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Subject: Response to Broadband Opportunity Council Request for Comment
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To the Broadband Opportunity Council,

US Ignite is pleased to submit its response to the Council's Request for Comment and looks forward to working with the Council to implement its recommendations.

William Wallace
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Primary Questions to be Addressed in US Ignite’s Response to the Broadband Opportunity Council’s Notice and Request for Comment (Docket # 1540414365-5365-01)

Question #1: How can the federal government promote best practices in broadband deployment and adoption? What resources are most valuable to communities? What actions would be most helpful to communities seeking to improve broadband availability and use?

Question # 21: How can the federal government support state, local, and tribal efforts to promote and/or invest in broadband networks and promote broadband adoption? For example, what type of capacity-building or technical assistance is needed?

Background on US Ignite’s “Pull” Approach to Broadband Deployment and Adoption

An inflection point in digital networking and applications is once again approaching and is marked by gigabit speeds to businesses, community anchor institutions, and households, software-defined networks, and local cloud computing. With inspiration from the National Science Foundation (NSF)-sponsored US Ignite Initiative, a public-private non-profit partnership called the US Ignite Partnership has been formed to promote U.S. leadership into this new space by encouraging the creation and deployment of compelling, next-generation applications and by leveraging investments in existing testbed networks to be able to deploy, test, and demonstrate those applications.

US Ignite believes that the fastest way to new economic value and broadband adoption is through applications “pull” – compelling new applications that leverage gigabit networks, software-defined capabilities, and distributed cloud computing. That “pull,” together with complementary “push” infrastructure efforts to deploy appropriate infrastructure, will create demand for both further new applications and infrastructure. America will work smarter, with better information adding to the velocity and intensity of economic development.

It is expected that next-generation applications will have the potential to transform sectors of national priority such as clean energy (including advanced vehicle technologies), education and workforce technologies, emergency preparedness and public safety, health information technologies, transportation, and advanced manufacturing. These have been the focus “pull” areas for US Ignite applications.

The intended results for US Ignite are to:

1. Accelerate the development and adoption of compelling smart gigabit city applications (applications not possible on today’s widely-deployed broadband assets) providing public benefit in national priority areas. Goal: foster the creation of 60 smart gigabit city applications by the end of 2018.
2. Facilitate creation of a testbed for these applications by coordinating and encouraging the deployment of advanced wired and wireless infrastructure in cities and regions, and among community anchor institutions. Goal: establish 200 smart gigabit city testbeds by the end of 2018.
3. Provide a forum for coordination and best-practice sharing among participants in industry, foundations, government, carriers and research and education networks, cities and regions, researchers, venture capitalists, and software developers to further the goals above

In short, US Ignite is in the process of assembling and jump-starting a sustainable ecosystem of smart gigabit city testbeds and corresponding applications delivering important new advances in the national priority areas of clean energy (including advanced vehicle technologies), education and workforce technologies, emergency preparedness and public safety, health information technologies, transportation, and advanced manufacturing. These advances will leverage advanced Internet concepts developed by prior NSF research programs that are not yet available on today's commercial Internet. In doing so, the project will open up new economic development and broadband adoption opportunities in the participating cities. It is hoped that ultimately multi-gigabit interstate links will interconnect the cities, and city-based interoperable application infrastructure will allow entrepreneurs and academics in one city to write visually-compelling and ultra-responsive new Internet applications that can be replicated in other cities and regions. An important key will be the involvement of citizens and community organizations in building and experimenting with multiple advanced networking applications addressing national priorities.

Proposed Administration Goal to Achieve a “Pull” Approach to Broadband Deployment and Adoption

It is recommended that the Administration promote – on an agency-by-agency basis – US leadership in developing and deploying applications and services for ultra-fast broadband and Software-Defined Networks that have the potential to transform areas of national priority.

Proposed Agency Actions to Meet Proposed Goals for Achieving a “Pull” Approach to Broadband Deployment and Adoption

Clean Energy (including advanced vehicle technologies): Recommended actions include the following:

- Encourage the Department of Energy's Offices of Science and Electricity to provide funding and encouragement to connect ESNets to the networks of smart gigabit cities (e.g., Chattanooga's Electric Power Board-owned fiber network reaching 170,000 end users) so that best practices in smart-grid management can be readily shared and applied across multiple cities.
- Request that the Department of Energy encourage renewable energy industries to standardize and accept uniform training and badging metrics so that workplace skills can be enhanced through “hands on,” experience-based learning, practice, and training (e.g., training in solar panel or wind turbine installation).

Education and Workforce Technologies: Recommended actions include the following:

- Request that the Department of Education encourage local school districts to use E-rate and/or ConnectEd programs to fund deployment of 10 Gigabit networks connecting all K-12 schools since advancements in Virtual Reality education modules and distance learning will soon require 10 Gigabit networks. Evolving Gigabit-enhanced distance

learning applications will enhance individually-tailored learning and expose students to diverse perspectives, new experiences, and new knowledge bases not available today.

- Request that the National Science Foundation provide additional funding opportunities for applied projects in cyberlearning aimed at specifically testing whether advanced gigabit networks can accelerate achievement of key K-12 educational goals.

Emergency Preparedness and Public Safety: Recommended actions include the following:

- Encourage FirstNet to include funding and encouragement for applications to ensure that local public safety agencies use information and communication technologies – including advanced computational modeling and simulation – to keep Americans safe by predicting disasters before they happen, preventing those disasters we can predict, and mitigating those we cannot prevent. In addition, these applications will provide ubiquitous, real-time, individually-tailored information and decision support for everyone involved in training for and addressing emergencies.
- Encourage FirstNet to pilot the use of Software Defined Networking (SDN) to create, on the spot, the networks needed for emergencies and contingencies by re-allocating commercial resources via SDN control planes, to form separate emergency and resilience networks as needed. SDN essentially allows fiber and spectrum assets to be reallocated to new uses, as needed, and in fractions of a second. For example, in case of a train derailment, cell tower resources near the derailment could be reallocated for emergency workers' usage, and text messages given priority for the remaining capacity available to the public. Into this same SDN network, the local university's chemical engineering department could be connected to give first responders the benefit of expert knowledge on the chemicals that might be involved in the derailment.

Health Information Technologies: Recommended actions include the following:

- Urge the Department of Health and Human Services to expedite implementation of patient reimbursement policies for services provided via advanced video conferencing. Reforming such practices, which in many states still require patient office visits to be eligible for reimbursement, will help achieve important health care goals: enabling health and wellness, not simply health care; proactive, healthy prevention, not reactive treatment of disease; early-detection of disease; regular, effective communication with health experts, empowering patients through information and medical knowledge to become an active part of their own care.
- Encourage HHS to make demonstration funds and grants available to test advanced healthcare applications in gigabit communities nationwide. Combined with the possibility of changes in reimbursement policies listed above, funded demonstration projects in gigabit cities will allow health care systems, hospitals, and insurance companies to experience what advanced networks can do to transform health care services.

Transportation: Recommended actions include the following:

- Accelerate the FCC's efforts to make available additional wireless spectrum for use in supporting autonomous vehicle experimentation.
- Encourage the DOT's Connected Vehicle (CV) program to extend its pilot program solicitation and to make it easier for smaller organizations, academic researchers, and entrepreneurs to participate and receive pilot project funding.

Advanced Manufacturing: Recommended actions include the following:

- Encourage the Advanced Manufacturing National Program Office (AMNPO within the Department of Commerce) to encourage participants in the National Institute for Manufacturing Innovation (NNMI) and the National Additive Manufacturing Institute (NAMII) to ensure access to the Gigabit networks required to support computational modeling and detailed simulation as well as computational design processes and sharing of data, knowledge, tools, and expertise across supply chain partners.

Overall Ecosystem Building: Recommended actions include the following:

- Encourage the Economic Development Administration to provide funding to support development of local ecosystems (e.g., steering groups comprised of government, civic, academic, foundation, nonprofit, and corporate support) that can identify novel solutions to city challenges through use of smart gigabit infrastructure and applications. Such an effort would further EDA's core mission to create the conditions for economic growth and improved quality of life by expanding the capacity of individuals, firms, and communities to maximize the use of their talents and skills to support innovation.
- Encourage the FCC/NTIA Wireless Model Cities program to select and target US Ignite communities (i.e., those with gigabit fiber or wireless networks deployed) as Model Cities for federal spectrum sharing testbeds.
- Encourage more coordination among agencies and the White House on broadband / advanced networking / smart city efforts to focus as much energy and momentum as possible into one or two coordinated efforts.

Other Policy Issues that Should be Addressed

A. Requirement to connect Community Anchor Institutions Passed

Local carriers and ISPs that are wiring or providing wireless services for areas containing Community Anchor Institutions (CAIs) should be required to connect those CAIs passed at low or no cost. Local services provided by CAIs are integral parts of the community and CAIs should be connected to each other and citizens via the most advanced local networks available. For example, if ISP "A" has fiber running down Main Street and running past the city library located on Main Street, ISP "A" should be required to offer connection at low or no cost to the city library. Consideration should be given to lowering the burden of providing such access if the CAI already has an adequate connection.

B. Requirement to Exchange Traffic at a Nonprofit Local Exchange Point

To promote competition and enhance the vitality and cohesiveness of cities, local carriers and ISPs should be required or incented to exchange traffic with other local carriers and ISPs at one or more nonprofit local exchange points in that city or region. This would allow for local commerce and local traffic to stay local to a community. This helps the economic infrastructure of American cities to develop along local lines and provides better service by minimizing the latency or delay inherent in longer-distance inter-city network connections. The exchange point(s) would also lower the barrier to entry for competitive entrants in the local market by giving them equal and nondiscriminatory access to local resources (such as CAIs). (It would also encourage more competition in inter-city Internet carriage and lower the barrier to new inter-city carriers.) The use of a nonprofit to run a local exchange point is suggested to help avoid favoritism and possible discrimination. We note that candidate nonprofits often include local academic institutions. But the key is required or incented participation (at adequate speeds) in a non-discriminatory local exchange point.

C. Requirement for unlimited local traffic carriage as part of basic services

To further encourage local economic development and to strengthen cities, it would be useful to require or incent local carriers and ISPs to include in their basic fee unlimited local traffic, including traffic to CAIs, governments, nonprofits, and for-profit companies (e.g., no caps on local data usage). Local traffic does not require the local carrier or ISP to pay a tier 1 national interstate carrier because the traffic is kept locally and not handed off to the larger Internet. Such local handoffs are facilitated by the local exchange point (see "B"). Encouraging local traffic would also provide for greater resiliency in case of emergencies where access to national services might not be available.

D. Facilitate interconnection of local higher education institutions

The Internet was invented at academic institutions, and the NeTS program in the National Science Foundation's Computer and Information Sciences and Engineering (CISE) Directorate has been pushing the frontiers of the newest kinds of Internet and SDN services. Some of the newest and most innovative broadband is now found on higher education campuses thanks to the CISE CC*NIE and subsequent campus infrastructure programs. To help spread this innovation in the local city or region networks discussed above, policies should encourage and facilitate interconnection of higher education institutions as a special example of an important CAI in a city or region.

E. Require IPv6 and IPv4 capabilities of all local carriers and ISPs

The Internet has run out of its traditional IPv4 addresses, and while some carriers still have a stockpile of unused IPv4 addresses they can continue to use to expand their businesses, any new player cannot acquire new IPv4 addresses and is at a competitive disadvantage. The right way to level this playing field is to require all local carriers and ISPs to support IPv6 addressing. There are plenty of IPv6 addresses and they are

available at very nominal prices. A requirement for and emphasis on IPv6 addresses would enhance competition and prevent an uneven playing field for local competition. A phase-in period would be required but should be minimized.

F. Provide incentives for symmetrical broadband

Developing local skills in coding, entrepreneurship, big data, and video origination requires originating lots of traffic. Today's asymmetrical up-and-down broadband speeds discourage coding, entrepreneurship, big data, and video origination because in each case the result is greater upstream traffic and that may be hindered by asymmetric broadband speeds. Symmetrical broadband speeds at reasonable prices should be encouraged with both incentives and regulations.

G. Educate cities and regions about the opportunities available to them through the US Ignite program

The US Ignite program is a White House OSTP and National Science Foundation initiative working in conjunction with the US Ignite nonprofit organization. Its goal is to develop and deploy compelling applications of ultra-fast broadband technologies and deploy them to smart gigabit cities throughout the country. That way, there are tangible benefits to broadband to help convince everyone involved to further deploy advanced broadband solutions. The benefits of US Ignite multiply when more communities adopt voluntary US Ignite programs and practices. Additional federal agencies should be encouraged to better serve their missions through ultra-fast broadband applications deployed in smart gigabit cities. We recommend that the National Coordination Office / NITRD be requested to lead this cross-agency effort.

US Ignite fully supports the Council's review of these important broadband issues and looks forward to working with the Council to implement its recommendations.

Respectfully submitted,

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