

Technology Advisory Council

Status of Recommendations

June 29, 2011



FCC Actions on TAC Recommendations

FCC took immediate action on four recommendations:

- ☑ (Jointly) Municipal Race-to-the-Top Program (#1); Best Practices/Technology Outreach to State & Local Governments (#4)
 - FCC cited the TAC recommendations in April NOI on Broadband Acceleration and is collecting data on best practices
 - Chairman directed staff (following data collection) to develop timeline for Broadband Acceleration Roadshow and Broadband City USA award

- ☑ Broadband Infrastructure Executive Order (#2)
 - FCC staff met with White House officials with request for Exec. Order
 - White House is working with FCC input on possible Exec. Order

- ☑ Promote Small Cell Deployment (#8)
 - FCC staff have begun series of meetings with GSA towards a possible fall workshop on small cell deployments in government buildings
 - FCC will report on progress at September meeting



FCC Actions on TAC Recommendations

FCC is waiting on further analysis on four recommendations:

- ❑ Advocacy for Rapid Tower Siting (#3)
 - Chairman directed staff to collect and analyze data on shot clock effectiveness in April Broadband Acceleration NOI
 - Staff will give recommendation to Chairman & Commissioners on response to TAC Rec. #3 after evaluating data
- ❑ Model an Online Deployment Coordination System (#5)
 - FCC has initiated outreach with stakeholders to determine demand for model and possible design and functionality
- ❑ New Metrics to Measure Broadband Network Quality (#6)
 - TAC Working Group has prepared an initial analysis and recommends a workshop
- ❑ Highlight Stranded PSTN Investments (#7)
 - TAC Working Group has prepared an initial analysis and recommends a workshop



Technical Advisory Council

Critical Legacy Transition Working Group (CLT-WG)

- 29 June, 2011
- Washington, DC



Meeting Agenda

- What we addressed
- Working group members
- Work product status
- Report summaries and recommendations
- TAC discussion
- Next steps



What the Critical Legacy Transition Working Group Addressed

- Transition from the PSTN to an all IP Network and future technologies
 - New Metrics for Broadband Quality
 - Quantifying the size of the PSTN transition (Carrier stranded assets)
 - National competitiveness and benchmarking
 - After the PSTN: Non-carrier stranded devices
 - Regulatory impacts and changes required for the transition
 - Economic impacts of the transition



Working Group Membership

- **Shahid Ahmed** - Accenture
- **Nomi Bergman** - Bright House Networks
- **Lynn Claudy** - National Association of Broadcasters
- **Adam Drobot** (Co-Chair) - 2M Companies
- **Tom Evslin** - Vermont Telecommunications Authority
- **Lisa Gelb** - FCC
- **Russ Gyurek** – Cisco
- **Greg Lapin** - American Radio Relay League (ARRL)
- **Christopher Lewis** - FCC
- **Jack Nasielski** - Qualcomm
- **Roberto Padovani** - Qualcomm
- **Andrew Setos** – Fox
- **Doug Sicker** - FCC
- **David Tennenhouse** (Co-Chair) New Venture Partners LLC
- **Bud Tribble** - Apple
- **Robert Zitter** –HBO



Product Status

Item	Draft Papers Presentations	Summary Recommendations	Future Effort Next Steps
1. New Metrics for Broadband Quality	Completed	Completed	Workshop and Refinement
2. Quantifying size of the transition	Completed	Completed	Time Line for Transition
3. National Competitiveness	In Progress	No	Report at next TAC Mtg.
4. After the PSTN: Stranded Assets	Completed	Completed	Workshop and Refinement
5. Regulatory Impacts and changes	Completed	Completed	Contribution to rule making
6. Economic Impact	Started	No	Report at next TAC Mtg.

- **Draft Recommendations**
- **and**
- **Summaries**



Quantifying the PSTN Legacy Transition (DRAFT)

• Problem/Opportunity Addressed:

- As the number of subscribers on the PSTN falls, the cost per remaining customer increases and the overall burden of maintaining the PSTN becomes untenable. A fast transition can generate significant economic activity and at the same time lower the total cost
 - Today's demand for communications is much broader and requires much greater bandwidth
 - 'Cord-cutting' is already happening organically at impressive rates.
 1. Wire-line to Wireless displacement
 2. IP based network replacement/substitution for fixed and mobile communications

• Key Questions:

- What is the size of the PSTN transition for Service Providers?
- How can we further accelerate this transition?

• Findings:

- By 2014, the United States will have fewer than 42M access lines
- Access line losses were nearly 6.6 million between 2Q09 and 2Q10, a drop of 7.3%.
- By 2014 US consumers will have 31.6 million VoIP lines accounting for 42.5% of all U.S. access lines.
- Fixed lines continue to decline; mobile is the preferred choice for voice communication.
- More than 25% of U.S. consumers aged 18 or older have already given up their voice landline for voice wireless-only service.



Quantifying the PSTN Legacy Transition (DRAFT)

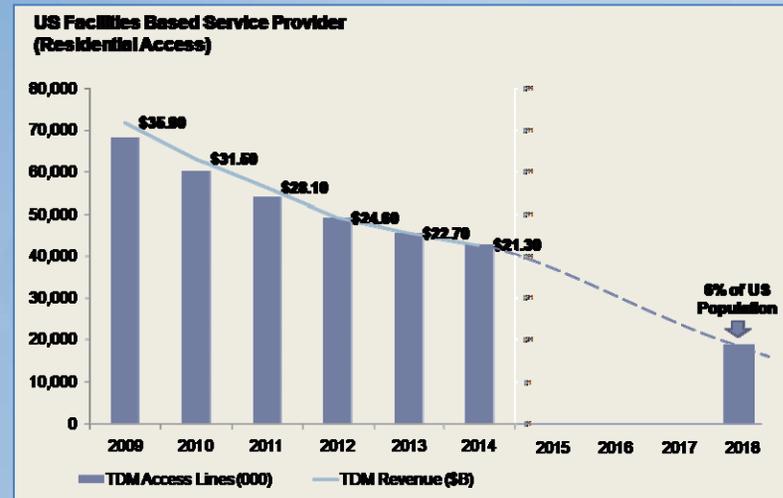
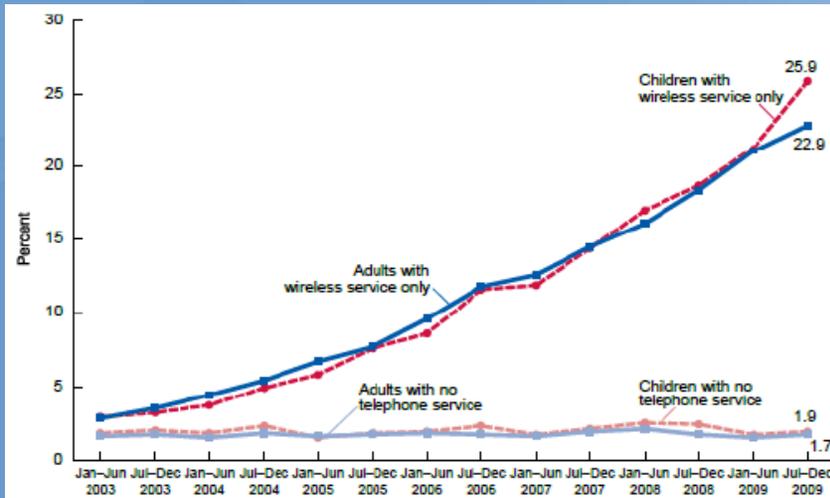
- **Recommendations:**

1. The FCC should take steps to prepare for the inevitable transition from the PSTN
2. The FCC should take steps to expedite the transition
3. Provide incentives for operators to provide broadband services (that can support Voice) to rural areas and underserved America
4. Fund PSAPs so they can accelerate integration with IP/Packet network (so E911 can work with IP)
5. Re-align regulatory requirements to emerging technologies
6. Assist Broadband and OTT providers by working with Security and Emergency Alarms industry associations to push for IP adoption e.g. NFPA 72
7. Bring the National Broadband Plan in alignment with the PSTN Sunset timetable and assure that adequate broadband/mobile capability is available everywhere that the PSTN is today



Quantifying the PSTN Legacy Transition (DRAFT)

- Cord cutting is happening in a rapid pace, especially the younger segments. However, PSTN lines are also dropping organically.
- As of May 2010, 23% of respondents in a study lived in a mobile-only household
- The same study also found that 37% of adults in the 18-24 and 30-34 age groups lived in a mobile-only household



Source: National Center for Health Statistics



New Metrics for Broadband Quality (DRAFT)

- **Problem/Opportunity Addressed:**

- As the nation transitions to Next Generation Networks, what kinds of metrics do we need?

- **Findings:**

1. An expanding set of applications for broadband networks requires quality and reliability metrics which go beyond simple speed
2. Much work is already underway in this area
3. Metrics for robustness and reliability should take into account the diversity provided by Next Generation Networks.



New Metrics for Broadband Quality (DRAFT)

- **Recommendations:**

1. The technical metrics of a replacement of the PSTN need to go beyond just a measurement of speed
2. Continue to focus awareness on the issues of quality of service and network reliability for broadband services, in addition to speed
3. Participation of industry and consumer groups, as well as additional research and innovation to develop new metrics for quality and reliability should be encouraged
4. The importance of the build out of next generation networks in support of public safety should be made clear at National, State and Local levels



After the PSTN: Non-carrier stranded assets (DRAFT)

- **Problem: What functions/services are dependent on the PSTN:**

–Non-carrier device adaption for IP will happen much faster if manufacturers know there is a date certain when they can no longer depend on PSTN. The schedule for transition also depends on the pace for broadband/cellular deployment.

- | | |
|---|--------------------------------|
| Universal Connectivity | E911 |
| Line Power, Battery Back-up, Ring Voltage | DTMF for Dialing, Transmission |
| Dial Tone | E.164 |
| Isochronous Communications Signaling (For Fax machines and other devices) | CALEA |
| Switched Circuit Features (class X switches) | GETS |
| | USF |

- **Findings**

- 1.The majority of these capabilities are already addressed by replacement technologies
- 2.Impact will be hardest in rural America
- 3.Clear advantages to accelerating the sunset of the PSTN?



After the PSTN: Non-carrier stranded assets (DRAFT)

- **Recommendations:**

1. Explore end dates for the PSTN.
2. Develop timeline to ensure smooth transition which addresses stranded assets
3. Assure that mobile and/or broadband replacements are available everywhere PSTN is currently provided. The need will be greatest in rural areas.
4. Update the National Broadband Plan to support the PSTN transition.
5. Change USF funding and spending to support universal coverage and other social goals.
6. Further Investigate emergency service impact to assure a suitable replacement capability.
7. Investigate incentive program for mediation device to bridge older devices w/o PSTN or towards purchasing new equipment (Consumer focused)



Regulatory impacts and changes required for the PSTN transition (DRAFT)

- **Problem/Opportunity Addressed:**

- Identify necessary regulatory changes to address the change in technology from the PSTN. Maintain or establish the least restrictive regulatory environment that still protects the public interest.

- **Findings**

1. Some regulations protect basic rights of citizens, such as: *Universal communications access for the disabled, the poor, and those in rural areas, Reliable access to emergency services, Consumer protection*
2. Some regulations are PSTN specific and should not be retained post transition
3. Standards created by organizations that govern public safety alarm systems (e.g. NFPA) and protect communications for industries critical to the nation's infrastructure (e.g. FISO) must be modified to account for regulatory changes in the communications sector.



Regulatory impacts and changes required for the PSTN transition (DRAFT)

1. Universal access to reliable emergency communications should continue to be guaranteed by regulation.
2. Access to communications for persons with disabilities should be guaranteed by modification of current regulations to acknowledge ubiquity of personal computers.
3. Consumer protections against misuse of the communications system should continue to be regulated with modifications to acknowledge the different landscape of communications.
4. Funding for PSAPs and Universal Service/Lifeline Assistance should be reformulated to cover all aspects of the future communications system.
5. Regulations that support the “regulated monopoly aspect” of the PSTN should be abandoned.
6. Two tiers of communications, services that meet regulations and those that do not, should be clearly explained to the consumer, who can then make an informed selection; regulations must make available highly reliable communications for critical industries.



TAC Discussion



Next Steps



Technological Advisory Council

IPv6 Working Group

29 June 2011



IPv6

- Driven by exhaust of IPv4 addressing scheme
 - Moves from 32 bit address to 128 bit address
- IPv6 standard (RFC) published 1998
- Last block of IPv4 addresses to regional registry on 2/11
 - First Regional Internet Registry (APNIC) depleted IPv4 4/11
- Delay or absence of IPv6 adoption will have impacts
 - Increase use of IPv4 address sharing
 - Security and legal
 - End user experience

IPv6 Transition Environment

Positives

- ISPs prepared to support initial IPv6 transition
- Awareness is increasing across industry regarding the transition to IPv6
 - Consumer electronic and retailer awareness IPv6 increasing
- World IPv6 day, a stress test, largely successful
 - Key participants included: content providers, large MSOs and telecom companies (Facebook, Google, Yahoo, Comcast)
 - “Corner Case” issues observed, very small % of participants had issues enabling Internet properties with IPv6
 - Heightened awareness
 - IPv6 usage increased and in some cases remained higher post World IPv6 Day
 - Next IPv6 global test opportunity possible 1H2012

IPv6 Transition Environment (continued)

- Negatives
 - More than simple address change
 - Affects features, security, technology, administration
 - IPv6 is not backwards compatible
 - Not an event but an evolution
 - Requirements, technology and user experience
 - Long transition expected although some “verticals” may move towards more of a transition (potential example machine-to-machine)
 - As with IPv4, most consumers are generally unaware of the need for IPv6

Evolution Path

- IPv6 perceived as net expense, producing expedient decisions
 - ISPs will use both dual stacks AND carrier grade NATs
 - Carrier Grade NATs will provide sub-standard experience and not support critical needs of specific verticals
 - Vendors will balance between non-IPv6 customer requirements and near-term IPv6 features
- Objectives not totally aligned between vendors, enterprises, ISPs, and consumers
- A degree of concern regarding increased Internet complexity
- Depletion of IPv4 in some regions will highlight the need for IPv6
 - May result in competitive advantage

Issues

- USGv6, DOD, Industry and other requirements driving vendor decisions
 - No single definition of IPv6 requirements at same point in time
 - Requirements may vary based on adopter and context (ISP versus enterprise)
- Uncertainty
 - Vendors: what gets built? When?
 - Users: many still assessing impact and investment plan
 - Increased risk perceived in new technology and transition complexity
- New entrants encumbered by lack of IPv4 addresses during transition
- No strategic plan encompassing technology evolution across sectors

TAC Concern

- An increasingly complex Internet will impact innovation
 - Unknown period of transition
- Internet is foundation of US innovation
 - Concern for long term competitiveness
- Goal should be to minimize period of complexity

TAC Objectives

- Benchmarking
 - Identify IPv6 preparedness and metrics across key Internet sectors
 - Define track-able measure of progress
 - Outline techniques that can be used to gather measurable data points
- Make recommendations to improve path of evolution

Benchmarking Metrics

- High level metrics to benchmark IPv6 transition activities
 - Consumer Electronics
 - Network
 - End-user
 - Application
 - Content
 - Services
 - Traffic Levels (IPv4 vs. IPv6)
- There is a relationship between the metrics
 - Delays or gaps in one are could have an overall impact to IPv6 transition

Consumer Electronics

- Home or SOHO router support for IPv6
 - Percent of devices support IPv6
 - Number of devices sold or deployed
- In-premise device support for IPv6
 - Internet-enabled TVs, tablets, game consoles
 - Percent of devices that support IPv6
 - Number of devices sold or deployed
- Operating system support for IPv6
 - Percent penetration per OS

Network

- IPv6 support by service provider
- IPv6 support by type of provider
 - Broadband
 - Wireless
 - Tier 1
- Number of ASNs that advertise support for IPv6
- Categorization of impediments to IPv6 adoption

End-User

- Support for IPv6 by end-user
 - By service provider
 - By type of service
 - Consumer electronics capabilities in the premise
- Intersection of these attributes will determine effective support for IPv6

Applications

- Support by application type
 - Browser, Email, others
 - Percent support by category
 - Percent support by popularity
- Intersects with traffic types
 - Support for IPv6 in applications will play into traffic types

Content and Services

- Support for content and services over IPv6
 - Government
 - Educational
 - Commercial
 - Not for profit
- Percent of content and service supporting IPv6 by category
- Percent of traffic that each category represents for all traffic

Traffic Levels

- Aggregate global and national Internet traffic volumes
 - IPv4 vs. IPv6
 - IPv6 total
- Per provider traffic levels

Potential Recommendations

- Government to be a catalyst for the IPv6 transition
 - Set date by when all government Internet properties must support IPv6 (September 2012?)
 - Ensure IPv6 is required by all government vendors and contractors
- Establish national objectives for IPv6 transition across sectors
 - Set timelines for government and industry objectives
 - Develop benchmarking information supporting the IPv6 transition
- Minimize the transition period
 - Increase awareness of objectives/issues
 - Sharing of information to support decision making
 - Foster collaboration among key stakeholders
- Government policies to support objectives/transition
 - Issues similar to other legacy transition issues

Next Steps

- Benchmarking Team
 - Vet benchmarking measures with key industry and government groups and finalize
 - Identify owner of on-going benchmarking activities
- Recommendations/Guidelines
 - Agree with key government groups on lead versus support groups for potential recommendations on IPv6

Technological Advisory Council

Sharing Working Group

29 June 2011



Charter

The purpose of the Sharing Working Group is to identify steps the FCC might take to promote near term private investment and job creation based on sharing techniques, including sharing of spectrum, facilities, or other techniques as the working group may find appropriate.



Statement of Work - Focus Topics

- Spectrum Efficiency Metrics
- Receiver Standards
- Commercial Wireless Applications
- Hybrid Systems
- Emerging Technology Promotion / Deployment
- Additional Topics to be Identified by the Working Group



Working Group Members

- Peter Bloom
- John Chapin
- Richard Currier
- Brian Daly
- Dick Green
- Dale Hatfield
- Ari Juels
- Geoffrey Mendenhall
- Dan Reed
- Jesse Russell
- Paul Steinberg
- John Leibovitz
- Julie Knapp
- Tom Wheeler
- Walter Johnston
- Chris Lewis
- Dennis Roberson



Ideas for Consideration

1. Develop Spectrum Efficiency Metrics
2. Encourage Receiver Standards
3. Create Spectrum Sharing Taxonomy
4. Accelerate Small Cell Deployments and Spectrum Sharing - especially Indoors
5. Remove Application Friction Points



Idea #1: Spectrum Efficiency

Status – Longer Term Opportunity

Problem

- Spectrum efficiencies achieved by wireless systems of all types must improve if the Nation is to accommodate rapidly increasing demand and stimulate job growth
- There is no single measure of spectrum efficiency that can be applied across all services

Proposed Idea

- Metrics can (and have been) developed that allow efficiency comparisons to be made **between similar types of systems which provide similar services**. (e.g., bps/Hz/km² for personal communications systems)
- Our initial taxonomy of similar systems: Broadcast, Personal Communications, Point-to-point directional, Radar, and Satellite.
- The metrics should stimulate **technical efficiency** - the inherent efficiency of the modulation schemes etc., and **operational efficiency** - the efficiencies achieved through the practices of service providers and users (e.g., through dynamic loading/sharing)



Idea #1: Spectrum Efficiency

Progress

- Identified initial classes and prepared a draft white paper describing our initial categories and related metrics and discussing the challenges associated with the development and the usage of both the categories (and sub-categories) and the associated metrics.
- Determined that our focus needs to be on the system level challenge of spectrum efficiency rather than a transmitter based focus.

Economic Impact

- Jobs will be created immediately to design, manufacture, and deploy more efficient technologies and over the longer term as a natural consequence of the economic expansion from more efficient spectrum use

Next Steps

- Plan to integrate Ideas 2 into Idea 1 to form a systems level efficiency view
- Engage the academic / business community to vet the category and metric definitions – report on progress at next TAC meeting
- Once vetted, product / service providers to be recognized for leadership and encouraged to demonstrate progress against the metrics
- Commission may wish to coordinate with NTIA / other government agencies to encourage research into advanced methods for improved efficiency and positive incentives to encourage efficiency¹

Note 1: See http://www.ntia.doc.gov/advisory/spectrum/csmac_reports.html for NTIA work in this area.



Idea #2 – Receiver “Standards”

Status – Longer Term Opportunity

Problem

- Receivers have become one of the critical limiting factor in optimizing and thereby increasing the use of the spectrum
- Reduced availability of spectrum in turn reduces the opportunity to deploy new wireless application thereby reducing economic deployment opportunities

Proposed Idea

- Identify all receiver related spectrum usage challenges through delivery of a study
- Initiation a “Living Document” that establishes the best practices for ever improving receiver specifications, particularly in spectrum selectivity, sensitivity and linearity while addressing economic and form factor feasibility



Idea #2 – Receiver Standards

Progress

- Identified a list of the most significant receiver related issues that have occurred over the past twenty years or so
- Analyzing the list to glean the understanding that can be obtained that is applicable to refining our future efforts within the Commission to reduce the impact of this class of problems

Economic Impact - Action should stimulate the creation of high paying jobs

- Research and development on receivers meeting the ever improving specifications
- Deployment resources needed for replacement of out-dated and highly inefficient receiver equipment
- Enhanced spectrum utilization will free up more spectrum allowing new wireless application to be more rapidly deployed

Next Steps

- Proposed receiver impact study underway to determine the scale of the opportunities, the depth of the challenge and the targets for initial actions
- Integrating Ideas 2 into Idea 1 to form a systems level efficiency view
- Actionable Progress Report to be provided at the next TAC meeting



Idea #3: Spectrum Sharing Taxonomy

Status – Long Term Opportunity

Problem

- More spectrum sharing will be needed to meet the Administration and FCC goal of finding 500 MHz for Broadband
- Sharing of allocations typically reflects incremental decisions, not an overall strategy

Proposed Idea

- Create a “sharing taxonomy” that identifies successful examples of sharing and proposes co-existence opportunities



Idea #3: Spectrum Sharing Taxonomy

Progress

- An initial spreadsheet has been created that indicates both the existing spectrum sharing / co-allocation bands and the means by which the sharing is accomplished
- Vetting of this initial taxonomy is underway and the analysis of this data to develop guidance for future sharing efforts has been initiated

Economic Impact

- Enabling more efficient sharing across a wider set of spectral bands should accelerate and expand the mobile broadband ecosystem, creating jobs in the development and deployment of new and enhanced networks and in the deployment of new devices and services at the edge of the network

Next Steps

- The taxonomy of existing spectrum co-allocations is being circulated at this TAC meeting with a goal of having feedback from the TAC membership in time for us to have a v. 1.0 document released by the next TAC meeting
- Stage II of this effort will include:
 - Examination of opportunities to enhance services to enable sharing
 - Creation of a distilled patterns to a matrix and put out for public comment



Idea #4: Encourage Small Cell Deployment

Status – Near Term Opportunity - existing spectrum; Mid- to Longer-Term Opportunity where new spectrum development is required

Problem

- How to accelerate deployment of fast, reliable integrated narrowband / broadband wireless solutions (e.g. Femtocells, PicoCells, NanoCells, Wi-Fi, DAS, etc.) to meet the breadth of demand for broadband services within high teledensity areas and to support new approaches of offloading high use spectrum (e.g. Wide Area Cellular Networks)
- Challenges include siting, interference, QoS, incentives to deploy new small cell networks and the sharing of existing / new backhaul infrastructure

Proposed Ideas

- Explore mechanisms, working with federal agencies, to expedite siting requests within federal lands and buildings
- Provide spectrum assignment/allocation for carriers, premise owners, and/or third party entities to install and operate in-building networks, including “provider agnostic” infrastructure



Idea #4: Encourage Small Cell Deployment

Progress

- Outreach to some stakeholder groups (e.g., premises owners, carriers, users)
- Development of strawman view of potential benefits, enablers, and roadblocks to inform FCC-hosted workshop
- FCC staff outreach to GSA regarding access to federal siting

Economic Impact

- Creation of a large number of high-paying jobs for design, installation, and operation of systems (e.g. in-building, in high traffic venues)
 - Over 2 million commercial buildings >5k Sq Ft in the U.S. (~ 60 million workers)
- Creates a more ubiquitous mobile network with scalable bandwidth and capability (e.g., improved indoor location accuracy and smart grid energy management services) sufficient to engender a new realm of application development.

Next Steps

- Follow up with GSA / federal agencies to understand deployment issues
- Define siting issues / recommendations associated with various small cell options
- Convene forum in September to align stakeholder groups around opportunity and identify specific actions for consideration by TAC at next meeting



Idea #5- Reducing Application Friction Points

Status – Longer Term Opportunity

Problem

- Friction Points are inhibitors to enabling public and private applications to be developed and deployed on wireless carrier networks. Public and private applications include:
 - Utilities (electric, gas, water, ...)
 - Enterprise (education, energy/natural resources, healthcare, manufacturing, professional & consumer services, retail/hospitality, telecom/media, transportation/logistics, wholesale ...)
 - Public Safety (police, fire, emergency services, ...)

Proposed Idea

- Reduce / Eliminate barriers for various applications and usages in a realistic and cost-effective manner: Privacy, Security, Robustness, Geographic Coverage, Survivability & Disaster Recovery, Certification.



Idea #5- Reducing Application Friction Points

Progress

- Obtaining current processes for qualifying system level applications on cellular carrier networks.
- Identified specific industry and government target groups to assess their specific friction points.

Economic Impact

- Reduction of Friction should engendering Innovation, Economic Development and significant Job Creation, as well as improving service delivery

Next Steps

- Convene action oriented FCC Sponsored Workshop (in conjunction with Small Cell Workshop) in September with the following constituencies involved:
 - Wireless carriers (including satellite), government users (national, state and local), service providers, energy companies, healthcare providers, investors, wireless entrepreneurs and academics in the space
- Share the current (carrier) state of application development/certification and generate Application Challenges and Opportunities through meeting
- Make specific recommendations at the next TAC Meeting



Summary and Conclusions

- The Working Group met on numerous occasions since the last meeting as a full group and as “Idea” based sub-groups refining and making progress on the five Ideas generated prior to the last TAC meeting ultimately refining the focus to four “Ideas” – Spectrum Efficiency, Spectrum Sharing, Small Cell and Friction Reduction.
- The Working Group members are now looking forward to the feedback of the full TAC and the FCC team on the various deliverables created for the first two Ideas
- The Working Group is anxious to complete the actions outlined above to move the Ideas to actions that create jobs, improve the utilization of our nation’s spectrum resource and enhances the well-being of our citizens



Technological Advisory Council

Broadband Deployment Working Group

June 29, 2011



State and Local Permitting Process

Problem

- Inconsistent state and local municipality permitting processes and policies result in uncertainty, discouraging and/or delaying investment.

Proposed Idea

- FCC-sponsored education and communication with state and local municipalities to incent support for investment and deployment of broadband.

Next Steps

- Encourage collaboration to identify tools to assist municipalities in identification and implementation of best practices.
- Convene workshops to sensitize state and local municipalities to the positive benefit of acceleration.
- Identify and publish best practices for permit requirements and processing



Building Ingress

Problem

- Building management policies that are inconsistent and restrictive cause broadband deployment delays and increased costs.

Proposed Idea

- FCC-sponsored education and communication with private land and building owners.
 - Focus on impact to broadband deployment and investment growth and benefits to private owners.
 - Identify best practices for egress.

Next Steps

- Brochure developed by the FCC highlighting the benefits of broadband deployment in private buildings.
- Identify best practices and create a common tool to educate building owners.



Definition of Middle Mile Provider*

Problem

- Some pole attachment and franchise agreements do not allow middle-mile, transport-only providers to obtain franchises and usage of Pole Attachments and Rights-of-Way agreements.
- High cost of middle-mile broadband transport in some areas.
- The USA has the lowest cost of Internet bandwidth in the world until middle mile costs are added.

Proposed Ideas

- FCC should consider a new definition of a carrier-neutral, middle-mile provider to aid with establishing easements and rights of way and determine what (if any) obligations apply to this new class of provider.

** This topic is under discussion within the Working Group*

