposes. As one author suggested, albeit in a different context, is the use of white spaces a “Horn of Plenty”, or the “Opening of Pandora’s Box?”⁷¹

7 Conclusions and Recommendations

It would seem that the use of WS /TVWS would be a solution to providing access to broadband communications in rural and remote areas, while making efficient use of the spectrum available with the transition from analog to digital transmissions. At least this is one conclusion arrived at by the different entities that have undertaken pilot or test projects using TVWS in different regions of the world. Most of the authors quoted or cited in this

⁶⁹ See notes 30, 31, 33, and note 70.

⁷⁰ “Microsoft and its partners announce new affordable access projects on four continents.” Microsoft press release, 13 May 2014. <http://www.microsoft.com/en-us/news/press/2014/may14/05-13tvwspr.aspx>. And David Meyer, “Microsoft and Facebook turn to white space broadband to connect Ghanaian students”, 13 May 2014. <http://gigaom.com/2014/05/13/microsoft-and-facebook-turn-to-white-space-broadband-to-connect-ghanaian-students/>. See note 30, citing Microsoft’s projects in Kenya.

⁷¹ John Shaw, “Opportunistic Use of Spectrum: Horn of Plenty or Pandora’s Box?” Presentation at ITU-R SG 1/WP 1b Workshop: Spectrum Management Issues On the Use of White Spaces by Cognitive Radio Systems. (Geneva, 20 January 2014), notes 3, 7.

paper are strong advocates of using TVWS for broadband services in currently under-served regions.⁷²

Another conclusion seems to be the acknowledgement that the use of TVWS would not be protected; i.e., should their use cause interference in protected services, they would have to be ‘turned off.’ However, as one blogger commented, “[the] assertion that it is a bad thing to allow interference with TV broadcast is redundant. The vast majority of TV broadcast is nothing but noise, anyway. It could all disappear into static tomorrow, and the world would be all the richer for it.”⁷³ Could the same assessment be made of most of the social media, that they use valuable resources (the RFS) for frivolous purposes?

Most of the authors of the studies cited herein seem to concur that the current system of allocation or assignment of spectrum resources needs to be changed, so that new uses can be made of the RFS. However, the incumbent broadcasters are unlikely to agree with this assessment, as they are keen on keeping these resources for themselves, even if they don’t use them.

Thus the regulators will have to achieve a balance between the incumbents, (resulting in fewer broadband communications to rural communities), and the proponents of new uses of TVWS, who support wider use of these frequencies with few, if any, licensing requirements. They also seem to concur that this spectrum should not be auctioned for short-term economic gains, but that long-term economic and social benefits should be determining factors in their use or allocation /assignment.⁷⁴

In regard to data protection and privacy rights, the European Union seems to have struck a good balance in its recent Regulation, amending the 1995 Data Protection Directive.⁷⁵ Perhaps the new EU Regulation could serve as a model for other governments, as their regulators struggle to protect users/consumers, yet not impose onerous limitations on operators and service providers that might amount to censorship or that could stifle new commercial opportunities.

At the end of the day, it is hoped that TV White Spaces and satellite communications will be used to facilitate economic and social development, by bringing low-cost broadband services in underserved areas and countries. Hopefully more efficient use will be made of these frequencies than at present, when they are either being “warehoused”, or not made available to entities that do support their use in underserved, rural areas. The regulators around the

⁷² Ibid. Shaw seems to have less positive views on the use of these frequencies.

⁷³ “White Space Wireless: The Difference Engine: Bigger than Wi-Fi.”
http://www.economist.com/blogs/babbage/2010/09/white-space_wireless.

⁷⁴ See E.Pietrosemoli and M.Zennaro, editors, “TV White Spaces: A Pragmatic Approach.” ICTP- The Abdus Salam International Centre for Theoretical Physics T/ICT4D Lab, publisher (2013), note 20.

⁷⁵ http://ec.europa.eu/justice/data-protection/files/factsheets/factsheet_data_protection_en.pdf., note 60.

PROCEEDINGS OF THE INTERNATIONAL INSTITUTE OF SPACE LAW 2014

world have the challenging task to ensure that all their constituents, not only the big incumbent businesses, have access to new technologies at affordable prices or rates, ultimately benefitting (most of) mankind.