

Cumberland County, NJ

9-1-1 Consolidation Study



Report prepared by



Certificate of Authorization 24GA28156300
Dominic C. Villecco, President
David K. Stern, Vice President

Peter M. Longo, PML Consulting Engineers, L.L.C.
Licensed Professional Engineer, License No. 24GE03476100

Scott J. Burnley, KBA Architecture, Inc.
Licensed Architect, License No. 21AI01439200

May 17, 2011



Acknowledgements

We would like to thank all of the individuals and organizations who assisted in providing information that assisted with our research and was taken into consideration for this analysis. Our gratitude should not be limited to the following list:

- The staff and supervisors of the following PSADPs who completed surveys and hosted site visits:
 - Cumberland County
 - Vineland
 - Millville
 - Bridgeton
- The following organizations or departments for their input, advice and feedback:
 - WPCS
 - Motorola
 - Zetron
 - State of New Jersey OIT

Table of Contents

1	Executive Summary	1
2	Background.....	3
2.1	Future Statewide NG 9-1-1 Considerations.....	3
2.2	S-45	4
2.3	Description of Current PSADP Environment	6
3	Task Specific Activities, Findings and Recommendations	8
3.1	Task 1 - Baseline Assessment.....	8
3.1.1	Management and Organization Structure.....	9
3.1.2	Staffing Findings	10
3.1.3	Operational Services	12
3.1.4	Call Volumes, Incidents, Reporting Methods.....	16
3.1.5	PSADP Current Operational Facilities.....	19
3.1.6	Operations and Maintenance Support, and Costs.....	21
3.2	Task 2 - Operational Needs Analysis	22
3.2.1	Stakeholder Comments/Concerns	22
3.2.2	PSADP Data Statistics	23
3.2.3	Data Analysis	30
3.2.4	Staffing	32
3.2.5	Required Equipment	32
3.2.6	Transition Plan	32
3.2.6.1	Employees	32
3.2.6.2	Equipment.....	32
3.2.6.3	Facility	32
3.2.6.3.1	PSADP Facilities	32
3.2.6.3.2	County Facility Improvement.....	32
3.2.6.4	Timeline	32
3.2.7	Budget.....	32
3.2.7.1	Building Electrical System Upgrade	32
3.2.7.2	Building Structural Upgrade	32
3.2.7.3	Consolidation Capital Expenditures	32
3.2.7.4	Transitional Operational Expenditures	32
3.2.7.5	Ongoing Operational Expenditures	32
3.2.7.6	Budget Summary	32
3.2.8	Future.....	32
3.2.8.1	Growth & Expansion	32
3.2.8.2	Narrowbanding.....	32
3.2.8.3	NG 9-1-1	32
3.2.8.4	PSADP backup	32
3.2.9	Radio Frequency Evaluation	32
3.2.9.1	Overview	32
3.2.9.2	License Audit	32
3.2.9.3	Narrowbanding.....	32
3.2.9.3.1	FCC Mandate Overview.....	32
3.2.9.3.2	Implementation Preparation	32

3.2.9.3.3	Required Action.....	32
3.2.9.3.4	Inventory Results	32
3.2.9.3.5	Estimated Narrowbanding Costs	32
3.2.9.4	Coverage Analyses	32
3.2.9.5	RF Recommendations	32
3.3	Task 3 – Recommendations.....	32
3.3.1	Overview	32
3.3.2	Recommendation of Single County-Wide PSADP	32
3.3.3	Consolidated County PSADP Equipment.....	32
3.3.3.1	Calltaking and Dispatching.....	32
3.3.3.2	Computer Aided Dispatch (CAD)	32
3.3.3.3	Phone Answering.....	32
3.3.3.4	Radio Equipment.....	32
3.3.3.5	Electrical	32
3.3.4	Consolidated County PSADP Staffing.....	32
3.3.5	Back up PSADP Opportunities.....	32
3.3.6	Other Consolidation Options	32
3.3.6.1	Private Operations	32
3.3.6.2	Multi-Municipal	32
3.3.6.3	Status Quo	32
3.3.6.4	Advantages/Disadvantages of Each Alternative	32
3.3.6.5	Consolidation Considerations	32
3.3.7	Budget Estimate.....	32
3.4	Task 4 - Conceptual Design and Implementation Strategy	32
3.4.1	Recommended Conceptual Design.....	32
3.4.1.1	PSADP Equipment Conceptual Design.....	32
3.4.1.2	Facility Requirements.....	32
3.4.1.3	Budget Estimate.....	32
3.4.1.4	Consolidated PSADP Organization.....	32
3.4.2	Implementation Plan	32
3.4.2.1	Issues.....	32
3.4.2.2	Staffing.....	32
3.4.2.3	Equipment.....	32
3.4.2.4	Construction	32
3.4.2.5	Narrowbanding.....	32
3.4.2.6	Non Participation.....	32
4	APPENDICES	32
4.1	APPENDIX A: Acronyms.....	32
4.2	APPENDIX B: Cumberland County PSADP Survey.....	32
4.3	APPENDIX C: PSAP Pictures	32
4.4	APPENDIX D: Cumberland County Subscriber Inventory	32
4.5	APPENDIX E: Cost Estimate Stipulation.....	32
4.6	APPENDIX F: RF Coverage Analysis	32

Table of Figures

Figure 1 Typical PSADP Management and Organization.....	9
Figure 2 Current Call Flow and Dispatch Operations Diagram.....	13
Figure 3 Total Calls to 9-1-1 Calls Comparison.....	25
Figure 4 9-1-1 Call Traffic Comparisons.....	26
Figure 5 Percent of Events Where Police or Fire/EMS Units Were Dispatched .	27
Figure 6 Cumberland County Number of 9-1-1 Calls per Month	28
Figure 7 Percent of Population that Called 9-1-1	29
Figure 8 Calls and Events by PSADP.....	32
Figure 9 Scenario 1 - Proposed 1 st Floor Layout.....	32
Figure 10 Scenario 2 - Proposed 1 st Floor Layout.....	32
Figure 11 Scenario 3 - Proposed 1 st Floor Layout.....	32
Figure 12 Scenario 3 - Proposed Basement Layout.....	32
Figure 13 - Baseline Project Schedule	32
Figure 14 Electrical One-Line Diagram.....	32
Figure 15 Updated Scenario 3 Call Flow And Dispatch Operations Diagram.....	32
Figure 16 Cumberland County Organizational Chart.....	32
Figure 17 Full Consolidation Conceptual Basement Layout.....	32
Figure 18 Talk-Out Portable In-Building Coverage - EMS 1	32
Figure 19 Talk-Out Portable Street Coverage - EMS 1	32
Figure 20 Talk-In Portable In-Building Coverage - EMS 1.....	32
Figure 21 Talk-In Portable Street Coverage - EMS 1	32
Figure 22 Talk-Out Portable In-Building Coverage - EMS 2	32
Figure 23 Talk-Out Portable Street Coverage - EMS 2	32
Figure 24 Talk-In Portable In-Building Coverage - EMS 2.....	32
Figure 25 Talk-In Portable Street Coverage - EMS 2	32
Figure 26 Talk-Out Portable In-Building Coverage - EMS 3.....	32
Figure 27 Talk-Out Portable Street Coverage - EMS 3	32
Figure 28 Talk-In Portable In-Building Coverage - EMS 3.....	32
Figure 29 Talk-In Portable Street Coverage - EMS 3	32
Figure 30 Talk-Out Portable In-Building Coverage - EMS 5.....	32
Figure 31 Talk-Out Portable Street Coverage - EMS 5	32
Figure 32 Talk-In Portable In-Building Coverage - EMS 5.....	32
Figure 33 Talk-In Portable Street Coverage - EMS 5	32
Figure 34 Talk-Out Portable In-Building Coverage - Fire 1.....	32
Figure 35 Talk-Out Portable Street Coverage - Fire 1	32
Figure 36 Talk-In Portable In-Building Coverage - Fire 1	32
Figure 37 Talk-In Portable Street Coverage - Fire 1.....	32
Figure 38 Talk-Out Portable In-Building Coverage - Fire 2.....	32
Figure 39 Talk-Out Portable Street Coverage - Fire 2.....	32
Figure 40 Talk-In Portable In-Building Coverage - Fire 2	32
Figure 41 Talk-In Portable Street Coverage - Fire 2.....	32
Figure 42 Talk-Out Portable In-Building Coverage - Fire 3.....	32
Figure 43 Talk-Out Portable Street Coverage - Fire 3.....	32
Figure 44 Talk-In Portable In-Building Coverage - Fire 3	32

Figure 45 Talk-In Portable Street Coverage - Fire 3.....	32
Figure 46 Talk-Out Portable In-Building Coverage - Fire 4.....	32
Figure 47 Talk-Out Portable Street Coverage - Fire 4	32
Figure 48 Talk-In Portable In-Building Coverage - Fire 4	32
Figure 49 Talk-In Portable Street Coverage - Fire 4.....	32
Figure 50 Talk-Out Portable In-Building Coverage - Fire 6.....	32
Figure 51 Talk-Out Portable Street Coverage - Fire 6	32
Figure 52 Talk-In Portable In-Building Coverage - Fire 6	32
Figure 53 Talk-In Portable Street Coverage - Fire 6.....	32
Figure 54 Talk-Out Portable In-Building Coverage – County Fire Police.....	32
Figure 55 Talk-Out Portable Street Coverage - County Fire Police.....	32
Figure 56 Talk-In Portable In-Building Coverage - County Fire Police	32
Figure 57 Talk-In Portable Street Coverage - County Fire Police.....	32
Figure 58 Talk-Out Portable In-Building Coverage – County OEM	32
Figure 59 Talk-Out Portable Street Coverage - County OEM.....	32
Figure 60 Talk-In Portable In-Building Coverage - County OEM	32
Figure 61 Talk-In Portable Street Coverage - County OEM	32
Figure 62 Talk-Out Portable In-Building Coverage – County Prosecutor	32
Figure 63 Talk-Out Portable Street Coverage - County Prosecutor	32
Figure 64 Talk-In Portable In-Building Coverage - County Prosecutor	32
Figure 65 Talk-In Portable Street Coverage - County Prosecutor	32
Figure 66 Talk-Out Portable In-Building Coverage – County Sheriff	32
Figure 67 Talk-Out Portable Street Coverage - County Sheriff	32
Figure 68 Talk-In Portable In-Building Coverage - County Sheriff.....	32
Figure 69 Talk-In Portable Street Coverage - County Sheriff	32

Table of Tables

Table 1 Management and Organization Structure.....	9
Table 2 Collective Bargaining Agreements.....	10
Table 3 PSADP Staffed Positions.....	10
Table 4 PSADP Staffing Ranges.....	10
Table 5 Population to Peak Staff Comparison.....	11
Table 6 Operational Services	14
Table 7 PSADP Technology Capabilities	15
Table 8 Call Volume as Reported.....	16
Table 9 State Reported 9-1-1 Call Volume by PSADP	17
Table 10 County CAD Metrics Provided	17
Table 11 County 9-1-1 Calls Transferred Over 21-Day Period.....	18
Table 12 Current PSADP Building Information.....	19
Table 13 Equipment Inventory.....	20
Table 14 Employee Costs	21
Table 15 PSADP Salary Ranges.....	21
Table 16 Operational Costs.....	21
Table 17 Number of Events Where Police or Fire/EMS Units Were Dispatched	27
Table 18 Employee Cost per 9-1-1 Call, by PSADP	30
Table 19 Equipment, Maintenance Costs Per Call	30
Table 20 2009 Call Volume Evaluated	32
Table 21 Required Calltaker and Dispatcher Positions per Peak Shift.....	32
Table 22 Calculated Positions Required Per Shift, by Scenario	32
Table 23 Required Positions Per Shift with Required FTEs, by Scenario.....	32
Table 24 County Prior Expenditures.....	32
Table 25 Building Electrical Service Upgrade.....	32
Table 26 Structural Upgrade Budget.....	32
Table 27 Developed Consolidation Budget	32
Table 28 Budgetary Summary.....	32
Table 29 Cumberland County ULS Information.....	32
Table 30 Cumberland County ULS Information (continued)	32
Table 31 County Public Safety Radio Systems, by Frequency.....	32
Table 32 Summary Radio Inventory	32
Table 33 Narrowband Cost Estimate.....	32
Table 34 Coverage Simulation Color Gradient	32
Table 35 Coverage Analyses Summary	32
Table 36 Long Term RF High-Level Budget.....	32
Table 37 Cumberland County Region 28 700 MHz Channel Allotments	32
Table 38 Consolidation Models - Advantage and Disadvantages	32
Table 39 Proposed County Expenses	32
Table 40 Proposed County Expenses - Summary.....	32
Table 41 Annual Employee Cost Savings Calculations.....	32
Table 42 Annual Equipment and Maintenance Savings Calculations.....	32
Table 43 Post-Consolidation Annual Cost Savings	32

1 Executive Summary

The team of V-COMM, L.L.C. ("V-COMM") would like to extend our gratitude to Cumberland County and the Board of Chosen Freeholders for choosing to utilize our professional telecommunications engineering and governmental consulting services in this important endeavor. The purpose of this study is to determine if a Public Safety Answering Dispatch Point (PSADP) consolidation would be feasible for Cumberland County. It should be noted that V-COMM was not directed to any predetermined outcome and performed the analysis herein based upon a vast range of data and options to identify the most appropriate configuration to meet the County's specific needs. The goals set forth by V-COMM include increasing both the efficiency and grade of service for the County's emergency response system, as well as accounting for the evolution toward Next Generation 9-1-1 (NG 9-1-1) services.

Currently, the County is served by 3 local PSADPs and the County's Communications Center. Surveys were distributed to each Cumberland County PSADP and County Dispatch Center in order to gather the required data to perform a baseline assessment. In order to make sure all factors were considered, V-COMM incorporated input from all parties involved. Local meetings were held with each of the affected organizations allowing all parties to voice any questions or concerns related to both the current PSADP operations and any potential PSADP consolidation. Each existing PSADP site was visited to observe the current operations and assess facilities. The New Jersey Office of Emergency Telecommunications Service (NJ OETS) was also solicited for their input and views on existing PSADP consolidations that have already taken place in the State of New Jersey.

A central approach for V-COMM was to evaluate the opinions of the public safety community and make recommendations for the most efficient answering/dispatch center that could support these agencies, the individual first responders, and ultimately provide the best level of service for the future to the citizens of Cumberland County. We believe that the thoughtful consideration and candid opinions of all the first responder agencies have provided the basis for the consolidation of the Cumberland County answering/dispatch network to be the best for first responders in the future. Our observations of current conditions provided an overview that the prevailing sentiment is that shared services and consolidations will be increasingly necessary. Nevertheless, the circumstances remain that there are a complex set of operational and functional hurdles to be able to implement one comprehensive short-term solution.

After fully analyzing all available factors obtained throughout the study period from multiple sources, V-COMM is recommending that Cumberland County consider a phased consolidation of all PSADP functions within the County into one single consolidated PSADP as more specifically outlined herein. We



investigated the existing County Dispatch facility located on Bridgeton Avenue and have determined this is the best location within the County for this consolidated PSADP.

As part of the RF Analysis, V-COMM performed a full evaluation as to the County's status regarding the upcoming January 1, 2013 deadline set forth by the FCC Narrowbanding mandate. This mandate will require the County to upgrade all of its VHF SF systems to narrowband operation before the deadline. This will consist of reprogramming all base equipment and user equipment capable of narrowband operation and the replacement of any equipment not capable of narrowband operation. In order to develop a budget for the County's narrowband transition; a full radio make/model inventory was developed of all radio equipment, including pagers. It is recommended that the County immediately begin necessary planning for this project as the requirement to program and/or replace every single user radio under the County's jurisdiction will likely not be accomplished quickly.

While finances were a major concern of all the stakeholders, the most commonly voiced desire based on the meetings was to maintain/improve the quality of service to both the citizens of Cumberland County and the first responders. Consolidation at the County level will offer the opportunity to have a properly staffed PSADP that is capable of handling all calls, regardless of the agency or the location. The fact that financial efficiencies related to staffing, training and the facility would also be realized in the long term becomes an added benefit.

We invite all stakeholders to thoroughly read this entire document as it contains significant information regarding the current status of PSADP operations within the County today as well as an analytical and objective approach regarding our recommendations contained within.



2 Background

In August 2010, the Cumberland County Board of Chosen Freeholders (Board) developed a Request for Proposals (RFP) for consulting firms to perform a study that would evaluate the potential for a County-wide Public Safety Answering and Dispatch Point. The Board asked that the study review current emergency dispatch services, evaluate potential operational and financial savings, and identify a possible location for a consolidated center, if the recommendation was such.

In September 2010, V-COMM, L.L.C. Telecommunications Engineering was awarded the project. Since then, V-COMM has undertaken the collection of data from municipal dispatch centers, conducted multiple stakeholder and outreach sessions, held individual interviews with state, county and local officials, and evaluated future technological and facility needs.

This current study was conducted on the basis that V-COMM would elicit all opinions, consider current and future needs of the County 9-1-1 Communications Center and all involved Public Safety agencies, and recommend the best option for the future of County calltaking/dispatch services. The Board specifically wanted to ensure that this effort would identify the telecommunication requirements for emergency communications system upgrades and how the County might meet these projected technological demands.

V-COMM was also directed to identify the future costs associated with these requirements. However, V-COMM was not tasked to identify future funding sources or comment on the public policy issues of whether the County or local agencies should make these investments. The Board also specifically permitted V-COMM latitude in making its evaluation and recommendations, including the feasibility of any consolidated dispatch center and its potential location. V-COMM evaluated the current operations in each dispatch center, held dialogue with the staff and leadership, and identified which operations might be susceptible to consolidation or sharing.

The State of New Jersey consists of 21 counties, 19 of which have considered or acted on some level of consolidation to date.

2.1 Future Statewide NG 9-1-1 Considerations

The U.S. Department of Transportation (USDOT) “views the NG 9-1-1 System as an evolutionary transition to enable the general public to make a 9-1-1 “call” from any wired, wireless, or Internet Protocol (IP)-based device, and allow the emergency services community to take advantage of Enhanced 9-1-1 (E911) call



delivery and other functions through new internetworking technologies based on open standards.”¹

Currently, industry consortium and standards development organizations such as the Federal Communications Commission’s (FCC) Network Reliability and Interoperability Council (NRIC), National Emergency Number Association (NENA), the Internet Engineering Task Force (IETF), and the Alliance for Telecommunications Industry Solutions (ATIS) Emergency Services Interconnection Forum (ESIF), are working to develop the requirements and future standards for public safety systems, 9-1-1, and other emergency services networks. USDOT will utilize their work to progress an overall NG 9-1-1 system architecture for deploying IP-based emergency services to support the ability to handle 9-1-1 calls regardless of the originating device. Additionally, the system is intended to provide a much more efficient mechanism for first responders and PSADPs to request help, share incident data between agencies and handle other types of information, such as location, text messages, video, and images along with voice as part of the call.

These initiatives, being taken at the federal level, will require the State of New Jersey to implement new technologies and systems across each of the Public Safety Answering Points and Public Safety Dispatch Points. Without consolidation at some level, the overall cost to support these systems could become unmanageable. Without some level of consideration to these costs, some communities may fall behind as a result of their financial inability to purchase and maintain these systems. While certain funding may be available, it would likely be taxed beyond the ability to maintain status quo.

These efforts to develop and deploy real working NG 9-1-1 networks are already underway in several regions throughout the US. While still limited in nature, they represent the future capabilities of NG 9-1-1 services. The State of New Jersey is looking to incorporate this technology in five plus years.

Given the proliferation of mobility, convergence, and the use of IP based communications systems, the limitation of the current 9-1-1 systems are being exposed. New systems are required to support these new technologies.

2.2 S-45

In order to manage the cost associated with these new systems, the State of New Jersey adopted Senate Bill 45 (S-45), which provided the framework for the consolidation of services. The Office of Information Technology’s (OIT) Office of

¹ Intelligent Transportation Systems, US Department of Transportation, Next Generation 9-1-1 (NG 9-1-1) System Initiative, Concept of Operations. April 6, 2007 Version 2.0

Emergency Telecommunications Service (OETS), through the E911 commission, has set forward an initiative to reduce the overall number of PSADPs throughout the state. This plan is based on the immediate effort to improve overall service while maintaining current cost, and to minimize the potential increase in cost as these new networks are deployed.

Senate Bill 45 (S-45), addresses the need for the consolidation of Public Safety Answering Points² (PSAPs), stating “The State plan shall require the consolidation of PSAPs as appropriate, consistent with revisions in the plan to upgrade the enhanced 9-1-1 system and shall condition the allocation of moneys dedicated for the operation of PSAPs on the merging and sharing of PSAP functions by municipalities, counties and the State Police, consistent with the revised plan.” The Bill also states that “The Treasurer may establish, by regulation, a 9-1-1 call volume minimum that may be utilized as a factor in determining which PSAP functions are to be consolidated under the State plan.” Furthermore, “The State plan shall limit the use of sworn law enforcement officers to provide dispatch services and the office shall condition the receipt of moneys dedicated for the operation of PSAPs on the limited use of sworn law enforcement officers, except for officers returning to active duty from an injury or other physical disability.”

Without some level of consolidation, funding would need to be increased for each of the existing PSADPs to secure the necessary infrastructure and to build out the interconnection facilities to the state operated network. The funding increases could only continue to be maintained through continued state, local or federal grants, bonds issuance, user fees, annual contributions from supported agencies or implementation or shifting of taxes. With the increased pressures to maintain or reduce cost, federal, state, and local grants may become much less obtainable, leaving less desirable alternatives to secure the necessary funding.

² We have utilized the term PSADP throughout this document as the centers which are deployed throughout the County provide both answering and dispatch functions. In State Bill S-45, the State refers to PSAPs as indicated above, however, it should be noted that the intent of S-45 relative to this study would include both answering and dispatch functions.

2.3 Description of Current PSADP Environment

Currently, there are 3 Public Safety Answering Points (PSADPs) in Cumberland County in addition to the County 9-1-1 Communications Center. Each of these centers are under the direction of the local police departments and handle emergency call taking and dispatching functions for their respective departments.

The County 9-1-1 Communications Center PSADP currently answers **all** wireless 9-1-1 **calls** placed within the County and all landline 9-1-1 calls placed within the County with the exception of those originating in Vineland. Calls are **transferred** to/from other PSADPs as follows:

- To Bridgeton PD PSDP: All calls requiring Bridgeton PD units to be dispatched
- To Millville PD PSDP: All calls requiring Millville PD units to be dispatched
- To Vineland PD PSADP: All wireless calls requiring Vineland PD and/or EMS units to be dispatched
- From Vineland PD PSADP: All calls originating in Vineland requiring Vineland FD units to be dispatched
- To NJ State Police Centralized Dispatch: All calls requiring State Police units to be dispatched, includes standard police emergencies beyond jurisdiction of Cumberland County's three police departments of Bridgeton, Millville and Vineland.

The County 9-1-1 Communications Center PSADP also dispatches units for various departments across the County, as follows:

- All 27 Fire Stations within Cumberland County
- Nine (9) EMS Squads, the only exception being Vineland EMS
- County Sheriff's Department (forthcoming in 2011)
- EMS ALS Services throughout the County, should they be required

The Vineland PD PSADP currently answers all landlines 9-1-1 calls originating in Vineland. Calls are transferred to/from other PSADPs as follows:

- To County 9-1-1 Communications Center PSADP: All calls originating in Vineland requiring Vineland FD units to be dispatched
- From County 9-1-1 Communications Center PSADP: All wireless calls requiring Vineland PD and/or EMS units to be dispatched

The Vineland PD PSADP also dispatched units for the Vineland Police and EMS (BLS) Departments. Additional PSDPs operate at the Bridgeton and Millville Police Departments with each dispatching units for their respective department.

The Bridgeton PD PSDP dispatches all units for the Bridgeton Police Department. This facility receives 9-1-1 calls as transfers from the County Communications Center PSADP, no 9-1-1 calls are directly answered by this



facility. However, this facility does receive the majority of its emergency calls via 10-digit dial, as opposed to transferred 9-1-1 calls from the County PSADP.

The Millville PD PSADP dispatches all units for the Millville Police Department. This facility also receives 9-1-1 calls as transfer from the County PSADP, with no 9-1-1 calls being directly answered at this facility. However, similar to that the other local PSADPs, this facility receives the majority of its emergency calls via 10-digit dial, as opposed to transferred 9-1-1 calls from the County PSADP.

Within Cumberland County, there are three municipality police departments, which correspond to the local PSADPs, Vineland, Millville, and Bridgeton. Any emergency call, 9-1-1 or 10-digit dial, requiring the dispatching of police services outside of these municipalities is transferred to the New Jersey State Police (NJSP) PSADPs at either Bridgeton or Port Norris.

A common practice seen reported by the smaller local PSADPs was the lack of a complete backup plan for the calltaking and dispatch of each respective PSADP's public safety services. There was not always a backup SOP and/or equipment in place to effectively automatically transfer a 9-1-1 call that cannot be answered within the allotted time to another PSADP, or transfer the complete calltaking and/or dispatching processes to another facility in the event of a catastrophic failure. The Vineland PSADP backup plan is to fall back to the County PSADP. The County PSADP's backup plan enables unanswered calls or all 9-1-1 calls (in the event of complete site/system failure) to be automatically transferred to the Salem County Consolidated PSADP. Dispatch operations during a similar event can be maintained via the County's mobile Field Communication Unit.

3 Task Specific Activities, Findings and Recommendations

3.1 Task 1 - Baseline Assessment

An operations and technical information survey, which is attached as Appendix A, was distributed to the 9-1-1 Division Head Don Philippi of the Cumberland County Department of Emergency Services, Sergeant Christopher Fulcher of the Vineland Police Department, Police Chief Mark Ott of the Bridgeton Police Department, acting Police Chief Thomas Haas of the Millville Police Department. The purpose of this survey was to secure information regarding the operations, technical equipment, and other relevant information required as part of this analysis.

Following is a complete list of all PSADPs that received the survey:

Cumberland County 9-1-1 Communications Center
Vineland Police Department
Bridgeton Police Department
Millville Police Department

After a 2 week extension, all departments returned completed surveys by the extended date set forth at the beginning of this project. It was anticipated that there would be varying levels of information returned with some agencies providing more detail than others. Therefore, to further assist in the assessment of consolidation efforts, visits were made to each of the 4 PSADPs to review survey results, view the current operations, and assess facilities. V-COMM also conducted multiple calls with agencies during the project on an as needed basis to allow for continued input, follow-up, and clarification. All of the PSADPs were responsive and forthcoming in their submittal of data and expression of concerns regarding a potential consolidation. As expected, there was a wide array of concerns regarding the current and future state of operations. Depending on the agency being represented and its serving PSADP, there were various comments, questions and concerns regarding the consideration of PSADP consolidation. These are documented below.

The following sections of 3.1 were delivered as Task 1 under separate cover. They are duplicated here for completeness of the deliverable and ease of reference for Task 2 through Task 4 deliverables.

3.1.1 Management and Organization Structure

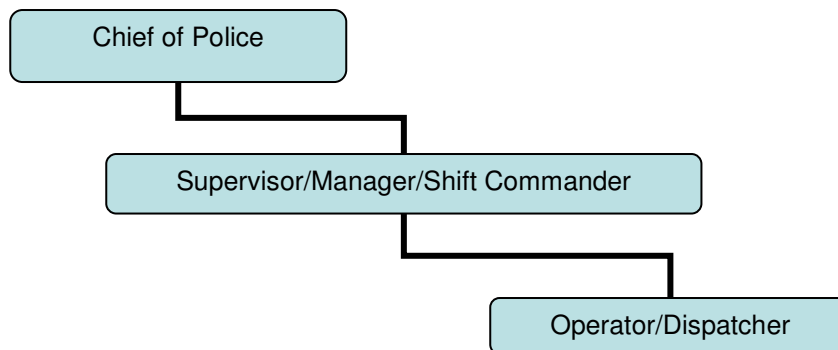
In Cumberland County, there are 3 Public Safety Answering/Dispatch Points (PSADPs) at Municipality Police Departments and 1 PSADP at the County 9-1-1 Emergency Communications Center. Of the 4 PSADPs surveyed, 2 have Supervisory/Manager positions and 1 has a Shift Commander position. Each PSADP employs all civilian Calltakers/Dispatchers, while only 1 PSADP has civilian Supervisors/Managers or Shift Commander positions. In each local department's case, the Shift Commander/Shift Supervisor is a uniformed officer performing other duties. Based on information provided by the agencies, a table outlining current organizations including Supervisors/Managers and staff was assembled and can be found below Table 1.

Table 1 Management and Organization Structure

PSAP	Supervisors/ Managers	Shift Commanders	Full Time PSAP Operators/Dispatchers	Part Time PSAP Operators/Dispatchers	Clerical Support
Cumberland County Comm Center	3	4	16	4	1
Vineland Police Department	1	0	18	0	0
Millville Police Department	0	0	6	0	0
Bridgeton Police Department	0	1	6	0	0

Based upon the survey results, the majority of the PSADPs in Cumberland County, the Operators/Dispatchers report directly back to Supervisors/Managers/Shift Commanders, who then report back to the Chief of Police. In the case of the County Communications Center, the Chief of Police is replaced by Division Head / 9-1-1 Chief. This is a typical 3-Tier PSADP Organization, as shown in Figure 1 below.

Figure 1 Typical³ PSADP Management and Organization



³ For Cumberland County Center, Division Head / 9-1-1 Chief replaces "Chief of Police"

Three of the four PSADP reported existing Collective Bargaining Agreements with their employed civilian Calltaker/Dispatchers. These agreements are shown below in Table 2.

Table 2 Collective Bargaining Agreements.

PSADP	Collective Bargaining Agreements
County	UAW - United Auto Workers Local 2327
Vineland PD	International Brotherhood of Electrical Workers (IBEW) Unit 2
Millville PD	American Federation of State, County and Municipal Employees (AFSCME) Council 18

Note: Data taken from Cumberland County Public Safety Answering Point Survey

3.1.2 Staffing Findings

The following staff findings were taken from the Cumberland County Public Safety Answering Point Survey unless otherwise stated. For all PSADPs combined, there were a total of 56 full time and 4 part time workers throughout the County with a peak of 13 Operators/Dispatchers per shift. Please refer to Table 3 and Table 4 below which shows the reported position breakdown and ranges of PSADP employees.

Table 3 PSADP Staffed Positions

PSAP	Operators/Dispatchers on duty during the Day Shift	Operators/Dispatchers on duty during the Evening Shift	Operators/Dispatchers on duty during the Night Shift
Cumberland County Comm Center (1)	5	5	5
Vineland Police Department	4	5	4
Millville Police Department	1	1	1
Bridgeton Police Department	1	2	1

(1) The County operates using 2 - 12 hour shifts, of 5 team members each shift; the data has only been "presented" as 3 shifts in the above

Table 4 PSADP Staffing Ranges

Title	Number of Full Time Employees (Min)	Number of Full Time Employees (MAX)	Number of Part Time Employees (MIN)	Number of Part Time Employees (MAX)
PSAP Operators/Dispatchers	6	18	0	4
Shift Commanders	0	4	0	0
Supervisors/Managers	0	3	0	0
Information Systems	0	0	0	0
Radio Technical Support	0	0	0	0
Clerical Support	0	1	0	0

Note: Staff Counts taken from Cumberland County Public Safety Answering Point Survey

A comparison was made of the local population served by each PSADP to the peak number of Operators/Dispatchers on duty. The local population data as



taken from Pitney Bowes TargetPro® demographics software based on US Census data with projections; which is shown below in Table 5 with the Population Ratio for the corresponding PSADP. The Population Ratio was calculated by taking the population served for each PSADP and dividing this amount by the peak shift quantity of Operators/Dispatchers on duty as reported via the Cumberland County Public Safety Answering Point Survey. The amount of population per peak shift Operator/Dispatcher ranged from 8,682 to 28,790. While these staffing ratios vary significantly, it is noted that these ratios change dramatically with minimal change in staffed personnel when working with low staffing quantities as in Millville and Bridgeton PSADPs.

Table 5 Population to Peak Staff Comparison

PSAP Name	Total Population to Operators On Duty, based on Calltaking	Ratio: Pop. to Peak Operators On Duty, based on Calltaking	Total Population to Dispatchers On Duty, based on Dispatching	Ratio: Pop. to Peak Dispatchers On Duty, based on Dispatching
Cumberland County Comm Center	96,678	19336 : 1	156,149	31230 : 1
Vineland Police Department	59,471	11894 : 1	59,471	11894 : 1
Millville Police Department	0	0 : 1	28,790	28790 : 1
Bridgeton Police Department	0	0 : 1	24,478	12239 : 1

Note: Calltaking populations and ratios calculated with respect to landline 9-1-1 calls, 100% of wireless calls originating within the County are routed to the County PSADP. Staff Counts taken from Cumberland County Public Safety Answering Point Survey. Population counts taken from Pitney Bowes TargetPro® demographics software.

3.1.3 Operational Services

Each PSADP reported that it performs both Answer and Dispatch functions; although they do so in varying capacities. A Call Flow diagram is shown below in Figure 2; which includes 9-1-1 and Local Number emergency call taking and countywide dispatching.

The County 9-1-1 Communications Center answers 100% of the wireless 9-1-1 calls in Cumberland County and all of the landline based 9-1-1 calls with the only exception being those originating in Vineland; which are routed to the Vineland PSADP. The County Communications Center is also responsible for the dispatching of all Fire Departments throughout Cumberland County (27 stations), nine (9) EMS squads (BLS), and countywide ALS Services. The County Communications Center is currently configuring for the dispatching of the County Sheriff's Department in 2011.

Inbound 911 calls requiring other services to be dispatched are transferred to other PSADPs as follows:

- Calls requiring Bridgeton Police Department to be dispatched to the Bridgeton PSDP.
- Calls requiring Millville Police Department to be dispatched to the Millville PSADP.
- All wireless 9-1-1 calls that require either Vineland Police Department or Vineland EMS (BLS only) to be dispatched are transferred to the Vineland PSADP.
- All 9-1-1 calls that require Police dispatch in areas beyond the reaches of the Vineland, Millville, and Bridgeton Police Departments are transferred to the New Jersey State Police as the appropriate agency having Police jurisdiction within Cumberland County outside of Bridgeton, Millville, and Vineland.

In addition to transfers of 9-1-1 calls out of the County PSADP to other PSADPs, the County PSADP receives transferred landline based 9-1-1 calls that are originally routed to the Vineland PSADP if the Vineland Fire Department is required to be dispatched.

In addition to 9-1-1 Emergency Calls, the survey process revealed that each local municipality PSADP in Cumberland County has reported receiving a significant, and non-typical (V-COMM finding), amount of emergency calls (calls resulting in a dispatched event) via their respective local (usually non-emergency) number. Each PSADP has reported this method of emergency call receipt as responsible for the majority of their dispatched events.



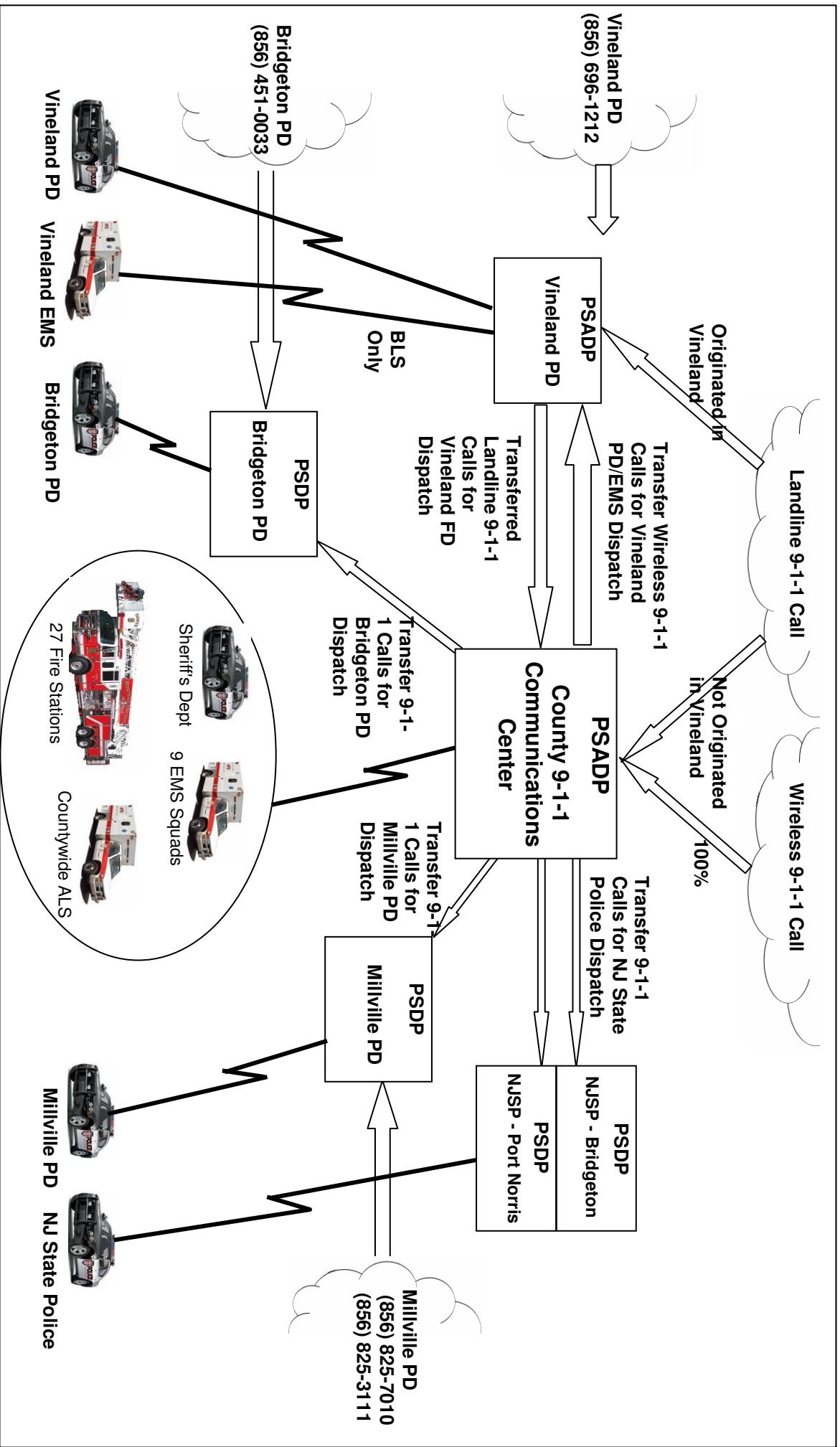


Figure 2 Current Call Flow and Dispatch Operations Diagram

Each of the local PSADPs combined the Calltaker and Dispatcher roles into a single employee's role. Meaning, each Calltaker/Dispatcher at the local PSADPs answers Emergency calls AND dispatches appropriate personnel for that event. The County Communications Center separates these roles using independent Calltaker and Dispatcher personnel. However, all County console positions maintain 100% capability and all County personnel are cross-trained and rotate across all positions and roles. These Operational Services, as obtained via the Communications Survey, are detailed in Table 6 below.

Table 6 Operational Services

PSADP	PSAP performs both Answer and Dispatch functions	Number of stations PSAP is able to perform both Answer and Dispatch functions	Agencies covered by PSAP	PSAP able to provide tactical dispatcher	Pre-arrival medical instructions provided	PSAP has capability for backup dispatch
Cumberland County Comm. Center	Yes	7	Sheriff (TBD 2011) County FD EMS BLS EMS ALS All 911 Police – Answer Only	Yes	Yes	Yes, Mobile Field Command Unit
Vineland Police Department	Yes	5	Vineland PD Vineland EMS BLS Vineland Fire-Answer Only	Yes	Yes	No
Millville Police Department	Yes	2	Millville PD	Yes	No	Mobile Command Unit
Bridgeton Police Department	Yes	2	Bridgeton PD	No	No	No

Each local PSADP reported the services routinely supplied by their Calltakers/dispatchers to include but not necessarily be limited to answer phones, dispatch & monitor calls, run warrant checks, NCIC entries, DMV look-ups, NCIC hit confirmations, criminal history checks, and notifications for major crimes/personal call-ins. Additional duties that some local Calltakers/dispatchers support include public greeter contact, front door answer, and employee time sheets. Bridgeton and Millville PSADPs reported their Calltakers/dispatchers to routinely be the only staff jailors and staff in the building on duty at times.

V-COMM gathered further information outlining the technical operations and capabilities of the service provided by each PSADP. This information was not used to identify any operations as insufficient; instead, it was used to identify the feature set that would be required of any proposed consolidated operation. Table 7 shows each capability and its status for each of the PSADPs.

Table 7 PSADP Technology Capabilities

PSAP Name	Cumberland County Comm Center	Vineland Police Department	Millville Police Department	Bridgeton Police Department
Notify dispatchers of response unit status	Available & Used	Available & Used	Available & Used	Available & Used
Notify dispatchers of past # of 911 calls from the number calling	Available & Used	Available & Used	Available & Used	Available & Used
Notify dispatchers of details of past 911 calls from the number calling	Available & Used	Available & Used	Available & Used	Available & Used
Notify dispatchers of alerts and warnings for a particular phone number	Available & Used	Available & Used	Available & Used	Available & Used
Notify dispatchers of events in proximity to each other	Available & Not Used	Available & Used	Available & Not Used	Available & Not Used
Ability to know what call has been ringing the longest	Available & Used	Available & Used	Available & Used	Available & Used
Distinctive ringing or visual indicators for 911 calls	Available & Used	Available & Used	Available & Used	Available & Used
Speed dial	Available & Used	Available & Used	Available & Used	Available & Used
Last number redial	Available & Used	Available & Used	Available & Used	Available & Used
Caller ID on administrative lines	Not Available	Available & Used	Available & Used	Available & Used
Automatically feed ALI information into CAD or other system	Available & Used	Available & Used	Available & Used	Not Available
Show map of wireless calls	Available & Used	Not Available	Available & Used	Available & Used
Show map of wireline calls	Available & Used	Available & Used	Not Available	Available & Used
Ability to vary dispatch protocols by map location	Available & Used	Available & Not Used	Available & Used	Not Available
Automatically communicate with your agency's incident record system	Available & Used	Available & Used	Available & Used	Available & Used
Automatically query criminal justice information systems	Available & Used	Available & Used	Available & Used	Available & Used
Communicate with mobile terminals in law enforcement vehicles	Available & Not Used	Available & Used	Available & Used	Available & Used
Communicate with mobile terminals in fire vehicles	Available & Used	Not Available	Not Available	Not Available
Communicate with mobile terminals in EMS vehicles	Available & Used	Not Available	Not Available	Not Available
Automatically communicate vehicle location	Available & Used	Available & Used	Available & Used	Available & Used

3.1.4 Call Volumes, Incidents, Reporting Methods

As part of the Cumberland County PSAP survey, each PSADP developed and delivered their respective call volume metrics for the total yearly 9-1-1 calls received, administrative calls and a category for other types of calls and/or incidents. Included with the response data is the quantity of Events resulting in Police and/or Fire/EMS dispatches corresponding to each type of call. These statistics are documented below in Table 8.

Table 8 Call Volume as Reported⁴

PSAP	9-1-1			Admin			Other		
	Calls	Events Police Dispatched	Events Fire/EMS Dispatched	Calls	Events Police Dispatched	Events Fire/EMS Dispatched	Calls	Events Police Dispatched	Events Fire/EMS Dispatched
Cumberland County Comm Center	78,853	0	23,247	N/A	N/A	N/A	N/A	N/A	N/A
Vineland Police Department	22,771	5,465	799	270,758	51,909	7,599	0	15,670	2,295
Millville Police Department	691	691	N/A	138	N/A	N/A	29,634	N/A	N/A
Bridgeton Police Department	N/A	N/A	N/A	2,811	N/A	N/A	40,374	N/A	N/A

In addition to the 9-1-1 Call Volume data provided by the PSADPs, V-COMM acquired 9-1-1 Call Volume metrics by PSADP from the New Jersey State Office of Emergency Telecommunication Services (NJOETS) which operates within the New Jersey State Office of Information Technology (NJOIT). These results can be used in comparison to the provided data and analysis of reported 9-1-1 Call Volumes. The data set provided by the NJOETS is shown below in Table 9.

⁴ All numbers in this table reflect reported values from original survey responses. Further analysis and correspondence with the various agencies refined these values and will be presented in the remaining project Tasks.

Table 9 State Reported 9-1-1 Call Volume by PSADP

Month	PSADP		
	County	Vineland	Millville
Jun-10	6,310	1,469	210
May-10	6,348	1,447	203
Apr-10	5,712	1,365	227
Mar-10	5,160	1,184	161
Feb-10	5,426	1,147	160
Jan-10	6,041	1,340	162
Dec-09	6,728	1,466	199
Nov-09	5,931	1,342	190
Oct-09	6,237	1,421	212
Sep-09	6,311	1,410	203
Aug-09	7,122	1,395	216
Jul-09	7,171	1,659	253
Totals =	74,497	16,645	2,396

The County provided additional data to break their provided Call Volumes and Dispatched Events down to a month-by-month basis, shown below in Table 10.

Table 10 County CAD Metrics Provided

Month	9-1-1 Calls		CAD Incidents Entered		Business Call (Pager Log and Admin Log Entries)	
	2009	2010	2009	2010	2009	2010
January	5,881	6,161	1,876	1,881	946	921
February	5,425	5,498	1,653	1,777	824	827
March	5,905	6,160	1,810	1,946	1,059	940
April	6,157	6,198	1,908	1,833	986	872
May	6,706	6,926	1,959	2,096	951	968
June	7,341	6,900	2,108	2,030	1,029	834
July	7,327	7,634	2,134	2,284	1,033	922
August	7,366	7,096	2,091	2,079	1,067	1,076
September	6,870	6,637	1,846	1,897	876	1,052
October	6,487	6,433	2,035	1,973	955	997
November	6,232	-	1,823	-	835	-
December	7,156	-	2,004	-	925	-
Total	78,853	65,643	23,247	19,796	11,486	9,409
Average	6,572	6,565	1,938	1,980	958	941

The County also had their telco provider develop a metric of calls taken and transferred to other PSADPs, including the three local PSADPs included in this study. The results are shown below in Table 11. It was noted that this metric is not readily available to the County as it is not supported/provided by their CAD and it was provided to the County via its telco provider, and described by the telco as a tedious task. This resulted in a small sample size relative to the 365-day quantities but did provide an accurate basis for 9-1-1 transfer volumes.

Table 11 County 9-1-1 Calls Transferred Over 21-Day Period

To PSAP	To PSAP #	Calls	% of Total County Calls
Vineland	98	280	10.66%
Millville	114	214	8.15%
Bridgeton	N/A	151	5.75%
Buena Vista	50/51	284	10.81%
Gloucester County	3	8	0.30%
Salem County	59	9	0.34%
Egg Harbor City	33	2	0.08%
Middle Township	9	1	0.04%
Buena Boro	37	1	0.04%
Poison Control	800-222-1222	1	0.04%

3.1.5 PSADP Current Operational Facilities

This study evaluated each facility housing current PSADPs as a potential location to house any proposed consolidated operations. This consisted of gathering information regarding the current setup at each PSADP with respect to the current equipment size, condition, and potential for expansion applied to each building, telecommunication connections, and building power system. The building information gathered via the Cumberland County Communications Inquiry is shown below in Table 12.

Table 12 Current PSADP Building Information

PSAP Name	Cumberland County Comm Center	Vineland Police Department	Millville Police Department	Bridgeton Police Department
What year was the building built?	1993	1967	1985	?
When was the building last renovated (Month/Year)?	N/A	May-93	N/A	Apr-10
How many operable stations exist?	7	5	2	2
Is the facility / building capable of being expanded?	Yes	Yes	No	No
Are there any planned updates to the facility / building?	Yes	No	No	No
If yes, please explain	Expansion study completed	N/A	N/A	N/A
Current telecommunication connections? (i.e. DS0, voice trunk, etc.) If additional space is required please attach an additional page	Voice Trunked and two fdda data circuits, see attached	2 ANI/ALI Modems, 6-911 Trunk Line, Multiple Avaya In-house phone lines	Awaiting answers from IT at Verizon	3 Voice Trunk
Are you able to easily expand with additional connections?	Yes	Yes	Unknown	No
Does the building power plant have the ability to expand?	Yes(1)	Yes	Don't Know	No
Does the building have back up power?	Yes	Yes	Yes	Yes

(1) Clarified from "No" – the current building power supply is at a capacity; but power plant can be expanded

In addition to the building infrastructure, a catalog of equipment comprising each current PSADP call answering and dispatching operation can be found in Table 13. This information was based primarily on the on-site audits.

Table 13 Equipment Inventory

PSAP	Equipment Vendor	Equipment Model	Equipment Description	Qty
Cumberland County Comm Center	Zetron	Model 3200	911 Answering Equipment	7
Cumberland County Comm Center	Motorola	CentraCom Elite	Dispatch Console	7
Cumberland County Comm Center	Voiceprint		Logging Recorder	1
Cumberland County Comm Center	Generac	120/240V,625A	Generator	1
Cumberland County Comm Center	APC	Symmetra	UPS	1
Cumberland County Comm Center	QED		CAD	7
Cumberland County Comm Center	QED		RMS	7
Cumberland County Comm Center	Motorola	Astro	Interop Radio	3
Cumberland County Comm Center	Harris (Tyco)	NetworkFirst	Gateway Equipment	1
Cumberland County Comm Center	Digitize	Model 3505	Alarm Monitoring Computer	1
Vineland Police Department	Zetron	Model 3200	911 Answering Equipment	5
Vineland Police Department	Zetron	Model 4118	Dispatch Console	5
Vineland Police Department	Eventide		Logging Recorder	1
Vineland Police Department	Cummings		Generator	1
Vineland Police Department	Powerware	30kVa	UPS	1
Vineland Police Department	NewWorld		CAD	1
Vineland Police Department	NewWorld		RMS	1
Vineland Police Department	Motorola	Moscad	SCADA	1
Millville Police Department	Zetron	Model 3200	Call Answering Equipment	2
Millville Police Department	Zetron	Model 4118	Dispatch Console	2
Millville Police Department	ASC	Marathon Advanced	Logging Recorder	1
Millville Police Department	Zetron	Model 3202	Instant Recall Recorder	2
Millville Police Department	Zetron	Model 4113	Console Expander	2
Millville Police Department	Zetron	Model 3200	ALI Display	2
Millville Police Department	Zetron	Model 3031	Line Printer	2
Millville Police Department			Generator	1
Millville Police Department	Archonix	XCAD	CAD	1
Millville Police Department	Archonix	XRMS	RMS	1
Millville Police Department	Archonix	Xmobile	Subscriber	Unk
Millville Police Department	Radtrack	Radtrack	AVL	1
Millville Police Department	Motorola	MCS2000(?)	Interop Radio	1
Millville Police Department	Motorola	P1225	Interop Radio	1
Bridgeton Police Department	Toshiba PBX		Call Answering Equipment	2
Bridgeton Police Department	Motorola	CommandStar Lite	Dispatch Console	2
Bridgeton Police Department	NICECALLO	Focus III	Logging Recorder	1
Bridgeton Police Department	APC	2200	UPS	1
Bridgeton Police Department	APC	750XL	UPS	1
Bridgeton Police Department	Impact	VCAD	CAD	1
Bridgeton Police Department	Impact	Impact RMS	RMS	1

3.1.6 Operations and Maintenance Support, and Costs

Using information gathered as part of the Cumberland County Communications Inquiry, V-COMM developed Table 14 through Table 16 to outline the costs associated with the current PSADP operations. Table 14 contains salaries for each employee tier, averaged by PSADP, and the total employee expenses born by the respective municipal entity for each PSADP.

Table 14 Employee Costs

PSAP	Avg Supervisor/Manager/Shift Commander Salary	Avg Operator/Dispatcher Salary	Total Employee salary, overtime, benefits, training and allowances
Cumberland County Comm Center	\$74,950.00	\$59,601.00	\$1,655,750.00
Vineland Police Department	Not given(1)	\$54,200.70	\$975,612.55
Millville Police Department	Not given(1)	\$47,791.05	\$448,243.34
Bridgeton Police Department	\$100,000.00(1)	\$60,000.00	\$243,700.00(2)

(1) All reported duties were performed by uniformed personnel

(2) Clarified – This figure did not include benefits

The salaries ranges, as reported by each PSADP in the Cumberland County Communication Inquiry, are shown below in Table 15. This table shows the ranges currently in place across the County for similar positions. An average of all reported salaries for each position is included.

Table 15 PSADP Salary Ranges

Title	Minimum Average Salary (Including benefits)	Average Salary (Including benefits)	Maximum Average Salary (Including benefits)
Supervisor/Manager salary/Shift Commander	\$74,950	\$87,475	\$100,000
Operator/Dispatcher	\$47,791	\$55,398	\$60,000

In addition to existing expenses due to the employees of each PSADP, each PSADP incurs yearly expenses as a result of maintenance contracts in place to support the equipment necessary to provide required services. These expenses, shown below in Table 16, include expenses incurred from the support of radio vendor contracts, building and facility maintenance and upgrades (does not include utilities).

Table 16 Operational Costs

PSAP	Facility Use and Maintenance	Total Equipment and Maintenance	Total Employee Salary
Cumberland County Comm Center	\$16,690	\$98,704.00	\$1,655,750.00
Vineland Police Department	Not available	\$28,280.00	\$975, 612.55
Millville Police Department	Not available	\$45,387.84	\$448,243.34
Bridgeton Police Department	Not available	\$20,000.00	\$243,700.00



3.2 Task 2 - Operational Needs Analysis

3.2.1 Stakeholder Comments/Concerns

As part of the interview process, V-COMM held meetings with each current PSADP in the County to clarify answers to the survey and discuss operations with the agencies. During these meetings, a number of agency stakeholders expressed concerns regarding the current PSADP operations and/or operations if consolidation were to occur. These concerns are not specifically evaluated by V-COMM; however, many are addressed as part of our analysis and recommendations. They are included herein as reference to the thoughts expressed by some of those affected by any proposed PSADP consolidation:

- Desire of seamless, unified communications and conventions, i.e. – “All or Nothing” approach with respect to individual services and/or areas.
- 9-1-1 Call transfers between PSADPs require the repetition between PSADPs of information gathered, which takes extra time.
- Some PSADP personnel fill multiple roles, not all of which would go away with consolidation.
- Dispatchers answer calls not related to 9-1-1 (i.e.-auto-attendant after hours transfers). Administrative calls would still require calltaking personnel on a 24/7 basis.
- Throughout the County, the majority of emergency calls are received via 10-digit dials, NOT 9-1-1
- Police Stations are and have been Safe Havens and places of shelter for walk-ins and victims in need of assistance.
- The 10-digit dial function is important to local crime fighting as it is commonly used as a tool for information sharing by citizenry more inclined to use a local number.
- Wireless 9-1-1 Calls can go through a “re-bid” process to get position updates on the wireless caller. However, since all wireless calls go to the County, for a Police event in Vineland, Millville, or Bridgeton (in which the original call is transferred) the re-bid information is not usable.
- Local municipalities have recently invested significant funds into their PSADP operation that consolidation would render useless.
- New technologies already in place and planned at all PSADPs should be implemented at any consolidation operation so no functionality and/or investigative methods are lost.
- Smaller PSADP operations enable dispatchers to have closer relationship with officers, including the potential to know strengths and weaknesses of independent officers.
- This Dispatcher-Officer relationships in place builds trust and developed anticipation of needs and team coordination.

- Existing relationships Dispatchers & Officers have with the public (i.e. – tipsters) will be compromised by changing of the 10-digit dialing, effectively removing the “eyes and ears” of the dispatchers and officers
- Anticipating a decrease in the level of service, the public could see a decision to consolidate as a pure political (\$) move, not in best interest of the Police Departments and/or the protection of the public.
- With a move to consolidation effectively removing many tools used by officers in the field, officer safety will be threatened, resulting in endangered officers and a decrease in the level of protection provided by the officers.
- The County Communications Center’s experience is specific to the dispatch of Fire and EMS service, not Police services. The significant difference between these services cannot be overcome easily.

3.2.2 PSADP Data Statistics

There was some discrepancy in the inclusions used to develop the call volume numbers in response to the Cumberland County Communications Survey. However, V-COMM was able to use the 2009 data provided by the County to develop more reliable data with consistent known inclusions, shown in Table 20, to be used in the calculations of this Operational Needs Analysis. From this resultant set of call volume data, the following statistical facts were assembled based on 2009 data:

- Combined Total Amount of Calls received by the PSADPs 402,542
- Highest Total Number of Calls received by a PSADP 239,199
- Lowest Total Number of Calls received by a PSADP 39,360
- Total Calls Resulting in Police units being dispatched 139,651
- Total Calls Resulting in Fire/EMS units being dispatched 33,940

The following 9-1-1 Call Data was based on information received from the New Jersey State OETS and the population data taken from the Pitney Bowes TargetPro™ demographic software. This data set only includes calls received by dialing 9-1-1 and does not take into account any 10-digit dial emergency calls received at the PSADPs.

- Total Amount of 9-1-1 Calls received by the PSADPs 112,584
- Highest Monthly Volume of 9-1-1 Calls occurred during July 9,083
- Lowest Monthly Volume of 9-1-1 Calls occurred during March 6,505
- Highest Monthly Percent of the Population to call 9-1-1 was during July 9.3%
- Lowest Monthly Percent of the Population to call 9-1-1 was during March 5.97%
- Highest Total Employee Cost per 9-1-1 Call for a PSADP \$79.38



- Lowest Total Employee Cost per 9-1-1 Call for a PSADP \$21.00

The following Equipment/Maintenance costs are based on data provided by the PSADPS in the survey:

- Highest Equipment/Maintenance Cost per 9-1-1 Call for a PSADP \$7.06
- Lowest Total Employee Cost per 9-1-1 Call for a PSADP \$1.24

Figure 3 shows the Total Calls received by each PSADP with the subset of the calls that were received via 9-1-1 dials. This figure illustrates the unique scenario evident throughout the County where a significant portion of the emergencies are reported via the local PD non-emergency phone numbers, a.k.a. 10-digit dials. The percentage of calls via 10-digit dials versus 911 dials bucks national trends. Potential reasons for this were revealed during the agency visits. The “local” people are knowledgeable that a 911 dialed call for police emergency will result in a transfer (delay) of the call to their local PSADP and interaction with a County Calltaker intermediary. This has, especially for smaller PSADP staffs, lead to the development of personal caller-dispatcher “relationships”. In addition, 10-digit phone answering PBX systems allow, or even encourage, calls ending up at the dispatch (to a human voice) via “zeroing out” on the auto attendant and/or not encouraging a “hang-up and dial 911” prompt. These circumstances have subverted the “911” trends seen elsewhere. Since “911” allows for a greater depth and breadth of information available to Calltakers/dispatchers (via ANI/ALI) versus simple caller ID of a 10-digit dial (which may not always be available). In addition, since 911 dials are the encouraged avenue for emergency calls and funded accordingly, these practices should be discouraged and changed. Note the equivalent numbers for the County Communications Center are due to the County not operating⁵ a non-emergency number.

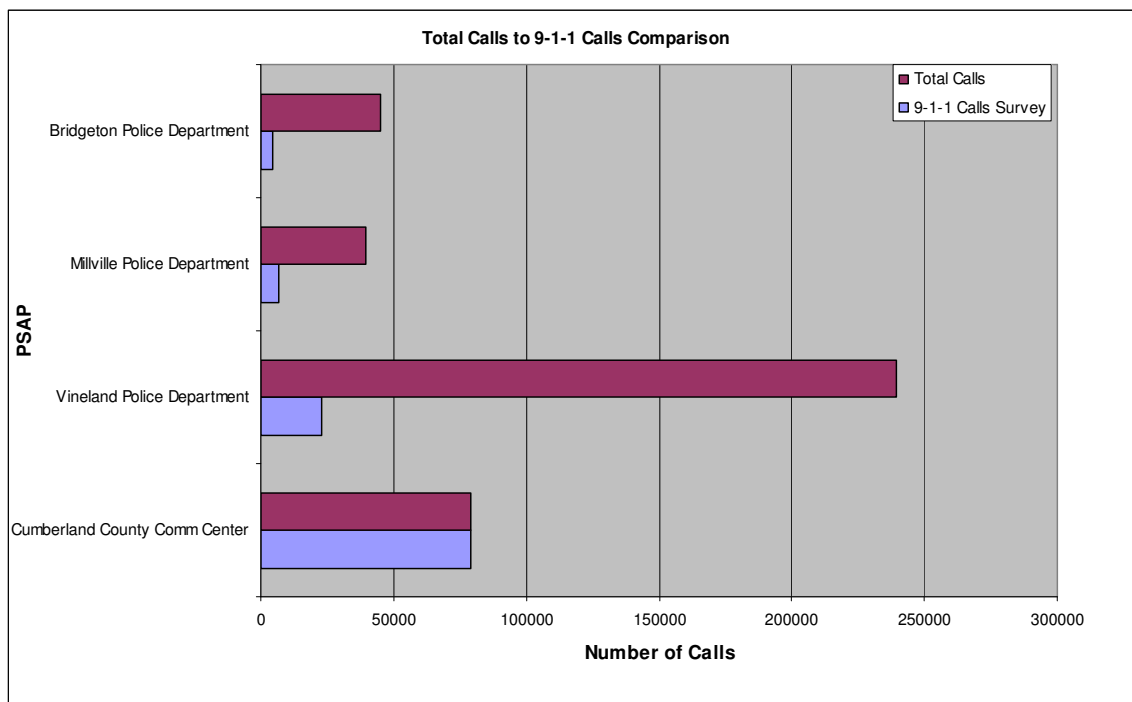


Figure 3 Total Calls to 9-1-1 Calls Comparison

⁵ A caller can get to dispatch via County answering system on (856) 456-8526, but this was never intended as an Emergency Services Number and generally is not used by public as such.

Figure 4 shows consistent difference between the number of 9-1-1 Calls received as reported by each PSADP and the quantity reported by the NJ OETS. Note that the NJ OETS data does not include any 9-1-1 calls for the Bridgeton PSADP, as to be expected, but does include a small number of 9-1-1 calls answered by the Millville PSADP. The reason for this reporting by OETS is not entirely clear. Although Millville has 9-1-1 capable equipment, current 9-1-1 call processing/routing should not allow 9-1-1 calls to go directly to Millville PSADP.

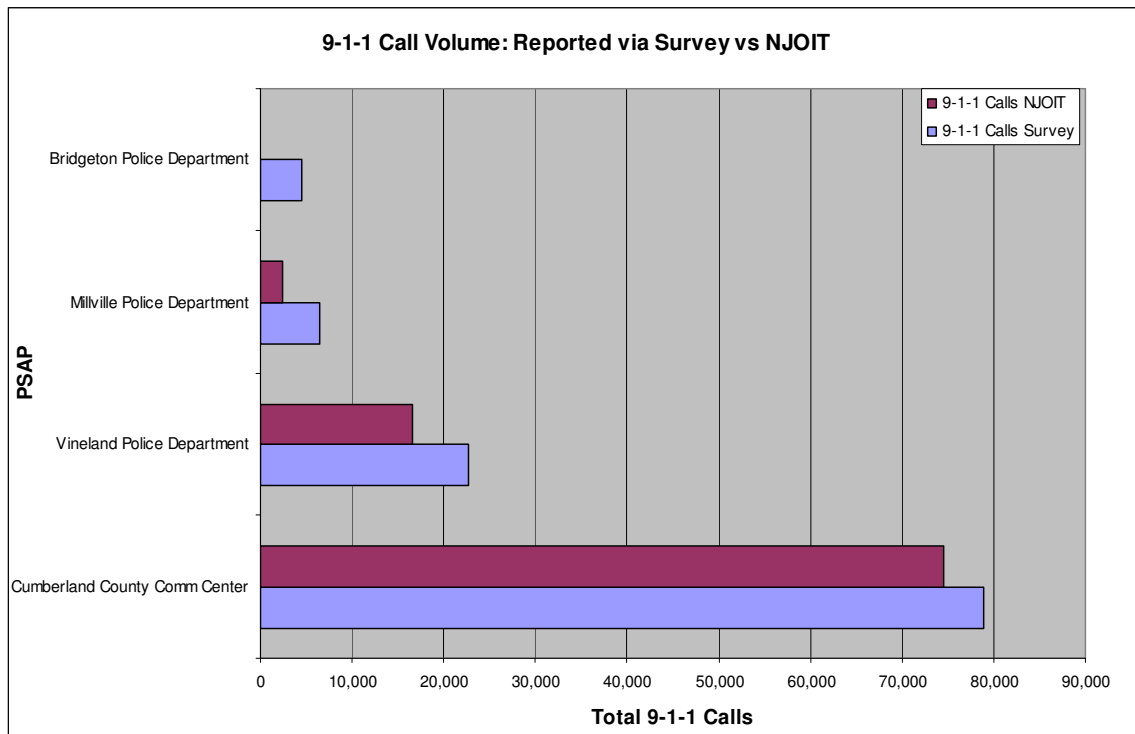


Figure 4 9-1-1 Call Traffic Comparisons

Figure 5 is derived from the PSADP data received from the survey reflecting the type of events dispatched across the county. The police events far exceeding Fire/EMS events is a breakdown percentage that falls in the norm. Note the definition of an event is an incident requiring Public Safety services be dispatched for support. Therefore, it stands to reason that Police might be dispatched to a Fire event, and vice versa, depending on SOPs in place. The same data is shown in tabular form in Table 17. This data metric represents only the number of events and the corresponding ratio does not necessarily represent any call volume or radio traffic metrics for either Police or Fire/EMS services.

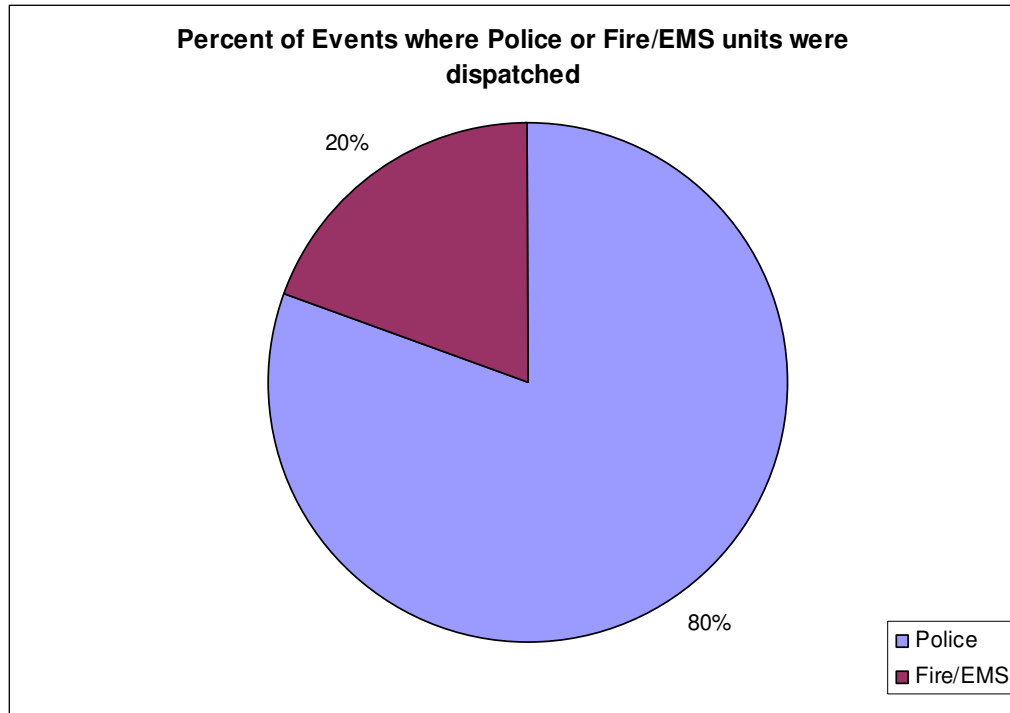


Figure 5 Percent of Events Where Police or Fire/EMS Units Were Dispatched

Table 17 Number of Events Where Police or Fire/EMS Units Were Dispatched

PSAP	TOTAL Events Police Dispatched	TOTAL Events Fire/EMS Dispatched
Cumberland County Comm. Center	0	23,247
Vineland Police Department	73,044	10,693
Millville Police Department	29,634	0
Bridgeton Police Department	36,973	0
Total	139,651	33,940

Figure 6 and Figure 7 show the number of 9-1-1 Calls by month for the most recent 12-month period and the percent of the covered population to call 9-1-1 for each PSADP. These numbers are based on 9-1-1 ALI dips provided by NJ OETS for all Cumberland County PSADPs. Note the Bridgeton PSADP is not included due to all calls being transferred through the County PSADP. Although it appears there is a slight increase in the amount of calls from the Fall and Winter seasons into the Summer season, this increase is not shown to be as significant as would be expected and has been observed for areas with significant population increases during the summer months. The relative consistent County population shown in the two graphs below indicates minimal change in population during the seasonal months. Therefore, although the summer months are the “busy months”, that level is not such that special operational procedures or manpower are required and need be considered.

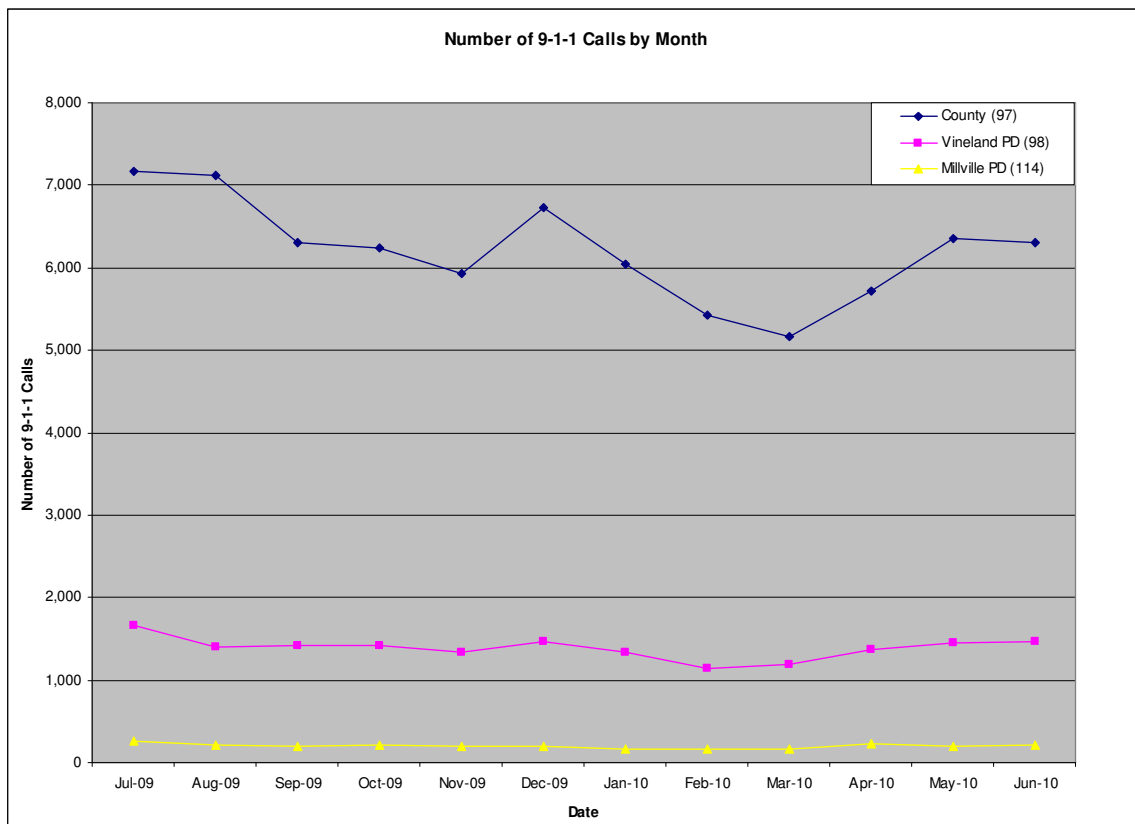


Figure 6 Cumberland County Number of 9-1-1 Calls per Month

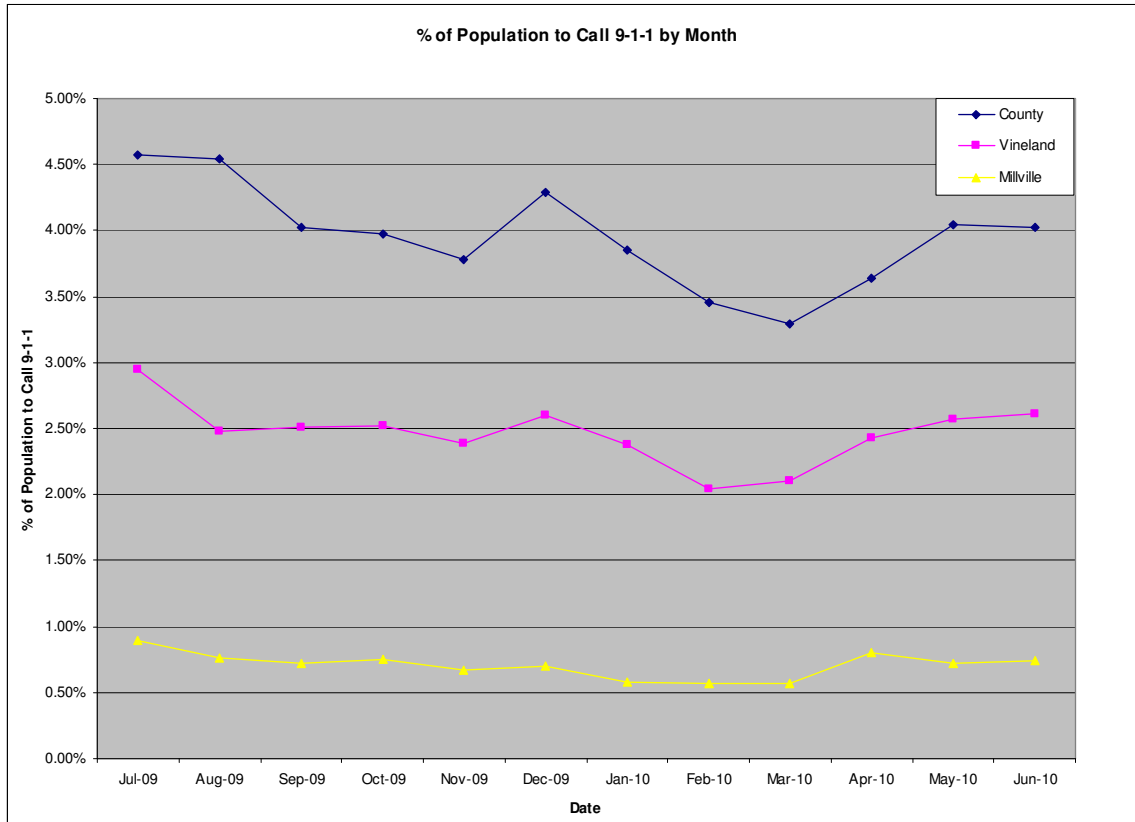


Figure 7 Percent of Population that Called 9-1-1

The following table compares total employee costs per Total Call and 9-1-1 Call. The Total Call data metric takes into account all calls answered by the dispatchers and the 9-1-1 Call data metric only includes direct 9-1-1 calls answered or transferred 9-1-1 calls. All of the local PSADPs, especially the smaller, single-service operations, have significantly lower costs per Total Call and higher costs per employee per 9-1-1 call. The lower Costs per Total Call are attributed to the larger Total Call volume handled by Calltakers at the local PSADPs, in comparison to the County. The higher costs per 9-1-1 Call demonstrate inefficiencies in the use of 9-1-1 Call taking equipment and trained 9-1-1 Calltaking personnel. The larger the difference in these metrics for a given PSADP indicates a greater call volume received and answered by the certified, trained PSADP Calltakers that are meant to be answered by an administrative phone operator.

Table 18 Employee Cost per 9-1-1 Call, by PSADP

PSADP	Total Employee salary, overtime, benefits, training, and allowances for 2009	Employee Cost per call (Total Calls)	Total Employee Cost per 9-1-1 Call
Cumberland County Comm Center	\$1,655,750.00	\$21.00	\$21.00
Vineland Police Department	\$975,612.55	\$4.08	\$42.84
Millville Police Department	\$448,243.34	\$11.39	\$69.77
Bridgeton Police Department	\$360,000.00 ⁽¹⁾	\$7.98	\$79.38

(1) Represents the addition of a percentage load for benefits, as reported Total Employee Cost appears to be an unloaded number.

Included in the survey process was a request for total Equipment and Maintenance Costs for each PSADP. These costs were to include all expenses incurred to keep the PSADP itself operational, including equipment service and repair costs, on-going maintenance contracts, and related expenses. The costs provided by each PSADP are below in Table 19. Using the 9-1-1 Call and Total Call numbers previously developed for PSADP, ratios are also included in Table 19 to show the costs associated with maintaining each PSADP operation on a per call basis, similar to what was previously calculated for Employee Costs Per Call. Through the PSADP visits, and in understanding the inability of some agencies to effectively account⁶ for all expense items, any comparison across agencies is difficult to make, and thus conclusions be drawn.

Table 19 Equipment, Maintenance Costs Per Call

PSADP	Total Equipment, Maintenance Costs	Equipment, Maintenance Cost per call (Total Calls)	Equipment, Maintenance Cost per 9-1-1 call
Cumberland County Comm Center	\$98,704.00	\$1.25	\$1.25
Vineland Police Department	\$28,280.00	\$0.12	\$1.24
Millville Police Department	\$45,387.84	\$1.15	\$7.06
Bridgeton Police Department	\$20,000.00	\$0.44	\$4.41

3.2.3 Data Analysis

The number of operators/dispatchers required to be on hand at a PSADP in the State of New Jersey is dependent on the volume of calls observed at that PSADP. According to the New Jersey Administrative Code (N.J.A.C.) 9-1-1 regulations subchapter 2 17:24-2.2: "...each PSAP will be staffed 24 hours a day 7 days a week, with enough Calltakers to answer all calls within 10 seconds, or

⁶ E.g. budgetary items can not be broken out, funding/expenses were included within a larger overall department or facility budget

10 percent of all calls during the average busiest hour will be answered in 20 seconds”.

The number of staff at each PSADP was for the most part, consistent throughout the year. Staffing during the evening shift were the highest levels which identifies the “busy hour” for the day. The data provided pertaining to call volumes and tracking was inadequate to determine if current staffing levels at the various PSADPs satisfied the requirements set forth in the New Jersey State 9-1-1 regulations provision 17:24-2.2. However, some agencies reported a best effort that suggests at times the criteria may not be met. The use of 10-digit dials for emergency calls does not help to clarify this metric as these phone lines do not have the same level of performance information available as with 911 lines (“trunks”).

Regulations outlined in N.J.A.C 17:24 regarding the expectations of the Calltakers and the PSAPs include:

- All PSAPs shall be operated on a full-time basis, 24 hours a day, seven days a week
- All components of the 9-1-1 network shall meet or exceed a P.01 grade of service which is no more than one busy signal in 100 call attempts in the average busiest hour
- All 9-1-1 calls should be answered in 10 seconds, except that 10 percent of the calls received during the average busiest hour may be answered within 20 seconds
- No more than two percent of incoming 9-1-1 calls shall overflow to an alternate PSAP
- Following receipt of a 9-1-1 call requiring a dispatch of emergency medical, emergency police or emergency fire services, a PSAP call-taker, within 20 seconds for 90 percent of the calls received, will dispose of the call as follows:
 - If the PSAP also serves as a PSDP with respect to some or all emergency services, the PSAP call-taker shall transfer the call to the appropriate dispatcher;
 - No call-taker shall transfer a 9-1-1 call without first advising the calling party that the call is being transferred and that the caller should remain on the line until the call is connected. No "blind transfers" are permitted.
- Following receipt of a 9-1-1 call that is not an emergency and does not require emergency services, the call-taker shall clear the line as quickly as possible under these circumstances. If circumstances permit, the call-taker may, if appropriate, refer the caller to the appropriate public safety agency, either verbally or through a prerecorded message.

- Whenever possible and practical, PSAPs and PSDPs dispatching emergency medical services must provide pre-arrival instructions utilizing Emergency Medical Dispatch Guidecards approved by the New Jersey State Department of Health and Senior Services, Office of Emergency Medical Services
- Calltaker positions will be staffed by a person certified by the Office of Emergency Telecommunications Services (OETS).

Evaluation of the proposed call volume for a potential consolidated Cumberland County PSADP is based upon the data received from the Communications Survey. Being that the three categories of calls/events were gathered independently among the local PSADPs, varying interpretations at the local PSADPs lead to the data metrics received having varying inclusions across the board. This is a common result in these types of surveys as each agency typically has different equipment and software configurations that support different methods of compiling statistics. Combined with this is the unique scenario discussed earlier in which Cumberland County has a large percentage and volume of calls coming on local non-emergency phone lines (10-digit dials). Therefore; as a follow up to the surveys, V-COMM held face-to-face meetings with each responding entity to go over the complete survey results, as well as any additional questions V-COMM had developed in preparation for the consolidation study. This interview process provided V-COMM the ability to perform calculations and reformat the resultant table under one set of definitions in order to be able to compare equivalent data metrics in the analysis phase. This result set of data is shown below in Table 20.

Table 20 2009 Call Volume Evaluated

PSAP	9-1-1 Calls		Local # Emer Calls		FTE Events
	Calls	Events	Calls	Events	
Cumberland County Comm Center	78,853	23,247	0	0	0
Vineland Police Department	22,771	6,264	216,428	59,508	17,965
Millville Police Department	6,425	691	32,935	28,805	138
Bridgeton Police Department	4,535	1,134	40,595	33,028	2,811
Totals	112,584	31,336	289,958	121,341	20,914

The call volume outlined in Table 20 includes some calculated estimates, as the exact values for the given metric were not available. The “9-1-1” and “Local # Emergency Call” call volumes refer to only calls that were placed by a caller dialing 9-1-1 and the local non-emergency number (10-digit dial), respectively. In all three local municipalities, it is very evident from the reported values that an abnormally high percentage of emergency calls are placed via local non-emergency numbers as opposed to the standard 9-1-1 dials. Further, it is also very evident that an abnormally high percentage of emergency calls are landline calls as opposed to wireless calls. The Functional Time Equivalent (FTE) metric

corresponds to the remaining tasks that Calltakers/dispatchers are responsible to perform under their current SOP. These tasks include but are not limited to execute; warrant checks, NCIC entries, DMV look-ups, NCIC hit confirmations, and criminal history checks, and notifications for crimes via personal call-ins, walk-ins, etc. It is noted that this metric is incomplete for some departments as not all PSADPs included or are capable of including all above referenced tasks in the recorded numbers. The data shown above in Table 20 is displayed below in Figure 8 and was then used to calculate the corresponding required number of Calltakers/dispatchers.

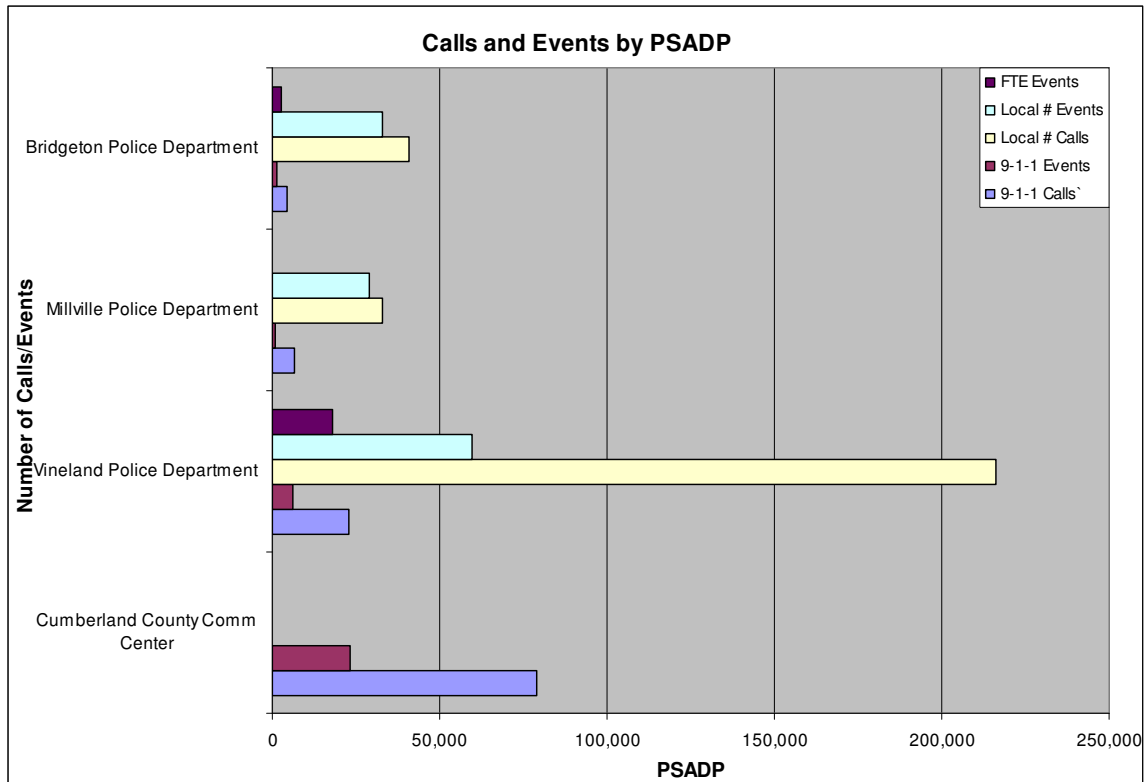


Figure 8 Calls and Events by PSADP

The calculations for required number of Calltakers and Dispatchers were based upon the derivation of the Busy Hour amount of calls to be taken by a consolidated PSADP configuration. This Busy Hour Call Volume calculation was based on observations made of the call statistics (see Section 3.2.2) and industry standards for determining monthly, daily, and hourly call metrics based on annual data. This resultant metric was used in conjunction with a Grade Of Service (GOS) selected in accordance with 9-1-1 Regulations; as well as industry standard queuing theory, and assumed call durations, to directly calculate the corresponding required number of Calltakers/Dispatchers. V-COMM was instructed to develop multiple configurations for the potential consolidation;

therefore, three scenarios were developed and evaluated to correspond to the County Communications Center taking on operations of varying PSADPs as follows:

1. The Bridgeton PSDP consolidated into the County Communications Center
2. The Bridgeton and Millville PSDPs consolidated in the County Communications Center
3. All three (3) local PSADPs consolidated into the County Communications Center.

Multiple iterations of these calculations were performed in order to determine the proper staffing level needed to achieve the desired GOS and performance levels. The results of these calculations and corresponding input parameters are displayed below in Table 21.

Table 21 Required Calltaker and Dispatcher Positions per Peak Shift

Scenario	Position	Busy Hour Calls/Events (Qty)	Assumed call duration in sec	Busy Hour Calls/Events (Erlang)	Required Positions
1	Calltakers	49.59	30	0.41	3
	Dispatchers	24.09	65	0.44	4
2	Calltakers	65.34	30	0.54	4
	Dispatchers	35.94	65	0.65	4
3	Calltakers	161.02	30	1.34	6
	Dispatchers	69.44	65	1.26	6

Therefore, Table 21 reflects the number of physical positions that need to be staffed (Peak Shift) in order to handle the anticipated busy hour volume while still meeting the GOS parameters assumed. These calculations do not take into account any potential additional positions that might be desired by the County (i.e. - for a supervisor, training, or spare). The total number of personnel required to staff these positions over a given shift schedule is calculated separately in Section 3.2.4 below.

3.2.4 Staffing

Given the number of positions required to support a consolidated 9-1-1 Communication Center during Peak Shift, V-COMM calculated the number of positions required to support the proposed consolidated operations during the off-Peak Shift. This was calculated using traffic engineering formulas based on the evaluated call data, current staffing levels of each PSADP during all shifts, and industry standard assumptions for busy hour percentages and average call

duration. The resultant positions to be staffed for each 12-hour shift to meet the 24x7 staffing requirement are shown below in Table 22.

Table 22 Calculated Positions Required Per Shift, by Scenario

Scenario	Shift	Calltakers	Dispatchers	Total
1	1	2	3	5
	2	3	4	7
2	1	3	3	7
	2	4	4	9
3	1	4	4	9
	2	6	6	12

Next, V-COMM calculated the quantity of Full Time Equivalent Employees (FTEs) required to staff a 24x7 PSADP under each proposed scenario with the corresponding quantity of staffed positions (Table 22). These calculations are utilize a shift manning ratio of 2.0, whose derivations is based upon the ratios of total work hours available in a year divided by the actual hours an employee would be available to work less vacation, training, sick leave, etc. All parameters were assumed to be equivalent to the County's current PSADP scheduling. Table 23 below shows the previously reported Required Positions to be Staffed Per Shift, with the corresponding number of FTEs necessary to meet the stated needs for each scenario.

Table 23 Required Positions Per Shift with Required FTEs, by Scenario

Scenario	Shift	Calltakers	Dispatchers	Total	Total FTEs
1	1	2	3	5	24
	2	3	4	7	
2	1	3	3	6	28
	2	4	4	8	
3	1	4	4	8	40
	2	6	6	12	

As described previously, and reflected in Table 20 and Table 21, the amount of emergency calltaking from the local 10-digit non-emergency number at each local PSADP is difficult to absolutely quantify. In addition, it is anticipated that a number of these are of a "311" nature (Informational) and better handled through local "operator" functions. Therefore, V-COMM anticipates that the Calltaker volume may decrease over time, reducing the FTE requirements, due to the anticipated success of the Public Education Campaign ensuring that only calls of a true 9-1-1 nature will reach the consolidated PSADP in the future.

3.2.5 Required Equipment

All equipment calculations determined via the total Calltaker and Dispatcher positions implemented in a consolidated PSADP are based upon requirements to meet standards set forth by State regulations and industry methods. These standards also dictate that the equipment should include identified primary equipment, peripheral equipment, and other components of the overall operation to insure a properly operated 911 PSADP. The following documents these components/regulations.

According to N.J.A.C 9-1-1 regulations subchapter 2 17:24-2.1, each Calltaker/dispatcher position is required to be outfitted with the following equipment: a 9-1-1 terminal – capable of utilizing all the enhanced features of the 9-1-1 network, Logging Recorder, Instant Playback Recorder, Universal Power Supply (UPS), Line Printer, and a Teletypewriter (TTY). Based on the information gathered through the Cumberland County Survey and obtained from the New Jersey Office of Information Technology, 3 of the 4 PSADPs meet these required equipment standards.

Peripheral systems can provide an effective tool to officers for use in their day-to-day activities in the field. In the interests of a smooth transition to any potential consolidated operation, the controlling entity (County) should procure and implement all of the necessary hardware and software to ensure that no entity transitioning their dispatch services from another PSADP to the consolidated operation loses any necessary functionality. Inherently, there will be some change in typical operational procedures and standardized interaction between emergency personnel and dispatcher, but minimizing these changes should be a common goal used throughout the transition. Some peripheral systems currently, or soon to be, in operation throughout the County by entities affected by a consolidated operation include Field Reporting, Remote Alarming and monitoring, Automatic Vehicle Location (AVL), and Gun-Shot Detection (GSD).

Any consolidation of services will result in increased call volumes at the consolidated facility in comparison to current call volume at that facility. As previously detailed, the call volume will require additional telco connectivity be in place prior to any migration of services. The standard allocation for 9-1-1 Trunks is at least one per Calltaker position due to the need to handle one call per position, if necessary. All additional 9-1-1 trunks require advance planning and should be a priority in any transition plan.

Additional telco changes requiring advance planning and execution is the handling of the local PSADP non-emergency numbers to the consolidated PSADP. Currently, these numbers are the point of origin of most calls resulting in the dispatch of police services for the local PSADPs in Cumberland County.



For central station alarm/other calls, a new County 10-digit non-emergency number should be developed and promulgated to the companies/entities requiring this system. For other calls, local citizenry must be “educated” to use the 9-1-1 System; where better information is available via ANI/ALI to the County Calltakers/dispatchers. This should be done via the setup of an auto attendant on these lines providing two prompts to callers:

1. “In the case of an emergency, Hang Up and call 9-1-1”
2. “If you do not have an Emergency but would like to talk with a Local Police Officer, Please Hang Up and call your Police Department’s Administrative number.”

3.2.6 Transition Plan

3.2.6.1 Employees

Recognizing that those employed by the municipal PSADPs are local people, great consideration must be given to both their and the local Police Department’s concerns regarding continued gainful employment for the current PSADP staff. In reviewing the Gloucester County and Burlington County consolidated PSADPs, it appears their model meets the needs of both the County and staff of Cumberland County. Both Counties followed a model that allowed them to offer positions to all existing Calltakers that were currently employed by those local PSADPs involved in the consolidation. The proposed consolidation would be a call center for the entire County and need to be staffed 24x7. Due to the quality of service and financial gains coming from having experienced, knowledgeable, certified Calltakers from day one of operation, it is desirable to migrate as much of the current PSADP staff to the consolidated operation as possible. It is likely that not all existing PSADP staff will wish to accept a position at the new facility. Therefore, adjustments to staffing levels will have to be analyzed via an interviewing process of current local PSADP staffs to quantify an attrition number and establish a hiring need, if any.

All adjustments to staffing levels should be done in accordance with the overall Implementation Plan so as to ensure that all necessary staff is in place and ready once migration of services begins. This will require advance planning by personnel controlling the consolidated PSADP as well as the local PSADP since both will require full operation prior to the transition. Note that even in the scenario of staffing all experienced Calltakers and dispatchers, some level of training will still be required in order to develop/maintain all existing and new policies and procedures moving forward. This training will require inclusion in the Implementation Plan as there will be associated expenses and must be completed as part of the transition.

3.2.6.2 Equipment

The County's PSADP currently resides at 637 Bridgeton Avenue. This facility has been in the process of being upgraded for incorporation of the Sheriff's dispatch activity. The Sheriff Dispatch requirements include items (e.g. NCIC/CJIS interface) that are necessary for Police dispatch functionality, which could be leveraged if Bridgeton, Millville, and/or Vineland were to consolidate into the County facility. In addition, the County facility has made other improvements to prepare for a potential consolidation. A list of expenditures related to the dispatch consolidation effort can be found in Table 24 below.

Table 24 County Prior Expenditures

Date	Status	Description	Qty	Price	Total
11/10/2009	Complete	NCIC/CJIS Interface for CAD	1	\$26,200.00	\$26,200.00
11/10/2009	Complete	IBM Informix Software for NCIC/CJIS	1	\$7,465.00	\$7,465.00
12/30/2009	Complete	Police Records Management System Lite	1	\$56,684.00	\$56,684.00
12/30/2009	Complete	Data Lux MDTs - Sheriffs Dept	6	\$37,760.46	\$37,760.46
1/6/2009	Complete	Server Install & Data Transfer	1	\$12,250.00	\$12,250.00
7/15/2010	Complete	Server - Dell Power Edge R710	2	\$8,926.50	\$17,853.00
9/14/2010	Ordered	Printer	1	\$1,179.64	\$1,179.64
9/14/2010	Ordered	Shredder	1	\$1,000.23	\$1,000.23
9/14/2010	Ordered	Dry Erase Board	1	\$170.51	\$170.51
9/14/2010	Ordered	Headsets	4	\$64.75	\$259.00
9/14/2010	Ordered	Dell Precision Work Station Computer	2	\$4,014.66	\$8,029.32
9/14/2010	Complete	Dell Monitor Stands - Quad Monitor Stands	6	\$279.76	\$1,678.56
9/14/2010	Complete	APC Battery Backup Surge Protector	3	\$405.59	\$1,216.77
9/27/2010	Ordered	Police Consolidation Study - V-COMM	1	\$93,500.00	\$93,500.00
9/28/2010	Ordered	CCSD Radios & Interface to Console	1	\$12,855.20	\$12,855.20
Total =					\$278,101.69

Dependent upon the timeframe that a consolidation would occur and the budget available, the proposed consolidation could implement the identified scenarios, as phases. In the initial 2 scenarios, there exists the possibility that the County Communications Center could take on PSADP operations of both the Bridgeton and Millville PSDPs without incurring significant new equipment costs through the TEMPORARY SOLUTION of reconfiguring the current equipment. The current Motorola dispatch equipment cannot be expanded without a major upgrade; therefore, reconfiguration is a more prudent option. This equipment ultimately will require upgrade as Motorola has announced "end of life" on the Gold Elite Consoles and will no longer support the equipment. Additionally, the Zetron 911 equipment will also require upgrades as it pertains to the initiatives and timeframes related to the State of New Jersey OETS's NG 9-1-1 network. However, for scenarios 1 and 2, this upgrade can be delayed.

Should complete consolidation occur, it would be necessary to do so utilizing new dispatch consoles and equipment that are capable of being upgraded to function with the future NG 9-1-1 System. The NG 9-1-1 system will enable the general public to make a 9-1-1 call from any wired, wireless, or Internet Protocol (IP)-based device. The State of New Jersey is looking to incorporate this technology in within the next five years and will be dependent upon requirements from the FCC and DHS. Given the age of most of the current equipment deployed at the local PSADPs, it is unlikely that cost effective upgrades to support the NG 9-1-1 standards for that equipment could be achievable. Cost of new consoles supporting current technology would be in the range of \$60,000 each, and an additional \$10,000 to \$15,000 per console depending on manufacturer to support an upgrade of the Zetron 911 equipment to IP technology. Costs of NG 9-1-1 capable equipment vary widely as standards are still being finalized with cost ranging upward to the hundreds of thousands of dollars. V-COMM conversations with NJ OIT representatives indicate that funding for **NG 9-1-1 upgrades via the State (grants) will only be issued to one PSADP per County (with some major metro area exceptions)**. On a Countywide basis, if multiple PSADPs are in existence at the time of NG 9-1-1 implementation mandates, those entities not associated with the County PSADP will be responsible for self-funding any NG 9-1-1 upgrades using internal dollars. Therefore, it is in the "County's" best interests, as a whole, to have a single PSADP in preparation for the NG 9-1-1 mandate.

The dispatch functionality of any consolidated operation is independent of the radio system in operation by each local entity. The consolidated dispatch operation only requires a connection between the console equipment and the main transmit site of each entity's radio system. This link can consist of a leased line but typically will be implemented utilizing a control radio(s).

3.2.6.3 Facility

The County provided the Facilities Study completed in March, 2010 by J.W. Pederson Architect, P.C. as reference material for this project. This report raised concerns about the structural integrity of the County facility and its ability to sustain high winds in a storm event without suffering damage and interrupting service. The specific concerns raised in the Pederson report include the structural integrity of the foundation and exterior walls and the structure's inability to meet current code standards for construction of an essential facility. Although the report goes on to state that it would be impractical, if not impossible, to bring the current facility completely up to code; recommended upgrades were made with respect to these specific areas. V-COMM recommends that these upgrades be evaluated thoroughly via a complete structural analysis, which should be executed in conjunction with a complete design of all recommended upgrades.

The Pederson report provided a \$130,000 budget for the structural upgrades, which should be incorporated at a minimum.

In addition, the County has been investigating the suitability of the electrical service in conjunction with evaluating the overall expandability of the facility, as reflected in the Facilities Study. The facility has been deemed to require an electrical service upgrade as it is currently at capacity with limited/no room for additional electrical load. The County has determined the electrical service will require upgrade **regardless** of any dispatch consolidation effort. However, as a part of the dispatch consolidation effort, the electrical requirements were considered and are included below.

3.2.6.3.1 PSADP Facilities

While all of the PSADPs are managing their role today, it would not be in the best interest of the County for any one of the local municipality PSADPs to take on the role of the primary PSADP. Millville and Bridgeton would require a significant expansion in PSADP equipment to support a consolidated operation, beyond the capabilities of both structures. Even though Vineland is one of the better suited PSADPs operationally, its location being in the far north of the County, combined with the age of the building, led to it not being best suited for a proposed consolidated PSADP operation. The remaining location observed as part of this study is the County Communications Center, offers the best viable option for renovation for the following reasons:

- This building is located somewhat centrally in the County
- It is the newest building included in the study, making expansion a more feasible scenario
- It is the only PSADP with significant tower resources in place (added benefit that towers are County-owned).
- The site has a generator capable of providing power to support all services at the County Communications Center, although we are recommending as part of the upgrade of the electrical system, a new separate electrical service be installed to the radio communications shelters as well as separate generator be installed.
- There is existing room for expansion and/or reconfiguration

3.2.6.3.2 County Facility Improvement

Space

Some current PSADPs facilities within the County have inadequate space per dispatch position, lighting, training areas, conference rooms, break/lunch areas, quiet areas, and ergonomic consoles. The comfort of the staff should be taken into consideration at the consolidated PSADP, given the amount of time the staff

will spend working at the facility. Most work stations at the PSADPs today are fixed height computer style workstations that have been adapted for the 9-1-1 answering/dispatch functions. Newer designs and more user friendly environments have been developed in the recent years allowing workers to adapt the work stations to their personal needs. As the specific functions of Calltaker/dispatcher require extended periods of time to be spent at the work stations, having such a design is not only a benefit to the worker but assists in keeping workers alert and comfortable while performing their functions. As an example, other consolidated PSADPs in the area have ergonomic consoles that can be individually temperature controlled by the worker allowing heated and air conditioning of the immediate work area to be adjusted to the comfort of the worker. Additionally, changes to task lighting and console height permit the worker to make adjustments that assist with reduction of fatigue and eye and muscle strain while performing their duties.

Some considerations for a newly consolidated facility that would be addressed through the final planning process would be:

- Adequate lighting – both overall and workstation task lighting
- UPS systems
- Generator
- Radio tower
- Administrative offices
- Conference rooms
- Training areas
- Break/lunch areas
- Locker rooms/shower facilities
- Parking
- Security
- Ability of the facility to withstand environmental disasters

The proposed floor layout for Scenario 1 as discussed herein would include 8 console positions to support 3 Calltaker, 4 Dispatcher, and 1 Supervisor positions. The plan will reconfigure existing Zetron 9-1-1 equipment to implement 2 of 3 Calltaker positions maintaining the ability to backfill on dispatch and 3 of 4 Dispatcher positions maintaining the ability to backfill on Calltaking. The floor plan for this scenario will require of 1 additional furniture position to fit in among the existing furniture in the existing space. Some reconfiguration of the existing equipment will have to take place, which can utilize any/all of the following space saving methods to create the necessary space:

- Resizing of the existing console position that will have the Zetron removed to create a separate Calltaker-Only Position

- Rearranging of existing consoles to remove an aisle, either between consoles and exterior/interior walls or center aisle
- Rearranging of existing console positions to a back-to-back configuration to minimize overlap operator working space
- Integrate smaller furniture position for Calltaker-Only Position

The proposed floor plan for this scenario, with furniture, is shown below in Figure 9. If it is decided to reconfigure the existing furniture, there are many layout iterations to be evaluated by the County in order to create the necessary space while maintaining desired buffers. The figure below shows one possible iteration that is common in larger, consolidated dispatch centers which positions consoles back-to-back and makes as much use of existing space as possible.

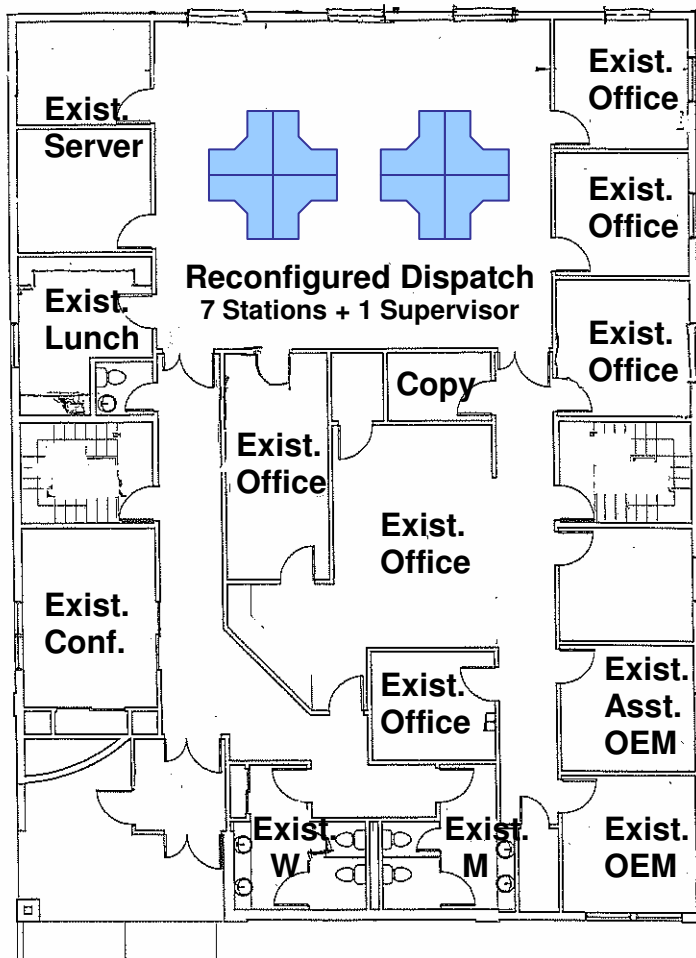


Figure 9 Scenario 1 - Proposed 1st Floor Layout

The proposed floor layout for Scenario 2 as discussed herein would include 9 console positions to support 4 Calltaker, 4 Dispatcher, and 1 Supervisor positions. The plan for this scenario will reconfigure existing Zetron 9-1-1 equipment to implement 2 of 4 Calltaker positions maintaining the ability to backfill on dispatch and 2 of 4 Dispatcher positions maintaining the ability to backfill on Calltaking. The floor plan for this scenario will require of 2 additional furniture positions to fit in among the existing furniture in the existing space. Some reconfiguration of the existing equipment will be required, which can utilize any/all of the following space saving methods to create the necessary space:

- Resizing of the existing console positions that will have the Zetron removed to create 2 separate Calltaker-Only Positions
- Rearranging of existing consoles to remove an aisle, either between consoles and exterior/interior walls or center aisle
- Rearranging of existing console positions to a back-to-back configuration to minimize overlap operator working space
- Integrate smaller furniture positions for 2 Calltaker-Only Positions

The proposed floor plan for this scenario, with furniture, is shown below in Figure 10. If it is decided to reconfigure the existing furniture, there are many layout iterations to be evaluated by the County in order to create the necessary space while maintaining desired buffers. The figure below shows one possible iteration that is common in larger, consolidated dispatch centers which positions console back-to-back and makes as much use of existing space as possible.

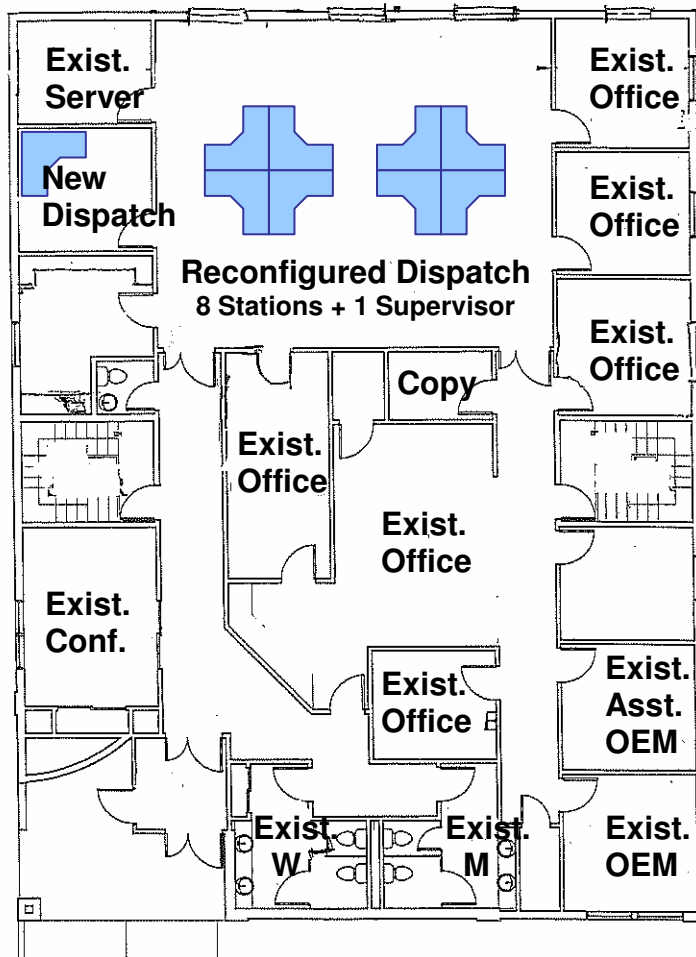


Figure 10 Scenario 2 - Proposed 1st Floor Layout

The proposed floor layout for Scenario 3 as discussed herein would include 14 console positions to support 6 Calltaker, 6 Dispatcher, 1 Supervisor, and 1 Spare/Training positions. It is recommended to maintain 50% backfill capability between Calltaking and Dispatching positions resulting in 3 of 6 Calltaking positions maintaining Dispatching operations and 3 of 6 Dispatching positions maintaining Calltaking operations. This will require that the County upgrade all Calltaking and Dispatching console equipment.

The floor plan for this scenario requires more space than is readily available on the first floor without major disruption to multiple existing spaces. It is proposed to relocate the dispatch center to the basement, in the area of the existing training room, which can in turn be relocated into the current dispatch center. Although some offices existing in the basement would have to be relocated, the overall disturbance to the existing floor plan is less than a 1st floor integration

would require. The proposed 1st floor layout is shown below in Figure 11 and the proposed basement layout, with furniture, is shown below in Figure 12.

As in the previously discussed scenarios, there are many layout iterations to be evaluated by the County in order to create the necessary space while maintaining desired buffers. Figure 12 below shows one possible iteration that is common in larger, consolidated dispatch centers which positions console back-to-back and makes as much use of existing space as possible.

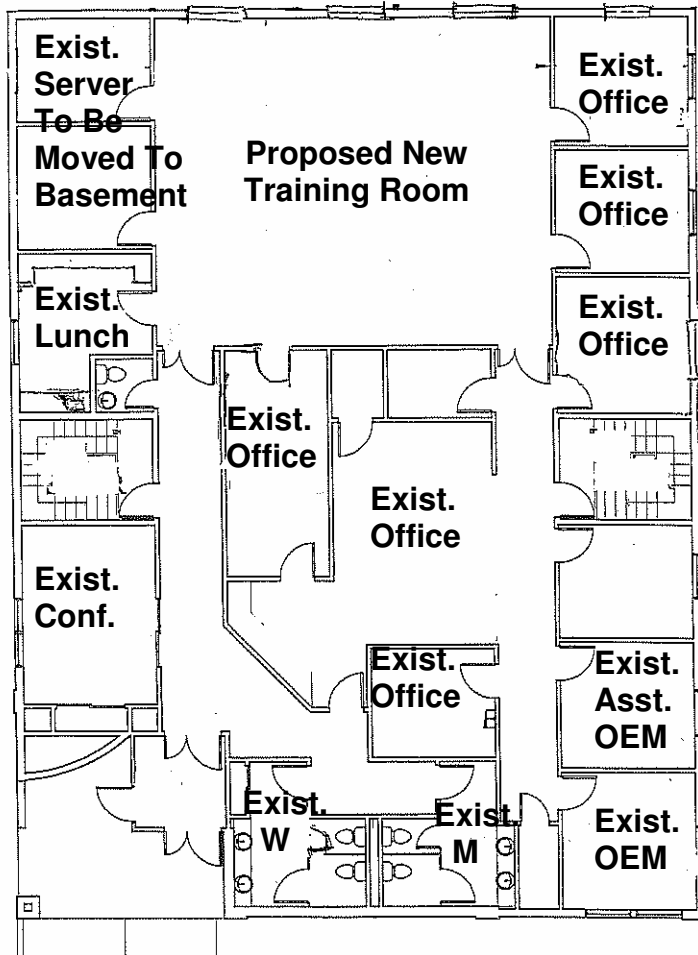


Figure 11 Scenario 3 - Proposed 1st Floor Layout

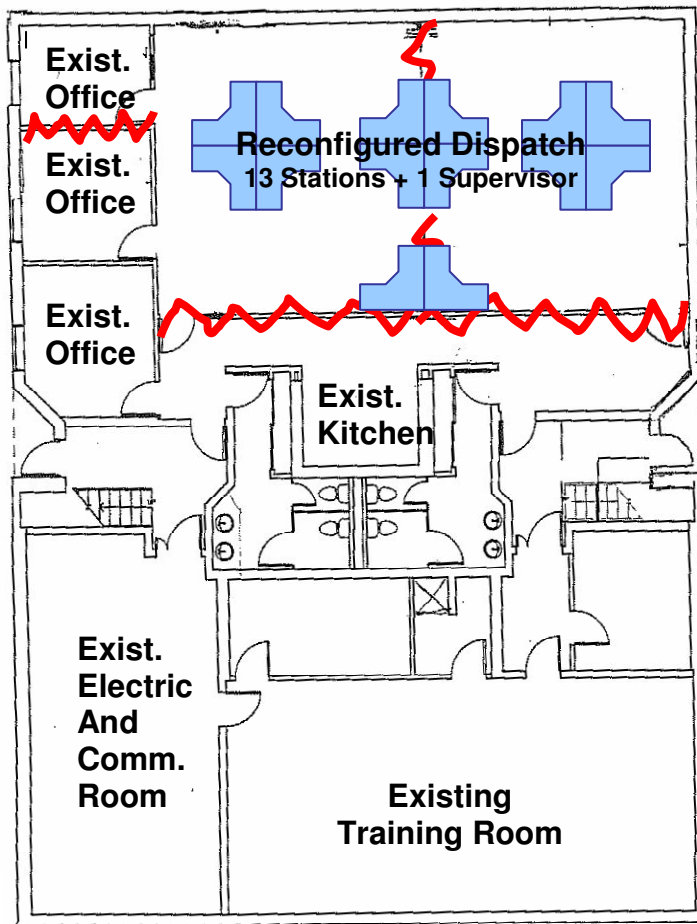


Figure 12 Scenario 3 - Proposed Basement Layout

Electrical

As part of the dispatch consolidation effort, the electrical requirements were considered. The facility was visited on November 4, 2010 and again on December 15, 2010. In addition to data gathered during the site visits, the following documents have been reviewed to develop as part of the analysis:

- Atlantic City Electric bill for the period of October 19, 2010 thru November 16, 2010
- Historical electrical demand data supplied by Cumberland County
- Partial set of original construction drawings dated 1992
- Preliminary Electrical Quote of unknown origin presenting a potential design scenario

- The three (3) identified consolidation design scenarios

The facility is served from an existing line of utility poles that run along Bridgeton Avenue. The utility line is single phase and runs overhead along the driveway on the east side of the facility to a terminal pole with a 75 kVA “can” type transformer. The service extends under the driveway to the building through a 4 inch conduit and enters the building along the east wall where the utility meter pan is mounted to the exterior wall. The service feeding the building is single phase 3W, 120/240 volts and terminates into Main Panel MDP which is rated for 600 amps, 120/240 volts, 3W, 1Ph, located in the basement. The main panel feeds several subpanels located throughout the facility, and the main panel and the various subpanels appear to have been modified over the years.

Next to the Panel MDP there is a 400 amp automatic transfer switch, which brings an existing Generac 150 kVA diesel generator on line. The generator visually appears to be in good working condition and it is our understanding that it is exercised regularly and subjected to a maintenance service contract. There are also provisions for a portable generator to be connected to the building via an Appleton plug; but based on our conversations with on-site personnel, the connection of a portable generator does not seem to work as intended.

There is an existing APC Symmetra UPS in the basement. According to the display at the time of our visit, the UPS had an input/output voltage of 247/244 Volts. This UPS likely serves just the communications elements of the facility, but an investigation of the actual circuits supplied will be required during the design phase of the project.

The existing electrical equipment at the facility is fairly typical for a public safety dispatch center. There are several offices with computers, monitors and printers, and the dispatch room itself contains a combination of call taker and dispatch positions totaling seven (7) existing consoles, each with various electronic equipment, radios, and ancillary components.

In addition to typical office and dispatch equipment inside the main building, there are pump motors for the on-site water well and septic system, two (2) motors total. There are also three (3) self supporting radio towers and an approximate 200 square foot Auxiliary Radio Building situated near two of the towers on the west side of the building. The electrical feed for the Auxiliary Building originates from a subpanel in the Parent Building. The subpanel in the shelter is a 24 circuit Single-Phase, 3-Wire, 240 Volt panel, rated for 100 Amps and there are no spare slots to add additional circuit breakers. There are plans to add a second auxiliary radio building next the existing building near the base of the tower. Each building has or will have internal lights, UPS systems, batteries, and HVAC systems. They will also require backup generator power.

At the present time several scenarios have been proposed to combine the emergency dispatch operations of Cumberland County. Each option will increase the electrical demand at the subject facility, and regardless of which option is ultimately selected, the existing electrical service will have to be upgraded to accommodate even minimal growth. Again, this upgrade is required and will take place regardless of the decisions regarding dispatch consolidation.

The various operational scenarios contemplated require up to seven (7) call taker or dispatcher positions be added to the current configuration. To determine the impact to the existing electrical demand, we have assumed the future console positions will be equipped similar to the existing console positions, and that the electrical demand per console will be similar to the existing.

The existing Auxiliary Radio Building contains a 100 Amp subpanel with all breaker positions occupied. The new shelter is assumed to be of a similar size and configuration and will likely require a minimum of 3 tons of air conditioning.

In addition to communications equipment, the proposed facility's expansion will experience an increase in electrical demand from additional employees, increased need for heating and cooling, and increased cycling of the aforementioned water pumps.

3.2.6.4 Timeline

A basic project timeline for the implementation process was developed for this phase of the analysis (see Figure 13). The timeline assumes a consolidation start date of July 5, 2011. As stated earlier, the dispatch consolidation will be dependent on the planned facility electrical upgrade. Therefore, we have included the facility electrical upgrade as an item in the basic dispatch consolidation timeline to reflect that dependency. We have also used an assumed start date for the Electrical upgrade of April 18, 2011. Either start date can be adjusted based on County decision milestones and the schedule will be adjusted accordingly.

The basic timeline is based on a complete consolidation (Scenario 3). Either Scenario 1 or 2 would result in a reduced overall schedule (and cost); however, the basic line items would remain relevant; but with some modifications. Equipment purchases would become equipment reconfigurations with respect to Calltaker and dispatch positions. Construction efforts would be similarly reduced.

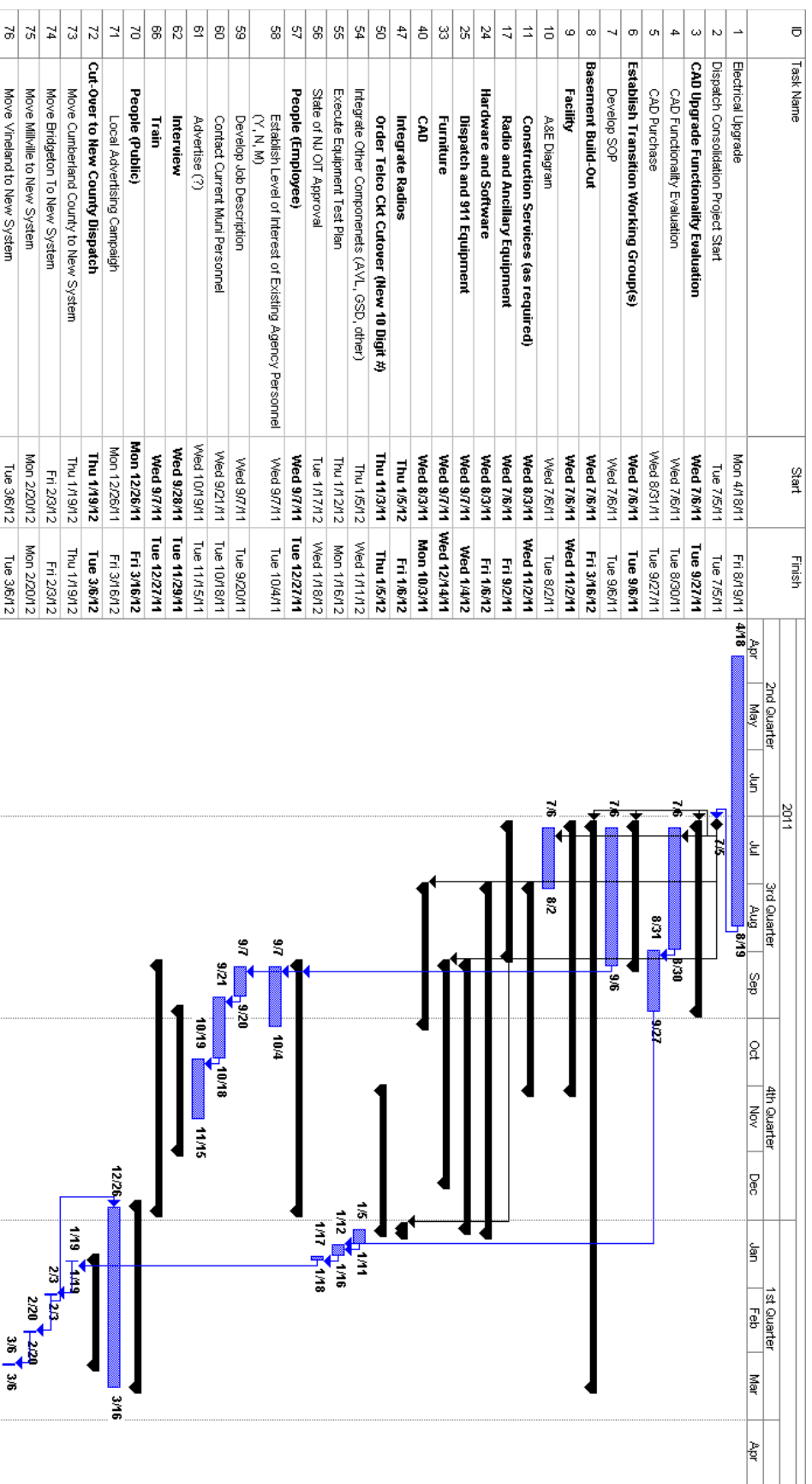
Two important tasks in the first stage of any Scenario consolidation project are the CAD functionality evaluation and establishment of a transition working group. The CAD functionality evaluation will take into consideration how to "port" data from any current muni-PSADP system into a new/modified County system. The

ability to retain historical information is a requirement (Statute) for the dispatch system(s). A decision on a path to take and equipment vendor may be very dependent on which agency(s) ultimately transition (e.g. which Scenario) to the County. It is highly likely that a new CAD system will be the result of this evaluation.

A Transition Working Group (TWG) is necessary to insure processes and procedures from the various PSADPs are accounted for during and after transition. Establishment of a new, integrated Standard Operating Procedure (SOP) is likely. In addition, the Working Group should address and alleviate concerns from the end-user Public Safety community regarding the consolidation of dispatch. The TWG should be comprised of Calltaker/dispatchers and public safety personnel representative(s) from every agency.

The overall project schedule is approximately 15 months and will obviously be dependent on a funded effort for each component, timely identification and execution of all necessary contracts with multiple vendors, and tightly controlled project management with a timely decision making capability.

Figure 13 - Baseline Project Schedule



3.2.7 Budget

The budget evaluated for this consolidation study is to be comprised of three main categories corresponding to differing types of expenses to be incurred during the implementation of such an operation. These categories are Capital Expenditures, Operational Expenses incurred during the transition to the proposed operation, and the Operational Expenses required to keep the proposed consolidated PSADP in operation.

3.2.7.1 Building Electrical System Upgrade

Since the Building Electrical System Upgrade will take place regardless of the dispatch consolidation decision, that line item is not included as a Dispatch Specific budget item and in the project's overall budget total. However, since the information was studied, our estimate for the electrical upgrade is included as follows:

- Main Service
 - Assumes the cost of the transformer will be borne by Atlantic City Electric, since there will be a payback for them over a three year period (typical power company analysis)
 - The utility company will also absorb the cost of electrical distribution upgrades (new overhead lines, poles etc.)
 - Cumberland County will be responsible for all electrical infrastructure costs from the load side of the transformer, including trenching and new service equipment.
- A new 3-Phase generator with fuel storage and transfer switch to supply power for all non-communications loads. As previously mentioned the generator cannot be sized at this time.
- Building Equipment
 - Main Service Disconnect
 - C/T –P/T Cabinet (Current and Potential transformer cabinet)
 - Main Electrical Service Power Distribution Panel and Circuit Breakers
 - Assorted Subpanels and Circuit Breakers for power distribution
 - Assorted Subpanels and Circuit Breakers for new lighting and convenience receptacles
 - Possible new independent or supplementary UPS system or batteries
 - New cables, conduits and associated wiring and hardware.
 - New HVAC equipment to supplement the increased heat load of electronic equipment and comfort of additional employees.

- All Labor associated for connection of old and new equipment to the new service and separation of existing loads as indicated.
- All Labor and Materials to improve existing grounding issues and to correct potential NEC violations.

Based upon data gathered during site visits and the references cited above, V-COMM has developed the budget for the Building Service Electrical Upgrade as shown below in Table 25.

Table 25 Building Electrical Service Upgrade

Line Item		Materials	Labor	Sub-Total	Total
New Service					\$145,000.00
	Conduits, Conductors, Trenching	\$23,000	\$23,000	\$46,000	
	Generator (125 kW) with alarms, controls, ATS and W/P Enclosure	\$41,000	\$25,000	\$66,000	
	AG Diesel Storage Tank	\$18,000	\$15,000	\$33,000	
Building Equipment					\$290,500.00
	Main Service Disconnect, 1200 A	\$17,000	\$35,000	\$52,000	
	C/T - P/T Cabinet, Revenue Meter	\$3,000	\$4,000	\$7,000	
	Branch Ckt Power Panels (2)	\$10,000	\$15,000	\$25,000	
	Subpanels - Lighting (4)	\$10,000	\$15,000	\$25,000	
	Supplemental UPS	\$65,000	\$10,000	\$75,000	
	HVAC	\$25,000	\$30,000	\$55,000	
	Rerouting of Ckts	\$1,500	\$15,000	\$16,500	
	Electrical Wiring, Conduits, Conductors, Fittings	\$10,000	\$25,000	\$35,000	
Building Electrical Service Upgrade Total =					\$435,500.00

3.2.7.2 Building Structural Upgrade

Since the current facility has issues with current code regulations, the Building Structural Upgrade should take place regardless of the dispatch consolidation decision. Since this upgrade is not included as a PSADP Consolidation budget item, our estimate for the structural upgrade references the Pederson report as follows:

- Structural Upgrade
 - Strengthen building structure, with focus on increased tie downs between the roof and the foundation system.
 - Some upgrades required of roof trusses
 - If not specific to the event of a building addition, the masonry work should be reinforced through additional bracing



These upgrades will help protect the facility from Flood & Wind damage and the corresponding budget developed is shown below in Table 26.

Table 26 Structural Upgrade Budget

Structural Upgrade Component		
Roof	\$25,000	\$55,000
Masonry	\$10,000	\$75,000

3.2.7.3 Consolidation Capital Expenditures

The Capital Expenditures evaluated in this report consist of all expenses necessary to procure the required hardware, software and services for the consolidated operation.

The first expense incurred by the implementation of the consolidated operation is any and all facility renovations to accommodate the proposed equipment necessary. These renovations include all structural and electrical upgrades to allow the building the capability to support the proposed operation. The electrical upgrades area needed to ensure the facility electrical service is sufficient to support the additional load, while still leaving room for future growth and expansion. As part of the electrical evaluation and upgrades, the UPS and Generator systems should be made adequate to support the increased load of the proposed consolidated facility. Structural upgrades include the design and implementation of any necessary floor plan and layout alterations to accommodate the new facility equipment. This could be as simple as rearranging some existing equipment, eliminating a few non-load bearing walls, or as difficult as developing a complete new dispatch center. Accordingly, the structural upgrade costs could vary widely. Scenarios 1 and 2 include equipment rearranging by the console vendors, which could have associated costs in the \$5,000-\$7,000 range. A new dispatch's costs would likely be completed within the scope of an equipment contract and therefore included below.

Once all the facility upgrades are implemented and in place, the integration of the new console network (whether an expanded or reconfigured version of existing equipment or a new turnkey system), can begin with the procurement and installation of all appropriate console furniture and peripheral equipment. The console furniture should be in place with any necessary computers and monitors prior to the bringing in of a console equipment vendor. A unit cost of \$15,000 - \$21,000 should be assumed to implement a Calltaker/Dispatcher position.

The transition plan will be required to integrate any newly proposed Calltaker and Dispatcher positions while not interrupting service to the current operations, in

order to provide a seamless transition. The unit cost per Calltaker positions is approximately \$36,000 and for per Dispatcher position is approximately \$50,000.

Other equipment costs necessary to implement the consolidated PSADP include the procurement, licensing, and implementation of an interconnect system connecting the PSADP with the various transmit and receive sites across the County that comprise the Radio Communications Systems of each entity being supported by the consolidated PSADP. For a control radio solution, to include the equipment and install on the County tower, a unit cost of \$7,000 per radio has been budgeted. Note this cost would be incurred for Bridgeton and Millville; but not Vineland due the current existence of a similar link.

A CAD software suite will be required of any consolidated operation, with a set of complex, unique requirements. All proposed consolidation scenarios require that the previous CAD systems in operation be tied together in order to, at a minimum; allow historical data to be ported to the software to be used in the consolidated operation. It is possible that the current software in place at any PSADP in the County could be expanded/relicensed to be utilized by the consolidated operation. Note the CAD solution at the current County PSADP could be expanded by an estimated at \$35,000 per additional entity. However, all scenarios need to be reviewed in depth between parties of interests and from a neutral point of view. Our recommendation will include a study, via a County Working Group, of potential CAD software to meet the consolidated operations. These costs are included below.

3.2.7.4 Transitional Operational Expenditures

The implementation of a consolidated PSADP will be a large project to undertake and require a significant amount of dedicated hours from multiple personnel of the controlling entity to manage day-to-day items requiring County attention. The personnel currently on staff at the County Communications Center may or may not be able to handle the increased workload, possibly leading to the requirement of the controlling entity to procure the external services of a project manager and incur the associated expense. Another factor that will contribute to the increased workload is the interview processes necessary to implement staffing level adjustments needed by the consolidated operation. An evaluation of the CAD software in place and its capabilities will present a unique challenge to the County personnel in that even if the current software can be (and is decided to be) expanded and manipulated to support the proposed consolidated operation, coordination between multiple entities using different vendors and platforms will present unique problems and difficulties requiring detailed attention. Our recommendations include a County CASP Working Group with members from the County and the consolidating entities.

The final piece, and likely the simplest, of the transition to the proposed consolidated operation will be the implementation of the required RF links to each radio system for dispatching purposes. Although minimal, there are potential licensing costs and equipment procurement that will have to be managed throughout the implementation process.

It should be noted that the local PSADPs involved in any consolidation efforts will likely incur some of the previously mentioned costs as well.

Additional fees to be incurred throughout the implementation of the proposed project include multiple costs for services, such as Project Manager, Testing, Architect/MEP fees, Job Opening advertisements, and the cost for the development of this study and any bid specifications as well.

3.2.7.5 Ongoing Operational Expenditures

Once the proposed consolidated PSADP is in place and operational, there will be additional Operational Costs necessary to keep the PSADP operating as required. First and foremost, these costs include additional staff salaries, benefits, overtime and other overhead costs. Additionally, increased utility, maintenance and equipment (hardware and software) costs will contribute to the higher Operational Costs.

3.2.7.6 Budget Summary

V-COMM has developed independent budgetary estimates for the procurement of all required PSADP equipment and corresponding services related to the implementation of the proposed consolidated PSADP for each scenario. In Table 27 below, these estimates are outlined according to their higher-level category of Capital, Transitional Operational or Ongoing Operational Expenditures. All prices were considered typical during the time of the analysis. The above pricing is based on the best available current pricing data. The estimates do not take into account changes that can occur over time as the results of inflation, rising construction, material, and fuel costs, which may change the actual costs in comparison to estimates.

Table 27 Developed Consolidation Budget

		Scenario 1	Scenario 2	Scenario 3
Capital Expenditures - Facility				
	Construction Services	\$0	\$10,000	\$100,000
	UPS	-	-	\$50,000
Capital Expenditures - Equipment				
	Furniture	\$15,000	\$30,000	\$210,000
	Electrical & Data Cabling	\$2,500	\$5,000	\$35,000
	Computers & Monitors	\$4,000	\$8,000	\$56,000
	Calltaker positions			
	Zetron Equipment (3300)	-	-	\$396,000
	IP Addition (3200-3300 Upgrade)	\$149,000	\$149,000	-
	Zetron "Split"	\$5,000	\$10,000	-
	Dispatcher positions			\$550,000
	Logging Recorder	\$20,000	\$20,000	\$20,000
	Control Radios	\$14,000	\$28,000	\$56,000
Capital Expenditures - Software				
	CAD/RMS	\$35,000	\$70,000	\$105,000
	AVL			\$10,000*
	LPR			\$10,000*
	GSD			\$10,000*
Transitional Operational Expenditures				
	CAD Study	\$15,000	\$15,000	\$15,000
	Job Advertisements	\$500	\$500	\$2,000
	Architect, MEP fees	\$15,000	\$15,000	\$15,000
	Project Manager, Consultant	\$15,000	\$20,000	\$50,000
	Specifications, Bid Spec Preparation	\$2,000	\$2,000	\$12,500
	Vendor Selection, Analysis	-	-	\$5,000
Ongoing Operational Expenditures (Annual)				
	Total Employee Costs	\$2,132,558	\$2,370,962	\$3,086,174
	Facility Maintenance/Upgrades	\$15,000	\$15,000	\$20,000
	Equipment Maintenance/Upgrades	\$80,000	\$80,000	\$80,000
	Software Licensing Fees	\$20,000	\$20,000	\$20,000
	New County 10-Digit Number	\$2,400	\$2,400	\$2,400
	Utilities	<inc>	<inc>	<inc>

*Budgetary estimates corresponding to the County monitoring existing systems, these costs will need to be refined between the County, Vineland, and the supporting vendors.

Table 28 below displays summary costs corresponding to the previously detailed costs for each scenario. Note that the Electrical Upgrades, noted at the head of the table, are required as Step 1 for the County PSADP, regardless of any path chosen towards a consolidation.

Table 28 Budgetary Summary

Electrical Upgrades	\$435,500		
Structural Upgrade	\$130,000		
	Scenario 1	Scenario 2	Scenario 3
Capital Expenditures	\$244,500	\$330,000	\$1,608,000
Transitional Operational Expenditures	\$62,500	\$72,500	\$149,500
Scenario Sub-Total	\$307,000	\$402,500	\$1,757,500
Total Annual Operational Expenditures	\$2,249,958	\$2,488,362	\$3,208,574

3.2.8 Future

There is a continual need for the 9-1-1 systems to be maintained and upgraded. Triggers for upgrading can result from many aspects including: government mandates; equipment obsolescence (age); equipment End of Life (EOL) whereby support (software, hardware) from the equipment vendor ends; need for hardware/software expansion resulting from increased performance needs; introduction of new functionality (AVL, etc.). With these factors in mind, V-COMM did not execute the consolidation study “in a vacuum”, but considered the above factors in assessing an appropriate Transition plan.

3.2.8.1 Growth & Expansion

As stated above, the current Motorola Gold Elite dispatch/radio equipment is nearing its EOL. In addition, this equipment is at its maximum supportable configuration; e.g. the dispatch system can not be expanded to include any more positions. Input from Motorola is as follows:

- New Console sales ended Dec 2006.
- Opportunity to expand the CEB⁷ and AEB⁸ ended Dec 2009
- Opportunity to add operator positions ended Dec 2009
- Motorola's goal for CentraCom then is to supply parts for 7 years till 2017 (infrastructure goal is 7 years, subscriber goal is 5 years)

⁷ CEB = Central Electronics Banks

⁸ AEB = Ambassador Electronics Banks

Therefore, any required dispatch growth, via consolidation or otherwise; can only be accomplished through the equipment partitioning process V-COMM has identified. The partitioning process limits a station to either dispatch or calltaking. **Therefore, through either growth or equipment obsolescence, the County will require and investment into their dispatch console equipment in the near future (≤5 years) regardless of whether consolidation (and associated position growth) occurs.** This needs to be factored into the timing of any consolidation and the overall budgetary planning for the County operations.

Zetron, manufacturer of the County 9-1-1 equipment, continues to support the Model 3200 equipment, currently deployed at the County 9-1-1 Communications Center as well as Vineland and Millville PSADP's. However, Zetron is planning to announce in June 2011 that they will phase out the Model 3200 and will introduce a new product that will support NG 9-1-1 calls. "To enable the general public to make a 9-1-1 'call' (any real-time communication – voice, text, or video) from any wired, wireless, or IP-based device, and allow the emergency services community to take advantage of advanced call delivery and other functions through new internetworking technologies based on open standards." The new Zetron 9-1-1 equipment will not be backwards compatible and will require a complete change out. Therefore, once the FCC and DHS introduce a timetable for compliance for NG 9-1-1, the County will have to upgrade its 9-1-1 calltaking equipment.

3.2.8.2 Narrowbanding

Narrowbanding is the process by which the radio spectrum "channels" will be divided in order to create more available channels. The narrowbanding initiative does not severely impact the dispatch consolidation effort, as the only consideration would be for the new radio equipment ("control station") required at the County in order to communicate with a municipality's radio network; if the Control Station approach is implemented (recommended).

Otherwise the narrowbanding impact to the County is the replacement/upgrade of the existing County wide radio equipment. Details and costs for this activity are described in 3.2.9.3, below.

3.2.8.3 NG 9-1-1

As described in 3.1 above, the next evolution of 9-1-1 calltaking is the migration to equipment capable of receiving 9-1-1 through a myriad of devices. This will necessitate an upgrade to any 9-1-1 capable equipment within the County. The costs of this equipment have a degree of uncertainty due to the preliminary nature of the mandate (see 3.2.6.2). However, early indications are unit costs would be higher than current unit costs (\$50-60K) for the calltaking equipment. As stated in 3.2.6.2, V-COMM conversations with NJ OIT representatives



indicate that funding for NG 9-1-1 upgrades via the State (grants) will only be issued to one PSADP per County (with some major metro area exceptions). On a Countywide basis, if multiple PSADPs are in existence at the time of NG 9-1-1 implementation mandates, the “County”⁹ would end up funding a NG 9-1-1 upgrade using internal dollars. Therefore, it is in the “County’s” best interest to have a single PSADP at the time of the NG 9-1-1 mandate.

3.2.8.4 PSADP backup

The current Cumberland County PSADP Calltaking back-up is the consolidated Salem County PSADP. In the event of a consolidated operation integrated into the County PSADP, this back-up arrangement need not be impacted with the exception of potential additional call volume. The Salem facility could continue to be the facility that would receive 9-1-1 calls in cases of overflow, 9-1-1 calls that are not being answered timely, and site failure of the Cumberland County PSADP. This is accomplished via the Verizon 9-1-1 selective router.

The County CAD server has a back-up capability at the Sheriff’s office. If PSADP consolidation occurs, the CAD Evaluation Study should take into account this back-up arrangement and determine if there are any advantages or requirements to change this configuration.

The current facility dispatch back-up is through the use of the Field Communications Unit (FCU) which can maintain dispatch functionality, albeit in a reduced fashion. An alternative to the FCU would be the development of another facility within the county. This facility and equipment would need to be maintained to some level of calltaking and dispatching functionality, and would typically result in a higher overall operational cost, as well as a significant initial capital cost. A consolidated dispatch’s impact on the back-up capability would be the potential upgrade of the FCU to handle additional capacity; unless there are specific reasons to move away from the FCU arrangement.

3.2.9 Radio Frequency Evaluation

3.2.9.1 Overview

This phase of the project was intended to accurately depict the state of the Cumberland County Public Safety LMR systems, with specific attention paid to RF coverage and potential future required system upgrades and/or alterations. The evaluation also focuses on the forthcoming FCC narrowband mandate and the status of the County equipment with respect to that mandate.

⁹ In this context, “County” represents citizens living within the County; the costs would be borne by the local municipality itself.

3.2.9.2 License Audit

As a starting point for a coverage analysis, V-COMM performed a License Audit of all applicable Cumberland County FCC licenses. Table 29 and Table 30 below shows all current licenses available on the FCC's online ULS system corresponding to the Cumberland County FRN¹⁰.

V-COMM then developed the coverage model parameters in conjunction with County personnel to confirm site locations and specifications, as they pertain to coverage modeling. During this process, a few inconsistencies were found between the County's ULS licenses and the system as-built configurations. Recommended actions to correct these errors are included the following tables.

¹⁰ FRN – FCC Registration Number



Table 29 Cumberland County ULS Information

Entity	Call Sign	Transmit Sites	Frequency (MHz)	Emission Mask	Power ERP (W)	Height to Tip (m)	Proposed Action
Fire Police	KNGD350	County Comm Site	156.21	Wideband	100	24	-
Fire Police	KXK420	Sheriff	156.21	Wideband	100	47.2	-
County DPW	KAZ605	County Manor	44.8	Wideband	150	25	-
EMS 1	WSU218	Port Norris	155.22	Wide & Narrowband	100	37	Remove
EMS 1	WSU218	County Comm Site	155.22	Wide & Narrowband	100	37	-
EMS 1	WSU218	County Manor	155.22	Wide & Narrowband	100	45.1	-
EMS 1	WSU218	Rt 347	155.22	Wide & Narrowband	100	50	-
EMS 1	WSU218	Millville PD	155.22	Wide & Narrowband	100	37	-
EMS 2	WSU218	County Comm Site	155.34	Wide & Narrowband	100	37	-
EMS 3	WSU218	County Comm Site	155.28	Wide & Narrowband	100	37	-
EMS 5	WPLS477	County Comm Site	155.325	Wideband	95	27	-
EMS 5	WPLS477	County Highway 793	155.325	Wideband	95	137	Remove
EMS 5	WPLS477	County Manor	155.325	Wideband	95	36.5	-
Fire 1	KNAA943	Port Norris	154.43	Wideband	100	37	Remove
Fire 1	KNAA943	County Comm Site	154.43	Wideband	100	37	-
Fire 1	KNAA943	Rt 347	154.43	Wideband	100	50	-
Fire 1	KNAA943	Millville PD	154.43	Wideband	100	37	-
Fire 1	KNAA943	County Manor	154.43	Wideband	100	47.5	-
Fire 1	KNAA943	County Highway 793	154.43	Wideband	100	152	Remove
Fire 2	KNAA943	Port Norris	154.325	Wideband	100	37	Remove
Fire 2	KNAA943	County Comm Site	154.325	Wideband	100	37	-
Fire 2	KNAA943	Rt 347	154.325	Wideband	100	50	-
Fire 2	KNAA943	County Highway 793	154.325	Wideband	100	122	Remove
Fire 2	KNAA943	County Manor	154.325	Wide & Narrowband			Add
Fire 2	KNAA943	Millville PD	154.325	Wide & Narrowband			Add
Fire 3	KNAA943	Port Norris	154.265	Wideband	100	37	Remove
Fire 3	KNAA943	County Comm Site	154.265	Wideband	100	37	-
Fire 3	KNAA943	Millville PD	154.265	Wideband	100	37	-
Fire 4/5	WPDJ988	County Comm Site	154.4	Wideband	95	46	-
Fire 6	WPDJ987	County Comm Site	154.175	Wideband	132	46	-
Fire 6	WPDJ987	County Highway 793	154.175	Wideband	132	152	Remove
Fire 6	WPDJ987	County Manor	154.175	Wideband	132	36.5	-
OEM	KNFR856	Port Norris	154.085	Wideband	50	37	Remove
OEM	KNFR856	County Comm Site	154.085	Wideband	50	37	Correct latitude
OEM	KNFR856	Millville PD	154.085	Wideband	50	37	Remove
OEM	KXK420	Sheriff	154.085	Wideband	65	47.2	Remove
OEM	KNFR856	County Manor	154.085	Wideband	50	42.6	-
OEM 1	WPHD815	County Comm Site	857.4125	Wideband	500	52	-
Pros.	WPGS699	Millville PD	155.52	Wideband	100	49	-



Table 30 Cumberland County ULS Information (continued)

Entity	Call Sign	Transmit Sites	Frequency (MHz)	Emission Mask	Power ERP (W)	Height to Tip (m)	Proposed Action
RERP School System	WPGU673	County Comm Site	33.1	Wideband	60	24	-
RERP School System	WPGU673	Stowcreek Elementary	33.1	Wideband	35	18	-
RERP School System	WPGU673	Woodland Day School	33.1	Wideband	35	12	-
RERP School System	WPGU673	Morris Goodwin	33.1	Wideband	35	6	-
RERP School System	WPGU673	Administration	33.1	Wideband	35	6	-
RERP School System	WPGU673	Cumberland HS	33.1	Wideband	35	9	-
Sheriff Dispatch	KXK420	Sheriff	155.865	Wideband	100	47.2	-
Sheriff-Courthouse Sec	KXK420	Bridgeton Courthouse	151.445	Wide & Narrowband	80	47	-
Vineland Fire Disp	KNAA943	County Comm Site	33.74	Wideband	100	37	-

The above information was used to supplement the data provided by the County contained in the County tower studies reports, and V-COMM observations gathered during site visits. The resultant site location and frequency information used in the RF Coverage Analysis (Section 3.2.9.4) are shown below in Table 31.

Table 31 County Public Safety Radio Systems, by Frequency

Channel Naming	Frequency (MHz)
Fire Police	156.210
EMS 1	155.220
EMS 2	155.340
EMS 3	155.280
EMS 5	155.325
Fire 1	154.430
Fire 2	154.325
Fire 3	154.265
Fire 4	154.400
Fire 5	154.400
Fire 6	154.175
OEM	154.085
Prosecutor	155.520
Sheriff Dispatch	155.865



3.2.9.3 Narrowbanding

3.2.9.3.1 FCC Mandate Overview

The FCC Narrowbanding mandate states that all Public Safety operations on frequencies between 150 and 512 MHz must be transitioned from previously allowed “wideband” operations (i.e. – 25 kHz channels) to “narrowband” operations (i.e. – 12.5 kHz channels). The deadline for this migration has been set at January 1, 2013. In the past, the Public Safety community has challenged this mandate as the migration requires the wholesale replacement of a significant portion of the imbedded communications equipment prior to its previously anticipated end of life; therefore, requiring significant capital expenditures that have not been previously planned for. This has twice resulted in delays of the deadline to its current timeframe. When the 2013 deadline was set, the FCC adopted a much firmer stance in that significant time has now passed since the mandate’s initial stages and enough time has been allotted for Public Safety entities and administration to adequately plan for the necessary capital expenditures. The current FCC position is that the deadline will not be extended and any non-compliance will be considered a violation subject to FCC Enforcement Bureau action; which may include admonishment, monetary fines, and/or possible loss of license.

3.2.9.3.2 Implementation Preparation

In order to ensure the narrowbanding process is realized without interruption of service, a complete plan should be developed and put into place. The first phase of a plan should be the development of a complete inventory of all radio make and models affected. The resultant analysis can be used for planning purposes, as well as coordinating the initial SOW with the equipment vendors selected to implement the narrowbanding equipment upgrades and replacements. This inventory was largely completed under this scope’s timeframe and the results are documented below.

It has been V-COMM’s experience that the development of a standardized channel format/list should be completed. This channel list should be developed prior to the commencement of any radio programming. The standardized channel list should be developed with each radio’s limitations with respect to maximum channel specifications.

3.2.9.3.3 Required Action

In order for Cumberland County to comply with this mandate, it would need to convert its current Public Safety communication networks to operate on 12.5 kHz channels. There are a few different methods in executing the transition to narrowband channels. Each method requires that the first step be to replace all



equipment not capable of narrowband operation. The only method that maintains full operation during the implementation phases is a method where all user radios are essentially programmed twice. Although there is an expense in programming a significant amount of radios twice, it allows for the smoothest transition while not requiring all work to be rushed. The step-by-step overview is as follows:

1. Addition of narrowband emission masks onto Cumberland County FCC licenses
2. Replacement of all subscriber equipment not capable of narrowband operation, including Mobile, Portables, Control Stations, Pagers, all Insta-Alert Devices, Base Radio, and Repeaters
3. Concurrently with #2, the reprogramming of all narrowband capable subscriber units to add post-narrowbanding channels
4. The reprogramming of all base equipment to narrowband operation and cutover to narrowband operation
5. Concurrently with #4, as each repeater is transitioned to narrowband operation, the user community should be alerted to use corresponding narrowbanded programmed channels
6. Reprogramming of all subscriber units to remove all wideband channels

It is possible to eliminate the requirement to reprogram the user equipment a second time to remove the wideband operations. The high-level plan would be to first reprogram the repeater equipment to operate in narrowband and then reprogram the subscriber equipment afterwards. This plan has an important side effect of the subscriber equipment operating in wideband mode with repeater equipment operating in narrowband until the respective subscriber equipment can be reprogrammed. This will result in some level of degraded voice quality at the subscriber radio. This degradation cannot be qualified as it is dependent on the make/model/generation of the subscriber equipment, as well as the repeater equipment.

3.2.9.3.4 Inventory Results

This first phase of the proposed Narrowband Implementation Plan was largely completed as part of the user survey conducted under this scope of work. A summary of the 2,234 devices inventories yielded results which are summarized below in Table 32. The complete inventory compilation (Excel format) will be separately delivered to County personnel due to database length.

Table 32 Summary Radio Inventory

	Total	Reprogrammable to Narrowband?			
		Yes	No	Unk	N/A
Mobile	506	301	151	11	43
Portable	993	778	40	14	161
Pager	572	171	401	0	0
Console	10	0	0	0	10
Repeater	33	24	6	0	3
Encoder	2	0	0	0	2
Unk	29	0	0	29	0
	2145	1274	598	54	219

Information not available for certain radio model/series numbers and/or model numbers likely reported incorrectly lead to a small quantity of radios with unknown narrowband operation capabilities. For budgeting purposes, these radios should be included in replacement quantities and costs to best prepare the County for the overall transition costs. In other cases, a series of radios reported (i.e. – HT1000 Portable radio) have only a subset of model numbers sold over the years that are incapable of narrowband operation. In most cases similar to this, a significant majority of the model numbers for such a series of radios will lead to a general consensus as to the series capabilities of being reprogrammed for narrowband operation. In the event of missing model information, V-COMM assumed the general consensus to be true since assuming incorrect capabilities for a small percentage of the radios will not create significantly sway the project's overall budget.

It has been V-COMM's experience that the first step to engage a vendor in a project similar to this is to have the vendor prepare a detailed analysis of the radio fleet including actually inspecting all radios affected. This allows the vendor to finalize all installation costs and necessary hardware to complete the project, as well as gather all series and model information needed to produce an exact cost upfront.

3.2.9.3.5 Estimated Narrowbanding Costs

Acknowledging that not all details were reported in the radio inventory conducted as part of the inquiry conducted under this scope of work (e.g. – Radio Series numbers were typically provided in lieu of actual model numbers, likely that not all dual head mounted mobile radios were reported, etc.), V-COMM prepared a cost estimate based on Motorola pricing included in the New Jersey State Contract T-0109, Radio Communications Equipment and Accessories, in conjunction with received Motorola quotes. These quotes assumed that all replacement mobile radios will be Motorola XTL1500 and portable radios will be Motorola XTS1500, Model 1.5. The corresponding cost estimates are outlined below in Table 33.



Table 33 Narrowband Cost Estimate

	Qty	Unit Equipment Cost	Unit Labor Cost	Extended Cost
Mobiles-Reprogram	301	\$0	\$59	\$17,759
Mobiles-Replace	191	\$1,407	\$382	\$341,626
Portables-Reprogram	778	\$0	\$41	\$32,131
Portables-Replace	54	\$930	\$41	\$52,466
Pagers-Reprogram	171	\$0	\$21	\$3,563
Pagers-Replace	401	\$500	\$21	\$208,854
Repeaters-Reprogram	24	\$0	\$125	\$3,000
Repeaters-Replace	6	\$12,000	\$125	\$72,750
Narrowbanding Total =				\$732,150

The cost developed in the above table is to be used as a budgeting number. As stated previously, the ideal first step in the implementation of this project to have the vendor complete an independent analysis, which will yield more complete information, and an exact cost upfront. Further, the unit costs used to develop the overall Narrowbanding project estimate are considered to be typical for the time this analysis was conducted. The above pricing is based on the best available current pricing data. The estimates do not take into account changes that can occur over time as the results of inflation, rising construction, material, and fuel costs, which may change the actual costs in comparison to estimates.

3.2.9.4 Coverage Analyses

V-COMM developed coverage propagation simulations for each of the Cumberland County Communications Systems listed in Table 31, comprised of both single and multi-site VHF applications. Each coverage propagation displays signal strength color gradients throughout the County and beyond in each of six (6) scenarios as follows:





- Talk-Out (a.k.a. – downlink, forward link) Mobile Street
- Talk-Out Portable Street
- Talk-Out Portable In-Building
- Talk-Back (a.k.a. – uplink, reverse link, or talk-in) Mobile Street
- Talk-Back Portable Street
- Talk-Back Portable In-Building

These different scenarios account for the difference in links (Talk-Out vs. Talk-Back) and location of the subscriber unit (Street-Outdoors vs. In-Building). Each scenario has different coverage thresholds that have been derived by V-COMM using industry standardized methods, such as the link budget and building loss

calculation techniques published by the Telecommunications Industry Association (TIA) in TSB-88-B.

The color gradient used depicts varying levels and quality of coverage provided at a specific location. The colors vary from light blue, green, yellow to red and represent varying levels of coverage as follows:

Table 34 Coverage Simulation Color Gradient

Coverage Color	Description
	Excellent
	Good
	Fair
	Marginal

Plots were not developed for the Mobile Street Coverage scenarios. Since there is a significant increase in power of the mobile radio above that of a portable radio, it is assumed the mobile plots would consist of 100% excellent coverage throughout the County. This assumption is based on the Good/Fair performance of the Portable Street Coverage scenarios and the subsequent high power and ERP of the mobile radio configuration.

The individual system plots for each coverage scenario are shown in Figure 18 through Figure 69 in Section 4.6 of this report. For display purposes, these plots are subjectively summarized in Table 35 below. The summary rates each system's provided coverage in each of the six previously defined scenarios. The ratings are excellent, good, fair, poor, and minimal. The excellent rating means that almost 100% of the County receives strong communications for the corresponding coverage scenario, meaning the corresponding coverage plot in Section 4.6 displays close to 100% light blue coverage. A 'Good' rating represents approximately 75% of the County area receiving top level coverage; 'Fair' drops to about 50% of the County area, 'Poor' is between 25% and 50% of the area and 'Minimal' represents little or no acceptable covered area.

Table 35 Coverage Analyses Summary

Channel	Talk-Out			Talk-In		
	Mobile Street*	Portable Street	Portable In-Building	Mobile Street*	Portable Street	Portable In-Building
CC Fire Police	Excellent	Good	Fair	Excellent	Fair	Minimal
EMS 1	Excellent	Excellent	Good	Excellent	Good	Poor
EMS 2	Excellent	Excellent	Fair	Excellent	Fair	Minimal
EMS 3	Excellent	Excellent	Fair	Excellent	Fair	Minimal
EMS 5	Excellent	Excellent	Fair	Excellent	Fair	Minimal
Fire 1	Excellent	Excellent	Good	Excellent	Good	Poor
Fire 2	Excellent	Excellent	Good	Excellent	Good	Minimal
Fire 3	Excellent	Excellent	Fair	Excellent	Fair	Minimal
Fire 4	Excellent	Excellent	Fair	Excellent	Fair	Minimal
Fire 6	Excellent	Excellent	Fair	Excellent	Fair	Minimal
OEM	Excellent	Excellent	Fair	Excellent	Fair	Minimal
Prosecutor	Excellent	Excellent	Fair	Excellent	Fair	Minimal
Sheriff Dispatch	Excellent	Excellent	Fair	Excellent	Fair	Minimal

*Assumed to be Excellent coverage due to increased power of Mobile radios over Portable radios.

3.2.9.5 RF Recommendations

License Audit

During the License Audit process, V-COMM identified inconsistencies in the County's FCC licenses and the system as-built configurations. V-COMM recommends the updating of these licenses to properly reflect as-built configurations in order to comply with FCC regulations and avoid potential action. It would be a cost benefit to the County to incorporate these license changes simultaneous to any other license changes necessitated by the incorporation of other applicable changes similar to further recommendations included in this section of the report.

Narrowband

Although a significant project, V-COMM strongly recommends that the County move forward with the migration to narrowband operation on all of its VHF and UHF frequencies. Since this implementation requires license changes and programming and/or replacement of all radios under the County's control, as well as a significant funding requirement, it is recommended that the County pursue the commencement of this project as soon as possible in order to ensure completion by the FCC mandate of January 1, 2013.

RF Coverage



Each channel/frequency's coverage must be evaluated geographically against the needs of the respective user community in various areas of the County. The coverage demands in Millville and Bridgeton likely exceed that in more rural parts of the County such as Maurice River Township. A given system might have been evaluated in Table 35 as "Fair" since strong coverage is only provided to approximately 50% of the County's geographic area. However, if the given system is only really needed in that half of the County, then that system meets its projected coverage goal and would not necessitate any site changes and/or additions. V-COMM recommendations based on the coverage analyses should be evaluated given this caveat, since V-COMM recommendations will be based on the assumption that each system's coverage goal is the entire County area. In addition, the coverage predictions are based upon the information provided. Any considerations for system upgrades should take into account actual, observed performance in order to take into account factors that a coverage model simply cannot duplicate, such as actual subscriber unit performance, recent and isolated variations in clutter, and evaluation of various buildings of differing construction materials.

EMS 1 and Fire 1 appear to be primary systems used throughout the County as they have the most transmit/receive sites and resultant coverage. Both Systems provide adequate Street Level coverage Countywide and adequate In-Building coverage in the densely populated areas. The only exception is Vineland, as expected since the Vineland Communications System is responsible for the area. The only significant coverage hole is evident when evaluating In-Building coverage through large portions of Lawrence and Commercial Townships and all of Downe Township. With no changes necessary with respect to the Street Level coverage provided by these systems, **the only recommended change to either of these systems would be the addition of a "Downe Twp" site along CR 553 between Dividing Creek and Newport.** The County's alternative would be to try and relocate sites in Bridgeton and Maurice River Township closer to each other to try and close the gap. The benefit gained from this alternative would likely be overshadowed by the loss of In-Building coverage in Bridgeton and Maurice River Township.

Several of the other EMS and Fire systems are seemingly less of a priority throughout the County, since they consist of fewer sites and provide less coverage. This is likely due to the coverage goal for these systems only requiring street level coverage, which is typical for Fire and EMS systems. Systems that provide coverage similar to that of EMS 1 and Fire 1, and would also benefit from the addition of the **"Downe Twp"** site to each respective system, include EMS 2, EMS 3, Fire 2, Fire 3, and Fire 4. The additional coverage could be significant in the southern and eastern areas of the County, as these systems have weak/limited coverage in these areas.



EMS 2, EMS 3, Fire 2, Fire 3, and Fire 4 all have a transmit/receive site at the County Communications Center and resultant weak In-Building coverage in the Bridgeton area (and heading south west) and weak Street Level coverage in the area of Greenwich Township. Solutions available to improve these coverage deficiencies for these systems include the addition of a site in/near or just southwest of Bridgeton (e.g. County Manor site). However, it is recommended that the County examine **relocating the current County Communications Center radio equipment to the County Manor** (or another site in that immediate area). This could allow the County to address the coverage concerns to the Bridgeton and southwestern area more cost effectively than the addition of a new site.

A common coverage hole exists in the southeastern portion of the County in Maurice River Township, specifically near Port Norris. Although the addition of the “Downe Twp” would improve street level coverage in this area, the only way to significantly improve In-Building coverage would be to add a system to the “**Mauricetown**” site between Leesburg and Port Elizabeth. Systems that would benefit from the addition of this site include EMS 2, EMS 3, EMS 5, Fire 3, Fire 4, and Fire 6.

The County Fire Police and Sheriff Systems consist of single transmit/receive sites in Bridgeton and therefore maintain strong In-Building coverage throughout Bridgeton and the surrounding area. However, that is the end of their In-Building coverage and their Street Level coverage is limited to that half of the County. In order to pick up coverage in eastern half, both systems would benefit greatly from the addition of the Downe Twp and/or Mauricetown sites. And although not a single site system, the County OEM coverage is also similarly limited to the western half of the County. Therefore, the County OEM system would also experience greatly improved coverage throughout the eastern half of the County with the addition of the Downe and/or Mauricetown sites.

Just as the other single sites have their strong coverage geographically limited to one area, the Prosecutor system’s In-Building coverage is strong throughout Millville and the surrounding area only with the Street Level coverage covering much of the eastern half of the county, although some weaker areas do exist in the Port Norris area. Only sporadic and weak Street Level coverage exists in Bridgeton and areas west, leading to the **recommendation to add the County Manor site to the Prosecutor system in order to expand the level of coverage provided, if desired**. Note that the radio system supporting Prosecutor operations typically consists of mostly mobile radios with little or no need for In-Building coverage. It is likely that mobile coverage is adequate and any additions to this system would only produce minimal gain.

Long Term RF Coverage

The future of Cumberland County may include County industry growth and continued population increases¹¹. The expansion of industry within the County (Millville Moto track; Boeing retrofit; Solar Facility) will result in more jobs, people and possible even more industry. In reaction to this, the County will have increased emergency events for the Police, Fire, and EMS entities, resulting in the need to expand the capacity of the current Public Safety Radio Communications System.

In order to meet this demand, the County basically has two paths; continue to work through multiple, independent single frequency (SF) VHF systems; or investigate a wholesale evolution to an Interoperable 700/800 MHz System. SF operations will be less costly solution for the short term; however, the drawbacks are a limited interoperable environment within the County; an increased interference risk to/from other systems; limited technological advances (i.e. trunking, simulcast) and associated functionality; and uncertain frequency and equipment growth potential. Further, since the VHF spectrum is being shared with other services, including non Public Safety, that have the ability to license the frequencies through multiple, function-specific, frequency coordinators, less interference protection is provided to licensed operators; despite the FCC rules and regulations. Additionally, with the spectrum being so crowded there are virtually no VHF frequencies available for licensing in areas of close proximity to major metropolitan areas (e.g. Philadelphia). A high level budget based on V-COMM's experience with single site radio expansions (SF network) and 700/800 MHz network planning is documented in Table 36. The SF budget includes all recommendations for site additions documented above.

The State is in the process of upgrading their existing State-wide 800 MHz system to P25 digital and adding 700 MHz channels. The system is designed to be compliant with P25 Phase II interoperability. The City of Vineland currently operates an 800 MHz trunked simulcast system. It should also be noted that most grant funding is requiring that any funds be utilized for systems that promote interoperability as well as regional consolidation. Therefore, with the growth potential and future prospective of the VHF spectrum rather dim and most important, the ability of the County to significantly improve interoperability, the best path for the County to pursue is the development and integration of an Interoperable 700/800 MHz, Multi-Site, Digital Trunked¹², Simulcast¹³ Radio

¹¹ <http://quickfacts.gov>, 7.7% population increase 2000 to 2009

¹² A Radio Network that uses trunking technology allows a limited number of frequencies to be shared across all users; thereby making the most efficient use of the frequencies in use. This is

System. It should also be noted that State of New Jersey in introducing a program to allow the various public safety entities to utilize its “Master Control” sites which we help defray some of the costs of building out a 700/800 MHz Multi-Site, Digital Trunked, Simulcast Radio System.

Table 36 Long Term RF High-Level Budget

	SF Systems	700/800 MHz System
Infrastructure	\$272,000	\$10,000,000
User Equipment	\$0	\$8,000,000
Services	\$10,000	\$1,000,000
Operational Costs	\$50,000	\$1,000,000
Total	\$332,000	\$20,000,000

A 700/800 MHz Radio System would be a more significant investment; however, with the ability to take advantage of the State’s upgraded system, and improved access to grant monies, the new system would use more efficient trunked, simulcast configuration, offer much greater inter/intra department interoperability; have a clean, expandable spectrum environment; and be more in tune with plans of nearby northern counties. It is worth noting that a good portion of the cost would be borne in the requirement for new radio for all County based end users. However, the intention of the system would be the elimination of the current Bridgeton PD and Millville PD systems and the required maintenance and upgrade thereof.

The County is in the process of relinquishing its 800 MHz NPSPAC allocation. The intended system was a five channel trunked, simulcast system. Should the County determine to reverse its decision to relinquish its spectrum and implement at 700/800 system, V-COMM recommends returning to the FCC Region 28 Regional Planning Committee (Region 28 RPC) and refilling for these same allocated frequencies. In addition, in order to support the projected demand of the system, V-COMM recommends that the County pursue additional channels in the 700 MHz spectrum. The 700 MHz spectrum is new spectrum specifically allocated for Public Safety operations and is governed by local Regional Planning committees (Region 28 RPC for Cumberland County). These allocations were designated on a County basis; therefore, the Cumberland County geographic area has 13-25 kHz wide channel allotments that could be

accomplished through the use of a control channel that assigns each subscriber radio a traffic channel for a requested voice transmission.

¹³ A Simulcast Radio Network links multiple sites together in order to transmit a single voice transmission on a common frequency from all linked sites, increasing the geographic area able to receive the voice transmission. These transmissions are time-synchronized in order to ensure no self-inflicted interference is experienced by the subscriber units.

licensed. The allocation prefers countywide entities over local entities; although local entities may apply for the channels.

Table 37 Cumberland County Region 28 700 MHz Channel Allotments

Channel Type	Channel Numbers	Channel Center Frequency (MHz)
General Use, Voice	45-48	769.28750
General Use, Voice	125-128	769.78750
General Use, Voice	165-168	770.03750
General Use, Voice	205-208	770.28750
General Use, Voice	325-328	771.03750
General Use, Voice	405-408	771.53750
General Use, Voice	485-488	772.03750
General Use, Voice	529-532	772.31250
General Use, Voice	617-620	772.86250
General Use, Voice	669-672	773.18750
General Use, Voice	749-752	773.68750
General Use, Voice	793-796	773.96250
General Use, Voice	833-836	774.21250

Due to the nature of the spectrum, the County could deploy a 700/800 MHz Interoperable Communication System capable of serving all public safety entities and directly integrate the Vineland 800 MHz System and the State of New Jersey 700/800 MHz P25 System. This would implement the highest level of interoperability. Therefore, V-COMM recommends that, over the long term, the County deploy a trunked 700/800 MHz Radio Communications System that would provide coverage as required in order to provide top level coverage for all Public Safety entities throughout the County. In order to realize this in a timely process (next several years), the County should begin the planning process now by evaluating the funding requirements. A high level budget based on V-COMM's experience with 700/800 MHz Radio Systems assumes a 7-site network capable of Mobile coverage throughout the County and In-Building coverage to support Bridgeton PD and Millville PD. The County can further develop this high level budget, in conjunction with the system design, with the major vendors in the market (i.e. Motorola, Harris, PowerTrunk, Tait, EADS, Kenwood, etc.). The proposed system can be designed in advance of the release of an RFP to ensure site locations will be favorable to the County and meet the specific coverage needs of all Public Safety entities throughout the County.

If the County determines the appropriate long-term solution is the development and implementation of an Interoperable 700/800 MHz Radio System, then the County will need to assemble a 700 MHz frequency application, in accordance with Region 28 rules, to insure the spectrum allocations are not lost to other entities within the County in the near-term; or agencies outside the county in the

long term. The County could also re-apply to the Region 28 RPC for the 800 MHz NPSPAC channels that were recently relinquished by the County.

3.3 Task 3 – Recommendations

3.3.1 Overview

Three consolidation scenarios of current PSADP operations into the County PSADP have been identified as potential consolidation options as follows:

1. Scenario 1 – Bridgeton PSADP is integrated into County PSADP
2. Scenario 2 – Millville and Bridgeton PSADPs are integrated into County PSADP
3. Scenario 3 – Vineland, Millville and Bridgeton PSADPs are integrated into County PSADP – **V-COMM Recommended Option**

3.3.2 Recommendation of Single County-Wide PSADP

When analyzing all of the data collected through the various methods described in the Baseline Assessment section of this document, it became evident that the optimal recommendation for Cumberland County is to consolidate the PSADPs into one single, central center. There are a number of external and internal drivers moving the County in this direction:

- Legislative requirements of S-45 requiring consolidations to continue eligibility for state grant funding
- NJ State directives emphasizing consolidation of services
- Opportunity to improve the quality of service to the first responders and the citizens of Cumberland County
- Standardization of operating procedures across all served agencies
- Reduction of future NG 9-1-1 network implementation and operating costs as compared to current model
- Overall savings for the County residents from the reduction of emergency calltaking/dispatching facilities and equipment from 4 to 1.

Although an end goal may be to operate a consolidated PSADP center similar to that of Gloucester, Burlington, and Salem Counties, all of which encompass Police, Fire and EMS, the recommended method to achieve this goal would be a phased approach.

The first phase of the proposed consolidation effort would involve the County developing a migration plan and timeline for the transition to the consolidated PSADP. With the migration of multiple services and departments, it is recommended to conduct the migration of each department on a rolling schedule, as has been successful in other consolidations throughout the State. A rolling schedule could institute a period where processes could be fine-tuned and standardized as the center grows. An additional benefit provided is the allowance for the recommended Public Education campaign to be implemented and take effect by “re-training” the Public to utilize the 9-1-1 system in the case of an emergency, in lieu of the 10-digit dial that has been shown to be dominant in the past. This phase will provide the County a sound plan and supporting information to provide to each local PSADP during the next phase coordination with the affected PSADPs. During this phase, the County should engage each of the local Police Departments that maintain each of the local PSADPs throughout the County. After the first department is transitioned to the consolidated PSADP, the lessons learned in this initial migration would aid in easing future migrations; as well as demonstrate the ability of the consolidated PSADP to take on Police Dispatching and additional 9-1-1 Call Volume. Further, a proven efficient and tactful migration would also demonstrate the effectiveness of the County’s consolidation plan and the ability of the County to take on additional Police services.

During consideration for the recommendation of a single, centralized PSADP, various geographic areas and existing structures within Cumberland County were discussed and reviewed. Some of these were existing PSADP locations, others were established properties with existing buildings, and other areas were land parcels for consideration of a “Greenfield” build.

Keeping the current economic climate in mind including budget challenges existing within the State of New Jersey, and, after discussions with the New Jersey OETS group, it became apparent that building a brand new facility from the ground up would be a cost intensive endeavor that neither the State nor County would likely be willing to support if a less expensive and easier alternative is feasible.

The remaining options involve utilizing an existing facility that could be expanded or renovated at a much more reasonable cost. During this study, V-COMM visited each of the local PSADPs and the County Communications Center. It was determined that the best possible location for a centralized PSADP is an expansion of the current PSADP at the County Communications Center. This recommendation is a result of reported data included in the Communications Survey and a review of each location’s facilities and attributes in terms of supporting a single consolidated countywide PSADP. Additionally, ensuing conversations with the NJ OETS regarding potential support for various consolidation options provided additional insight and further supported this



recommendation. In addition to the current space occupied by the County Communications Center, expansion of the building has been studied and found to have potential. The previously evaluated building expansion, relocation of the PSADP equipment to the training room in the basement of the County Communications Center, and/or simple renovations to the existing floor layout are all options available to the County that could meet the needs of a consolidated PSADP operation, without the construction of a new facility or the relocation of the existing equipment and supporting infrastructure to another existing facility.

The existing County Communications Center building itself is a two-story structure which is built into the side of a small hill with reinforced exterior walls in the lower level. The facility also has a weather protected generator and fuel capacity capable of supplying the needs of the center for up to 7 days. Today, there are multiple communications towers on the current County Communications Center property.

The geographical location of the current County Communications Center building is another reason it is one of the most viable locations to house the proposed consolidated County PSADP. The facility is located inland and near the center of the County. Although no area near the bay is flood proof, the County Communications Center would do better than most other locations in that regard.

3.3.3 Consolidated County PSADP Equipment

3.3.3.1 Calltaking and Dispatching

V-COMM has evaluated the County's existing Motorola CentraCom Gold Elite Radio Dispatch Equipment, in conjunction with the vendor, as part of this study. It has become evident that this equipment series is quickly approaching the point where replacement will be required. Since new Console sales ended in December of 2006 and the opportunity to expand existing CEB and AEB equipment ended in December 2009, the County is currently unable to expand or add-on any equipment to their existing Dispatch console positions. Further, with Motorola's current goal to supply parts for the CentraCom equipment until 2017, it is recommended that the County should immediately look to replace the current Dispatch console equipment and plan to have the project completed no later than 2015 in order to avoid operating unsupported equipment in a mission critical setting.

Similarly, the existing County Zetron 9-1-1 Calltaking equipment is also approaching its End-of-Life. In addition, it will not support anticipated State NG 9-1-1 mandates. Both of these situations require the wholesale replacement of the Zetron Equipment to enable vendor support of the equipment into the future

and provide NG 9-1-1 capabilities. The life of the Zetron 9-1-1 equipment could be extended somewhat by implementing Zetron's IP upgrade (Model 3300 equivalent) to enable some NG 9-1-1 capabilities.

Therefore, V-COMM recommends that if consolidation is limited to either or both Bridgeton and Millville PSADPs into the existing facility (Scenario 1 or 2) this can be accomplished in the short term via the reconfiguration of existing County Zetron 9-1-1 and Motorola Radio Dispatch equipment in the space currently occupied at the County facility¹⁴. This temporary solution will only allow the County to implement the Scenario 1/2 consolidation effort and will not provide any extended vendor support of the equipment in regards to the previously stated End-of-Life timelines or anticipated State 9-1-1 mandates. Therefore, under Scenarios 1 and 2, if the County decides to reconfigure the existing equipment, it is recommended that the County also immediately begin making all preparations to replace the existing Motorola dispatch equipment to support infrastructure expansion, and replace the existing Zetron 9-1-1 equipment to support NG 9-1-1 within an approximate 5-year window.

The addition of Vineland into the County facility (Scenario 3) will necessitate the need to add dispatch and call taking equipment into the facility to meet the recommended quantity of staffed positions for peak shift and still maintain an acceptable level of spare stations and/or backfill capability. Therefore, V-COMM recommends that Scenario 3 include the wholesale replacement of the existing 9-1-1 equipment to Zetron's soon-to-be released (2Q/3Q 2011) NG 9-1-1 product. This will enable maximum capabilities moving forward and comply with all regulations and mandates formulated by the State as the industry transitions to NG 9-1-1. Additionally, V-COMM recommends that the Scenario 3 consolidation (or any consolidation including Vineland) include the upgrade of the existing dispatching equipment. The additional equipment capacity will require the relocation of the Dispatch Center from its current location on the first floor to the basement to achieve the required space.

The recommended final configuration to support complete consolidation would be for 14 total positions. Two of those 14 would be for the Supervisor and a Spare/Trainer. The remaining 12 would support the daily calltaking and dispatching functionality. Six of the 12 would be configured to support both calltaking and dispatching; three would be calltaking only positions, and the remaining three would be dispatch only positions. This recommended configuration provides for ideal functional redundancy while reducing total equipment costs for 6 of the 12 positions.

¹⁴ It is not recommended to reuse equipment deployed at the local PSADPs as this will provide an added level of difficulty in the planning of the migration of services (loss of service, testing of equipment).

3.3.3.2 Computer Aided Dispatch (CAD)

ANY level of consolidation will require that the County's current CAD system be evaluated for its ability to support the needs of all consolidating departments, and support the conversion and integration of all historical data from each department's current CAD system. If the County's CAD system is found insufficient, it will need to be replaced/upgraded accordingly.

3.3.3.3 Phone Answering

Imperative to any level of consolidation is getting the emergency calls to the consolidated PSADP via a 9-1-1 dial. The 9-1-1 System provides the Calltakers/Dispatchers with ANI/ALI¹⁵ information in order to supply the public safety personnel with as much reliable data as possible in the performance of their duties. Further, the 9-1-1 System is designed, implemented, and funded based on measured statistics of that system.

The current tendency of the public is to call the 3 local PSADPs for police emergencies (10-digit Emergency dialing). A 10-digit dial provides very limited information to a calltaker/dispatcher. The continued usage of the 10-digit dials will result in a lower service level to the citizens, undermines the 9-1-1 System, and requires correction.

To increase and encourage the 91-1 emergency dials, V-COMM is recommending an educational campaign to alert the public of the consolidated PSADP integration and urge the use of the 9-1-1 System in the event of an emergency. As part of this campaign, V-COMM makes the following recommendations in the interests of making a timely and successful transition:

- Install auto answering attendants on the current 10-digit emergency numbers for Bridgeton (856-451-0033), Millville (856-825-3111), and Vineland (856-696-1212) that encourage the use of 9-1-1 dialing. Auto-attendant that states "if this is a true emergency, hang up and dial 9-1-1" should be the default for all. **This modification should take place regardless of the timing of any PSADP consolidation, or none at all.**
- As is often the case, a caller will simply press 0 rather than even listen to the auto-attendant. Therefore, do not allow a caller to "0-out" and immediately reach a calltaker/dispatcher.
- The consolidated County PSADP should implement a new 10-digit dial number for the receipt of all "central station calls", (i.e. – alarm companies, ability to reach County dispatch from outside the County, etc.)

¹⁵ ANI = Automatic Number Identification; ALI = Automatic Location Information

- If the ability to reach dispatch directly from the local PSADP's 10-digit dial number must be maintained, it should be done through a selection other than 0, i.e. – “Press 9 for dispatch”. This would require the caller to listen through the complete menu before hearing the dispatch option, increasing the likelihood they will hang up and dial 9-1-1, for an emergency.

3.3.3.4 Radio Equipment

As addressed in Section 3.2.9, the County is in relatively good shape with respect to the FCC narrowbanding mandate. A solid majority of the equipment, user radios, base stations, repeaters, etc, are already narrowband capable via a programming update. The incompatible equipment will need to be replaced. The narrowbanding mandate is January 1, 2013, less than 2 years from the development of this report. Given funding required, and associated funding cycles, a County Narrowbanding Plan for the purchase of the new equipment, and reprogramming of capable equipment, cutover of operations, and appropriate FCC filing paperwork should be identified. Inclusion of the user community through education and participation in Plan development is recommended. Identification of grant funding avenues should be pursued vigorously.

Ownership and maintenance of the independent radio systems should remain unaffected by any consolidation effort. Although benefits typically exist for all parties involved, the proposed PSADP consolidation does not require or imply that the radio systems for any/all of the entities integrated be consolidated as well. The proposed consolidation will only require the consolidated PSADP to interact with each entity's radio system.

As previously detailed in this report, V-COMM recommends that over the long term, the County should consider the replacement of the current network of multiple Single Frequency (SF) Radio Systems with a modern Multi-site, Digital Trunked, Radio Communications Network¹⁶ with interoperability to multiple neighboring jurisdictions. As populated areas continue to see overall population increases, and as suburban areas continue to spread geographically, technology has been developed to provide a higher level of interoperability between public safety personnel. To help local municipalities meet the ever changing needs facing the sector, funding avenues are being made available at both the state and federal levels. A common focus, and often a requirement, of these funding paths is Interoperable Communications. In the future, the County will experience the need for improved Public Safety Interoperability and will also find it harder to obtain funding for the current multi-SF network without transitioning to a redesigned, modern network.

¹⁶ See previous footnotes 12 and 13 for overview of proposed system technologies.

V-COMM's recommendation is a 700/800 MHz based network. This takes advantage of the 700 MHz channel already allocated to the County's geographic area. A 700 MHz Based system can also take advantage of 800 MHz channel, be compatible with Vineland's existing 800 MHz system, surrounding County systems, and the State system(s).

3.3.3.5 Electrical

Based on our site investigations, we have concluded that the existing electric service is only marginally suitable for the existing facility and substantial upgrades will be required to implement any of the options described herein.

The size of the future electrical service required will be dictated and dependent on whether the local utility company, Atlantic City Electric, will upgrade the existing distribution plant. As previously described the Utility Company provides single phase, 3-Wire, 120/240 Volts overhead at the street. Based on our calls to the utility company, it appears 3-Phase, 4-Wire, 120/208 Volts distribution is available in the area.

Our recommended new service should consist of an 800 amp, 3-Phase, 4-Wire 120/208 Volts service minimum.

New service entrance equipment, additional distribution panels, and additional branch circuits for equipment, lighting, HVAC and convenience receptacles are recommended.

A new 3-Phase generator is recommended to supplement the existing 150 kVA, Single-Phase generator.

Since the new generator will have to be 3-Phase, and since the existing building circuits will have to be separated by type of load, (i.e., 1Ph and 3Ph loads cannot be mixed); it is our recommendation that all communication circuits including the radio buildings be separated¹⁷ to remain on the existing single phase generator, and that the remaining building loads be fed by the new 3-Phase generator. The new generator cannot be sized at this time, because the isolated building loads have not been determined.

Shown below in Figure 14 is a proposed Electrical One-Line Diagram to illustrate our recommendations.

¹⁷ It is also beneficial to separate the communications loads from the building loads because the latter generally does not require UPS back up.

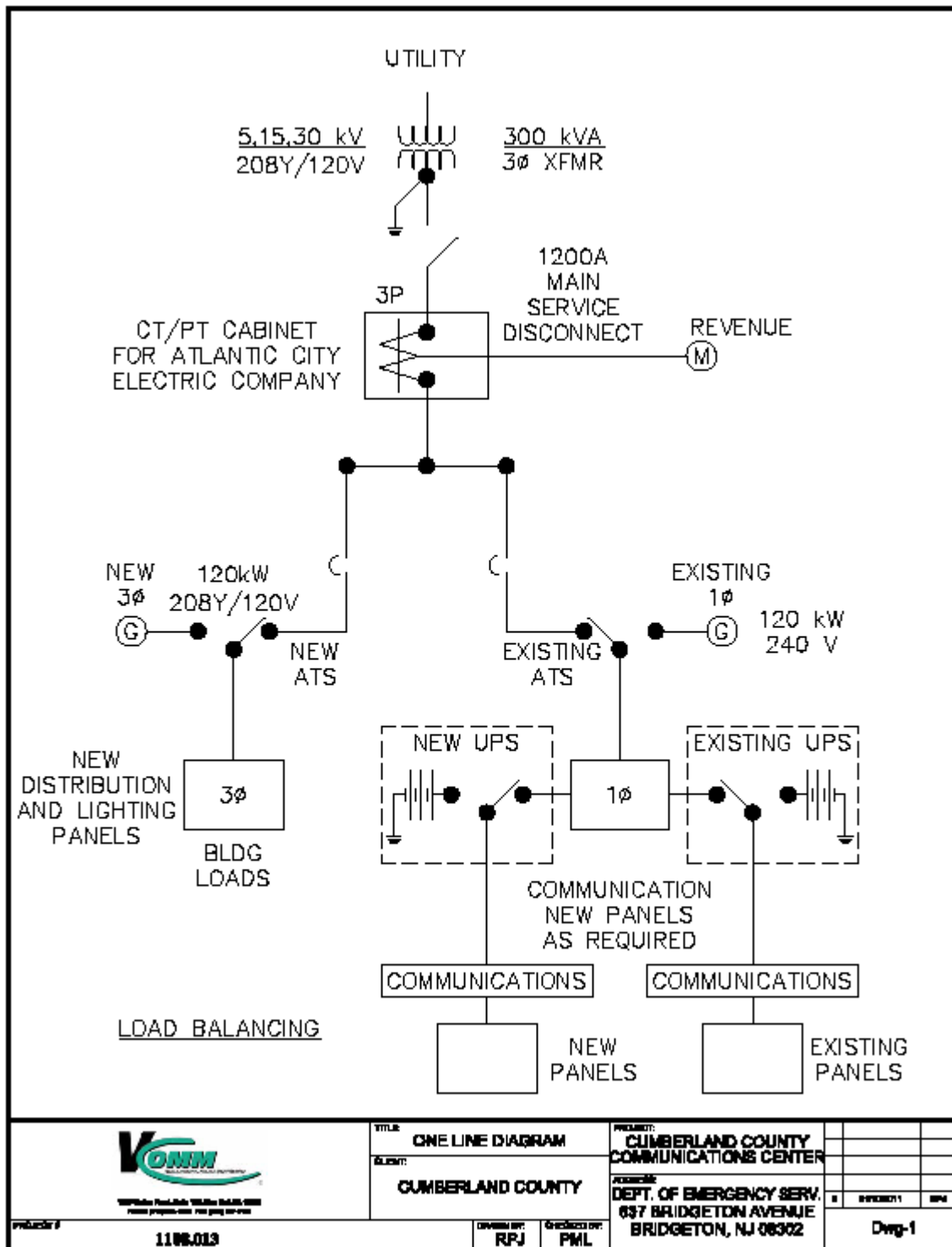


Figure 14 Electrical One-Line Diagram

3.3.4 Consolidated County PSADP Staffing

In the development of a proposed consolidated PSADP, the County will need to increase current staffing levels with trained, seasoned, professional Calltakers and Dispatchers. With the County PSADP's limited experience in Police Dispatch, it is recommended that the County accomplish this through the hiring of existing staffed dispatchers at the local PSADPs undergoing consolidation. This will enable the County to ensure the desired quality of service is provided to the Public Safety personnel and the public, with the added benefit of limiting training time and associated costs. This effort should also give those supported by each consolidating PSADP, a level of confidence that the consolidated PSADP will have the ability to provide the services at hand to acceptable levels.

As an addition to the current Calltaker and Dispatcher Training program, it is recommended the County have employees (new and current) visit and observe day-to-day operations at each local PSADP affected by the proposed consolidation. Observations made during these visits will assist in the development of new SOPs for the consolidated operation, as well as institute a familiarity with language used and dispatcher-officer interactions currently in place. This training is in addition to 9-1-1 training required for all new hires.

A consolidated County PSADP must implement standard procedures for dealing with all public safety departments supported by the PSADP. An example observed during the interview processes at the local PSADPs is the inconsistent naming convention in place when communicating with EMS units in the field across separate PSADPs. This must be addressed and the user community educated as to any change to be implemented. In addition, some perform their tasks adhering very closely to the written documents while others rely more on general knowledge and communication flow as opposed to incident procedural documents. We recommend a Working Group of calltakers/dispatchers and end user community members as part of the transition process.

3.3.5 Back up PSADP Opportunities

With any consolidation, consideration should be given to the backup of PSADP services. The County's current backup plan includes the roll-out of unanswered 9-1-1 calls to the Salem County consolidated PSADP, as well as complete operations in the event of a complete building/site or telephone interconnect failure. Additionally, the County owns and maintains a mobile Field Communications Unit. This will enable the County to connect to various radio systems and communicate via their existing radio systems.

The Mobile Field Communications unit can not be considered a fully functional PSADP back-up due to its inability to receive 9-1-1 calls via a secure and consistent method and its limited RF coverage. However, V-COMM realizes that



the high costs associated with the implementation of a redundant facility are likely financially inconceivable. Therefore, it is recommended that the County maintain their current backup plans, with expansions applied where necessary to account for increased primary services and volumes. Salem County should be notified of changes in Cumberland's PSADP status and functionality. SOPs should be updated accordingly.

3.3.6 Other Consolidation Options

Although the focus and overall recommendation of this project is the complete consolidation of the Bridgeton, Millville, and Vineland PSADP's into the current County PSADP, the scope was not limited to this scenario. Therefore, consideration of alternative scenarios was performed.

While many consolidation models were reviewed and evaluated, serious considerations were given to each level of PSADP consolidation. These models included the current model of PSDAP configuration, a multi-municipal (or dual) consolidation model, the implementation of a Private PSADP, and the single consolidated Countywide PSADP. All models were taken into consideration prior to the determination of a final recommendation.

3.3.6.1 Private Operations

Since all PSADPs currently operating in Cumberland County are maintained by governmental entities, the choice to implement a consolidated PSADP under the control of a non-governmental entity would be a decision not inline with the operations existing within the County. Therefore, a consolidated PSADP as a private operation was evaluated as a less-than-ideal opportunity in Cumberland County due to an overall lack of an entity capable to take on such an operation.

3.3.6.2 Multi-Municipal

When conducting the meetings with the various stakeholders, one concern expressed was the lack of familiarity with geographic locations in a centralized model if the calltaker/dispatcher was not from the municipality from which a given call was being received. This concern gave way to considering two (or potentially more) consolidated PSADPs supporting entities from multiple municipalities. This scenario was limited to evaluating two potential PSADPs since there are only four in operation being evaluated in this study and being considered for consolidation. In addition, the logistics necessary in creating and maintaining two complete PSADP facilities supporting all municipalities and agencies on a County level were reviewed. These considerations included the two physical buildings and associated costs, along with the necessary equipment and staff that would be required. The intent of the NJ S-45 legislation prevents this from being a

viable, permanent solution due to population considerations. Per Pitney Bowes TargetPro™ Demographic software, Cumberland County has a year round population of approximately 156,000 residents. Since the minimum population required under consolidation is 65K, it is possible that at least 1 of the 2 centers would qualify for state funding and assistance. This could result in ongoing inequities and variations in services rendered across the County to its constituents.

There are several reasons behind V-COMM not recommending the regional or multiple PSADP concept as an acceptable final option. Cumberland County does not cover a significantly large land area or population base to justify more than one consolidated PSADP. Further, with only four PSADPs in total, only two of which receive direct 9-1-1 calls, a final solution yielding more than one PSADP would not represent a significant stride towards unified emergency communications. With respect to costs, a single countywide consolidated PSADP is in the best interests of the taxpayers of Cumberland County as multiple PSADPs is clearly not the most cost effective method to provide the desired level of service to the public. Additionally, in discussions with the NJ State OETS, it was stated that those municipalities/counties working towards consolidation through such a phased approach would remain eligible for funding under S-45.

3.3.6.3 Status Quo

Should the stakeholders take no action toward planning and implementing a countywide PSADP, the long-term financial impact could be significant for most communities. Acknowledging there are a few communities that may not need state grants, there are more that do need that assistance. Considering the new technological challenges being created at the federal and state levels, new equipment and systems costs along with the ongoing expense of current equipment and software upgrades alone should bring concern of budget constraints. Under the S-45 legislation and the NJ State 9-1-1 commission plans, all grant monies are to be directed to those counties consolidated, or working towards consolidation. Although there exists the possibility that a non-consolidated PSADP in Cumberland County could serve a population greater than the 65,000 threshold and therefore qualify for receipt of some level of aid, the State mandate clearly states that without consolidation, state grants, funding and support would be reduced, if not entirely eliminated. There may be some municipalities that may choose not to join in a consolidation effort, possibly preventing Cumberland County from ever reaching complete consolidation. Recognizing this, the State has acknowledged that a good effort has been made in good faith on the part of the municipalities/County, the State would grant consideration to those centers that attempted to follow the intent of complete consolidation. It has also made clear that those municipalities that do not

participate may be pressed to bear the costs associated with operating costs associated with maintaining connection to the current state operated E911 network as well as those costs that will be required as they deploy a new statewide NG 9-1-1 network.

3.3.6.4 Advantages/Disadvantages of Each Alternative

Advantages and disadvantages of possible solutions to consolidation vary according to the extent that consolidation is implemented. In reviewing the potential criteria to consider consolidation, the following factors were given priority:

- Resources – including staffing efficiencies
- Facilities – quantity and size
- Operating cost
- Probability of obtaining funding assistance for new or ongoing operation
- Probability of obtaining uniform levels of service to all agencies
- Infrastructure cost

The least advantaged option with respect to the above criteria is to maintain the current individually operated PSADPs. This solution leaves the three local municipalities with the ongoing expense of maintaining and upgrading the current PSADPs with the future NG 9-1-1 requirements, becoming a potentially large capital expense.

A consolidation of any type or scope, dual or multi-municipality would yield some level of potential benefit whether it is in ability to better utilize resources or the potential reduction in facility and operating cost. Even with initial benefits, unless such consolidation were to meet the State's S-45 mandates, some PSADPs would be left to bear the cost of NG 9-1-1, with very little if any funding assistance.

A single PSADP consolidation under a privately operated agency has most of the same favorable benefits as a single governmental consolidation. The funding model for this scenario would need to consider future costs and current lack of state funding to private agencies. While this may be viable, there are many future unknowns with this model being deployed in the State of New Jersey, as there is only one regional private PSADP in service today within the state.

The most advantaged consolidation option given the review criteria is that of a single, governmentally operated PSADP. In establishing such a PSADP within Cumberland County, all consideration points are met to the ideal level in comparison to other alternatives while maintaining opportunities for state and federal funding assistance.

Table 38 below outlines the above detailed criteria as it applies to the consolidation effort in Cumberland County.

Table 38 Consolidation Models - Advantage and Disadvantages

	Model			
	1	3	4	5
	Private Operation	Multi-municipal	Current Operations	Consolidated county
Staffing Efficiency	High	Medium	Low	High
Total sq ft	Low	Medium	High	Low
Number of Facilities (not including backup)	1	2-3	4	1
Operation Cost	Low	Medium	High	Low
Chance of State Funding	Low	Medium	Low	High
Chance of Uniform Service	High	Medium	Low	High
Infrastructure Cost	Low	Medium	High	Low

This table shows that the Private Operations and Consolidated County models rate the highest with the preference being the Consolidated County model due to the much higher chance to realize State funding. An additional deciding factor for the consolidated County model in comparison to the Private operations model is the very low presence of the privately operated PSADPs through the State of New Jersey.

3.3.6.5 Consolidation Considerations

During this analysis, V-COMM was not given any specific direction from the County or Freeholders related to the final outcome or recommendation. There have been numerous comments from the stakeholders as to their desire for multiple PSADPs, based on either municipality or service (i.e. separating Fire/EMS from Police) or even if there should be any additional level of consolidation. After careful consideration, discussions and analysis of the existing local PSADP and County Communications Center data, below is the recommendation of V-COMM pertaining to the consolidation study and efforts for Cumberland County.

3.3.7 Budget Estimate

A number of considerations need to be made when determining the financial implications and ongoing operating budget associated with the deployment of a consolidated County PSADP. Since the recommended location is the existing County Communication Center structure and no new facilities (or significant addition) are being built to support the proposed consolidated operation, construction costs are drastically reduced in comparison to a new facility. Additional consideration needs to be given to the reuse of as many other facilities as possible that are already located within the County Communications Center; such as showers, lunch room, and possible conference room areas; even if not located on the same floor. Other immediate cost reductions in the budget would include the availability and reuse of the existing telecommunications towers and the protected generator and fuel supply area. Further, considerations need to be established, on behalf of the County, regarding the costs of the equipment procured in preparation for the proposed consolidated operation, as well as costs deemed necessary for the County to incur over the next 5 years, regardless of the path taken towards consolidation.

In the evaluation of the complete costs associated with the previously identified scenarios of consolidation, five categories were developed as follows:

- Building Electrical System Upgrade
- Building Structural Upgrade
- Dispatch Center Preparation
 - PSADP consoles and staff area
 - PSADP Equipment
 - Staffing
- Migration of Services
- Projected Ongoing Operational Costs
- Projected 5-Year Equipment Recommended Costs

V-COMM recommends the implementation of the previously discussed Building Electrical System Upgrade calculated at \$435,500, regardless of the path chosen towards consolidation as these upgrades will prepare the County PSADP for expected growth and expansion into the future, even without consolidation. The Dispatch Center Preparation varies with the chosen consolidation scenario. This cost category includes all layout alterations required of the facility, the procurement and implementation of the PSADP hardware/software required, and the hiring and training of any additional staff. The Migration of Services category includes the costs borne by the County directly associated with the transition to the chosen path of consolidation. In general, all the line items in this category are consistent across all three proposed scenarios with a scaling factor applied to accommodate the higher level of work to be done for the higher levels of

consolidation. The Projected Ongoing Operational Costs outline the expected dedicated costs to maintain the consolidated operation and associated required staff and equipment. Finally, V-COMM evaluated the Projected Equipment Costs that it would recommend the County allocate over the next 5 years. These costs correspond to the timeframe in which it is recommended the County would have to replace its current Calltaking and Dispatch equipment, even under the decision to implement only Scenarios 1 or 2 (or not consolidation at all). Recall that these scenarios implement a short term plan to consolidate the Bridgeton and Millville PSADPs without the immediate replacement of the current calltaking and dispatch equipment at the County PSADP. This plan will only serve to postpone the need to replace this equipment within the next 5 years. All of these costs are displayed in Table 39 below.

Table 39 Proposed County Expenses

Electrical Upgrades	\$435,500		
Structural Upgrades	\$130,000		
	Scenario 1	Scenario 2	Scenario 3
Capital Expenditures	\$244,500	\$330,000	\$1,608,000
Transitional Operational Expenditures	\$62,500	\$72,500	\$149,500
Consolidation Scenario Sub-Total	\$307,000	\$402,500	\$1,757,500
Projected 5-Year 9-1-1 Equipment Upgrade	\$288,000	\$324,000	\$0
Projected 5-Year Dispatch Equipment Upgrade	\$400,000	\$450,000	\$0
Projected 5-Year Equipment Upgrade Sub-Total	\$995,000	\$1,176,500	\$1,757,500
Total Annual Operational Expenditures	\$2,249,958	\$2,488,362	\$3,208,574

*5 Year Projected Sub-Total includes expenses incurred through the respective consolidation scenario.

Summarizing each line item in the above costs table yields the total equipment costs associated with each consolidation scenario, projected over the first 5 years of operation. These costs, as shown below in Table 40, demonstrate that the County will incur significant equipment expenses over the next 5 years, even when implementing the initial cost saving exercise of reconfiguring existing equipment in Scenarios 1 and 2. Therefore, it is V-COMM's recommendation that the County pursue the complete consolidation, described herein as Scenario 3. In the event Scenario 3 cannot be realized, V-COMM recommends the County pursue the replacement of the Calltaking and Dispatching equipment as part of Scenario 1 or 2 in the interests of avoiding "sunk" costs associated with the equipment costs included in the respective scenarios to reconfigure the existing equipment.

Table 40 Proposed County Capital Expenses - Summary

Upgrades Sub-Total	\$565,500		
	Scenario 1	Scenario 2	Scenario 3
Consolidation Scenario Sub-Total	\$307,000	\$402,500	\$1,757,500
Projected 5-Year Equipment Upgrade Sub-Total	\$688,000	\$774,000	\$0
Total County Projected 5-Year Costs	\$1,560,500	\$1,742,000	\$2,323,000

The above pricing is based on the best available current pricing data. The estimates do not take into account changes that can occur over time as the results of inflation, rising construction, material, and fuel costs, which may change the actual costs in comparison to estimates.

With the implementation of Scenario 3, V-COMM recommends the use of a rolling schedule in the migration of each entity. As detailed previously in this report, the use of a rolling schedule will allow for lessons to be learned in the initial migration and will serve to streamline the process as further entities are migrated. Further, V-COMM recommends that the County implement the proposed Calltaking and Dispatch Equipment replacements in the interests of avoiding “sunk” costs borne through the temporary reconfiguration of the existing equipment to support any initial migrations.

It can be expected, as shown in the above tables, that significantly increased expenses will be incurred by the County in the event of the recommended complete consolidation. However, when evaluated from the eyes of those that fund a significant portion of the County government, the Cumberland County taxpayers, a different scenario can emerge. Below in Table 41, are the Total Employee Costs borne by each PSADP currently and in the proposed consolidation scenario. Although the County PSADP will require significantly more employees to meet the increased call and dispatch volume (and corresponding costs); each local PSADP will no longer require the services of their Calltaker/Operator staff and therefore, not incur the costs of their salaries. It is important to note that no cost savings were associated with Supervisors and/or Shift Commanders at any of the local PSADPs due to these duties being fulfilled by sworn officers. These officers will still be required by the Police Department in the event of the proposed consolidation; and their respective salaries would therefore, not be associated with any potential savings. The table below is summarized by a net \$591,835.89 in savings of Total Employee costs across the County.



Table 41 Annual Employee Cost Savings Calculations

PSAP	Previous Number of PSADP Operators/Dispatchers	Previous Total Employee Costs	Post-Consolidation Number of PSADP Operators/Dispatchers	Post-Consolidation Total Employee Costs	Projected Savings Post-Consolidation
Cumberland County Comm Center	20	\$1,894,154.00	40	\$3,086,174.00	-\$1,192,020.00
Vineland Police Department	18	\$975,612.55	0	\$0.00	\$975,612.55
Millville Police Department	6	\$448,243.34	0	\$0.00	\$448,243.34
Bridgeton Police Department	6	\$360,000.00	0	\$0.00	\$360,000.00
NET SAVINGS =					\$591,835.89

Additional savings will be borne by the local PSADPs in the event of the proposed consolidation with respect to an assumed 50% reduction in Total Equipment and Maintenance costs, as much of this budget is typically dedicated to support the PSADP operations that are proposed to migrate to the County PSADP. As shown to be expected, the County will experience an increased Equipment and Maintenance costs requirement due to more equipment to be maintained and associated costs to be incurred in the event of the proposed consolidation. However, the net result with respect to Countywide Equipment and Maintenance is a projected savings of \$23,137.92.

Table 42 Annual Equipment and Maintenance Savings Calculations

PSAP	Total Equipment and Maintenance	Post-Consolidation Total Equipment and Maintenance	Projected Savings Post-Consolidation
Cumberland County Comm Center	\$98,704.00	\$122,400.00	-\$23,696.00
Vineland Police Department	\$28,280.00	\$14,140.00	\$14,140.00
Millville Police Department	\$45,387.84	\$22,693.92	\$22,693.92
Bridgeton Police Department	\$20,000.00	\$10,000.00	\$10,000.00
NET SAVINGS =			\$23,137.92

Table 43 summarizes the two above tables to present an Annual Total Costs Savings when evaluated from the point of view of the Cumberland County Taxpayers of \$614,973.81 a year.

Table 43 Post-Consolidation Annual Cost Savings

PSAP	Projected Savings Employee Costs	Projected Savings Equipment and Maintenance
Cumberland County Comm Center	-\$1,192,020.00	-\$23,696.00
Vineland Police Department	\$975,612.55	\$14,140.00
Millville Police Department	\$448,243.34	\$22,693.92
Bridgeton Police Department	\$360,000.00	\$10,000.00
Sub-Total	\$591,835.89	\$23,137.92
TOTAL =	\$614,973.81	



3.4 Task 4 - Conceptual Design and Implementation Strategy

3.4.1 Recommended Conceptual Design

As detailed in prior sections contained in this document, V-COMM recommends that the County pursue implementation of a complete consolidated PSADP (Scenario 3) to be located at the site of the current County PSADP. The proposed consolidated PSADP would perform all 9-1-1 Calltaking duties and support dispatch operations for all Police, Fire and EMS departments in Cumberland County. An updated Call Flow and Dispatch Operations Diagram representing V-COMM's recommendations is shown below in Figure 15.

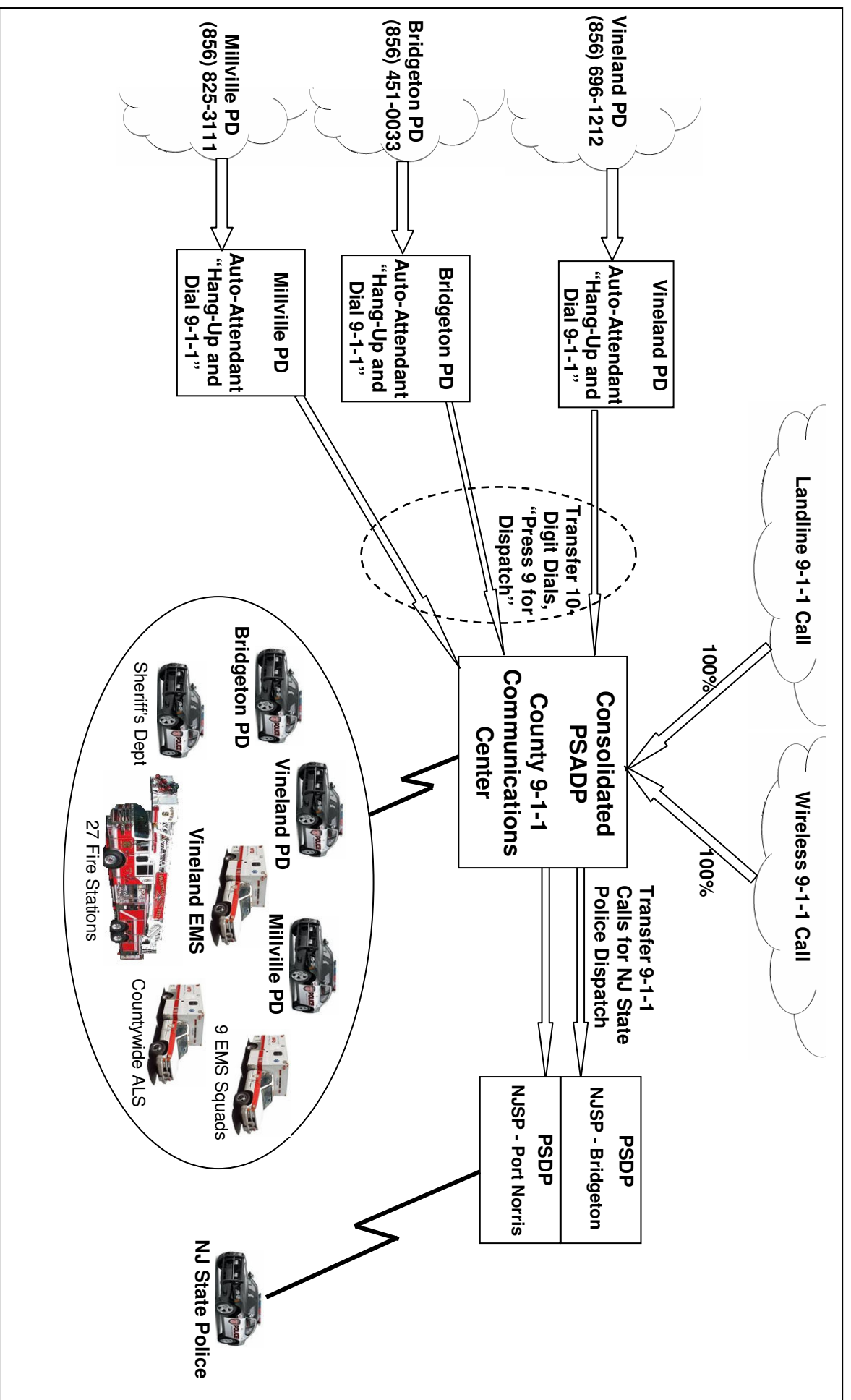


Figure 15 Updated Scenario 3 Call Flow And Dispatch Operations Diagram

3.4.1.1 PSADP Equipment Conceptual Design

The conceptual design includes all new call taking and dispatch equipment. This includes the upgrade of the existing Zetron Model 3200 9-1-1 Calltaking equipment in order to implement the ability to comply with NG 9-1-1 mandates expected to be implemented in the coming years; as well as the existing Motorola CentraCom Radio Dispatch equipment in order to meet the expected demand of the consolidation. Fourteen (14) total positions would be integrated. Of these, one (1) would be for the supervisor's position, and one (1) would be a training/spare position. Both would be configured call taking and dispatch equipment. Of the remaining twelve (12) positions: six (6) would be configured with call taking and dispatch equipment; three (3) would be call taking only; and three (3) would be for dispatch only. This would provide the necessary equipment to enable the County to meet the recommended staffed positions for the proposed consolidated PSADP on a peak shift of 6 Calltakers and 6 Dispatchers. Further, 50% of these positions would have the capability to backfill the other positions in addition to the fully functional Spare/Trainer and Supervisor positions.

The dispatch equipment would interface with the Millville and Bridgeton radio networks via new control stations licensed and located on the existing tower at the County Communications Center. The existing Vineland control station would continue to operate as it does currently to provide the same radio interface functionality. In the event the County is able to implement an interoperable 700/800 based system, these control stations would not be required; in favor of a direct radio connection to the new system.

A new/updated CAD system will be required to integrate the CAD systems in place at each local PSADP into the consolidated operation. This integration shall include the porting of all historical CAD data into the County system.

The upgraded Calltaking equipment will require higher call volume than the County PSADP previously received; therefore, additional 9-1-1 trunks will be required to support this increased call volume. The conceptual design includes the implementation of a new 10-digit number for the Center for the reception and handling of "station calls" (alarm companies, etc.). This circuit would be order and installed via the local phone company. In addition, the design calls for the installation of auto-attendants on the current local police department non-emergency calls.

3.4.1.2 Facility Requirements

The conceptual design of the proposed consolidated PSADP assumes that the Electrical upgrades are implemented as they recommended regardless of any consolidation efforts. These upgrades include updated main electrical service,



new 3-Phase generator with fuel storage and transfer switch, and building equipment such as distribution panels, subpanels, disconnects, and a new HVAC system to support the additional electrical equipment and proposed employees.

Additional facility preparation work required for the recommended consolidated PSADP will be the move of the Dispatch Center from its current location on the first floor to the proposed location in the basement. This move includes the relocation of all dispatch center support facilities such as server equipment and kitchen/bathroom facilities and any displaced offices or office equipment.

3.4.1.3 Budget Estimate

As detailed previously in this report, V-COMM developed the budget corresponding to each phase of the proposed consolidation. The above pricing is based on the best available current pricing data. The estimates do not take into account changes that can occur over time as the results of inflation, rising construction, material, and fuel costs, which may change the actual costs in comparison to estimates. The first phase, as previously discussed, would be the incorporation of the Building Electrical Service Upgrade and Building Structural Upgrade. The upgrades included in this phase are required regardless of the consolidation path chosen by the County.

- Building Electrical Service Upgrade = \$435,500
- Building Structural Upgrade = \$130,000

The next phase of the recommended consolidation consists of the procurement and integration of the equipment required for the proposed Dispatch Center. At a high level, this includes the (14) Console Furniture positions with computer equipment, (11) NG 9-1-1 Calltaking positions, (11) Radio Dispatch Positions, and all corresponding hardware and software. This not only includes the upgrade of the Calltaking and Dispatching hardware and corresponding software, but also includes peripheral components such as Logging Recorders, Control Radios, UPS, and Furniture Positions.

- Capital Expenditures = \$1,608,000

With the scope of the proposed project, some Operational Costs are expected to be borne by the County during the transition. These costs include the recommended CAD study, Job Advertisements, Project Manager and Architect fees, and documentation preparation.

- Transitional Operational Expenditures = \$149,500

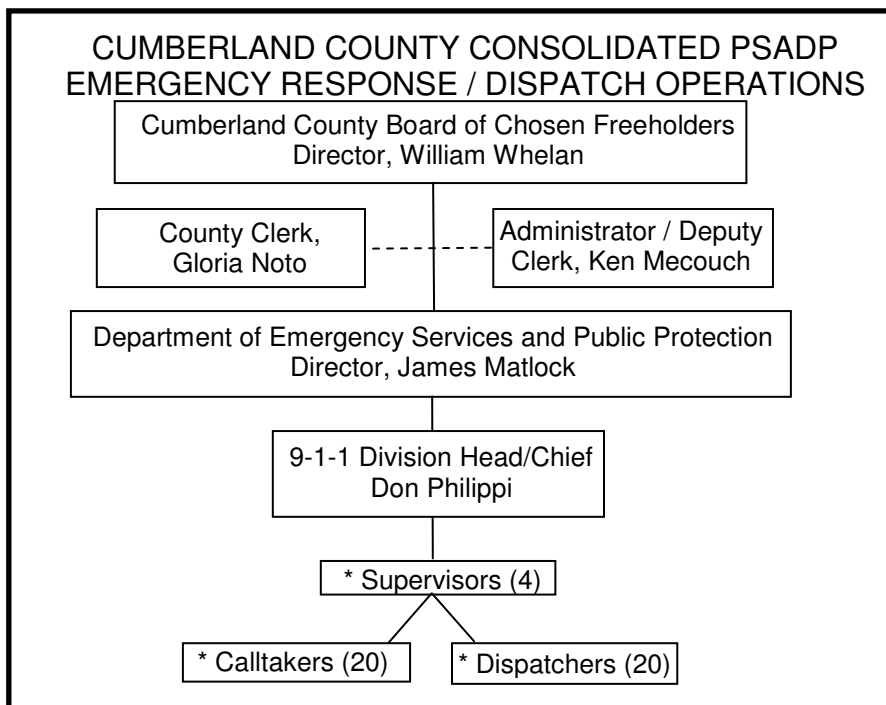
With the proposed Consolidation County PSADP supporting a higher number of Public Safety services and personnel, as well as increasing the number of total County Full Time Calltakers/Dispatchers to 40, Ongoing Operational Costs will be significantly increased. These costs include; increased employee costs, fees associated with maintenance contracts, the new County non-emergency number, and increased utilities.

- Ongoing Operational Expenditures = \$3,208,574 per year

With the above costs representing the procurement and implementation of new equipment, the projected life of the 9-1-1 Calltaking and Radio Dispatching equipment at the Consolidated County PSADP is expected to be at least 15 years. However, the County can expect to replace/upgrade the computer equipment associated with this equipment at a minimum of every 5 years of operation.

3.4.1.4 Consolidated PSADP Organization

Although the proposed consolidated PSADP will require significantly more Calltakers/Dispatchers on staff, the organizational structure above that level does not necessarily need to change. The key factor that needs to be evaluated by the County is the increased Calltaker/Dispatcher to Supervisor ratio and whether or not County policies and regulations call for the hiring/staffing of more Supervisors. This organizational structure is shown below in Figure 16.



* Note: All Calltaker and Dispatcher Employees should be cross-trained and rotate through each discipline.

Figure 16 Cumberland County Organizational Chart

It has been recommended that the County implement the proposed consolidated PSADP into the current County facility. Further recommendations state that it is in the County's best interests to integrate all local PSADPs into the consolidated PSADP. In this case, the County should move relocate the Dispatch Center from its current location on the first floor to a reconfigured area in the basement, currently a training room.

The proposed position layout for the new Dispatch Center, as shown in Figure 17 below, includes 14 console positions to support 6 Calltaker, 6 Dispatcher, a Supervisor, and 1 Spare/Training positions. It has been proposed to relocate the dispatch center to the existing training room in the basement due to more space being required than is readily available in the current space. As previously discussed, there are many layout iterations to be evaluated by the County in order to create the necessary space while maintaining desired buffers. Figure 17 below shows one possible iteration that is common in larger, consolidated dispatch centers which positions the consoles back-to-back to maximize use of existing space. During implementation, different console layouts can be developed by furniture vendors, using the chosen furniture style; thereby producing a final position layout configuration.

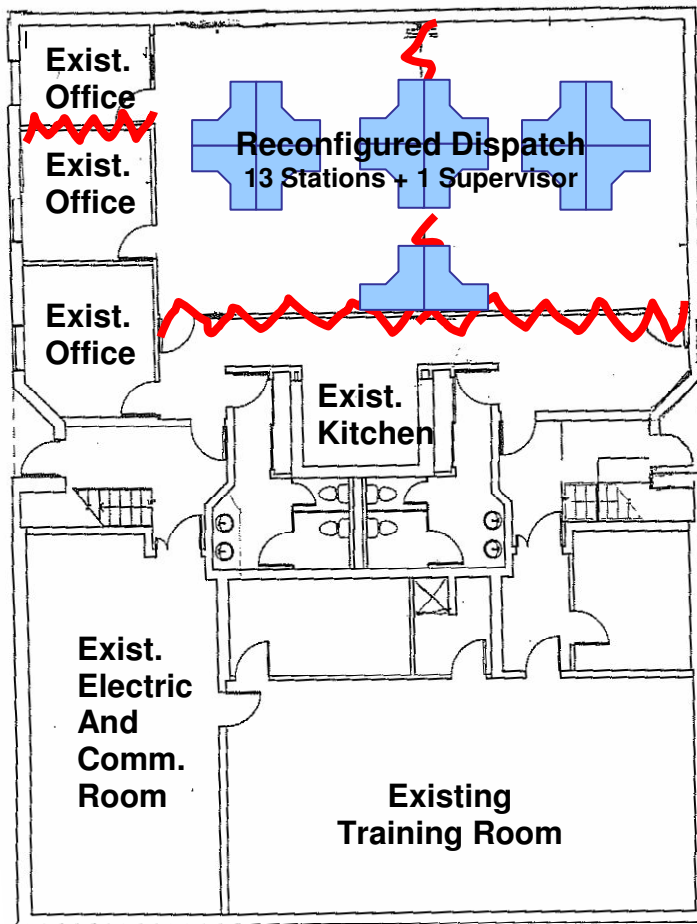


Figure 17 Full Consolidation Conceptual Basement Layout

3.4.2 Implementation Plan

3.4.2.1 Issues

First and foremost, the most significant issue requiring attention from the County in the implementation of the proposed consolidated operation will be funding. The County will have to identify, or already have in place/allocated, the funding necessary to cover the Capital Expenditures and the Transitional Operational Costs prior to starting PSADP construction. In addition to this, the County should already have the PSADP budget updated and approved to cover the increased Operational Costs that will be required to support the consolidated PSADP once in operation.

Other issues that will require significant attention is the coordination between entities involved in the consolidation. The transition requires absolutely no interruption of service to the public and the multiple public safety entities involved in this project. A sound plan needs to be developed to account for all expenses and procedures in advance. Inter-governmental, binding commitments will be required to allow the County to proceed with the implementation.

3.4.2.2 Staffing

The recommended consolidation will present an added level of difficulty due to the increased staffing required. In the interests of adding employees with as much applicable experience as possible, the County should first identify which Calltakers/Dispatchers currently on staff at the local PSADPs are interested in transitioning to the consolidated County facility. An interview process should be conducted with the identified individuals and decisions made regarding who and how many will be “hired” by the County. Depending on these results, it is possible the County would have to look to other sources to find additional employees to complete the staffing needs of the consolidated PSADP operation. This will require an advertising and hiring process.

All employees will require a level of training prior to working in the new consolidated Dispatch Center. Training required of all employees would include training on the new equipment in the new Dispatch Room and newly developed SOPs that will be required of a consolidated PSADP. However, new employees, whether transitioned from a consolidated PSADP or new hires, will likely require a higher level of training. Although the transitioning of employees from the consolidated PSADPs will bring a level of experience to the consolidated PSADP, this will present a challenge to management at both the County PSADP and each affected local PSADP in the coordination of each respective employee’s evaluation and training while not interrupting the work schedule at either PSADP. This will require a high level of coordination between the County and each local PSADP and significant cooperation to prevent any staffing shortages in the transition. It will also require a “hiring” date strategy and arrangements regarding payment of training. Lastly, union transitions will be required for affected parties.

3.4.2.3 Equipment

The proposed consolidation scenario includes the relocation of the Dispatch Center from the first floor of the County building to a reworked training room in the basement. This, in combination with the recommendation to replace the Calltaking and Dispatching equipment in front of any entity migrations, presents the County with the potential to experience few disturbances in day-to-day operations of the current Dispatch Center. This will allow the County to complete



installation and training on the new equipment prior to the “Cutover” date. V-COMM recommends that once the new Dispatch Center is completed, the current County services (Fire and EMS) be transitioned to the new Dispatch Center prior to the migration of additional entities in order to simplify the transition of PSADP personnel, apply lessons learned by each transition, and allow functional training in a working environment. Each entity would be transitioned one at a time with a 90 day evaluation period whereby lessons learned can be documented and leveraged during follow-on transitions. Accelerations of the transition(s) remain viable.

3.4.2.4 Construction

As previously recommended, the County should move forward with the implementation of the Building Electrical System Upgrade calculated at \$435,500, regardless of the path chosen towards consolidation. These upgrades will prepare the County PSADP for expected growth and expansion into the future, even without consolidation.

The County could also concurrently move towards addressing the structural issues raised in the Pederson Facilities Study of March, 2010. This would consist of having a complete structural analysis done, which should include the complete design and implementation of required modifications. A worst-case budget estimate is approximately \$130,000.

We recommend the complete consolidation scenario include the relocation of the Dispatch Room to the training room in the basement. This recommendation will allow the County to perform the “demolition”¹⁸ in the training room and any necessary relocation of equipment and/or offices. The first construction phase in the new Dispatch Center will consist of prepping the room for the equipment installation. The first equipment to populate the room should be the console furniture, followed by the PSADP equipment and ancillary support equipment. Once this equipment is installed and tested, training of current County Calltakers/Dispatchers should begin.

In the recommended complete consolidation scenario, the development of the new Dispatch Room in the basement of the County facility can be completed without any disruption of the current Dispatch Room on the first floor. Once the new Dispatch Room is completed, the County should first migrate all current operations to the new Dispatch Room to ensure a smoother transition. Once the new Dispatch Room has been in operation for 30-60 days, the County can begin converting the current Dispatch Room on the first floor to a training room and integrating proposed consolidating entities in accordance with the previously recommended rolling migration schedule.

¹⁸ “Demolition” is primarily in the form of remodeling.

In order to manage the multiple vendors required and all anticipated issues, it has been recommended that the County procure the services of a project manager to be responsible for all aspects related to demolition, construction, and equipment installation. This will ensure that the work is performed to specifications and stays on schedule. Further, this will enable County personnel to concurrently begin negotiations with proposed consolidating entities.

3.4.2.5 Narrowbanding

V-COMM completed a Narrowbanding analysis to outline the requirements for the County to come into compliance with the FCC mandate. This narrowbanding transition is largely independent of the PSADP consolidation efforts. In order to ensure the narrowbanding process is realized without interruption of service, the County should implement a complete transition, starting with a complete inventory of all radio make and models affected. The resultant analysis can be used for planning purposes, as well as coordinating the initial SOW with the equipment vendor(s) selected to implement the narrowbanding equipment upgrades and/or replacements. This inventory was largely completed under this scope's timeframe and the results were used to develop the estimated total budget for the narrowbanding process at \$732,150. This figure was developed using information reported from the user community and current Motorola quotes for the reprogramming labor, as well as the replacement of necessary radios with Motorola XTL1500 mobile radio and XTS1500 portable radios.

It should be noted that the budget developed and corresponding inventory included radios as reported for all Fire and EMS entities in the County, and a few additional County entities. Bridgeton, Millville, and Vineland Police Department radios were not considered in this study as these departments maintain their own independent radio systems and it was assumed they will be responsible for narrowbanding compliance of their radio systems and user equipment. The above pricing is based on the best available current pricing data. The estimates do not take into account changes that can occur over time as the results of inflation, rising construction, material, and fuel costs, which may change the actual costs in comparison to estimates.

3.4.2.6 Non Participation

Although the Governor of New Jersey issued a directive to consolidate services wherever it improves services and makes fiscal sense, and the potential loss of federal and state grants has been foretold, the option to not consolidate PSADPs still exists at both the County and Municipal level.



While finances were a major concern of all the stakeholders, the most commonly voiced desire based on the meetings was to improve the quality of service to both the citizens of Cumberland County and the first responders. Consolidation at the County level will offer the opportunity to have a properly staffed PSADP that is capable of handling all calls, regardless of the agency or the location. The fact that financial efficiencies related to staffing, training, and the facility would also be realized in the long term, becomes an added benefit.

Should the the municipalities of Cumberland County choose not to consolidate the individual PSADPs based upon input from their respective police, fire and EMS agencies; they may find themselves in financial constraints due to continued funding cuts, NG 9-1-1 requirements, and costs being passed on to them. Although it appears that the local PSADPs receive minimal financial support today in terms of grants, the new technologies available or under development will be an expensive endeavor for any center and their respective municipality.

If the County chooses to move forward with a consolidation plan, but some municipalities decide to continue operating their local PSADPs independently, they will forfeit their access to future grant monies. If the County PSADP cannot meet the population mandate cited under S-45, due to some municipalities deciding to maintain their independent structure, it may be possible that neither the County nor its members will be penalized with loss of funding as a concerted effort was made to consolidate.

4 APPENDICES

4.1 APPENDIX A: Acronyms

AEB - Ambassador Electronics Banks
AFSCME - American Federation of State, County and Municipal Employees
ALS - Advanced Life Support
ALI - Automatic Location Information
ANI - Automatic Number Identification
ATIS - Alliance for Telecommunications Industry Solutions
AVL - Automatic Vehicle Location
BLS - Basic Life Support
CAD - Computer Aided Dispatch
CEB - Central Electronics Banks
CJIS - Criminal Justice Informational Services
DHS - Department of Homeland Security
DMV - Department of Motor Vehicles
E911 - Enhanced 9-1-1
EMS - Emergency Medical Services
EOL - End of Life
ERP - Effective Radiated Power
ESIF - Emergency Services Interconnection Forum
FCC - Federal Communications Commission
FCU - Field Communications Unit
FD - Fire Department
FRN - FCC Registration Number
FTE - Functional Time Equivalent
FTE - Full Time Employee
GOS - Grade Of Service
GSD - Gun-Shot Detection
HVAC - Heating, Ventilation and Air Conditioning
IBEW - International Brotherhood of Electrical Workers
IETF - Internet Engineering Task Force
IP - Internet Protocol
kHz - Kilohertz
kVA - Kilovolt-Ampere
LMR - Land Mobile Radio
LPR - License Plate Recognition
MDT - Mobile Data Terminal
MHz - Megahertz
NCIC - National Crime Information Center
NEC - National Electric Code
NENA - National Emergency Number Association
NG - Next Generation



NJAC - New Jersey Administrative Code
NJOETS - New Jersey Office of Emergency Telecommunications Service
NJSP - New Jersey State Police
NPSPAC - National Public Safety Planning Advisory Committee
NRIC - Network Reliability and Interoperability Council
OEM - Office of Emergency Management
OIT - Office of Information Technology
PBX - Private Branch Exchange
PD - Police Department
PSADP - Public Safety Answering/Dispatching Point
PSAP - Public Safety Answering Point
PSDP - Public Safety Dispatching Point
RF - Radio Frequency
RFP - Request For Proposal
RMS - Record Management System
RPC - Regional Planning Committee
S-45 - Senate Bill 45
SF - Single Frequency
SOP - Standard Operating Procedure
SOW - Statement Of Work
TBD - To Be Determined
TIA - Telecommunications Industry
TSB - Telecommunications Service Bulletin
TTY - Teletypewriter
TWG - Transition Working Group
UAW - United Auto Workers
UHF - Ultra High Frequency
ULS - Universal Licensing System
UPS - Uninterruptible Power Supply
USDOT - United States Department of Transportation
VHF - Very High Frequency
W - Watt

4.2 APPENDIX B: Cumberland County PSADP Survey

(Refer to the next six pages)

Cumberland County Public Safety Dispatch Point (PSDP) Survey

(Please PRINT all responses)

PLEASE RETURN BY October 22nd to V-COMM L.L.C. at

1730 WALTON RD SUITE 100, BLUE BELL, PA 19422

ATTN : Jim Shelton (jim.shelton@vcomm-eng.com)

PLEASE CALL Jim Shelton at (610) 684-1000 x235 WITH ANY **TECHNICAL SUPPORT QUESTIONS** WHILE FILLING OUT THE SURVEY.

1. General Information

- 1.1. PSAP/PSDP Name _____
- 1.2. Respondent Name _____
- 1.3. Position _____
- 1.4. Phone _____
- 1.5. Email _____

2. Facility Information

- 2.1. Building
- 2.1.1. What year was the building built?.....
- 2.1.2. When was the building last renovated (Month/Year)?.....
- 2.1.3. How many operable stations exist?.....
- 2.1.4. Is the facility / building capable of being expanded?.....
- 2.1.5. Are there any planned updates to the facility / building? ☐ Yes ☐ No
- If yes, please explain _____
- _____
- _____

2.2. Telco

- 2.2.1. Current telecommunication connections? (i.e. DS0, voice trunk, etc.) If additional space is required please attach an additional page.

Qty	Type

- 2.2.2. Are you able to easily expand with additional connections?
- ☐ Yes ☐ No ☐ Don't Know

2.3. Power

- 2.3.1. Does the building power plant have the ability to expand?
- ☐ Yes ☐ No ☐ Don't Know

- 2.3.2. Does the building have back up power?
- ☐ Yes ☐ No ☐ Don't Know



3. Operations (for the purpose of this survey Seasonal will be considered May 1st through November 1st)

3.1. Does your PSAP perform both Answer and Dispatch functions?

☐ Yes ☐ No

3.1.1. Provide a list of specific agencies where you perform each of these functions.
(attach separate page if necessary)

Agency	Answer	Dispatch	Both
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

3.2. At the end of 2010, how many stations will your PSAP have that were capable of

3.2.1. Dispatch Only.....

3.2.2. Accept Calls Only.....

3.2.3. Both Dispatch and Accept Calls.....

3.3. During major emergency incidents, does your PSAP provide a tactical dispatcher dedicated to monitor communications traffic?

☐ Yes ☐ No

3.4. Are pre-arrival medical instructions provided?

☐ Yes ☐ No

If yes,

3.4.1. ☐ Our PSAP provided pre-arrival instructions

3.4.2. ☐ We referred pre-arrival instructions to another organization

3.5. What were your PSAP's operating expenses?

2009

2010

3.5.1. Total Employee salary, overtime, benefits, training, and allowances

3.5.1.1. Average Operator/Dispatcher salary (including benefits)

3.5.1.2. Average Shift Commander salary (including benefits)

3.5.1.3. Average Supervisor/Manager salary (including benefits)

3.5.1.4. Average Information Systems salary (including benefits)

3.5.1.5. Average Radio Technical Support salary (including benefits)

3.5.1.6. Average Clerical Support salary (including benefits)

3.5.2. Equipment and maintenance (including systems/software support)

3.5.3. Facility use and maintenance (if budgeted)

3.5.4. Other (please specify below).....

3.5.5. Total budget.....

3.5.6. Other, Specified



3.5.7. Year 2010 Planned Capital Improvement

3.5.7.1. 2010 Completed.....

3.5.7.2. 2010 Remaining.....

3.5.8. Year 2011 Planned Capital Improvement

3.6. At the end of 2010, how many employees will your PSAP have in the following categories? How many unfilled vacancies did you have in authorized positions? (Note: these are employees paid for out of your operating budget - see previous question).

	Regular		Peak		Vacancies
	Full Time	Part time	Full Time	Part Time	
3.6.1. PSAP Operators/Dispatchers					
3.6.2. Shift Commanders					
3.6.3. Supervisors/Managers					
3.6.4. Information Systems					
3.6.5. Radio Technical Support					
3.6.6. Clerical Support					
3.6.7. Other (please specify below)					
3.6.8. Covered under collective bargaining agreement (if applicable please provide list of agreements below)					

3.6.9. Other, Specified _____

3.6.10. Collective bargaining agreement list (attach separate page if necessary)

3.7. In 2010, how many PSAP operators/dispatchers do you have on duty during the following times of day?

	Regular		Peak	
	Weekday	Weekend	Weekday	Weekend
3.7.1. Day Shift				
3.7.2. Evening Shift				
3.7.3. Night Shift				

3.8. In 2010, how many operator/dispatcher Full-Time Equivalent employees occupied other duties (receptionist, jailer, clerical, etc.) during the following shifts?

	Regular	Peak
3.8.1. Day Shift		
3.8.2. Evening Shift		
3.8.3. Night Shift		

- 3.9. In 2010, did your PSAP operators/dispatchers also regularly serve as the only jailers *and* the only staff in the building on duty during any of the following shifts?

	Regular		Peak	
	Yes	No	Yes	No
3.9.1. Day Shift	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.9.2. Evening Shift	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
3.9.3. Night Shift	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- 3.10. In 2010, how many PSAP employees left for any of the following reasons?

3.10.1. Retired		3.10.2. Termination before completion of probationary period	
3.10.3. Job Related Stress		3.10.4. Work schedule and hour issues	
3.10.5. Pay Issues		3.10.6. Moved to another area	
3.10.7. termination of non-probationary employee		3.10.8. Other (please specify below)	

3.10.9. Other, Specified _____

- 3.11. In 2010, approximately how many total response units did your PSAP dispatch during the following times of the day?

	Regular		Peak	
	Weekday	Weekend	Weekday	Weekend
3.11.1. Day Shift				
3.11.2. Evening Shift				
3.11.3. Night Shift				

- 3.12. How many agencies does your PSAP cover in 2010?

3.12.1. Police	
3.12.2. EMS	
3.12.3. Fire	
3.12.4. Other	

- 3.13. How many calls did your PSAP receive in 2009? For how many events did you dispatch police or fire/EMS units?

	Number of calls	Number of events where <i>police</i> units were dispatched	Number of events where <i>Fire/EMS</i> units were dispatched	Number of calls	Number of events where <i>police</i> units were dispatched	Number of events where <i>Fire/EMS</i> units were dispatched
	2009	2009	2009	2010 (YTD)	2010 (YTD)	2010 (YTD)
3.13.1. 911						
3.13.2. Administrative						
3.13.3. Other						
3.13.4. Total calls/requests						

3.14. What percentage of calls were answered with no more than three rings, during the busy hour of an average week of your busy month in 2009?.....

3.15. What percentage of calls were answered with no more than three rings, during the busy hour of an average week of your busy month in 2010?.....

3.16. Do you have the capability for backup dispatch?
☐ Yes ☐ No

If yes, please specify _____

4. Comments

Please provide any additional information that you feel is relevant for this study that is not covered by the questions above.

5. Cumberland County User Equipment Inquiry

V-COMM has been authorized by Cumberland County to collect the information detailed below for the Public Safety user equipment currently operating within the County. Please provide answers to the below as accurately as possible. This information is critical in the completion of the County's dispatch consolidation study and the FCC narrowbanding mandate analysis.

- 4.1. Municipality: _____
4.2. Entity (circle one): Police Fire EMS
4.3. Number cruisers/mobile radios in use today: _____
4.4. Current Mobile Radio Inventory (Please list all makes/models, with quantities):

MOBILE RADIOS		
Make	Model	Quantity
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- 4.5. Number portable radios in use today: _____
4.6. Current Portable Radio Inventory (Please list all makes/models, with quantities)

PORTABLE RADIOS		
Make	Model	Quantity
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- 4.7. POC for person(s) completing form:
Name/Title: _____
E-mail: _____
Phone: Office () - Mobile () - _____

- 4.8. Note/Comments: _____

If you have any questions, feel free to contact the following individuals for technical assistance:

V-COMM, L.L.C.
1730 WALTON RD SUITE 100, BLUE BELL
PA 19422
Attn: Jim Shelton
tel (610) 684-1000x235
jim.shelton@vcomm-eng.com



4.3 APPENDIX C: PSAP Pictures

Included as separate document

4.4 APPENDIX D: Cumberland County Subscriber Inventory

Included as separate document

4.5 APPENDIX E: Cost Estimate Stipulation

All costs estimates provided in this report are based on the best available current pricing data. All cost estimates assume prevailing union wage. The estimates do not take into account changes that can occur over time as the results of inflation, rising construction, material, and fuel costs which may change the actual costs in comparison to estimates. In addition, the estimates do not take into account price changes due to shortages in products, materials, or labor.

4.6 APPENDIX F: RF Coverage Analysis

Cumberland County RF Coverage - Talk-Out Portable In-Building
EMS 1 - 155.220 MHz

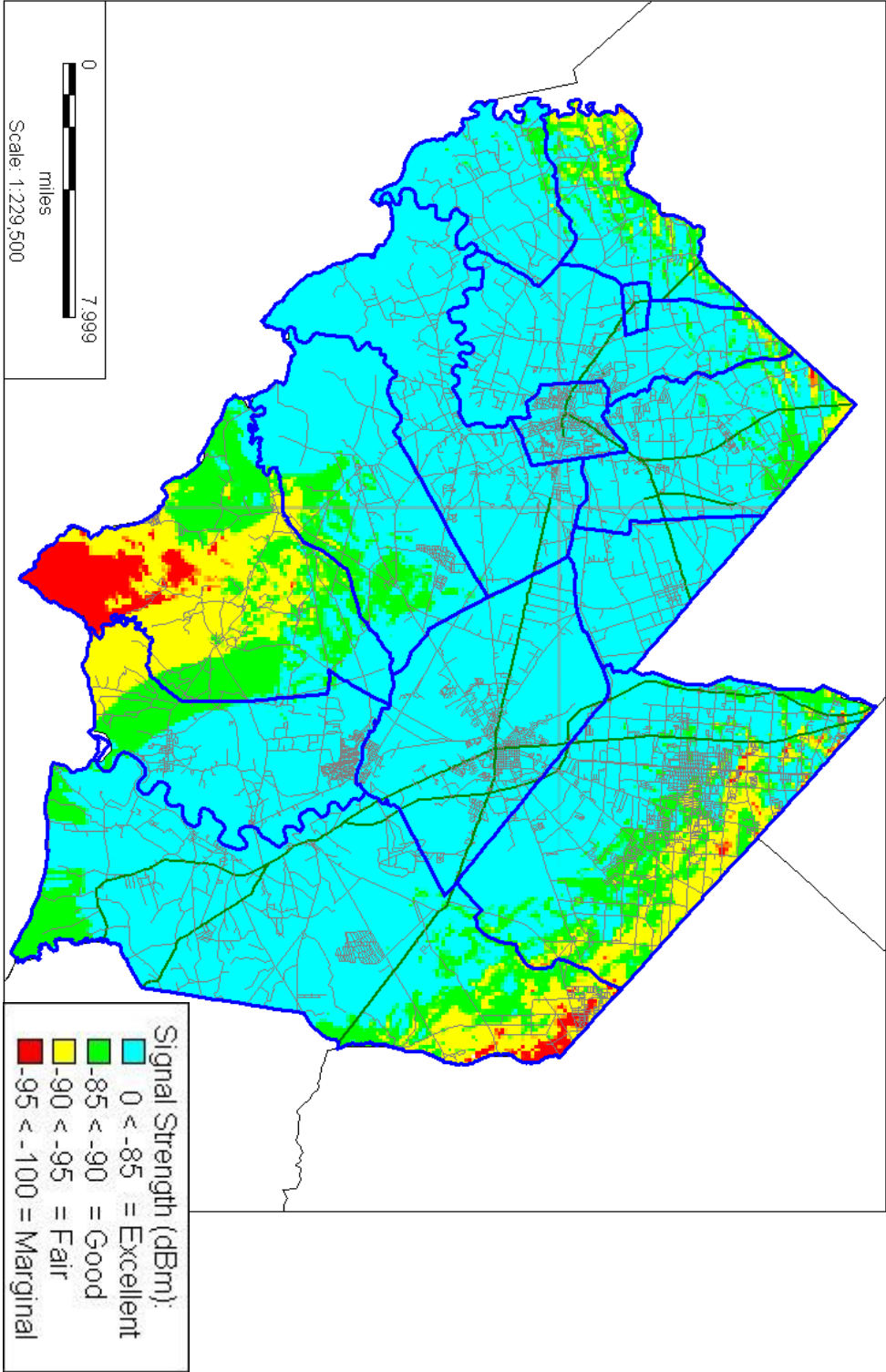


Figure 18 Talk-Out Portable In-Building Coverage - EMS 1

Cumberland County RF Coverage - Talk-Out Portable Street
 EMS 1 - 155.220 MHz

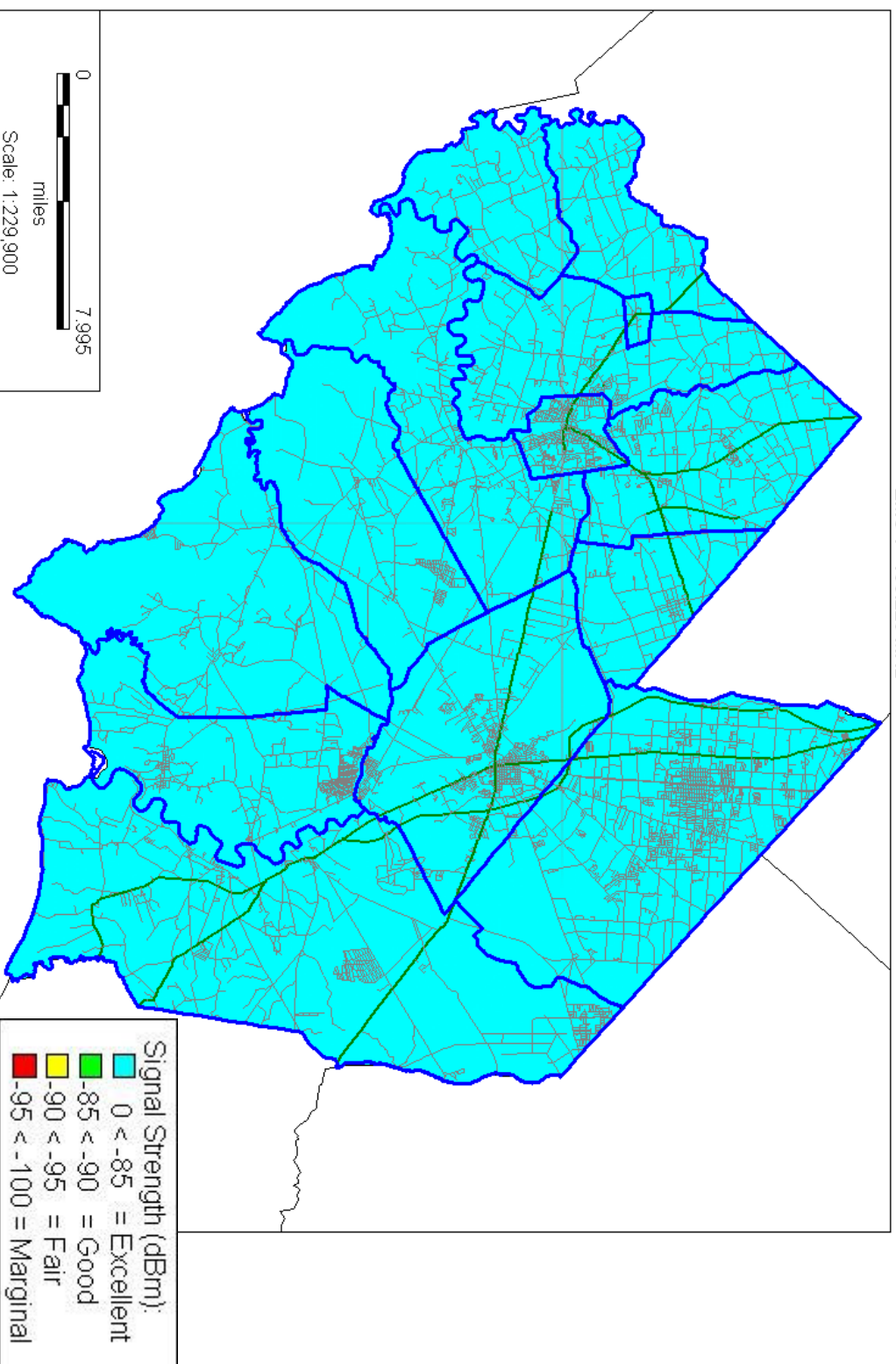


Figure 19 Talk-Out Portable Street Coverage - EMS 1

Cumberland County RF Coverage - Talk-In Portable In-Building
 EMS 1 - 155.220 MHz

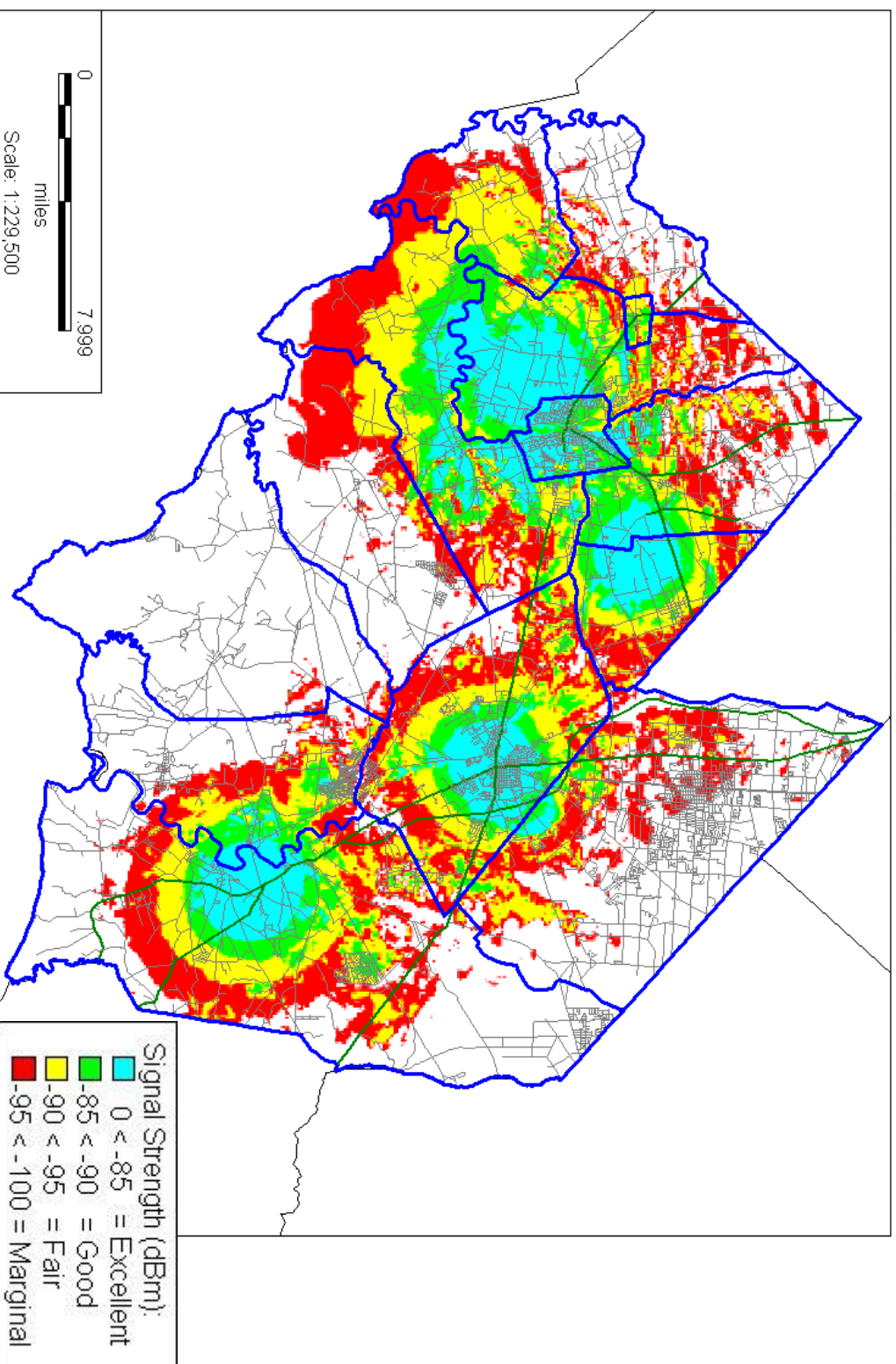


Figure 20 Talk-In Portable In-Building Coverage - EMS 1

Cumberland County RF Coverage - Talk-In Portable Street
 EMS 1 - 155.220 MHz

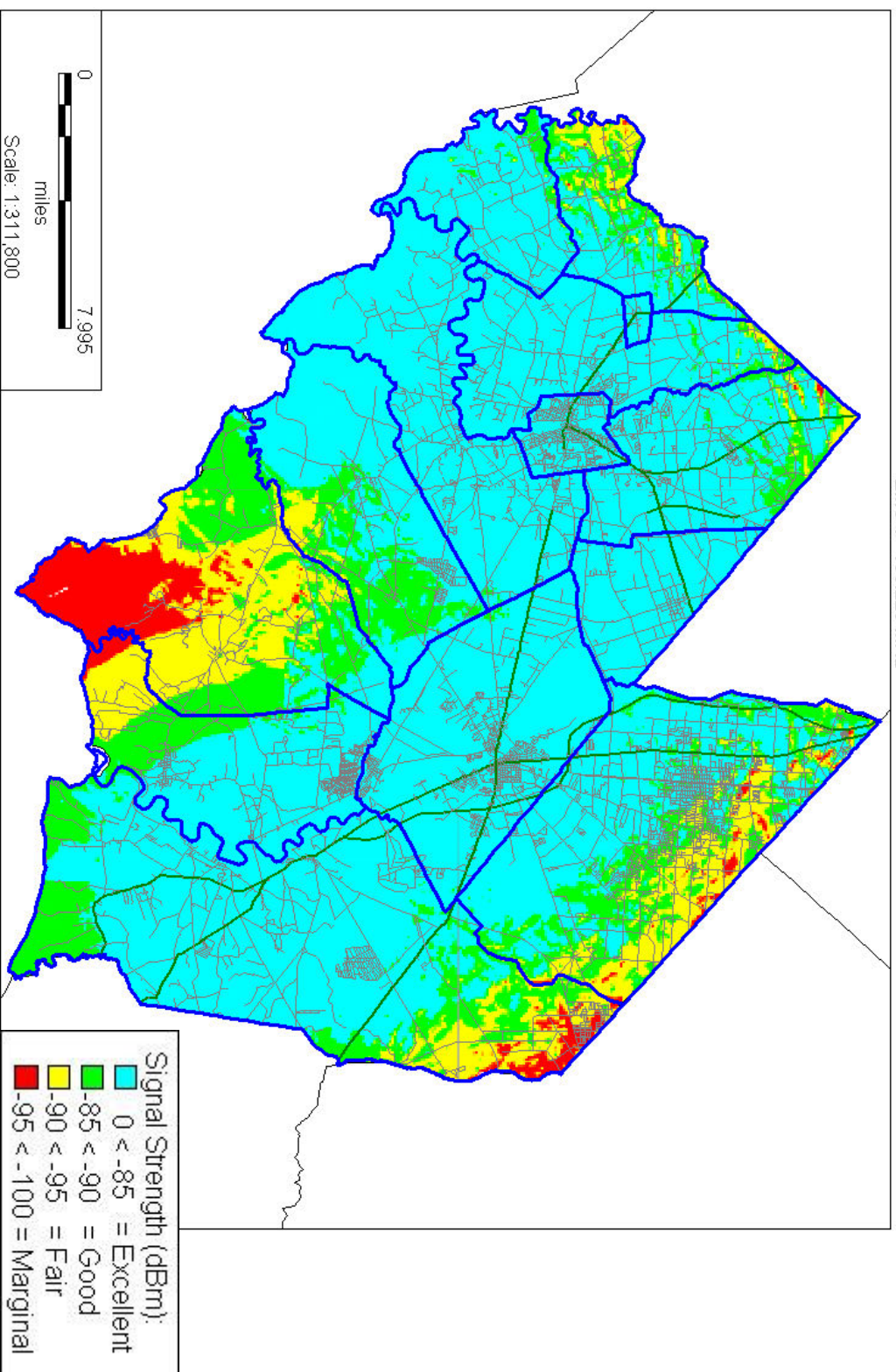


Figure 21 Talk-In Portable Street Coverage - EMS 1

Cumberland County RF Coverage - Talk-Out Portable In-Building
 EMS 2 - 155.340 MHz

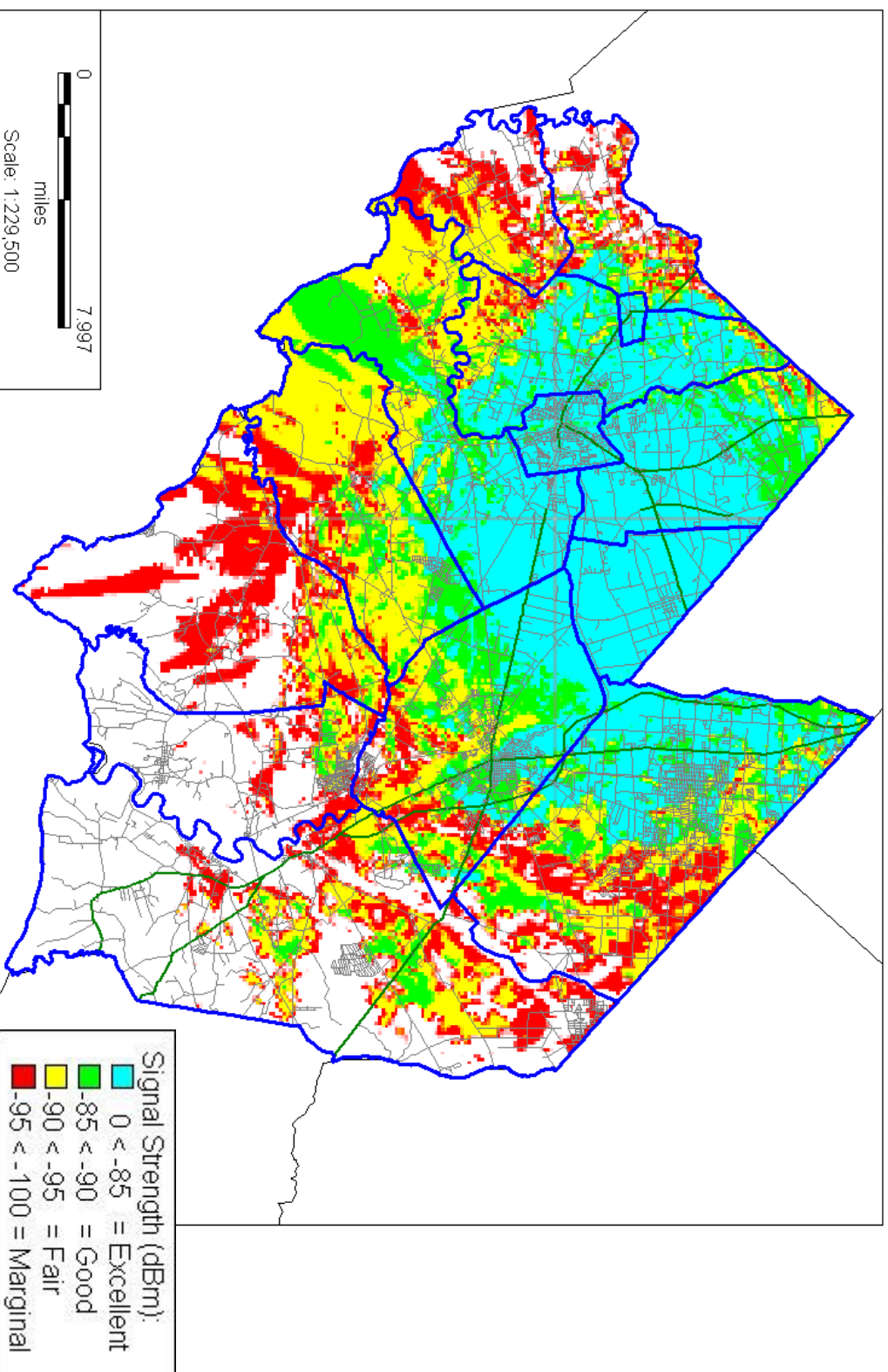


Figure 22 Talk-Out Portable In-Building Coverage - EMS 2

Cumberland County RF Coverage - Talk-Out Portable Street
 EMS 2 - 155.340 MHz

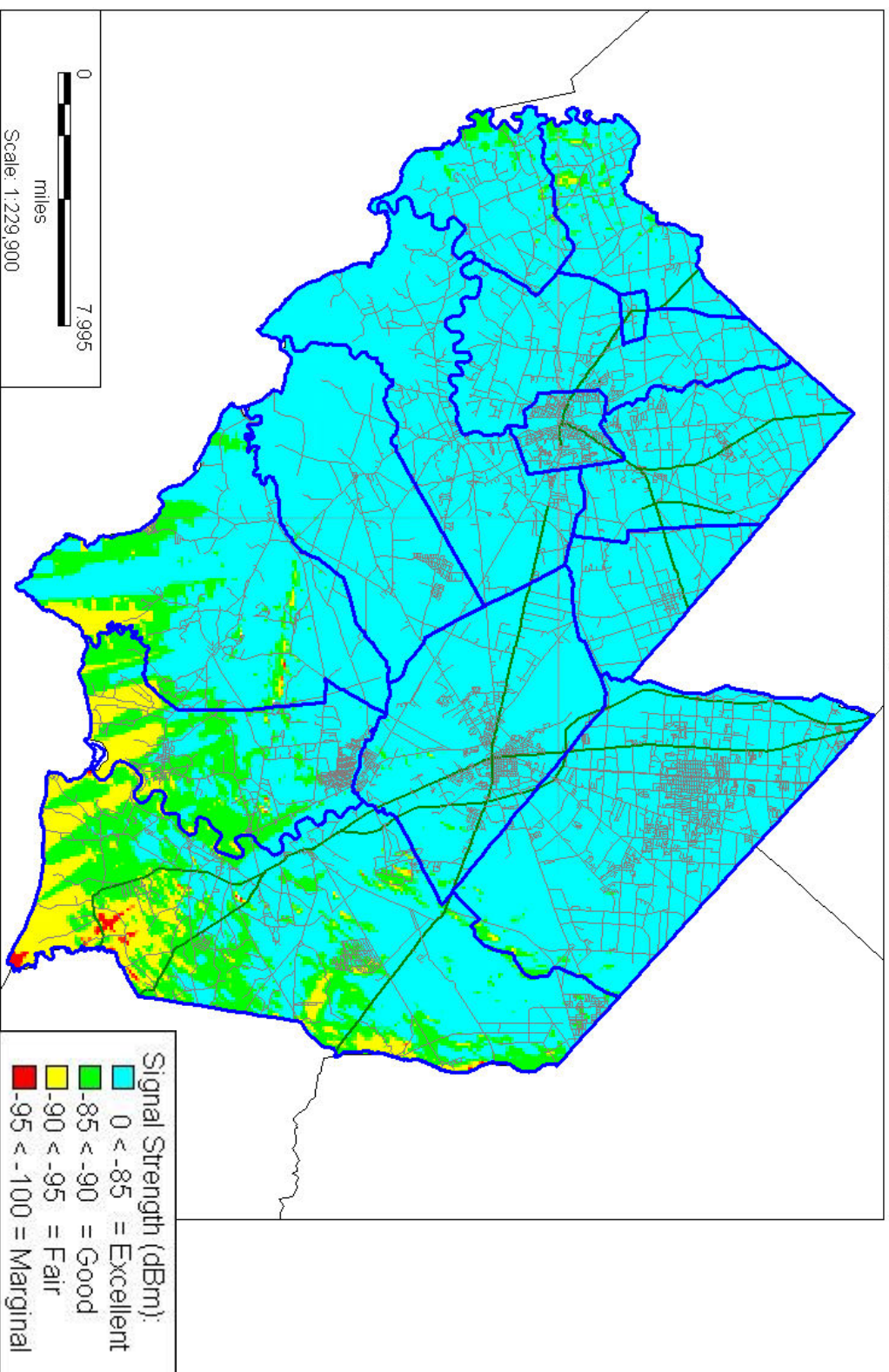


Figure 23 Talk-Out Portable Street Coverage - EMS 2

Cumberland County RF Coverage - Talk-In Portable In-Building
 EMS 2 - 155.340 MHz

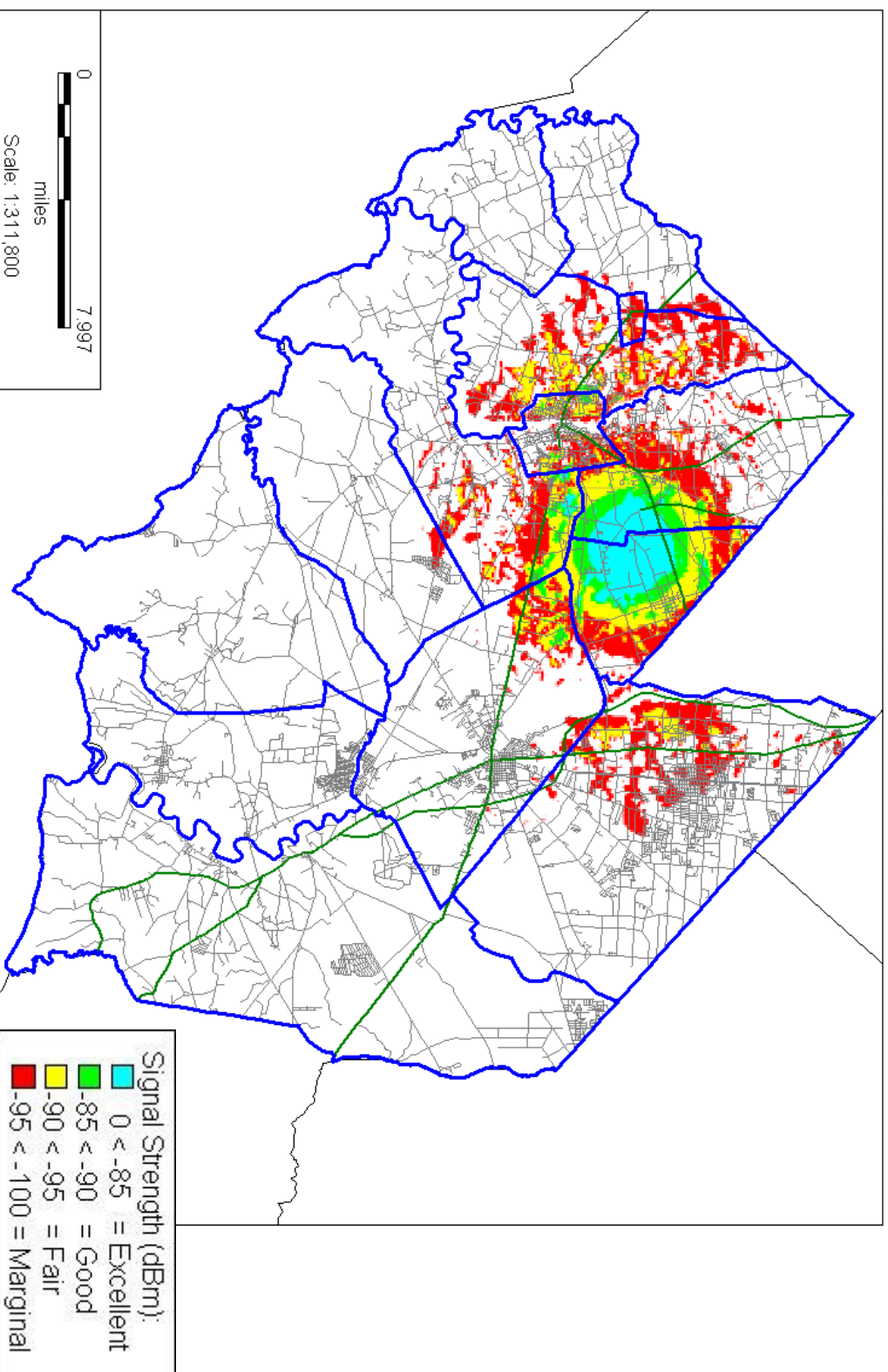


Figure 24 Talk-In Portable In-Building Coverage - EMS 2

Cumberland County RF Coverage - Talk-In Portable Street
 EMS 2 - 155.340 MHz

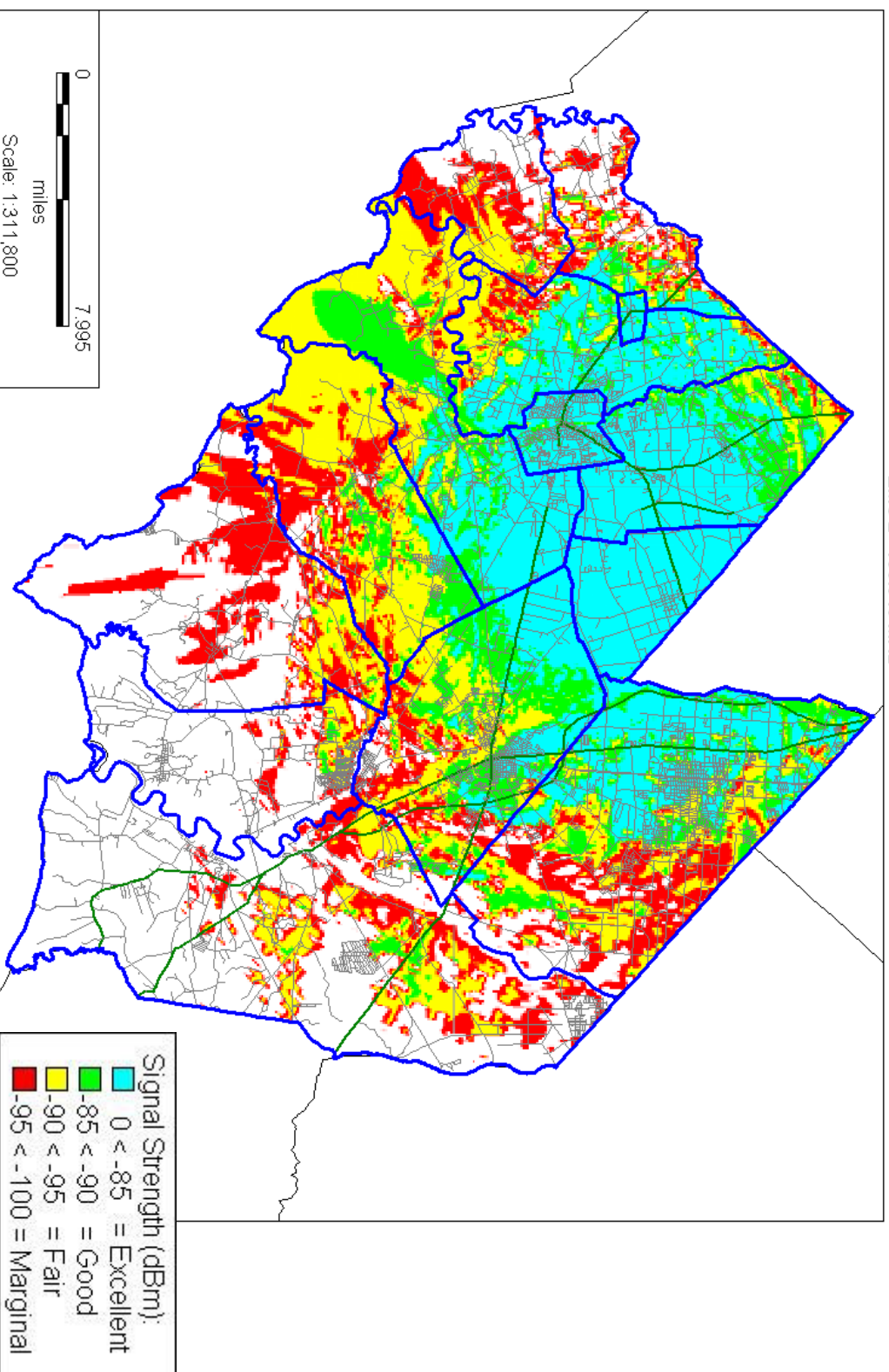


Figure 25 Talk-In Portable Street Coverage - EMS 2

Cumberland County RF Coverage - Talk-Out Portable In-Building
 EMS 3 - 155.280 MHz

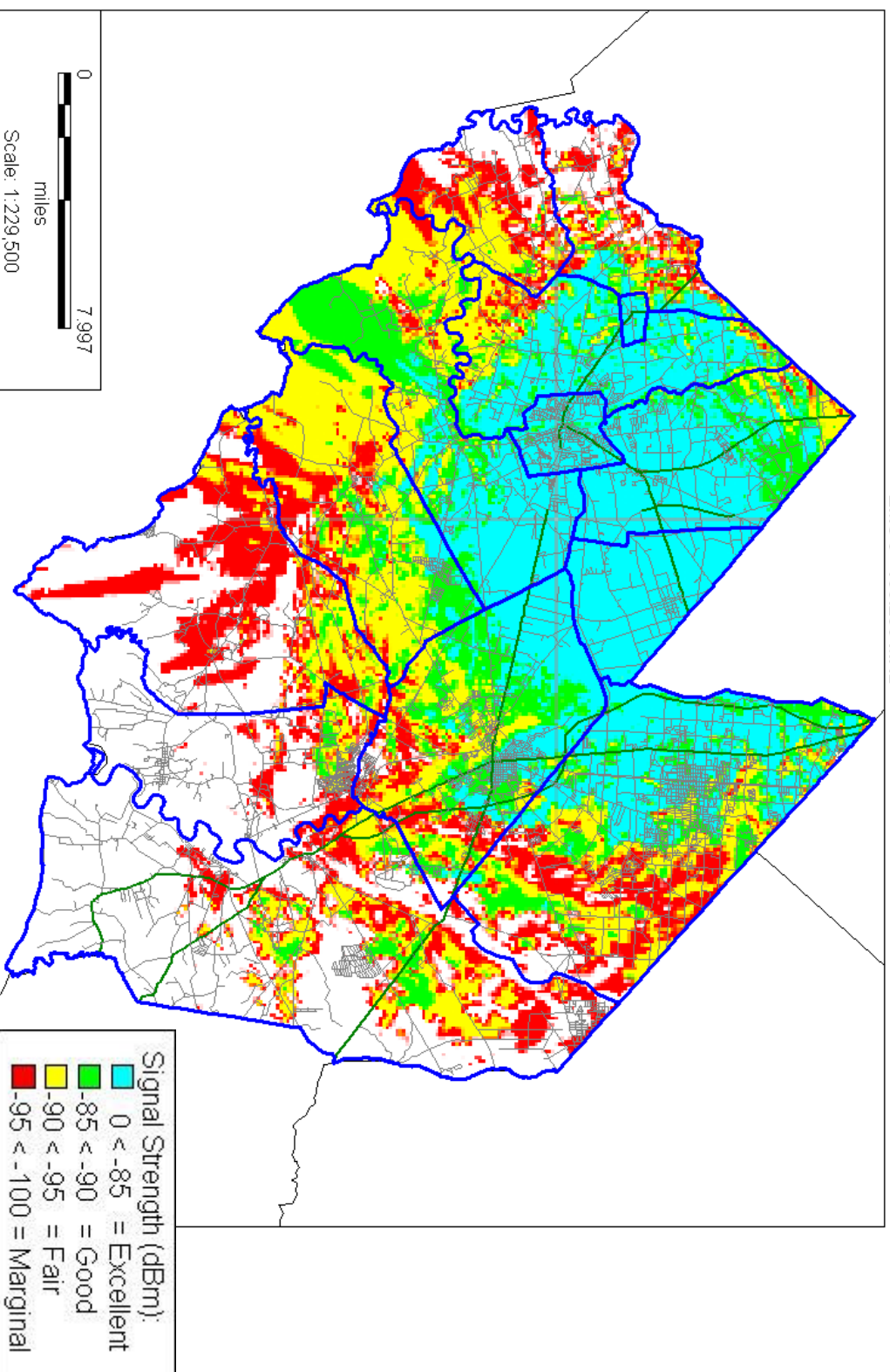


Figure 26 Talk-Out Portable In-Building Coverage - EMS 3

Cumberland County RF Coverage - Talk-Out Portable Street
 EMS 3 - 155,280 MHz

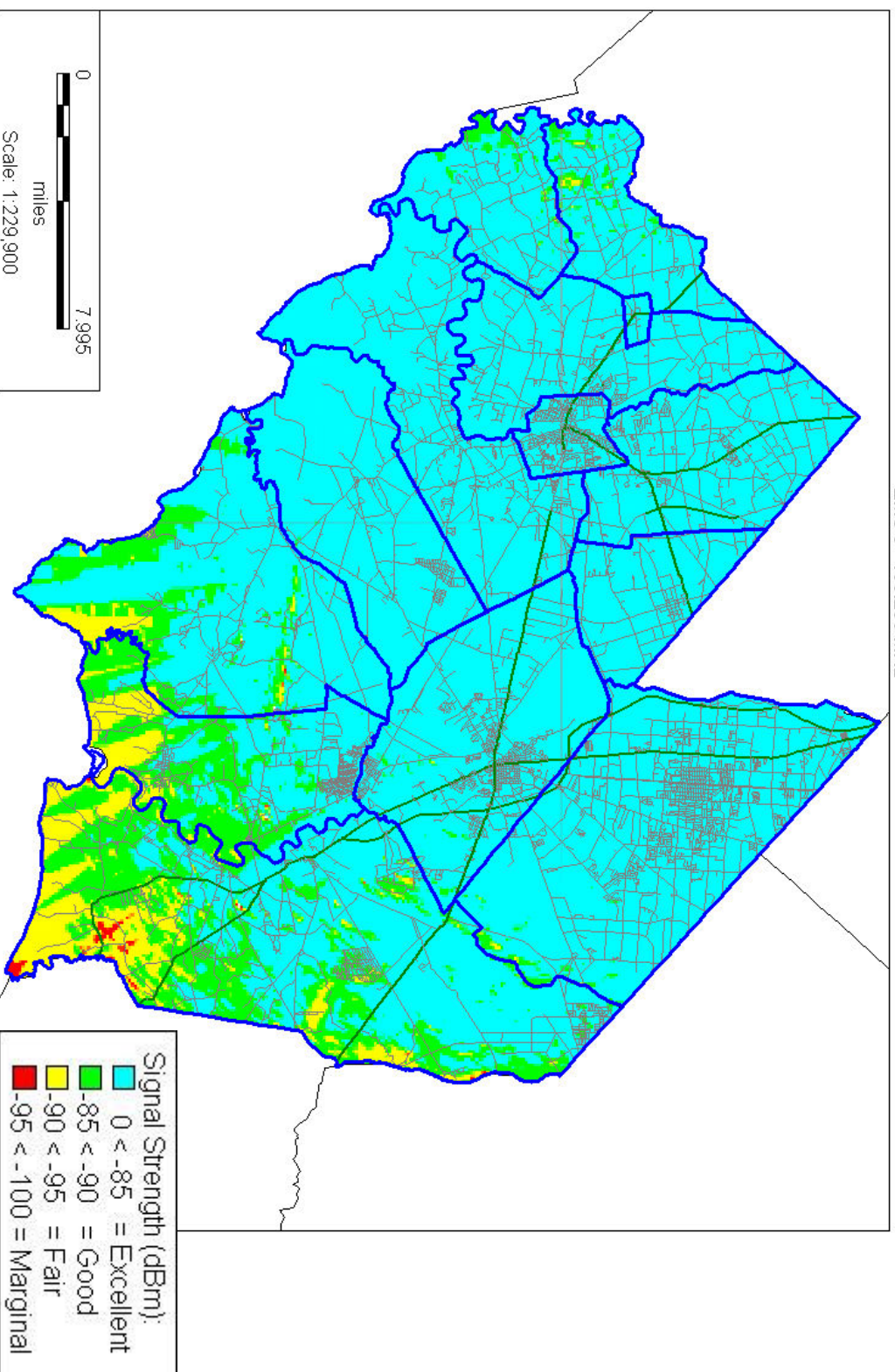


Figure 27 Talk-Out Portable Street Coverage - EMS 3

Cumberland County RF Coverage - Talk-In Portable In-Building
 EMS 3 - 155.280 MHz

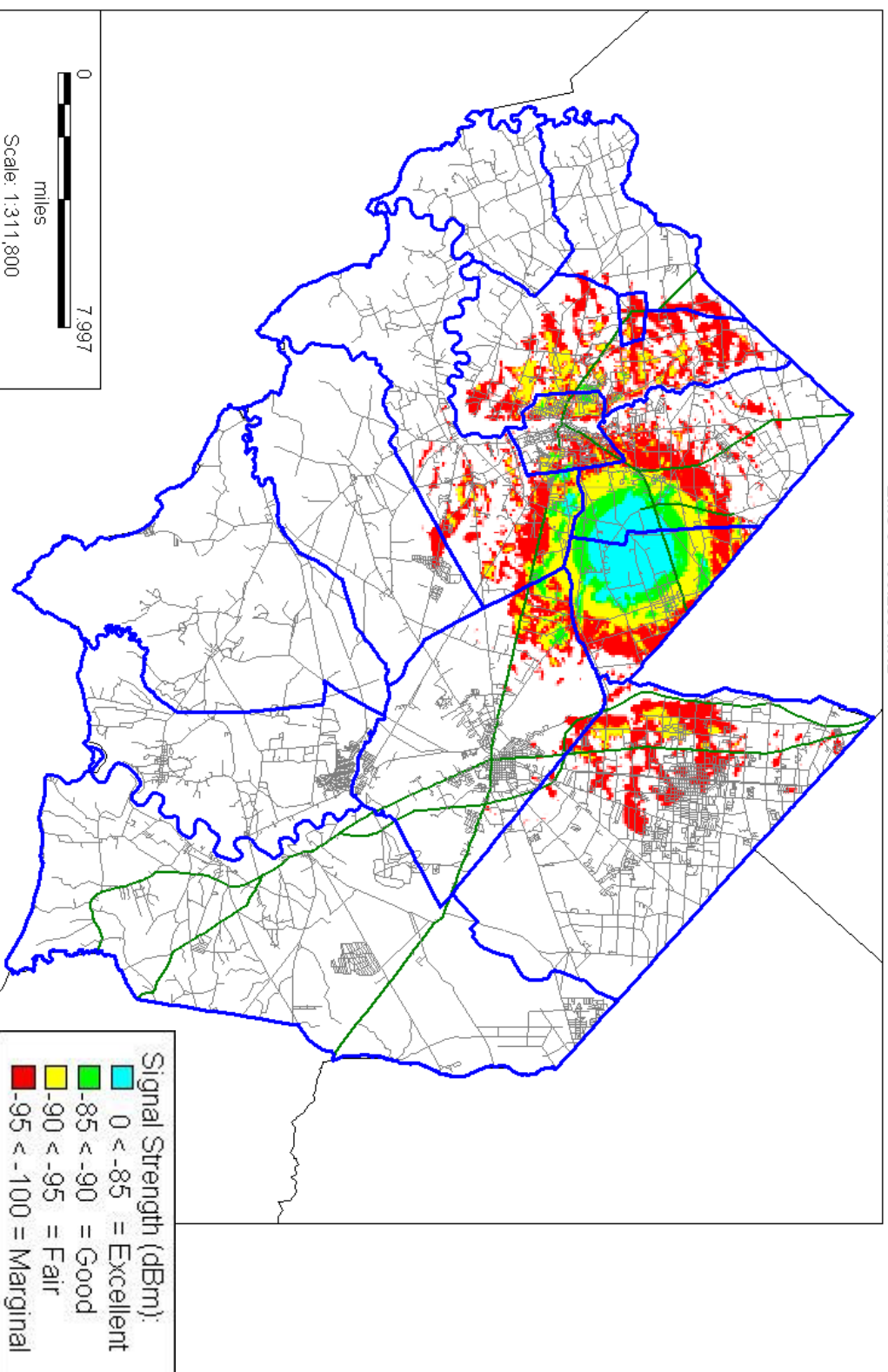


Figure 28 Talk-In Portable In-Building Coverage - EMS 3

Cumberland County RF Coverage - Talk-In Portable Street
 EMS 3 - 155,280 MHz

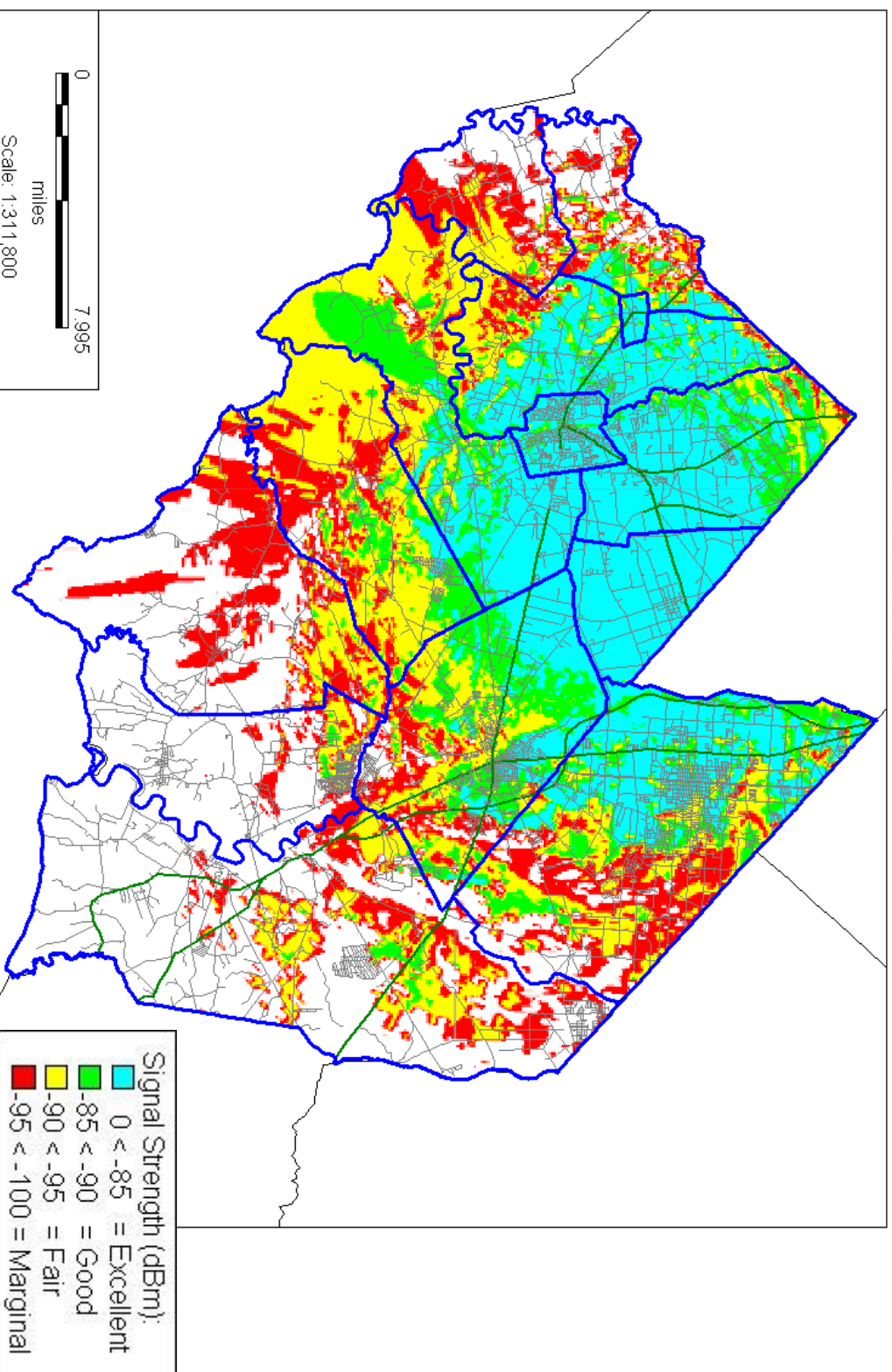


Figure 29 Talk-In Portable Street Coverage - EMS 3

Cumberland County RF Coverage - Talk-Out Portable In-Building
 EMS 5 - 155.325 MHz

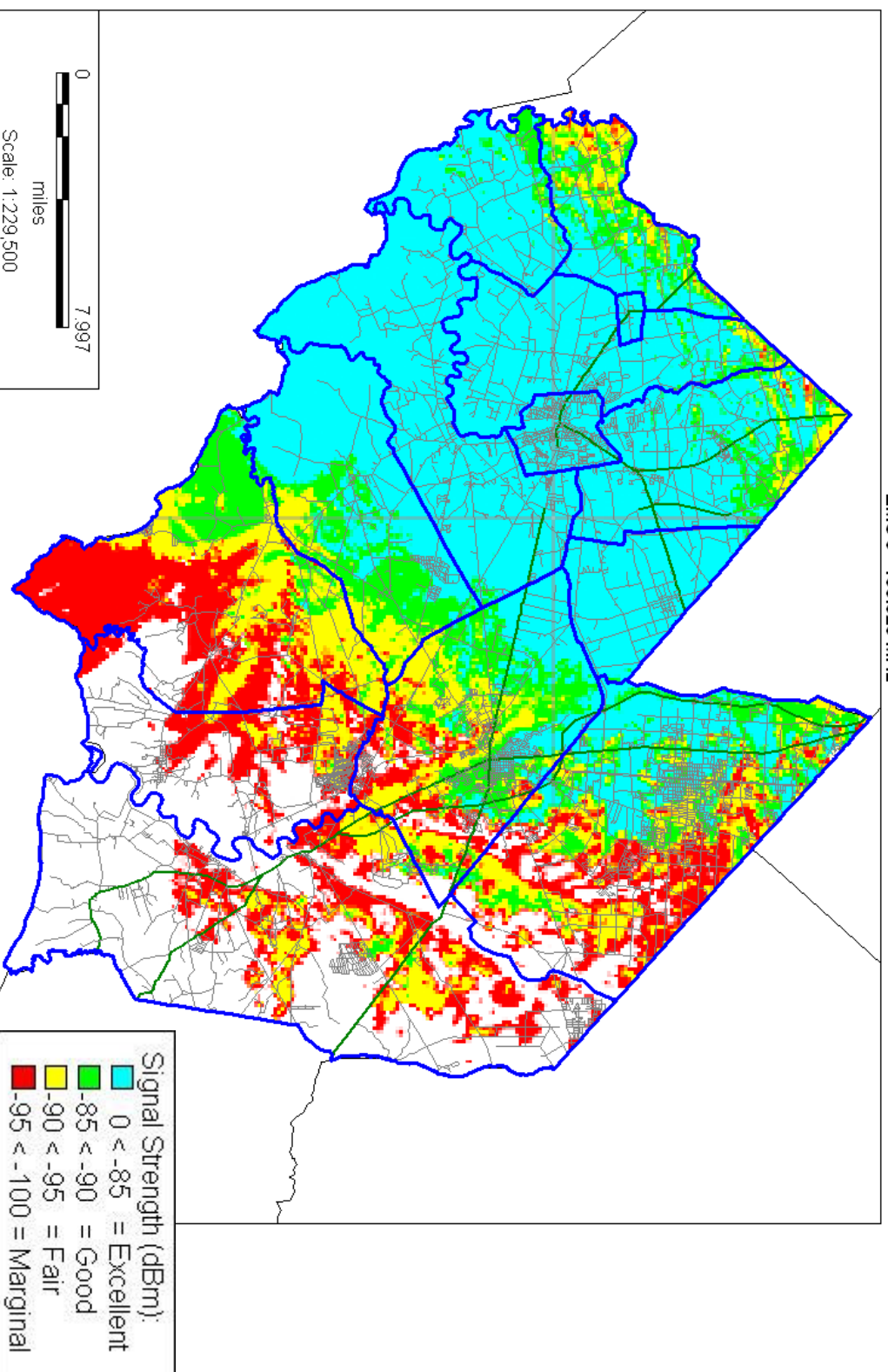


Figure 30 Talk-Out Portable In-Building Coverage - EMS 5

Cumberland County RF Coverage - Talk-Out Portable Street
 EMS 5 - 155.325 MHz

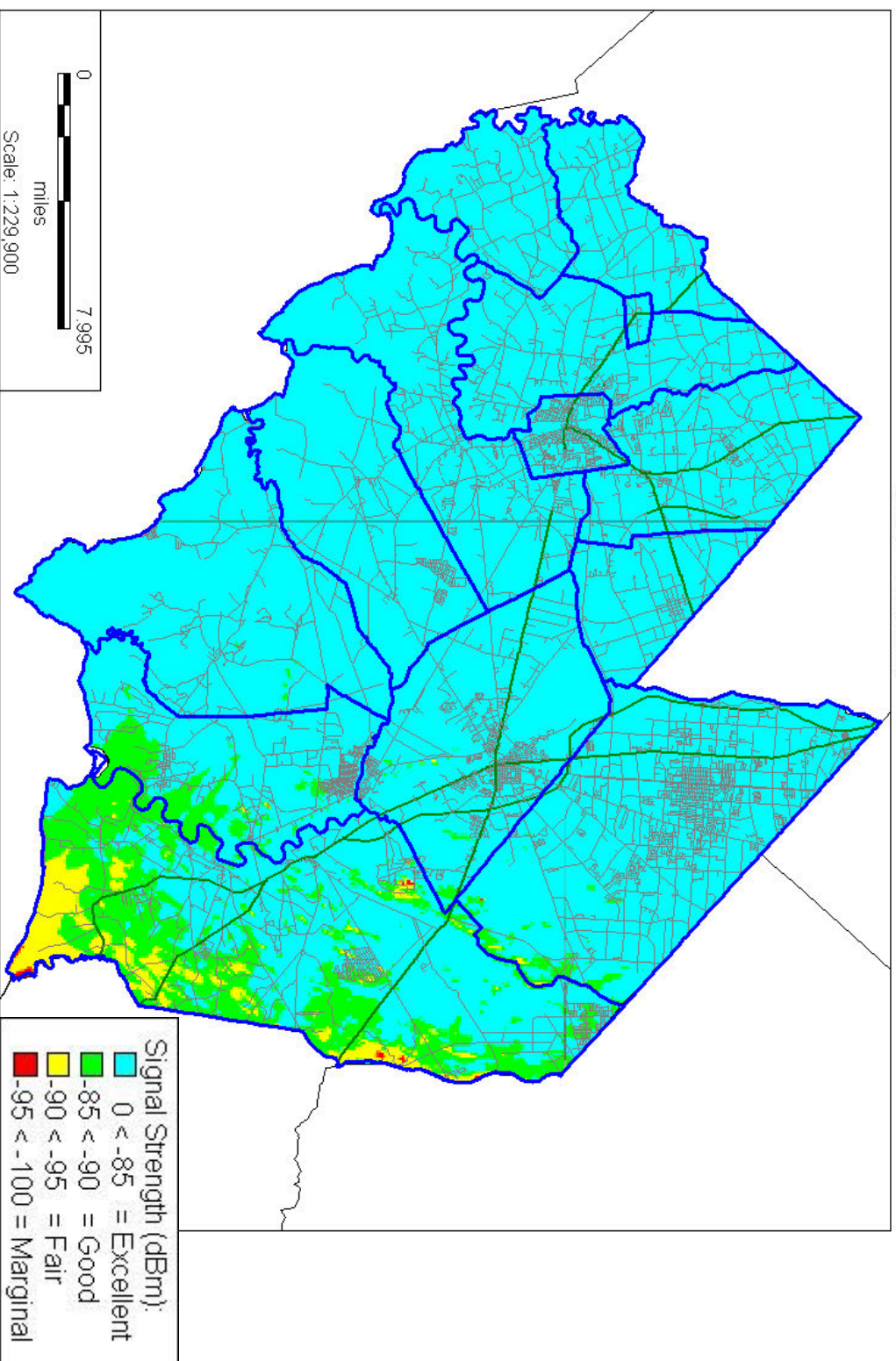


Figure 31 Talk-Out Portable Street Coverage - EMS 5

Cumberland County RF Coverage - Talk-In Portable In-Building
 EMS 5 - 155.325 MHz

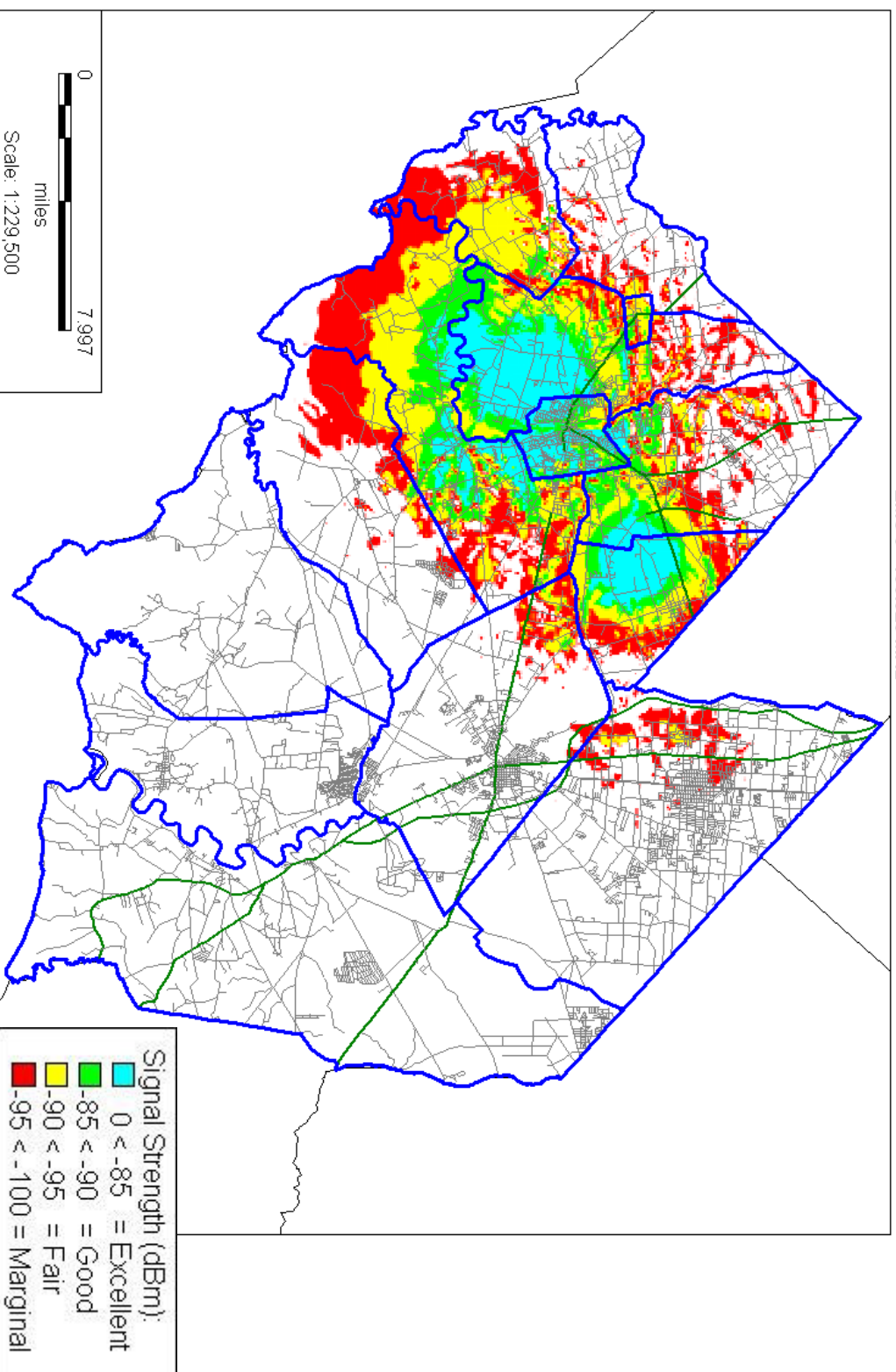


Figure 32 Talk-In Portable In-Building Coverage - EMS 5

Cumberland County RF Coverage - Talk-In Portable Street
 EMS 5 - 155.325 MHz

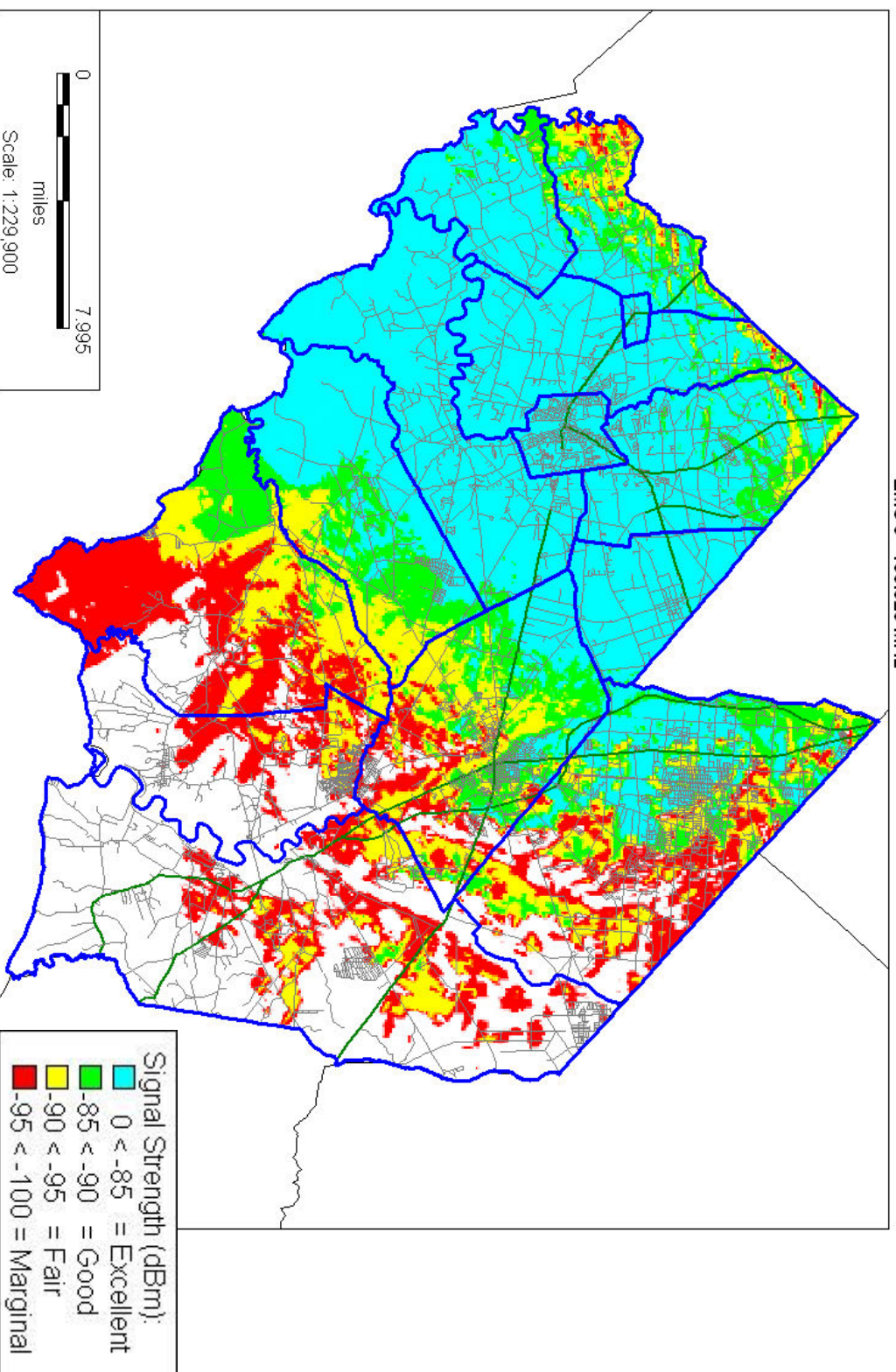


Figure 33 Talk-In Portable Street Coverage - EMS 5

Cumberland County RF Coverage - Talk-Out Portable In-Building
 Fire 1 - 154.430 MHz

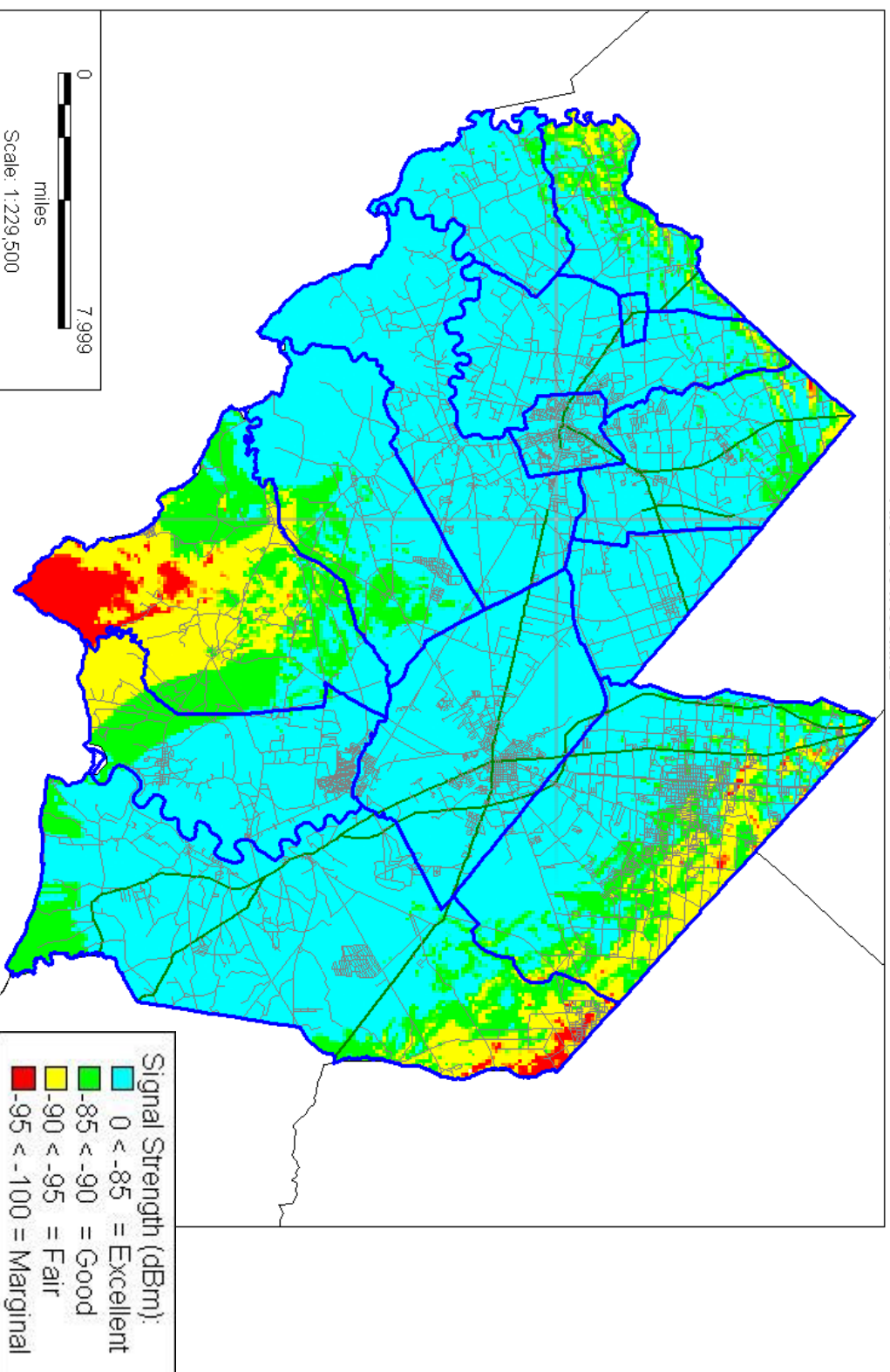


Figure 34 Talk-Out Portable In-Building Coverage - Fire 1

Cumberland County RF Coverage - Talk-Out Portable Street
Fire 1 - 154.430 MHz

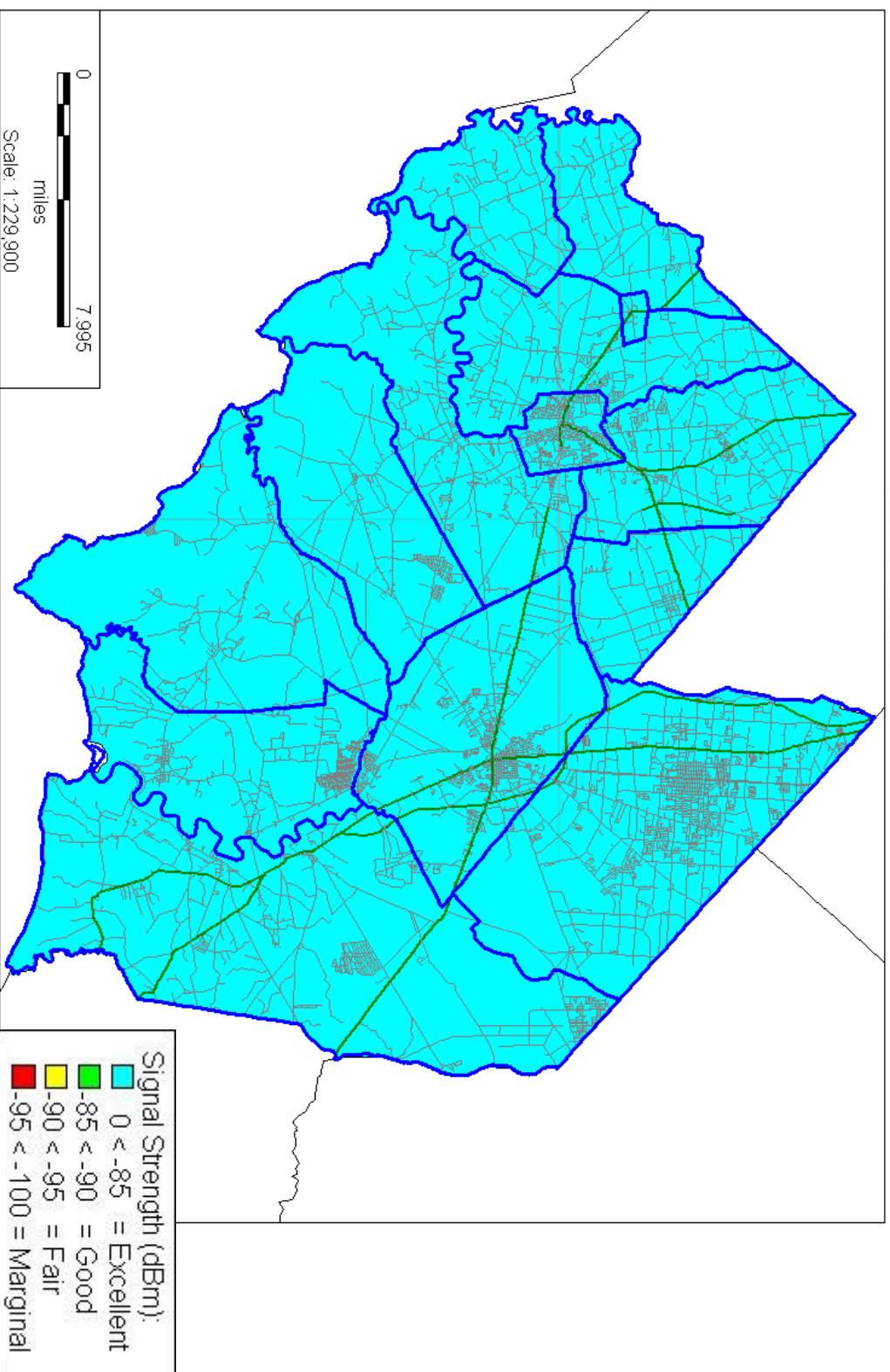


Figure 35 Talk-Out Portable Street Coverage - Fire 1

Cumberland County RF Coverage - Talk-In Portable In-Building
Fire 1 - 154.430 MHz

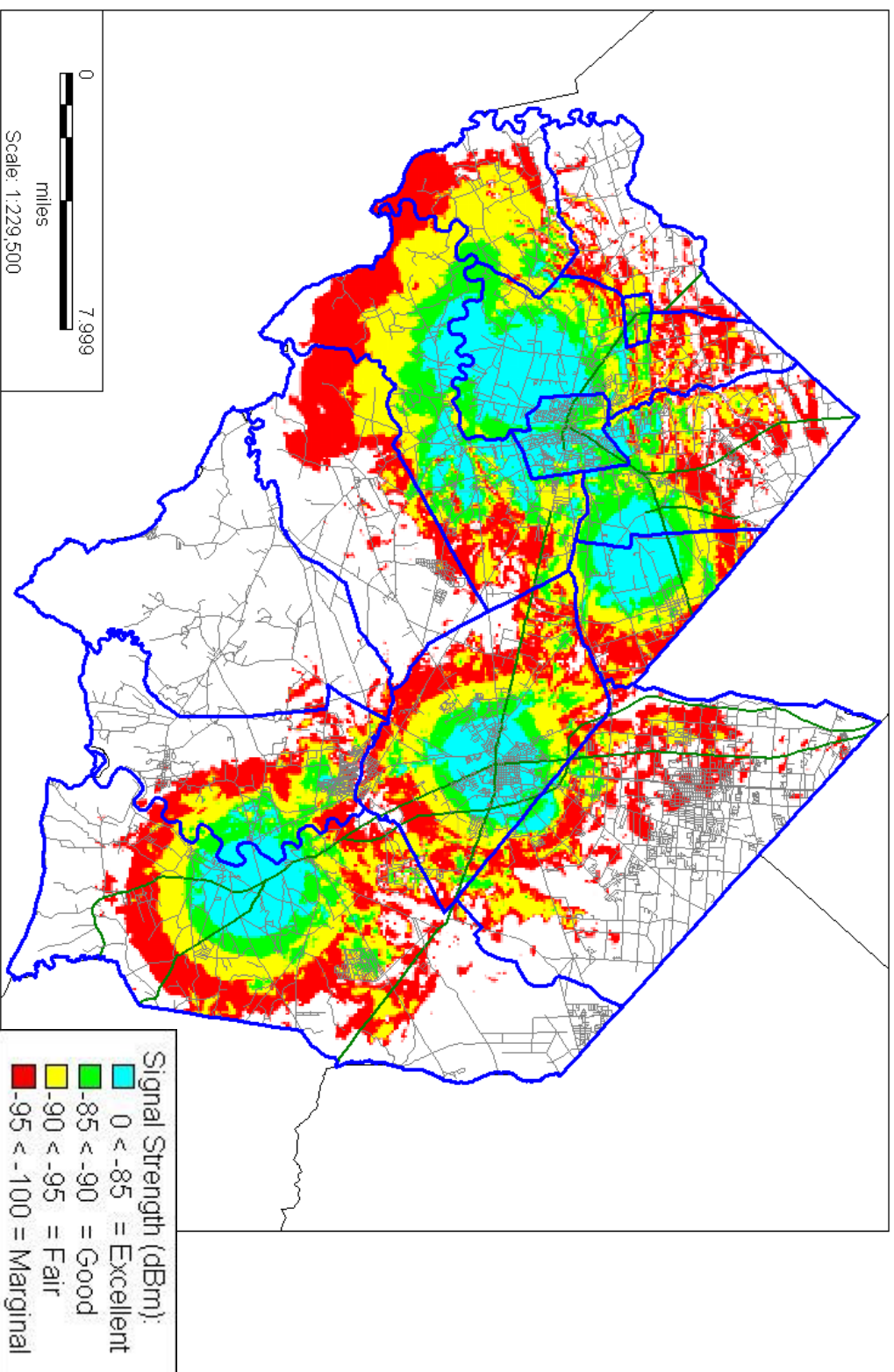


Figure 36 Talk-In Portable In-Building Coverage - Fire 1

Cumberland County RF Coverage - Talk-In Portable Street
Fire 1 - 154.430 MHz

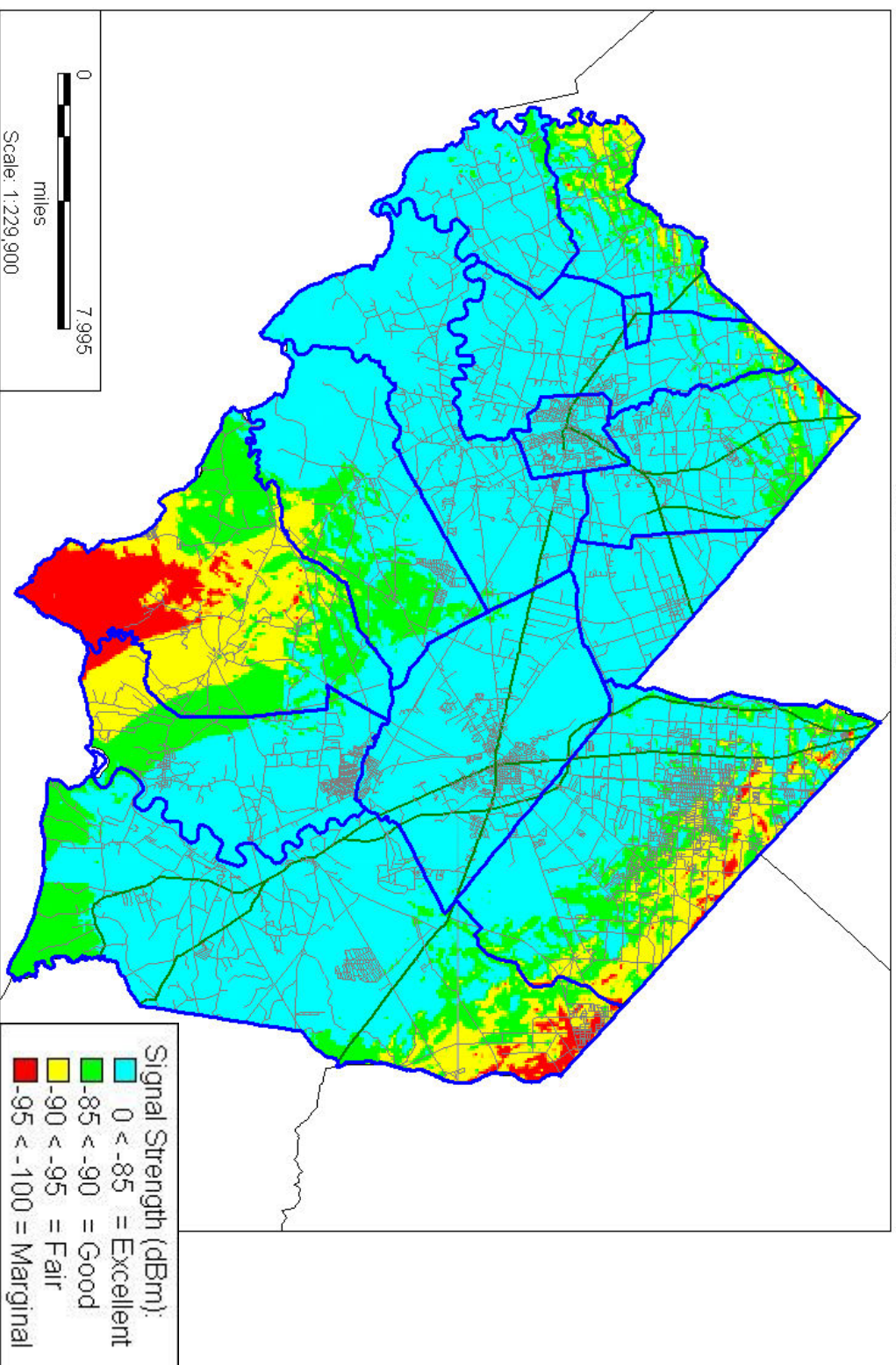


Figure 37 Talk-In Portable Street Coverage - Fire 1

Cumberland County RF Coverage - Talk-Out Portable In-Building
Fire 2 - 154.325 MHz

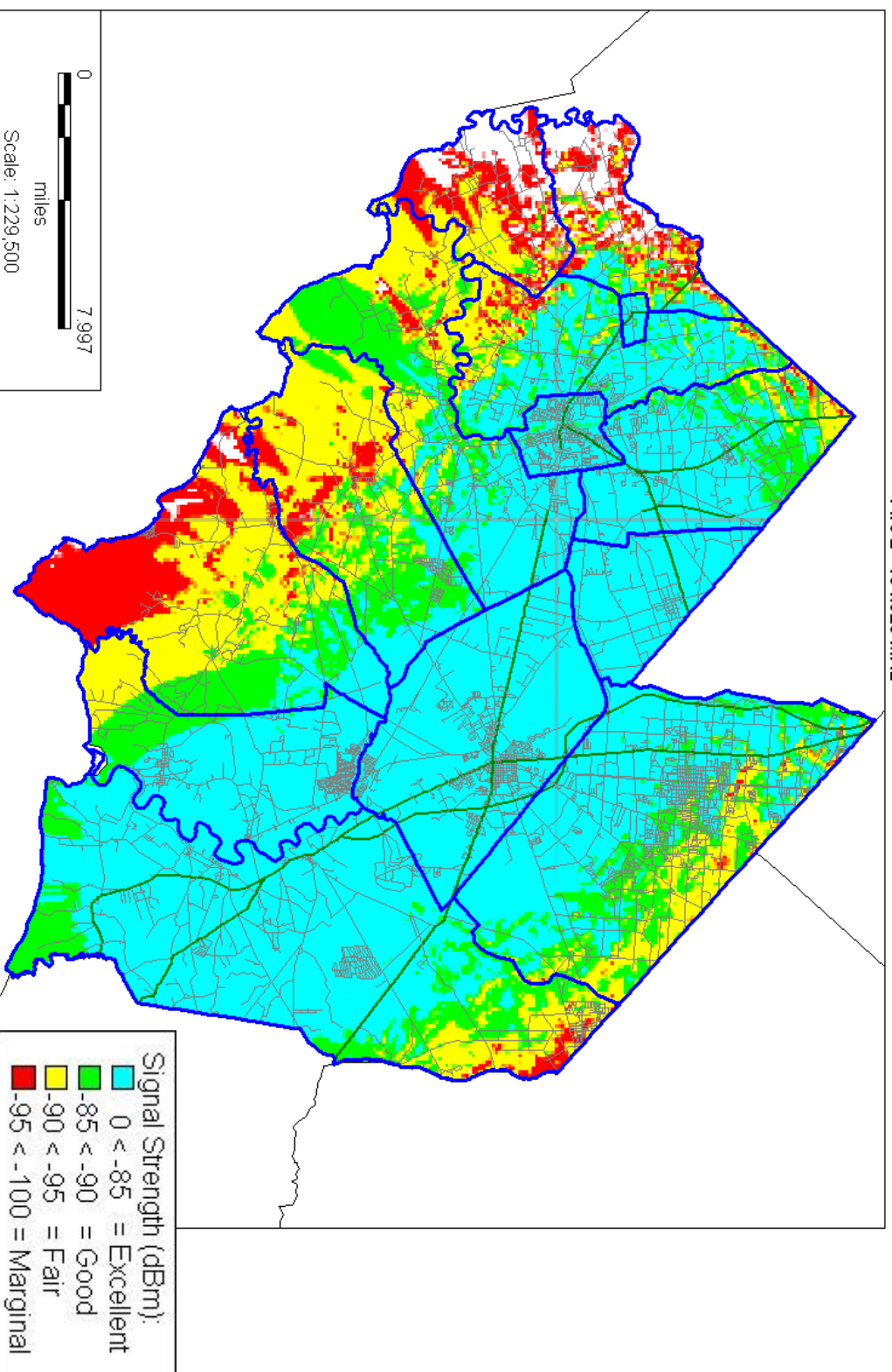


Figure 38 Talk-Out Portable In-Building Coverage - Fire 2

Cumberland County RF Coverage - Talk-Out Portable Street
Fire 2 - 154.325 MHz

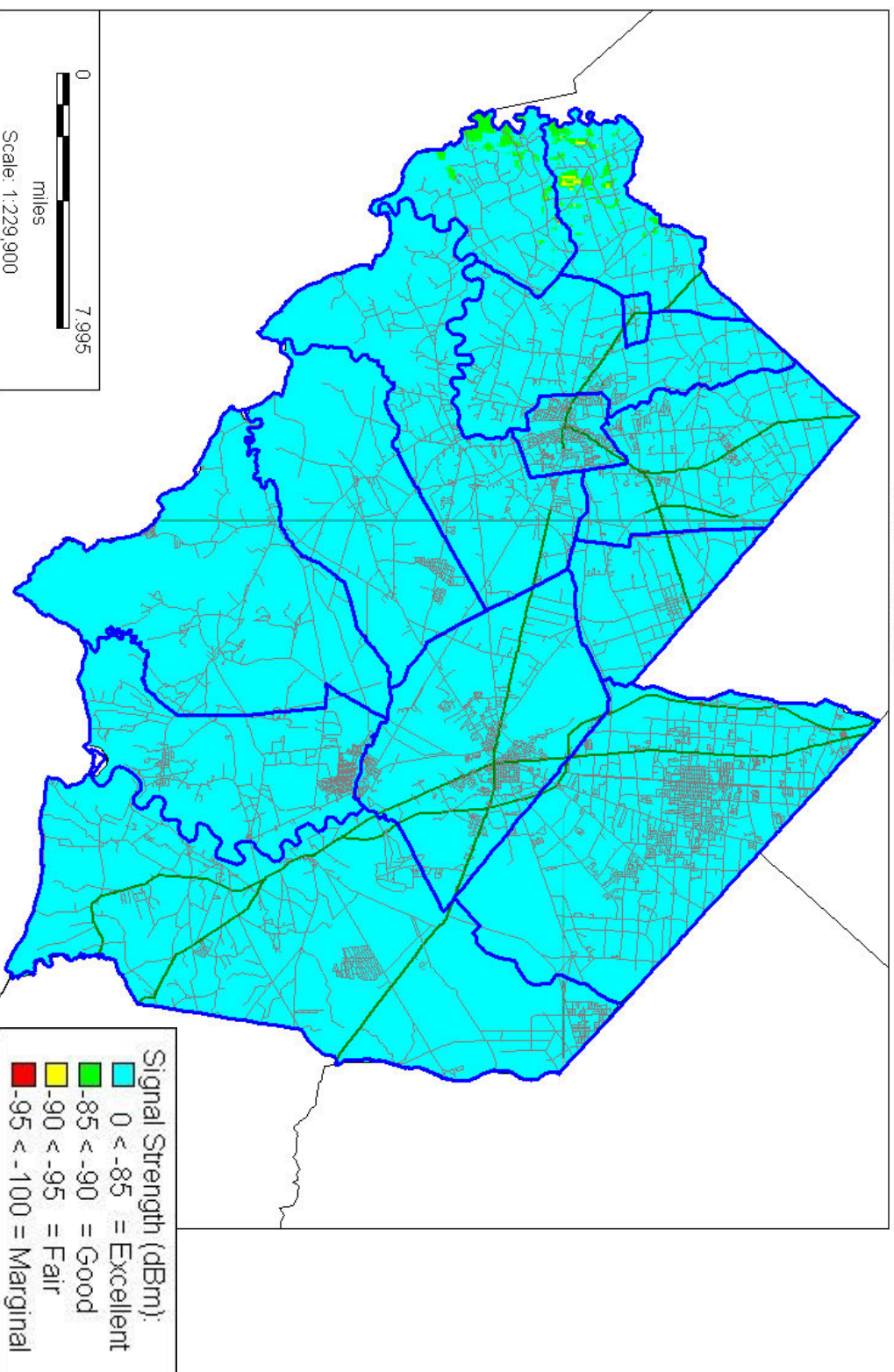


Figure 39 Talk-Out Portable Street Coverage - Fire 2

Cumberland County RF Coverage - Talk-In Portable In-Building
Fire 2 - 154.325 MHz

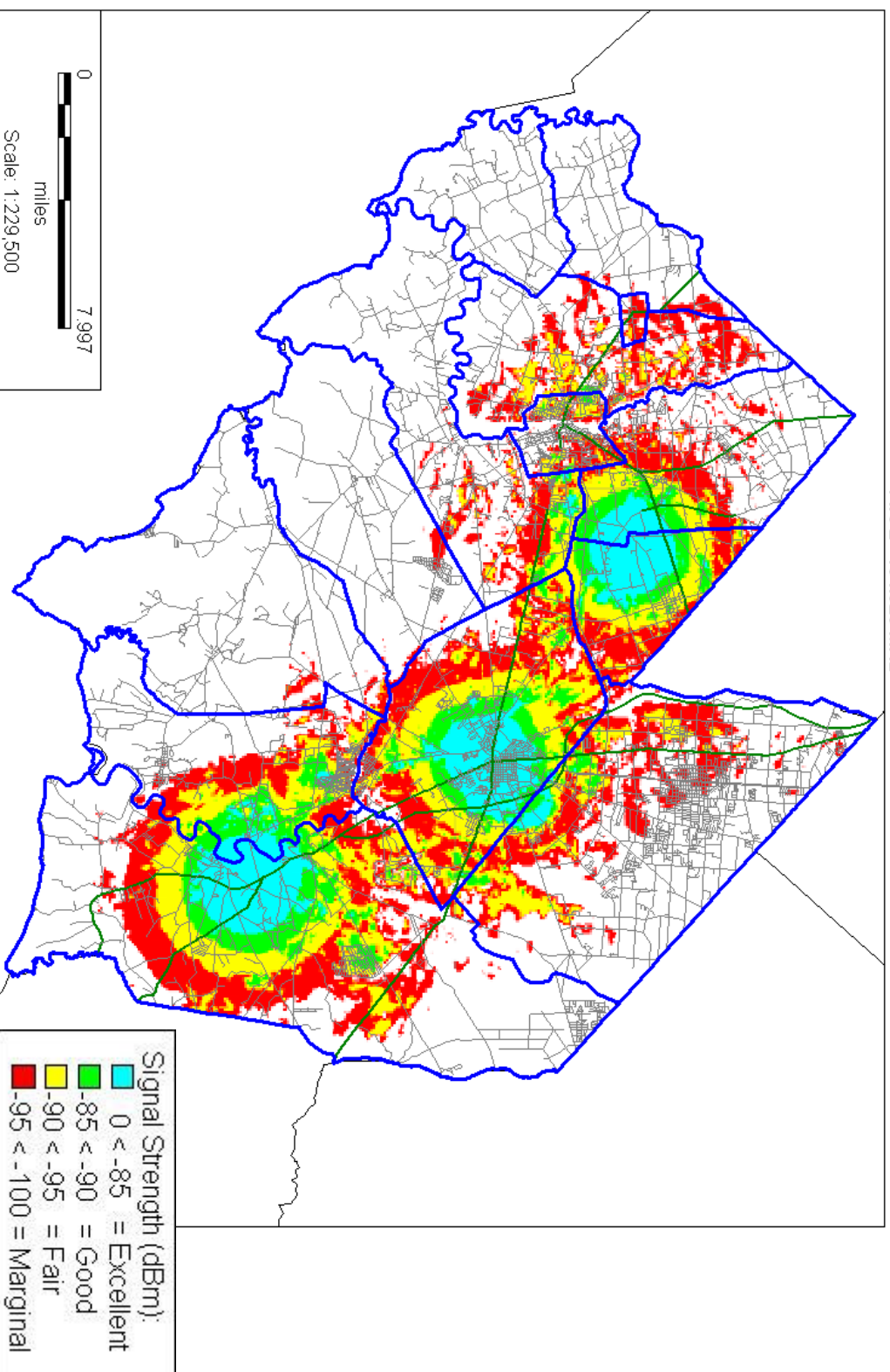


Figure 40 Talk-In Portable In-Building Coverage - Fire 2

Cumberland County RF Coverage - Talk-In Portable Street
Fire 2 - 154.325 MHz

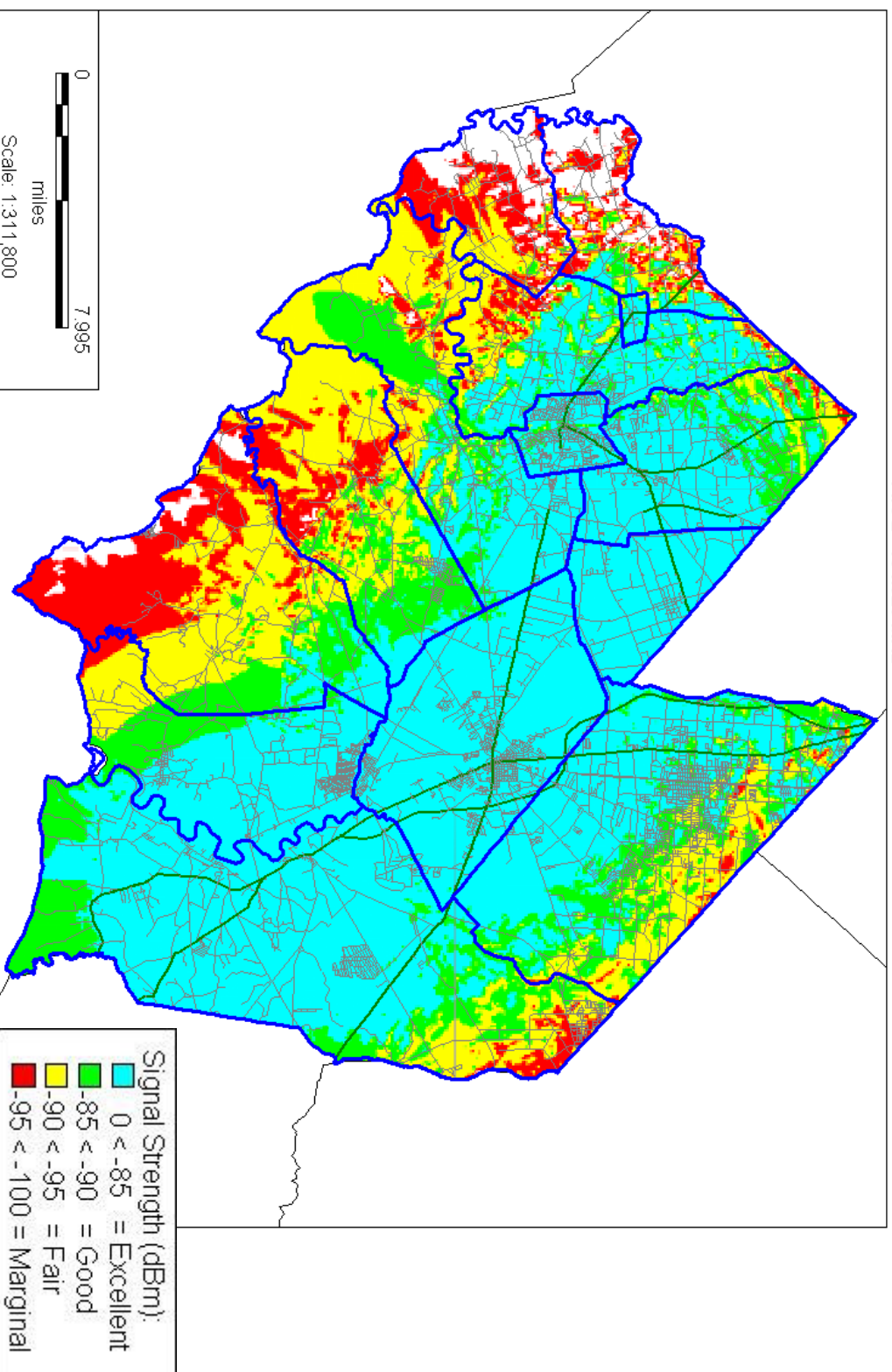


Figure 41 Talk-In Portable Street Coverage - Fire 2

Cumberland County RF Coverage - Talk-Out Portable In-Building
Fire 3 - 154.265 MHz

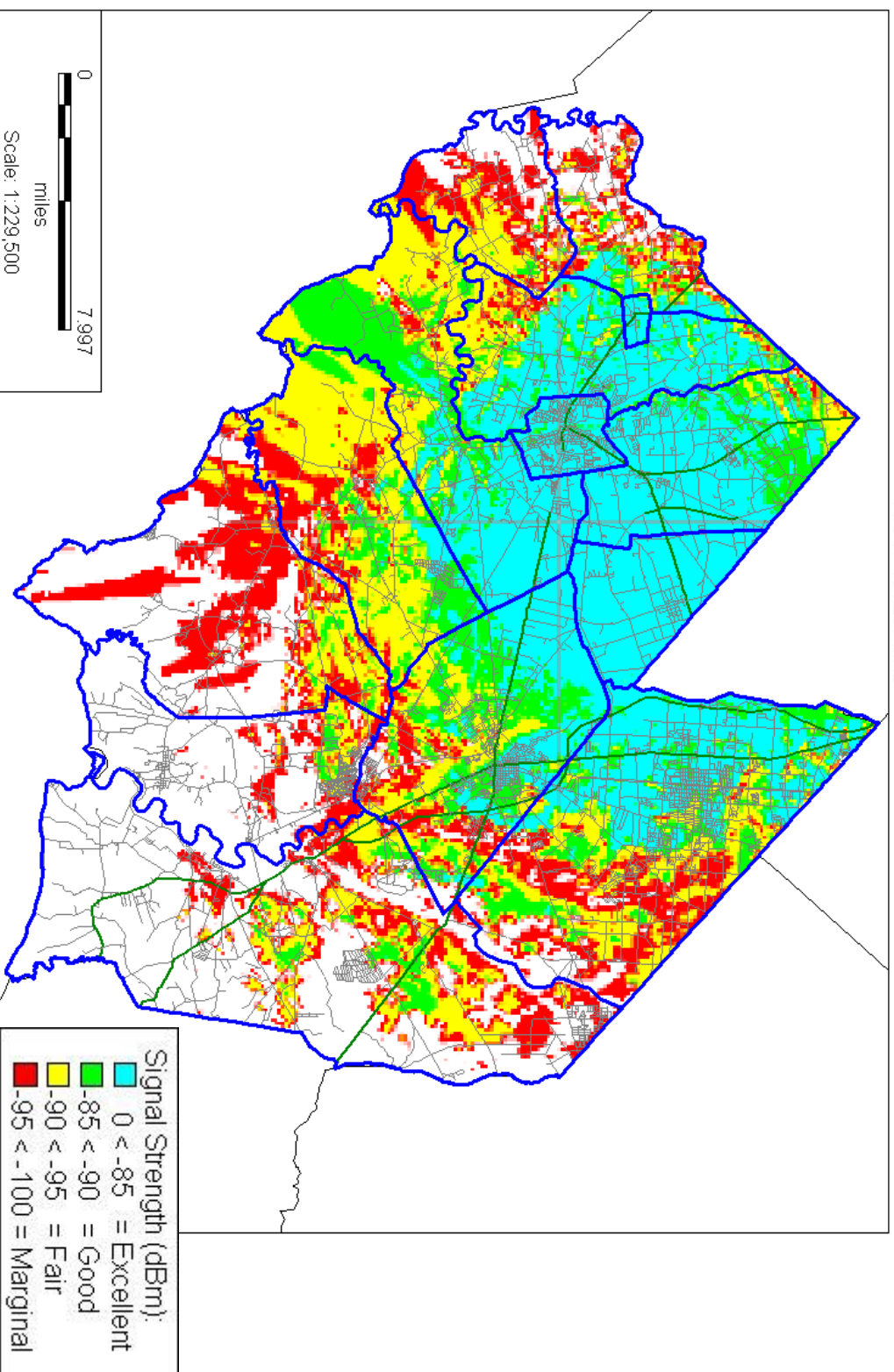


Figure 42 Talk-Out Portable In-Building Coverage - Fire 3

Cumberland County RF Coverage - Talk-Out Portable Street
Fire 3 - 154.265 MHz

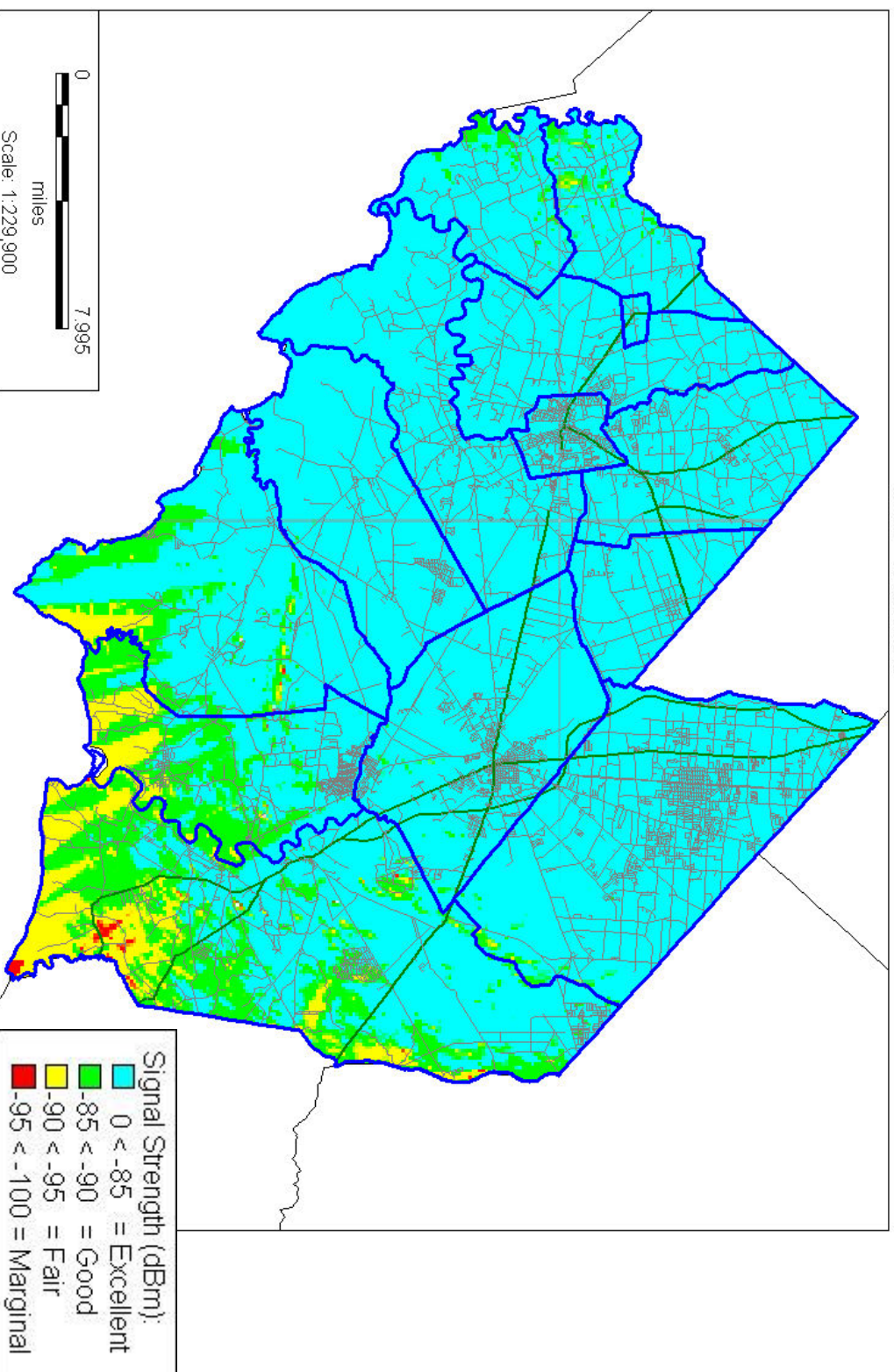


Figure 43 Talk-Out Portable Street Coverage - Fire 3

Cumberland County RF Coverage - Talk-In Portable In-Building
Fire 3 - 154.265 MHz

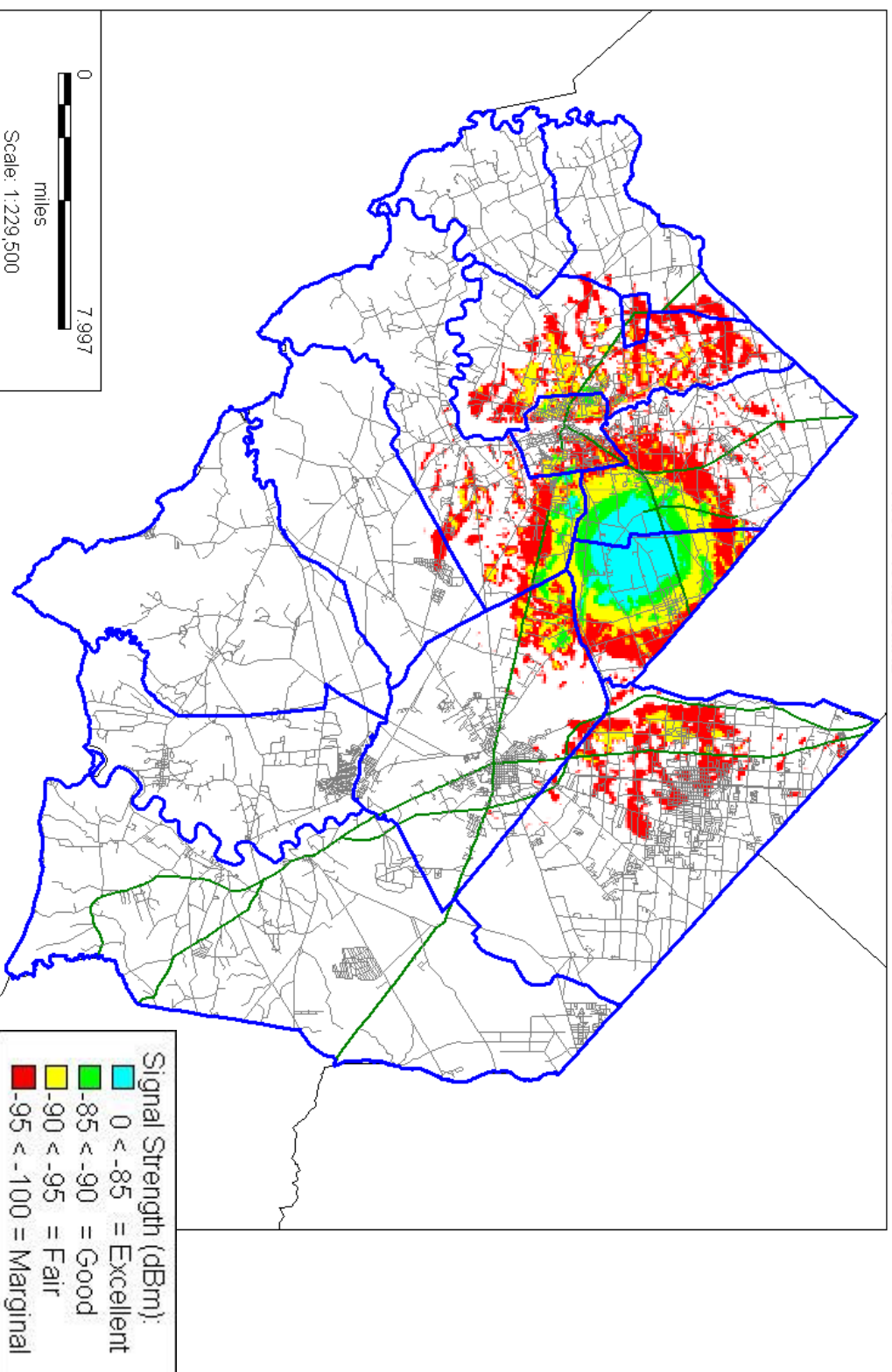


Figure 44 Talk-In Portable In-Building Coverage - Fire 3

Cumberland County RF Coverage - Talk-In Portable Street
Fire 3 - 154.265 MHz

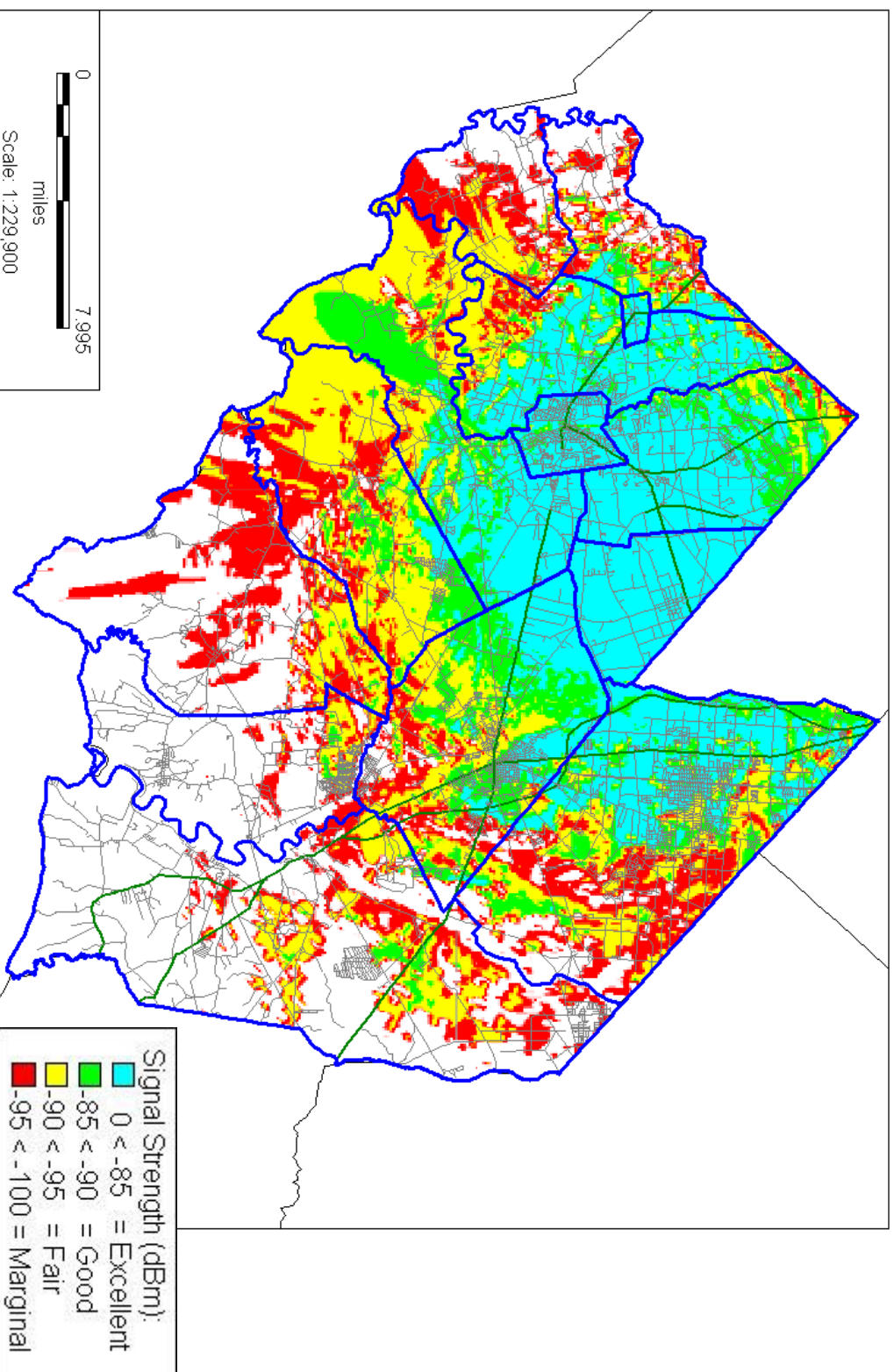


Figure 45 Talk-In Portable Street Coverage - Fire 3

Cumberland County RF Coverage - Talk-Out Portable In-Building
Fire 4 - 154.400 MHz

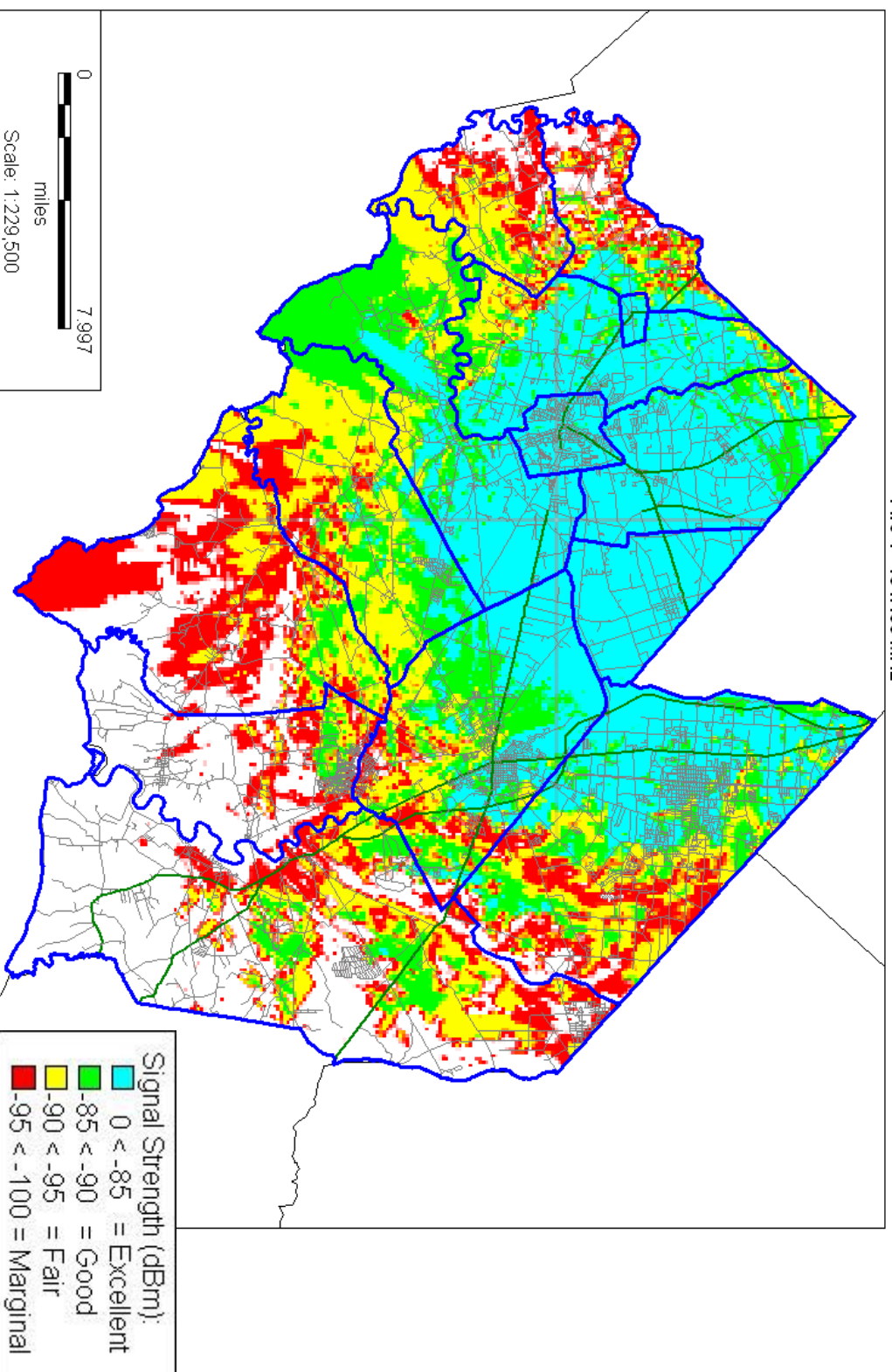


Figure 46 Talk-Out Portable In-Building Coverage - Fire 4

Cumberland County RF Coverage - Talk-Out Portable Street
Fire 4 - 154.400 MHz

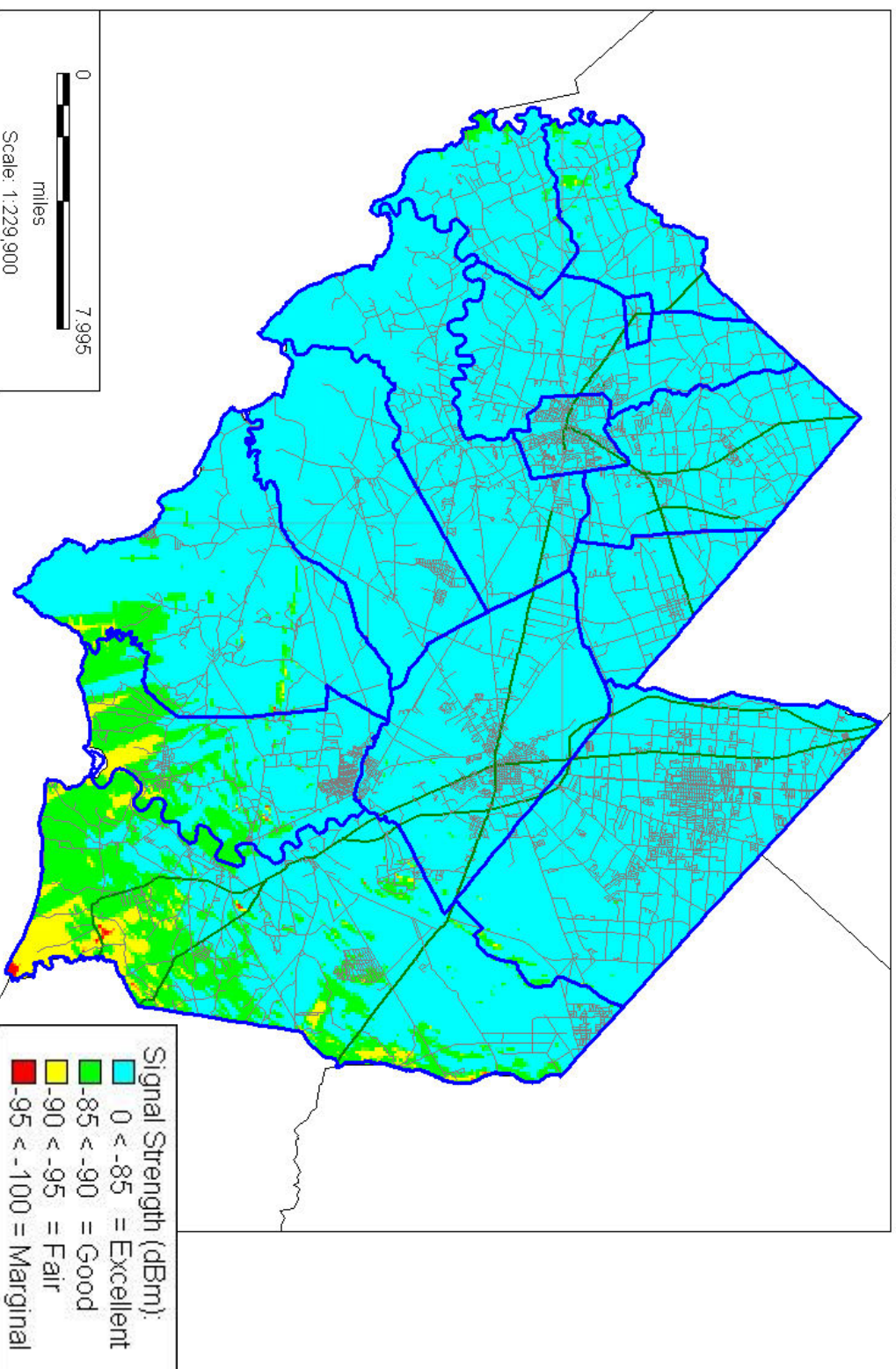


Figure 47 Talk-Out Portable Street Coverage - Fire 4

Cumberland County RF Coverage - Talk-In Portable In-Building
Fire 4 - 154.400 MHz

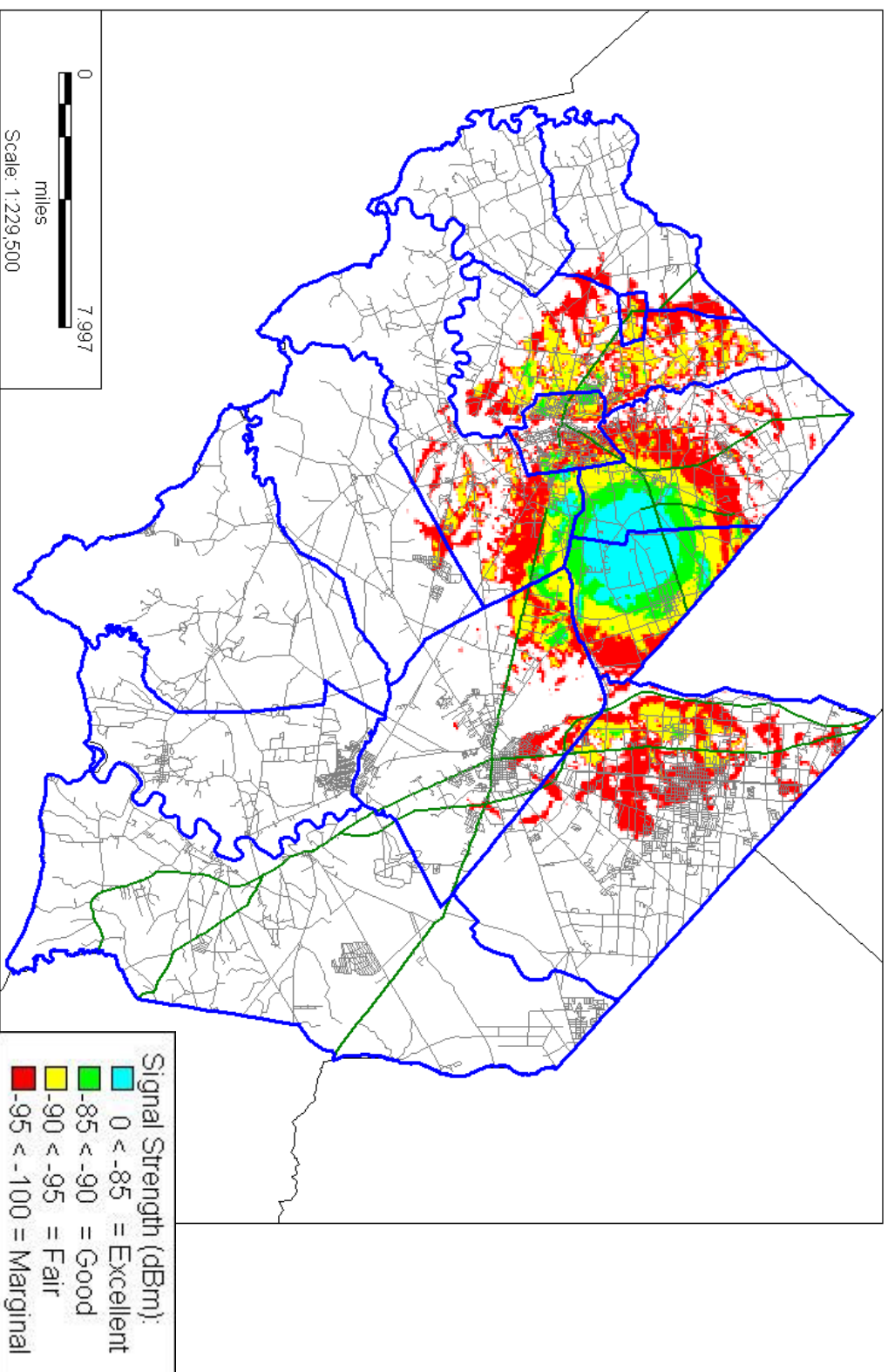


Figure 48 Talk-In Portable In-Building Coverage - Fire 4

Cumberland County RF Coverage - Talk-In Portable Street
Fire 4 - 154.400 MHz

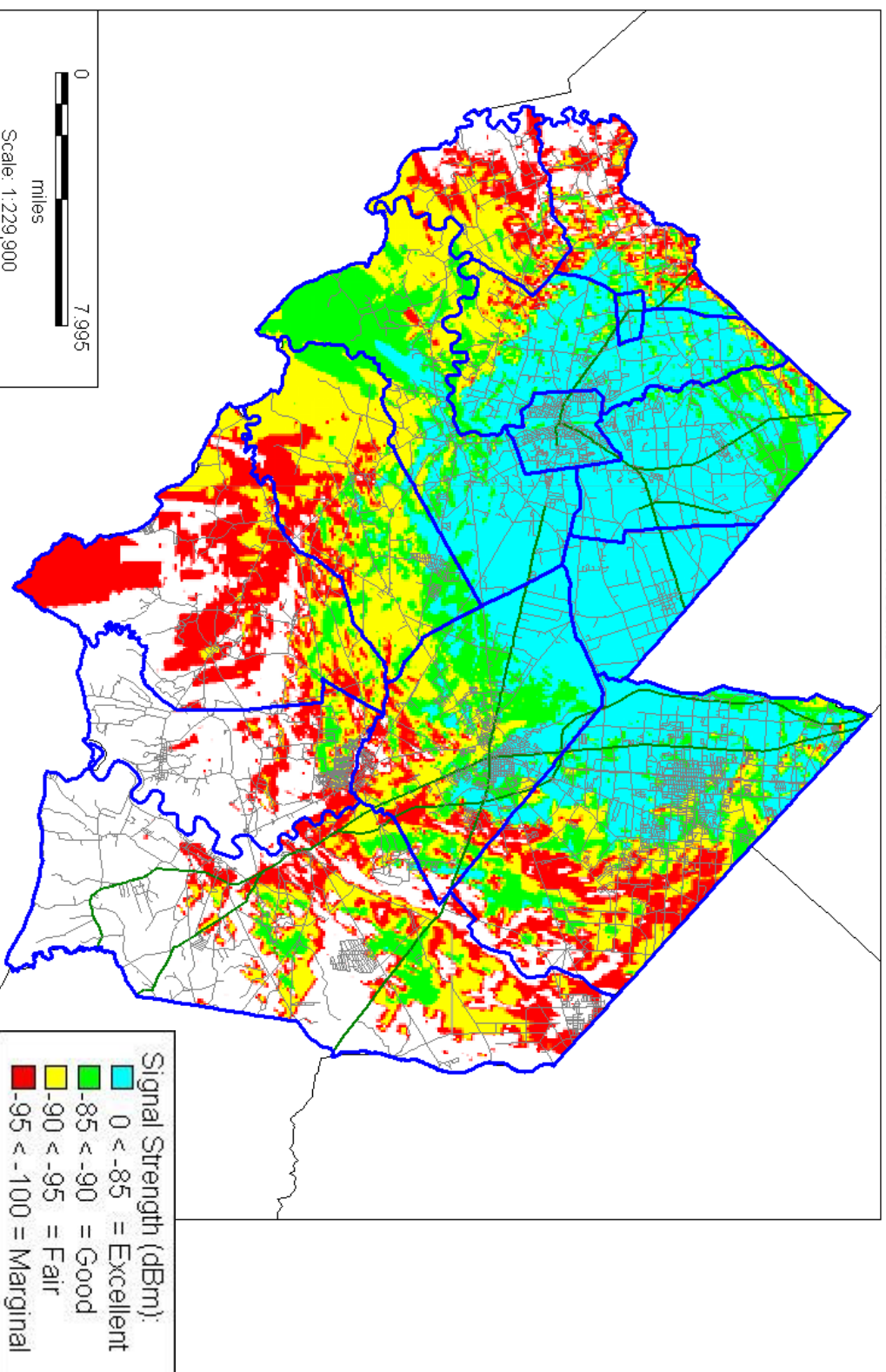


Figure 49 Talk-In Portable Street Coverage - Fire 4

Cumberland County RF Coverage - Talk-Out Portable In-Building
Fire 6 - 154.175 MHz

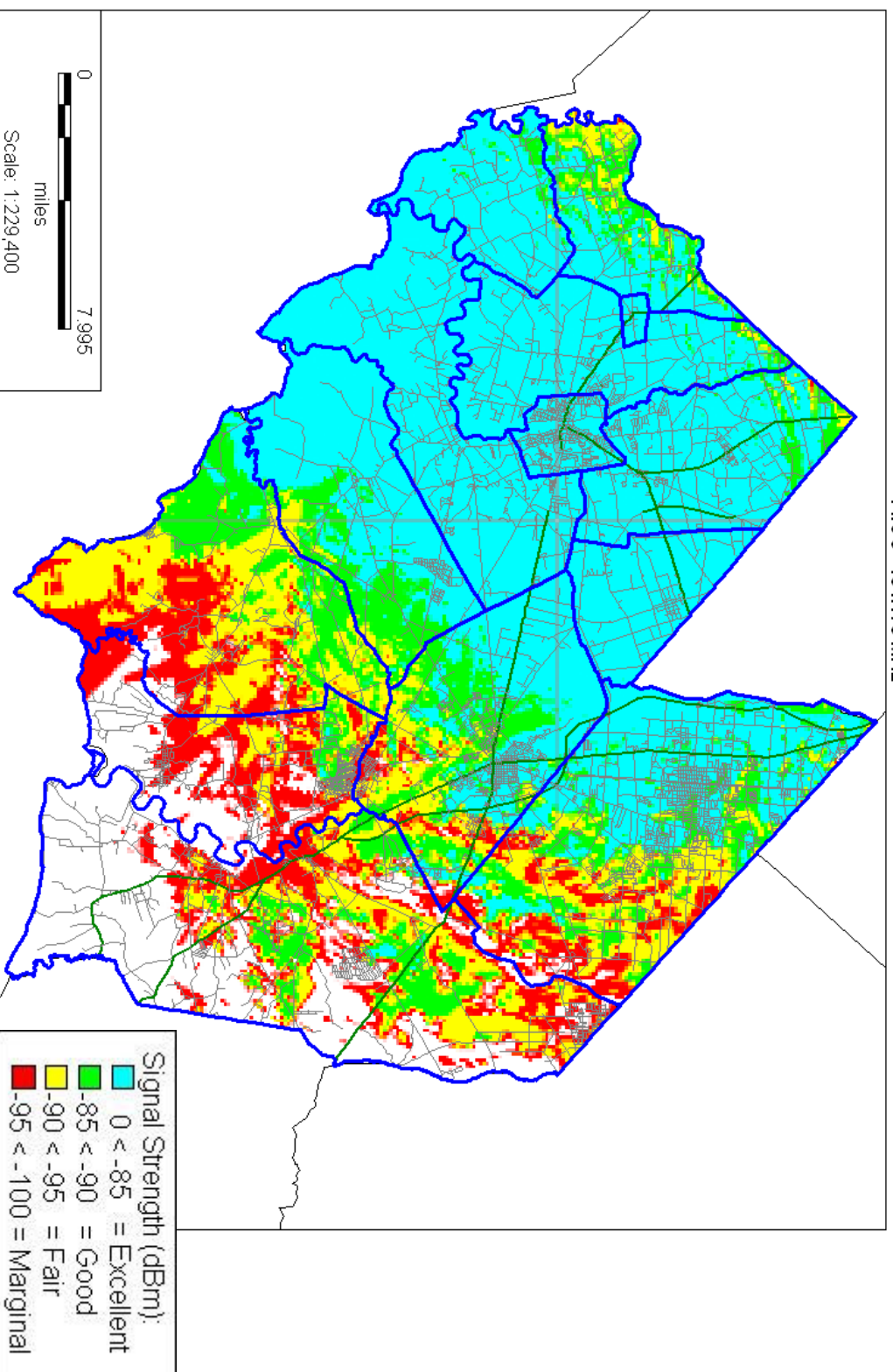


Figure 50 Talk-Out Portable In-Building Coverage - Fire 6

Cumberland County RF Coverage - Talk-Out Portable Street
Fire 6 - 154.175 MHz

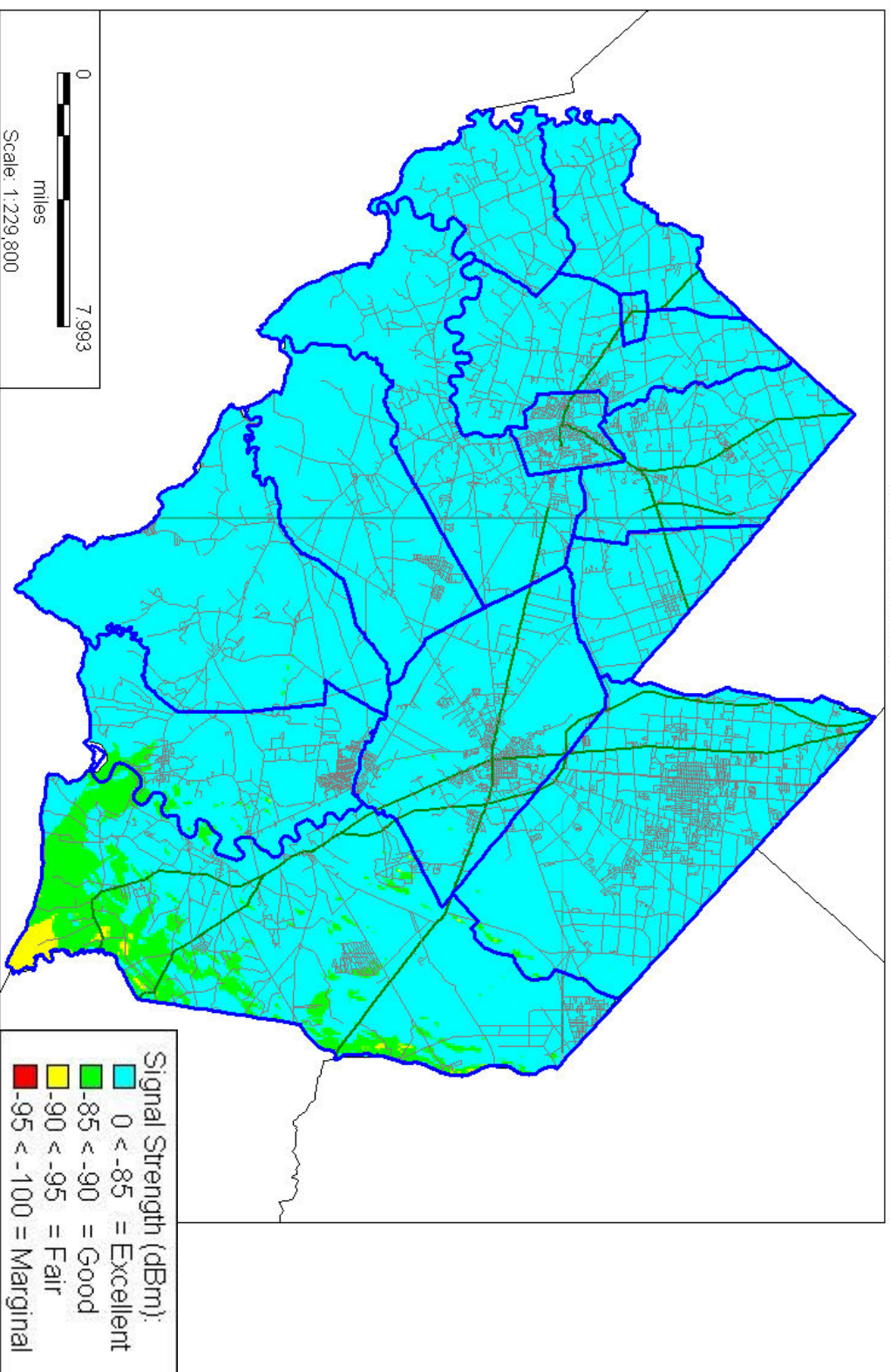


Figure 51 Talk-Out Portable Street Coverage - Fire 6

Cumberland County RF Coverage - Talk-In Portable In-Building
Fire 6 - 154.175 MHz

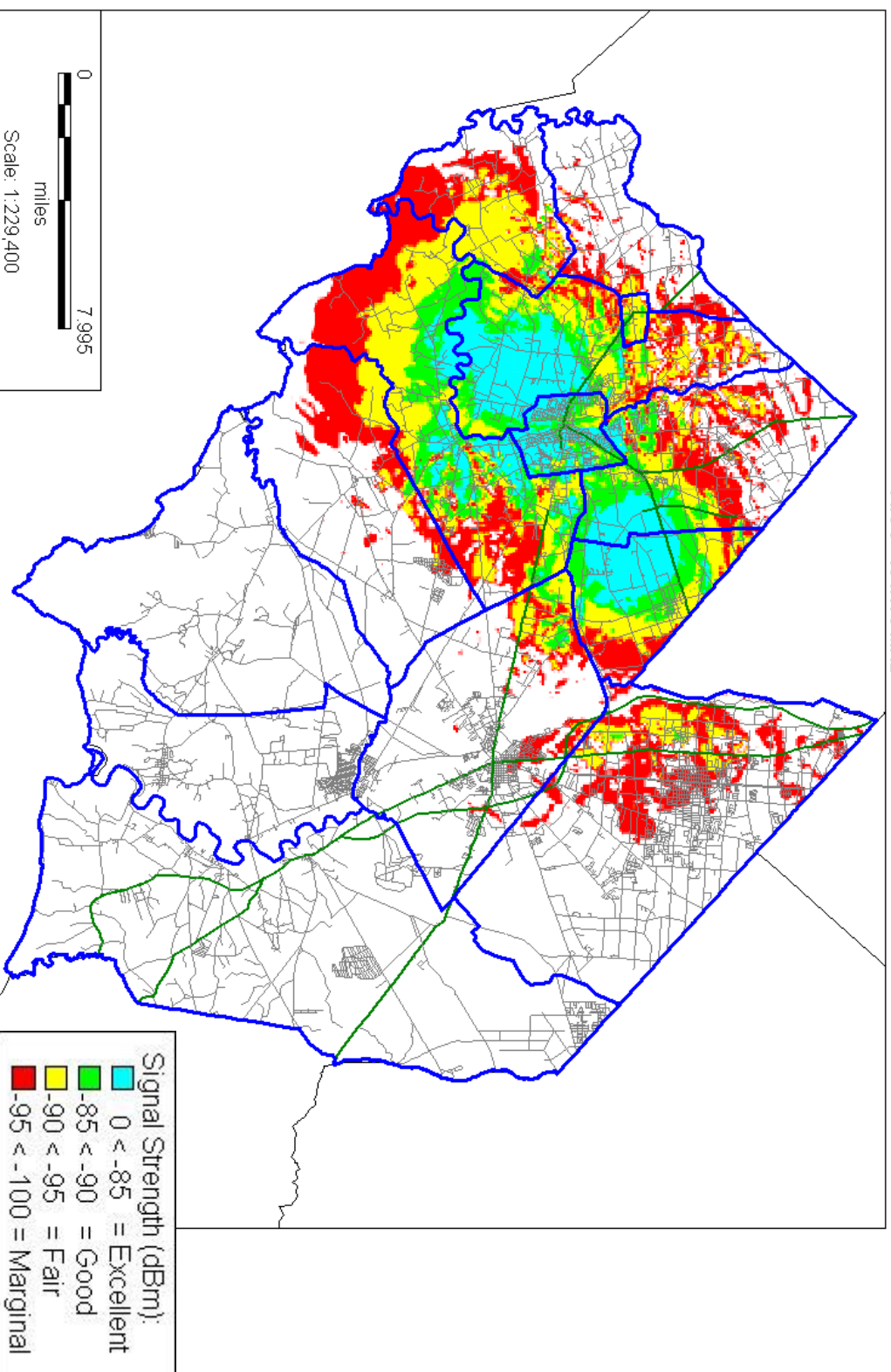


Figure 52 Talk-In Portable In-Building Coverage - Fire 6

Cumberland County RF Coverage - Talk-In Portable Street
Fire 6 - 154.175 MHz

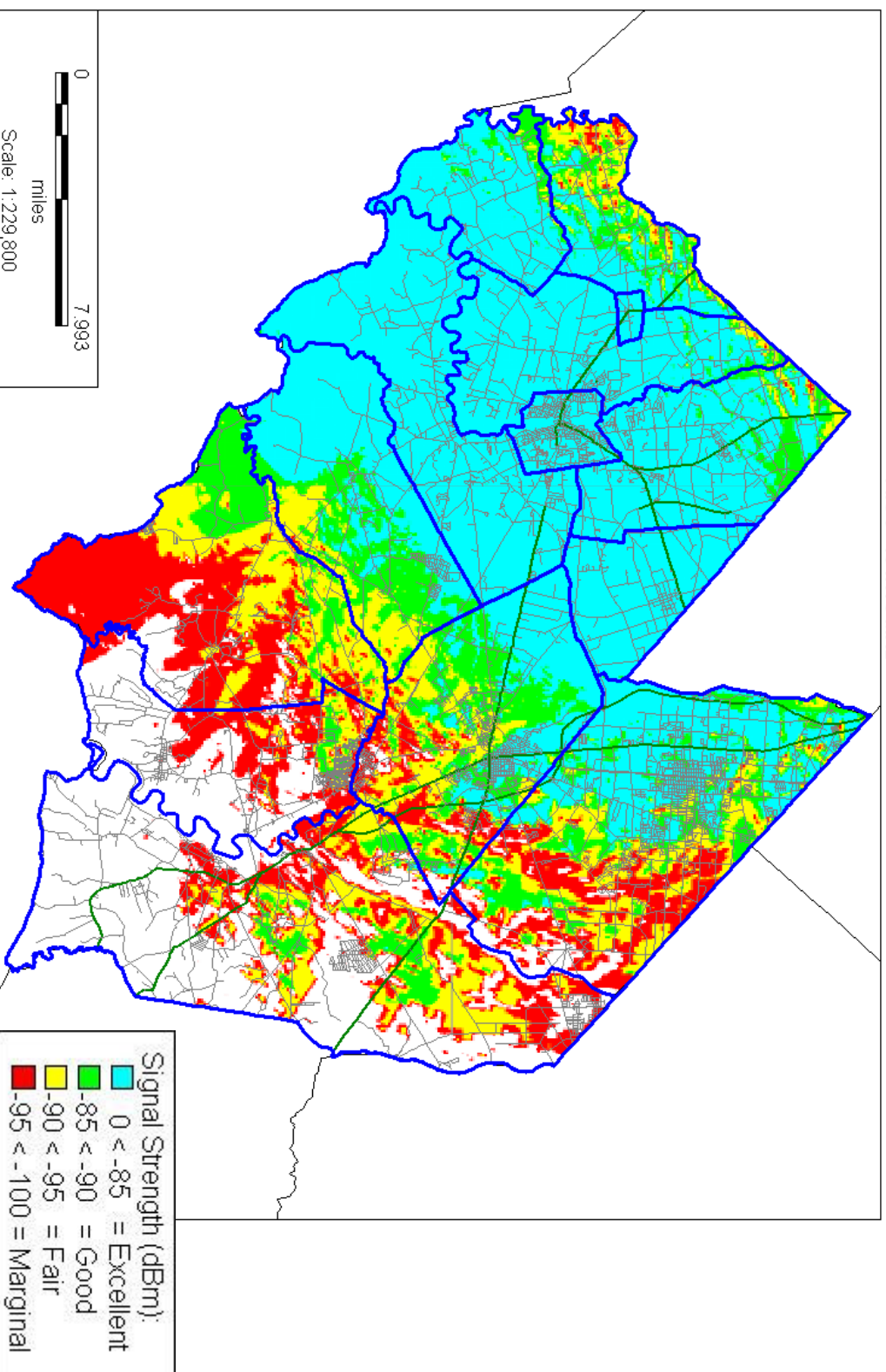


Figure 53 Talk-In Portable Street Coverage - Fire 6

Cumberland County RF Coverage - Talk-Out Portable In-Building
County Fire Police - 156.210 MHz

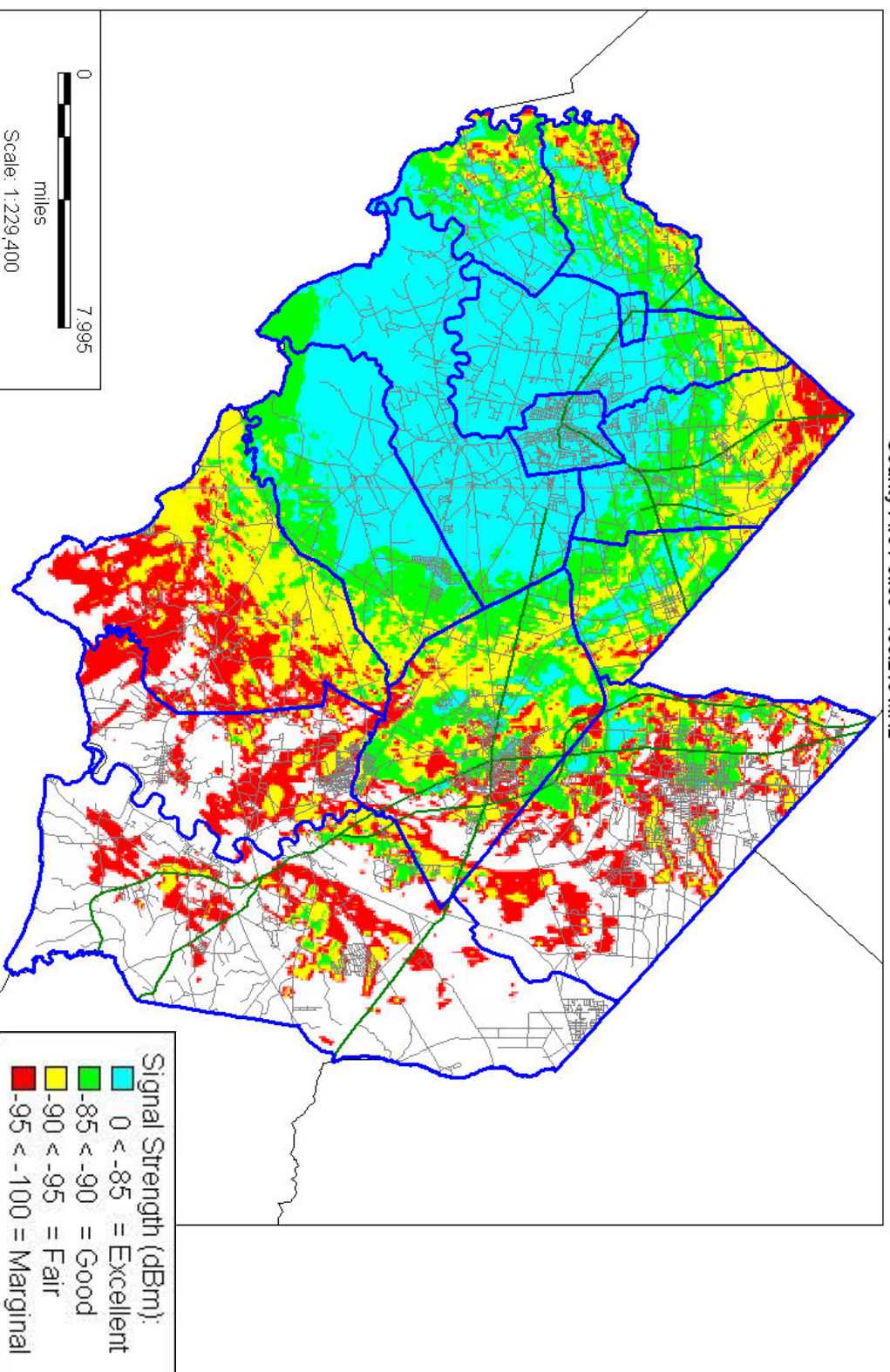


Figure 54 Talk-Out Portable In-Building Coverage – County Fire Police

Cumberland County RF Coverage - Talk-Out Portable Street
County Fire Police - 156.210MHz

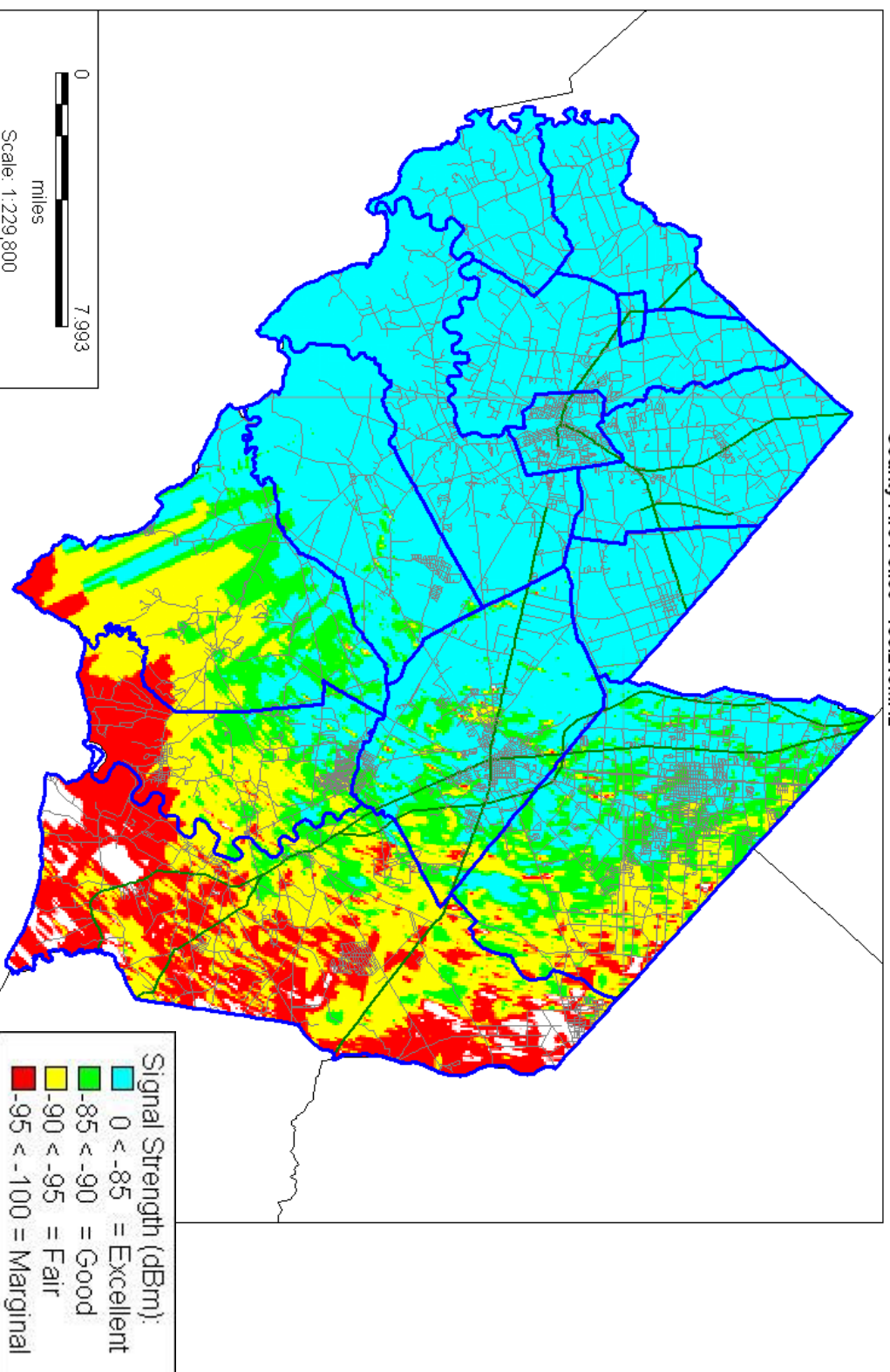


Figure 55 Talk-Out Portable Street Coverage - County Fire Police

Cumberland County RF Coverage - Talk-In Portable In-Building
County Fire Police - 156.210 MHz

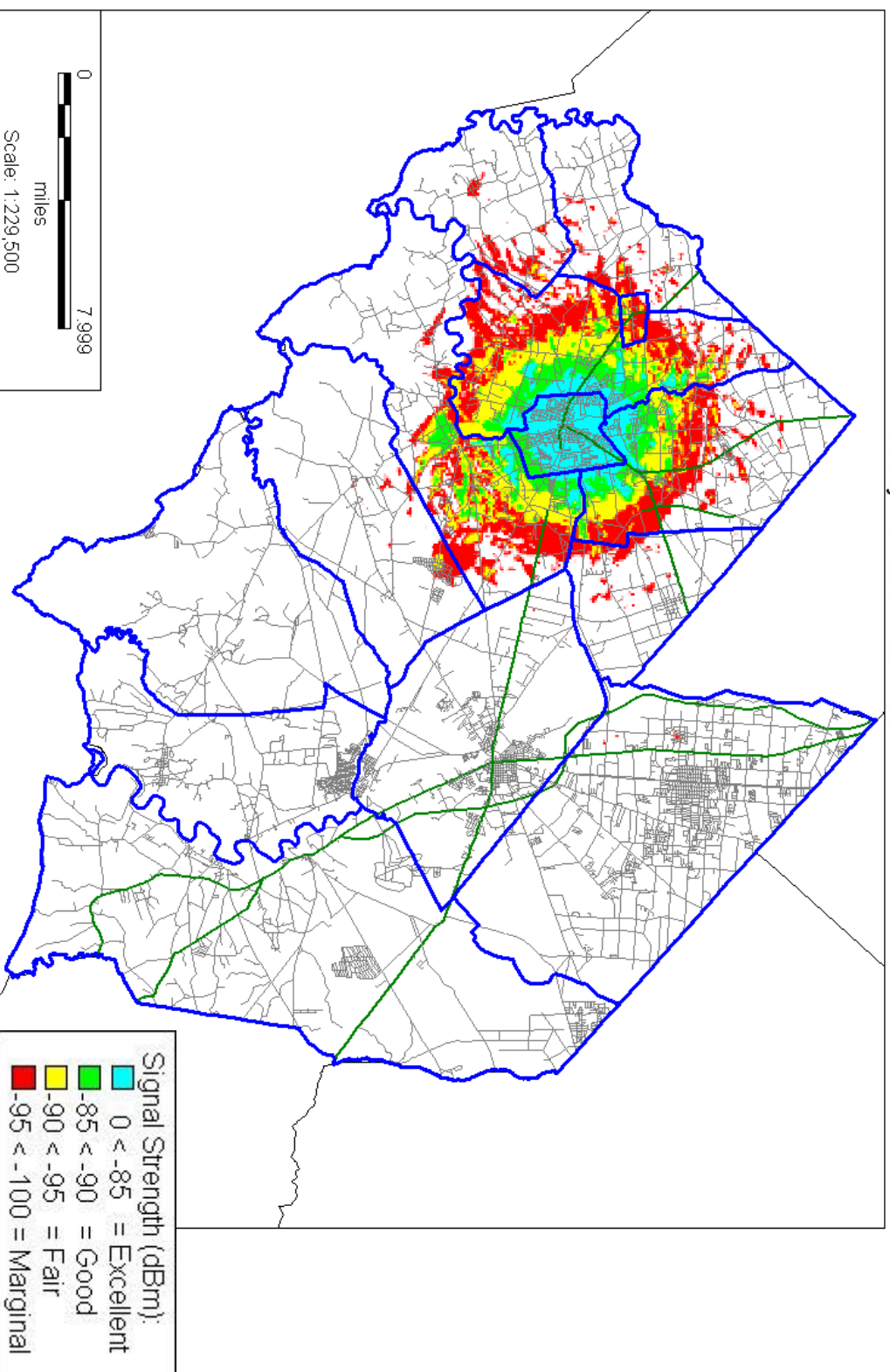


Figure 56 Talk-In Portable In-Building Coverage - County Fire Police

Cumberland County RF Coverage - Talk-In Portable Street
County Fire Police - 156.210MHz

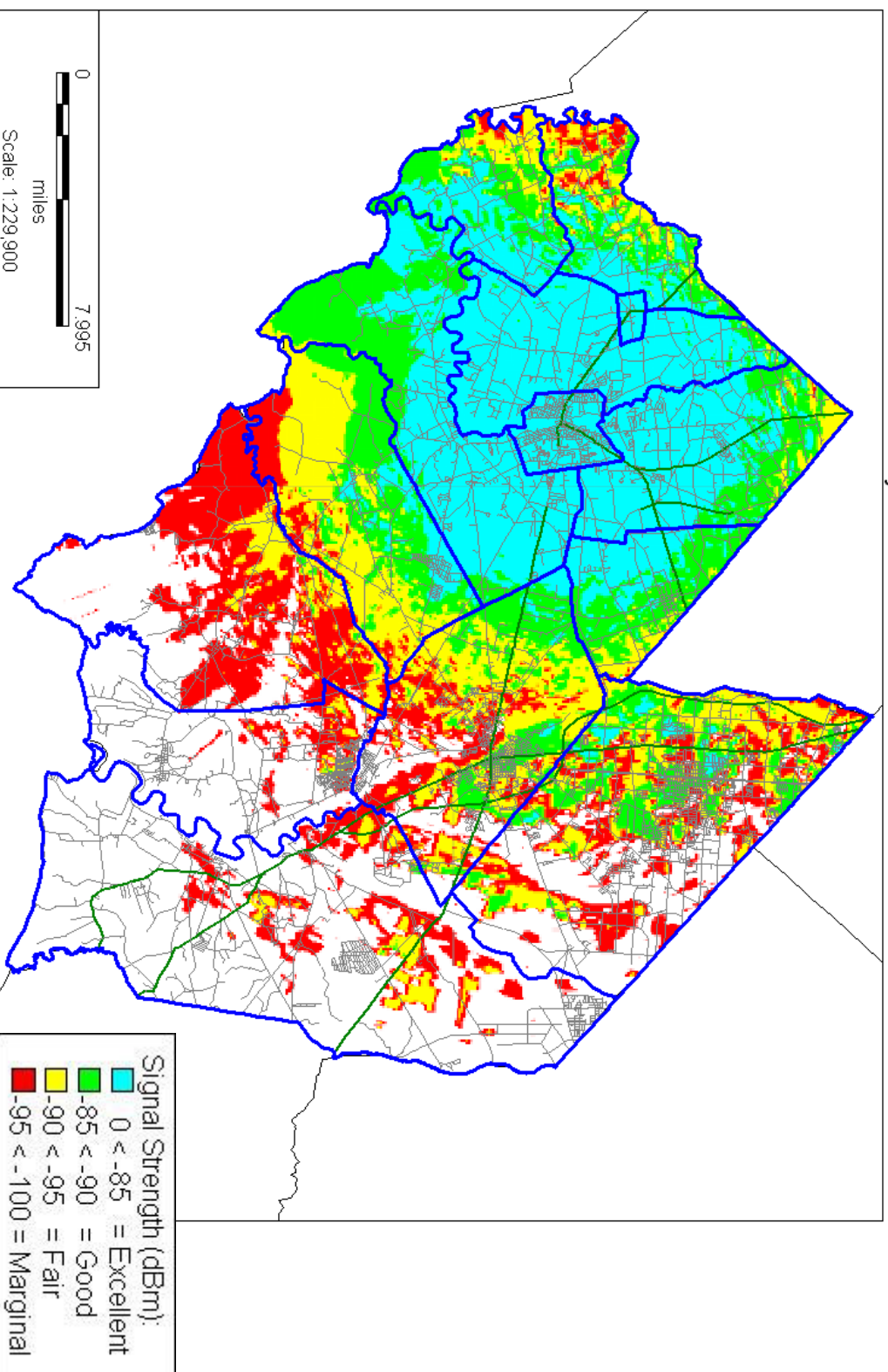


Figure 57 Talk-In Portable Street Coverage - County Fire Police

Cumberland County RF Coverage - Talk-Out Portable In-Building
County OEM - 154.085 MHz

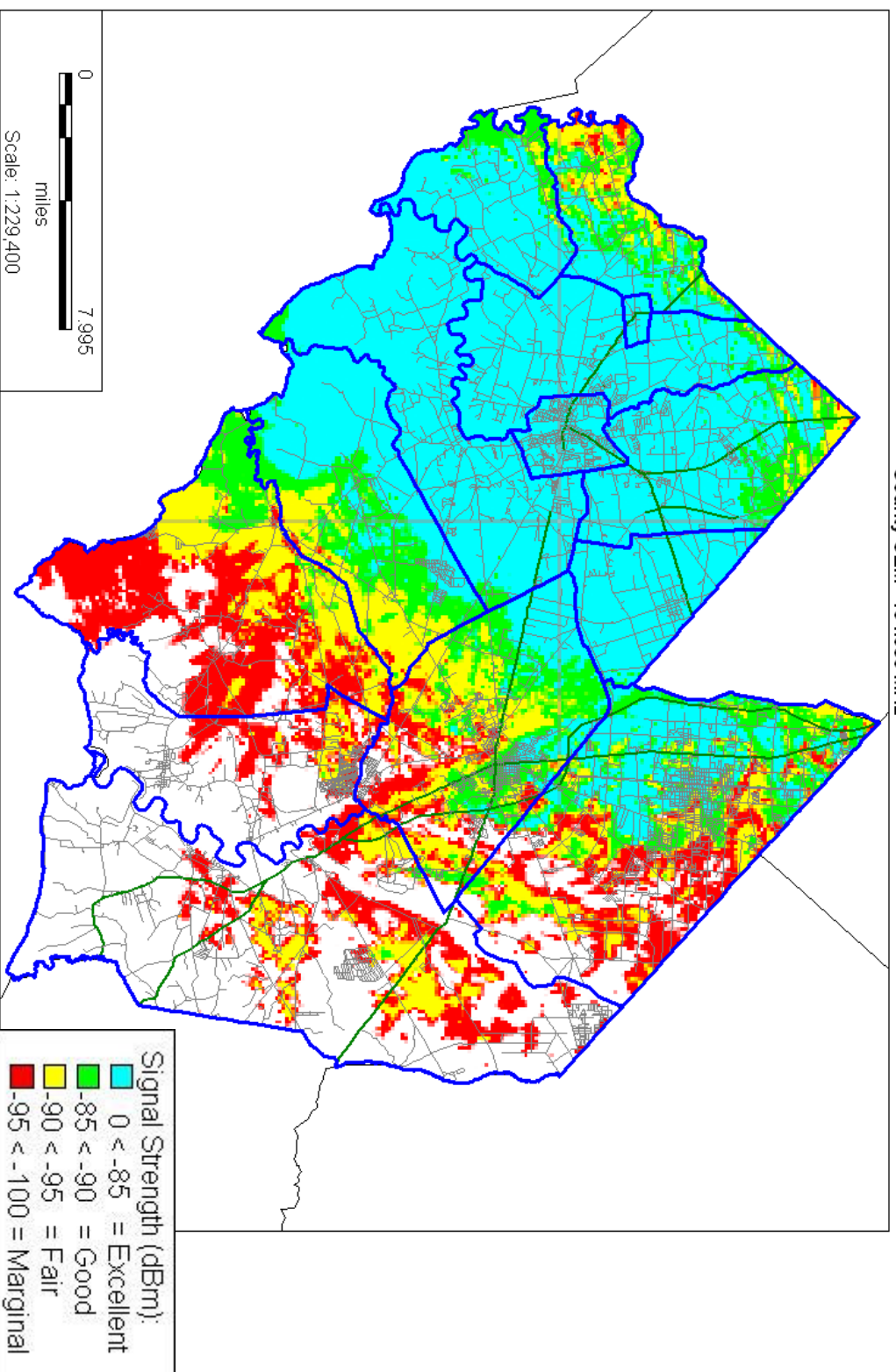


Figure 58 Talk-Out Portable In-Building Coverage – County OEM

Cumberland County RF Coverage - Talk-Out Portable Street
County OEM - 154.085 MHz

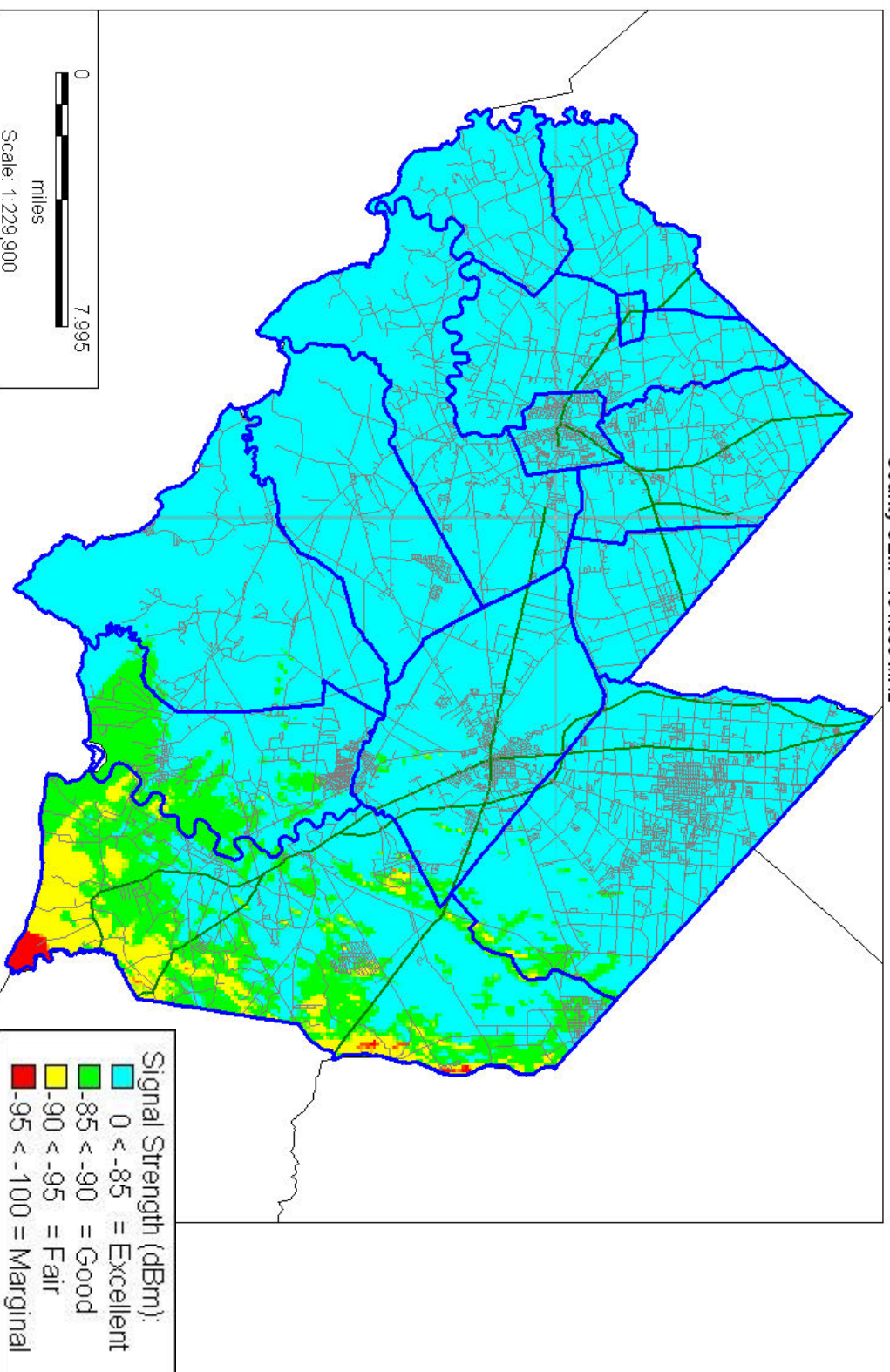


Figure 59 Talk-Out Portable Street Coverage - County OEM

Cumberland County RF Coverage - Talk-In Portable In-Building
County OEM - 154.085 MHz

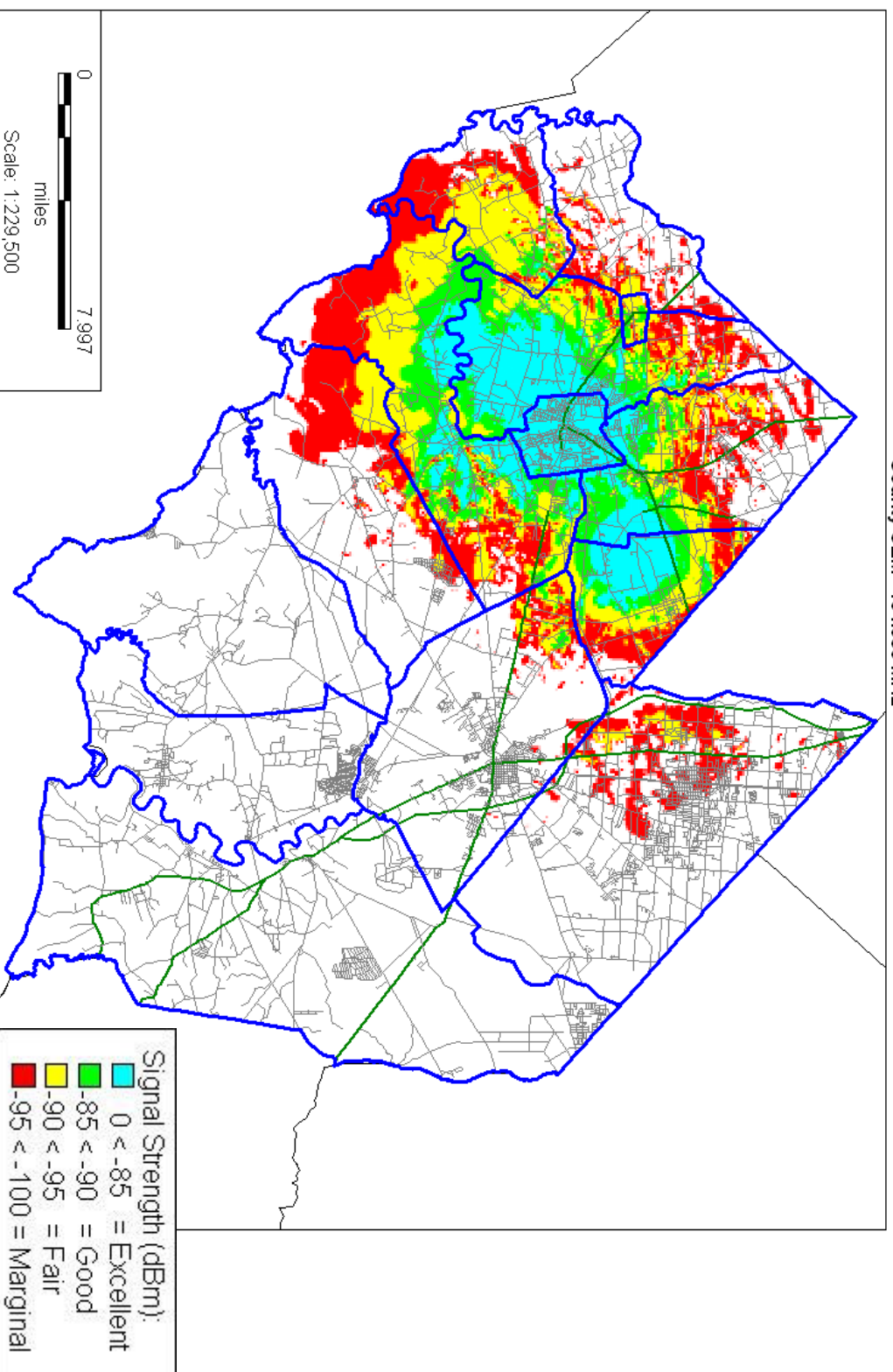


Figure 60 Talk-In Portable In-Building Coverage - County OEM

Cumberland County RF Coverage - Talk-In Portable Street
County OEM - 154.085 MHz

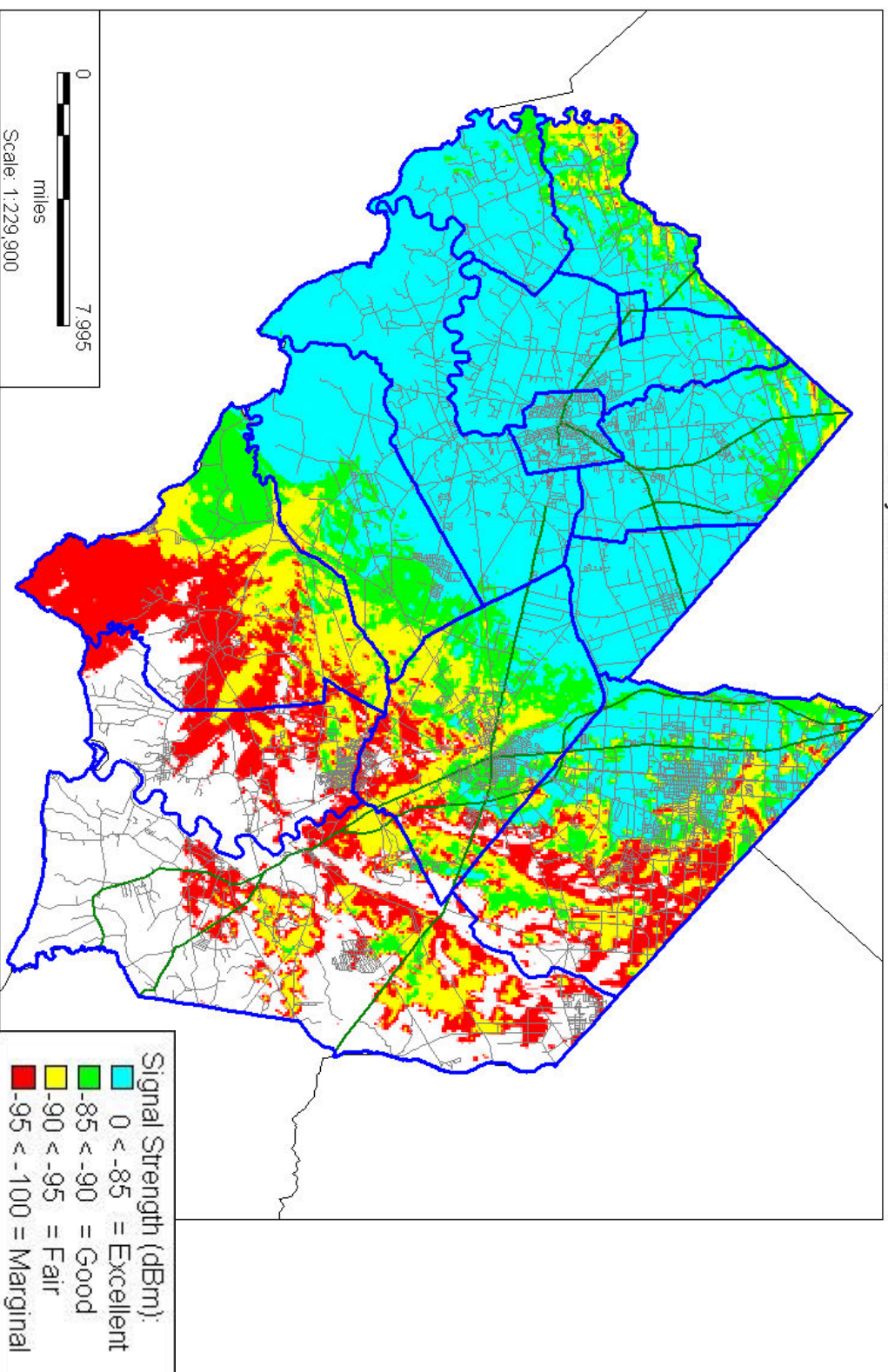


Figure 61 Talk-In Portable Street Coverage - County OEM

Cumberland County RF Coverage - Talk-Out Portable In-Building
Prosecutor - 155.520 MHz

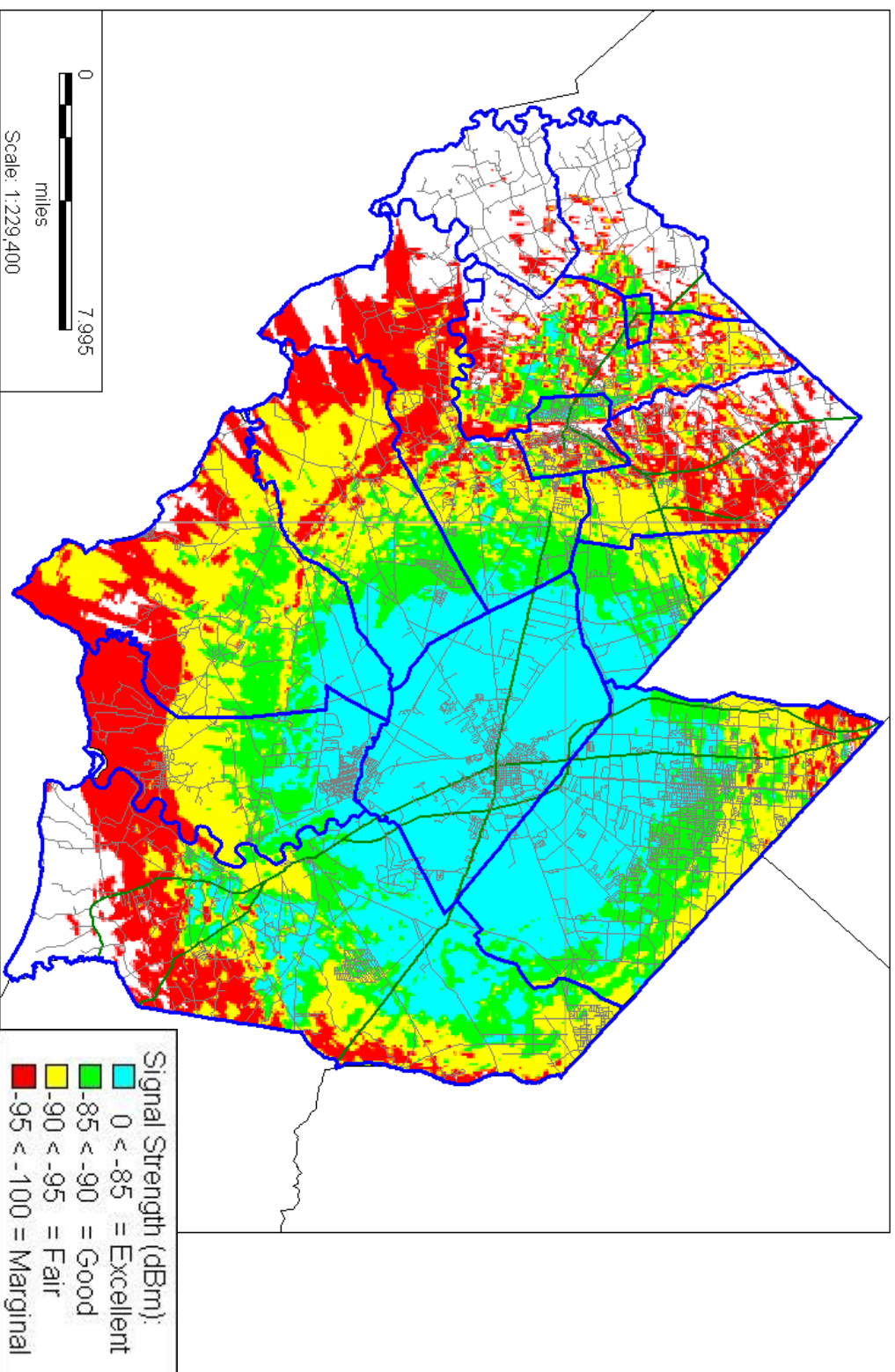


Figure 62 Talk-Out Portable In-Building Coverage – County Prosecutor

Cumberland County RF Coverage - Talk-Out Portable Street
Prosecutor - 155.520 MHz

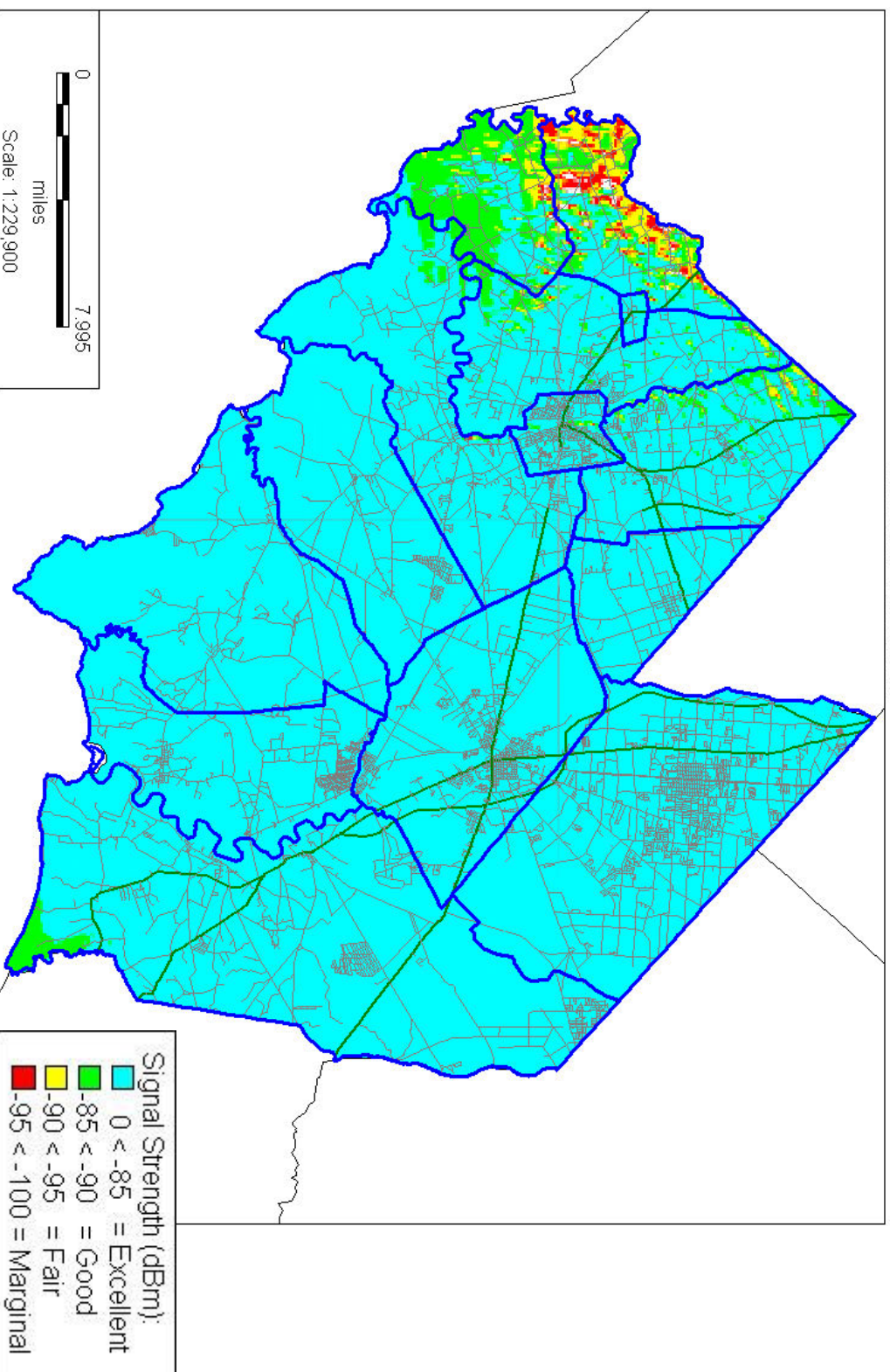


Figure 63 Talk-Out Portable Street Coverage - County Prosecutor

Cumberland County RF Coverage - Talk-In Portable In-Building
Prosecutor - 155.520 MHz

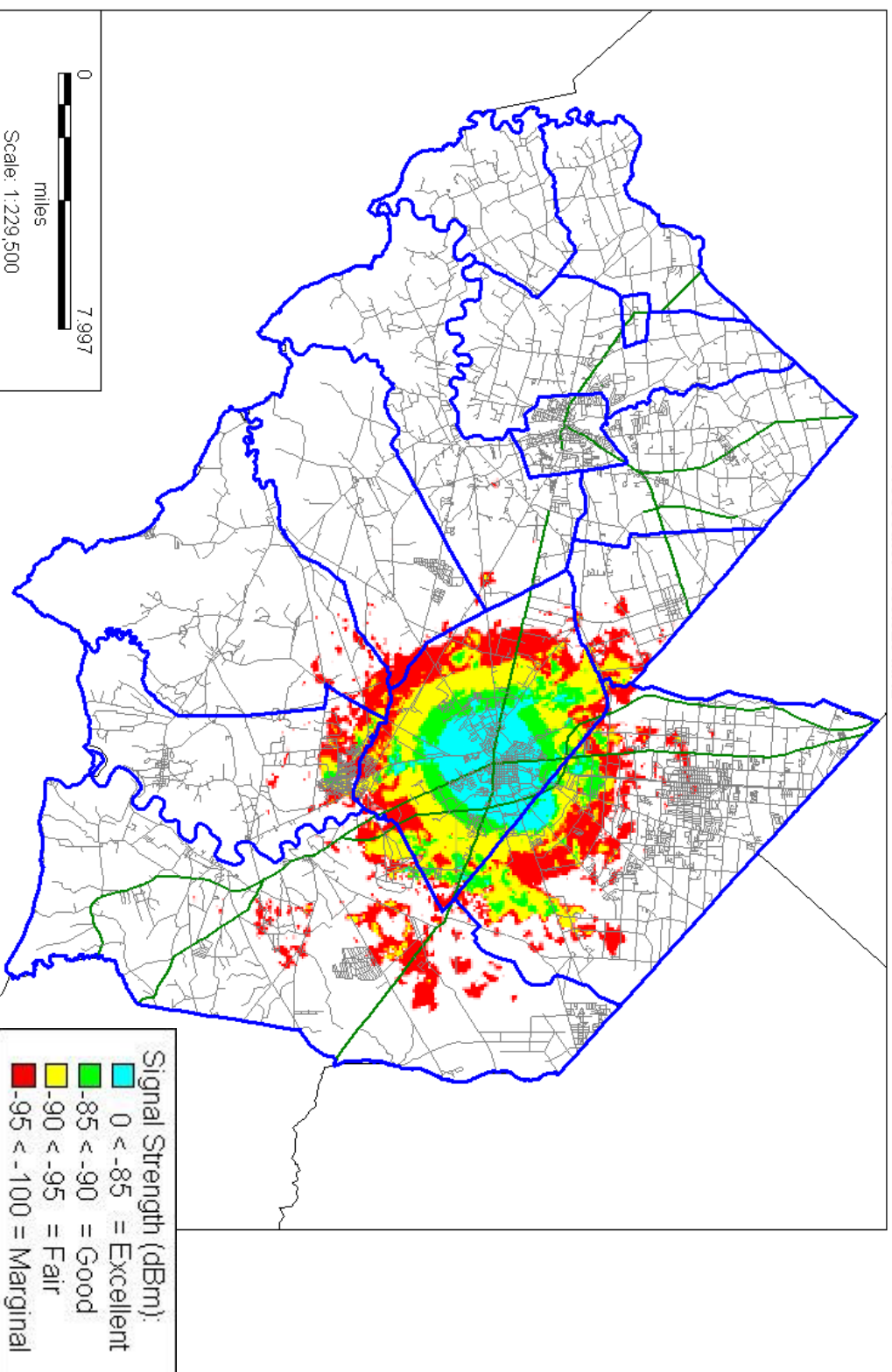


Figure 64 Talk-In Portable In-Building Coverage - County Prosecutor

Cumberland County RF Coverage - Talk-In Portable Street
Prosecutor - 155.520 MHz

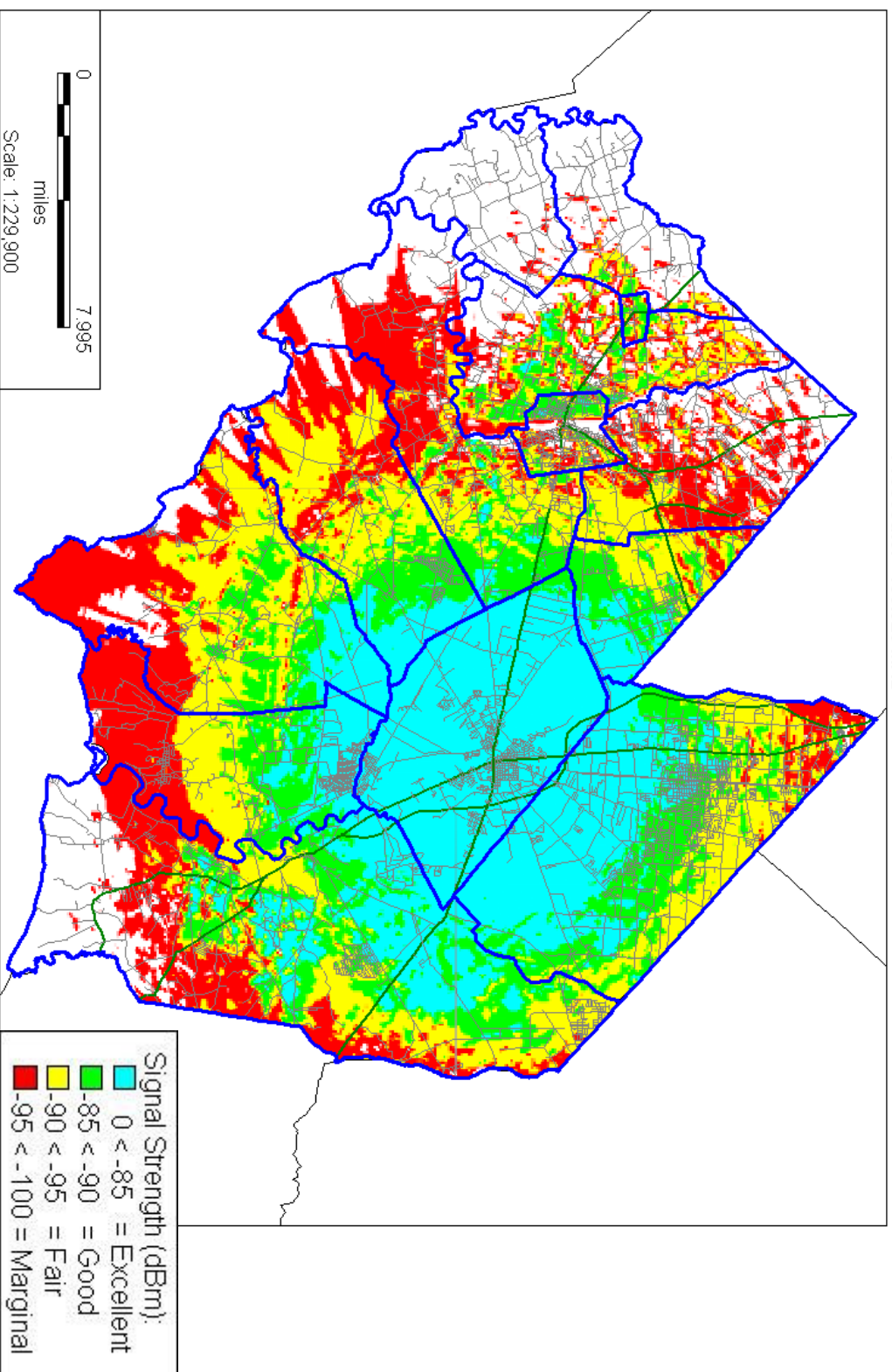


Figure 65 Talk-In Portable Street Coverage - County Prosecutor

Cumberland County RF Coverage - Talk-Out Portable In-Building
 Sheriff - 155.865 MHz

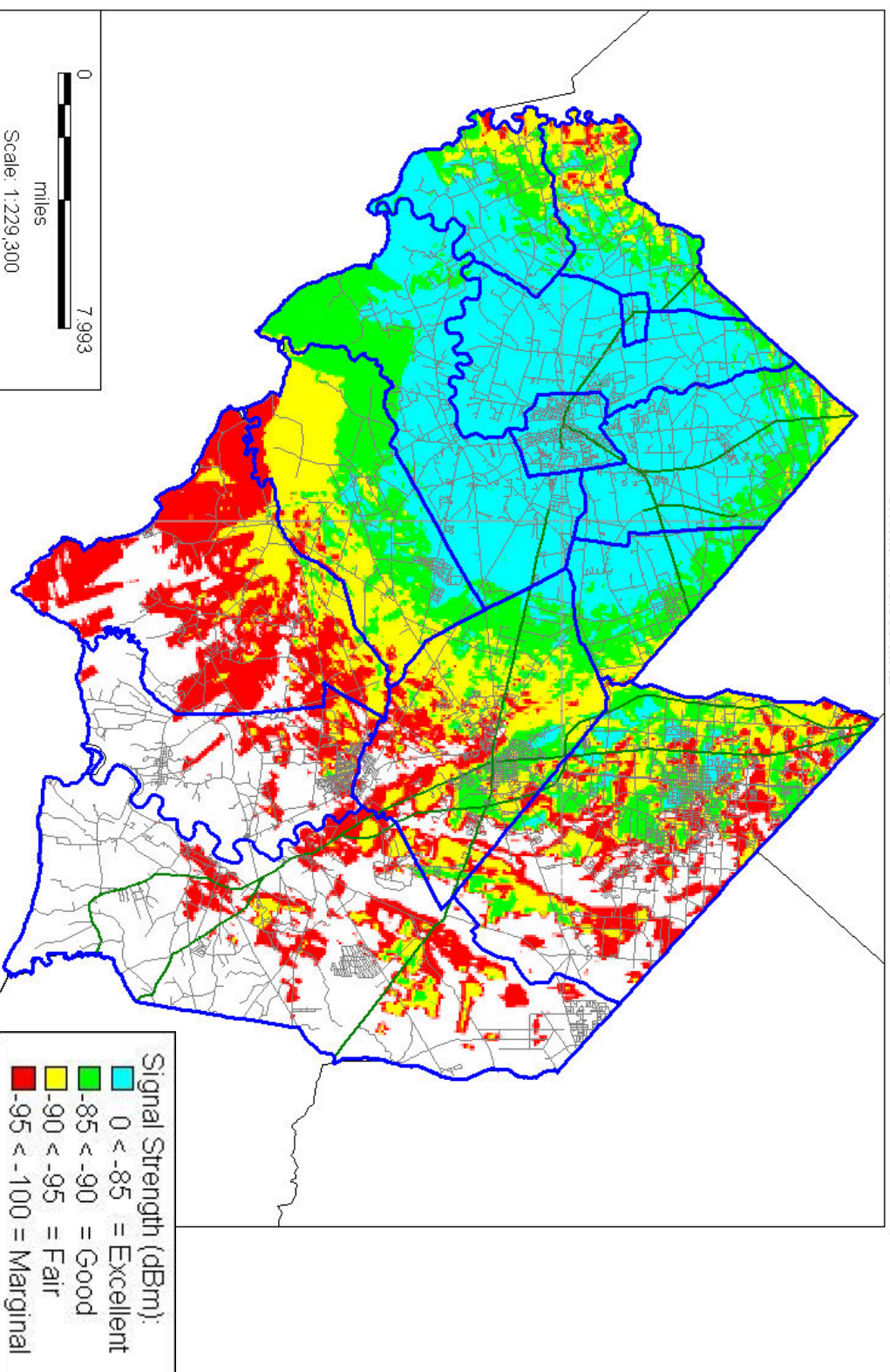


Figure 66 Talk-Out Portable In-Building Coverage – County Sheriff

Cumberland County RF Coverage - Talk-Out Portable Street
 Sheriff - 155.865 MHz

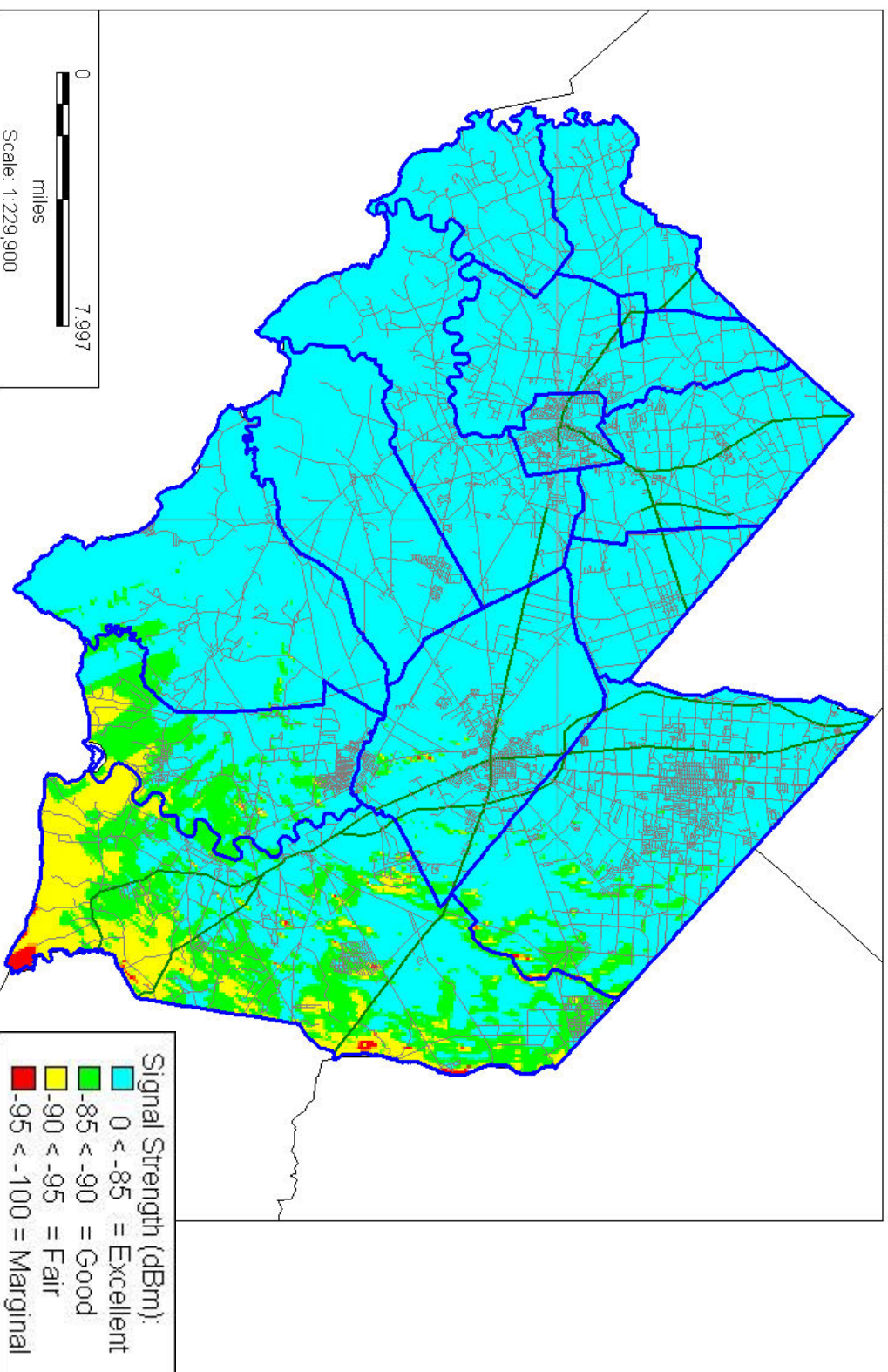


Figure 67 Talk-Out Portable Street Coverage - County Sheriff

Cumberland County RF Coverage - Talk-In Portable In-Building
 Sheriff - 155.865 MHz

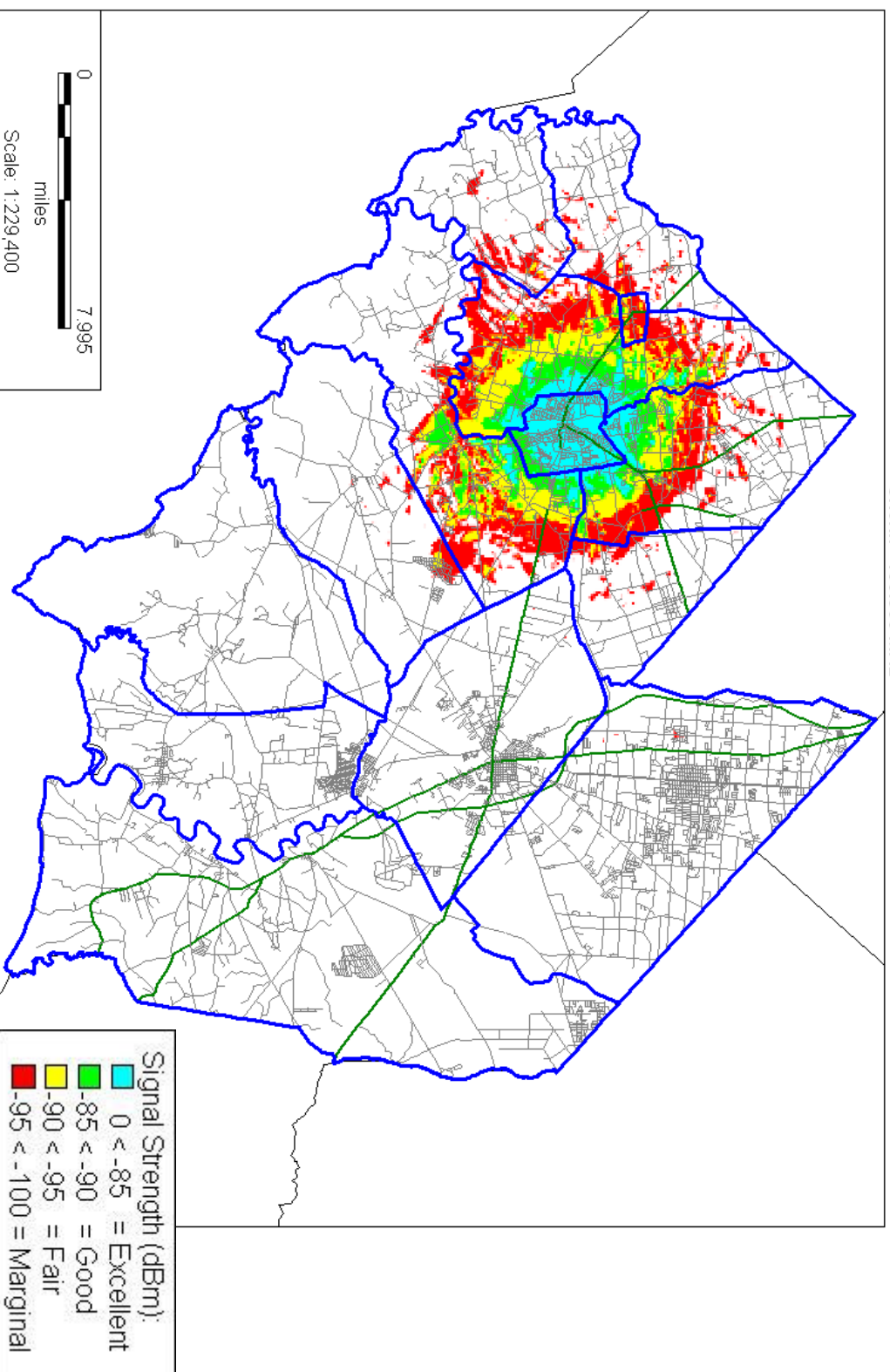


Figure 68 Talk-In Portable In-Building Coverage - County Sheriff

Cumberland County RF Coverage - Talk-In Portable Street
 Sheriff - 155.865 MHz

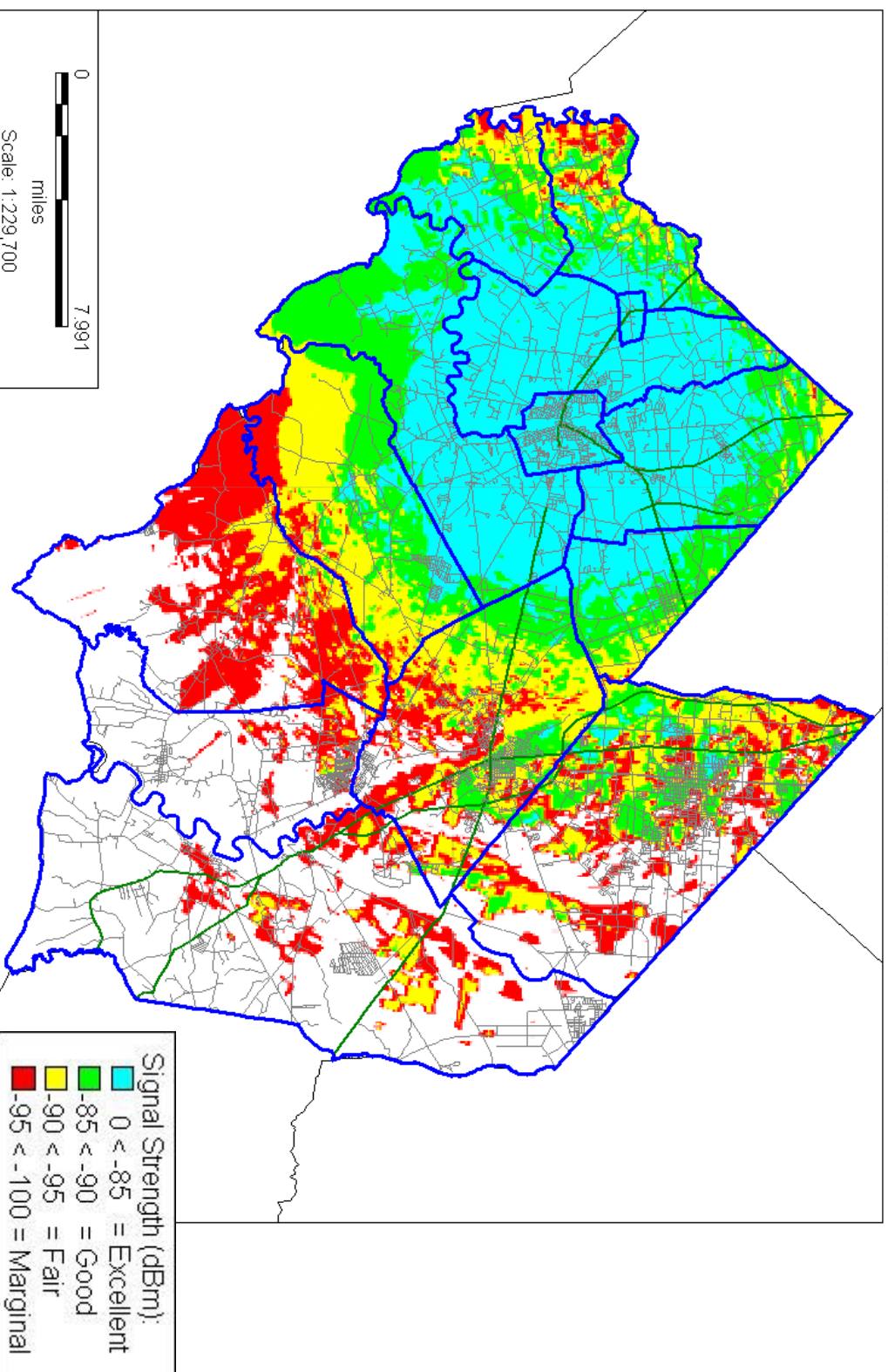


Figure 69 Talk-In Portable Street Coverage - County Sheriff