

Introduction to Broadband

Overview of the regulatory and market landscape for broadband service in Vermont

Presentation for the House Committee on Energy and Digital Infrastructure

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What is Broadband?



“Broadband” is the transmission of wide bandwidth data over a high-speed internet connection (not dial up; always on)



“High-speed internet connection” is defined by the FCC as at least 100/20 Mbps

100 Megabits per second download

20 Megabits per second upload

Evolving metric

[Ookla Speed Test](#)



Often the terms are used interchangeably

Broadband Connection Types

Wired

- DSL
- Cable modem
- Fiber optic cable
- Hybrid fiber coaxial

Wireless

- Mobile or fixed:
 - Terrestrial (cellular; WISPs; FWA)
 - Satellite (geostationary and LEO)

Network Architecture

[Graphic from NTIA Broadband USA](#)



Network Types:

Last mile (end user to node)

Middle mile (node to core)

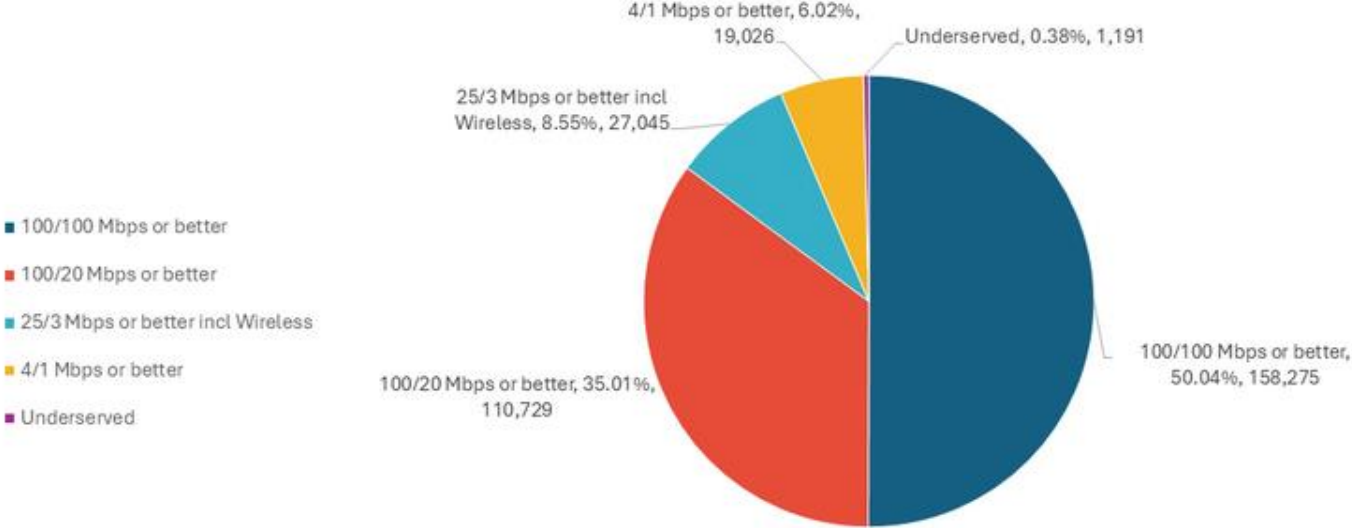
Internet backbone core

(Connects “end users” with “edge providers”)

VT's Goal for Universal Connectivity

By the end of 2024, every E-911 business and residential location in VT has access to broadband capable of at least 100/100 Mbps

Broadband Coverage by Highest Speed Available 2024



National Communications Marketplace (2024 FCC Report)



Since 2018, every two years the FCC must assesses the state of competition across the broader communications marketplace



More than 1/3rd of Americans have only one or no high-speed broadband provider



Of the 121 million fixed residential connections in 2023:

- 61% cable
- 23% fiber
- 9% twisted-pair copper
- 6% terrestrial fixed wireless
- 2% satellite

Challenges to Universal Connectivity



Infrastructure costs (money and time)



Affordability (cost of service)

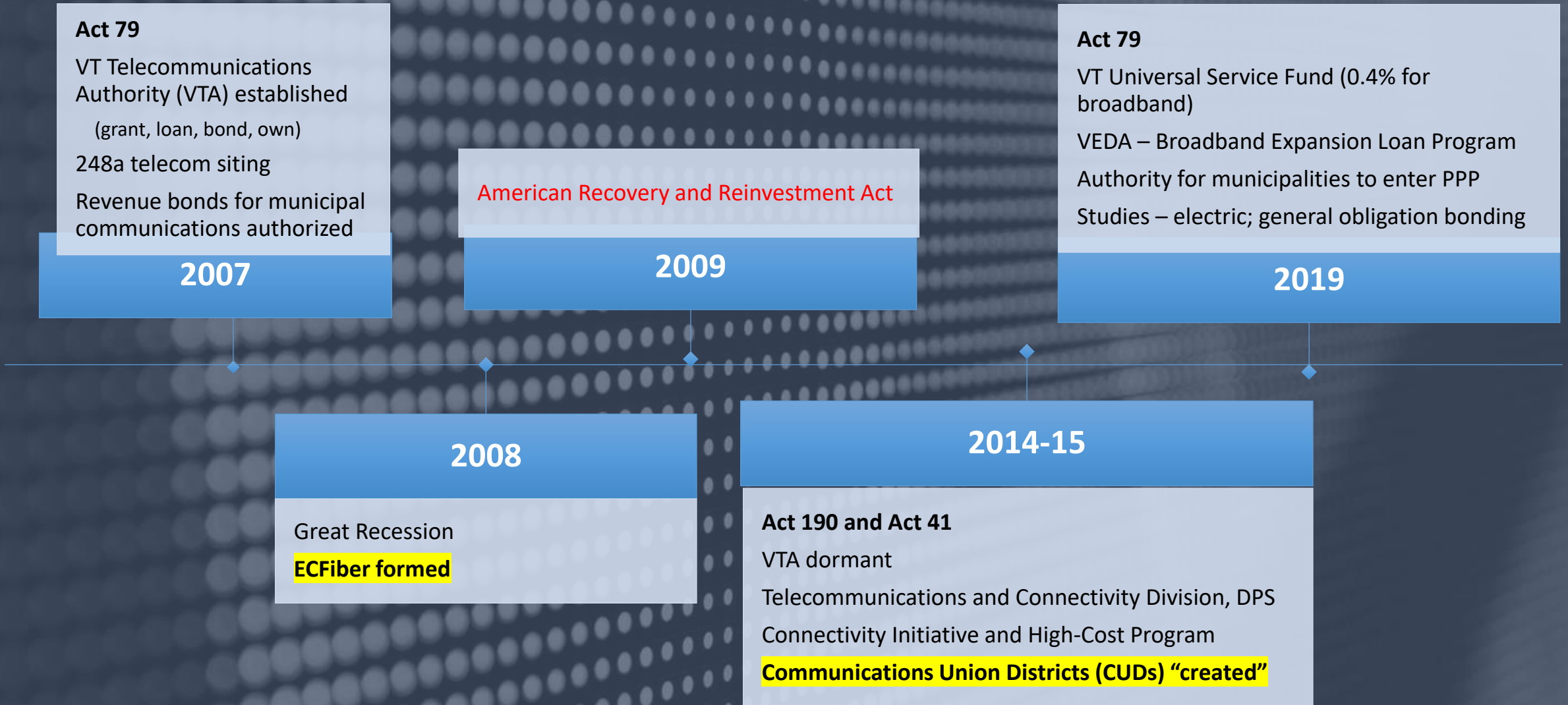


Lack of digital literacy; digital equity

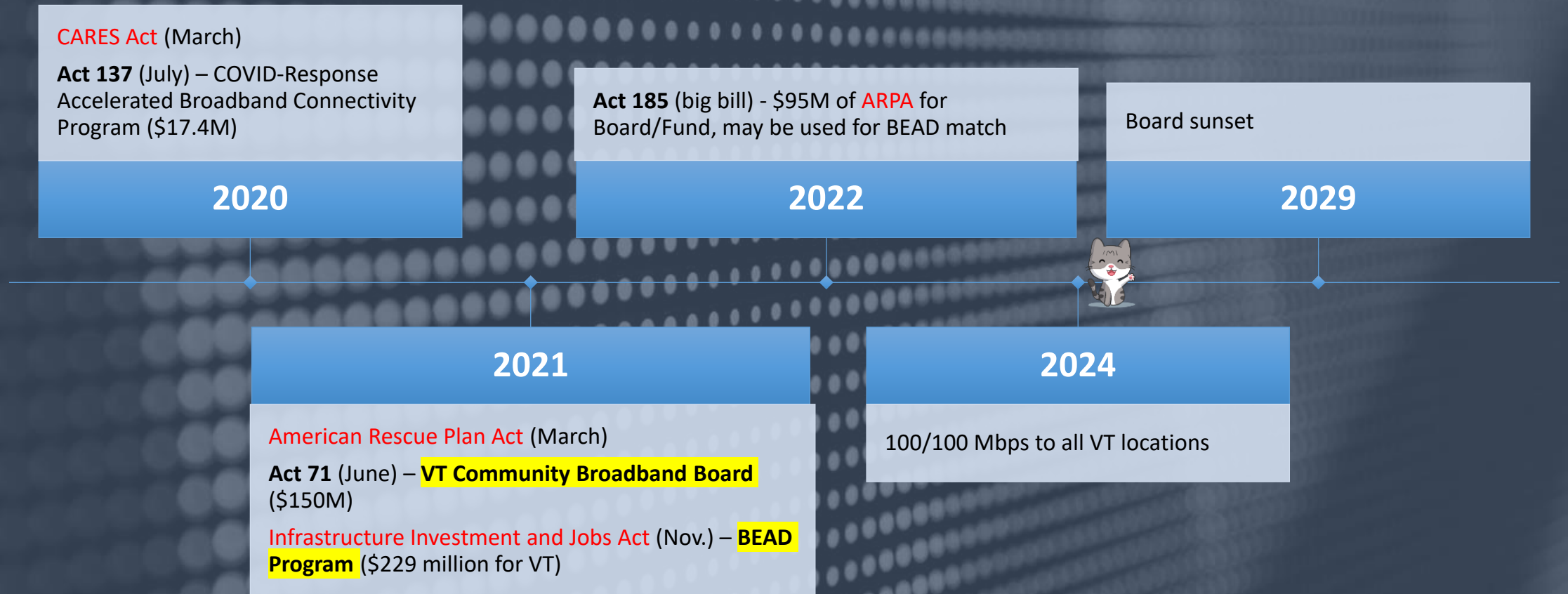


Regulatory Considerations

VT Broadband Timeline (2007 - 2019)



VT Broadband Timeline (2020-2029)



Vermont Community Broadband Board



Mission

The VCBB was created to coordinate, facilitate, support, and accelerate the development and implementation of universal community broadband solutions



Grant programs

For projects of at least 100/100 Mbps



Eligible entities

CUDs, small telecom providers; ISPs working with CUDs



Communications Union Districts (CUDs)

Municipal entities that deploy broadband in unserved and underserved areas



Intent

All projects become financially self-sustainable (subscription revenue; private/municipal bond market)



CONNECTED

Vermont's Grassroots Effort for Rural Broadband



Broadband Equity, Access, and Deployment (BEAD) Program (in brief)



\$42.5B last-mile infrastructure program

\$229M grant for VT



States may competitively award subgrants for (in priority):

Connecting unserved (below 25/3
Mbps)

Connecting underserved (below
100/20 Mbps)

Connecting community anchor
institutions with 1/1 Gbps



Matching requirement (25%) except in high-cost areas



Project requirements

Service of at least 100/20 Mbps (and
low latency and no outages over 48
hours/year)

Offer at least one low-cost
broadband service option

Complete buildout within 4 years of
receiving subgrant

Regulatory Landscape

Communications Act of 1934

- Established the FCC
- To regulate interstate and foreign commerce in communication by wire and radio
 - Telephone; telegraph; radio
- Cooperative federalism (interstate/intrastate)
- Telephone companies mostly local
 - Intrastate common carriage, utility model

Technologies Developed and Evolved

1939 First commercial TV broadcast

1948 First cable TV (to pick up broadcast signals)

1970s First national cable TV networks

1982 Breakup of Bell system

1983 Commercial launch of the first handheld cellphone, “the brick”

1989 Commercial launch of **dial-up access** to the internet; early DSL arrives

Internet access over a common carrier network

1990 Tim Berners-Lee invents WWW, HTML, first web browser

1996 Residential broadband through cable and ADSL modems (dial-up era replaced by broadband era)



Policy Shift to Deregulation

Telecommunications Act of 1996

To provide for a pro-competitive, de-regulatory national policy framework designed to accelerate rapidly private sector deployment of advanced information technologies and services to all Americans by opening all telecommunications markets to competition

Forbearance Provision – FCC must forbear from applying unnecessary regulations to telecommunications carriers or services

Internet Tax Freedom Act (1998)

3-year moratorium made permanent in 2016

Broadband Classification: Regulatory Approaches

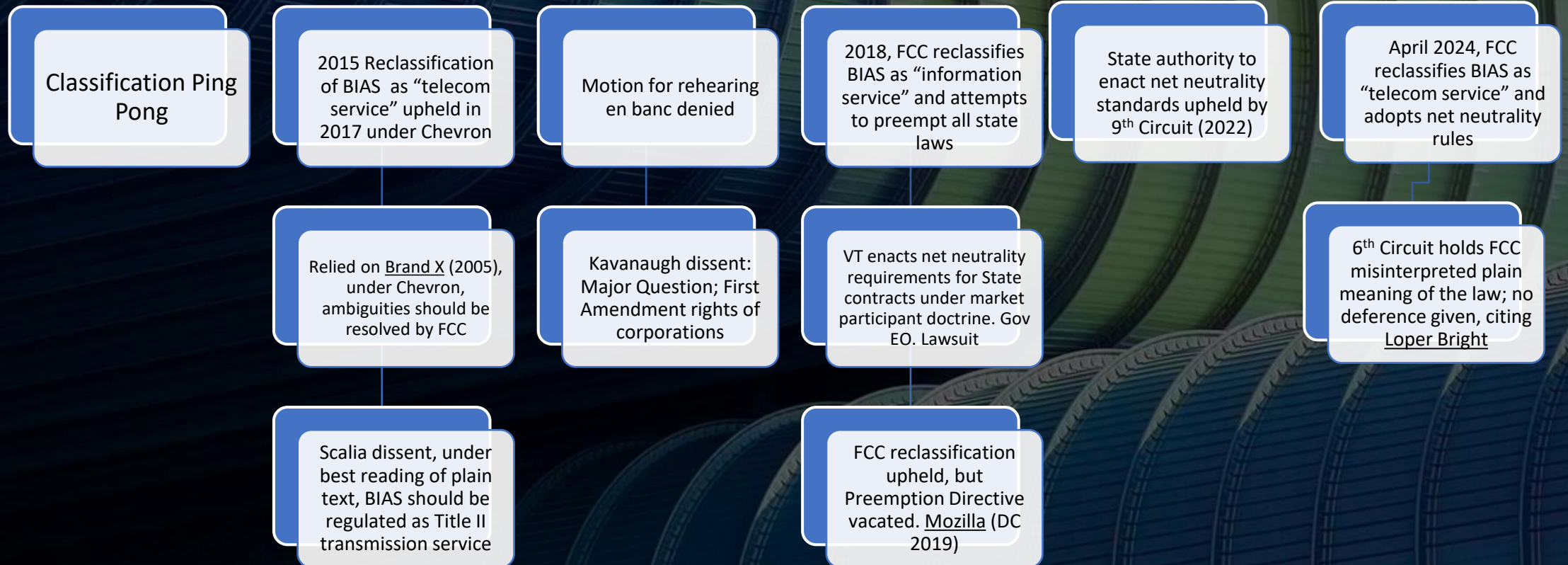
“Information service” – market-based, light-touch under Title I

Means the offering of a capability for generating, acquiring, storing, transforming, processing, retrieving, utilizing, or making available information via telecommunications, and includes electronic publishing, but does not include any use of any such capability for the management, control, or operation of a telecommunications system or the management of a telecommunications service

“Telecommunications service” – common carrier, utility-style under Title II

Means the offering to the public for a fee the transmission, between or among points specified by the user, of information of the user’s choosing, without change in the form or content of the information sent and received, regardless of the facilities used

Broadband Classification: Chevron, Major Question, or Plain Meaning?



Net neutrality is the principle that the company that connects you to the internet does not get to control what you do on the internet; i.e., no blocking, throttling, interfering, paid prioritization

Universal Service Fees and the Nondelegation Doctrine



Plaintiffs argue USF “fees” are really “taxes” and only Congress has the authority to assess taxes (254 is explicit but unconstitutional); and
FCC cannot subdelegate taxing power to private entity (USAC)



FCC argues USAC performs administrative, ministerial functions on behalf of FCC and has no independent regulatory power

FCC prevailed in the 6th and 11th Circs.

Plaintiffs prevailed in the 5th Circ., en banc, 9-7



Supreme court will consolidate cases and review

Federalism – Jurisdictional Issues

- Supremacy Clause vs. Tenth Amendment
- Congress has power to regulate interstate commerce (broadband is inherently interstate)
- States have police powers to protect the public welfare – consumer protection
- Balancing the two in an ever-changing national/local landscape
 - Market consolidation and competition; technological innovations; consumer usage
- Two significant consumer protection laws enacted and reviewed to date:
 - 2nd Circuit upholds 2021 NY law requiring ISPs to offer plans as low as \$15/month, cert denied
 - 9th Circuit upholds 2018 California net neutrality law

Emerging Issues

- Privacy
- Affordability
- Broadband and the Grid
- Spectrum
- Geotechnopolitics
- Trump Administration Forecast

Privacy

- FCC's 2016 Privacy Rule repealed by Congress in 2017
- Federal Trade Commission has authority to regulate data collection practices based on unfair and deceptive trade practices laws, as does the VT AG
- Several states have enacted comprehensive privacy legislation

Affordability

- **Federal Lifeline Program**
- **Affordable Connectivity Program (\$14.2B)**
 - Established in 2021 by the federal Infrastructure Investment and Jobs Act
 - An extension and modification of the FCC's Emergency Broadband Benefit
 - Subsidy up to \$30 month (was \$50)
 - \$100 towards device
 - Income eligibility 200% of FPL (increased from 135%)
 - Ended June 1, 2024 due to lack of funding

Broadband and the Grid

Heavy data and power users



Grid Modernization



AI



Crypto Mining



Content Delivery Networks

UNITED STATES FREQUENCY ALLOCATIONS

THE RADIO SPECTRUM

- RADIO SERVICES COLOR LEGEND**
- AERONAUTICAL MOBILE
 - AERONAUTICAL MOBILE SATELLITE
 - AERONAUTICAL RADIONAVIGATION
 - AMATEUR
 - AMATEUR SATELLITE
 - BROADCASTING
 - BROADCASTING SATELLITE
 - DATA RELAY/NAVIGATION SATELLITE
 - FIXED
 - FIXED SATELLITE
 - INTER-SATELLITE
 - LAND MOBILE
 - LAND MOBILE SATELLITE
 - MARITIME MOBILE
 - MARITIME MOBILE SATELLITE
 - METEOROLOGICAL
 - METEOROLOGICAL SATELLITE
 - MOBILE
 - MOBILE SATELLITE
 - RADIO DETERMINATION SATELLITE
 - RADIOLOCATION
 - RADIOLOCATION SATELLITE
 - RADIONAVIGATION
 - RADIONAVIGATION SATELLITE
 - SPACE RESEARCH
 - STANDBY FREQUENCY AND TIME SIGNAL
 - STANDBY FREQUENCY AND TIME SIGNAL SATELLITE

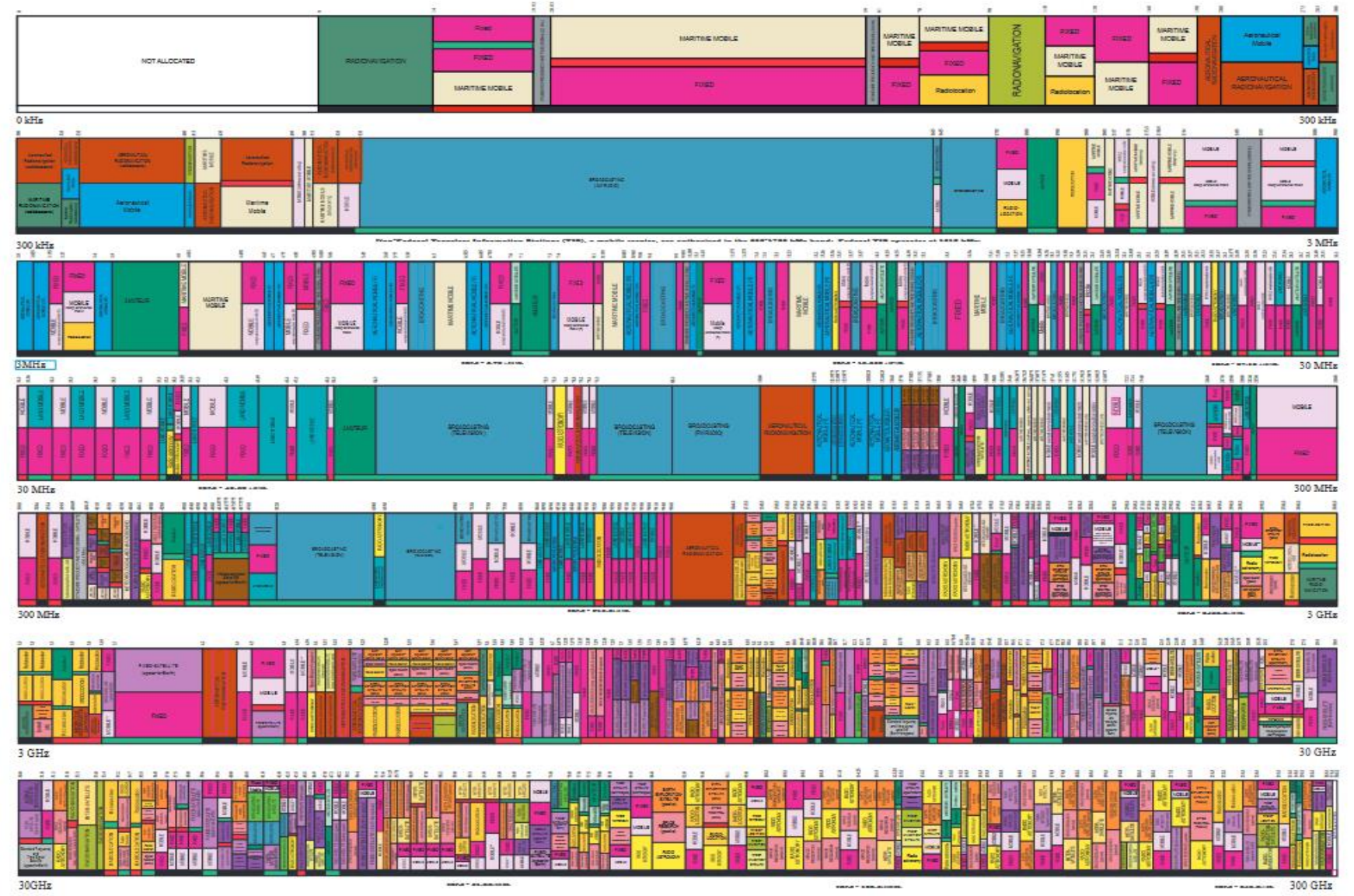
- ACTIVITY CODE**
- FEDERAL/GOVERNMENT
 - FEDERAL/NONFEDERAL SHARED
 - NONFEDERAL/GOVERNMENT

ALLOCATION USAGE DESIGNATION

SERVICE	EXAMPLE	DESCRIPTION
Primary	F3DZ	Digit 1 Letter
Secondary	D4B6	Let Digit with inverse value

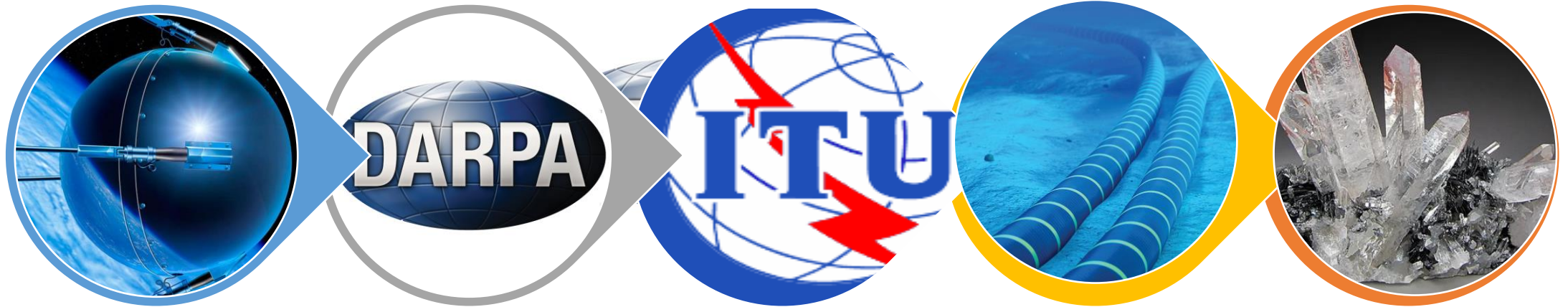
This chart is a graphic representation of the radio frequency spectrum as used in the United States, based on the current allocations of spectrum. It is not intended to be a legal document. For a complete and authoritative listing of the radio frequency spectrum, please refer to the Federal Communications Commission's (FCC) Part 2 of the Code of Federal Regulations, Title 47, Chapter 1, Subchapter C, Part 25.101-25.999. The information in this chart is for informational purposes only and should not be used as a legal reference.

U.S. DEPARTMENT OF COMMERCE
 National Telecommunications and Information Administration
 Office of Spectrum Management
 JANUARY 2016



PLEASE NOTE: THIS CHART IS FOR INFORMATIONAL PURPOSES ONLY AND SHOULD NOT BE USED AS A LEGAL REFERENCE. FOR A COMPLETE AND AUTHORITATIVE LISTING OF THE RADIO FREQUENCY SPECTRUM, PLEASE REFER TO THE FEDERAL COMMUNICATIONS COMMISSION'S (FCC) PART 2 OF THE CODE OF FEDERAL REGULATIONS, TITLE 47, CHAPTER 1, SUBCHAPTER C, PART 25.101-25.999.

Geotechnopolitics



Trump Administration Forecast



Brendan Carr, Trump's nominee for Republican Chair of FCC

Authored FCC chapter in Project 2025

- Reign in big tech (content providers; 230 political viewpoints/content moderation; pay USF)
- National security (cybersecurity; supply chain)
- Support LEO (global space leadership); commercialization of spectrum
- Competition, market forces



Department of Government Efficiency (Advise OMB)

Elon Musk

- Cut 1/3 of U.S. government's annual budget (\$2T)
- Cut 75% of the federal government workforce (1.5 million civilians)
- Eliminate regs contrary to recent Supreme Court decisions