

THE 2014 VERMONT TELECOMMUNICATIONS PLAN



Pursuant to 30 V.S.A. § 202d

Public Comments Draft

TABLE OF CONTENTS

Executive Summary i

Chapter 1: An Overview of Past, Current, and Future Telecommunications Trend

I. Introduction..... 1-1

II. Voice

 a. An Overview of the Vermont Voice Market 1-2

 b. Verizon/NYNEX Sale..... 1-2

 c. Incentive Regulation 1-3

 d. Federal and State Universal Service Changes 1-5

 e. E-911 1-8

 f. Transition to VoIP..... 1-8

 g. Wireline Abandonment..... 1-10

 h. Commercial Mobile Radio Service (CMRS)..... 1-10

 i. The Future of Voice Service 1-13

III. Internet Access..... 1-14

 a. Overview of Vermont’s Internet Access Market and Infrastructure 1-15

 b. Minimum Technical Service Characteristic Objectives 1-15

 c. Legal Framework for High Speed Internet Access Improvement 1-16

 d. State Efforts to Increase Broadband Availability 1-18

 e. ILEC High speed Internet Access Expansion..... 1-19

 f. VTel Wireless Open World 1-20

 g. CLEC Broadband..... 1-21

 h. Mobile Wireless Data Service 1-22

 i. Public Broadband Initiatives..... 1-23

 j. The Future of Broadband in Vermont..... 1-23

IV. Video..... 1-24

 a. Overview of Vermont’s Video Market..... 1-24

 b. National Trends in Video..... 1-25

 c. Public, Educational, and Government TV 1-26

 d. The Future of Video..... 1-27

Chapter 2: Telecommunications Almanac

I. Introduction..... 2-1

II. Telephone Service..... 2-2

 a. Telephone Penetration 2-2

 b. Retail Service 2-3

 c. Intercarrier Compensation 2-6

 d. Universal Service 2-7

III. Cable and Video..... 2-11

IV. Broadband Service Availability and Adoption 2-12

 a. Computer and Internet Adoption 2-12

 b. Broadband Penetration and Availability 2-12

 c. Broadband Pricing 2-13

V. National and State Wireless Trends 2-15

- a. Competition and Market Consolidation..... 2-15
- b. Mobile Radio Service Retail Rates 2-17
- VI. Consumer Protection..... 2-18

Chapter 3: Public Input Process

Note: The Department of Public Service was fortunate to be able to receive grant money to conduct a telecommunications Survey this year. In April, the Department hired the Castleton Polling Institute to conduct the Survey. The Survey results and report are forthcoming and are expected in mid-August. The Department will post the results on its website as soon as results are received. Included in this draft is the 2012 Telecommunications Survey, which was conducted by ICF International.

Chapter 4: Vermont State Government Telecommunications Plan

- I. Optimization 4-1
- II. Data Communications..... 4-2
- III. Voice Communications..... 4-3
- IV. Strategic Plan 4-4
 - 1. Enterprise Approach 4-4
 - 2. Robust and Flexible 4-5
 - 3. Public Safety and Emergency Preparedness 4-6
 - 4. Protection of Information Assets and Networks 4-7
 - 5. Integration of Telecommunications Services..... 4-8

Chapter 5: Telecommunications Development Planning and Regulatory Policy

- I. A Vision for Vermont 5-1
- II. Telecom Infrastructure Planning and Development 5-2
 - a. Infrastructure Financing and Service Development 5-2
 - b. Technical Objectives..... 5-3
 - c. Open Access..... 5-4
 - d. Service Adoption 5-6
 - e. Broadband and Mobile Wireless Mapping 5-7
 - f. Public, Educational, and Government Access 5-8
- III. Regulatory Policy..... 5-8
 - a. Incentive Regulation 5-9
 - b. Municipal Telecom Providers..... 5-9
 - c. Mobile Wireless Service Regulation 5-10
 - d. Line Extension Policy 5-11
 - e. Pole Attachment Rules..... 5-12
 - f. E-911 5-12
 - g. FCC Advocacy..... 5-13
- IV. Conclusion 5-13

Appendices

- Table of Locations by Wire Center.....App. 1
- Service Maps.....App. 2

EXECUTIVE SUMMARY

I. INTRODUCTION

The telecommunications market in Vermont is a competitive environment in which consumers have choice between many service providers and platforms to meet their telecommunications needs. Vermont, much like the rest of the nation, has witnessed great technological and economic change in the communications industries—change that touches almost every aspect of life in Vermont, from healthcare to political engagement. As Vermont heads into the future, it must consider the challenges and opportunities the current telecommunications landscape presents. This document considers the range of issues affecting the provision of telecommunications, video, and Internet service in Vermont, as well as the policy considerations affecting each service. This document puts forward the general objective of ensuring that every Vermonter has access to quality, reliable, and affordable communications services.

The Department of Public Service is a unit of the executive branch of Vermont state government, and is charged with representing the public good in energy, telecommunications, water, and wastewater utility matters before the Public Service Board (PSB). The Department exercises regulatory authority over telephone service, cable service, and wireless telecommunications facilities. In addition, the Department has played an active role in facilitating the state's recent broadband expansion efforts. Vermont law directs the Department to prepare and periodically revise a telecommunications plan covering a ten-year period. The Plan must consider a host of statutory goals, including strengthening the universal availability and affordability of telecommunications services, supporting the availability of modern mobile services, providing the benefits of future advancements in technology to Vermont residents, and supporting competitive choice for consumers.¹ It is with this mandate in mind that the Department publishes this *2014 Telecommunications Plan*.

The *Plan* has three primary objectives. First, the *Plan* is intended to inform Vermont residents and policy makers of the current state of telecommunications services, infrastructure, and regulation in Vermont. The *Plan* explores how technological advances and shifts in consumer demands have caused significant changes in how telecommunications companies invest in infrastructure and how residents use their services.

Second, the *Plan* presents readers with future challenges facing the state in providing telecommunications. The major challenge facing Vermont is the ability of service providers to continue to service and expand capability in rural areas. As this *Plan* demonstrates, market forces, technological advancements, and national regulatory policies have caused disruption and dysfunction in the telecom industry. As the state looks to the future, the state must overcome challenges affecting the provision of basic service and broadband in highly rural areas.

Lastly, the *Plan* suggests policies and initiatives to help Vermont attain its telecommunications objectives. While demand for telecommunications services are greater than ever, the state's authority to regulate the market has waned. The state has adopted an incentive based framework, in which it encourages the build-out of infrastructure through grants,

¹ 30 V.S.A. § 202c

expeditious permitting of facilities, and other inducements. As the state looks to the future, it must grow existing private-public partnerships and create new relationships. The *Plan* outlines ten desired goals and the strategies the state should employ to meet those goals.

II. CURRENT STATE OF VOICE, INTERNET ACCESS, and VIDEO INDUSTRIES

a. *Technology and Market Trends: 2004 – 2014*

When the *Telecommunications Act* was signed into law in 1996, the Public Switched Telephone Network (PSTN) and the Internet were nearly completely separate.² Voice service over the PSTN was the only plausible definition of an “essential” service.³ This remained largely true at the publication of the Department’s *2004 Telecommunications Plan* when competition in the telephone market was still establishing itself. But technological changes over the last 10 years have blurred the line between what is an essential service and what is not. One significant change is the use of packet switching to carry voice data in the same way that information data is transmitted.

The dominant packet switching technology, voice over Internet protocol (VoIP), has allowed a greater number of competitors to enter the voice market, such as cable and Internet content companies. Some companies provide voice service to fixed locations over internally managed Internet protocol (IP) networks, while other providers use IP technology to send voice traffic over the public Internet (nomadic VoIP).⁴ More importantly, VoIP has challenged the distinction between “telecommunication service” (or “basic service”) and an enhanced “information service.”⁵ Because federal law distinguishes between telecommunication and information services, and regulates each one differently, the rise of VoIP raises an important question about what is a telecommunications service. The transition from traditional circuit switched technology to IP technology is inevitable, and the roles that states and the national government play in this transition will be crucial to determining basic questions about quality, reach, and affordability of basic voice service in the future.

The voice telephony market has changed in other ways. Commercial Mobile Radio Service (cellular service) has become a dominate technology in the telecommunications industry over the past decade. The *2004 Telecommunications Plan* survey indicated that an overwhelming majority of Vermont households (77%) had not even considered the idea of giving up their traditional landline service in favor of wireless service. Today, 29.9% of Vermont adults live in wireless-only households, and that number continues to increase as service expands and becomes more reliable.⁶ Recent consolidation of the wireless market has resulted in four nationwide carriers offering service in Vermont. These carriers have made great inroads into rural Vermont, installing facilities in some

² JONATHAN NUECHTERLEIN & PAUL J. WEISER, *DIGITAL CROSSROADS: AMERICAN TELECOMMUNICATIONS POLICY IN THE DIGITAL AGE*, at 231 (2d ed. 2013).

³ PETER BLUHM & ROBERT LOUBE, *VERMONT UNIVERSAL SERVICE GOALS AND POLICY OPTIONS* at 3, 35 (2014). Authors Bluhm and Loube argue that services other than telephony may be essential, but that it is up to states to decide.

⁴ Department of Public Service, *Vermont Telecommunications Plan* at 1-6 (2004).

⁵ States have regulatory authority over intrastate telecommunications services, but are generally preempted from regulating interstate information services. *See In re Investigation into Internet Protocol (VoIP) Services*, 2013 VT 23, ¶ 6. Federal Law gives the U.S. Department of Commerce and the Federal Communications Commission limited authority over Broadband service. 47 U.S.C §§ 1302 et. seq.

⁶ Blumberg SJ, Ganesh N, Luke JV, Gonzales G. Wireless substitution: State-level estimates from the National Health Interview Survey, 2012. National health statistics reports; no 70. Hyattsville, MD: National Center for Health Statistics. 2013.

of the hardest to reach places of the state. The result has been that Vermonters increasingly rely on their wireless devices to communicate.

The other area of great change has been in the nationwide adoption and use of Internet technology. The Internet, which was once considered an exclusively academic pursuit, is now an essential component of modern life. In 2004, only 27% of Vermont households subscribed to broadband (high speed) Internet service. By 2012, 76% of Vermont households subscribed to high speed Internet.⁷ This increase in adoption has been the direct result of an increasing supply of Internet applications, as people now use their connection to watch video, access social media, write emails, work from home, and much more. The Internet has become essential to participating in the modern economy. Small and large businesses rely on the Internet to sell goods and services. Job seekers use it to search for employment. As more Vermonters continue to adopt and use the Internet, broadband Internet access will play an increasing role in the economic success of Vermont.

Ten years ago, only 75% of the state's locations had high speed internet access available, defined then as 768 kilobits per second (kbps) download and 200 kbps upload. In the *2011 Telecommunications Plan*, the state put forward a goal of ubiquitous availability of broadband at 768/200 kbps with service at 10 megabits per second (Mbps) available to most locations by 2013. The state met this goal, thanks to the investments and hard work of Vermont service providers and state leaders. Key investments from private partners, federal stimulus, and state capital appropriations have yielded great success in the expansion of basic broadband service.⁸ Today, service is available in 99% of the state, with the remaining 1% having a funded solution in place. Seventy five percent of households have access to speeds of four Mbps download and one Mbps upload, or faster.

While broadband subscription rates have increased, Vermont cable companies have experienced a corresponding decline in cable subscriptions. The *2004 Telecommunications Plan* noted a moderate increase in cable availability as cable operators expanded their plants. In recent years, however, cable subscription has been on the decrease. In 2009, the number of in-state cable connections peaked at 139,275. As of 2012, there were 132,373, and that number is expected to trend downward as consumers abandon cable in favor of Internet hosted video content. The decline in cable subscriptions will likely not be fatal to cable companies, especially those that offer telephone and broadband service. However, the decline in subscriptions does present funding challenges for public access television, because public access stations derive their funding from revenue generated by cable video subscriptions. Declining subscriptions have resulted in lower funding amounts for public access stations.

b. Universal Service and Inter-carrier Compensation Reform

Universal Service was, and still is, the cornerstone of telecommunications regulatory policy in the United States. Universal Service is the idea that telephone service should be available to everyone. Both the state and federal government further this policy by managing universal service funds. The federal Universal Service Fund benefits four programs—Lifeline, Rural Healthcare, Schools and Libraries (E-Rate), and the Connect America Fund (formally the high

⁷ High speed is defined as 768 Kbps download and 200 Kbps upload. 2012 Vermonter Poll, Center for Rural Studies (Discussed *Infra* at Chapter 2).

⁸ *Telecommunications Plan v. 4.0*, Section 3-10, 2004

cost fund)—all of which are aimed at managing cost and increasing telephone penetration. In 2011, having declared providing high speed Internet access to be the “universal service challenge of our time,” the Federal Communications Commission (FCC) set about the largest reform of the Universal Service Fund since the *1996 Telecommunications Act*. The FCC order, known as the *Transformation Order*, made two fundamental changes. It reformed interstate and intrastate inter-carrier compensation rules, and it redirected universal service support to the deployment of broadband in unserved areas of the nation.

The *Transformation Order* gradually eliminates high cost support to price cap carriers, such as FairPoint, and provides broadband support through the newly created Connect America Fund (CAF).⁹ The *Transformation Order* froze support for high cost support price-cap carriers and replaced high cost support with money tied directly to the build out of broadband facilities and the provision of broadband service.¹⁰ Through a series of “phases” over a period of time the FCC will distribute different sums of money, which will have various achievement goals and will be available to different sets of participants.

At the state level, changes in the Vermont Universal Service Fund (VUSF) provide a support mechanism similar to the CAF. The purpose of the VUSF is to support the Vermont Telecommunications Relay Services (VTTRS), telephone Lifeline Assistance, and the development of state-wide enhanced Emergency 911 service. To finance these programs, Vermont law imposes a broad based charge (“VUSF charge”) on all telecommunications services that interact with the public switched network.

The Vermont General Assembly added the Connectivity Fund to the menu of VUSF funded programs in 2014. Vermont service providers may now bid on grants through the VUSF to fund broadband expansion projects. The same legislation also created the Division of Connectivity to be under the aegis of the Agency of Administration. Its goal is to promote broadband service expansion within the state. The Division of Connectivity will have the ability to apply for support through the VUSF and will help direct state efforts to expand broadband service.

c. *The America Recovery and Reinvestment Act*

The 2008 financial crisis caused profound changes to American society, many of which negatively impacted working families. However, Governor Shumlin, Vermont’s Congressional Delegation, and Vermont’s telecommunications industry leaders positioned the state competitively with regard to opportunities created by the recession. The largest opportunity the state benefited from was funding provided through the *America Recovery and Reinvestment Act* (ARRA). In 2009 Congress made available an unprecedented \$813 billion in stimulus funding. This funding included many infrastructure projects to improve roads, electricity networks, and telecommunications infrastructure, among others.

Vermont Telephone (VTel) was Vermont’s largest recipient of ARRA funds, receiving funds to build a state-wide wireless network, fiber to the home in its landline service territory, and a statewide fiber backhaul project. Green Mountain Power, Vermont’s largest electric utility, also

⁹ The *Transformation Order* also reformed intercarrier compensation, a topic discussed in the Voice section of this Plan.

¹⁰ The FCC made modest changes to support for rate-of-return carriers, which includes most Vermont ILECs.

received ARRA funding, which it used to upgrade and expand VTel's fiber network. Through a partnership with VTel, GMP will utilize this fiber network as part of its smart grid network. The Vermont Telecommunications Authority (VTA) also applied for, and received, ARRA funding, which it sub-awarded to Sovernet to build out its middle mile fiber network. Once complete, these projects will provide important benefits to Vermont residents and businesses, especially those in rural areas. It is important to note that the amount of federal stimulus provided to Vermont entities was unprecedented and unlikely to be repeated in the foreseeable future.

III. THE CHALLENGES AHEAD

The changes described above present Vermont with three fundamental challenges. First, Vermont will need to grapple with the question of how to increase the speed of available broadband services. Second, Vermont will be faced with the challenge of maintaining basic voice service in rural areas. Lastly, changes in how consumers use services will require rethinking about how content is delivered in the multi-channel video industry. Questions about public access, retransmission costs, and the viability of the existing cable plant will turn on consumers' expectations for broadband and video services.

As discussed above, providing broadband service in rural areas is costly. National reform to the Universal Service Fund will help bring a basic level of service to rural areas. This support is contingent upon Vermont service providers accepting broadband specific universal service obligations. Furthermore, this support is unlikely to bring every Vermonter the level of service necessary for the state to remain economically competitive.

The goal announced in *The Vermont Telecommunications Plan 2011: Broadband* was to ensure that every address¹¹ in Vermont have access to broadband with the minimum technical requirements of four Mbps download and one Mbps upload by year end 2020. Also, by year end 2020, a majority of addresses in Vermont should have access to a broadband connection with speeds of at least 100 Mbps download and 100 Mbps upload. These speeds exceed the capabilities of existing deployed technology. In many cases this will mean procuring fiber to the node (FTTN) or fiber to the home (FTTH) in rural, high cost areas. As Vermont looks to the future, it must determine the efficacy of maintaining or increasing these benchmarks.

Support for basic voice service has diminished since the *Transformation Order*. Vermont will be faced with hard questions about how to supply service in high cost, unprofitable areas. Additionally, incumbent local exchange carriers (ILECs) face fierce competition in the denser, more profitable regions of the state. One report written on behalf of the Department of Public Service called Vermont a "daunting place to provide service," noting that in 2011 all Vermont incumbent telephone providers reported an aggregate net operating loss of \$39 million.¹² The same report predicted continuing losses for the foreseeable future. Yet despite high costs and line losses, every ILEC has an obligation, as carrier of last resort, to make service available to every location in its territory. To ensure that service continues in all areas of the state, Vermont will need to formulate policies that will encourage telecom providers to retain and expand voice service in high cost areas.

¹¹ "Address" means E-911 residential and business locations.

¹² PETER BLUHM & ROBERT LOUBE, COSTS AND PROFITABILITY OF VERMONT'S INCUMBENT TELECOMMUNICATIONS CARRIERS at 40 (2014).

Lastly, changes in ways video content is delivered to consumers have caused disruption in the multichannel video industry. Consumers are increasingly migrating to Internet-based content providers and are increasingly watching content “on demand.” A decline in cable subscription rates has meant a decline in revenues for public access television stations. A decrease in viewership means the relevance of public access through cable is called into question. As the state contemplates cable video policy, it should assess the value of public access television to consumers, and think about how consumers should pay for that content.

IV. VISION

While the state’s regulatory authority over telecommunications has diminished, its interest in maintaining affordable and reliable service has not. As this *Plan* looks to the state’s telecommunications future, it is important to have a sense of what that future should look like. The Department views the following goals as an essential part of supporting and growing a reliable telecommunications network throughout the state of Vermont.

1. *Broadband Speed.* Every address¹³ in Vermont should have broadband Internet access with the minimum technical requirements of 4 megabits per second (Mbps) download and 1 mbps upload. By year end 2020, a majority of addresses in Vermont should have access to the Internet at speeds of at least 100 Mbps symmetrical, and all addresses should have access to speeds of at least 10 Mbps download. By 2024, every address should have broadband with minimum technical requirements of 100 Mbps symmetrical.
2. *Broadband Deployment.* Every address in Vermont should have access to wired and wireless broadband Internet access service.
3. *Affordability.* Broadband service should be affordable to all customer classes.
4. *Local Public Generated Content.* The state should promote locally generated content that is used and useful to communities.
5. *Adoption and Usage.* Vermont should support the universal adoption and use of broadband service at home and at work.
6. *Mobile Service.* Vermont should have universal availability of mobile service along travel corridors and near universal availability statewide.
7. *Basic Service.* Vermont should have reliable, economical telephone service in all areas of the state, including rural areas. All residents, regardless of income or location, should have access to basic telephone service.
8. *Enhanced 911.* Vermont should have available the best possible E-911 service. The state should endeavor to find greater efficiencies within the e-911 system while maintaining and enhancing public safety.
9. *Competition* – Vermont’s telecommunications marketplace should be competitive, and all Vermonter’s should reap the benefits of competition.
10. *Regulatory Fairness* – Like services should be regulated alike, regardless of the platform or technology used to provide the service.

To meet Vermont’s telecommunications goals, the following strategies should be pursued:

¹³ “Address” means E-911 residential and business locations.

1. Vermont should provide universal service support for broadband build out projects. Vermont should require that all projects receiving public monies meet the minimum technical objectives set by the Department of Public Service.
2. Vermont should encourage the expansion of commercial mobile radio service by maintaining the existing permitting process for telecommunications facilities.
3. Vermont should continue its wireless and broadband mapping initiatives with or without federal support.
4. Vermont, through the Public Service Board, should examine existing cable line extension rules.
5. Vermont should assess the value of public access stations to the communities they serve and explore new ways in which local content can be cost effectively generated and disseminated to consumers.
6. The Department of Public Service and Public Service Board should continue a regulatory framework that facilitates competition, while assuring affordable basic service rates, high quality of service, consumer protection, and universal service.
7. Vermont policy makers should carefully consider the potential negative outcomes of state and municipalities directly competing with private firms in the provision of telecommunications services, especially in areas where consumers are adequately served. Vermont should refrain from policies, including financial incentives, that have the net effect of diminishing competitive choice in the marketplace.
8. The state should refrain from enacting laws that regulate like services differently. Vermont policy makers should advocate for national reform measures that regulate substitutable platforms similarly. As cross-platform competition increases, the state and national regulatory framework should equally regulate all service providers without regard to the way in which service is provisioned.
9. Vermont should stimulate demand for broadband service by promoting skills training programs and instituting policies for reducing the cost of broadband service for low income families.

V. BROADBAND ACTION PLAN

The State of Vermont has a legislated goal of universal availability of broadband Internet access services.¹⁴ In the short term, legislation indicates that Vermont seeks to provide each service location in Vermont with access to Internet service that is capable of speeds of at least 4 Mbps download and 1 Mbps upload (“4/1”).¹⁵ Over the longer term, legislation indicates that Vermont seeks to ensure that every business and residential locations in Vermont has infrastructure capable of delivering Internet access with service that has a minimum download

¹⁴ 30 V.S.A § 8060(b) states that it is the goal of the general assembly to ensure that (1) all residences and business in all regions of the state have access to affordable broadband service and (2) the universal availability of mobile telecommunication services, including voice and high-speed data along roadways, and near universal availability statewide.

¹⁵ 30 V.S.A § 7515b (a) indicates that it is the purpose of the Connectivity Initiative to achieve this goal.

speed of 100 Mbps and is symmetrical (“100/100”).¹⁶ To achieve these goals, the Department presents this Action Plan consisting of the following initiatives:

- It is projected that the Federal Communication Commission’s (FCC) Connect America Fund (CAF) Phase II program will, by 2020, bring universal availability of broadband Internet access at 4/1 to service to census blocks that are completely unserved.¹⁷
- The State of Vermont’s Connectivity Fund (including the High-Cost Program and the Connectivity Initiative)¹⁸ supported by the Vermont Universal Service Fund, will be directed to bring service to partially-served areas of the state. This will include areas that lack complete access to services meeting the minimum technical objectives (“Objectives”)¹⁹, but that are excluded from the CAF II program because they are partially served. This initiative will be aligned with the FCC program for universal availability at 4/1 by 2020. This will require two steps:
 - The Department will work with the Public Service Board to ensure that support from the High Cost Program is directed to these partially served areas.²⁰
 - In identifying areas eligible for Connectivity Initiative grant funding, the Department will develop and employ an inventory of infrastructure that is available or reasonably likely to be available to support provision of services to unserved areas²¹ to ensure that the Connectivity Initiative funds are directed to these partially served areas.
- After the goal of universal availability of 4/1 is met, the focus will be brought on furtherance of the goal of ensuring universal availability at 100/100.
- The Telecommunications Plan will define the Objectives²² to evolve over time as related below.²³
 - 2014: 4/1
 - 2017: 10/1²⁴

¹⁶ 30 V.S.A § 202c(10) indicates that it is the purpose of the state’s telecommunications planning and policy statutes to support measures designed to ensure achievement of this goal.

¹⁷ Areas eligible for the CAF Phase II program are census blocks in which no locations have internet access service at 4/1 (with data reported as 3 mbps down and 768 kbps up as a proxy for 4/1), or more, from a service provider other than the incumbent LEC. Grant recipients will be required to offer services supporting 4 mbps download speed and 1 mbps upload speed to all supported locations within 5 years of the award, expected in 2015.

¹⁸ 3 V.S.A § 7516 directs the Fiscal Agent of the Vermont Universal Service Fund to annually determine the amount of monies available to the Connectivity Fund, such funds apportion equally to the High-Cost program and the Connectivity Initiative.

¹⁹ The Objectives were defined in the 2011 Telecommunications Plan as 4 mbps download speed and 1 mbps upload speed.

²⁰ 30 V.S.A § 7515(j) indicates that the Board shall adopt procedures to ensuring projects funded under this section are not competitive overbuilds of existing wired telecommunications services.

²¹ 3 V.S.A § 2222b(b)(1) indicates that this is one of the duties of the Secretary of Administration.

²² 30 V.S.A § 202d(g) directs the Department to review and update the minimum technical service characteristic objectives in the Telecommunications Plan.

²³ The Objectives will remain at the previous level until commitments are in place to reach all unserved areas at the lower speed.

- 2020: 100/100²⁵
- The Objectives serve two specific purposes:
 - Locations lacking services at these speeds will be eligible for State support²⁶, and
 - Grantees accepting State support will be obligated to provide services at these speeds²⁷
- The Department, in cooperation with the Connectivity Division, will pursue additional strategies to meet the broadband goals outlined in statute, including:
 - Identify and aggregate shared customer access objectives
 - Develop manageable, replicable deployment models
 - Coordinate opportunities and stakeholders to advance economic development, education, public services, and healthcare
 - Coordinate multiple federal grant programs
 - Provide technical support for funding applications
 - Tap both private and public funding sources
 - Give technical support to State agencies to leverage federal funding

How this *Plan* is Organized

Vermont law directs the Department to prepare a plan addressing five subjects. This document follows that format, providing readers with chapters that address the statutory criteria in turn. Chapter one describes the future needs of Vermont's telecommunications infrastructure, looking ten years into the future. This chapter also discusses relevant events of the last ten years, and how those events have shaped the present. Chapter two is the Telecommunications Almanac. This section describes current telecom infrastructure and services. This section also provides a comparative analysis of Vermont relative to other states. Chapter three addresses the public input. The Department commissioned a survey of Vermont residences and businesses to assess the telecommunications needs of consumers. Chapter Four is a report, prepared by the Department of Information and Innovation, that describes the telecommunications infrastructure needs of state government. Chapter Five outlines the state's policy goals and strategies for the next ten years. This section outlines a vision of what Vermont's telecommunications systems ought to be and how Vermont can build them. This plan also outlines aggressive, but realistic, strategies for making this *Plan's* vision a reality.

²⁴ In June 2014, the FCC issued an FNPRN seeking comments on a proposal to increase the speed requirements for supported services from 4 mbps download speed to 10 mbps. It also sought comment on whether to increase the upload speed from 1 mbps, but did not propose a speed.

²⁵ The Department proposes that the goal of ubiquitous 4/1 set in 30 V.S.A § 7515b(a) should be met by 2020. The Objectives will be increased to 100/100 when the 4/1 goal is met.

²⁶ 30 V.S.A § 7515b(a) indicates that locations not served according to the Objectives are eligible for support from the Connectivity Initiative.

²⁷ 30 V.S.A § 7515b(a) does not specify the specific speeds required for supported services, but the Department finds that these services should meet the Objectives. 30 V.S.A § 2225(e) indicates that the Connectivity Division shall promote the expansion of services that meet the Objectives.

CHAPTER 1: AN OVERVIEW OF PAST, CURRENT, AND FUTURE TELECOMMUNICATIONS TRENDS IN VERMONT

I. INTRODUCTION

Vermont law requires the Department to give an overview of future requirements for telecommunications services that looks ten years into the future.¹ This overview must consider services needed for economic development, technological advances, and other trends and factors which, as determined by the Department “will significantly affect State telecommunications policy and programs.”² This chapter responds to that mandate. Below are separate discussions of the three major services—voice, Internet access, and video—which relate to telecommunications infrastructure and development. This chapter provides an overview of trends over the last ten years and likely future market trends.

II. VOICE

Vermont’s telecommunications market has grown more competitive in the last ten years with the entrance of competitive local exchange carriers (CLECs), explosive growth of mobile wireless telephone service, and telephone service being offered from cable providers. In urban and suburban areas such as Chittenden County, this influx of competition has resulted in greater choice of services for businesses and residents. Most Burlington residents for instance may now choose between at least three landline voice service carriers. In addition many consumers have cancelled landline phone service in favor of mobile radio or other service.

Competition, however, is less abundant in rural areas. Incumbent local exchange carriers (ILECs) are very often the only wireline provider in the state’s highest cost areas and act as the carrier of last resort (COLR). ILECs are losing lines in Vermont’s profitable, urban areas. At the same time, these carriers are experiencing reductions in high cost support. In the past, federal universal service funds were provided to support voice service. FCC changes indicate that the money will be redirected to support the provision of broadband. These two trends put great financial stress on ILECs, as they try to maintain an aging network for a dwindling number of customers.

Technological changes are also affecting the voice market. Voice over Internet protocol (VoIP) is poised to replace circuit switched technology with a voice system that rides over data networks. Telephone providers all over the country are seeking more cost effective ways to bring service to consumers. In some rural areas this may mean abandoning traditional wireline service altogether in favor of a wireless solution. The great challenge moving forward will be addressing the cost of service in rural areas.

¹ 30 V.S.A. § 202d (b) (1)

² *Id.*

a. An Overview of the Vermont Voice Market

Vermont is served by ten ILECs. The incumbent carriers are FairPoint Vermont, Inc., Franklin Telephone Company, Ludlow Telephone Company (TDS Telecom), Northfield Telephone Company (TDS Telecom), Perkinsville Telephone Company (TDS Telecom), Shoreham Telephone, LLC (OTT Communications), Telephone Operating Company of Vermont LLC (FairPoint Communications), Topsham Telephone Company, Vermont Telephone Company (VTel), and Waitsfield–Fayston Telephone Co., Inc.³ These companies have designated service territories and are obligated to make service available to every location in their territory. Incumbent carriers must file tariffs with the Public Service Board and adhere to service quality standards.⁴ Telephone Operating Company of Vermont is Vermont’s successor Regional Bell Operating Company (RBOC). Both FairPoint companies are price-cap carriers under state and Federal law. The eight “independent” ILECs are treated as rate of return carriers for purposes of federal law and are designated as “small eligible telecommunications carriers” by the Public Service Board, allowing them to receive Universal Service Fund support.⁵

Vermont is also served by several facilities based CLECs. CLECs are not rate regulated and have no imposed service territory.⁶ CLECs lease facilities of a phone company or co-locate equipment within ILEC owned central offices. Facilities based CLECs also include cable operators, which offer voice service through their cable network, and wireless Internet service providers (WISPS).

Voice competition exists throughout the state, but is not evenly distributed. Urban centers and suburban areas generally have multiple carriers. ILECs face competition from several facilities based providers. Most cable companies now offer voice service, and cable networks reach an estimated 67.5% of E-911 locations in Vermont.⁷ Three of the four national wireless providers also have a presence in Vermont, reaching an estimated 96% of the state’s geographic area. Within urban centers, ILECs experience intense competition from these providers, which can offer lower cost services. Rural areas have a less developed telephone market. In many rural exchanges, ILECs are the only landline carrier. In an estimated 22-25% of the state’s addresses, the designated ILEC is the only landline option for voice service.

b. Verizon/NYNEX Sale

Vermont has experienced a great deal of activity in the wireline telephone market over the past ten years. At the publication of the *2004 Telecommunications Plan*, Verizon New England owned the geographically largest telephone territory in New England. In 2007, Verizon sought to sell its lines in Vermont, New Hampshire, and Maine. FairPoint Communications, Inc., a North Carolina based corporation, agreed to purchase Verizon’s lines for \$2.7 billion, of which approximately \$1 billion was in the form of FairPoint stock transferred to Verizon shareholders.

³ A service territory map is located in Appendix 2 of this publication.

⁴ As directed by 30 V.S.A. §§ 225, 226 and 227d.

⁵ By providing written notice to the Public Service Board, a small ETC may elect to be exempted from one or more of Vermont’s tariffing requirements. *See* 30 V.S.A. 227d.

⁶ While not rate regulated, basic common carriage principles still apply.

⁷ E-911 location any building designated as an E-911 location. This does not represent a count of addresses cable companies serve. This analysis is based on data provided to the Department of Public Service by cable companies as part of the broadband mapping Initiative.

The Public Service Board approved the sale in February of 2008.⁸ Although the Board expressed concern over the level of financial risk that FairPoint agreed to assume, the Board concluded that FairPoint's intention to expand broadband service, coupled with a commitment to improve service quality, would, on balance, benefit the public. The Board noted that Verizon's lack of interest in operating a wireline business in Vermont and its unwillingness to deploy fiber in the state were compelling reasons to accept the sale.⁹ Verizon and FairPoint agreed to additional conditions of the sale, which helped FairPoint service its debt and meet the performance enhancement plan conditioned by the Board.

FairPoint's debt, however, proved too great to service. The Company filed for Chapter 11 bankruptcy protection in October 2009. During this same period of time, FairPoint's service quality had degraded to the point that the Department of Public Service filed with the Public Service Board a petition to show cause why FairPoint's certificate of public good should not be revoked.¹⁰ The cutover from the Verizon system to the FairPoint system proved challenging for FairPoint. FairPoint experienced provisioning and service quality issues which further hurt FairPoint. Bankruptcy protection allowed FairPoint to shed \$1.7 billion in debt obligations. In exchange, FairPoint's creditors received an equity interest in the company. Verizon's FairPoint stock was liquidated and many of FairPoint's debt payments were deferred until after 2011.

The Public Service Board approved the reorganization and restructuring plan put forward by the Department of Public Service and FairPoint in October of 2010. FairPoint was able to show the Department and the Board that its restructuring plan was reasonable given its revenue predictions. The Board approved the plan, which included several service quality conditions that FairPoint was obligated to meet. Today, FairPoint is improving its service quality and finances despite the challenges facing the telephone industry as whole.

c. Incentive Regulation

Competition in the telecommunications market benefits consumers. One way the state can promote competition is through even and fair regulation of the market. With the entrance of CLECs to the market, incumbent telephone companies have experienced dramatic line losses in the residential and business sectors. CLECs are able to offer lower prices and are subject to less regulation. Most ILECs, by contrast, are subject to rate-of-return regulation, making them slow to respond to changes in the marketplace.¹¹

The Department of Public Service, with the approval of the Public Service Board, helped ease regulatory constraints on Vermont's largest incumbent carrier, FairPoint, by negotiating an Incentive Regulation Plan (IRP) with FairPoint.¹² Under the IRP, which must be renewed every five years, basic local exchange service (BLES) rates are capped, and the company is given the

⁸ *Joint Petition of Verizon New England Inc.*, Docket 7270, Order of 2/15/2008 at 39.

⁹ *Id.* at 4-5.

¹⁰ *See Petition of Department of Public Service for an investigation and for an order Directing Telephone Operating Company of Vermont LLC, d/b/a FairPoint Communications to Show Cause Why its Certificate of Public Good Should not Be Revoked*, Docket 7540, 7/14/2009.

¹¹ Vermont's independent ILECs, although considered rate of return utilities, are free of traditional cost of service regulation. See 30 V.S.A. § 227d.

¹² The first IRP was with Verizon.

opportunity to modify rates up to a set ceiling at any time, subject to the conditions of the IRP.¹³ FairPoint is also relieved of its retail tariffing obligation for all services other than BLES, and may offer new services and rates at any time without notice to the Board. FairPoint may not offer retail prices more advantageous than those offered to its wholesale customers. FairPoint may also not offer promotional prices for periods of more than one year.

BLES rates and terms of service remain regulated, but the IRP gives FairPoint the ability to change rates at any time so long as the change is within the price cap. The current IRP prohibits FairPoint from deaveraging BLES service. This ensures rates in rural areas do not exceed rates in urban areas. The same Order approving the IRP also imposed on FairPoint the same service quality standards applied to the independent phone companies. The Plan sets metrics for wholesale and retail services that FairPoint must meet during the course of the IRP.

The Board observed that the IRP “will decrease the scope of regulation for FairPoint, providing the Company with increased ability to compete in the telecommunications marketplace.”¹⁴ The Board made several findings supporting the IRP. First, it concluded that FairPoint was experiencing competition from several facilities based providers, such as cable and fiber based companies, and mobile providers. Competitor cable plants passed 71.8% of addresses in FairPoint’s service territory. Mobile wireless service covered 73% of FairPoint’s footprint.¹⁵ Between 2007 and 2011, FairPoint lost an estimated 33% of its lines. Telephone penetration was stable during this period.¹⁶

The Board found that FairPoint’s low-use measured service rate was lower than any competitor offering. Additionally, FairPoint was the only provider for a significant portion of its rural service territory.¹⁷ For these reasons, the Board required FairPoint to file tariffs for basic service and prohibited the company from deaveraging BLES rates.

Incentive regulation has been generally successful. The conditions imposed by the Board ensure that FairPoint can remain cost competitive with CLECs while investing in its facilities and improving reliability. Other states have deregulated the intrastate telephone market, leaving consumers exposed to the vagaries of market forces. Vermont’s form of alternative regulation, by contrast, ensures basic consumer protections and reliability.

FairPoint competes with cable companies for voice and Internet access. FairPoint offers a basic service package priced on par with that of its competitors and is cost competitive in urban areas. FairPoint has also been a vital partner in the state’s broadband expansion efforts. By leveling the competitive playing field, FairPoint has been able to compete where it matters and maintain stable prices in places where competition is lacking.

¹³ *Petition of Telephone Operating Company of Vermont LLC, d/b/a FairPoint Communications (“FairPoint”), for Approval of a Successor incentive Regulation Plan (“IRP”), Pursuant to 30 V.S.A. § 226b*, Docket No. 7270, Order of 2/15/08 at 8.

¹⁴ *Id.* at 1.

¹⁵ *Id.* at 6.

¹⁶ Telephone penetration is the measure of the population that has access to a telephone. Vermont’s penetration generally remains stable and near 100%. The fact that FairPoint lost lines when penetration was stable suggests consumers were leaving FairPoint for other service providers.

¹⁷ *Id.* at 7.

d. Federal and State Universal Service Fund Changes

One of the most significant industry changes since the publication of the 2004 *Telecommunications Plan* was in the area of universal service. The Universal Service Fund supports four disparate programs: Lifeline (support for low-income consumers), Schools and Libraries (E-Rate), Rural Healthcare, and Connect America Fund (CAF) (formally the High Cost Fund). The CAF is relatively new, and replaces a system of “high cost support” to rural telephone carriers in areas where the cost of service is higher than likely revenue. On November 18, 2011, the FCC released an order redirecting high cost support to broadband development. This order, the so called *Transformation Order*, created the Connect America Fund and ties support to broadband infrastructure development and service. In the past support was offered based on the projected cost to provide voice service. Under the new regime, support will be offered to provide broadband to specific locations.

The *Transformation Order* modifies Universal Service on an incremental basis and will take effect in phases. As an initial matter, the *Transformation Order* “froze” existing high cost support to price cap carriers. The Order limited some high cost support in favor of supporting building and operating broadband capable networks.¹⁸ Over time requirements for high cost support will become more stringent with the expectation that fewer providers will receive support.

In Phase I of the *Transformation Order*, the FCC offered a onetime opportunity of \$300 million to carriers in “incremental support” for capital construction of broadband facilities. FairPoint took this support and initiated projects that made service available to thousands of additional locations.

CAF Phase II redirects \$1.8 billion nationwide from explicit support for voice in high cost areas to instead support additional broadband availability. The FCC will commit to five years of support to incumbent carriers in exchange for the carrier’s commitment to bring broadband service to areas that presently lack it.¹⁹ The level of support offered to each carrier is determined by a cost model developed by the FCC. Price cap carriers will have the right to accept or reject the FCC’s offer. The FCC will open any rejected offers to other carriers through a competitive bidding process. Rate of return carriers (including all Vermont rural ILECs other than FairPoint) will continue to receive high-cost voice support in exchange for a promise to provide broadband to any customer upon “reasonable request.”

1. Vermont Universal Service Changes

The State recently modified its universal service fund (VUSF) to support the expansion and improvement of broadband. The fund allows any Vermont eligible telecommunications carrier (VETC) to seek support in exchange for an obligation to provide basic voice and broadband

¹⁸ This restriction does not necessarily require recipients to expand broadband networks, although recipients may use support for that purpose. PETER BLUHM & ROBERT LOUBE, REVENUE EFFECTS OF FCC REFORMS TO INTERCARRIER COMPENSATION AND FEDERAL UNIVERSAL SERVICE MECHANISMS 13 (2013).

¹⁹ *Id.* at 14.

service in a designated area.²⁰ The VUSF also established the Connectivity Initiative—a new program that supports improving broadband reach in underserved areas.²¹

The VUSF was established to fund telecommunications relay service (phone service for the hearing impaired), Vermont’s Lifeline program and enhanced-911 (E-911). This year, the General Assembly activated a high cost mechanism that supports ILECs serving rural locations. Under the new high cost support mechanism, any company can receive support by becoming a Vermont eligible telecommunications carrier (VETC). A VETC must offer “supported services” to all locations throughout the service areas for which it has been designated and must meet service quality standards set by the Board for voice telephone. Supported services include voice telephony service and broadband at 4 Mbps downstream and 1 Mbps upstream. The VETC can be relieved of the broadband obligations if it can demonstrate that the costs of meeting them exceed the support provided.

2. The Future of Universal Service

The causes of the ILECs financial troubles are many, but the major issue plaguing Vermont’s carriers is the unsustainably high cost of serving rural locations. Under federal and state law, telecommunications providers, such as FairPoint, are treated as common carriers and are prohibited from price discrimination between customers of the same class.²² Furthermore, COLR companies are obligated to serve every customer in their service territory who wants service.²³ Federal regulations indicate that a carrier designated by a state commission as an Eligible Telecommunications Carrier (ETC) is eligible to receive support, and shall offer the supported services throughout its service territory.²⁴ Federal regulations indicate that prior to permitting a carrier to be relieved of these obligations a state commission shall require other carriers to ensure that all customers will continue to be served.²⁵

Much like rural electrification, there was an implicit cross subsidy embedded within this regulatory framework. The phone company achieved price parity by setting a price at a point above the cost of service in urban areas and below the cost of service in rural areas. The company’s costs, however, are not evenly distributed and are largely fixed.²⁶ COLR companies traditionally received high cost support on a per line basis from the federal Universal Service Fund to offset losses incurred in rural areas. With the loss of urban lines, this model of cross subsidy no longer works.

Federal policy favors competition in the telephone market, but the playing field is not level. The *Telecommunications Act of 1996* gives new competitors some advantages over incumbents. New competitors do not have COLR obligations. Competitive exchange companies are able to offer service in profitable urban and suburban areas at rates below the rates of incumbent

²⁰ The VETC need not provide service where service already exists from another provider.

²¹ Discussed *Infra* III.c.3.

²² 47 U.S.C. § 202 (a).

²³ FairPoint must make service available to every address as a condition of receiving federal universal service support.

²⁴ 47 C.F.R. § 54.201(d).

²⁵ 47 C.F.R. § 54.205(b).

²⁶ Carriers of last resort are responsible for maintaining their entire network, including every loop, regardless of whether they have the revenue base to support the maintenance of the network.

companies. Incumbents must allow CLECs access to their facilities at reasonable rates so that CLECs can effectively compete with them. Incumbent carriers have sustained significant line losses in the most profitable areas as a result of competition. The rural, high cost areas, however, remain untouched by competitive LECs, which have no economic interest in serving these unprofitable areas.

A series of independent reports produced on behalf of the Department of Public Service concluded that “Vermont is a daunting place to provide carrier of last resort service.”²⁷ The report noted that for regulated operations in 2011, “all Vermont [incumbent] companies reported an aggregate net operating loss of \$39 million.”²⁸ The report predicted that Vermont’s ILECs would continue to suffer losses in the future. While some losses may be due to inefficiency, the bulk of these losses are attributable to retail line losses, which is the primary source of revenue for telephone companies.

The independent reports’ authors collected a variety of data on finances of Vermont’s incumbent carriers. The data showed that cost and density are negatively correlated in that costs increase as density decreases. Profitability decreases as density decreases. The reports found that all Vermont ILECs have per-line costs higher than the national average.

Further compounding the problem is the transition in federal universal service support from high cost support for basic telephone service to broadband expansion. The 2011 *Transformation Order* shifted the focus of universal service from supporting the existing landline copper network to the Connect America Fund, a support mechanism for expanding broadband in unserved areas. COLR companies that relied on high cost support to offset losses in rural areas must now tie support to broadband improvement, leaving costs associated with the operation and maintenance of the telephone network to the supported company.

Collapse of Vermont’s telephone networks is an unacceptable outcome. No other network exists at this time that can provide voice service to every part of the state. In most cases, commercial mobile radio service (CMRS) exists in rural areas, but there are two reasons why CMRS is not a suitable substitute for the wireline system at this time. First, wireless networks are very much dependent on the copper networks managed by the telephone companies to transmit and complete calls. CMRS providers contract with wireline companies for transport and other services necessary to interconnect with the public switched telephone network. Second, cellular service providers are lightly regulated. States are preempted from rate regulation, and the FCC has exercised its “forbearance” power with regard to CMRS.²⁹ It is unreasonable to expect competition to bring reliable and affordable phone service to the remote reaches of the state, as other facilities based operators have little financial incentive to expand into low-density areas.

There is no easy solution to the problem. State policy supports universal access to affordable, and quality, basic telephone service. However, market volatility, changes in technology, and shifts in national telecommunications policy are forces beyond the state’s control. Nevertheless, the state can attempt to make up for the loss in high cost support by instituting and fully funding

²⁷ PETER BLUHM & ROBERT LOUBE, COSTS AND PROFITABILITY OF VERMONT’S INCUMBENT TELECOMMUNICATIONS CARRIERS (2014).

²⁸ *Id.* at 41

²⁹ *See Infra.* pp. 10-12 of this Chapter.

a high cost support component of the state’s universal service fund that funds both the improvement of broadband internet service and the operation of basic telephone service.

e. E-911

Enhanced 9-1-1 (E-911) continues to be immensely important to the safety of Vermonters. E-911 links callers with the relevant public services, such as fire, police and rescue, in an emergency. Through E-9-1-1, the state operates several public safety answering points around the state. These call centers are able to dispatch first responders to a callers location using location data provided by the caller and the E-911 system.

E-911 has made significant progress over the past year. In 2013, E-911 initiated a texting service, which allows people the opportunity to use short message service (SMS) to text E-911. This service can be very beneficial in cases where making a phone call is imprudent or impossible. For instance, victims of domestic violence can use the service to request help without alerting the offender that the victim has done so.

The most important future requirement for E-911 will be increasing efficiency, accuracy and accountability. Act 190 has started the process. Act 190 requires the Secretary of Administration to recommend to the General Assembly a plan for moving E-911 to the Division of Connectivity, the Department of Public Service, or the Department of Public Safety with a goal toward achieving annual operational savings of at least \$300,000.00, as well as “enhanced coordination and efficiency, and reductions in operational redundancies.”³⁰

f. Transition to VoIP

When the federal *Telecommunications Act* was amended in 1996, the Public Switched Telephone Network (PSTN) and the Internet were nearly completely separate. Voice service was the only plausible definition of an “essential” telecommunications service. This remained largely true at the publication of the *2004 Telecommunications Plan* when competition in the telephone market was still establishing itself. But technological changes over the last 10 years have blurred the line between what is and is not phone service. One significant change is the use of packet switching to carry voice data in the same way that information data is transmitted.

The PSTN relies on a switching system called time division multiplexing (TDM), whereby multiple analog telephone calls are digitized and sent on a common path, with each signal sequenced in fractions of a second. The signals have dedicated space in the signal path, and each bit of data takes the same path to termination. By contrast, the dominant packet switching technology, Internet Protocol (IP) converts the analog signal into packets of information. With IP, each packet is assigned location data (an IP address) and sequencing data (to reorganize the data at the terminus). The packets are then sent over various pathways, including potentially over the Public Internet, and converge at their destination.

Voice over Internet protocol (VoIP) has allowed a greater number of competitors to enter the market for voice service, such as cable and Internet content companies. More importantly VoIP has challenged the distinction between “telecommunication service” (previously referred to as a “basic

³⁰ 2014 Acts and Resolves No. 190, Sec 24.

service”) and an “information service” (or “enhanced service”).³¹ Some companies provide voice services to fixed locations over internally managed IP networks (fixed VoIP), which provide a high level of service quality. Other providers use IP technology to send voice traffic over the Public Internet (“nomadic” or “over the top” VoIP).³² Because federal law distinguishes between telecommunication and information services, and regulates each one differently, the rise of VoIP service raises an important question about what is a telecommunications service and what level of regulation states may exert over VoIP. The distinction between circuit switched technology and IP networks is one of technology. Consumers may not discern a difference between two similar services offered over different platforms.

The FCC has yet to decide whether VoIP is a telecommunications service or information service, but has imposed some requirements. VoIP providers must support local number portability, contribute to universal service, and provide E-911 service.³³ The FCC, however, has limited state jurisdiction of VoIP to instances where intrastate traffic can be determined.³⁴ Providers operating nomadic VoIP services, such as Microsoft’s Skype or Vonage, claim that they have no way to determine which calls are made intrastate versus those calls made interstate.

In 2007, the Department of Public Service initiated an investigation into whether the Public Service Board has jurisdiction over VoIP services provided in Vermont.³⁵ Comcast, for instance, currently offers a fixed VoIP service that is interconnected with the PSTN. Customers may place and receive calls with any other telephone user, regardless of whether the end user is a Comcast customer. Comcast’s service is “fixed” in that it can only be used from one location, usually the customer’s home or business. Calls are sent through Comcast’s managed network and do not touch the Public Internet.

The Board ruled that, as a matter of state law, Comcast’s service was a telecommunications service. However, the Board did not reach the question of whether VoIP was a telecommunications service as a matter of federal law.³⁶ On appeal, Comcast argued that the Board erred by not determining whether VoIP service should be classified as an interstate information service under federal law. As an interstate information service, Vermont would not be able to impose common carrier regulation on VoIP providers. The state Supreme Court ruled that the Board must answer this question and remanded the case for further proceedings.³⁷ It is the Department’s position that VoIP service provided over managed networks to fixed locations is a title II telecommunications service under the *Telecommunications Act*.

The FCC appears to be supportive of the transition from TDM to VoIP. This past year, the FCC approved AT&T’s plan to conduct a series of experiments in which it will convert TDM wire-centers to IP only centers. AT&T selected two study areas. The first wire-center is in Carbon Hill, Alabama, a sparsely populated rural area. The second wire center is in King’s Point Florida, a suburban community with multiple retirement communities. AT&T will offer new business and residential customers in these areas IP based services in place of traditional TDM services. Existing customers

³¹ States have regulatory authority over intrastate telecommunications and information services, but are preempted from regulating interstate telecommunications and information services.. Broadband internet access has been defined as an interstate information service. Services employing VoIP have not been defined.

³² This discussion is confined to “fixed” and “nomadic” VoIP services capable of interconnecting with the PSTN.

³³ 47 C.F.R. § 52.34

³⁴ *Minn. Pub. Utils. Comm’n v. FCC*, 483 F.3d 570, 574 (8th Cir. 2007)

³⁵ See Docket No. 7316.

³⁶ *In Re Investigation into Regulation of Voice Over Internet Protocol Services*, 193 Vt. 439, 449-50 (2013).

³⁷ A decision was pending at publication of this *Plan*.

can keep the service they have. AT&T also proposes to drop wireline service altogether in some areas of these communities and to serve these areas through its wireless subsidiary, AT&T Mobility. AT&T will not remove copper infrastructure.

The transition to VoIP raises several issues. One issue is that fiber based IP systems rely to a greater extent on electrical service to power the system. Both end user and provider battery sources may not have sufficient life to keep service running for more than a few hours during a power outage.

A transition from the circuit switched technology to IP is inevitable, and the roles that states and the national government play in this transition will be crucial to determining basic questions about quality, reach, and affordability of basic voice service in the future. If the AT&T experiments are successful, the states should expect all phone companies to begin the transition. State policy makers should support national proposals that ensure VoIP networks provide for the same level of reliability and consumer protection that consumers currently enjoy with their copper based landline services.

g. Wireline Abandonment

Another national trend closely related to the transition to VoIP is the potential abandonment of wireline facilities by service providers. In the aftermath of Hurricane Sandy, Verizon briefly proposed abandoning its wireline service in parts of Fire Island, NY in favor of Voice Link, its fixed wireless service.³⁸ Many residents of Fire Island opposed the transition, citing concerns over reliability and the extent of service. Consumers feared losing DSL service, the ability to use burglary systems, losing the system in an electrical outage, and the reliability of E-911. In response to this opposition Verizon dropped its plans to abandon wireline service and instead transitioned Fire Island to its Fiber based FiOS service.

AT&T has also sought to abandon wireline service in areas where the cost of providing wireline service exceeds the cost of its wireless service. As discussed in the VoIP passage of this section, AT&T has petitioned the FCC to allow it to provide wireless service as a substitute for wireline service in its VoIP only study area. While the FCC has approved AT&T's plan to offer wireless voice as a substitute to landline service in its VoIP wire center trials, the FCC has not condoned or otherwise expressed support for landline abandonment.

No Vermont provider has suggested abandoning wireline service, and there is no evidence Vermont's providers will attempt to abandon service in the near future. However, as the wireline market becomes more costly to manage, Vermont should prepare for the possibility that service providers will look to wireless as an alternative to the traditional copper network, so that appropriate consumer protections and reliability standards can be maintained.

h. Commercial Mobile Radio Service (CMRS)

Mobile wireless voice service is becoming ever more vital to Vermont's residents and businesses. Vermonters' use and reliance on mobile voice technology has increased since the publication of the last telecommunications plan. Twenty nine percent of Vermont households are wireless only households. Wireless, broadband data has become a technologically feasible alternative to landline data services and, in some areas, the only source for broadband internet

³⁸ *Comments Invited on Application of Verizon New Jersey Inc. and Verizon New York Inc. to Discontinue Domestic Telecommunications Services*, Public Notice, WC Docket No. 13-149 Comp. Pol. File No. 1112, 28 FCC Rcd. 9193 (Wireline Comp. Bur. 2013).

access. Since 2007, it has been Vermont’s goal to obtain ubiquitous mobile voice coverage along state highways and interstate roads.

1. Infrastructure Development

Wireless telecommunications infrastructure is central to the provision of service. Providers need facilities throughout the state in order to meet their coverage goals. In 2008, the General Assembly passed a law streamlining the permitting process for new telecommunications facilities.³⁹ The law, known as “248a,” gives the Public Service Board authority to permit new facilities and modifications to existing facilities outside the Act 250 permitting process.. The law allows providers to seek a certificate of public good from the Board for construction of a cell tower in any town or city in Vermont. The law also allows applicants to co-locate equipment on existing structures, such as farm buildings, church steeples, ski resorts, or existing telecommunications towers.

Section 248a has been very successful. From January, 2012, to January, 2014, the Public Service Board approved 216 applications under 248a. Many of these applications were for upgrades and modifications to existing facilities. About 50 of these were for new facilities. Vermont’s two largest nationwide providers, AT&T Mobility and Verizon Wireless, have taken full advantage of the 248a permitting process. AT&T filed ninety-five applications in that two year period. Verizon filed 28 applications in that same time.

VTel Wireless has also taken advantage of the law during the roll out of its Wireless Open World (WOW) project.⁴⁰ Between January 2012 and January 2014, VTel filed 75 applications, all of which have been in support of its WOW project. The WOW project will be available throughout Vermont, including some presently underserved communities.

In 2014, the General Assembly made procedural reforms aimed at increasing municipal participation in the 248a process. The updated law gives towns the ability to intervene in 248a petitions as a matter of right. It also affords towns the opportunity to have a public hearing with applicants and the Department of Public Service regarding new and heavily modified facilities. 248a will be in effect until July 1, 2017. Wireless providers will likely continue to expand their networks at a rate similar to the last two years. With the greater community input that the new 248a revisions provide, Vermont’s CMRS providers will be able to target service improvements where they are most needed and in ways that conform to local planning goals.

2. CMRS Regulatory Framework

The FCC has general authority over commercial mobile radio service providers. States retain regulatory control over “other terms and services.” The FCC has exercised its “forbearance” authority over CMRS and generally does not require companies to file tariffs. CMRS providers must adhere to general principles of common carrier regulation, such as the rule that rates must be “just and reasonable” and laws prohibiting customer discrimination. CMRS providers are also subject to E-911 and Universal Service Fund contributions.

³⁹ 30 V.S.A. § 248a.

⁴⁰ VTel WOW is Discussed *Infra* III.f.

Vermont regulates CMRS providers to the extent permissible by federal law. CMRS providers must obtain a license to provide telecommunications services in Vermont. As conditions of licensure, the Board generally requires CMRS providers to file the Board's standard service contract and post bond in advance of offering prepaid voice services. Providers must also contribute to the Vermont Universal Service Fund.

The regulatory structure for CMRS providers differs greatly from traditional telephone service. This is mostly because the retail market for wireless service differs from that of the residential landline telephone market. Policy makers and regulators generally consider the wireless market to be competitive. Vermont is served by four nationwide providers. These are AT&T Mobility, Verizon Wireless, T-Mobile, and Sprint PCS. Nationwide providers operate networks that touch all fifty states. In addition, there are numerous regional and local wireless providers notably including US Cellular. Currently, VTel Wireless is the only local provider offering mobile wireless service in the state.⁴¹

The wireless market is not as competitive as the current regulatory framework would imply. The industry has experienced a considerable amount of consolidation in the last ten years. The four nationwide providers listed above possessed 92% of the total share of the U.S. market as of July, 2012. The U.S. Wireless mobile market had a Herfindahl-Hirschmann Index (HHI) weighted average score of 2,873 at the end of 2011, which is considered "highly concentrated" by the federal agencies that use the HHI.⁴² The concentration of the market is a direct result of mergers and acquisitions by and between these four large companies and smaller regional providers.

The consolidation of local and regional providers into four nationwide providers has limited consumer choice. However, it also enhanced the level of service. Consumers rarely pay roaming charges anymore. Consumers can also expect comparable service as they travel throughout the country. Prices for wireless voice service have declined over time, suggesting that the market has retained some characteristics of a competitive environment. For this reason, the FCC continues its policy of regulatory forbearance.

The FCC has not been totally silent on CMRS issues. In 2010, the FCC issued a report detailing customer confusion about early termination fees (ETFs) and other fees. ETFs are fees consumers must pay to exit their wireless service contracts. The report and survey noted widespread instances of "bill shock" when it came to fees incurred for data overages and ETFs. In response to the FCC's inquiry, the wireless industry undertook voluntary measures to better notice customers of early termination and data overage fees.

In Vermont, the Attorney General's office also investigated third-party providers for "cramming" – the practice of loading consumer bills with unauthorized fees. In 2013, Attorney General, William Sorrell, announced a settlement with the state's major cell service providers to

⁴¹ VTel will offer voice service through a VoIP application on mobile devices. Customers will utilize VTel's wireless 4G/LTE data network to place calls.

⁴² The Herfindahl – Hirschmann Index (HHI) is a calculation used to measure the competitiveness of a given market. The HHI is calculated by summing the squares of the individual firms' market shares. The HHI ranges from less than 1 (atomistic market) to 10,000 (pure monopoly). The FTC and Justice Department consider any market with a score of 2500 or greater to be "highly concentrated." See FCC, WIRELESS MONITORING REPORT, (March 2013);

stop cramming. AT&T Mobility, T-Mobile, and Sprint agreed to no longer charge their customers for commercial Premium Short Messaging Services, also known as “PSMS,” or “premium text messages.” PSMS accounted for the majority of third-party charges on bills and for the overwhelming majority of cramming complaints received by the Attorney General.⁴³

i. The Future of Voice Service

Voice service plays an important role in the way Americans communicate and will continue to be an indispensable resource to Vermonters for the next 10 years. While other forms of communication, such as email and short messaging service, have supplemented voice, nothing has supplanted it. Vermonters in particular value voice service as is evidenced by Vermont’s above average telephone penetration rate. The main challenge ahead is the continued provision of voice service in rural areas. Reductions in support, coupled with the high cost of maintaining aging, rural infrastructure, make rural service a challenging enterprise.

Cost is the main obstacle. The Department solicited comments from service providers about their future needs in advance of publishing this *Plan*. All responding providers cited the cost of rural service as the main obstacle. Most of the cost of a telephone network is “sunk” in the initial investment of capital. That cost is then recouped over time with revenue generated from retail service. Line losses, aging infrastructure, and the reduction in high cost support all work against rural providers. Providers are no longer guaranteed the opportunity to recoup their costs through service delivery.

In other parts the country, providers have suggested scrapping wireline service in favor of a wireless network. Providers cite cost and the difficulty resourcing parts. Vermont, however, is not well suited to this kind of network. Wireless facilities have not yet reached every rural customer. More importantly, wireless service, while competitive with most wireline service packages, may not be cost competitive with landline providers’ low use measured service. It is unclear whether the state could exert rate regulation over “fixed” wireless services when the wireless provider is the primary servicer. Wireless is, however, a suitable supplement to wireline service, and should be made available everywhere in the state.

Vermont needs its wireline networks at this time. For rural residents and small businesses, wireline service is a necessity. Residents in rural areas may not have adequate cell coverage. DSL is also the best available broadband option in Vermont’s most rural areas. Concerns over E-911 and the reliability of wireless service in a power outage are valid and should be carefully considered before the state accepts wireless services as a substitute for wireline services.

⁴³ Press Releases: AT&T Mobility, Sprint and T-Mobile Will Stop Billing Problematic Third-Party Charges, Vermont Attorney General, November 21, 2014, <http://www.atg.state.vt.us/news/att-mobility-sprint-and-t-mobile-will-stop-billing-problematic-third-party-charges.php>

III. INTERNET ACCESS

The importance of high speed Internet access to Vermonters cannot be overstated. Internet access is a prerequisite to participation in our nation's information economy. Vermonters use Internet access services to participate in commerce, politics, education, and business. In addition, Vermonters rely on it to access social media platforms, entertainment, cloud based services, and the wealth of information available online. Internet access is an indispensable resource for job seekers, who must rely on it to find and apply for employment opportunities. Vermont businesses need Internet access to market goods and services, interact with customers, and process transactions. While this Plan does not opine on any issue related to Internet content or use, this plan reiterates the same sentiments observed in the Executive Summary of the National Broadband Plan: "Broadband is the great infrastructure challenge of the early 21st Century."⁴⁴ To remain competitive in our national economy, Vermont will need to remain focused on building a robust digital network that serves all Vermonters.

Since 2007, it has been the goal of Vermont to bring high speed Internet access to all parts of the state. The *2011 Telecommunications Plan* put forward a policy of aggressively supporting the expansion of broadband Internet access to unserved areas. In 2010, Governor Peter Shumlin made it the goal of the state to have a funded broadband solution in place for every Vermonter by the end of 2013.

Thanks to the investments and hard work of Vermont service providers, the Administration, and Vermont's policy leaders, high speed Internet access is now universally available. Only 1% addresses lacked service at the end of 2013, and all of these addresses have a funded solution in place. This section discusses the Broadband expansion efforts of the last decade and the ways in which Vermont's broadband network is improving. This Section also describes the kinds of infrastructure investments that will be necessary to ensure Vermonters have a robust and reliable network.

The state's other broadband goals included having the availability of mass-market broadband and mobile service along roadways; achieving universal first responder communications; connecting "anchor institutions" with fiber broadband service; having universal adoption of broadband at home and at work; and deployment of smart meters. Today, these goals remain the policy of the Department of Public Service. There is still room to expand and improve upon the services currently being offered. Demand for bandwidth will increase as consumers find new uses for the service. Similarly, wireless service has greatly expanded throughout the state, but there a constant need to improve speed. This is especially true as consumers begin to rely more heavily on their smart phones and fixed wireless service for data consumption.

Vermont employed several strategies to meet its service and adoption goals. Strategies included directing investment to projects in unserved and high cost areas, streamlining the permit process for telecommunication facilities, partnering with private enterprise to deploy broadband, and mapping investment and coverage needs. Vermont will continue these efforts as the state plans for the future.

⁴⁴ FCC, NATIONAL BROADBAND PLAN at xi (2010).

The new focus of the private-public partnership will be speed. Vermonter's needs for bandwidth will steadily increase as consumers find new Internet based applications. Consumers are increasingly using mobile devices, and the deployment of wireless infrastructure will become integral to the success of Vermont's high-tech economy. This section describes the important activities and initiatives of the past decade and what will be important to Vermonters as the state plans for the following ten years.

a. Overview of Vermont's Internet Access Market and Infrastructure

There are several ways in which high speed Internet access is provided to Vermonters. Vermont residents and businesses may purchase Internet access service from cable television providers in locations where cable is accessible. Landline telephone companies sell Digital Subscriber Line (DSL) service, which provides access via copper telephone wires. Some providers, such as Burlington Telecom and VTel, offer fiber to the home service within their territories. CMRS providers offer mobile data plans through 3G and 4G/ LTE networks. Vermont is also home to several wireless Internet Service Providers (WISPs), which sell fixed wireless service to homes and businesses. VTel, for instance, began offering wireless Internet service in several rural Vermont towns this summer.⁴⁵ Customers may also purchase Internet services through satellite providers.

Cable providers pass an estimated 66.5% of the state's E-911 residential and business locations. DSL networks reach about 88.1% of the addresses. Together, DSL and cable reach 94.2% of locations. 4.8% are served by other platforms and 1% of locations have a funded solution in place. CMRS providers have 3G and 4G networks that cover over 96% of the state's geographic area, and improving every day. Through the projects described below, high speed broadband will soon be available in some of the hardest to reach locations of the state. Satellite is also becoming a viable alternative to terrestrial networks, as it can offer service anywhere and at speeds comparable to DSL and mobile wireless service.

In urban and suburban areas, such as Burlington and its surrounding communities, most consumers have competitive choice from multiple providers on multiple platforms. Residents in Burlington can obtain broadband access through cable, fiber to the home, DSL, and mobile wireless networks. Residents of rural areas generally have less competitive choice, but new options are coming online. Those in remote parts of the state are best served with fixed and mobile wireless services.

b. Minimum Technical Service Characteristic Objectives

Vermont law directs the Department to define the minimum technical service characteristics objectives ("Objectives") that ought to be available as part of broadband services commonly sold to residential and small business users throughout the state⁴⁶. The purpose of that provision was to direct investments by the Vermont Telecommunications Authority (VTA). Although the functions of the VTA are transitioning to the Connectivity Division, the Objectives remain important for two reasons.⁴⁷ First, locations lacking access to services that meet the Objectives

⁴⁵ Discussed *Infra*, III.f.

⁴⁶ VT. STAT. ANN. tit. 30, § 8077

⁴⁷ 2014 Acts and Resolves No. 190, Sec. 9 directs the Department to include the Objectives in the telecommunications plan starting in 2017.

are eligible for support from the Connectivity Initiative.⁴⁸ Second, the Connectivity Division is directed to promote the expansion of broadband services that offer actual speeds that meet or exceed the Objectives contained in the State’s Telecommunications Plan.

The Department defined the Objectives at 4 Mbps download and 1 Mbps upload (4/1) in the 2011 Telecommunications Plan. In the *Transformation Order*, The FCC specified that all services supported by the Universal Service Fund must provide Internet access with speeds of 4/1.⁴⁹ The Department mirrored the state’s Objectives on those set by the FCC.⁵⁰ The Objectives set in the 2011 Plan remain in effect today. More discussion on the state’s minimum technical service characteristic objectives can be found in Chapter 5 of this *Plan*.

c. Legal Framework for High Speed Internet Access Expansion and Improvement

The FCC has found it challenging to regulate the Internet and Internet access services. Much of the challenge is, however, self-imposed. In 2002, the FCC categorized broadband Internet access service as an “information service,” exempting broadband providers from the basic common carriage rules of Title II of the Telecommunications Act.⁵¹ While the FCC retains some “ancillary” authority over Internet access services, its classification as an information service prohibits the FCC from enforcing net neutrality rules, reviewing interconnection agreements between backbone providers, and regulating retail rates and terms and conditions which it would otherwise be able to do pursuant to its powers in Section 706 of the 1996 Telecommunications Act.⁵² When it comes to encouraging the construction of broadband infrastructure through universal service support, the FCC has relied on its ancillary authority and a controversial interpretation of the Telecommunications Act’s provisions governing Universal Service Fund support eligibility.⁵³

⁴⁸ 30 V.S.A. § 7515b. The Connectivity Initiative was created with the purpose of bringing broadband that is capable of 4 Mbps download and 1 Mbps upload to each service location in Vermont.

⁴⁹ The FCC indicated that some percentage (to be defined later) would need to support 6 Mbps download speed and 1.5 Mbps upload speed. The FCC has yet to define the percentage that would need to meet these speeds. However, in FNPRM 14-54, issued June 10, 2014, the FCC sought comment on a proposal to increase the benchmark prospectively to a download speed of 10 Mbps and some upload speed greater than 1 Mbps. (http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0626/FCC-14-54A1.pdf) ¶ 138.

⁵¹ 47 U.S.C. §§151-61. Prior to 2002, the FCC had designated DSL transmissions as a telecommunications service. Internet access services were exempt, but the pure transmission of data over telephone lines was not. See *In re Deployment of Wireline Services Offering Advanced Telecommunications Capability*, 13 F.C.C.R. 24012, 24014, 24029–30 ¶¶ 3, 35–36 (1998) (“*Advanced Services Order*”).

⁵¹ 47 U.S.C. §§151-61. Prior to 2002, the FCC had designated DSL transmissions as a telecommunications service. Internet access services were exempt, but the pure transmission of data over telephone lines was not. See *In re Deployment of Wireline Services Offering Advanced Telecommunications Capability*, 13 F.C.C.R. 24012, 24014, 24029–30 ¶¶ 3, 35–36 (1998) (“*Advanced Services Order*”).

⁵² *Verizon v. FCC*, No. 11-1355, slip op. (D.C. Cir. Jan. 14, 2014) (Holding that the FCC was empowered by § 706 of the Telecommunications Act to regulate broadband Internet service, but that its most recent attempt to implement net neutrality rules amounted to common carrier regulation, which the agency was precluded from promulgating without first classifying broadband as a telecommunications service).

⁵³ 47 U.S.C. § 254(e) restricts universal service support to “eligible telecommunications carriers.” Because broadband is classified as an information service, many argue that the FCC is exceeding its statutory authority by tying support to broadband availability. JONATHAN NUECHTERLEIN & PAUL J. WEISER, *DIGITAL CROSSROADS*, 313 (2d ed. 2013).

Some argue that Title II reclassification would provide a sounder legal basis for establishing direct support for rural broadband under the Universal Service Fund, while industry leaders believe that competition and the FCC's ancillary jurisdiction are sufficient to meet national universal service goals.⁵⁴ The FCC has not seriously considered reclassifying broadband as a title II service, and will continue implementing the National Broadband Plan it formulated in 2010.⁵⁵

The universal service reforms of the *Transformation Order* provide national support to telephone carriers willing to provide broadband and act as "carrier of last resort" in rural territories.⁵⁶ As is discussed in the *Voice* section of this chapter, support is frozen at 2011 levels, and recipients will need to meet availability goals and technical benchmarks as a prerequisite to receiving support. Federal benchmarks restrict funding to service at speeds of at least 4 mbps download and 1 mbps upload.⁵⁷ The CAF fund makes available at most \$1.8 billion dollars to price cap carriers, \$2 billion to rate of return carriers, \$500 million to the CAF Mobility Fund, and \$200 million to remote and tribal lands. The FCC will rely on market driven policies and competitive bidding to direct investment in broadband capable networks.

Price cap carriers (including in Vermont only FairPoint) will be offered an opportunity to receive funds in return for deploying broadband to areas completely lacking 4/1 service. Once the awards are made, either to FairPoint or to another company through an auction if FairPoint declines the offer, the current frozen voice support will be withdrawn. The Department notes two important points about CAF support in price cap territories: issues related to locations and partially served census blocks.

CAF II support is calculated by a model based on the number of locations as determined by the census bureau, as opposed to the E-911 system. The FCC has identified 4135 census blocks that are completely unserved by an unsubsidized competitor offering service with 4 Mbps down and 1 Mbps upload. The FCC model identified approximately 30,000 locations in these census blocks that are eligible for CAF II support. The Department contracted with Stone Environmental to analyze the December 31, 2012 broadband availability data. This analysis identified 4,918 census blocks with 41,338 locations that are completely unserved by an unsubsidized competitor offering 4/1.

The FCC considers a census block eligible for CAF II support if any location in the census block is served by an unsubsidized competitor. The Stone analysis of the 12/31/12 data identified 3704 census blocks that are partially, but not completely served. These census blocks contain 112,794 locations, 36% of which (30,179) of which are not served.

Rate of return carriers, (including all rural carriers in Vermont) are required to offer broadband service meeting 4/1 upon reasonable request⁵⁸.

⁵⁴ FCC, CONNECTING AMERICA: THE NATIONAL BROADBAND PLAN 337 (2010).

⁵⁵ The FCC has thrice attempted to implement net neutrality rules without reclassifying Broadband Internet. In its current proposal, the FCC is seeking comment on whether it should reclassify Broadband. However, the FCC cites 47 U.S.C. § 706 as the legal authority to implement the rules currently under consideration. *See In Re Protecting and Promoting the Open Internet*, GN Docket No. 13-28, ___ FCC Rcd. ___ (2014), ¶¶ 142-147 & 148 .

⁵⁶ For purposes of Universal Service, the FCC has designated high cost areas by census block.

⁵⁷ *See* FCC, SIXTH BROADBAND PROGRESS REPORT (2010)

⁵⁸ In the FCC order 14-54, the FCC declared that a request would not be reasonable if the incremental cost of implementing necessary upgrades to a particular location exceed the revenues that could be expected from that

States have limited authority to regulate broadband Internet access service. Vermont has no legal authority to compel broadband providers to offer service in designated areas or offer minimum threshold speeds. Vermont's strategy to date has relied on incentive programs such as grants and universal service support that encourage providers to bring service to rural and remote areas. Unless and until national lawmakers shift national policy from an incentive based strategy to a regulatory one, Vermont will need to continue on its chosen course. This *Plan* discusses the various ways in which the state has encouraged investment in broadband capable networks and what the state should do to further its broadband goals.

d. State Efforts to Increase Broadband availability

1. Data & Mapping Initiatives

Vermont state government, through its partnerships with telecom industry leaders, initiated an aggressive and comprehensive effort to map and chart broadband progress. The Vermont Agency of Commerce and Economic Development coordinated with the Department of Public Service and the Vermont Center for Geographic Information to capture and map data about broadband availability. Address specific information was collected from service providers about availability. That information was made publicly available on Broadbandvt.org, the state's Internet access specific website. The initiative was funded by a \$3.5 million federal grant. Through crowdsourcing, the state was able to verify coverage data and map areas where coverage is still needed. Through this effort, the state was able to provide some of the most granular data in the nation on high speed Internet and broadband availability. It has also helped the state and industry partners target development where it is most needed. Information on Vermont's broadband initiatives can be found at www.broadbandvt.org.

2. Vermont Telecommunications Authority

Since 2007, The Vermont Telecommunications Authority (VTA) has worked toward Vermont's broadband and mobile wireless service goals. The VTA, a quasi-governmental organization, is governed by an appointed Board and works toward goals laid out in 30 V.S.A. § 8060 (b) to expand broadband and cellular service. Currently, the VTA focuses on four broad areas: grants, developing and managing fiber optic infrastructure, developing wireless sites (towers and non-tower sites), and leasing wireless equipment.

VTA has run grant programs to expand broadband service since its creation, and currently has 9 last-mile grant-funded projects in process. This includes nine awards for last-mile broadband service expansion to FairPoint, Comcast, Topsham Communications, Southern Vermont Cable, and EC Fiber. VTA has run a program to directly assist unserved consumers with the costs of extending cable for broadband to their locations.

VTA has developed fiber optic infrastructure to support broadband service and provide "backhaul" for cell sites. Its largest project to date is the funding of the Vermont Fiber Connect project, part of federal Broadband Technology Opportunities Program (BTOP) stimulus program, which funded "middle-mile fiber networks." The Vermont Fiber Connect project is

upgraded line, including federal or state universal service support projected to be available under current rules. Paragraph 65, (http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0626/FCC-14-54A1.pdf)

developing approximately 800 miles of fiber in eight counties, and has two subawardees, Sovernet and New Hampshire Optical Systems. The Vermont Fiber Connect project includes approx. \$33.4M in federal funding, \$2.4M in state capital funding, \$400,000 in foundation funding, and \$12M in private funding. More recently, the VTA has worked to directly develop fiber optic networks for both last-mile and middle-mile purposes. It currently has three primary projects in process related to this “dark” fiber development.⁵⁹

The 2014 legislative session marked a milestone for the VTA. With the state’s expansion goals largely met, the General Assembly initiated policy reforms that shift the focus from infrastructure expansion to speed. The VTA, which was originally conceived as a temporary vehicle for infrastructure development, is shifting too. The General Assembly dissolved the VTA as an independent, non-profit entity, and redirected its resources to a new organization within state government called the Division of Connectivity.⁶⁰ The VTA will cease operations on July 1, 2015.

The Division of Connectivity will have a similar makeup and mission to that of the VTA, but will be focused on bringing access to Vermonters at threshold speeds of 4 mbps download and 1 mbps upload. The Division of Connectivity will promote broadband development and improvements by coordinating state government initiatives, providing grants, and planning, among others.

3. The Connectivity Fund and High Cost Support

Act 190, enacted in 2014, created the Connectivity Fund. The Connectivity Fund is a program under the Vermont Universal Fund that will be used as a vehicle for supporting Broadband facilities upgrades and operations. The fund will be administered by the Department of Public Service. The Department will publish annually a list of census blocks eligible for funding based on the Department’s most recent broadband mapping data. Using this data, the Department will then solicit proposals from service providers, and the VTA and Division of connectivity, to deploy broadband in eligible census blocks. Projects will be chosen based on cost, quality, speed and conformance with the *Telecommunications Plan*.

Act 190 also activated a high cost fund for Vermont Eligible Telecommunications Carriers (VETC). The high cost fund provides support to VETCs for capital improvements in high cost areas to build broadband capable networks. VETCs must provide voice telephony *and* broadband to receive support. The law provides support to rural telephone companies, as defined by federal law, and rural exchanges served by the RBOC.

e. ILEC High Speed Internet Access Expansion

All ILECs offer high speed Internet access. FairPoint, Vermont’s largest incumbent carrier, offers DSL service to an estimated 92% of the service locations in its territory. VTel, as described above, offers fiber to the home to customers in its territory. The other independent

⁵⁹ Current dark fiber projects include the Hardwick-Newport Fiber Project, the Orange County Fiber Connector, and the Northern Borders Connectivity Project in Northern Orleans County, at a cost of approximately \$2,031,000 in state funding, plus approximately \$220,000 in Northern Borders Regional Commission funding.

⁶⁰ 2014 Vermont Acts and Resolves No. 190, Sec 28.

phone companies offer DSL within their entire service territory. Most offer service at speeds of 4 mbps downstream and 1 mbps upstream or higher.

FairPoint is working diligently to expand its DSL capable network. FairPoint invested \$6.6 million dollars in broadband expansion pursuant to agreement reached between it and the Department of Public Service over FairPoint's failure to meet service quality metrics.⁶¹ This agreement helped FairPoint bring broadband to 3,000 new customers, 500 of which were previously unserved.

FairPoint also invested \$120 million in fiber backbone upgrades in fulfilling their obligations under Docket 7270. Some of this investment was a dollar specific expenditure requirement on network upgrades and a portion was spent meeting its broadband build out obligations. This important network upgrade replaced outdated copper connectivity between central offices with fiber. It also extended fiber to remote terminals. In addition, FairPoint invested in electronics equipment upgrades, such as D-SLAM and metro Ethernet. These upgrades have allowed FairPoint to compete with other providers, such as cable providers, for business and residential customers.

f. VTel Wireless Open World

Vermont Telephone Company (VTel) began a project in 2011 to bring wireless broadband service to Vermont. This project is central to the state's broadband efforts. VTel is installing a state wide wireless network called wireless open world (WOW).⁶² WOW's 4G/LTE network will reach Vermont's presently under-served and un-served areas. The WOW project was made possible through the support of the Rural Utility Service (RUS), the National Telecommunications and Information Administration (NTIA) and VTel. The NTIA awarded VTel \$82 million through a grant and \$35 million loan to build the network. VTel contributed \$30 million in spectrum licenses.

Once complete, the project will consist of 200 4G/LTE equipped wireless facilities that will reach an estimated 18,000 unserved or underserved addresses, and 97% of the state. The WOW project will bring service to some of the most remote regions of the state. The project also includes fiber to the home in VTel's telephone service territory. The project has been hailed as a model for broadband expansion nationwide. On July 1, 2014, VTel began offering service, covering 20,000 rooftops in 24 towns. O locations now served by VTel were previously unserved. Other locations were served, but now have choice between two or more providers.

g. CLEC Broadband

1. Cable Internet Access

All cable providers in Vermont offer broadband service. Cable plants cover an estimated 67.5% of addresses within the state. All offer speeds of at least 4/1 mbps and in most cases much faster speeds. Prices for broadband service are generally competitive with DSL, but can offer higher speeds. Vermont is served by Comcast and Charter, two of the nation's largest cable companies and several small, independent cable companies.

⁶¹ Docket 7725

⁶² VTel Grant Application Summary, 3/29/2010

Nationally, the cable market is consolidating. As this Plan goes to publication, the FCC and Department of Justice are reviewing a potential merger of Comcast with Time-Warner Cable. Both companies have a national presence, and this sale could potentially affect millions of customers nationwide, including Vermont's Charter and Comcast customers.

2. Burlington Telecom

Burlington Telecom is Vermont's only municipal telecom company, which is operated as a department of Burlington City government. Burlington Telecom has certificates of public good (CPG) to provide telecommunications and video service throughout the entire city, and offers fiber to the home services in most Burlington neighborhoods. Conceived in the early 1990s, Burlington Telecom began offering video and advanced telecommunications services in 2007. Today Burlington Telecom can offer broadband speeds of up to 1 gigabit per second (gbps) download and upload speeds.

Burlington Telecom brought consumers some of the fastest broadband in Vermont, but failed to achieve sustainable penetration levels. On September 13, 2005, the Board granted the City of Burlington a CPG to own and operate a cable television system within the City. On August 9, 2007, the City entered into a lease/purchase agreement with CitiCapital Municipal Finance (Citibank) to finance 33.5 million for the build out of the BT system. BT also used approximately \$16.9 million the City's general fund for the build out of the BT system in contravention of the City's charter and CPG.

Citibank filed a lawsuit against BT in 2011 after BT failed to make regular payments under the lease/purchase agreement. Citibank sought damages for the \$33 million, plus costs and punitive damages. After three years of litigation, Citibank and Burlington Telecom came to a mediated resolution, which allows the city to extinguish the \$33 million debt in exchange for \$10.5 million. The agreement calls for the sale of BT to a private entity within five years. The agreement will shield Burlington taxpayers from further liability, and guide the City out of the telecommunications business.

Burlington's telecommunications market underwent significant change between 2006 and 2010. Adelphia Cable was Burlington's primary video service during the early part of the 2000s. Verizon provided phone service. Both companies had little interest in providing advanced telecommunications services to Burlington residents. Since Burlington Telecom began offering service, FairPoint purchased Verizon's lines and Comcast purchased Adelphia. These companies made a positive commitment to serving Burlington and today offer broadband service throughout the city. Most Burlington residents and businesses can now choose between three wireline providers of terrestrial broadband service. Burlington Telecom was unable to achieve the penetration level it needed to justify the capital investments it made in its fiber network.

Chattanooga Tennessee has a city-wide fiber network which officially began offering service in 2010. This network, run by the Electric Power Board of Chattanooga (EPB), a municipal electric and communications entity, offers speeds of up to 1 Gbps symmetrical. Chattanooga began its fiber to the home project in the early 2000s. It was able to complete the project after it

received a \$111 million dollar stimulus grant in 2009.⁶³ In 2012, EPB reported it had 35,000 customers purchasing its fiber based broadband Internet service, which exceeded the city's initial goal of 26,000. EPB has reported an even or positive revenue stream since initializing service.⁶⁴

Although Vermont's experience with municipal telecommunications has proved to be a challenging experience, it is important to note that many municipal projects are succeeding. However, there are distinctions between Chattanooga's and Burlington's experiences that readers should consider. First, Chattanooga was aided by a \$111 million dollar federal grant, which greatly offset the capital costs of providing service. Chattanooga also achieved and exceeded the subscribership levels it needed to maintain an even balance sheet. These differences go a long way in explaining why Chattanooga has been successful.

3. ECFiber

ECFiber is a community owned telecommunications provider of fiber based services. ECFiber brings together 24 towns in the Upper Valley, with the goal of bringing fiber to the home.⁶⁵ ECFiber is most prevalent in the Upper Valley, where it has built extensive Fiber Networks in rural villages such as Barnard and Bethel. ECFiber raises capital through grant applications and community support. ECFiber currently serves approximately 600 customers.

4. WISPs

Vermont consumers are served by several Wireless Internet Service Providers. These companies offer fixed wireless broadband service to residents within range of their facilities. Speeds and prices are competitive with wireline offerings. Cloud Alliance, a service provider in the Plainfield area, offers plans ranging from 768/200 kbps to 6/2 kbps.⁶⁶

h. Mobile Wireless Data Service

Vermonters are served by all of the major wireless network providers, but AT&T Mobility and Verizon Wireless have the deepest facilities based penetration in Vermont. VTel recently launched a wireless VoIP service which is anticipated to be operational statewide. Vermonters may also choose service from a variety of pre-paid service providers and resellers of national service. As discussed more fully in the Voice portion of this section, Mobile carriers are continuously expanding coverage and upgrading facilities to bring 4G/LTE service to existing coverage areas. The state's permitting regime has allowed expeditious deployment of wireless telecommunications facilities all around the state. .

CMRS providers offer both mobile and fixed data plans. Users can access service through a multitude of devices, including tablets, laptops, and smartphones. Data plans offered by CMRS providers generally differ from landline offerings in that customers have data limits and pay data overage fees. Mobile data plans utilize a pricing model based on user consumption rather than

⁶³ EPB also borrowed \$219 million to finance the network's \$330 million cost. See Edward Wyatt, *A City Wired for Growth*, N.Y. TIMES, Feb. 4, 2014, at B1.

⁶⁴ Sean Buckley, *Chattanooga EPB Fiber Defies tough Telecom Odds*, Feb. 24, 2012, FIERCE TELECOM, <http://www.fiercetelecom.com/story/chattanoogas-epb-fiber-defies-tough-telecom-odds/2012-02-24>

⁶⁵ Sometimes called fiber to the premises (FTTP).

⁶⁶ Cloud Alliance, <http://www.cloudalliance.com/what/residential/>, visited on June 20, 2014.

speed of service.⁶⁷ Mobile data services are often used to compliment users' primary Internet connections. Users rely on mobile service when traveling, but use a wireline connection at home or in the office. But for rural consumers, Mobile Data is increasingly becoming the best source for broadband Internet access.

i. Public Broadband Initiatives

1. Firstnet

Firstnet promises to be the first national broadband data network dedicated to public safety. FirstNet is an independent authority within the U.S. Department of Commerce's National Telecommunications and Information Administration and is governed by a 15-member Board consisting of the Attorney General of the United States, the Secretary of Homeland Security, the Director of the Office of Management and Budget, and 12 members appointed by the Secretary of Commerce. The FirstNet Board is composed of representatives from public safety; local, state and federal government; and the wireless industry. One of Firstnet's overriding goals is to implement the recommendations of the 9/11 commission concerning the interoperability of first responder communication.

Vermont is working hard to ensure that it participates in the roll out of the FirstNet network. Vermont has an established FirstNet Board, which coordinates with federal policymakers on Firstnet Progress. Vermont's Board is comprised of members of various state agencies, E-911, local law enforcement and rescue, and a VTA representative.

As the project moves forward, adoption and use among Vermont's first responders will be key. Project proponents have provided only vague statements about how first responders will make use of a broadband connection in the field.

j. The Future of Broadband in Vermont

Vermont should endeavor to remain competitive in the digital economy. To do this, Vermont will need to aggressively support the expansion and upgrade of advanced telecommunications infrastructure. Act 190 states that the purpose of the state's telecommunications policy and planning statutes is to support measures designed to ensure that every business and residential locations in Vermont has infrastructure capable of delivering Internet access with service that has a minimum download speed of 100 Mbps and is symmetrical. This goal will require aggressive fiber deployment to much of the state. The next step will be to extend these fiber connections deeper into communities, allowing providers to bring fiber based Internet access service directly to homes and businesses.

The main obstacle Vermont faces in reaching this goal is cost. The cost of bringing service to rural areas may outpace the revenues providers will expect to receive from selling broadband service. State lawmakers have already taken steps to address this issue by activating high cost support and the Connectivity Fund. These two programs will provide much needed support to providers that commit to serving broadband in designated areas. The FCC's reforms will also

⁶⁷ Many wireline providers of Internet access services institute data caps, but these caps are usually much higher and are aimed at curbing abusive uses of the Internet connection.

help support broadband capable networks, while increasing efficiency and accountability within the universal service system.

The new technical benchmarks put forward in this Plan will help direct investment toward the best available technology. By targeting investments at broadband capable networks that meet the new benchmarks, the state can ensure that Vermonters will continue to have access to the best available Internet access infrastructure in the state. As wireless broadband become more widely used, the state will need to consider how best to maintain and improve wireless infrastructure. Policy makers will need to ask whether competition is sufficient to keep wireless infrastructure robust, or if the state will need to target universal service support directly at wireless infrastructure. For the reasons discussed above, the public-private partnership, which has driven key investments thus far, will become even more important in the future.

IV. VIDEO

The ways in which video is delivered have expanded in the 10 years since the *2004 Telecommunications Plan*. In 2004, consumers watched video content in four primary ways: broadcast television, satellite, cable television, and pre-recorded video (i.e. tapes and DVDs). The Internet, however, was already starting to change consumer behavior. In 2005, YouTube, a website dedicated to user-generated content, launched. Today, YouTube gets millions of unique visitors every day. Around the same time, Netflix, a video rental-by-mail company, began offering streaming content to users “on demand.” Today Netflix is the largest user of consumer bandwidth and transmits more data than any other single entity. Other online providers of video have since appeared. Despite these new services, Vermonters still depend heavily on cable and broadcast television.

This section primarily discusses video providers with a physical presence in Vermont, but will also discuss national trends in the video industry and new methods of video delivery such as Internet-based content providers. This section will also address the strong presence in Vermont of access management organizations.

a. Overview of Vermont’s Video Market

Vermont is served by 13 cable providers. Each provider has its own designated franchise territory determined by the Public Service Board. A cable provider receives a certificate of public good (CPG) for an 11 year period.⁶⁸ During this period the cable provider is obligated to make service available to locations in its service area subject to the Board’s line extension rules. Some cable companies are required by a CPG to adhere to additional cable extension obligations. The Almanac section of this *Plan* includes a map of cable service areas.

Many Vermonters use satellite television. Satellite television signals can be received anywhere with a clear view of the sky. Satellite offers an amount and type of content similar to cable and some exclusive content.

In the past 10 years, Vermont has witnessed many mergers and acquisitions of its local cable providers. Comcast has been the main driver. In 2006, Time Warner Cable purchased Adelphia Communications Corporation as it was struggling with chapter 11 bankruptcy and

⁶⁸ Stowe Cablevision Inc. is the exception. It does not have a time limit on its CPG.

allegations of securities violations on the part of its leadership. As part of this transition, Comcast Cable assumed Adelphia's Vermont subscribers. Also as part of the transition, Comcast took on obligations to extend its cable plant in Vermont. Comcast brought service to thousands of new locations, including all of Grand Isle. Comcast has also purchased several small Vermont cable firms. Comcast is now the largest cable provider in Vermont.

In the early 2000s, dissatisfaction among Vermonters about the quality of Cable television and the lack of access in certain areas, caused localities to seek alternatives to private offerings. As discussed in the *Broadband* section of this chapter, Burlington initiated its own telecommunications department, Burlington Telecom (BT). BT offers a range of video packages at competitive rates. Burlington is the only place in Vermont where consumers have a choice between two facilities based video providers. Elsewhere in Vermont, ECFiber, a community driven entity, considered the idea of offering video. ECFiber has a CPG to provide video service but has not yet begun offering it to consumers.

Burlington Telecom and ECFiber use fiber-based networks to extend service. VTel has also entered the video market, offering video service through its new fiber to the home network.

b. National Trends in Video

The biggest technological change of the last 10 years has been in the area of high-definition digital content. The number of digital channels cable providers offer has increased. So too has the amount of "on demand" content cable providers offer. In addition, consumers are using digital recorders. Consumers no longer need to watch at an appointed time to see the must see content on the major networks.

Many consumers are "cutting the cord."⁶⁹ Despite the growth in consumer demand for video content, the number of cable video customers has decreased. Here in Vermont, the number of cable subscribers has decreased from 139,275 in 2009 to 132,373 in 2012. Consumers are increasingly turning to other sources of video content, including online platforms such as Netflix and Hulu. Online media outlets offer content "on demand" and at prices below the typical cable package. As stated above, Netflix's streaming service has grown exponentially in recent years. This year, Netflix entered into an interconnection agreement with Comcast to gain direct access to Comcast's network, obviating the need to send data through backbone providers, such as Cogent, to reach Comcast customers.

Mergers and acquisitions have dominated cable related headlines in recent years. Comcast acquired a majority stake in the media conglomerate, NBCUniversal in 2011.⁷⁰ Through this acquisition, Comcast has positioned itself to be not only the largest cable provider in the United States, but also one of the largest content producers in the world. The sale expanded Comcast's market share both horizontally and vertically, giving Comcast control over a large segment of the content production industry, and, along with it, copyright and retransmission rights of NBC content. To gain approval from the United States Department of Justice, Comcast agreed to adhere to the FCC's net neutrality rules that were in place in 2011 for a period of seven years.

⁶⁹ Referring to the physical cable connection into one's residence or business.

⁷⁰ Comcast currently owns 100% of NBCUniversal.

The Comcast merger with Time-Warner has drawn controversy from consumer groups who say that Comcast will be able to wield its market power to suppress competition in the content production and online video industries. Net neutrality advocates argue that in the absence of net neutrality rules, Comcast will use its market power to impose restrictions on Internet users, such as blocking content, imposing data caps, and throttling speeds when users access certain edge providers.⁷¹ Comcast has responded in the press that the merger will not harm competition because Comcast and Time Warner do not directly compete in the cable market. Both Comcast and Netflix denied that their agreement to give Netflix direct access to Comcast's network had anything to do with accusations that Comcast was inhibiting data stream originating from Netflix.

Comcast is Vermont's largest cable provider. Should it successfully merge with Time Warner, Comcast will likely increase its presence in Vermont. The merger will involve a sale of facilities to and from Charter Communications, Vermont's second largest cable provider. As part of the merger agreement, Comcast has also agreed to sell some of its subscriber base in other states to Charter Communications and will take on other Charter accounts. Should federal authorities approve the sale, Charter Communications and Comcast will seek to transfer Charter's Vermont subscriber accounts to Comcast. Comcast will sell its accounts in other areas of the country to Charter. Charter is expected to net 1.3 million accounts nationwide from Time Warner, and the two companies will swap an estimated 1.6 million accounts. Charter will no longer have a presence in Vermont.

AT&T also announced possible acquisition of DirecTV for \$48.5 billion. By acquiring DirecTV, AT&T would be able to offer consumers bundled packages of TV, phone, and Internet much similar to popular bundle packages offered by most cable companies. Both deals must be approved by the FCC and the Department of Justice prior to being effectuated.

c. Public, Educational, and Government TV

Public, Educational, and Governmental (PEG) access is recognized by Vermont state law as an important component of cable systems. PEG cable stations provide an outlet for community members and organizations to produce non-commercial programming and present programming of interest to their neighbors. PEG access became a mainstay of cable television when Congress passed the *Cable Communications Act of 1984*. The law allowed local franchising authorities (such as the Public Service Board) to require cable companies to set aside channels for locally generated non-commercial content. Vermont has a rich history of strongly supporting PEG stations and PEG content. Vermont has 26 access management organizations (AMOs) dedicated to PEG content. These organizations are essential to cable customers who rely on AMOs for broadcasts of local government meetings and hearings, school information, and local arts and entertainment offerings.

AMOs receive support directly from cable customers. A portion of each customer's monthly cable payment is distributed to the local PEG station(s) serving the customer. AMOs use this funding to produce content and run operations. Surveys conducted by the Department of Public Service show that consumers watch public access regularly. The majority of consumers in

⁷¹ Edge providers are providers of Internet based services and applications. Edge providers include just about everything found on the Internet. Amazon, iTunes, Netflix, and Facebook are all examples of edge providers.

Charter Communications' territory, for instance, watch public access programming at least once per month.⁷²

PEG stations' value to the communities they serve go beyond their broadcasts. The ability of PEG stations to originate live programming from a variety of locations around the community adds value to the PEG programming experience. Local government meetings and candidate forums are examples of how PEG programming, and especially live PEG programming, contributes to democracy in the community. Furthermore, PEG access can serve the public by being more than just a place to play tapes. When PEG access includes facilities and training for members of the community to learn video production, it contributes to media literacy in the community.

During the comment period of this Plan, the majority of comments received by the Department of Public Service stressed the value of Public access television. The comments focused on a number of benefits AMOs provide. AMOs give community members access to their facilities, helping residents interested in video production learn how to produce content. AMOs also cover a wide range of community events that would otherwise not be broadcast. The decline in cable subscribership and the shift to online content has caused some in the AMO community to question the continued viability of PEG television as video subscriber funded entities.⁷³ PEG stations are facing technological hurdles. Many stations have not made a transition to high definition, causing a technological disparity between PEG television and other networks.⁷⁴

d. The Future of Video

The existing physical cable plants are important to Vermonters for two reasons. First, cable television serves as an important source of local and national news and entertainment. Second, the same lines that carry video also carry data, making cable facilities indispensable to Vermonters' Internet access needs. As discussed in the Broadband chapter of this *Plan*, coaxial cable facilities currently provide the fastest broadband Internet in the state. Vermonters depend on these facilities and will require that they are maintained and expanded in conformance with Board rules.

Broadening the reach of cable access will be important to the future of the system. This will increase the number of addresses able to meet the State's 2024 technical benchmarks for broadband access as well as the ability of residents to access local content.

Cable subscription rates are on the decline. However, nationwide, video consumption is increasing. As Americans look to other sources of video content, cable companies will play an important role in determining the range of access consumers will have to that content. Consolidation of the cable industry raises questions about consumer access to edge content providers and those providers' access to consumers. Rules governing retransmission and the application of common carriage principles to broadband providers will become ever more important as the market continues to consolidate with respect to providers and services.

⁷² 2014 Charter CPG Renewal Survey Results, June 2014.

⁷³ Email of Jamie Dimick to the Department of Public Service, March 20, 2014.

⁷⁴ Email of Lisa M. Byer to the Department of Public Service, March 21, 2014.

Chapter 2: TELECOMMUNICATIONS ALMANAC

I. INTRODUCTION

The Telecommunications Almanac provides data about the status of telecommunications infrastructure and services in Vermont through 2012. The purpose of the Almanac is to give a snapshot of the current state of telecommunications in Vermont and to provide the data from which the Department of Public Service has developed the plans for meeting emerging trends related to telecommunications technology, markets, financing, and competition pursuant to its statutory reporting obligations under 30 V.S.A. § 202d. The Almanac includes statistical data covering a wide range of topics as well as analysis of that data. The data contained in this report helps inform state policymakers on the direction of future telecommunication policy and regulation.

II. TELEPHONE SERVICE

Vermonters are served by 10 incumbent local exchange carriers (ILECs). An ILEC provides telephone service to residents in a specific geographic region. In addition to providing retail service, ILECS have an obligation to open their facilities to, and carry calls from, competitor service providers at competitive rates. Vermonters are also served by competitive local exchange companies (CLECs) and several market substitutes for voice service, such as Internet-based voice communication. The following subsections provide information and data on telephone service in Vermont. Subsection (a) provides data on telephone usage and penetration. Subsection (b) focuses on retail service, while section (c) provides information on wholesale service and rates. Subsection (d) presents data on universal service fund support and disbursements to Vermont.

a. Telephone Penetration

The telephone penetration statistics measure the availability of telephone service within the home. These statistics are collected by the U.S. Census Bureau as part of its Current Population Survey (CPS). The CPS is a staggered panel survey in which the people residing at particular addresses are included in the survey for four consecutive months in one year and the same four months in the following year.¹ The CPS survey asks participants specific questions about their access to voice service within the home.² Once collected, the Federal Communications

¹ FCC, UNIVERSAL SERVICE MONITORING REPORT (December 2012)

² Specifically, the survey asks "Does this house, apartment, or mobile home have telephone service from which you can both make and receive calls? Please include cell phones, regular phones, and any other type of telephone." Thus telephone penetration includes any in home access to voice service that allows a member of the household to make and receive voice communication.

Commission (FCC) publishes this data in the Universal Service Monitoring Report on an annual basis.

With a 97.8% penetration rate, Vermont ranks ninth in the nation for telephone penetration. This is well above the 95.9% national average, and on par with penetration rates throughout New England.³ The data show a consistent penetration rate from year to year. However, there was a 0.3% decrease from 2011 to 2012. Nonetheless, the data collected between 1984 and 2012 show the penetration rate trending upward.

Table 1 shows telephone penetration among the lowest income households is 94.9%, which exceeds the national average of 92%. Since the publication of the *2009 Almanac*, Vermont has slipped from the number one position among the 50 states to number eleven. This downward trend is due to other states increasing their penetration rates among low income households. Vermont's penetration rate among low income households has remained around 95% since 2007. Vermont's near ubiquitous penetration rate is a result of government policies such as Lifeline, Link-Up, and the Universal Service Fund, which have helped maintain a robust telecommunications network and affordable rates for consumers.

Table 1
Percentage of Household Telephone Penetration by State and Income, 2012

State	\$9,999 or Less	\$10,000 to \$19,999	\$19,999 to \$29,999	\$30,000 to \$39,999	\$40,000 or More	All Households
Connecticut	95.20%	99.50%	97.60%	98.20%	99.60%	98.30%
Maine	97.40%	98.60%	99.10%	97.90%	99.10%	98.50%
Massachusetts	93.70%	97.10%	99.60%	100%	98.80%	97.80%
New Hampshire	93.90%	96.40%	97.90%	99.60%	99.70%	97.90%
New York	89.10%	92%	94.80%	97%	96.90%	93.60%
Rhode Island	92.20%	96.70%	97.20%	99.50%	98.50%	96.40%
Vermont	94.90%	97.10%	99.70%	98.30%	98.90%	97.80%
United States	92%	95.30%	96.90%	97.80%	98.30%	95.90%

Source: *Universal Service Monitoring Report 2012*, Table 3.8 by Federal and State Staff for the Federal-State Joint Board on Universal Service

³ The New England average is 97.8%.

b. Retail Service

As Table 2 below shows, non-ILEC entities own 35% of the active lines in Vermont. This is much lower than the New England and New York average of 49% and below the national average of 39%. Several factors may account for the below average CLEC market share in Vermont, including low population density, and the high cost of providing service in rural areas.

Table 2
Total-End-User Switched Access Lines and VoIP Subscriptions in New England and New York
As of June 30, 2012 (in thousands)

State	ILECs				Non-ILECs				Total	NON-ILEC Share % of total
	Switched Access Lines	VoIP Purchased as		Total	Switched Access Lines	VoIP Purchased as		Total		
		Stand-alone	bundled with Internet			Stand-alone	Bundled with Internet			
Connecticut	995	0	116	1,111	197	67	559	823	1,934	43
Maine	401	0	0	401	137	13	144	293	694	42
Massachusetts	1,613	1	244	1,858	1,174	156	968	2,299	4,157	55
New Hampshire	304	0	0	304	124	39	240	403	708	57
New York	4,390	2	551	4,943	1,856	258	3,170	5,283	10,226	52
Rhode Island	195	0	50	245	238	25	92	355	600	59
Vermont	234	0	0	234	45	12	70	127	362	35

Source: FCC, *Local Telephone Competition: Status as of June 30, 2012*, June 2013.

Table 3 on the following page shows some of the various factors included in the calculation of consumers' local telephone bill, current as of the end of 2012. Consumers with local telephone service are generally charged a basic flat fee to maintain dial tone. Added to this flat fee are per minute charges, which may vary by time of day and whether the call extends into the caller's extended area service (EAS) local calling area. The flat fee and per minute local charges—often referred to as local measured service—are regulated by the Vermont Public Service Board. Most providers include a cap on the sum of per minute local charges a customer can accrue in a single month.

Table 4 shows how much incumbent carriers charge customers for varying levels of local telephone use. In addition to per minute charges shown in Table 3 that telephone companies charge, consumers typically see a subscriber line charge (SLC), Federal Universal Service Charge, and a Vermont Universal Service Fund (VUSF) charge. Table 4 attempts to capture what a typical bill would look like for each level of service listed. These calculations exclude state and federal taxes.

Table 3
2012 Vermont Independent Local Exchange Carriers' Local Rates

Company	Rate per minute of local use				Fee for Basic Dial Tone		Cap on total per month local fees	
	Home Exchange		EAS		Residential	Business	Residential	Business
	Peak	Off-Peak	Peak	Off-Peak				
TOC of VT (FairPoint Communications)	\$0.022	\$0.005	\$0.000	\$0.000	\$13.15	\$32.00	\$39.40	\$75.27
VTel	\$0.022	\$0.005	\$0.022	\$0.005	\$12.70	\$23.25	\$25.00	\$35.00
FairPoint of Vermont (formerly Northland)	\$0.010	\$0.005	\$0.025	\$0.005	\$13.20	\$23.65	\$24.00	\$38.00
Waitsfield Telecom* (WCVT)	\$0.010	\$0.005	\$0.022	\$0.010	\$13.90	\$26.40	Home \$13.00, EAS \$15.00	home \$20.00, EAS \$42.00
Champlain Valley Telecom* (WCVT)	\$0.010	\$0.005	\$0.022	\$0.010	\$13.90	\$26.40	\$28.00	\$38.00
Shoreham Telephone	\$0.014	\$0.005	\$0.020	\$0.005	\$6.15	\$10.25	\$30.00	\$30.00
Topsham Telephone	\$0.000	\$0.000	\$0.035	\$0.015	\$12.15	\$19.37	\$22.00	\$22.00
Franklin Telephone**	\$0.000	\$0.000	\$0.030	\$0.010	\$10.00	\$18.00	none	none
TDS Ludlow Telephone	TDS Co's have declining rate structure, 300 minutes or less - No Charge; 301-600 minutes - 2.5 cents; 601-900 minutes - 1.5 cents; 901+ minutes - 0.5 cents. Exception: Northfield charges 1.5 cents for 301-900.				\$12.90	\$21.65	none	none
TDS Northfield Telephone					\$13.40	\$22.15	none	none
TDS Perkinsville Telephone					\$12.90	\$21.65	none	none

Notes: Dial tone rates do not include mileage charges, where applicable. Residential caps are in addition to dial tone rates. Residential rates reflect rate with lowest level of included usage.

*Waitsfield & Champlain Valley Telecom has different caps for their Waitsfield Telecom and Champlain Valley Telecom exchanges and have thus been divided in the above table.

**Franklin Telephone has a different basic dial tone fee for seasonal (May-October) residential customers of \$15.00.

Source: 2012 Annual Reports

Table 4
Incumbent Local Exchange Carriers' Local Minute Charges: 2012

Company	Residential Charges				Multi-Line Business Charges			
	100 local minutes	1000 local minutes	1500 local minutes	2000 local minutes	100 local minutes	1000 local minutes	1500 local minutes	2000 local minutes
TOC of VT (FairPoint Communications)	\$21.43	\$27.61	\$31.05	\$34.49	\$40.62	\$46.81	\$50.24	\$53.68
VTel*	\$22.08	\$28.13	\$32.26	\$39.13	\$36.05	\$41.54	\$45.67	\$52.54
Northland Telephone (FairPoint)	\$22.27	\$32.58	\$38.31	\$44.03	\$34.48	\$44.79	\$50.52	\$56.25
Waitsfield and Champlain Valley Telecom	\$22.61	\$33.38	\$39.36	\$45.34	\$39.07	\$49.84	\$55.82	\$61.81
Shoreham Telephone	\$15.11	\$25.10	\$30.65	\$36.20	\$22.50	\$32.49	\$38.04	\$43.59
Topsham Telephone**	\$21.41	\$32.87	\$39.23	\$42.54	\$31.99	\$43.45	\$49.81	\$53.12
Franklin Telephone	\$18.97	\$28.13	\$33.22	\$38.32	\$30.34	\$39.51	\$44.60	\$49.69
TDS Ludlow	\$20.90	\$33.63	\$36.18	\$38.72	\$33.04	\$45.77	\$48.31	\$50.86
TDS Northfield	\$21.41	\$31.09	\$33.63	\$36.18	\$33.55	\$43.22	\$45.77	\$48.31
TDS Perkinsville	\$20.90	\$33.63	\$36.18	\$38.72	\$33.04	\$45.77	\$48.31	\$50.86

Source: 2012 Annual Reports

Calculation: rates include all fees and charges except state sales tax and federal excise tax. Cost calculated with half peak local usage minutes and half off-peak minutes. For companies with different home and EAS rates, calculated with half of the peak and off-peak minutes at EAS rates.

*VTel charges assume customer subscribes to PlainTalk package when cost-effective. PlainTalk includes 1200 minutes of local calling. In this table, it is cost effective at all but the 100 local minute's interval.

**Topsham Telephone's cap goes into effect at the 2000 local minute level of use for both residential and business customers.

The government regulated fees mentioned above help maintain affordable rates for telephone users. The SLC is a fee telephone companies are allowed to charge to maintain a consumer's line. This fee is capped by the FCC. Currently, the cap is set at \$6.50 for residential lines and \$9.20 for multi-line businesses.⁴ The SLC fee goes directly to the telephone company, despite being called the "federal subscriber line charge" by some companies. The SLC is not a tax, and companies are not obligated to charge a SLC. While providers may choose not to charge this or to charge less, each independent incumbent carrier in Vermont is a member of the National Exchange Carrier Association (NECA) and pays the full SLC amount into a pool regardless of the fee actually charged consumers.

Table 5 shows ILEC rate changes since 2005. As the table shows, ILEC charges for basic dial tone have remained mostly unchanged since 2005. Some companies have increased their

⁴ The first residential line is capped at \$6.50. Companies may charge higher rates for subsequent lines.

charges, while others have reduced the price of their fixed monthly rates. Per-minute rates have increased slightly, but the average local measured service (LMS) rate still remains under \$0.02 per minute.

Table 5
Changes to ILEC Dial Tone and Local Usage Rates 2005, 2010, & 2012

Company	Residential Monthly Fee for Basic Dial tone			Business Monthly fee for Basic dial tone			Local Measured Service Rate (per minute of use)					
	2005	2010	2012	2005	2010	2012						
							2005	2010	2012	2005	2010	2012
TOC of VT (FairPoint, formerly Verizon)	\$13.15	\$13.15	\$13.15	\$32.00	\$32.00	\$32.00	\$0.0220	\$0.0220	\$0.0220	\$0.0220	\$0.0000	N/A
Vtel	\$12.70	\$12.70	\$12.70	\$23.25	\$23.25	\$23.25	\$0.0220	\$0.0220	\$0.0220	\$0.0220	\$0.0220	\$0.0220
FairPoint of Vermont (formerly Northland)	\$13.20	\$13.20	\$14.00	\$23.65	\$23.65	\$23.65	\$0.0100	\$0.0100	\$0.0100	\$0.0250	\$0.0250	\$0.0250
Waitsfield & Champlain Valley Telecom	\$13.40	\$13.40	\$13.90	\$26.40	\$26.40	\$26.40	\$0.0100	\$0.0100	\$0.0100	\$0.0220	\$0.0220	\$0.0050
Shoreham Telephone	\$6.15	\$6.15	\$16.65	\$10.25	\$10.25	\$10.00	\$0.0137	\$0.0137	\$0.0137	\$0.0200	\$0.0200	\$0.0200
Topsham Telephone	\$11.35	\$12.15	\$12.15	\$18.10	\$19.37	\$19.37	\$0.0000	\$0.0000	\$0.0000	\$0.0350	\$0.0350	\$0.0350
Franklin Telephone	\$10.00	\$10.00	\$10.00	\$18.00	\$18.00	\$18.00	\$0.0000	\$0.0000	\$0.0000	\$0.0300	\$0.0300	\$0.0300
TDS Ludlow	\$29.00	\$12.90	\$12.90	\$38.00	\$21.65	\$21.65	No Change in rates from 2005 to 2012. TDS companies have a declining rate structure. 300 minutes or less: 0.0 cents; 301-600 minutes: 2.5 cents; 601-900 minutes: 1.5 cents; 901+ minutes: 0.5 cents. Exception: Northfield charges 1.5 cents for 301-900.					
TDS Northfield	\$29.00	\$13.40	\$13.40	\$38.00	\$22.15	\$22.15						
TDS Perkinsville	\$29.00	\$12.90	\$12.90	\$38.00	\$21.65	\$21.65						

Notes: Dial tone rates do not include mileage charges, where applicable. Rates not available for grayed-out fields. Residential rates reflect rate with low est level of included usage.

Source: ILEC Annual Reports

c. Intercarrier Compensation

Table 6 provides data on intrastate wholesale access charges. Access charges are fees charged to carriers connecting long distance calls to a local telephone company's local network and customers. Carriers providing long distance service pay for access on both the originating end and terminating end of a call. Although access charges tend to be expressed in terms of per-minute rates, they are, in fact, a variety of usage- and non-usage sensitive charges. The Public Service Board regulates intrastate access charges. The following table shows access rates for ILECs.

Table 6
2012 Incumbent Telephone Company Intrastate Access Charges

Rate Element	Company									
	TOC of VT (FairPoint Comm.)	Vermont Telephone (VTel)	FairPoint of Vermont (formerly Northland)	Waitsfield and Champlain Valley Telecom	Shoreham Telephone	Topsham Telephone	Franklin Telephone	TDS Ludlow	TDS Northfield	TDS Perkinsville
CCL Originating per minute	N/A	\$0.006900	\$0.004418	\$0.003450	\$0.000000	\$0.006900	\$0.006900	\$0.004740	\$0.004740	\$0.004740
CCL Terminating per minute	N/A	\$0.004034	\$0.036450	\$0.003593	\$0.000000	\$0.043300	\$0.023397	\$0.043300	\$0.043970	\$0.043300
Local transport - per mile per minute	\$0.000127	\$0.007500	\$0.000195	\$0.000344	\$0.000165	\$0.000423	\$0.000423	\$0.000423	\$0.000423	\$0.000423
Local switching per minute	\$0.009700	\$0.013992	\$0.013992	\$0.034341	\$0.001160	\$0.035200	\$0.035200	\$0.030000	\$0.030000	\$0.030000
Local transport - Circuit Connection - per minute	\$0.000731	\$0.045140	\$0.004802	\$0.004892	\$0.008160	\$0.008400	\$0.008400	\$0.008400	\$0.008400	\$0.084000
Composite originating per minute	\$0.018178	\$0.141032	\$0.025162	\$0.046123	\$0.011300	\$0.054730	\$0.052750	\$0.047370	\$0.047370	\$0.122970
Composite terminating per minute	\$0.018178	\$0.138166	\$0.057194	\$0.046266	\$0.011300	\$0.091130	\$0.069247	\$0.085930	\$0.086600	\$0.161530
Total originating and terminating per minute	\$0.036356	\$0.279198	\$0.082356	\$0.092389	\$0.022599	\$0.145860	\$0.121998	\$0.133300	\$0.133970	\$0.284500

Assumes 10 miles of local transport, except 61 miles for TOC of VT (FairPoint Comm), 5.32 miles of local transport for Franklin and 12 miles for Shoreham. Does not include non-usage sensitive elements or tandem switching. Also assumes measured Verizon host-remote local termination only.

Source: 2012 Annual Reports

d. Universal Service

Consumers are charged a fee for the Federal Universal Service Fund. Universal service is the principle that all consumers should have access to telecommunication services at just and reasonable rates. The Universal Service Fund helps support service in high cost areas, such as low density, rural towns in Vermont. This fund has been an important part of telecom regulation since 1934 when the *Telecommunications Act* established the first universal service policy. Today all consumers are charged a monthly fee that is applied to the Universal Service Fund. This charge is calculated as a percentage of a consumer's interstate calling portion of the bill. The Universal Service Fund supports four key programs:

- Connect America Fund: A fund dedicated to the build out of broadband services in underserved areas.
- Lifeline: a fund dedicated to reducing the cost of phone service for low income consumers
- Schools and Libraries: a fund that subsidizes the cost of telecommunications services for schools and libraries.
- Rural Health Care Program: a fund that assists rural health care providers with the cost of telecommunications services.

Table 7 below shows universal service support contributions by New England and New York service providers and resulting disbursements. As the table shows, Vermont receives a net distribution meaning that service providers receive more money in contributions than Vermonters pay into the Universal Service Fund. States with a higher proportion of designated rural areas generally see a positive estimated net dollar flow.

Table 7
Universal Service Fund Annual Payments and Contributions by Support Mechanism: 2011
(In Thousands of Dollars)

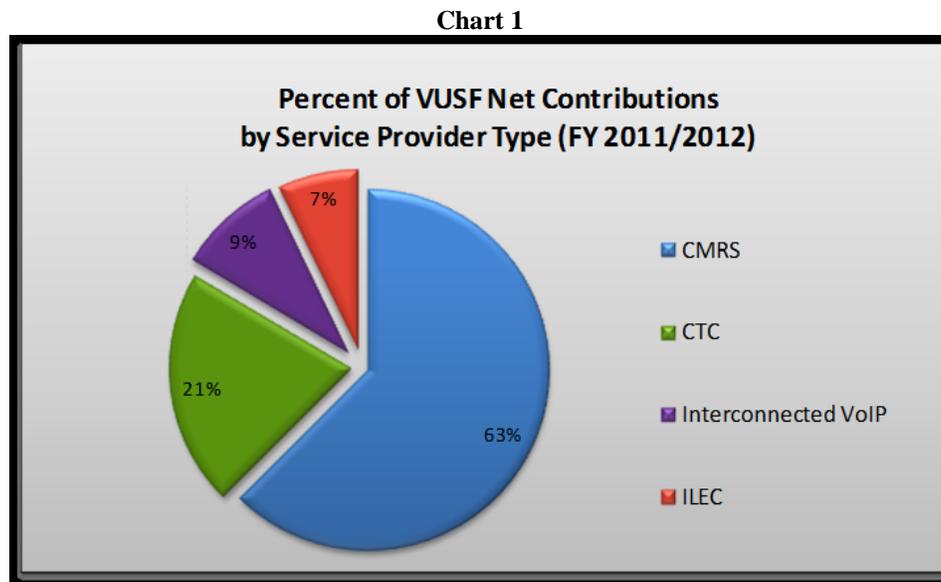
State	Payments from USF to Service Providers					Estimated Contributions		Estimated Net Dollar Flow to state	
	High Cost Support	Low Income Support	School & Libraries	Rural HealthCare	Totals		Amount		% of Total
					Amount	% of total			
Connecticut	\$453	11,561	21,103	\$0	33,116	0.41%	109,984	1.33%	-76,868
Maine	30,004	11,478	6,995	669	49,145	0.60%	36,294	0.44%	12,853
Massachusetts	2,088	29,693	26,292	129	58,203	0.71%	194,274	2.35	-136,071
New Hampshire	9,381	2,215	2,601	18	14,215	0.17%	37,958	0.46%	-23,743
New York	41,715	130,928	148,954	783	322,379	3.95	552,494	6.69%	-230,114
Rhode Island	29	3,425	9,014	0	12,468	0.15%	27,646	0.33%	-15,178
Vermont	18,298	2,477	1,827	46	22,647	0.28%	19,567	0.24%	3,080
National total	4,031,268	1,750,728	2,232,539	141,013	8,155,548	100.00%	8,262,633	100.00%	-107,085

Source: FCC, *Universal Service Monitoring Report*, CC Docket No. 98-202, 2012

Vermonters are also charged a fee for the Vermont Universal Service Fund (VUSF). The purpose of the VUSF is to support the Vermont Telecommunications Relay Service (VTTRS), telephone Lifeline Assistance, and the development of state-wide enhanced 911 emergency service (e-911). To finance these programs, Vermont law imposes a broad based charge (VUSF charge) on all telecommunications services that interact with the public switched network. This charge is calculated as a percentage of a consumer's entire bill. The Public Service Board sets the rate for VUSF charge, which is currently 1.82%.⁵

⁵ See 30 V.S.A. § 7523(a).

The revenue base—that is, the total value of telecommunications services subject to the charge—fluctuates from year to year. Each year before it sets the surcharge rate the Board makes an estimate about what the revenue base will be in the following year. Since the surcharge is based on a projection, the amount of revenue projected in the budget will never exactly equate to the actual revenue generated. Each year the Board issues an order that lays out the budget for the following year as well as the projected revenue and resulting VUSF assessment rate. The total actual income for the year ending June 30, 2012 was \$5,878,694. This figure includes provider contributions as well as interest, charges, performance assurance penalties, and other income. Chart 1 below breaks down the total VUSF assessments for fiscal year 2011/2012 by service provider type.⁶

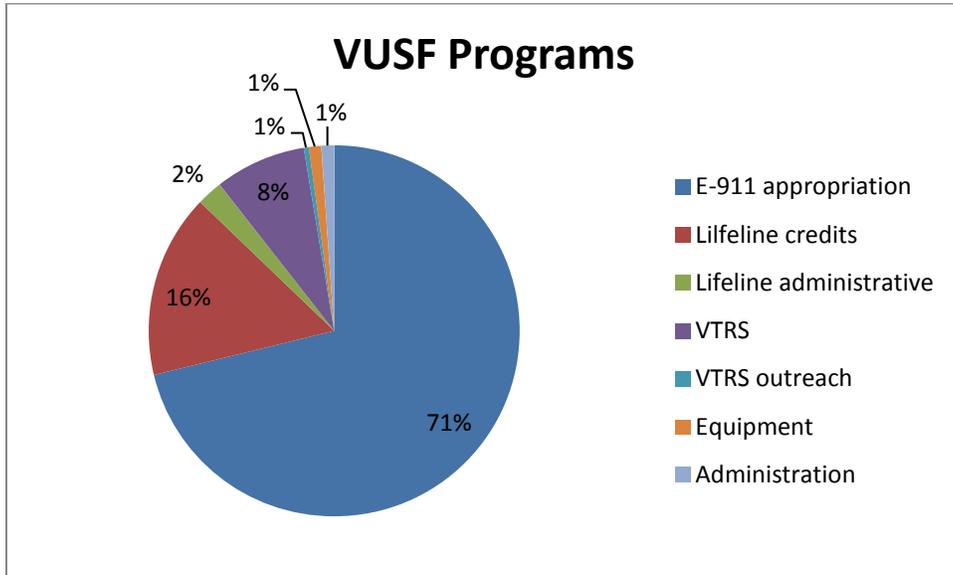


Source: QSI Consulting, *Assessment of the Vermont Universal Service Fund* May 2013

In 2011/1012 the VUSF disbursed \$7,183,142 to its programs and administrative and operational costs. Chart 2 relates the components and their proportion of the fund expense projected for 2013:

⁶ Assessments for fiscal year 2011/2012 totaled \$5,388,457.

Chart 2



Source: QSI Consulting, *Assessment of the Vermont Universal Service Fund*, May 2013

III. CABLE & VIDEO

Vermont is served by 13 cable providers that, for the most part, have exclusive franchises within their respective service territories. Table 8 below shows the number of cable subscribers for years 2006 through 2012. Cable subscribership has remained fairly consistent over this period with subscribership peaking at 139,275 in 2009.

**Table 8
Vermont Cable Subscribers**

Company	2006 subscribers	2007 subscribers	2008 subscribers	2009 subscribers	2010 subscribers	2011 Subscribers	Year 2012
Comcast Cable (formerly Adelphia Cable)	100467	106253	110505	113796	113213	112826	111585
Burlington Telecom	669	1909	3049	3275	2803	2384	2440♀
Charter Communications (formerly Helicon Cable)	12624	11226	11031	10921	10747	10487	8888
Duncan Cable TV	3032	2977	2980	2963	2852	2855	2815
Jeffersonville Cable TV	344	347	347	330	342	342	342
North Country Cablevision*	964	1063	1040	N/A	N/A	N/A	N/A
Smugglers Notch CATV	565	638	638	638	638	638	638
Southern Vermont Cable	1809	1793	322	2006	1977	1938	1914
Topsham Cable	Not in Operation				15	15	Not Reported
Stowe Cablevision	1025	1054	1077	1098	1130	1130	1130
Trans-Video, Inc.	1227	1308	1135	1110	2142	1068	2336
Waitsfield-Fayston Cable	3383	3528	3051	2947	2915	2796	2725
PC One Cable	213	204	940**	191	146	146	***
Total Cable Connections	126322	132300	135175	139275	138920	136625	132373

Source: Annual Reports 2006 - 2012

* North Country Cablevision sold to Adelphia/Comcast in 2008.

** White Mountain Cablevision reported combined Vermont and New Hampshire subscribers in 2008 only, accounting for this spike.

*** As of July 31, 2013 PC One was delinquent with its 2012 Annual Report and has not otherwise reported subscriber information.

♀ Represents City of Burlington average for 2012.

These companies have franchise rights to provide service in designated areas. The number of customers each company serves is partly a function of its service territory. Companies with less

territory have a smaller customer base. The Public Service Board has exclusive franchising authority under state law and provides cable companies with the license to operate in a designated service territory for a period of time, usually 11 years. Subscriber rates have remained fairly consistent from year to year but have been trending downward since 2009.⁷ Many cable companies now offer multiple services, such as telephone and broadband Internet access, which have helped increase revenue despite flat or declining video subscribership. Additionally, Comcast, with its acquisition of NBCUniversal, has branched into the content market.

Cable pricing and offerings have remained largely the same over the past few years, with cable prices remaining stable or decreasing slightly. Many cable providers have increased the number of channels they offer as part of their basic service. It is also worth noting that many cable companies offer cable bundled with telephone and broadband access, which is often cheaper than buying each service separately.

IV. BROADBAND SERVICE AVAILABILITY AND ADOPTION

a. Computer and Internet Adoption

Computer and Internet usage have steadily increased over the past decade, as Table 9 shows. Of Vermonters polled 85.9% reported that there is a personal computer in their household. This is a 6% increase from a decade ago. Internet in the home has likewise increased. In 2002, 74% of Vermont households reported having internet access. By 2012 that number had increased to 87.6%, surpassing the number of those who claim to have a computer in the home.

Table 9
Vermont Households with Computer, Internet, and Broadband as of 2012

Poll Year	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Computer	76%	80%	79%	83%	80%	81%	80%	83%	83%	83%	83%	86%
Internet	68%	74%	73%	70%	75%	75%	77%	83%	82%	81%	8100%	88%
Broadband	9%	18%	16%	27%	31%	41%	51%	63%	67%	69%	72%	76%

Source: 2010 Vermont Poll, Center for Rural Studies at UVM

b. Broadband Penetration and Availability

All Vermont households have access to the Internet so long as they have a phone line. Approximately 88% of households report having a connection to the Internet. Broadband deployment, however, is less ubiquitous. Of Vermont households 76% reported having broadband as of 2012. This number is up from 16% in 2003 and Broadband subscription has

⁷ Vermont cable subscribership peaked in 2003 when subscribership totaled 139,563.

increased steadily over the past ten years, but has slowed as the subscription rate meets the broadband availability. State and private efforts have focused on increasing the availability of broadband in areas not currently served with the hope that Vermont will soon have broadband access throughout the entire state.

Broadband speeds are also on the rise. The *2004 Telecommunications Plan* defined the minimal technical requirements for broadband service. The plan called for minimum benchmark download speed of 768 Kbps and an upload speed of 200 Kbps. As of June 2012, 76.7% of Internet connections in Vermont supported speeds of at least 768 Kbps downstream and 200 kbps upload.

Table 10
Percentage of Connections by Downstream Speed by State as of June 30, 2012

(Connections over 200 kbps in at least one direction)

State	Over 200 kbps Upstream and				
	% over 200 kbps	% at least 768 kbps	% at least 3 Mbps	% at least 6 Mbps	% at least 10 Mbps
	Downstream	Downstream	Downstream	Downstream	Downstream
Connecticut	95.9	77.8	42.8	35.3	23.9
Maine	93.2	80.4	46.7	37.8	11.5
Massachusetts	95.5	76.8	50.7	43.7	33.8
New Hampshire	93.3	69.9	51.2	42.8	31.9
New York	95.0	76.0	45.3	37.1	25.7
Rhode Island	95.7	79.9	55.2	46.2	35.1
Vermont	93.1	76.7	44.6	33.4	18.7
United States	95.1	78.8	47.6	33.7	19.3

Source: Internet Access Services: Status as of June 30, 2012 by F.C.C. Wireline Competition Bureau

Broadband coverage continues to expand in Vermont. The Public Service Department and the Department of Economic Development, with the cooperation of service providers have mapped coverage for the different types of Broadband platforms.

c. Broadband Pricing

Table 11 below lists the pricing of select broadband providers available in Vermont. This table, while not an exhaustive list of providers, does represent the full range of plans available to Vermonters.

Table 11
Selected Consumer Broadband Prices 2014

Provider	Service	Region	Monthly Rate	Speed (download/upload) *	Note
Comcast Cable	Cable modem	Vermont, various U.S.	\$39.99	25 Mbps/5 Mbps	Offer includes price of 39.99 for the first 12 months. Price increases to 54.99 thereafter. Price does not reflect installation and equipment charges
Telephone Operating Company of VT (FairPoint)	DSL	Vermont, various U.S.	\$49.99	15 Mbps/1 Mbps	Requires 1 year contract. Requires phone service, \$100.99 with phone and DSL.
VTel	DSL or Fiber	Southern Vermont	\$34.95	24 Mbps (up to 1 Gbps where fiber is available)	Price reduced to \$29.95 per month when bundled with voice services. Installation fee: \$99 (\$0 with 1 year commitment)
SoVerNet (National Mobile)	DSL	Vermont	\$50.00	5 Mbps/1 Mbps	\$37.50 charge for modem, \$100 installation fee (waived with one year contract).
Burlington Telecom	Fiber	Burlington	\$39.00	5 Mbps/5 Mbps	Installation fee: \$65.
FairPoint of Vermont	DSL	Northern Vermont	\$46.99	7.1 Mbps/1 Mbps	Requires 1 year contract, \$57.99 without contract.
Waitsfield & Champlain Valley Telecom	DSL	West Central Vermont	\$42.95	6 Mbps/1 Mbps	\$50 non-refundable installation fee. Consumer has the option of purchasing a self-installation kit. Rates may be reduced if included with a bundle.
Great Auk Wireless	WISP	Vermont and New Hampshire	\$39.95	5 Mbps/ 1mbps	Activation fee: \$29.95.
Kingdom Connection	WISP	North Eastern Vermont	\$99.95	1536 Kbps download	Requires 1 year contract. Installation fee: \$300. Equipment rental fee: \$8.95/mo.
Verizon	Mobile Broadband	various U.S.	\$60.00	5-12 Mbps/2-5 Mbps ♀	Requires a 2 year agreement. Includes 3 GB data limit with overage fees
AT&T	Mobile Broadband	various U.S.	\$70.00	5-12Mbps/ 2-5 mbps ♀	Requires 2 year contract. Plan includes 4 GB limit and overage fees. Other plans with additional limits are available.
Hughes Network Systems, LLC	Satellite	worldwide	\$39.99	5 Mbps/1 Mbps	Activation fee: \$99. Equipment leasing fee: \$9.99/mo. Rate reverts to \$49.99 after 3 months.

* FCC adopted a minimum speed of 4 Mbps download and 1 Mbps upload to be considered "broadband" in its Sixth Broadband Deployment Report, released in July 2010. All plans listed are the least expensive available from providers that meet those speeds or the highest speed available from the provider.

Source: Prices were web-published rates in effect April 2014. Prices are for services with speed as described. Other service levels/speeds may be offered at other prices. Prices for Great Auk, SoVerNet, and FairPoint were obtained by calling each company.

♀ speeds assume 4G service

V. NATIONAL AND STATE WIRELESS TRENDS

a. *Competition and Market Consolidation*

The wireless mobile market has undergone significant change over the past decade. Two of the most notable changes are the introduction of mobile technology for data and the proliferation of nationwide networks. Tables 12 and 13 show the number of voice subscribers increased from 2008 to 2012 at the same time as consumers report having more Internet-capable devices. Another notable change, as shown in Table 14, is the consolidation of market share into the hands of four nationwide providers: Verizon, AT&T, Sprint, and T-Mobile. Together, these companies possessed 92% of the total share of the U.S. market as of July 2012. Table 15 shows the U.S. wireless mobile market had a Herfindahl-Hirschmann Index (HHI) weighted average score of 2,873 at the end of 2011, which is considered “highly concentrated” by the federal agencies that use the HHI.⁸ The concentration of the market is a direct result of mergers and acquisitions by and between these four large companies with smaller regional providers.

Table 12
New England and New York Wireless Voice Subscribership: 2008-2012 (in Thousands)

State	2008	2009	2010	2011	2012
Connecticut	2959	3047	3,192	3305	3385
Maine	972	1006	1040	1090	1195
Massachusetts	5624	6027	6367	6419	6638
New Hampshire	1045	1075	1141	1171	1215
New York	17260	18193	19303	19938	20410
Rhode Island	874	880	906	935	1016
Vermont	421	398	431	471	521
Nationwide	255,729	265,332	278,918	290,318	303,052

Note: Subscriber figures collected as of June 30 of respective year.

Source: Wireless Subscriber figures: FCC Wireline Competition Bureau, Local Telephone Competition Report, released June 2013.

⁸ The Herfindahl – Hirschmann Index (HHI) is a calculation used to measure the competitiveness of a given market. The HHI is calculated by summing the squares of the individual firms’ market shares. The HHI ranges from less than 1 (atomistic market) to 10,000 (pure monopoly). The FTC and Justice Department consider any market with a score of 2500 or greater to be “highly concentrated.” See *FCC Wireless Monitoring Report, March 2013*.

Table 13
Mobile Wireless Subscribers with Full Internet Access as of December 31, 2011
(In Thousands)

State	Internet Capable Devices in Service	Subscribers with Full Internet Access
Connecticut	2,285	1,732
Maine	586	373
Massachusetts	4,006	3,084
New Hampshire	691	482
New York	11,789	9,301
Rhode Island	607	447
Vermont	311	201
Nationwide	183,666	142,066

Source: FCC, Source: FCC, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless Including Commercial Mobile Service (16th Report), March 2012.

Table 14
Estimated Facilities Based Service Provider Share of Service Revenues, 2008 - 2012 (percent)

	2008	2009	2010	2011	2012 (Q1 & Q2)
Verizon Wireless	27.8	33.4	33.7	33.8	34.3
AT&T	28.9	31.2	32.4	32.4	32.3
Sprint Nextel	18.6	16.6	15.7	15.6	15.8
T-Mobile	12.6	12.1	11.3	10.5	9.7
MetroPCS	1.6	2	2.2	2.5	2.6
U.S. Cellular	2.2	2.2	2.1	2.2	2.3
Leap Wireless	1.2	1.4	1.5	1.6	1.7
Other	7.2	1.1	1	1.4	1.4

Source: FCC, Annual Report and Analysis of Competitive Market Conditions with Respect to Mobile Wireless Including Commercial Mobile Service (16th Report), March 2012.

Table 15

Mobile Wireless Market Concentration: Herfindahl - Hirschmann Index, 2006 - 2011						
Year	2006	2007	2008	2009	2010	2011
High	6,551	6,272	6,801	6,572	6,512	7,178
Average	2,674	2,674	2,842	2,811	2,868	2,873
Low	1,609	1,795	2,123	1,903	1,878	2,008

Source: FCC, Annual Report and Analysis of Competitive Market Conditions With Respect to Mobile Wireless Including Commercial Mobile Service (16th Report), March 2012.

b. Mobile Radio Service Retail Rates

Commercial mobile radio service (CMRS) is subject to a regulatory framework that differs from traditional wireline service, despite the technological similarities. The *Telecommunications Act of 1996* preempts states from regulating the rates of CMRS services, although states do retain regulatory authority over “other terms and conditions.” The FCC has taken a policy position against strict regulation of CMRS, and instead, favoring rates that result from competition. Whereas traditional phone service rates vary from region to region, the four major CMRS providers own and operate nationwide networks, and their pricing is generally consistent across the country. Table 16 below shows the advertised nationwide rates for the four nationwide providers.

Table 16
Rates and Plans of Nationwide Facilities Based Carriers

Service Provider	Plan	Rate
AT&T	2 year agreement; unlimited text and voice; 1GB data limit	\$35 per month (price includes one phone on plan)
Sprint	2 year agreement; unlimited text and voice; 1 GB data limit	\$55 per month (includes one device on Plan)
T-Mobile	No annual service contract; unlimited text and voice; 1 GB data limit	\$50 per month
Verizon	2 year agreement; unlimited text and voice; 1GB data limit	\$60 per month

All plans are nationwide advertised rates. Rates were retrieved from service providers’ websites on April 11, 2014. Rates do not include taxes, universal service charge fees or cost of device. Activation and other fees and charges may apply. Plans may not be available in all areas.

All national carriers, and most regional carriers, offer pre-paid plans that offer consumers the flexibility of paying by minute for service in advance of using the service. These plans do not require service contracts or a set monthly fee. Consumers also have the option of purchasing plans from resellers of CMRS service, and their rates may vary from those advertised in the table above.

VI. CONSUMER PROTECTION

The Department’s Consumer Affairs & Public Information (CAPI) Division helps consumers reach informal resolutions to complaints against regulated utilities; advocates for policies that protect consumer interests; and educates consumers about utility issues. As part of its work, CAPI maintains complaint related data. Tables 17 and 18 below show complaints related to telephone and cable service. These numbers reflect “escalated” complaints—that is any complaint that has been screened and verified by CAPI as a legitimate dispute between a company and a consumer.

The companies with the largest customer base and service territories tend to have the most complaints, and the data show that the Telephone Company of Vermont (FairPoint) and Comcast each received the majority of the complaints for their respective industries. However, Fairpoint’s complaint numbers show a significant decrease in complaints over the last three years, from 930 complaints in 2009 to 226 in 2012. Comcast also saw an appreciable decrease in complaints with only 48 in 201

Table 17
Cable Complaints 2006-2012

Cable Television Service	2006	2007	2008	2009	2010	2011	2012
Adelphia ¹	34	2	0	0	0	0	0
Charter	8	4	17	3	8	16	7
Comcast	70	126	99	56	122	91	48
North Country ²	0	1	0	0	0	0	0
Northern Valley ³	0	4	0	0	0	0	0
Transvideo	0	0	0	0	1	0	0
Opticable	0	0	0	0	0	0	0
Burlington Telecom	0	0	1	1	1	0	0
Duncan	0	0	1	1	1	0	0
Stowe Cable	0	0	1	0	1	0	0
Southern VT	0	0	0	0	1	1	0
Waitsfield Telecom	0	0	0	0	1	0	0
Total	112	137	119	61	136	108	55

¹ Comcast purchased Adelphia in November 2006

² Comcast purchased North Country in 2009

³ Still has CPG, but no customers

Source: Vermont Department of Public Service, Consumer Affairs and Public Information Division

Table 18
Telephone consumer complaints: 2006-2012

	2006	2007	2008	2009	2010	2011	2012
Incumbent Local Exchange Carriers							
TOC of VT (Fairpoint Northern New England) ¹	245	169	218	930	636	348	226
Fairpoint of VT (formerly Northland)	15	13	8	4	8	14	1
Franklin Telephone	0	0	0	0	0	0	0
Shoreham Telephone	0	0	1	0	0	1	1
TDS Ludlow Telephone	0	1	0	2	0	0	0
TDS Northfield Telephone	0	1	0	0	0	0	0
TDS Perkinsville Telephone	0	0	2	0	0	0	0
Topsham Telephone	0	0	0	0	0	2	0
VTel	7	0	7	0	3	7	2
Waitsfield & Champlain Valley Telecom	2	0	1	3	3	2	3
Competitive Local Exchange Carriers							
AT&T	N/A	N/A	N/A	N/A	N/A	7	1
BCN Telecom	1	1	3	2	1	0	0
Burlington Telecom	1	1	0	0	1	0	0
Excel/Matrix Telecom	3	3	3	0	0	0	0
Level 3	0	0	5	0	2	4	0
Lightship	2	0	2	0	0	0	0
Metropolitan Telecommunications (Mettel)	1	0	0	1	11	0	0
One Communications ²	0	3	8	6	10	6	0
OneStar Long Distance	0	0	0	0	1	0	0
SoVerNet Communications	1	4	3	9	10	4	0
Telcove of Vermont, Inc.	0	0	1	0	0	0	0
Verizon Business (formerly MCI)	50	10	10	6	0	4	0
Toll Companies³							
AT&T	9	7	13	7	13	0	0
Excel/Matrix Telecom	0	3	1	1	0	3	1
LDCB	0	0	0	0	0	0	0
MCI	10	0	3	1	2	0	1
NSBI	N/A	N/A	N/A	N/A	N/A	1	0
Pioneer	N/A	N/A	N/A	N/A	N/A	1	0
OneStar	0	0	1	0	0	0	0
Sprint	0	0	0	0	1	0	0
Verizon	8	0	0	1	1	0	0
VOIP Providers³							
Comcast	0	2	5	8	16	28	12
Charter	0	0	0	0	0	4	2
Vonage	0	1	0	0	0	0	0

¹ Formerly Verizon

² One Communications was formed by the mergers and acquisitions of the Conversent, CTC and Choice One Communications companies

³ Access line information not available for toll companies and VOIP providers

Source: Vermont Department of Public Service, Consumer Affairs and Public Information Division; Annual Reports

2012 Vermont Telecommunications Survey Report

Prepared by:



126 College Street
Burlington, VT 05401

September 29, 2012

Table of Contents

Table of Contents	2
Summary	3
Internet	4
Residential.....	7
Non-residential	12
Cellular Telephone	19
Residential.....	20
Non-residential	23
Local Telephone	24
Trends	29
Service Changes and Improvements.....	30
Service Satisfaction	32
Television	33
Telecommuting	36
Survey Methodology.....	38
Appendix A: Landline and Cell Dual-Frame Weighting	41

Summary

ICF International, on behalf of the Vermont Public Service Department, conducted a survey with 400 Vermont residents (99 cell phone, 301 landline) and 521 non-residential organizations. All public, private, non-profit, and educational organizations were eligible for the survey. The survey measured Vermonters' telecommunication needs, as well as related behaviors, knowledge, awareness, and perceptions. For example, nearly 20 percent of Vermont adult residents report that technology services which could change the way they live are not available from local technology service providers. The Vermont Public Service Department will use the information to identify areas of deficiency in Vermont's telecommunications systems, and work with telecommunications providers to develop programs and policies to address such deficiencies, such as expanded broadband Internet access and cell phone coverage. The survey data will also be used to evaluate Vermonters' needs and behaviors to support short- and long-term planning efforts for bringing relevant technologies to Vermont. The survey was conducted by telephone, including cell phones, from July 30 through September 4, 2012 for residential and from July 31 through August 27, 2012 for non-residential; it researched services related to local telephone, cell phone, internet, television, and telecommuting. Some of the key findings include:

- Nearly 20 percent of Vermont adult residents do not have access to technology that could change the way they live.
- Local telephone subscribers are declining in Vermont. FairPoint holds a 42 percent residential market share of the local telephone subscribers and 44 percent for non-residential.
- Seventy-four percent of Vermont households have at least one cell phone, and 57 percent of businesses subscribe to cell phone service. Verizon Wireless has the largest market share in the residential market at 45 percent. AT&T has the largest market share in the non-residential market at 46 percent.
- Ninety percent of Vermonters use the Internet. Ninety-four percent of internet users have access from home.
- Nearly 43 percent of Vermont households subscribe to cable television, and nearly 42 percent subscribe to satellite television.
- About eight percent of workers telecommute at least one day per week on a regular basis, while six percent report that they telecommute every day.

The sections below describe the survey results. Appendix A contains information on weighting. The residential survey estimates are calculated by region: Champlain Valley, Northeast Kingdom, Central Vermont, and Southern Vermont. The non-residential survey estimates are

calculated by business size as measured by the total monthly expenses spent on telecommunications: \$0-\$100, \$101-\$200, \$201-\$500, and \$500 or more.

Internet

Ninety percent of Vermonters use the Internet, with most (76 percent) using it daily. Eighty percent of residents in the Champlain Valley (Addison, Chittenden, Franklin, and Grand Isle counties) use the Internet daily, compared to 73 percent in the rest of the state.

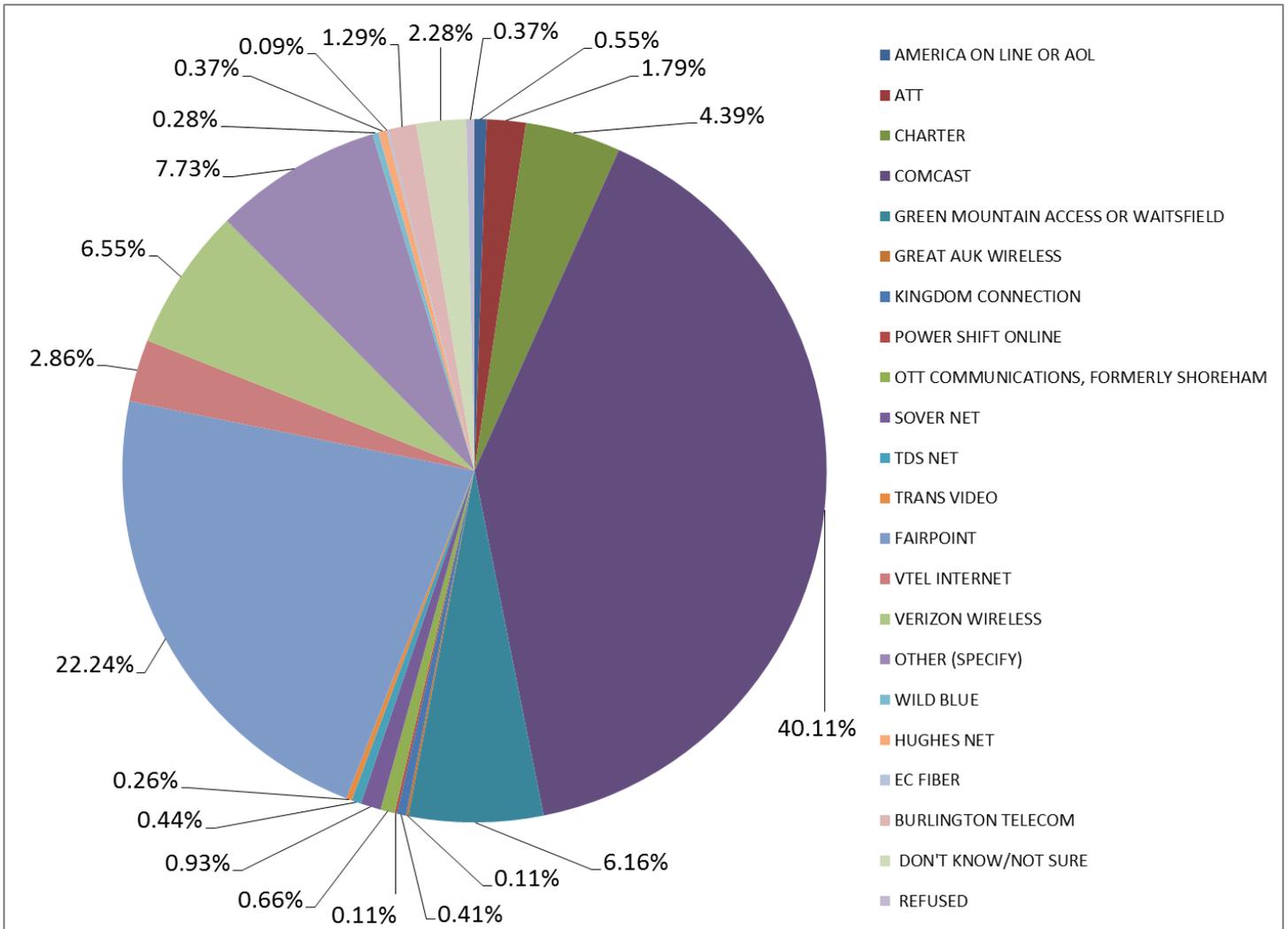
Exhibit 1 Vermonters' Internet Use Frequency

	Vermont	Champlain Valley	Northeast Kingdom	Central	Southern
Daily	75.75%	80.02%	65.36%	67.64%	78.68%
Weekly	10.32%	9.24%	12.76%	12.79%	9.41%
Monthly	1.38%	2.24%			1.53%
A few times a year	1.68%		2.48%	4.68%	1.84%
Never	10.65%	8.49%	19.39%	14.90%	7.80%

While there are numerous Internet providers servicing Vermont homes, Comcast and FairPoint are by far the market leaders, with shares of 40 percent and 22 percent, respectively. Comcast and FairPoint are also the two market leaders with non-residential consumers, but the gap between them is much narrower, 32 percent versus 24 percent respectively.

Exhibit 2 Estimated ISP Market Share

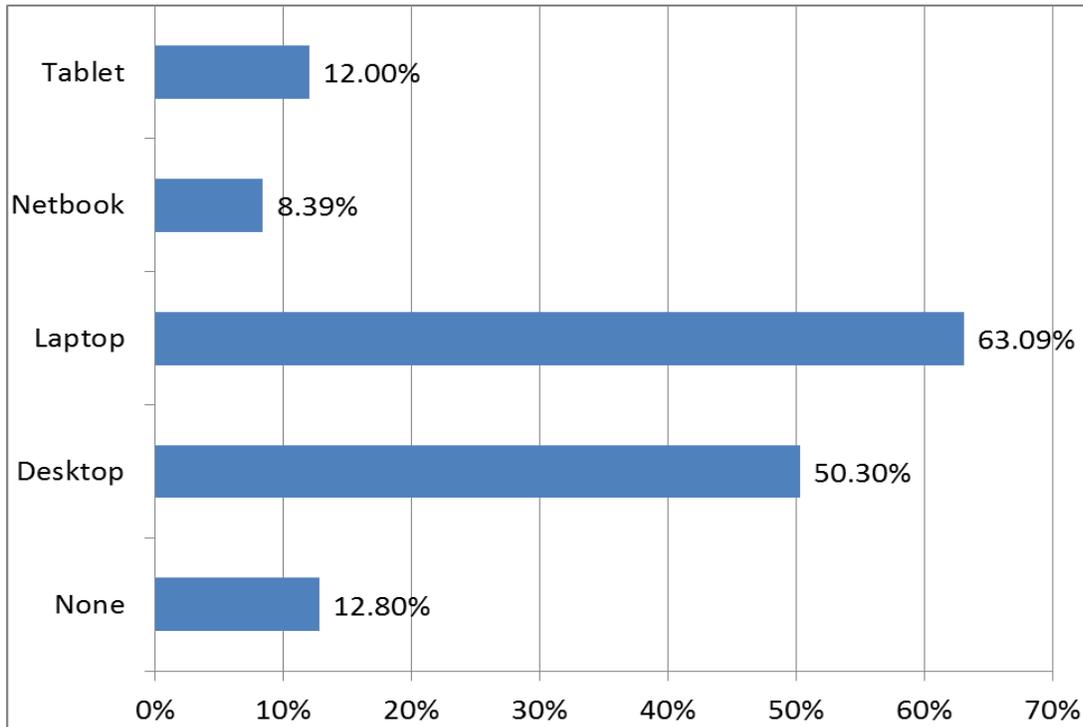
A. Estimated Residential ISP Market Share



Residential

Eighty-seven percent of Vermonters own a computer—either a desktop, laptop, or a netbook. Fifty percent own a desktop, 63 percent own a laptop, and eight percent own a netbook. Twelve percent of Vermonters own a tablet.

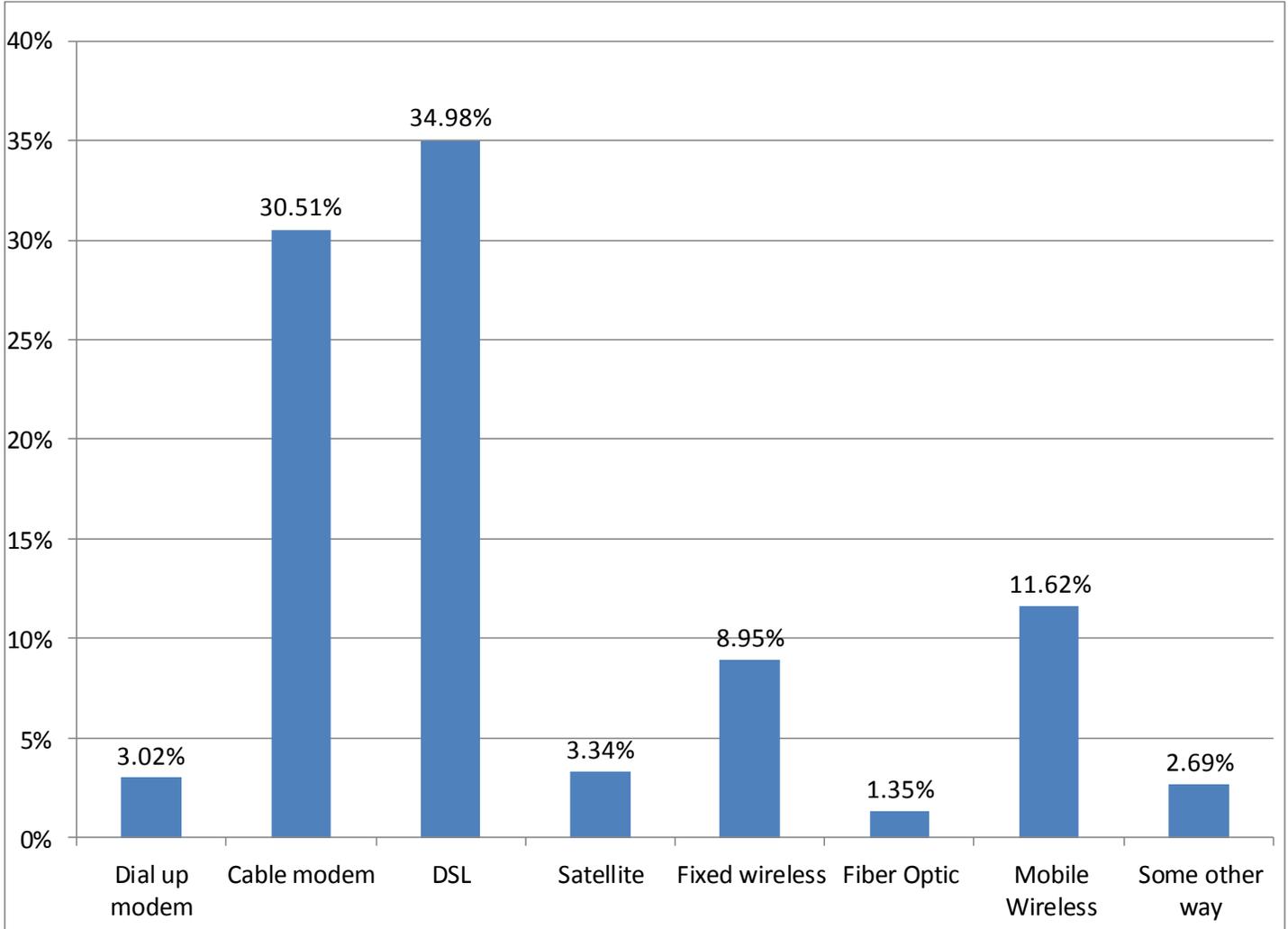
Exhibit 3 Computer Ownership



Broadband Availability and Adoption

Sixty-seven percent of home Internet users have broadband access (DSL, cable modem, or fiber option) in their homes, with DSL and cable modem as the most popular connection methods. Since 94 percent of Vermonters connect to the Internet from home, 56 percent of all Vermonters connect via broadband. The average monthly cost for home Internet access is \$48.54. For home Internet users who do not have broadband access, 30 percent reported that they do not have broadband because it is not available to them where they live. This suggests that broadband is not available for five percent of Vermont's home Internet users.

Exhibit 4 Residential Internet Connection Type



Ninety-four percent of Vermont Internet users connect from home. Forty-seven percent connect from work; 30 percent from a friend, relative, or neighbor’s house; and 15 percent from the library. Eighteen percent connect from a café or restaurant, 14 percent connect from a school in their community, and 13 percent connect from a college or university. Thirty percent of Vermont Internet users connect while traveling.

Exhibit 5 Locations Where Vermonters Access the Internet

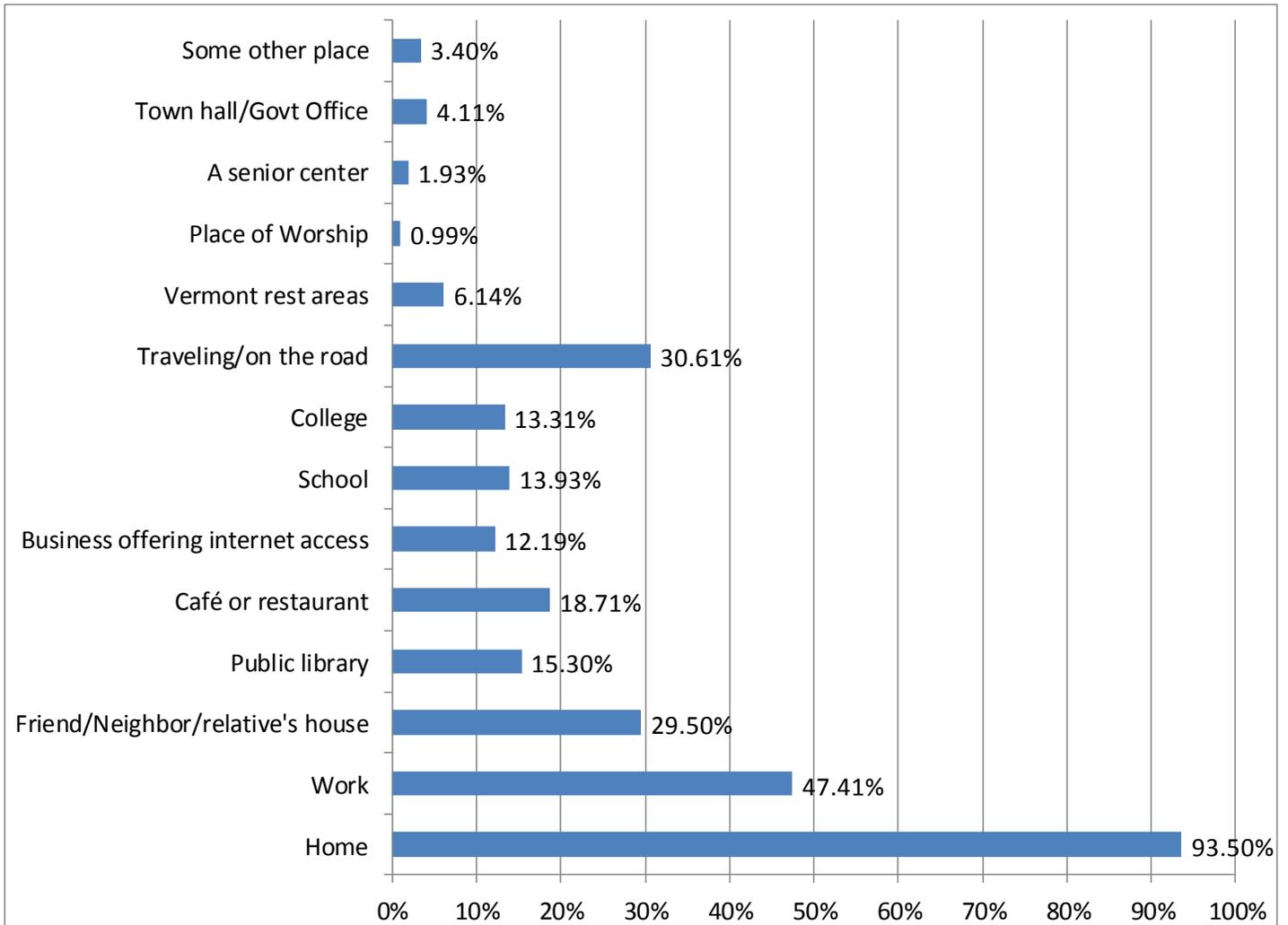


Exhibit 6 Reasons for Not Having Broadband at Home

Reason	
Broadband not available	29.82%
Equipment too expensive	5.34%
Service too expensive	4.81%
Don't use it enough	1.66%
Don't know how to use web well enough	1.90%
Other	45.73%

Fourteen percent of home Internet subscribers indicated that they will be upgrading to faster Internet service in the next year. This is less than in 2009 when 24 percent reported that they planned to upgrade.

We asked home Internet users about the nine internet activities listed in Exhibit 7—respondents were asked about these activities as they took place the time span of the four weeks or six months (depending on the category) prior to the survey. Nearly all access the internet from home to use personal email or other written electronic communication. Seventy percent access the Internet from home to pay bills or manage finances. Getting advice on health or medical services is also a frequent reason for accessing the Internet from home, as are downloading and streaming media, social networking sites, and work.

Exhibit 7 Online Activities of Home Internet Users

Activity	
Paying bills or managing your money or finances in last 4 weeks	69.74%
Getting health or medical services, advice or information in last 4 weeks	48.00%
Downloading music or video file in last 4 weeks	47.44%
Distance Learning/Online classes in last 4 weeks	20.46%
Video Conferencing or webcam in last 4 weeks	21.88%
Personal email or other written electronic communication	95.60%
Social networking sites	62.04%
Streaming media for entertainment	50.69%
Work	49.93%

Seventy-seven percent of internet users have visited a Vermont State Government website. The Department of Motor Vehicles was the most frequently mentioned. Nearly fifty percent of respondents provided at least one response that did not fit within the answer categories offered. Of the other responses provided, twenty-two percent mentioned job-related searches, twenty percent were looking for information on agriculture, hunting, and fishing, and seventeen percent were researching legislative and election information were the most frequent responses. About thirty-six percent of the open-ended answers were not able to be categorized.

Exhibit 8 Vermont State Government Online Services Used in the Past Two Years

	Vermont	Champlain Valley	Northeast Kingdom	Central	Southern
Buy hunting and fishing licenses	6.86%	7.55%	2.16%	3.25%	9.45%
Driver's license reinstatement fee payment	4.18%	3.97%	3.99%	2.35%	5.52%
Pay traffic tickets and court violations online	0.41%	0.73%			0.35%
Tax filing and refund status lookup	13.08%	12.53%	6.40%	23.65%	10.15%
Unclaimed property search	1.29%	3.10%			
Vital records request services	0.09%	0.22%			
Bizfile business tax filings and payments	3.11%	6.85%		0.79%	0.40%
Obtain a criminal conviction report	1.33%	0.25%		5.69%	0.82%
Order Police reports and public records	2.09%	2.00%		2.16%	2.85%
Something else	49.19%	52.19%	41.86%	37.58%	53.97%

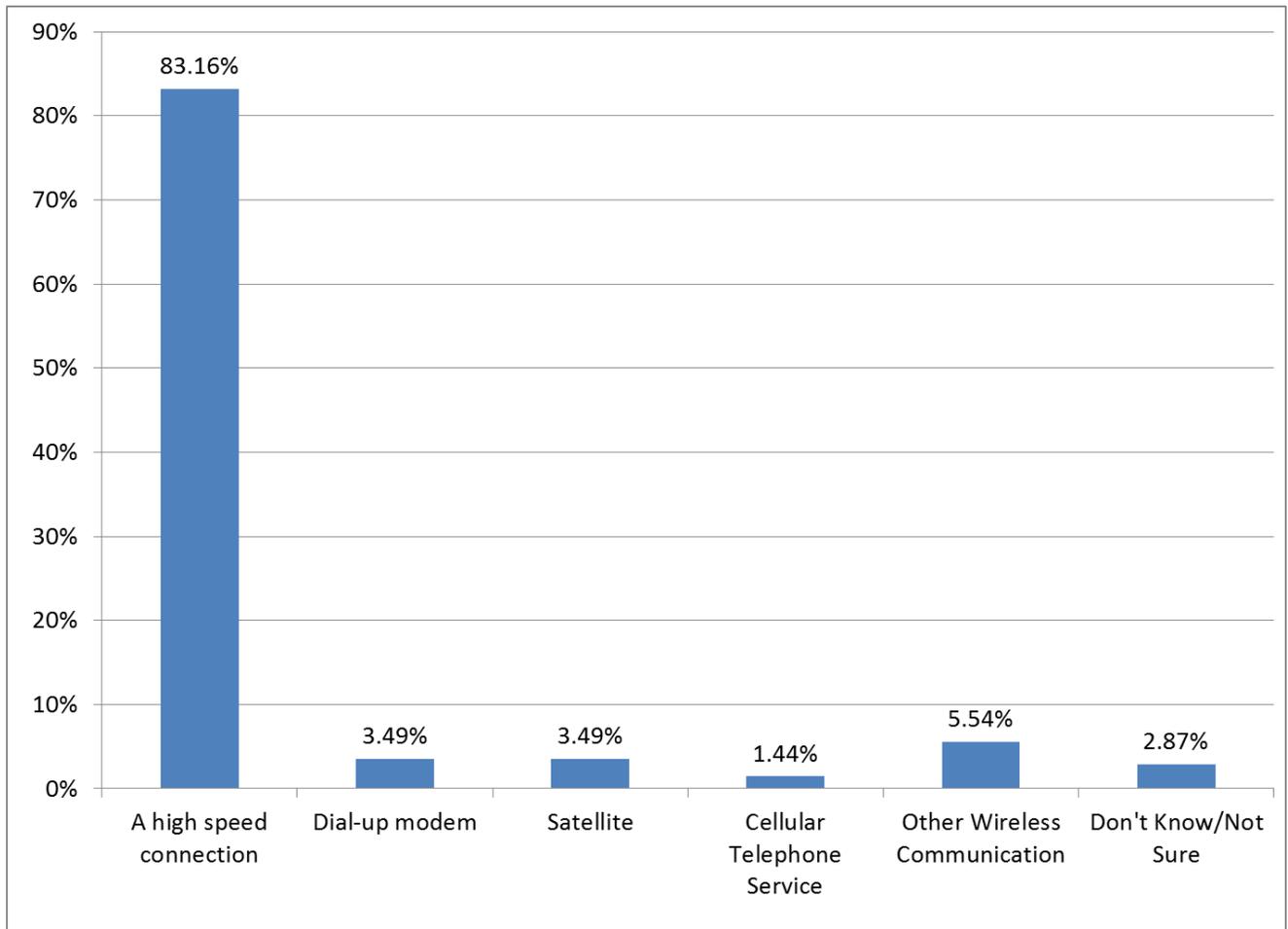
For those who do not access the internet, or access it infrequently (a few times a year), expense does not seem to be a barrier. Six percent reported that the equipment, Internet service, or telephone expenses are too expensive. This is similar to 2009, when seven percent reported that faster Internet service was too expensive. Twenty-seven percent of non- and infrequent users reported that they *don't have the necessary equipment or access to the necessary equipment*.

When asked about the availability of computers with free Internet access in their community, 20 percent of Vermonters were unsure. The percentage of non-users who were unsure was 32 percent. Vermonters were split on the issue of whether their community needs more Internet terminals that are available for public use. About one-third agreed, one-third disagreed, and one-third were unsure.

Non-residential Internet

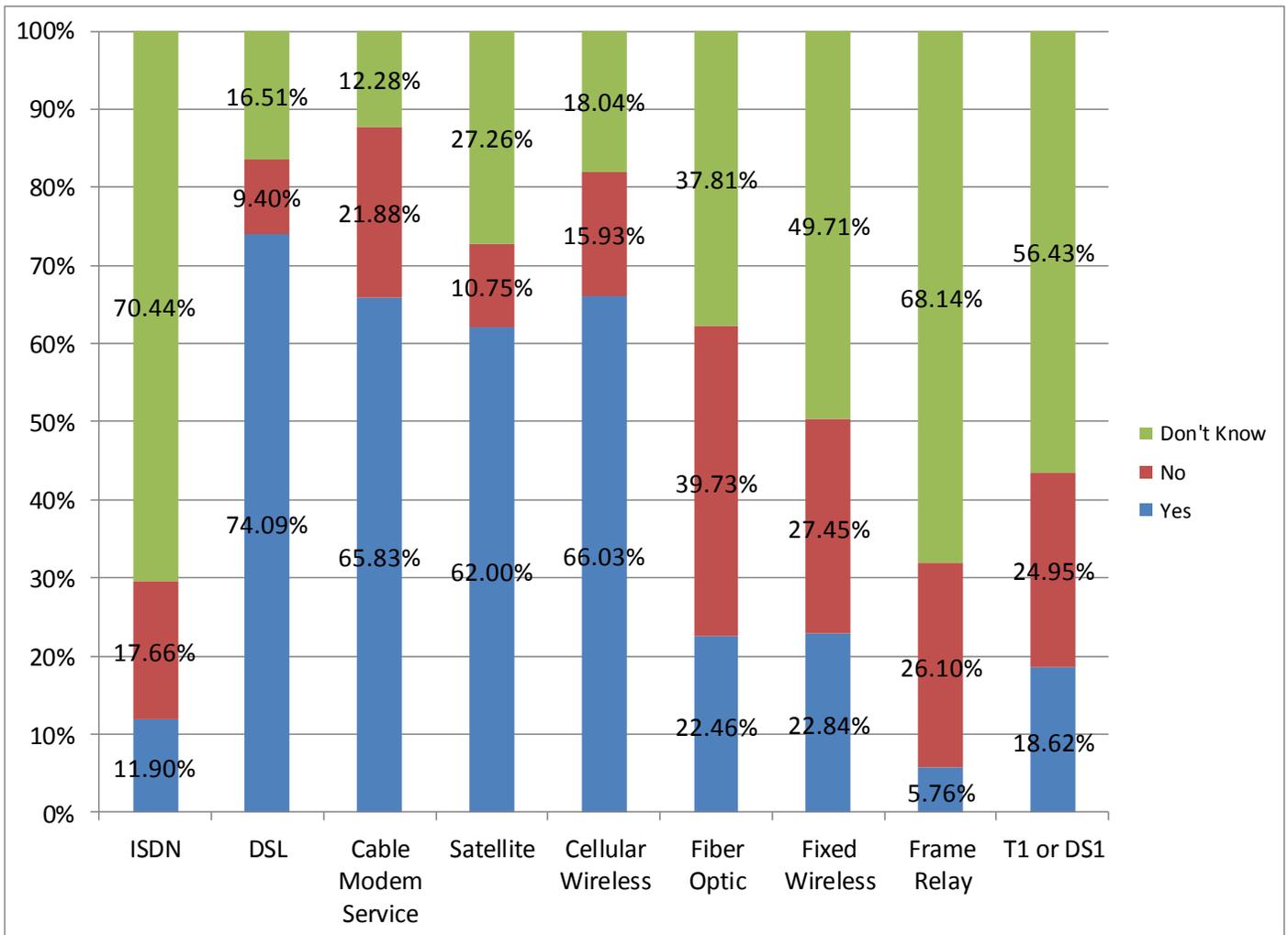
Ninety-three percent of non-residential consumers have Internet service at their location. Of these, 83 percent have broadband access. Fifty percent of the broadband access is DSL, followed by cable modem at 33 percent, T1/DS1 at two percent, and direct fiber optic at two percent.

Exhibit 9 Non-residential Internet Connection Type



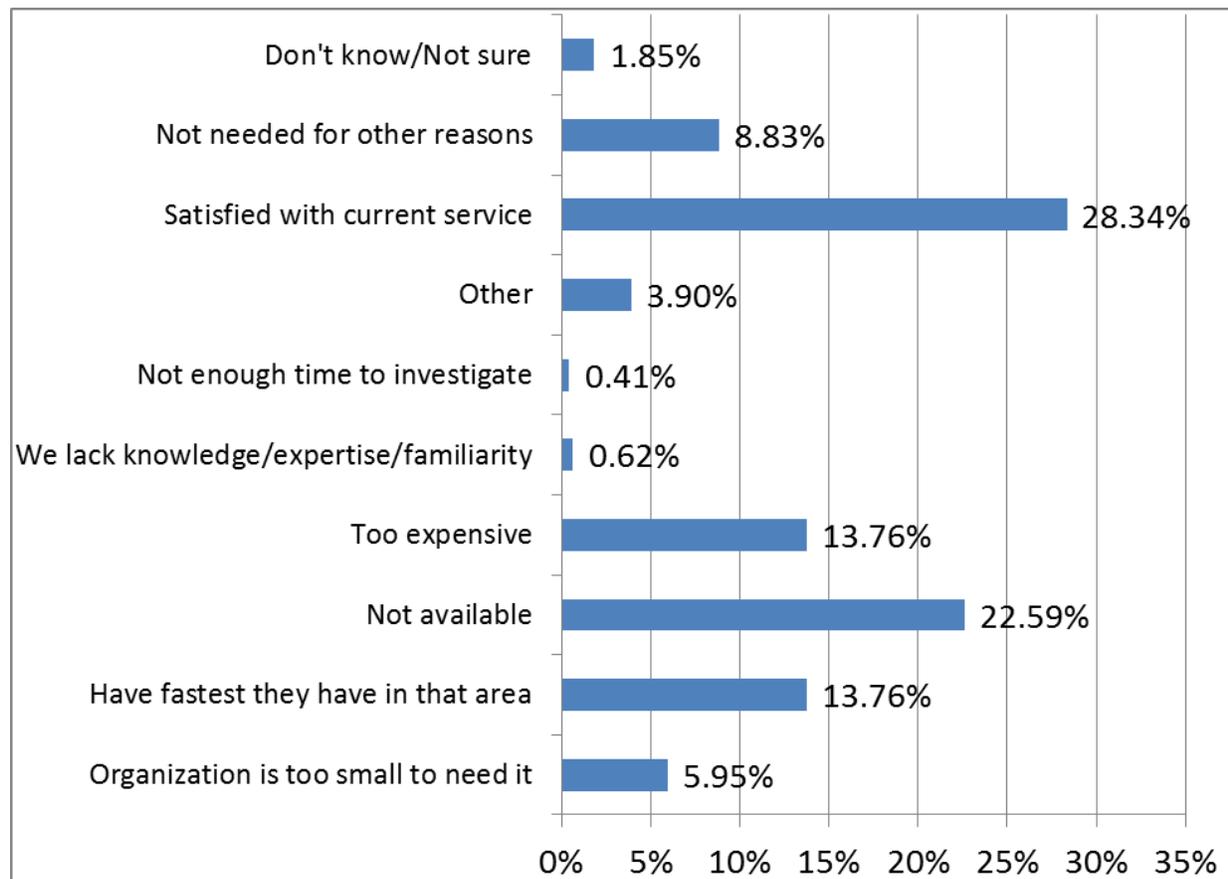
The average cost for internet service, as reported by non-residential consumers, is \$81.36 per month. Sixteen percent of non-residential consumers reported having an additional Internet service other than their primary one, with over half reporting that it is a broadband connection. Non-residential consumers were asked about the availability of various types of Internet connections. There was a high degree of uncertainty about availability of ISDN, Fiber Optic, Fixed Wireless, Frame Relay, and T1/DS1.

Exhibit 10 Availability of Internet Service Types



When asked about plans to upgrade to a faster service, 76 percent of non-residential consumers reported that they have no plans to upgrade and two percent didn't know. Almost 23 percent of non-residential consumers who do not have high speed access reported that high speed not being available was the most important reason their organization had not subscribed to a faster service.

Exhibit 11 Most Important Reason that Organization Does Not Subscribe to a Faster Service



Non-residential consumers reported that an average of 74 percent of their employees use e-mail at work, with over 65 percent reporting that all of their employees use e-mail. Almost 70 percent of non-residential consumers reported conducting business-to-business transactions over the Internet. Over sixty percent report that they have a website, most of which are used by the public and employees. Only two percent of organizations indicated that their website was for internal use only. Twenty-seven percent of the non-residential consumers who have publicly-accessible websites allow customers to make purchases online.

Non-residential consumers were asked the following two questions about their Internet service:

- Internet services may provide different speeds for uploading information to the Internet and downloading information from the Internet. For your organization, is upload or download speed more important?
- For your organization, which is most important: the reliability of your Internet service, the speed of your Internet service, or the price of that service?

Most non-residential consumers felt that download speeds were more important than upload speeds, and the vast majority of non-residential consumers reported that reliability is more important than price or speed.

Exhibit 12 Non-residential Importance of Internet Download and Upload Speed

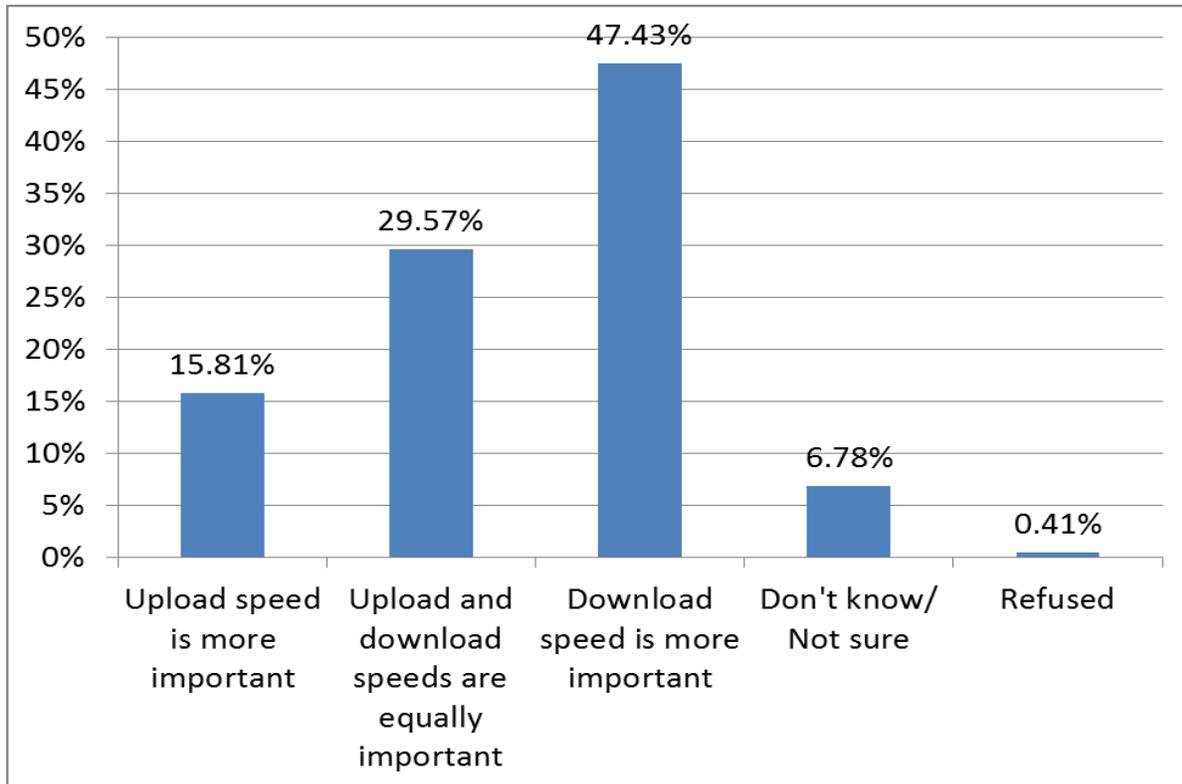
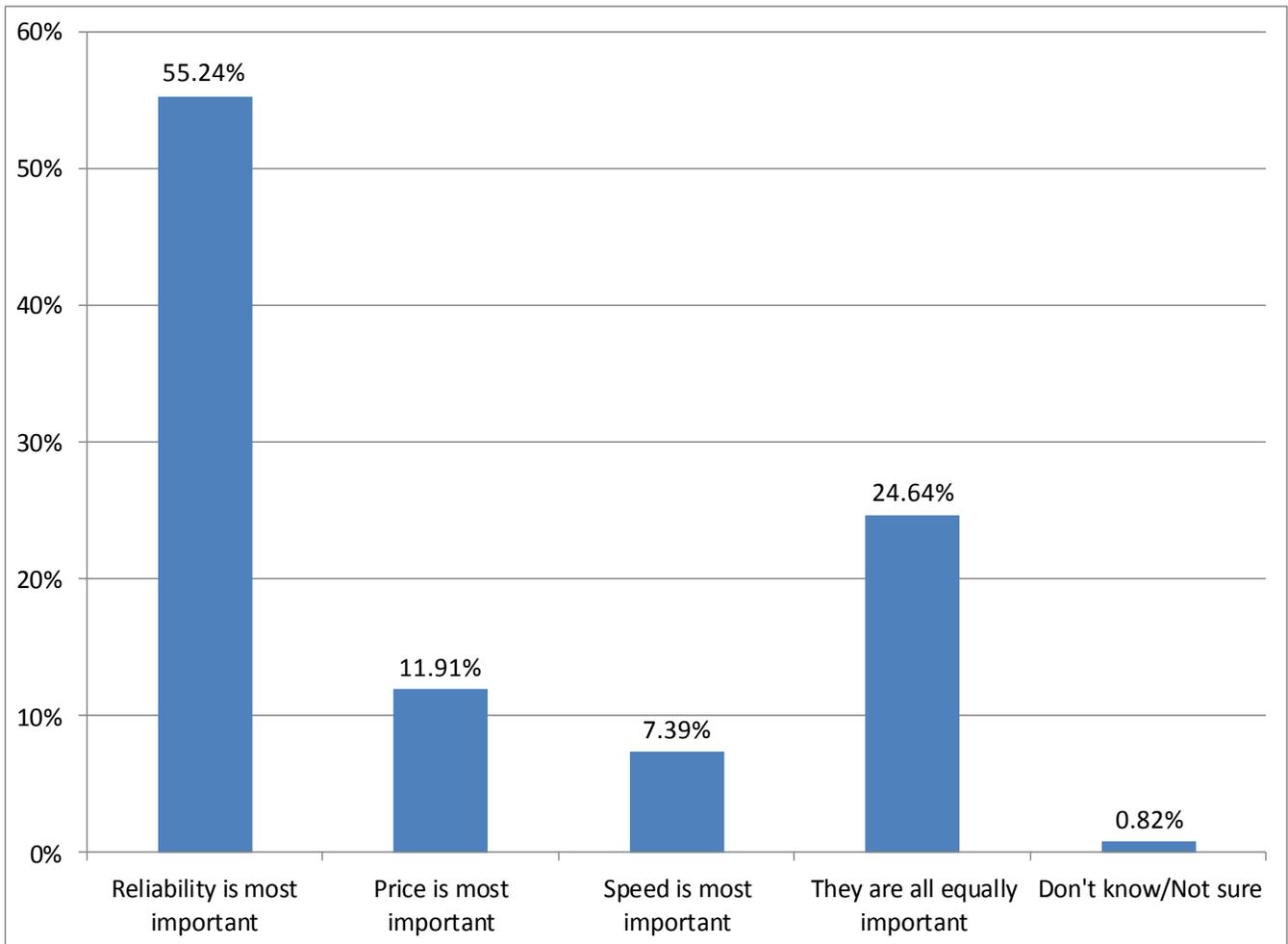


Exhibit 13 Non-residential Importance of Internet Reliability, Price, and Speed



Most non-residential consumers reported that they had an interruption in their primary Internet Service at least once per year, with around a quarter reporting that interruptions occur at least monthly. However, over 90 percent of consumers report that their Internet service is reliable, with two-thirds reporting it is very reliable. Consumers overwhelmingly report that keeping prices low is most important to the future of their business (63 percent).

Exhibit 14 Non-residential Frequency of Interruptions in Primary Internet Access Service

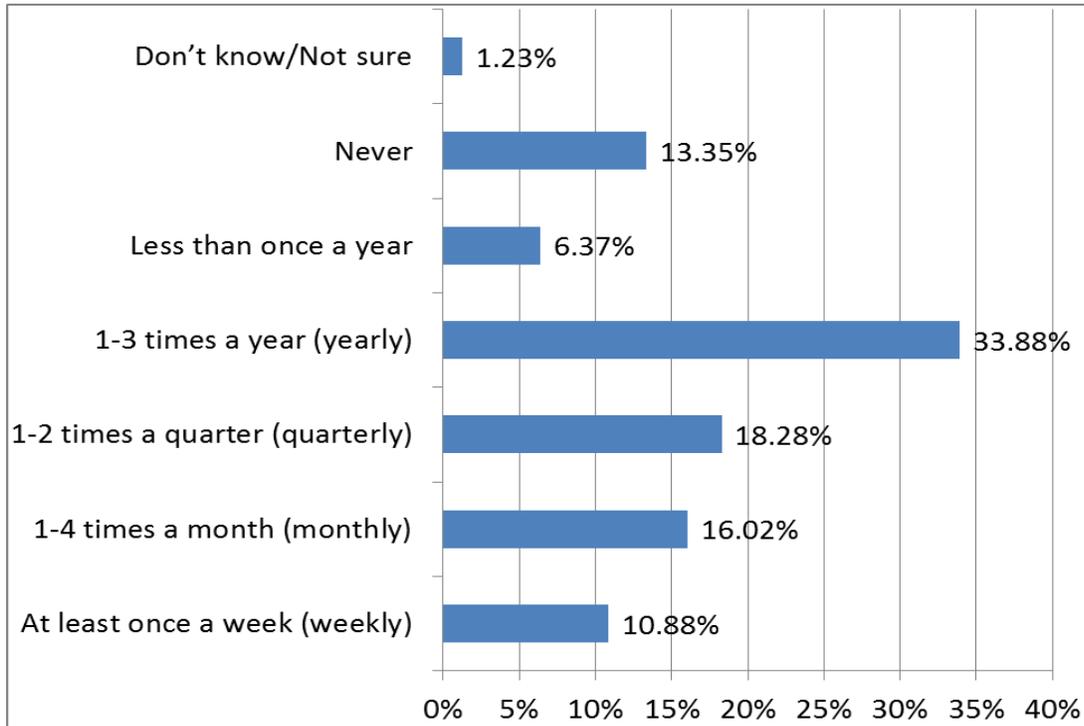
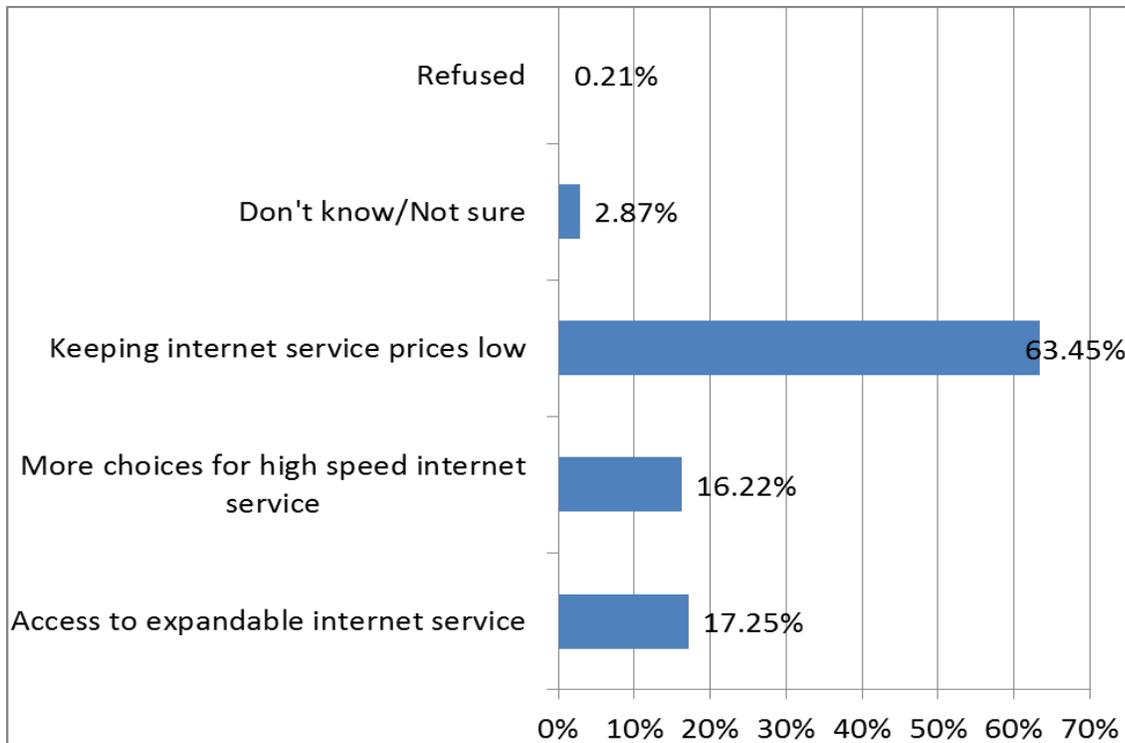


Exhibit 15 Which is Most Important for the Future of Your Business?



Cellular Telephone

Verizon Wireless has the largest share of residential subscribers in Vermont, at 45 percent. AT&T has an estimated 38 percent of residential subscribers, followed by Tracfone at nine percent. For the non-residential market, Verizon Wireless and AT&T hold over 80 percent of the market.

Exhibit 16 Estimated Cell Phone Market Share

A. Estimated Residential Cell Phone Market Share

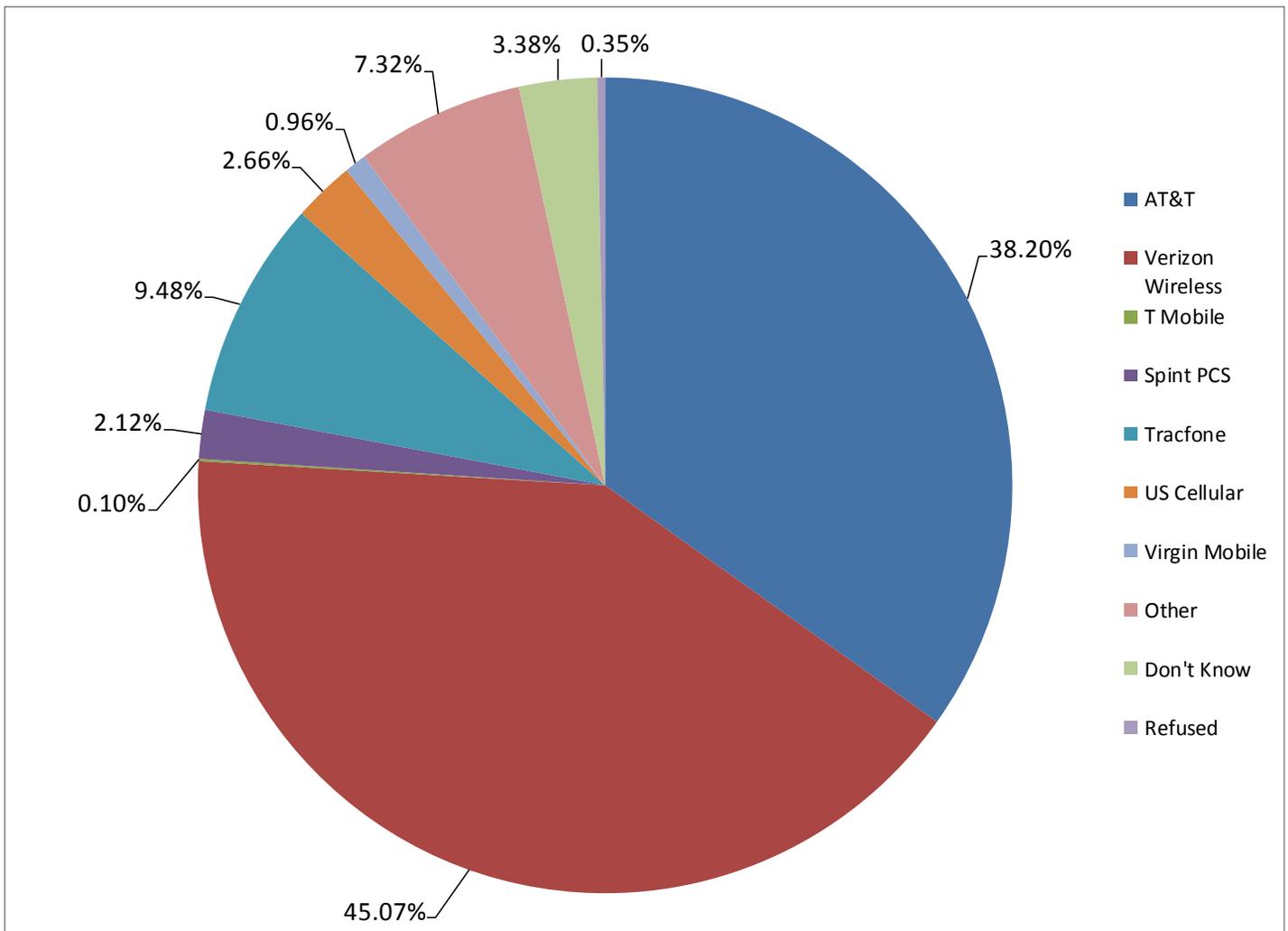
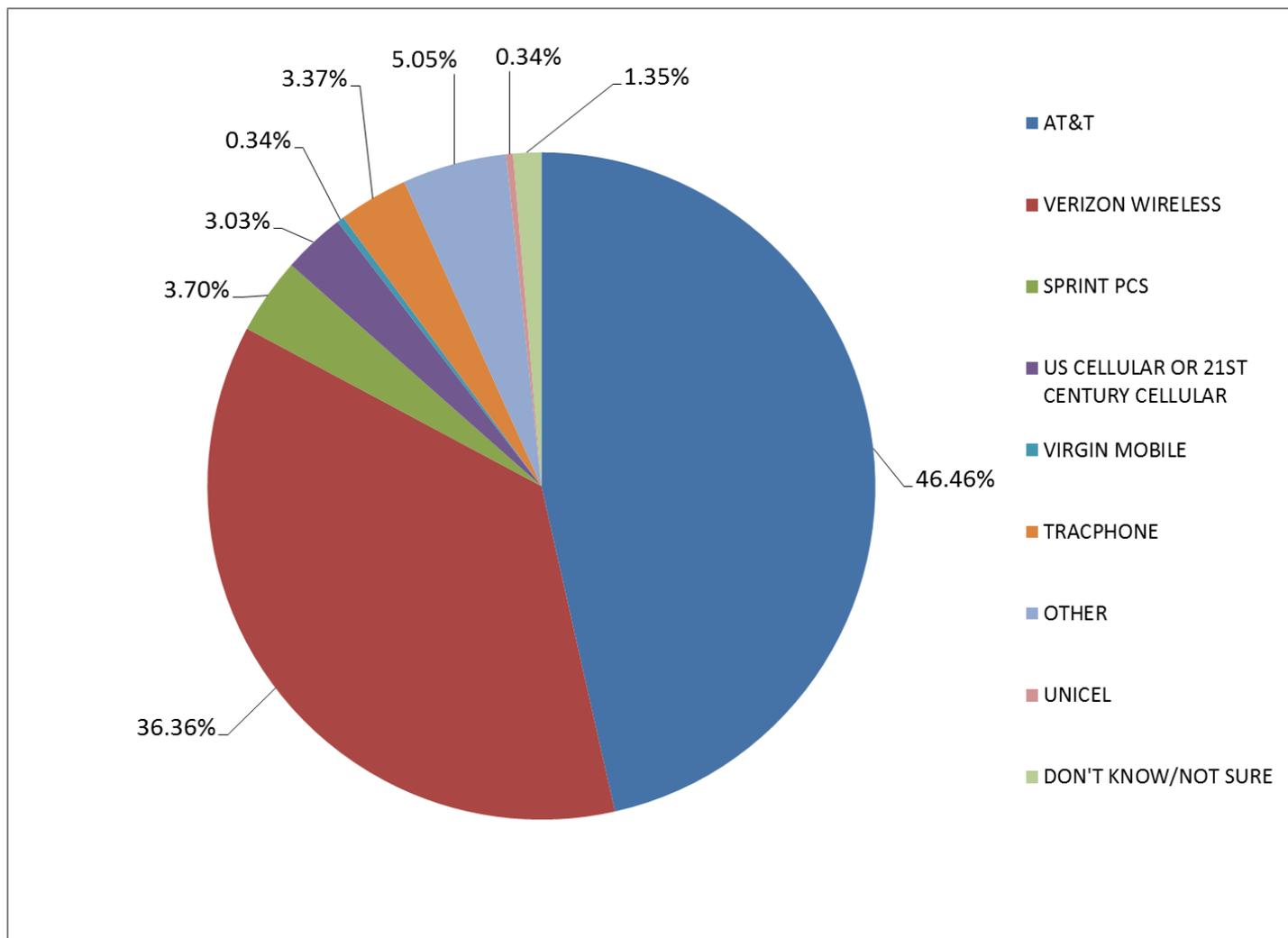


Exhibit 16 Estimated Cell Phone Market Share

B. Estimated Non-residential Cell Phone Market Share



Residential

Eighty-eight percent of Vermont households have at least one cell phone, and the average number of household members who have cell phones is 1.94. Vermont’s cell phone penetration among adults is similar to the national penetration rate of 89.6 percent.¹ Vermont residential consumers spend an average of \$83 per month on cell phone service. Cell phones are being used for a variety of purposes aside from voice communications; 83 percent of cell phone

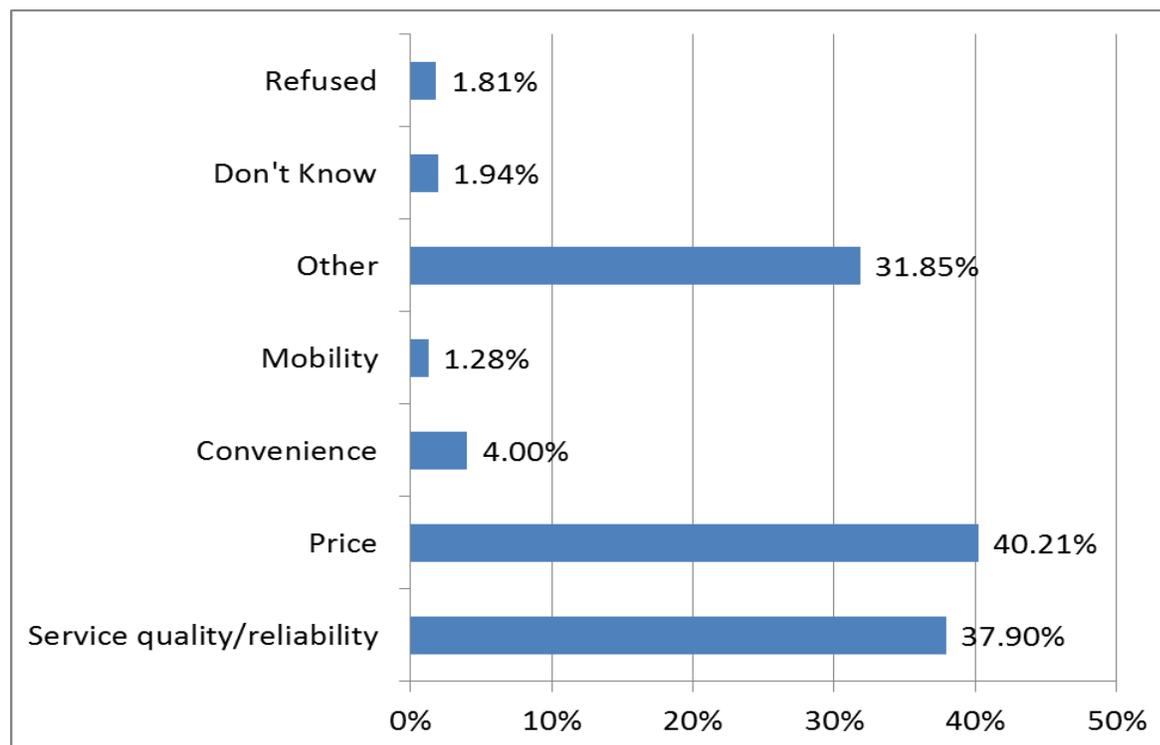
¹ Blumberg SJ, Luke JV. Wireless substitution: Early release of estimates from the National Health Interview Survey, July-December 2011. National Center for Health Statistics. June 2012. Available from: <http://www.cdc.gov/nchs/nhis.htm>.

consumers use their phones for texting and nearly two-thirds of cell phone consumers use their phones for data and internet connections.

Approximately 6 percent of Vermonters reported replacing their landline with a cell phone.

Over half of cell phone consumers reported that their cell phone is their primary phone, and 36 percent of cell phone consumers who maintain a landline have considered dropping their landline. When asked what factors they would consider when deciding to end landline service and use a cell phone exclusively, *service quality* (including coverage and reliability) and *price* were the two factors mentioned most often. *Convenience* was mentioned by about four percent of the residential consumers. While the other responses were difficult to categorize, respondents indicated that a *lack of need* for a landline telephone would be the main reason they would eliminate their landline service.

Exhibit 17 Factors Vermonters would Consider When Eliminating Landline Service for Cell Service



Thirty-six percent of Vermont residents rate the geographic cell phone coverage as good or excellent. The lowest percentage is among residents of Southern Vermont (Rutland, Windsor, Bennington, Windham counties) where 30 percent reported that coverage was excellent or good. This is a change from 2009, where Central Vermont (Lamoille, Orange, Washington

counties) had the lowest percentage of residents reporting that coverage was excellent or good. While very few residents of Central Vermont reported that coverage was excellent, the percentage of these residents reporting that coverage was good increased to nearly 44 percent.

Exhibit 18 Residential Ratings of Cell Phone Service Coverage

	Vermont	Champlain Valley	Northeast Kingdom	Central	Southern
Excellent	3.60%	4.90%	2.68%	0.40%	4.05%
Good	32.26%	29.81%	37.74%	43.66%	26.73%
Fair	46.33%	48.77%	41.05%	36.67%	50.74%
Poor	15.88%	15.44%	18.53%	17.26%	14.65%
Don't Know	1.47%	0.84%			3.83%

Vermont residents universally agree that cell phone service ought to be as reliable as landline service in areas where it is available. Vermonters are split when given the choice between improving cell phone coverage with a large number of short cell phone towers or a small number of large cell phone towers. Thirty-six percent chose numerous small towers, and 38 percent chose tall towers, while six percent chose neither and 24 percent were unsure.

Nearly all Vermonters would support the placement of more towers in their community if it were necessary to improve two-way mobile radio communications for police, ambulance, or fire services.

Exhibit 19 Attitudes about cell phone coverage

Agreement that cell phone service ought to be as reliable as landline service

	Vermont	Champlain Valley	Northeast Kingdom	Central	Southern
Strongly Agree	62.17%	57.16%	70.54%	63.23%	65.39%
Somewhat Agree	32.50%	40.09%	27.36%	31.77%	24.11%
Somewhat Disagree	2.22%	1.19%		1.99%	4.70%
Strongly Disagree	0.98%	0.99%		1.79%	0.85%

Cell towers are a necessary part of cell phone service. Would you prefer building a smaller number of tall towers or a larger number of short towers?

	Vermont	Champlain Valley	Northeast Kingdom	Central	Southern
A large number of short towers	36.35%	32.34%	44.89%	29.57%	42.57%
A small number of large towers	38.22%	41.66%	43.18%	41.76%	29.69%
Neither	5.87%	7.40%	5.71%	5.25%	4.26%
Don't Know/Unsure	16.69%	16.43%	6.21%	21.23%	18.23%

Non-residential

Fifty-seven percent of non-residential consumers subscribe to cell phone service. Of these subscribers, nearly 75 percent have agreements with service providers that set the price for an extended period. Approximately 1 in 5 non-residential cell phone subscribers rated the coverage as good or excellent.

Exhibit 20 Non-residential Cell Phone service subscription

Does your organization subscribe to a cell phone service?

Yes	57.01%
No	42.80%
Don't know/Not sure	0.19%

Do you have cell phone contracts, that is, agreements with service providers that set the price for an extended period, not just month to month?

Yes	74.41%
No	23.23%
Don't know/Not sure	2.36%

Local Telephone

FairPoint is the largest local telephone provider in the State of Vermont with 42 percent of the residential market and 44 percent of the non-residential market. Comcast has secured the second largest share of residential consumers with 21 percent, followed by cell phone companies at nine percent and AT&T at eight percent. For the non-residential market, Sovernet, Comcast, Verizon, Waitsfield and Champlain Valley Telecom, and VTel join FairPoint in the top five (Sovernent and Waitsfield and Champlain Valley Telecom were both selected by four percent of non-residential consumers).

Exhibit 21 Estimated Local Telephone Market Share

A. Estimated Residential Local Telephone Market Share

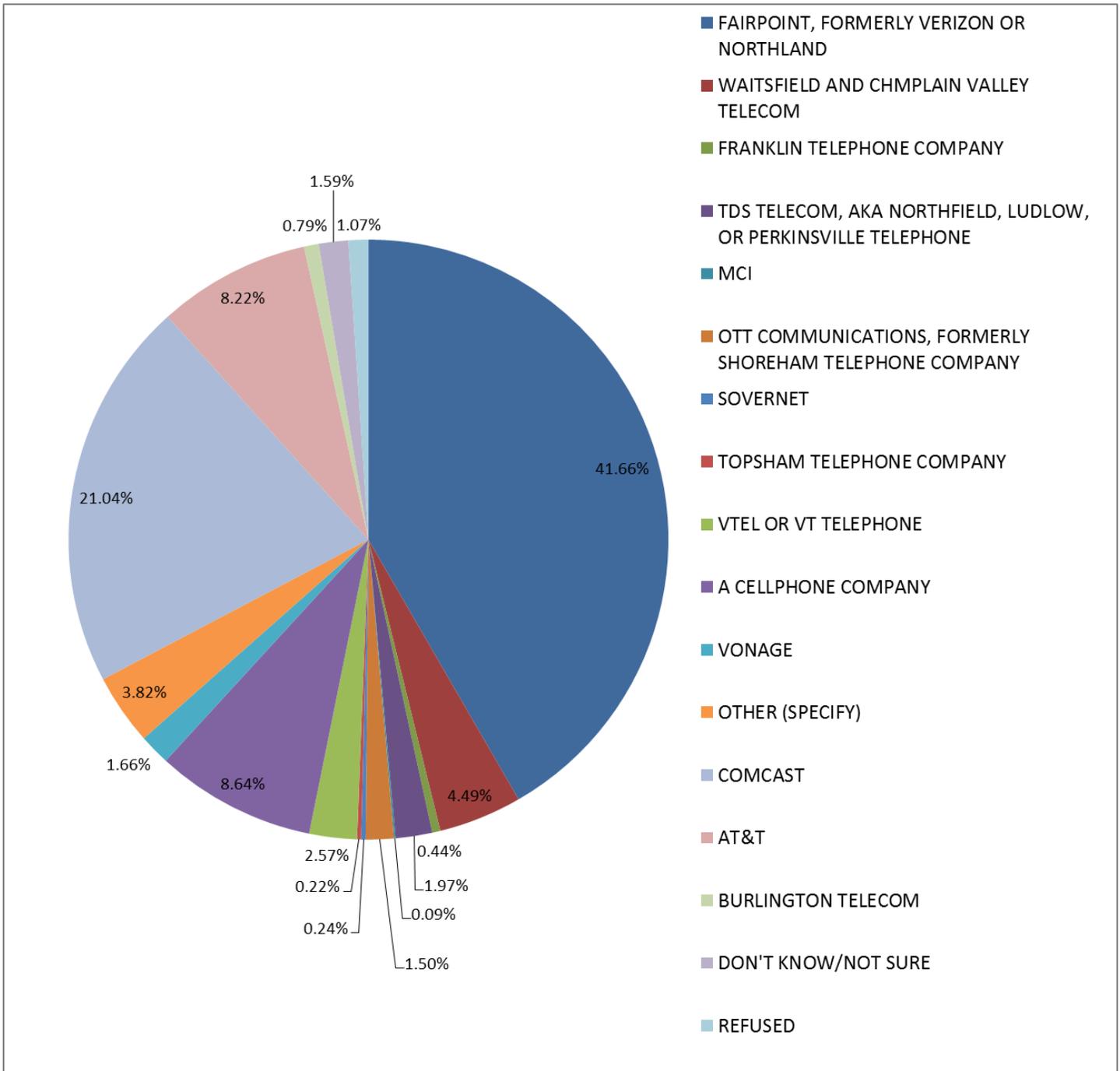
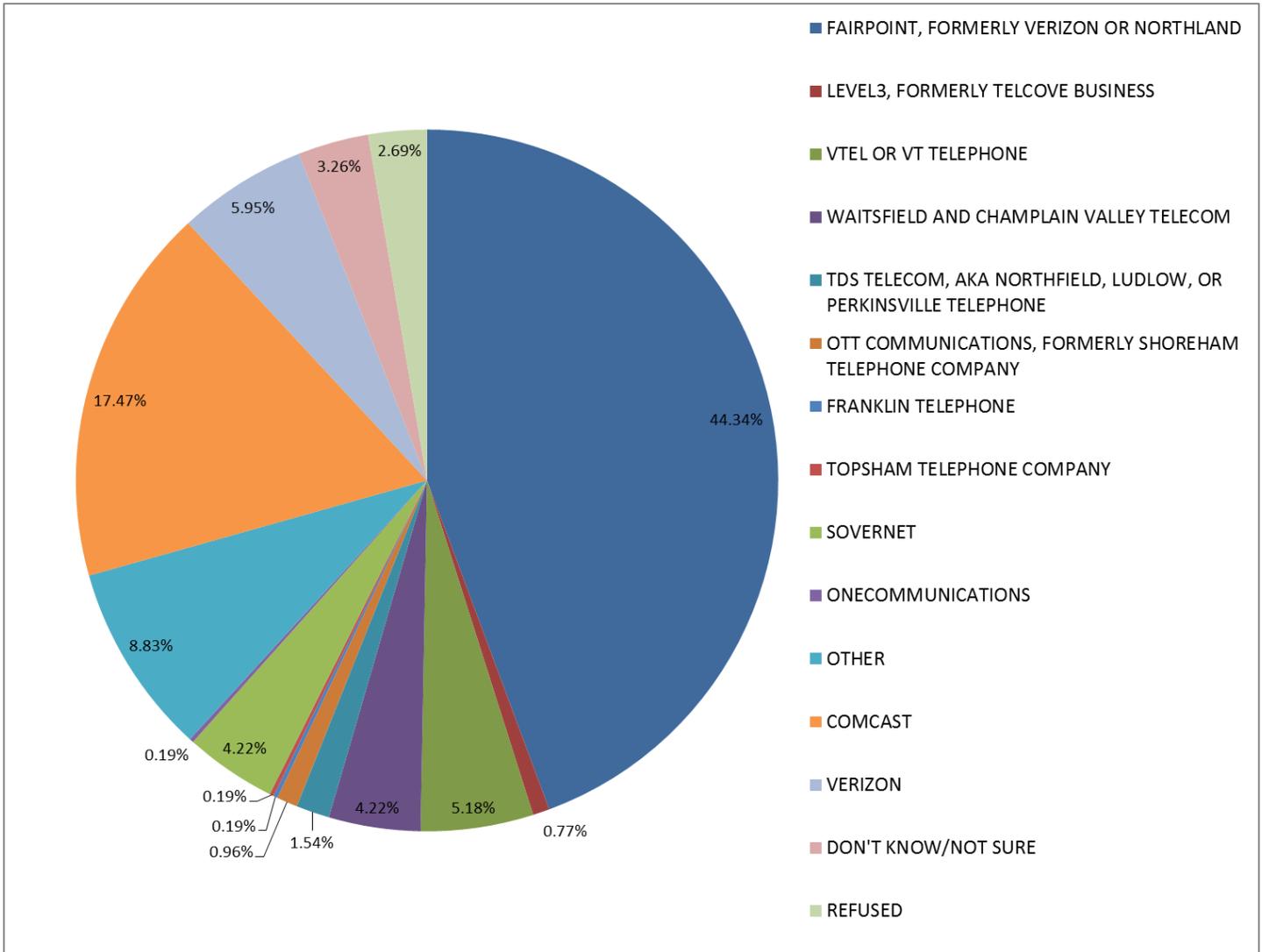


Exhibit 21 Estimated Local Telephone Market Share

B. Estimated Non-residential Local Telephone Market Share



Eighteen percent of non-residential consumers reported that they have contracts to purchase voice and fax telephone service for a certain period of time, instead of just month-to-month. This is consistent with the 2009 Vermont Telecommunications Survey. Over one-half of the non-residential consumers have one or two telephone lines used for fax or voice communications.

Exhibit 22 Non-residential Telephone Service Contracts and Line Counts

Do you have any contracts to purchase voice and fax telephone service for a certain period of time instead of just month to month?

Yes	18.43%
No	77.74%
Don't know/Not sure	3.65%
Refused	0.19%

How many telephone lines does this location have for voice and fax communications?

1	40.69%
2	24.76%
3	13.05%
4	4.22%
5	5.57%
6	3.45%
7	1.15%
8	1.54%
9	0.58%
10	1.34%
12	0.38%
14	0.19%
16	0.19%
26	0.19%
29	0.19%
30	0.19%
50	0.19%
52	0.19%
53	0.19%
100	0.19%
115	0.19%
400	0.19%
552	0.19%
800	0.19%
997	0.77%
999	0.19%

Trends

Two percent of landline-equipped residential consumers reported having more than one residential phone lines in their home. This is lower than in 2009, and continues a downward trend since 1999. As discussed in the next section, many households have no landline, or wireline, service at all.

Subscribers to local telephone service in Vermont have been in decline since 2001. At its peak, the number of telephone subscriptions reached over 425,000. Since then, it has declined over 10 percent. As discussed in the next section, many consumers are migrating to cell phones as their primary telephone communication.

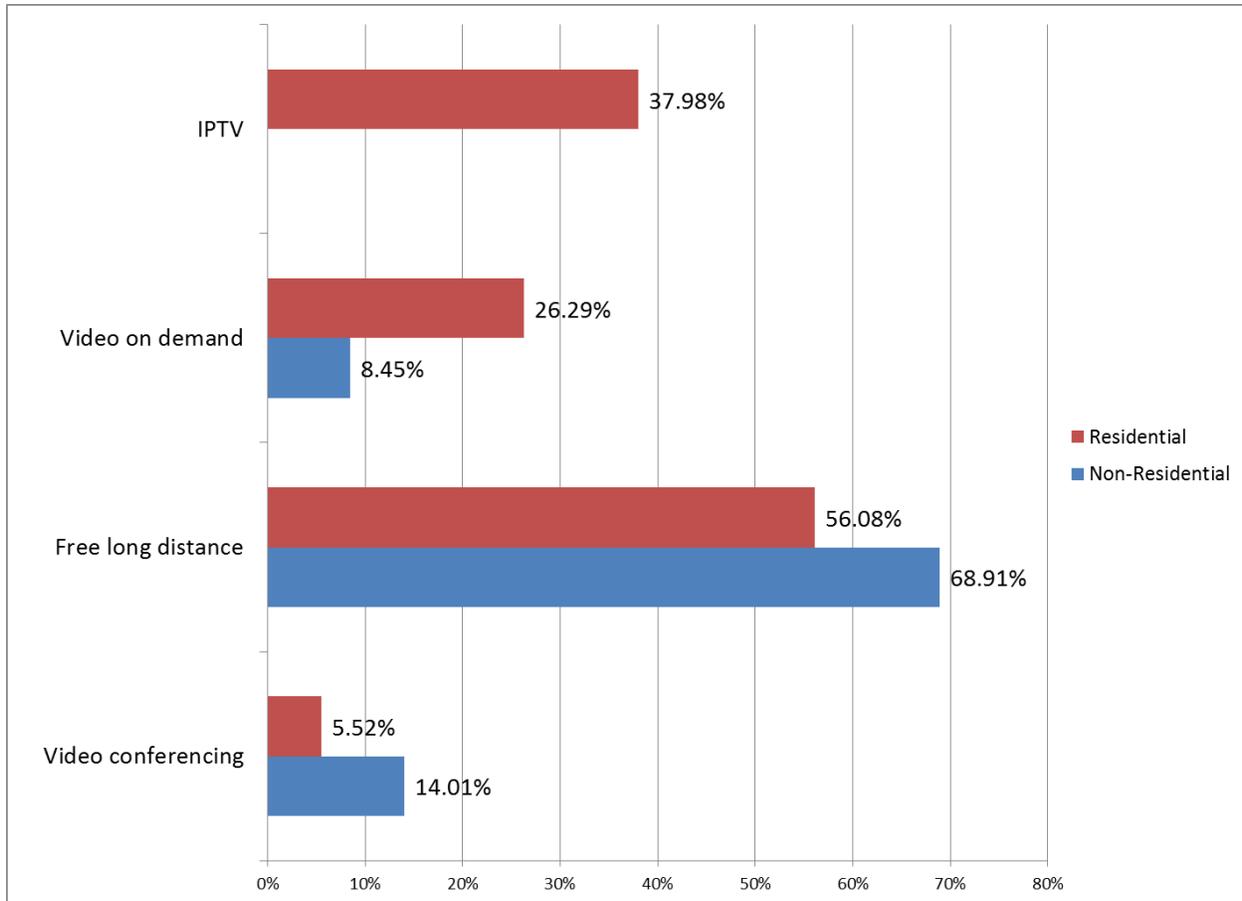
This trend seems to be continuing as less than one percent of residential consumers anticipate adding an additional telephone line in the next six months, yet seven percent anticipate dropping a local landline.

Eight percent of non-residential consumers reported eliminating a fax line in the past year. When asked whether their organization will consider changing its telephone service to a VoIP provider, such as Skype or Vonage, 26 percent reported they would, 68 percent reported they would not, and 7 percent were unsure.

Service Changes and Improvements

When asked about features that would make local telephone service more relevant or useful, the majority of residential and non-residential consumers were in favor of *free long distance*. *IPTV* was also fairly popular for residential consumers (not asked for non-residential). *Video on demand* was more popular with residential consumers than non-residential consumers. *Video conferencing* was not a popular feature with residential or non-residential consumers.

Exhibit 23 Features That Would Make Local Telephone Service More Relevant



A majority of consumers believe that having the whole state as the local calling area is very or somewhat important, but most are not willing to pay extra for the service. Residential and non-residential consumers were asked, “How important would it be for you to have the whole state as your local calling area?” If they responded very or somewhat important, a follow-up question was posed, “In order to have the whole state as your local calling area, would you be willing to pay more for local service?”

Non-residential consumers who were willing to pay extra were then asked, “How much more per month per line would you be willing to pay to have the whole state as your local calling

area?” Non-residential consumers were willing to pay an average of \$5.40 extra to have the whole state as the local calling area. The amounts below were asked in descending order until the respondent said ‘yes’. Over 20 percent said they were willing to pay \$9 extra, the maximum amount presented.

Exhibit 24 Importance of Whole State in Local Calling Area

Residential	
Very Important	36.11%
Willing to Pay	41.94%
Not Willing to Pay	37.53%
Unsure	18.90%
Somewhat Important	27.35%
Willing to Pay	17.15%
Not Willing to Pay	76.51%
Unsure	5.42%
Not very important	19.44%
Not at all important	13.81%
Non-residential	
Very Important	54.37%
Willing to Pay	18.12%
Not Willing to Pay	31.93%
Unsure	4.53%
Somewhat Important	45.63%
Willing to Pay	12.62%
Not Willing to Pay	29.13%
Unsure	3.88%
Not very important	0.00%
Not at all important	0.00%

Exhibit 25 Non-residential Amount Willing to Pay for Whole State in Local Calling Area

Extra per Month	2009	2012
9 Dollars	51.00%	21.05%
6 Dollars	56.00%	9.47%
5 Dollars	78.00%	36.84%
4 Dollars	79.00%	9.47%
3 Dollars	85.00%	8.42%
2 Dollars	87.00%	4.21%
1 Dollars	89.00%	3.16%
Nothing	90.00%	1.05%
Don't know/Not Sure	6.00%	5.26%
Refused	--	1.05%

Service Satisfaction

Vermonters rated their satisfaction with their local telephone service as a 4.0 on a scale of one (very dissatisfied) to five (very satisfied). Fifty-eight percent of local telephone customers have had to call their telephone company to speak to a service representative about a service issue. Nearly 80 percent reported that the wait time to speak with a customer service representative was acceptable.

When asked about their expectations, local telephone consumers provided the following average duration limits before the delay is unacceptable:

Exhibit 26 Wait Time Expectations for Local Telephone Service

Residential	
To speak to a telephone company representative	5.8 Min
To have a telephone line repaired	1.7 Days
To have an additional line installed	2.7 Days
Non-Residential	
To speak to a telephone company representative	4.4 Min
To have a telephone line repaired	1.3 Days
To have an additional line installed	N/A

Non-residential consumers were presented with a scenario where their organization needs an additional telephone line installed as soon as possible. After requesting the line and learning that it will take more than a week to be installed, the following were presented as options. Respondents were asked whether or not they would consider each option.

Exhibit 27 Alternatives to Local Telephone Service Installation Wait Time

Alternatives	
Purchasing cellular service	21.31%
Purchasing a VOIP service	10.36%
Waiting for the landline	60.46%
Don't know/Not Sure	6.91%
Refused	0.96%

Non-residential consumers were also asked the following questions about back-up providers for telephone and internet. One-third reported that they have back-up for telephone and 13 percent for Internet. Of those who reported having a back-up provider for telephone, 85 percent reported that their back-up was cellular service.

Exhibit 28 Non-residential Backup Providers

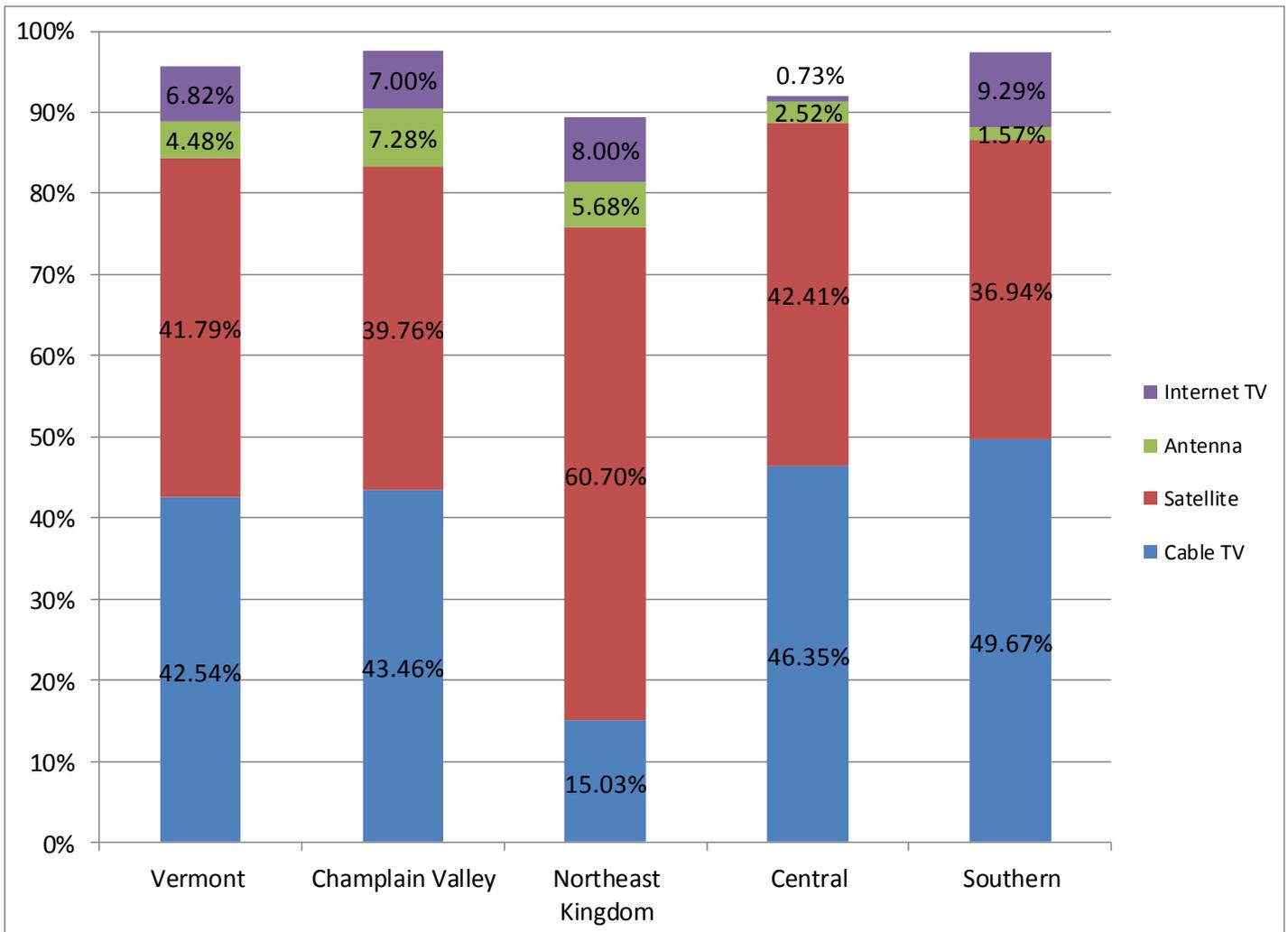
In case of an outage, have secondary providers for:	
Telephone Service	32.82%
Internet Service	12.67%

Television

Ninety-three percent of Vermonters live in households with at least one television. The average number of televisions is slightly more than two. Forty-three percent of Vermont households subscribe to cable television. Of those who do not, 72 percent subscribe to satellite television. The cable and satellite subscription rates are similar to 2009, where 48 percent had cable service, and 74 percent of those who did not have cable service, had satellite service.

Cable television subscriptions in the North East Kingdom are much lower than the rest of the state.

Exhibit 29 Regional Distribution of Television Service Types



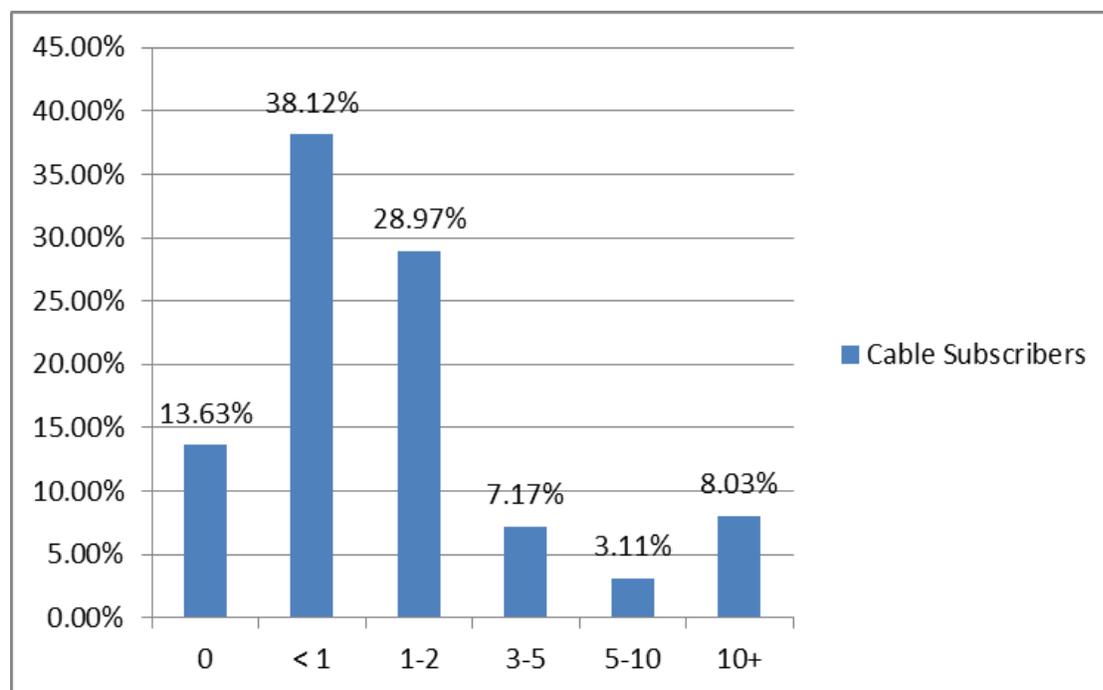
Nearly thirty percent of satellite television subscribers dropped cable service when they subscribed to satellite. Nearly 60 percent of satellite television subscribers have a choice of cable or satellite, while 35 percent report that cable does not run past their house and six percent were unsure.

Exhibit 30 Percentage of Satellite Subscribers Who Have Access to Various Forms of Cable Service

Do cable TV company wires run past your house so that you could subscribe to:	
Television	59.12%
Internet	55.81%
Telephone	49.60%

Public access television channels, sometimes called PEG access channels, are designated cable TV channels used exclusively for transmitting television programs produced by the public, educators, and local or other governments, such as Town Council meetings, Statehouse press conferences, educational events, etc. After providing this description during the survey, the respondents were asked if they have ever watched PEG access channels. Eight-two percent of cable subscribers responded that they have, with 85 percent of those who have ever watched PEG channels in the past 12 months.

Exhibit 31 Hours Spent Watching PEG Channels in Past 12 Months



Fifty-one percent of cable subscribers have watched a town meeting on a PEG access channel. Nearly thirty-nine percent of Vermonters with a cable subscription reported that PEG channels are *very important*.

Exhibit 32 Importance of PEG Access Channels to Cable Subscribers

	Vermont	Champlain Valley	Northeast Kingdom	Central	Southern
Very important	38.61%	24.32%	57.14%	44.83%	54.17%
Moderately important	38.61%	44.59%	14.29%	44.83%	29.17%
Little importance	15.82%	21.62%	14.29%	6.9%	12.50%
Unimportant	6.96%	9.46%	14.29%	3.45%	4.17%

Telecommuting

Forty-four percent of respondents reported that they worked for pay or profit in the week prior to the survey. Of those who did, 26 percent spent at least one day where they worked mostly in a home office, with nearly eight percent working five or more days from a home office.

Of respondents who were employed, about seventeen percent of respondents used the internet most of the time for their work, while more than two-thirds use the internet less than half of the time or not at all.

Exhibit 33 Time Spent Online or on the Telephone for Business or Employment Purposes

Last week, in the course of your business or employment, how much time did you spend on the telephone or online?

Most of the time	17.22%
About half the time	11.44%
Less than half of the time	48.80%
None of the time	21.92%

About 14 percent of workers telecommute at least one day per week on a regular basis with six percent reporting that they telecommute every day. This is similar to 2009 where 14 percent reported telecommuting at least one day per week on a regular basis. Another 18 percent reported telecommuting occasionally. This is similar to 2009, where 19 percent reported telecommuting occasionally. Slightly more than three percent of those who never telecommute expect to begin doing so next year, and another four percent did not know what their plans would be.

Exhibit 34 Telecommuting Behavior

Telecommuting means working at home with the capability to connect to your office's computer network. Do you telecommute?

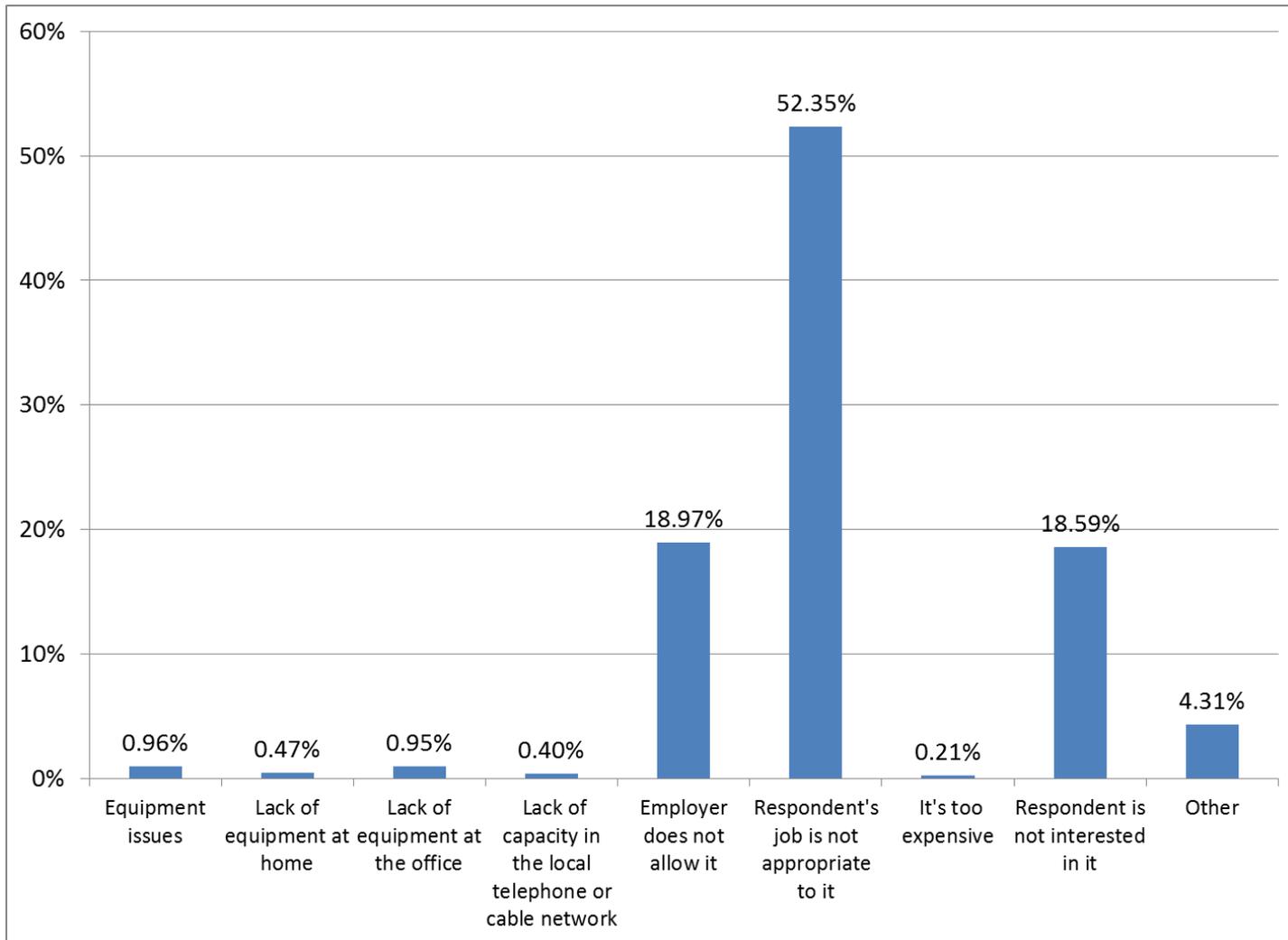
Everyday	6.24%
One or more days per week on a regular basis	7.78%
Occasionally	17.79%
Never	67.90%

Do you expect to begin telecommuting in the next year?

Yes	3.35%
No	91.81%
Don't Know	4.45%

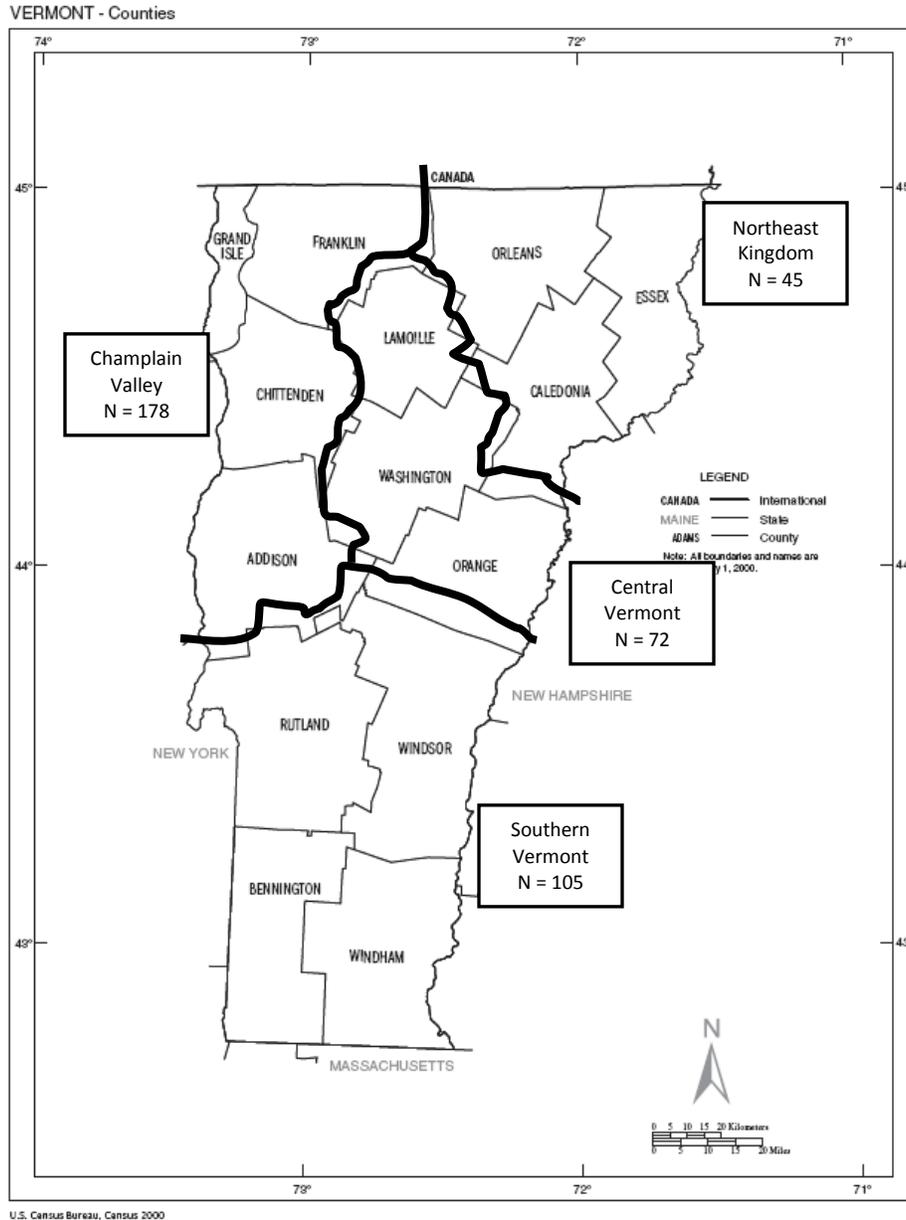
When asked about barriers, more than half responded that their occupation is not appropriate for telecommuting. About 19 percent reported that they were not interested, and another 19 percent reported that their employer does not allow it. Many fewer people reported that lack of equipment (at work or at home) was a barrier.

Exhibit 35 Reasons for Not Telecommuting



Survey Methodology

The sample for the Vermont Telecom Residential Survey was a dual-frame Random Digit Dialing (RDD) sample. The survey is referred to as “dual-frame” since some Vermont residents were selected from a cell phone sampling frame, and some Vermont residents were selected from a landline telephone frame. In total, 400 Vermont residents were interviewed—301 on landline phones and 99 on cell phones. The landline sample was stratified into four regions of the State: Champlain Valley, Northeast Kingdom, Central Vermont, and Southern Vermont.



Interviewers asked for the adult (18+) member of the household “who knows the most about the telephone and internet services that your household uses.”

Interviewing took place between July 30, 2012 and September 4, 2012 for residential consumers. Attempts to reach the household were made on weekdays, weeknights, and weekends between the hours of 9 AM and 9 PM. The questionnaire averaged 19.4 minutes in length (19.5 for landline and 19.1 for cell phone).

Exhibit 36 Demographics of Survey Respondents

	Residential Survey	
	Landline	Cell
Gender		
Male	40.86%	52.53%
Female	58.80%	47.47%
Age Group		
18-24	1.00%	7.07%
25-34	5.65%	10.10%
35-44	9.97%	17.17%
45-54	24.58%	33.33%
55-64	26.25%	25.25%
65+	29.24%	7.07%
DK/Ref	3.32%	0.00%
Educational Attainment		
LT HS	1.66%	2.02%
HS Grad	25.91%	24.24%
Some college or Tech school	21.59%	21.21%
College degree	24.58%	27.27%
Graduate Degree	22.59%	24.24%
DK/Ref	3.65%	1.01%
Income		
Less than \$15,000	3.99%	7.07%
\$15,000-\$25,000	10.63%	9.09%
\$25,000-\$35,000	8.64%	5.05%
\$35,000-\$50,000	13.29%	11.11%
\$50,000-\$75,000	17.61%	16.16%
\$75,000 or more	26.25%	40.40%
DK/Ref	19.60%	11.11%

The residential sample was weighted to account for unequal selection probabilities, non-response in the cell phone survey, and finally weighted to match the Vermont demographics of age, gender, and educational attainment. The weighting is described in detail in Appendix A.

The non-residential survey was administered to 521 non-residential organizations. All public, private, non-profit, and educational organizations were eligible for the survey. The organizations were selected from the Dunn & Bradstreet database. All interviewing took place between 9AM and 5 PM, Monday through Friday, beginning July 31, 2012 and ending September 4, 2012. The questionnaire averaged 15.8 minutes in length.

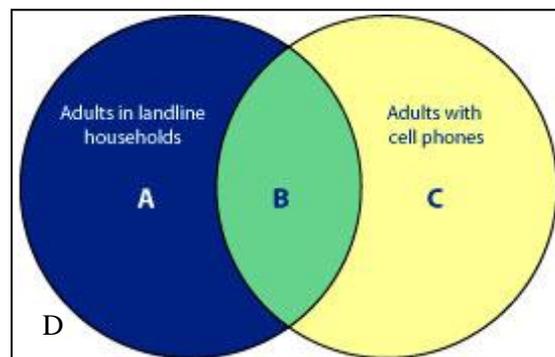
Exhibit 37 Summary Characteristics of Non-residential Respondents

Number of locations in Vermont	Non-Residential Survey
1	86.37%
2	9.21%
3+	4.42%
Primary Location	
In Vermont	97.70%
In residence	48.33%
Not in residence	51.08%
DR/Ref	0.59%
Not in Vermont	2.11%
DR/Ref	0.19%
Customers Served	
Mostly in Vermont	52.02%
Mostly outside of Vermont	10.56%
Both in and outside Vermont	36.66%

Appendix A: Landline and Cell Dual-Frame Weighting

A landline and cell phone dual-frame sampling design requires a weighting plan that ensures that the frames are combined so that the survey respondents accurately represent the population. The Venn diagram (Exhibit C-1) displays three populations covered by the cell and landline sampling frames. Adults with a landline but no cell phone (A) must be reached through a landline telephone sample. Adults with a cell phone and no landline (C) must be reached through the cell phone sample. Adults with both a landline and a cell phone (B) can be reached through either of the frames. The population with no telephone (D) is not covered by either frame, but is only two percent of the population.

Exhibit C-1: Overlap between the two telephone sample components



An outcome of the dual frame weighting process is an estimate of the cell-only population in Vermont. The estimate is based on dual-frame estimation methods, described in the *Combine landline sample with cell phone sample* section. The accuracy of the estimate is improved with a non-response adjustment described in *Cell phone response adjustment: propensity model methodology* section. The results of this estimation produce an estimate of the cell-only population of 17 percent.

Base weights

The weighting process begins by computing sampling weights that reflect the unequal probabilities of selection. Specifically, sampling weights are the reciprocal of the probabilities of selection. This weighting adjustment accounts for the oversampling of the Northeast Kingdom and Central Vermont Regions.

Combined landline sample with cell phone sample

The cell phone survey will include the following question designed to adjust for the overlap between the two components: “In addition to your cell phone, is there at least one telephone inside your home that is currently working and is not a cell phone? Do not include telephones only used for business or telephones only used for computers or fax machines.” Those who respond ‘yes’ are cell and landline adults, while those who responded ‘no’ are cell-only adults. Similarly, the landline survey will ask the question, “In addition to your residential landline telephone, do you also use one or more cell phone numbers?” Those who answer ‘yes’ are cell and landline, while those who respond ‘no’ are landline only. Based on these questions, We classify respondents as follows emulating the notation in Exhibit C-1:

- a_1 : Landline respondents without a cell phone
- b_1 : Landline respondents with a cell phone
- b_2 : Cell phone respondents with a landline
- c_2 : Cell phone respondents without a landline

We estimate the phone user group population totals using the fact, illustrated in Exhibit C-1, that the sum of the phone group percentages equals one, $P_A + P_B + P_C = 1$. This can be restated in terms of the dual user group, $P_B = 1/(P_A/P_B + 1 + P_C/P_B)$. We estimate the number of landline-only adults relative to dual-user adults (P_A/P_B) and the number of landline-only adults relative to dual-user adults (P_C/P_B) using the sample estimates a_1 , b_1 , b_2 , and c_2 . Thus, an estimate of the dual-user percentage is $\hat{p}_B = 1/(a_1/b_1 + 1 + c_2/b_2)$. The estimated percentages for landline-only adults and cell phone-only adults are derived from this estimate. Specifically, the estimate of landline-only adults is $\hat{p}_A = \hat{p}_B(a_1/b_1)$ and the estimate of cell phone-only adults is $\hat{p}_C = \hat{p}_B(c_2/b_2)$. Estimated population totals for the user groups (\hat{A} , \hat{B} , \hat{C}) are calculated by multiplying the total population by each estimated percentage.

Cell phone response adjustment: propensity model methodology

Prior to estimating the user group population totals, we weight the cell phone respondents based response propensity. Cell phone surveys tend to over-represent cell users who use their cell phone more often such as those who are cell-only and cell-mostly. In other words, the sample will have a higher percentage of cell-only and cell-mostly users relative to dual users and landline-only users. To reduce the cell-only bias inherent in cell phone surveys, We will adjust the cell phone sample using a response propensity model. The model will estimate the probability of observing a cell phone respondent in a cell phone sample relative to observing a cell phone respondent in the NHIS, an in-person survey that is not skewed according to cell phone use. The predictor variables include age group, race group, and the key variable that describes an individual’s cell phone use with four categories:

- Does not have a landline (cell-only);

- Very few or none received on a cell phone (mostly landline);
- Some received on a cell phone and some on a regular landline phone (dual); and
- All or almost all calls received on a cell phone (cell mostly)

The model is built using a national cell phone sample and data from the National Health Interview Survey NHIS, which tracks the phone status for the U.S. population. This national model can be applied at state and local levels under the assumption that response propensities for cell phone users do not vary across geographies.

With estimates of the population totals, we weight-adjust the landline sample and the cell sample to their respective population estimates:

- The landline only sample (a_1) to the landline population (\hat{A});
- The cell-only sample (c_2) to the cell-only population (\hat{B}); and
- Each dual user sample (b_1, b_2) separately to the dual user population (\hat{C}).

The dual-user groups (b_1, b_2) can be further classified into three subgroups. Sample sizes for the two groups are broken down for those who receive most calls on cell phone (b_{13}, b_{23}), those who receive most calls on landline (b_{11}, b_{21}), and those who receive calls on both regularly (b_{12}, b_{22}). To permit this finer adjustment, the survey will ask dual users (landline and cell), “Of all the telephone calls that you receive, are...”

- All or almost all calls received on a cell phone?
- Some received on a cell phone and some on a regular landline phone?
- Very few or none received on a cell phone?

Each of the three dual-user groups is represented by samples from the landline and the cell samples, both weighted to the population. For each of the three dual-user groups, we average the two sets of weights with a composite weight based on sample size and estimated design effect:

$$f_j = \frac{b_{1j} / deff_{1j}^2}{b_{1j} / deff_{1j}^2 + b_{2j} / deff_{2j}^2}, \text{ where } deff_{1j} = b_{1j} \sum_{b_{1j}} w_1^2 \times \left(\sum_{b_{1j}} w_1 \right)^{-2}.$$

By weighting by inverse variances (the square of the design effects divided by sample sizes), or by the reciprocals of effective sample sizes, the weighting coefficients are developed to minimize mean square errors of the composite weighted estimates.

Population Weighting

Finally, the combined cell phone and landline sample is weighted to match the Vermont adult population based on age, sex, and educational attainment.

Chapter 4: VERMONT STATE GOVERNMENT TELECOMMUNICATIONS PLAN¹

As we become more and more reliant on the use of Information Technology, the State of Vermont must establish a telecommunications plan to ensure operations are not only enhanced, but also reliable, sustainable, and available for use. This telecommunications plan is designed to anticipate the needs of the State for the next seven years. The State must procure and incorporate technologies that will optimize the telecommunications infrastructure. This will create a platform that will enable the use of applications needed to support public services and include emergency responders. In order for the State to remain innovative in its approach to telecommunications services, it must anticipate the needs of agencies and departments by designing and engineering an infrastructure that is flexible enough to handle any future technology. This plan describes the ongoing optimization project that was started in fiscal year 2011. It also describes the current and future direction of the State's data and voice components, along with a strategic plan to move the State forward as new technologies become available.

I. OPTIMIZATION

In the year 2003, the State of Vermont saw significant positive movement toward the effective management of telecommunications within state government. With the creation of the Department of Information and Innovation (DII), the State took initial steps towards an enterprise-wide approach by transitioning to a more centralized management concept. While the first stage of reorganization and integration took hold, it was appropriate to look at other ways to integrate state government telecommunications even further. In 2009, the Agency of Administration completed an Information Technology Optimization Project (I-TOP) assessment that led to a consolidation effort of information technology across state government. This consolidation led to cost savings, leveraging of existing and future vendor contracts, and centralized management of state government resources. In FY11, I-TOP was initiated and as of 2014, the telecommunication consolidation project is approximately 70% complete. Expected completion of the I-TOP initiative is 2016.

Policies

- In budgeting for and funding state communications systems, facilities and services used for law enforcement, emergency response, emergency management, and public health threat response are considered high priorities.
- When examining its options for providing voice and data services to state government agencies, DII will examine both state-operated networks and facilities. DII is responsible for managing the communications services provided and costs incurred across the entire state government enterprise.

¹ The Vermont State Government Telecommunications Plan was prepared by the Department of Information and Innovation (DII). The Department of Public Service would like to thank the DII staff for their contribution of time, effort, and expertise to this Plan.

Strategies/Action Plans

- All state agencies and departments must consult with DII on planning and implementation of all major telecommunications projects, initiatives, and interagency service arrangements to ensure that these plans are consistent with state government enterprise-wide telecommunications policies and objectives.

II. DATA COMMUNICATIONS

Every three to five years, the State puts out to bid major telecommunications contracts for data services. Information technology changes rapidly during this intervening period. Services available have evolved, prevailing prices have changed, and a major upgrade to the network backbone of the State's telecommunications infrastructure was completed. The renewal of the state contracts for data communications services in the spring of 2014 represented an important opportunity to address these changes. The State maintains data contracts with multiple vendors to ensure the State avoids dependency for data services on a single vendor. It also gives the State an opportunity to leverage its power as a customer for the public interest, by bringing in high speed connectivity into rural locations and demanding higher quality service from those vendors that also support the private sector.

Policies

- Except for those instances when there are overriding issues of public safety or security, state government should favor the use or creation of open networks above networks that only state government or elements of the public sector are allowed to use.
- The State must structure a request for proposals (RFP) for data communications connectivity to explicitly enable smaller vendors the opportunity to bid for a fraction of the state's data connectivity needs, or the state's needs in a particular region.
- The State must try to use its purchasing power and excess capacity on state-owned networks to promote improvements in telecommunications infrastructure, services, and prices, especially in unserved or underserved areas of the state.
- The State should seek to engage the purchasing managers at other telecommunications service providers on an ongoing basis. This should include entities such as colleges, schools, major businesses, and hospitals and health care networks. With these partners, State should seek to identify opportunities to coordinate purchases of telecommunications services for mutual benefit or to help improve telecommunications in the wider community.

Strategies/Action Plans

- The State must make open space located in strategically placed state buildings available to telecommunications service providers, if doing so will enable telecommunications vendors serving the State a better or less costly data telecommunications services to unserved or underserved communities.

- The State must issue a request for information (RFI) and an RFP (if warranted) for broadband service contracts to residence for state agencies and departments supporting telecommuting employees.

III. VOICE COMMUNICATIONS

As of 2014, the State still relies upon Centrex technology for voice communications throughout state government. However, the day is quickly approaching when the State will fully utilize a voice telephone system that rides over a data network. The State is poised to see significant costs savings and improved telecommunications service through operating a single voice and data network infrastructure, instead of providing separate voice and data services. The State currently supports 13 call centers utilizing Voice over Internet Protocol (VoIP). These call centers support 340 employees over multiple agencies and departments; such as Department of Tax, Department of Motor Vehicles, and several Agency of Human Services departments. Although a small cost savings has occurred through these VoIP services, it demonstrates the State is ready to implement this on a much larger scale in the coming years.

Policies

- The State must continue to review new voice technologies as they mature and standards become firm.
- The State must continue to maintain a voice communications system that provides relatively low cost at high value to state government.
- The State should seek to balance lowest cost with features that enhance the productivity of state workers and improve service to the public, not allowing either one to become a concern to the exclusion of the other.
- The State must seek to establish a long-term technology migration path, while allowing enough flexibility to adjust to technology developments.

Strategies/Action Plans

- The State must seek out telephone services that, when required, can be integrated with and complement other communications-related applications.
- The State must plan for an eventual migration to VoIP services, contingent on cost and value factors. It must establish a migration path over the next two to five years. It must take steps now as opportunities present themselves to facilitate a smooth migration.
- When selecting a voice service provider, the State must evaluate the costs of operating separate voice and data services/networks vs. the costs of operating a converged voice and data network.
- When selecting a telephone service supplier or suppliers, the State must evaluate options for both buying services (e.g. Centrex, VoIP) and operating equipment (e.g. standard or Power over Ethernet switches) and include in the evaluation the long-term costs of each option.

IV. STRATEGIC PLAN

A strategic plan is necessary to help focus the State on future development and innovation of the State's telecommunication infrastructure. The design of this strategic plan was aided through the use of other state telecommunication plans, such as California's; however, the scope of this plan was designed to meet needs of State of Vermont.² The strategic plan emphasizes the need to continue with the move towards enterprise-wide management. It also addresses the need for a more robust and flexible telecommunications infrastructure. An emphasis is placed on public safety and emergency preparedness, along with the protection of all information assets. Finally, the strategic plan addresses the importance and need to integrate the State's telecommunications services.

1. Enterprise Approach

The State will utilize an enterprise approach towards management of telecommunications services. The State will accomplish this through acquisitions, management, and maintenance of enterprise-wide services that are necessary to support any current and all future State government operations. In order to do this, the State must raise its level of telecommunications services to match its business needs. This must be identified during the planning, designing and implementation phases to ensure telecommunications systems are dynamic enough to support all State business requirements. To effectively implement this, the State should:

- Periodically inventory existing telecommunications services.
- Identify telecommunications services required by State agencies and departments.
- Evaluate existing telecommunications services to determine if they meet the needs of the customer.

There are two critical components in the acquisitions process of telecommunications services: 1) procurement and 2) cost management.

The State should only pursue additional enterprise-wide procurements that are timely and cost-effective. This can most effectively be achieved through leveraging of existing/future telecommunication contract vehicles. However, this is only effective if contracts are centrally managed. Actual savings can occur through central management of state-wide contracts; as opposed to allowing individual agencies and departments the ability to manage telecommunication contracts within their organizations. To effectively implement this, the State should:

- Develop an easy-to-use procurement vehicle for: 1) independent network service management and operational services; 2) streaming video and audio services; and 3) enhanced and extended data and/or voice services.

² See *California Statewide Telecommunications Strategic Plan: Pathways to a Connected California*, Information Technology Council (2007)

In addition to centralizing the procurement process, the State should reduce complexity in telecommunications cost management. Previously, agencies and departments were responsible for managing their own bills for telecommunications services. This method incurred a substantial hidden cost of reconciling, reviewing, and approving invoices from telecommunication service providers. Efficiencies and cost savings will be realized through the continuous efforts to centralize and simplify telecommunication services cost management, where possible. To effectively implement this, the State should:

- Explore and recommend billing simplification options with telecommunication providers.
- Identify billing simplification options for other telecommunications costs.

2. Robust and Flexible

The State will procure robust and flexible telecommunications services in support of its business objectives. The State must remain innovative and forward thinking in its development and engineering of the telecommunications infrastructure. To achieve this goal, the State should: 1) develop a more diverse network infrastructure and 2) engineer the network infrastructure to support a wide variety of applications.

Development of a more diverse network infrastructure gives the State flexibility in choosing locations where agencies and departments can conduct government business. This diversity also gives the State the unique ability to choose how business processes are conducted by being able to procure higher bandwidth options, along with network redundancy at critical locations. To effectively implement this, the State should:

- Engineer appropriate wireless deployment models for use by state agencies and departments.
- Explore alternatives for shared high-speed communications services to support functions that include general backup, disaster recovery, and fault tolerance for multiple sites/organizations.

The ability to enhance the State telecommunications infrastructure, as bandwidth requirements keep increasing, is a critical aspect of creating a robust and flexible network. The State agencies and departments administer many types of applications that rely on a considerable amount of network bandwidth. Modernizing an infrastructure that can quickly adapt to these unique requirements will enable greater types of usage, along with meeting business needs. To enable this to happen, the State should:

- Ensure advanced network features (e.g., Quality of Service (QOS) and multi-casting) are built in to the network data flow.
- Implement and manage multimedia services to facilitate public access to government information and services, along with information exchange between government organizations.

3. Public Safety and Emergency Preparedness

The State has a responsibility to facilitate public safety and emergency preparedness. This will be accomplished through enhanced access to State managed telecommunications networks and through improved survivability and sustainability of these networks. However, to ensure adequate protection of the public, the State will fulfill its obligations, related to public safety and emergency preparedness, by establishing an improved survivability and disaster recovery plan for the State's critical resources. To achieve this goal, the State should: 1) assess the readiness, survivability, and flexibility the current telecommunications infrastructure and 2) ensure the ability to recover from catastrophic outages is integrated into the operational plan.

The level of readiness, survivability, and flexibility of the State's telecommunications infrastructure will determine whether it has the capability to withstand any manmade or natural disaster. An assessment of the level of readiness, survivability, and flexibility is critical in identifying single points of failure and unsustainable operations. To enable this to happen, the State should:

- Direct a risk assessment of the readiness, survivability and flexibility of the State's telecommunications assets in the event of a major regional disaster and develop a proposed action plan for addressing identified deficiencies.
- Conduct a feasibility study of alternatives for survivable and rapidly recoverable communications facilities for critical locations and initiate implementation to minimize and/or eliminate single points of failure.

The ability of the State to recover from a catastrophic outage of telecommunications, power, IT resources, or other key infrastructure is totally dependent upon preparations and prioritization schemes developed prior to any major outage. To enable this to happen, the State should:

- Ensure rapid recoverability and survivability features of new and existing telecommunication services are considered and used appropriately.
- Develop policies that facilitate prioritization of rapid restoration for the telecommunications infrastructure and any facilities affected by the disruption.
- Generate telecommunications fault tolerance guidelines and standards to be used for new State constructed buildings that address:
 - Diversity of telecommunication pathways and installations.
 - Minimum electrical power requirements needed to survive extended interruptions of utility services.
- Use current and emerging telecommunications technologies to provide information, directions, and status updates to the public during an emergency.
- Provide alternate region-wide emergency telecommunications capabilities for recovery from catastrophic or extended outages.

4. Protection of Information Assets and Networks

The State has an obligation to protect its information assets and networks from loss, damage, misuse, and misappropriation. To ensure security of critical information assets, the State will take actions to secure its networks from unauthorized intrusion, malware, and other disruptions to the safe conduct of the state's business. State networks will be safeguarded from unnecessary or unauthorized use. To achieve this goal, the State should: 1) establish policies and procedures for governing telecommunications security and 2) provide tools, services, and standards that enable organization to comply with these policies and procedures.

The establishment of policies and procedures that govern telecommunications security is necessary to create a safe and secure operational environment. It helps educate users and produces a culture of smart business practices. It also sets an expectation of information security that is traditionally governed by State and Federal statutes. To enable this to happen, the State should:

- Develop statewide policies for:
 - Appropriate use
 - Internet use
 - Malware protection
 - Expectation of privacy
 - Mobile devices
 - Remote access
 - Identity management
 - Authentication
- Manage remote connectivity to the network for:
 - Virtual private networks
 - Remote desktop and client applications
 - Telecommuting
 - Access from publicly accessible computers
 - File sharing
 - Network access control.

The State will provide the security tools, services, and standards to all the agencies and departments. This will enable organizations to comply effectively with all security policies and requirements that are implemented. To enable this to happen, the State should:

- Establish a repository for network security best practices, maintain an inventory of current installed technologies, and provide general information to the user of the State's telecommunications network.
- Assess the need of contracts for security products and service offerings (e.g., intrusion protection systems, firewall implementations, network access control, network vulnerability assessment, etc.).
- Implement a security strategy for wireless deployment.

5. Integration of Telecommunication Services

The State will promote the integration of voice, data, and video services. The State should move sensibly and deliberately toward unified communications. Unified communications services offer the promise of broader capabilities to better serve the public sector, while significantly reducing operational costs. Converged telecommunications technologies, when compared to traditional “silos” of voice, data, and video, offer efficiencies that must be investigated for possible cost savings and service improvements. To effectively implement this, the State should:

- Develop a technology plan for state organizations that includes voice, data, and video services.
- Design networks with the capability of supporting integration of voice, data, and video services.
- Draft standards to ensure consideration of opportunities for integration in any new development or major redevelopment projects.

CHAPTER 5:

TELECOMMUNICATIONS DEVELOPMENT PLANNING AND REGULATORY POLICY

I. A VISION FOR VERMONT

Connectivity is crucial to economic growth in Vermont, and quality communications services are necessary for Vermont's continued prosperity and success. Ensuring that every Vermonter has access to quality, reliable, and affordable communications services is the primary goal of this *Telecommunications Plan*. This chapter presents readers with a vision for Vermont's telecommunications future. As discussed in other sections of the *Plan*, the challenges facing Vermont and the nation are complex and dynamic. Uncertainty over federal regulatory policy, cost, and national funding decisions will be factors to consider as we develop and implement solutions. The policies and strategies outlined below provide realistic and attainable solutions to the challenges that lay ahead—solutions that take into account the limits of state action and all the possibilities when the state collaborates with public and private stakeholders.

This *Plan* envisions a Vermont where every Vermonter has affordable access to the Internet using the best technology at every location. The *Plan* also envisions a Vermont where Vermonters have reliable phone service at affordable rates, and where mobility, reliability, and public safety are highly valued characteristics of every network. This vision supports the belief that in most of Vermont's urban and suburban areas, demand will drive private investment and competition in a way that will maximize consumer choice and benefit.

The following goals, if met, will make this plan's vision a reality.

1. *Broadband Speed*. Every address¹ in Vermont should have broadband Internet access with the minimum technical requirements of 4 megabits per second (Mbps) download and 1 Mbps upload. By year end 2020, a majority of addresses in Vermont should have access to the Internet at speeds of at least 100 Mbps symmetrical. By 2024, every address should have broadband speeds of 100 Mbps symmetrical.
2. *Broadband Deployment*. Most addresses in Vermont should have access to wired and wireless broadband Internet access service.
3. *Affordability*. Broadband service should be affordable to all members of every customer class.
4. *Local Public Generated Content*. The state should promote locally generated content that is used and useful to the community.
5. *Adoption and Usage*. Vermont should support the universal adoption and use of broadband service at home and at work.
6. *Mobile Service*. Vermont should have universal availability of mobile service along roadways and near universal availability statewide.
7. *Basic Service*. Vermont should have reliable, economical telephone service in all areas of the state, including rural areas. All residents, regardless of income or location, should have access to basic telephone service.

¹ "Address" means E-911 residential and business locations.

8. *Enhanced 911*. Vermont should have available the best possible E911 service. The State should endeavor to find greater efficiencies within the E911 system without sacrificing public safety.
9. *Competition* – Vermont’s telecommunications marketplace should be competitive and all Vermonter’s should reap the benefits of competition.
10. *Regulatory Fairness* – Like services should be treated equally by regulators, regardless of the platform or technology used to provide the service.

II. TELECOM INFRASTRUCTURE AND SERVICE DEVELOPMENT

a. Infrastructure Financing and Service Development

Vermont received an unprecedented amount of funding for broadband infrastructure projects as a result of the America Recovery and Reinvestment Act. It is unlikely that Vermont will have an opportunity of this magnitude in the foreseeable future. There are, however, several initiatives directing investments in advanced telecommunications networks going forward. The two major sources of investment funding that Vermont providers will utilize are the Connect America Fund and the Vermont Universal Service Fund. Each program is discussed in turn.

i. Connect America Fund

The Connect America Fund (CAF II) is poised to bring millions of dollars to the state to improve Vermont’s broadband capable networks. In areas deemed eligible for support, the FCC will give Vermont’s successor Regional Bell Operating Company (RBOC), FairPoint, the opportunity to bring 4/1 access (or FCC other FCC established service) to designated areas. If FairPoint accepts this funding, it will be required to make a commitment to serve the designated areas. In the event that FairPoint chooses not to accept support, funding will be awarded to other providers through a competitive bidding process.

ii. Vermont Universal Service

There are two initiatives funded by Vermont’s universal service fund. First, the Connectivity initiative will make support available to Internet access projects with speeds of at least 4/1. State law directs the Department of Public Service to identify and publish a list of census blocks eligible for Connectivity funding. Annually, the Department will solicit proposals from service providers, the VTA, and the Division for Connectivity to deploy broadband to eligible census blocks. By statute the Department will give priority to the lowest cost bidder and consider factors such as the data transfer rates, price of service to consumers, proposed set costs to consumers, economic feasibility of the deployed technology, the availability of other services, and the objectives of the this plan. The goal of the Connectivity Initiative is to bring 100 Mbps symmetrical service to all Vermont locations by 2024.

The second program provides high cost support to any provider that commits to serving a designated high cost area. To receive support, a provider must petition the Public Service Board to become a Vermont Eligible Telecommunications Carrier (VETC). The VETC shall offer voice telephony and broadband to customers at all locations throughout the service area or areas for

which it has been designated.² It must also meet service quality standards for telephone service. Both the Connectivity Initiative and the High Cost Program will be funded by the Connectivity Fund.

b. Technical Objectives

Vermont law directed the Department to define the minimum technical service characteristics objectives (“Objectives”) that ought to be available as part of broadband services commonly sold to residential and small business users throughout the state.³ The purpose of that provision was to direct investments by the Vermont Telecommunications Authority (VTA). Although the functions of the VTA are transitioning to the Connectivity Division, the Objectives remain important for two reasons.⁴ First, locations lacking access to services that meet the Objectives are eligible for support from the Connectivity Initiative.⁵ Second, the Division of Connectivity is directed to promote the expansion of broadband services that offer actual speeds that meet or exceed the Objectives contained in the State’s Telecommunications Plan. The requirements for services supported by the Connectivity Initiative are not defined in statute.⁶

The Department defined the Objectives at 4 Mbps download and 1 Mbps upload (4/1) in the 2011 Telecommunications Plan. In the *Transformation Order*, The FCC specified that all services supported by the Universal Service Fund must provide Internet access with speeds of 4/1.⁷ The Department mirrored the state’s Objectives on those set by the FCC.⁸

Act 190 provides important direction to guide the formation of the Objectives. The short term goal is found in 30 V.S.A. § 7515b, which states that it is the purpose of the Connectivity Initiative to provide each service location in Vermont access to Internet service that is capable of speeds of at least 4 Mbps download and 1 Mbps upload. The long term goal is found in 30 V.S.A. § 202c (10) which states that the purpose of the state’s telecommunications policy and planning statutes is to “support . . . measures designed to ensure that every business and

² 30 V.S.A. § 7501(b)(7) indicates that the number of service locations in each exchange shall be determined by the Department of Public Service in periodic updates to the State Telecommunications Plan based on analysis of the locations in the database of the Vermont Enhanced-911 Board. The Department identified business and residential locations from the database and prepared a summary of locations in each wire center. The table in Appendix 1 lists, for each Vermont wire center, the number of business and residential locations. It also lists the wire center loop density zone identified in the FairPoint Telephone Operating Company of Vermont Statement of Generally Available Terms, section 5.5.1.2.

³ 30 VSA § 8077.

⁴ 2014 Acts and Resolves No. 190, Sec 9 (Amending 30 V.S.A. § 202d to direct the Department to include the Objectives beginning with the 2017 Telecommunications Plan.

⁵ 30 V.S.A. § 7515b. The Connectivity Initiative was created for the purpose of bringing broadband that is capable of 4 Mbps download and 1 Mbps upload to each service location in Vermont.

⁶ 30 VSA § 7515b indicates that any new services funded in whole or in part by monies in this Fund shall be capable of being continuously upgraded to reflect the best available, most economically feasible service capabilities.

⁷ The FCC indicated that some percentage (to be defined later) would need to support 6 Mbps download speed and 1.5 Mbps upload speed. The FCC has yet to define the percentage that would need to meet these speeds. However, in FNPRM 14-54, issued June 10, 2014, the FCC sought comment on a proposal to increase the benchmark prospectively to a download speed of 10 Mbps and some upload speed greater than 1 Mbps. (http://transition.fcc.gov/Daily_Releases/Daily_Business/2014/db0626/FCC-14-54A1.pdf) paragraph 138.

⁹ The Objectives will remain at the previous level until commitments are in place to bring that level to all locations throughout the state.

residential locations in Vermont has infrastructure capable of delivering Internet access with service that has a minimum download speed of 100 Mbps and is symmetrical.”

The FCC CAF II program will provide funding to bring 4/1 service to completely unserved areas throughout the state. The program, expected to be launched in early 2015, will allow grantees up to 5 years to bring service to supported locations. The Department believes that state goals should be in line with, and take advantage of, federal funding sources. Therefore the Department believes it is reasonable to expect the ubiquitous 4/1 availability goal should be met by 2020. As an intermediate goal, the Department believes that a majority of locations should have access to 100 Mbps duplex service by 2020. Ubiquitous availability of 100 Mbps duplex service by 2024 remains the long term goal.

To support attaining these goals, the Department believes that the Objectives should be set as follows. The Objectives should remain at the 4/1 level they were set at in 2011 through the end of 2017. The Objectives should be set at 10/1 in the 2017 Telecommunications Plan. The Objectives should be set at 100/100 in the 2020 Telecommunications Plan.⁹

Year	Objectives
2014	4/1
2017	10/1
2020	100/100

Achieving these goals will be complicated for several reasons. First, gathering information about the availability of services meeting various speeds has proven difficult. Service providers are often either not able or not willing to provide address specific speed information. Second, this effort will be costly, and highly dependent on funding. Therefore, Vermont should ensure that the Connectivity Initiative is funded to levels that can meet the 2024 goal established in statute.

c. Open Access

“Open Access” was discussed during the public hearing for this plan and in testimony during the 2014 legislative session. The concept, as raised, appears to center around the state requiring service providers to make their facilities available on a non-discriminatory basis.¹⁰ Supporters of open access believe that the backhaul from remote areas to more urban areas is one of the leading impediments to bringing broadband and mobile services to rural and remote unserved and underserved areas. It was suggested that companies employing public rights of way or accepting public funds should have a requirement to provide “open access” to their networks, and that this would improve broadband and mobile availability. Although a seemingly simple concept, it is actually hard to define open access, much less implement it. Is open access a requirement imposed on a service provider to allow other providers to employ the carrier’s facilities? Is it more specific, such as a requirement to provide dark fiber strands? Alternatively

⁹ The Objectives will remain at the previous level until commitments are in place to bring that level to all locations throughout the state.

¹⁰ Testimony of Charlie Larkin, Tr. 2/21/14 at 9-11.

is it a requirement to provide throughput across a network? And ultimately the issue comes down to cost: how should costs be allocated, and who should do this?

Network operators contend that the primary reason areas remain underserved is that the business model to serve them is challenging. If additional service providers have subsidized access to the network, this will erode the subscription rate of the underlying carrier and further undermine that business model. Even for those supportive of open access, there are legal impediments in the ability of regulators to impose conditions to effectuate the requirement. States have jurisdiction over intrastate telecommunications and information services. However, if states attempt to impose interconnection and non-discrimination requirements on inter-state services, or services that might include inter-state services, service providers may argue that states are preempted from this action.

There are two examples of network sharing approaches to consider that approximate the open access provisions described by proponents. These are the requirements of incumbent telecommunications (ILECs) carriers under the telecommunications act, and the requirements on recipients of ARRA-funded grants by the NTIA and RUS.

i. ILEC requirements

Federal law requires ILECs to “provide nondiscriminatory access at any technically feasible point on rates, terms, and conditions that are just, reasonable, and nondiscriminatory,” subject to review by the FCC and state commissions.¹¹ Rural ILECs are exempt from this requirement. In Vermont this requirement only applies to FairPoint, and this is reflected in the FairPoint Statement of Generally Available Terms (SGAT). The SGAT effectively constitutes the FairPoint wholesale tariff, and the prices included in it are cost-based and were approved by the Public Service Board. The SGAT relates prices for telecommunications transport services and dark fiber between FairPoint central offices throughout the state.

Some have expressed frustration that the services laid out in the SGAT do not ideally meet their understanding of Open Access. The SGAT provides prices for services connecting central offices, but some open access proponents envision the ability to purchase fiber from any points. Additionally the SGAT is only available to qualified telecommunications carriers, and open access proponents suggest it should be available to all companies. SGAT services also generally require colocation arrangements in the central offices of each side of a link, and open access proponents complain that this is excessively complicated and expensive.

The FCC provided important interpretation of this statute in the *Triennial Review Remand Order* (TRRO).¹² In this order the FCC found that the purpose of the 1996 Telecommunications Act was to facilitate competition in areas where the ILEC held monopoly power. It found that the ILEC could be relieved of these obligations if the market for telecommunications services was not impaired. Based on the rules laid out in the TRRO order, FairPoint sought relief from these obligations in several areas of the state. In 2014, the Board found that the telecommunications

¹¹ 47 USC § 251 (c)(3) (3)

¹² *Unbundled Access to Network Elements; Review of the Section 251 Unbundling Obligations of Incumbent Local Exchange Carriers*, WC Docket No. 04-313, CC Docket No. 01-338, Order on Remand (rel. Feb. 4, 2005).

market in several Vermont urban and suburban central offices were no longer impaired, and relieved FairPoint of certain obligations in serving these wire centers.¹³

ii. NTIA and RUS grants

Recipients of ARRA-funded grants and loans from the NTIA and RUS are required to offer “interconnection, where technically feasible without exceeding current or reasonably anticipated capacity limitations, at reasonable rates and terms to be negotiated with requesting parties.” Grants subject to these requirements include three grants to VTel, including the FTTH project, the WOW wireless project, and the middle mile fiber project, as well as the VTA middle mile project (in conjunction with Sovernet). In addition to the grant language, the NTIA offered additional interpretation guidance for recipients, including the following key provisions:

Interconnection: grantees should be prepared to: (a) wholesale a direct connection that it has built to the customer (i.e., loop or lateral); and (b) provide transport services to a last mile provider that is serving the customer (e.g., backhaul, Internet access). Recipients should make all reasonable efforts to allow all requesting parties to interconnect with their facilities regardless of the business model or purpose of the requestor. The requirement to offer interconnection at any technically feasible point along the network includes all points of interconnection set forth in a recipient’s approved application, including splice points and mid-span.

Wholesale: Recipients should offer wholesale broadband services at rates and terms that are reasonable and non-discriminatory. Many recipients set forth wholesale pricing in their applications and, as such, those rates will be presumed reasonable and non-discriminatory. Customers will expect certain wholesale services to be provided including, but not limited to, local transmission services, transport, and dedicated Internet access services.

Dark fiber: To the extent that a recipient’s business plan involves offering dark fiber, the recipient should consider making available various information to requesting parties including, but not limited to, route maps, interconnection points, splice points, and type of fiber.

Information: Recipients should provide up-to-date information to parties making bona fide requests regarding the location of grant-funded network routes, including routes containing dark fiber and points of interconnection.

The concerns about business viability described in the opening paragraph are echoed in the actual grant agreements offered by the NTIA and RUS, which include this additional language: “Notwithstanding the above, the Grantee may not offer interconnection to anyone that will provide services that duplicate services provided by projects funded by outstanding telecommunications loans made under the RE Act.” These provisions indicate that the NTIA and

¹³ The term “impaired” refers to competition. In markets where competition is impaired, the successor RBOC is obligated to provide unbundled network elements (such as fiber) at cost based rates. The Board’s findings were made following FCC rules that were promulgated in the TRRO Order.

RUS want these grant recipients business models to succeed, and if other network operators employ the facilities, this may undermine these business models.

d. Service Adoption

i. Demand Stimulation

One way Vermont can increase service adoption is by increasing demand for broadband services. Basic telephone service is a good example. Since the 1930s, the national policy has been universal service. As the telephone became a more indispensable part of American life, the penetration rate increased. Use and adoption of broadband applications is on the increase. However, unlike the telephone, the immediate benefit of broadband to non-adopters is less clear. Many non-adopters see no need to use information technologies, and others wish to use broadband applications but lack the right skills. Using most broadband applications takes a considerable amount of skill and training. To increase adoption rates, the state should support education and training to residents and businesses on information technologies.

- The state should encourage digital literacy programs to address long term growth of the demand in rural areas.
- The state should partner with rural businesses to identify and promote information technology skills programs. Programs should be targeted to develop skills that meet the workforce needs of Vermont businesses.
- State and municipal agencies, state colleges, public and private schools, and other relevant institutions should adopt programs that increase use of broadband based applications at anchor institutions.
- The Division of Connectivity should consider staffing a broadband outreach coordinator to facilitate and coordinate adoption and usage initiatives in a way that maximizes those initiatives' benefits.

ii. Affordability

Another way to stimulate demand for Internet access service is to promote low cost services for lower income and working families. Comcast for instance, as a requirement of its purchase of NBCUniversal, offers a low cost broadband option for \$9.95 per month. Eligible Comcast customers have the option to purchase an "Internet ready" computer for \$150. VTel, as a requirement of its ARRA funded WOW project, offers a similar low cost broadband solution for \$10. These programs are already making Internet Access available to a greater number of families. Such programs should be encouraged and expanded. The state can do this in several ways.

- The state should consider expanding its VUSF Lifeline program to cover some of the cost of broadband for qualifying recipients.
- The state should consider whether to seek the incorporation of low cost options into certificates of public good.

e. Broadband and Mobile Wireless Mapping

The National Telecommunications and Information Administration (NTIA) awarded Vermont a \$3.5M grant to conduct its broadband mapping initiative in 2010. The grant provided funding for three years to the Vermont Center for Geographic Information (VCGI) in partnership with the Vermont Telecommunications Authority (VTA) and Department of Public Service. Through this grant, VCGI and its partners started the Broadband Mapping Initiative. The initiative's primary responsibility is the collection and analysis of data on broadband availability.

The NTIA grant ends in October 2014. However, state law provides for continued mapping initiatives. Act 190 directs the Department of Public Service to identify eligible census blocks for funding through the Connectivity Fund. The Act also directs the Department to determine service locations for purposes of high cost fund eligibility. By continuing its mapping effort, Vermont can direct investment where it is most needed.

Strategies

- Vermont state government should ensure a fluid transition from broadbandvt.org to a new mapping resource site.
- The Department of Public Service will lead the state's mapping effort after October 2014.
- Maps produced by the Department should be publicly available and incorporate the most up to date information available.

f. Public, Educational, and Governmental TV

Vermont has a long history of strongly supporting local public, educational, and government content (PEG). PEG stations offer Vermonters locally generated entertainment and educational programming. PEG also gives viewers access to local government proceedings and school events. PEG stations keep Vermonters in touch with their community. The primary funding source for PEG stations comes from cable subscriptions through a franchising fee allowed under federal law.¹⁴ Access Management Organizations receive 5% of the cable operator's gross revenue—the maximum allowed by federal law.¹⁵ Cable subscriptions have declined in the past four years as viewers migrate to other media sources, such as Hulu, Netflix, and Apple TV. As a result, many AMOs are seeing their funding stagnating or decreasing. This trend is expected to continue and will prove challenging to the AMOs. While the state should be supportive of the AMOs direction will largely come from the FCC. At the same time, technological advances have outpaced PEG stations ability to offer hi-definition content. Many of the comments received by the Department noted the difficulty PEG station's face bringing content to Vermonters on new platforms, such as the Internet, without additional funding.

- Vermont should consider the many ways PEG stations deliver content and the ways in which most consumers access their content.
- Any public discussion about PEG funding should consider viewership levels and the viewing habits of the PEG audience.

III. REGULATORY POLICY

¹⁴ 47 U.S.C. § 542(b).

¹⁵ *Id.*

The state's ability to comprehensively regulate telephone companies has waned over the last decade. Since the inception of the Telecommunications Act of 1996, and the entry of competitive telephone companies, Vermont has relaxed regulation of telephone companies. Ten years ago, the prevailing thought was that competition would come from other wireline carriers purchasing unbundled network elements (UNEs) from RBOCs and their successors. Today, competition is, for the most part, cross-platform. Traditional phone companies compete for residential and business consumers with mobile wireless providers and cable companies. Many have also sought a broadband only solution, using nomadic VoIP carriers, such as Vonage and Skype. Vermont's regulatory framework has attempted to address these changes by reducing more traditional regulation where competition can adequately secure basic reliability and customer service. However, the state continues to exercise regulatory authority over basic local service (BLES) and service quality standards for all phone companies. Continued regulation in these areas is important for protecting captive customers who have limited choice of service providers other than the designated ILEC.

a. Incentive Regulation

As Vermont's dominant carrier, FairPoint is the most regulated provider of telephone service in the state. As competition from cable-based and wireless providers of voice service has increased, the Department of Public Service has advocated for an incentive regulation plan (IRP) that allows FairPoint to compete on a level playing field with its far less regulated competitors while maintaining some level of rate regulation over basic service. By maintaining control over rates for basic local exchange service, consumers in areas lacking in competition are guaranteed affordable phone service. It is reasonable to expect that by the time the next Telecommunications Plan is written, FairPoint will no longer be the dominant carrier in Vermont.

The Department has also advocated for holding the Vermont ILECs to service quality standards that fit consumer expectations and are in line with industry norms. FairPoint and all independent phone companies must adhere to the retail service quality standards established in Docket 5903. The Public Service Board established through Docket 5903 a set of generic service quality standards that apply to all local service providers. The Purpose of these standards was to set minimum performance levels in areas such as installation and repair, reliability, and companies' handling of inquiries, requests, and complaints.

These measures are valuable for several reasons. First, the standards keep providers focused on basic aspects of network integrity and customer service. They also enable the public and regulators to evaluate companies' performance over time. Companies can be compared with one another. Docket 5903 also established a consumer "bill of rights," which is now incorporated into Public Service Board rules.

The Docket 5903 standards were established in 1999 and it may be time to re-visit them and see if they need to be updated to reflect the current needs and expectations of the Vermont consumer. In addition, we should examine whether voice providers other than ILECs should be subject to service quality standards.

b. Municipal Telecom Providers

To date, many rural areas in Vermont have yet to see competitive providers offer service and many are understandably frustrated. In these areas where cable has yet to be deployed and DSL does not provide sufficient speed to meet the needs of the consumer, some municipalities have expressed interest in building high-speed systems. One community based company in Vermont has endeavored to bring fiber to the home in rural areas and currently serves over 600 customers. Because the telecommunications market is highly competitive, the risks are substantial. Much of the cost of service is sunk in the initial investment of infrastructure, and it can be challenging in sparsely populated areas to have enough subscribers to make the venture viable.

Vermont law restricts the ability of municipalities to expose their taxpayers to financial risk. Broadly speaking, the law restricts a municipal telecommunications entity to revenues generated through the provision of service. Chattanooga, Tennessee has a municipally owned fiber system and it is widely regarded as a national model. Burlington, Vermont has a municipally owned fiber system and it provides a cautionary model for what taxpayers may be exposed to if the concern fails to meet its penetration rates and revenue expectations. Therefore, Vermont law restricts the ability of municipalities to expose their taxpayers to financial risk. Broadly speaking, the law restricts a municipal telecommunications entity to revenues generated through the provision of service.¹⁶ The need for, and deployment of, municipal telecommunication systems has seen recent debate in Congress and at the FCC, and the concept is something that warrants further discussion and consideration in Vermont, Vermont should carefully consider the role municipalities should play in the telecommunications market.

Strategies

- Support policies that refrain from funding municipal and state market activity where that activity will have the net effect of reducing competition.
- The state should engage electric transmission and distribution providers to explore ways in which they may contribute to Vermont’s telecommunications goals.
- Public support should be confined to areas where competition cannot produce and maintain a robust wired network. State directed support should not be used for overbuilds of backbone/middle mile infrastructure absent a compelling need. State level grant funding should be spent in ways that maximize federal and private investment and on projects that help end users improve connections.

c. Mobile and Wireless Service Regulation

Commercial mobile radio service (CMRS) is regulated differently from landline telephone. Congress limited state action with regard to rate regulation, but states maintain authority over “other terms and conditions.” States are prohibited from granting wireless carriers exclusive franchises or otherwise creating barriers to entry.¹⁷ Currently, the state exercises much of its regulatory authority over commercial mobile carriers through the siting of telecommunications facilities. Wireless carriers must also seek approval from the Public Service Board to offer service in Vermont. Carriers can obtain certificate of public good to offer service and are obligated to pay gross receipts tax, file annual reports, and contribute to the universal service fund.

¹⁶ 30 V.S.A. § 1913

¹⁷ 47 U.S.C. § 332 (c) (3) (A).

1. Section 248a

Vermont law provides for a streamlined permitting process for telecommunications facilities. In 2007, the Vermont Legislature created Section 248a. 248a provided telecommunications carriers the option of seeking a CPG to construct telecommunications facilities as an alternative to local zoning and Act 250 environmental review.¹⁸ The law was amended in 2011 to provide greater flexibility. Applicants can now quickly obtain a cpg for *de minimis* (very minor) changes to existing facilities. Many Mobile wireless providers have taken advantage of this permitting regime.

248a has been highly successful, allowing for the permitting of new facilities as well as the upgrade to hundreds of existing facilities. The 248a permitting regime allows small upgrades to be quickly permitted through the *de minimis* application process. Applicants may also seek the permitting of new facilities and major upgrades to existing facilities by submitting a “limited size and scope” or “full” petition. Most of the 4G/LTE upgrades by AT&T and Verizon have utilized the *de minimis* provisions. 248a has lowered the cost of siting telecommunications facilities, as well as increased regulatory certainty for mobile providers. 248a, however, is a temporary law, and is slated to sunset in 2017.

This plan calls for the continuation of Section 248a. During the 2014 legislative session, the General Assembly crafted new provisions designed to increase town participation in 248a proceedings. With these new provisions now enacted, 248a allows applicants to focus attention on areas where service should be improved. 248a will help providers upgrade their networks to 4G/LTE and maintain network reliability and coverage statewide.

Strategies

- The State should maintain the 248a permitting regime at least until sufficient infrastructure is established.
- The state should permanently maintain the *de minimis* filing process so that existing structures can continuously be upgraded to the best available wireless technology.

2. Mobile Wireless Service quality and Consumer Protection

As discussed above, the Public Service Board outlined a “Consumer Bill of Rights” in Docket 5903 and incorporated it into Board rule 7.600. This bill of rights applies to all telephone companies, including CMRS providers. Although Vermont lacks control over rates, the state maintains its authority over “other terms and conditions.” When the state applied consumer protections to phone carriers, the rules excluded mobile wireless carriers. At the time, most consumers did not rely on cell phones as their primary telephone. Today, about 30% of Vermont households are wireless only. Many more use wireless as their primary mode of communication, even though they may subscribe to multiple phone services. Perhaps it is now time to revisit Rule 7.600 to review what, if any, benefits consumers might enjoy through the inclusion of wireless providers to Rule 7.600.

Strategies

¹⁸ Applicants may still seek permits through local zoning laws and Act 250. Section 248a provides an alternative to that process.

- Vermont should consider analyzing what, if any, consumer protection measures should be applied to mobile wireless carriers.

d. Line Extension Policy

Vermont Public Service Board rules require that cable operators have tariffs for expansion of cable service into unserved areas. The Board rule lays out the method these tariffs must use for distributing the costs of the expansion between the cable operator and the affected customers based on density. The rule indicates that as population density increases, the cable operator share increases. Prior to 2010, the rules required cable providers to conduct house-count surveys and extend cable plant when areas of sufficient density were identified. The rules were revised in 2010 to remove these provisions. The current rule simply requires that the cable operator contribute toward the cost of consumer-driven line extensions, based on the density of the specific extension. It no longer requires house-count surveys and thus no longer requires proactive line extensions. In addition, before 2010 cable CPGs required companies to periodically determine the appropriate density thresholds, based on company-specific data from annual reports. The 2010 revision appears to contemplate an industry-wide Board process to determine the appropriate build-out density.

Strategies

- Vermont should consider whether the cable line extension rules maximize the number of consumers who can receive service.

e. Pole Attachment Rules

Utility poles go everywhere in the state, allowing service providers to reach every location in Vermont. Under Public Service Board Rules, any service provider can attach to existing utility poles at cost based rates. The Public Service Board has rules governing how utilities can attach to facilities to those poles. The Board rules lay out the method for calculating these tariffs and they specify two pole attachment rates, one for cable operators that do not offer local exchange service, and another for all other entities. This has created confusion. A unified rate may encourage expansion of broadband services into unserved and underserved areas and eliminate the confusion.

f. E-911

Enhanced 9-1-1 is a term of art that refers to the type of system that Vermont initially put in place in the late 1990's. At that time, Enhanced 9-1-1 generally meant a system that was capable of returning the telephone number and location (that was always tied to a landline phone) of the caller to the 9-1-1 call taker when someone called with an emergency.

The system has evolved over the years. The push across the country is for 9-1-1 jurisdictions to adopt Internet Protocol (IP) based 9-1-1 systems, and those systems are referred to as "Next Generation 9-1-1".

Vermont has had a Next Generation system in place since 2011, and the State is currently in a bid process to determine who the service provider will be after June 30, 2015. Having such a system in place enabled Vermont to be the first state in the country to provide Text to 9-1-1

services statewide to those citizens and visitors that are customers of the four nationwide wireless carriers. Vermont has played a leadership role in the development and implementation of Text to 9-1-1 and is recognized nationally as a leader in this initiative. Text to 9-1-1 is important to individuals who are deaf or hard of hearing, or those who may be in a dangerous situation where if they made a voice call to 9-1-1 that danger could increase. Since April, 2012 Vermont has had a number of critical interventions that resulted from someone sending a Text to 9-1-1. It has helped victims of domestic abuse and others who were not able to make a voice call get emergency assistance. It has proven useful in a situation where someone was lost hiking, and didn't have a strong enough signal to place a voice call, but the text sent to 9-1-1 was transmitted and the call taker was able to effect a rescue.

None of that would have been possible with the availability of the Next Generation 9-1-1 system. In the future, Enhanced 9-1-1 anticipates being able to receive and retransmit pictures and video, to better enable emergency responders to do their job.

g. FCC Advocacy

Decisions about many of the issues confronting the state are made at the FCC. The FCC in recent years has instituted several sweeping reforms, especially in the area of universal service and inter-carrier compensation. As we've discussed throughout the Plan, many regulatory issues will have to be settled through the FCC. Vermont is largely dependent on federal funding for future broadband build out. As a result, state advocacy in front of the FCC continues to be extremely valuable to the state.

The state has traditionally participated at the FCC through two organizations: the Federal-State Joint Board on Universal Service and the National Association of Regulatory Utility Commissioners (NARUC). Currently, Public Service Board staff participates on the Joint Board. Staff members from the Board and the Department of Public Service sit on the NARUC Committee on Telecommunications. Because FCC decisions will continue to have a large impact on the telecommunications market in Vermont, this Plan calls for the continuation of the state's advocacy at the FCC.

IV. CONCLUSION

The policies and strategies discussed above are intended to ensure that the state will reach its telecommunications goals. As stated throughout this *Plan*, this *Plan* envisions a Vermont where every Vermonter has affordable access to the Internet using the best technology at every location. The *Plan* also envisions a Vermont where Vermonters have reliable phone service at affordable rates, and where mobility, reliability, and public safety are highly valued characteristics of every network. This *Plan* offers solutions that its authors believe are attainable and realistic given today's telecommunications market.

Number of Locations by Wire Center

Prepared on behalf of the Public Service Department pursuant to 30 V.S.A. § 7501(b)(7) by Stone Environmental, August 5, 2014

This table lists the number of business and residential locations from the Vermont E-911 database located in each Vermont wire center.

Wire Center	Exchange	Telephone Company	CLLI	SGAT	Locations
ADDISON	ADDISON	Waitsfield – Fayston Telephone Co., Inc.	ADSNVTXARS1	O	820
ALBANY	ALBANY	Telephone Operating Company of Vermont LLC	ORLNVTIRRS1	N	465
ALBURG	ALBURG	FairPoint Vermont, Inc.	ALBGVTXADS0	V	1,764
ARLINGTON	ARLINGTON	Telephone Operating Company of Vermont LLC	ARTNVTSCRS1	R	2,168
BARNET	BARNET	Telephone Operating Company of Vermont LLC	BARNVTCHRS1	R	850
BARRE	BARRE	Telephone Operating Company of Vermont LLC	BARRVTXARS1	S	7,438
BARTON	BARTON	Telephone Operating Company of Vermont LLC	BARTVTXARS1	R	2,241
BELLOWS FALLS	BELLOWS FALLS	Telephone Operating Company of Vermont LLC	BLFLVTHERS1	S	1,889
BENNINGTON	BENNINGTON	Telephone Operating Company of Vermont LLC	BGTNVTPLDS0	S	8,228
BENSON	BENSON	SHOREHAM Telephone, LLC	BNSNVTXARS1	O	568
BETHEL	BETHEL	Telephone Operating Company of Vermont LLC	BETHVTMARS1	R	1,988
BLOOMFIELD	BLOOMFIELD	Telephone Operating Company of Vermont LLC	NSFRNHMA962	N	267
BRADFORD	BRADFORD	Telephone Operating Company of Vermont LLC	BRFRVTXARS1	R	1,136
BRANDON	BRANDON	Telephone Operating Company of Vermont LLC	BRNDVTCARS1	R	2,694
BRATTLEBORO	BRATTLEBORO	Telephone Operating Company of Vermont LLC	BRBOVTMADS0	S	7,697
BRIDGEWATER	BRIDGEWATER	Vermont Telephone Company	BRWRVTXARS1	O	1,177
BRIDPORT	BRIDPORT	Waitsfield – Fayston Telephone Co., Inc.	BRPTVTXARS1	O	689
BRISTOL	BRISTOL	Waitsfield – Fayston Telephone Co., Inc.	BRSTVTAARS1	O	3,943
BROOKFIELD	BROOKFIELD	Telephone Operating Company of Vermont LLC	BRFDVTBCRS1	R	570
BURLINGTON	BURLINGTON	Telephone Operating Company of Vermont LLC	BURLVTMADS0	U	21,349
CABOT	CABOT	FairPoint Vermont, Inc.	CABVTXADS6	V	1,149
CANAAN	CANAAN	Telephone Operating Company of Vermont LLC	WSTWNHBS266	N	509
CASTLETON	CASTLETON	Telephone Operating Company of Vermont LLC	CSTNVTORS1	R	1,219
CHARLOTTE	CHARLOTTE	Waitsfield – Fayston Telephone Co., Inc.	CHRLVT0IRS1	O	2,280
CHELSEA	CHELSEA	Telephone Operating Company of Vermont LLC	CHLSVTMARS1	R	1,198
CHESTER	CHESTER	Vermont Telephone Company	CHESVTXARS1	O	2,571
CONCORD	CONCORD	Telephone Operating Company of Vermont LLC	CNCRVTMARS1	R	987
CORNWALL	CORNWALL	SHOREHAM Telephone, LLC	CRNWVTXARS1	O	521
CRAFTSBURY	CRAFTSBURY	Telephone Operating Company of Vermont LLC	GNBOVTGB586	N	735
CUTTINGSVILLE	CUTTINGSVILLE	Vermont Telephone Company	CTVLVTXARS1	O	444
DANBY	DANBY	Vermont Telephone Company	DNBYVTXARS1	O	754
DANVILLE	DANVILLE	Telephone Operating Company of Vermont LLC	DAVLVTYARS1	R	866
DERBY	DERBY	Telephone Operating Company of Vermont LLC	DRBYVTMARS1	S	1,291
DERBY LINE	DERBY LINE	Telephone Operating Company of Vermont LLC	DRBYVTMARS1	N	370
DORSET	DORSET	Telephone Operating Company of Vermont LLC	DRSTVTYARS1	R	766
E. CALAIS	E. CALAIS	Telephone Operating Company of Vermont LLC	PLFDVTYARS1	N	788
E. FAIRFIELD	E. FAIRFIELD	Telephone Operating Company of Vermont LLC	EFFDVTMARS1	R	903
EAST CORINTH	EAST CORINTH	Topsham Telephone Company	ECRNVTXADS0	O	1,915
ENOSBURG FALLS	ENOSBURG FALLS	Telephone Operating Company of Vermont LLC	ENFLVTMARS1	R	2,738
ESSEX JCT.	ESSEX JCT.	Telephone Operating Company of Vermont LLC	ESJVTLIDS0	S	13,060
FAIR HAVEN	FAIR HAVEN	Telephone Operating Company of Vermont LLC	FRHNVTMARS1	R	1,862
FAIRFAX	FAIRFAX	Telephone Operating Company of Vermont LLC	FRFXVTMARS1	R	2,011
FAIRLEE	FAIRLEE	Telephone Operating Company of Vermont LLC	FARLVTMLRS1	R	1,589
FRANKLIN	FRANKLIN	Franklin Telephone Company	FKLNVTXADS1	O	933
GRAFTON	GRAFTON	Vermont Telephone Company	GFTNVTXARS1	O	350
GRAND ISLE	GRAND ISLE	Telephone Operating Company of Vermont LLC	GDISVTYARS1	R	3,350
GREENSBORO	GREENSBORO	Telephone Operating Company of Vermont LLC	GNBOVTGBRS1	R	1,143
GROTON	GROTON	FairPoint Vermont, Inc.	CABVTXADS6	V	1,348
GUILDHALL	GUILDHALL	Telephone Operating Company of Vermont LLC	LNCNHHIRS2	N	368
HARDWICK	HARDWICK	Telephone Operating Company of Vermont LLC	HRWKVTPKRS1	R	1,875
HARTLAND	HARTLAND	Vermont Telephone Company	HRLDVTXARS1	O	1,131
HINESBURG	HINESBURG	Waitsfield – Fayston Telephone Co., Inc.	HNBGVTXARS1	O	2,142
HUBBARDTON	HUBBARDTON	SHOREHAM Telephone, LLC	HBTNVTXARS1	O	1,274
ISLAND POND	ISLAND POND	Telephone Operating Company of Vermont LLC	ISPNVTALRS1	R	1,467
ISLE LA MOTTE	ISLE LA MOTTE	FairPoint Vermont, Inc.	ALBGVTXADS0	V	497
JACKSONVILLE	JACKSONVILLE	Telephone Operating Company of Vermont LLC	JCVLVTSCRS1	R	1,437
JAMAICA	JAMAICA	Telephone Operating Company of Vermont LLC	JAMCVTMARS1	R	1,204

JEFFERSONVILLE	JEFFERSONVILLE	Telephone Operating Company of Vermont LLC	JFVLVTVARS1	R	2,210
JOHNSON	JOHNSON	Telephone Operating Company of Vermont LLC	JHSNVTRARS1	R	2,176
LEMINGTON	LEMINGTON	Telephone Operating Company of Vermont LLC	CLBKNHMA277	N	141
LUDLOW	LUDLOW	Ludlow Telephone Company	LDLWVTXADS0	O	2,716
LUNENBURG	LUNENBURG	Telephone Operating Company of Vermont LLC	LNBGVTECRS1	R	753
LYNDONVILLE	LYNDONVILLE	Telephone Operating Company of Vermont LLC	LYVLVTCERS1	R	3,624
MAIDSTONE	MAIDSTONE	Telephone Operating Company of Vermont LLC	GVTNNHSTRS2	N	318
MANCHESTER	MANCHESTER	Telephone Operating Company of Vermont LLC	MNCHVTSCRS1	S	3,645
MARSHFIELD	MARSHFIELD	FairPoint Vermont, Inc.	CABVTXADS6	V	663
MENDON	RUTLAND	Telephone Operating Company of Vermont LLC	RTLDTVWEDS0	S	488
MIDDLE TOWN SPRING	MIDDLE TOWN SPRING	Vermont Telephone Company	MDSPVTXARS1	O	794
MIDDLEBURY	MIDDLEBURY	Telephone Operating Company of Vermont LLC	MDLBVTCCRS1	S	3,407
MILTON	MILTON	Telephone Operating Company of Vermont LLC	MLTNVTELRS1	S	4,691
MONTGOMERY	MONTGOMERY	FairPoint Vermont, Inc.	MTGMVTXADS0	V	862
MONTPELIER	MONTPELIER	Telephone Operating Company of Vermont LLC	MTPLVTSCDS0	S	6,545
MORGAN	MORGAN	Telephone Operating Company of Vermont LLC	MRGNVTTORS1	R	1,504
MORRISVILLE	MORRISVILLE	Telephone Operating Company of Vermont LLC	MRVLVTUNRS1	R	4,657
MOUNT HOLLY	MOUNT HOLLY	Vermont Telephone Company	MTHLVTXARS1	O	1,260
N. SPRINGFIELD	N. SPRINGFIELD	Vermont Telephone Company	NSFDVTXARS1	O	850
N. TROY	N. TROY	Telephone Operating Company of Vermont LLC	TROYVTYARS1	N	989
NEWBURY	NEWBURY	Telephone Operating Company of Vermont LLC	NWBYVTPCRS1	R	319
NEWFANE	NEWFANE	Telephone Operating Company of Vermont LLC	NWFNVTYARS1	R	1,523
NEWPORT	NEWPORT	Telephone Operating Company of Vermont LLC	NWPTVTSERS1	S	3,652
NORTHFIELD	NORTHFIELD	Northfield Telephone Company	NRFDTVXADS0	O	2,514
NORTON	NORTON	Telephone Operating Company of Vermont LLC	ISPNVTAL822	N	510
NORWICH	NORWICH	Telephone Operating Company of Vermont LLC	HNVRNHSCDS2	N	1,528
ORLEANS	ORLEANS	Telephone Operating Company of Vermont LLC	ORLNVTIIRS1	R	1,874
ORWELL	ORWELL	SHOREHAM Telephone, LLC	ORWLVTXARS1	O	741
PANTON	PANTON	Waitsfield – Fayston Telephone Co., Inc.	PNTNVTXARS1	O	629
PAWLET	PAWLET	Vermont Telephone Company	PWLTVTXARS1	O	804
PEACHAM	PEACHAM	FairPoint Vermont, Inc.	CABVTXADS6	V	463
PERKINSVILLE	PERKINSVILLE	Perkinsville Telephone Company, Inc.	PKVLVTXARS1	O	972
PITTSFIELD	PITTSFIELD	Telephone Operating Company of Vermont LLC	PTFDVTMARS1	R	606
PITTSFORD	PITTSFORD	Telephone Operating Company of Vermont LLC	PTFRVTYARS1	R	1,767
PLAINFIELD	PLAINFIELD	Telephone Operating Company of Vermont LLC	PLFDVTYARS1	R	860
POULTNEY	POULTNEY	Telephone Operating Company of Vermont LLC	PLTNVTBERS1	S	1,527
POWNAI	POWNAI	Telephone Operating Company of Vermont LLC	PWNLVTBERS1	R	1,332
PROCTOR	PROCTOR	Telephone Operating Company of Vermont LLC	PRCTVTPIRS1	S	757
PROCTORSVILLE	PROCTORSVILLE	Ludlow Telephone Company	PRVLVTXARS1	O	768
PUTNEY	PUTNEY	Telephone Operating Company of Vermont LLC	PTNYVTCHRS1	R	1,646
QUECHEE	WHITE RIVER JCT.	Telephone Operating Company of Vermont LLC	WRJVTGADS0	S	1,433
RANDOLPH	RANDOLPH	Telephone Operating Company of Vermont LLC	RNDHVTPLRS1	R	2,841
READING	READING	Telephone Operating Company of Vermont LLC	RDNGVTMIRS1	R	1,286
READSBORO	READSBORO	Telephone Operating Company of Vermont LLC	RDBOVTTURS1	R	467
RICHFORD	RICHFORD	Telephone Operating Company of Vermont LLC	RCFRVTINRS1	R	1,146
RICHMOND	RICHMOND	Waitsfield – Fayston Telephone Co., Inc.	RCMDVTXADS1	O	3,296
ROCHESTER	ROCHESTER	Telephone Operating Company of Vermont LLC	ROCHVTSPRS1	R	1,318
RUPERT	RUPERT	Telephone Operating Company of Vermont LLC	RPRTVTGRRS1	R	380
RUTLAND	RUTLAND	Telephone Operating Company of Vermont LLC	RTLDTVWEDS0	S	9,286
S. LONDONDERRY	S. LONDONDERRY	Telephone Operating Company of Vermont LLC	SLNDVTYARS1	R	2,739
S. ROYALTON	S. ROYALTON	Telephone Operating Company of Vermont LLC	SRYLVTYARS1	R	2,088
S. STRAFFORD	S. STRAFFORD	Telephone Operating Company of Vermont LLC	SSFRTVYARS1	R	547
SALISBURY	SALISBURY	Telephone Operating Company of Vermont LLC	SLBRVTBARS1	R	730
SAXTONS RIVER	SAXTONS RIVER	Vermont Telephone Company	SXRVTXARS1	O	955
SHELBURNE	BURLINGTON	Telephone Operating Company of Vermont LLC	SHLBVTPHRS1	S	3,027
SHERBURNE	SHERBURNE	Vermont Telephone Company	SHBNVTXARS1	O	1,168
SHOREHAM	SHOREHAM	SHOREHAM Telephone, LLC	SHHMVTXADS0	O	653
SPRINGFIELD	SPRINGFIELD	Vermont Telephone Company	SPFDVTXADS0	O	2,946
ST. ALBANS	ST. ALBANS	Telephone Operating Company of Vermont LLC	STALVTBARS1	S	8,174
ST. JOHNSBURY	ST. JOHNSBURY	Telephone Operating Company of Vermont LLC	STBYVTSMDS0	S	4,178
STAMFORD	STAMFORD	Telephone Operating Company of Vermont LLC	RDBOVTTURS1	N	451
STOWE	STOWE	Telephone Operating Company of Vermont LLC	STOWVTHIRS1	S	2,926
STRATTON	S. LONDONDERRY	Telephone Operating Company of Vermont LLC	SRTNVTARRS1	R	2,102

SWANTON	SWANTON	Telephone Operating Company of Vermont LLC	SWTNVTYORS1	R	4,146
THETFORD	THETFORD	Telephone Operating Company of Vermont LLC	LYMENHYARS2	N	925
TROY	TROY	Telephone Operating Company of Vermont LLC	TROYVTYARS1	R	1,158
TUNBRIDGE	TUNBRIDGE	Telephone Operating Company of Vermont LLC	TNBRVTYARS1	R	571
UNDERHILL	UNDERHILL	Telephone Operating Company of Vermont LLC	UNHLVTUCRS1	R	3,256
VERGENNES	VERGENNES	Telephone Operating Company of Vermont LLC	VRGSVTMORS1	R	2,062
W. BURKE	W. BURKE	Telephone Operating Company of Vermont LLC	WBURVTYARS1	R	1,745
W. RUTLAND	W. RUTLAND	Telephone Operating Company of Vermont LLC	WRTLVTBARS1	R	1,367
WAITSFIELD	WAITSFIELD	Waitsfield – Fayston Telephone Co., Inc.	WTFDVTXARS1	O	3,769
WALLINGFORD	WALLINGFORD	Vermont Telephone Company	WLFRTXADS0	O	1,076
WARDSBORO	WARDSBORO	Telephone Operating Company of Vermont LLC	WRBOVTYARS1	R	1,132
WASHINGTON	WASHINGTON	Telephone Operating Company of Vermont LLC	BARRVTELRS1	N	439
WATERBURY	WATERBURY	Telephone Operating Company of Vermont LLC	WTRBVTSWRS1	S	2,927
WEATHERSFIELD	WEATHERSFIELD	Telephone Operating Company of Vermont LLC	WNDSVTPIRS1	N	40
WELLS	WELLS	Telephone Operating Company of Vermont LLC	PLTNVTBERS1	N	1,180
WELLS RIVER	WELLS RIVER	Telephone Operating Company of Vermont LLC	WDVLNHJLRS1	N	293
WEST DOVER	WILMINGTON	Telephone Operating Company of Vermont LLC	WLMGVTDARS1	R	2,816
WEST NEWBURY	WEST NEWBURY	FairPoint Vermont, Inc.	CABVTXADS6	V	617
WESTMINSTER	WESTMINSTER	Telephone Operating Company of Vermont LLC	WLPLNHWP722	N	689
WEYBRIDGE	WEYBRIDGE	Waitsfield – Fayston Telephone Co., Inc.	WYBGVTXARS1	O	505
WHITE RIVER JCT.	WHITE RIVER JCT.	Telephone Operating Company of Vermont LLC	WRJVTGADS0	S	3,611
WHITING	WHITING	SHOREHAM Telephone, LLC	WHNGVTXARS1	O	347
WILLIAMSTOWN	WILLIAMSTOWN	Telephone Operating Company of Vermont LLC	WLTWVTLARS1	R	1,177
WILLIAMSVILLE	WILLIAMSVILLE	Telephone Operating Company of Vermont LLC	NWFNVTYARS1	N	798
WILMINGTON	WILMINGTON	Telephone Operating Company of Vermont LLC	WLMGVTDARS1	R	2,570
WINDSOR	WINDSOR	Telephone Operating Company of Vermont LLC	WNDSVTPIRS1	S	2,065
WINOOSKI	BURLINGTON	Telephone Operating Company of Vermont LLC	WNSKVTWARS1	U	3,036
WOODSTOCK	WOODSTOCK	Telephone Operating Company of Vermont LLC	WDSTVTGORS1	R	2,540
Total					295,065

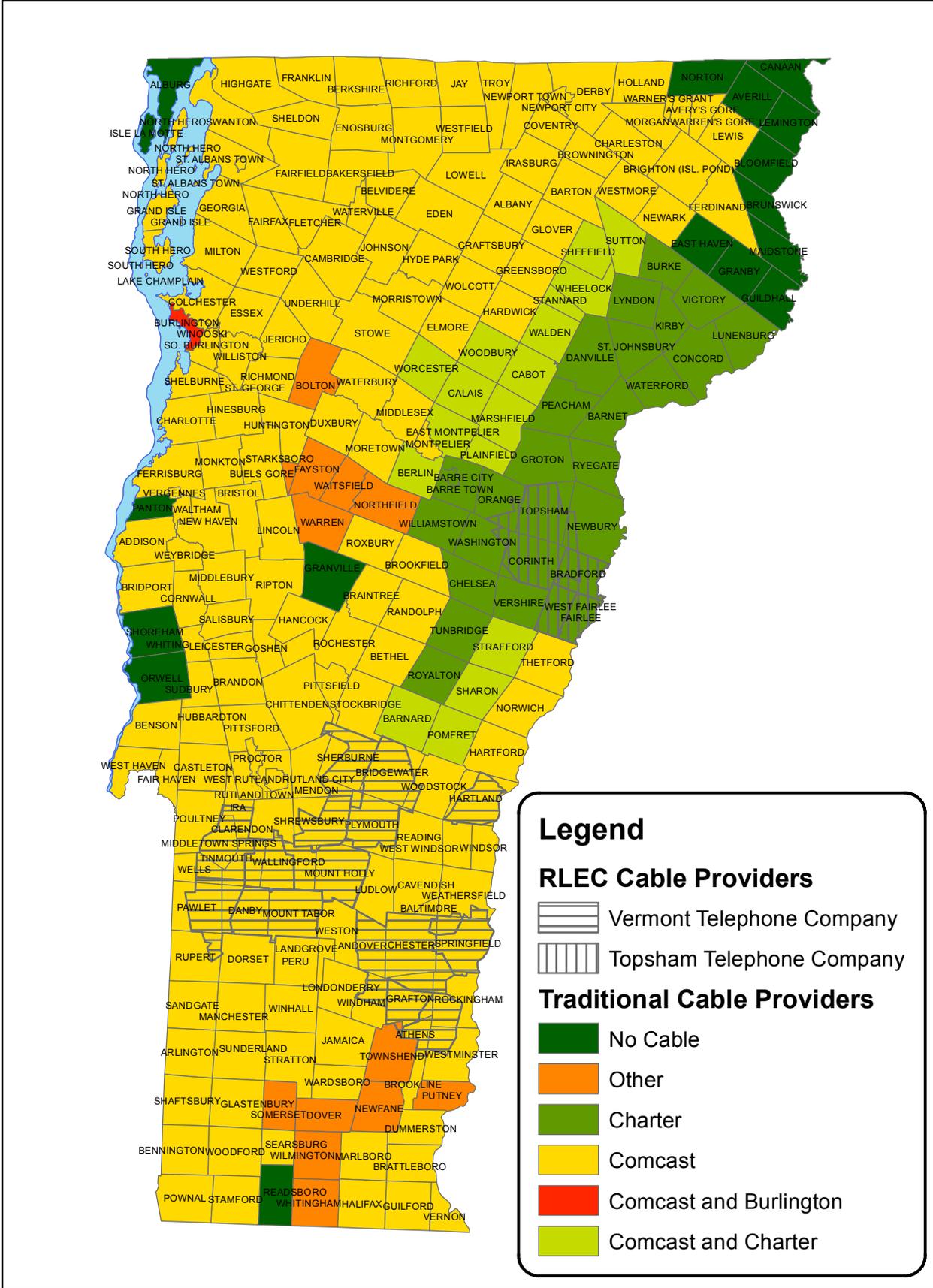
The CLLI column lists the Common Language Location Identifier code maintained by Telcordia.

The SGAT column lists the wire center loop density zone in FairPoint TOC Statement of Generally Available Terms section 5.5.1.2

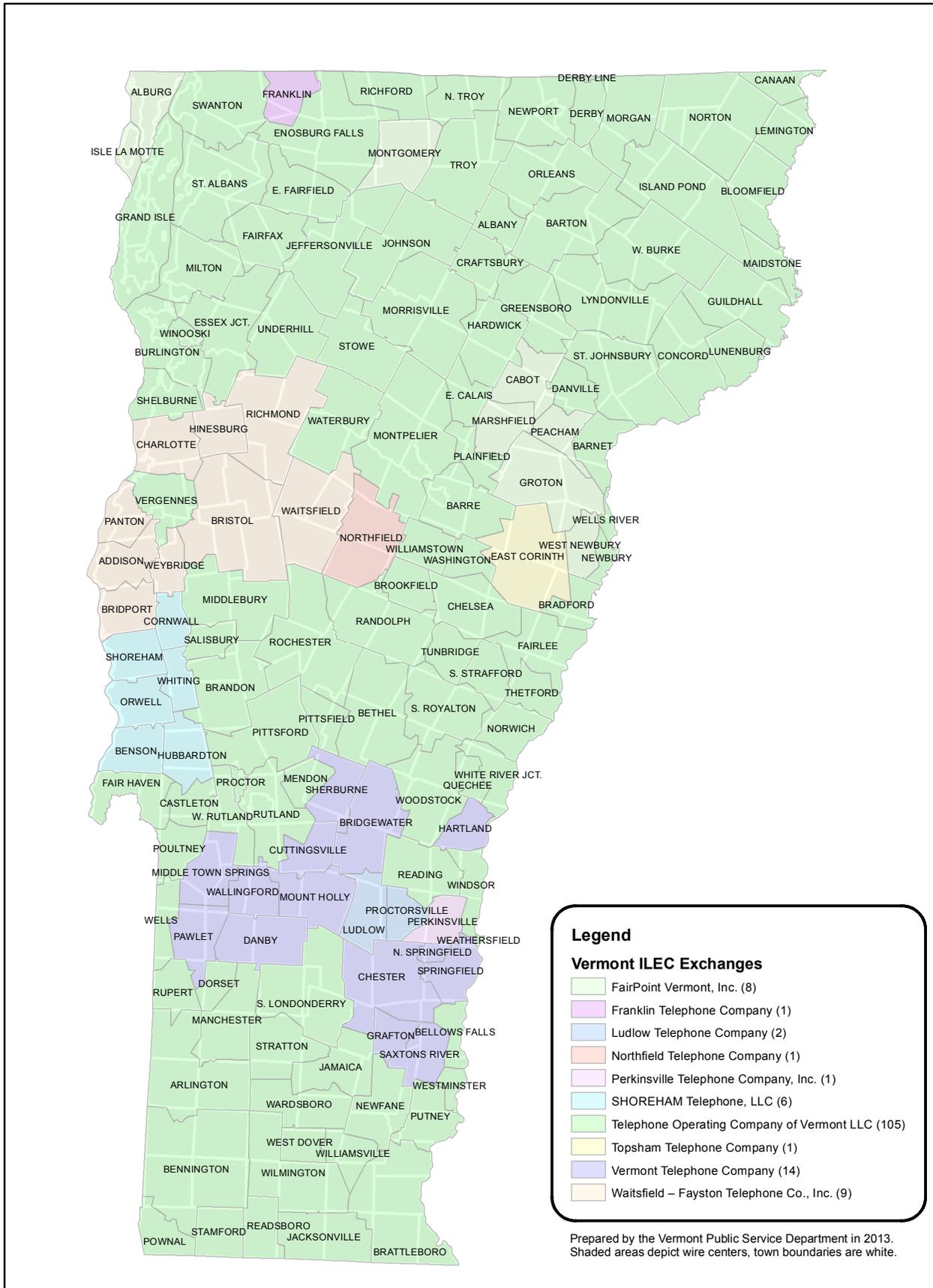
Type	Description
N	Not listed*
O	Not FairPoint
R	Rural
S	Suburban
U	Urban
V	FairPoint Vermont

* These wire centers are served by FairPoint TOC but are not listed in the Vermont SGAT.

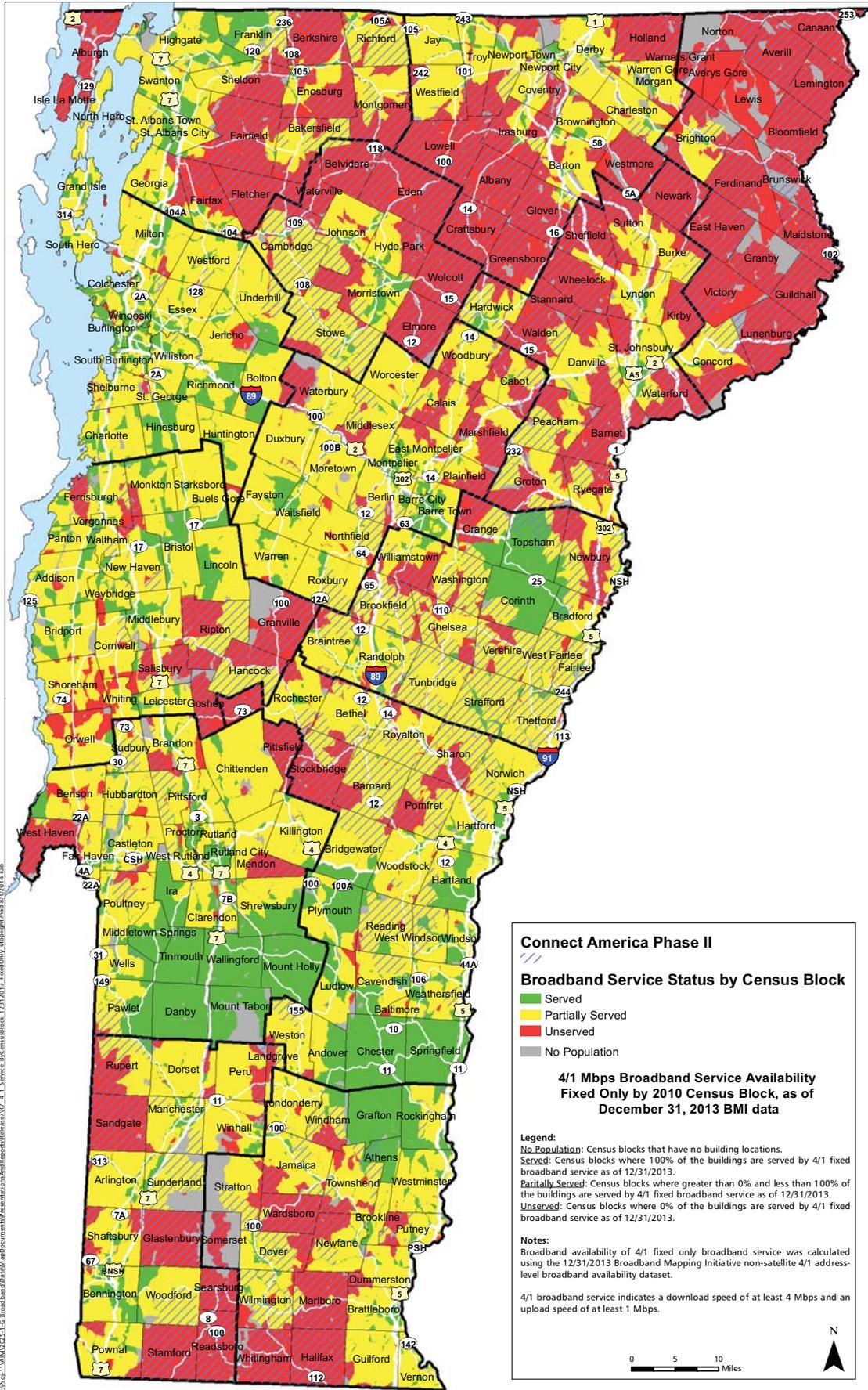
Vermont Cable Franchise Areas



Territories of Vermont Incumbent Telephone Companies



**4/1 Mbps Percent Broadband Availability With Fixed Only Service
Release 7**



Sources: This dataset was developed by Stone Environmental using the non-satellite 4/1 address level fixed only broadband availability dataset developed by the Broadband Mapping Initiative (BMI). The BMI, a collaboration of VCGI, the VT DPS, and the VTA, is funded through a SBDD grant from the NTIA. 2010 census blocks, US Census Bureau; Wire center boundaries, VCGI; Administrative boundaries, VCGI.