Topic: Availability
What is the current availability of high-speed internet access in Tennessee from all technologies, including but not limited to landline technologies, such as DSL, ADSL, Cable, Private Line, GPON, and fiber-based service as well as wireless technologies such as mobile broadband, fixed wireless, Wi-Fi and satellite?

- Maps of each development district in Tennessee showing coverage reported by providers to the FCC as of December 2015 and population density are attached
- Maps only show coverage reported by fixed, terrestrial broadband providers; they exclude coverage reported by providers of satellite broadband and mobile broadband
- Maps likely overstate extent of this coverage: Maximum speed reported for each block may only be available to a single address in the block, but the FCC still lists the entire block as covered at that speed

Are there gaps in the availability of broadband?

Fixed Broadband

- Less than 7% live in census blocks where no provider reports offering fixed access to at least 10 megabits per second download and 1 megabit per second upload (as of December 2015)
- 11% live in census blocks where no provider reports offering fixed access to at least 25 megabits per second download and 3 megabits per second upload (as of December 2015)
- Tennessee is the 29th most connected state based on the 25/3 standard (2016 FCC Broadband Progress Report)

Compared to National Averages for Access to Higher Speed Fixed Broadband

- 17% of Tennesseans live in census blocks where no provider reports offering fixed broadband of at least 100 megabits per second download and upload; nationally more than 35% live in census blocks where no provider reports offering 100/100 (ECD 2016)
- A little over 82% of Tennesseans live in census blocks where no provider reports offering at least one gigabit per second download and upload; nationally more than 92% live in census blocks where no provider reports offering gigabit service (ECD 2016)

Mobile Broadband

- Less than 1% of Tennesseans live in a Census block where no provider reported offering mobile wireless broadband of at least 4G (as of December 2015)

If so, are these in rural or urban areas?

Gaps for fixed broadband are larger in rural areas but gaps do exist in urban areas

- Urban: 2% of Tennessee's urban residents live in census blocks where no provider reports offering fixed broadband at 25/3 definition (FCC 2016)
- Rural: 34% of Tennessee's rural residents live in census blocks where no provider reports

offering fixed broadband at 25/3 definition (FCC 2016)

- Note: FCC uses the US Census Bureau's 2010 definition of urban and rural areas

Less competition among providers in rural areas

- Urban: 56% of urban Americans lack access to more than one provider at 25/3 definition (ECD 2016)
- Rural: 87% of rural Americans lack access to more than one provider at 25/3 definition (ECD 2016)
- Speeds tend to be higher in areas with more than one provider (ECD 2016)
- Relationship between price and competition isn't straightforward
- ECD found that price does not vary greatly based on the number of providers (ECD 2016). But, anecdotally, providers do reduce their prices in communities with more competition, e.g. providers in several cities have dropped their prices to match Google Fiber's after Google announced it would begin offering service there

Traditionally, high-speed broadband has been readily available for business, industries and schools. Is that still the case?

Business and Industry

- Anecdotally, large businesses and industries don't have difficulty obtaining access according to economic development professionals, but obtaining access can be expensive in some areas
- Small businesses tend to subscribe to mass-market broadband plans, the availability of which correlates with the coverage gaps mentioned above (FCC 2016)

Other anecdotes suggest that businesses have problems obtaining affordable access in hard to reach unserved areas—e.g. reasonably well-publicized (Chattanooga Times-Free Press; Fortune) experience of John Thornton, a developer building a residential

- community in Marion County, who spent more than $400,000 to get a broadband connection from the North Alabama Electric Cooperative to his mountaintop development after being quoted a build-out price of $1.3 million by other providers

Don't have availability data specifically for businesses and industry

Download speeds:

- 69% of businesses responding to ECD's survey have connections slower than 25 megabits per second download
- 36% have connections slower than 10 megabits per second download

Upload speeds: Usually more important for businesses than residential customers

- 42% of businesses responding to ECD's survey have connections slower than 3 megabits per second upload
- 17% have slower than 1 megabits per second upload

Availability for businesses is worse in at-risk and distressed counties

Download speeds:

- 79% of businesses responding to ECD's survey in counties designated as "at-risk" have connections slower than - 25 megabits per second download; 54% have slower than 10 megabits per second
- 81% of businesses responding to ECD's survey in counties designated as "distressed" have connections slower than 25 megabits per second download; 52% have slower than 10 megabits per second

Upload speeds:

- 61% have slower than 3 megabits per second upload in "at risk" counties; 50.2% have slower than 1.5 megabits per second
- 69% have slower than 3 megabits per second upload in "distressed" counties; 48% have slower than 1.5 megabits per second

Schools

- 96% of Tennessee's public schools have broadband according to the Tennessee Department of Education. Schools have access to subsidies through the FCC's E-Rate program, and they rely on these subsidies to make broadband affordable according to the DOE.
- All public colleges and universities, including all community colleges and colleges of applied technology (TCAT) as well as four-year institutions, are connected via the NetTN network (state contracts with AT&T which owns and operates network)

Libraries

- 72% of libraries in Tennessee's nine regional library systems (does not include major urbans) have access to download speeds of at least 100 megabits per second, though fewer than 10% actually subscribe to those speeds according to survey by staff at the state library and archives
- Reasons libraries that have access have not adopted 100 megabits per second service according to state library and archives survey
  - Too expensive even with E-Rate (50%)
  - Receive current service for free (13%)
  - Library shares connection with other entities (local government) and not in control of service chosen or otherwise impeded by local government (11%)
  - Existing contract for service (3%)
- Note: All other libraries that had access but hadn't adopted 100 megabits per second service in 2015 said they have submitted requests to increase to 100 megabits per second for 2016 (22%)

- Libraries also have access to subsidies through the FCC's E-Rate program, and they rely on these subsidies to make broadband affordable according to representatives from the state library and archives.

What about residential consumers?

See general data on availability in response to second and third questions above.

Note: FCC reports availability based on maximum advertised speed at the census block level; if even one address in a census block has access to a speed the FCC reports the entire block as having access to that speed

What are the various broadband target speeds discussed by the FCC? What speeds are required to run typical residential and business applications, such as email, web surfing and video streaming?

FCC target speeds

- FCC adopted 25 megabits per second download and 3 megabits per second upload (25/3) as definition for broadband in February 2015 (FCC 2015)
- FCC standard for receiving funding through programs like the Connect America Fund and Lifeline is 10 megabits per second download and 1 megabit per second upload (10/1)
- Previous FCC definition was 4 megabits per second download and 1 megabit per second upload (4/1) adopted in 2010 (FCC 2015)

Speeds required for different applications

Note: Speed guidelines below are for a single user performing a single task; multitasking or sharing a connection among multiple users requires higher speeds

- Basic emailing or web surfing can be done with less than 10 megabits per second according to presentation by Victor Hazlewood and Anthony Mezzacappa from UT-JICS

- Streaming video to watch lectures can require between 3 and 10 megabits per second download (especially if high-definition video is necessary); common streaming services like Amazon Prime and Netflix recommend minimum download speeds in this range.

- The State's Office of Strategic Technology Solutions recommends that state employees working outside the office have a minimum connection speed of 6 megabits per second and that this minimum could increase to 10 megabits per second if the connection is shared with other users.

- Transferring large files (e.g. medical images), backing up computer servers in an office, or transferring large data sets or health records in a reasonable amount of time can require one gigabit per second (a gigabit is a thousand megabits) download and upload or more depending on the size and number of files.

What role does broadband play in decisions by businesses to locate or expand in Tennessee?

Economic development professionals interviewed said that broadband availability is necessary but not sufficient for recruiting large businesses; i.e., sites without broadband access are removed from consideration, but access alone does not guarantee selection.

ECD's survey results for businesses in Tennessee

- 34% of businesses responding to survey said broadband was essential to selecting their location
- 56% said it is essential to remaining in their location
- 16% of economic development agencies said businesses frequently choose not to locate in their communities because of insufficient broadband
- An additional 28% of economic development agencies said businesses occasionally choose not to locate in their communities because of insufficient internet
- ECD's consultants found stronger correlation between internet use and upload speeds than download speeds for businesses
- 43% of net new jobs were attributed to broadband by businesses surveyed by ECD
- 66% of revenue generated through broadband according to businesses surveyed by ECD
- 3.6% cost savings attributed to internet use by businesses surveyed by ECD
- 77% of businesses said broadband is very important to making operations easier
- 74% said broadband is very important to improving service to customers
- 71% said broadband is very important to reaching new customers
- 70% said broadband is very important to increasing their revenues
- 62% said broadband is very important to lowering their operating costs
- 61% said broadband is very important to keeping pace with competitors
- 47% said broadband is very important to improving staff skills

Topic: Adoption

What percentage of Tennessee households, where broadband is already deployed, currently subscribe to high-speed internet access in Tennessee?

FCC (2016 Broadband Progress Report) data

- 40% of Tennesseans have adopted service that meets 25/3 standard
- National average is 37%
- Tied for 19th out of 45 states reporting adoption data
- Note on other states in the region: VA (53%) is 5th, WV (46%) is 10th, GA (35%) is 26th, MO (27%) is 31st, MS (26%) is 32nd, AL (25%) is 35th, AR (24%) is 37th, SC (23%) is 39th, NC (16%) is 40th, and KY (8%) is 43rd

ECD survey results

- 24% have connections with at least 25 megabits per second download according to speed tests collected as part of ECD's survey; 42% have at least 3 megabits per second upload
- 47% have connections with at least 10 megabits per second download; 68% have at least 1 megabits per second upload

Will increasing subscription rates (adoption) change the business model to encourage more private-sector deployment of broadband?

- Higher subscription rates could allow private providers to make a business case for expanding to areas that are currently unserved or underserved according to the Tennessee Telecommunications Association
- Population density in rural areas has been cited as a barrier to expanding coverage both by the Tennessee Telecommunications Association and by the Tennessee Electric Cooperative Association

What reasons do Tennessee residents give for choosing not to subscribe where high-speed broadband service is available?

ECD survey—reasons businesses with access don't adopt

- Security concerns—48% very important; 27% somewhat important
- Privacy concerns—36% very important; 25% somewhat important
- Cost too high—20% very important; 26% somewhat important
- Products not suitable for internet sales—16% very important; 18% somewhat important
- Uncertain about benefits—9% very important; 18% somewhat important

ECD survey—reasons residents with access don't adopt

- Connection speed or reliability—68% very important; 20% somewhat important
- Privacy concerns—41% very important; 31% somewhat important
- Uncertain about benefits—9% very important; 16% somewhat important
- Lack skills—8% very important; 11% somewhat important
- 81% of Tennessee households with incomes below $30,000 surveyed by ECD said affordability of service was major concern when selecting internet service provider

2015 nationwide Pew survey (reasons for not adopting fixed connections at home)

- Cost of subscription too high—33% cited as most important reason
- Smartphone (mobile connection) meets all needs—12%
- Cost of computer too high—10%
- Have other options outside home—10%
- Some other reason—16%

Note: Pre-worded answers did not include "privacy/security concerns," "don't see relevance," or "lack skills" as options; authors do not report how many volunteered these reasons specifically

2013 nationwide Pew survey (reasons adults don't use internet)

- Don't see relevance—34% cited as main reason
- Usability—29% (not including security concerns)
- Lack computer—13%
- Cost of subscription too high—6%
- Security concerns—3%

Are there programs in Tennessee and elsewhere today that encourage the adoption of broadband? Which are most successful?

Note: See section below on broadband discounts for information on programs that encourage adoption by providing discounted service, for example
Federal subsidy programs, including E-Rate, Rural Healthcare Program, and Lifeline
Discount programs offered by private providers, including Comcast, AT&T, and Century Link

2012 FCC low-income pilot studies

- Focus on overcoming barriers related to cost, relevance, and digital literacy
- 14 different programs in 21 states and Puerto Rico (pilot did not include Tennessee)
- Programs typically offered service subsidies, device subsidies, digital literacy training, or some combination thereof
- Success measured by how many consumers signed up for plans
- Service subsidies and device subsidies appear to have greater effect on adoption than digital literacy training offered by broadband providers
- According to executive summary of pilot program: "Requiring [broadband providers] to offer or provide digital literacy training does not appear to be an efficient or effective model for converting non-adopters to adopters. Participating consumers generally had little interest in training provided by the broadband providers. This raises the question of whether other organizations specializing in digital literacy training may be more successful at such training."

Many adoption programs are local

Local libraries

- Often offer digital literacy training
- 18 (such as Spring Hill, Tennessee) have started lending wireless hotspots to patrons that can be used to access the internet through mobile broadband networks

Nashville and Memphis are participating in US Housing and Urban Development's ConnectHome pilot program in which local governments partner with existing providers to offer families with school-age children in public housing free digital literacy training, internet connections, and devices.

- Results: Programs are one year old, no information on increases in adoption

- Note: ConnectHome treated as local because
  - HUD provides no funding and
  - each community chosen to participate is allowed to develop its own program
    - Memphis partnering with T-Mobile for mobile wireless devices and coverage
    - Nashville partnering with Comcast and Google Fiber for fixed wireline coverage and devices
  - HUD provides limited technical assistance

Nashville's Digital Inclusion Fund similarly is a partnership between providers, metro government, and local non-profits to offer public school students access to training, home internet connections, and devices.

- Results: Program one year old; no information on increases in adoption

Chattanooga's Tech Goes Home Program, 2015

- Modeled after Tech Goes Home program that started in Boston, Massachusetts
  - Tech Goes Home is an initiative developed by Open Air Boston, a non-profit that helps
- Participants who complete 15 hours of digital literacy training have option to purchase laptop for $50 and receive assistance obtaining discounted broadband service
- Programs
  - School: Conducted by trained staff member of child's school - includes tracking student performance, obtaining an email address, finding web-based family resources
  - Early Childhood: Trains parents, caregivers, and preschools to make targeted use of mobile technology to prepare children for kindergarten
  - Community: Conducted by trained staff member of community organization at which training is run - includes finding jobs, obtaining an email address, discovering web-based city resources; Courses run at libraries, community centers, public housing among other locations
- Results: As of October 2015 had helped 140 people (99 families) get access to technology and computer skills
- 2015 funding
  - $210,000 from city of Chattanooga
  - $110,000 from Hamilton County
  - Enterprise Center has also raised $440,000 of the program's $540,000 annual budget
- Partner with Everyoneon.org to provide low-cost options for home broadband access
  - Everyoneon.org is a national non-profit that works with broadband providers and device refurbishers to offer low-cost service and devices

Examples of programs in other states (programs reporting information on resulting adoption listed first; others report number of participants but don't provide information on adoption)

NC Linking Internet to Economically Underprivileged People (LITE-UP) pilot program (January 2013 through August 2014)

- Tested effect of consumer discounts and digital literacy training on adoption
- 179 low-income households were randomly assigned to receive (1) no discount, (2) 50% discount, or (3) 100% discount
- Within each discount group households were either (A) offered two three-hour digital literacy training courses or (B) not offered training
- All participants received free desktop computer, free technical assistance, and had all installation fees for internet service waived regardless of whether they were to receive a service plan discount
- Funded by grant from National Telecommunications and Information Administration
- Results
  - Before program only 13% of participants had computer at home and only 4% had broadband access (though not necessarily at home)
  - "Computers or some form of access device, may be the first and most important investment in broadband adoption. Providing a home computer and helping establish home Internet access appears to have had more impact than subsidies and/or digital literacy training. Computers were the leading enticement for participation (76%), followed by Internet access (54%) and digital literacy training (39%). The value of the computer is also reflected in the fact that 87 percent of households still had a functioning computer 15 months after the project began."
  - "85 percent of households invited to the project signed up for Internet and 71 percent continued the service post project without subsidy. "Cost" was the primary reason cited for not retaining service."
    - Whether participant was initially offered a discount on internet service did not have statistically significant effect on whether they signed up for or still had internet service
    - Participants offered digital literacy training were statistically less likely to sign up for service in the beginning but offer of training did not affect whether participants still had service
  - "At the project's end, subsidy level and being offered training affected the perceived value of having a computer in the home–the greater the subsidy received and being offered training resulted in increasing levels of importance given to having a home computer. Three months post-project, training was the only variable positively associated with a heightened perceived value of having a computer and the association was stronger for participants from the urban county."

  - "Although training enhances the perceived value of computers and Internet access, it is not a compelling attraction before the fact as only 38 percent of participants offered training attended at least one class."

- Conclusion
  - "Cost is a critical impediment and even partial subsidies can be an effective tool for increasing broadband adoption by low-income households. That said, subsidies alone are not sufficient."
  - "Service activation costs were covered for all participants who signed up for Internet, so that even households that were assigned to the zero-percent subsidy cells were, in fact, subsidized for the activation costs. Existing discount programs offered by providers generally do not waive activation fees. Programs targeting lower-income households need to address barrier costs to enable adoption."
  - Size of discount did not matter—adoption rates similar between those that received 0%, 50%, and 100% discounts
  - 100% of those who did not plan to keep service after program ended or who did not know if they would cited cost as a reason; the next most cited reason was that they could use the internet somewhere else (14%)

<u>PowerMyLearning (formerly Computers For Youth (CFY); partnerships with Los Angeles, Atlanta, San Francisco and New York City public schools)</u>

- Focus on access to devices, digital literacy training, and subsidized service
- Participating families take 4-hour digital literacy course that focuses on computer and internet skills and the benefits of broadband for education
- Receive free desktop with 30 education-related software programs installed
- 24/7 tech support
- Can apply for subsidized service
- Results for program in New York City
  - benefited from $22 million grant in ARRA funding from Broadband Technology Opportunities Program
  - From 2010-11 and 2011-12 surveys of participants found that 93% had adopted broadband within three months of entering program compared with 50% prior to entering program
  - 7,500 families adopt broadband that hadn't had it before
  - Cost reported between $400 and $700 per student depending on hardware and software donations

<u>New York City (NYC) partnership with providers</u>

- Focus on access to subsidized service

- NYC Department of Information Technology and Telecommunications and non-profit partners negotiated discounts with providers
- Online system for low-income families can apply for subsidized service
- Results: 8,000 families subscribe

Chicago partnership with Local Initiative Support Corporation

- Focus on relevance through building awareness by developing advertising that highlights
- Target low-income residents of five city neighborhoods
- Results: 32,000 households citywide obtained subscriptions
  - 15% higher in target neighborhoods than similarly situated neighborhoods

Every Citizen Online (Ohio)

- Provided free computer training at libraries and other community institutions throughout state
- Taught participants how to access and best use the internet
  - 6 hours of intro material:
    - 2 hours of basic introduction to computers
    - 2 hours of introduction to internet
    - 2 hours of tools and benefits of using internet
- Mission was to create sustainable broadband adoption
- Trained library staff and others from community colleges and workforce development centers to provide guided training sessions for community
- BTOP funding from 2011-2013; no longer have expert-led training in public libraries etc. but still supports self-guided training through driveyourlearning.org, a subsidiary of Connected Nation
- Also provided participants with offers from service providers including
  - free internet service installation
  - low cost computers
  - subsidized monthly service
- Results (as of 2013)
  - worked with 281 libraries and community institutions;
  - distributed 1,177 computers;
  - 20,338 completed training;
  - estimate 3,087 new household subscribers many are elderly or low-income;
  - 64% of survey respondents who participated in training said they would subscribe to broadband within next year

Illinois Lifeline Pilot

- Studied whether digital literacy training affected adoption
- All participants received:
  - $60 credit toward internet installation fees

  - $30 monthly discount on internet service
  - option to purchase refurbished desktop at a discount from Computer Banc, a non-profit United Way member agency located in Illinois that provides discounted computers to at-risk populations priced at cost

- 153 total participants
  - 63 were offered free digital literacy training and
  - 90 were not

  Participants
  - 96% earned less than $30,000 per year
  - 73% of participants had never had home broadband before
    - 50% said they didn't have broadband before because it was too expensive
    - 34% said they didn't have home broadband before because they either didn't use the internet (7%), were uncomfortable with it (5%), or didn't know how to use it (22%)
  - Of those who had home broadband at one time before the program, 78% cancelled it because it cost too much
- Results
  - 66% of all subscribers still retained service two months after the program's discounts ended whether they received digital literacy training or not
  - 15% discontinued service immediately when discount ended and an additional 6% cancelled within two months of discount ending
  - 75% of those who took advantage of digital literacy training retained service two months after program ended
    - But cannot conclude that training resulted in higher rates of retention because sample size too small
    - Of 63 participants offered training only 16 took advantage of it

<u>Tech Goes Home (Boston, MA, initially, since expanded to Las Cruces, NM; Litchfield, CT; New Orleans, LA; and Chattanooga, TN)</u>

- Initiative of Open Air Boston, a non-profit that helps low-income and under-served populations have full access to the internet
- Programs designed for schools, communities, and small businesses
- Run through schools, libraries, community centers, public housing developments, local economic development organizations
- Participants receive
  - 15 hours of targeted digital literacy training
    - Schools: includes tracking student performance, obtaining an email address, finding web-based family resources

    - Community: includes finding jobs, obtaining an email address, discovering web-based city resources
    - Small Business: includes using city resources for licensing and permitting, managing finances, expanding customer base, managing online purchases
  - option to purchase new device for $50 upon completion of training
    help finding low-cost internet options upon completion of training

- 75% of participants have household incomes under $25,000 per year
- 20,000 people have been trained since 2010
- Results: 90% of participants reported having home internet after training according surveys conducted one year after participation compared with 66% who had home internet access before training

Connect Arkansas

- Trained 2,100 students from 144 high schools to leverage the internet to support entrepreneurial activities
  - Results: No data on resulting number of broadband adopters
- Collaborated with University of Arkansas for Medical Sciences to provide a broadband-based health awareness campaign and train 4,000 health professionals
- Funded by federal Broadband Technology Opportunities Program grant as part of American Recovery and Reinvestment Act (ARRA)

California Connects

- Provided digital literacy training to over 18,000 Californians who did not have access to the internet
- Partnered with community colleges to equip over 5,800 students in the Math, Engineering, and Science Achievement program with laptops and training to serve as community trainers for their families and neighbors
- Results: No data on resulting number of broadband adopters
- Funded by $10.9 million grant from Broadband Technology Opportunities Program as part of ARRA

Colorado State Libraries

- Funded construction or improvement of public computer centers at libraries (also in a museum, town hall, general store, and other locations in communities without libraries) in 88 high-need urban and rural communities in the state
- Funded purchase of 1,293 computer devices, including 681 laptops, 59 tablets, 487 desktops, 66 Americans with Disability Act compliant stations, and other equipment for training and public use
- 60% of computer training classes offered by library staff were about internet use

- Results: No data on resulting number of broadband adopters
- Funded by combination of Broadband Technology Opportunities Program grants and private foundation grants

University of Wisconsin Extension Service

- Focus on relevance through building awareness by disseminating information about state residents whose lives changed because of access to broadband (e.g., able to work remotely, take graduate classes, or run small business)
- Produce
  - 8- to 11-minute in-depth case studies,
  - 30-second television commercials, and
  - 3-minute testimonial interviews
- Extension service website also has repository of resources for communities interested in expanding coverage and adoption
- Results: No data on resulting number of broadband adopters

Digital Charlotte (North Carolina)

- Focused on educating low-income residents about the benefits of broadband and how to use broadband effectively
- Recruited and trained "ambassadors" for low-income neighborhoods to educate their neighbors
- Approximately two dozen workshops since 2012 have trained 350-400 people
- Annual conference on bridging digital divide in Charlotte
- Knight School of Communication at Queens University established and funded program
- Results: No data on resulting number of broadband adopters

Mississippi State University Extension Service—Extension Broadband Education and Adoption Team

- State level advisory council with six regional coordinators "whose focus is to address broadband issues that align with the unique capabilities and challenges of each of multi-county region in which they operate in the state."
- There are six regional broadband coordinators stationed across the state at county Extension offices and Research and Extension Centers. These dedicated individuals will assemble teams of civic, business, elected leaders, and others in each of their counties to work together toward improving the access to and use of broadband in their areas. Each community is different, so they will tailor solutions from the state's broadband plan in a way that best fits the needs of the local population.

- "delivered (face to face and online) several educational programs that showcase these important resources, such as Internet 101, Facebook 101, Twitter 101, Small Business Internet Uses and Apps, finding resources online, technology at your fingertips, location-based services (Google Map & Yelp)."

- Trainings offered in partnerships with local anchor institutions, in particular libraries
- Focused on
  - Assess broadband access and use
  - Create and facilitate local/regional planning teams
  - Host local/regional roundtable meetings
  - Deliver education and provide planning assistance to target groups
  - Develop and implement an evaluation plan to measure success
- Funded through grant from National Telecommunications and Information Administration
- 3,200 participants
- Results: No data on resulting number of broadband adopters

What are recommended ways Tennessee can increase digital literacy and adoption of existing broadband service?

- NC LITE-UP found that offering free devices and service installation in combination with service subsidies and digital literacy training encouraged initial adoption and long term retention of broadband service

- 2012 FCC low-income pilot program found that service subsidies and device subsidies were more effective at encouraging adoption than digital literacy training programs offered by broadband providers

  - Note: pilot programs did not test whether all digital literacy training was ineffective; rather the programs found that training offered by broadband providers was ineffective

  - According to executive summary: "Requiring broadband providers to offer or provide digital literacy training does not appear to be an efficient or effective model for converting non-adopters to adopters. Participating consumers generally had little interest in training provided by the broadband providers. This raises the question of whether other organizations specializing in digital literacy training may be more successful at such training."

- Tech Goes Home (Boston) found that offering digital literacy training and providing those who completed the training with a discounted device and service options increased adoption

- Nashville and Memphis programs also require digital literacy training as a condition for receiving free device and subsidized service

- Many public libraries in Tennessee already offer digital literacy training
  - Nashville Public Library and its branches offers classes on how to use the Internet to
    - find your next job, home, or apartment,
    - keep in touch with loved ones, and
    - access government services.
  - Offering regular digital literacy training is included among guidelines developed by the Tennessee State Library and Archives for non-metropolitan libraries

Partner with other existing non-profits

Everyoneon.org

- Operates in parts of 48 states, including Tennessee, and District of Columbia
- Partners with broadband providers and device refurbishers to offer low-cost broadband access and low-cost devices
  - Eligibility for low-cost broadband varies by provider
  - Eligibility for low-cost devices
    - Child in National School Lunch Program,
    - Belong to community organization that has been preapproved as a Community Partner, or
    - Live in zip code where median income is below $35,000
  - Broadband service meets following requirements
    - 5 megabits per second download and 1 megabit per second up
    - Monthly data cap - Wireless: 3 Gigabytes
    - Monthly data cap - Wired: 100 Gigabytes
    - Cost: $10-$25 per month, no overage charges
    - Equipment fees: Maximum $50 one-time modem fee
    - Service is month-to-month, no long term contracts
- Partners with community organizations, including schools and public housing agencies to pre-qualify individuals for discounted service and devices
  - Website helps consumers
    - determine which low-cost plans and devices are available to them
    - locate digital literacy training programs in their community
  - Facilitates adoption by allowing schools and other community organizations to prepay for broadband service and buy devices in bulk for the populations they serve
  - Funded primarily through donations: 2014 income included more than $1.5 million in donations from foundations and corporate partners

ECD study provides broad recommendations regarding adoption and groups to target

- Develop initiatives to target populations that are not utilizing broadband or underutilizing broadband
  - Low-income residents benefit from subsidy programs

  - Seniors benefit from digital literacy training and outreach on the relevance of broadband
    - Study found "When compared to people between 18 and 35, those 65 and older are 50% more likely to say that the complexity of the Internet is a major barrier to improved utilization."
  - Suggested themes for initiatives
    - Learning to start a business, work remotely, or supplement income
    - After school access to learning, online training, certification opportunities, etc.
    - Accessing health services remotely, especially for aged or chronic care patients
    - Better access to government services and more effective participation in government processes
- Develop initiatives to target business/industry sectors that make largest contribution to economy and have greatest growth potential
  - Initiatives not described
- Work through existing anchor institutions, specifically libraries and economic development agencies, to reach target populations

Topic: Broadband Discounts
Do local and state governments in Tennessee provide discounts directly to consumers to pay for broadband? Have other government entities provided funding or financial incentives paid directly to residents to increase the affordability of high-speed internet access to encourage adoption of existing broadband such as the federal E-Rate program for discount service to schools and the Rural Health Care program? And if so, did that increase adoption and deployment of broadband?

Tennessee

- State: unable to find any direct discounts at state level
- Local: Some local governments are involved in public-private partnerships that provide discounts to consumers:
- *Metro-Nashville:*
  - ConnectHome initiative
  - Digital Inclusion Fund
  - programs approximately one year old; still collecting adoption data
- *Memphis: ConnectHome initiative*
  - programs approximately one year old; still collecting adoption data

- *Chattanooga: Tech Goes Home (through Everyoneon.org)*
  - Tech Goes Home program partners with Everyoneon.org, which connects participants with discounted service options from AT&T, Comcast, and Basic Internet, a provider that partners with T-Mobile
    - Started in 2015
    - As of October 2015 had helped 140 people (99 families) get access to technology and computer skills
- Columbia Housing and Redevelopment Corporation (through Everyoneon.org)
  - No information found on increases in broadband adoption

Providers offer several low-price programs and, in some cases, low-cost devices to low-income residents, examples include

- Comcast Internet Essentials (internetessentials.comcast.com)
  - $9.95 per month, no credit check, no installation fee, wireless router included, no long-term contract
  - 10 megabits per second download and 1 megabit per second upload

    Eligibility
    - Have at least 1 child qualifying for National School Lunch Program
    - No outstanding debt to Comcast that is less than 1 year old
    - Live in Comcast service area but have not subscribed within 90 days
    - Pilot program in Nashville expands eligibility to those living in public housing
    - Pilot programs in other communities have expanded eligability to the elderly and residents who receive federal assistance through a variety of programs including Medicaid; Head Start; Supplemental Nutrition Assistance Program; Supplemental Security Income; Temporary Assistance to Needy Families; the Low Income Home Energy Assistance Program; Emergency Aid to the Elderly, Disabled, and Children; Bureau of Indian Affairs General Assistance; Tribally-Administered Temporary Assistance for Needy Families; and Food Distribution Program on Indian Reservations.
    - A pilot program in Illinois and Colorado expands eligability to students in community colleges
  - Option to purchase low-cost desktop or laptop for $150
  - Digital literacy training tools on website and information about local training options
  - Information on number of participants request, but may be proprietary

  AT&T Access (https://www.att.com/shop/internet/access/#/)
  - $5 per month for 3 megabits per second download or
  - $10 per month for 5 or 10 megabits per second depending on speed available in area, no deposit, no installation fee, wireless router included, no long-term contract

- Eligibility
  - At least one member of household eligible for Supplemental Nutrition Assistance Program
  - No outstanding debt with AT&T for fixed broadband for last 6 months or no outstanding debt for Access program within last year
  - Program eligibility expanded to include families eligible for Supplemental Security Income in California
- Digital literacy training tools on website
- Information on number of participants request, but may be proprietary

CenturyLink Internet Basics (http://www.centurylink.com/home/internetbasics/?rid=interr

- $9.95 per month, 12-month contract, no modem rental fees for 1 year, other taxes and fees apply
- 1.5 megabits per second download
- Option to purchase iPad mini 2 for $150 but requires 2 year contract with 2nd year at $14.95 per month with an early termination fee
- Eligibility
  - Eligible for Lifeline
  - Have not subscribed to internet service from Century Link in past
  - Do not have debt with Century Link or unreturned equipment
- Information on number of participants request, but may be proprietary

<u>Federal programs</u>

- E-Rate (schools and libraries)
  - Department of Education says that E-Rate is vital for schools to afford broadband.
  - State Library and Archives says that E-Rate is vital for libraries to afford broadband.
- Rural Health Care Program (non-profit health facilities)
  - Interviewees say that Rural Health Care program is vital for some rural health facilities to afford broadband
- Lifeline (low-income residents)
  - $9.25 subsidy to low-income subscribers is being expanded from only telephone (landline and mobile) service to include broadband; those eligible include
    - recipients of federal aid programs (public housing residents, SNAP, Low Income Home Energy Assistance, Medicaid, School Lunch Program, SSI, TANF),
    - recipients of qualifying state aid programs, and
    - household income no greater than 135% of federal poverty guidelines.
  - Lifeline program has just been expanded to include broadband, no data available yet
- Note: These programs do not pay subscribers directly, rather they pay providers who then

Other states:

- NC LITE-UP pilot program (January 2013 through August2014)
  - See above

How could that be replicated in Tennessee? Should it?

Public private partnerships at local level:

- Not all aspects of every program are likely transferrable
  - Major barriers that these programs face according to Metro-Nashville's CIO include
    - obtaining devices,
    - providing relevant training, and
    - offering affordable broadband service
  - Nashville benefited from partnership with Vanderbilt University, Dell Computers, ER2, and the Community Foundation of Middle Tennessee that facilitated access to
- But could build partnerships between local governments and providers to connect target populations with discounted service plans already offered by those providers

Topic: Deployment Incentives

What are the costs to providers to provide broadband?

- General operating and maintenance: president of AT&T Tennessee said they must essentially rebuild their networks every eight years; others have said that fiber-optic cable has a lifespan of 20 to 30 years, but that electronics used to operate the system must be replaced much more frequently.
- For-profit providers pay the following taxes: property taxes, franchise and excise taxes, sales taxes on equipment purchases, federal income taxes, and payroll taxes.
- Non-profit private providers pay property taxes and payroll taxes.
- Municipal providers make payments in lieu of the following taxes: property taxes and franchise and excise taxes (must also pay payroll taxes).
- Additional fees paid by all providers: local right-of-way fees, pole-attachment fees, permitting.

Are those costs different in cities, compared to rural areas?

- Cost of connecting broadband provider's local network to larger internet backbone can be more expensive in areas that are farther from the backbone's major access points according to municipal providers interviewed
- Costs must be spread across fewer subscribers in sparsely populated areas.
- Costs are location specific and can be affected by topography, etc.

Has Tennessee or other states or local government entities created a funding mechanism to provide targeted financial incentives to encourage broadband providers to deploy broadband in specific underserved and unserved areas?
And if so, how successful are/were those programs in increasing deployment of broadband?

Local Governments: Have not found any local governments in Tennessee or in other states that have funding mechanisms for providers

Tennessee state funding mechanism:

- Tennessee Code Annotated, Section 7-59-315, establishes a fund to promote deployment in unserved areas
- Relies on general appropriations from the legislature
- Has not been funded
- Would be administered by Tennessee Regulatory Authority
- Grants authorized for local governments, entities associated with local governments (e.g. municipal utilities), and for-profit and non-profit providers

Examples of funding mechanisms from other states

California: California Advanced Services Fund

- $100 million grant and loan program for unserved or underserved areas established in 2007
- Additional $100 million allocated for broadband infrastructure in 2010
- Additional $10 million allocated for rural and regional consortia in 2010
- Additional $15 million allocated for broadband infrastructure loans in 2010
- Infrastructure grants and revolving loan account has awarded $99.3 million to support 51 projects benefiting almost 300,000 households as of 2015
- Public Housing account has awarded $1.72 million to support 69 projects connecting 4,292 units as of 2015
- Rural and regional consortia grant has awarded $9.26 million to support 16 consortia
- Funded by 0.25% tax on intrastate phone service

Colorado: Middle mile grants by Department of Local Affairs

- $20 million broadband grant program for building "middle mile" infrastructure
- Requires 50% match by local government
- funded by Energy and Mineral Impact Assistance Fund
- No information found on success

Colorado: Broadband Deployment Fund

- created in 2014
- $2.4 million in competitive grants for first grant cycle
- grants can provide up to 75% of infrastructure costs

- available to telephone and electric co-ops that existed as of May 10, 2014 and for-profit companies
- only available for unserved areas: contiguous census blocks in which majority of households lack access to at least one satellite and at least one non-satellite provider offering speeds of at least 25 megabits per second download and 3 megabits per second upload and located either in unincorporated areas or cities with fewer than 5,000 residents but not in an area with a population density large enough to require service under an existing franchise agreement

- Project must provide broadband at minimum of 25 megabits per second download and 3 megabits per second upload at a reasonable price
- applicant must demonstrate ability to provide service to area for at least five years and must begin service within two years
- cannot duplicate other federal or state broadband grant programs
- No information found on success

Delaware Broadband Fund

- created in 2013 through a combination of contributions from providers and state matching grants
- $2.5 million total
- resulted in 354 miles of fiber-optic cable being installed
- Unclear whether fund is still actively disbursing grants

Illinois Gigabit Communities Challenge

- awarded $8 million among four projects
- projects were required to connect at least 1,000 users to networks capable of providing upload and download speeds of one gigabit per second
- at least one of the companies awarded a grant defaulted on its obligations after spending much of its grant
- another project was delayed too long and had funding pulled

Maine Infrastructure Grant Program

- Began in 2007 and overseen by ConnectME
- Approximately $1 million per year in competitive grants to providers to build out networks in unserved and underserved areas
- Provider match expected (shoot for 50-50 split, but some more, some less)
- Funded through a 0.25% tax on retail telecommunications/cable/internet services (10 to 12 cents per customer per month)
  - Note: Unclear whether sales tax is actually applied to internet service because Maine is not one of the states grandfathered in under the internet tax freedom act
- Grants scored based on improvement in max broadband speed, but must provide minimum of 10 megabits per second download and upload

- 38,971 homes/businesses now have access to improved broadband as result of grant program

Maine Community Broadband Planning Grants

- created in 2015 to fund local plans to expand the availability of broadband
- Funded through a 0.25% tax on retail telecommunications/cable/internet services (10 to 12 cents per customer per month)
  - Note: Unclear whether sales tax is actually applied to internet service because Maine
- Four grants totaling more than $200,000 awarded in first year

Massachusetts Broadband Initiative

MassBroadband 123

- $44.3 million state grant through Massachusetts Broadband Initiative matches a $45.4 million federal grant through Broadband Technology Opportunities Program
- Encourage public-private collaboration in western Massachusetts to bring 1,200 mile fiber-optic network to 123 communities in western Massachusetts to serve 400,000 homes and businesses
- Completed in 2014

Open Cape

- $5 million in state grant through Massachusetts Broadband Initiative serve as matching funds to leverage $32 million federal stimulus award
- created 350 mile open access fiber optic network to serve as internet middle mile for other providers to use in southeastern Massachusetts and Cape Cod
- also connects more than 90 community anchor institutions
- completed in 2013

Future grants

- grants for last mile service for 44 eligible communities that remain unserved; projects must
  - provide minimum speed of 25 megabits per second download and 3 megabits per second upload,
  - be self-sustaining
  - seek minimum goal of 96% residential coverage in service area
  - grants for communities partially served by incumbent cable providers (lower than 96% penetration rate)

Previous grants

- $335,000 of competitive grants in total provided to four different planning projects and
- required 25% match from recipient
- estimated approximately 8,000 households located in project areas
- 2011 and 2012

Minnesota Border to Border Broadband Development Grant Program

- created in 2014 and managed by Office of Broadband Development within Department of Employment and Economic Development
- for 2016 legislature appropriated $35 million in grant funds with $500,000 reserved for projects in low income areas and $5 million reserved for underserved areas
- Max of $5 million to any one project
- grants provide up to 50% of project costs
- only unserved and underserved areas are eligible for use of grants
  - unserved: area lacks access to wireline internet with a minimum speed of 25 megabits per second download and 3 megabits per second upload
  - underserved: areas with wireline internet access of at least 25 megabits per second download and 3 megabits per second upload but less than 100 megabits per second download and 20 megabits per second upload
- applicants can include for-profit businesses, political subdivisions, Indian tribes, non-profit organizations, and cooperative organizations
- In 2014, awarded $19.4 million in grants to 17 projects serving 5,860 households, 83 community institutions, and 150 businesses

Nebraska Universal Service Fund: Broadband Pilot Program

- Managed by state public service commission
- Funded through state's universal service fund by tax on telecommunications services in state
- Established in 2011
- $4 million in support in FY 2012
- No information on number of locations served or funding for other year

New York: Broadband for All

- $500 million grant program to build out service of at least 100 megabits per second for most of state and 25 megabits per second in the most remote areas, announced in
- Priority given to unserved areas, libraries, and educational opportunity centers (provide vocational and academic training for underserved populations)
- Reverse auction process prioritizes grants to those seeking least amount of state funding
- Trying to average 50% matching funds across all projects
- First round of grants announced August 2016
  - 25 projects across 27 counties
  - $54.2 million in state grants paired with $21.6 million in private investment
  - When completed, Round 1 projects will cover
  - 18 libraries,
  - 96 other community anchor institutions, including healthcare facilities, government

  - over 34,000 homes and 36,000 total locations
- Began accepting applications for Round 2 grants in August 2016

North Carolina Economic Infrastructure Program

- not broadband specific but public broadband infrastructure is one of the uses of the program
- Maximum of $500,000 per project in tier 1 or 2 counties (smaller populations and higher poverty rates) depending on number of full-time jobs created
- Maximum of $250,000 per project in tier 3 counties (larger populations and lower poverty rates) depending on number of full-time jobs created
- No information found on number of locations gaining access

Oregon Special Public Works Fund

- funding for publicly owned facilities that support economic and community development
- not broadband specific
- cities, counties, tribal councils, county service districts among those that can apply
- Eligible facilities include telecommunications facilities
- Loans for $100,000 to $10 million with loan terms of up to 30 years, interest rates are based on market conditions
- Grants for projects that create or retain "traded-sector jobs" are a maximum of $500,000 per project based on the number of jobs created or 85% of project costs
- Municipalities seeking government-owned networks must hold public hearing and adopt resolution that says that project is necessary and that no for-profit entity will provide
- No information found on number of locations gaining access

Pennsylvania Broadband Outreach and Aggregation Fund

- No longer accepting new applications (sunset June 30, 2016)
- managed by department of community and economic development
- funded by 20% tax on rate increases of telecommunications providers that did not commit to 100% broadband deployment by 2008 but capped at $5 million per year
  - $3.3 million was available in FY 2015
  - Tax sunset with fund
- grants for "outreach programs concerning the benefits, uses and procurement of broadband services as well as providing the ability to aggregate the demand in
- No information found on number of locations gaining access

Vermont Connectivity Initiative

- managed by state public service department's division for
- telecommunications and connectivity
- Funded by
  - proceeds of Vermont Universal Service Fund, which is funded by a 2% tax on all retail telecommunications services in state,

  - Penalties collected from providers of wholesale telecommunications services that fail to meet performance standards
- Competitive bid process:
  - Awarded $885,944 in grants in 2015 to serve 175 locations
  - Approximately $556,000 available in 2016 according to 2016 RFP, though the Initiative's 2015 annual report calculated that only $423,000 would be available in
- Division for telecommunications and connectivity determines census blocks eligible for use of grant funding (similar to FCC and CAF II program)
- Providers obligated to provide minimum of 10 megabits per second download and 1 megabits per second upload speeds
- No data yet on whether locations have been served

Virginia Community Development Block Grants

- Telecommunications projects are eligible for up to $200,000 per project
- Must provide a local match equal to 50% of the funds requested from the state
- No information found on number of locations gaining access

Washington Community Economic Revitalization Board

- located within the Department of Commerce
- Funding to local governments and Indian tribes for infrastructure projects, including but not limited to telecommunications infrastructure
- Primarily a loan program but grants are awarded too
- Matching funds required for all projects
- Not available for government owned networks
- No information found on number of locations gaining access

Wisconsin Broadband Expansion Grant Program

- $1.5 million total available in each fiscal year
- Managed by state public service commission
- Eligible for use in census blocks or portions of census blocks with fewer than two fixed terrestrial providers that provide a minimum of 25 megabits per second download and 3 megabits per second upload
- Eligible applicants include for-profit and non-profit providers as well as political subdivisions, but political subdivisions must establish a joint venture with a for-profit or non-profit provider
- In FY2014 and FY2015 resulted in completed projects that have expanded or improved service to approximately 3,300 homes

How could that be replicated in Tennessee?

Mechanism appears to exist already in state law

- Broadband Deployment Fund under Tennessee Code Annotated, Section 7-59-315

- Would be administered by TRA
- Grants can be made to local governments, entities associated with local governments (e.g. municipal utilities), and for-profit and non-profit providers
- Must build support within legislature for significant appropriation

Maine, California, and Vermont programs: Could pass state tax on telephone and cable service

- Could be earmarked for broadband deployment fund
- Cannot tax sales of internet service (federal Internet Tax Freedom Act)

Massachusetts and New York programs rely on large one-time appropriations

Minnesota and Wisconsin rely on annual appropriations

What would be the costs?

The cost to cover every home where no provider reported offering 10/1 in Tennessee as of December 2015 ranges from $210 million for fixed wireless to $955 million for fiber to the home

The cost to cover every home where no provider reported offering 25/3 in Tennessee as of December 2015 ranges from $356 million for fixed wireless to $1.6 billion for fiber to the home

The cost to cover remaining homes where no provider reported offering 10/1 as of December 2015, and which are not in Census blocks eligible for CAF II funding, ranges from $122 million for fixed wireless to $554 million for fiber to the home

ECD Study (based on June 2014 data)

Fiber To The Home (or Business)

- Between $1.1 billion and $1.7 billion to build fiber-to-the-premises networks to all homes and businesses in areas currently without 25/3 service
- Between $819 million and $1.3 billion to build fiber-to-the-premises networks to all homes and businesses in areas currently without 10/1 service

Fixed Wireless

- Between $492 million and $1.4 billion to build fixed wireless capable of serving all homes and businesses in areas currently without 25/3 service
- Between $361 million and $996 million to build fixed wireless capable of serving all homes and businesses in areas currently without 10/1 service

The FCC recently announced that it will provide $4.5 billion over the next six years, including approximately $210 million in Tennessee, for telephone companies to deploy broadband in underserved areas of Tennessee that the FCC has identified. How would state specific activities hinder or maximize that Federal funding?

Connect America Fund Phase II

- Subsidies totaling up to $210 million (approximately $29.9 million per year for up to seven

years) were awarded by the FCC to three incumbent telecom providers in Tennessee (providers had opportunity to accept or reject funding awarded and all who were eligible in Tennessee accepted)

  - AT&T accepted $26.1 million per year to build out to 81,173 homes and businesses,
  - Frontier accepted $2.1 million per year for 6,458 homes and businesses, and
  - Century Link accepted $1.7 million per year for 5,791 homes and businesses
  - Subsidies based on cost to build fiber to the home networks
- FCC offered subsidies to these providers in census blocks where FCC determined that no service is available at 4 megabits per second download and 1 megabit per second upload
- Funds must be used to build out of networks capable of offering 10 megabits per second download and 1 megabit per second upload
- Providers must build out to 40% of their funded locations by the end of 2017, 60% by the end of 2018, 80% by the end of 2019, and 100% by the end of 2020 or risk loss of funding
  - 15% of monthly subsidy will be withheld if provider is at least 15% but less than 25%
  - short of benchmark
  - 25% withheld if at least 25% but less than 50% short
  - 50% withheld if at least 50% short
  - 100% withheld if at least 50% short for six months (will also partially recapture prior funding)
- Providers must offer service that meets the 10/1 standard at a price that is no more than the non-promotional price it charges for the same service in the state's urban areas

- Maps showing Tennessee census blocks for which providers accepted CAF II funding are
  - Maps show
    - census blocks eligible for CAF II funding (providers accepted all eligible blocks in Tennessee and funding can be used to expand coverage in these blocks);
    - census blocks where providers already report offering broadband at speeds of at least 10 megabits per second download and 1 megabit per second upload (these blocks were ineligible for CAF II funding); and
    - census blocks ineligible for CAF II funding but where no provider reports offering broadband at speeds of at least 10 megabits per second download and 1 megabit per second upload
    - Note: Some of these blocks will be eligible for the next phase of CAF funding; providers have until November 2016 to accept funding for the next phase

  - Note: Some census blocks eligible for CAF II funding already receive service that meets the 10/1 standard according to the coverage data released by the FCC in 2015. The FCC determined eligibility for CAF II funding based on coverage data from 2013, and providers have extended service to some of the eligible blocks in the intervening two years. Providers may still use CAF II funds to expand their networks in these blocks.

- State or local policies that affect deployment costs could alter the effectiveness of the CAF II program
- FCC subsidies will not be increased or decreased if deployment costs change
- Have not found anything that prevents states from providing additional subsidies to CAF II recipients
- Local permitting and zoning can limit the effectiveness of the CAF II program by
  - delaying projects and
  - increasing costs

TVA pole-attachment-fee formula could limit effectiveness of CAF II program by doubling current median pole attachment fee in Tennessee
Note: TVA's statutory mandate is to provide its service area with inexpensive electricity

Topic: Tax Policy
Do other federal, state, or local government entities provide tax incentives, such as income tax credits, sales-tax exemptions, and property-tax exemptions for the purchase and installation of high-speed internet infrastructure by broadband providers to encourage broadband deployment?

Note: Ten years ago, Sen. Bill Ketron introduced legislation to provide tax credits for companies to encourage broadband deployment. The bill didn't pass.

Do other federal, state, or local government entities provide tax incentives, such as income tax credits, sales-tax exemptions, and property-tax exemptions for the purchase and installation of high-speed internet infrastructure by broadband providers to encourage broadband deployment?

- Sales tax exemptions for equipment purchases: 22 states and DC either have no sales tax or exempt equipment purchases by telecommunications providers from sales taxes
  - No sales tax:
    - Alaska (no state sales tax but local sales taxes may still apply)
    - Delaware (no sales tax)
    - Montana (no sales tax)
    - New Hampshire (no sales tax)
    - Oregon (no sales tax)

- Exemptions for equipment:
  - Arizona
  - Connecticut (broadband equipment not taxed but other telecommunications equipme
  - D.C.
  - Hawaii
  - Indiana
  - Iowa
  - Michigan
  - Minnesota
  - Mississippi (broadband equipment not taxed but other telecommunications equipment is) (Mississippi Code Annotated, Section 27-65-101, 57-73-21, and 57-87-5) - 50% exemption from sales tax on equipment purchases in tier 1 (developed) counties; 100% exemption for tier 2 and 3 counties (moderately and less developed)
  - Missouri
  - New Jersey
  - New York
  - North Carolina
  - North Dakota
  - Ohio
  - Pennsylvania
  - Utah
  - West Virginia
- Property Taxes
  - Eight states use higher assessment ratios for property tax purposes for broadband providers that are legacy telephone companies
    - Tennessee
    - Alabama
    - Kansas
    - Louisiana
    - Maryland
    - Mississippi
    - Montana
    - Oklahoma
- *But three of them also have credits or refunds to partially offset these higher assessments*
  - Tennessee (Tennessee Code Annotated, Section 67-6-221 and 222)
    - Ad valorem tax reduction fund

    - Reimburses broadband providers that are legacy telephone companies for 27.27% of ad valorem taxes paid on real property assessed at 55% rate (equal to difference between 55% utility and 40% commercial rate)
    - Reimburses broadband providers that are legacy telephone companies for 45.45% of ad valorem taxes paid on tangible personal property assessed at 55% rate (equal to difference between 55% utility and 30% commercial rate)
    - But subject to availability of funds from 4% sales tax on interstate and international telephone service sold to businesses
    - Fund lacks resources to compensate providers fully
  - Kansas (Kansas Statutes Annotated, 79-32,210)
    - Credit equal to difference between taxes owed at 33% public utility assessment rate owed by legacy telephone companies and 25% rate owed by all other providers
    - Applied to state income taxes
    - Amount of credit greater than income taxes is refunded to taxpayer
    - Only for property acquired or put in service after December 31, 2000
  - Louisiana (Louisiana Revised Statutes, Sections 47:302, 321, and 331; and Section 47:6014)
    - Credit equal to 40% of aggregate ad valorem taxes paid for telephone company property assessed at the 25% rate
    - Applied to state income and franchise taxes
    - Amount of credit greater than income and franchise taxes is refunded to taxpayer with interest
    - Lost tax revenue offset by 0.97% sales tax (as of April 1, 2016) on interstate telephone services
    - If 0.97% sales tax does not cover lost revenue from credits then amount of credits available shall be reduced in succeeding fiscal years (unclear if this has happened)
    - In 2016, House Committee on Ways and Means and Senate Committee on Revenue and Fiscal Affairs directed to study whether to terminate credit; report due by March 1, 2017
- Property Tax Exemptions for Broadband Equipment
  - Kansas Property Tax Exemption on New Equipment (Kansas Statutes Annotated, Section 79-224)
    - Not broadband specific
    - Applies to equipment purchased or leased after June 30, 2006
    - No time limit on exemption
    - Also applies to equipment transported into Kansas after June 30, 2006 for the purpose of expanding an existing business or creating a new business

- Mississippi Property Tax Exemption (Mississippi Code Annotated, Section 57-87-7)
  - 10 year exemption
  - Applies to broadband equipment placed in service after June 30, 2003 and before July 1, 2020

Tax credits:

- Georgia: Investment Tax Credit (Georgia Code, Section 48-7-40 et seq.; and Rules and Regulations of Georgia, Rule 560-7-8-.37)
  - Credit equal to
    - 5% of capital investments of at least $50,000 in tier 1 counties (71 least developed counties based on unemployment, per capita income, and poverty levels),
    - 3% in tier 2 counties (those ranked 72nd through 106th least developed), and
    - 1% in tier 3 and 4 counties (all others—107th through 159th),
  - Capital investments for which credit can be used include all real and personal property purchased or acquired for use in the construction of an additional telecommunications facility located in this state or the expansion of an existing facility, including, but not limited to, amounts expended on land acquisition, improvements, buildings, building improvements, and machinery and equipment to be used in the telecommunications facility
  - Can offset up to 50% of state corporate income tax liability
  - If credits exceed 50% of state corporate income tax liability, then unused credits can be carried forward up to 10 years to be used on future years' tax liabilities as long as "investment property remains in service"

- Idaho:
  - Credit on franchise and income taxes for broadband equipment purchases (Idaho Code, Section 63-3029I)
    - 3% tax credit of the value of broadband infrastructure investments and can be applied to a providers income and franchise taxes.
    - Must obtain order from state utility commission stating that property qualifies for credit
    - For any one year amount of credit is capped at lesser of taxes owed or $750,000
    - Credits exceeding the cap can be carried forward for up to 14 years
  - Credit on income tax (Idaho Code, Section 63-3029B)
    - Credit equal to 3% of the value of qualified investments, including broadband infrastructure, made during the tax year
    - Must obtain order from state utility commission stating that broadband property qualifies for credit
    - Credit applied to income tax
    - Cannot exceed 50% of income tax liability

        - Credits exceeding the cap can be carried forward for up to 14 years
        - Credits can be recaptured if investment no longer qualifies but have not found what recapture period is
- Mississippi: Tax credit for equipment purchases
    - Can be applied to up to 50% of provider's aggregated franchise and income taxes
    - Annual credit is equal to a percentage of cost of equipment purchased by provider for deployment in a specific area
        - 5% in Tier I (developed) counties
        - 10% in Tier II (moderately developed)
        - 15% in Tier III (less developed)
    - Credits claimed annually for 10 years and are available beginning the year the equipment is placed in service
    - Unused credits in any given year can be carried forward up to 10 years
    - Total value of credits taken annually over ten year period cannot exceed original cost of equipment
- Oregon (Oregon Code, Chapter 315.511)
    - Credit is up to 20% of cost of deploying advanced telecommunications services
    - Can be applied to personal or corporate income taxes
    - May not exceed tax liability and may not be carried forward
- Pennsylvania: Tax credit for equipment purchases for mobile broadband
    - Can be applied to up to 50% of provider's income taxes
    - Credit is equal to 5% of purchase price of equipment placed into service in Pennsylvania during the prior tax year
    - Unused credits may be carried forward for up to five years
    - Total amount of credits for the state capped at $5 million per year
    - Began in 2013; will end in 2024
- Repealed
    - Montana Advanced Telecommunications Infrastructure Tax Credit (Montana Code Annotated, Section 15-53-201_et seq.)
        - Credit equal to 20% of total infrastructure investment can be applied to excise tax
        - Competitive application process: $2 million in credits maximum awarded for all providers in any 12 month period
        - Repealed in 2003

Have they been successful?

- Have not found before/after data to demonstrate causal relationship between individual tax incentives in each state and deployment

- Providers at May 2016 commission meeting said that eliminating sales tax on equipment purchases would allow capital invested in building and maintaining networks to go farther and that it could encourage providers to expand their networks

Does Tennessee provide sales- and property-tax exemptions for the purchase and installation of broadband infrastructure?

- Tennessee exempts equipment purchases by telephone (and electric) cooperatives from sales tax.
- Tennessee's four-year property tax exemption for property used by electric cooperatives to provide electricity (Tennessee Code Annotated, Section 65-25-122(a)), is unconstitutional according to 2015 opinion by state's attorney general.

If not, how could those programs be replicated in Tennessee? What would be the costs?

- Exempting the purchase of broadband equipment from the sales tax on equipment purposes would reduce state revenue by approximately $45.5 million per year and local revenue by approximately $16.3 million per year according to the Tennessee Department of Revenue
- Assessing telephone companies' telecommunications property at the commercial rates rather than the utility rate for property tax purposes would reduce local revenue by approximately $16 million per year according to the Tennessee Comptroller of the Treasury

Topic: Streamlined Government Costs

Have state or local government entities adopted efforts to streamline local government zoning and right of way and permitting costs, fees and red tape to encourage the placement of wireless broadband towers and other broadband infrastructure in the public right of way?

Indiana has Broadband Ready Communities Program

- Communities certified as "broadband ready" by Indiana Economic Development Corporation if meet requirements
- Certification intended to signal providers that community has taken steps to reduce barriers to broadband infrastructure investment
- Minimum requirements
  - must have single point of contact for all matters related to broadband projects
  - must allow all broadband project applications, forms, or documentation to be submitted electronically
  - all permit applications must be approved or denied within 10 business days

- must "assure" that all inspections related to broadband projects occur in a "timely and expeditious manner"
- Cannot require designation of final contractor to complete project
- Cannot impose fees for applications or permits
- Cannot impose seasonal moratorium on issuance of permits
- Cannot discriminate against providers

Wisconsin has Broadband Forward Community Program (Wisconsin Code Annotated, Section 196.504)

- Cities and counties may apply to state public service commission for designation as Broadband Forward Community
- Must adopt ordinance that includes all of following
- - Appoint single point of contact for all matters related to broadband projects; Must review and make determination on whether permit applications are complete within 10 days; Must notify applicant in writing; Must specify details that are incomplete in applications; Must allow applications to be resubmitted as many times as necessary until complete

- Must approve or deny completed applications within 60 days
  - Must notify applicant in writing; Denied applications must be accompanied by evidence that denial was not arbitrary and capricious; Application is considered approved if applicant not notified in writing within 60 days

- Application and permit fees and any other fees related to broadband projects must be "reasonable"
  - Application fees may not exceed $100
- All forms and applications must be able to be submitted electronically

  Prohibited from
  - Requiring applicants to designate final contractor
  - Imposing a moratorium on new projects
  - Discriminating among providers and
  - Conditioning approval on
    - 1) Access to network for political subdivision or
    - 2) Additional payments beyond reasonable fees

Louisville (Kentucky) has One-Touch Make Ready

- Allows a single, approved contractor to perform all work necessary to make a utility pole ready to receive a new attachment (includes moving attachments of existing providers)
- Before one touch make ready, each attaching entity would send its own contractor to move its own equipment one by one; proponents of "one-touch" say this caused unnecessary delays for new providers

- Opposed by existing providers who say they want to have their own contractors moving their individual attachments to prevent damage to their networks (some also have contracts with Communications Workers of America)
- Sued by AT&T

Has Tennessee and local governments taken similar approaches?

- Nashville has adopted one-touch make ready ordinance (opposed by existing providers)
  - Sued by AT&T, which alleges that ordinance is preempted by federal pole attachment laws and that it violates AT&T's contracts with Nashville Electric Service
  - Also sued by Comcast

Are local governments in Tennessee taking any actions to inhibit the deployment of broadband? How could efforts to streamline broadband deployment be applied to Tennessee?

- Anecdotally, permitting processes can delay projects: Comcast representatives say that it took five months to receive a permit from Metro-Nashville to connect a new downtown office building.
- At least two counties have passed resolutions that require providers to clear a radius around their above-ground equipment located in public rights of way
  - 1) Greene County has 10-foot radius
  - 2) Washington County has 4-foot radius
  - Providers say this increases costs unnecessarily.
- Some communities have zoning policies that have the effect of prohibiting construction of cell towers according to president of Tennessee Wireless Association.

Topic: Pole-attachment Rates

How do the rates that broadband providers pay to municipal and cooperative electric providers in Tennessee to attach to their poles compare to the FCC rates?

- Note: In most states, the FCC sets pole attachment rates for commercial providers and has said high pole attachment rates can reduce broadband deployment. The FCC does not regulate poles for cities and cooperatives. More than 20 states regulate pole attachment rates for both commercial and municipal providers.
  - Tennessee pole-attachment rate average is three times national average according to Comcast.
  - New TVA formula could double current median rate in Tennessee according to TVA.
  - New TVA formula results in rates several orders of magnitude higher than FCC rates.
  - Note: 1) TVA's statutory mandate is to provide its service area with inexpensive electricity. 2) FCC's guidelines are based on its goal of promoting consistent, cross-industry attachment rates that encourage deployment and adoption of broadband internet access services.

Are broadband providers paying more or less than in states where pole attachment rates are regulated? If it's more, how much more is it?

- Tennessee pole-attachment rate average is three times national average according to Comcast.
- New TVA formula could double current median rate in Tennessee according to TVA.
- Note: TVA's statutory mandate is to provide its service area with inexpensive electricity.

What role should the state play in reducing high pole attachment rates to encourage broadband deployment?

- Because of TVA's authority to regulate the utilities and cooperatives it serves, Tennessee likely lacks authority to override TVA's formula according to a 2014 opinion by the state's attorney general.
- Note: AG's opinion says that "[r]egulation by the State of the rates, terms, and conditions of pole attachments of the TVA's distributors is not, currently, clearly preempted by the TVA Act, *provided that State regulation does not affect either those distributors' rates for electric power or their ability to comply with their agreements with the TVA. If the TVA were to assert its discretionary control over the rates and revenues of its distributors in a manner that directly affected pole attachments, regulation by the State would likely be preempted.*" (emphasis added)

Topic: Municipal Electric Expansion

As discussed in the Commission meeting last month, several members anticipated that the legislation sponsored by Senator Janice Bowling and Rep. Kevin Brooks (SB1134/HB1303) would likely be referred to TACIR for study in the 2016 session. Although the legislation doesn't specifically reference broadband, proponents of the bill (a variation of which has been introduced every year since 1999) say that removing the statutory limitation that prevents city-funded broadband networks from providing service outside their electric footprint will lead to increased rural broadband. Opponents of the bill are concerned that government expansion will allow cities to overbuild and cherry pick customers from the private sector, thereby inhibiting broadband deployment.

With that in mind, what role could Tennessee's current city-owned networks play in deploying broadband to rural areas that do not have service provided by a private-sector provider? How many cities currently provide broadband?

- Tennessee has 56 municipal electric systems and four county electric systems organized under Tennessee Code Annotated, Section 7-52-101 et seq., that may provide broadband under Tennessee Code Annotated, Section 7-52-601 et seq.

- Current law forbids cities and counties to provide retail broadband service outside the electric service territories of their electric utilities.
  - The FCC released an order in March 2015 preempting Tennessee's territorial restriction on municipal providers in response to a petition from the Electric Power Board of Chattanooga (EPB).
  - Tennessee sued to reverse the FCC's ruling in March 2015.
  - US Court of Appeals for Sixth Circuit ruled in favor of Tennessee's challenge and reversed the FCC's preemption order on August 10, 2016.
  - EPB, Tullahoma, and Jackson Energy Authority have expressed interest in serving communities outside of their electric service areas if state law were changed.
- Ten municipal electric systems currently provide broadband
  - Bristol Tennessee Essential Services (Sullivan County)
  - Chattanooga Electric Power Board (Hamilton County)
  - Clarksville Department of Electricity (Montgomery County)
  - Columbia Power and Water Systems (Maury County)
  - Erwin Utilities (Unicoi County)
  - Fayetteville Public Utilities (Lincoln County)
  - Jackson Energy Authority (Madison County)
  - Morristown Utility Systems (Hamblen County)
  - Pulaski Electric System (Giles County)
  - Tullahoma Utilities Board (Coffee and Franklin Counties)

Have they all built out broadband service to all existing electric customers in their footprint?

- Some of the municipals' broadband systems do "pass" all of their existing electric customers
  - Clarksville
  - Morristown
  - Jackson
  - EPB
  - Note: Erwin only began building out its system in 2015 and has not yet finished doing so but intends to serve its entire electric footprint
- Others do not
  - Bristol passes almost all of their electric customers
  - Columbia Power and Water provides broadband only within the city limits but the electric system extends into the county
  - Pulaski passes 40% of their electric customers

- Need to verify with
  - Fayetteville
  - Tullahoma

Two cities, Covington and Morristown, were part of a pilot program that allowed them to serve customers outside their footprints. Are these entities serving typically unserved rural broadband customers outside their footprint or have they deployed service overbuilding existing commercial providers?

- Covington sold its system in 2007.
- Morristown serves a limited number of community outside its electric service area; they have not expanded further because of the cost of doing so

Are these city-funded networks using resources funded by the monopoly electric service? Does that affect electric rates?

- Fiber-optic networks are typically shared with electric department, and electric department may own the asset
- Note: A utility's telecommunications department must pay for (lease) access to any network components (e.g. fiber cable) owned by the electric department
  - Morristown and Clarksville appear to make payments based on the percentage of the overall number of accounts served by the utilities (i.e. electric subscriptions + telecommunications subscriptions) attributed to their telecommunications departments
  - If the utility serves all 70 homes and businesses in its service area with electricity and 30 of those homes and businesses also subscribe to telecommunications services then the telecommunications department pays for 30% of the annual cost of the fiber network
  - Representatives from Morristown and EPB said they thought cost allocation formula is based on one developed by AT&T several decades ago
  - According to TVA, municipal providers that it serves must adopt procedures for allocating costs of jointly used assets among the divisions that use them; these procedures must be approved by TVA

State law prohibits using municipal electric department revenues to subsidize the cost of providing broadband.

- The Comptroller's Division of Local Audit reviews municipal audits prepared by private CPA firms to ensure that they follow appropriate accounting standards.
  - As part of its review, the Division of Local Audit looks at each division's revenues and expenditures, its assets and liabilities, whether cash is being transferred between divisions, and whether there are detailed depreciation schedules for assets

- If there is an asset like a fiber network that one division leases from another but no cash transfer is reported between the divisions that would be a red flag for a subsidy according to the Division of Local Audit
- But the Division of Local Audit typically only reviews the final audits prepared by private CPA firms
  - Most of the detail necessary to determine whether one division is subsidizing another is located in the private CPA firms' working papers
  - Division of Local Audit can view these working papers if necessary but only does so for a limited number of audits each year as part of rotating quality control checks
  - CPA firms' working papers are considered proprietary
- Evidence of a subsidy results in an audit finding being written.
  - But the Comptroller's Office does not have enforcement authority; instead they are only a reporting agency according to the Division of Local Audit.
  - Audit reports, including findings, are mailed to district attorney offices, mayors, aldermen, and other local officials.

According to TVA staff, TVA

- Must approve any intra-utility loans from a utility's electric department to its telecommunications/broadband department and
- According to TVA, municipal providers that it serves must adopt procedures for allocating costs of jointly used assets among the divisions that use them; these procedures must be approved by TVA
- TVA's wholesale power contract prohibits municipal utilities from using electric ratepayer revenue to subsidize broadband service
- TVA reviews utilities' annual audits for comliance with their joint cost allocation agreements

What is the debt load of existing government-owned networks? Who is responsible for that debt?

Note: Staff collected debt information from 2010 through 2015 from audits.

- Order of responsibility for debt depends on how debt is structured
  - Some systems have issued revenue bonds ultimately backed by electric system revenues (e.g. EPB)
  - Other systems have issued general obligation bonds backed by local taxpayers (e.g. Columbia)
  - However, even if revenue bonds are used, a utility's debt would revert to taxpayers in the worst case scenario of a complete collapse of the utility

- Debt taken on by a municipality to build a broadband network does not automatically prevent a municipality from issuing debt to fund other public projects, but it may result in tradeoffs by limiting a municipality's willingness or ability to issue bonds for other city functions or priorities according to 2015 NYU study.

- Municipal networks that have failed have resulted in substantial losses for municipalities involved according to 2015 NYU study, for example
  - Monticello, Minnesota has at least $9.75 million in municipal funds
    - $4 million in inter-fund loans
    - $5.75 million of general funds to repay revenue bond obligations that system defaulted on
  - Groton, Connecticut
    - Sold network to investors at loss of over $30 million
    - Taxpayers still responsible for more than $27 million in loans
  - Provo, Utah
    - Sold $39 million network to Google for $1
    - City still responsible for paying off nearly $40 million in debt related to system

What state agency provides oversight of these city networks?

- The Comptroller's Office of State and Local Finance reviews business plans submitted by municipalities prior to their beginning service to determine whether a plan is feasible based on whether the utility's broadband operations will be self-sufficient.
  - These reviews are only advisory.
  - Final decision on whether to provide service is made at the local level.
- The Comptroller's Division of Local Audit reviews municipal audits prepared by private CPA firms to ensure that they follow appropriate accounting standards.
  - As part of its review, the Division of Local Audit looks at each division's revenues and expenditures, its assets and liabilities, whether cash is being transferred between divisions, and whether there are detailed depreciation schedules for assets.
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Do the current municipal networks pay sales tax when purchasing materials or network components used to deliver broadband?

- Yes, they make payments in lieu of sales tax on equipment purchases; payments are equal to the taxes they would pay if they were for-profit providers.
- Tennessee Code Annotated, Section 7-52-606(b), requires municipal providers to make payments in lieu of sales taxes that would be owed by private providers.

Do they pay property taxes to the local governments and F&E taxes to the State of Tennessee?

- They make payments in lieu of property taxes as well as payments in lieu of franchise and excise taxes.
- Tennessee Code Annotated, Section 7-52-606(a), requires municipal providers to make payments in lieu of property taxes provided that those payments do not exceed what a private provider would pay.
- Tennessee Code Annotated, Section 7-52-606(b), requires municipal providers to make payments in lieu of franchise and excise taxes to the same extent as if they were a private provider.
- Tennessee Code Annotated, Section 7-52-606(b), also requires municipal providers to make payments in lieu of sales taxes and local privilege (business) taxes to the same extent as if they were a private provider, but private providers do not pay privilege taxes, nor do they remit sales taxes on internet service.

- Note: In cases where utility's electric division rather than its broadband/telecom division owns an asset such as a fiber-optic network, payments in lieu of property taxes for that asset are made by the electric division, though they should be passed through to the broadband/telecom division as part of its lease payments to the electric division for use of the asset according to the Tennessee Comptroller's Division of Local Audit. In this scenario, the utility's audit would show payments in lieu of property taxes for the electric division but not the broadband/telecom division.

Topic: Additional Questions Raised During Interviews with Stakeholders, Commission Meetings, and Other Research
Could municipal utilities and electric cooperatives act as wholesalers for retail broadband providers?

Anecdotally, yes they could legally:

- Providing wholesale service most likely falls under the definition of "telecommunications" under state law according to municipal providers interviewed.
- State law authorizes both electric cooperatives and municipal electric systems to provide telecommunications services without territorial restriction.
- Subject to regulation by the Tennessee Regulatory Authority.

But, making the business case for setting up a wholesale network may be difficult

- Municipal providers interviewed said that you need to have a strong retail broadband provider signed up to use the network
- Memphis Networx was developed as a wholesale network
  - Had difficulty finding retail broadband providers willing to use it (partly because of bad timing: dotcom bubble burst)
  - Sold at a loss of approximately $28 million in 2007
- Provo, Utah, also had a wholesale network that failed
  - The retail broadband provider the city worked with did not generate enough revenue for the city to make debt payments on the network.
    - Sold $39 million network for $1 to Google Fiber in 2013.

Still, some municipalities are building or have built wholesale networks.

- Ammon, Idaho
  - Open access network allows any retail provider to offer service
  - Scheduled to cost residents who connect to the network approximately $30 per month in taxes and fees
  - Broadband service will be available for approximately $30 per month for a connection of 100 megabits per second download and 100 megabits per second upload

- Huntsville, Alabama (TVA distributor)
  - Currently building an open access network for retail providers to provide fiber-to-the-home service
  - Google Fiber has already agreed to use network

Creating a state broadband office is one of the recommendations of ECD's study.

One of ECD's consultants also completed a separate study that correlates the presence of a state broadband office with higher rates of access, adoption, and use. But information reported in ECD's study and the separate study prepared by its consultant does not demonstrate the need for a new, large state office:

- Most state broadband offices are relatively small according to ECD's consultants
  - Median number of employees is only three
  - 13 states reported budget information for broadband
    - Average of annual budgets for 11 of these states is $596,000
    - Outliers are New York ($500 million per year) and California ($330 million per year)
- Many duties of the broadband offices studied potentially overlap with those of other state agencies
  - Mapping infrastructure
  - Collecting information on adoption and use
  - Supporting local broadband/technology planning
  - Collecting information on and administering grants and loans
  - Digital literacy training

State agencies that already perform some of these functions or are well situated to do so

- Tennessee Regulatory Authority
- Department of Finance and Administration's Division of Strategic Technology Solutions
- Tennessee State Library and Archives
- Department of Education
- Tennessee Department of Transportation
- Board of Regents
- University of Tennessee
  - County Technical Assistance Service
  - Municipal Technical Advisory Service
- Development Districts
- Tennessee Advisory Commission on Intergovernmental Relations
  - Report on broadband needs as part of annual infrastructure survey
- Department of Economic and Community Development