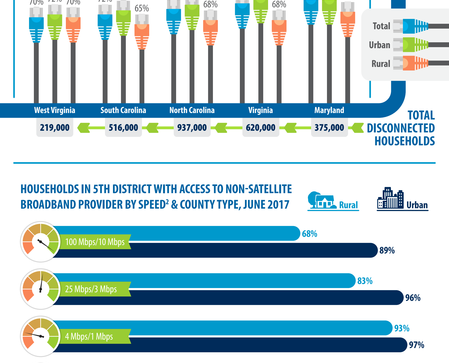
CONNECTING RURAL HOUSEHOLDS TO BROADBAND:

BARRIERS AND MODELS FOR PUBLIC INTERVENTION

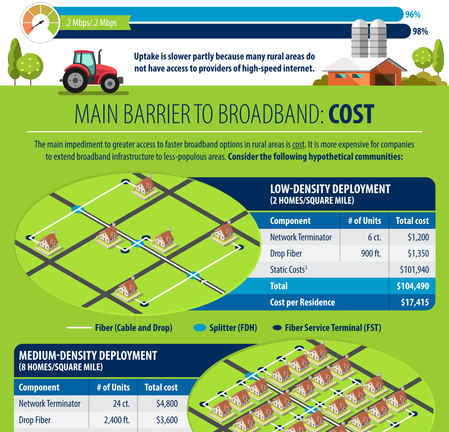
THE PROBLEM

A smaller share of rural households in the 5th District are connected to the internet, compared with urban areas.

HOUSEHOLDS WITH BROADBAND SUBSCRIPTION BY COUNTY TYPE[1], 2017



HOUSEHOLDS IN 5TH DISTRICT WITH ACCESS TO NON-SATELLITE BROADBAND PROVIDER BY SPEED[2] & COUNTY TYPE, JUNE 2017



Uptake is slower partly because many rural areas do not have access to providers of high-speed internet.

MAIN BARRIER TO BROADBAND: COST

The main impediment to greater access to faster broadband options in rural areas is cost. It is more expensive for companies to extend broadband infrastructure to less-populous areas. **Consider the following hypothetical communities:**

LOW-DENSITY DEPLOYMENT (2 HOMES/SQUARE MILE)

Component	# of Units	Total cost
Network Terminator	6 ct.	$1,200
Drop Fiber	900 ft.	$1,350
Static Costs[3]		$101,940
Total		**$104,490**
Cost per Residence		**$17,415**

Fiber (Cable and Drop) Splitter (FDH) Fiber Service Terminal (FST)

MEDIUM-DENSITY DEPLOYMENT (8 HOMES/SQUARE MILE)

Component	# of Units	Total cost
Network Terminator	24 ct.	$4,800
Drop Fiber	2,400 ft.	$3,600
Static Costs[3]		$101,940
Total		**$110,340**
Cost per Residence		**$4,597.[50]**

Nearly ¼ the cost of low-density areas

POSSIBLE SOLUTIONS FOR BROADBAND ACCESS EXPANSION IN RURAL COMMUNITIES

Options for broadband expansion in rural communities differ by cost and effectiveness.[4]

Technology	Definition	Cost to Connect (Rural)	Max Download Speed	Potential Limitations
Wireless — 6MHz TV White spaces	Internet using parts of broadcast TV spectrum	$10B–$15B	33 Mbps	Shares TV airwaves, possibly limiting speed and requiring FCC rule compliance
Wireless — 700 MHz Fixed	Internet using a stationary radio link	$15B–$25B	1,000 Mbps	Shares airwaves with other technologies, possibly limiting speed
Wireless — 2,500 MHz 4G LTE	Internet using a high-frequency radio link	$25B–$40B	100 Mbps	Only cost-effective in areas with over 200 people/sq. mile
Satellite	Internet using satellite signals	$30B–$45B	100 Mbps	Data usage limitations, higher latency and higher consumer costs
Fiber-to-home	Internet using fiber optic technology	$45B–$65B	1,000 Mbps	Higher upfront construction costs and delays

POTENTIAL PARTNERS

There are numerous different potential players in broadband development projects:

FUNDERS

- Institutional Investors
- Venture Capitalists
- Angel Investors
- Governments
- Opportunity Zone Funds
- Financial Institutions[5]
- Philanthropy

DEVELOPERS & OPERATORS

- Local Governments
- Internet Service Providers
- Nonprofit Consortia
- Cooperatives

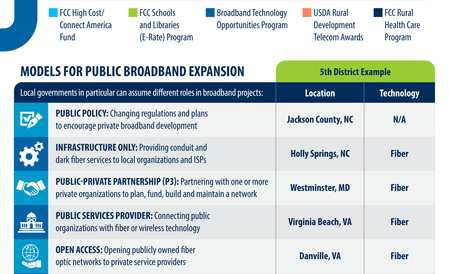
STAKEHOLDERS

- Residents
- Educational Institutions
- Health Care Providers
- Businesses
- Nonprofits
- Government Agencies

BROADBAND FUNDING

The federal government is the largest single funder of broadband infrastructure projects in the 5th District, supporting **$6.09 billion** in investments between 2009 and 2016.

FEDERAL SUPPORT[6] FOR BROADBAND INFRASTRUCTURE EXPANSION, FY09–16



MODELS FOR PUBLIC BROADBAND EXPANSION

Local governments in particular can assume different roles in broadband projects:	5th District Example: Location	5th District Example: Technology
PUBLIC POLICY: Changing regulations and plans to encourage private broadband development	Jackson County, NC	N/A
INFRASTRUCTURE ONLY: Providing conduit and dark fiber services to local organizations and ISPs	Holly Springs, NC	Fiber
PUBLIC-PRIVATE PARTNERSHIP (P3): Partnering with one or more private organizations to plan, fund, build and maintain a network	Westminster, MD	Fiber
PUBLIC SERVICES PROVIDER: Connecting public organizations with fiber or wireless technology	Virginia Beach, VA	Fiber
OPEN ACCESS: Opening publicly owned fiber optic networks to private service providers	Danville, VA	Fiber
RETAIL PROVIDER (BUSINESS ONLY): Offering internet services to business and industrial districts	Allegany County, MD	Fixed Wireless
RETAIL PROVIDER (RESIDENT & BUSINESS): Offering internet services to all residents	Wilson, NC	Fiber

For more information, visit:
https://www.richmondfed.org/community_development

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ENDNOTES

[1] For this infographic, urban areas are defined as counties in metro areas with 1 million or more residents (USDA Rural Urban Continuum Code (RUCC) 1) or any county in a metro area with 250,000 to 1 million residents (RUCC 2). Rural/smaller towns are those in RUCC categories 3–9. For more information about the USDA RUCC, please see https://www.ers.usda.gov/data-products/rural-urban-continuum-codes.aspx.

[2] 25 Mbps download/3 Mbps upload is the FCC-defined benchmark broadband speed.

[3] Static Costs include fiber service terminal, trenching, splitter cabinet and splitter card.

[4] DSL technology not included because its average download speeds are below the FCC benchmark threshold of 25 Mbps/3 Mbps.

[5] Bank investment in broadband infrastructure for low- and moderate-income communities may qualify for Community Reinvestment Act (CRA) credit.

[6] The High Cost, Schools and Libraries and Rural Health Care Programs are part of the FCC's Universal Service Fund.

GENERAL SOURCES

The Problem:
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Barriers to Broadband:
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Solutions for Broadband Access Expansion in Rural Communities:
Wolfgang Bock et al., "The Economic Case for Bringing Broadband to the Rural US," The Boston Consulting Group (2018); "USDA Rural Development 2016 Progress Report," U.S. Department of Agriculture (2017); BroadbandSA, "Grants Awarded," (2019); Rural Health Care Program Funding Commitments, FY2009–FY2016, Universal Service Administrative Co.

Models for Public Broadband Expansion:
John Horrigan, "Seven Models for Community Broadband," Broadband Communities Magazine (2016); "Municipal Broadband Case Studies & Benchmarking Analysis," Magellan Advisors; Wolfgang Bock et al., "The Economic Case for Bringing Broadband to the Rural US," The Boston Consulting Group (2018).