AGENDA

Welcoming Remarks

Sarah Bleau, Director, Enabling Middle Mile Broadband Infrastructure Program, Office of Internet Connectivity & Growth, NTIA

Broadband Supply Chain

Maureen Russell, Senior Telecommunications Policy Advisor, Office of Policy Analysis and Development, NTIA

Broadband Workforce Development

Lucy Moore, Special Policy Advisor, Office of the Assistant Secretary, NTIA

Questions & Answers Discussion

Moderator: Sarah Bleau, Director, Enabling Middle Mile Broadband Infrastructure Program, Office of Internet Connectivity & Growth, NTIA
TODAY'S FOCUS

What this webinar **is**

An **overview of supply chain and workforce development**, including suggestions and best practices for states

What this webinar **is not**

Guidance on **requirements** that will be included in IIJA Notices of Funding Opportunities
TODAY, WE WILL FOCUS ON BROADBAND SUPPLY CHAIN AND WORKFORCE DEVELOPMENT

SUPPLY CHAIN
Understand the broadband supply chain, including security requirement
Review drivers of ongoing broadband supply chain challenges
Consider strategies to ease constraints

WORKFORCE DEVELOPMENT
Understand workforce needs for broadband deployment
Review drivers of labor shortages
Consider strategies to ease workforce shortages
THE BROADBAND SUPPLY CHAIN

Maureen Russell, Senior Telecommunications Policy Advisor, Office of Policy Analysis and Development, NTIA
BROADBAND DEPLOYMENT RELIES ON A COMPLEX SUPPLY CHAIN

Various materials are needed during deployment

Passive Infrastructure: The physical layer of material needed to enable connectivity
- Examples: Fiber-optic and copper cables, ducts, conduit, utility poles, adaptors, splitters, towers, antennas, power equipment

Active Infrastructure: The electronic elements that enable passive infrastructure to transmit data
- Examples: Terminals, routers, servers, and switches

Other materials, including construction equipment
- Examples: Trucks, fuel, drills and other machinery, generators

And many activities throughout the production, logistics, and deployment of those materials

Illustrative, High-level Supply Chain for Fiber Optic Cables

- **Raw materials**
  - May include glass, cables, chemicals and other materials

- **Manufacturer and/or Cabler**
  - First, manufacturer turns raw materials into fiber; Cabler takes fiber and turns into final fiber optic cables

- **Distributor**
  - Sells fiber optic cables to telecom provider or directly to sub-contractor

- **Telecom provider**
  - Purchases fiber to expand their network

- **Sub-contractor**
  - Hired by Telecom provider to install fiber optic cable (long haul or local)
Network planning and deployment should aim to protect cybersecurity interests

Network infrastructure devices are ideal targets for malicious cyber actors.

The risk of cyberattacks must be mitigated by reducing supply chain vulnerabilities during network planning, deployment, and maintenance.

For example:

- During sourcing, refer to the FCC's Covered List.
- Identify critical suppliers and set robust security requirements for their procurement; conduct regular monitoring to ensure suppliers are continuing to comply with requirements.

<table>
<thead>
<tr>
<th>Source</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>NTIA’s Communications Supply Chain Risk</td>
<td>A program designed to help small / rural providers’ and equipment suppliers’ better understand supply chain risks.</td>
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<tr>
<td>Information Partnership</td>
<td></td>
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<tr>
<td>NIST SP 800-161</td>
<td>Guidance on identifying, assessing, and mitigating ICT supply chain risks at all organizational levels.</td>
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<tr>
<td>FCC’s Covered List</td>
<td>List of communications equipment and services that pose an unacceptable risk to national security or the security and safety of United States persons.</td>
</tr>
<tr>
<td>For your constituents: Privacy + Security</td>
<td>A digital skills resource library to help individuals learn about protecting themselves online.</td>
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<td>Skills Resources</td>
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THE SIZE AND SPEED OF NEW DEPLOYMENT WILL EXACERBATE ONGOING SUPPLY CHAIN CHALLENGES

IIJA represents an unprecedented increase in the scale of federal broadband investment…

...As network operators and subscribers also continue to exhibit strong demand

BIP¹  BTOP²  RDOF³  IIJA⁴
~$228M  ~$4.7B  ~$20.4B  ~$65B

**DRIVERS OF SUPPLY CHAIN CHALLENGES WILL VARY DEPENDING ON MATERIALS AND TECHNOLOGY**

**Examples of supply chain constraints**

<table>
<thead>
<tr>
<th>Category</th>
<th>Sample material</th>
<th>Drivers of expected shortage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Passive infrastructure</td>
<td>Fiber</td>
<td>• <strong>Demand has increased</strong> significantly in recent years as carriers and tech companies increasingly move to replace older technology or expand</td>
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<td>• <strong>Fiber supply is limited</strong>: production is capital-intensive, high-tech, difficult to ramp up quickly</td>
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<td>• Constraint will be particularly high for sub-grantees without existing supplier contracts (e.g., smaller providers)</td>
</tr>
<tr>
<td>Active infrastructure</td>
<td>Semiconductor</td>
<td>• <strong>Impacted by worldwide semiconductor shortage</strong> and shipping constraints: most chips are manufactured overseas, and deliveries are already delayed by months</td>
</tr>
<tr>
<td></td>
<td>chips</td>
<td>• Broadband electronics (like modems, central office electronics, and satellite ground equipment) compete with other high-demand goods for chips (like cars)</td>
</tr>
<tr>
<td>Construction equipment</td>
<td>Bucket trucks</td>
<td>• Key to aerial deployment, bucket trucks have been impacted by worldwide chip shortage</td>
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<tr>
<td></td>
<td></td>
<td>• Shortage in bucket trucks for purchase have led to a subsequent increase in the price of used trucks and rentals</td>
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<tr>
<td></td>
<td></td>
<td>• Widely-used, broadband <strong>competes with other construction projects</strong> for use of trucks</td>
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</table>
WHILE INDUSTRY IS WORKING TO IMPROVE SUPPLY CHAIN, STATES CAN ALSO TAKE ACTIONS TO EASE CHALLENGES

**Regional planning**
- Work with providers and other stakeholders to coordinate regional planning & identify potential efficiencies

**Policies and mechanisms**
- For example, consider “dig once” policies to lay conduit today, in preparation for adding future fiber when available
- For more, please see NTIA’s [Enabling Conditions webinar](#) (Apr. 6, 2022)

**Plan for supplier resilience**
- Weave risk-based assessments into vendor engagements and acquisition strategies

**Existing infrastructure**
- Map existing broadband assets to identify potential to utilize and avoid unintentional damage and delay
- Facilitate cooperation among providers and asset owners (e.g., brownfield deployment)

**Public assets**
- Where possible, make public infrastructure open access to speed deployment and reduce costs

**Aggregate purchasing**
- Consider pooling demand to support sub-grantees in finding suppliers (especially smaller providers)
Lucy Moore, Special Policy Advisor, Office of the Assistant Secretary, NTIA
BROADBAND DEPLOYMENT REQUIRES A WORKFORCE WITH DIFFERING FUNCTIONS AND NEEDS

<table>
<thead>
<tr>
<th>Sample responsibilities</th>
<th>Sample Roles</th>
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<tbody>
<tr>
<td>Design &amp; Planning</td>
<td>Design proposed networks</td>
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<tr>
<td></td>
<td>Ensure all technical, safety, permitting, and other requirements are met prior to and during construction</td>
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<tr>
<td></td>
<td>Network architect or planner</td>
</tr>
<tr>
<td></td>
<td>Project management</td>
</tr>
<tr>
<td></td>
<td>Civil engineers</td>
</tr>
<tr>
<td>Specialized Broadband</td>
<td>Conduct all specialized labor for fiber, coaxial, and wireless technologies</td>
</tr>
<tr>
<td></td>
<td>Install last-mile fiber at premises</td>
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<tr>
<td></td>
<td>Fiber splicer</td>
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<tr>
<td></td>
<td>Installer (e.g., line, drop)</td>
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<tr>
<td></td>
<td>Tower technician</td>
</tr>
<tr>
<td></td>
<td>Tower climber</td>
</tr>
<tr>
<td>Construction</td>
<td>Perform all additional excavation, trenching, lashing, and other labor for safe installation of broadband network materials</td>
</tr>
<tr>
<td></td>
<td>Civil construction crew</td>
</tr>
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<td></td>
<td>Machinery operator</td>
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Disclaimer: These sample roles are intended to be illustrative and should not be considered an exhaustive list.
INTENSIFYING DEMAND COMBINED WITH A TIGHT LABOR MARKET WILL LIKELY LEAD TO BROADBAND LABOR SHORTAGES

New programs will greatly increase broadband labor needs...

Even before IIJA, broadband demand was strong and increasing

- At the pre-IIJA (2021) rate of deployment, expected 850K new broadband and 5G jobs through 2025¹

IIJA investment will accelerate workforce needs

...As broadband-specific roles face shortages

Drivers of broadband workforce shortages:

- **Skilled workforce shortage**: Specialized broadband labor, like fiber technicians, are in short supply; trainers also limited
- **Overall labor shortage**: An estimated 3.5M workers are still missing from workforce (vs. no-pandemic projections)²
- **Competing roles**: Other new IIJA jobs will likely seek similar worker profiles (e.g., construction)

¹ US Telecom Letter to Biden (link), 2. Projections based on 2015-2019 growth, April, 6, 2022 WSJ article (link)
LABOR CONSTRAINTS ARE LIKELY TO BE EVEN HIGHER IN RURAL AREAS

With BEAD's focus on unserved & underserved households, significant deployment will be rural

Rural America will have higher resourcing needs…

A higher percentage of remaining unserved and underserved areas are rural

Also, likely to see higher resourcing needs per location due to:

- Low population density
- Remoteness
- Difficult terrain

…Simultaneously, smaller potential workforce

Higher-skilled labor, like specialized broadband workers or network planners, may be particularly difficult to secure for rural deployment

Rural areas may continue facing broadband ops and maintenance labor shortages post-deployment, as workers relocate to new projects or returns to population centers
LABOR CONSTRAINTS AND POTENTIAL SOLUTIONS ARE LIKELY TO VARY BY WORKER NEEDED

<table>
<thead>
<tr>
<th>Design &amp; Planning</th>
<th>Specialized Broadband</th>
<th>Construction</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Design proposed networks</td>
<td>• Conduct all specialized labor for fiber, coaxial, and wireless technologies</td>
<td>• Perform all additional excavation, trenching, lashing, and other labor for safe installation of broadband network materials</td>
</tr>
<tr>
<td>• Ensure all technical, safety, permitting, and other requirements are met prior to and during construction</td>
<td>• Install last-mile fiber at premises</td>
<td></td>
</tr>
<tr>
<td>• Asynchronous planning across localities to allow for state-wide or regional pooling of design &amp; planning labor</td>
<td>• Potential to re-recruit former workers</td>
<td>• Take advantage of the likely skill transferability between construction projects by coordinating with other civil works projects</td>
</tr>
<tr>
<td></td>
<td>• Training and upskilling to meet demand increase</td>
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Sample responsibilities

Sample responsibilities

Potential shortage mitigations

Potential shortage mitigations
3 WAYS STATES AND LOCALITIES CAN PREPARE NOW TO EASE WORKFORCE CONSTRAINTS

States have ample opportunity to begin to tackle workforce constraints today in preparation for future deployment. 3 tactics to consider include:

1. Facilitate matching between workers and opportunities
2. Invest in and promote training programs and apprenticeships
3. Bolster state and local offices, in size and capabilities
FACILITATE MATCHING BETWEEN WORKERS AND OPPORTUNITIES

Collaborate with stakeholders to assess and anticipate needs
- Collaborate with local stakeholders to identify labor gaps, assess roadblocks, and develop strategies to break down existing barriers
- Consider publishing aggregated data for use by partners running amplifying and parallel efforts

Match workers to opportunities
- Work with organizations / individuals already in contact with potential workers (e.g., State Workforce Agencies) to actively match workers to opportunities (e.g., training/upskilling, broadband projects)
- Conduct outreach to workers who are unemployed, experienced in telecoms, have recently retired, or are in adjacent regions / industries

Share information and elevate available positions
- Consider public campaigns, in partnership with stakeholders, to elevate public awareness of available positions
- Partner with employers to improve job quality (e.g., wages, benefits)
- Act as a clearinghouse on broadband projects, ensuring stakeholders know where to find relevant information

Louisiana encourages collaboration and proactive training efforts
- Used CPF funding to establish GUMBO broadband grant program in 2021
- To get ahead of constraints, encouraged GUMBO applicants to partner with community colleges to build broadband workforce dev. programs
- Since Dec. 2021 grant deadline, 3 certification programs are under development
INVEST IN AND PROMOTE TRAINING PROGRAMS AND APPRENTICESHIPS

Assess training needs

Types of programs and potential impact vary widely, including reskilling, upskilling, re-entry, and entry-level training

Consider:
- What type of training would most benefit your local population and providers (e.g., lead time, skills taught, entrance level)?
- Which employers can help create career pathways?
- How can you expand recruitment to new groups (e.g., women, BIPOC)?
- What should students earn at program completion (e.g., certificate, job)?

Support training

Facilitate higher education and private sector programs aimed at upskilling and training broadband workers

Support may include:
- Subsidies for program operations or scholarships
- Connecting or matching training programs, employers, and workers
- Incentivizing sub-grantees to support training or partner with existing programs

Keep trainers in mind

Lack of adequate trainers may become a bottleneck for the expansion of training programs

Trainers should have boots-on-the-ground experience, knowledge of current regulations, and the correct teaching certifications

Reinforce trainer numbers by:
- Supporting re-entry outreach to retired Telecom or construction workers
- Potentially competing with private sector offers or otherwise financially incentivizing roles

Training Program Best Practices

- Partner with employers on program development; determine specific skills employers need
- Establish career pathways, with guaranteed and funded jobs or apprenticeships
- Ensure classes are accessible for all (e.g., working professionals, parents)
- Consider wraparound services
- Ensure trainers are comfortable teaching remotely
## TRAINING PROGRAM EXAMPLES

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<tbody>
<tr>
<td><strong>Focus</strong></td>
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</tr>
<tr>
<td>• Upskilling, entry level</td>
<td>• Advanced entry level</td>
<td>• Entry level (Apprenticeship Readiness Program), Advanced (Registered Apprenticeship)</td>
<td>• Reskilling / general digital skills</td>
</tr>
<tr>
<td>• Certification focus</td>
<td>• Certification focus</td>
<td>• Career pathway</td>
<td>• Career pathway</td>
</tr>
<tr>
<td><strong>Partnerships</strong></td>
<td></td>
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<tr>
<td>• Education initiated</td>
<td>• Trade association initiated</td>
<td>• ARP: Driven by community groups, in partnership with state &amp; local Building Trades Councils</td>
<td>• Private sector initiated</td>
</tr>
<tr>
<td>• Scholarships through Wisconsin State Telecommunications Association</td>
<td>• Partners with veterans programs, community and technical colleges</td>
<td>• Reg. Ap.: Driven by building trades unions, with employers</td>
<td>• Partners with nonprofit on job matching (Generation USA), colleges for delivery</td>
</tr>
<tr>
<td><strong>Description</strong></td>
<td></td>
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<tr>
<td>• A continuing ed program at a public technical college</td>
<td>• Curriculum developed by FBA and taught through partner colleges to train future fiber technicians</td>
<td>• ARP: Intro to each construction craft; also offers train-the-trainer</td>
<td>• Provides 100% free, online programs focused on technical and soft skills for the general public—preparing more people to fully engage in the digital world</td>
</tr>
<tr>
<td>• Provides training, professional development, and cross-training for broadband customer service specialists and installers</td>
<td>• Currently being piloted at Wilson Community College</td>
<td>• Reg. Ap.: “learn and earn” career training in 1 of 15 constructions crafts at the jobsite and in the classroom</td>
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<tr>
<td><strong>Course length</strong></td>
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<tr>
<td>• Broadband customer service specialist: 8 weeks</td>
<td>• 144 hours followed by 2,000-hour apprenticeship</td>
<td>• ARP: approx. 4-8 weeks</td>
<td></td>
</tr>
<tr>
<td>• Broadband Installer: 16 weeks</td>
<td></td>
<td>• Reg. Ap.: 3-5 yrs., depending on craft training req.</td>
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</tr>
<tr>
<td><strong>Certification or employer partnership</strong></td>
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<td></td>
</tr>
<tr>
<td>• Broadband Customer Service CE Certificate</td>
<td>• Certification as an FBA Accredited OpTIC Technician</td>
<td>• ARP: works to place graduates into Reg. Apprenticeship</td>
<td>• CompTIA A+</td>
</tr>
<tr>
<td>• Broadband Installer CE Certificate</td>
<td>• Pilot partnered with Greenlight Community Broadband for internship placing commitments</td>
<td>• Reg. Ap.: Certificate, other credentials, depending on craft (e.g., license for electrician)</td>
<td>• Assistance finding work or continuing ed</td>
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Program preparation & state planning
- Leverage partners during stakeholder engagement
- During planning, identify roles, responsibilities, and decision makers early to avoid delays

Sub-grantee selection
- Plan for expert support and/or training to speed subgrantee evaluation or proposal validation

Deployment
- Work with DoTs to improve rights-of-way (ROW) permitting
- Coordinate with Workforce Dev. Boards/State Agencies to prioritize broadband needs

Illustrative actions to take today

- Work with collaborators to collect data on access, adoption, assets, potential match sources
- Collaborate with sub-grantee applicants to ensure community needs will be met
- Identify state broadband contacts to convey local preferences during sub-grantee selection
- Ramp up permitting capacity and/or training
- Consider process changes that may speed permitting
- Staff-up to give timely construction inspections

Effectively staffing and organizing offices can accelerate overall construction timelines, reducing deployment workforce needs
## EXISTING FEDERAL PROGRAMS COULD POTENTIALLY FUND WORKFORCE DEVELOPMENT SOLUTIONS

<table>
<thead>
<tr>
<th>Name of Existing Federal Program/Resource</th>
<th>Description</th>
</tr>
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</table>
| Workforce Innovation and Opportunity Act (WIOA) ([link](link)) | • Primary federal source of workforce development funding, administered by Department of Labor  
• Funding coordinating entity may vary by state – often Workforce Development Boards |
| Strengthening Community Colleges Training Grants (second round) ([link](link)) | • $45M in grant funding, authorized by WIOA and available to higher ed institutions; applications due June 6, 2022  
• Awarded grants will focus on accelerated learning strategies that support skill development, rapid reskilling, and employment through targeted industry sectors and career pathway approaches |
| Employment and Training Administration (ETA) ([link](link)) | • A part of the Department of Labor, the ETA administers federal grants to states for employment-related programs, primarily provided through state and local workforce development boards  
• A current list of funding opportunities is available on the ETA site |
| USDA Rural Business Development Grants (RBDG) ([link](link)) | • A competitive grant designed to support activities leading to the development or expansion of small and emerging private businesses in rural areas (incl. workforce development)  
• Applications are closed for 2022, but re-open annually |
| The Federal Resources Playbook for Registered Apprenticeship ([link](link)) | • A guide on using select federal funds and resources to support apprenticeship, with additional information on available funding and programs |

For a full list of available federal grants, visit: [www.grants.gov](http://www.grants.gov)
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