COMMONWEALTH of VIRGINIA
Wireless E-911 Services Board
FY2006 Annual Report

Prepared by the
Virginia Information Technologies Agency
Division of Public Safety Communications
October 1, 2006

COMMONWEALTH of VIRGINIA

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October 1, 2006

The Honorable Timothy M. Kaine
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The Honorable John H. Chichester
Chairman, Senate Finance Committee

The Honorable Vincent F. Callahan, Jr.
Chairman, House Appropriations Committee

The Honorable Kenneth W. Stolle
Chairman, Virginia State Crime Commission

Gentlemen:

As required by Section 56-484.14 of the *Code of Virginia*, the enclosed report provides a status on the implementation of the Wireless Enhanced Public Safety Telephone Service Act.

If you have any questions regarding this report, please contact me at (804) 343-9002, or Steve Marzolf, Public Safety Communications Coordinator, (804) 371-0015, e-mail: steve.Marzolf@vita.virginia.gov.

Sincerely,

Lemuel C. Stewart, Jr.
Chairman

Enclosure

c: The Honorable Aneesh P. Chopra
The Honorable John W. Marshall
The Honorable Leonard G. Cooke
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Executive Summary

The *Code of Virginia* (§56-484.14) requires the Wireless E-911 Services Board (the Board) to report annually to the Governor, the Senate Committee on Finance, the House Committee on Appropriations, and the Virginia State Crime Commission on the following:

(i) the state of enhanced wireless emergency telecommunications services in the Commonwealth,

(ii) the impact of, or need for, legislation affecting enhanced wireless emergency telecommunications services in the Commonwealth,

(iii) the need for changes in the Wireless E-911 funding mechanism as appropriate, and

(iv) the sufficiency of other moneys appropriated for the provision of enhanced wireline emergency telecommunications services only in those local jurisdictions not wireline capable as of July 1, 2000.

The state of enhanced wireless emergency telecommunications services in the Commonwealth

The Commonwealth has maintained its national leadership in the deployment of wireless E-911 services. Wireless enhanced 9-1-1 (E-911) Phase I service, where the caller's telephone number and the address of the cell site are provided to the public safety answering point (PSAP), is almost complete, with over 99% of all wireless subscribers now being provided the service. The few localities that are not completed are among the most rural Virginia localities and are aggressively working toward deployment. They are also many of the same localities still working to deploy wireline E-911.

The deployment of wireless E-911 Phase II, which provides the PSAP with the caller's actual location by longitude and latitude, is also nearing completion, due to the hard work and dedication of the PSAPs and telecommunications service providers. Phase II service is now available to 97% (up from 93% in FY2005) of wireless telephone service subscribers in the Commonwealth. The wireless service providers and all of the localities involved should be commended for their efforts to protect the public. While Phase II is not 100% accurate, the locations provided are typically within 50 to 300 meters, with some calls actually showing the caller's location within a matter of a few feet. It is not the same as wireline E-911, but it does provide the 9-1-1 call taker with a valuable tool to quickly locate a caller in need of emergency assistance, especially if the caller is unfamiliar with their location.

With the deployment of Phase II many of the wireless service providers opted for a handset-based Phase II solution, which uses a global positioning system (GPS) chip in the telephone to locate the caller. As more PSAPs and providers deploy Phase II service, focus has shifted to encouraging subscribers to replace their existing handset with one that has a GPS chip. The Federal Communications Commission (FCC) required that each provider choosing to use a handset solution have 95% of their customer base converted to the GPS-equipped handsets by December 31, 2005. Though all of the providers missed this target, Verizon Wireless announced they were the first major provider to meet this milestone on May 26, 2006. With most other providers between 90% and 95%, it shows that the vast majority of consumers have upgraded to the requisite handsets to take advantage of Phase II service.

The impact of, or need for, legislation affecting enhanced wireless emergency telecommunications services in the Commonwealth

Because of the changes passed by the General Assembly in Senate Bill 395 during the 2006 session, the Wireless E-911 Services Board is not recommending any legislative changes for the 2007 General Assembly Session.

The need for changes in the Wireless E-911 funding mechanism as appropriate

The Wireless E-911 Fund remains fiscally sound. With the legislative changes made during the last legislative session, the funding process has been substantially changed. Since the revised process, which utilizes a formula-based distribution methodology, is new for FY2006, it will take time to determine if future funding levels are adequate. However, projections indicate that the $0.75 surcharge is adequate to sustain historical funding levels to each locality. Additionally, the 2006 legislative changes added a grant program to assist the localities in most need, which may have had difficultly funding future equipment replacements under the old funding process.

It should be noted that the Appropriations Act for 2006-2008 continues the transfer of $3.7 million from the Wireless E-911 Fund to the Virginia State Police. However, by the end of FY2004, almost all local PSAPs were taking the wireless E-911 calls directly, thus removing the original justification for providing the funding to the State Police. Continuing the appropriation to the State Police after they are no longer taking the wireless 9-1-1 calls could jeopardize the eligibility of the Commonwealth and all of the localities for federal E-911 grant funding. While there is no federal appropriation to support this grant program yet, federal legislation passed in early 2006 earmarks $42 million from a radio spectrum auction for the program in the 2008 federal budget. If this transfer were to cease, the amount of funding provided to the localities would increase proportionally.

The sufficiency of other moneys appropriated for the provision of enhanced wireline emergency telecommunications services

The FY2002-2004 biennial budget includes a $9.8 million appropriation from the Wireless E-911 Fund to assist the 37 localities that did not have E-911 as of July 1, 2000 with the deployment of wireline E-911. This funding was allocated to each of the localities. At this time, no additional funding is required.

The following sections of the report provide a more detailed analysis of the current state of E-911 in the Commonwealth, exploring both wireless and wireline implementations.

Wireless Enhanced 9-1-1

Introduction

The number of wireless 9-1-1 calls has continued to grow rapidly since wireless service was introduced commercially in 1985 (Figure 1). Though the rate of growth has slowed in recent years, the number of wireless 9-1-1 calls has already reached or surpassed the number of wireline E-911 calls in many Virginia localities. Through the 1990's, a 9-1-1 call placed from a wireless telephone would simply be forwarded to a 10-digit telephone number that went to the local PSAP or to the State Police. Coming in on a 10-digit number meant that the location of the caller, call back number and other important data elements were not provided like they were for wireline E-911. This lack of an automatic location resulted in more time for the call taker to process the call or an inability to locate the caller at all. Several incidents were documented around the country that demonstrated the problems PSAPs were having locating a wireless 9-1-1 caller.

Year	Wireless 911 calls
1985	193,333
1986	649,659
1987	1,202,336
1988	2,382,855
1989	4,311,497
1990	5,914,653
1991	8,007,586
1992	12,641,470
1993	15,491,344
1994	17,910,620
1995	20,059,894
1996	21,659,967
1997	30,517,327
1998	35,805,405
1999	43,298,856
2000	51,104,214
2001	56,879,775
2002	64,330,447
2003	72,535,945
2004*	75,940,000
2005*	79,350,000
2006*	81,760,000

Source: CTIA

Figure 1 - Wireless 9-1-1 Calls (*-estimated)

To respond to this issue, in 1996, the FCC released an order requiring wireless service providers to implement enhanced features and location technology. The implementation was to occur in two phases. Phase I provided the PSAP with the caller's telephone number and the address of the cell site receiving the call along with the orientation of the antenna, if the antenna is directional. Phase II provided the PSAP with the actual location of the caller within a defined margin of error depending on the location technology used by the provider (Figure 2). According to the order, the wireless service provider had to implement Phase I within six months of a request from the PSAP. The timeline for Phase II was contingent on the location technology selected by the wireless service provider, network-based (triangulation) or handset-based (global positioning system – GPS).

Wireless E-911 Fund

The Wireless E-911 Fund is generated by a $0.75 monthly surcharge collected from each wireless customer whose place of primary use is in Virginia. One question the Board is asked annually is whether the surcharge rate should be adjusted. With the changes to the funding process made during the 2006 General Assembly Session, this question requires a different approach to answer than in previous reports. In the past, the funding required was based on the actual costs incurred by the PSAPs and wireless carriers. Determining sufficiency of the fund and appropriate surcharge required a projection of the expected costs that would be incurred during the fiscal year. With large fluctuations and disparity of the initial, non-recurring costs, accurate projections were often difficult.

The 2006 legislative change (described below) modified the funding process to distribute majority of the Wireless E-911 Fund based on a formula. As a result, sufficiency of the surcharge is less relevant except in two instances. First, thirty percent of the Wireless E-911 Fund is earmarked for

wireless service cost recovery. In recommending this change, the Board's intent was that this amount be sufficient to fund the known, on-going costs of the providers. Since the providers have historically only collected approximately 26% of the fund, projections of known provider costs indicate that this portion of the fund is sufficient within the current surcharge rate.

The second instance where the surcharge rate could have a potential impact is with PSAP funding. The localities have come to rely on the wireless E-911 funding source to operate and maintain their PSAPs. Any reduction to the overall funding would be detrimental to service delivery. The surcharge rate must be sufficient so that the distribution formula results in consistent funding to the locality. Historically, the PSAPs have received forty-eight percent of the Wireless Fund for recurring and operational costs. Since the new process distributes sixty percent of the fund to the PSAPs, the funding level is actually increased. This increase is in part to provide funding for equipment replacements and upgrades. Under the previous methodology, partial funding was provided for equipment replacements and upgrade in the year they were procured. This made projecting costs in any one fiscal year difficult. Though the new methodology provides greater predictability, it also requires greater fiscal planning by the locality to ensure the funding is available when needed. PSAPs will be eligible for additional assistance through the PSAP Wireless Grant Program, which was included in the 2006 legislative changes and is funded by the remaining ten percent of the Wireless Fund.

Phase II Error/Timing

Network based solution:

Accuracy

- 100 meters 67% of the time
- 300 meters 95% of the time

Timing

- Six months after request must implement 50% of network
- 100% of network within 18 months of request

Handset based solution:

Accuracy

- 50 meters 67% of the time
- 150 meters 95% of the time

Timing

- Must offer handsets with GPS capability by October 2001
- 25% of new handsets must be GPS capable by December 31, 2001
- 50% of new handsets must be GPS capable by June 30, 2002
- 100% of new handsets must be GPS capable by December 31, 2002
- 95% of all customers must be converted to GPS capable handsets by December 31, 2005

Figure 2 - FCC Phase II Requirements

In the FY2006 Annual Report, the Board expressed concern that some of the smallest PSAPs would not be able to afford to maintain their wireless E-911 technology under the old funding methodology. They made recommendations that would increase the funding available to those PSAPs. As a result, the amount of funding to the PSAPs will increase in FY2007. Whether the increases are sufficient and targeted well enough to address the issues raised by the Board in last year's report will be determine with greater experience. The Board will continue to monitor the situation and will make recommendations for changes in the future if they are warranted.

Ensuring an appropriate funding level using a formula-based methodology requires sufficient revenue to be generated. Revenue is difficult to project accurately. Even wireless industry experts have had trouble predicting the growth rate of wireless services. Though current industry subscriber growth rates may result in higher revenue projections, a more conservative estimate of revenue is appropriate, especially in light of the volatility in the telecommunications industry and the economy. The projected revenue for FY2007 and FY2008 is $42 million and $44 million, respectively. Each penny of surcharge generates approximately $520,000 of revenue annually. It is important to note that there are other draws on the Wireless E-911 Fund that reduce the amount of

funding available to the PSAPs and wireless service providers. The Division of Public Safety Communications (DPSC) and a portion of the Virginia Geographical Information Network (VGIN) Division are funded through Wireless E-911. Both the DPSC and VGIN programs directly support wireless E-911. Since this funding is contained in the Appropriation Act, it is subtracted before the distribution of funding based on the formulas thus evenly reducing the amount of funding across the three funding programs.

The current biennial budget also includes a $3.7 million appropriation to the State Police for wireless 9-1-1 call taking. This appropriation also reduces the amount of funding available to the PSAPs and wireless service providers. The wireless 9-1-1 calls are currently being transitioned from the State Police dispatch centers to the local PSAP. Only five (5) localities utilize the State Police for wireless 9-1-1 call taking and they will begin taking the calls directly when E-911 is deployed. Thus, the justification for the State Police receiving Wireless E-911 funding will no longer exist. Additionally, federal legislation was signed into law on December 23, 2004 that requires states, who apply for federal E-911 grant funding (or the PSAPs within the states), to certify that no E-911 funding was diverted to other areas. A state that has diverted funding shall be ineligible for federal funding for 18 months after the diversion. Though it is unclear if the State Police funding would be considered a diversion, the likelihood of it will increase when they no longer receive the calls.

Wireless Funding

The Wireless E-911 Services Board began providing funding to PSAPs and wireless service providers in FY2000. Since FY2000, the Board has approved the distribution of over $98.9 million to localities and over $33 million to the carriers. The amount of funding increased each year as more localities moved to implement the service and more deployments occurred (Figure 3). However, in the most recent fiscal years, the amount of funding has stabilized. As the costs have become more stable, the PSAPs have begun receiving a more constant funding level, which is primarily comprised of personnel funding. As a result, last year, the Board recommended a legislative change to implement a formula-based funding process for the PSAPs. This not only made the costs to the Board more predictable, but also reduced much of the bureaucratic paperwork required under the previous funding process. These changes were codified with the passage of Senate Bill 395 during the 2006 General Assembly session.

The new approach to funding splits the Wireless E-911 Fund into three parts. The first part is a sixty percent allocation to be distributed to the localities for PSAP operations. The distribution formula for this portion of the funding is based on the percentage of the PSAPs costs and call load to the total throughout the Commonwealth. Minimum costs and wireless call load percentages are applied to ensure that the smallest PSAPs in Virginia get a fair share of the funding. This funding is distributed to the PSAPs each month based on the wireless E-911 surcharge revenue collected in the previous month. The sixty percent allocation

FY	PSAPs	Localities Served	PSAP Funding	Wireless Provider Funding
2000	23	28	$4,316,115	$396,144
2001	40	51	$7,047,639	$1,862,736
2002	81	91	$13,930,840	$3,719,132
2003	125	133	$18,861,283	$5,288,230
2004	123	129	$16,015,454	$8,361,966
2005	125	134	$20,086,422	$8,106,850
2006	115	130	$18,680,037	$5,371,059
TOTAL			$98,937,790	$33,106,117

Figure 3 - Wireless E-911 Funding History

represents an overall increase of funding to the PSAPs since historically they have received approximately 46% of the fund for recurring costs. However, while this funding replaces the funding provided for recurring costs of wireless E-911, it may not cover the non-recurring costs such as equipment replacement. The projected increase in funding (the difference between 46% and 60%) will likely address these non-recurring costs (over the life cycle of the equipment) in larger localities, it will not in many smaller localities. As a result, the Board recommended the creation to the second partition of the Wireless E-911 Fund, the Wireless E-911 PSAP Grant Funding.

The Wireless E-911 PSAP Grant Funding utilizes a 10% allocation of the Wireless E-911 Fund and is intended to assist the localities with the most need. While the legislation provides the Board with great latitude in the adoption of grant guidelines, the grant focus will be on equipment upgrades and ensuring continuity of the wireless E-911 service into the future. The Board formed a grant committee to develop grant guidelines as soon as the legislation was approved to ensure that funding would be available to the localities as soon as possible. Logistically, it will not be possible for the Board to implement the full grant process until FY2008, but the Board will accept emergency grant requests in FY2007 to ensure that no locality loses funding during the transition from the old process to the new.

The grant guidelines, which were approved by the Board on July 12, 2006, were structured to have two categories for funding. The first category, termed Continuity Grants, will focus on maintaining the current services provided by the PSAPs. Continuity grants will receive at least 80% of the funding available in the grant program. Up to 20% of the available grant funding will be utilized for Enhancement Grants, which are the second category of grants. These will be focused on expanding services by looking toward the future of E-911 and helping the PSAPs prepare for it.

In addition to the 10% allocation of the Wireless E-911 Fund, the grant program will also receive the remaining funding from the final part of the Fund, CMRS Cost Recovery. Wireless service providers can seek cost recovery for direct and reasonable costs for the deployment and operation of the wireless E-911 network. Since 60% of the Wireless E-911 Fund is distributed to the localities and 10% is allocated for PSAP grants, 30% remains for this part of the Fund allocation. Any funding remaining in this part of the Fund at the end of the fiscal year will be transferred to the grant program. Any funding remaining in the grant program at the end of the fiscal year will be distributed to the localities in the same manner as the 60% part of the Fund; however, the Board may retain any or the entire amount if a specific need is identified in the next fiscal year.

Also of note during FY2005, the Board settled the claims against the Board made by two wireless service providers. Originally, the guidelines for Phase II funding were broad, allowing each provider to make a submission that would be evaluated on a case-by-case basis. After reviewing the first round of funding requests in FY2002 and FY2003, the CMRS Subcommittee identified an issue requiring a change to the funding guidelines to address a wide disparity in the funding requests. After great discussion, the Board decided to explicitly exclude the location measurement unit from funding in both the handset and network-based solutions. Had funding been provided for these devices the statewide deployment cost for Phase II would be increased by approximately $40 - $50 million. At the time of the decision, the Board received two requests (later merged into one) to reconsider its position. It should be noted that four wireless providers, Sprint PCS, Nextel, T-Mobile, and Triton/Suncom, indicated that they would not be seeking any cost recovery for Phase II. Their reasons were varied but include intent to market location technology services.

This was one of the reasons the Board did not provide funding for the location measurement units (their applicability to other applications other than E-911). During their review of the reconsideration request, the argument was made by the appealing carrier that if no other applications did exist for the location measurement unit then it should be considered an allowable expense by the Board. The Board offered to consider funding requests for location measurement units so long as the provider certified that they had no plans to use the units for any application other than E-911 and agreed to return the funding if any other application was deployed. Only two providers were interested in seeking funding. Both met with the CMRS subcommittee and worked out terms of a potential settlement. The Board then authorized the Board Chairman to enter into a settlement based on those terms. Finalization of the settlement agreements was achieved in FY2006 though one will not be signed or paid until FY2006 due to the approval process.

Phase I Project Status

To date, one hundred twenty-five (125) localities have implemented wireless E-911 Phase I (call back number and cell site location) with all of the wireless service providers serving the locality. Four more only have one more provider to implement (Figure 4). Analyzing this by the number of wireless subscribers in each locality, this means that over 99% of Virginia's wireless users now have Phase I service available to them from their wireless service provider and local PSAP. A total of 686 out of 711 (96.5%) Phase I deployments have been completed as of June 30, 2005. Only 15 more deployments in 9 localities must be completed.

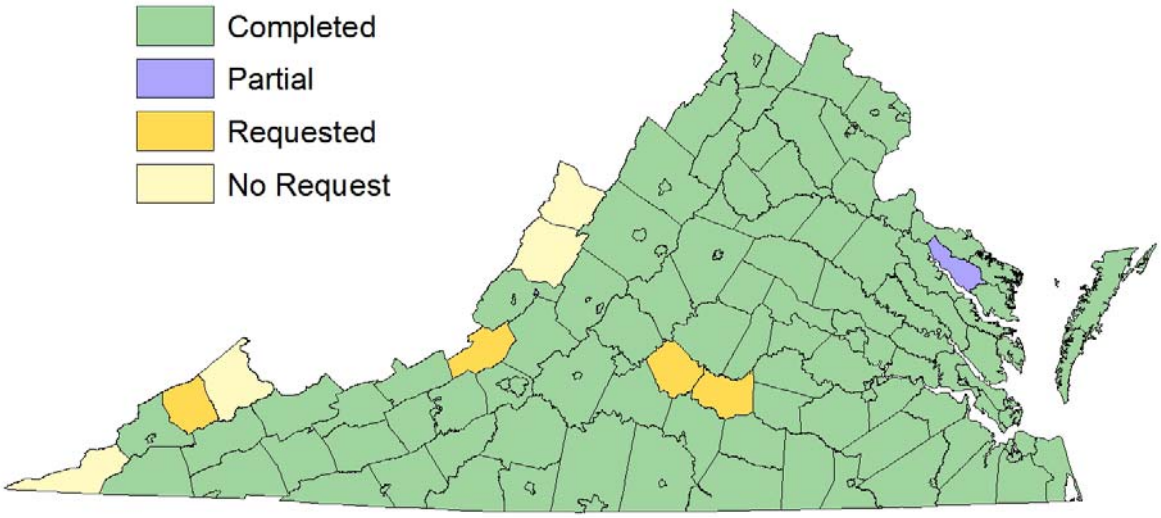

Figure 4 - Wireless E-911 Phase I Status

The remaining deployments are in localities still working to complete deployment of wireline E-911. It is interesting to note that many of these localities will be able to deploy wireless E-911 Phase I and II prior to the deployment of wireline E-911. As soon as the E-911 network and call answering equipment is in the PSAP, wireless E-911 calls can be routed to the PSAP with Phase I and II information. Several localities, including most recently Russell and Scott County, chosen to implement wireless E-911 first to speed delivery of this life saving service. In fact, both have deployed wireless E-911 Phase II service.

Phase II Project Status

The strong push to complete wireless E-911 Phase II deployment continued in FY2006. To date, a total of 612 Phase II deployments out of 711 have been completed, up from 555 last year (Figure 6). Just over 97% of all wireless subscribers now have access to the Phase II technology. Though the original FCC order required deployment to begin by October 1, 2001, every major wireless service provider sought and received a waiver of that requirement from the FCC. The waivers granted each

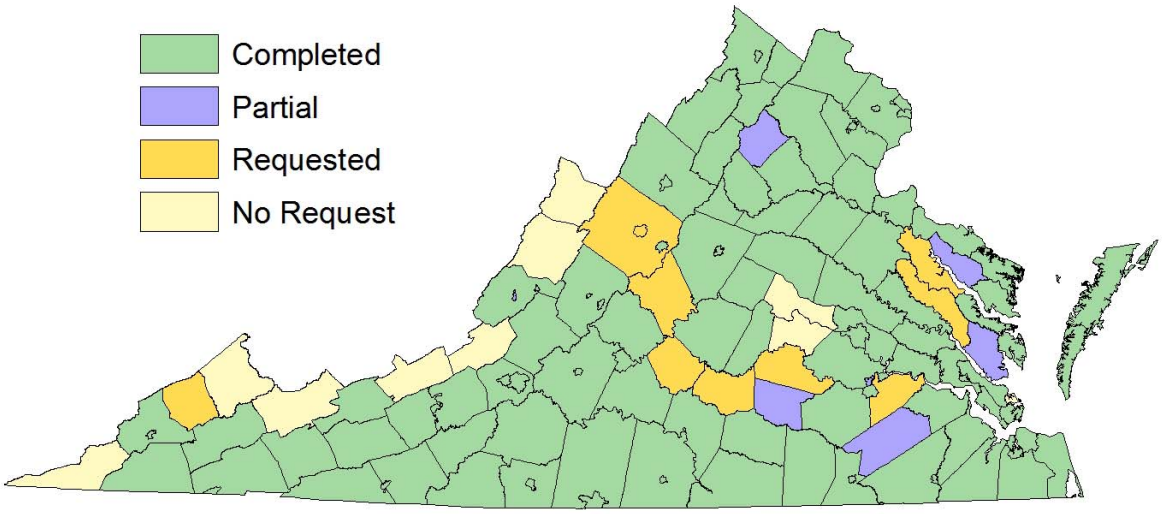

Figure 6 - Wireless E-911 Phase II Status

provider an extension of time but did not relax the accuracy requirement nor extended the ultimate completion date for implementation, which was December 31, 2005 for 95% of all subscribers to have location equipped handsets. Unfortunately, none of the carriers met this deadline. In May 2006, Verizon Wireless was the first (and to date only) wireless provider to meet the 95% threshold. However, this is less an issue of wireless carrier performance than it is about customer choice. All of the actions of the FCC, Wireless E-911 Services Board and wireless providers rely on the wireless subscriber purchasing the equipped handsets (for providers using the handset-based solution). Though many of the wireless providers have fallen short of the 95% requirement established by the FCC, all indications are that the wireless providers are close to the goal, which requires the subscriber to want to upgrade their handset.

Figure 5 shows a map of downtown Richmond near the Capital. The flag represents a caller at the corner of 9th Street and Broad Street, in front of the General Assembly Office Building. The blue circle shows a 750-meter radius area, which is the possible error for some of the safety-net solutions. The circle extends from 1st Street to Shockoe Bottom and from the Interstate 95 and 64 interchange to the James River. Though much more helpful in rural areas, in urban areas it is less beneficial. The green circle represents a 300-meter radius area, which is the largest allowable error under the FCC order (for a network-based solution). Again, very helpful in a rural area, better in an urban area, but still it encompasses about six square

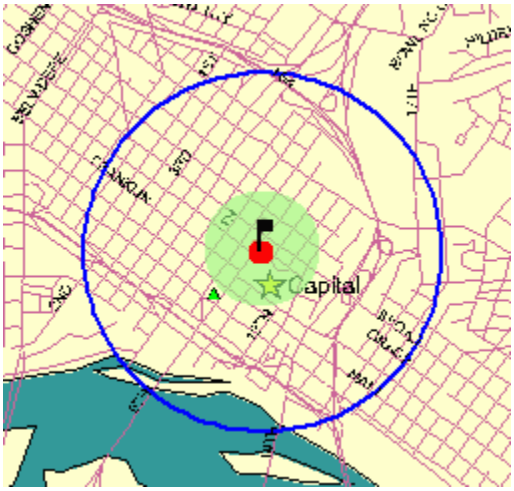

Figure 5 – Varied Accuracy Levels

blocks. The red circle is a 50-meter radius area. This level of accuracy, required for all handset based solutions (67% of the time), will get the responder within a block; however, even this will not provide elevation, so responders will not know which floor of the GAB the caller is on. Of course, searching one building is much better than searching six square blocks or more.

Wireless service providers are required to provide the Board with monthly status reports, which are posted on the DPSC website. These reports have been mapped to provide a visual status for each provider for Phase I & II (Appendix E). The "Requested" status means that the PSAP has requested service and that it has not yet been installed, but it does not necessarily mean that the project is behind schedule.

Wireless Responsibility

Section 56-484.16 of the *Code of Virginia* makes clear the General Assembly's intent that wireless 911 calls be answered by the PSAP local where the call is initiated instead of by the State Police. The *Code* required that by July 1, 2003, all localities be directly taking the wireless 911 calls made within their jurisdiction. Rather than just taking the call as required by Code, many localities have opted to deploy Phase I instead. As a result, the success with Phase I deployment translates into success with moving the calls from the State Police to the local PSAP.

At the close of FY2003, 19 localities were still directing their wireless 9-1-1 calls through the State Police. At the close of FY2005, that number had been reduced to 5 localities (Figure 7). All five plan to complete deployment of wireline E-911 prior to proceeding with wireless.

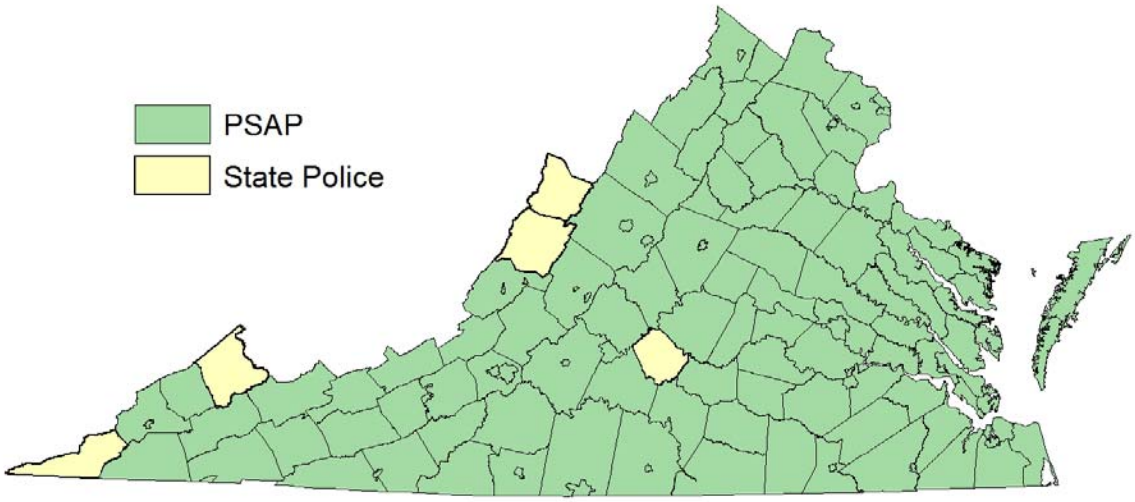

Figure 7 - Responsibility for Wireless 9-1-1

Need for Legislative Change Affecting Wireless E-911

One issue that the Board is directed to address in this report is the need for legislative changes affecting wireless E-911. Since the Board performed a very comprehensive review in preparation for last year's report and all of those changes (outlined above) were accepted by the General Assembly and Governor, the Board is not proposing any legislative changes for the 2007 General Assembly session. The text from that report supporting those changes and articulating the vision for the future of E-911 is available in Appendix C of this report.

Wireline Enhanced 9-1-1

Wireline E-911 Project Status

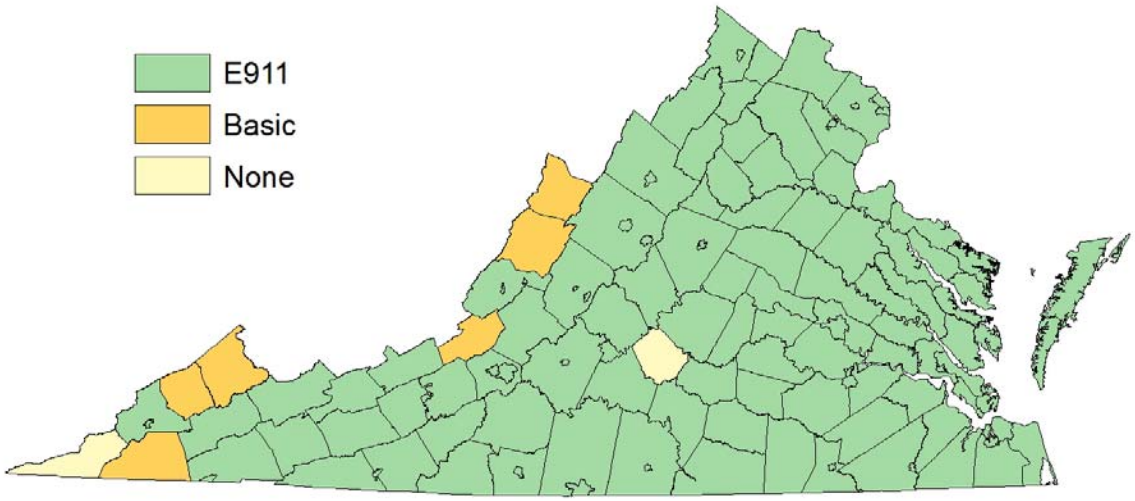

Figure 8 – Wireline E-911 Deployment Status

The number of localities to complete wireline E-911 deployment (Figure 8) in FY2006 belies the large amount of effort and resources put towards deployment. Though only two more localities deployed wireline E-911 during the last year, great progress has been made with all of the projects. Originally, 37 jurisdictions were eligible for funding, because they had not fully deployed E-911 as of July 1, 2000. All, but eight (8), of those original localities have deployed E-911 Service (Figure 9). Many jurisdictions have finished all of the onsite work and are waiting on the U.S. Postal Service to verify and process the addressing changes, which has been a significant delaying factor for many of these remaining projects.

A detailed update for each locality still needing to implement wireline E-911 is available in Appendix D.

Accomack County	Highland County
Alleghany County	King & Queen County
Amherst County	King William County
Appomattox County	Lee County
Augusta County	Lunenburg County
Bath County	Madison County
Bedford	Mathews County
Bedford County	Middlesex County
Bland County	Nelson County
Buchanan County	Northampton County
Buckingham County	Norton
Campbell County	Prince Edward County
Clarke County	Pulaski County
Covington	Russell County
Craig County	Scott County
Cumberland County	Tazewell County
Dickenson County	Westmoreland County
Essex County	Wise County
Fluvanna County	
Legend	
	= Currently E-9111
	= Basic 9-1-1
	= No 9-1-1

Figure 9 - Localities without E-911

Wireline E-911 Funding

A total of $9.8 million was appropriated from the Wireless E-911 Fund to assist localities with the deployment of wireline E-911. The entire amount has been encumbered for wireline projects. The Board approved funding for all 37 jurisdictions that were not wireline E-911 as of July 1, 2000. To date, those jurisdictions have received $7.4 million in wireline payments from the Board. Payments are made to localities when they can provide the Board with signed contracts or firm price quotations. Recipients of wireline funding are subject to the same audit process as recipients of wireless funding.

The remaining localities that are not currently wireline E-911, did not implement by the July 1, 2003 deadline established in *Code*. The Board has the authority to grant extension of time and has already done so for the eight localities needing to complete deployment. Though the original project plans showed completion of these projects by the end of FY2006, unexpected delays with the U.S. Postal Service has pushed some projects to a December 31, 2006 completion date.

The process for implementation of enhanced 9-1-1 can be broken down into two broad processes, (1) the mapping and addressing process and (2) the network and equipment process. During the mapping and addressing process, the locality, by itself or with a vendor, identifies and names all of the streets and structures in the locality, assigns a street address to each structure in the locality and posts a street sign at each intersection. Often the jurisdiction will hire one vendor to perform the entire mapping and address process with the exception of the street naming, which is the responsibility of the locality. The result of this process is a list of the old addresses matched with the new addresses and the occupant's name and telephone number. The total cost for this process can range from $135,000 to $450,000 depending on the size of the jurisdiction. A portion of this cost was saved due to the Virginia Base Mapping Initiative supplying digital orthographic photography to the localities. The Board is requiring all localities that still need to map and address to use the VGIN supplied data.

The second process is the network and equipment implementation. The local telephone company provides the network components, which are basically the telephone lines needed to complete the 9-1-1 call from the caller to the PSAP. The local telephone company often, but not always, provides the enhanced 9-1-1 telephone equipment as well. This includes the equipment to answer the call, request the location information and display the information to the call taker. The cost for the network is $2,100 to $7,500 per 1,000 telephone access lines in the jurisdiction. In addition, the equipment will cost approximately $150,000 for a two-position PSAP. No statewide contracts exist for this equipment so each locality must conduct their own procurement.

Under the wireline E-911 grant guidelines, the following costs are considered allowable: mapping; addressing; street signage; customer premise equipment (PSAP telephone equipment); and network costs. Specifically not eligible for funding under the wireline E-911 grant guidelines are: voice logging equipment; computer-aided dispatch systems; buildings and furnishings; and radio systems.

Conclusion

The Wireless E-911 Services Board continues to be effective in their role of promoting and assisting with wireless E-911 deployment. As a result, Virginia continues to be a nationally recognized leader in E-911. With the changes made in 2005 and 2006, no legislative changes are being proposed for wireless E-911 for the 2007 General Assembly session.

The implementation of wireless enhanced 9-1-1 is nearing completion. Over 99% of all wireless telephone service subscribers now have Phase I service, which provides the caller's telephone number and the address of the cell site processing the call. Approximately 97% have access to Phase II service, which provides the longitude and latitude of the caller. Though many will need to upgrade their telephone handsets to take advantage of the Phase II service, the infrastructure is in place at the PSAP and within the wireless network to process the call. A total of 107 localities have now completed deployment of Phase II with all of the wireless service providers in their area (up from 79 at the end of FY2005).

The Appropriations Act for the 2006-2008 biennium continues the transfer of $3.7 million to the Virginia State Police. If this appropriation is not eliminated, it may impact the ability of the Commonwealth and its localities to received future federal grants for E-911.

The implementation of statewide wireline enhanced 9-1-1 has also progressed. All of the $9.8 million appropriated during the 2002 General Assembly session from the Wireless E-911 Fund has been allocated for wireline E-911 grants to localities. Though some of the localities did not implement E-911 by the July 1, 2003 deadline established in *Code*, all are working toward full deployment of their E-911 system.

With the 2006 legislative changes, the Commonwealth of Virginia has positioned itself for the new and coming challenges to the E-911 system. The successful partnership between the Board, PSAPs and telecommunications industry established during the wireless E-911 program can now be leveraged to support the future of E-911 as well. It will take the hard work and dedication of all involved to prepare for these future challenges. Some of which, like Voice over Internet Protocol (VoIP), are already before us. The first step will be the development of a comprehensive plan, which the Board will undertake in the coming year.

Appendix A - Legislative History

In 1998, the General Assembly passed legislation that established a $0.75 surcharge on wireless telephone service and created the Board to administer the funds. The original Board consisted of seven members, three from local government, three from the telecommunications industry and the Comptroller of Virginia, who chaired the Board. The Board was a separate political subdivision and did not have any staff support within the state government. In spite of this, the Board began distributing funding to localities and wireless service providers in FY2000, providing over $4 million for the provision of wireless E-911.

During the 2000 Session, the General Assembly enacted omnibus legislation (Senate Bill 148) to enhance the delivery of public safety services to citizens of the Commonwealth through improvements to emergency telecommunications systems. First, the legislation established 9-1-1 as the only emergency number for use in the Commonwealth and dates by which localities must implement wireline E-911 and wireless 911. It also expanded the Wireless E-911 Services Board both in size and in scope. The Board increased to fourteen members, adding representatives for the police chiefs, fire chiefs, EMS chiefs, sheriffs, State Police, and emergency management. The scope of the Board was expanded to include the disbursement of funding for the implementation of wireline enhanced 911 and policy-making authority for issues relating to wireless 911. To provide staff support the Division of Public Safety Communications (DPSC) was created within the Department of Technology Planning, which was merged into VITA in 2003.

In 2001, two pieces of legislation passed impacting 911. The first revised several definitions in the legislation including one change to specifically include resellers of wireless service in the requirement for surcharge collection. The other bill (HB1611) excluded localities with no local wireline E-911 surcharge and less than 50% wireless telephone service coverage from having to implement wireline and wireless E-911. While this bill originally was intended to exempt Bath, Highland and Craig Counties, Lee County believed they qualified for the exemption and thus need not implement E-911. This is significant since Lee was the only one of the four localities that did not even have Basic 911.

During the 2002 General Assembly session, only one legislative change that impacted E-911 was enacted. The change, which modified several definitions relating to the wireless surcharge, was necessary to keep the wireless E-911 legislation (and other legislation with mobile telecommunications taxation) in compliance with the federal Mobile Telecommunications Sourcing Act of 2000.

The 2003 General Assembly brought only one legislative change. Language was added to the surcharge statute to provide prepaid wireless carriers, who do not bill their customers on a monthly basis, with options concerning how the surcharge could be collected from customers. Previously, only seven out of ten major wireless service providers offering prepaid service collected the surcharge. The other three major providers and a number of other small resellers were not collecting the surcharge, believing that the legislation was ambiguous. The change clarified to all wireless service providers and resellers, including those providing prepaid services, that they were required to collect the surcharge. The change was projected to result in increased revenue in the amount of $1.1 million per year.

During a review of another issue, the Attorney General's Office (AGO) discovered a problem that required resolution during the 2004 General Assembly session. At the request of several wireless service providers, the Board had been making quarterly payment to the providers based on actual costs incurred during that quarter. However, the Code section required the Board to make four equal quarterly payments based on the estimated costs submitted by the provider. Unfortunately, the estimates submitted were often found to greatly exceed the amount actually expended during a fiscal year. Additionally, receiving payments without an associated invoice did not work well for the providers either. To avoid these problems, the Board honored the request of several providers to switch to paying on actual costs incurred not realizing the existing legislative requirement. When the problem was identified by the AGO, legislation was drafted and ultimately passed by the General Assembly to allow the Board discretion in the timing of payments to providers and PSAPs.

At the request of the Board, during the 2005 session, Senate Bill 1159 was introduced to address several issues identified in last year's annual report. These issues included:

- A possible constitutional conflict allowing the Board to incur a debt upon the Commonwealth;
- Providing an explicit exemption from the wireless E-911 surcharge for federal, state and local government agencies;
- Removal of the exemption from E-911 deployment since no locality was using it;
- Adding a third methodology for the collection of the wireless E-911 surcharge from prepaid wireless service;
- Permitting the Board to establish the schedule for the year-end audit of funding to more realistically reflect what is actually achievable;
- Establishing a deadline for late funding submission after which they will not be considered by the Board;

- Clarifying the appeals process for Board decisions on funding; and

- Giving the Board the responsibility to develop a statewide electronic addressing database.

Appendix B – Brief History of E-911

To better understand where E-911 is headed into the future, it is important to have a brief understanding of where it has been. Lessons can be learned from our historical experiences deploying Basic 911, E-911 and wireless E-911 services.

A single telephone number for reporting fire emergencies was first proposed by the National Association of Fire Chiefs in 1957, but it took over 10 years before the first 911 call was to be made. Though the first official 9-1-1 call was made on February 16, 1968 in Haleyville, Alabama, the first 911 call in Virginia was placed in Prince William County at about the same time[1]. Initially, the provision of 911 was just to complete the call to the closest public safety answering point (PSAP). This "Basic 911" service did not provide any information about the caller or their location. The primary advantage to this level of service was that the caller did not have to look up the seven-digit telephone number for the local police or fire department, which previously varied from locality to locality and often service to service. Since most people did not memorize these telephone numbers or were only visiting an area, minutes could be spent finding the number or calling directory assistance.

While "Basic 911" was a great advance to speed the reporting of emergencies, it did not provide any advantage to call processing once the call was connected. In 1980, AT&T developed the concept of an enhanced 911 service that would provide subscriber information to the call taker. Specifically, the three components of this enhanced service were:

1. selective routing, which allowed the 911 switch to route a call to the correct PSAP based on phone number rather than based on the central office that was serving the area;

2. the phone number, called the ANI (automatic number identification), which was passed to identify where the call was coming from; and

3. the location, called the ALI (automatic location identification), which included not only the street address where the telephone service was provided, but also the subscriber's or company's name and other basic information.

This enhanced service was first implemented in Arlington County in 1983, but one impediment to broad deployment was the high cost of the technology required. Recognizing the importance and life-saving potential of E-911, the General Assembly passed Virginia's first 9-1-1 legislation in the early 1980's to allow counties, cities and towns to impose a local surcharge on each telephone line to fund the technology. There was initially no cap on the amount of the surcharge, but the use of the funding was limited to the equipment and deployment costs. Additionally, there was actually a requirement to lower the surcharge after capital costs had been recovered by the locality.

[1] According to Selby Jacobs, Prince William County's first Fire Chief, their first 9-1-1 call was in late 1967, but no documented proof is available.

In about 1985, a new service emerged that would forever change the face of E-911, wireless or cellular telephone service. Unfortunately, at the time, no one really recognized the potential impact or the incredible growth rate this new "luxury" would generate. The original growth projections for wireless service were that there would be about 9 million subscribers by 2000. There were actually 140 million subscribers by that year. In most of Virginia, with only a few exceptions, wireless 9-1-1 calls were routed to the Virginia State Police and not to the local PSAPs. This made sense at the time because most people believed that wireless telephones were going to be used on major highways by travelers and business people and the State Police have primary responsibility for incidents at these locations.

In 1993, the General Assembly modified the E-911 surcharge legislation to expand the use of the special fund by allowing salaries of call takers and dispatchers to be paid from the surcharge revenue. This change was not made in response to any particular innovation in the delivery of E-911 service, but rather reflected the fiscally challenging times and the desire to shift more of the cost of the PSAP from local general funds to E-911 surcharge revenue. Still there was no cap on the amount of the surcharge that could be imposed.

In 1996, the FCC released their first report and order on E-911 for wireless telephone service. They had been considering the issue since 1994, but in 1996, a coalition of wireless industry and public safety representatives reached a consensus agreement on how wireless E-911 should be deployed. This consensus was the basis for the FCC's first order, which required the wireless carriers to deploy location technologies. It is important to recognize that at that time no location technologies existed. Discussions of accuracy requirements and timelines for deployment were based on theoretical models and not actual field trials. The philosophy seemed to be, "if you require it, solutions will come."

At about this same time, the Virginia State Police began recognizing the impact of wireless E911 on their dispatch centers. The call load was increasing exponentially, but the increases were not from calls on the interstate as originally anticipated. More and more the calls were coming from local streets in cities and towns, and even from inside buildings and homes. While many were reporting vehicle accidents, the types of calls received began to include medical situations as well as fires.

In 1998, wireless industry representatives put forward a legislative proposal to establish a statewide wireless E-911 surcharge to provide cost recovery to carriers and PSAPs for the implementation of the FCC requirement. Several localities, recognizing the burden that the increased call load would place on their PSAPs, opposed taking the wireless 9-1-1 calls. Instead, they proposed a study be conducted to determine the most appropriate handling of the calls. Not wanting to delay the localities that wanted to deploy wireless E-911, such as those in Northern Virginia, but recognizing that additional study of the issue was necessary, the General Assembly passed two pieces of legislation: one that created the first Wireless E-911 Services Board, chaired by the Comptroller, to administer a statewide $0.75 wireless E-911 surcharge; and one establishing a two-year study of E-911 to be conducted by the Crime Commission.

Because Virginia pioneered wireless E-911 legislation, the original legislation that established the Wireless E-911 Services Board had some fundamental flaws. One example was the appointment of the Comptroller as the chairman of the Board. The legislation also established that only the chairman of the Board could review funding requests from the wireless carriers due the proprietary

information they contained; however, the Comptroller did not have the technical background to evaluate these funding requests. The original Board also had no staff support, which meant all of the work had to be performed either by the Comptroller or Board members. Fortunately, since the Crime Commission study lasted two years, 1998 to 2000, the Commission was also able to evaluate the first year of the Board's operation and make recommendations for improvements in addition to the other areas they were tasked with reviewing.

The Crime Commission study resulted in Senate Bill 148 in the 2000 General Assembly Session. The Bill reconstituted the Wireless E-911 Services Board expanding its membership from 7 to 14. This expansion of membership was originally included in the Bill because the introduced version expanded the Board's responsibility to all E-911 (wireline and wireless) funding and policy issues. Since the bill would have repealed the local wireline E-911 surcharge and replaced it with a $0.75 statewide surcharge administered by the Board, this part of the proposed legislation was opposed by many localities. In the end, the legislation was amended to leave the local wireline surcharge in place; however, the membership of the Board was left at 14 members. The chairmanship of the Board was shifted from the Comptroller, who remained a member of the Board, to the Director of the Department of Technology Planning (DTP), now the Chief Information Officer with the formation of VITA. A subcommittee of the Board was also established to review wireless carrier funding requests, at the same time exempting these meetings and records from the open meetings and Freedom of Information Act requirements.

In addition to reforming the Board, the legislation created the Division of Public Safety Communications in DTP (now part of VITA). The Division was to provide staff support for the activities of the Board and to promote the deployment of E-911 more broadly. The Division was comprised of four positions including a Coordinator, two Analysts and an Administrative Assistant.

Though the Crime Commission study only identified 14 localities without wireline E-911, a more detailed review by the Division found that there were actually 37 localities that did not have wireline E-911 as of July 1, 2000. The Appropriations Act approved in 2000, authorized the Board to use $1.4 million of wireless E-911 funding (increased in 2002 to $9.8 million) to provide grant funding to those 37 localities to deploy wireline E-911.

Despite the fact that wireless E-911 funding had been available at this point for two years, very few PSAPs had deployed wireless E-911. Initial delays with deployments were caused by the pace of technology advances, pending regulatory reconsiderations and a general lack of cooperation among the stakeholders. However, once deployments began in earnest in late 2000 and into 2001, Virginia became a national leader not only with Phase I service, but also Phase II service. In fact, Virginia's Wireless E-911 program was recognized in 2004 by the National Association of State Chief Information Officers for excellence in the category of telecommunications infrastructure.

Appendix C - Future Vision for E-911

Current Situation

Though the status of wireline and wireless E-911 deployment is provided elsewhere in this report, it is worthwhile to note here that Virginia has maintained its national leadership with regards to E-911. Specifically, very few states of Virginia's size have had our level of success with the deployment of wireless E-911. The success is due in large part to the professional commitment and

tireless efforts of the Wireless E-911 Services Board, local PSAPs and telecommunications service providers (wireline and wireless) and the support of the Governor and General Assembly. The current atmosphere of cooperation and teamwork will ensure that the citizens of the Commonwealth are protected by the best service and technology available.

However, new challenges threaten to undermine the success of the E-911 system, and the current system architecture will prevent the E-911 system from being able to meet those challenges. The E-911 network was designed for wireline E-911 system. Unfortunately, the design has changed little since its introduction in the early 1980's, which was based on 1970's analog technology. This means the current E-911 system handles voice very reliably, but can only handle a very small amount of data. While this was adequate for the wired world of the 80's and 90's, wireline telephone service is now declining. Several PSAPs have reported declines of wireline access lines of 5-15% in the last year.

That is significant not only because the means of accessing 9-1-1 is changing, but also because the majority of funding for most PSAPs comes from the local wireline E-911 surcharge. Though the wireless E-911 fund revenue is increasing, the wireless funding to the PSAPs is not able to cover the shortfall because the allowable uses of the funding are different and the surcharge rate is lower. The wireline funding is used to fund more of the daily operations of the PSAPs whereas the wireless funding is specifically only for those direct costs incurred in the deployment and continued operation of wireless E-911. The Board's authority is currently limited to the funding of wireless and providing assistance for wireless E-911 only.

Many citizens are converting their telephone service to wireless or other newer technologies. Many, especially younger people, are not getting wireline service at all, opting instead for the more mobile wireless service or cheaper VoIP service. As reliability of these services increases, more and more people will be adopting them as their only telephone service. This shift has had a dramatic impact on Virginia's PSAPs.

The current shift towards wireless service in lieu of wireline is being faced in Virginia and across the nation. It has occurred as an evolution of regulatory and technological influences over a long period of time. As an example, the current E-911 network is based on the local telephone area, called a Local Access and Transport Area (LATA), or rate center. This design made sense because of past regulatory influences. Regulations of the time required that telephone lines or trunks across LATA boundaries had to be provided by long distance carriers, which cost significantly more than trunks within the LATA. As a result, it was most cost-effective to put in a separate E-911 network for each LATA.

Because of the large investments that had been made in the existing E-911 networks, when wireless E-911 emerged, no one was interested in replacing or significantly modifying the system. Instead, the solutions for deploying wireless E-911 shoehorned the service into the existing wireline E-911 system, designed in the early 1980s. While this was at times a technically complex challenge, it has been successfully completed as what is essentially an overlay to the existing network. However, with the advent of new telecommunications services such as VoIP, it is becoming increasingly difficult to shoehorn 21st century technologies into a 20th century infrastructure. It also does not make sense to deal with each new telecommunications service as a separate overlay to the existing network.

System Issues/Gap Analysis

Existing Architecture

One of the biggest issues is the existing architecture, which has performed very well. The E-911 system, with few exceptions, is one of the most reliable and trusted citizen services in the Commonwealth and the nation. When people have an emergency, they do not think twice about picking up the phone and dialing 911, and that is to the credit of the PSAP community and telecommunications service providers. Unfortunately, there isn't just one E-911 system in the nation or in even Virginia. Virginia alone has nine independent networks. With seven LATAs in Virginia, there are seven Verizon networks, and two Sprint networks. Right now, each is totally independent of the others, which means there is no interconnection between them. In practical terms this means that if a 9-1-1 call is received in New Kent County on Interstate 64, but the call is really occurring in James City County, the call cannot be transferred from the one County to the other through the E-911 network because they are two different 911 networks. When the call taker presses the one-button transfer, it goes to James City County on a 10-digit number through the public telephone network. James City County receives the call (the voice) but no data about the call. They do not get any location information. The New Kent County call taker can read it over the telephone, but it is not automatically transferred. In an age when a child in Virginia can chat online and exchange data with another child half a world away, this is obviously not the most efficient way to share information. Additionally, once the New Kent County call taker drops out of the call, there is no way to get updated location information for a caller in motion. This was not an issue with wireline telephone service, for which the E-911 network was designed, because calls were routed to the correct PSAP well over 99% of the time. With wireless calls, especially near jurisdictional boundaries, the wireless telephone radio signals may easily be received by a cell site in the wrong locality.

The existing architecture is also hindered by the fact that the link or last mile between the 9-1-1 switch and the PSAP is still analog technology utilizing Centralized Automatic Message Accounting (CAMA) trunks. This limits the amount of data that can be sent with the voice to 20 digits of data, which is typically comprised of 10 digits for the caller's telephone number and 10 digits of routing information for wireless E-911 calls. The location of the caller cannot be sent with the call to the PSAP, which means it must be retrieved through another means. In fact, no additional data elements can be sent directly with the voice into the PSAP with the current network.

Additional data, including location information, is received through the automatic location identification (ALI) database. Since this database system was designed for wireline telephone service, it is also a limiting factor in the architecture. The current interface between the PSAP and the ALI database is limited to 512 formatted characters, which means that the data must be formatted with spaces between data elements so that the call taker can understand what is being displayed. Many PSAP systems simply display whatever is received from the ALI database. Though some of the new PSAP equipment can manipulate the data stream in different display formats, the database interface needs to support legacy systems as well as the new ones. As a result, the 512 character limit does not net the PSAP 512 characters of data, but rather closer to 200-300 actual characters of data. While the critical wireless E-911 data elements were able to be inserted in the ALI data stream, technologies with even more data available, such as automatic crash notification or telematics (OnStar, as an example), will never be able to utilize the ALI database to send all of the available data to the PSAP.

It may seem to be an inane distinction, but it is nonetheless probably important to note that the current E-911 network and application are one and the same (referred to together as the E-911 system). This means that the infrastructure or network used for E-911 is used only for E-911. No other data travels across the ALI data circuits. After leaving the local end office on the public telephone network, the 911 call travels on dedicated 9-1-1 trunks that only carry 911 calls. While this type of stovepipe design may have made perfect sense when the network was designed in the 1980's, a shared network architecture makes much more sense now. It is not cost effective to continue to build stovepipe networks for each new application.

In today's world, the need for public safety agencies to share information and interoperate extends far beyond the provision of E-911. The current network does not support that need. Of course, as evidenced by the example above of New Kent County transferring a call to James City County, the existing architecture does not support interoperability even within the E-911 system. While it is technically possible to interconnect the 911 networks in the Commonwealth to provide greater interoperability, there is a lack of clear responsibility and authority to address it. Each E-911 network may support 10-25 PSAPs. It is unreasonable to expect one or even two to take the responsibility and cost of establishing the required interconnectivity between even two networks, let alone statewide. The State Corporation Commission (SCC) has jurisdiction over the local exchange carriers such as Verizon and Sprint, who provide the wireline E-911 networks, but wireless E-911 is generating the greatest need for the interconnection and the SCC does not regulate wireless E-911. Since the Wireless E-911 Services Board is limited by its legislation to providing funding and technical assistance, it is not clear that they have the authority to require such interconnection.

New Technology

Even before the deployment of wireless E-911 is completed, the next challenge for E-911 is already here: VoIP (Voice over Internet Protocol). VoIP is a telephone-like service that uses the Internet rather than traditional telephone lines to connect a call. The VoIP providers deploy gateways throughout the nation (or world) between the Internet and the public telephone network so a call can reach a person even if they do not have VoIP service themselves. Since the call rides on the Internet between the caller and the gateway closest to the person being called, it avoids long distance carriers and charges even if the call is going across the country. Another facet of VoIP service is that telephone (or VoIP adaptor) is an Internet device, which means it will work anywhere on the Internet. In other words, it will work anywhere in the world. Since the Internet is somewhat anonymous by design, trying to locate a VoIP device on the Internet is extremely difficult.

Another complicating factor is that, unlike traditional wireline telephone service (and the existing E-911 system), the network and the application are separate. This means that the VoIP service may be provided by a different company than the one providing the Internet service. With wireline telephone service, the line is provided by the same company as the telephone service. Even with competitive local telephone service, many competitive providers lease the telephone lines to the house from the incumbent provider so the consumer gets both from the same company. For E-911 service this means that the telephone service provider knows the location of the telephone because they also provide the line. With VoIP, the provider of the line (Internet service), who should know the location where the service is provided, may not be the same as the VoIP provider that is actually processing the E-911 call. In cases where they are the same (typically this happens with a bundled service from a cable or competitive local telephone provider), true E-911 is usually provided.

However, even in this scenario, the E-911 fails if the VoIP user takes their telephone to another location and connects it to the Internet.

Another significant difference between traditional wired telephone service and the new technologies is that the new technologies are less local and more national or global. This is a continuation of a trend started by wireless telephone service. Wireline telephone service was very much a local service. In fact, with the introduction of E-911, calls could be selectively routed based on their telephone number to the appropriate PSAP. Because cell sites may cover areas served by more than one PSAP, the implementation of wireless E-911 required coordination at a regional or statewide level. VoIP is a national or even global service. Many of the major carriers do not even have a presence in Virginia, choosing to lease the gateways to the Virginia public telephone network from other providers. It is quite possible that VoIP companies will headquartered in other countries if they can operate more cheaply. It does not matter where their server is located that processes the VoIP call, as long as they have connectivity to the public telephone network here in Virginia. This trend will likely continue with new technological advances as people demand the ability to go anywhere and to take their telecommunications technology with them.

Of even more concern than VoIP service are the technologies yet to be developed (or released). The Division of Public Safety Communications has already received an inquiry from a member of the hearing-impaired community asking if Virginia PSAPs could receive a call from an Internet instant messenger system. At least one wireless carrier is advertising on television an ability to use instant messenger from a telephone. This individual used this service to communicate with friends so that they would not need to have a telecommunications device for the deaf. All they needed to do was download that free instant messenger program and have internet connection, and they would be able to chat with their hearing-impaired friends. Short messaging service (SMS) or text messaging may also be beneficial for the hearing impaired community. Unfortunately, no PSAP anywhere is currently able to receive these types of calls for help. Of course providing this service is much more difficult than installing an instant messenger program in the PSAP. Some method must be developed to “dial” 9-1-1 and to reach the correct PSAP (routing).

Connectivity Issue

As previously discussed, there are nine separate 9-1-1 networks in Virginia alone and hundreds nationally. Since these were designed for local service, the architecture requires that each telecommunications service provider must connect directly to the 9-1-1 switch in each network. Again, each network or switch will serve between 10-25 PSAPs. At a time when there were only one or maybe two telephone companies in a particular locality, this was not an overly burdensome requirement. When wireless E-911 service came along, with eleven (11) wireless carriers operating in Virginia and only a few with statewide coverage, again, it was not overly burdensome to require them to connect to each network. This was especially true because the mobile switching centers (MSC), which process all wireless calls for a particular carrier, were relatively local. While they typically covered an area much larger than each 9-1-1 network service area, the MSC was usually at least within the same state or region.

There are a far greater number of VoIP providers currently offering service. A recent report put the number of VoIP service providers offering service nationally at 456. This is far too great a number to allow each to connect to each 9-1-1 network. Further complicating this issue is the fact that any one VoIP provider may not have access to the public telephone network in every area where their

customers could make a 9-1-1 call. Especially with nomadic users that moved their VoIP telephone to different locations, the VoIP provider would need to connect to all E-911 networks regardless of whether there is even one customer in that service area, since one could go there. The connection to each E-911 network would be made from the closest public telephone network gateway, but since there may not be one in each LATA, connection costs will increase. A solution must be developed that allows VoIP and other new technology providers to more easily connect to the E-911 network.

Funding

As previously mentioned, wireline E-911 funding is reducing. Since the overall total number of telecommunications users is still increasing, they are shifting to wireless, VoIP, or some other technology. Many of the second or more telephone lines installed in the 1990's for dial-up Internet access are now being removed in favor of broadband Internet access from cable or DSL. Unfortunately, the newer technologies either have a lower, more restrictive surcharge (wireless) or are not collecting any surcharge at all for E-911. When a person switches to wireless, for example, they pay a $0.75 E-911 surcharge instead of the up to $3.00 local wireline surcharge. Additionally, that funding goes to the Wireless E-911 Services Board instead of directly to the locality, and the use of the fund is limited to direct costs of wireless E-911 only and not for basic PSAP operation costs, which are often funded locally from the wireline E-911 surcharge or general funds.

With reductions this past year of 5-15%, local PSAPs are feeling the budgetary pinch. This is compounded by the fact that the cost of operating a PSAP is increasing as new technologies, such as robust mapping display systems to plot the wireless caller's longitude and latitude, are being added to address new and emerging technologies. The $0.75 wireless E-911 surcharge revenue managed by the Board is not going to be able to replace all losses that the localities are taking on the wireline side.

System Maintenance Issue

Based on concerns raised by several PSAPs in the Commonwealth, the Wireless E-911 Services Board has recently begun to question whether some PSAPs will be able to afford to maintain the overall E-911 system with their current level of resources. The concern is that they simply do not have the adequate tax base to generate sufficient local revenue. Through the existing legislation, the Board was able to provide sufficient resources to deploy the E-911 services for wireline and wireless, but maintaining the system also requires a significant commitment of local resources as well. Additionally, every four to six years the technology within the PSAP needs to be refreshed.

Based on the current funding policies of the Board, five years from now, these PSAPs will not get that same level of funding as they did for the initial deployment. This policy was established for a couple of reasons. First, it recognized that the initial costs were identified after local budgets were approved. If wireless E-911 was to be implemented in a timely manner, many of the costs needed to be fully funded. The Board was able to accomplish this because a significant wireless E-911 fund balance was available, since the wireless E-911 surcharge was being collected prior to costs actually being incurred. However, much of the same equipment that was fully funded initially is only eligible for partial funding upon replacement since the replacement could be planned and budgeted for along with all of the other equipment in the PSAP. Second, by requiring a local commitment of funding for replacement, the PSAP would have a stake in determining when it would be most appropriate to replace, upgrade or enhance the existing system. The current

legislation somewhat limits the Board's ability to award based on financial need requiring instead of funding all direct, reasonable costs.

Minimum Standards for PSAPs

There are currently no standards within Virginia regarding what constitutes a PSAP. While the Department of Criminal Justice Services is required to set standards for the training of law enforcement dispatchers, there are no other standards that the locality must meet in establishing a PSAP. Even these training standards do not apply to PSAPs that do not fall under law enforcement management. There is a general statement in the *Code of Virginia* (§56-484.16), which states that every locality must be served by wireline E-911 and wireless 9-1-1, but this does not even technically require the PSAP to provide wireless E-911 Phase I and Phase II service. It only requires that the wireless 9-1-1 call be routed to the local PSAP rather than the Virginia State Police as was done in the past.

Guiding Principles

While changes are necessary to meet the system gaps identified above, several guiding principles need to underlie any proposed changes. The Wireless E-911 Services Board recommends the following four guiding principles be maintained regardless of any other changes made.

E-911 is a local service

The E-911 service provided by the PSAPs is the first link in the provision of emergency response and mitigation. It therefore needs to be managed in concert with the other emergency services provided by the locality including fire, law enforcement, emergency medical services and emergency management and planning. It is an integral part of the overall public safety system in each locality and needs to be able to adapt to the sometimes unique needs of their first responders and citizens. However, much like emergency management or law enforcement services, which coordinate their activities with the Virginia Departments of Emergency Management and Criminal Justice Services, respectively, the delivery of the local E-911 service should be in coordination with statewide as well as national strategies.

Sufficient Resources

Standards cannot be developed in a vacuum. They must take into consideration the available resources and the return on the investment. Gone are the days when, "if it saves even one life, it is worth it." Serious deliberation is needed to determine which services provide the greatest protection of our citizens and these services must be funded adequately to ensure they are available in an emergency.

A lesson learned from the deployment of wireline E-911 was that, left entirely to local choice and funding, 27% of localities were unable to deploy the service in 15 years. This created an uneven delivery of service across the Commonwealth (haves and have-nots). It was not that there was a vast unwillingness to deploy what had been proven to be a life saving service. It was instead that these localities had insufficient resources to provide the service until grant funding was made available through the Wireless E-911 Services Board in 2002. For this reason, this guiding principle can at times be in conflict with the first, of local E-911 control.

If state funding is provided to the local PSAPs, sufficient oversight and accountability needs to be in place to ensure that the funding is being used efficiently. Some localities may chose to organize

their E-911 system in a less than efficient manner for other reasons. As an example, several localities have more than one PSAP with one serving law enforcement and one serving the fire department. This may be done for several reasons, but it raises the concern that if both are required to meet the minimum standards, should the locality be eligible for twice the funding assistance because they have two PSAPs?

Obviously, there will need to be a balance between providing adequate resources and supporting E-911 as a local service. Best practices need to be encouraged to ensure that sufficient resources are available for all localities. In those localities previously discussed that are too small to afford the service on their own, regional consolidation, which has proven successful in areas such as the Eastern Shore, may provide a reasonable alternative. Again, the goal must be to have sufficient funding throughout the Commonwealth to ensure that all citizens and visitors can receive rapid local emergency assistance by dialing 9-1-1. The E-911 service is far too important to only provide it in the localities that can afford the technology and other costs. It must be available to all. Additionally, the requirements to provide the service cannot simply be pushed upon the localities with just good wishes that they will be able to afford to deploy and maintain it.

Anytime, Anywhere from Any Device

Rest assured that telecommunications technology will continue to advance. As new technologies and devices are developed and become available to the public, a determination must be made as to whether the consumer could reasonably expect to request emergency service from that device. If so, the E-911 system must support that expectation. However, the E-911 network needs to be designed to be technology independent and not require an overlay for each new advance.

In addition to new telecommunications services, other new service may become available and need to be supported. As an example, additional data about the emergency could be provided to the PSAP if they have the ability to receive it. Though the capability to transmit photos from a wireless camera telephone while a 9-1-1 call (or any call for that matter) is in progress is not yet available, the ability to transmit images or even video from other devices could prove beneficial to the processing of an emergency. If it is, then the E-911 network needs to be robust enough to receive and process the additional data. Other examples of additional data that could be provided with the 9-1-1 call could include medical history, automatic vehicle collision information or hazardous material transport logs.

Need for consistent service delivery and interoperability

While E-911 is a local service, it cannot be totally independent from surrounding localities or the Commonwealth as a whole. There needs to be at least a basic ability to interoperate. This includes the ability and common procedure to transfer calls and data between PSAPs should a call go to the wrong PSAP. While this is the most basic type of E-911 interoperability, it could also include the ability to transfer calls to a neighboring PSAP should an evacuation of the PSAP become necessary. Best practices need to be in place to ensure that these types of services are available throughout the state and not in just a few regions or areas. The publication of best practices should not limit the ability of the PSAP or the locality to exceed the minimum requirements so long as the necessary functionality is maintained.

Future Vision/Direction

To position the Commonwealth of Virginia to respond to the challenges of new technology and to ensure that ALL citizens and visitors have access to the most essential life saving services, some fundamental changes must be made to the E-911 program. The Wireless E-911 Services Board proposes below the following recommendations:

Continuation of locally managed and controlled PSAPs

Though technical assistance should be available to the PSAPs upon request, the PSAP should remain a function of local government. While the Commonwealth as a whole has an interest in ensuring that E-911 services are provided to a consistent level throughout the state, this is no different than a similar need in law enforcement or fire protection. As is discussed above in the guiding principles section, the delivery of local service must be coordinated to ensure cost-effective and reliable service is available to all.

Integrated Public Safety network

The Commonwealth of Virginia should move aggressively to establish a secure, managed IP-based network for public safety applications. This network should be layered with national, state and local components. As has long been the case, the PSAP should be viewed as the hub of communications for each locality. The local component of the network would be the responsibility of the locality and should link together all public safety agencies serving the locality. The state layer should be the responsibility of the state and should link together every PSAP in the Commonwealth. The national level, coordinated through the recently created National E-911 Program Office, would link together the state systems since border localities often interoperate across state lines.

Obviously, with each layer interfacing with and relying upon the next, there is a strong need to protect both the reliability and security of the network. It is an important distinction to make that while this network would be based on Internet protocol (IP), it would not be the Internet. It would instead be a separate, managed network to protect its integrity. Because of their existing relationship with the PSAPs in the Commonwealth and the telecommunications industry, the Wireless E-911 Services Board should be responsible for the development and management of the overall state level network layer. This will also allow other applications to utilize the network even beyond the PSAP, such as data sharing, etc.

Next Generation E-911

Parallel with the development of the secured, managed IP-based network, the Commonwealth should move forward with the development and deployment of the next generation E-911 application. This application will utilize the new network to move both voice and data efficiently in and out of the PSAP. It must be technology neutral so that all known (and likely future) telecommunications technologies, such as VoIP, can be supported. The application (as well as the network) must be able to handle data with the same ease as voice.

The development of the next generation E-911 needs to be a partnership between the Commonwealth and the localities as well as the telecommunications service provider, in the same way (and for the same reasons) the deployment of wireless E-911 was a partnership. Since the Board has representation from nearly all of the key stakeholders, wireless E-911 program should be used as a model. Rather than creating a new Board or Commission for this function, the existing Wireless E-911 Services Board should be utilized since they are currently responsible for the

wireless portion of the E-911 service. The representation on the Board may need to be modified by replacing one of the wireless carrier representatives with a VoIP carrier, but this will become less of an issue as all of the technologies change and evolve. As is the case with wireline and wireless, many of the companies that provide service utilizing one technology will also market other technologies, meaning such distinctions in representation are unnecessary.

PSAP Best Practices

Beyond standards for the new public safety network and E-911 application, as discussed in the guiding principles, best practices are needed to encourage a consistent level of service and interoperability between PSAPs. Again because of their representation and experience with wireless E-911, the Wireless E-911 Services Board is well positioned to publish such best practices; however, the Board should utilize, when possible, the outstanding work of the E-911 professional organizations to leverage existing and evolving efforts.

Funding

Telecommunications taxation reform has been debated within the General Assembly for the last several years. Regardless of the method selected to collect the revenue to support E-911, sufficient resources need to be available to the PSAP from either local or state funding sources. Additionally, both the revenue collection and costs paid should be technology neutral. On the revenue side, this means that all consumers must pay their fair share for the service they receive. The cost of the shared components, such as the network, should be spread across all of the E-911 users and not just one segment. Since it is difficult to predict future technologies, any E-911 user fees or surcharges should be applied to all technologies that can access the E-911 system (today or in the future).

On the cost side, technology neutrality means that each telecommunications service provider that provides E-911 services is similarly compensated. Currently, the type of telecommunications technology impacts the type of compensation the service provider receives. Wireline service providers are compensated very differently than wireless service providers. Some providers are limited to recovery of their actual costs incurred while others receive a rate of return or margin. In a related wireless E-911 order, the FCC declared the input to the 9-1-1 switch or selective router as the demarcation point for costs between the wireless carriers and PSAPs. In other words, using this as a model, the telecommunications service provider, regardless of the technology (wireline, wireless, VoIP, etc.), would be responsible for cost to get the 9-1-1 call to a central point, currently the 9-1-1 switch, in the E-911 network. The cost of the E-911 network and the E-911 application would be the responsibility of the state and local PSAPs.

Again, regardless of the source, sufficient funding needs to be provided for the PSAPs to deliver the E-911 service. PSAPs need to be encouraged to adopt efficient organizational structures and operations. Funding should encourage consolidated and regional PSAP services instead of multiple PSAPs in a single locality. Additionally, partnership should be leveraged whenever possible. Regional coordination efforts proved very beneficial in the deployment of wireless E-911 and should be used when possible moving forward. Programs such as public education should be a partnership between state and local agencies.

Appendix D – Detailed Wireline PSAP Update

Appomattox County has completed 84% of the field verification process and telephone numbers have been compared to the pseudo MSAG. The local exchange carrier should begin the creation of the ALI database within the next month or so. All equipment has been purchased and installed in the new PSAP. It is estimated that the enhanced deployment will take place by March 2007.

Bath County has put its enhanced 911 project on hold, including the construction on the new PSAP facility. The county made this decision because key people related to this project have terminated their employment with the county. The county is re-evaluating the timeline for this project and is trying to re-establish leadership for this project within this county. In the meantime, the project management firm retained by the State has continued to work with the USPS and the local exchange carrier. The County has completed its field verification. An enhanced deployment date was not available.

Buchanan County is currently maintaining its addressing and mapping data while awaiting conversion with the USPS. All structures have been addressed and new addresses are being assigned for new residency or construction. The MSAG, USPS edit sheets, conversion database, etc. are being updated regularly to include any changes that occur. Coordination of efforts with the USPS (district and local) and the local exchange carrier is ongoing to maintain the most current data. Installation of the CPE, mapping, telephone trunks, and ancillary equipment has begun in the newly renovated facility that will house the PSAP. Coordination is underway to transition staff from the Sheriff's office to the new facility and equipment. Due to the estimated conversion schedule provided by the USPS, a September 2007 date is anticipated for the enhanced deployment, but the County is currently providing Basic 911.

Dickenson County has had Basic 911 for sometime, but the enhanced 911 project has been delayed due to issues with the USPS that have continued for four years. Because of the prolonged delay in the address conversion process with the USPS and the subsequent creation of the ALI database by the local exchange carrier, the County has opted to enter into an agreement with an addressing vendor for re-validation of the addresses. The County and the vendor will be providing the necessary field work and validation and intend to bring the outdated database current, and to keep it current, until the USPS notifies the County that work can commence on the project. It is estimated that enhanced deployment will take place by June 2007.

Lee County has completed 96% of the field verification process with a 95% match rate on the databases for the USPS and local exchange carrier. It is hoped that the delay with the postal service will not diminish this percentage and require an extension to the contractual agreement between the addressing vendor and the County. Road naming is completed and has been approved by the County. Address assignment (internally) is at 70% and should be completed by the release of this report. The release of the RFB for road signage will take place in November. The MSAG draft is nearing completion. Creation of the ALI database is dependent upon the schedule of conversion and notification process provided by the USPS. Discussions are underway for equipment procurement and network requirements. The County is currently in the process of renovating a section of the Court House in which to locate the PSAP. Due to an indeterminable schedule for address conversion, it is an estimated that enhanced deployment will not take place before December 2007.

Scott County is accepting Basic 911. The majority of the field verification work is complete and addressing data has been provided to the USPS. However, the USPS has delayed the start of the conversion process, but the local exchange carriers are ready to begin work as soon as the data is released to them. A method and process to coordinate the exchange of data among the County, USPS, and local exchange carriers is being implemented in an attempt to avoid compromising the integrity of the data and to assure accuracy once the conversion does begin. In addition, the County has occupied its new PSAP facility, CPE, mapping, and ancillary equipment have been installed, and the installation of road signs is complete. Because of the delay with the USPS, it is anticipated that enhanced deployment will occur by June 2007.

Wise County has identified that there are approximately 4,500 addresses of about 18,000 that need to be changed or corrected. The County's addressing vendor has been in the process of verifying or validating these addresses. A time line has been created that will allow these addresses to move into the conversion process when the USPS is ready to accept the data. Once these addresses are accepted and adopted into the USPS database, the local exchange carrier can then complete its database process. It is estimated that the enhanced deployment will occur by March 2007.

Appendix E – Wireless Service Provider Status

Alltel Status

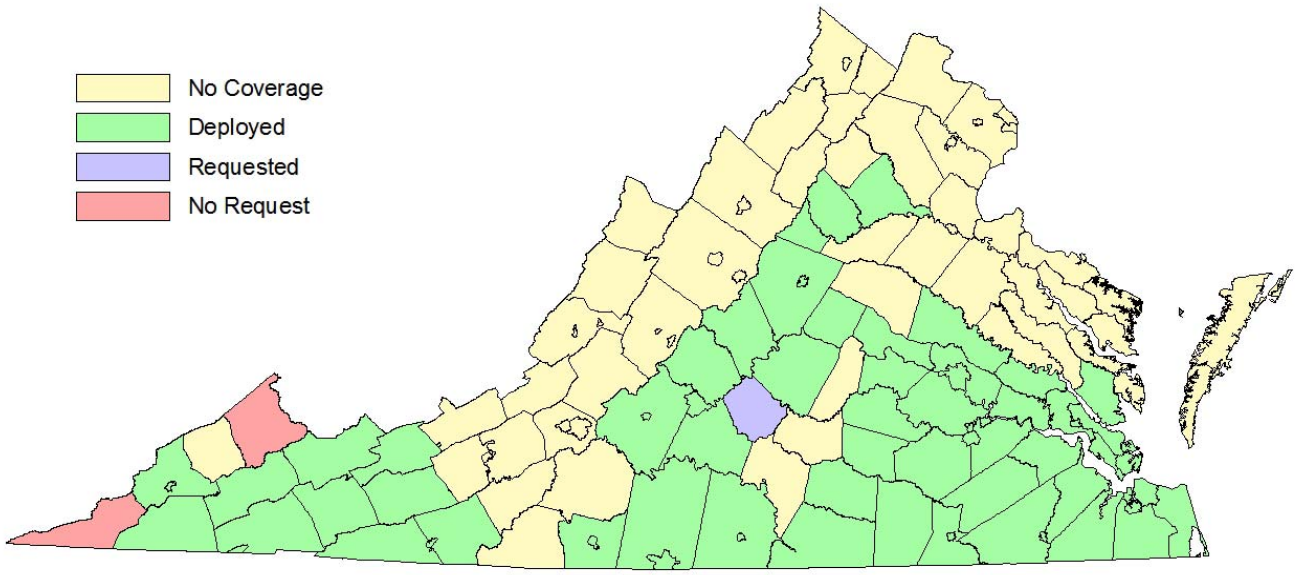

Figure 10 - Alltel Phase I Status

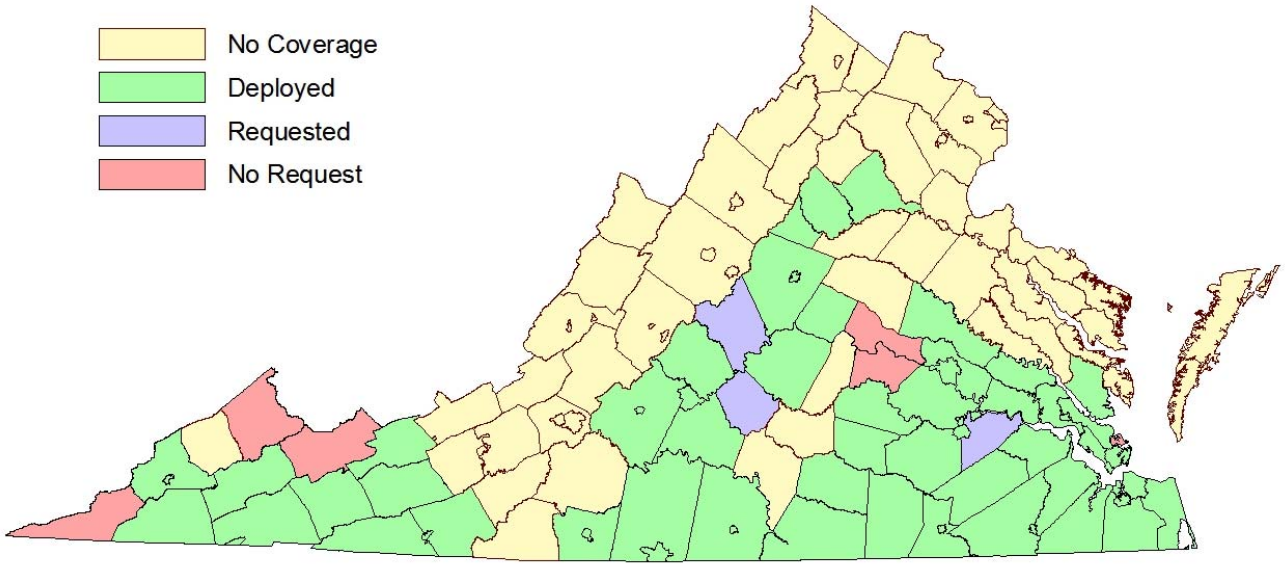

Figure 11 - Alltel Phase II Status

Cingular Wireless Status

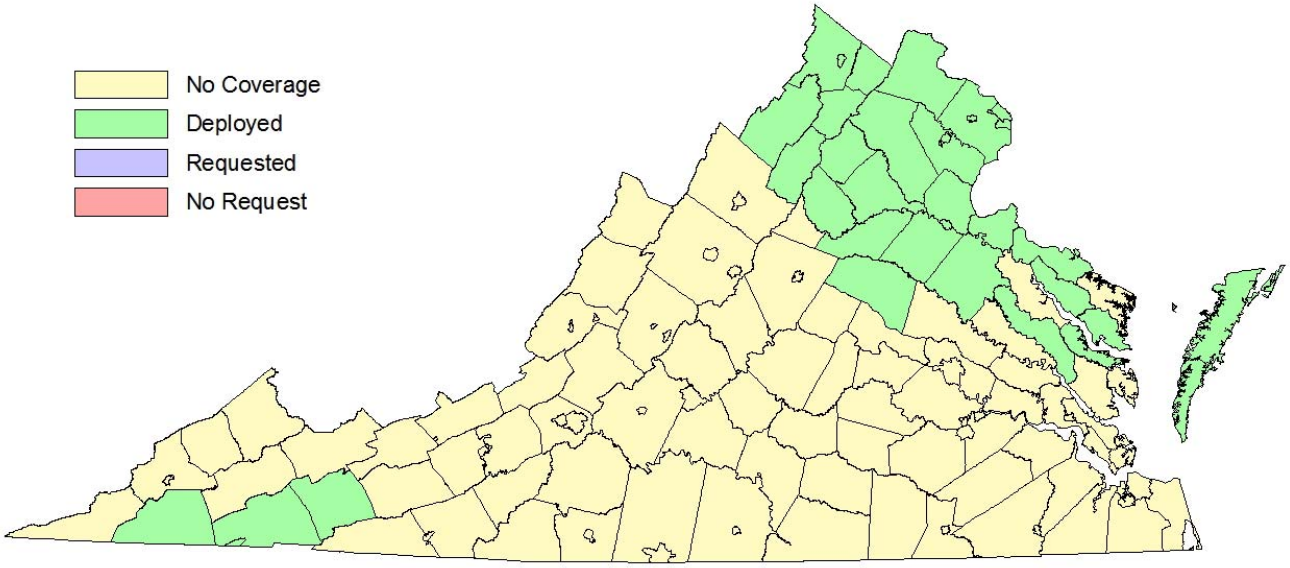

Figure 12 – Cingular Wireless Phase I Status

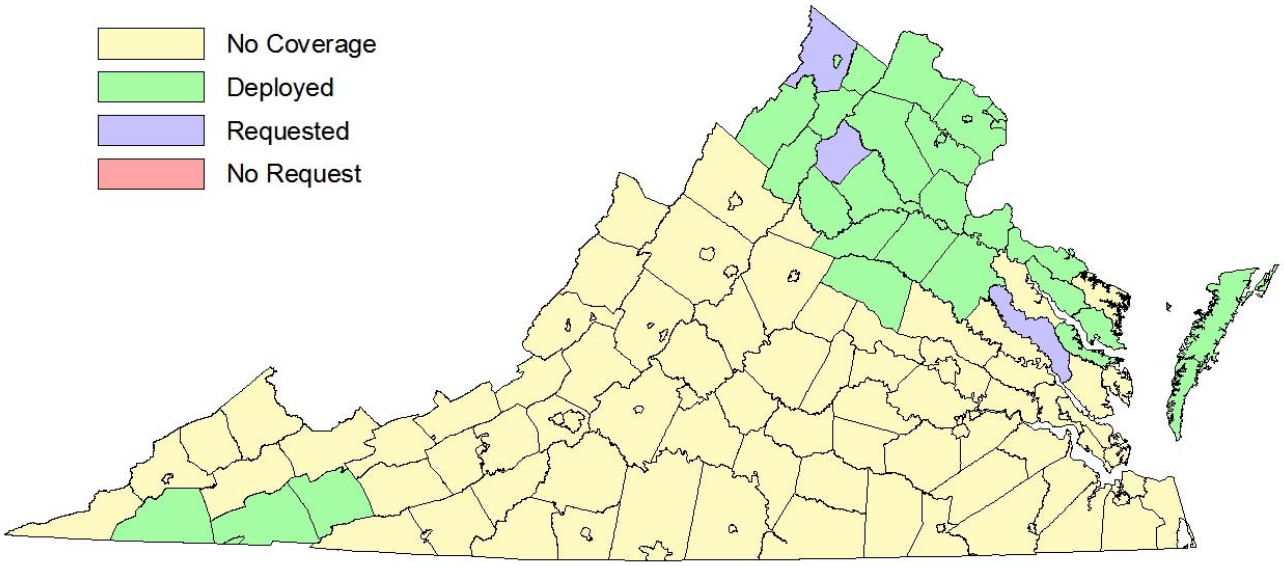

Figure 13 – Cingular Wireless Phase II Status

Cingular Wireless Status
(Former Triton/Suncom areas)

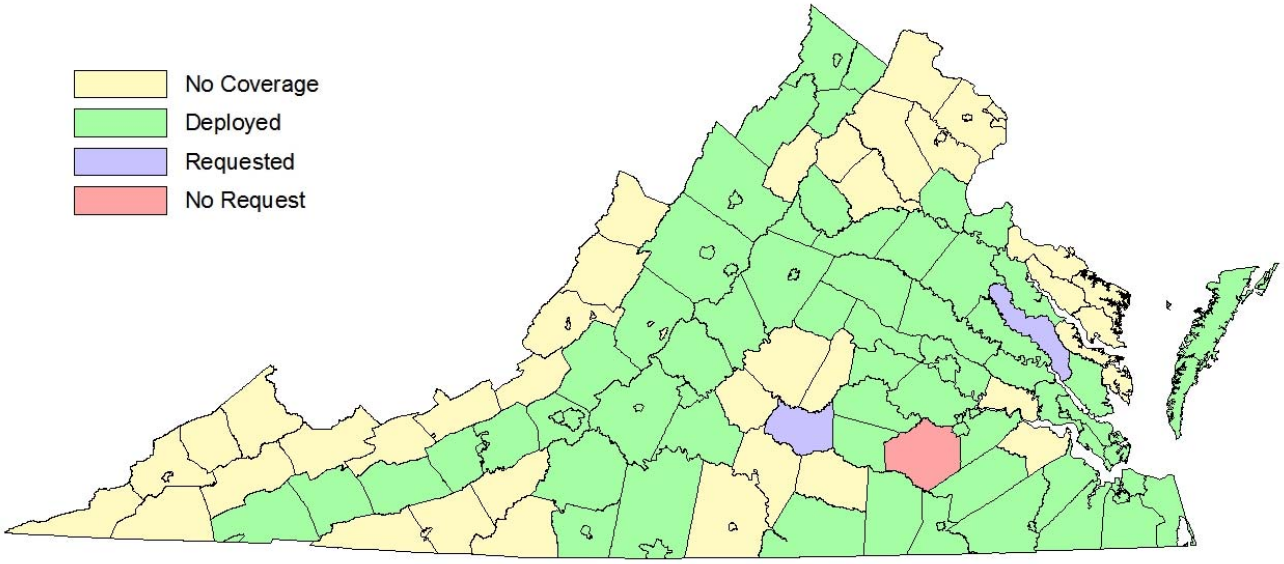

Figure 14 – Cingular Wireless (Suncom) Phase I Status

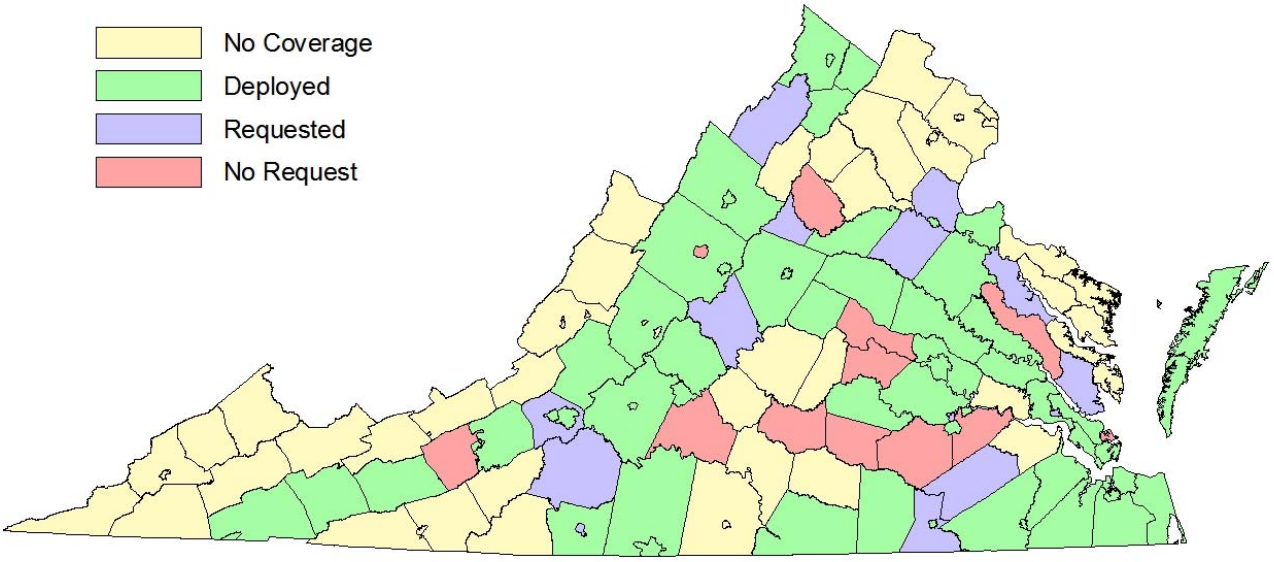

Figure 15 – Cingular Wireless (Suncom) Phase II Status

nTelos Status

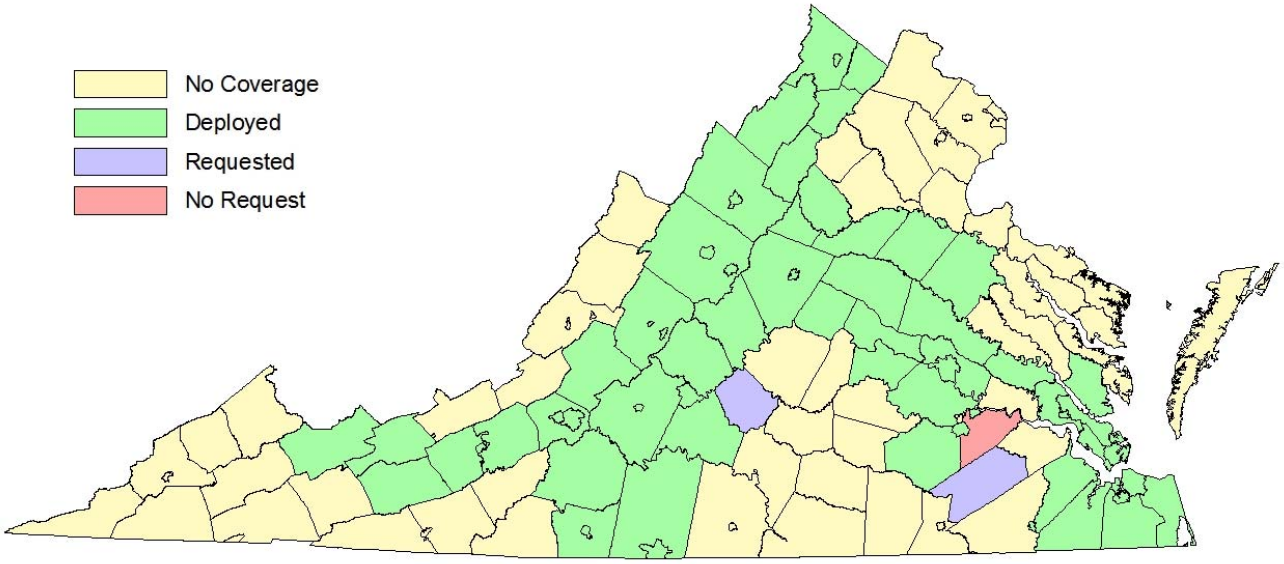

Figure 16 – nTelos Phase I Status

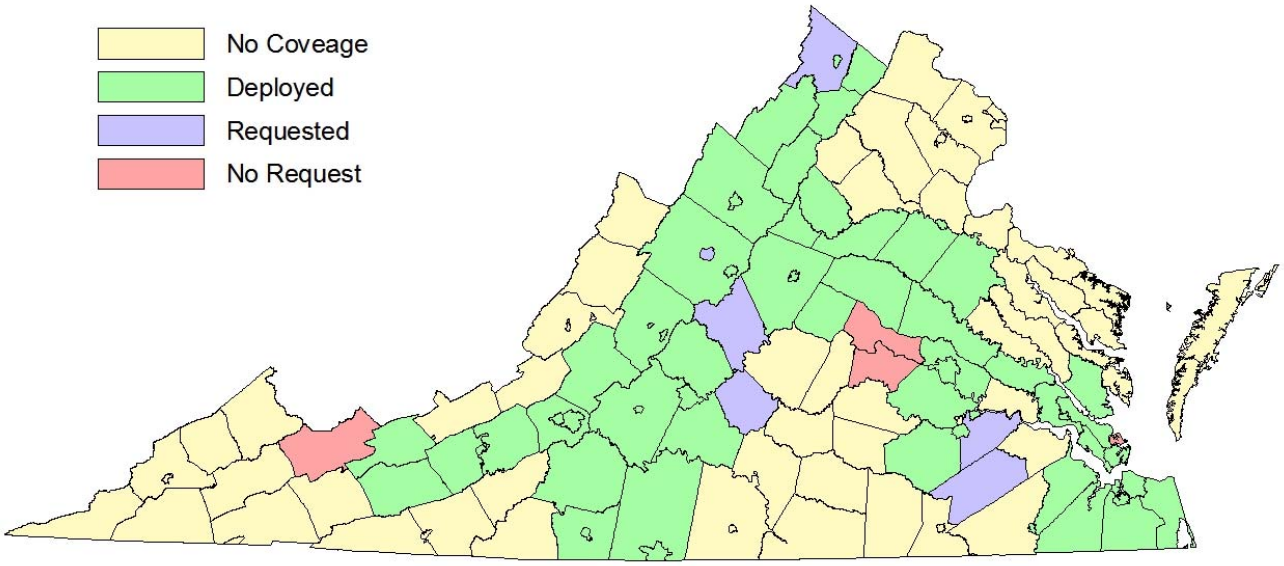

Figure 17 – nTelos Phase II Status

Sprint/Nextel Status
(former Sprint PCS area)

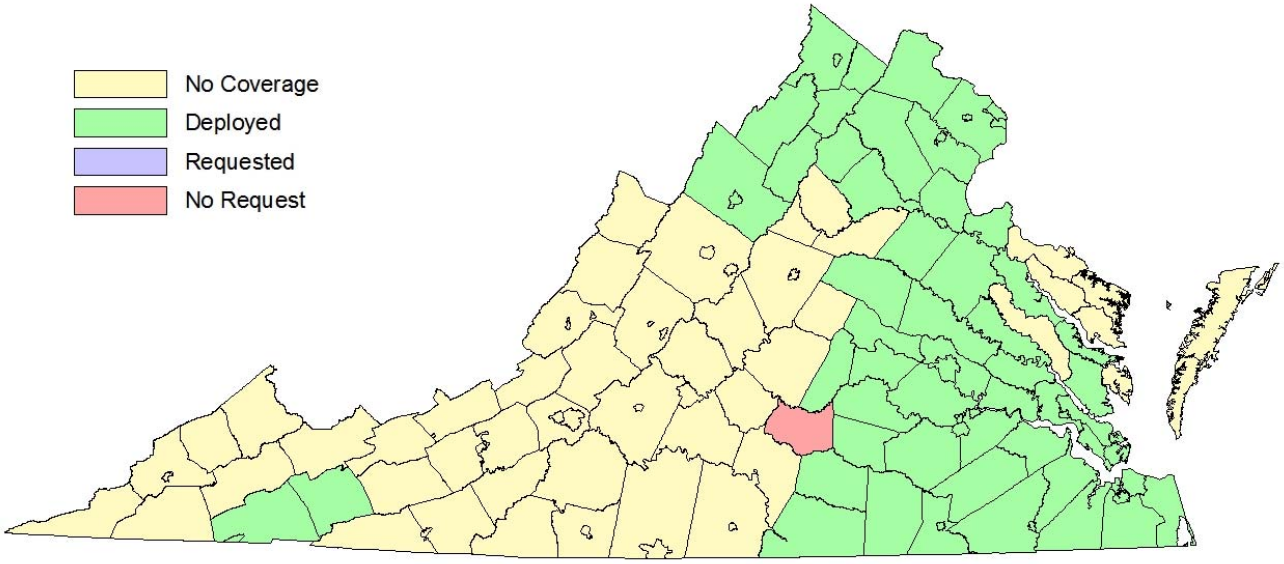

Figure 18 – Sprint PCS Phase I Status

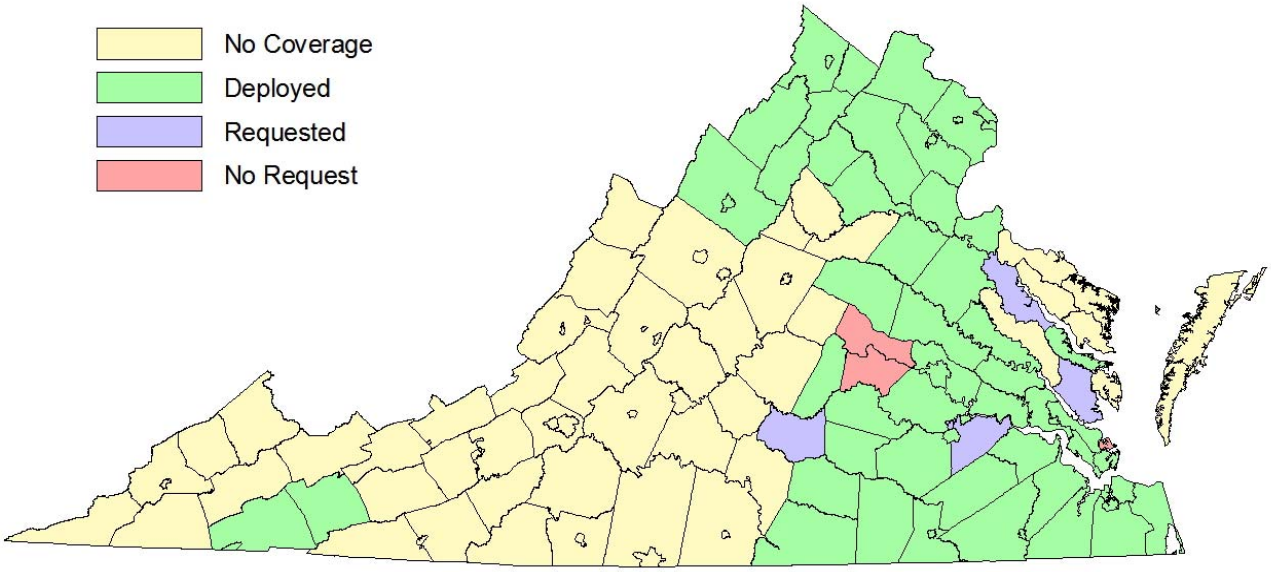

Figure 19 – Sprint PCS Phase II Status

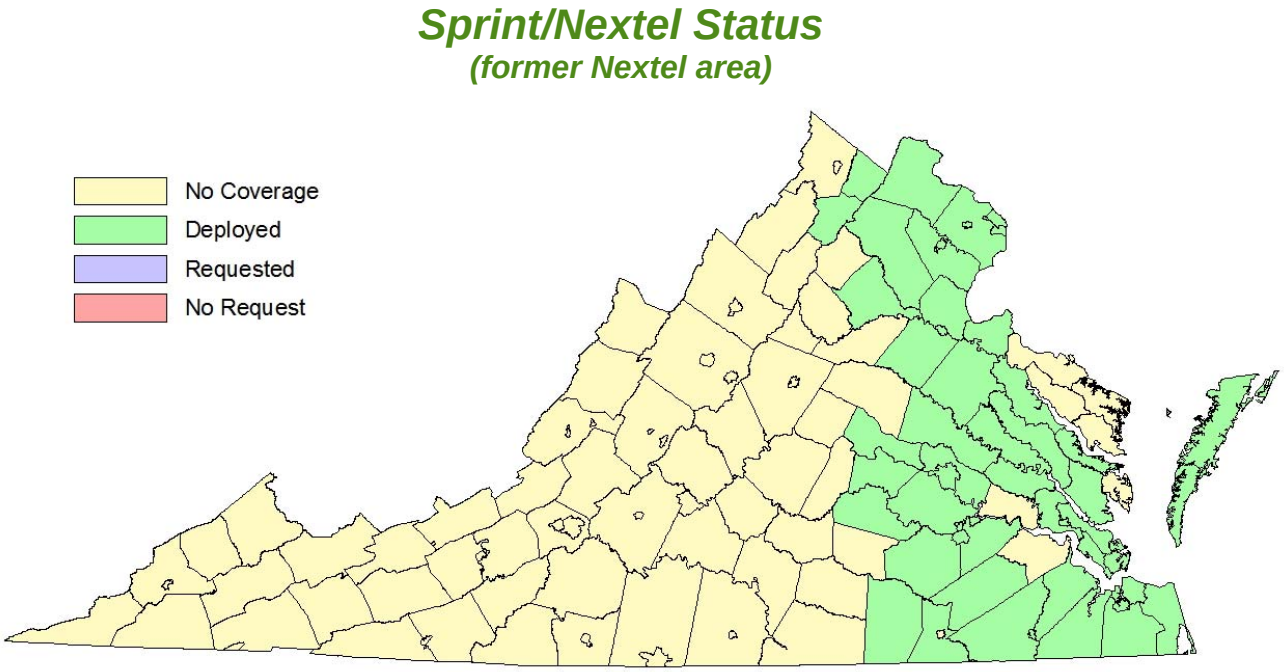

Figure 20 – Nextel Phase I Status

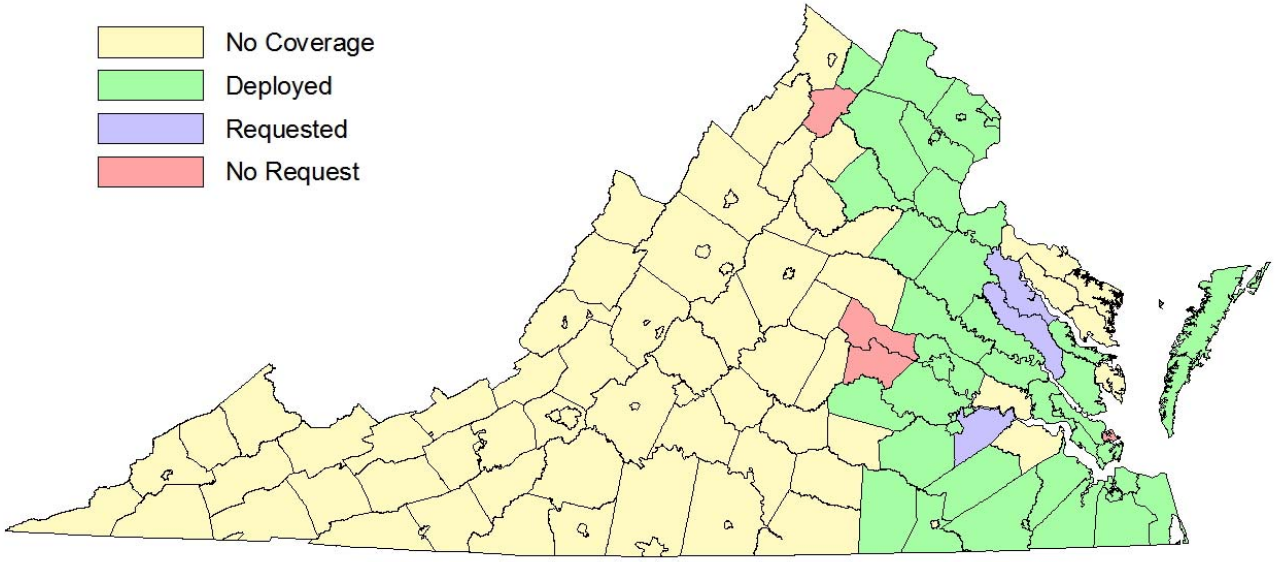

Figure 21 – Nextel Phase II Status

Sprint/Nextel Status
(former Nextel Partners area)

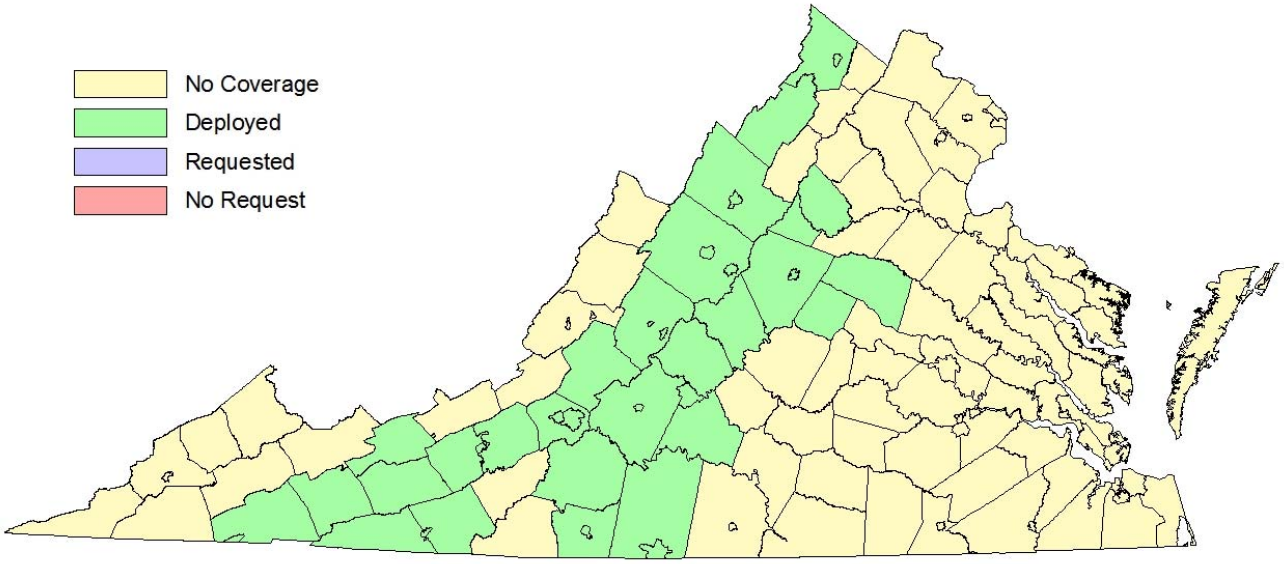

Figure 22 – Nextel Partners Phase I Status

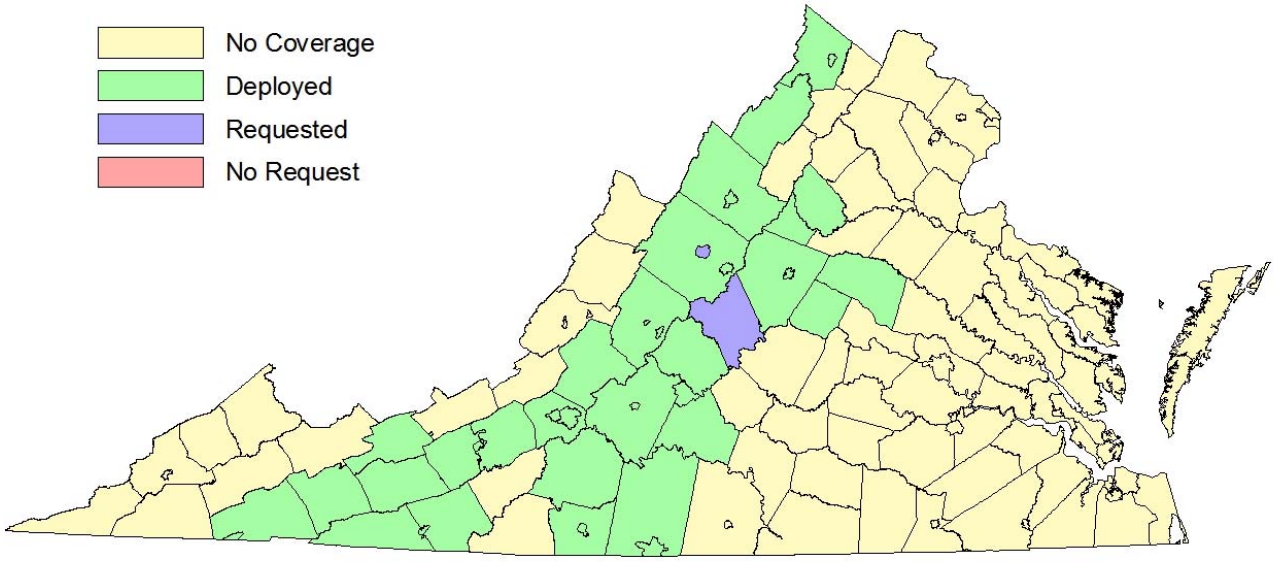

Figure 23 – Nextel Partners Phase II Status

T-Mobile Status

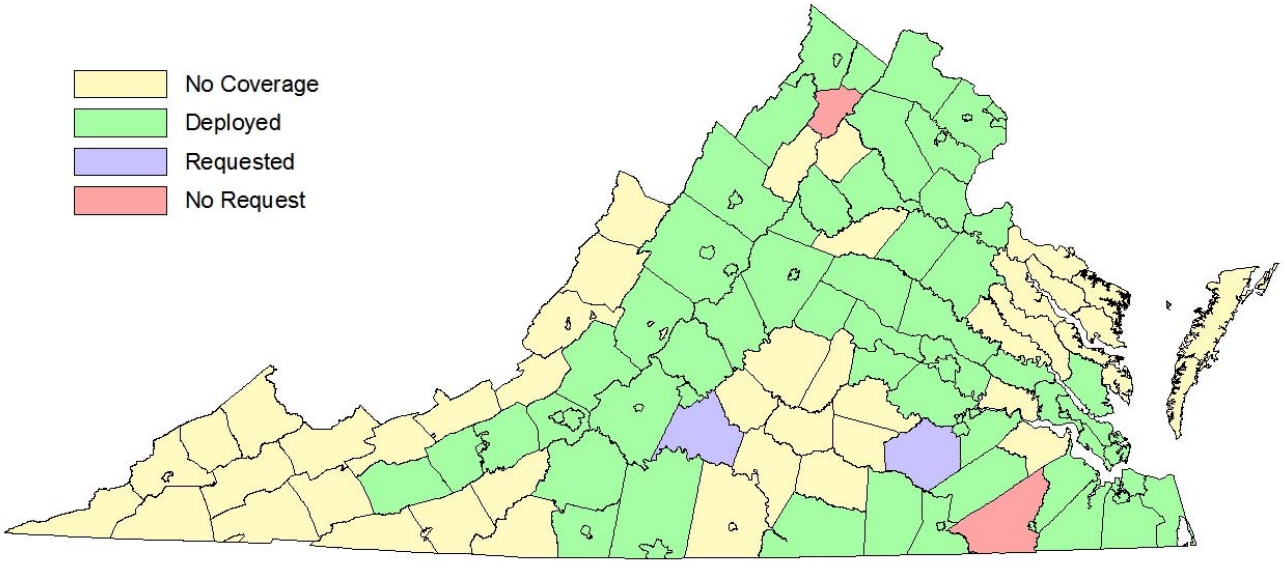

Figure 24 – T-Mobile Phase I Status

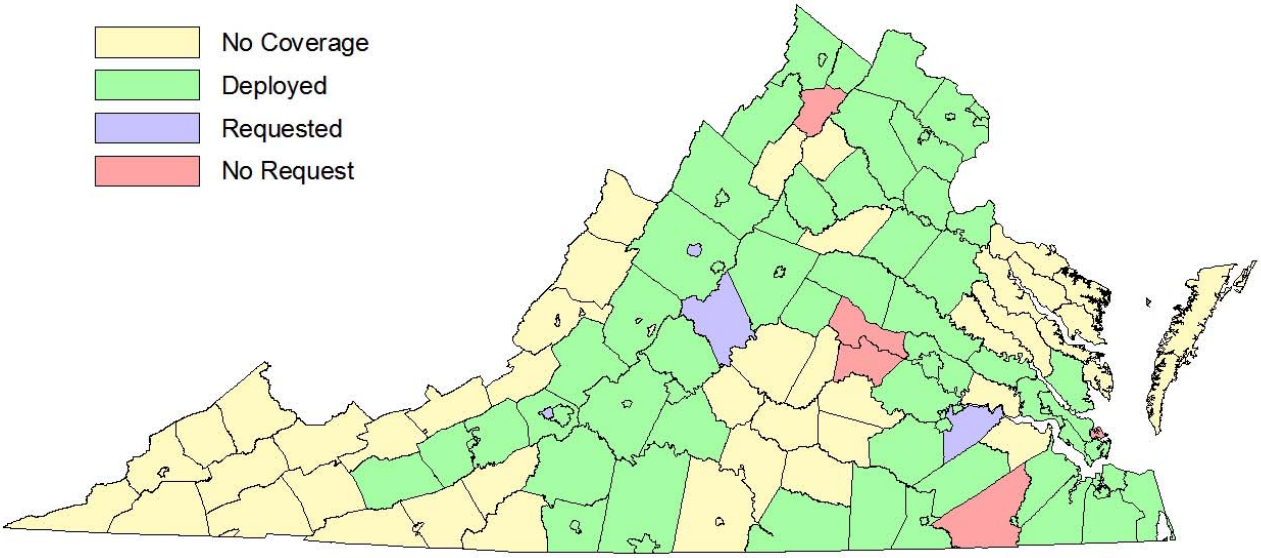

Figure 25 – T-Mobile Phase II Status

U.S. Cellular Status

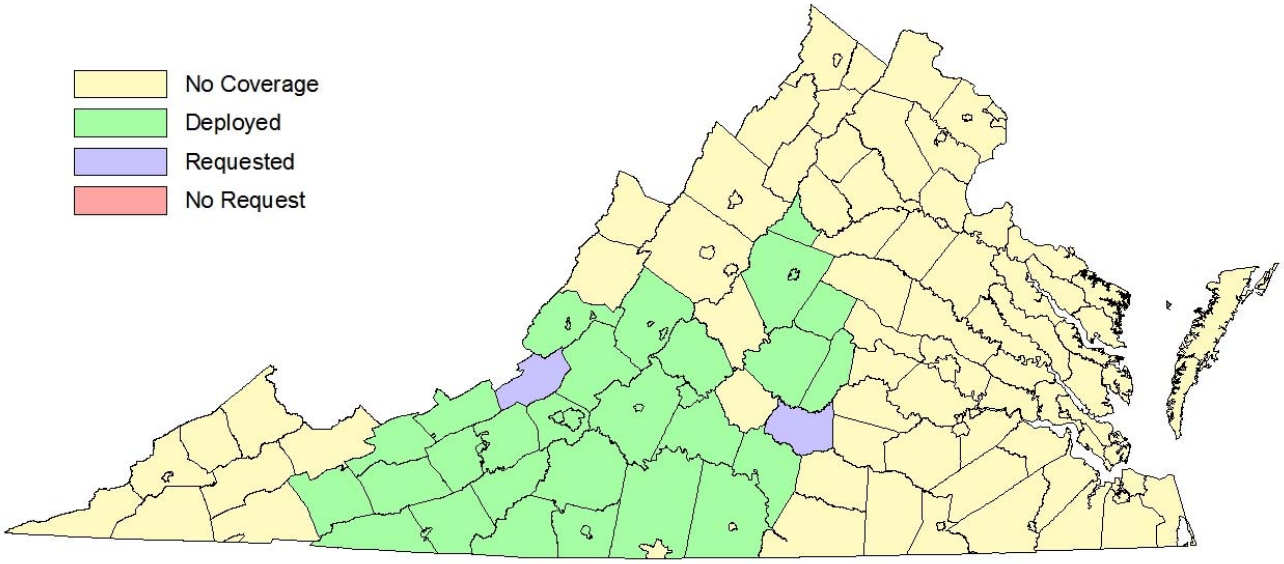

Figure 26 – U.S. Cellular Phase I Status

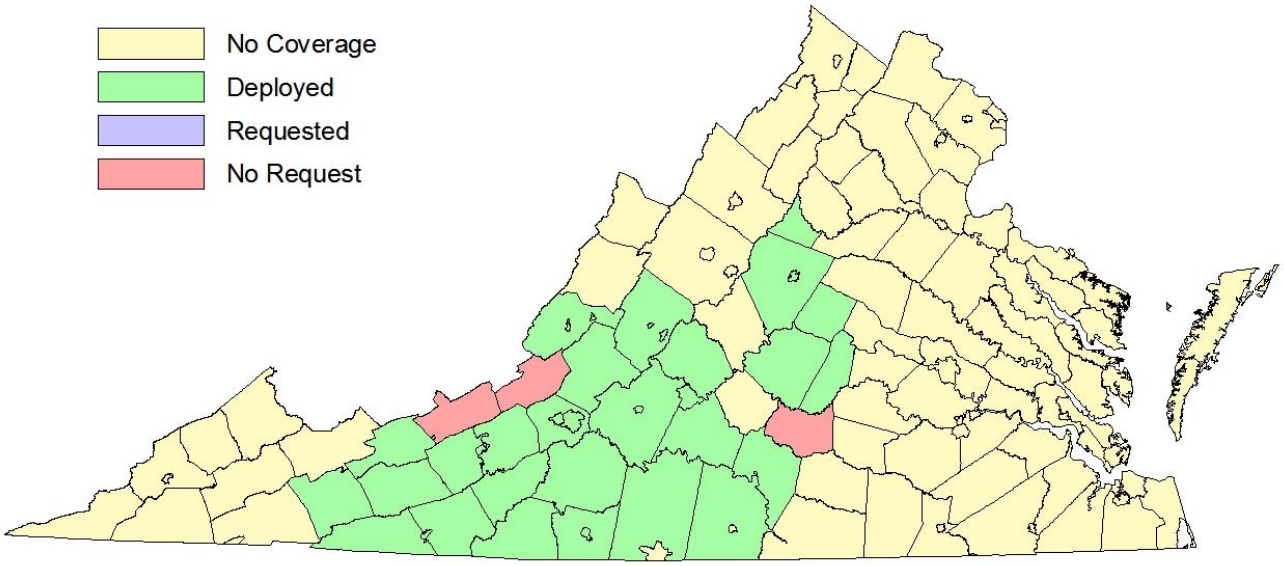

Figure 27 – U.S. Cellular Phase II Status

Verizon Wireless Status

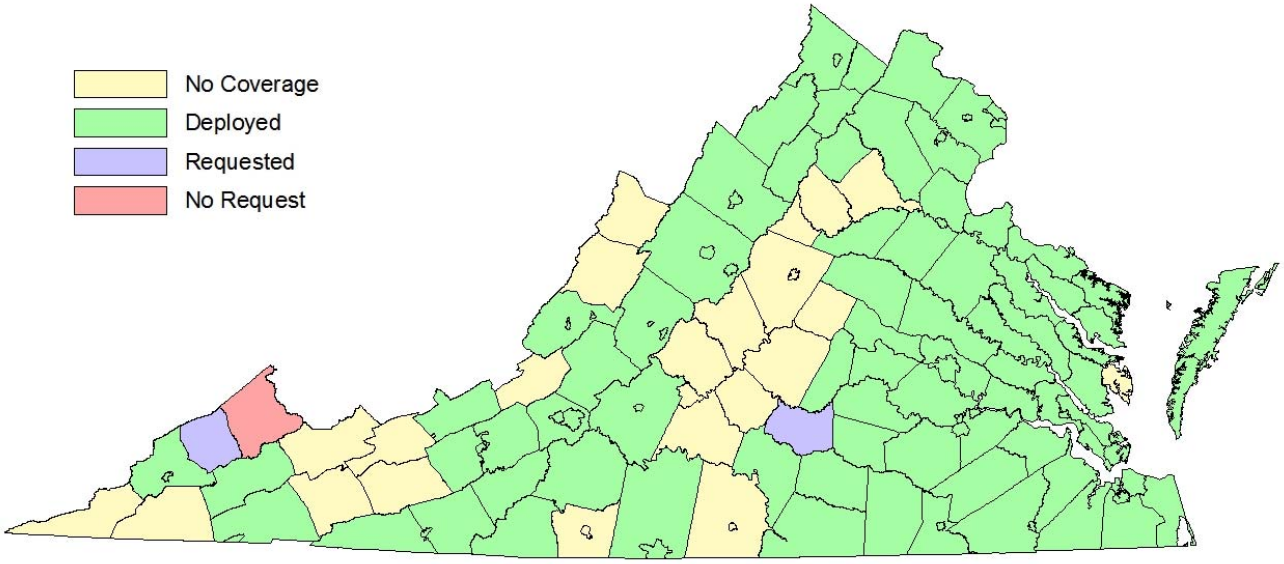

Figure 28 – Verizon Wireless Phase I Status

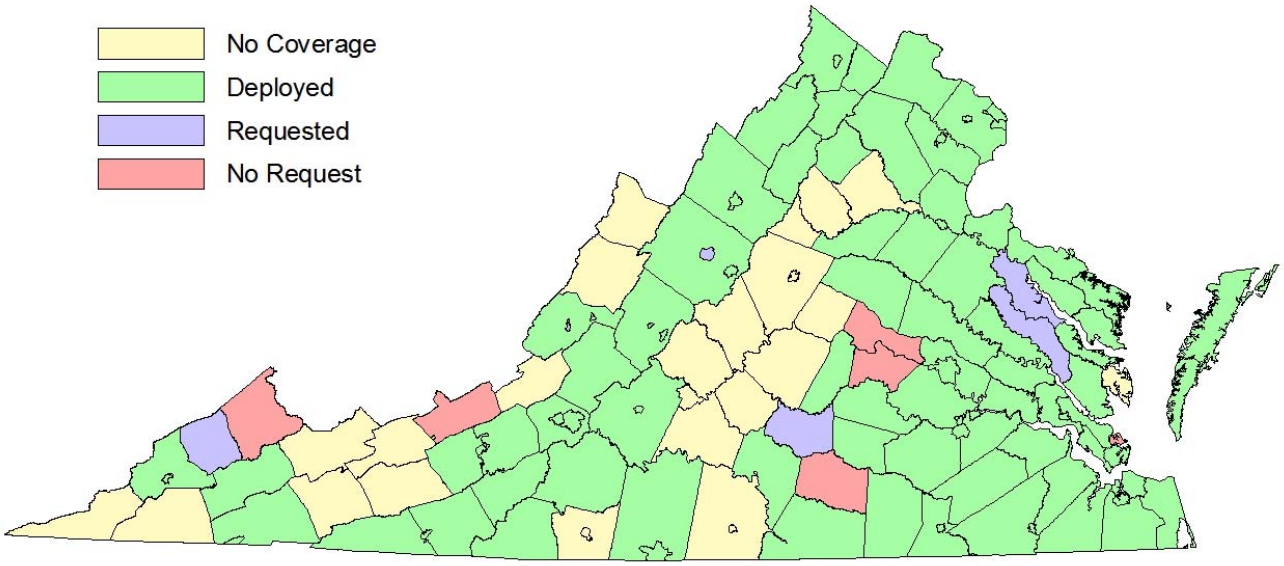

Figure 29 – Verizon Wireless Phase II Status

Virginia Cellular Status

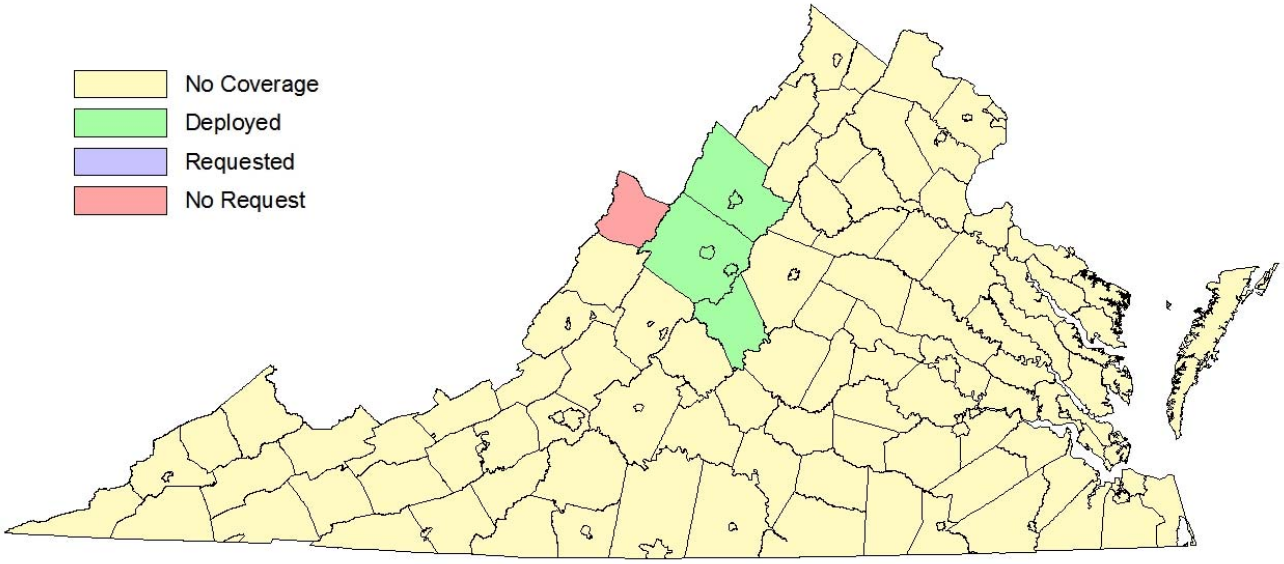

Figure 30 – Virginia Cellular Phase I Status

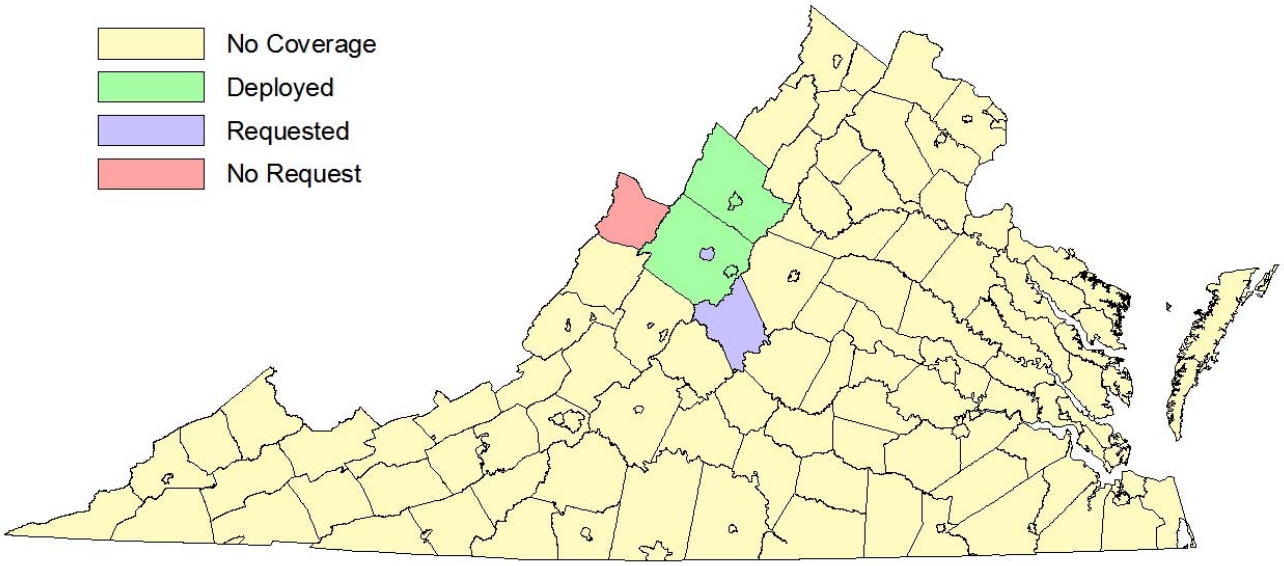

Figure 31 – Virginia Cellular Phase II Status