

Broadband Access Transformation: Drivers and Funding

Liliane Offredo-Zreik

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Executive Overview

Governments worldwide are investing on a massive scale to bring broadband to unserved and underserved areas, recognizing broadband as an essential utility to help address economic and other disparities. Public capital has attracted equally substantial amounts of private capital from investors, private companies, and others. This paper highlights the drivers for investing in broadband buildouts and the major sources of funding from the various government programs, and some of the large investments from investors and operators.

Introduction

As a wave of digitization sweeps the entire world, governments have become very aware of the acute challenges caused by the lack of access to broadband, either due to availability or affordability, as broadband has become an essential delivery mechanism for education, healthcare, and many other critical services.

This realization, and the glaring disadvantages that economically challenged, under connected communities faced during the recent pandemic, have led governments worldwide to invest massively to bring broadband to underserved or unserved locations. Bridging the digital divide and empowering rural and other underserved communities has become a stated goal for many governments and public entities.

While government funding for broadband in areas that are uneconomic to serve for the private sector is not new (for example, the RDOF program in the US over the past few years), the scale and scope of the funding is unprecedented and is akin to the rural electrification and interstate transportation government programs of the past century.

The massive public funding has attracted equally substantial private capital from operators, private equity, and other sources, resulting in a once in a lifetime transformation of the access network and adjacent infrastructure. In the US alone, the amount of money going into broadband is estimated at \$100 billion.

The drive toward broadband for all is happening at the same time as the access network is undergoing a fundamental transformation in technologies, economics, architecture, and operations management.

This paper provides an overview of the funding that is fueling the access network transformation, particularly in North America and Europe where this funding is most substantial, as well as an overview of the technologies and operations underpinning this transformation.

Part 1: The Drivers for Broadband Funding

Introduction

Broadband¹ is now recognized as an essential utility or infrastructure worldwide, on par with electricity and water, leading governments to invest to remediate broadband disparities. The amount of funding from some governments and private entities is staggering and leading to a once in a generation transformation, which will improve the prospects for many people and, it is hoped, lead to better economic outcomes. In a study in 2020, the US Federal Reserve found that broadband access and adoption in rural areas are linked to increased job and population growth, higher rates of new business formation, increases in home values, and lower unemployment rates.

- In healthcare in the US the traditional social determinants of health (food, shelter, transportation) now have an added determinant, broadband, which is even called a super determinant of health. Rural areas typically suffer from a shortage of healthcare services, including providers and hospitals; 77% of rural areas are considered health professional shortage areas², and 88.2% of rural counties in the U.S. are considered medically underserved³. Broadband will play a major role in remediating this disparity by enabling providers to provide service remotely and by bringing healthcare resources to the patient (more advanced medical services in the patient's home or local care delivery centers). The FCC is exploring the impact of broadband on healthcare under its Connect2Health FCC initiative. This will impose new requirements, such as guaranteed bandwidth, reliability, and security.
- Broadband plays an essential role in education, particularly as online learning and distance learning gain momentum. Providing broadband to underserved rural areas will have a profound impact on education opportunities and long-term economic prospects.
- Broadband enables farmers to follow commodity prices, enabling them to better run their businesses. It also allows them to communicate with customers, develop new markets for their products, introduce automation to promote efficiency and increase productivity and adopt precision farming, to name a few. For example, farmers can use IoT sensors to get accurate real-time information on greenhouse conditions such as lighting, temperature, soil condition, and humidity.
- The availability of broadband will encourage business formations and will encourage companies to locate facilities in newly served areas, where the availability of broadband combined with lower cost real estate makes these areas more attractive.

¹ There are many definitions of broadband. In the US, it was defined as 25 Mbps downstream, but the FCC wants to change it to 100 Mbps downstream. In Europe, there is no specific definition of broadband across the board.

² <https://data.hrsa.gov/tools/shortage-area/hpsa-find>

³ <https://data.hrsa.gov/data/download>

Extending broadband to previously underserved areas will not be effective unless local residents can afford to pay for the services it provides. The US government is wisely addressing this issue with the Affordable Connectivity Program (ACP), which provides up to \$30/month (more in tribal areas) in subsidy for broadband to eligible people. The US government is making offering the ACP a condition of funding for ACP in the USDA and BEAD programs, among others. However, the ACP program is unique (other countries do not have such programs), and the \$14.2 billion allocated to it as part of the 2021 infrastructure bill will likely expire in mid-2024. The future of ACP is being debated in the US Congress.

Broadband Funding

Although the importance of broadband is well understood, funding for broadband globally is far from equitable. The US is investing a staggering almost \$100 billion in broadening internet access. To a much smaller extent, European governments are investing large sums in broadband deployments. By contrast, in countries in Latin America, governments are seeking public/private partnerships, providing tax breaks and other incentives but largely relying on operators to address the broadband availability gap. There are many point solutions but no overall strategy. One example is Brazil's allocation of R\$3.5 billion (\$650 million) for states to provide internet access to poor public school students by buying them data plans and tablets. There are limited new government programs in Asia Pacific to fund broadband deployments beyond existing programs (for example, China's \$14.6 broadband investment fund set up in 2017). Unfortunately, poor countries must rely on the World Bank and similar entities for some limited broadband funding. The following highlights the major initiatives in broadband funding, focusing on the countries that are the most active with such investment.

In addition to government funding, private capital is pouring into broadband deployments. In the US, private capital is complementing BEAD funding. Some private equity specialists have already invested billions in broadband. For example, Apollo purchased the ILEC assets in 20 states from Lumen for \$7.5 billion and created a new entity, Brightspeed, serving 6.5 million homes. Telco and cable operators are expected to apply for BEAD funding and to supplement government funding with their own capital.

United States

US Broadband Government Funding ⁴				
Funding Program	Federal Agency	Amount	Timing	Comments
BEAD	NTIA	\$42.5 Billion	2023+	Funding delivered through the states. Seeks to provide high-speed internet access by funding planning, infrastructure deployment and adoption programs. Based on outcome of mapping to determine areas of broadband need. On June 30, NTIA announced its BEAD funding allocation to each state

⁴ ACG analysis

				and territory, with amounts ranging from \$3.3 billion (Texas) to \$27.1 million (U.S. Virgin Islands). Here is the full detail of allocation of BEAD funding ⁵ .
RDOF	FCC	\$20 Billion	Round 2 in Process	Phase 1 ended on Nov. 25, 2020, and awarded \$9.2 billion in support to 180 bidders; Phase 2 will award up to \$11.2 billion.
Middle Mile	NTIA	\$1 Billion	Feb 2023	Connect underserved communities to Internet backbone. Fuel the construction, improvement or acquisition of middle-mile infrastructure. The recipients of middle-mile funding were recently announced ⁶ .
CPF	Treasury/ARPA	\$10 Billion	2022–2023	Funding to states related to PHE; unclear if persistent, especially after “Fiscal Responsibility Act.” To date (June 2023) it has awarded \$6.7 billion for broadband, digital technology, and multi-purpose community centers, funding projects in 42 states that reach about 1.88 locations ⁷ .
ARPA	Treasury	\$20 Billion	Ongoing	Used by states and localities to fund broadband deployments.
Tribal Broadband Connectivity	NTIA	\$2 Billion	Ongoing	Broadband deployment on tribal lands, as well as for telehealth, distance learning, broadband affordability and digital inclusion.
USDA Reconnect	USDA	\$1.15 Billion	Applications Were Due Nov 2022	Future rounds depend on funding availability; primarily for rural areas; here is a recent snapshot of recipients and projects in the fourth round ⁸ .
Total		\$97 Billion		

Table 1. US Federal Funding

Operators are using multiple sources of capital to fund their initiatives: operations, public markets, private equity, and government funding (primarily RDOF as BEAD funding is not available yet). The following are some of the key US operators with announced broadband deployments:

⁵<https://internetforall.gov/news-media/biden-harris-administration-announces-state-allocations-4245-billion-high-speed-internet>

⁶<https://broadbandusa.ntia.gov/funding-programs/enabling-middle-mile-broadband-infrastructure-program/funding-recipients>

⁷ <https://www.telecompetitor.com/on-its-first-birthday-capital-projects-fund-looks-back-on-6-7b-in-awards/>

⁸ <https://www.rd.usda.gov/media/file/download/usda-rd-reconnect-r4-tranche-2-06122023.pdf>

- **Altice USA:** Targeting 6.5 million fiber passings by the end of 2025⁹.
- **AT&T:** Goal of reaching 30 million fiber passings by year-end 2025¹⁰.
- **Brightspeed (Apollo):** Plans to invest at least \$2 billion to bring fiber to more than 3 million homes and businesses over the next 5 years, primarily targeting locations where fiber and advanced technology have not historically been deployed¹¹.
- **Charter Communications:** Building fiber to about 1 million locations using RDOF money.
- **Cincinnati Bell (now Altafiber):** \$100 million investment to deliver fiber to about 52,000 locations by 2026¹².
- **Consolidated Communications:** Plans to upgrade 1.6 million passings to fiber by 2025.
- **Frontier Communications:** Plans to convert 10 million passings to fiber by 2025.
- **Lumen (Quantum Fiber):** Targets 8–10 million fiber passings by 2027.
- **MetroNet:** Expanding fiber service to more than 1 million homes and businesses.
- **Windstream (Elliott Management):** Targeting about 300k fiber passings/year.
- **Ziplay Fiber:** Plans to build/upgrade 900k premises to fiber, bringing its network footprint to 1.4 million fiber passings by 2024. Raised \$350 million from bondholders in addition to PE capital. Migrating technology to XGS-PON.

Canada

The Universal Broadband Fund is a \$3.225 billion investment by the government of Canada designed to help provide high-speed internet access to 98% of Canadians by 2026 and achieve the national target of 100% access by 2030.

Europe

The EC's strategy on Connectivity for a European Gigabit Society sets out a target of access to connectivity offering at least 100 Mbps for all European households by 2025¹³.

Pan European Broadband Funding

There are many funding initiatives across the continent:

*Connecting Europe Facility Digital*¹⁴

A €1.6 billion euro fund to be implemented between 2021 and 2027. It will focus:

- Development of safe, secure, and sustainable high-performance infrastructure, including Gigabit and 5G networks.

⁹<https://www.alticeusa.com/news/articles/press-release/fiber/altice-usa-announces-acceleration-fiber-deployment-strategy-announces-multi-year-plan-bring-100>

¹⁰ <https://www.fiercetelecom.com/broadband/heres-how-much-fiber-us-operators-are-planning-build-2023>

¹¹ <https://www.bbcmag.com/breaking-news/brightspeed-officially-begins-operations-and-fiber-deployment>

¹² <https://www.fiercetelecom.com/broadband/altafiber-ramps-ohio-fiber-deployments-100m-investment>

¹³ Source: European Commission

¹⁴ https://hadea.ec.europa.eu/programmes/connecting-europe-facility_en

- Increased capacity and resilience of digital backbone infrastructures.
- Digitization of transport and energy networks.

Allocation:

- €800 million for 5G coverage along transport corridors.
- €389 million for backbone connectivity for digital global gateways.
- €142 million for 5G for smart communities.
- €100 million for backbone networks for pan European cloud federations.

The Connecting Europe Broadband Fund

The Connecting Europe Broadband Fund (CEBF), launched in 2018, aims to improve broadband connectivity. Eligible countries to receive funding are EU member states, Norway, Iceland, and the United Kingdom. The fund held its final close in June 2021, raising €555 million for broadband investment and is expected to unlock total investments of €1-1.7 billion¹⁵.

CEBF only invests in greenfield projects, defined as investments done by start-up companies or companies that have an asset base that is small compared to the cumulative investments planned for new assets. Eligible projects use state of the art technology and are deployed in predominantly underserved areas. Each investment will not exceed €50 million for a project.

Broadband Funding in Major European Countries

The following is a list of countries and their highlights of funding in Europe since 2021¹⁶¹⁷¹⁸¹⁹:

Germany: €12 billion (2021) for fiber in areas with less than 100Mbps in broadband speeds. These funds will be used to cover 50% to 70% of the cost of the GB roll out²⁰. Telefonica and Allianz signed an agreement for the creation of a joint venture to deploy FTTH in Germany with an investment of approximately €5 billion over the next six years.

Spain: €4.3 billion for 5G and extend high-capacity network coverage by 2025. €812 million for high-speed connectivity and 5G in rural areas and €150 million for passive infrastructure for mobile networks.

France (Plan France Tres Haut Debit): Total cost about €21 billion, with public investment comprising €13 billion to €14 billion. €3.3 billion to expand fiber throughout the country by 2025. €240 million for rural connectivity. €812 million for high-speed connectivity and 5G deployments in rural areas. €150 million for

¹⁵ <https://digital-strategy.ec.europa.eu/en/library/connecting-europe-broadband-fund>

¹⁶ <https://www.whitecase.com/insight-our-thinking/funding-europes-broadband-ambitions>

¹⁷ <https://datlinfra.com/broadband-investment-deployment-government-funding/>

¹⁸ <https://www.progressivepolicy.org/wp-content/uploads/2022/09/PPITelecoms0922.pdf>

¹⁹ <https://datlinfra.com/broadband-investment-deployment-government-funding/>

passive infrastructure for mobile networks. In 2020, €7 billion to strengthening French digital sector, including focus on infrastructure. FTTH household coverage in France is only 57.1% today.

Infrastructure fund Vauban and Axione have launched a €6 billion digital platform to consolidate the French firm's existing digital assets into one platform, with the unique trait of offering accessibility to all telecom operators.

Italy: Jan 2022. €3.7 billion for broadband expansion through private operators as part of €6.7 billion Italy earmarked for broadband (fixed, 5G, and satellite).

UK, Project Gigabit: The treasury pledged £5 billion to bring 1 Gb broadband to over 1 million hard to reach homes and businesses.

Austria, Symmetric Gigabit: €2 billion from European Commission to roll out passive infrastructure for fixed broadband access networks in areas of the country where there is no current or planned network able to provide at least 100 Mbps download speed.

The EU also has the Connecting Europe Facility program (CEF2 Digital), a co-financing program managed by the European Commission that is scheduled to run to 2027. The €3 billion funding program will support digital infrastructure investment in member states.

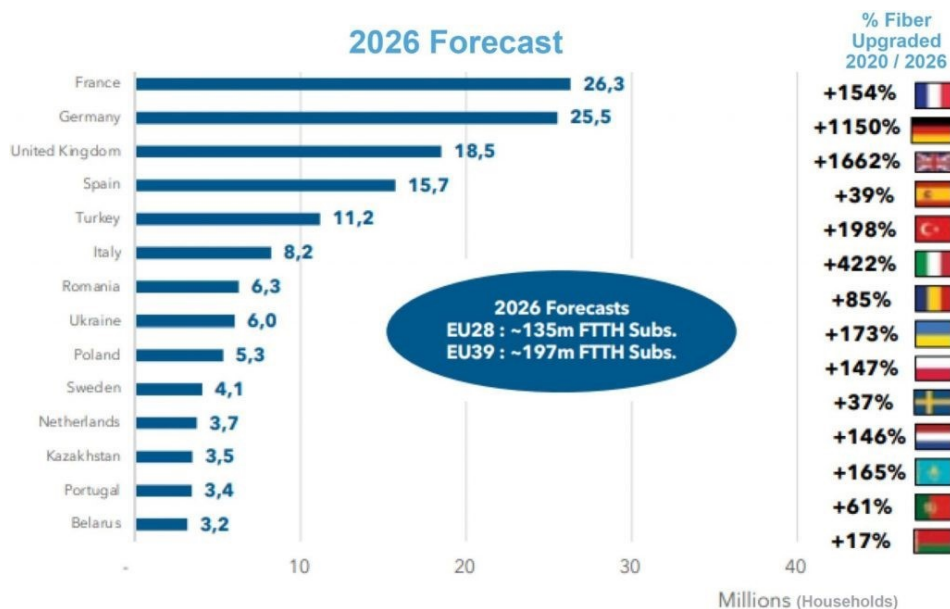


Figure 1. Households Passed in Millions (left) and Percentage Change in Fiber

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