Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

NOTICE OF INQUIRY

In the Matter of	)	
	)	
A National Broadband Plan for Our Future	)	GN Docket No. 09-51
	)	

Comments of IEEE-USA's Committee on Communications Policy on
A National Broadband Plan for Our Future

IEEE-USA would like to take this opportunity to provide written comments on the Federal Communications Commission (FCC)'s Notice of Inquiry (NOI) in the matter of *A National Broadband Plan for Our Future*, issued April 8, 2009, with comments due by June 8, 2009.

A selected set of specific questions contained within the FCC's NOI http://www.fcc.gov/Daily_Releases/Daily_Business/2009/db0408/FCC-09-31A1.pdf are repeated, and comments provided as follows:

III. B. 1 Defining Broadband Capability

(16.) For instance, the Commission currently uses the terms "advanced telecommunications capability," "broadband," and "high-speed Internet." Should these definitions be unified, or should they have separate meanings for different purposes, keeping in mind that current and future broadband platforms will increasingly support "high-speed Internet" as one of several offered services including voice, video, private data applications, and the like? In addition, to the extent that broadband is defined by "speed," should the Commission consider raising the speeds that define broadband? Should we distinguish among the various broadband technologies? Are there specific Commission actions that could encourage more rapid adoption of these more advanced broadband deployments using mobile wireless technologies, such as Worldwide Interoperability for Microwave Access (WiMAX), Long Term Evolution (LTE), or wireline broadband deployments, such as fiber, DSL, or coaxial deployments supporting DOCSIS 3.0, for example? Are there other advanced broadband technologies that, if deployed, might better position the nation's broadband infrastructure for continued evolution?

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Comment:

First, the FCC should define broadband capability within a clear vision of broadband itself. "Broadband" should represent the overarching and evolving concept of a system that embraces the several dimensions of digital communications -- purpose, technology, place, availability, speed, latency, reliability, and scalability as time progresses. In short,

> *The function of the broadband system should be to carry out any digital application across all of its dimensions.*

Second, there must be a measure of capability to characterize the system and its goals. Capability is usually expressed in terms of speed (bits per second) and latency (milliseconds). However, actual capability varies with circumstances -- such as application, user, technology and location. It seems unfortunate, then, to fragment a definition of broadband capability among many specific cases. Accordingly,

> *The FCC should define a single capability floor for the national broadband system that spans most situations, and looks ahead to a realistic time horizon.*

For example, the capability floor for speed should accommodate any common application in data, voice and video, including provision for reasonable future advances. In particular, such goals have been expressed as follows by IEEE-USA:

> The most important short-term goal is broadening ubiquitous availability. Data rates should be sufficient to provide the equivalent of several channels of bidirectional, high-resolution video, achievable by expanding the capabilities of current technologies. This will enable or enhance the most important Internet services available today, as well as generate extra benefits that materialize as more and more people are connected. The important long-term goal is scalability to data rates that will accommodate the most advanced applications in sight today, as well as the new ones that will emerge as capabilities increase. (IEEE-USA, January 15, 2009)

The IEEE-USA recommendation goes on to say:

- Initially, we advocate the achievement of at least 20 Mb/s bidirectional speed, with 90 percent availability throughout the nation within five years. The wide penetration of such speeds will achieve most of the expected benefits and accommodate numerous simultaneous applications per household or small business. Of course, greater speeds can be had by those with greater needs.

- We further advocate the achievement of at least 100 Mb/s bidirectional speed with availability to all businesses and households within 10 years. The technology necessary to meet this goal is scalable to almost any future need at inexpensive upgrade costs.

Finally, beyond the *capability floor* that characterizes the national system, policymakers and regulators need information about the *state* of broadband to progress toward its goal. Therefore, for mapping, tracking progress, and planning, the parameters of actual broadband capability must necessarily be *described* separately according to the case at hand -- wired or wireless technology, urban or rural location, and business or residential purpose. Thus, we may accept several subdivisions of broadband reporting, which may reveal important limitations of the technology and its deployment.

III.C.4. Wireless Service Policies

42. In the *Wireless Terrestrial Rural Report and Order*, the Commission concluded that steps were needed to promote greater deployment of wireless services, including steps to eliminate disincentives to serve or invest in rural areas, and to help reduce the costs of market entry, network deployment and continuing operations. Therefore, the Commission adopted measures designed to increase carrier flexibility, reduce regulatory costs of providing service to rural areas, and promote access to both spectrum and capital resources for entities seeking to provide or improve wireless services in rural areas. Should the Commission employ other mechanisms to encourage wireless broadband deployment in rural and tribal areas? For example, have bidding credits for carriers proposing to serve tribal lands been successful in encouraging deployment of wireless services, including broadband, to Indian Country?

Comment:

In a wired context, rural areas are usually highly local markets that have a poor level of wireline competition, and the providers involved create little "direct" economic benefit to the communities that they service. Most rural wireline broadband service offerings are usually supported indirectly by the Universal Service Fund (USF) dollars.

In a wireless context, broadband services are often creators of much needed competition in rural markets. But the reality is most competitive wireless broadband services are either cellular companies who sometimes have little incentive to build-out rural markets or are Wireless Internet Service Providers (WISPs), who are usually forced to provide services based on use of unlicensed spectrum. It is worth mentioning that there is no direct USF funding support currently provided to WISPs -- even though they are usually local companies that are part of the communities, and they are usually the companies servicing the hardest to serve locations in those communities.)

Given the above realities, the use of TV spectrum in rural areas is a clear candidate to drive the build-out of rural wireless broadband internet services. The inherent value of TV spectrum alone could be enough to push introduction and adoption of such services at great speed.

It is also important for the Commission to consider the way that the TV spectrum be made available to new broadband services, so as to prevent market power abuses and foster local ownership.

Specifically, the Commission needs to permit access to both spectrum freed by the digital television (DTV) transition and also the spectrum white spaces in the TV bands, while supporting the current service rules for existing DTV bands under the law.

Further, in the context of establishing a National Broadband Plan, the Commission needs to provide access to TV spectrum without the sole focus on the revenue created by auctioning that spectrum. The Commission should also focus on the indirect local economic benefits that occur as a result of using spectrum in rural areas to provide broadband Internet services, such as rural economic environment.

The Commission should try to engage in inter-governmental programs that foster broadband adoption, once these types of rural wireless broadband internet services become more available. An example of such joint programs might be conducted with United States Department of Agriculture/Rural Utilities Service, or even with State agencies or other State level resources, to enable access to computing resources (and therefore, Internet resources) via local community centers. Joint programs could also be accomplished through libraries or other community service organizations, and might also include "loaned computing resources" that would come with access to the Internet "built in."

Another example might be to approach the National Telecommunications and Information Administration to help the Commission to create something similar to its DTV voucher program. Such a program could provide "price subsidies" to rural citizens that would lower the "price barrier" for some period of time, so that those who normally are priced out of using broadband services get the chance to subscribe.

43. We also seek comment on how different regulatory approaches that the Commission has adopted in the past, such as facilitating more efficient spectrum use, developing licensing rules and construction requirements, designating spectrum for licensed versus license exempt use, secondary markets, cognitive radio, or other polices can ensure efficient and effective access to broadband. For example, what about the adoption of more rigorous buildout obligations for wireless services, such as were recently adopted by the Commission with regard to the 700 MHz band? How effective will these policies be with regard to ensuring delivery of broadband services in rural areas, or how may they discourage investment? More importantly, how can the Commission ensure that any measures to encourage wireless broadband service coincide with and complement other broadband platforms (and vice versa)?

<u>Comment:</u>

IEEE-USA wishes to point out that industry's pursuit of digital convergence (i.e., the ongoing transition from separate voice/data and video services and infrastructure towards a single infrastructure where services are "converged") will drive the requirement for "regulatory innovation" at the Commission in the area of spectrum policy.

> An example of an area of needed innovation is in spectrum auctions. This need can be seen by re-examining the outcomes of 700 MHz Auction 73 which occurred in early 2008. The auction was a complex and costly exercise that heavily favored any bidder with the largest amount or cash to invest.

Had part of the auction been focused on creating a significant number of new entrants by offering B-Block Cellular Market Area (CMA) licenses to new entrants only, new entrants might have represented a world of future converged services that would combine voice and data. These new entrants might have then been both competitors to cellular operators, and also complementary to them.

44. We seek comment on the extent to which access to spectrum may pose a constraint on broadband access and development. We also seek suggestions for approaches toward spectrum allocation, assignment, management, and use that will best promote national access to broadband service. For example, should the Commission conduct a "spectrum census" or "spectrum inventory" to identify spectrum bands that may be suitable for wireless broadband services?

Comment:

In a regulatory context, usually any spectrum surveys or inventories are done via computer-based propagation models. These models, coupled with the fact that spectrum utilization is, by its nature, deceptively hard to measure, illustrates the complexity surrounding the above questions.

Most of the complexity comes from the multidimensional aspects of spectrum use (i.e., an accurate look at what spectrum is used depends on a number of parameters like radiated power, location, time, frequency and antenna type or height.)

For any survey to truly reflect real-world spectrum utilization accurately, it must be done on an ongoing basis to provide any kind of accurate assessment of utilization. Multiple monitoring locations are also needed to cover geographic distribution.

If so, which portions of the spectrum would be most appropriate for examination?

Comment:

As to criteria for deciding what spectrum to examine, one logical answer is that spectrum creating the most economic value or benefit should be assessed.

In other regulatory domains, a desire also exists to create transparency, or full disclosure, in the use of spectrum. Such transparency might also be a way to select what spectrum to examine.

For instance, spectrum used by the Department of Homeland Security (DHS) for security and first responders could be a candidate for examination on the grounds that security is important --

but also on the grounds that this spectrum can be used more intelligently if that spectrum lies fallow. Such spectrum might be made available to opportunistic use (that is, dynamic access), as long as a good level of regulatory control is exerted over the spectrum, so that it can be used for DHS applications on a moment's notice.

There are a variety of ways in which the Commission might conduct a "spectrum census" or "spectrum inventory," including review of spectrum allocations, licenses, spectrum monitoring, and user surveys. What approaches would be most effective in assessing the actual use of existing spectrum and gauging potential opportunities for wireless broadband services?

Comment:

The answer to this question can differ, depending on the operational goal for the spectrum use. Because market forces and the costs associated with using some spectrum bands vary significantly, the Commission would have to look at each "opportunity of use" on a case-by-case basis to try to determine how to monitor or inventory the band in question. The Commission would also need to determine if monitoring or license-based inventorying database information alone would be acceptable, or if a combination of database and empirical data (such as real-time monitoring) makes sense.

Innovative approaches for assessing spectrum use and potential may include support for interdisciplinary teams conducting targeted research programs, combining business, policy and engineering schools. An alternative is to seek to utilize crowd-sourcing, and endeavor to obtain the information from volunteers. For example, the shortwave community consists of highly specialized, passionate volunteers with knowledge of spectrum use.

How should we measure "use" of spectrum, accounting for different technical properties, licensing framework, and the like, in determining whether spectrum is being fully utilized?

Comment:

See the above comment on spectrum census. Also, in past Commissions, developing an interference metric had been thought to be a means to estimate the level of spectrum utilization. This measure still remains to be proven, though other regulatory domains (for example, Ofcom, in the United Kingdom) have recently looked at interference metrics in unlicensed bands.

In conducting such a census or inventory, how should "underutilized spectrum" be defined and what actions should be taken if the spectrum is underutilized?

Comment:

Spectrum underutilization can be characterized in a variety of ways. Two that seem most relevant in the context of this question are:

1.) How much more capacity exists to deliver the same or similar services that the spectrum is currently used to provide; and

2.) Given the service rules and expected power levels found at a receiver, how much more energy can be put into the spectrum before either the services delivered begin to degrade, or before the equivalent isotropically radiated power (EIRP) service rules are violated.

Should the FCC conduct an analysis to attempt to define "underutilized spectrum" from a "service delivery" point of view, we suggest that it do so on a case-by-case basis for each service to be examined.

Should a more general approach be desired (e.g., looking at the power spectral density), establishing receiver-side power rules may be one of a number of credible places to start.

Would such a census or inventory, especially if conducted along with a similar census or inventory by the National Telecommunications and Information Administration of Federal Government spectrum use, be helpful in implementing a more efficient use of spectrum or locating spectrum used for other purposes that could be reallocated and made available to meet growing demand for broadband communications and data services?

Comment:

Yes, so long as a transparent process was agreed upon by the stake holders involved.

45. The Commission has recently adopted the White Spaces Order, which opens up the use of significant spectrum in the core TV spectrum bands for use by unlicensed devices. Many see these rules as creating an important new mechanism that can help ensure broadband services become available for more Americans. Given the importance to wireless broadband services of backhaul to the PSTN and the Internet, how can this spectrum be maximized to provide point-to-point backhaul in rural areas?

Comment:

The question of backhaul within TVWS spectrum has been the subject of debate, and it is touched on in many of the TVWS proceeding filings.

Given that TVWS spectrum is a very valuable, non-line of sight (non-LoS) spectrum (that propagates well like cellular does), it seems hard to understand why TV spectrum should be used for backhaul for the following reasons:

Spectrum used in backhaul applications is usually under “continuous use,” owing to the nature of the application (i.e., aggregating a lot of traffic into one back haul “pipe”). Intuitively, a backhaul link’s spectrum is not likely to be a good candidate for opportunistic spectrum use, or access using spectrum sharing etiquettes or techniques, because of the need to keep latencies low. Which begs the question: If back haul is allowed in the spectrum, and its utilization is high, could this create a barrier to entry for innovative new uses, products and services based on opportunistic spectrum use?

Another consideration is that, at low frequencies, the wavelength of the RF signal is relatively large in these bands. The long wavelength means that antennas in these low frequencies to be used in a backhaul link would need to be very large indeed. And, though phased array antennas could be used to reduce the size, they do not focus “pencil width” beams, as most long-distance back haul technologies normally do. Rather, they create large side lobes and noise around the surrounding geography of the array, thus raising the noise floor of the spectrum in use in a large region around any antenna.

Additionally, were such backhaul approved for use in a rural setting, though at first there might be no issues, what would happen over a long period of time? How could the FCC “take back” the use of this spectrum should population densities change and other forms of spectrum use emerge in these bands? What happens when higher population density or changing demographics creates a transition from rural to suburban?

Bottom line -- the use of spectrum with these non-LoS propagation characteristics and long wavelengths for backhaul seem like the wrong tool for the job. Other spectrum could conceivably be freed up to help grow the backhaul market in the 3 GHz to 4 GHz range, instead of raising the noise floor of the high-value TV bands.

Several other bands are currently used by WISPs to provide broadband through the use of unlicensed devices. What more should the Commission do with respect to permitting the use of unlicensed devices?

Comment:

At the bottom of paragraph 106 in the Television White Spaces Memorandum Opinion and Order (FCC 08-260, November 2008), the following quote appears: "… the Commission will further explore in a separate Notice of Inquiry whether higher powered unlicensed operation might be accommodated in the TV white spaces in rural areas."

Notwithstanding the reconsideration filings on this proceeding, we feel the Commission should follow through with this NOI to allow the examination of higher EIRP levels in the TV band frequencies -- but only for rural areas owning to the clear primary/secondary service rules in these bands. Inside of Canada's regulatory domain, they are making good use of higher power to provide broadband services over greater distances that would currently be possible here in the United States.

The details of the incumbent protection approach in the Canadian model, and the way they have relocated channels so that guard bands are not wasted spectrum after their DTV transition, could create better spectral use for the United States. Different types of operating rules could be considered as well.

Even the type of licensing might be used to control any high-power use of this spectrum; and any of a number of different types of deployment schemes might also be accommodated. The right combination of non-exclusive light licensing and full exclusive use licensing might be all that is needed.

If the Commission could provide more spectrum, or could find a way to change the current transmit power restrictions in Part 15 Rules for 5.2 and 5.4 GHz bands (DFS and RADAR issues aside for a moment), such actions could provide more practical backhaul spectrum for which there is already equipment in the marketplace. All that would be needed to use this spectrum in most cases would be a firmware upgrade. (Practically speaking, under the Part 15 Rules, there is currently only one reasonable high-power, unlicensed allocation in the 5.7 GHz band that is a "good fit" for outdoor backhaul applications. More unlicensed backhaul spectrum is needed by a number of industries.)

How should the Commission measure "subscribership" or use of devices utilizing unlicensed spectrum? What more should the Commission do to promote the development of cognitive radio devices in order to ensure more availability of spectrum for broadband uses?

Comment:

Though many suggest that dynamic access to spectrum can be achieved by using Cognitive Radio techniques that may offer better spectrum utilization without suffering unpredictable interference issues, this suggestion is only true as long as a sufficient level of information and control is implemented to allow any CR techniques or spectrum access etiquettes to work.

If the Commission were seeking to take a step in the right direction, it would first require stepping away from the legal and regulatory requirements of the past. A specific productive action would be to set-up a band of spectrum sufficiently large to create value such that any potential spectrum user could access it easily and over a long period of time. This action could spur CR development.

The Commission could also provide more active support to the CR Standards that are under development for public sector use.

For the private sector, the volume and quality of spectrum solely could motivate adoption of CR technology needed to access and use that spectrum. Note that this stimulus for CR was attempted by the Spectrum Testbed rulemaking, which set aside 25 MHz of spectrum. The Testbed had a limited term and, therefore, limited direct commercial value. Also, given the frequency and the amount of spectrum, there was not enough incentive for industry participation.

The combination of too much uncertainty and not enough long-term potential made the Testbed too uncertain as a long-term proposition to attract local government, not-for-profit and community participants.

Should the Commission revisit the Testbed, but with a larger more valuable swath of spectrum, and allow stake holders to feel positive that their long-term access to that spectrum would be assured, and that their "product development risk" might be minimized, then a viable way to incenting private sector investment in CR technology could occur.

To what extent should unlicensed wireless play a role in a national broadband plan?

Comment:

Currently, for millions of Americans in rural settings, providing a "best effort services" using Part 15 devices is far better than dial up, and vastly better than no services at all.

Part 15 will always have this value when it comes to providing competition and connectivity at a low cost. Sustaining a business based on current Part 15 technology is also a good local alternative to large-scale providers, so clearly Part 15 already has a place in any National Broadband Plan.

In the future, as new spectrum is freed to be used via unlicensed access, new models will emerge that should also be supportive of a National Broadband Plan.

IEEE-USA urges the Commission to foster innovative spectrum uses and technologies to create second- generation Part 15 spectrum use cases, centering on the availability and use of registration systems, and, at some point down the road, sensing technologies.

III. C. 5. Open Networks

48. We seek comment on the state of broadband infrastructure and service competition, interconnection, nondiscrimination, and openness, and whether these should factor into development of a national broadband plan. We ask commenters to address the value of open networks, and specifically, the impact on investment, innovation and entrepreneurship, content, competition and affordability of broadband, among other things. For instance, has the private sector sufficiently produced open platforms, and if so, to what extent? Would further regulation encourage or discourage more open platform innovation? We seek comment on how and whether open network principles should be incorporated into a national broadband plan. We note that some have suggested the need for a so-called "fifth principle" on nondiscrimination. If the Commission were to adopt such a principle, what would be a definition of "nondiscrimination"? We ask commenters to address whether such a principle is necessary in light of the current state of competition and the four existing Internet policy principles. What would be the impact of adopting a principle requiring nondiscrimination? What would be the result if the Commission chose

not to adopt such a principle, or if its *Internet Policy Statement* principles were found to be unenforceable? Should the underlying facilities over which service is provided have any impact on how open network policy should be applied to broadband providers? With regard to applying open network policies to wireless networks, what are the costs and benefits, technical considerations, bandwidth constraints, or constraints associated with the capacity of mobile wireless devices or networks that should be given consideration?

Comment:

The state of broadband infrastructure and service competition is spotty in the United States. Studies, such as the Chairman's Report on the ITU-T Future of Voice Workshop, have shown that where there are at least two broadband access providers, the cost is 20% less than markets where there is a single access provider and the performance is often an order of magnitude greater than where there is a single access provider.

The interconnection market also appears to be working. If anything, the state of interconnection pricing is driving access providers to work with peer-to-peer application developers to optimize the experience of end users while reducing interconnect traffic. We see this as an example of the market working.

One question raised in the Notice of Inquiry is: "Has the private sector sufficiently produced open platforms, and if so, to what extent?" We would offer that for wired connectivity, the private sector (to-date) has produced open platforms. DSL and cable broadband providers have embraced open standards such as the Internet Engineering Task Force protocol suite and IEEE transport specifications. These services have enabled numerous applications and services that were never anticipated, generating considerable wealth and employment. Examples include Google, Amazon, Wikipedia, and numerous anecdotal stories of small, local businesses that not only have found ways to stay in business, but also now have world-wide customer bases. While it is true that a number of service providers have raised the possibility of restricting access to competitive content, such as a DSL provider blocking Voice-over-IP services, none have done so, at this writing.

We would offer that further, explicit regulation now might be counter-productive. Such regulation may stifle alternative investment or encourage incumbents to offer a least-acceptable access policy. That said, we also offer that the FCC should make it clear to access providers that the FCC (and possibly Federal Trade Commission) will not tolerate predatory blocking of services. Likewise, *a priori* blocking, or tiered pricing of packets based on the application *per se*, introduces a large loophole for providers to implement predatory blocking or impairment of service.

What makes this issue difficult is that service providers, given a competitive market, should have the right to maximize their revenues. Competition provides an economic incentive for further investment and, presumably, excess capacity that one could use for new services or additional service coverage. An analogy is the air transport industry: by allowing for differential pricing, an airline can have a significant volume of users paying significantly below the marginal cost for a seat by having a premium service that more than offsets the cost. In the communications arena, such premium services may include guaranteed levels of service, or on-demand quality of

service. However, the key principle to enforce is that the user decides whether to subscribe to the level of service, not the service provider. An example of this principle might be a streaming video access service that would be independent of the content provided by the service provider, content network, or peer-to-peer network.

While we have seen competition and open networks on the wired network, we do not see a similar level of openness in the wireless market. Nevertheless, this closed nature of the wireless market is not a technological imperative, as shown by investment in the open platform and open source Android by Google.

III. D. 3. Broadband Privacy

58. Americans are using broadband to perform everyday tasks in which they pass personal and confidential information over broadband connections, raising important consumer privacy concerns.[85] As a result, it is important to consider the privacy implications of such use in connection with our development of a national broadband plan.

59. The last several years have witnessed significant growth in multi-platform services, such as mobile wireless telephones enabled with broadband Internet access; bundled service offerings of voice, video, and broadband communications; and voice services offered over broadband. What are consumer expectations of privacy when using broadband services or technology and what impact do privacy concerns have on broadband adoption and use? We also note that certain broadband providers have purchased the behavioral advertising services of companies that advertise an ability to "deliver[] the most actionable consumer intelligence by extending [those companies'] reach dynamically to encompass the ever-growing network of sites that consumers visit." These companies track the WebPages customers visit, the searches they perform, and the ads they click, among other information. Consumers may also be aware of the technological ability that broadband providers have to perform functions, such as deep packet inspection.

What is the impact of this type of activity on consumers' willingness to use broadband services? We seek comment on how the Commission should treat issues such as deep packet inspection and behavioral advertising in developing a national broadband plan and whether there are issues related to other types of information connected with the provision of broadband services that the Commission should consider. Do these practices discourage consumers from "access[ing] the lawful Internet content of their choice" for fear of having that access tracked or revealed? If consumers view this negatively, is it something that Congress or government agencies should address, or can privacy protections be achieved through industry self-regulation, such as industry best practices? Would protection of customers' private information spur consumer demand for broadband connections, and consequently encourage more broadband investment and deployment consistent with the goals of section 706?

60. The Commission has long been committed to safeguarding customer privacy and repeatedly has taken steps to ensure that private customer information is adequately

protected. In fact, the Commission has already stated that consumers' privacy needs are no less important when consumers communicate over and use broadband Internet access than when they rely on telecommunications services. Should the Commission consider as part of its plan whether to exercise its ancillary jurisdiction to address broadband privacy issues, or are other approaches available?

Comment:

Privacy, in the broadband context, should mean guidelines of consumer privacy protections that should exist between the broadband provider and the consumer of the services. Education is a key element with many technologies assisting the consumer by informing them of privacy issues (e.g., Firefox has plug-ins that show a color coded meter when privacy is at risk). It is also necessary to empower consumers so that they are able to act on their privacy decisions once educated. For example, Local Shared Objects are cookies created by Flash that are invisible to the user and have no built-in management options in any browser. Transparency of information collection and usage can be violated with new technologies like "Deep Packet Inspection" (DPI), Behavioral Marketing, and profiling of consumers. Additionally, the ability of a provider to change its policies at any time, lacking sufficient security controls to protect from breaches, and a lack of recourse for the consumer when a breach occurs, creates an air of uncertainty that dissuades the public from trusting these services.

IEEE-USA recommends that FCC require broadband providers to establish policies on privacy, including education on their privacy policy and the practices of the provider with regard to collection, storage, sharing, and usage of user's data, and also to provide their customers with a choice of opting in or opting out of the service. We also recommend that providers be required by the FCC to publish their security and privacy policies, publish breaches, and provide their customers with support when their data has been stolen.

By establishing a privacy policy recommendation and providing "templates" and samples for education, transparency and specific protections (opt-in, collection, use, etc.) for the customer, broadband adoption issues could be mitigated and providers would still be allowed to collect data for monetary gain from those customers who choose to allow it (Note: similar to the Do Not Call options). If the majority of providers do not follow the FCC recommendation within a reasonable time (e.g., 12-24 months) then the recommendation could be replaced by a regulatory requirement. In this way, the FCC would allow time for providers to adapt their current policies, the FCC to measure compliance, and to survey the public-at-large, as measured by broadband adoption and growth.

III. F. 6. Energy Independence and Efficiency

86. In the development of a national broadband plan, the *Recovery Act* requires that the Commission include "a plan for the use of broadband infrastructure and services in advancing . . . energy independence and efficiency." We seek comment on how to interpret and implement this directive, including an analysis of existing Commission and other agency policies, programs and proposals designed to advance the policy goals of the

***Recovery Act*. Federal policy and recent legislation have trended towards implementing more efficient energy distribution mechanisms. Are there broadband applications that could help to improve efficiencies in energy production, distribution or consumption, like smart grid technology? In 2007, Congress set aside $100 million per fiscal year between 2008 and 2012 for developing and implementing smart grid technologies. The *Recovery Act* provisioned $11billion for the same goal. We seek comment on how broadband infrastructure and services could help achieve efficient implementation of smart grid technology. Are there other organizations, such as the Department of Energy, with which the Commission should coordinate? We also seek comment on how these aspects of the national broadband plan will affect the economy and the creation of new jobs.**

Comment:

Within the federal government, Smart Grid activities are being conducted by the following agencies:

- Federal Energy Regulatory Commission (FERC)
- Department of Energy (DOE)
- National Institute of Standards and Technology (NIST).

NIST has engaged the Electric Power Research Institute (EPRI) as a contractor to support their efforts in developing a Smart Grid Roadmap, and in identifying Smart Grid standards, as required by the Energy Independence and Security Act of 2007 (EISA-2007).

The FCC should be coordinating with those activities relative to the potential impact of broadband on the Smart Grid. We were pleased to see that the FCC presented at the initial plenary session of the May 19-20 Smart Grid Workshop, so we assume that the FCC is aware and has initiated coordination with those activities.

FERC has a draft policy statement, Docket PL09-4, for which comments closed May 11. In the draft policy, FERC identified four functional areas as priorities:

- Wide area situational awareness
- Demand response
- Electric storage
- Electric transportation

In its activities, the NIST/EPRI effort has augmented this list by including:

- Distribution grid management
- Advanced metering infrastructure

FERC has also identified two cross-cutting issues as priorities:

- Cybersecurity
- A common semantic framework

In the functional areas, broadband is either required as a fundamental enabling technology, or can serve as a highly desirable means of removing bandwidth constraints. Such constraints were identified as issues in reports presented by tracks at the May 19-20 meeting, as well as in other documents.

The level of need for broadband is categorized in these categories:

- Basic need for high bandwidth and low latency. This category primarily applies to some use cases in wide area situational awareness, particularly those involving protective relay technology. The typical requirement for intra-substation communications related to protective relays is four milliseconds, and this requirement may well apply to power system protection communications over a wider area among devices in substations, and in other facilities. A four millisecond response time can only be achieved on a broadband network.

- Need for communication with a large number of nodes. This requirement is likely to apply to several of the other priority areas. The need for bandwidth applies to the aggregate communications, which may be exchanging frequent messages of relatively limited size to every home and business, or even to individual devices within a customer's premises.

- Needs related to the increasing verbosity of communication protocols and related data models/structures. Such needs facilitate the common semantic framework that FERC has identified as a priority.

The older technologies for communicating with field devices are capable of operating over 1,200 bit-per-second multi-drop lines. This technology is common in parts of today's electric grid control, although it would be regarded as obsolete for at least a decade as a means of supporting any other modern communications application. The older technologies identify data by its position in the communication formats rather than by what power system information it represents. This scheme requires maintenance of a separate, error-prone mapping between the communication formats and the data semantics. The newer protocols identify data by its power-system-related semantics, provide expanded capabilities related to those semantics, and have numerous benefits in reduced cost, improved operations and better cybersecurity.

However, the new capabilities come at a cost in bandwidth. The newer communications requirements are impractical for technology such as 1,200 bit per second multi-drop serial lines, but are easily supported in broadband systems. The major potential contribution of broadband to the Smart Grid is the elimination of constraints imposed by protocols optimized for older communications technology. By eliminating these constraints, broadband can unleash the potential of modern computer/communications technology to support the kinds of applications needed to achieve the benefits of the Smart Grid.

These broadband capabilities will be needed wherever electricity is generated, transmitted, distributed, or used -- not only to enable use of 61850, but also to enable or facilitate use of other modern standards across all Smart Grid domains. Such capabilities will be needed at rural, as well as urban, locations; poletop, as well as substation, sites; and on customer premises, as well as electric power grid facilities. The detailed needs will depend on use cases, but in general,

ubiquitous, high-speed broadband will be a welcome source of enablement and support for the Smart Grid.

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We appreciate the opportunity to present these comments. If you have questions, or for more information, please contact Deborah Rudolph, Manager, IEEE-USA Government Relations, at (202) 530-8332; or at d.rudolph@ieee.org.

Sincerely,

Gordon W. Day
IEEE-USA President

GWD/DR:bc