Southwestern Commission (Region A)
Wireless Propagation Study

January 30 2020

Prepared by

ECC Technologies, Inc.

All information included in this report and the accompanying GIS mapping is considered confidential by ECC Technologies, Inc. The information in this report was gathered for the exclusive use of the Southwestern Commission (SWC) or the purposes of planning. Any other use of this information is strictly prohibited. This information is considered confidential trade secret information and is not to be reproduced in any form without the expressed written consent of SWC and ECC Technologies, Inc.

13341 NEW FALLS OF NEUSE RD. SUITE 200 RALEIGH, NC 27614
PHONE: 984-204-7506 FAX: 585-381-5654 WEBSITE: WWW.ECCTEC.COM

Building smarter schools, richer corporations, and integrated communities.

Southwestern Commission (Region A)
Wireless Propagation Study

January 30 2020

Table of Contents

EXECUTIVE SUMMARY **11**

REGIONAL INVENTORY **19**

Mapping Revisions. 24

FCC Broadband Maps 26

FCC Connect America Fund Maps 27

North Carolina Great Grant Maps 28

REVIEW AND VALIDATION OF COUNTY PROVIDED VERTICAL ASSET DATA. **31**

County Owned and Referenced Assets. 32

Sample Propagation. 32

Cherokee County 34

Clay County 48

Graham County 54

Haywood County 59

Jackson County 63

Macon County 68

Swain County 72

Additional Vertical Assets. 75

TOOLS UTILIZED TO MAP VERTICAL ASSETS **77**

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

SITE VISITS. 81

Field Visit Sites and Criteria. 82

CONTACT THE ASSET OWNER 119

TOWER ORDINANCE REVIEW. 121

Regulatory Information from the 1996 Telecommunications Act. 122

INITIAL STRATEGIC PLANNING. 125

Funding 126

Grants 126

Loans 128

Partnerships 128

Disclaimer 129

Cherokee County Project 131

Clay County Project 132

Graham County Project 133

Haywood County Project 134

Jackson County Project 135

Macon County Project 136

Swain County Project 137

Overall Strategic Plan 138

REGIONAL SERVICE PROVIDERS 141

Discussions with Providers 141

Service Provider and State BIO Meetings Summaries 141

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

SkyFi 142
SkyWave 142
SkyRunner Internet 143
Sky-Tek 143
BalsamWest 144
State & Federal Resources 145
NC State Broadband Infrastructure Office (BIO) Group 145
State and Federal Grants 145
Selected Direct Measurements 146
Neighborhood 1 Results 148
Neighborhood 2 Results 149
Neighborhood 3 Results 150
FCC Registration Review 151
WIRELESS TECHNOLOGY OPTIONS FOR RETAIL BROADBAND SERVICE 153
Backbone and Local Network. 153
Last Mile 154
Short Haul. 156
Middle Mile 156
Internet. 157
Design and Deployment. 157
Management and Maintenance 158
IDENTIFY AND MAP KNOWN FIBER ASSETS 161
Benefits of Fiber 162

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

High Capacity/Future Proof 162
Long Term Life Cycle 162
Highly Reliable 162
Flexible Platform 162
Possible Dark Fiber Routes 163
PROVIDE INFORMATION TO REGIONAL PROVIDERS. 165
APPENDIX 167
APPENDIX A COUNTY TOWER ORDINANCES 169
Haywood County Ordinance 171
Jackson County Tower Ordinance 199
Macon County Tower Ordinance 231
Swain County Tower Ordinance [Moratorium] 245
APPENDIX B GRAHAM COUNTY POTENTIAL LOCATIONS FOR TOWER PLACEMENT 249
APPENDIX C FCC 1996 TELECOM ACT INFORMATION ON WIRELESS TOWER SITING 251
APPENDIX D TYPE OF VERTICAL ASSETS 263
Lattice Towers 263
Guyed Tower 263
Monopole Towers 264
Camouflage Towers 264
Rooftops 264
Water Towers 265
Water Tanks 266

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Other Alternative Vertical Assets Which Can Be Used 266

APPENDIX E FREQUENCIES IN USE BY COUNTY 267

Radio Service Codes – Interpretive Keys 267

Cherokee County Frequencies 270

Clay County Frequencies 275

Haywood County Frequencies 279

Jackson County Frequencies 284

Macon County Frequencies 291

Swain County Frequencies 295

APPENDIX F PROVIDER MEETING NOTES 299

Skyrunner 299

SkyFi 302

SkyWave 304

APPENDIX G REGIONAL VERTICAL ASSET DATABASE 307

APPENDIX H MANUFACTURERS COVERAGE MAP 313

Cambium 313

About Cambium Networks 313

Cambium 365 and 5 Coverage Map 316

Radwin 317

Radwin Executive Summary 317

Radwin Coverage Maps 320

Telrad 336

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Telrad Summary Information 336

Telrad Coverage Maps – Under Development Jan 17 2020 340

Telrad Parameters 342

5GHz legend 342

Planning Assumptions 342

APPENDIX I - UNDER 10/1 TOWERS BY COUNTY 345

INDEX 353

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Table of Figures

Figure 1 BAAT Campaign 2017 19
Figure 2 Phase 1 BAAT Residential Speed Results 20
Figure 3 Phase 1 BAAT – Residential Speed Results (Full Page) 21
Figure 4 Phase 1 BAAT Commercial Speed Results 22
Figure 5 Phase 1 BAAT Commercial Speed Results (Full Page) 23
Figure 6 Revised Map Thumbnail 24
Figure 7 Revised Large Map 25
Figure 8 FCC Reported Residential Download Throughput 26
Figure 9 FCC Reported Commercial Download Throughput 26
Figure 10 Connect American Fund (CAF) Areas 27
Figure 11 Connect American Fund Awards 27
Figure 12 NC Great Grant Awarded Areas 2019 28
Figure 13 NC Great Grant Award 2019 SkyWave 28
Figure 14 NC Great Grant Award 2019 Sky-Fi 29
Figure 15 Google Mapping 77
Figure 16 Thumbnail of Vertical Assets in Southwestern Commission Region 78
Figure 17 Map of Vertical Assets in Southwestern Region (Full Size) 79
Figure 18 Cherokee County Project - Selected Towers and coverage 131
Figure 19 Clay County Project - Selected Towers and Coverage 132
Figure 20 Graham County Project - Selected Towers and Coverage 133
Figure 21 Haywood County Project - Selected towers and Coverage 134
Figure 22 Jackson County Project - Selected Towers and Coverage 135
Figure 23 Macon County Project - Selected Towers and Coverage 136
Figure 24 Swain County Project - Selected Towers and Coverage 137
Figure 25 Swain County Project - Selected Towers and Coverage 137
Figure 26 Southwestern Commission Region - project master 138
Figure 27 Southwestern Commission - Project Master (Full Page) 140

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Figure 28 Neighborhood One - Aerial 148
Figure 29 Neighborhood One - Readings 148
Figure 30 Neighborhood Two - Aerial 149
Figure 31 Neighborhood two - Readings 149
Figure 32 Neighborhood three - aerial 150
Figure 33 neighborhood three - readings 150
Figure 34 Known Fiber Routes in Southwestern Commission Region 161
Figure 35 Known Fiber Routes in SW Commission Region (Full Page) 164
Figure 36 Example of Lattice Tower 263
Figure 37 Example of Guyed Tower 263
Figure 38 Example of Monopole Tower 264
Figure 39 Example of Camouflage tower 264
Figure 40 Example of rooftop Mounting 265
Figure 41 Example of Water Tower 265
Figure 42 Example of Water Tank 266
Figure 43 Cambium Coverage Map 316
Figure 44 Radwin Overall 320
Figure 45 Tower 1000280 321
Figure 46 Tower A1286915 322
Figure 47 A1239307 323
Figure 48 Tower 1058525 324
Figure 49 Tower 800917 325
Figure 50 Tower nc03609 326
Figure 51 Tower GR3 327
Figure 52 Tower A1308158 328
Figure 53 Tower CLT6 329
Figure 54 Tower CLT5 330
Figure 55 Tower CHWT1 331

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Figure 56 Tower NC5015 332
Figure 57 Tower OSWCHT9 333
Figure 58 Example of Radwin Base Station Parameters 334
Figure 59 Example of Residence Link Parameters 335
Figure 60 Telrad SINR Coverage Map 340
Figure 61 Telrad RSSI Coverage Map 341

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

[This Page Intentionally Left Blank]

Executive Summary

The Southwestern Regional Commission engaged ECC Technologies to perform a survey of vertical assets in seven western North Carolina counties as part of its initiative to bring broadband services to the region. This report summarizes the work involved in the survey. This project is also referred to as Phase 2.

This report is written for a broad audience including county officials, other governmental organizations, local businesses, community advocacy groups, service providers, equipment suppliers and others. However, ECC's commitment is to its client: The Southwestern Commission.

As an advocate for, and with a bias in favor of The Southwestern Commission, ECC has completed work that will benefit the objectives of advancing broadband in western North Carolina. This report is designed to be a key component of that advocacy work, and as such is not submitted as a technical treatise, or as advocating one solution, approach, manufacturer, location or relationship over another.

ECC began the work by reviewing data provided from a Phase 1 project. In the Phase 1 project, ECC Technologies worked with the Southwestern Commission to develop a Broadband Assessment project. In this project, ECC worked to identify citizens in the target area, and further, to determine if those households had broadband access.

This information was mapped and presented to the community in November of 2017. ECC utilized this data as a key basis for completing the current project. The initial section of this report reviews

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

that data. Following the review, ECC has added information which displays map data from the FCC, the USDA, and the state of North Carolina.

These maps show areas in the region which are (a) impacted by certain Federal and state grant programs, and (b) where grants have been awarded (current as of the date of the report). These maps and data help establish the baseline environment in which the remainder of the work was completed.

Review of county provided vertical asset data

Each of the seven counties was contacted by ECC. Requests were made to each county to forward information regarding county owned vertical assets. Based on information received from the counties, ECC compiled a list of the vertical assets. The report provides detailed information on each of these assets. Additionally, ECC utilized a standard radio frequency (RF) toolset to develop sample propagations for these vertical assets.

This work provides an estimate for "first glance" analysis by the Southwestern Commission, the counties, service providers and others, to assess the county owned assets.

In some cases, a county submitted a vertical asset which they did not own. In other cases, a county advised ECC they owned no vertical assets. In all cases, this is documented in the report.

Tools Utilized to Map Vertical Assets

The Southwestern Commission and ECC agreed that the application Google Earth would be used for mapping.

Site Visits

As part of the study, ECC selected as many county-owned vertical assets as possible in order to perform site surveys. Where the vertical assets were unavailable or physically unreachable, ECC substituted an alternate vertical asset site which could prospectively provide fixed wireless broadband coverage.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

In some cases, site visits seemed to indicate ownership of a particular site differed from information provided to ECC by the County.

Each site visit was documented with the completion of a Wireless Tower Infrastructure Form. Copies of the form, and selected photographs from each site visit are included in the report. ECC also provided additional information about the applicability of vertical assets to the delivery of broadband services.

Asset Owner Contact

As noted, there is a database of vertical assets included in the Appendix of the Report. Within the database are listed asset owners and the physical street address of the asset as well as additional detail.

Tower Ordinance Review

ECC was asked to review tower ordinances in the seven counties. Ordinances from three counties are included in the Appendix of the report. One county passed a tower moratorium a number of years ago – a reprint of that moratorium is also included in the Appendix.

Initial Strategic Planning

The Southwestern Commission requested approaches for initial planning for offering fixed wireless services within the seven-county region in those areas defined as unserved and underserved. ECC's analysis took two routes.

The first review, on a county by county basis, was to assess the viability of county owned (or county provided) vertical assets. This process allowed ECC to determine if such assets were viable for providing broadband services. For each county, ECC summarized the provided assets, and created coverage maps to indicate potential propagation from those assets.

The second review focused on the region. This review considered areas that were eligible for Federal or state grants with assets which could be used to provide service, and with adequate responses from the Phase 1 work to indicate the probability of creating a feasible business plan.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Regional Providers

ECC interviewed regional providers who currently provide fixed wireless broadband services in areas within the region, or adjacent to the region. If ECC was unable to set an appointment, secondary research sources were used to garner information about the provider to include in the report. A summary of these interviews/research is included in the body of the Report, and notes from the conversations are incorporated into an Appendix.

Wireless Technology Options

This section provided an overview of one methodology currently in use to provided fixed wireless broadband service. While there are multiple topologies available to engineer networks, it is often easier to visualize a network with an example for comparison. In this section, certain terms related to the technology were introduced which makes conceptualization easier.

Fiber Assets

Within this section, ECC utilized certain secondary research sources, and its personal knowledge of fiber assets to provide an overview of potential fiber in the seven states. This section also includes data points related to fiber usage as a key component either in backhaul or as a part of a hybrid fiber/fixed wireless network environment.

Share Information

During the project, ECC met with service providers, community groups and county officials. During these meetings, ECC took to emphasize the collaborative nature of this project in working hand in hand with the Southwestern Commission. Information exchanges were important in these meetings with respect to concerns, issues, ideas, as well as reinforcing the value of communication between interested parties and the Southwestern Commission.

Next steps include formal reviews of the draft of this report with the Southwestern Commission and the production of a final revision. ECC plans to present this revision as a meeting of the Southwestern Commission board in February 2020, and jointly present to a broader community meeting which is planned for the spring of 2020.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Appendix

There are a number of appendices in the report. Some of the data within these sections are narrative such as ordinance information from counties, and alternative solution proposals from manufacturers. Other data is tabular.

These sections are:

- Appendix A County Tower Ordinances
- Appendix B Graham County Added Information
- Appendix C FCC 1996 Telecom Act Information
- Appendix D Type of Vertical Assets
- Appendix E Frequencies in Use by County
- Appendix F Provider Meeting Notes
- Appendix G Regional Vertical Asset Database
- Appendix H Information
- Appendix I Manufacturers Summary Information

Summary

The Southwestern Commission has taken an appropriately assertive stance in pulling assets and resources together to focus on broadband availability in western North Carolina. This report provides further leverage for the Southwestern Commission to work with county governments, cooperatives, service providers, state government and others, to solve the issues surrounding the lack of broadband.

There are opportunities to combine grant funds with available infrastructure. Successful projects require understanding, and at times some “give” from the parties involved. An analysis of the need

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

vs potential assets indicates that there are solutions available today using current technologies and appropriate service delivery processes.

It has been a privilege to have a part in this study, and ECC anticipates having the opportunity to present the results and provide additional information to help forward the process of bringing broadband access into western North Carolina.

Respectfully Submitted

ECC Southwestern Commission Team

Jeffrey Brooks

Cory Brown

Kurt Frenzel

Jeff Holtmann

Jon Van Tol

ECC Technologies

Raleigh, NC 27614

February 4 2020

[This Page Intentionally Left Blank]

[This Page Intentionally Left Blank]

Regional inventory.

In 2017-18 ECC Technologies, Inc. (ECC) conducted an online survey campaign called a BAAT (Broadband Aggregation & Adoption Tool). This campaign was targeted at residents and commercial entities within the seven-county region.

This assessment was conducted to verify availability of current broadband services in these counties, to identify actual speeds available through the speed test, and collect information on demand for services from residents and businesses across these counties. Below is a map of the 7 "zones" or counties that were part of the campaign.

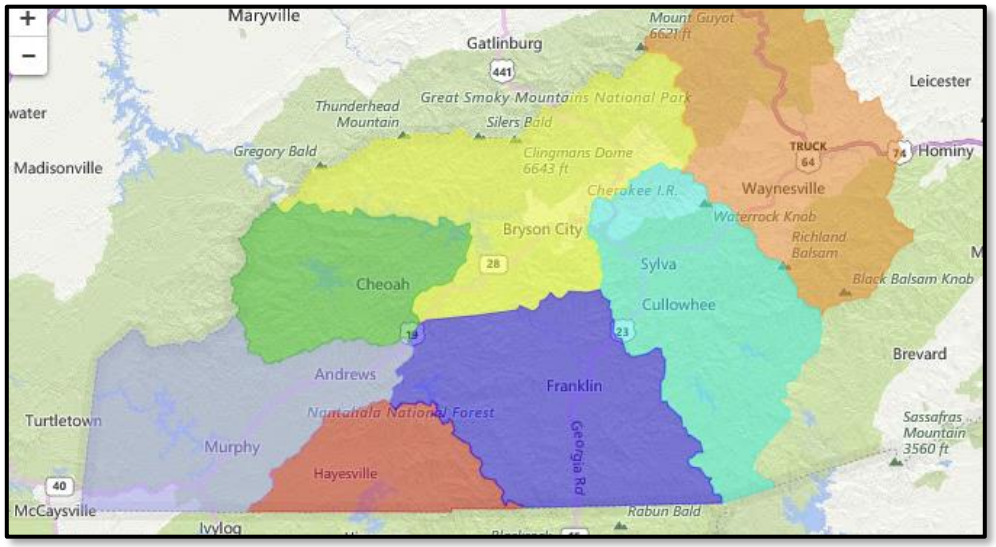


FIGURE 1 BAAT CAMPAIGN 2017

Almost 5,000 responses were received during the survey period. In total, 4,689 residential responses and 154 commercial responses are included in the county survey response data. Response totals for the seven counties were as follows:

County	Residential	Commercial
Cherokee County	1,217	18
Clay County	328	11
Graham County	384	15
Haywood County	268	26
Jackson County	963	65
Macon County	1,340	39
Swain County	189	10

The following maps show the locations of responses and the associated speed test results.

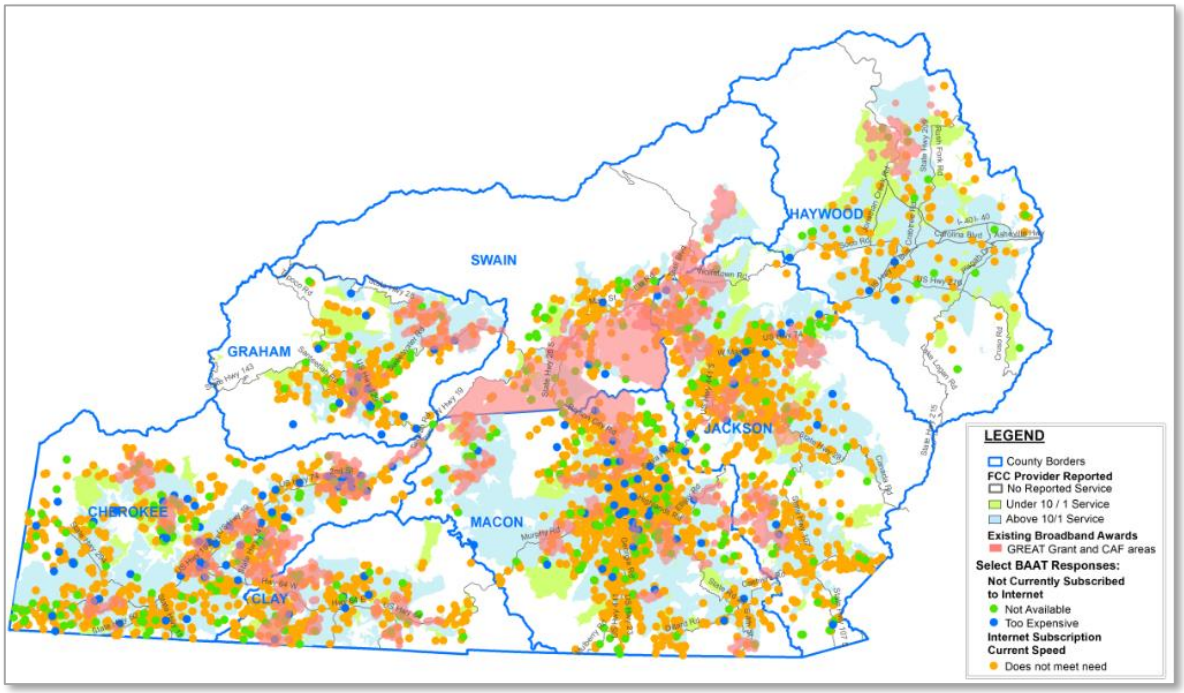


FIGURE 2 PHASE 1 BAAT RESIDENTIAL SPEED RESULTS

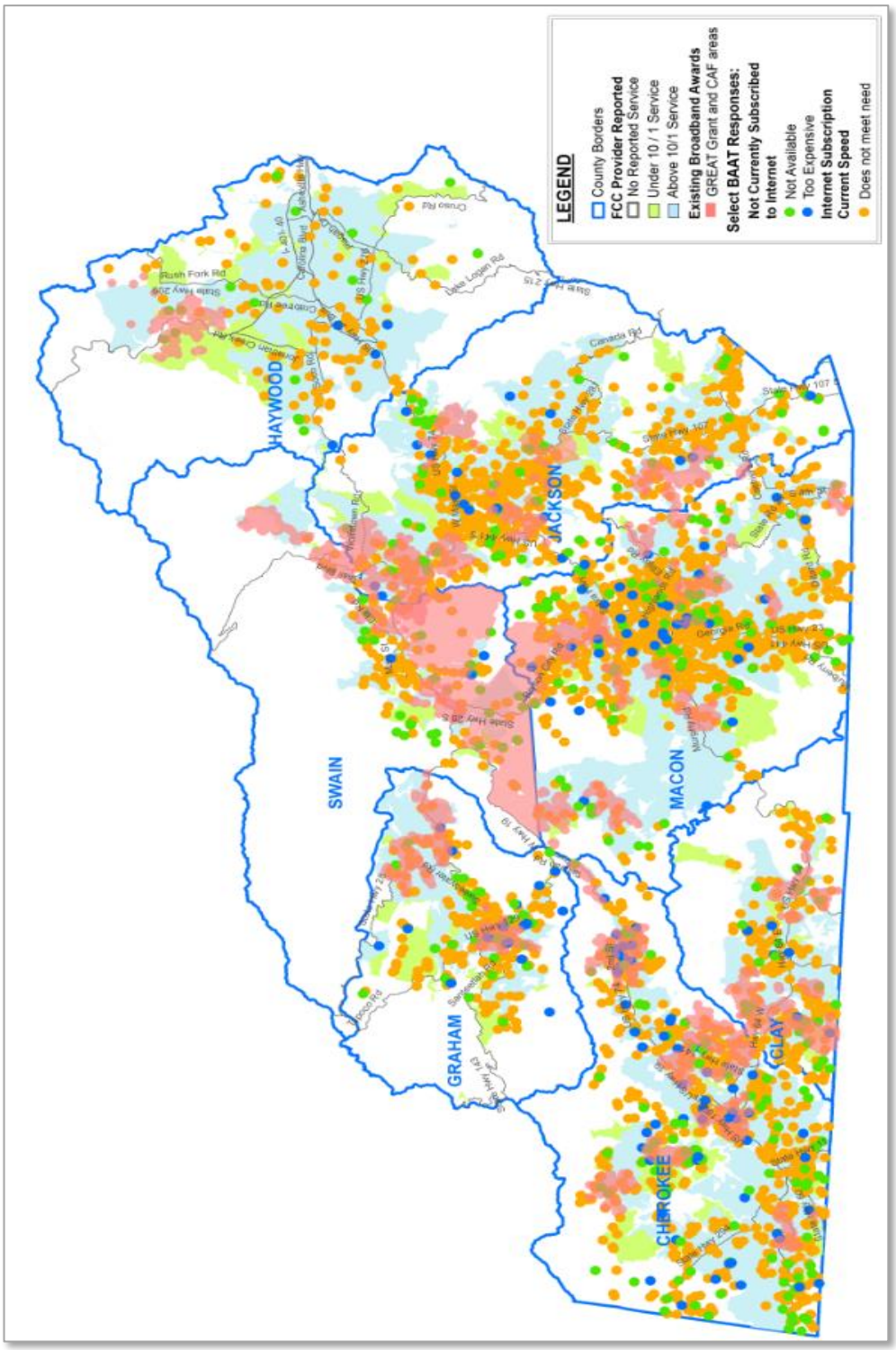


FIGURE 3 PHASE 1 BAAT – RESIDENTIAL SPEED RESULTS (FULL PAGE)

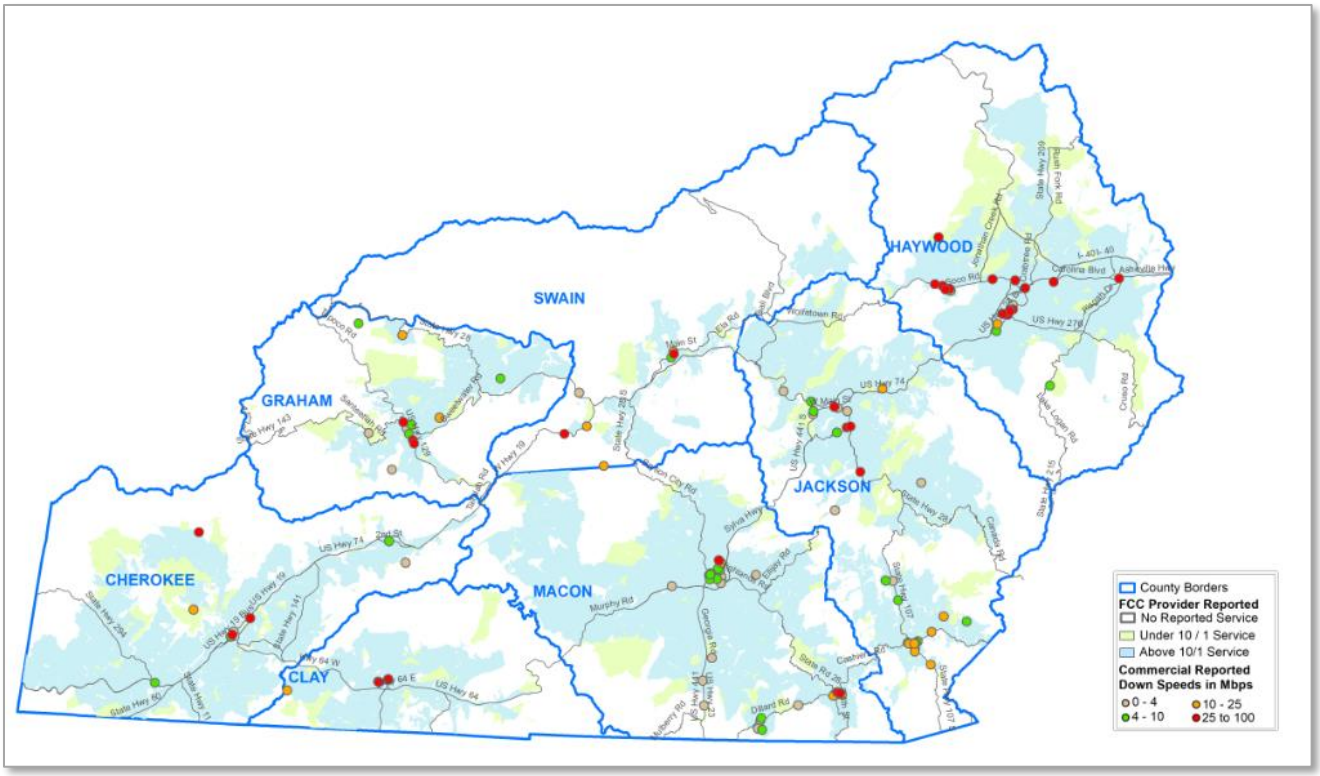


FIGURE 4 PHASE 1 BAAT COMMERCIAL SPEED RESULTS

[The remainder of this page intentionally blank.]

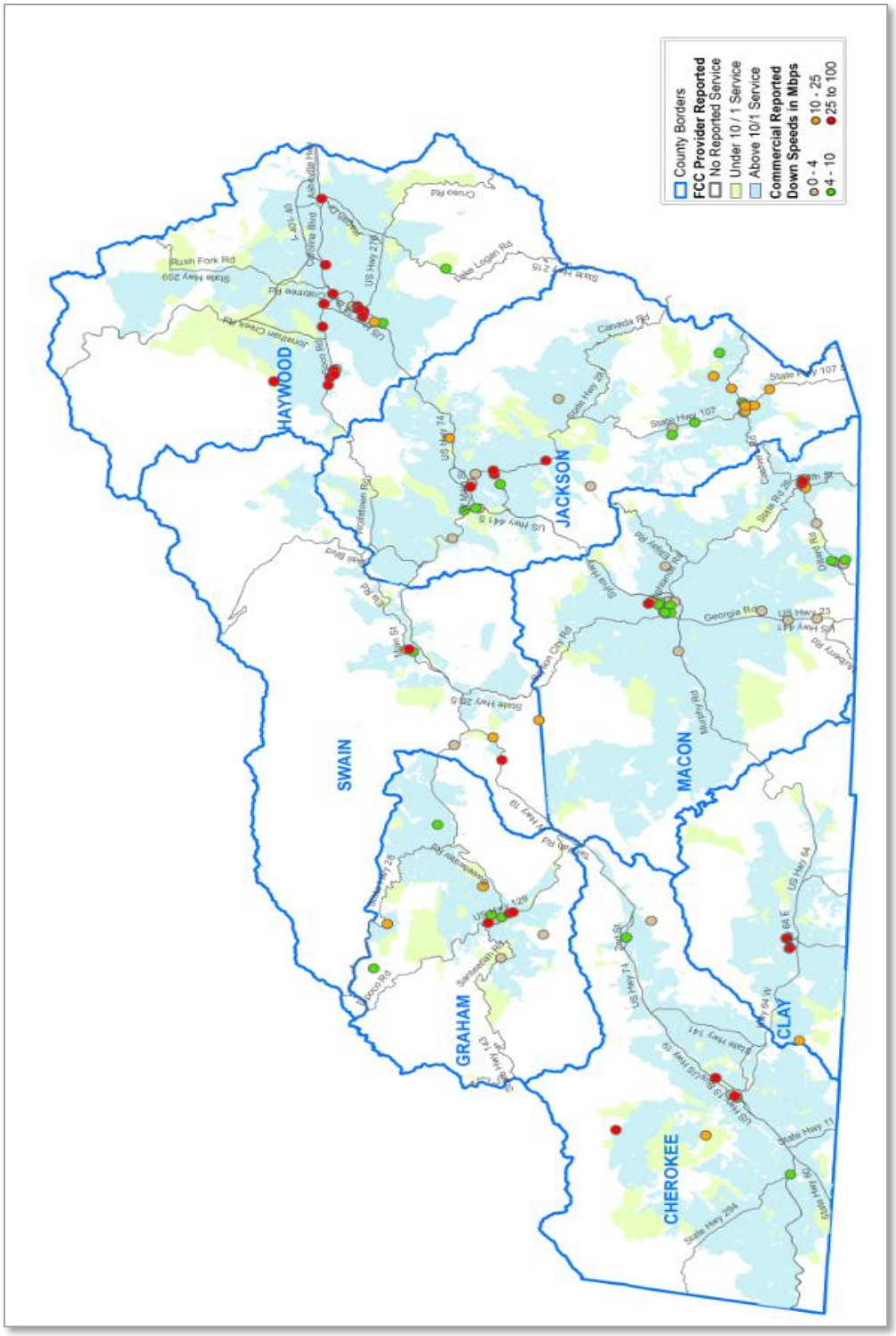
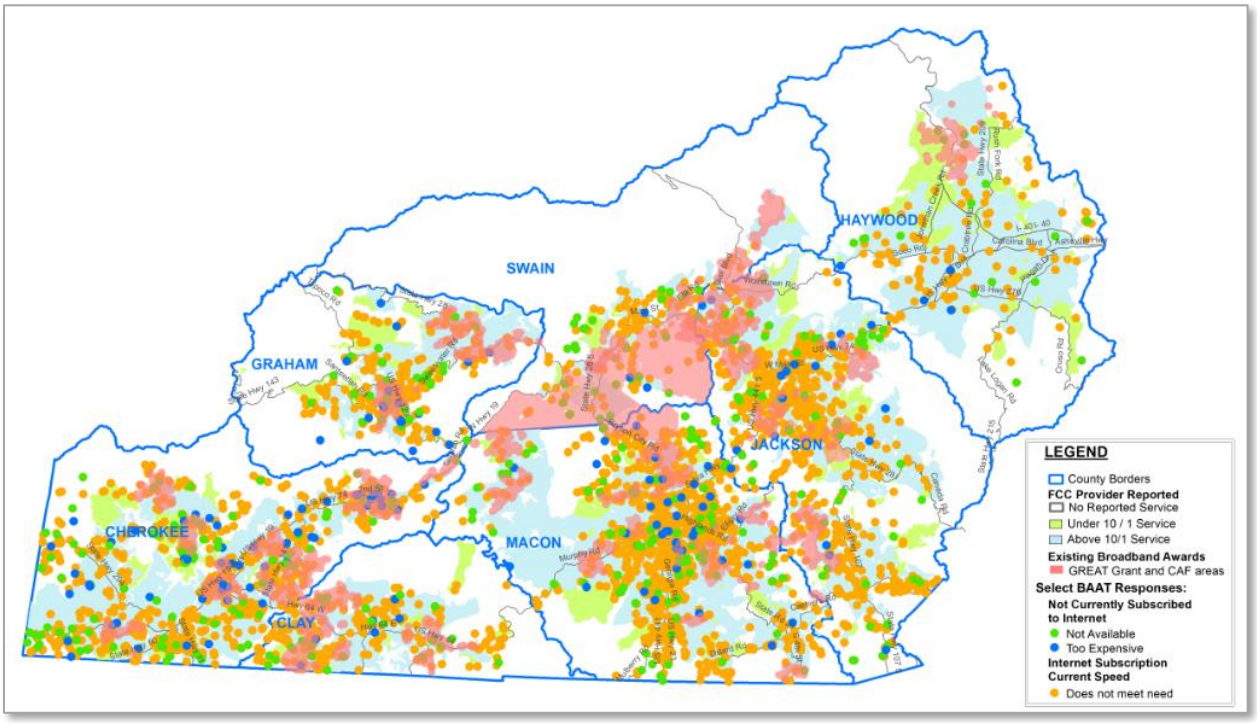


FIGURE 5 PHASE 1 BAAT COMMERCIAL SPEED RESULTS (FULL PAGE)

Mapping Revisions.

The following maps combine the BAAT responses with overlays related to CAF, Great Grant awards and current FCC Form 477 [Broadband] status. This information is vital because it not only shows the BAAT responses, but also provides graphic representation of areas which should have improved broadband access due to awards from both the Federal and state government.



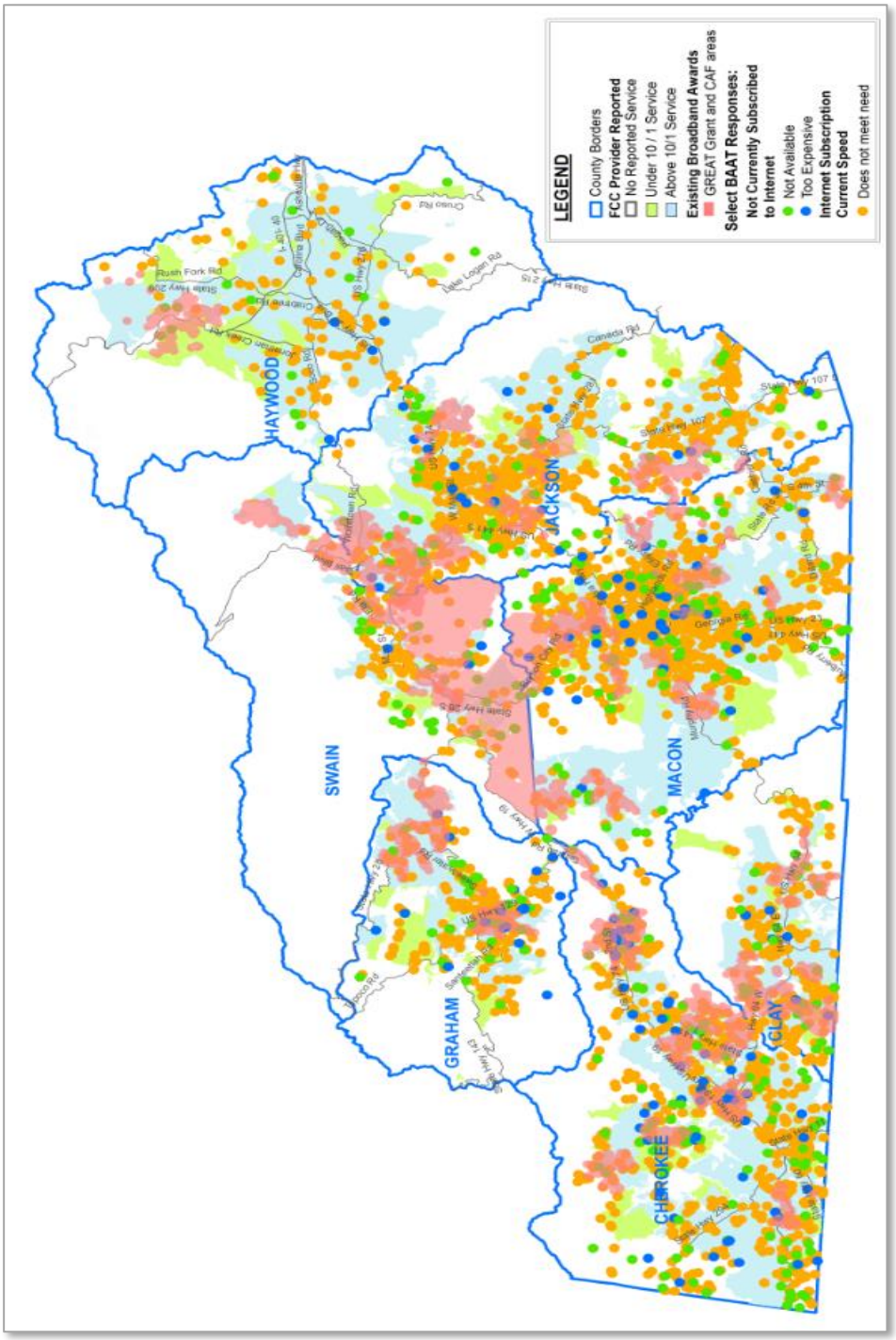


FIGURE 7 REVISED LARGE MAP

FCC Broadband Maps

The next two maps provide additional detail on current download speeds are reported by the FCC. Map data on these maps [generally termed as Form 477 data] is generally 12 to 18 months old

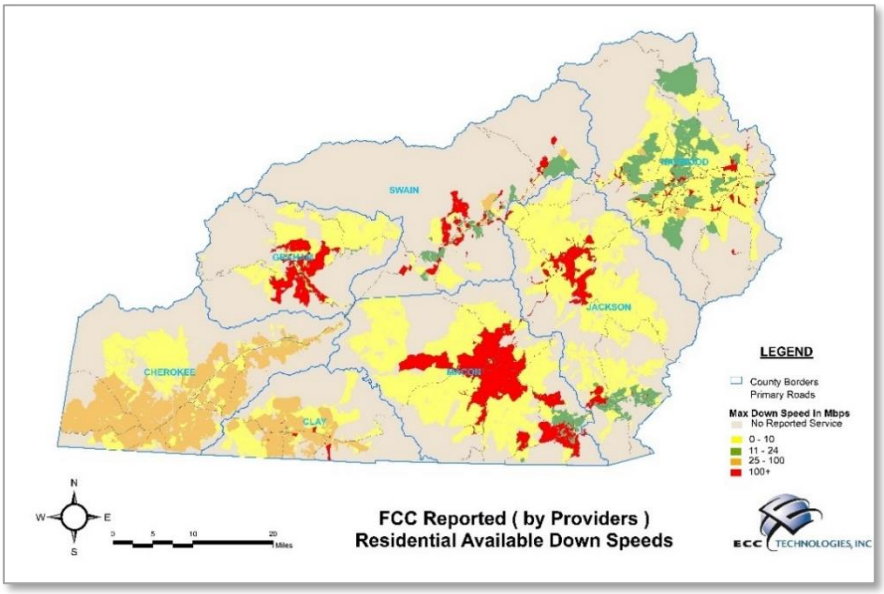


FIGURE 8 FCC REPORTED RESIDENTIAL DOWNLOAD THROUGHPUT

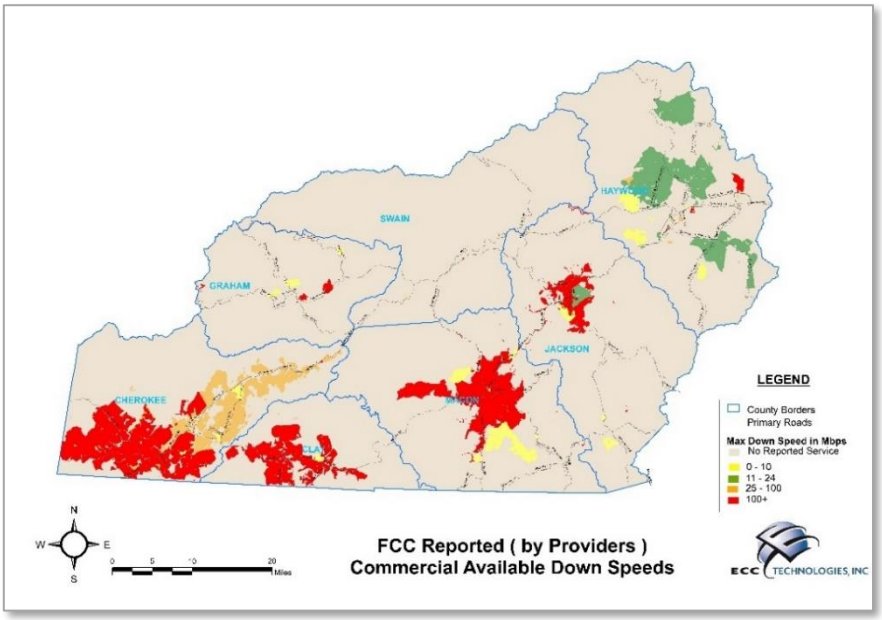


FIGURE 9 FCC REPORTED COMMERCIAL DOWNLOAD THROUGHPUT

FCC Connect America Fund Maps

This section shows current Internet browser screen shots representing Connect American Fund (CAF) defined areas and awards. This data can be viewed at [https://data.usac.org/publicreports/caf-map/.](https://data.usac.org/publicreports/caf-map/)

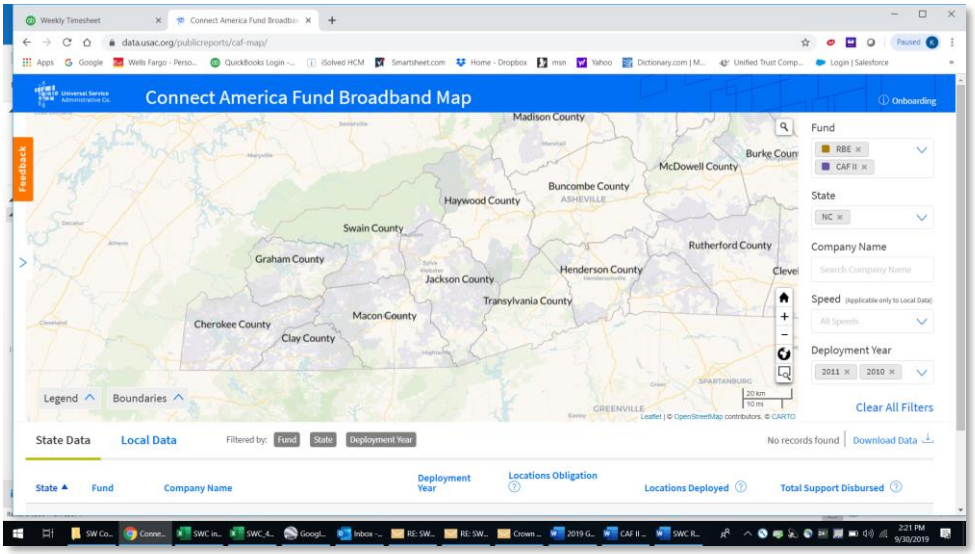


FIGURE 10 CONNECT AMERICAN FUND (CAF) AREAS

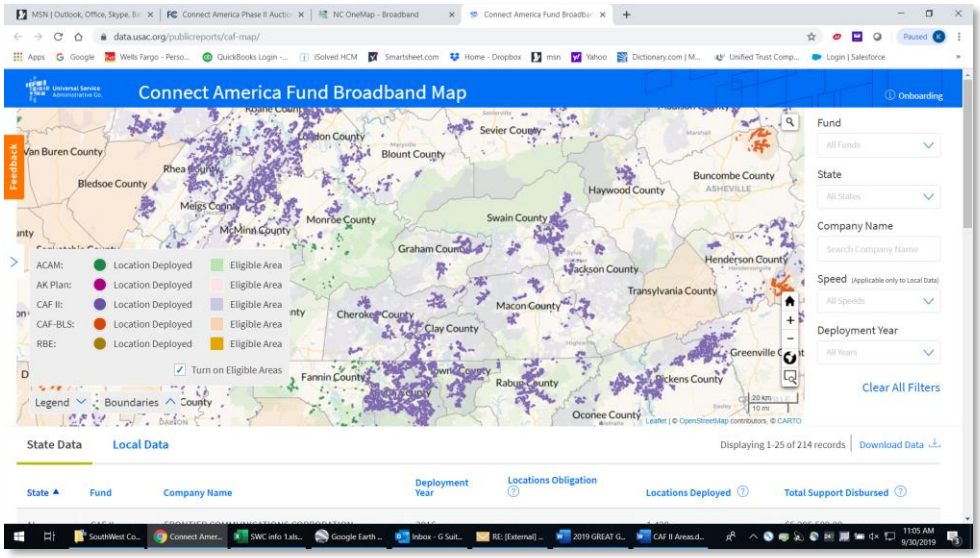


FIGURE 11 CONNECT AMERICAN FUND AWARDS

North Carolina Great Grant Maps

The following sections provides maps from the North Carolina Broadband Infrastructure Office and provides information about areas which reviewed awards under the NC Great Grant program in 2019.

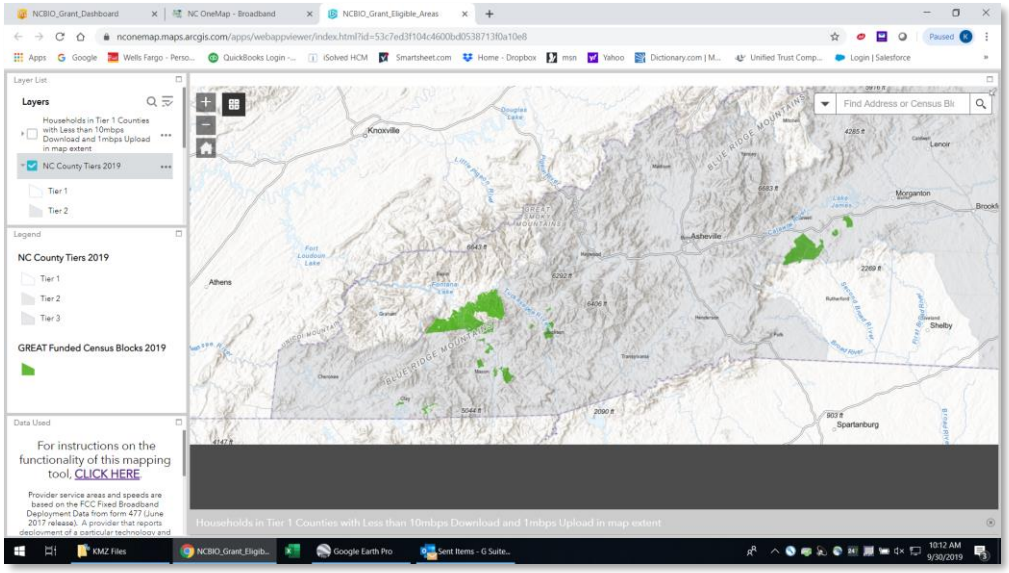


FIGURE 12 NC GREAT GRANT AWARDED AREAS 2019

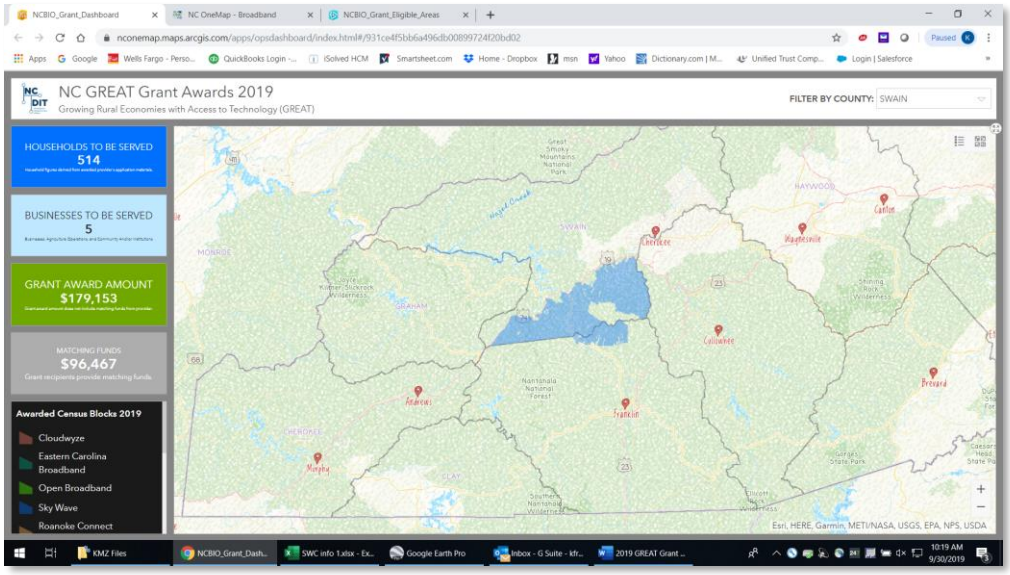


FIGURE 13 NC GREAT GRANT AWARD 2019 SKYWAVE

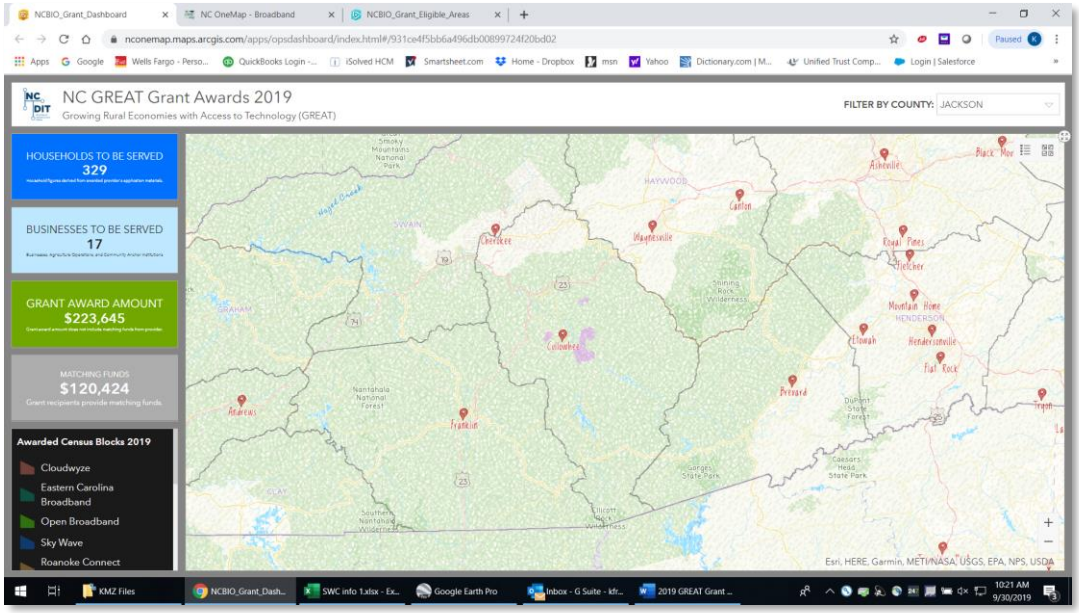


FIGURE 14 NC GREAT GRANT AWARD 2019 SKY-FI

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Review and Validation of County Provided Vertical Asset Data.

Vertical assets come in many shapes and sizes. As part of the review of individual tower data, the following sections provide reference information related to potential mounting sites for wireless equipment.

Government owned vertical assets, such as public safety towers, government communications masts or poles, and water towers or tanks, can be made available to broadband providers. These public entities may often work with service providers. Often, to encourage broadband deployment, a reduced monthly cost or 'free to rent' space can be made available on the asset to deploy wireless antennas to provide service in a needy area.

The initial focus was to review and validate county owned vertical assets. ECC requested vertical asset information from each of the counties in the SWC region, to which all counties ultimately responded. Of the seven counties, only Swain County reported they had no county owned vertical assets.

Due to the small number of county owned assets in some counties, ECC further contacted certain municipalities within the seven-county region. Data received from those follow-ups is incorporated in the full listing.

As a result of the dearth of county owned resources, ECC worked with secondary data sources to include additional vertical asset information in the listing in order to provide additional reference/resource material to the member counties.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

County Owned and Referenced Assets.

The following sections list information received from each county of their vertical assets. The information provided includes towers, water towers and water tanks. (In addition to towers, Graham County provided a list of county owned land and buildings which could be considered potential locations for erecting a tower or antenna structure. This information is in Appendix A)

As previously noted in this report, Swain County did not report any county owned vertical assets. ECC selected commercial three sites for inclusion in this section to allow for comparative data.

The tower profiles on the following pages represent the various vertical assets that were reviewed. Each profile contains an overhead picture of the tower site and its surrounding area, an elevation diagram, with cross section line, that depicts the altitude of the asset as it relates to the general area and a wireless signal propagation map. In the propagation map the shaded polygon represents area that is considered by the FCC unserved (below the 10/1 Mbps broadband service threshold) and therefore available for grants. More information on each site can be found in Appendix G.

Sample Propagation.

Though not required by the RFP response, ECC has created Radio Frequency (RF) propagation studies for the selected towers. These studies are desktop engineered using consistent parameters to estimate potential fixed wireless propagation which are shown in the "heat maps" below.

ECC makes no representation or guarantee that certain vertical assets are accessible, suitable for use for the sample equipment, or that the propagation equals real world performance. However, these studies to provide the reader with consistency in comparisons of vertical assets.

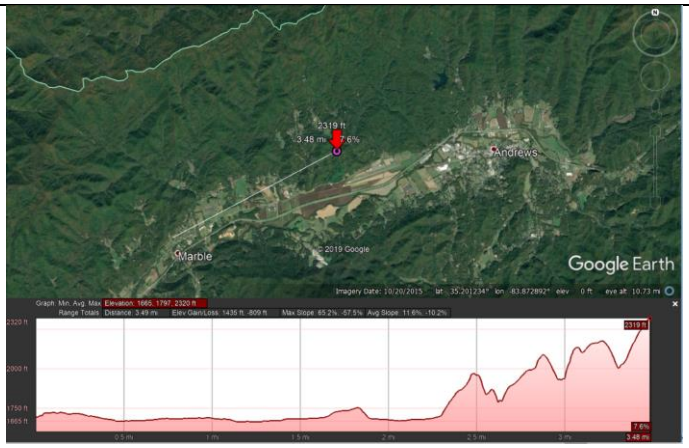
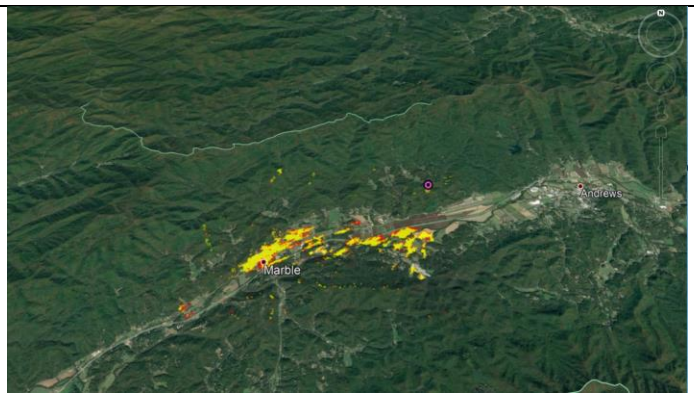
The test radio selected was the Cambium 450 utilizing generic antenna to perform one coverage per site. All antennas mounted 2 meters below top tower height or est. height if not given by county.

Antenna Gain – 35	Frequency – 5700
Channel width – 20 Mhz	Transmit power – 28
Transmit line loss - .5	Down Tilt – 4
Client install height 6 meters	Client gain – 19
Line loss - .5	

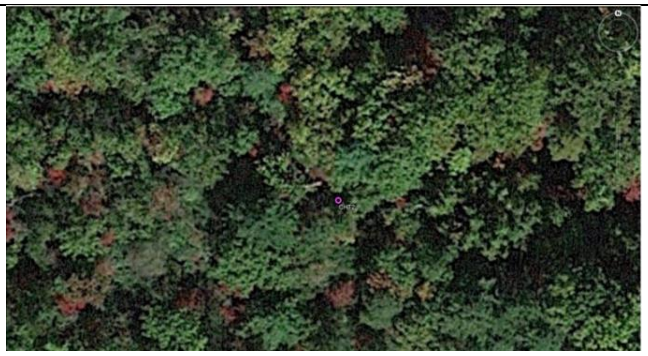
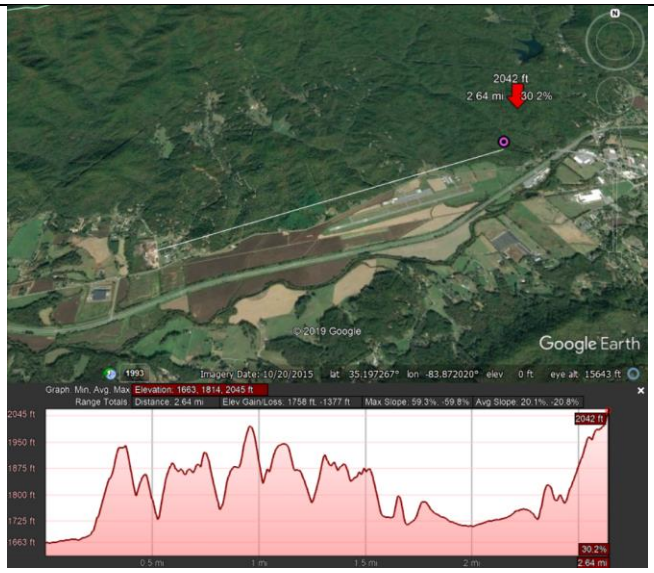
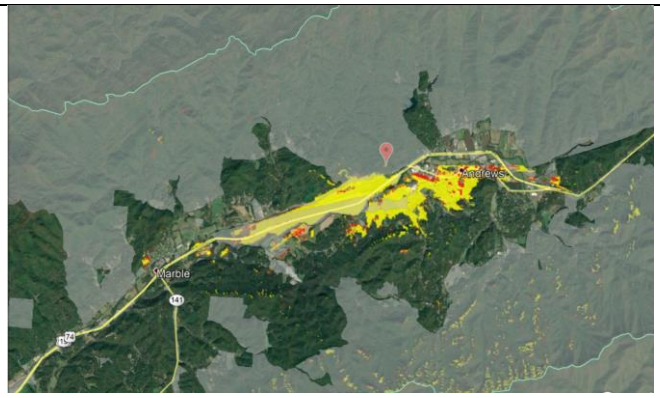
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

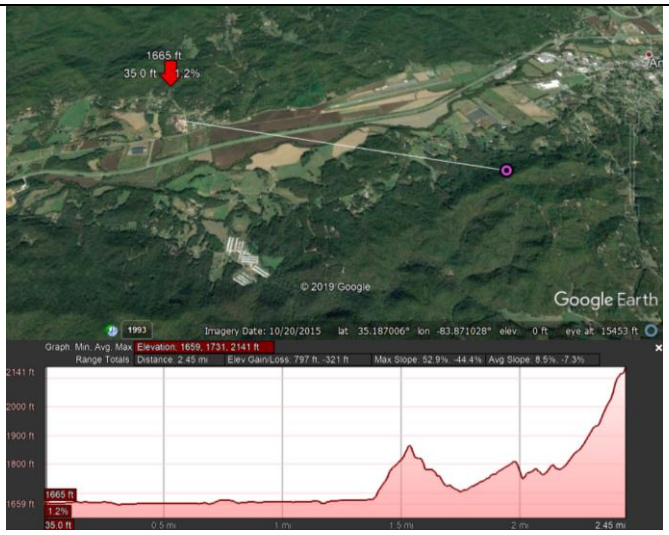
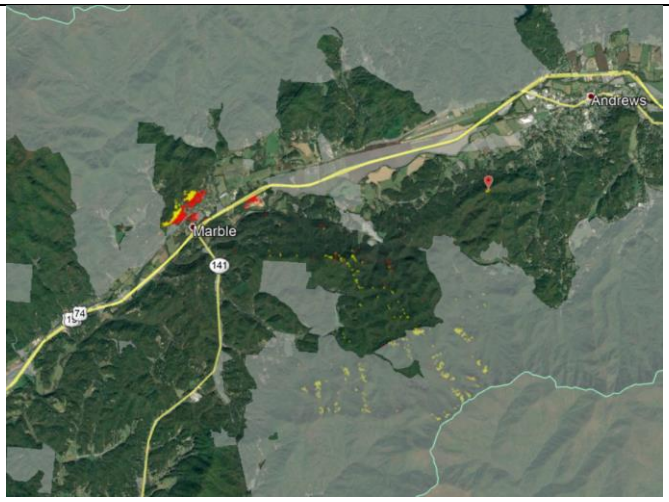
[The remainder of this page intentionally left blank]

Cherokee County

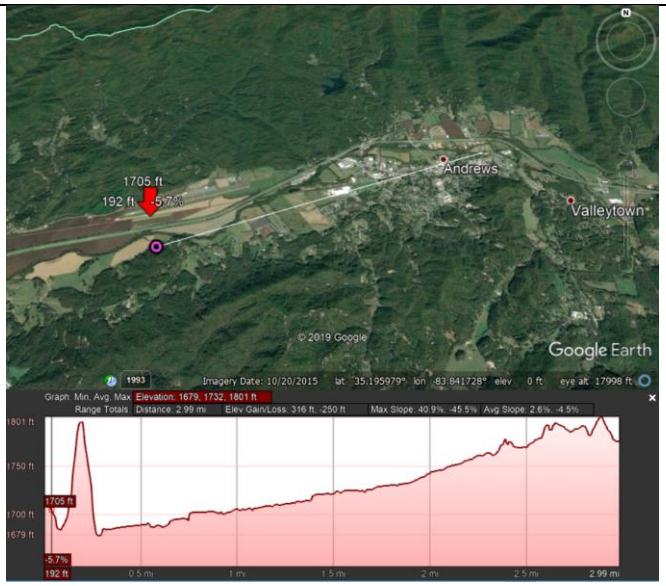
Cherokee County – Airport Main Rotating Beacon	
Tower ID: CHT1	Lat 35.201371 Long -83.874769
Overview Tower in deep woods with power line ROW access, which is over tree height.	
Elevation Variances (ft) • Tower: 1,979 • Mid: 1,750 • Low: 1,647	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

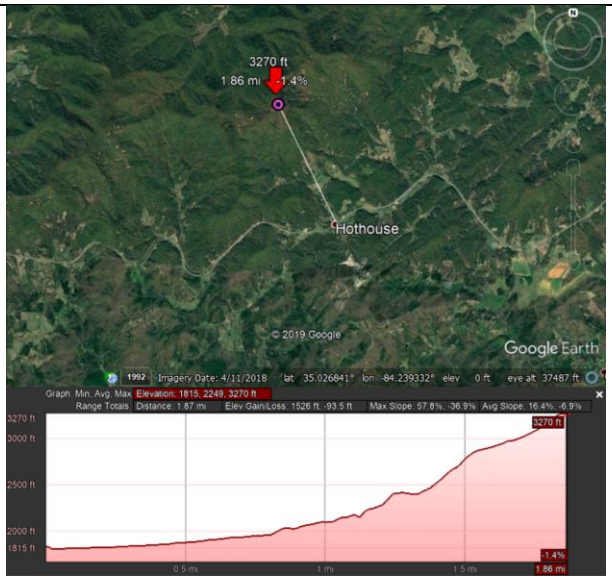
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

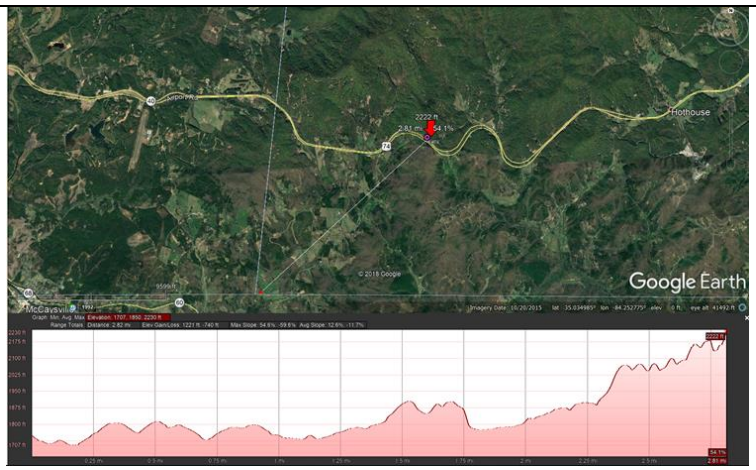
Cherokee County - Airport Beacon – NE Terrain	
Tower ID: CHT2	Lat 35.203207 Long -83.849216
Overview Airport beacon just over tree height with no access road.	
Elevation Variances (ft) • Tower: 2,042 • Mid: 1,875 • Low: 1,663	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Cherokee County – East TAC	
Tower ID: CHT3	Lat 35.182096 Long -83.850361
Overview Airport Beacon on top of hill with no access road	
Elevation Variances (ft) • Tower: 2,141 • Mid: 1,819 • Low: 1,659	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

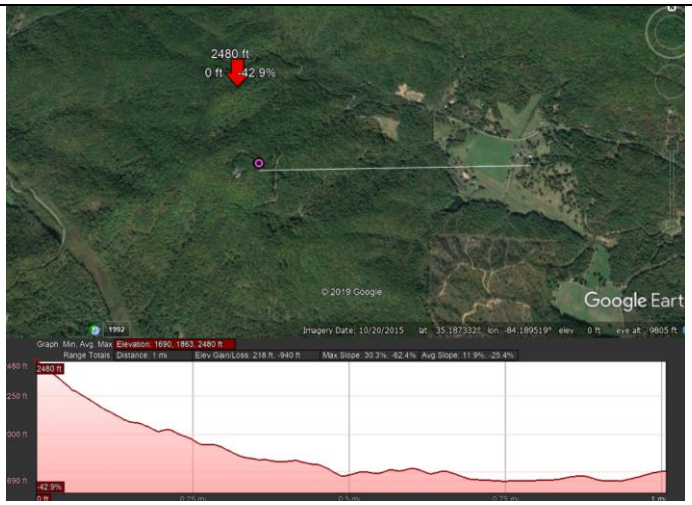
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

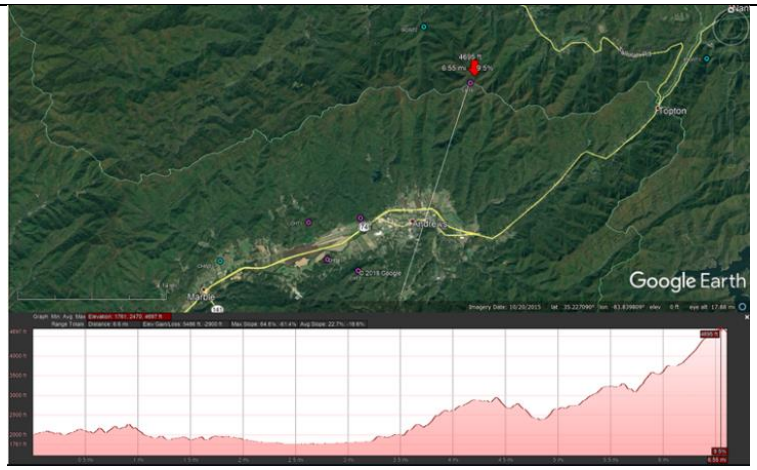
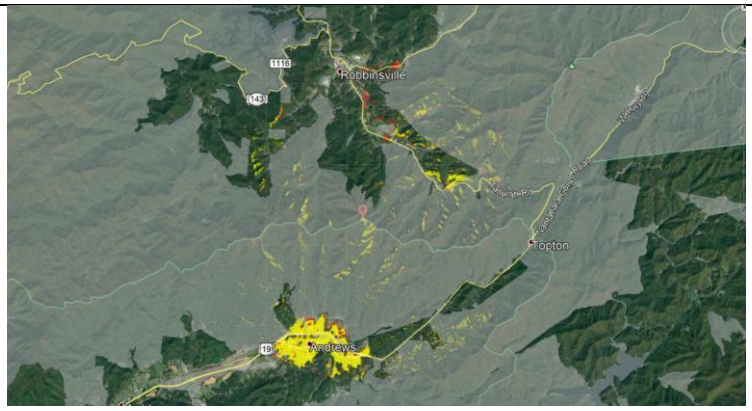
Cherokee County – Airport Beacon – SW Terrain	
Tower ID: CHT4	Lat 35.186538 Long -83.865458
Overview Airport Beacon in woods with no road access	
Elevation Variances (ft) • Tower: 1,710 • Mid: 1,750 • Low: 1,801	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Cherokee County – Wolf Creek Repeater Tower	
Tower ID: CHT5	Lat 35.044788 Long -84.245898
Overview Repeater site with no visual access road	
Elevation Variances (ft) • Tower: 3,270 • Mid: 2,101 • Low: 1,850	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

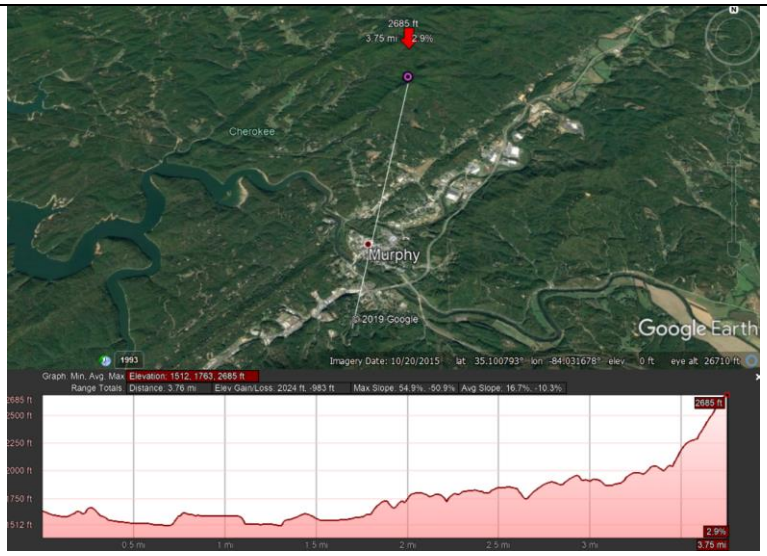
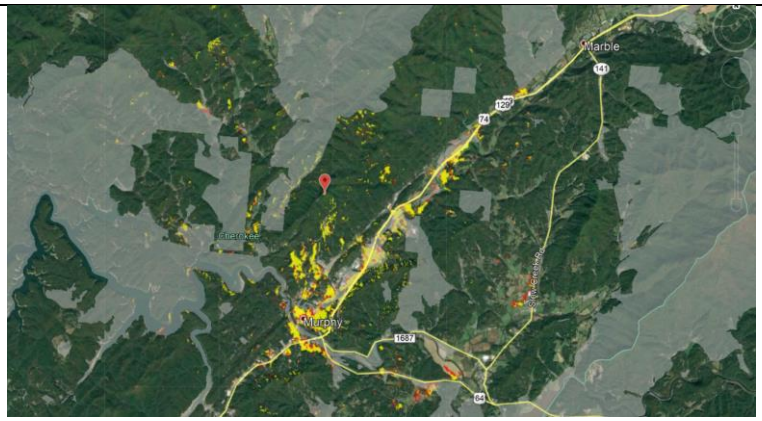
Cherokee County – West TAC	
Tower ID: CHT6	Lat 35.016142 Long -84.284829
Overview Tower with hut in developed area near road.	
Elevation Variances (ft) • Tower: 2,222 • Mid: 1,800 • Low: 1,707	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

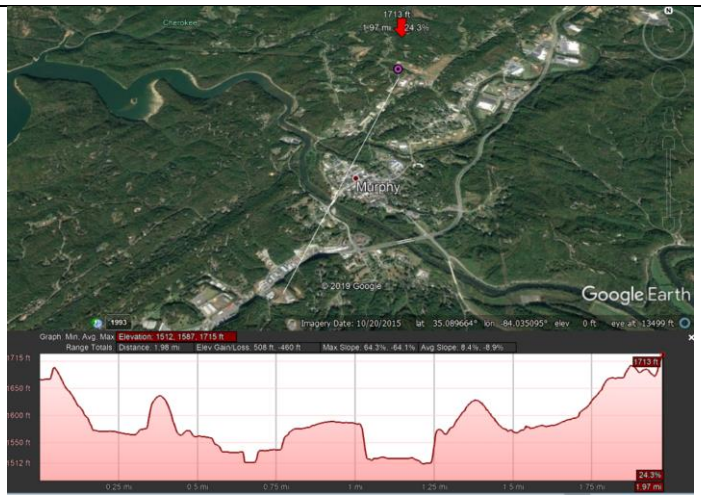
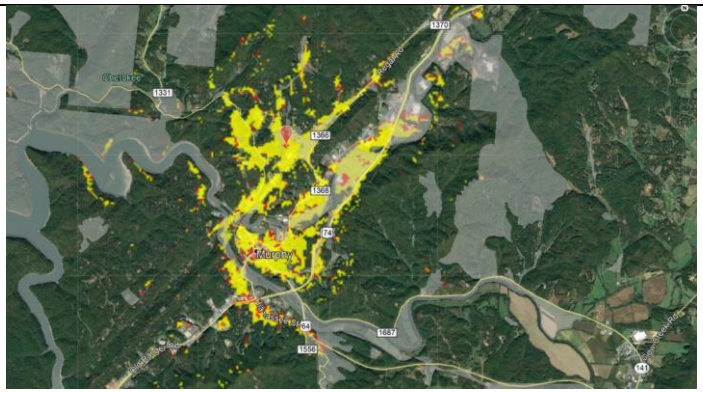
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

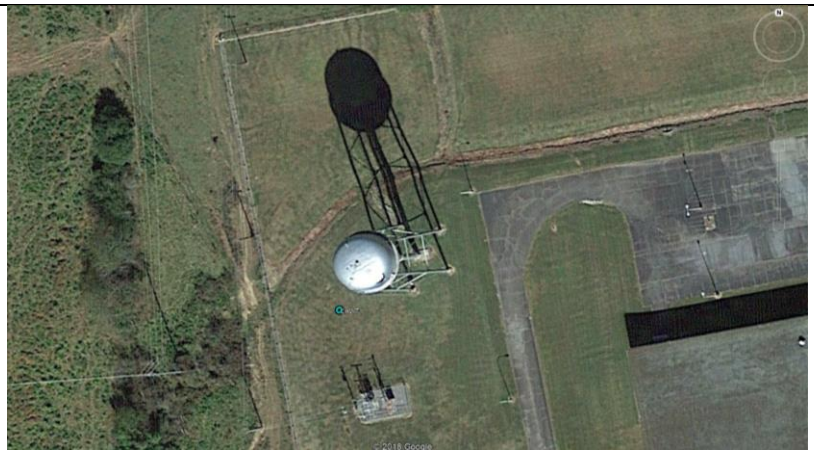
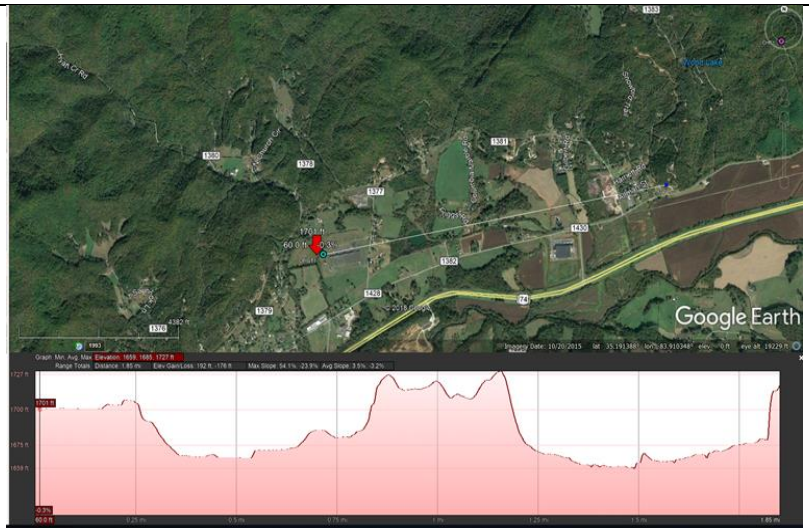
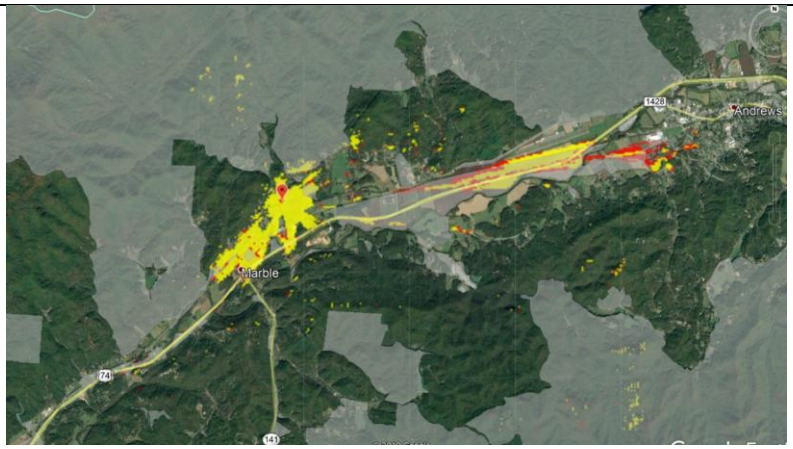
Cherokee County – North TAC	
Tower ID: CHT7	Lat 35.187316 Long -84.195295
Overview Wireless tower with road access, under tree canopy	
Elevation Variances (ft) • Tower: 2,480 • Mid: 1,820 • Low: 1,758	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Cherokee County – Joanna Bald	
Tower ID: CHT8	Lat 35.2574 Long -83.795172
Overview Tall tower with hut on top of mountain and access road. On border of county.	
Elevation Variances (ft) • Tower: 4,6,49 • Mid: 3,000 • Low: 1,750	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

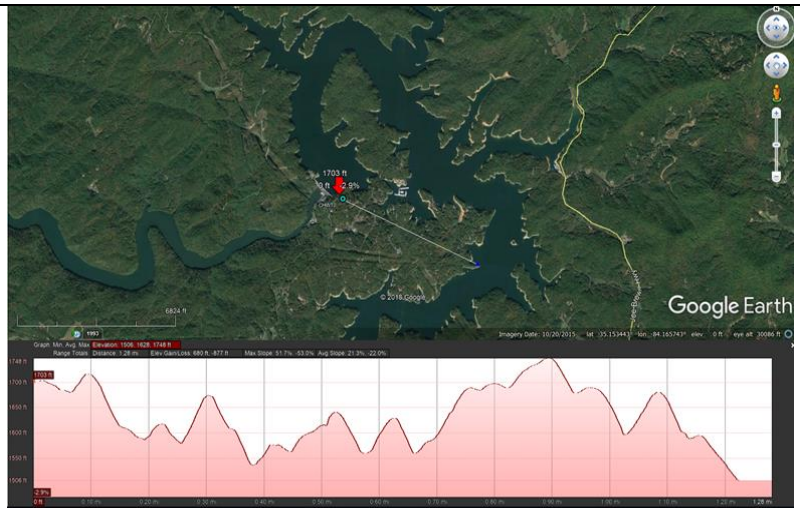
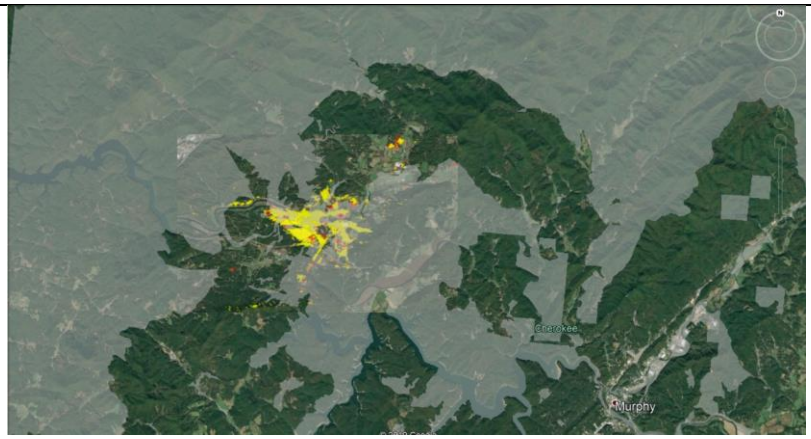
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

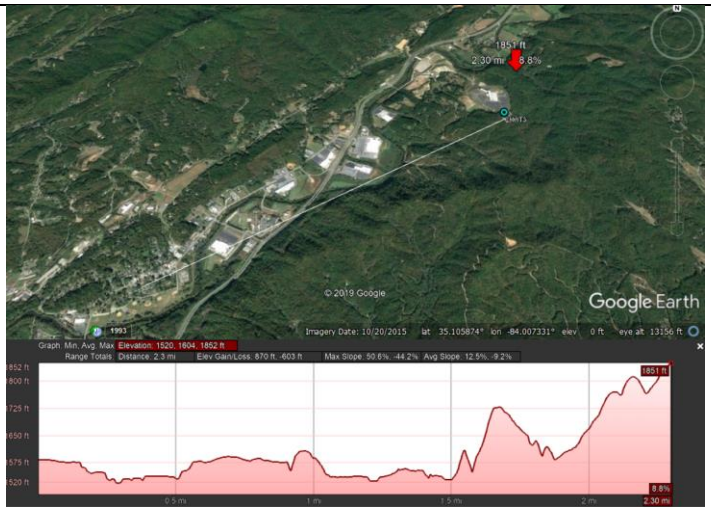
Cherokee County – Fain Mountain Towers	
Tower ID: CHT9	Lat 35.127063 Long -84.026375
Overview Multiple lattice towers on top of mountain with access road. Own by Bill Forsyth.	
Elevation Variances (ft) • Tower: 2,685 • Mid: 1,750 • Low: 1,642	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

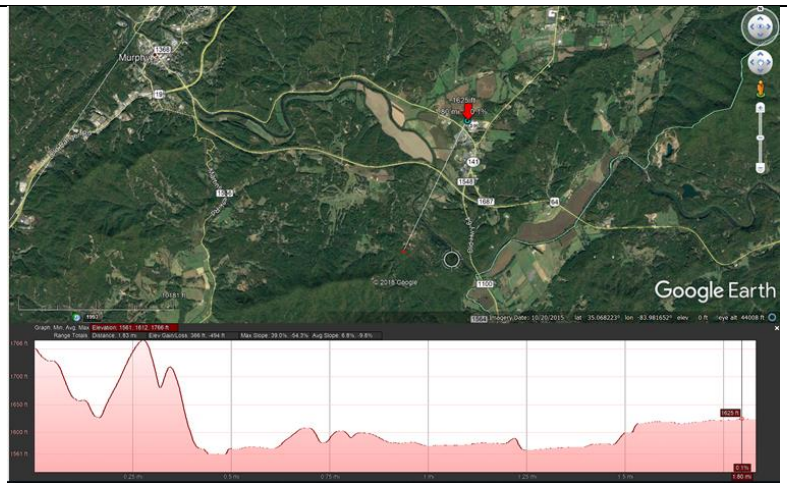
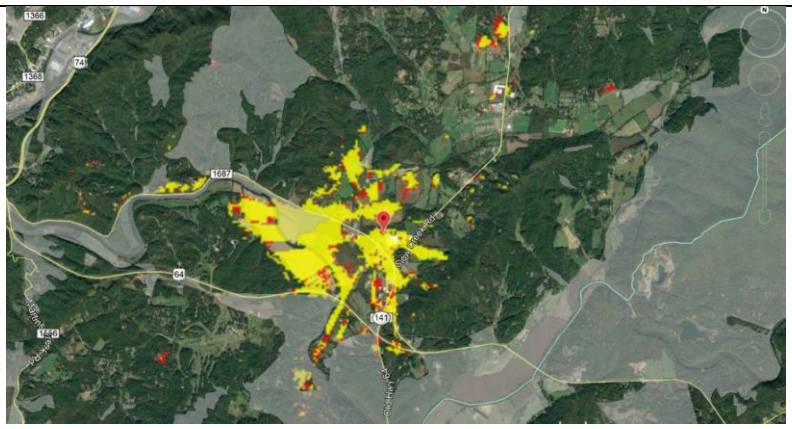
Cherokee County – VIPER Tower	
Tower ID: CHT10	Lat 35.103171 Long -84.029152
Overview Large lattice state highway patrol VIPER tower with road access.	
Elevation Variances (ft) • Tower: 1,713 • Mid: 1,570 • Low: 1,660	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Cherokee County - Water tower	
Tower ID: CHWT1	Lat 35.185836 Long -83.918151
Overview Large water tower with road access	
Elevation Variances (ft) • Tower: 1,701 • Mid: 1,727 • Low: 1,655	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

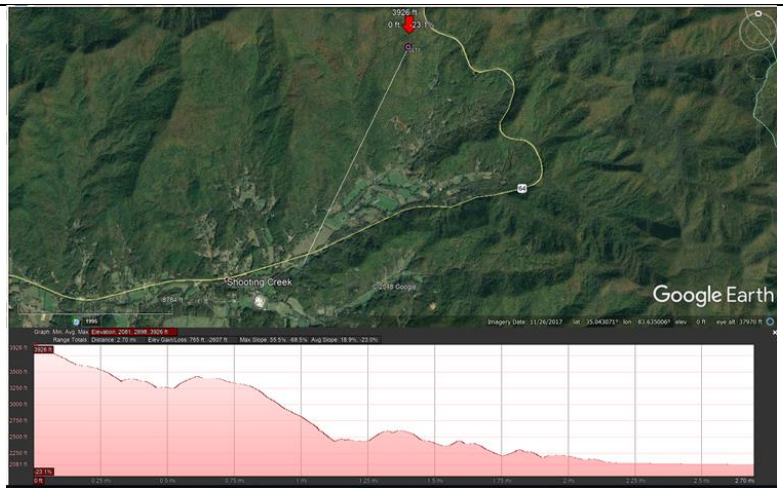
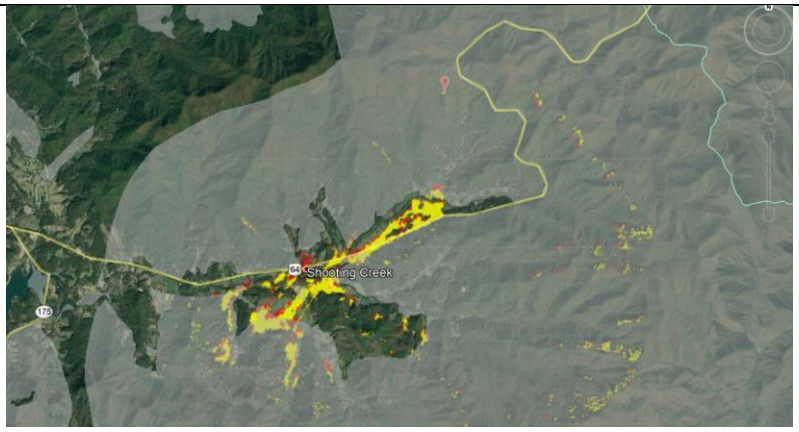
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Cherokee County - Water tower	
Tower ID: CHWT2	Lat 35.150121 Long -84.174552
Overview Water tower near wireless tower, and road access	
Elevation Variances (ft) • Tower: 1,703 • Mid: 1,741 • Low: 1,506	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

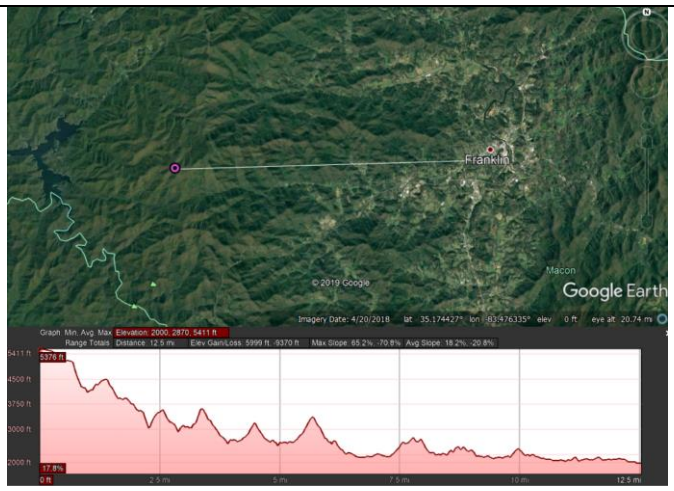
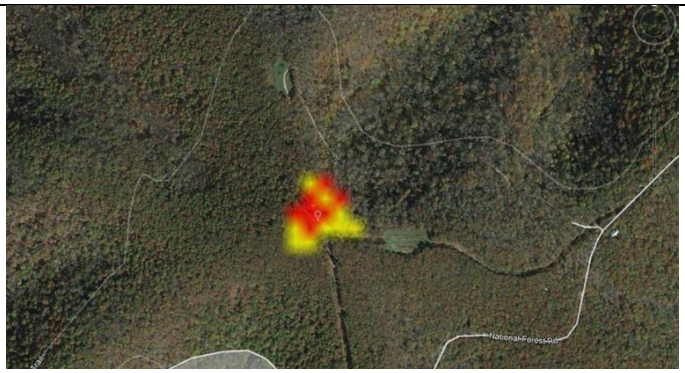
Cherokee County - Water tower	
Tower ID: CHWT3	Lat 35.112031 Long -83.991251
Overview Water tank on ground, with road access	
Elevation Variances (ft) • Tower: 1,851 • Mid: 1,590 • Low: 1,575	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

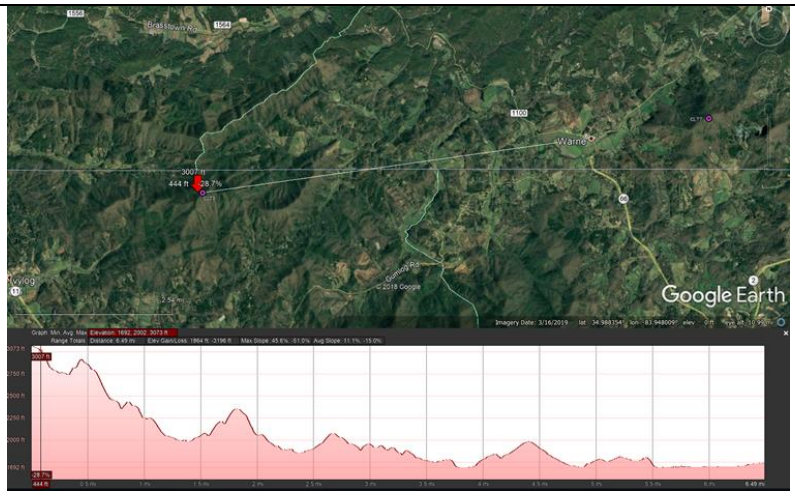
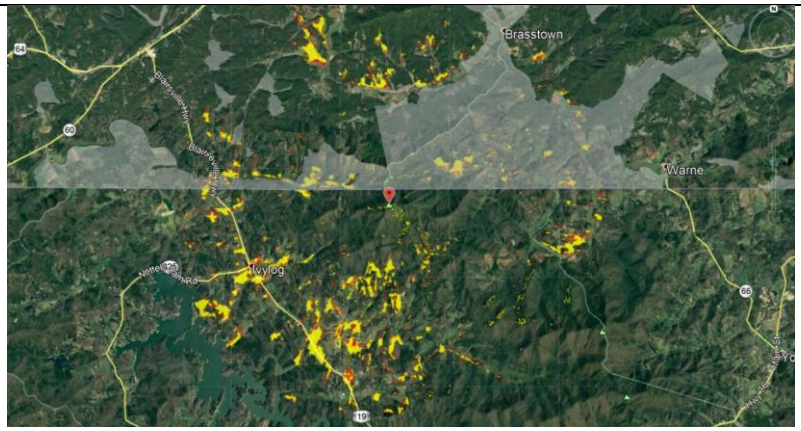
Cherokee County - Water tower	
Tower ID: CHWT4	Lat 35.075803 Long -83.965727
Overview Tall water tower behind building	
Elevation Variances (ft) • Tower: 1,625 • Mid: 1,600 • Low: 1,726	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Clay County

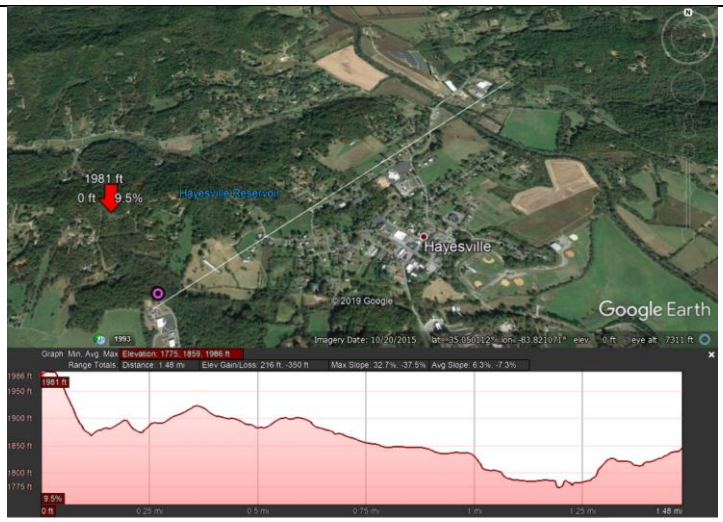
Clay County – Self Supporting Tower	
Tower ID: CLT1	Lat 35.061817 Long -83.632282
Overview Wireless Tower in heavy woods appears dirt road access. On Chunky Gal Mountain.	
Elevation Variances (ft) • Tower: 3,937 • Mid: 2,436 • Low: 2,017	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

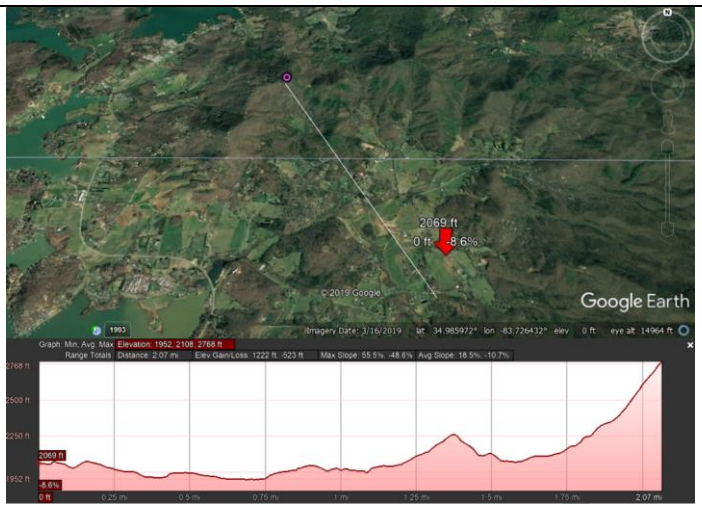
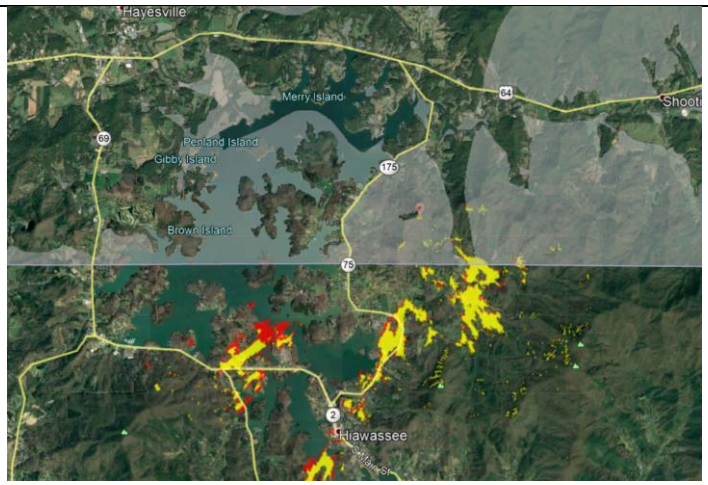
Clay County - Tower	
Tower ID: CLT2	Lat 35.173246 Long -83.580834
Overview Tower on mountain top in deep woods in Macon County.	
Elevation Variances (ft) • Tower: 5,376 • Mid: 3,307 • Low: 2,006	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

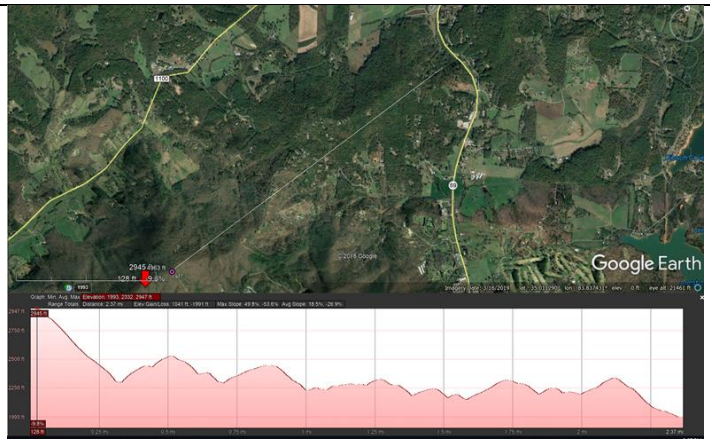
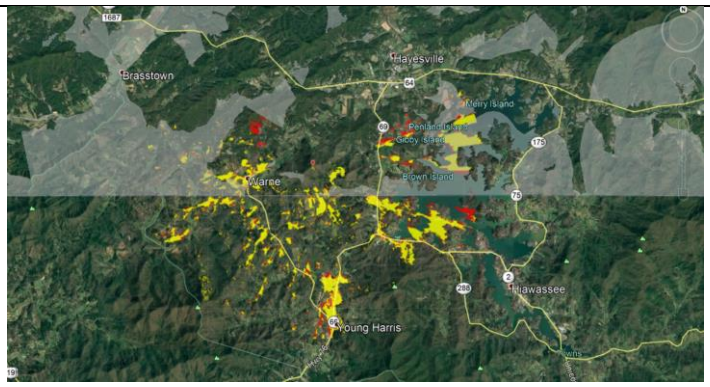
Clay County - Tower	
Tower ID: CLT3	Lat 34.981956 Long -84.003629
Overview Wireless lattice tower with hut, fenced in and dirt access road. On top of Rocky Top mountain.	
Elevation Variances (ft) • Tower: 3,007 • Mid: 1,990 • Low: 1,692	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

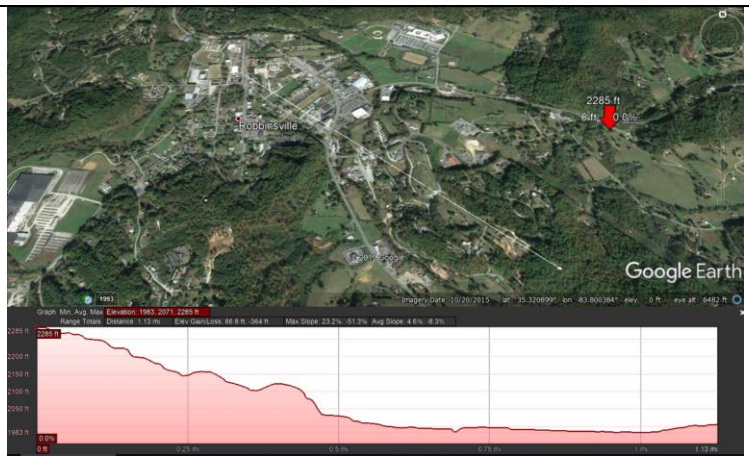
Clay County – Large Lattice Tower	
Tower ID: CLT5	Lat 35.043271 Long -83.830499
Overview Large tower, fenced in and located behind Clay County jail.	
Elevation Variances (ft) • Tower: 1,981 • Mid: 1,901 • Low: 1,830	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Clay County - Tower	
Tower ID: CLT6	Lat 35.043271 Long -83.830499
Overview Small tower next to building near road. On Eagle's view Mountain.	
Elevation Variances (ft) • Tower: 2,766 • Mid: 2,014 • Low: 2,064	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

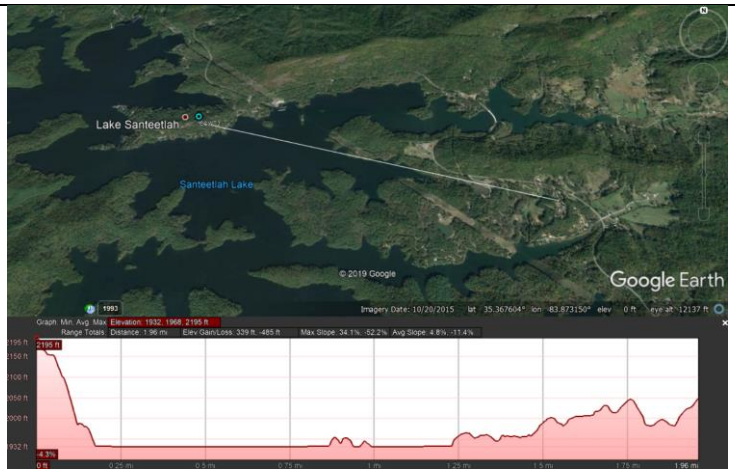
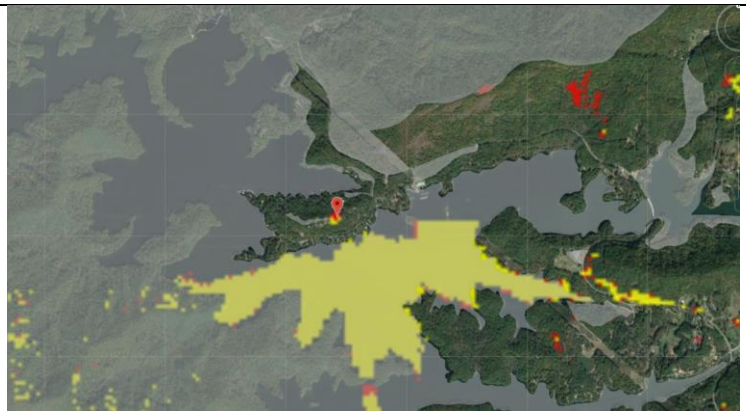
Clay County - Tower	
Tower ID: CLT7	Lat 34.999316 Long -83.859304
Overview Wireless tower on top of Davy mountain. Fenced in with dirt road access	
Elevation Variances (ft) • Tower: 2,945 • Mid: 2,450 • Low: 2,250	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

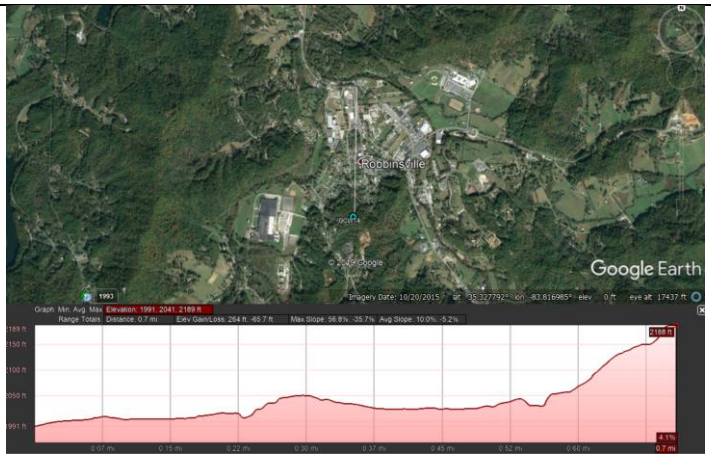
Graham County

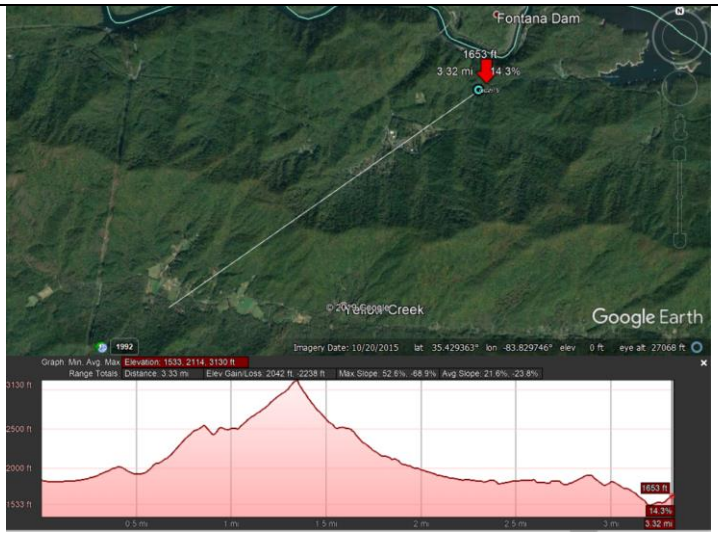
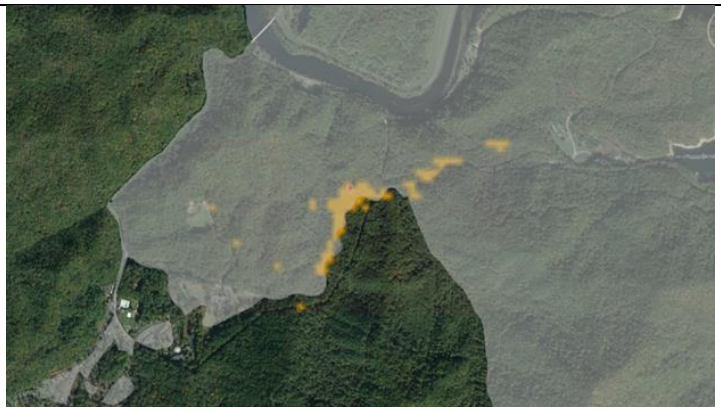
Graham County – Vertical Water Tank	
Tower ID: GCWT1	Lat 35.315611 Long -83.792972
Overview Water tank in the woods above Robbinsville	
Elevation Variances (ft) • Tower: 2,285 • Mid: 1,997 • Low: 2,007	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Graham County - Water Tank	
Tower ID: GCWT2	Lat 35.280613 Long -83.818745
Overview Water tank below tree height, has road access	
Elevation Variances (ft) • Tower: 2,414 • Mid: 2,375 • Low: 2,339	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

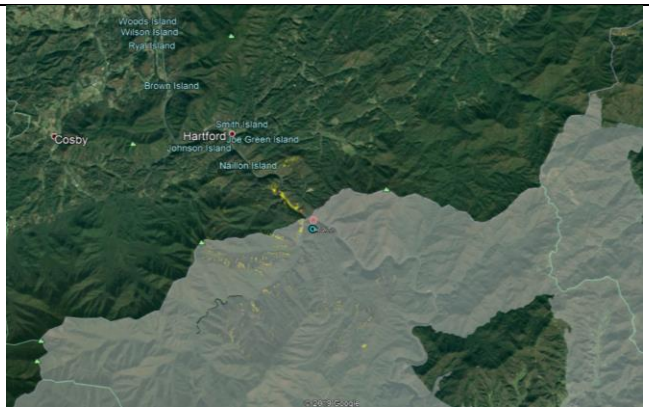
Graham County - Water Tank	
Tower ID: GCWT3	Lat 35.36354 Long -83.864941
Overview Water tank at tree height, has road access	
Elevation Variances (ft) • Tower: 2,195 • Mid: 1,932 • Peak: 2,050	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

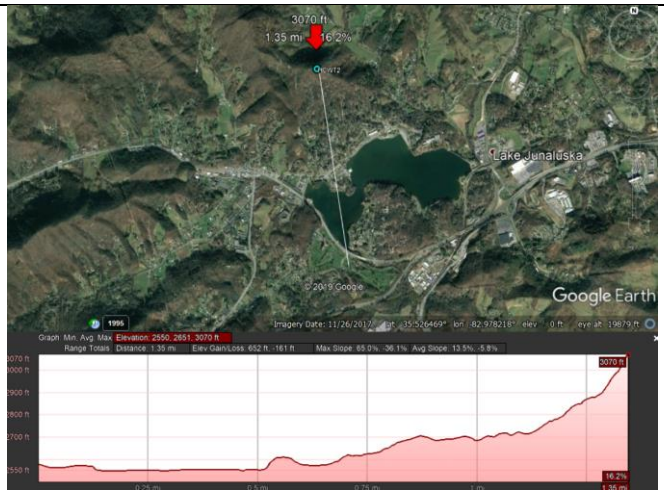
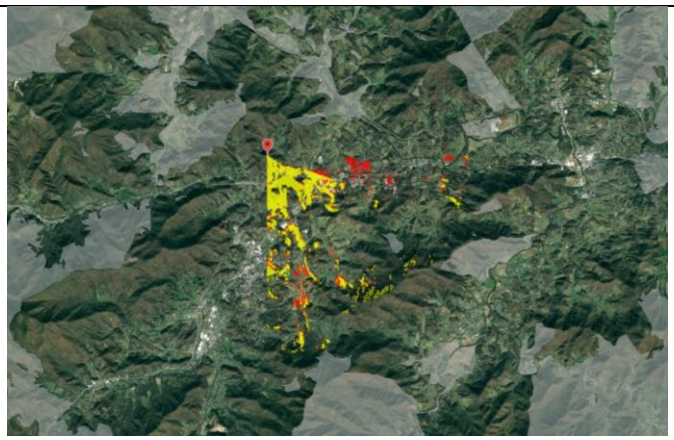
Graham County - Water Tank	
Tower ID: GCWT4	Lat 35.3186 Long -83.808088
Overview Water tank that appears to be at tree height. No visible access road.	
Elevation Variances (ft) • Tower: 2,188 • Mid: 2,050 • Low: 1,991	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

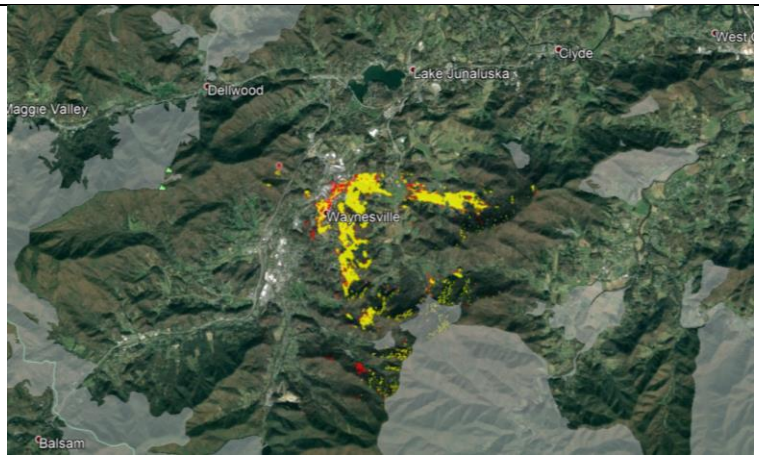
Graham County – Water Tank	
Tower ID: GCWT5	Lat 35.43992 Long -83.811913
Overview Short water tank in undeveloped area, below tree height	
Elevation Variances (ft) • Tower: 1,653 • Mid: 3,130 • Low: 1,856	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

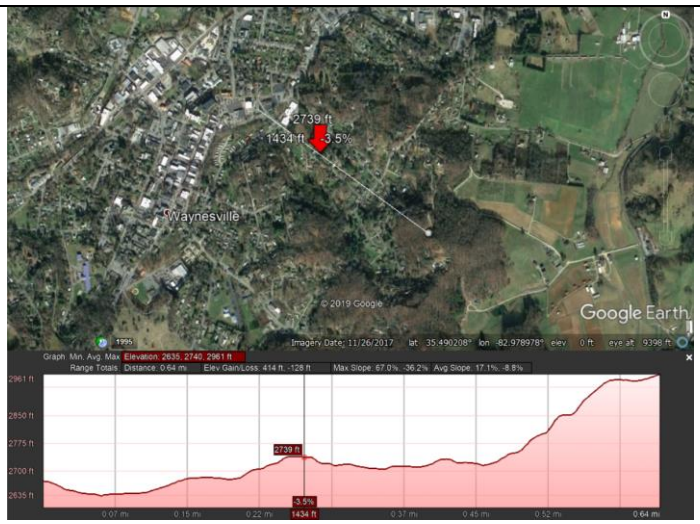
Haywood County

Haywood County – Water Tank with attachment	
Tower ID: HCWT1	Lat 35.770382 Long -83.095559
Overview Water tank on northern border above tree height, has lattice tower mounted on top.	
Elevation Variances (ft) • Tower: 2,053 • Mid: 1,501 • Low: 1,381	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Haywood County – Water Tank	
Tower ID: HCWT2	Lat 35.53584 Long -82.980086
Overview Water tank in woods below tree height, does not appear to have access road.	
Elevation Variances (ft) • Tower: 3,067 • Mid: 2,610 • Low: 2,555	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

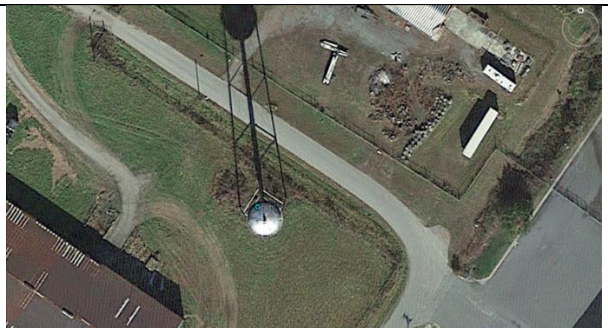
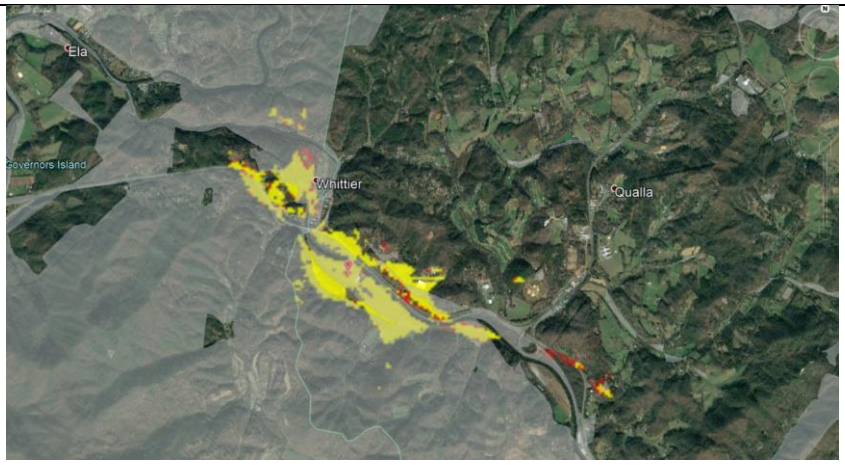
Haywood County - Water Tank	
Tower ID: HCWT3	Lat 35.499642 Long -83.004672
Overview Tall water tank next to road and populated area. Also, nearby monopole.	
Elevation Variances (ft) • Tower: 2,941 • Mid: 2,775 • Low: 3,205	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Haywood County - Water Tank	
Tower ID: HCWT4	Lat 35.487843 Long -82.974911
Overview Short water tank below tree height, has road access.	
Elevation Variances (ft) • Tower: 2,959 • Mid: 2,745 • Low: 2,674	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

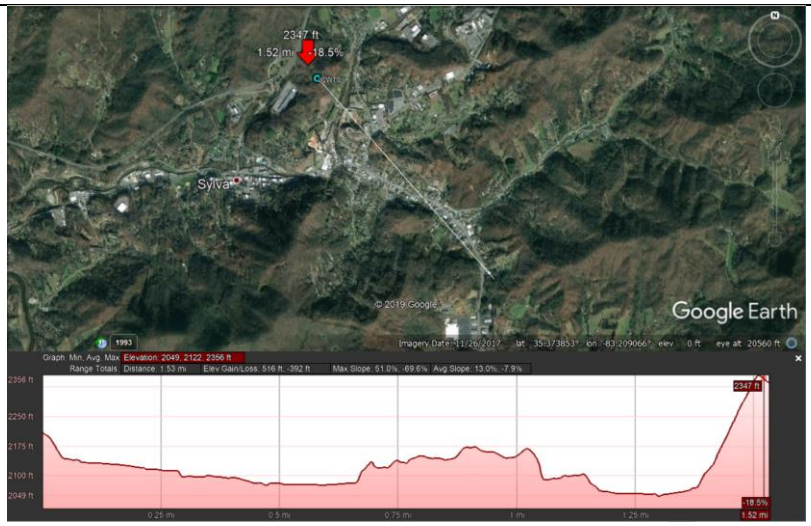
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Jackson County

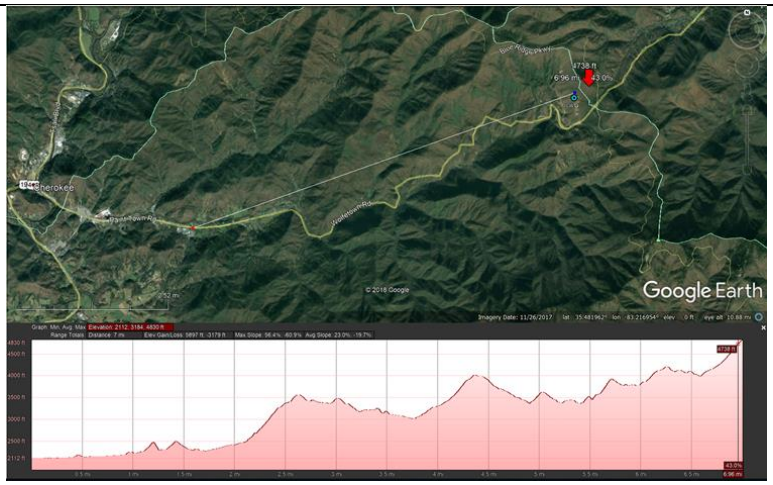
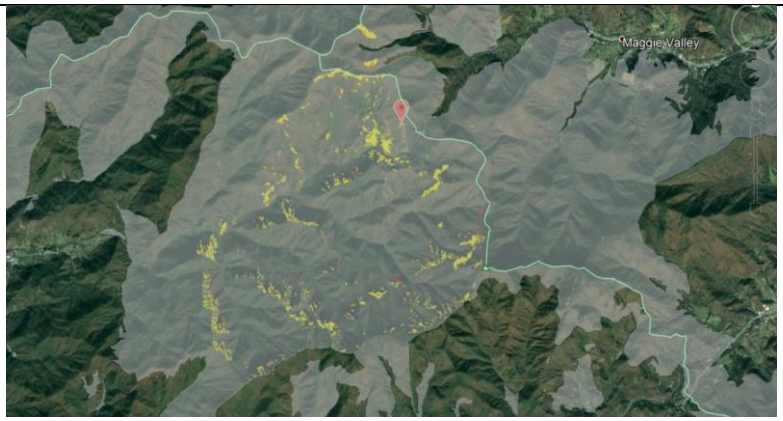
Jackson County – Water Tower	
Tower ID: JCWT1	Lat 35.426735 Long -83.355933
Overview Tall water tower in developed area near road, border tower	
Elevation Variances (ft) • Tower: 1,839 • Mid: 1,900 • Low: 1,954	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

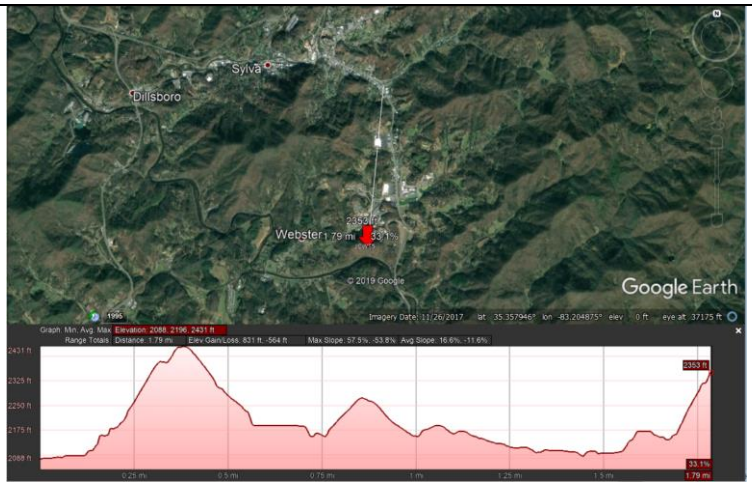
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Jackson County – Water Tank	
Tower ID: JCWT2	Lat 35.387268 Long -83.197717
Overview Water tank in developed area near road, border tower	
Elevation Variances (ft) • Tower: 2,431 • Mid: 2,110 • Low: 2070	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Jackson County – Water Tower	
Tower ID: JCWT3	Lat 35.38204 Long -83.21787
Overview Water tower in woods near developed area and nearby roads.	
Elevation Variances (ft) • Tower: 2,347 • Mid: 2,175 • Low: 2,200	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

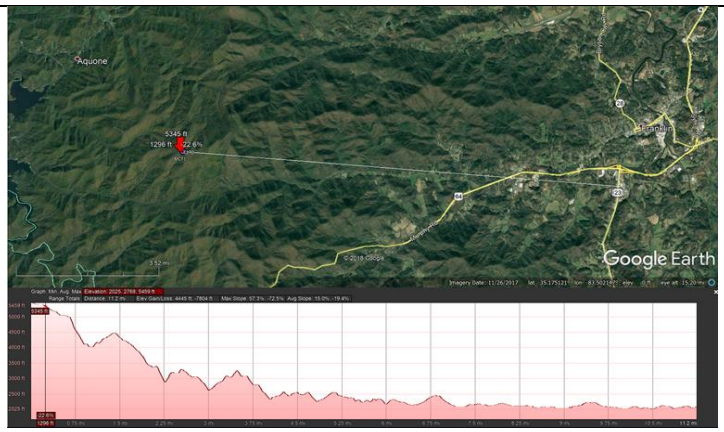
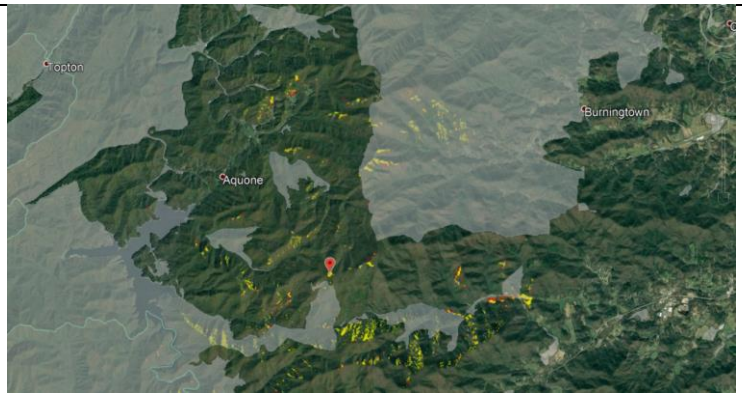
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

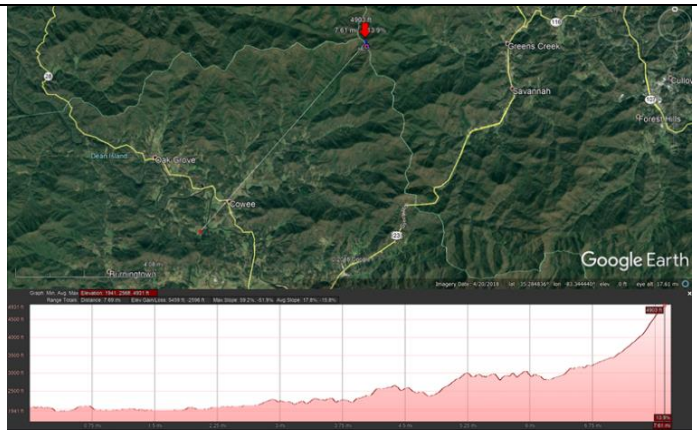
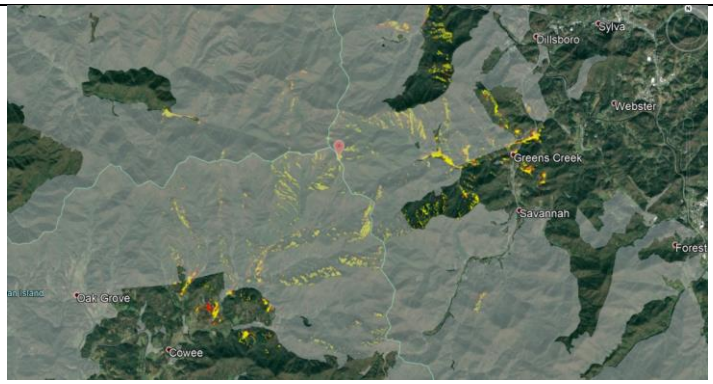
Jackson County – Water Tank	
Tower ID: JCWT4	Lat 35.497863 Long -83.16218
Overview Tall water tank at the end of neighborhood road, border tower.	
Elevation Variances (ft) Tower: 4,734 Mid: 4,011 Low: 2,112	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Jackson County - Tower	
Tower ID: JCWT5	Lat 35.345675 Long -83.20619
Overview Short water tank well below the surrounding trees in developed area.	
Elevation Variances (ft) • Tower: 2,352 • Mid: 2,250 • Peak: 2,431	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

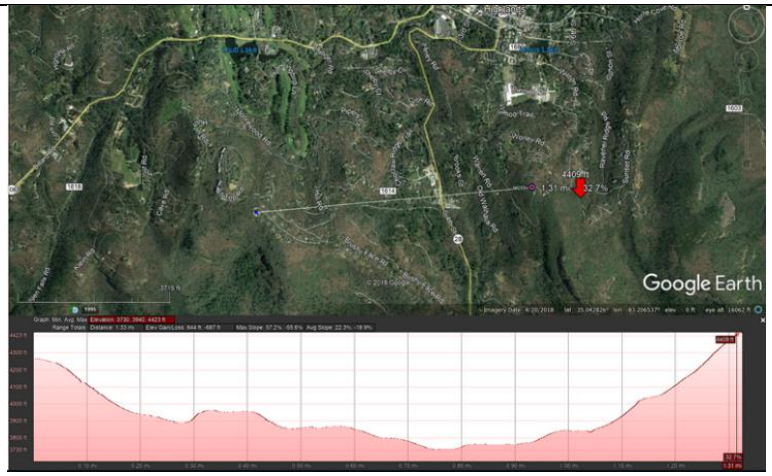
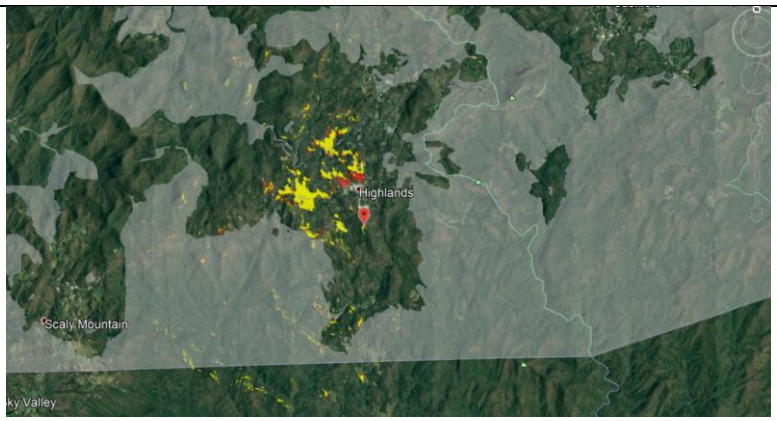
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

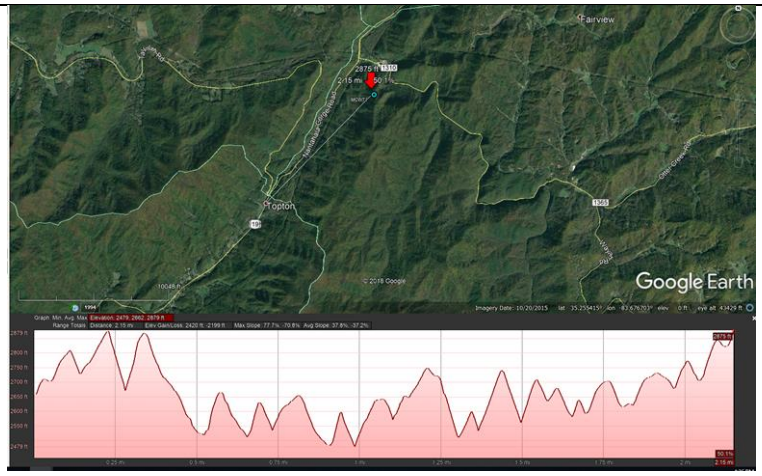
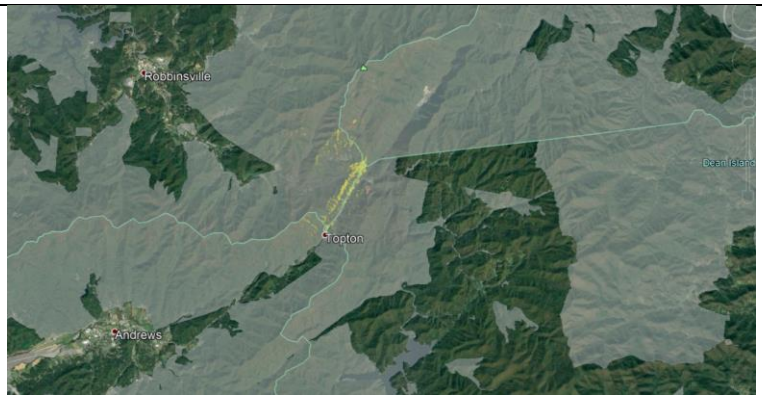
Macon County

Macon County - Tower	
Tower ID: MCT1	Lat 35.173019 Long -83.580798
Overview Multiple lattice towers with hut and access road. Wine Spring Bald border tower.	
Elevation Variances (ft) • Tower: 5,345 • Mid: 2,501 • Low: 2,025	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

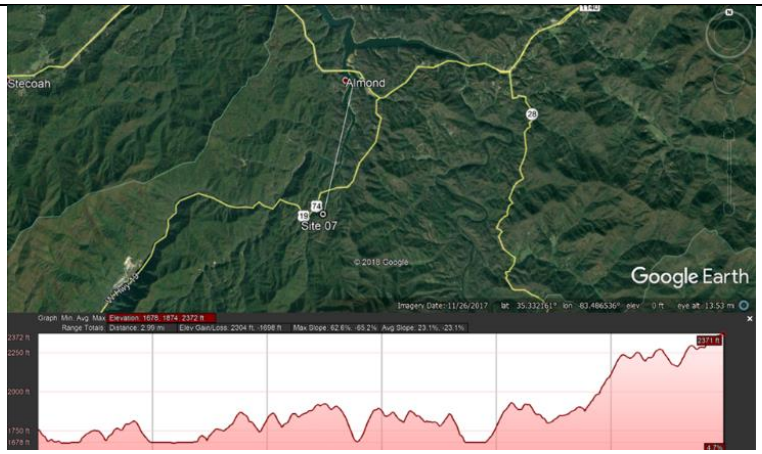
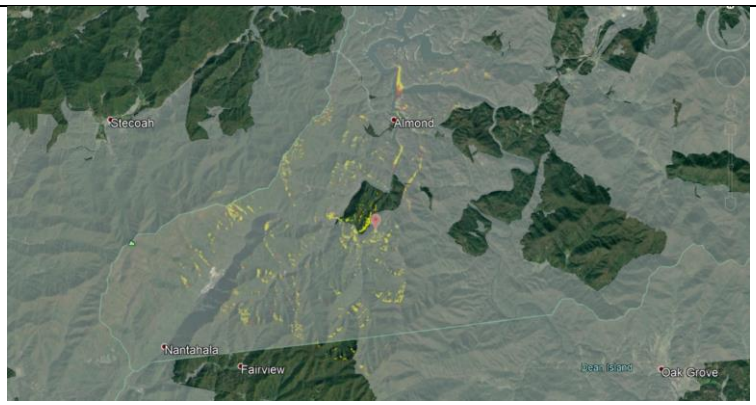
Macon County - Tower	
Tower ID: MCT2	Lat 35.327432 Long -83.335785
Overview Large number of lattice towers and huts together next to road. On Cowee Mountain near County border.	
Elevation Variances (ft) • Tower: 4,903 • Mid: 2,525 • Low: 1,941	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

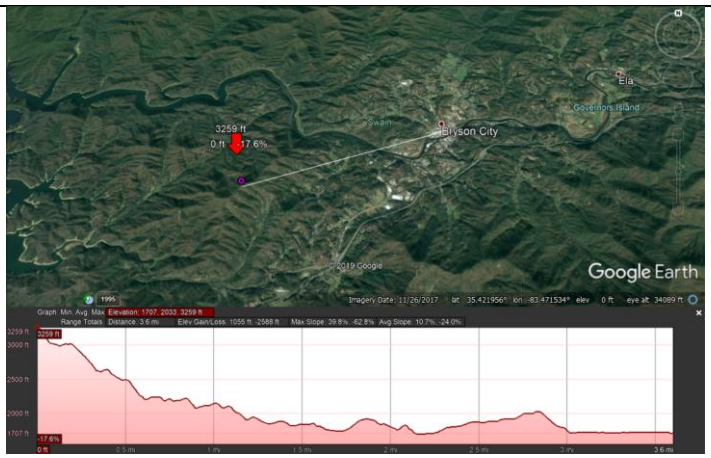
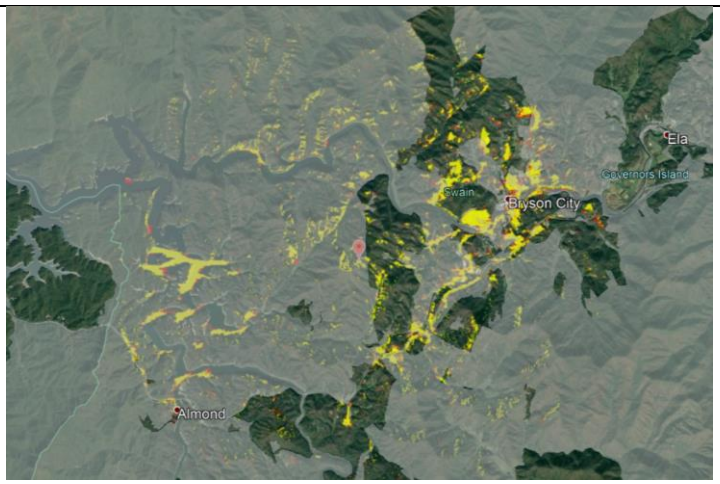
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Macon County – Self Supporting Tower	
Tower ID: MCT3	Lat 35.040914 Long -83.194764
Overview Monopole tower fenced in off of paved neighborhood road. Land is owned by the Town of Highland.	
Elevation Variances (ft) • Tower: 4,409 • Mid: 3,800 • Low: 4,275	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

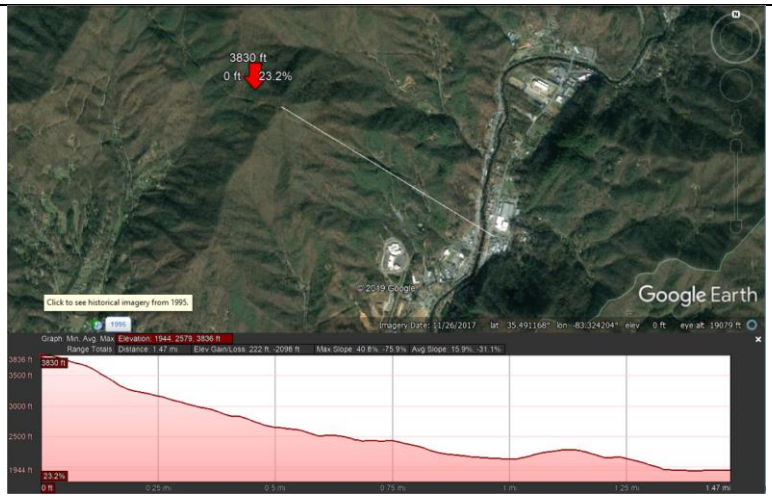
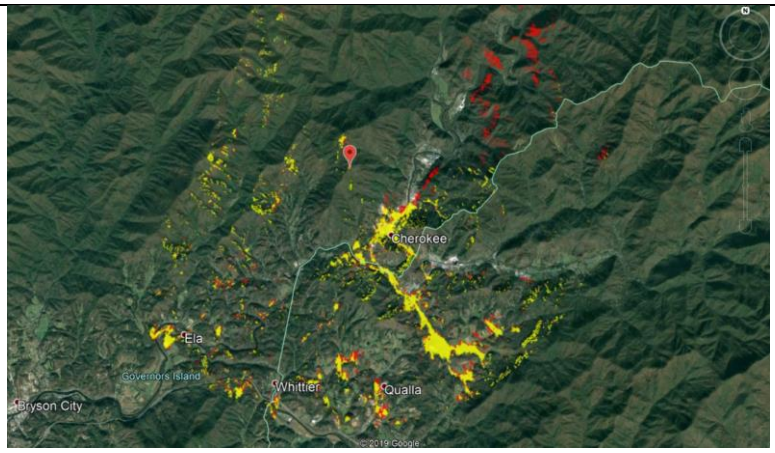
Macon County – Water Tower	
Tower ID: MCWT1	Lat 35.266977 Long -83.678904
Overview Water tank with dirt road access on County borders.	
Elevation Variances (ft) • Tower: 2,875 • Mid: 2,750 • Low: 2,879	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Swain County

Swain County - SBA Owned tower (Not owned by Swain County)	
Tower ID: SCT1	Lat 35.329797 Long -83.573162
Overview Commercial Tower behind house off of Shady Drive. A number of homes directly below tower.	
Elevation Variances (ft) • Tower: 2,371 • Mid: 1,900 • Low: 1,750	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Swain County - Multiple Towers including a VIPER tower (Not owned by Swain County)	
Tower ID: SCT2	Lat 35.413167 Long -83.500402
Overview Three lattice towers 2 tall and one short on top of mountain with dirt road access	
Elevation Variances (ft) • Tower: 3,259 • Mid: 1,922 • Low: 1,722	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Swain County – Tower (Not owned by Swain County)	
Tower ID: SCT3	Lat 35.496598 Long -83.334431
Overview Two tall towers one lattice and one monopole on top of hill.	
Elevation Variances (ft) • Tower: 3,836 • Mid: 2,523 • Low: 1,944	
Baseline RF Propagation Yellow indicates approximated service better than -60 dBm. This suggests service availability from this location. Red represents levels between -60 to -70 dBm and is degraded.	

Additional Vertical Assets.

County owned vertical assets make up a small percentage of the total vertical assets in the region. ECC further committed, as previously noted, to expand its work beyond local taxpayer owned assets.

In addition to the County provided information, ECC received tower information from the State of NC Broadband Infrastructure Office (BIO), the FCC, tower holding companies, and other sources.

The FCC registration database includes the most comprehensive information on particular towers including tower ownership, type, height and more. Information in this database further contains status on the tower registration process including application pending, granted, constructed, terminated, cancelled and dismantled. In certain cases, this information may be dated and towers that are listed as pending application or granted may already be constructed.

Based on desktop research utilizing the FCC online database and numerous other resources, there are 219 wireless towers, 4 water towers and 14 water tanks registered or otherwise identified as constructed in seven county territory.

Unless owned by a cellular carrier such as Verizon Wireless or AT&T, commercial tower owners lease space on their towers to cellular companies wireless Internet providers and public entities. Furthermore state, county, municipal and public safety departments mount wireless communication antennas on vertical assets including commercial towers, county owned towers, water tower and tall buildings.

Line of sight availability is important for fixed wireless services so in many cases, the higher the infrastructure the better. Hills, trees and other objects can impact delivery of signal and ultimately end user Quality of Service (QOS).

It should be noted however, that certain equipment manufacturers indicate that for penetrating frequencies such as 600 Mhz, the preference is to be lower in an area so as to avoid undue frequency interference.

The larger tower owners in the region (by number of towers) includes American Tower, Crown Atlantic, Crown Castle, North Carolina State Highway Patrol / VIPER and SBA Towers. A full list of the towers, their location and heights, and owner contact information are located in Appendix G and will be supplied on a flash drive with this report.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

[This page intentionally left blank]

Tools Utilized to Map Vertical Assets

ECC procured, reviewed, and cataloged data regarding radio tower, water tower and other vertical assets identified in the region. The data was placed into multiple tables and then combined to remove duplicates. In some cases, counties provided data on commercial assets rather than limiting their response to county owned facilities. Those duplicates were also corrected.

FIGURE 15 GOOGLE MAPPING

Once all tower databases were obtained, ECC combined and compared data to remove duplicate tower locations. When a final "master" was created, each tower location was placed into Google Earth for further analysis. The master list contained 237 towers/tanks over the 7-county region.

There are a number of mapping tools, but the Southwestern Commission requested that ECC utilize the Google Earth application. In some areas, Google Earth personnel or contractors had driven areas in a "Google Mapmobile [see image]. This activity simultaneously collects images from multiple locations or directions.

In many cases, including certain rural areas, Google Earth provides multiple images. ECC reviews both sets of images in its review work.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

These images are later pieced or stitched together to provide a 360-degree image of a given location. Currently more rural areas and backroad are less likely to have been driven. Unfortunately, in the SWC region many areas do not have road level imagery.

Aerial and road level imagery can then be used to confirm that a particular tower exists and document its accessibility and potential use by WISPs and others. It should be noted that according to the GE website satellite overhead pictures in the region were typically taken between 2017 and 2019, while much of the road imagery was more dated and ranged from 2013 to 2019.

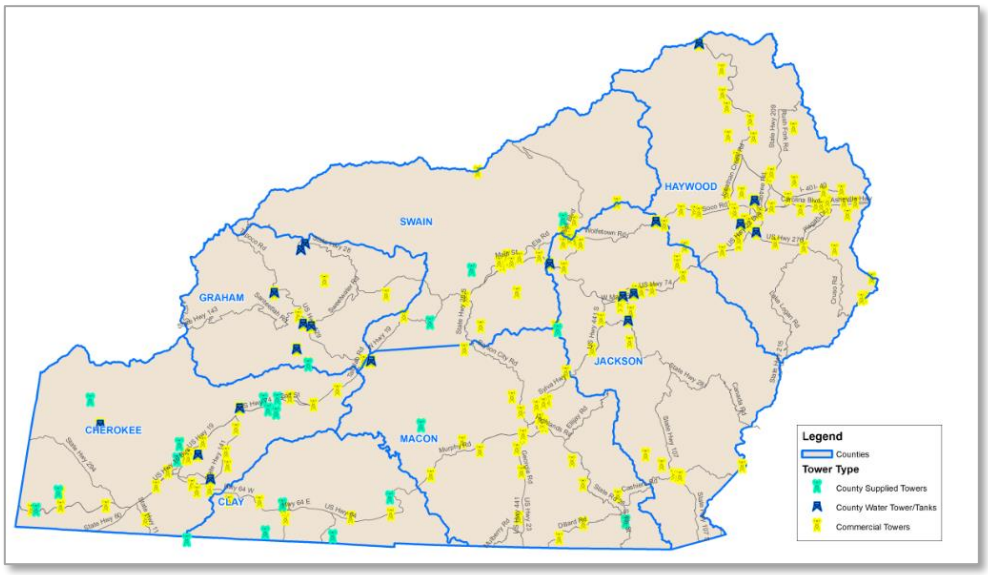


FIGURE 16 THUMBNAIL OF VERTICAL ASSETS IN SOUTHWESTERN COMMISSION REGION

ECC used Google Earth to review each of the towers contained in the master list. Of the towers listed, 198 were verified in Google Earth and 26 were unverified.

The map above (and Full Page on the following page) shows the location of all of the towers, depicted as yellow tower icons. The towers vary in ownership, height, size, and ability to add additional antenna equipment. The water towers in the map are shown as blue icons.

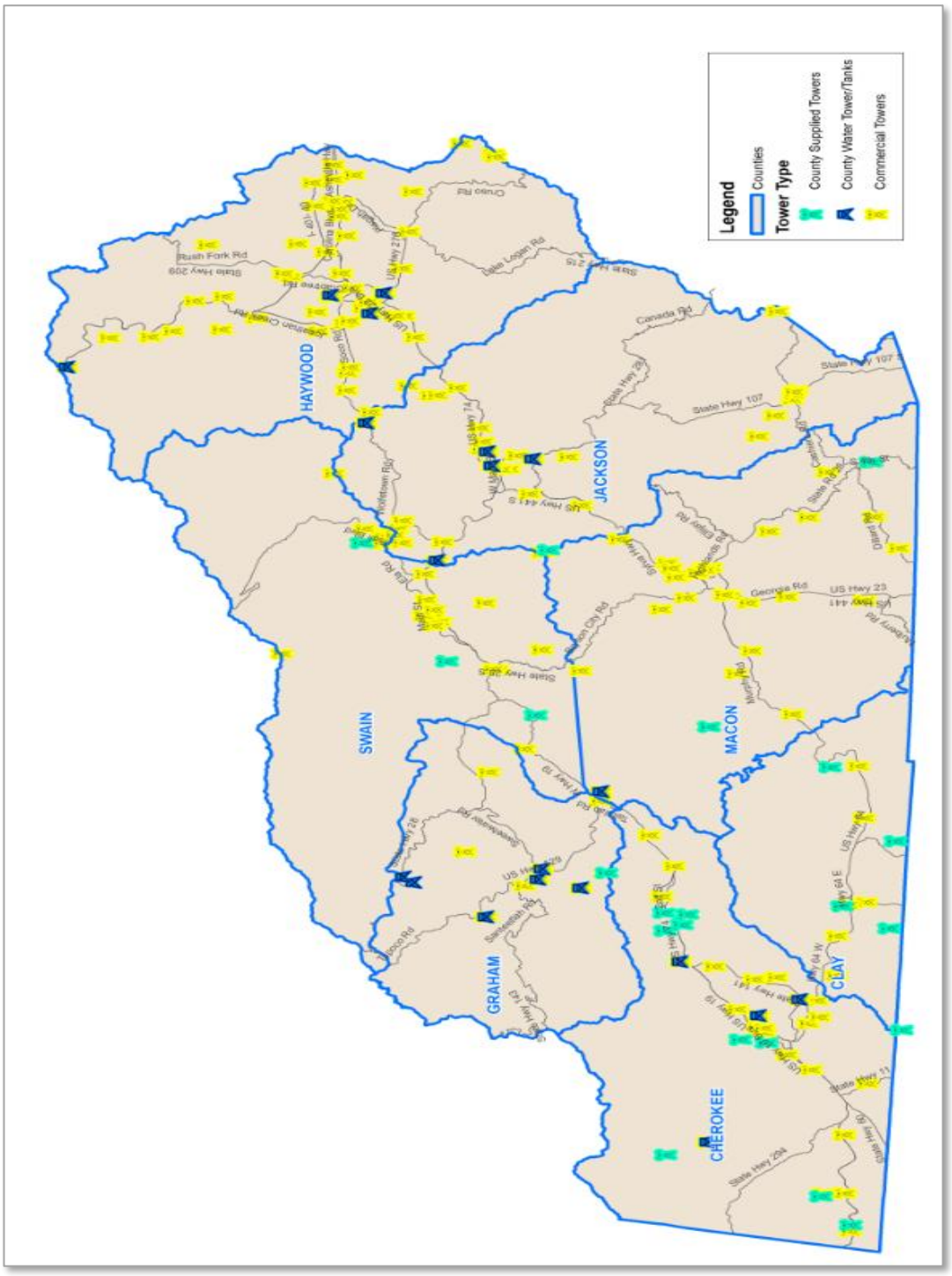


FIGURE 17 MAP OF VERTICAL ASSETS IN SOUTHWESTERN REGION (FULL SIZE)

[This Page Intentionally Left Blank]

Site Visits.

ECC planned on physical surveys as required to validate our data with respect to certain identified towers / vertical assets.

Most commercial towers currently in operation, such as those owned by American Tower or Crown Castle et al, were not included in physical surveys. The parameters of such towers are available from the tower owner/operator. We utilized additional tools to evaluate the practical use of selected commercial towers for fixed wireless services.

Government owned vertical assets, such as public safety, government communications, and water towers, were physically surveyed where possible. In a several instances, access to the tower was not accessible. In those cases, nearby alternative towers were surveyed.

Prior to site visits, ECC viewed each of the county selected vertical assets in Google Earth to determine the practical use of the asset for wireless broadband signal propagation. Both overhead views and street level views (where available) were examined.

Based on the information provided by the Counties, ECC used Google Earth to determine the potential of each tower or water tower and tanks for use, as can be discussed in the previous section, in providing broadband services using Fixed Wireless technologies. ECC used the following criteria for making the decision to visit and conduct a physical survey of the vertical asset.

1. Is the tower structure accessible from a road? Or does it have an access road?
2. Does the location have an equipment hut or access to power? (though solar power can sometimes be used by a WISP or other type of provider)

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

3. Is the tower or tank taller than the surrounding trees?
4. What is the structure height and does the asset have space on it to mount equipment?
5. Does the elevation of the tower provide radio signal access to the surrounding area?
6. Do people live in the surrounding area?

Field Visit Sites and Criteria.

After the first phase of analysis was completed as described above a number of vertical assets were deemed unusable from a propagation perspective. To further refine the value of the remaining assets ECC conducted "heat map" propagation analysis through an Internet based application program: Tower Coverage. Tower Coverage is an industry standard tool for baseline propagation development.

Below is a list of the number and type of vertical asset selected for the field visit.

County	Wireless Towers	Water Towers or Tanks
Cherokee	2	1
Clay	3	0
Graham	1	0
Haywood	2	0
Jackson	3	0
Macon	3	0
Swain*	3	0

Site visit results are shown in the following section.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Cherokee County Tower ID: CHT9

Onsite Visit Engineer Report

Date: 12/13/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Cherokee County
Name of Engineer:	J. Van Tol

Tower Owner:	(?) Undetermined	**Tower/Digital Picture No:**	IMG_1509 - 1511
No Site Access:	Multiple Towers	**No of Pictures:**	3
Tower Address: Fain Mountain	End of Fain Peak (road) off of Reservoir Rd. (NC-1365), @ Joe Brown Hwy, out of Murphy, NC.		
FCC Tower Number:	?) Undetermined		
Contact Info on Placard or Sign with Telephone #:	?) Undetermined		

TOWER INFRASTRUCTURE

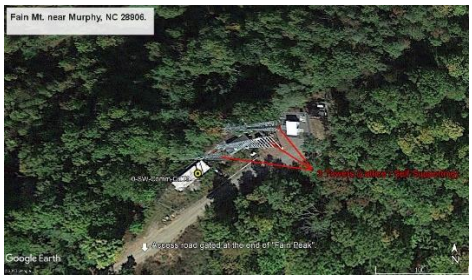
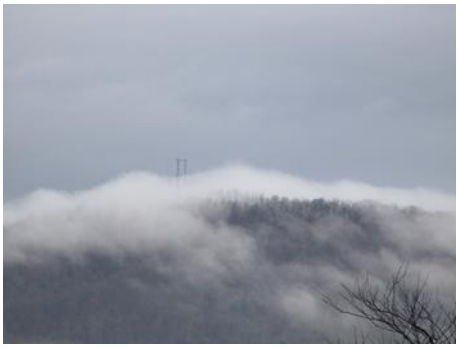
Type of Tower:	Monopole **X** Lattice / **X** Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	Feet
Number of cell panel levels:	2 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	Yes; other type dish antennas, No Microwave.
Est No. of additional levels not used:	Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	Verizon Wireless	T-Mobile
	☐ Sprint	☐ US Cellular
	AT&T	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed? (AT&T Fiber Ca.)	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	Yes	☐ No	X Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road:	**X** Paved **X** Gravel Dirt ☐ Other _____		

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Cherokee County Tower ID: CHT10

Onsite Visit Engineer Report

Date: 12/13/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Cherokee County.
Name of Engineer:	J. Van Tol

Tower Owner:	(?) Undetermined (the County?).	**Tower/Digital Picture No:**	IMG_1512 - 1517
Site ID #: HP - 1359		**No of Pictures:** 6	
Tower Address: behind County Jail@ # 577 Regal St., Murphy, NC. 28906 (Cherokee County Detention Center).			
FCC Tower Number:	ASR - 1274680		
Contact Info on Placard or Sign with Telephone #:	**L-919-662-4440**		

TOWER INFRASTRUCTURE

Type of Tower:	Monopole **X** Lattice / **X** Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	~300' Feet
Number of cell panel levels:	3 Levels
Antenna hardware:	
Microwave or other dish hardware:	Yes; other type dish & Omni antennas, No Microwave.
Est No. of additional levels not used:	Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	Verizon Wireless	T-Mobile
	☐ Sprint	☐ US Cellular
	AT&T	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed? (AT&T Fiber Ca.)	Yes	☐ No	X Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road:	☐ Paved **X** Gravel **X** Dirt ☐ Other _____		

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Cherokee County Tower ID: CH24

Onsite Visit Engineer Report

Date: 12/13/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Cherokee County.
Name of Engineer:	J. Van Tol

Tower Owner:	(?) Undetermined	**Tower/Digital Picture No:**	IMG_1518 - 1521
No Site Access	Water Tower	**No of Pictures:**	4
Tower Address:	155 Palmer Lane, Marble, NC. 28905		
FCC Tower Number:	N/A		
Contact Info on Placard or Sign with Telephone #:			

TOWER INFRASTRUCTURE

Type of Tower:	Monopole ☐ Lattice / ☐ Self Supporting ☐ Guyed **X** Other ___Water Tower_____
Estimated Height of Tower:	Feet
Number of cell panel levels:	Levels
Antenna hardware:	N/A
Microwave or another dish hardware:	N/A.
Est No. of additional levels not used:	Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	Verizon Wireless	T-Mobile
	☐ Sprint	☐ US Cellular
	AT&T	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed? (AT&T Fiber Ca.)	Yes	☐ No	X Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	Yes	☐ No	X Undetermined
Does tower have nearby hut?	Yes	X No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road:	**X** Paved **X** Gravel Dirt ☐ Other _____		

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Clay County Tower ID: CLT5

Onsite Visit Engineer Report

Date: 12/13/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Clay County.
Name of Engineer:	J. Van Tol

Tower Owner:	Crown Castle. Site Name - Hayesville	**Tower/Digital Picture No:**	IMG_1531 - 1539
Unit #: 806757		**No of Pictures:** 9	
Tower Address:	1876 Highway 64 Business, Hayesville, NC 28094		
FCC Tower Number:			
Contact Info on Placard or Sign with Telephone #:	**L-877-486-9377**		

TOWER INFRASTRUCTURE

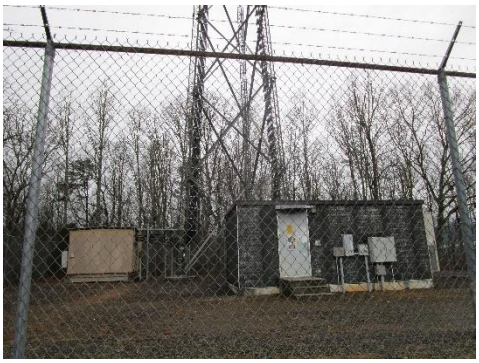
Type of Tower:	Monopole **X** Lattice / **X** Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	~180' Feet
Number of cell panel levels:	3 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	Yes; other type dish antennas, & Microwave.
Est No. of additional levels not used:	1 Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	Verizon Wireless	T-Mobile
	☐ Sprint	**X** US Cellular
	AT&T	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed?	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road:	**X** Paved Gravel Dirt ☐ Other _____		

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Clay County Tower ID: CLT6

Onsite Visit Engineer Report

Date: 12/14/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Clay County.
Name of Engineer:	J. Van Tol

Tower Owner:	County 911 (?).	**Tower/Digital Picture No:**	IMG_1546 - 1552
		No of Pictures:	7
Tower Address:	570 Eagles View Cir., Hayesville, NC. 28904		
FCC Tower Number:	? Undetermined		
Contact Info on Placard or Sign with Telephone #:	? Undetermined		

TOWER INFRASTRUCTURE

Type of Tower:	Monopole ☐ Lattice / ☐ Self Supporting ☐ Guyed **X** Other __Wood Pole 3/55'_____
Estimated Height of Tower:	~47' Feet
Number of cell panel levels:	0 Levels
Antenna hardware:	Omni Antenna
Microwave or other dish hardware:	Yes; other type directional antennas, No Microwave.
Est No. of additional levels not used:	Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	Verizon Wireless	T-Mobile
	☐ Sprint	☐ US Cellular
	AT&T	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed?	Yes	☐ No	X Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	Yes	X No	☐ Undetermined
Type of Access Road:	**X** Paved Gravel Dirt ☐ Other _____		

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Clay County Tower ID: CL2

Onsite Visit Engineer Report

Date: 12/14/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Clay County.
Name of Engineer:	J. Van Tol

Tower Owner:	Crown Castle. Site Name – Big Pine Ridge.	**Tower/Digital Picture No:**	IMG_153 - 1561
Unit #: 841972		**No of Pictures:** 9	
Tower Address:	139 Ash Loop Road, Hayesville, NC. 28904		
FCC Tower Number:			
Contact Info on Placard or Sign with Telephone #:	**1-877-486-9377**		

TOWER INFRASTRUCTURE

Type of Tower:	**X** Monopole ☐ Lattice / ☐ Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	~190' Feet
Number of cell panel levels:	5 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	No; no other type of antennas, & No Microwave.
Est No. of additional levels not used:	____ Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	Verizon Wireless	____	T-Mobile	____
	☐ Sprint	____	☐ US Cellular	____
	X AT&T	____	☐ Other_____	

TOWER AREA ATTRIBUTES

Is tower fiber fed? (Balsam West Fibernet LLC.)	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut?	Yes	X No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road: ☐ Paved **X** Gravel **X** Dirt ☐ Other _____			

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Graham County Tower ID: A1308158

Onsite Visit Engineer Report

Date: 12/13/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Graham County.
Name of Engineer:	J. Van Tol

Tower Owner:	Southern Towers. Site Name; JOHN DRIVE	**Tower/Digital Picture No:**	IMG_1522 - 1529
Site ID #: NC - 007		**No of Pictures:** 8	
Tower Address:	179 John Grant Way, Robbinsville, NC. 28771		
FCC Tower Number:	ASR - 1308158		
Contact Info on Placard or Sign with Telephone #:	**L-423-531-6300**		

TOWER INFRASTRUCTURE

Type of Tower:	**X** Monopole ☐ Lattice / ☐ Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	~200' Feet
Number of cell panel levels:	1 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	Yes; other type dish antennas, No Microwave.
Est No. of additional levels not used:	☐ Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	**X** Verizon Wireless ☐	T-Mobile ☐
	☐ Sprint ☐	☐ US Cellular ☐
	AT&T ☐	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed?	Yes	☐ No	X Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	Yes	X No	☐ Undetermined
Does tower have nearby hut?	Yes	X No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road:	☐ Paved **X** Gravel Dirt ☐ Other _____		

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Haywood County Tower ID: NC03609-S

Onsite Visit Engineer Report

Date: 12/11/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Haywood County.
Name of Engineer:	J. Van Tol

Tower Owner:	SBA Towers.	**Tower/Digital Picture No:**	IMG_1428 - 1438
Site ID #: NC03609		**No of Pictures:** 11	
Tower Address:	361 Stick Weed Trail, Waynesville, NC. 28786		
FCC Tower Number:	1224808		
Contact Info on Placard or Sign with Telephone #:	**1-800-487-7483**		

TOWER INFRASTRUCTURE

Type of Tower:	**X** Monopole ☐ Lattice / ☐ Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	~160' Feet
Number of cell panel levels:	5 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	Yes; other type dish antennas, No Microwave.
Est No. of additional levels not used:	____ Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	**X** Verizon Wireless ____	**X** T-Mobile ____
	☐ Sprint ____	☐ US Cellular ____
	X AT&T ____	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed? (AT&T Fiber Ca.)	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road: ☐ Paved **X** Gravel **X** Dirt ☐ Other _____			

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Haywood County Tower ID: 800917

Onsite Visit Engineer Report

Date: 12/11/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Haywood County.
Name of Engineer:	J. Van Tol

Tower Owner:	Crown Castle. Site Name – Jonathan Creek.	**Tower/Digital Picture No:**	IMG_1439 - 1450
Unit #: 800917		**No of Pictures:** 12	
Tower Address:	147 Boyd Farm Rd., Waynesville, NC. 28786		
FCC Tower Number:			
Contact Info on Placard or Sign with Telephone #:	**1-877-486-9377**		

TOWER INFRASTRUCTURE

Type of Tower:	**X** Monopole ☐ Lattice / ☐ Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	~133' Feet
Number of cell panel levels:	4 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	Yes; other type dish antennas, No Microwave.
Est No. of additional levels not used:	Levels
Height of highest available space:	? Undetermined

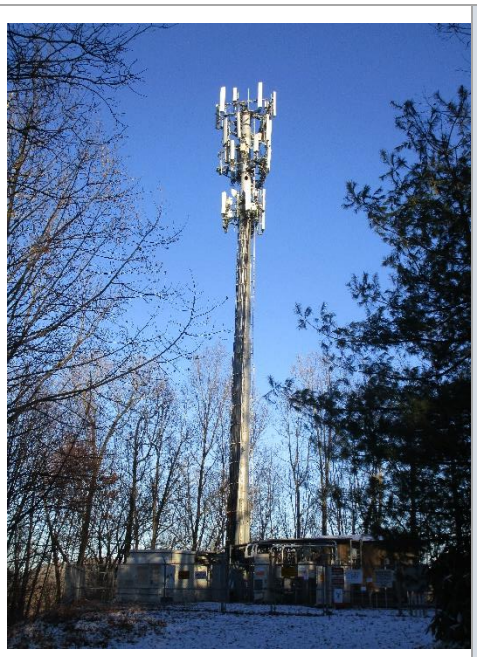
EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	**X** Verizon Wireless	T-Mobile
	☐ Sprint	**X** US Cellular
	X AT&T	**X** Other Air Gate_____

TOWER AREA ATTRIBUTES

Is tower fiber fed? (AT&T Fiber Ca.)	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road:	☐ Paved **X** Gravel **X** Dirt ☐ Other _____		

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Jackson County Tower ID: A1058525

Onsite Visit Engineer Report

Date: 12/12/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Jackson County.
Name of Engineer:	J. Van Tol

Tower Owner:	Undetermined (Crown Atlantic Company LLC.).	**Tower/Digital Picture No:**	IMG_1451 - 1454
NO SITE ACCESS!		**No of Pictures:** 4	
Tower Address:	13 Boar Ridge Rd., Savannah, NC. 28786		
FCC Tower Number:			
Contact Info on Placard or Sign with Telephone #:			

TOWER INFRASTRUCTURE

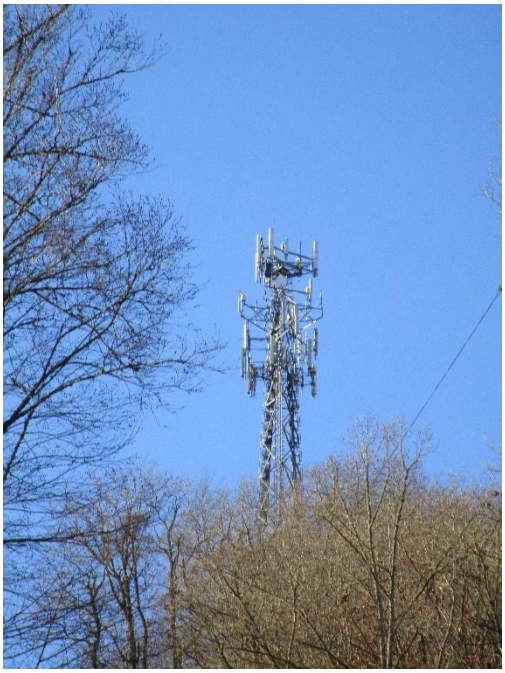
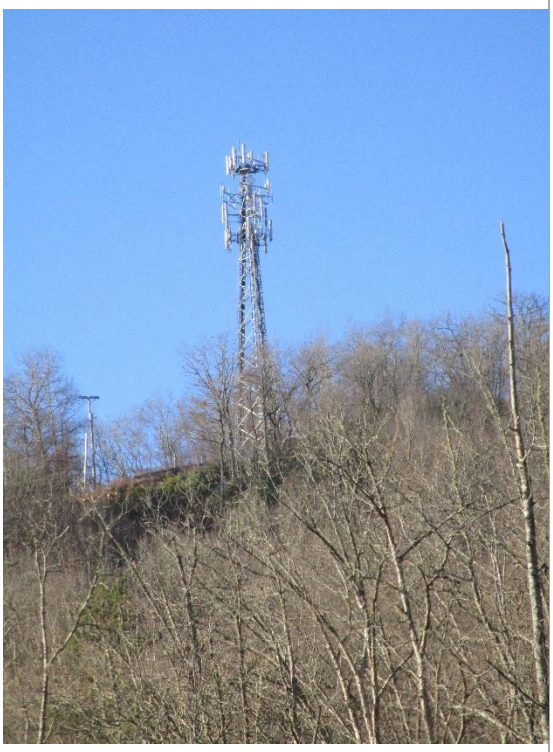
Type of Tower:	Monopole X Lattice / X Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	Feet
Number of cell panel levels:	5 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	? Undetermined.
Est No. of additional levels not used:	Levels
Height of highest available space:	? Undetermined.

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	Verizon Wireless	T-Mobile
	☐ Sprint	☐ US Cellular
	AT&T	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed?	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	Yes	☐ No	X Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road:	X Paved X Gravel X Dirt ☐ Other _____		

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Jackson County Tower ID: NC-5015

Onsite Visit Engineer Report

Date: 12/15/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Jackson County.
Name of Engineer:	J. Van Tol

Tower Owner:	American Tower Corp. Site Name - Toxaway.	**Tower/Digital Picture No:**	IMG_1590 - 1637
Site ID #: NC-372897	(Note: Multiple towers on site; (Qty=9 sites)).	**No of Pictures:** 48	
Tower Address:	1461 Tower Rd., Sapphire, NC. 28774		
FCC Tower Number:			
Contact Info on Placard or Sign with Telephone #:	1-877-282-7483		

TOWER INFRASTRUCTURE

Type of Tower:	**X** Monopole **X** Lattice / **X** Self Supporting **X** Guyed **X** Other _____
Estimated Height of Tower:	Feet See notes; Multiple tower types and sizes.
Number of cell panel levels:	Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	Yes; other type dish antennas, Omni, and Microwave.
Est No. of additional levels not used:	Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	**X** Verizon Wireless	**X** T-Mobile
	☐ Sprint	**X** US Cellular
	X AT&T	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed?	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road:	**X** Paved **X** Gravel **X** Dirt ☐ Other _____		

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Jackson County Tower ID: Alt #1

Onsite Visit Engineer Report

Date: 12/12/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Jackson County.
Name of Engineer:	J. Van Tol

Tower Owner:	Crown Castle. Site Name – Dills Gap.	**Tower/Digital Picture No:**	IMG_1455 - 1461
Unit #: 841462		**No of Pictures:** 7	
Tower Address:	533 US 441 South, Sylva, NC. 28779		
FCC Tower Number:			
Contact Info on Placard or Sign with Telephone #:	**L-877-486-9377**		

TOWER INFRASTRUCTURE

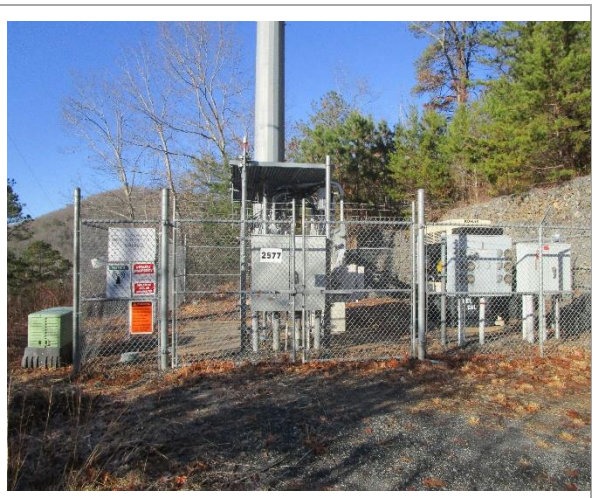
Type of Tower:	**X** Monopole ☐ Lattice / ☐ Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	~120' Feet
Number of cell panel levels:	1 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	NO.
Est No. of additional levels not used:	____ Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	Verizon Wireless	____	T-Mobile	____
	☐ Sprint	____	☐ US Cellular	____
	X AT&T	____	☐ Other_____	

TOWER AREA ATTRIBUTES

Is tower fiber fed? (AT&T Fiber Ca.)	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut?	Yes	X No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road: ☐ Paved **X** Gravel **X** Dirt ☐ Other _____			

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Macon County Tower ID: 1237135

Onsite Visit Engineer Report

Date: 12/14/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Macon County.
Name of Engineer:	J. Van Tol

Tower Owner:	Crown Castle. Site Name - Tank.	**Tower/Digital Picture No:**	IMG_1562 - 1570
Unit #: 804753		**No of Pictures:** 8	
Tower Address:	30 Cunningham Rd., Franklin, NC 28734		
FCC Tower Number:	1237135		
Contact Info on Placard or Sign with Telephone #:	**1-877-486-9377**		

TOWER INFRASTRUCTURE

Type of Tower:	**X** Monopole ☐ Lattice / ☐ Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	~190' Feet
Number of cell panel levels:	4 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	Yes; other type dish antennas, and Microwave.
Est No. of additional levels not used:	____ Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	**X** Verizon Wireless ____	**X** T-Mobile ____
	☐ Sprint ____	**X** US Cellular ____
	X AT&T ____	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed? (Balsam West Fibernet LLC.)	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road: ☐ Paved **X** Gravel **X** Dirt ☐ Other _____			

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Macon County Tower ID: A1286915

Onsite Visit Engineer Report

Date: 12/14/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Macon County.
Name of Engineer:	J. Van Tol

Tower Owner:	Duke Energy.	**Tower/Digital Picture No:**	IMG_1571 - 1573
NO SITE ACCESS!		**No of Pictures:**	3
Tower Address:	?71 NP & L Loop, Franklin, NC. 28734		
FCC Tower Number:	? Undetermined		
Contact Info on Placard or Sign with Telephone #:	? Undetermined		

TOWER INFRASTRUCTURE

Type of Tower:	X Monopole ☐ Lattice / ☐ Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	~70' Feet
Number of cell panel levels:	0 Levels
Antenna hardware:	Yes; Undetermined
Microwave or other dish hardware:	Yes; other type Omni antennas, No Microwave.
Est No. of additional levels not used:	____ Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	Verizon Wireless	____	T-Mobile	____
	☐ Sprint	____	☐ US Cellular	____
	AT&T	____	☐ Other_____	

TOWER AREA ATTRIBUTES

Is tower fiber fed?	Yes	☐ No	X Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut? (NO HUT But, Buildings)	X Yes	☐ No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road:	X Paved Gravel Dirt ☐ Other _____		

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Macon County Tower ID: A1239307

Onsite Visit Engineer Report

Date: 12/14/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Macon County.
Name of Engineer:	J. Van Tol

Tower Owner:	SBA Towers.	**Tower/Digital Picture No:**	IMG_1574 - 1578
Site ID #: NC20296	**NO SITE ACCESS!**	**No of Pictures:** 5	
Tower Address:	Road @ the end of / off of "Youngs Mountain Rd.", Franklin, NC. 28734		
FCC Tower Number:	1239307		
Contact Info on Placard or Sign with Telephone #:	**1-800-487-7483**		

TOWER INFRASTRUCTURE

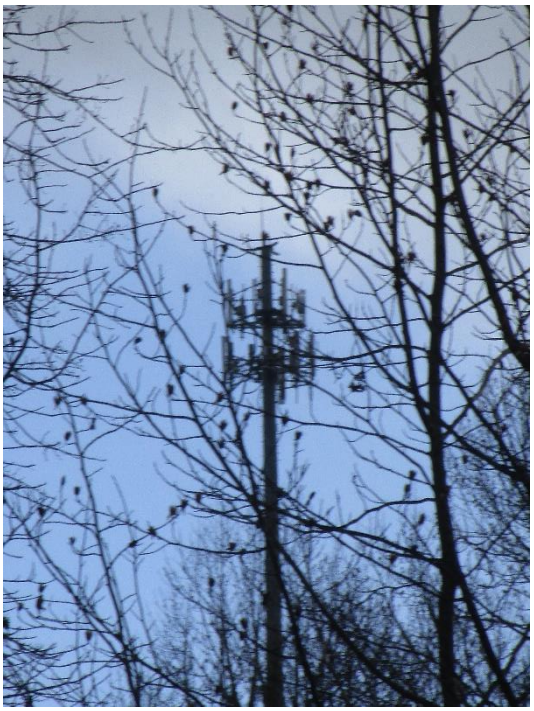
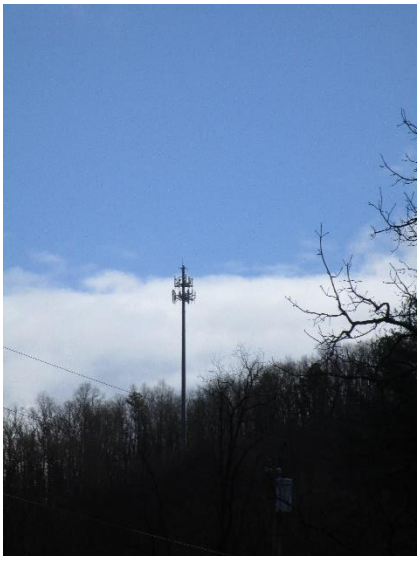
Type of Tower:	**X** Monopole ☐ Lattice / ☐ Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	Undetermined
Number of cell panel levels:	3 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	? Undetermined.
Est No. of additional levels not used:	1 Levels (Note: Top level is open.)
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	**X?** Verizon Wireless	T-Mobile
	☐ Sprint	☐ US Cellular
	X? AT&T	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed? (Verizon)	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	Yes	☐ No	X Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road:	☐ Paved **X** Gravel **X** Dirt ☐ Other _____		

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Swain County Tower ID: A1000280

Onsite Visit Engineer Report

Date: 12/12/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Swain County.
Name of Engineer:	J. Van Tol

Tower Owner:	Crown Castle. Site Name – Bryson City	**Tower/Digital Picture No:**	IMG_1470 - 1478
Unit #: 807217		**No of Pictures:** 8	
Tower Address:	168 Wells St., Bryson City, NC. 28713		
FCC Tower Number:	1000280		
Contact Info on Placard or Sign with Telephone #:	**1-877-486-9377**		

TOWER INFRASTRUCTURE

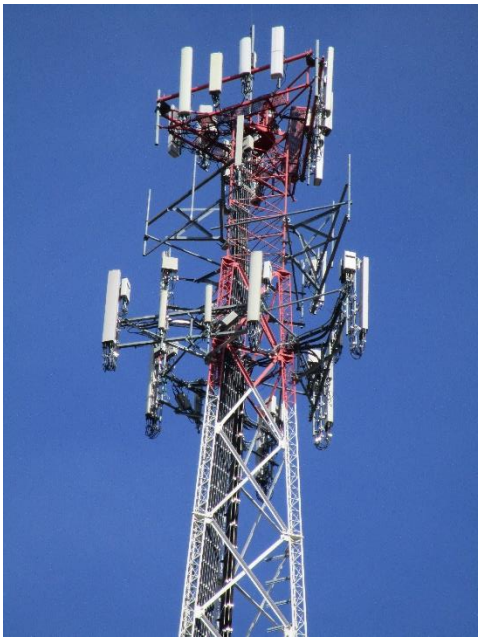
Type of Tower:	Monopole **X** Lattice / **X** Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	~230' Feet
Number of cell panel levels:	3 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	Yes; other type dish antennas, No Microwave.
Est No. of additional levels not used:	____ Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	Verizon Wireless	____	**X** T-Mobile	____
	☐ Sprint	____	☐ US Cellular	____
	X AT&T	____	☐ Other_____	

TOWER AREA ATTRIBUTES

Is tower fiber fed? (AT&T Fiber Ca.)	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road: ☐ Paved **X** Gravel Dirt ☐ Other _____			

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Swain County Tower ID: SCT2 (A1280547)

Onsite Visit Engineer Report

Date: 12/12/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Swain County.
Name of Engineer:	J. Van Tol

Tower Owner:	Smokey Mountain Towers, LLC.	**Tower/Digital Picture No:**	IMG_1479 - 1508
Multiple Towers on site:	(Qty = 4 plus, 1 wood utility pole)	**No of Pictures:**	30
Tower Address:	1800 Big Rockys Rd, Bryson City, NC 28713.		
FCC Tower Number:	ASR - 1280547		
Contact Info on Placard or Sign with Telephone #:	**1-800-487-7483**		

TOWER INFRASTRUCTURE

Type of Tower:	Monopole **X** Lattice / **X** Self Supporting ☐ Guyed **X** Other ___Wood Utility Pole_____
Estimated Height of Tower:	Feet
Number of cell panel levels:	6 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	Yes; other type dish & Omni antennas, plus Microwave.
Est No. of additional levels not used:	Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	**X** Verizon Wireless	**X** T-Mobile
	☐ Sprint	**X** US Cellular
	X AT&T	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed?	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	X Yes and	X No	☐ Undetermined
Type of Access Road:	☐ Paved **X** Gravel **X** Dirt ☐ Other _____		

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Swain County Tower ID: NC15430-A

Onsite Visit Engineer Report

Date: 12/15/19

SW COMMISSION
WIRELESS TOWER INFRASTRUCTURE FORM

County Name:	Swain County.
Name of Engineer:	J. Van Tol

Tower Owner:	SBA Towers.	**Tower/Digital Picture No:**	IMG_1579 - 1589
Site ID #: NC15430		**No of Pictures:** 10	
Tower Address:	Year house # 222 Shady Dr., Bryson City, NC. 28713		
FCC Tower Number:	12499096 (Pegasus Tower No. NCSW01)		
Contact Info on Placard or Sign with Telephone #:	**1-800-487-7483**		

TOWER INFRASTRUCTURE

Type of Tower:	Monopole **X** Lattice / **X** Self Supporting ☐ Guyed ☐ Other _____
Estimated Height of Tower:	~250' Feet
Number of cell panel levels:	3 Levels
Antenna hardware:	Cell Antennas
Microwave or other dish hardware:	Yes; other type dish antennas, No Microwave.
Est No. of additional levels not used:	____ Levels
Height of highest available space:	? Undetermined

EXISTING SERVICE PROVIDERS

Service Providers on Tower: (from placards, power meter, conduit ID or other identifying characteristic)	**X** Verizon Wireless ____	T-Mobile ____
	☐ Sprint ____	**X** US Cellular ____
	X AT&T ____	☐ Other_____

TOWER AREA ATTRIBUTES

Is tower fiber fed? (Verizon Fiber Ca.)	X Yes	☐ No	☐ Undetermined
Does tower have available conduit?	☐ Yes	☐ No	X Undetermined
Is back up power in place?	X Yes	☐ No	☐ Undetermined
Does tower have nearby hut?	X Yes	☐ No	
Is tower fenced in?	X Yes	☐ No	☐ Undetermined
Type of Access Road:	**X** Paved Gravel **X** Dirt ☐ Other _____		

Photo 1		**Photo 2**	
Photo 3		**Photo 4**	

End Site Visit

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Contact the Asset Owner.

During the periods relating to kickoff and initial follow up meeting, ECC and the SWC will consider an appropriate contact schedule and define the results of such contact.

Based on ECC's experience, the following information is considered as the most important components of contact activities:

- Identification of the asset
- Type of asset
- Location of the asset
- Ownership of the asset
- Type of ownership
- Construction date
- Height
- Registrations (if any – e.g. FCC)

ECC utilized best efforts to contact the owners of all publicly owned assets i.e. counties and other designated authorities. We further made direct contact with the owners of major tower holdings such as American Tower and Crown Castle. Information noted above is readily available from the online databases operated by each of these providers; for brevity, not all of the above listed data points is not reproduced in this report thought the assets are identified.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

[This Page Intentionally Left Blank]

Tower Ordinance Review.

The Southwestern region of North Carolina is located one of the most scenic area of the United States. Year-round tourism based on the natural beauty of this mountainous area is a large part of the overall economy.

The proliferation of towers across the region could lower the overall charm and character of the region. Each of the seven county local governments in the region understand the importance of preserving this natural resource. At the same time cellular telephone and broadband access have become a vital part of everyday life of modern society.

To balance the need to maintain the visual appeal of the area and to provide modern day convenience of wireless communications, some counties have developed tower ordinances that regulate and control the placement, construction and modification of tower infrastructure on private and public land.

ECC obtained Tower Ordinances for the following Counties:

- Haywood
- Jackson
- Macon
- Swain (old moratorium doc)

Of the counties that have tower ordinances, each one differs, to some degree, but many common points are shared. These ordinances generally include:

1. Application and Review Process

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

2. Criteria for Issuing a Building Permit
3. Public Notice
4. Structure Plan with requirements
5. Approval

All ordinances which could be accessed, are included in Appendix B of this report.

ECC is making no determination or representation as to whether any given identified asset is in compliance with the applicable county ordinance based or Federal act, as discussed below, on the asset location.

Regulatory Information from the 1996 Telecommunications Act.

The 1996 Telecommunications Act – Section 704 - allows jurisdiction by state and local zoning authorities over the construction, modification and placement of facilities such as towers for wireless communications with some stipulations:

A Fact Sheet from the FCC regarding National Wireless Tower Siting Policies can be found in Appendix C. Below are some important points from that document.

1. It preserves local zoning authority but clarifies when the exercise of local zoning authority may be preempted by the FCC.
2. Prohibits any action that would discriminate between different providers of personal wireless services, such as cellular, wide-area SMR and broadband PCS.
3. It also prohibits any action that would ban altogether the construction, modification or placement of these kinds of facilities in a particular area.
4. The law also specifies procedures which must be followed for acting on a request to place these kinds of facilities and provides for review in the courts or the FCC of any decision by a zoning authority that is inconsistent with Section 704.

1) Section 704 requires the federal government to take steps to help licensees in spectrum-based services, such as PCS and cellular, get access to preferred sites for their facilities. Federal agencies and departments will work directly with licensees to make federal property available for this purpose, and the FCC is directed to work with the states to find ways for

states to accommodate licensees who wish to erect towers on state property, or use state easements and rights-of-way.

[This Page Intentionally Left Blank]

Initial Strategic Planning.

In evaluating potential starting points for each county, and with a focus on the County supplied assets and fixed wireless, the initial criteria for analysis were:

1. What is existing coverage?
2. Are service providers planning new, expanded or enhanced coverage?
3. What is projected coverage based upon a review of completed/in-process grant applications [Federal/State].

With the above questions as a backdrop, ECC shifted attention to pertinent information from the Phase 1 BAAT (Broadband Aggregation and Assessment Tool) project from 2017 discussed in the first section of this study.

Responses from the survey were parsed, and two questions were identified as more important in response to this question. As an aside, this survey was also presented to any respondent whose address was out of the seven-county area, though out-of-zone responses have not been included in this report.

The two pertinent questions from the survey were:

1a. If you don't currently subscribe to Internet service, please tell us why.

- Not available
- Too expensive

4. Does the speed you currently subscribe to meet your needs?

ECC overlaid selected propagation data over county maps on a county by county basis. In general, ECC selected a minimum of two vertical asset sites provided by the county for each map. Previously referenced grant and projected coverage information were then overlaid onto each map.

Finally, the BAAT data was added to the maps to produce sample coverage maps for review.

In looking to ensure this report was of value to a wide variety of influencers and decisions makers, ECC interviewed area service providers. This step was taken not only to confirm frequency utilization in the study area, but to gain insight into expansion / growth plans of providers.

From a strategic perspective, each area desiring to increase its broadband coverage has to consider funding. While North Carolina is somewhat stricter on government involvement in broadband than neighboring states. It is believed that some state restrictions may be relaxed in the coming legislative sessions.

In the interim, some providers such as Wilkes Communications, have demonstrated a progressive track record incorporating local/county participation with a private partner Several other providers in North Carolina have also exhibited similar capabilities in Nash County, Stanly County, and others.

Funding

Funding is the key strategic initiative. The starting point for obtaining funding is to define the appropriate source for funds. Grants, loan programs and outside investments are three commonly used funding mechanisms.

Grants

Competitive grants are available, for approved projects, from both state and federal entities as previously noted. Access to these funds are almost always tied to having a service provider available as a partner. Projects are no longer evaluated just on the builds, but also on the demonstrated ability of the applicant(s) to maintain a viable operating presence within the award territory.

Grants generally require an addition of funds from the participant. For the USDA Reconnect Grant and the NC State Great Grant for example, defined percentages are specified as the required contributions to be made by the applicants.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Grant awards are often evaluated on a point system. For example, certain levels of points are acquired based on cost of provisioning a household; ability to service farms, anchor institutions, health care facilities; leveraging a public/private partnership, and other criteria.

For FCC grants, funds are usually obtained by a reverse auction. In this case, an applicant must determine for themselves what is the minimum level of grant funds ("support") they are willing to accept in order to provide services as defined in a given area.

Areas are becoming increasingly precise in terms of definitions. In the early days of cellular licensing, the country was divided into 306 Metropolitan Service Areas, or MSA's, which often comprised multiple counties. Subsequent awards were made by the FCC for 427 Rural Service Areas, or RSA's, which expanded the cellular footprint.

Initial allocations were for two providers for market – when new frequencies with made available, four additional entrants were market were added.

The multiple rounds of the reverse auction are designed to get the government contribution down as low as possible, with a commitment by the provider to make up the difference. In a past FCC auction, funds were disbursed over a ten-year period with buildout taking place is six years.

There is a distinct companion piece to the auctions and that is the use of technology. While fiber technologies – especially fiber to the home or FTTH are a critical component of last mile broadband delivery, wireless spectrum auctions are also publicized.

Fixed wireless offers from the early 2000's generally focused on unlicensed 900 MHz spectrum. Since that time, the FCC has issued a dizzying array of licensed and unlicensed regulations and NPR's in an attempt to regulate spectrum, drive innovation, and bring money into the Treasury.

CBRS and 3.65 are two of the latest – AT&T is aggressively working to gain 39 GHz space and T-Mobile is actively exploiting the 600 MHz spectrum sharing rules.

All these changes mean that multiple entities could be vying, with alternate technologies, to deliver service into a given geographical area. The competitor who wins grant funding has a head start

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

from a competitive perspective no matter what technology is utilized if the entity is launched and operationalized correctly.

Loans

Loan funds are also available. Low cost Federal loans – sometimes packaged with grants – are available with long repayment terms and below market interest rates.

If the loan packages are not combined with a grant, then a loan is often less competitive, and therefore easier to obtain than the grant only, or grant/loan combinations.

There are other loan sources available to support broadband rollout – the obvious sources include commercial banks [some SBA lenders are participatory], vendor financing options, and cooperative lenders.

Local governments are often tapped as being a bank of sorts, with loan agreements being setup ensuring taxpayer investments are recovered and/or protected.

The issue with debt, unless there are forgiveness clauses within the mortgage, is the obvious requirement for repayment. Non fiber / non real property assets generally depreciate more quickly than the favorable loans utilized to finance the equipment or project.

There are very real situations – in the current time – where the depreciated valued of the assets utilized in a network deployment, are substantially less than the loan balance used to finance asset acquisition and network buildout.

Partnerships

This section discusses partnerships from a perspective of barters for value, vs. a true partnership such a joint venture, merger, or some other contractual combination of operating interests.

This arrangement would suggest that certain partners providing high degrees of professional, build out or operational services, might take payment in the form of a down payment and/or monthly retainer, and an agreed upon percentage of future revenue or earnings.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Disclaimer

ECC Technologies makes no recommendations, provides no guidance, and cannot assume any responsibility for any operating entity with respect to the conceptualization, funding, design, development, deployment or operation of a broadband system.

Within this document, both ECC and certain manufacturers have provided propagation information. ECC makes no recommendations as to the viability of the propagation represented either by itself or by any third party, where such propagation is contained within this document.

Applicants must seek and utilize the advice of qualified legal, regulatory, tax, and accounting professionals prior to making any major decisions or executed contracts related to the areas previously noted.

Potential Projects

Following are project starting points for each of seven counties. As previously discussed, the starting point for each of these, beyond the common areas identified earlier in this section, is the careful examination of data at the confluence of key factors:

- Current services and unserved area (10/1 Mbps)
- Projected and funded services
- Vertical assets
- BAAT campaign data.

The vertical assets represented are those county owned assets which potentially could be made available for use by a service provider in delivering broadband services.

ECC Technologies previously provided very detailed BAAT information to the Southwestern Commission, and is prepared to review that data, combined with the information in this report with qualified service providers who want to consider a broadband project in one of the seven counties.

Under separate cover, separate (Full Page) 8 ½ x 11 maps will be made available for use by the SW Commission, the Counties and service providers.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

ECC will provide these maps to the SW Commission in electronic format but may also be able to provide responses to service providers for additional detail which can be pulled from the current data and the previous BAAT study.

Reasonable requests will be handled in an appropriate manner, but ECC is unable to handle exceptionally large or unreasonable requests for data.

The following is represented by the BAAT survey dots. The green dots signify there is a no broadband service available, blue dots signify there is no service for other reasons, (over 80% of these responses were because the service is too expensive) and orange dots which represents responders that stated the service available does not meet their current speed needs. For further viewing and analysis larger maps can be seen at ECCSWC.COM

[The Remainder of This Page Intentionally Left Blank.]

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Cherokee County Project

Below is a map of the 3 towers visited in Cherokee County which shows signal propagation from field estimated mounting height. The map also shows BAAT campaign dots in area and FCC 477 unserved area info.

County	Site Name (Tower Coverage)	Description	Owner	Default Height	Proposed Mounting Height
Cherokee	CHT9	Lattice	Bill Forsyth	48	47
Cherokee	CHT10 – Alt 2	Multi - Lattice	SHP and others	100	97
Cherokee	CHWT1 (CH24)	Water Tower		45	44

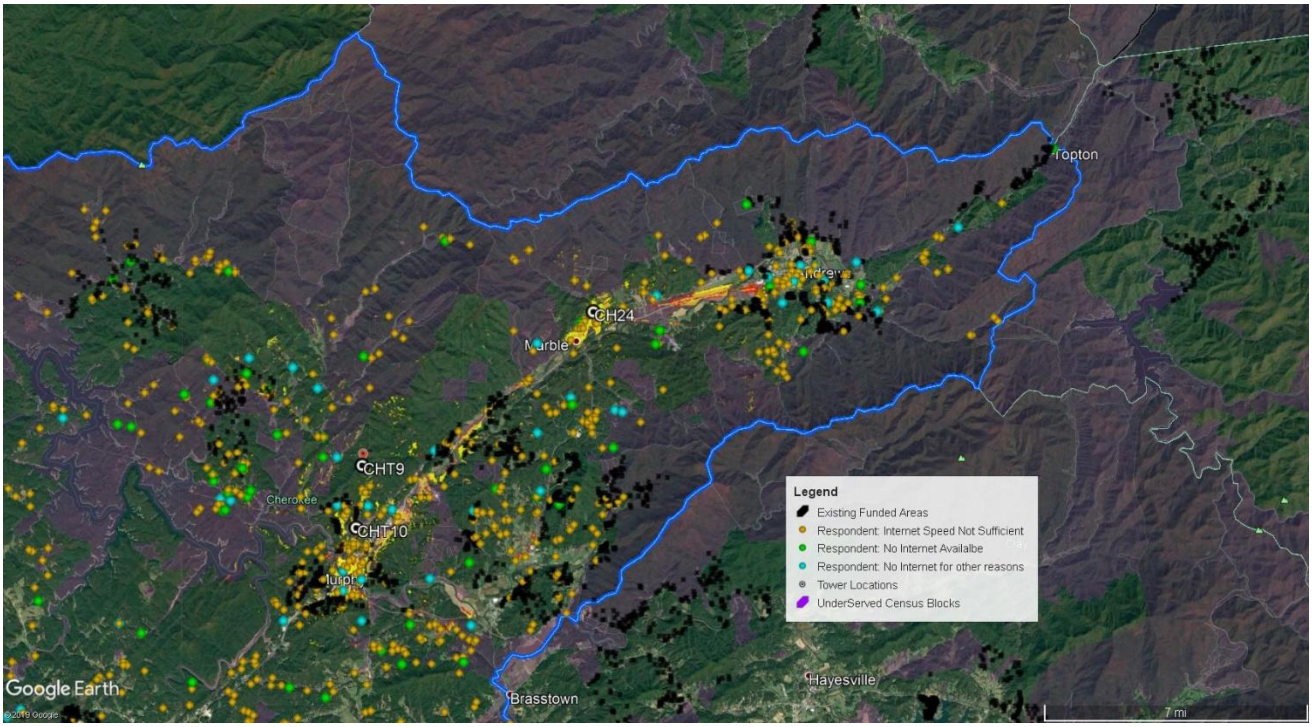


FIGURE 18 CHEROKEE COUNTY PROJECT - SELECTED TOWERS AND COVERAGE

Clay County Project

Below is a map of the 3 towers visited in Clay County which shows signal propagation from field estimated mounting height. The map also shows BAAT campaign dots in area and FCC 477 unserved area info.

County	Site Name (Tower Coverage)	Description	Owner	Default Height	Proposed Mounting Height
Clay	CLT5	Lattice	Crown Castle	60	59
Clay	CLT6	Pole	County	18	16
Clay	CL2 Alt-3	Monopole	Crown Castle	65	63

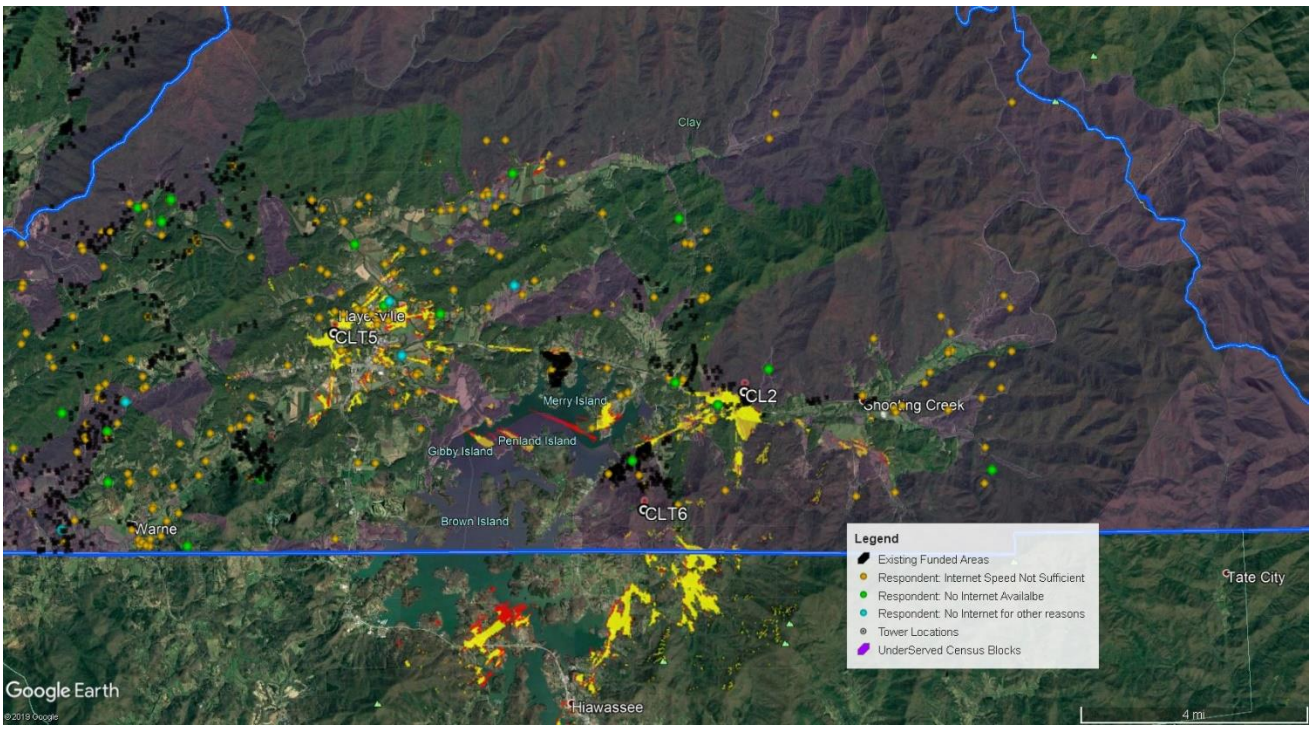


FIGURE 19 CLAY COUNTY PROJECT - SELECTED TOWERS AND COVERAGE

Graham County Project

Below is a map of the 1 tower visited in Graham County which shows signal propagation from field estimated mounting height. The map also shows BAAT campaign dots in area and FCC 477 unserved area info.

County	Site Name (Tower Coverage)	Description	Owner	Default Height	Proposed Mounting Height
Graham	A1308158	Monopole	Southern Towers, LP	68.2	66

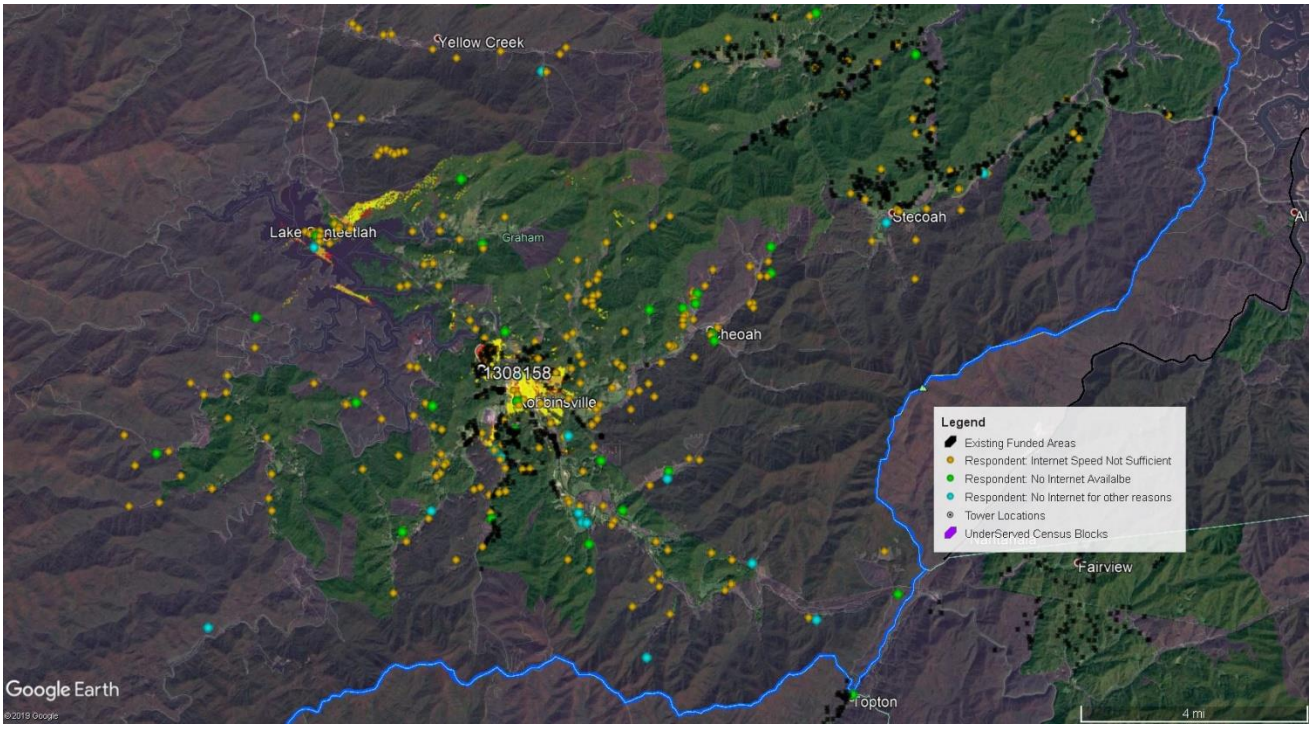


FIGURE 20 GRAHAM COUNTY PROJECT - SELECTED TOWERS AND COVERAGE

Haywood County Project

Below is a map of the 2 towers visited in Haywood County which shows signal propagation from field estimated mounting height. The map also shows BAAT campaign dots in area and FCC 477 unserved area info.

County	Site Name (Tower Coverage)	Description	Owner	Default Height	Proposed Mounting Height
Haywood	NC03609-S	Monopole	SBA	50	45
Haywood	800917	Monopole	Crown Castle	40	37

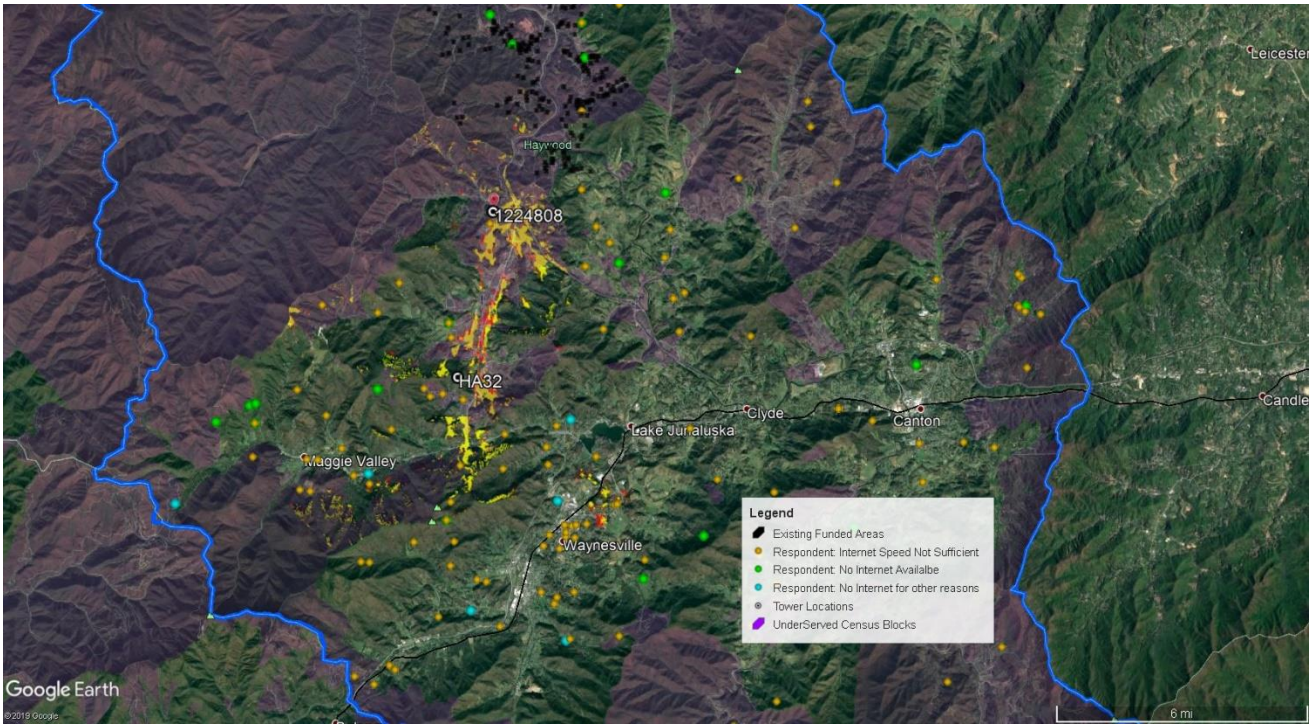


FIGURE 21 HAYWOOD COUNTY PROJECT - SELECTED TOWERS AND COVERAGE

Jackson County Project

Below is a map of the 2 towers visited in Jackson County which shows signal propagation from field estimated mounting height. The map also shows BAAT campaign dots in area and FCC 477 unserved area info.

County	Site Name (Tower Coverage)	Description	Owner	Default Height	Proposed Mounting Height
Jackson	A1058525	Lattice - Cell	Crown Atlantic Company LLC	47.5	47.5
Jackson	NC-5015	Multiple Lattice	American Tower	52	48.768
Jackson	841462 Alt-1	Monopole	Crown Castle	40	38

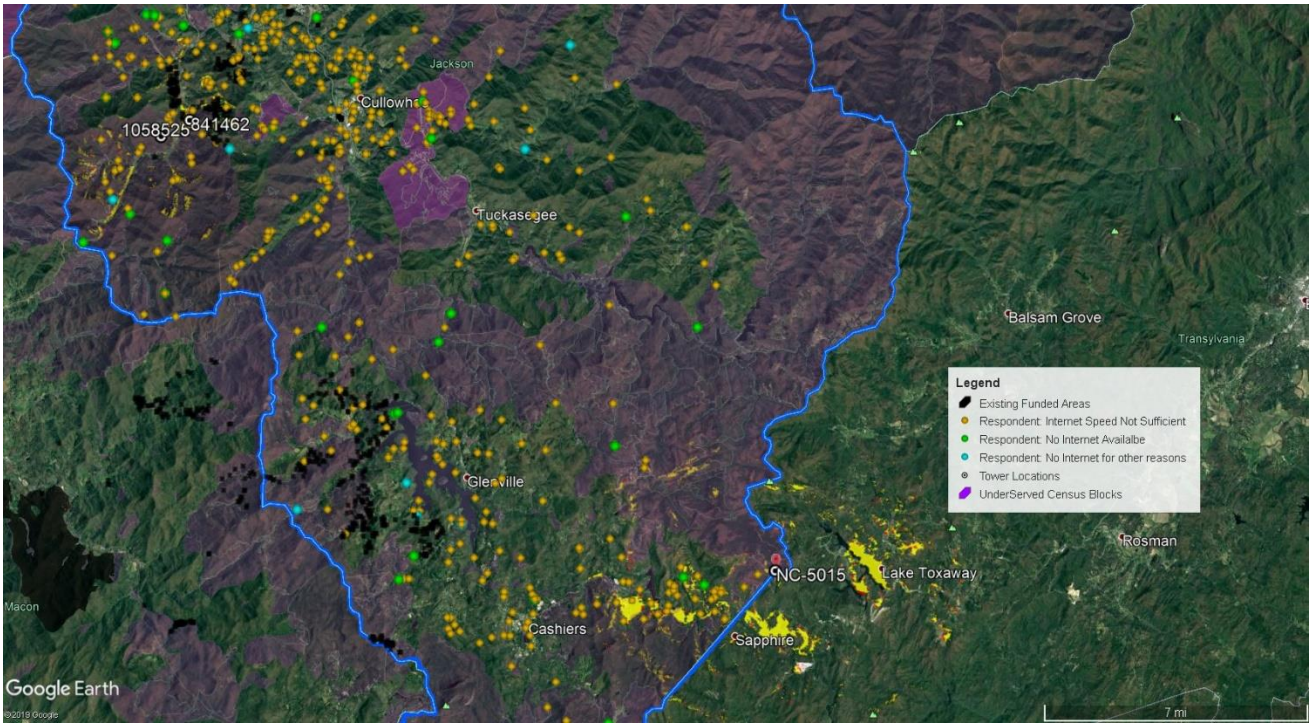


FIGURE 22 JACKSON COUNTY PROJECT - SELECTED TOWERS AND COVERAGE

Macon County Project

Below is a map of the 3 towers visited in Macon County which shows signal propagation from field estimated mounting height. The map also shows BAAT campaign dots in area and FCC 477 unserved area info.

County	Site Name (Tower Coverage)	Description	Owner	Default Height	Proposed Mounting Height
Macon	1237135 – Alt 4	Monopole	Crown Castle	65	62
Macon	A1286915	Pole	Duke Energy Business Services, LLC	35	33
Macon	A1239307	Monopole	SBA Towers	65	62

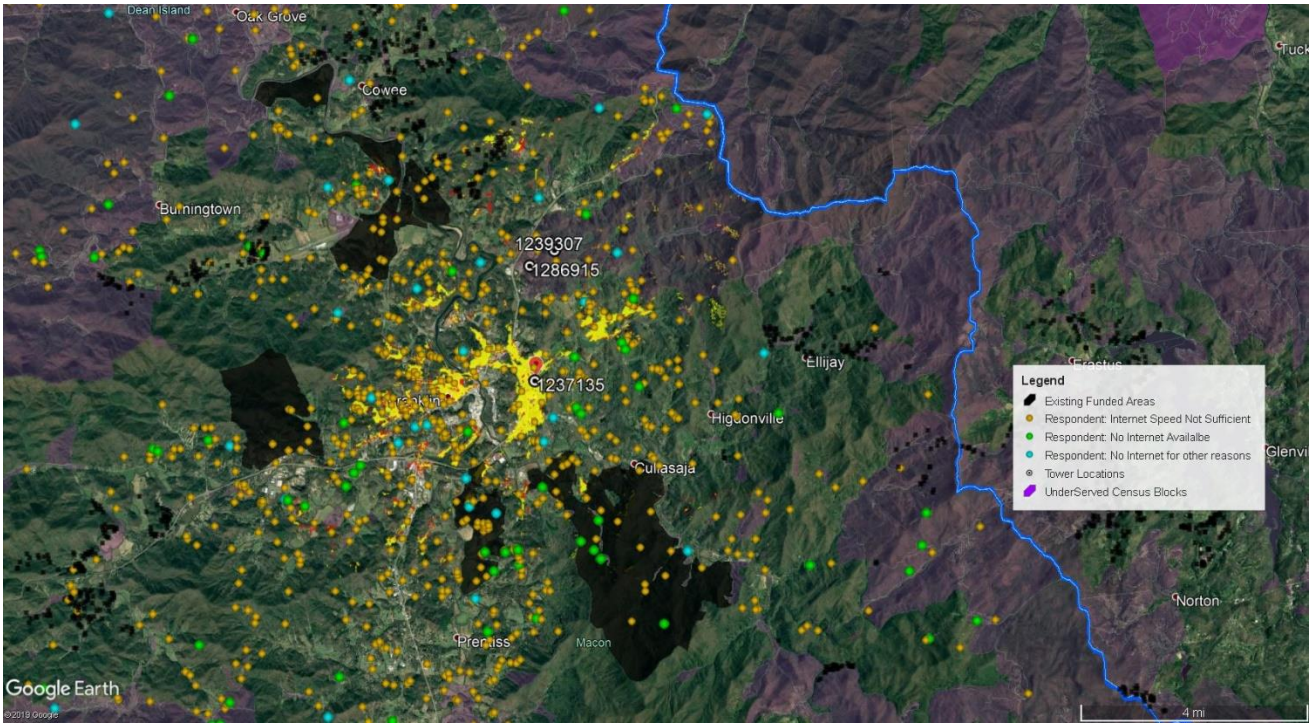


FIGURE 23 MACON COUNTY PROJECT - SELECTED TOWERS AND COVERAGE

Swain County Project

Below is a map of the 3 towers visited in Swain County which shows signal propagation from field estimated mounting height. The map also shows BAAT campaign dots in area and FCC 477 unserved area info.

County	Site Name (Tower Coverage)	Description	Owner	Default Height (M)	Proposed Mounting Height
Swain	SCT2 (A1280547)	3 Towers – 1 is VIPER	SHP and Cell	61	59
Swain	NC15430-A	Lattice	Pegasus Tower	80	76
Swain	A1000280	Lattice	Crown Castle	76.2	76.2

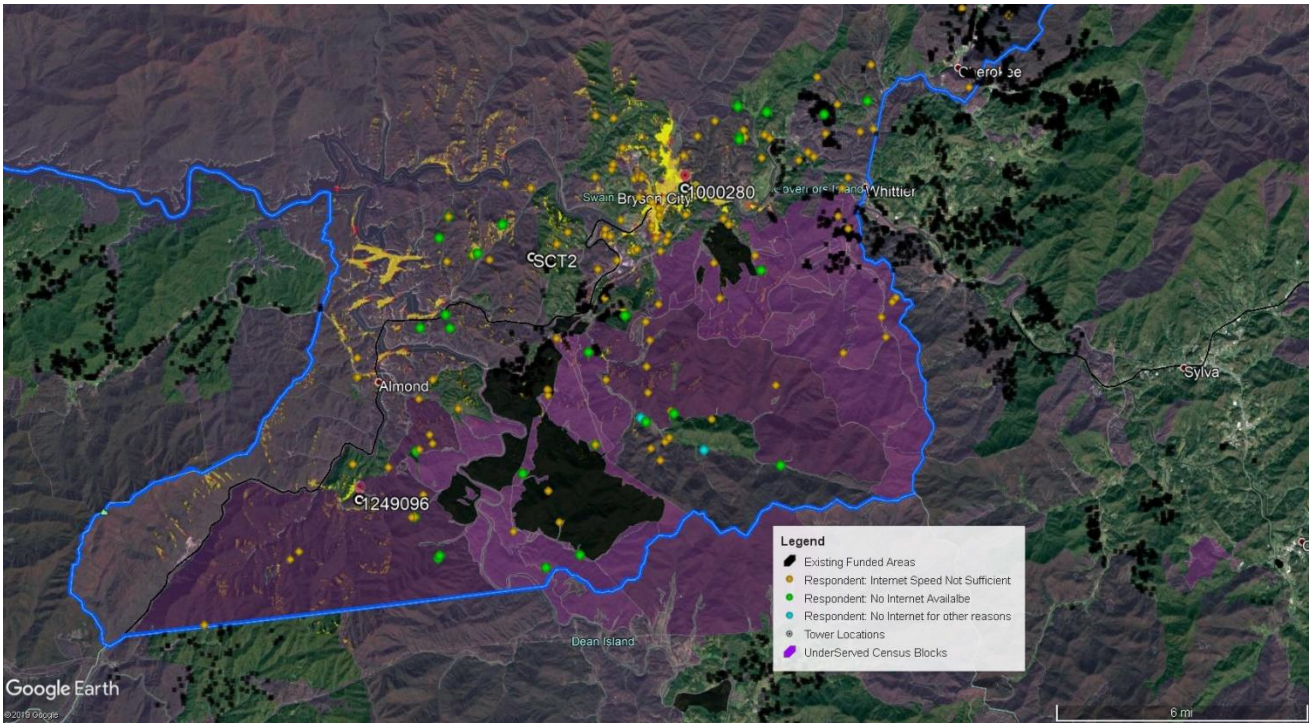


FIGURE 24 SWAIN COUNTY PROJECT - SELECTED TOWERS AND COVERAGE

Overall Strategic Plan

In addition to suggesting potential assets in each county, ECC took a broader look at the seven-county region. In the map below (and the full-size copy on the following page), ECC considered several key components.

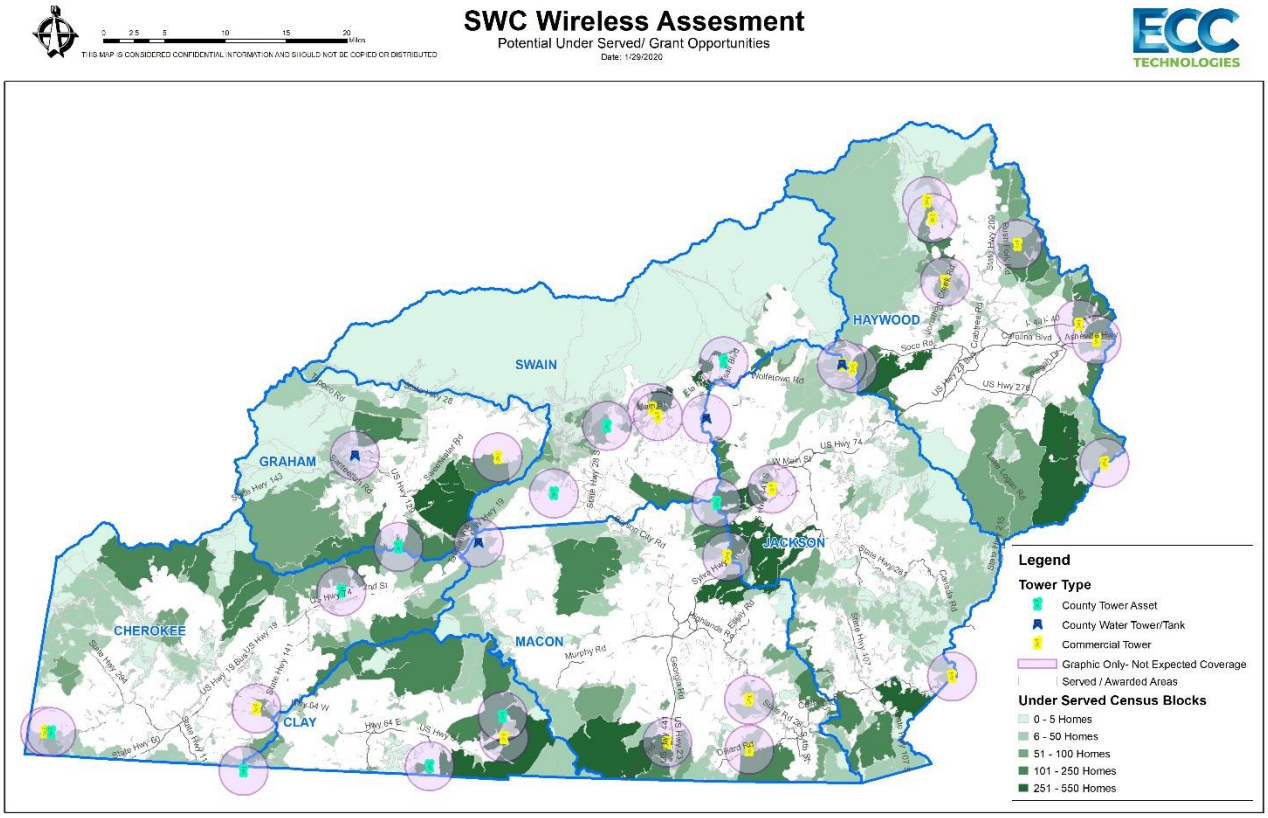


FIGURE 26 SOUTHWESTERN COMMISSION REGION - PROJECT MASTER

The initial map was created by looking at currently underserved census blocks. This information takes into account areas considered served including planned service based on recent grant and loan awards. The color-coded areas represent the population density of the census blocks in each county.

Added to map were tower locations which were deemed as closest to the unserved areas. A two-mile radius (the fuchsia colored circle) was drawn around each tower simply to highlight the tower location and to suggest a maximum range of potential RF propagation. It is important to note that the circle does not represent propagation in any manner.

This map provides a different view when considering the availability of assets and allows for a more focused approach to the delivery of broadband via fixed wireless to end user homes and businesses. A similar map on a county by county basis is shown in Appendix I and can be made electronically.

[The reminder of this page is intentionally blank]

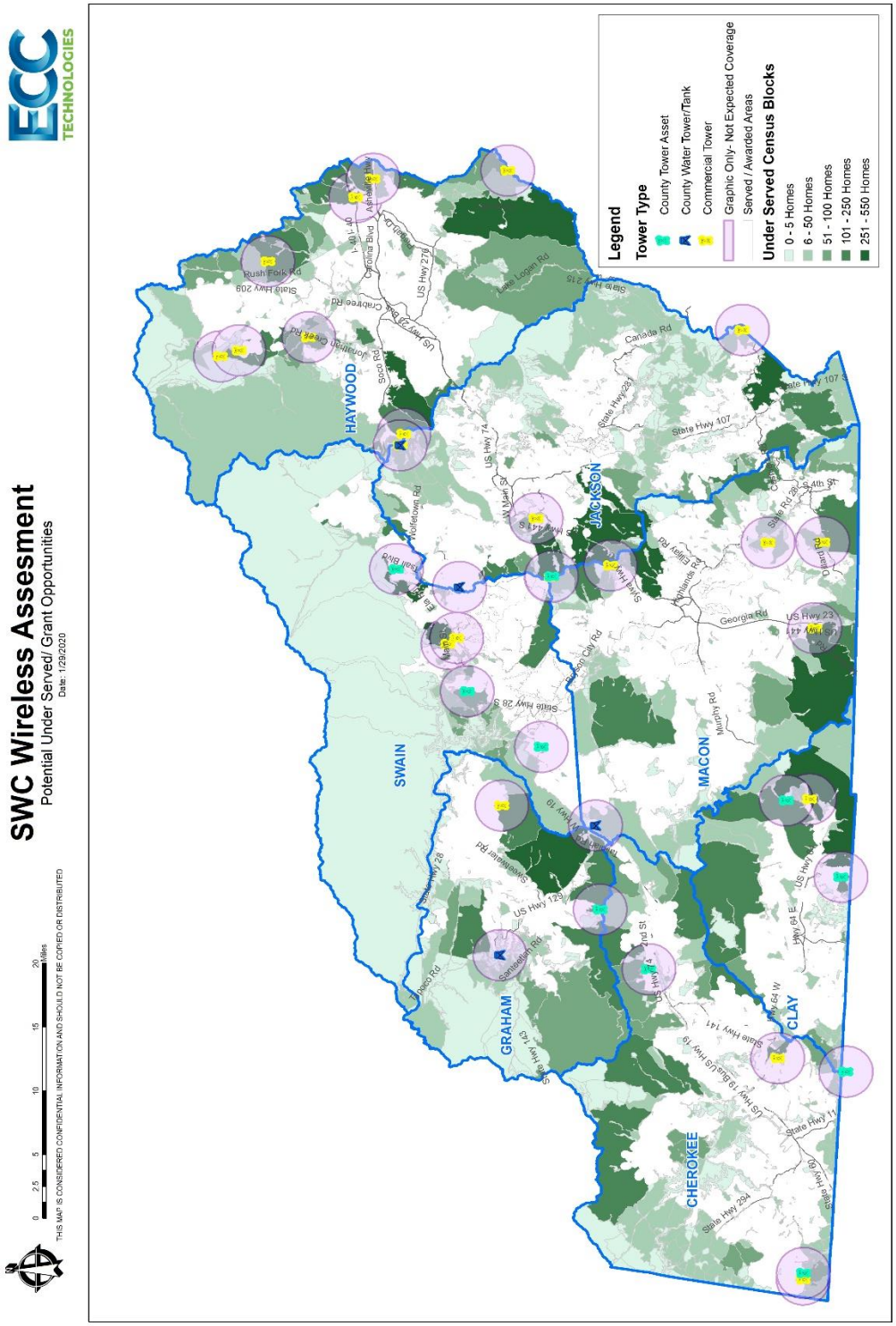


FIGURE 27 SOUTHWESTERN COMMISSION - PROJECT MASTER (FULL PAGE)

Regional Service Providers

ECC reached out to as many Fixed Wireless providers (WISPs) as possible in the region. The purpose of this outreach was primarily to respond to the proposal requirement requesting information about spectrum usage in the area. However, these conversations also represented opportunities to discuss current and future plans, opportunities and challenges with operators.

As a side note, ECC stresses the need for all parties to understand the financial perspective of a partner. By asking questions, or even creating a financial model for a partner, it becomes easier to understand financial and operating constraints, and to develop strategies to either work around those issues, or perhaps to halt a project that simply is not feasible.

This section of the project was broken into three areas:

1. Discussions with providers – both WISPA and non-WISPA members.
2. Review of the assigned frequencies database maintained by the FCC
3. Determining specific areas within the region to deploy personnel, equipment and applications to sample the usage of specified frequencies.

Discussions with Providers

Service Provider and State BIO Meetings Summaries

As part of this broadband initiative, ECC met with a number of last mile providers to discuss the results of the 2017-18 BAAT survey program and their interest in expanding service in the SWC marketplace.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

As discussed above, while initial point of the meetings was to confirm spectrum usage, the conversations covered additional ground.

Of the providers with whom ECC met, two provide both fixed wireless and fiber based last mile service and two provide only fixed wireless service.

All providers are located within North Carolina; two are headquartered within the area and two located only a few hours from the region. ECC also met with representatives from the State Broadband Infrastructure Office (BIO). Below are the important points of these meetings.

In the Appendix, additional notes from the meetings are attached for reference. All providers understood their comments would be included within the report. No confidential or proprietary information was requested from any provider.

SkyFi

SkyFi is a privately held business based in Sylva and financed by the company's founder. SkyFi has six employees and have been in business since 2015. To date, they have approximately 800 customers mostly located in Jackson County. This WISP recently won a large state GREAT grant and will be busy constructing that project over the next year in Jackson and part of Macon County. SkyFi provides a wireless service to the home and business.

SkyFi stated they have experience partnering with government entities and worked with Jackson County on gaining permits to build 8 wireless towers throughout the county. The owner of the company believes another dozen or so towers will cover the county and give the majority of unserved homes in the area coverage. The company is looking at other areas to expand.

SkyWave

SkyWave is a privately held company located in Bryson City and focused mainly on areas of Swain County. They have five employees and were formed in 2017. SkyWave provides a wireless service to the home and business of up to 50 Mbps.

They currently have approximately 800 customers. They recently won a large state grant awards and will be constructing the Swain County project over the next years.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

SkyWave has experience partnering with local government and have a working relationship with the Swain County broadband committee. Over the past couple years, they have worked with members of the SWC organizations and used the 2018 Survey campaign info to identify areas of need and expand service. They would like to see continuing assistance from the SWC in the future to help them grow.

SkyRunner Internet

SkyRunner Internet is a privately held company located in Asheville and is the largest and probably oldest operating WISP in the state. They have 26 employees and have been in business since 1997. SkyRunner has over 8,000 customers in 18 counties in the western half of the state including two, Jackson and Haywood, in the SWC region.

They provide service to public entities, private organization and residential customers. They are providing wireless service and fiber to the home (FTTH) in select neighborhoods in their territory. They have expanded their footprint organically and through acquisitions over the years. They have a large number of communities in the Jackson County are that are interested in their FTTH offering.

Throughout its history, SkyRunner has developed a number of public-private partnerships with local cities and counties. They are looking for areas and local leadership that have all the components ready for use including prequalified customer based, available vertical assets and a business-friendly environment – meaning low or no cost government permitting and other structural fees.

They typically suggest a revenue-based compensation model for the use of County assets. Recently they have been working with neighborhood real estate developers on FTTH project, where the developer is paying for the installation of fiber.

During the study period the company was purchased by Wilkes Telephone dba RiverStreet located in Wilkesboro, NC.

Sky-Tek

Sky-Tek Communications is located in Murphy, NC. The company began providing wireless Internet service in 2012. Sky-Tek provides service in most of Cherokee County and parts of Clay County and

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

has greater than 1400 customers (in 2014 – 2 years old - they had 800 according to application discussed below).

They have fiber connected towers strategically placed throughout their territory to deliver service. According to their website they have broadband speeds of up to 6 Mbps for residential with no data limit and higher for commercial customers.

During the study period the company was purchased by Wilkes Telephone dba RiverStreet located in Wilkesboro, NC.

Sky-Tek uses Ubiquiti Equipment for airlinks, with frequencies in the 5 GHz, 2.4 GHz and some licensed 3 GHz for backhauls. They have a direct fiber line from Blue Ridge Mountain EMC (BRMEMC) Internet and fiber connection to towers.

The cost of each remote tower site can range. Their cost of a new tower can be anywhere from $10,000 to $20,000, depending on a number of factors, such as site access, power availability, tower height and more.

BalsamWest

Though not a WISP, BalsamWest is a regional fiber-based provider to carriers (service providers), public entities, businesses and residents in the southwest region. BalsamWest was established in 2003 and provides telecommunications services in Western North Carolina, East Tennessee and Northeast Georgia. BalsamWest has middle mile fiber routing through all seven counties and provides fiber to the premise as a premier offering. They have a Tier 2 data center in Sylva and provides wholesale Internet service to WISPs in the area.

ECC met with BalsamWest at the regional Broadband day and discussed the opportunities in expanding broadband capabilities in Southwestern North Carolina. The fiber backbone they constructed and manage represent significant assets for land and wireless ISP's in the region. Balsam West is a long-time supporter of the Southwestern Commission and anticipates working with them more closely growing access to the Internet in the region.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

State & Federal Resources

NC State Broadband Infrastructure Office (BIO) Group

According to its website, the Broadband Infrastructure Office was established by the State Chief Information Officer (SCIO) in 2015 as a statewide resource for broadband access, first responder communications and classroom connectivity initiatives led by the State of North Carolina.

The BIO group is working with a number of counties and service providers across the state to bring broadband access to unserved areas. In 2018-19 they introduced a new state grant program, through the state NCDIT office, to promote broadband expansion in Tier 1 County as defined by the NC Department of Commerce. The program is discussed below.

Members of the BIO group stated they currently work each of the seven counties and will continue to work with the SWC government organizations on future initiatives.

State and Federal Grants

The Appalachian Regional Commission (ARC) has two grant programs that can assist with expanding broadband service in counties that are part of the Appalachian region. All seven counties in the SWC region are part of the ARC territory. The first program, called the Information Age Appalachia (IAA) program is designed specifically at providing assistance for broadband service in unserved areas.

Under the heading of Access to Infrastructure the program lists: 1) Developing telecommunications plans 2) Creating aggregation of demand projects 3) Installing necessary infrastructure in distressed areas. ARC will partner with public entities and non-profit institutions and others. In 2018 this program had $110M allocated to it for funding initiatives. The second program is for coal impacted and distressed counties that can apply for special funding which can in certain situations be used for broadband service availability initiatives.

There are a couple new FCC and USDA broadband supporting grant opportunities for landline and wireless providers. The first is the upcoming Rural Digital Opportunity Fund (RDOF) which will replace the Connect America Fund (CAF). Like CAF the RDOF will be a reverse auction type program that is due out in 2021-22 timeframe. The RDOF has reportedly $20.4B allocated to the program.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

The next opportunity is USDA ReConnect grant program which is available now and has a grant application window until March 16 2020. These programs will support both wireless and fiber expansion. The ReConnect program has $550M funds available in three award types which are 50/50 grant and loan, grant only with 25% match and pure loan at a low rate. Individual awards are capped at $25M, $25M/$25M and $50M respectively.

The USDA Community Connect grant program has been around for years, has a total funding of $30M and provides up to $3M per award. This program has a 15% match and has been very competitive in terms of number of applicants. The Community Connect program generally opens in the February/March timeframe of each year. This has further increased the number of these types of initiatives across the country to levels far beyond what has been previously seen.

A new state grant program called the Great Grant was introduced in late 2018. Through the state NCDIT office the program is targeted at Tier 1 counties only. In 2019 $10M was available for award. In 2020 the funds available for the program will increase to $15M but the Tier 1 qualifier will remain the same.

Both Swain and Graham Counties are considered Tier 1. However, it was been stated that the following year (2021) the program might include Tier 2 counties. All of the remaining SWC counties are considered Tier 2 except for Haywood County which is Tier 3. The window for the GREAT grant is currently open and is accepting applications. The window will close March 16, 2020. The next round of funding is slated for July/August of this year.

On a somewhat related topic a recent bill, allowing Counties and Cities the ability to build fiber and offer dark fiber strands which has been floating around for a couple years, was reintroduced. The bill did not pass this year but will be reviewed again in coming years.

Selected Direct Measurements

In an effort to look at the viability of using the unlicensed 5GHz spectrum for wireless broad band service, ECC selected three onsite neighborhoods that contained least 20 homes in a fairly small geographic area.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

ECC then performed a 10-15 minute sampling of the 5 GHz wireless spectrum using a wireless spectrum analyzer which scans the 5 GHz range from 5150-5850 and records a heat map of the related frequencies detected in use and logged during the drive through of the respective neighborhoods. In all three scans the results showed there is sufficient frequency to use the 5 GHz spectrum as a method to deliver broadband services from a fixed wireless solution.

The use of 5 GHz wireless is broken into 20 MHz channels and depending on the availability of contiguous channels and related interference from the field can deliver broadband speed in the 100's of Mbits range when an 80 MHz wide band full channel is implemented.

A good connection with -60 dBm or better to a fixed wireless AP on a single 20 MHz channel can deliver download speeds between 60-80 Mbits.

ECC selected defined areas with population as there were limited resources to drive all seven counties. A key tactical component if deployment plans move forward, will be to conduct a full frequency analysis prior to grant application or permitting/construction.

[The remainder of this page left intentionally blank]

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Neighborhood 1 Results

These results over the 10-minute period indicate that there are several channels available to deliver a 5 GHz wireless. The largest contiguous frequency on this scan shows that the block between 5400 and 5600 MHz would be available which provides 10 contiguous 20 MHz channels for use.

FIGURE 28 NEIGHBORHOOD ONE - AERIAL

FIGURE 29 NEIGHBORHOOD ONE - READINGS

Neighborhood 2 Results.

These results over the 15-minute period indicate that there are several channels available to deliver a 5 GHz wireless. The largest contiguous frequency on this scan shows that the block between 5360 and 5620 MHz would be available which provides a block of 13 contiguous 20 MHz channels for use.

FIGURE 30 NEIGHBORHOOD TWO - AERIAL

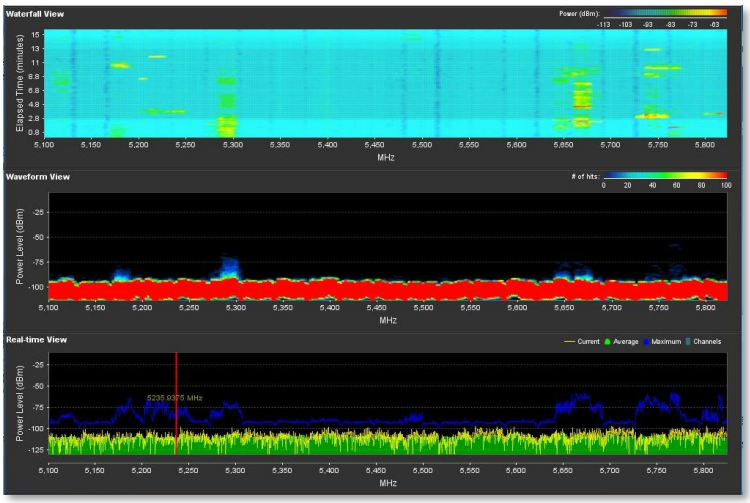


FIGURE 31 NEIGHBORHOOD TWO - READINGS

Neighborhood 3 Results

These results over the 15-minute period indicate that there are several channels available to deliver a 5 GHz wireless. The largest contiguous frequency on this scan shows that the block between 5320 and 5480 MHz would be available which provides a block of 8 contiguous 20 MHz channels for use

FIGURE 32 NEIGHBORHOOD THREE - AERIAL

FIGURE 33 NEIGHBORHOOD THREE - READINGS

FCC Registration Review

Frequency reviews by ECC were limited to those frequencies most commonly used to service multiple users (i.e., specialized, point to point circuits, limited broadcasted spectrum were collated, any often included in the data, but were not reviewed). These frequencies include TVWS, 9nn Mhz, 2.4/2.5 Ghz, CBRS, 3.65 Ghz and 5.7 Ghz.

[The remainder of this page intentionally left blank]

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

[This page intentionally left blank]

Wireless Technology Options for Retail Broadband Service

Backbone and Local Network.

Retail based-service providers will desire a fiber-based core network that has a fully redundant backbone, with multiple diverse connections to the Internet. Dark fiber or broadband service can be made available on the backbone. Bandwidth speed on the backbone should be a minimum range 1 Gbps and scalable to 20 Gbps.

ECC has evaluated equipment from various wireless equipment vendors including Telrad, Cambium, Baicells, Ubiquiti, Mimosa and Radwin. As the consultant for the Southwestern Commission, ECC is not recommending any specific vendor.

However, for other clients, ECC has developed evaluation criteria to help service providers evaluation technology options based on price, performance, upgradeability, serviceability, maintenance and other criteria.

In this section, usage of the word "cellular" refers to a network topology which utilizes multiple assets to provide coverage. However, unlike mobile phones, fixed wireless client units are fixed in place. It is convenient to think of the fixed wireless access points as being in the center of a cell when defining coverage; hence the use of the term cellular.

The retail broadband service network can be defined in four logical segments:

1. Internet – this is the connection from the network core to the Internet via direct connection, peering, or alternately, to another dedicated circuit or service.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

2. Middle Mile – this is the connection between the local network segments and the network core.
3. Short haul – this is the connection between the NAP and the local segment of the network. Local segments are those necessary components which allow for network connectivity to and from the network core, and the last mile.
4. Last mile – home Network Interface Device (NID) to Network Access Point (NAP). The NID can either be fiber or fixed wireless. The NAP can either be a fiber-based distribution component or a Wireless Access Point (WAP).

The two primary flavors of last mile service are Fixed Wireless and Fiber to the Home. The primary focus of the narrative in this section is oriented towards Fixed Wireless as the delivery vehicle for providing last mile services. A WISP will utilize fixed wireless technology to provide a last mile connection to its subscribers.

There is no legal or regulatory requirement however, limiting providers from using multiple methods to provide services. Larger carriers, such as AT&T for example, utilize traditional copper services (Dial up and DSL), fiber to the home, cellular data, and fixed wireless.

Last Mile.

The last mile connection begins in the subscriber premises with the router. Depending upon subscriber and application requirements, there are a variety of routers available for use which provide in- home Wi-Fi support. These devices reflect the ever-growing consumer trend towards wireless connectivity in the home for computing, entertainment, Internet access and home automation.

The standard Network Interface Device (NID) is generally mounted to the premises or home of the end user. This consists of a radio unit and an antenna (these may be separate components or integrated into a single unit). The antenna could be directly mounted to the structure, attached to a mast, or even mounted remotely on a pole or tree and connected via ethernet. The customer premise equipment (CPE) is installed by WISP trained installation technicians.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Last mile fixed wireless service is currently based on the utilization of Line of Sight (LOS) Radio Frequency (RF) waves broken into channels. Because the RF being utilized is LOS, WISPs employ several methods to reach the end user. These methods can be defined as "macro cell" from large towers or "micro cell" from utility or repeater poles.

There are additional Fixed Wireless capabilities utilizing lower frequencies which do not require LOS in order to deliver services. While those services are available and viable today, this overview will focus on LOS type of service delivery.

The first method involves utilizing a macro-cellular approach utilizing significant vertical assets. Where practical, and financially feasible, the WISP designs last mile capabilities utilizing the macro-cellular equipment to reach a larger user base. In the SWC area this is the approach that many WISPs are using.

The base stations are co-located at towers and often share tower space with other wireless providers. Because cellular and PCS providers, radio stations and fixes wireless equipment operate using different frequencies, there is rarely, if ever, the occurrence of issues related to frequency overlap.

The micro-cellular approach utilizes vertical assets which are not as tall that typically operate below the leaf canopy of trees. For effectiveness in areas with high tree density, with high bandwidth needs, this type of approach can represent the predominant WAP architecture deployment. Power company or utility poles represent the best choice for deploying the base station equipment.

During the network engineering phase, utility poles are designated as network sites for installation of the base stations or Wireless Access Points (WAP). These small cells mirror their larger cousins in requirements for calculating the appropriate azimuth or horizontal angle, height and physical tilt (if required). The engineering process also calculates and subsequently validates, antenna requirements and placement.

A typical micro cellular installation consists of 1-2 radios and 2-6 antennas utilizing custom designed and constructed mounts for utility pole attachment. Usual height is between 18 and 20 feet from the base of the pole.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Short Haul.

These components represent the connection from the WAP into the local network.

Every WAP is connected to either an equipment cabinet or a dedicated building. Generally small cell sites feature a non-environmentally controlled cabinet attached to the vertical asset, while macro sites generally have an environmentally controlled building at the tower location.

Switches, routers and other equipment are usually located in these spaces. Fiber interfaces for network backhaul are completed, as are connections for point to point wireless circuits, and point to multipoint last mile services.

The cabinet or building contains all of the equipment necessary to maintain the persistent connection required for delivering access to last mile subscribers.

Environmental hardening is a prerequisite for these devices; macro cellular based equipment is typically housed in an environmentally controlled structure located at or adjacent to the tower site.

A Fiber Interface Device (FID) is connected to the switch. The FID allows for the conversion of the fiber wavelengths allocated to service for the local segment, to be transmitted through the switch from the backbone for delivery to the WAP.

Lateral fiber connections used in hybrid networks are typically 12 count fiber cables which connect the WAPs to the fiber backbone. Generally, a network of this type requires a minimum number of fiber strands, but from a cost effectiveness, and scalability perspective, 12 count fiber provides serviceability and support for future subscriber / traffic expansion. This architecture differs from the traditional FTTH PON/GPON topology, and generally relies on active Ethernet for network service delivery.

Lateral fiber is connected to the backbone via strategically designed points. At those points, ring cuts are made in order to splice in the local fiber for the connection.

Middle Mile.

The middle mile network represents internal backhaul from the WAP's to the core network. This is accomplished by switching traffic from the local, or lateral segments, to the backbone via gateway

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

switches located in a defined and constructed point of presence (POP). These locations represent secure placements for these large switches.

Each gateway manages traffic at full speed, and routes data to and from the backbone as required.

The middle mile terminates in the network core. Dedicated routers are at the network core, and are located in an environmentally conditioned space. This space will feature secure physical access and N+1 HVAC and power supplies.

In some areas where it is not cost effect to build middle mile fiber, middle mile traffic can be carried by a high capacity fixed wireless, licensed point to point (PTP) network assets. These assets, and the PTP circuits, are managed in the same manner as the remainder of the network.

Connectivity at the base of the towers is delivered via fiber interfaces to WAPS, which in turn provides access for the last mile connections to end users. It should be noted that in many case rural counties will make county owned assets such as water and communications towers, as required, to expand broadband service in their area.

The network core redundant high-end routers will maintain routing table information, and continually update relative to traffic and destinations.

Internet.

Internet to the retail provider (WISP) can be delivered by a 3rd party utilizing a peering arrangement which will allow for efficient, redundant and lower cost access to the Internet for its network. The connection from the service provider to the Internet is termed as transport.

Alternatively, the service provider can contract with another carrier to provide Internet connectivity for its network – this service is termed as transit.

Design and Deployment.

The last mile retail provider network rollout is twofold: first, engineer, develop and deploy a network with appropriate levels of resiliency and redundancy to support a diverse subscriber base which includes residential subscribers and commercial/institutional users. Second, ensure that the

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

network as designed supports technological and traffic scalability in order to maximize investment from both a capex and a maintenance perspective.

Last mile providers will typically evaluate multiple frequencies for a given area – both licensed and unlicensed – looking in terms of initial costs, and ongoing management and operating costs.

From a technical perspective, three key frequencies are generally evaluated – 900 Mhz, 3.xx Ghz, and 5.x Ghz. There were advantages and disadvantages to each frequency. Lower frequencies penetrate tree foliage but feature lower bandwidth and shorter distances. Higher frequencies do not penetrate trees but are capable of higher bandwidth and longer distances.

As noted above, there are sub 900 Mhz frequencies which utilize different equipment and, in some cases, alternate engineering design. These NLOS solutions often provide additional capabilities to extend broadband to difficult to reach areas.

Overall network design must emphasize cost management, coupled with efficient construction management. To that end, the WISPs usually adopt a "crawl, walk, and run" approach to deployment. The crawl phase takes the form of a pilot phase using limited equipment from various wireless manufacturers to assess issues with internet service delivery to live end user subscribers.

This allows for initial experience for the WISP in broadband service delivery and support for end users. The concurrent project was a follow-up to the initial vendor evaluations.

Signal strength and stability are measured relative to the equipment to examine signal strength, loss, and to allow for projections relative to canopy penetration.

The results of the testing will prove out which MHz or GHz equipment in a micro-cellular environment would represent a superior solution relative to coverage when compared to other designed and tested solutions.

Management and Maintenance

A critical component of any network design is the management and monitoring of the deployed network. There are multiple levels of monitoring of the network for operational effectiveness and

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

traffic efficiency. These levels range from Layer 1 physical layer via dedicated hardware and software tools, through higher layers in the OSI stack.

Layer 1 monitoring represents a 24 x 7 capability which continually assesses the health of the fiber ring, or other backbone. These agreements have specific SLA's related to timing of dispatch and repair teams.

When utilizing the appropriate monitoring solution, physical breaks in the fiber backhaul can be isolated in almost real-time to within about 10 meters of a break or problem. An appropriate organizational protocol supports a two-hour response to the break and dispatch request for repair, and a minimum four-hour response from dispatch notification to on-site work relative to the issue. Fiber repairs in this hybrid model, are focused on the repair of the backbone.

At levels above Layer 1, vendor specific management platforms are used to support the installed environments. These platforms are standard toolsets for these vendors. Each of them allows for remote management and administration base on individual, grouped and pooled devices. Further, each device is accessible locally via secured direct connect, or secure wi-fi access.

Scalability

End user subscriber usage will increase, and there will be additional opportunities for increased access to new applications across the network for residential, commercial and institutional users.

Beginning with Internet access, multiple data center capabilities not only support redundancy, but also represent an opportunity to support geographic load balancing. Multiple circuits from diverse routes allow multiple ingress/egress options for data on the network. There is currently no perceived issue with multi-carrier traffic capacity.

At the network core, capacity should be designed to support future subscriber growth, increased traffic, more complex routing, and discernment between local hosted content, edge server, CDN content, dedicated and other traffic. The core routers must support hardware and firmware upgrades, and routing fabric within each data center supports the addition of increased resources (hardware and software) to enhance a high level of traffic availability.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Backhaul and middle mile growth is supported with the deployment of high-count fiber, with connections to large aggregation switches. As previous discussed, these 10Gbps switches have significant capacity for growth. The network architecture also supports splits, which allows additional traffic relief via the integration of dedicated switching or routing capacity at any aggregation point.

Last mile growth is supported in several key ways. First, the WAP environment, which connects to the lateral fiber, or dedicated lateral fiber strands, supports 1 Gbps and is consistently field upgradeable to 10 Gbps as required.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Identify and Map Known Fiber Assets

ECC gathered relevant information of existing fiber routes and owners. ECC's secondary research included utilizing resources from fiber mapping organizations, providers, and provider's websites to document the routes. This data was then placed into GIS format and analyzed for potential use. Once complete, the fiber routes have then been exported to a Google Earth file. The existing known fiber route map is shown below.

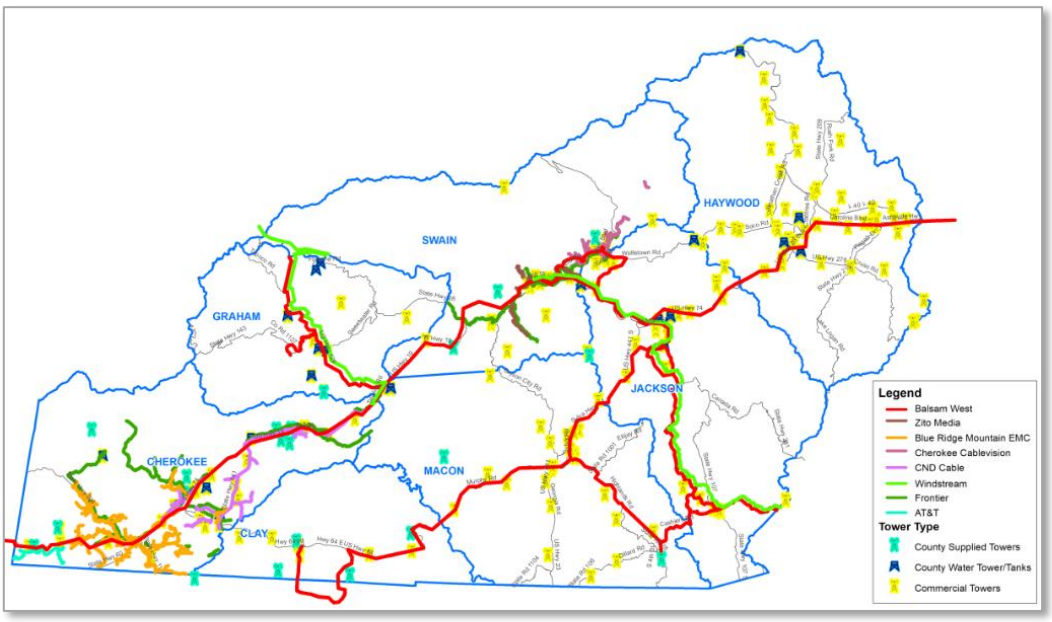


FIGURE 34 KNOWN FIBER ROUTES IN SOUTHWESTERN COMMISSION REGION

Fiber optic technology may be deployed by an Internet Service Provider, a carrier, a cable provider, or other entities, to the premises for delivery of broadband services. However, the costs of fiber

deployment are high in rural areas, and in areas which there are natural obstacles to deployment in an underground environment.

In serving rural areas, most providers utilize fiber as a backhaul technology, and utilize high performance fixed wireless to provide last mile services. The previous discussion provided an overview of a sample type of fixed wireless network; this section will discuss the value of fiber.

Benefits of Fiber

Fiber infrastructure is a robust, reliable, flexible, and secure platform for today and the foreseeable future. Benefits of fiber optics are discussed below.

High Capacity/Future Proof

Fiber has virtually unlimited bandwidth capacities for future broadband initiatives; it allows high-speed, high-bandwidth transmission over great distances. Backhaul data transmission rates are much faster than copper lines or wireless technologies. Highspeed last mile bandwidth capabilities are enabled by fiber supporting next generation technologies:

- Present and future Industrial Internet of Things (IIOT) – Support thousands of IP devices and sensors that will be part of the future business and home devices.
- Foundational backbone – Enabling future innovation

Long Term Life Cycle

Fiber is compatible with long term technology plans. Fiber has a very long-life cycle of 30+ years. When it's time to update the WAN, relatively inexpensive end point equipment is replaced, not the fiber itself.

Highly Reliable

The fiber medium is ideally suited for networks with a focus on survivability – self-healing and fault tolerant when set up in a ring.

Flexible Platform

Fiber strands can handle any type of telecommunications technology including data, voice, and video.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Possible Dark Fiber Routes

For study purposes, shown below are all the known alternative owned dark fiber provider combined routes, based on the OSP study and provider's websites in the area.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

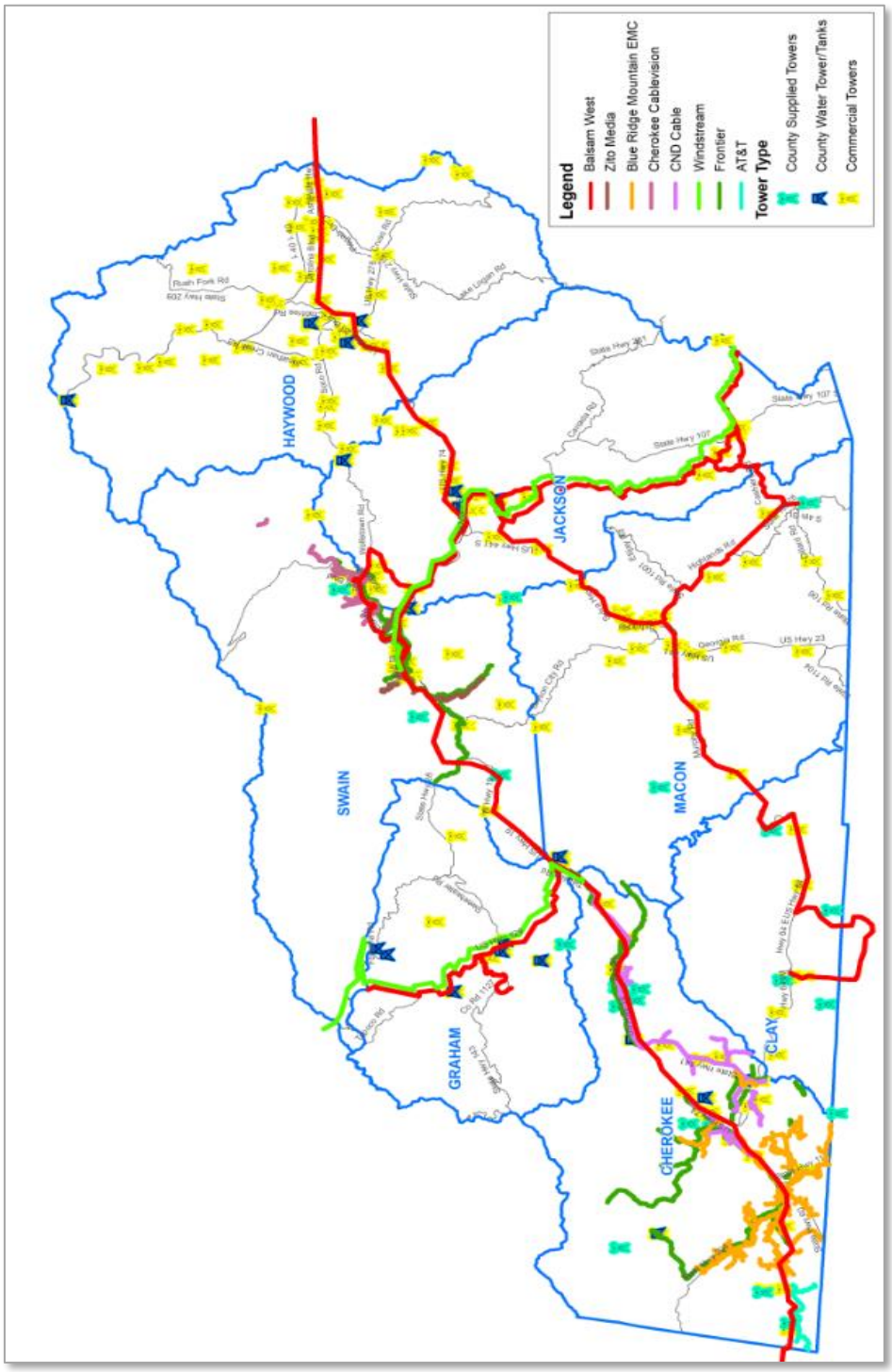


FIGURE 35 KNOWN FIBER ROUTES IN SW COMMISSION REGION (FULL PAGE)

Provide Information To Regional Providers.

As part of ECC's support for the Phase 2 project, meetings were coordinated with service providers who operate in the Southwestern Commission region. As previously documented, these meetings represented opportunities to gain additional information to support the study.

An additional benefit of the meetings was the establishment, or maintenance, of a communications chain, to allow for information to be provided to these service providers.

The Southwestern Commission maintains an active degree of contact with businesses and individuals within the seven-county area. However, to support the project goals, ECC will plan for one on one follow up with each participating service provider to review the study, and to identify any gaps and address concerns.

A summary of each meeting will be created and retained by ECC, as well as provided to the Southwestern Commission project manager in an electronic format.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

[This Page Intentionally Left Blank]

Appendix

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

[This Page Intentionally Left Blank]

Appendix A County Tower Ordinances

The following sections detail County tower ordinances for four counties in the study area.

- Haywood [searchable]
- Jackson [searchable]
- Macon [searchable]
- Swain

[This Page Intentionally Left Blank]

HAYWOOD COUNTY

CHAPTER 115: WIRELESS TELECOMMUNICATIONS FACILITIES

Section

General Provisions

115.01 Authority and purpose

115.02 Jurisdiction

115.03 Definitions

Wireless Telecommunication Facilities

115.20 Special use permit required

115.21 Applicant's certifications

115.22 FCC license required

115.23 Electromagnetic emissions compliance

115.24 Liability insurance

115.25 Public property preference

115.26 Installations utilizing existing structures

115.27 Maintenance/removal agreement

115.28 Abandonment and removal

115.29 Nonconforming uses

Telecommunication Towers

115.40 Applications for telecommunication towers

115.41 Applicant's burden

115.42 Electric transmission towers

115.43 Presumption favoring existing structures

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

115.44 Tower height limitations

115.45 Protected federal lands

115.46 Co-location requirements

115.47 Tower and antenna design requirements

115.48 Fall zones and setbacks

115.49 Tower lighting

115.50 Signage

115.51 Site development plans

115.52 Temporary facilities

Modifications to Approved Facilities

115.70 Minor modifications

115.71 Major modifications

115.72 Processing and fees

Annual Permits

115.75 Annual permit required

115.76 Applicant's certifications

115.77 Annual permit fee

115.78 Compliance

Variances

115.80 Variances

115.81 Public hearing and notice

Miscellaneous Provisions

115.90 Penalties

115.91 Validity of individual sections

115.92 Headings and captions

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

115.93 Effective date, repealers and revival of moratorium

GENERAL PROVISIONS

§ 115.01 AUTHORITY AND PURPOSE.

This chapter is enacted pursuant to the general police powers granted to Haywood County by G.S. § 153A-121 and Article 18 of Chapter 153A.

(A) The Haywood County Board of Commissioners finds the following facts and circumstances justify and warrant the exercise of those powers with respect to wireless telecommunications facilities in order to protect the health, safety and welfare of its citizens:

(1) Haywood County is blessed with a distinctive mountain topography and natural beauty that defines its cultural identity and provides a special sense of place, and

(2) Haywood County is home to a number of exemplary scenic and recreational resources of national significance located on Federal lands including the nation's oldest and longest scenic byway, the Blue Ridge Parkway, as well as the Appalachian Trail, Great Smoky Mountains National Park, and the Pisgah National Forest; that these scenic and recreational resources draw countless visitors from throughout the nation and drive the economic engine of Haywood County's economy, and

(3) The unregulated and uncoordinated proliferation of telecommunications towers across the region degrades the aforementioned values and qualities, detracts from the natural beauty of the mountains, and is detrimental to the health, safety and welfare of the citizens of Haywood County, and

(4) The protection of the mountains of Western North Carolina was officially recognized as an important public policy by Executive Order 74 signed on March 27, 1995 by the Governor of the State of North Carolina creating the Year of the Mountains Commission, and

(5) The Chairman of the Year of the Mountains Commission challenged local governments in Western North Carolina to protect and improve the beauty, charm and advantages of the mountains and to guide the region's long-term growth, development and destiny through sound planning, and

(6) On February 8, 1996 the President of the United States signed the Telecommunications Act of 1996 into law and Section 704 of that Act (42 U.S.C. 332(c)(7)), with limited exceptions, expressly preserves the authority of State and local governments and instrumentalities thereof over decisions regarding the placement, construction, and modification of personal wireless service facilities, and

(7) The Presidential Memorandum signed by the President of the United States on August 10, 1995 and the General Services Administration Guidelines implementing Section 704(c) of the

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Telecommunications Act of 1996 published on March 29, 1996 specifically mandate that antenna siting on Federal properties shall comply with all state and local laws and regulations.

(B) In order to accommodate the wireless communication needs of residents, businesses and visitors while protecting the health, safety and welfare of its citizens, the Haywood County Board of Commissioners finds that enactment of this chapter is necessary and advisable in order to:

(1) Facilitate the provision of wireless telecommunications services to residents, businesses and visitors in Haywood County;

(2) Regulate in an orderly manner the placement, construction, modification, maintenance and removal of wireless telecommunication facilities;

(3) Provide a uniform and comprehensive framework for evaluating proposals for wireless telecommunication facilities;

(4) Preserve the scenic and visual character of Haywood County by encouraging the location, design and architectural treatment of wireless telecommunication facilities to minimize their visibility from public places, to avoid intrusion into public vistas, to avoid disruption of the natural and built environment, and to insure harmony and compatibility with surrounding land use patterns;

(5) Encourage the use of existing and approved structures to accommodate wireless telecommunications infrastructure prior to approving additional structures; and

(6) Avoid potential injury to persons and properties from tower failure through structural standards and setback requirements.

§ 115.02 JURISDICTION.

This chapter shall regulate the placement, construction and modification of wireless telecommunications facilities on private and public lands throughout Haywood County, except that it shall not be enforced within any incorporated municipality in the County (or within any municipality's extraterritorial jurisdiction where such jurisdiction is being exercised with respect to wireless telecommunication facilities). The following types of installations are excluded from the scope of this chapter:

(A) Amateur radio facilities with antennas mounted on supporting structures less than 100 feet in height.

(B) Television, AM radio and FM radio broadcast transmitting antennas and towers.

(C) Residential antennas for receiving television, AM radio or FM radio broadcast signals.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(D) Customer premise antennas for receiving microwave or satellite signals, provided such antennas are less than one meter (39.4 inches) in height or diameter and are mounted on a support structure less than twelve feet in height.

§ 115.03 DEFINITIONS.

The following words, terms and phrases shall have the specific meaning ascribed to them herein. All other words, terms and phrases shall have their ordinary meaning of common usage in the English language.

ALTERNATIVE STRUCTURE. A structure which is not primarily constructed for the purpose of holding antennas but on which one or more antennas may be mounted.

structures include, but are not limited to, buildings, silos, water tanks, pole signs, lighting standards, steeples, billboards and electric transmission towers.

ANTENNA. Any exterior transmitting or receiving device which radiates or captures electromagnetic waves (excluding radar signals).

ANTENNA, DUAL-BAND/MULTI-BAND. An antenna with separate elements for two or more commercial wireless service frequency bands (example: Cellular and PCS or Specialized Mobile Radio).

CO-LOCATION. The placement of additional antennas or antenna arrays on an existing or approved telecommunications tower (or alternative structure), the sharing of an antenna or antenna array, or otherwise sharing a common location by two or more FCC licensed providers of personal wireless services. Co-location includes antennas, transmitters, receivers and related electronic equipment, cabling, wiring, equipment enclosures and other support equipment or improvements located on the tower site.

COMMERCIAL WIRELESS SERVICE PROVIDER. Persons who operate radio systems requiring an FCC license and who employ those facilities to provide fixed wireless (including microwave) or mobile wireless communication services to third parties for compensation. Commercial wireless service providers include, but are not limited to, Cellular, Personal Communication Services (PCS), Specialized Mobile Radio (SMR), Enhanced Specialized Mobile Radio (ESMR), paging, and Competitive Local Exchange Carriers (CLEC) utilizing point-to-multipoint microwave.

DISCERNIBLE. Capable of being distinguished with the eye or mind from its surroundings as a telecommunications tower.

ELECTRIC DISTRIBUTION TOWERS. Metal or wooden towers and poles used to suspend wires transporting electricity between substations at the terminus of transmission lines and individual customer premises.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

ELECTRIC TRANSMISSION TOWERS. Metal or wooden towers and poles used to suspend wires transporting electricity between generating plants and substations supplying electricity to distribution and feeder lines.

EQUIPMENT ENCLOSURE. A building, cabinet or shelter used to house transmitters, receivers and other electronic equipment and accessories at a wireless telecommunication facility.

FAA. Federal Aviation Administration.

FALL ZONE. An area around the base of a telecommunication tower required to be kept clear of buildings, other than equipment enclosures associated with the wireless telecommunication facility, to contain debris in the event of a tower structural failure.

FCC. Federal Communications Commission.

FUNCTIONALLY EQUIVALENT SERVICES. FCC-licensed providers of Commercial Mobile Radio Services (CMRS) classified as Cellular, Personal Communication Services (PCS), Paging, Specialized Mobile Radio (SMR) and Enhanced Specialized Mobile Radio (ESMR).

GOVERNMENTAL USER. Federal, State or local governments, or agencies or instrumentalities thereof, volunteer fire departments or rescue squads which operate radio systems (including microwave) requiring an FCC license and which employ those facilities exclusively for intra-governmental or inter-governmental public service, public safety or administrative purposes.

MAXIMUM CREDIBLE EARTHQUAKE. The maximum earthquake predicted to affect a given location based on the known lengths of the active faults in the vicinity.

MODIFICATION. The addition, removal, repositioning (other than downtilt adjustments), alteration or other material change in the number or type of antennas employed in a wireless telecommunications facility; changes in the height, size, shape or appearance of telecommunications towers; and increases in the number or size of equipment enclosures or other improvements at an existing or approved wireless telecommunication facility.

ORDINANCE ADMINISTRATOR. Person designated by the Board of Commissioners to oversee and administer review and approval of applications and permits for wireless telecommunication facilities.

PERSON. Any individual, partnership, limited partnership, company, corporation, trust, estate, agency, association or other legal entity and their successors and assigns.

PRIVATE BUSINESS USER. Persons who operate radio facilities (including microwave) requiring an FCC license solely for intra-company communications and who do not employ those facilities to offer fixed or mobile wireless communication services to third parties for compensation.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

PROTECTED MOUNTAIN RIDGE. A ridge at or above 3,000 feet with an elevation of five hundred (500) feet or more above the elevation of an adjacent valley floor.

REPLACEMENT TOWER. A telecommunications tower intended to replace an existing approved tower where such replacement tower is (1) at or within 50 feet of the existing tower base, and (2) no higher than the existing tower.

RIDGE. The elongated crest or series of crests at the apex or uppermost point of intersection between two opposite slopes or sides of a mountain and includes all land within 100 feet below the elevation of any portion of such line or surface along the crest.

TELECOMMUNICATIONS TOWER. Any tower, pole or similar structure twenty (20) feet or more in height, used to support one or more antennas including self-supporting lattice-framed towers or monopoles and guyed towers.

TEMPORARY FACILITY. A vehicle-mounted or portable wireless telecommunications facility including portable towers, antennas, equipment enclosures, generators and associated electronics, cabling, wiring and hardware.

TOWER BASE. The foundation, usually concrete, on which the telecommunications tower is situated. For measurement calculations, the tower base is the actual or geometric center of the tower.

TOWER HEIGHT. The vertical distance measured from the tower base to the highest point on a telecommunications tower, including any antennas or other equipment affixed thereto, but excluding any lightning protection rods extending above the tower and attached equipment.

TOWER SITE. The land area which contains, or will contain, a proposed telecommunications tower, and related equipment enclosures and other improvements.

VEGETATIVE CANOPY. Trees which create a roof-like layer of spreading branches.

VISIBLE. Capable of being seen by the unaided eye in daylight.

WIRELESS TELECOMMUNICATION FACILITY. Equipment at a single location used by a private business user, governmental user or commercial wireless service provider to transmit, receive or relay electromagnetic signals (including microwave). Such facility includes antennas or antenna arrays, telecommunications towers, support structures, transmitters, receivers, base stations, combiners, amplifiers, repeaters, filters or other electronic equipment; together with all associated cabling, wiring, equipment enclosures and other improvements.

WIRELESS TELECOMMUNICATION FACILITIES

§ 115.20 SPECIAL USE PERMIT REQUIRED.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

It shall be unlawful for any person to place, construct or modify any wireless telecommunication facility within the jurisdiction of this chapter without first obtaining a Wireless Telecommunication Facility Special Use Permit. Permits shall be regulated as follows:

(A) Applications for Special Use Permits will be classified and processed in one of the following categories depending on the characteristics of the proposed installation:

(1) Installations utilizing existing structures

(2) Telecommunications towers

(3) Modifications to approved facilities

(B) Special Use Permits for wireless telecommunication facilities shall be valid for an initial period of five (5) years. Upon application by the holder of a Special Use Permit within sixty (60) days prior to the expiration of the initial permit period, a review shall be conducted to determine whether and under what conditions the Special Use Permit may be renewed for successive five-year periods. Costs associated with the review process shall be borne by the permitee. Grounds for nonrenewal or revocation include:

(1) The use involved is no longer allowed or fails to comply with the relevant requirements of this chapter or any subsequently enacted land use regulations in effect at the time of renewal and the permitee has failed to supply reasonable assurances to the Ordinance Administrator that the facility will be brought into compliance within ninety (90) days of the initial permit's expiration; or

(2) The permitee has failed to comply with the conditions of approval contained in its Special Use Permit; or

(3) The facility has not been properly maintained; or

(4) The facility has not been upgraded to minimize its impact, including community aesthetics, to the greatest extent permitted by the technology that exists at the time of renewal; or

(5) The permitee has ceased to operate the facility for a continuous period of ninety (90) days or more.

(C) Changes in Special Use Permit conditions at each five-year review shall be limited to changes in tower height. Tower height may not be reduced to such an extent that it displaces a wireless telecommunication facility co-located on the tower.

(D) If a Special Use Permit is not renewed prior to its expiration, it shall automatically become null and void without notice and hearing five (5) years after it is issued or upon cessation of use for more than ninety (90) days, whichever comes first. Within ninety (90) days after expiration or revocation of

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

a Special Use Permit, or the abandonment or cessation of operations of a facility, all installed above-ground improvements (not including any part of the foundation) shall be removed from the property.

(E) A Special Use Permit shall become null and void if the permitted facility is not constructed and placed in service within one year of the date of the County's approval provided, however, that the permit may be extended one time for six (6) months upon payment of an additional $250 fee if the Ordinance Administrator determines that substantial construction has commenced before expiration of the initial year.

(F) Nonconforming telecommunication towers in existence on the date of enactment of this chapter shall be exempt from the Special Use Permit requirements of this section. However, any increase in height of such a nonconforming tower shall be subject to the provisions of this section.

.§ 115.21 APPLICANT'S CERTIFICATIONS.

An application for a Special Use Permit for a wireless telecommunication facility shall not be deemed complete until the applicant certifies that:

(A) it has not constructed, maintained, operated or modified any wireless telecommunication facility within Haywood County without the approval of Haywood County; and

(B) if it has constructed, maintained, operated or modified any wireless telecommunication facility within Haywood County without the approval of Haywood County that it has ceased operating and has removed all above-ground portions of such facilities (not including any part of the foundation); and

(C) the proposed wireless telecommunication facility complies with and at all times will be maintained and operated in accordance with, all applicable FCC rules and regulations with respect to environmental effects of electromagnetic emissions; and

(D) any telecommunication tower to be constructed as part of the proposed wireless telecommunications facility is not required to be lighted or painted by rules and regulations of the Federal Aviation Administration; and

(E) all improvements constructed as part of the wireless telecommunication facility shall comply with the Uniform Building Code, National Electrical Code, Uniform Plumbing Code, Uniform Mechanical Code, Uniform Fire Code, and structural standards of the Electronic Industries Association/Telecommunications Industry Association, where applicable.

§ 115.22 FCC LICENSE REQUIRED.

The applicant for a wireless telecommunication facility Special Use Permit must currently be licensed by the FCC to provide fixed or mobile wireless communication services or, if the applicant is not such an FCC licensee, must demonstrate that it has binding commitments from one or more FCC licensees

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

to utilize the proposed wireless telecommunication facility. An application for a Special Use Permit shall not be deemed complete unless it is accompanied by a copy of each applicant's or tenant's FCC license and, if the applicant is not an FCC licensee, the Ordinance Administrator shall verify that the applicant holds executed leases from each FCC licensee proposing to locate wireless facilities at the site. If a copy of an FCC license has previously been supplied to the Ordinance Administrator in conjunction with an application for a wireless telecommunication facility, the Applicant may certify that such license remains valid in lieu of submitting an additional copy of such license.

§ 115.23 ELECTROMAGNETIC EMISSIONS COMPLIANCE.

Wireless telecommunication facilities shall at all times comply with FCC standards for radio frequency emissions.

§ 115.24 LIABILITY INSURANCE.

Prior to the issuance of a Special Use Permit the applicant shall be required to provide certificates of insurance demonstrating it has a minimum of $1,000,000 in general liability insurance covering any liability arising out of its construction or operation of the wireless telecommunication facility. The applicant shall be required to maintain such coverage in full force and effect until such time as all above-ground portions of the facility (not including any part of the foundation) have been removed and all other conditions of its Maintenance/Removal Agreement have been satisfied.

§ 115.25 PUBLIC PROPERTY PREFERENCE.

Applicants shall first be encouraged to consider properties owned by Haywood County, or instrumentalities thereof, before considering private properties as locations for wireless telecommunication facilities. Public properties shall be subject to the same restrictions and standards of appropriateness as private properties.

§ 115.26 INSTALLATIONS UTILIZING EXISTING STRUCTURES.

It is the policy of Haywood County to encourage use of existing structures and co-location. In furtherance of these policy objectives, wireless telecommunication facilities which do not require the placement or construction of a telecommunications tower, increases in tower height, or increases in height of alternative structures, and which otherwise meet the requirements of this chapter, shall enjoy a streamlined approval process. For purposes of this chapter, existing telecommunication towers or alternative structures requiring an increase in height to accommodate a wireless telecommunication facility shall be treated the same as applications for a new or additional telecommunication tower.

(A) Approval process. Applications for Special Use Permits for wireless telecommunication facilities which do not require a new or additional telecommunications tower, increases in tower height, or

increases in height of alternative structures, may be approved by the Ordinance Administrator without public hearing**.** Applications shall be in a form and shall contain such information as required by this chapter and, in addition, such other information as the Ordinance Administrator shall deem necessary and appropriate. An application shall not be deemed complete until the application fee and maintenance/removal bond have been received by the County.

(B) Application fee. Payment of a $500 nonrefundable application fee shall be required. Private business users operating a single wireless telecommunication facility at their principal place of business and governmental users are exempt from the application fee.

(C) Maintenance/Removal bond. An applicant for a Special Use Permit for a wireless telecommunication facility that does not include a new or additional telecommunication tower, or require an increase in tower height or heights of alternative structures, shall be required to post a $5,000 cash bond, or other security satisfactory to the County, to secure the costs of maintaining the exterior appearance of the facility if the wireless provider fails to continually do so, or removing such facility in the event the applicant shall fail to do so within 90 days of abandonment or cessation of operation of the facility. The applicant shall be required to continue such bond or other security until such time as all above-ground portions of the facility (not including any part of the foundation) have been removed and all other requirements of its Maintenance/Removal Agreement have been satisfied. Private business users operating a single wireless telecommunication facility at their principal place of business and governmental users are exempt from the maintenance/removal bond.

§ 115.27 MAINTENANCE/REMOVAL AGREEMENT.

An application for a Special Use Permit shall be accompanied by those portions of an executed copy of a lease requiring the applicant to remove all above-ground portions of wireless telecommunication facilities (not including any part of the foundation) no later than ninety (90) days after cessation of operations. In addition, each applicant for a wireless telecommunication facility Special Use Permit shall execute a standard facility maintenance/removal agreement prior to issuance of the Special Use Permit. Said agreement shall bind the applicant and the applicant's successors-in-interest to properly maintain the exterior appearance of and ultimately remove the facility in compliance with the provisions of this chapter and any conditions of approval. It shall further bind them to pay all costs for monitoring compliance with, and enforcement of, the agreement and to reimburse the County for all costs incurred to perform any work required of the applicant by the agreement that the applicant fails to perform. Such costs shall include, but not be limited to, administrative and job supervision costs. It shall also specifically authorize the County and/or its agents to enter onto the property and undertake said work so long as the Ordinance Administrator has first provided the applicant the following written notices at the applicant's last known address:

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(A) An initial compliance request identifying the work needed to comply with the agreement and providing the applicant at least thirty (30) days to complete the work; and

(B) A follow-up notice of default specifying the applicant's failure to comply with the work within the time period specified and indicating the County's intent to commence the required work within ten (10) days.

§ 115.28 ABANDONMENT AND REMOVAL.

Abandoned or unused wireless telecommunication facilities shall be removed as follows:

(A) All abandoned or unused wireless telecommunication facilities located above ground (not including any part of the foundation) shall be removed within ninety (90) days of the cessation of operations.

(B) In the event that all above ground portions of a wireless telecommunication facility (not including any part of the foundation) are not removed within ninety (90) days of the cessation of operations, the facility may be removed as provided in the applicant's Maintenance/Removal Agreement by the County and the costs of removal recovered from the applicant's bond or other security.

§ 115.29 NONCONFORMING USES.

Any wireless telecommunication facility in existence on the date of enactment of this chapter which does not comply in all respects with the provisions of this chapter shall be deemed a nonconforming use. Such pre-existing facilities may not be increased in height without complying with the provisions of this chapter. In the event such facility shall be destroyed, or suffer damage in excess of 50% of the tax value of the facility's improvements, such facility shall not be repaired or replaced and shall be removed unless any replacement facility complies in all respects with the provisions of this chapter. Except in the case of destruction or damage in excess of 50% of the tax value of the facility's improvements, technological upgrades of electronics and antennas are permitted.

TELECOMMUNICATION TOWERS

§ 115.40 APPLICATIONS FOR TELECOMMUNICATION TOWERS.

In addition to the general requirements set forth in sections § 115.20 through § 115.29 above for wireless telecommunication facilities, applications for Special Use Permits for wireless telecommunication facilities requiring a new or additional telecommunications tower, increases in tower height, or increases in height of alternative structures, shall comply with the provisions of sections § 115.40 through § 115.52. Such applications shall be reviewed and processed in accordance with the following provisions:

(A) Approval process. Applications for telecommunications towers, increases in tower height, or increases in height of alternative structures, shall be submitted in writing to the Ordinance

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Administrator and shall contain all information required by this chapter as well as any additional information the Ordinance Administrator deems necessary and appropriate. A quasi-judicial public hearing shall be required before the Board of Commissioners before any decision to grant or deny an Wireless Telecommunications Facilities 79 application. Public notice of the application and hearing shall be in accordance with the notice provisions set forth below.

(B) Application fee. Applications for a telecommunications tower Special Use Permit shall require payment of a nonrefundable $2500 application fee. Private business users operating a single wireless telecommunication facility at their principal place of business and governmental users are exempt from the application fee.

(C) Retention of consultants. The County may elect to retain outside consultants or professional services to review the application and make determinations and recommendations on relevant issues including, but not limited to, verification of the applicant's due diligence, analysis of alternatives, and compliance with State and Federal rules and regulations at the applicant's sole expense (subject to a $5,000 maximum). Any expense for consulting or professional services in excess of $5,000 shall be borne equally by the applicant and the County. A $5,000 cash bond, or other security satisfactory to the County, guaranteeing payment of such expenses shall be required. An application shall not be deemed complete until the application fee and bond or other security have been received by the County. The County shall require any consultants to disclose any potential conflicts of interest and to hold confidential any proprietary information supplied by the applicant. The Ordinance Administrator shall arrange an informal consultation with the applicant to review the consultant's report prior to any public hearing on the application. Private business users operating a single wireless telecommunication facility at their principal place of business and governmental users are exempt from the bond requirement.

(D) Maintenance and removal bond. An applicant for a Special Use Permit for a wireless telecommunication facility that includes a new or additional telecommunication tower, increases in tower height, or for increases in height of alternative structures, shall be required to post a $10,000 cash bond, or other security satisfactory to the County, to secure the costs of removing all above ground portions of a wireless telecommunication facility (not including any part of the foundation) in the event the applicant shall fail to do so within ninety (90) days of cessation of operation of the facility. The applicant shall be required to continue such bond or other security until such time as the facility has been removed and all other requirements of its Maintenance/Removal Agreement have been satisfied. Private business users operating a single wireless telecommunication facility at their principal place of business and governmental users are exempt from the bond requirement.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(E) Public Notice. Notice of an application for a proposed telecommunication tower shall comply with the provisions of G.S. §153A-323 and §153A-343 as amended and, at a minimum, shall comply with the following:

(1) Newspaper notice. The Ordinance Administrator shall cause a notice of any public hearing to be published as a legal advertisement in a newspaper of general circulation in Haywood County once a week for two consecutive weeks, the first publication of which shall not appear less than ten (10) days or more than twenty-five (25) days prior to the date set for public hearing. The notice shall include the date, time, and place of the hearing as well as information about the proposed telecommunication tower including its type, height, location and any other information the Ordinance Administrator shall deem necessary or appropriate. 80 Haywood County – Business Regulations

(2) Notice to affected property owners. The applicant shall mail notice to affected property owners in accordance with the following provisions, and shall provide the Ordinance Administrator with a signed certification of compliance listing the names, addresses and means of notification before any public hearing shall be conducted:

(a) Adjacent or abutting property owners. Notice of any public hearing shall be sent by certified mail (return receipt requested) to the owners of all parcels of land adjacent to or abutting the site of the proposed telecommunication tower at the last address listed for such owners in the County property tax records.

(b) Notice to other affected property owners. Notice to all other owners of properties within a one-quarter mile radius of the proposed telecommunication tower site shall be sent by first-class mail with proper postage affixed at the last address listed for such owners in the County property tax records.

(c) Timeliness of notice. Any notices required under the above subsections shall be mailed at least ten (10) but not more than twenty-five (25) days prior to the date of the public hearing.

(3) Posted notice. A sign advertising the application for a proposed telecommunication tower, and any scheduled public hearings, shall be posted by the Ordinance Administrator in a prominent location on or near the parcel containing the proposed telecommunication tower, or on a nearby public road. Such signs shall be posted at least ten (10) days prior to any public hearings.

(4) Additional notice regarding material changes. In the event the applicant shall seek to increase the height of a proposed telecommunication tower, or move its location more than fifty (50) feet laterally, from that stated in the original notices required above, additional notice shall be required to be given in accordance with the above provisions and all required time periods shall run from the date of supplemental notification.

§ 115.41 APPLICANT'S BURDEN.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

The applicant for a telecommunications tower shall bear the burden of demonstrating by substantial evidence in a written record that a *bona fide* need exists for the proposed telecommunication tower and that no reasonable combination of locations, techniques or technologies will obviate the need for, or mitigate the height or visual impact of, the proposed telecommunications tower.

§ 115.42 ELECTRIC TRANSMISSION TOWERS.

It is the policy of Haywood County to encourage the use of electric transmission towers to deploy wireless infrastructure. In furtherance of that policy objective: Wireless Telecommunications Facilities 81

(1) No telecommunications tower shall be approved if an electric transmission tower is located above or no less than twenty-five (25) feet below the ground elevation of and within a one quarter mile radius (1320 feet) laterally of the proposed telecommunications tower site and if road access and necessary utilities can be obtained within a one quarter mile radius (1320 feet) of the existing electric transmission tower, unless the applicant can demonstrate that sufficient easements or other interests in real property cannot be obtained to accommodate the wireless telecommunication facility, or that the electric utility owning the electric transmission tower is unwilling to allow its use for wireless facilities.

(2) Electric transmission towers less than one hundred (100) feet in height may be replaced by pressure-treated wooden or metal electric transmission towers up to one hundred (100) feet in height. Such replacement shall be at the discretion of the electric utility which owns or operates the electric transmission tower, taking into account safety, service disruptions, structural capacity and structure life or duty cycle. For purposes of this chapter, such replacement electric transmission tower shall be deemed to be an existing structure.

§ 115.43 PRESUMPTION FAVORING EXISTING STRUCTURES.

A proposal for a new or additional telecommunication tower shall not be approved unless the Board of Commissioners finds that the equipment planned for the proposed tower cannot be accommodated on existing or approved towers, buildings or alternative structures more than thirty (30) feet in height (after first considering electric transmission towers) within a one-quarter mile search radius (1320 feet) of the proposed telecommunication tower site due to one or more of the following reasons:

(A) The planned equipment would exceed the structural capacity of the existing or approved tower, building or structures, as documented by a qualified and licensed North Carolina professional engineer, and the existing or approved tower, building or structure cannot be reinforced, modified or replaced to accommodate planned or equivalent equipment at a reasonable cost.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(B) The planned equipment would cause interference materially impacting the usability of other existing or planned equipment at the tower, building or other structure as documented by a qualified and licensed North Carolina engineer and the interference cannot be prevented at a reasonable cost.

(C) Existing or approved towers, buildings or other structures within the search radius, or combinations thereof, cannot accommodate the planned equipment at a height necessary to function reasonably as documented by a qualified and licensed North Carolina professional engineer.

(D) Other unforeseen reasons that make it infeasible to locate the planned telecommunications equipment upon an existing or approved tower, building or other structure. 82 Haywood County – Business Regulations

§ 115.44 TOWER HEIGHT LIMITATIONS.

The height of any telecommunication tower shall be limited in accordance with the following provisions:

(A) Protected mountain ridges. Telecommunication towers located on a protected mountain ridge shall not exceed 100 feet in height and shall be subject to the following further limitations:

(1) Where the tower site is surrounded by a dense vegetative canopy within 100 feet of the tower site, the tower shall not extend more than thirty (30) feet higher than the average height of the vegetative canopy found within 500 feet of the site in the case of a single-user tower, or forty (40) feet higher in the case of a tower designed for the co-location of two or more wireless telecommunication facilities. The 100 foot maximum height may be exceeded to the extent necessary to allow these canopy clearances. If any antenna extends more than two feet from the side of the support structure, the portion of the tower extending above the vegetative canopy shall be camouflaged to appear like the top of a coniferous tree with all antennas concealed within simulated foliage.

(2) Where no vegetative canopy exists within 100 feet of the tower site, the maximum tower height shall be 60 feet. The entire tower shall be camouflaged like a coniferous tree, with all antennas concealed within simulated foliage, and the Board of Commissioners may require equipment enclosures to be placed underground or to be otherwise disguised or camouflaged to simulate structures that typically occur on landscapes similar to the proposed location.

(B) Towers visible from public roads or publicly owned properties. Telecommunication towers that are visible from any public road, or publicly-owned property within a one-half mile radius of the proposed tower site (not including a publicly-owned parcel which is proposed as the site for the wireless facility), and which are not located on a protected mountain ridge, shall not exceed 80 feet in height, except:

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(Ord. passed 2-23-98; Am. Ord. passed 11-30-98)

(1) Where the tower site is surrounded by a dense vegetative canopy within 100 feet of the tower site, the tower may extend sixty (60) feet higher than the average height of the vegetative canopy found within 500 feet of the site. If any antenna extends more than two feet from the side of the support structure, the portion of the tower extending above the vegetative canopy shall be camouflaged to appear like the top of a coniferous tree.

(Ord. passed 2-23-98; Am. Ord. passed 11-30-98)

(2) Telecommunication towers proposed for location within North Carolina Department of Transportation highway rights-of-way at or near highway interchanges, rest areas and weigh stations where two or more lighting towers exist within 500 feet of each other may be approved at a height greater than sixty (60) feet if the applicant demonstrates to the satisfaction of the Board of Commissioners that such telecommunication towers will simulate the lighting towers in height and appearance and will be clustered amidst the lighting towers so as to be unobtrusive. In no event shall such telecommunication towers exceed 100 feet in height.

(3) If any portion of a structure located within a North Carolina Department of Transportation right-of-way is used to mount cameras, instruments or sensors for governmental use, and the same structure supports or incorporates commercial wireless facilities, the governmental use shall be deemed incidental or accessory to the commercial use and the entire facility shall be treated as a commercial use for purposes of this chapter. Such structures shall be limited to sixty (60) feet in height unless they qualify as simulated lighting structures as provided above.

(4) Telecommunication towers that simulate objects that typically occur upon landscapes similar to the proposed location (except billboards, electrical transmission or telecommunication towers) may exceed sixty (60) feet in height if, in the opinion of the Board of Commissioners, the proposed structure would appear in context on the particular landscape, is aesthetically acceptable, and would be a preferable alternative to an undisguised telecommunication tower. In no event shall such telecommunication towers exceed 100 feet in height.

(C) Towers not visible from public roads or publicly owned properties. Telecommunication towers that are not visible from any public road or publicly-owned property (not including a publicly-owned parcel which is proposed as the site of a wireless facility) within a one-half mile radius of the proposed tower site, and which are not located on a protected mountain ridge, shall not exceed 199 feet in height provided the type or height of the proposed structure, or its location, will not require painting or lighting under any FAA rule or regulation. The burden of demonstrating that a telecommunication tower is not visible from any of these vantage points shall be on the applicant.

§ 115.45 PROTECTED FEDERAL LANDS.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

If a proposed telecommunication tower is to be located within one mile of Great Smoky Mountains National Park, the Appalachian Trail, or the Blue Ridge Parkway the applicant shall be required to submit a copy of its application to the appropriate Federal land manager for review and comment and shall provide a copy of its transmittal letter to the Ordinance Administrator to verify its compliance with this provision. The responsible Federal land manager shall have sixty days to review the application prior to its consideration by the Board of Commissioners.

§ 115.46 CO-LOCATION REQUIREMENTS.

To minimize cumulative visual impacts, it is the policy of Haywood County to encourage co-location of new wireless telecommunication facilities with existing and planned facilities whenever feasible and aesthetically desirable. All wireless telecommunications towers erected, constructed, or located within Haywood County shall comply with the following co-location requirements:

(A) A proposal for a new commercial wireless telecommunication tower shall not be approved unless the Board of Commissioners find that the telecommunications equipment planned for the proposed tower cannot be accommodated on existing or approved towers or alternative more than thirty (30) feet in height within a one-quarter mile search radius of the proposed location due to one or more of the following reasons:

(1) The planned equipment would exceed the structural capacity of the existing or approved towers, buildings or other structures, as documented by a qualified and licensed North Carolina professional engineer, and the existing or approved structure cannot be reinforced, modified or replaced to accommodate planned or equivalent equipment at a reasonable cost;

(2) The planned equipment would cause interference materially impacting the usability of other existing or planned equipment at the tower or building as documented by a qualified and licensed professional engineer and the interference cannot be prevented at a reasonable cost;

(3) Existing or approved towers, buildings or other structures within the search radius, or combinations thereof, cannot accommodate the planned equipment at a height necessary to function reasonably as documented by a qualified and licensed North Carolina professional engineer; or (4) Other unforeseen reasons that make it infeasible to locate the planned telecommunications equipment upon an existing or approved tower, building or other structures.

(B) Except in the case of a telecommunications tower on a protected mountain ridge, any proposed wireless telecommunication tower over sixty (60) feet in height shall be designed structurally, electrically, mechanically and in all respects to accommodate both the applicant's antennas and comparable antennas for at least one additional user. In the case of wireless telecommunication facilities placed on an electric transmission tower, co-location may not be required if the electric utility owning the tower determines that for structural, safety or operational reasons the tower

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

cannot accommodate additional users. Towers must be designed to allow for future rearrangement of antennas upon the tower and to accept antennas mounted at varying heights.

(C) Antennas or antenna arrays employed as part of a wireless telecommunication facility operated by a private business user, governmental user or commercial wireless service provider may not be co-located on a tower or other support structure used by an amateur radio operator.

(D) An application for a Special Use Permit for a wireless telecommunication facility requiring a new or additional telecommunications tower, increases in tower height, or increases in height of an alternative structure, shall not be deemed complete until the applicant provides a letter of intent agreeing to make all of its wireless telecommunication facilities (including existing facilities) within the jurisdiction of this chapter available to providers of functionally equivalent services at commercially reasonable rates. The Ordinance Administrator shall verify that the applicant has an executed lease for the property that allows the landowner and/or the permitee to enter into leases or subleases with other wireless service providers.

§ 115.47 TOWER AND ANTENNA DESIGN REQUIREMENTS.

No Special Use Permit shall be approved for a telecommunication tower, increase in tower height, or increase in height of an alternative structure, unless the Board of Commissioners finds that the design standards of this section have been met. Proposed or modified towers and antennas shall meet the following design requirements:

(A) Towers and antennas shall be designed to blend into the surrounding environment through the use of color and camouflaging architectural treatment.

(B) Guyed towers are prohibited. Commercial wireless telecommunication towers shall be of a monopole design unless the Board of Commissioners determines that an alternative design would better blend in to the surrounding environment.

(C) Use of polarized antennas which electronically combine the functions of transmit and receive antennas (rather than spatial diversity antenna arrays which rely on antennas being physically separated) and dual-band/multi-band antennas (allowing two or more providers of different types of commercial wireless services to share a common antenna) is encouraged.

(D) Antennas shall be mounted on telecommunication towers so as to present the smallest possible silhouette, profile, or cross-section. Preferred antenna mounting scenarios are, in order of descending preference:

(1) compact polarized antennas in a cylindrical unicell arrangement less than 22 inches in diameter mounted atop the tower;

(2) panel antennas flush-mounted against the tower;

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(3) antennas mounted at the end of straight or curved davit arms or brackets extending from the sides of the tower.

(E) No telecommunication tower shall have constructed thereon, or attached thereto, in any way, any platform, catwalk, crow's nest, triangular framework, climbing devices, or like structures or equipment, except during periods of construction or repair. Curved or straight davit arms or brackets used for antenna mounting shall be connected to the tower at the base of the arms or brackets only and such arms or brackets (and any antennas or hardware mounted thereon) shall not be physically interconnected with any similar arm or bracket.

(F) All equipment enclosures and other improvements accessory to a tower shall be architecturally designed to blend in with the surrounding environment and shall be maintained in good appearance and repair. No equipment enclosure may exceed ten (10) feet in height. Ground mounted equipment shall be screened from view by suitable vegetation, except where a design of non-vegetative screening better reflects and complements the architectural character of the surrounding neighborhood.

(G) To the greatest extent possible, wireless telecommunication facilities shall be designed to survive a natural disaster without interruption in operation. Toward this end, the following measures shall be implemented:

(1) Non-flammable exterior wall and roof covering shall be used in the construction of equipment enclosures;

(2) Openings in all equipment enclosures shall be protected against penetration by fire and windblown embers;

(3) The telecommunication tower when fully loaded with antennas and other equipment and camouflaging shall be designed to withstand the forces expected during the "maximum credible earthquake." All equipment mounting racks and equipment shall be anchored in such a manner that such a quake will not tip them over, throw equipment off shelves, or otherwise act to damage equipment; and

(4) Reasonable measures shall be taken to keep the facility operational in the event of a natural disaster or other catastrophe.

(H) Generators may not be used as a primary electrical power source. Backup generators shall only be operated during power outages and for testing and maintenance purposes. Testing and maintenance shall only take place on weekdays between the hours of 8:30 a.m. and 4:30 p.m.

(I) Telecommunication towers, equipment enclosures and other improvements shall be enclosed within a security fence consisting of chain link fencing at least eight (8) feet in height. The fence may

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

be topped with barbed wire. The Board of Commissioners may require as a condition of approval that the fencing be screened by appropriate landscaping or other means.

§ 115.48 FALL ZONES AND SETBACKS.

Towers shall conform with each of the following minimum setback requirements:

(A) A fall zone clear of any buildings on the parcel containing the tower site (other than equipment enclosures associated with the wireless telecommunication facility) equal to one-half the height of the tower shall be required. The fall zone shall have a minimum twenty-five (25) foot setback from all lot lines. If buildings (other than equipment enclosures associated with the wireless telecommunication facility) are located on an abutting property within a distance equal to the tower height, a combined fall zone and setback equal to the tower height shall be required.

(B) A tower's setback may be reduced or its location in relation to a public street varied, at the sole discretion of the Board of Commissioners, to allow the integration of a tower into an existing or proposed structure such as a church steeple, light standard, electric transmission tower, or similar structure.

§ 115.49 TOWER LIGHTING.

(A) No tower shall be of a type or height, or placed in a location, that the Federal Aviation Administration would require the tower to be lighted or painted.

(B) Towers shall not be illuminated by artificial means and shall not display strobe lights or other warning lighting unless, in a particular instance, the Board of Commissioners requires a tower to be lit. The applicant shall be required to certify that the proposed telecommunication tower is not required to be painted or illuminated by any FAA rule or regulation.

(C) When incorporated into the approved design of a tower, light fixtures used to illuminate ball fields, parking lots, or similar areas may be attached to the tower.

(D) A wireless telecommunication facility may utilize a security light controlled by a motion-detection sensor at or near the entrance to the facility.

§ 115.50 SIGNAGE.

Signage at any telecommunication tower site shall conform to the following provisions:

(A) A sign listing the name of the wireless telecommunication service provider operating the site, the site name or number and an emergency telephone number shall be posted at or near the entrance to the site so as to be readily visible to persons outside the site's security fencing.

(B) Equipment hazard warning and informational signs are permitted.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(C) The posting of any other signs or advertising is prohibited at any wireless telecommunication facility or upon any telecommunication tower.

§ 115.51 SITE DEVELOPMENT PLANS.

A site development plan shall be prepared by a North Carolina registered land surveyor, landscape architect or professional engineer and shall contain the following information:

(A) The name, address and telephone number of the applicant and the property owner, tax parcel identification number, scale, north arrow, a copy of the section of the 1:24,000 USGS quadrangle showing the proposed site and latitude and longitude coordinates.

(B) The name, address, telephone number, signature and seal of the professional preparing the site development plan.

(C) All identifiable structures located on the parcel, all private and public roads, highways and underground and overhead utilities.

(D) Surveyed boundary lines of the parcel containing the proposed telecommunication tower construction and its fall zone.

(E) All existing towers on the property or any towers whose fall zone encroaches onto the property.

(F) Description of adjacent land use and all property owner names, tax parcel numbers and mailing addresses.

(G) The ground elevation of the proposed tower's base, all proposed support structures, property corners, and a permanent site benchmark. All elevations shall be determined using the National Geodetic Vertical Datum of 1929 or other appropriate vertical datum.

(H) A preliminary tower design plan prepared by a registered North Carolina Registered Professional Engineer containing a plan depicting the tower and all proposed support structures, buildings and other improvements and access roads and utility connections within and to the proposed site. Such plan shall contain the following information:

1. The names, addresses and telephone numbers of the applicant and the property owner.

2. The plan scale, a North arrow and a vicinity map.

3. Tax parcel identification number for any parcel of land containing the tower site and the tower's latitude and longitude coordinates.

4. The name, address, signature and seal of the person who prepared the site plan.

5. The surveyed boundary lines of any parcel, or portion thereof, that will contain the proposed tower.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

6. The general location of boundary lines of any parcel or portion thereof within a radius from the tower base equal to the proposed tower height.

7. The names and tax parcel identification numbers of all owners of property immediately adjacent to any parcel containing the tower site.

8. All identifiable buildings and other structures (including existing towers) roads and perennial streams located on the parcel containing the tower site and within a radius from the tower base equal to the tower height.

9. The tower base and the foundations for all support structures, all proposed buildings, accessory structures and any other proposed improvements, including roads and utilities serving the proposed site.

10. The ground elevation of the base of the proposed tower, to the nearest foot.

11. A structural engineering certification, signed and sealed by an active, registered North Carolina professional engineer, certifying the structural integrity of the tower and the tower base. The Ordinance Administrator may accept, in lieu of the above, other documentation evidencing the structural integrity of the tower and the tower base.

§ 115.52 TEMPORARY FACILITIES.

Temporary wireless telecommunication facilities shall be permitted as follows:

(A) Temporary facilities may be placed at or near the location of an existing, proposed or approved wireless telecommunication facility for periods up to seventy-two (72) hours for equipment testing purposes or where the existing facility is unavailable due to scheduled or unscheduled maintenance.

(B) In the event of a natural disaster, catastrophic event or public emergency that either renders an existing wireless telecommunication facility unusable or creates an urgent need for supplemental capacity to manage the emergency, temporary facilities may be placed for periods of up to one week. Permits for the temporary facilities may be extended for successive one-week periods for the duration of the emergency as determined by the Ordinance Administrator.

(C) Permits may be issued for up to one week for temporary facilities needed in conjunction with scheduled special events at specific locales that are likely to generate a need for additional capacity at the event which is expected to exceed existing installed capacity.

(D) Permits for temporary facilities shall be issued by the Ordinance Administrator upon proof of eligibility and payment of a $50 permit fee.

MODIFICATIONS TO APPROVED FACILITIES

§ 115.70 MINOR MODIFICATIONS.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Minor modifications shall include:

(A) The addition, removal, repositioning (other than downtilt adjustments), alteration or other change in the number or type of antennas employed in a wireless telecommunication facility by a single permitee if, in the opinion of the Ordinance Administrator, such changes do not result in a significant increase in the facility's silhouette or other substantial visual or aesthetic impacts, or: (B) Increases in the number or size of equipment enclosures of a single permitee which do not increase the footprint of such equipment by more than 20%.

§ 115.71 MAJOR MODIFICATIONS.

Major modifications shall include:

(A) Increases in the height, size, shape or appearance of a telecommunication tower other than minor modifications as defined above; or

(B) Other modifications by a single permitee which, in the opinion of the Ordinance Administrator, substantially exceed the scope of any approval of a facility or which will result in a substantial increase in aesthetic or visual impacts.

(C) Placement of an additional wireless telecommunication facility operated by a different entity than the permitee on an existing structure that does not require an increase in height of the support structure shall be processed in accordance with section § 115.20 through § 115.29 of this chapter.

§ 115.72 PROCESSING AND FEES.

Applications for a minor modification to a wireless telecommunication facility shall be in a form and contain such information as the Ordinance Administrator shall deem necessary and appropriate and shall be accompanied by a $100 fee. Minor modification permits may be issued by the Ordinance Administrator. Major modifications require the approval of the Board of Commissioners and shall be processed in accordance with the provisions of section § 115.20 through § 115.29 or section § 115.40 through § 115.52 of this chapter for new wireless telecommunication facilities or telecommunication towers, as appropriate.

ANNUAL PERMITS

§ 115.75 ANNUAL PERMIT REQUIRED.

An annual Wireless Telecommunication Facility Permit shall be required for each wireless telecommunication facility within the jurisdiction of this chapter. Applications for an annual Wireless Telecommunications Facility Permit shall include such technical information about the facility as the Ordinance Administrator deems reasonable and appropriate. Such information shall be in a form designated by the Ordinance Administrator.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

§ 115.76 APPLICANT'S CERTIFICATIONS.

Before an annual Wireless Telecommunication Facility Permit shall be issued or renewed, the applicant must certify that:

(A) It currently holds an FCC license to provide commercial wireless services and that such license is in good standing or, if the permitee is not an FCC licensee, that the license of each of it's FCC tenants is in good standing.

(B) The wireless telecommunication Facility continues to be operated by the applicant and that it has a continuing need for the facility to meet the requirements of its FCC license.

(C) That the facility complies with all FCC rules and regulations currently in effect relating to environmental effects of electromagnetic radiation.

(D) That the facility as currently constructed, maintained or operated is in compliance with all FAA rules and regulations.

(E) That the applicant currently has liability insurance in force covering the wireless telecommunication facility in an amount deemed adequate by the Ordinance Administrator.

(F) That the applicant has not constructed, maintained, modified or operated any wireless telecommunication facility within the jurisdiction of this chapter without the approval of Haywood County or, if it has done so, that it has ceased operating and has removed all above-ground portions of such facilities (not including any part of the foundation).

(G) That any bond or other security to secure removal of the wireless telecommunication facility remains in full force and effect and that the applicant is in full compliance with its Maintenance/Removal Agreement and other terms and conditions of its Special Use Permit. Nonconforming telecommunication towers in existence on the date of enactment of this chapter shall be exempt from certifications with respect to Maintenance/Removal Agreements and bonds or other security therefor.

§ 115.77 ANNUAL PERMIT FEE.

Payment of a $150 fee shall be required before an annual Wireless Telecommunication Facility Permit shall be issued. Such fees may be adjusted from time to time by resolution of the Board of Commissioners. Permits shall be issued for calendar years beginning with 1998. Permit fees shall not be pro-rated. Persons operating wireless telecommunication facilities on the effective date of this chapter shall have sixty (60) days from the effective date to comply with the permit requirement. Private business users operating a single wireless telecommunication facility at their principal place of business and governmental users are exempt from the fee.

§ 115.78 COMPLIANCE.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Failure to obtain an annual permit for a wireless telecommunication facility within sixty (60) days after the commencement of the annual permit period shall result in the wireless telecommunication facility being deemed abandoned and subject to removal by the County at the expense of the owner or operator thereof, with such expenses to be recovered in accordance with the applicant's Maintenance/Removal Agreement, as well as subjecting the responsible person(s) to any other penalties set forth in this chapter.

VARIANCES

§ 115.80 VARIANCES.

Variances are to be discouraged, strictly construed against the applicant, and are only to be granted in extraordinary circumstances. The burden shall be on the applicant for a variance to overcome a presumption that variances should not be granted. Variances shall only be granted according to the following:

(A) Governmental users. Governmental users which operate wireless telecommunication facilities for public service, public safety or administrative purposes may be granted a variance if the restrictions and limitations contained in this chapter impose constraints that are contrary to the public interest. The burden shall be on the governmental user to demonstrate to the satisfaction of the Board of Commissioners that it cannot serve the public interest within the constraints of this chapter. Any variance granted to a governmental user shall be the minimum required to accomplish its public service mission.

(B) Non-governmental providers. In order to qualify for a variance, private business users and commercial wireless providers must demonstrate to the satisfaction of the Planning Board and the Board of Commissioners that unique technical reasons not shared by other providers of functionally equivalent services prohibit their ability to provide personal wireless services. In order to be granted a variance, applicants must demonstrate that no combination of locations, techniques or technologies generally known in the industry, can resolve their technological deficiency at a reasonable cost.

(C) Exceptions. The Board of Commissioners may grant a variance in a particular instance when, in its opinion, a proposed variance would result in further mitigation of adverse visual and other environmental impacts than would otherwise be possible.

§ 115.81 PUBLIC HEARING AND NOTICE.

Any person requesting a variance from the terms of this chapter shall submit a written request for a variance justifying the request to the Ordinance Administrator. The Ordinance Administrator may request the applicant to supply such additional information as he or she deems necessary before forwarding the request, together with any staff recommendations, to the Board of Commissioners. A

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

quasi-judicial public hearing before the Board of Commissioners shall be required on any request for a variance. Public notice of the variance request and public hearing shall be in accordance with section § 115.40(E) of this chapter.

MISCELLANEOUS PROVISIONS

§ 115.90 PENALTIES.

In addition to the penalties and other provisions for the revocation of any Special Use Permit set forth in this chapter, any person who violates this chapter shall be subject to the penalties, enforcement provisions, and other equitable, civil and criminal remedies provided in G.S. § 153A-123.

§ 115.91 VALIDITY OF INDIVIDUAL SECTIONS.

If any clause, sentence, provision or section of this chapter is for any reason held to be unconstitutional, illegal or invalid, such unconstitutionality, illegality or invalidity shall not affect or impair any of the remaining clauses, sentences, provisions or sections of this chapter. It is hereby declared to be the intent of the Board of County Commissioners that the remaining provisions of this chapter would have been adopted had such unconstitutional, illegal or invalid clause, sentence, provision or section not been included in this chapter.

§ 115.92 HEADINGS AND CAPTIONS.

Headings and captions are inserted for convenience only and shall not effect any interpretation of this Agreement.

§ 115.93 EFFECTIVE DATE, REPEALERS AND REVIVAL OF MORATORIUM.

The County Board of Commissioners declares that this is a public emergency ordinance necessary for the protection of public health, safety, and welfare and shall be effective upon adoption. Upon the effective date of this chapter, the moratorium upon the issuance of permits for wireless telecommunication facilities established by resolution on June 16, 1997 is repealed. provided, however, that if this chapter or any clause, sentence, provision or section in this chapter is held to be unconstitutional, invalid or void for any reason, the moratorium established on June 16, 1997 shall be immediately reinstated for a period of six months to allow the County time to formulate and pass new regulations.

Adopted and effective February 23, 1998.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

[This Page Intentionally Left Blank]

Chapter 30 - TELECOMMUNICATIONS

ARTICLE I. - IN GENERAL

Secs. 30-1—30-18. - Reserved.

ARTICLE II. - WIRELESS COMMUNICATIONS ORDINANCE

Footnotes:

--- (**1**) ---

Editor's note— Ord. No. O2008-02, §§ I—XIII, adopted Aug. 15, 2015, amended Ch. 30, Art. II, §§ 30-19—30-50, in effect repealing and reenacting said article as set out herein. Former Art. II pertained to similar subject matter and derived from Ord. of 3-28-2002 and Ord. No. 008-02, §§ 1, 4—29, 31—33, adopted Feb. 18, 2008.

Sec. 30-19. - Purpose and legislative intent.

The purpose of this wireless communications ordinance is:

(1) To provide for the public health, safety and welfare by ensuring that residents, businesses and public safety operations in Jackson County have reliable access to wireless communications networks and mobile broadband communications services while also providing for the protection of Jackson County's communities, residents, and natural resources;

(2) To encourage colocation of communications facilities on existing towers;

(3) To encourage the use of existing buildings and structures as locations for communications facilities; and

(4) To establish a fair and efficient process for review and approval of applications.

To accomplish the above stated objectives and to ensure that the placement, construction or modification of wireless communication facilities complies with all applicable federal laws, including without limitation Section 6409 of the federal Middle Class Tax Relief and Job Creation Act of 2012, Pub. L. No. 112-96, and to assure compliance with applicable state laws, including Session Law 2013-185, Jackson County adopts this wireless communications ordinance. By enacting this article it is Jackson County's intent to ensure Jackson County has sufficient wireless infrastructure to support public safety communications throughout Jackson County and to ensure access to reliable wireless communications services throughout all areas of Jackson County while protecting communities, residents, and natural resources.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(Ord. No. O2008-02, § I, 8-15-2015) Sec. 30-20. - Definitions.

For the purposes of this article, the following definitions apply:

Abandonment means cessation of use of a wireless support structure for wireless communications activity for at least the minimum period of time specified under this article.

Accessory equipment means any equipment serving or being used in conjunction with a wireless communication facility or wireless support structure. The term includes utility or transmission equipment, power supplies, generators, batteries, cables, equipment buildings, cabinets and storage sheds, shelters or similar structures.

Administrative approval means approval that the planning department is authorized to grant after administrative review.

Administrative review means non-discretionary evaluation of an application by the planning department. This process is not subject to a public hearing. The procedure for administrative review is set forth in section 30-23(d) of this article.

Antenna means communications equipment that transmits, receives, or transmits and receives electromagnetic radio signals used in the provision of all types of wireless communications services.

Application means a formal request submitted to the county to construct or modify a wireless support structure or a wireless facility.

Base station means a station at a specific site authorized to communicate with mobile stations, generally consisting of radio transceivers, antennas, coaxial cables, power supplies and other associated electronics.

Broadband is another term for bandwidth, or the amount of data that can be sent through a connection to access high-speed internet.

Building permit means an official administrative authorization issued by the city prior to beginning construction consistent with the provisions of G.S. 160A-417.

Camouflage means the use of any combination of materials or coloration that disguises wireless support structures or towers and antennas as something else (such as a tree).

Carrier on wheels or cell on wheels (COW) means a portable self-contained wireless facility that can be moved to a location and set up to provide wireless services on a temporary or emergency basis. A COW is normally vehicle-mounted and contains a telescoping boom as the antenna support structure.

Co-location means the placement or installation of wireless communication facilities on existing structures, including electrical transmission towers, water towers, buildings and other structures

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

capable of structurally supporting the attachment of wireless communication facilities in compliance with applicable codes.

Communications means the transmission and/or reception of audio, video, data, and other information by wire, radio frequency, light, and other electronic or electromagnetic systems.

Concealed wireless facility means any wireless facility that is integrated as an architectural feature of an existing structure or any new wireless support structure designed to conceal the presence of antennas or towers so that the purpose of the facility or wireless support structure is not readily apparent to a casual observer.

County means Jackson County, NC.

Electrical transmission tower means an electrical transmission structure used to support high voltage overhead power lines. The term shall not include any utility pole.

Eligible facilities request means a request for modification of an existing wireless tower or base station that involves collocation of new transmission equipment or replacement of transmission equipment but does not include a substantial modification.

Equipment compound means an area surrounding or near the base of a wireless support structure within which are located wireless communication facilities.

Existing structure means a wireless support structure, erected prior to the application for collocation or substantial modification under this article, that is capable of supporting the attachment of wireless communication facilities, including, but not limited to, electrical transmission towers, buildings and water towers.

FAA means the Federal Aviation Administration, or it's duly designated and authorized successor agency.

Fall zone means the area in which a wireless support structure may be expected to fall in the event of a structural failure, as measured by engineering standards.

FCC means the Federal Communications Commission, or it's duly designated and authorized successor agency.

Height means, when referring to a tower or structure, the distance measured from the pre-existing grade level to the highest point on the tower or structure, even if said highest point is an antenna or lightning protection device.

Jackson County Board of Commissioners means the governing body of Jackson County with the exception of when applications for conditional use permits are located within the zoning jurisdiction

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

of a municipality. In these cases, Jackson County Board of Commissioners means the governing body of the municipality in which the zoning jurisdiction is located.

Monopole means a single, freestanding pole-type structure supporting one or more antennas. For the purposes of this article, a monopole is not a utility pole.

Ordinary maintenance means ensuring that wireless communication facilities and wireless support structures are kept in good operating condition. Ordinary maintenance includes inspections, testing and modifications that maintain functional capacity and structural integrity; for example, the strengthening of a wireless support structure's foundation or of the wireless support structure itself. Ordinary maintenance includes replacing accessory equipment within an existing equipment compound and relocating existing antennas to different height levels on an existing monopole or tower upon which they are currently located, but does not include replacing existing antennas with new antennas of any size, weight, shape and/or color. Ordinary maintenance includes replacement of damaged equipment with similar equipment provided the replacement equipment does not exceed the height, diameter, weight, or other attribute of the original equipment by more than ten percent. ordinary maintenance does not include substantial modifications.

Planning board means the Jackson County Planning Board.

Planning department means the Jackson County Planning Department and its staff.

Planning director means the Jackson County Planning Director or his/her designee.

Replacement pole means the pole of equal proportions and of equal height or such other height that would not constitute a substantial modification to an existing structure in order to support wireless communication facilities or to accommodate collocation. Requires removal of the wireless support structure it replaces.

Search ring means the area within which a wireless support facility or wireless facility must be located in order to meet service objectives of the wireless service provider using the wireless facility or wireless support structure.

Substantial modification means the mounting of a proposed wireless facility on a wireless support structure that substantially changes the physical dimensions of the support structure. A mounting is presumed to be a substantial modification if it meets any one or more of the criteria listed below. The burden is on the local government to demonstrate that a mounting that does not meet the listed criteria constitutes a substantial change to the physical dimensions of the wireless support structure.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(1) Increasing the existing vertical height of the structure by the greater of (i) more than ten percent or (ii) the height of one additional antenna array with separation from the nearest existing antenna not to exceed 20 feet.

(2) Except where necessary to shelter the antenna from inclement weather or to connect the antenna to the tower via cable, adding an appurtenance to the body of a wireless support structure that protrudes horizontally from the edge of the wireless support structure the greater of (i) more than 20 feet or (ii) more than the width of the wireless support structure at the level of the appurtenance.

(3) Increasing the square footage of the existing equipment compound by more than 2,500 square feet.

Tower means a lattice-type or monopole structure, guyed or freestanding, or other structure designed primarily to support an antenna for receiving and/or transmitting a wireless signal. A tower is a wireless support structure as defined in this article.

Utility pole means a structure owned and/or operated by a public utility, municipality, electric membership corporation or rural electric cooperative that is designed specifically for and used to carry lines, cables, or wires for telephone, cable television, or electricity, or to provide lighting.

Water tower means a water storage tank, or a standpipe or an elevated tank situated on a support structure, originally constructed for use as a reservoir or facility to store or deliver water.

Wireless communication facility means the set of equipment and network components, inclusive of the underlying wireless support structure or tower, and including antennas, transmitters, receivers, base stations, power supplies, cabling, and associated equipment necessary to provide wireless data and wireless communications services to a discrete geographic area.

Wireless communication facility permit means the permit issued by the Jackson County Board of Commissioners following the review and approval process set forth in this article allowing the construction of a new wireless support structure or a substantial modification as defined in this article. The permit is a conditional use permit and the process for obtaining such a permit, as set forth in section 30-22(a) of this article, requires a public hearing.

Wireless support structure means a new or existing structure, including but not limited to a monopole, lattice tower, or guyed tower that is designed to support or capable of supporting wireless communication facilities.

(Ord. No. O2008-02, § II, 8-15-2015; Ord. No. O2008-02, 1-30-3017)

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Sec. 30-21. - Approvals required for wireless communication facilities and wireless support structures.

(a) *Overall procedure and desired outcomes for approving and issuing permits for wireless communication facilities* . In order to ensure that the placement, construction, and modification of wireless communication facilities protect the county's health, safety, public welfare, environmental features, the nature and character of communities and neighborhoods and other aspects of the quality of life within the county, while providing an adequate level of wireless communications service within the county, Jackson County hereby adopts an overall policy with respect to the review, approval and issuance of permits for wireless communication facilities for the express purpose of achieving the following outcomes:

(1) Implementing an application process for person(s) seeking approval of wireless communication facilities.

(2) Requiring review of applications for any new wireless communication facilities as required or otherwise specified in this article.

(3) Establishing a procedure for examining an application and issuing the required permit(s) for wireless communication facilities that is both fair and consistent.

(4) Promoting, and requiring wherever possible, the sharing and/or collocation of wireless communication facilities among service providers.

(5) Requiring, promoting and encouraging, wherever possible, the placement, height and quantity of wireless communication facilities in such a manner as to minimize the physical and visual impact on the community, including, but not limited to, the use of concealment technology and camouflaging.

(6) Providing for a level of service that provides access to adequate wireless communication throughout Jackson County.

(7) In approving a wireless communication facility, the county shall find that the proposed facility site is the most appropriate in regards to being the least visually intrusive within the community.

(b) *Requirements for review and approvals.*

(1) No person shall be permitted to site, place, build, construct, modify or prepare any site for the placement or use of a wireless communication facilities as of the effective date of this section without having first obtained the required permit for a wireless communication facilities as defined in section 30-20 or an administrative review as defined in section 30-20, whichever is applicable.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(2) If constructed as required by permit, all legally permitted wireless communication facilities that existed on or before the effective date of this section shall be allowed to continue as they presently exist, provided however, that they are operating as originally permitted and that any modification of an existing wireless communication facilities permitted by this article complies with the applicable provisions of this article.

(3) Ordinary maintenance of a wireless communication facilities as defined in this article and that does not exceed the conditions of the wireless communication facilities permit does not require an application for a wireless communication facilities permit but may require a building permit. Additional construction or site modification shall not be considered to be ordinary maintenance.

(c) *Exclusions* . The following shall be exempt from this section:

(1) Any facilities expressly exempt from the county's siting, building and permitting requirements.

(2) Any reception or transmission devises expressly exempted under the communications Act of 1996.

(3) Facilities used exclusively for private, noncommercial radio and television reception and private citizen's bands, licensed amateur radio and other similar noncommercial communications.

(4) Facilities used exclusively for providing unlicensed spread spectrum technologies, such as IEEE 802.11a, b, g services (e.g. Wi-Fi and Bluetooth) where the facility does not require a new tower or increase the height of the structure to which it will be attached.

(d) *Exempt from all approval processes* . The following are exempt from all Jackson County plan approval processes and requirements:

(1) Removal of equipment on an existing wireless tower or wireless communication facility.

(2) Ordinary maintenance of existing wireless communication facilities and wireless support structures, as defined in this article; and

(3) COWs placed for a period of not more than 120 days at any location within Jackson County or after a declaration of an emergency or a disaster by the governor and/or by the Jackson County Board of Commissioners.

(4) Facilities owned or leased by Jackson County or county authorities, e.g. airport authority.

(5) Facilities used exclusively for state and local emergency management communications systems.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(e) *Administrative review and approval* . The following types of applications are subject to the application and administrative review process as provided in section 30-23(d). No additional plan review is necessary:

(1) Concealed wireless communication facilities that are 60 feet or less in height, in any location;

(2) COWs, if the use of the COW is either not in response to a declaration of an emergency or disaster by the governor and/or by the Jackson County Board of Commissioners, or will last in excess of 120 days;

(3) Collocations;

(4) Facilities used exclusively for providing unlicensed spread spectrum technologies, such as IEEE 802.11a, b, g services (e.g. Wi-Fi and Bluetooth) where the facility requires a new tower or increases the height of the structure to which it will be attached;

(5) Wireless communication facilities placed on utility poles;

(6) Placement of new transmission equipment on an existing wireless support structure or tower; and

(7) Replacement of transmission equipment on an existing wireless support structure or tower or base station that does not result in a substantial modification as defined in this article. This includes both "like kind" replacement and upgrades with dissimilar equipment.

(8) Facilities used exclusively for providing broadband services, provided that the structure to which facilities are attached does not exceed 120 feet in height and does not require the construction of an access road to the property.

(9) Facilities owned by the State of North Carolina.

(f) *Wireless communication facilities permit (conditional use permit)* . The following types of applications are subject to the application and review process as provided in section 30-23(a).

(1) New wireless support structures, including towers;

(2) Substantial modifications to existing wireless communication facilities.

(Ord. No. O2008-02, § III, 8-15-2015; Ord. No. O2008-02, 1-30-3017) Sec. 30-22. - Standards for wireless communication facilities.

(a) *Location of wireless communication facilities* .

(1) It is recommended that applicants for all wireless communication facilities locate, site and construct said wireless communication facilities in accordance with the following priorities, in order:

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

a. On existing wireless support structures without substantial modification of the tower or structure.

b. On existing wireless support structures with substantial modification(s).

c. On existing structures other than wireless support structures, such as electrical transmission towers and buildings, capable of accommodating the facilities.

d. On properties in areas developed for business use.

e. On properties in areas developed for rural use.

f. On properties in areas developed for residential use.

(2) If the proposed site is not proposed for the highest priority listed above, then a detailed explanation and documentation (i.e. intermodulation study) must be provided in the application as to why a site of a higher priority designation was not selected.

(3) The county may approve any site located within an area in the above list of priorities, provided that the county finds that the proposed site is in the best interest of the health, safety and welfare of the county and its inhabitants.

(b) *Type and height of wireless support structures and towers* .

(1) The usual maximum height for wireless support structures shall be 100 feet. The Jackson County Board of Commissioners may approve increases in wireless support structure height up to a maximum height of 180 feet based on a showing of need and after consideration and satisfaction of the other requirements of this article.

(2) Wireless support structures and towers may be monopole or lattice type.

(3) Wireless support structures and towers may be located on a protected mountain ridge as defined in the Jackson County Mountain and Hillside Development Ordinance provided that:

a. The wireless support structure does not extend more than 20 feet above the average height of the tree canopy within 100 feet of the tower site. If any antenna extends more than two feet from the side of the support structure, the portion of the tower extending above the vegetative canopy shall be camouflaged to appear like the top of a coniferous tree with all antennas concealed within simulated foliage.

b. The wireless support structure or tower is not visible from a public road within one-half mile of the proposed site.

c. There is no other wireless support structure or tower located on a ridge within one mile of the proposed site.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

d. The proposed wireless support structure or tower is a monopole.

e. The proposed wireless support structure or tower is not visible from and within two miles of the Blue Ridge Parkway.

f. There are no other structures, including electrical transmission towers, within the search area capable of accommodating the wireless communications equipment.

(c) *Reserved* .

(d) *Visibility and noise of wireless communication facilities* .

(1) *Lighting.* Wireless communication facilities shall not be artificially lighted or marked, except as required by federal regulations. If lighting is legally required, the applicant shall provide a detailed plan for sufficient lighting of as unobtrusive and inoffensive an effect as is permissible under state and federal regulations. For any wireless communication facilities for which lighting is required under the FAA's regulations, or that for any reason has lights attached, all such lighting shall be affixed with technology that enables the light to be seen as intended from the air, but that prevents the ground scatter effect so that it is not able to be seen from the ground to a height of at least 12 degrees vertical for a distance of at least one mile in a level-terrain situation. Such device must be compliant with or not in conflict with FAA regulations. A physical shield may be used, as long as the light is able to be seen from the air, as intended by the FAA. If lighting is required by the FAA or other government agency, then such lighting shall be installed pursuant to the FAA or other government agency standards. The applicant shall present the options for selection by the county, being mindful of the impacts of the proposed lighting upon people whose residences are located at higher elevations.

(2) *Retrofitting.* In the event a wireless communication facility that is lighted is modified, at the time of the modification the county may require that the tower be retrofitted with the technology set forth in the preceding subsection.

(3) *Camouflage/concealment.* All new wireless communication facilities are encouraged to utilize camouflage and/or concealment techniques to the maximum extent feasible. Wireless communications facilities to be located within residential areas, rural areas, and scenic areas are encouraged to employ camouflage or concealment techniques.

(4) *Wireless communication facilities finish/color.* Structures shall be galvanized and/or painted with a rust-preventive paint of an appropriate color to harmonize with the surroundings and shall be maintained in accordance with the requirements of this section and subject to FAA requirements.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(5) *Noise.* All facilities at a wireless communication facility, regardless of the owner of the facilities, shall comply with the county's noise control regulations, without exception.

(e) *Security of wireless communication facilities* . All wireless communication facilities shall be located, fenced or otherwise secured in a manner that prevents unauthorized access. Specifically:

(1) All wireless communication facilities, including antennas, towers and other supporting structures, including guy anchor points and wires, shall be made inaccessible to individuals and constructed or shielded in such a manner that they cannot be climbed or collided with; and

(2) Transmitters and communications control points shall be installed in such a manner that they are readily accessible only to persons authorized to operate or service them.

(f) *Signage* . Wireless communication facilities shall contain a sign no larger than four square feet shall be installed to containing the name(s) of the owner(s) and operator(s) of the antenna(s) as well as emergency phone number(s). The sign shall be on the equipment shelter or cabinet of the applicant and be visible from the access point of the site and must identify the equipment owner of the shelter or cabinet. On tower sites, an FCC registration site, as applicable, is also to be present. The signs shall not be lighted, unless applicable law, rule or regulation requires lighting. No other signage, including advertising, shall be permitted.

(g) *Setbacks* .

(1) Unless otherwise stated herein, each wireless support structure shall be set back from all property lines a distance equal to its engineered fall zone plus ten percent. The setback shall be measured from the nearest portion of the right-of-way of any public road or thoroughfare and any occupied building or domicile. Further, the nearest portion of any new access road leading to a wireless communication facility shall be no closer than 15 feet to the nearest property line.

(2) Accessory structures shall be located within the footprint of the approved facility and meet the minimum property line setbacks for the district or 30 feet from adjacent property lines whichever is more restrictive.

(3) There shall be no development of habitable buildings within the wireless support structure setback set forth in the preceding subsection.

(h) The accessory structures associated with wireless communication facilities shall maximize the use of building materials, colors, and textures designed to blend with and harmonize with the natural surroundings.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(i) All utilities at a wireless communication facilities site shall be installed underground if practical and in compliance with all laws, ordinances, rules and regulations of the county, including specifically, but not limited to, the National Electrical Safety Code and the National Electrical Code where appropriate.

(j) At a wireless communication facilities site an access road and turnaround space for an emergency vehicle shall be provided to assure adequate emergency and service access. Maximum use of existing roads, whether public or private, shall be made to the extent practicable. Road construction shall at all times minimize ground disturbance and the cutting of vegetation. Road design and construction shall comply with the private road standards set forth in the Jackson County Subdivision Regulations. Maintenance of the access roads shall be provided to assure vehicular access to the site at all times. All erosion control and storm water management facilities shall be maintained at all times. A maintenance log that documents inspections of the site and access roads shall be maintained at the communications facility site. The required maintenance log shall be placed in a location accessible at all times to the Jackson County employees charged with review of the log. Inspections shall made at least quarterly by the owner/lessee of the site to confirm that the access road and site are maintained with no erosion or storm water issues and that all equipment is in good order. The employee of the site owner/lessee conducting the inspection shall note the date of the inspection and condition of the site and access road on the inspection log. Inspections logs shall be reviewed at least biennially by the Jackson County Planning Department. Any failure to maintain the inspection log and/or to maintain the erosion control and storm water management measures at the site and on the access roads shall be considered a violation of this article.

(k) All wireless communication facilities, shall be constructed, operated, maintained, repaired, provided for removal of, modified, or restored in strict compliance with all current applicable technical, safety and safety-related codes adopted by the county, state, or United States, including, but not limited to, the most recent editions of the ANSI Code, National Electrical Safety Code, and the National Electrical Code, as well as accepted and responsible workmanlike industry practices and recommended practices of the National Association of Tower Erectors. The codes referred to are codes that include, but are not limited to, construction, building, electrical, fire, safety, health, and land use codes. In the event of a conflict between or among any of the preceding the more stringent shall apply.

(l) A holder of a wireless communication facilities permit granted under this section shall obtain, at its own expense, all permits and licenses required by applicable law, ordinance, rule, regulation or code, and must maintain the same, in full force and effect, for as long as required by the county or other governmental entity or agency having jurisdiction over the applicant.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(m) A building permit shall not be issued for construction of the wireless support structure unless there is an FCC authorized or licensed spectrum carrier which has indicated it will be installing equipment to use such spectrum on the wireless support structure.

(Ord. No. O2008-02, § IV, 8-15-2015; Ord. No. O2008-02, 1-30-3017)

Sec. 30-23. - Application and review process.

(a) *Wireless communication facilities permit (conditional use permit) application requirements* .

(1) All applications for a wireless communication facilities permit (conditional use permit) shall comply with the requirements set forth in this section.

(2) There shall be a pre-application meeting with the planning director for all wireless communication facilities permit applications. The purpose of the pre-application meeting will be to address issues that will help to expedite the review and permitting process and certain issues or concerns the county may have. A pre-application meeting may also include a site visit, if there has not been a prior site visit for the requested facility.

(3) The applicant shall be notified by the planning department in writing within 15 working days of submission of an application as to the completeness of the wireless communication facilities application and any deficiencies. An amended application shall be required to correct any deficiencies. In the event the application is resubmitted with correction and denied again, the wireless communication facilities permit application is not refundable.

(4) A wireless communication facilities permit shall be considered a conditional use permit and shall be subject to the review and approval processes mandated for such permits. The board may, at its discretion, delegate or designate other official agencies or officials of the county or outside consultants to accept, review, analyze, evaluate and make recommendations to the board with respect to the granting or not granting or revoking wireless communication facilities permits for wireless communication facilities. However, outside consultants shall have no authority to make or change policy for the county.

(5) When placing wireless communication facilities or wireless support structures on government-owned property or facilities, only noncommercial wireless carriers and users are exempt from the permitting requirements of this section.

(6) No wireless communication facilities or wireless support structures shall be installed, constructed or modified until the wireless communication facilities permit has been approved and a building permit has been issued.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(7) The applicant must provide documentation to verify it has the right to proceed as proposed on the site. This requires an executed copy of the lease with the landowner or landlord or a signed letter of agency acknowledging authorization. If the applicant owns the site, a copy of the ownership record is required.

(8) The application shall include a statement in writing:

a. That the applicant's proposed wireless communication facilities shall be maintained in a safe manner, and in compliance with all conditions of the wireless communication facilities permit, without exception, unless specifically granted relief by the board in writing, as well as all applicable and permissible local codes, ordinances, and regulations, including any and all applicable county, state and federal laws, rules, and regulations; and

b. That the construction of the wireless communication facilities is legally permissible, including, but not limited to the fact that the applicant is authorized to do business in the state.

c. The applicant acknowledges and understands that should the facility not be used for a period of 180 days, the applicant will remove the facility at its expense within 90 days of abandonment as set forth in section 30-27 of this article.

(9) Where an engineering certification is required in the application materials, such certification shall bear the signature and seal of a professional engineer licensed in North Carolina.

(10) In addition to all other information required by this article, all applications shall contain the following information:

a. Ownership and management:

1. The name, address and phone number of the person preparing the application;

2. The name, address, and phone number of the property owner and the applicant, including the legal name of the applicant. If the owner of the structure is different than the applicant, the name and all necessary contact information shall be provided;

b. The 911 address and tax map parcel number of the property;

c. A copy of the FCC license applicable for the intended use of the wireless communication facilities;

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

d. Written acknowledgement that any new wireless support structure facility shall be structurally designed to accommodate a minimum of three antenna arrays and shall be managed so as to not restrict, prevent or prohibit competition among carriers. Further, applicant acknowledges that any charges made to other users of the facility, shall be reasonable and shall not exceed those charges made by other facility users in Jackson County using similar facilities.

e. The applicant shall disclose in writing any agreement in existence prior to submission of the application that would limit or preclude the ability of the applicant to share any new wireless support structure that it constructs;

f. A site plan depicting the following:

1. The zoning district or designation in which the property is situated, if applicable;
2. The size of the property footprint on which the proposed facility to be built or attached is located, stated both in square feet and lot line dimensions, topography of the subject property and the adjacent properties, and a survey showing the location of all lot lines. The location, size and height of all existing and proposed facility on the property on which the facility is to be located and adjoining properties;
3. The footprint and type, location and dimensions of any access drive, camouflage, landscaping buffers, fencing and any other improvements exiting on or proposed for the site;
4. Plans for any access road to be constructed to provide access to the site; and
5. Erosion control and storm water management plans for the proposed access road and the facility site.
6. A drawing showing a circle around the proposed facility equal to the setback requirements of Jackson County, if any; for such a facility.
7. A drawing showing any landscaping proposed for the site by the applicant.

g. Elevations showing the profile or the vertical rendition of the wireless support structure identifying proposed attachments and all related fixtures, structures, appurtenances and apparatus, including the height above the pre-existing grade, surrounding trees, materials, camouflage, color and lighting.

h. The azimuth, size and center line height location of all proposed antennas on the supporting structure;

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

i. Technical information regarding noise and/or sound generated by any generators or other equipment to be used on site, if applicable; if multiple generators are to be used, then the data should show the cumulative impact of noise generated. A specification sheet from the generator manufacturer providing this information is sufficient to meet this requirement.

j. *Safety* :

1. If substantially modifying an existing wireless communication facility

(i) The age of the facility in years, including the date of the grant of the original permit;

(ii) A description of the type of tower, e.g. guyed, self-supporting lattice or monopole;

k. A structural report certified and signed by a professional engineer licensed to do business in North Carolina and bearing that engineer's currently valid stamp, showing the structural adequacy of the proposed or existing structure to accommodate the proposed wireless communication facilities, including any equipment shelter, unless the equipment shelter is located on the lowest floor of a building;

(11) Compliance with FAA regulations. Applicant shall comply with all FAA regulations and shall supply any FAA determination for the proposed site. This applies to any modification to a pre-existing tower that adds additional height to the structure.

(12) The owner of a proposed new wireless support structure, and his/her successors in interest, shall negotiate in good faith for the shared use of the proposed wireless support structure by other wireless service providers in the future. Failure to abide by the conditions outlined above may be grounds for revocation of the wireless communication facilities permit.

(13) In order to better inform the public, in the case of a new wireless support structure (tower), the applicant shall conduct a "balloon test" prior to the initial public hearing on the application. The applicant shall arrange to fly, or raise upon a temporary mast, a minimum of a ten-foot length, brightly colored balloon at least three feet in diameter at the maximum height of the proposed new wireless support structure (tower).

a. At least 14 days prior to the conducting of the balloon test, the applicant, in coordination with the planning department, shall cause a sign to be erected so as to be clearly visible from the public road nearest the proposed site and shall be removed no later than 14

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

days after the conduct of the balloon test. The sign shall be readable from the road by a person with 20/20 vision.

b. Such sign shall be placed off, but as near to, the public right-of-way as is possible.

c. Such sign shall contain the location, purpose, times and date(s) of the balloon test and contact information.

d. The dates (including a second date, in case of poor visibility or wind in excess of 15 mph on the initial date), times, purpose, and location of this balloon test shall be advertised by the applicant seven and 14 days in advance of the first test date in a newspaper with a general circulation in the county and as agreed to by the county. The applicant shall inform the planning department in writing, of the dates and times of the test, at least 14 days in advance. The balloon shall be flown for at least four consecutive hours between 10:00 a.m. and 2:00 p.m. on the dates chosen. The primary date shall be on a weekend, but the second date, in case of poor visibility on the initial date, may be on a weekday. A report with photographs from various locations of the balloon shall be provided with the application. Locations from which photographs are to be taken shall be reviewed and approved by the planning department.

e. The applicant shall provide written notice to all property owners and residents of property located within 2,000 feet of the nearest property line of the subject property of the proposed construction of the wireless support structure (tower) and of the date(s), location, and time(s) of the balloon test. Such notice shall be provided at least 14 days prior to the conduct of the balloon test and shall be delivered by first class mail to a resident at the address of such property and to the owner at the mailing address for such owner as listed in the Jackson County property records.

(14) All applications for proposed wireless support structures shall contain a demonstration that the facility is sited and designed so as to create the least visual and physical intrusiveness reasonably possible given the facts and circumstances involved, and thereby will have the least adverse visual and physical effect on the environment and its character, on existing vegetation, and on the community in the area of the wireless support structure. The county expressly reserves the right to require the use of camouflage and/or concealment technology or techniques to achieve this goal and such shall be subject to approval by the board.

(15) To assist the county in making this determination, the applicant shall furnish a visual impact assessment, which shall include:

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

a. Pictorial representations (photo simulations) of "before and after" views from key viewpoints inside of the county, including, but not limited to, state highways and other major roads, state and local parks, other public lands, historic districts, preserves and historic sites normally open to the public, and from any other location where the site is visible to a large number of visitors, travelers, or residents. Guidance will be provided concerning the appropriate key viewpoints at the pre application meeting. In addition to photographic simulations to scale showing the visual impact, the application shall provide a map showing the locations of where the pictures were taken and the distance(s) of each location from the proposed wireless support structure;

b. A pictorial representation or photo simulation of the visual impact of the proposed facility, including, as applicable, the tower base, guy wires, fencing and accessory buildings from abutting and adjacent properties and streets as related to the need or appropriateness of screening.

(16) The applicant shall demonstrate and provide by drawing and/or photo simulation how it shall effectively screen from view the base and all related equipment and structures of the proposed wireless communication facilities.

(17) Applications will not be transmitted to the board for consideration until the application is deemed complete.

(18) The holder of a wireless communication facilities permit shall notify the county of any proposed modification of a wireless communication facility and shall apply to the county to modify, relocate or rebuild a wireless communication facility.

(19) All applications for a condition use permit and administrative review in the following sections shall be accompanied by the following statements.

a. The information contained in this application is true and accurate; and

b. Is signed and sworn before a notary public.

(b) *Procedural requirements for a wireless communication facilities permit (conditional use permit)* . The procedures set forth below for the review and consideration of the proposed wireless communication facilities permit shall be followed for new wireless support structures, substantial modifications, and any other proposal requiring a wireless communication facilities permit as required or otherwise specified in this section. The procedure for review and approval of a wireless communication facilities permit shall be a conditional use permit process, which will require a quasi-judicial hearing by the Jackson County Board of Commissioners.

(1) *Plan submittal* .

a. *Filing of application.* An application for a wireless communication facilities permit may be filed by an agent of the applicant who is specifically authorized to submit the application. The application for a wireless communication facilities permit shall be filed with the planning department on a form provided by the planning department, accompanied by all other application materials as provided in this article.

b. *Fees.* Any application fee, as designated by the board of commissioners, shall be due and payable upon submission of the application.

c. *Information required.* Each application for a wireless communication facilities permit shall contain the information required on the application form and other information meeting the requirements set forth in this article.

(2) *Staff review* .

a. *Planning department review.* Following submittal of the application for the wireless communication facilities permit, the application shall be reviewed by the staff of the planning department for compliance with the requirements of this article. The planning department may request input from consultants and/or experts to assist in the thorough review of the wireless communications permit application. The planning department shall review the permit application within 15 working days of its submittal to determine if the application is complete. When the planning department determines that the application is complete, it shall notify the applicant in writing via electronic mail.

b. *Planning department recommendation.* Upon review of a complete application and site plan for a wireless communication facilities permit, the planning department may make one of the following recommendations.

1. *Approval.* If the planning department finds the application and site plan to be in compliance with the requirements of this article, he/she shall forward the recommendation and the wireless communication facilities permit application shall be forwarded to the Jackson County Board of Commissioners for review. If the plan is not revised to meet the conditions within 60 days after the decision by the planning department, the request shall be deemed denied.

2. *Approval with conditions.* If the planning department recommends approval with conditions, the applicant may revise the application to address the conditions of such recommendation and resubmit it. The revised application shall be reviewed by the planning department and, if the identified conditions are adequately addressed, the revised application shall be forwarded to the Jackson County Board of Commissioners for review and approval. If the plan is not revised to meet the

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

conditions within 60 days after the decision by the planning department, the request shall be deemed denied.

3. *Denial.* If the planning department recommends denial of the application, the reasons for denial shall be provided in writing to the applicant within 30 days of the action taken. The application may be revised to address the reasons for denial and resubmitted in accordance with the provisions of this article. A recommendation for denial by the planning department shall be considered final action on the request unless, within 30 days of receiving the written recommendation, the applicant provides a written request for review by the Jackson County Board of Commissioners.

(3) *Formal review* .

a. *Quasi-judicial hearing.* Upon receipt of a report from the planning department requesting a quasi-judicial hearing on the application for a wireless communication facility permit, a hearing shall be scheduled by the Jackson County Board of Commissioners on the application. Notice of all quasi-judicial hearings shall be in accordance with the North Carolina General Statutes. In addition, owners of all adjoining properties and all properties abutting any private road to be used to access the proposed site of the proposed facility shall be notified of the hearing by first class mail. Such notice shall be provided as required by law prior to the hearing. The quasi-judicial hearing on the application shall be scheduled by the Jackson County Board of Commissioners and shall meet all requirements for such a hearing.

b. *Action by the Jackson County Board of Commissioners.*

1. *Designation of approval body.* The Jackson County Board of Commissioners is hereby designated as the approval body for wireless communication facilities permits required by this article and is granted all necessary authority to carry out this responsibility.

2. *Review of the wireless communication facilities permit request* . In order to preserve the integrity of the quasi-judicial hearing and at the same time comply with G.S. 153A-323, the Jackson County Board of Commissioners shall consider the wireless communication facilities permit request, at a quasi-judicial hearing.

3. *Conditional use standards* . The Jackson County Board of Commissioners shall not approve the wireless communication facilities permit application unless and until it finds that the application meets all requirements set forth in this article and the Jackson County Board of Commissioners makes the following findings, based on the

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

evidence and testimony presented at the public hearing or otherwise appearing in the record of the case:

(i) That the proposed use or development of the land will not materially endanger the public health or safety;

(ii) That the proposed use or development of the land is reasonably compatible with significant natural and topographic features on the site and within the immediate vicinity of the site given the proposed facility, site and access road design and any mitigation techniques or measures proposed by the applicant;

(iii) That adjacent/adjoining property owners have not demonstrated that proposed use or development of the land will substantially injure the value of adjoining or abutting properties;

(iv) That the site can be accessed by service and emergency vehicles; and

(v) That the application, site and proposed improvements comply with all provisions of this article.

4. *Decision by the Jackson County Board of Commissioners* . The Jackson County Board of Commissioners, after conducting the quasi-judicial hearing, may: deny approval; table the request pending submittal of additional information; or approve the wireless communications permit with or without additional conditions. The minutes of the Jackson County Board of Commissioners shall state whether the proposed use does or does not meet the requirements set forth in this article for the proposed use, and if the permit request is approved, the findings required by this article for such approval shall be stated within the minutes. The decision on the permit application shall be by a simple majority vote of those members of the Jackson County Board of Commissioners present at the meeting at which the action is taken. Any action taken by the Jackson County Board of Commissioners shall be given to applicant and property owner in writing within 30 days of the date the action is taken. If the application is denied, the Jackson County Board of Commissioners shall state the reason(s) for said denial in its notification to the applicant.

(4) *Transfer of approval.* A wireless communication permit approval may be transferred to a subsequent owner of the property for which the permit was issued but may not be transferred to another property.

(5) *Resubmission of denied applications* . No application for approval of a wireless communication permit shall be filed with or accepted by the planning department that is

identical or substantially similar to an application that has been denied by the Jackson County Board of Commissioners.

(6) *Modifications.* Modifications from the standards established by this article for wireless communication facility are subject to the procedure and standards set forth in section 30-29.

(7) *Appeals.* An appeal from the decision of the Jackson County Board of Commissioners regarding a wireless communications permit (conditional use permit) application and site plan may be made by an aggrieved party and shall be made to the Jackson County Superior Court. Any appeal to the superior court shall be filed no later than 30 days after a written copy of the decision of the Jackson County Board of Commissioners is received by the applicant.

(8) *Permit validity.* Approval of a wireless communications permit (conditional use permit) shall be valid for one year from the date of approval by the Jackson County Board of Commissioners. Failure to obtain a building permit, or otherwise initiate the permitted use, within this time shall render the wireless communications permit approval void. The Jackson County Planning Department may grant a single extension of this time period of up to six months upon submittal by the applicant of sufficient justification for the extension.

(9) *Violations.* Violations of the wireless communications permit (conditional use permit) or of any of the conditions attached to the approval shall be considered a violation of this article and subject to the enforcement and penalty provisions set forth in section 30-30 of this article.

(c) *Wireless communication facilities permit administrative review application requirements* .

(1) All applicants for administrative review to collocate on an existing wireless support structure, to upgrade equipment on an existing wireless support structure, to replace existing equipment, and/or any other activity not meeting the definitions of substantial modification or ordinary maintenance provided in this article shall comply with the requirements set forth below. The Jackson County Planning Department is the agency designated to review and approve applications for administrative review.

(2) The application fee for administrative review shall be as set forth in the county's schedule of fees.

(3) An application to "substantially modify" the parameters of an approved wireless communication facilities as relates to the approved height, profile, number of collocations or footprint shall not qualify for administrative review under this section.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(4) Approval of a wireless communication facilities permit (conditional use permit) by the Jackson County Board of Commissioners shall not be required for an application to modify or to co-locate an antenna array on an existing and properly permitted wireless support structure so long as the co-location or modification does not exceed the parameters set forth in G.S. 153A-349.53 (as amended by S.L. 2013-185), unless for good cause such approval shall be required by the planning board or planning department. Administrative review and approval as set forth below shall be required for such application.

(5) Documentation shall be provided to demonstrate that the applicant has the legal right to proceed as proposed on the site, including an executed copy of the lease with the owner of the facility proposed to be attached to, or a letter of agency, showing the right of the applicant to attach to the structure.

(6) The applicant shall include a written statement that:

a. The applicant's proposed wireless communication facilities shall be maintained in a safe manner, and in compliance with all conditions of all applicable permits and authorizations, without exception, as well as all applicable and permissible local codes, ordinances, and regulations, including any and all applicable county, state and federal laws, rules, and regulations; and

b. The construction of the wireless communication facilities is legally permissible, including, but not limited to the fact that the applicant is authorized to do business in the state.

(7) An application for attaching an antenna array, which shall include equipment upgrades and replacement of equipment, under this section shall contain the following information:

a. The name, address and phone number of the person preparing the application;

b. The name, address, and phone number of the property owner and the applicant, including the legal name of the applicant. If the owner of the structure is different than the applicant, the name and all necessary contact information shall be provided;

c. The 911 address and tax map parcel number of the property;

d. A copy of the FCC license or other authorization applicable for the intended use of the wireless communication facilities.

e. A site plan depicting the following:

1. The zoning district or designation in which the property is situated, if applicable;

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

2. For applications that involve expansion of the ground compound, the size of the property on which the structure to be attached to is located, stated both in square feet and lot line dimensions, and a survey showing the location of all lot lines;

3. The location, size and height of all existing and proposed structures on the property on which the structure is located and that is the subject of the application;

4. The footprint, location and dimensions of access drives, landscaping and buffers, fencing and any other existing or proposed site improvements;

5. Unless it is deemed inappropriate or unnecessary by the planning department given the facts and circumstances, the method proposed to effectively buffer and screen from view the base and all related equipment and structures of the proposed Wireless Communication Facilities up to a height of ten feet.

6. Unless already contained in the structural analysis required by Section 30-22(b)(9), elevations showing the vertical rendition of the wireless communication facilities identifying all attachments, and all related fixtures, structures, appurtenances and apparatus, including height above pre-existing grade, materials, color and lighting;

(8) All attachments and exposed cabling shall use concealment techniques to match as closely as possible the color and texture of the structure, whenever practical.

(9) The applicant shall provide a certification by a professional engineer licensed in North Carolina, along with documentation (a structural analysis), including calculations, that prove that the wireless support structure and its foundation as proposed to be utilized, including all proposed attachments, existing attachments, and reserved future attachments, are designed and were constructed to meet all local, county, state, federal and ANSI EIA/TIA 222 as amended requirements for loads, including wind and ice loads and the placement of any equipment on the roof a building after the addition of the proposed new facilities.

(10) All utilities installed for a new wireless communication facilities shall be installed underground when practical and in compliance with all laws, ordinances, rules and regulations of the county, including specifically, but not limited to, the National Electrical Safety Code and the National Electrical Code where appropriate.

(d) *Procedural requirements for administrative review and approval* . The procedures set forth below for administrative review and approval shall be followed for wireless communication facilities qualifying for administrative review and approval as required or otherwise specified in this section.

(1) *Plan submittal* .

a. *Filing of application.* An application for administrative review and approval may be filed by an agent of the company proposing to do the work and who is specifically authorized to submit the application. The application for administrative review and approval shall be filed with the planning department on a form provided by the planning department.

b. *Fees.* Any application fee, as designated by the board of commissioners, shall be due and payable upon submission of the application.

c. *Information required.* Each application for administrative review and approval shall contain the information required on the application form and meeting the requirements set forth in this article.

(2) *Staff review* .

a. *Planning department review.* Following submittal of the application and information for administrative review and approval, they shall be reviewed by the planning department for compliance with the requirements of this article. The planning department may request input from consultants and/or experts to assist in the thorough review of the wireless communications permit application. The planning department shall review the application package within five working days of its submittal to determine if the application is complete.

b. *Planning department action* . Upon review of a complete application and site plan for a wireless facility permit, the planning department may make one of the following determinations. Review of a complete application shall require no more than 30 working days.

1. *Approval.* If the planning department finds the application and related information to be in compliance with the requirements of this article, he shall notify the applicant of the approval and advise that any required building and/or electrical permits may be applied for.

2. *Denial* . If the planning department denies the request, the reasons for denial shall be provided in writing to the applicant. The site plan and application may be revised to address the reasons for denial and resubmitted in accordance with the provisions of this article. Denial of the request by the planning department shall be considered final action on the request unless, within 30 days of receiving the written recommendation, the applicant provides a written appeal to the board of adjustment.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(3) *Transfer of approval.* An administrative review and approval may be transferred to a subsequent owner of the property for which the permit was issued, but may not be transferred to another property.

(4) *Resubmission of denied applications.* No application for administrative review and approval shall be filed with or accepted by the planning department that is identical or substantially similar to an application that has been denied by the planning department within one year of the action denying the request. This waiting period may be waived in an individual case, for good cause shown, by the affirmative vote of three-fourths of the members of the planning board.

(5) *Modifications.* Modifications from the standards established by this article for wireless communication facilities are subject to the procedure and standards set forth in section 30-29.

(6) *Appeals* . An appeal from the decision of the planning department regarding an application for administrative review and approval may be made by an aggrieved party and shall be made to the Jackson County Board of Adjustment. Any petition to the board of adjustment shall be filed with the planning department no later than 30 days after a written copy of the decision of the planning department is received by the applicant. Appeals of the board of adjustment's decisions will be heard before Superior Court.

(7) *Permit validity.* Approval of a request for administrative review and approval shall be valid for one year from the date of approval by the planning department. Failure to obtain a building permit, or otherwise initiate the permitted use, within this time shall render the approval void. The Jackson County Planning Department may grant a single extension of this time period of up to six months upon submittal by the applicant of sufficient justification for the extension.

(8) *Violations.* Violations of the wireless communications permit or of any of the conditions attached to the approval shall be considered a violation of this article and subject to the enforcement and penalty provisions set forth in section 30-30 of this article.

(Ord. No. O2008-02, § V, 8-15-2015; Ord. No. O2008-02, 1-30-3017)

Sec. 30-24. - Retention of consultant/expert assistance cost to be borne by applicant.

(a) The county may hire any consultant and/or expert necessary to assist the county in reviewing and evaluating the application for substantial modifications, new wireless communication facilities, and collocations, including the construction and modification of the site, once permitted, and any site inspections.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(b) To prevent the taxpayers from having to bear the cost related to the issue of the regulation of wireless communication facilities, an applicant shall pay the consultant's fee as set forth in the contractual agreement between the consultant and the county. The amount of the fee shall be based on the cost of services provided and what is usual and customary in Jackson County for the review and permitting assistance related to wireless communication facilities to cover all reasonable costs of consultant and expert evaluation and consultation with the county in connection with the submittal, review and permitting of any application, and where applicable, any lease negotiation, preapproval evaluation and including any construction and modification of the site, once permitted. The payment of the consultant's fee to the county shall precede any work being done as regards to processing an application.

(c) Records of all outside costs associated with the review and permitting process shall be maintained and available for public inspection, in compliance with applicable North Carolina law.

(Ord. No. O2008-02, § VI, 8-15-2015)

Sec. 30-25. - Removal and performance security.

The Applicant and the owner of record of any proposed wireless communication facilities property site, at its cost and expense, shall be jointly required to execute and file with the county a bond, or other form of security acceptable to the county as to type of security and the form and manner of execution, in an amount and with such sureties as are deemed sufficient by the county to assure the faithful performance of the terms and conditions of this section and conditions of any communications facility permit issued pursuant to this section. The amount of the bond or other security shall be at least $75,000.00, with the amount based upon cost estimates for the removal of the wireless support structure or tower and the restoration of the site. Such cost estimates shall be submitted by the applicant and shall be provided by independent contractors. The full amount of the bond or security shall remain in full force and effect throughout the term of the communications facility permit and/or until any necessary site restoration is completed to restore the site to a condition comparable to that which existed prior to the issuance of the original communications facility permit. All bonds or other forms of security provided as required by this section shall be reviewed every five years to assure that the amount of the security is adequate to cover the cost of the structure removal and site restoration. An increase in the amount of the security shall be required if it is determined that the amount of the security is insufficient to adequately restore the site.

(Ord. No. O2008-02, § VII, 8-15-2015)

Sec. 30-26. - Reservation of authority to inspect wireless communication facilities.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

In order to verify that the holder of a wireless communications facility permit for wireless communication facilities and any and all lessees, renters, and/or licensees of such place and construct such facilities, in accordance with all applicable technical, safety, fire, building, and zoning codes, laws, ordinances and regulations and other applicable requirements, the county may inspect all facets of said permit holder's, renter's, lessee's or licensee's placement, construction, modification and maintenance of such facilities, including, but not limited to, wireless support structures, antennas and buildings (excluding exteriors) or other structures constructed or located on the permitted site.

(Ord. No. O2008-02, § VIII, 8-15-2015) Sec. 30-27. - Removal of wireless communication facilities.

(a) Under the following circumstances, the county may determine that the health, safety, and welfare interests of the county warrant and require the removal of wireless communication facilities.

(1) Wireless communication facilities with a permit have been abandoned (i.e. not used as wireless communication facilities) for a period exceeding 180 days, except for periods caused by force majeure or acts of God, in which case repair or removal shall commence within 90 days of abandonment;

(2) Permitted wireless communications facilities fall into such a state of disrepair that it creates a health or safety hazard;

(3) Wireless communications facilities have been located, constructed, or modified without first obtaining, or in a manner not authorized by, the required communications facility permit, or any other necessary authorization and the special permit may be revoked.

(b) If the county makes such a determination as noted in subsection (a), then the county shall notify the holder of the wireless communications facility permit within 48 hours that said wireless communication facilities are to be removed, the county may approve an interim temporary use agreement/permit, such as to enable the sale of the wireless communication facilities.

(c) The holder of the wireless communication facility permit, or its successors or assigns, shall dismantle and remove such facility, from the site and restore the site to as close to its original condition as is possible, such restoration being limited only by physical or commercial impracticability, within 90 days of receipt of written notice from the county. However, if the owner of the property upon which the facility is located wishes to retain any access roadway to the facility, the owner may do so.

(d) If wireless communication facilities are not removed or substantial progress has not been made to remove the wireless communication facilities within 90 days after the permit holder has received notice, then the county may order officials or representatives of the county to remove

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

the wireless communication facilities at the sole expense of the owner or wireless communication facility permit holder.

(e) If the county removes, or causes to be removed, wireless communication facilities, and the owner of the wireless communication facilities does not claim and remove it from the site to a lawful location within ten days, then the county may take steps to declare the wireless communication facilities abandoned, and sell them and their components.

(f) Notwithstanding anything in this section to the contrary, the county may approve a temporary use permit/agreement for the wireless communication facilities, for no more than 90 days, during which time a suitable plan for removal, conversion, or relocation of the affected facility shall be developed by the holder of the communications facility permit, subject to the approval of the county, and an agreement to such plan shall be executed by the holder of the permit and the county. If such a plan is not developed, approved and executed within the 90-day time period, then the county may take possession of and dispose of the affected facilities in the manner provided in this section and utilize the bond in this section.

(Ord. No. O2008-02, § IX, 8-15-2015)

Sec. 30-28. - Liability insurance.

(a) A holder of a wireless communication facility permit shall secure and at all times maintain public liability insurance for personal injuries, death and property damage, and umbrella insurance coverage, for the duration of the wireless communication facility permit in amounts as set forth below:

(1) Commercial general liability covering personal injuries, death and property damages $1,000,000.00 per occurrence/$2,000,000.00 aggregate; and

(2) Umbrella coverage: $3,000,000.00.

(Ord. No. O2008-02, § X, 8-15-2015)

Sec. 30-29. - Modifications.

Any applicant desiring modification, waiver, or exemption from any aspect or requirement of this article may request such at the pre-application meeting, provided that the request for modification is detailed in the submitted application for either a communications facility permit or, in the case of an improvement requiring administrative review, in the application submitted for administrative review. All requests shall be heard and decided by the Jackson County Board of Commissioners, which

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

must find that justification is provided for the requested modification, waiver, or exemption. Such relief may be temporary or permanent, partial or complete. However, the burden of proving the need for the requested modification, waiver, or exemption is solely on the applicant to prove. All requests for a modification, waiver, or exemption shall be accompanied by an application fee as set forth in the schedule of fees and charges. No modification, waiver, or exemption shall be approved unless the applicant demonstrates by clear and convincing evidence that the request is justified and is necessary to prevent unnecessary hardship and that, if granted, the modification, waiver, or exemption will have no significant effect on the health, safety, and welfare of the county, its residents, property owners and other service providers and preserves the intent of this article.

(Ord. No. O2008-02, § XI, 8-15-2015)

Sec. 30-30. - Violations and penalties.

(a) Appropriate actions and proceedings may be taken at law or in equity to:

(1) Prevent any violation of this article;

(2) Prevent unlawful construction;

(3) Recover damages;

(4) Restrain, correct or abate a violation; and / or

(5) Prevent illegal use of a building, structure or premises.

No building permit or certificate of occupancy shall be issued nor shall water, sewer or other public facilities or services be extended to or connected with any land or development subject to the standards of this article unless the requirements of this article are satisfied.

(b) *Enforcement procedures* . When the planning department becomes aware of a violation of this article, it shall be the planning director's duty to notify the owner of the property of the violation. The owner shall immediately remedy the violation.

(1) *Notice of violation* . If the owner of the land fails to take prompt corrective action, the planning department shall give the owner written notice (by certified or registered mail to his last known address, by personal service, or by posting notice conspicuously on the property) of the following:

a. That the activity is in violation of this article;

b. The nature of the violation, and citation of the section(s) of this article violated;

c. The measures necessary to remedy the violation; and

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

d. Mechanisms available to appeal the decision of the administrator.

(2) *Appeal* . Any owner who has received a notice of violation may appeal in writing the decision of the planning department to the board of adjustment within 30 days following the date of the notice of violation. The board of adjustment shall hear an appeal within a reasonable time, and it may affirm, modify, or revoke the notice of violation. In the absence of an appeal, the decision of the planning department shall be final.

(c) *Criminal penalty* . Any violation of this article or amendments thereto shall constitute a misdemeanor. Those convicted of such violations shall be punished as provided by G.S. 14-4. Each day that a violation continues shall be considered a separate violation and punishment assigned accordingly.

(d) *Civil penalty* . The owner of any land and any developer, builder, contractor, agent, or other person who participates or acts in concert, assists, directs, creates, or maintains any condition that is in violation of this article may be held responsible for the violation and subject to the civil penalties and remedies provided herein.

(1) *Notice* . No civil penalty shall be assessed until the person alleged to be in violation has been notified in accordance with section 30-30(b)(1). If after receiving a notice of violation under section 30-30(b)(1), the owner or other violator fails to take corrective action, a civil penalty may be imposed under this section in the form of a citation. The citation shall be served in the same manner as of a notice of violation. The citation shall state the nature of the violation, shall state the civil penalty to be imposed upon the violator, and shall direct the violator to pay the civil penalty within 15 days of the date of the citation.

(2) *Continuing violation* . For each day the violation is not corrected, the violator will be guilty of an additional and separate offense and subject to additional civil penalty.

(3) *Penalties* . Any person who violates any provision of this article shall be subject to assessment of a civil penalty for each such violation in accordance with the following schedule:

a. Fifty dollars for the first violation;

b. One hundred dollars for the second violation;

c. Two hundred dollars for the third violation; and

d. Five hundred dollars for the fourth and each succeeding violation.

(Ord. No. O2008-02, § XII, 8-15-2015; Ord. No. O2008-02, 1-30-3017)

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Sec. 30-31. - Legal status provisions and effective date.

(a) *Severability.* Should any section or provisions of this article be decided by a court of competent jurisdiction to be unconstitutional or invalid such decision shall not affect the validity of the ordinance as a whole or any part thereof other than the part so declared to be unconstitutional or invalid.

(b) *Conflict with other laws.* In interpreting and applying the provisions of this article said provisions shall be held to be the minimum requirements for promoting the intent of this article. This article is not intended to interfere with or abrogate or annul other rules, regulations or ordinances of the county. However, if the requirements of this article are at variance with the requirements of any other lawfully adopted rules, regulations or ordinances of the County of Jackson, the more restrictive or that imposing the higher standards shall govern.

(c) *Effective date.* This article shall take effect and be in force on August 18, 2015.

(Ord. No. O2008-02, § XIII, 8-15-2015)

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

AN ORDINANCE OF THE MACON COUNTY BOARD OF COMMISSIONERS FOR AN *AMENDED AND RESTATED* "WIRELESS TELECOMMUNICATION FACILITIES ORDINANCE" OF MACON COUNTY, NORTH CAROLINA, WHICH CHANGES THE NAME OF, AMENDS AND RESTATES THE EXISTING TELECOMMUNICATION TOWER ORDINANCE OF MACON COUNTY, NORTH CAROLINA, PRESENTLY

CODIFIED IN CHAPTER 154: TELECOMMUNICATIONS TOWER ORDINANCE OF THE MACON COUNTY, NORTH CAROLINA CODE OF ORDINANCES

WHEREAS, the Macon County Board of Commissioners adopted the Telecommunications Tower Ordinance of Macon County, North Carolina on or about May 5, 1998; and

WHEREAS, the Board of Commissioners did again amend the same on or about December 3, 2001; and

WHEREAS, the Board of Commissioners wishes to change the name of such ordinance, make certain specific amendments to the Ordinance, and restate such ordinance in its entirety as set forth hereinafter; and

WHEREAS, the Board of Commissioners finds the same to be in the public interest and to promote the public health, safety and welfare pursuant to authority vested in it by North Carolina General Statutes Sections 153A-121;

NOW, THEREFORE, BE IT ORDAINED by the Macon County Board of Commissioners that: The presently codified Chapter 154: Telecommunication Towers in the Code of Ordinances of the County of Macon, North Carolina, as heretofore amended, is now hereby renamed, amended and restated in its entirety, as follows:

CHAPTER 154: Wireless Telecommunication Facilities Ordinance

§ 154.01 TITLE:

This chapter shall be known and may be cited as the *Wireless Telecommunication Facilities Ordinance of Macon County, North Carolina*, codified as Chapter 154 of The Macon County Code of Ordinances

Ordinance passed 5-5-1998

Ordinance revised 12-3-2001 and (09-13-2016)

§ 154.02 AUTHORITY AND JURISDICTION:

(A) This chapter is established by the Macon County Board of Commissioners pursuant to the authority conferred in G.S. § 153A-121(a) and the provisions of Part 3B of Article 18 of Chapter 1

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

153A of the North Carolina General Statutes. The Board of Commissioners hereby ordains and enacts into law the following articles and sections.

(B) The provisions of this chapter shall apply to all unincorporated areas of Macon County, but shall not be applicable to and shall not be enforced within the corporate limits or the extraterritorial jurisdiction of any municipality in the county. The following types of installations are excluded from the scope of this chapter:

(1) Wireless Support Structures less than 50 feet in height.

(2) Premise antennas less than one meter (39.4 inches) in height or diameter.

(3) Premise antennas located totally within an enclosed building capable of structurally

supporting the antenna.

§ 154.03 PURPOSE:

The purpose of this ordinance is to ensure the safe and efficient integration of facilities necessary for the provision of advanced mobile broadband and wireless services throughout the community and to ensure the availability of reliable wireless services. The intent of this chapter is to minimize the negative impact of wireless support structures and wireless facilities, establish a fair and efficient process for the review and approval of applications, assure an integrated, comprehensive review of environmental impacts of such facilities, and protect the health, safety and welfare of the citizens of Macon County. The placement of, construction, or modifications of wireless communication facilities shall be in conformity with the Federal Communications Act of, 47 U.S.C. §332 as

amended, section 6409 of the federal Middle Class Tax relief and Job Creation Act of 2012, 47 U.S.C. §1455(a), and in accordance with the rules promulgated by the Federal Communications Commission.

§ 154.04 APPLICABILITY:

A wireless support structure as herein defined may be placed, erected and/or maintained in the jurisdiction of Macon County only in conformance with the standards, procedures and other requirements of this chapter.

§ 154.05 DEFINITIONS:

For the purpose of this chapter the following definitions shall apply unless the context clearly indicates or requires a different meaning.

ALTERNATIVE STRUCTURE: A structure which is not primarily constructed for the purpose of holding antennas but on which one or more antennas may be mounted. Alternative structures include, but

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

are not limited to, buildings, silos, water tanks, pole signs, lighting standards, steeples, billboards and electric transmission towers.

ANTENNA: Communications equipment that transmits, receives, or transmits and receives electromagnetic radio signals used in the provisions of all types of wireless communication services.

ANTENNA, CONCEALED: An antenna that is designed and erected on or in a building in such a way that it blends in with the existing facade and/or is located such that it is not readily visible to an individual at adjacent road level.

APPLICATION: A formal request submitted to the County to construct or modify a wireless support structure or a wireless facility.

***BASE STATION*:** A station at a specific site authorized to communicate with mobile stations, generally consisting of radio receivers, antennas, coaxial cables, power supplies and associated electronics.

BUILDING PERMIT: An official administrative authorization issued by the County prior to beginning construction consistent with the provisions of N.C. Gen. Stat. § 153A-357.

COLOCATION: The placement or installation of wireless facilities on existing structures, including electrical transmission towers, water towers, buildings, and other structures capable of structurally supporting the attachment of wireless facilities in compliance with applicable codes.

COMMERCIAL WIRELESS SERVICE PROVIDER: Persons who operate radio systems requiring an FCC license and who employ those facilities to provide fixed wireless (including microwave) or mobile wireless communication services to third parties for compensation. Commercial wireless service providers include, but are not limited to, cellular, personal communication services (PCS), specialized mobile radio (SMR), enhanced specialized mobile radio (ESMR), paging, and competitive local exchange carriers (CLEC) utilizing point-to-multipoint microwave.

CREST: The uppermost line of a mountain or a chain of mountains from which the land falls away on at least two sides to a lower elevation.

DISCERNIBLE: Capable of being distinguished with the eye or mind from its surroundings as a wireless support structure.

***ELIGIBLE FACILITIES REQUEST*:** A request for modification of an existing wireless tower or base station that involves colocation of new transmission equipment or replacement of transmission equipment but does not include a substantial modification.

***EQUIPMENT COMPOUND*:** An area surrounding or near the base of a wireless support structure within which a wireless facility is located.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

EQUIPMENT ENCLOSURE: A building, cabinet or shelter used to house transmitters, receivers and other electronic equipment and accessories in an equipment compound.

***FALL ZONE*:** The Area in which a wireless support structure may be expected to fall in the event of a structural failure, as measured by engineering standards.

GOVERNMENTAL USER: Federal, state or local governments, or agencies or instrumentalities thereof, volunteer fire departments or rescue squads which operate radio systems (including microwave) requiring an FCC license and which employ those facilities exclusively for intragovernmental or inter-governmental public service, public safety or administrative purposes.

***ORDINANCE ADMINISTRATOR*:** The Macon County Planner or his designee as assigned by the Board of Commissioners to enforce this chapter.

PRIVATE BUSINESS USER: Persons who operate radio facilities (including microwave) requiring the FCC license solely for intra-company communications and who do not employ those facilities to offer fixed or mobile wireless communication services to third parties for compensation.

***PROTECTED MOUNTAIN RIDGE*:** A ridge at or above 3,000 feet with an elevation of 500 feet or more above the elevation of an adjacent valley floor.

RIDGE: The elongated crest or series of crests at the apex or uppermost point of the intersection between two opposite slopes or sides of a mountain, including all land within 100 feet below the elevation of any portion of such line or surface along the crest.

***SEARCH RING*:** The area in which a wireless support facility or wireless facility must be located in order to meet service objectives of the wireless service provider using the wireless facility or wireless support structure.

***SUBSTANTIAL MODIFICATION*:** The mounting of a proposed wireless facility on a wireless support structure that substantially changes the physical dimensions of the support structure. A mounting is presumed to be a substantial modification if it meets any one or more of the criteria listed below: The burden is on the County to demonstrate that a mounting that does not meet the listed criteria constitutes a substantial change to the physical dimensions of the wireless support structure.

1) Increasing the existing vertical height of the structure by the greater of i) more than ten percent (10%) or ii) the height of one additional antenna array with separation from the nearest existing antenna not to exceed 20 feet.

2) Except where necessary to shelter the antenna from inclement weather or to connect the antenna to the tower via cable, adding an appurtenance to the body of a wireless support structure that protrudes horizontally from the edge of the wireless support structure the greater of i) more

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

than 20 feet or ii) more than the width of the wireless support structure at the level of the appurtenance.

3) Increasing the square footage of the existing equipment compound by more than 2,500 square feet.

***TELECOMMUNICATIONS*:** Technology involving the transmission or reception of wireless signals

***TOWER HEIGHT*:** The vertical distance measured from the ground to the uppermost point of the telecommunications tower and any antenna affixed thereto but excluding any lightning protection rods extending above the tower and attached equipment.

***TOWER SITE*:** The real property which an applicant is required to have ownership of, leasehold interest in, or easement over, pursuant to § 154.08(B) of this chapter.

UTILITY POLE: A structure that is designed for and used to carry lines, cables, or wires for telephone, cable television, or electricity, or to provide lighting.

***VEGETATIVE CANOPY*.** Trees which create a roof-like layer of spreading branches.

WATER TOWER: A water storage tank, a standpipe, or an elevated tank situated on a support structure originally constructed for use as a reservoir or facility to store or deliver water.

WIRELESS FACILITY: The set of equipment and network components, exclusive of the underlying wireless support structure or tower, including antennas, transmitters, receivers, base stations power supplies, cabling, and associated equipment necessary to provide wireless data and wireless telecommunications services to a discrete geographic area.

***WIRELESS SUPPORT STRUCTURE*:** A new or existing structure such as a monopole, lattice tower, or guyed tower that is designed to support or capable of supporting wireless facilities.

§ 154.06 BUILDING PERMIT REQUIRED:

It shall be unlawful for any person, corporation, partnership or other entity to erect within the jurisdiction of this Chapter any wireless support structure without first obtaining a Building Permit for the same from the Macon County Building Inspections Office. However, prior to the issuance of any such Building Permit, the Ordinance Administrator shall receive the applications for the same, review the same, and provide approval of the application for such Building Permit if appropriate. Thereafter, such Building Permit is to be issued by the Macon County Building Inspections Office. The owner of any wireless support structure to be replaced shall cause the same to be removed within 90 days of the issuance of a Certificate of Occupancy for the new wireless support structure which is to replace the older wireless support structure."

§ 154.07 APPLICATION SUBMISSION AND REVIEW PROCESS:

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(A) *Application requirements*. Anyone desiring to construct a new wireless support structure or substantially modify a wireless support structure shall submit an application to the County for a building permit and shall pay a fee. Any charges or fees assessed by the County, which are hereby specifically authorized, on account of an outside consultant shall be fixed in advance and incorporated into a permit or application fee and shall be based on the reasonable costs to be incurred

by the County in connection with the regulatory review authorized by N.C. Gen. Stat. § 153A-349.52. On request, the amount of the consultant charges incorporated into the permit or application fee shall be separately identified and disclosed to the applicant. The fee imposed by the County for review of the application may not be used for either of the following:

-Travel time or expenses, meals, or overnight accommodations incurred in review of an application by a consultant or other third party;

-Reimbursements for a consultant or other third party based upon contingent fee basis or a results-based arrangement.

The site development plan and preliminary design plan shall contain the following information and be part of the wireless support structure permit application:

(1) *Site Development Plan-* A site development plan shall be prepared by a North Carolina registered land surveyor, registered landscape architect or registered professional engineer, and shall contain the following:

(a) The name of the wireless telecommunications facilities owner and/or property owner, tax parcel identification number, scale, north arrow, a copy of the site plan showing the proposed site, and latitude/longitude coordinates;

(b) The name, address, signature and seal of the professional preparing the plan; (c) All identifiable structures located on the parcel, all private and public roads, highways and underground and overhead utilities;

(d) Surveyed boundary lines of the parcel containing the proposed wireless support structure construction area and its fall area;

(e) All existing towers on the property or any towers whose fall area encroaches onto the property;

(f) Property owner's names, tax parcel numbers, and mailing addresses;

(g) The ground elevation of the proposed wireless support structure's base, all

proposed support structures, property corners and a permanent site benchmark.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(2) ***Preliminary Wireless Support Structure Design Plan-*** A preliminary wireless support structure design plan prepared by a North Carolina registered professional engineer containing the following:

(a) The wireless support structure permit applicant's name and address, scale, north arrow, vicinity map and tax parcel identification number;

(b) The name, address, signature and seal of the engineer preparing the preliminary wireless support structure design plan;

(c) A plan showing the base of the wireless support structure and the foundations for all guy line anchors and support structures, all proposed buildings, and utility connections

(d) A wireless support structure elevation drawing showing the proposed lighting, height of the wireless support structure and all proposed antennas;

(e) The proposed wireless support structure design loads.

(f) Wireless support structures shall be earth toned colors or remain unpainted.

(g) The proposed wireless support structure shall be designed and constructed to permit the capability for colocation of at least two other equal telecommunication uses, unless the wireless support structure is located on a protected ridge in which case one colocation provision is required.

(3) Nothing contained in this Section shall be construed to:

(a). Authorize the County to require information on or evaluate an applicant's business decisions about its designed service, customer demand for its service, or quality of its service to or from a particular area or site;

(b). Authorize the County to require information that concerns the specific need for the wireless support structure, including if the service to be provided from the wireless support structure is to add additional wireless coverage or additional wireless capacity; and

(c). Authorize the County to require proprietary, confidential, or other business information to justify the need for the new wireless support structure, including propagation maps and telecommunication traffic studies.

(4) ***Proof of Regulatory Compliance-*** Written statements from the Federal Aviation Administration (FAA) and the Federal Communications Commission (FCC) showing that the proposed wireless support structure complies with all building permit regulations administered by that agency, or evidence that the proposed wireless support structure is exempt from those regulations.

(5) ***Colocation Alternatives-*** Applicants for new wireless facilities shall evaluate the reasonable feasibility of colocating new antennas and equipment on an existing wireless support structure or structure within the applicant's search ring. Colocation on an existing wireless support structure is

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

not reasonably feasible if colocation is technically or commercially impractical or the owner of the existing wireless support structure is unwilling to enter into a contract for such use at a fair market value. Applicants shall provide County with information to determine whether colocation on existing wireless support structures is reasonably feasible.

(6) The applicant must present to the Ordinance Administrator proof of fee simple ownership, a recorded leasehold interest or an easement from the record owner of all property within a radius of one time the height of the wireless support structure. The required area may include

Department of Transportation right-of-way if the applicant provides written consent to that effect by the Division Engineer.

(7) Wireless support structure building permit approval is conditional upon the owner providing written authorization that the tower may be shared by other telecommunication facilities at customary and usual charges.

(8) The applicant shall provide a letter to the ordinance administrator (See 158.08(G)) providing public entities the use of a wireless support structure at fair market value on a noninterfering basis. If it is determined that the proposed wireless support structure is situated in a location that will benefit the telecommunication system of the county, a municipality within the county, a volunteer fire department serving the county, or other public entity, the wireless support structure shall be engineered and constructed to accommodate the additional telecommunication equipment beneficial to the public system.

(9) The County shall issue a written decision approving or denying an application within a reasonable period of time consistent with the issuance of other land-use permits in the case of other applications, each as measured from the time the application is deemed complete.

§ 154.08 CRITERIA FOR ISSUING A BUILDING PERMIT FOR CONSTRUCTION OF A NEW WIRELESS SUPPORT STRUCTURE OR SUBSTANTIAL MODIFICATIONS TO AN EXISTING WIRELESS SUPPORT STRUCTURE:

Applications for construction of wireless support structures, increases in wireless support structure height, or substantial increases in height of alternative structures (as defined in this chapter), shall be submitted in writing to the Ordinance Administrator and shall contain all information required by this chapter as well as any additional information the Ordinance Administrator deems necessary and appropriate, including the following:

(A) No wireless support structure shall exceed 175 feet in height. No wireless support structure located on any protected mountain ridge shall have at its highest point an elevation greater than 40 feet higher than the vegetative canopy immediately surrounding the base of the wireless support

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

structure. If no vegetative canopy exists at the protected ridge, then the maximum wireless support structure height allowed shall be 100 feet.

(B) A single sign listing the name of the wireless telecommunication service provider operating the site, the site name or number and an emergency telephone number shall be posted at or near the entrance to the site so as to be readily visible to persons outside the site's security fencing. Equipment hazard warning and informational signs are permitted. The posting of any other signs or advertising is prohibited at any wireless telecommunication facility or upon any wireless support structure.

(C) The application must be accompanied by the payment of a nonrefundable processing fee. The county may elect to retain outside consultants or professional services to review the application and make determinations and recommendations regarding the application. Private business users operating a single wireless telecommunication facility at their principal place of business and governmental users are exempt from the application fee.

(D) If construction is not started within 6 months from the date of issuance, the wireless support structure building permit shall expire.

(E) No antenna shall be constructed on a structure which a National Register or other locally designated historic landmark is located.

(F) Fall zones and setbacks: Wireless support structures shall conform to each of the following minimum setback requirements:

(1) A fall zone on the parcel containing the tower site equal to the height of the wireless support structure shall be required. The fall zone shall have a minimum 25-foot setback from all property lines.

(G) The owner of the proposed wireless support structure shall record in the Macon County Register of Deeds office a letter of intent prior to the issuance of the building permit. The letter of intent must contain:

(1) The conditions of approval from the Macon County Board of Commissioners.

(2) Written authorization that the wireless support structure may be shared by other telecommunication facilities at customary and usual charges.

(3) Written authorization must also be submitted allowing Macon County to locate public safety equipment for Emergency Management, Fire Departments and Macon County Sheriff's Department on the wireless support structure.

(4) Written maintenance/removal agreement concerning the wireless support structure signed and notarized by Lessor and Lessee.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(5) The letter of Intent must include language that binds subsequent owners of the wireless support structures to the original letter of intent filed in the Macon County Register of Deeds office.

§ 154.09 APPROVAL OF APPLICATION AND PUBLIC HEARING REQUIRED:

Applications for new wireless support structures or substantial modifications of wireless support structures shall be approved or denied by the Macon County Board of Commissioners and require a quasi-judicial public hearing to be held before the Macon County Board of Commissioners before any decision is made to approve or deny an application. If the Macon County Board of

Commissioners approves the application for the permit, such approval and permit shall require the facilities to be constructed within at least 24 months.

(**A)** ***Public Notice Required-*** Notice of an application for a proposed wireless support structure shall comply with the provisions of G.S. §§ 153A-323 and 153A-343 as amended and, at a minimum, shall comply with the following:

(1) *Newspaper Notice*- The Ordinance Administrator shall cause a notice of any public hearing to be published as a legal advertisement in a newspaper of general circulation in Macon County once a week for two consecutive weeks, the first publication of which shall not appear less than ten days or more than 25 days prior to the date set for public hearing. The notice shall include the date, time, and place of the hearing as well as information about the wireless support structure including its type, height, location and any other information the Ordinance Administrator shall deems necessary or appropriate.

(2) *Notice to Adjacent or Abutting Property Owners*- The applicant shall mail notice to affected property owners in accordance with the following provisions, and shall provide the Ordinance Administrator with a signed certification of compliance listing the names, addresses, and means of notification before any public hearing shall be conducted:

(a) Adjacent or abutting property owners. Notice of any public hearing shall be sent by certified mail (return receipt requested) or by Priority Mail with Delivery Confirmation to the owners of all parcels of land adjacent to or abutting the site of the proposed wireless support structure at the last address listed for such owners in the county property tax records.

(b) Timeliness of notice. Any notices required under the above subsections shall be mailed at least 10 but not more than 25 days prior to the date of the public hearing.

(3) *Posted Notice*- A sign advertising the application for a proposed wireless support structure, and any scheduled public hearing, shall be posted by the Ordinance Administrator in a prominent location on or near the parcel containing the proposed wireless support structure, or on a nearby public road. Such signs shall be posted at least ten days prior to any public hearings.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(B) ***Special Conditions-*** During the public hearing, the Board of Commissioners shall have the authority to require special conditions in order to make the wireless support structure more compatible with surrounding properties, including one or more of the following but not limited to: (1) The portion of the wireless support structure extending above the vegetative canopy shall be camouflaged to appear like the top of a coniferous tree with all antennas concealed within simulated foliage;

(2) Appropriate landscaping or other means shall be used to screen the facility as much as possible from neighboring properties;

(3) Eliminating the requirement of additional spaces for colocations in order to reduce the height of the wireless support structure. See 154.07(2) (g)

§ 154.10 COLOCATION AND ELIGIBLE FACILITIES REQUESTS OF WIRELESS SUPPORT STRUCTURES:

(A) There shall be an application submitted to County for colocations and eligible facilities requests in connection with wireless support structures. In the case of an application for a colocation or eligible facilities request in connection with wireless support structures, the Ordinance Administrator shall review the preliminary application and determine whether the applicant meets the criteria for a colocation or eligible facilities request. The Ordinance Administrator may require additional information from the applicant, in order to make the determination. If the Ordinance Administrator determines that the application is complete, and that the applicant meets the criteria for a colocation or eligible facilities request he shall approve the special use permit, and no hearing shall be required.

(B) The Ordinance Administrator shall issue a written decision approving or denying a colocation or eligible facilities request application within 45 days of such application being deemed complete. **(C)** A nonrefundable application fee shall be required for review of colocations and eligible facilities requests. Private business users operating a single wireless telecommunication facility at their principal place of business and governmental users are exempt from the application fee. The county may impose a fee not to exceed $1,000.00 for technical consultation and the review of a colocation or eligible facilities request application. The fee must be based on the actual, direct and reasonable administrative costs incurred for the review, processing, and approval of a colocation application. County may engage a third-party consultant for the technical consultation and review of a colocation or eligible facilities request application.

(D) Pursuant to section 640 of the federal Middle Class Tax Relief and Job Creation Act of 2012, 47 U.S.C. § 1455(a), County may not deny and shall approve any eligible facilities request as provided in N.C. Gen. Stat. § 153A-349.53.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(E) Nothing in this Ordinance requires an application and approval for routine maintenance or limits the performance of routine maintenance on wireless support structures and facilities, including in-kind replacement of wireless facilities. Routine maintenance includes activities associated with regular and general upkeep of transmission equipment, including the replacement of existing wireless facilities with facilities of the same size.

(F) A colocation or eligible facilities request application is deemed complete unless County provides notice that the application is incomplete in writing to the Applicant within 45 days of submission or within some other mutually agreeable time frame. The notice shall identify the deficiencies in the application which, if cured, would make the application complete. County may deem an application incomplete if there is insufficient evidence provided to show that the proposed colocation or eligible facilities request will comply with Federal, State, and local safety requirements. County may not deem an application incomplete for any issue not directly related to the actual content of the application and subject matter of the colocation or eligible facilities request. An application is deemed complete upon resubmission if the additional materials cure the deficiencies indicated.

§ 154.11 OTHER PROVISIONS:

(A) ***Temporary Facilities-*** Temporary wireless telecommunication facilities shall be allowed as follows:

(1) In the event of a natural disaster, catastrophic event or public emergency that either renders an existing wireless telecommunication facility unusable or creates an urgent need for supplemental capacity to manage the emergency, temporary facilities may be placed.

(B) ***Nonconforming Uses-*** Any wireless telecommunication facility in existence on the date of enactment of this chapter which does not comply in all respects with the provisions of this chapter shall be deemed a nonconforming use. Such pre-existing facilities may not be increased in height without complying with the provisions of this chapter.

(C) ***Wireless Support Structure and Wireless Facility Lighting:***

(1) No wireless support structure or wireless facility shall be of a type or height, or placed in a location, that the Federal Aviation Administration would require the wireless support structure or wireless facility to be lighted or painted.

(2) A wireless support structure and/or a wireless facility may utilize a security light controlled by a motion-detection sensor at or near the entrance to the facility.

(D) Macon County Airport Restrictions- No new wireless support structure or wireless facility shall interfere with or protrude into the glide path of any runway in any direction of the Macon County Airport.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

§ 154.12 CONTINUED COMPLIANCE REQUIRED:

All building permits for the erection of a wireless support structure are issued in reliance upon a presumption that the wireless support structure will in fact conform to the plans which are submitted as the basis for the building permit, and once erected the wireless support structure must continue to be at all times maintained in compliance with the provisions of this chapter..

§ 154.13 APPEALS:

The imposition of any conditions precedent to the issuance of a wireless support structure permit, may be appealed to the Superior Court of Macon County within 30 days from the date of the decision.

§ 154.14 PENALTY:

A violation of this chapter shall be a misdemeanor subject to the penalties and enforcement provisions of G.S. § 153A-123, specifically including injunctions and abatement orders as provided by said statute.

Upon motion made by Commissioner _____, seconded by Commissioner _____, this Ordinance was passed, adopted and ordained by the unanimous vote of the Macon County Board of County Commissioners on this the 13th day of September, 2016, at the Regular Meeting of the Macon County Board of County Commissioners. _____

Kevin Corbin, Chairman

Attest:

Clerk to the Board of Macon County Commissioners

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

[This Page Intentionally Left Blank]

SWAIN COUNTY
NORTH CAROLINA

AN ORDINANCE ESTABLISHING A MORATORIUM ON ISSUANCE OF SWAIN COUNTY BUILDING AND SOIL AND EROSION CONTROL PERMITS FOR THE CONSTRUCTION OF TELECOMMUNICATION TOWERS AND UTILITY SUBSTATIONS, TIE-IN STATIONS, AND SWITCHING STATIONS AND ANY AND ALL BUILDINGS AND STRUCTURES ASSOCIATED THEREWITH PURSUANT TO NC GEN. STAT. §153A-340(h) and NC GEN. STAT. §153A-121

WHEREAS, the General Assembly has empowered counties to regulate development of land within the territorial jurisdiction of the county pursuant to Part 3 of Article 18 of Chapter 153A and Article 6 of Chapter 153A, specifically §153A-121, of the North Carolina General Statutes; and

WHEREAS, the Swain County Board of Commissioners has, pursuant to the police powers of North Carolina General Statutes Section 153A-121, the authority to define, regulate, prohibit, or abate acts, omissions, or conditions detrimental to the health, safety, or the general welfare of it's citizens within the unincorporated areas of Swain County; and,

WHEREAS, the Swain County Board of Commissioners has, pursuant to North Carolina General Statutes Section 153A-340(h), the authority to adopt temporary moratoria to regulate the development of land within Swain County; and,

WHEREAS, the scenic and unspoiled areas of Swain County have become critical to the county's tourism industry, economic growth, jobs and development as the tourism industry is one of the major, if not the major, economic sector within Swain County; and,

WHEREAS, the construction and placement of telecommunication towers and utility substations, tie-in stations, and switching stations and other structures and buildings associated therewith in Swain County create visual appearances that threaten to destroy the scenic and unspoiled aesthetic features of the County and the quality of life for residents and visitors, and regulations for these structures is necessary to insure the protection of the county's economic growth, tourism, jobs and development and safety of the local and visiting motorist on the roads in the county by reducing the visibility of the distracting utility structures throughout the county; and,

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

WHEREAS, County staff and the Board of Commissioners need a definite and reasonable period of time within which to consider an ordinance or other regulations having an unlimited duration which shall regulate the development of land within Swain County related to the construction of telecommunication towers and utility substations, tie-in stations, and switching stations and the buildings and structures associated therewith pursuant to the provisions of North Carolina General Statutes Section 153A-340 and other applicable laws in a manner that will create conditions essential to the economic growth and the public health, safety and general welfare of the citizens of the County while preserving the natural scenic and unspoiled areas of Swain County; and,

WHEREAS, the Swain County Board of Commissioners finds that waiting for a final determination to address the safety concerns in lieu of passing a moratorium is an inadequate course of action because the County staff and Board of Commissioners need sufficient time to discuss and determine reasonable ways of regulating the location of telecommunications towers and utility substations, tie-in stations and switching stations and structures and buildings associated therewith and that the construction of these within the County's territorial jurisdiction during the pendency of any such consideration may irreversibly change the character of the County to the possible detriment of the County and its residents and visitors; and,

WHEREAS, the Swain County Board of Commissioners may enact this moratorium pursuant to North Carolina General Statutes Section 153A-340(h) for a reasonable duration of ninety (90) days in order to preserve the status quo while appropriate County controls and regulations are considered and acted upon and ninety (90) days is a reasonable time to study and possibly adopt new ordinances; and,

WHEREAS, the Board of Commissioners has duly advertised and published its intent to consider this Ordinance in Swain County, North Carolina within The Smokey Mountain Times on February 25, 2010 and March 4, 2010, in accordance with North Carolina General Statutes Sections 153A-323 and 153A-340(h).

NOW, THEREFORE, BE IT ORDAINED that the Board of Commissioners of Swain County, North Carolina hereby imposes a moratorium as follows:

1) That there is hereby imposed a moratorium for a period of ninety (90) days on the issuance of building permits and soil and erosion control permits related to the construction of telecommunications towers and utility substations, tie-in stations, and switching stations and any and all structures and buildings associated therewith.

2) That this moratorium ordinance shall also apply to the issuance of building permits for any modification to any structure or building to which this moratorium applies.

3) That pursuant to North Carolina General Statutes Section 153A-340(h) this moratorium ordinance shall not apply to any project for which a

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

valid building permit issued pursuant to N.C. Gen. Stat. §153A-357 is outstanding.

4) That the provisions of this moratorium ordinance shall apply to unincorporated areas of Swain County, lying outside of the corporate limits or extraterritorial jurisdiction of any incorporated town.

This ordinance becomes effective upon its adoption on this the 9 day of March, 2010.

COUNTY OF SWAIN

By: Glenn Jones
Chairman Glenn Jones

ATTEST:

Cindi Woodard
Clerk of Board, Cindi Woodard

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

[This Page Intentionally Left Blank]

Appendix B Graham County Potential Locations for Tower Placement

GRAHAM COUNTY BUILDING ID	ADDRESS
ADMIN BUILDING/COMMUNITY CENTER	196 KNIGHT ST
GRAHAM CO LIBRARY	80 KNIGHT ST
LOWER GYM	76 KNIGHT ST
BALLFIELDS @ P&J FIELD	193 P AND J RD
TRANSIT	201 W FORT HILL RD
SENIOR BUILDING	185 W FORT HILL RD
911 CENTER	40 W FORT HILL RD
GRAHAM CO SHERIFF	300 RODNEY ORR BYPASS
SANITATION	400 SNOWBIRD RD
POOL	147 MOOSE BRANCH
HEALTH DEPT/DSS	191 P AND J RD
URGENT CARE/DENTAL	21 S MAIN ST
VACANT LOT (ACROSS RD FORM ADMIN BUILDING)	227 KNIGHT ST
VACANT LOT (BESIDE ADMIN BUILDING)	200 KNIGHT ST
HEADSTART BUILDINGS	141 KNIGHT ST
EXTENSION OFFICE	39 S MAIN ST
SOIL & WATER	47 S MAIN ST
FOUR SQUARE	49 S MAIN ST
EMS BUILIDNG	70 W FORT HILL RD
VEHICLE MAINTENANCE	125 MOOSE BRANCH RD
VETERANS OFFICE	115 MOOSE BRANCH RD
COURTHOUSE	12 N MAIN ST
JAIL	11 N MAIN ST

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

OLD COUNTY MANAGERS OFFICE/REC DEPT	18 COURT ST
BOARD OF ELECTIONS	14 COURT ST
ELEM SCHOOL	54 MOOSE BRANCH RD
SCHOOL ADMIN BUILDING	52 MOOSE BRANCH RD
BAND BUILDING	50 MOOSE BRANCH
RES LUNCHROOM	309 MOOSE BRANCH
HIGH SCHOOL	315 SWEETWATER RD
TRI COUNTY SCIENCE BUILDING	70 MOOSE BRANCH RD
SHOOTING RANGE	7340 TALLULAH RD
STECOAH SCHOOL	121 SCHOOL HOUSE DR
BALL FIELDS @ STANLEY	230 CODY ST

VACANT PARCELS W/ NO 911 ADDRESSES	DESCRIPTION
5660-00-EX-0009	OLD RR GRADE?
5625-00-00-0001-P1	ON YELLOW CREEK VFD?
5660-12-EX-9999	BESIDE UNITED COMMUNITY BANK
5660-11-1B-0036-A	BEHIND POP AND NAN'S KITCHEN

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Appendix C FCC 1996 Telecom Act Information on Wireless Tower Siting

April 23, 1996

FEDERAL COMMUNICATIONS COMMISSION

FACT SHEET

Information provided by the Wireless Telecommunications Bureau

NEW NATIONAL WIRELESS TOWER SITING POLICIES

The Telecommunications Act of 1996 contains important provisions concerning the placement of towers and other facilities for use in providing personal wireless services. Most state and local communities have worked closely with cellular and other wireless service providers on such placement plans, but this new law establishes new responsibilities for communities and for the Federal Communications Commission (FCC). The rapid expansion in the wireless industry makes these issues even more important.

This fact sheet is intended to explain the new provisions and to help state and local governments as they deal with the complex issues of facilities siting in their local communities. At the end of this fact sheet, you will find names of contacts for additional information about this area and other issues before the FCC.

Section 704 of the Telecommunications Act of 1996 (the "1996 Act") governs federal, state and local government oversight of siting of "personal wireless service" facilities. The 1996 Act establishes a comprehensive framework for the exercise of jurisdiction by state and local zoning authorities over

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

the construction, modification and placement of facilities such as towers for cellular, personal communications service (PCS), and specialized mobile radio (SMR) transmitters:

- The new law preserves local zoning authority, but clarifies when the exercise of local zoning authority may be preempted by the FCC.

- Section 704 prohibits any action that would discriminate between different providers of personal wireless services, such as cellular, wide-area SMR and broadband PCS. It also prohibits any action that would ban altogether the construction, modification or placement of these kinds of facilities in a particular area.

- The law also specifies procedures which must be followed for acting on a request to place these kinds of facilities, and provides for review in the courts or the FCC of any decision by a zoning authority that is inconsistent with Section 704.

Finally, Section 704 requires the federal government to take steps to help licensees in spectrum-based services, such as PCS and cellular, get access to preferred sites for their facilities. Federal agencies and departments will work directly with licensees to make federal property available for this purpose, and the FCC is directed to work with the states to find ways for states to accommodate licensees who wish to erect towers on state property, or use state easements and rights-of-way.

The attachments to this fact sheet seek to provide information concerning tower siting for personal wireless communications services. They include a summary of the provisions of Section 704 of the 1996 Act, the actual text of Section 704, and a technical information summary that describes the cellular, wide-area SMR and broadband PCS technologies that underlie the majority of requests for new tower sites.

Questions about the Telecommunications Act of 1996 generally may be addressed to Sheryl Wilkerson in the FCC's Office of Legislative and Intergovernmental Affairs, 202-418-1902 (email: swilkers@fcc.gov). Questions about tower siting, licensing issues or technical matters may be addressed to Steve Markendorff, Deputy Chief, Commercial Wireless Division in the Wireless Telecommunications Bureau, 202-418-0620, (e-mail: smarkend@fcc.gov).

This Fact Sheet is available on our fax-on-demand system. The telephone number for fax-on demand is 202-418-2830. The Fact Sheet may also be found on the World Wide Web at http://www.fcc.gov/wtb/wirehome.html.

SUMMARY OF SECTION 704 OF THE TELECOMMUNICATIONS ACT OF 1996

The following is a summary of key provisions. The text of Section 704 is reproduced in its entirety as an attachment to this summary.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

1. Local Zoning Authority Preserved

Section 704(a) of the 1996 Act amends Section 332(c) of the Communications Act ("Mobile Services") by adding a new paragraph (7). It preserves the authority of state and local governments over decisions regarding the placement, construction**,** and modification of personal wireless service facilities, except as provided in the new paragraph (7).

2. Exceptions

a. States and Localities May Not Take Discriminatory or Prohibiting Actions Section 704(a) of the 1996 Act states that the regulation of the placement, construction, and modification of personal wireless service facilities by any State or local government or instrumentality thereof shall not unreasonably discriminate among providers of functionally equivalent services and shall not prohibit or have the effect of prohibiting the provision of personal wireless services. 47 U.S.C. §332(c)(7)(B)(i).

Review: Any person that is adversely affected by a state or local government's action or failure to act that is inconsistent with Section 332(c)(7) may seek expedited review in the courts. 47 U.S.C. §332(c)(7)(B)(v).

b. Procedures for Ruling on Requests to Place, Construct or Modify Personal Wireless Service Facilities

Section 704(a) also requires a State or local government to act upon a request for authorization to place, construct, or modify personal wireless service facilities within a reasonable time. Any decision to deny a request must be made in writing and be supported by substantial evidence contained in a written record. 47 U.S.C.

§332(c)(7)(B)(ii), (iii).

c. Regulations Based On Environmental Effects of RF Emissions Preempted Section 704(a) of the 1996 Act expressly preempts state and local government regulation of the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the FCC's regulations concerning such emissions. 47 U.S.C. §332(c)(7)(B)(iv).

Review: Parties may seek relief from the FCC if they are adversely affected by a state or local government's final action or failure to act that is inconsistent with this provision. 47 U.S.C. § 332(c)(7)(B)(v).

3. Federal Guidelines Concerning RF Emissions

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Section 704(b) requires the FCC to prescribe and make effective new rules regarding the environmental effects of radio frequency emissions, which are under consideration in ET Docket 93-62, within 180 days of enactment of the 1996 Act.

NOTE: The pendency of this proceeding before the FCC does not affect the rules which currently are in effect governing the environmental effects of radio frequency emissions.

Section 704(b) gives preemptive effect to these existing rules. See related attachments to the Fact Sheet.

4. Use of Federal or State Government Property

a. Federal Property

Section 704(c) of the 1996 Act requires the President (or his designee) to prescribe procedures by which the federal government may make available on a fair, reasonable and nondiscriminatory basis, property, rights-of-way and easements under their control, for the placement of new spectrum-based telecommunications services.

b. State Property

With respect to facilities siting on state property, Section 704(c) of the 1996 Act requires the FCC to provide technical support to States to encourage them to make property, rights-of-way and easements under their jurisdiction available for the placement of new spectrum-based telecommunications services.

NOTE: Information concerning technical support for tower siting which the FCC is making available to state and local governments is attached to the Fact Sheet.

5. Definitions

"Personal wireless services" include commercial mobile services, unlicensed wireless services, and common carrier wireless exchange access services. 47 U.S.C.

§332(c)(7)(C)(i).

"Commercial mobile services" are defined in Section 332 of the Communications Act and the FCC's rules, and include cellular telephone services regulated under Part 22 of the FCC's rules, SMR services regulated under Part 90 of the FCC's rules, and PCS regulated under Part 24 of the FCC's rules. 47 C.F.R. §20.9.

"Unlicensed wireless services" are defined as the offering of telecommunications services using duly authorized devices which do not require individual licenses; direct-to-home satellite services are excluded from this definition. 47 U.S.C. §332(c)(7)(C)(iii).

COMPLETE TEXT OF SEC. 704 OF THE TELECOMMUNICATIONS ACT OF 1996

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

SEC. 704. FACILITIES SITING; RADIO FREQUENCY EMISSION STANDARDS.

(a) NATIONAL WIRELESS TELECOMMUNICATIONS SITING POLICY- Section 332(c) (47 U.S.C. 332(c)) is amended by adding at the end the following new paragraph:

`(7) PRESERVATION OF LOCAL ZONING AUTHORITY-

`(A) GENERAL AUTHORITY- Except as provided in this paragraph, nothing in this Act shall limit or affect the authority of a State or local government or instrumentality thereof over decisions regarding the placement, construction, and modification of personal wireless service facilities.

`(B) LIMITATIONS-

`(i) The regulation of the placement, construction, and modification of personal wireless service facilities by any State or local government or instrumentality thereof--

`(I) shall not unreasonably discriminate among providers of functionally equivalent services; and

`(II) shall not prohibit or have the effect of prohibiting the provision of personal wireless services.

`(ii) A State or local government or instrumentality thereof shall act on any request for authorization to place, construct, or modify personal wireless service facilities within a reasonable period of time after the request is duly filed with such government or instrumentality, taking into account the nature and scope of such request.

`(iii) Any decision by a State or local government or place, construct, or modify personal wireless service facilities shall be in writing and supported by substantial evidence contained in a written record.

`(iv) No State or local government or instrumentality thereof may regulate the placement, construction, and modification of personal wireless service facilities on the basis of the environmental effects of radio frequency emissions to the extent that such facilities comply with the Commission's regulations concerning such emissions.

`(v) Any person adversely affected by any final action or failure to act by a State or local government or any instrumentality thereof that is inconsistent with this subparagraph may, within 30 days after such action or failure to act, commence an action in any court of competent jurisdiction. The court shall hear and decide such action on an expedited basis. Any person adversely affected by an act or failure to act by a State or local government or any instrumentality thereof that is inconsistent with clause (iv) may petition the Commission for relief.

`(C) DEFINITIONS- For purposes of this paragraph--

`(i) the term `personal wireless services' means

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

commercial mobile services, unlicensed wireless services, and common carrier wireless exchange access services;

`(ii) the term `personal wireless service facilities' means facilities for the provision of personal wireless services; and

`(iii) the term `unlicensed wireless service' means the offering of telecommunications services using duly authorized devices which do not require individual licenses, but does not mean the provision of direct-to-home satellite services (as defined in

section 303(v)).'.

(b) RADIO FREQUENCY EMISSIONS- Within 180 days after the enactment of this Act, the Commission shall complete action in ET Docket 93-62 to prescribe and make effective rules regarding the environmental effects of radio frequency emissions.

(c) AVAILABILITY OF PROPERTY- Within 180 days of the enactment of this Act, the President or his designee shall prescribe procedures by which Federal departments and agencies may make available on a fair, nondiscriminatory basis, property, rights-of-way, and easements under their control for the placement of new telecommunications services that are dependent, in whole or in part, upon the utilization of Federal spectrum rights for the transmission or reception of such services. These procedures may establish a presumption that requests for the use of property, rights-of-way, and easements by duly authorized providers should be granted absent unavoidable direct conflict with the department or agency's mission, or the current or planned use of the property, rights-of-way, and easements in question. Reasonable fees may be

charged to providers of such telecommunications services for use of property, rights-of-way, and easements. The Commission shall provide technical support to States to encourage them to make property, rights-of-way, and easements under their jurisdiction available for such purposes.

TECHNICAL INFORMATION CONCERNING CELLULAR, SPECIALIZED MOBILE RADIO AND PERSONAL COMMUNICATIONS SERVICES

April 1996

Cellular Information

The FCC established rules and procedures for licensing cellular systems in the United States and its Possessions and Territories. These rules designated 306 Metropolitan Statistical Areas and 428 Rural Service Areas for a total of 734 cellular markets and spectrum was allocated to license 2 systems in each market. Cellular is allocated spectrum in the 824-849 and 869-894 MHz ranges. Cellular licensees are generally required to license only the tower locations that make up their outer service

contour. Licensees desiring to add or modify any tower locations that are within an already approved and licensed service area do not have to submit an application for that location to be added to their cellular license, although they may need FCC approval if the antenna would constitute a major environmental action (See question 2, below) or would exceed the criteria specified in Part 17 of the FCC's Rules ("Construction, Marking and Lighting of Antenna Structures"). Part 17 includes criteria for determining when construction or placement of a tower would require prior notification to the Federal Aviation Administration (FAA). (See question 3, below.)

A cellular system operates by dividing a large geographical service area into cells and assigning the same frequencies to multiple, non-adjacent cells. This is known in the industry as frequency reuse. As a subscriber travels across the service area the call is transferred (handed-off) from one cell to another without noticeable interruption. All the cells in a cellular system are connected to a Mobile Telephone Switching Office (MTSO) by landline or microwave links. The MTSO controls the switching between the Public Switched Telephone Network (PSTN) and the cell site for all wireline-to-mobile and mobile-to-wireline calls.

Specialized Mobile Radio (SMR) Information

Specialized Mobile Radio (SMR) service licensees provide land mobile communications on a commercial (*i.e.*, for profit) or private basis. A traditional SMR system consists of one or more base station transmitters, one or more antennas and end user radio equipment which often consists of a mobile radio unit either provided by the end user or obtained from the SMR operator. The base station receives either telephone transmissions from end users or low power signals from end user mobile radios.

SMR systems operate in two distinct frequency ranges: 806-821/851-866 MHz (800 MHz) and 896-901/935-940 MHz (900 MHz). 800 MHz SMR services have been licensed by the FCC on a site-by-site basis, so that the SMR provider must approach the FCC and receive a license for each and every tower/base site. In the future the FCC will license this band on a wide-area market approach. 900 MHz SMR was originally licensed in 46 Designated Filing Areas (DFAs) comprised of only the top 50 markets in the country. The Commission is in the process of auctioning the remainder of the United States and its Possessions and Territories in the Rand McNally defined 51 Major Trading Areas.

PCS Information

Broadband PCS systems are very similar to the cellular systems but operate in a higher frequency band, in the 1850-1990 MHz range. One other difference is that the FCC used different market areas for licensing purposes. The FCC used the Rand McNally definitions for 51 Major Trading Areas (MTAs) and 493 Basic Trading Areas (BTAs). PCS was allocated spectrum for six Broadband PCS systems and 26 Narrowband systems. The six Broadband PCS systems will be licensed as follows:

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

two Broadband PCS licenses will be issued for each of the 51 MTAs and four for each of the 493 BTAs. The 26 Narrowband systems will be licensed as follows: eleven Narrowband PCS licenses will be issued for nationwide systems, six for each of five regional areas, seven for each of the 51 MTAs and two for each of the 493 BTAs. PCS licensees are issued a blanket license for their entire market area and are not required to submit applications to license individual cell sites unless construction of the facility would be a major environmental action or would require FAA notification. Major environmental actions are defined by the National Environmental Policy Act of 1969 that is discussed in question 2, below. Therefore, the FCC has no technical information on file concerning PCS base stations.

Frequently asked questions concerning tower siting for personal wireless services.

1. Do local zoning authorities have any authority to deny a request for tower siting?

Answer: Yes. The Telecommunications Act of 1996 specifically leaves in place the authority that local zoning authorities have over the placement of personal wireless facilities. It does prohibit the denial of facilities siting based on RF emissions if the licensee has complied with the FCC's regulations concerning RF emissions. It also requires that denials be based on a reasoned approach, and prohibits discrimination and outright bans on construction, placement and modification of personal wireless facilities.

2. What requirements do personal wireless communications licensees have to determine whether a site is in a flood plain?

A historical site must also comply with the National Environmental Policy Act of 1969 (NEPA). as well as other mandatory federal environmental statutes. The FCC's rules that implement the federal environmental statutory provisions are contained in sections 1.1301-1.1319. The FCC's environmental rules place the responsibility on each applicant to investigate all the potential environmental effects and disclose any significant effects on the environment in an Environmental Assessment (EA), as outlined in section 1.1311, prior to constructing a tower. The applicant is required to consult section 1.1307 to determine if its proposed antenna structure will fall under any of the listed categories that may significantly affect the environment. If it does, the applicant must provide an EA prior to proceeding with the tower construction and. under section 1.1312, must await FCC approval before commencing any such construction even if FCC approval is not otherwise required for such construction. The FCC places all proposals that may significantly impact the environment on public notice for a period of 30 days, seeking any public comments on the proposed structures. The categories set forth in section 1.1307 include:

1. Wilderness Area
2. Wildlife Preserve

3. Endangered Species
4. Historical Site
5. Indian Religious Site
6. Flood Plain
7. Wetlands
8. High Intensity White Lights in Residential Neighborhoods
9. Excessive Radiofrequency Radiation Exposure

3. Are there any FCC regulations that govern where towers can or cannot be placed?

Answer: The FCC mandates that personal wireless companies build out their systems so that adequate service is provided to the public. In addition, all antenna structures used for communications must be approved by the FCC in accordance with Part 17 of the FCC Rules. The FCC must determine if there is a reasonable possibility that the structure may constitute a menace to air navigation. The tower height and its proximity to an airport or flight path will be considered when making this determination. If such a determination is made the FCC will specify appropriate painting and lighting requirements. Thus, the FCC does not mandate where towers must be placed, but it may prohibit the placement of a tower in a particular location without adequate lighting and marking.

4. Does the FCC maintain any records on tower sites throughout the United States? How does the public get this information (if any)?

Answer: The FCC maintains a general tower database on the following structures: (1) any towers over 200 feet, (2) any towers over 20 feet on an existing structure (such as a building, water tower, etc.) and (3) towers that are close to airports that may cause potential hazards to air navigation. The FCC's licensing databases contain some base site information for Cellular and SMR systems. The general tower database and the Cellular and SMR data that may be on file with the FCC is available in three places:

(1) Cellular licensing information is available in the Public Reference Room of the Wireless Telecommunications Bureau's Commercial Wireless Division. The Public Reference Room is located on the fifth floor of 2025 M Street, NW, Washington, DC 20554, telephone (202)418-1350. On-line database searches of cellular licensing information along with queries of the FCC's general tower database can also be accomplished at the Public Reference Room.

(2) People who would like to obtain general tower information through an on-line public access database should call or write Interactive Systems, Inc., 1601 North Kent St., Suite 1103, Arlington, VA 22209, telephone 703-812-8270.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

(3) The FCC does not duplicate these records, but has contracted with International Transcription Service, Inc. to provide this service. Requests for copies of information should be addressed to International Transcription Service, Inc. (ITS, Inc.), 2100 M St., NW, Suite 140, Washington, DC 20037, telephone 202-857-3800.

5. Why do Cellular and PCS providers require so many tower sites?

Answer: Low powered transmitters are an inherent characteristic of Cellular Radio and Broadband PCS. As these systems mature and more subscribers are added, the effective radiated power of the cell site transmitters is reduced so frequencies can be reused at closer intervals thereby increasing subscriber capacity. There are over 30 million mobile/portable cellular units and more than 22 thousand cell sites operating within the United States and its Possessions and Territories. PCS is just beginning to be offered around the country. Due to the fact that Broadband PCS is located in a higher frequency range, PCS operators will require more tower sites as they build their systems to provide coverage in their service areas as compared to existing Cellular carriers. Therefore, due to the nature of frequency reuse and the consumer demand for services, Cellular and PCS providers must build numerous base sites.

6. Can Cellular, SMR and PCS providers share tower structures?

Answer: Yes, it is technologically possible for these entities to share tower structures. However, there are limits to how many base station transmitters a single tower can hold and different tower structures have different limits. Moreover, these providers are competitors in a more and more competitive marketplace and may not be willing to share tower space with each other. Local zoning authorities may wish to retain a consulting engineer to evaluate the proposals submitted by wireless communications licensees. The consulting engineer may be able to determine if there is some flexibility as to the geographic location of the tower.

7. Is the Federal government helping to find ways to accommodate multiple licensees of personal wireless services?

Answer: Yes. The FCC has designated Steve Markendorff, Chief, Broadband Branch, Commercial Wireless Division, Wireless Telecommunications Bureau, FCC to as and respond to questions concerning tower siting issues. His telephone number is 202-418-0620. Also, President Clinton issued an Executive Memorandum on August 10, 1995 directing the Administrator of General Services (GSA), in coordination with other Government departments and agencies, to develop procedures to facilitate appropriate access to Federal property for the siting of mobile services antennas. GSA recently released "Government-Wide Procedures for Placing Commercial Antennas," 61 Fed Reg 14,100 (March 29, 1996). For further information contact James Herbert, Office of

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Property Acquisition and Realty Services, Public Building Service, General Services Administration, 18th & F Streets, NW, Washington, DC 20405,telephone 202-501-0376.

8. Have any studies been completed on potential hazards of locating a tower/base site closeto residential communities?

Answer: In connection with its responsibilities under NEPA, the FCC considers the potential effects of radiofrequency (RF) emissions from FCC-regulated transmitters on human health and safety. Since the FCC is not the expert agency in this area, it uses standards and guidelines developed by those with the appropriate expertise. For example, in the absence of a uniform federal standard on RF exposure, the FCC has relied since 1985 on the RF exposure guidelines issued in 1982 by the American National Standards Institute (ANSI C95.1-1982). In 1991, the Institute of Electrical and Electronic Engineers (IEEE) issued guidelines designed to replace the RF ANSI exposure guidelines. These guidelines (ANSI/IEEE C95.1-1992) were adopted by ANSI. The Telecommunications Act of 1996 mandates that the FCC complete its proceeding in ET Docket 93-62, in which it is considering updating the RF exposure guidelines, no later than early August 1996. Copies of this proceeding can be obtained from the International Transcription Service, Inc. (ITS), telephone 202-857-3800. Presently, RF emission requirements are contained in Section 1.1307(b) of the FCC's rules , 47 C.F.R. §1.1307(b), for all services. PCS has service specific RF emission provisions in Section 24.52 of the FCC's rules, 47 C.F.R. §

24.52.

Additional information concerning RF emission hazards can be obtained through a variety of sources:

(1) Information concerning RF hazards can be obtained on the World Wide Web at http://www.fcc.gov/oet/faqs. RF safety questions are answered, and further RF documents and information are contained under the Cellular Telephony Section. (2) OET Bulletins 56 and 65 concerning effects and potential RF hazards can be requested through the Radiofrequency Safety Program at 202-418-2464. Additionally, any specific questions concerning RF hazards can be answered by contacting the FCC at this phone number.

The FCC maintains a Communications and Crisis Management Center which is staffed 24 hours a day, seven days a week. In the event of an emergency, such as a radiofrequency hazard threatening public safety or health, you may call 202-632-6975. The watch officer who answers at that number can contact our compliance personnel in your area and dispatch them within a matter of hours.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

[This Page Intentionally Left Blank]

Appendix D Type of Vertical Assets

Lattice Towers

A lattice tower is a freestanding structure typically non guyed and designed with segments of rectangular or triangular base steel lattices. Examples of these can be wireless towers, electricity transmission towers and fire or observation towers.

FIGURE 36 EXAMPLE OF LATTICE TOWER

Guyed Tower

Guyed towers are supported by one or more levels of braided or stranded steel guy cables that anchor to the ground. Guy lines provide additional support to the tower especially in areas that are prone to high wind.

FIGURE 37 EXAMPLE OF GUYED TOWER

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Monopole Towers

Monopole towers are designed to use limited space, can withstand high winds and are generally less intrusive visually than lattice towers, making them popular in the cellular industry. Monopoles can be a single tube or tampered sections that are stacked together at the tower construction site.

They are the most popular type of pole in the wireless industry. They can be designed as stealth are camouflage towers as shown below. A monopole tower is considered to be a self-supporting tower or SST.

FIGURE 38 EXAMPLE OF MONOPOLE TOWER

Camouflage Towers

Camouflage towers are generally used in urban areas to have less of a visual import. The camouflage tower can take the look of a pine tree, palm tree or other depending on the natural surroundings.

There are other critical vertical assets beyond the typical wireless or cellular towers. Some of these assets include privately placed towers and poles, agricultural structures such as silos, and even the sides or tops of buildings.

FIGURE 39 EXAMPLE OF CAMOUFLAGE TOWER

Rooftops

Rooftops provide instant height to an antenna which can be either mounted directly to the building or extended even higher with the use of mounting masts or poles.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Rooftops generally, as part of buildings provide for easier access to electrical and communications facilities when compared to a remotely located tower.

Over the several years, tower companies have become very aggressive about securing rooftop rights and handling the leasing as a third party for property owners.

FIGURE 40 EXAMPLE OF ROOFTOP MOUNTING

Water Towers

Water towers are typically owned by the local town or county government of which they are in though some are owned by private operators. Most water towers rely on a pressurized gravity fed system and are therefore built high above the ground.

FIGURE 41 EXAMPLE OF WATER TOWER

In the past, owners of water towers were concerned with the physical connections of devices to the towers. However, significant advances in magnetic mounting structures have resolved many of those concerns.

These structures are becoming very popular with local wireless Internet service providers (WISPs), discussed later, as they are generally made accessable at low cost by the local governments that wish to improve broadband service for the citizentry.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Water Tanks

Much like water towers, many water tanks are also gravity fed systems. In mountainous areas, which have evelation changes, water tanks can be place on ground above an area and replace the need for visually unappealing water towers.

Unfortunately in many instances water tanks are shorter than the trees around them making them ill-suited for the propoagation of wireless signals.

FIGURE 42 EXAMPLE OF WATER TANK

Other Alternative Vertical Assets Which Can Be Used

- Grain Silos
- Church Steeples

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Appendix E Frequencies in Use by County

Radio Service Codes – Interpretive Keys

Radio Service Codes	Uses
AA	Aviation Auxiliary Group
AB	Aural Microwave Booster
AC	Aircraft Radio Service
AD	AWS-4 2000-2020/2180-2200 MHz bands
AF	Aeronautical and Fixed
AH	AWS- H Block 1915-1920 MHz/1995-2000 MHz
AI	Aural Intercity Relay
AR	Aviation Radionavigation
AS	Aural Studio
AT	AWS-3 1695-1710 MHz/1775-1780MHz/2110-2155 MHz
AW	(AWS) Advanced Wireless Service, 1710 - 1755/2110 - 2155 MHz bands
BR	Broadband Radio Service
CA	Commercial aviation air-ground service (incumbent)
CB	Basic Exchange Telephone Radio Service
CD	Paging and Radiotelephone
CF	Common Carrier Fixed Point to Point Microwave Service
CG	General aviation air ground service
CJ	Commercial aviation air-ground service (auctioned)
CL	Cellular
CM	Commercial Operator
CN	PCS Narrowband
CO	Offshore Radiotelephone
CP	Part 22 VHF/UHF
CR	Rural Radiotelephone
CT	Local Television Transmission
CW	Broadcast PCS
CY	Broadband PCS G Block 1901-1915/1990-1995 MHx Bands, Market Area
CZ	Paging and Radiotelephone, Auctioned
DV	Multichannel Video Distribution and Data Service
ED	Educational Broadcast Service

GB	Industrial Business, 806-821/851-866 MHz Conventionl
GC	929-931 MHz Bands, Auctioned
GI	896-901/935-940 MHz Conventional
GL	Speciliazed Mobile Radio Service (SMR), 900 Conventional SMR site specific
GM	800 Conventional SMR site specific
GO	806-821/851-866 MHz Conventional
GR	900 Conventional SMR
GS	Private Carrier Paging, 929-930 MHz
GU	Industrial Business 896-901/935-940 MHz Conventional
GX	800 Conventional SMR
HA	Amateur
HV	Amateur Vanity
IG	Industrial/Business Pool - Private, Conventional
IQ	Intelligent Transportation Service (Public Safety)
LD	Local Television Transmission
LP	Broadcast Auxiliary Low Power
LV	Low Power Wireless Assist Video Devices
MA	Marine Auxiliary Group
MC	Coastal Group
MG	Private Operational Fixed Point to Point Microwave Service
MK	Alaska Group
MM	Millimeter Wave 70-80-90 GHz
MR	Marine Radiolocation Land
MW	Private Operational Fixed Point to Point Public Safety Service
NC	Phase I Nationwide Commercial Service
NN	3.5 GHz Band
PC	Public Coast Stations
PW	Shared Public Safety Channels
QA	Phase II auctioned service
QD	Phase I Other Service
QM	Public safety licenses are issued on channels 161 through 170 and channels 181 through 185
QO	No new QO licenses being issued beyond existing incumbent service contours
QQ	Intelligent Transportation Service (Non-Public Safety)
QT	Phase I Trunked Service
RL	Restricted Radiotelephone Operator Permit-Limited Use
RP	Radio Broadcast Auxiliary Remote Pickup

RR	Restricted Radiotelephone Operator Permit
SA	Ship Recreational or Voluntarily Equipped
SB	Ship Compulsory Equipped
TB	TV Microwave Booster
TI	TV Intercity Relay
TN	Former 39 GHz Market Area
TP	TV Pickup
TS	TV Studio Transmitter Link
TT	TV Translator Relay
TZ	Former 24 GHz Market
UU	Upper Microwave Flexible User Service
WS	Wireless Communication Service
WX	700 MHz Service
WZ	Lower 700 MHz
YB	Industrial Business 806-821/851-866 MHz Trunked
YC	800 Auctioned SMR
YD	900 Auctioned SMR
YG	Industrial/Business Pool - Private, Trunked
YH	800 Auctioned SMR - Rebanded YC
YI	896-901/935-940 MHz Trunked
YL	900 Trunked SMR site specific
YM	800 Trunked SMR site specific
YO	806-821/851-866 MHz Trunked
YS	900 Trunked SMR
YU	Industrial Business 896-901/935-940 MHz Trunked
YX	800 Trunked SMR
ZA	GMRS
ZV	218 - 219 Mhz Service

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Cherokee County Frequencies

Number	Call Sign	Holder	Frequency	Radio Service	Status	Exp Date
1	WRBK994	T-MOBILE LICENSE LLC	1565449	CF	Active	4/17/2028
2	WQVZ971	New Cingular Wireless PCS, LLC	3291192	CF	Active	6/26/2025
3	WQXU280	T-MOBILE LICENSE LLC	1565449	CF	Active	6/9/2026
4	WQAR206	Duke Energy Business Services, LLC	20991360	YI	Active	7/22/2024
5	KNKN890	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CL	Active	10/1/2021
6	WQAV229	Duke Energy Business Services, LLC	20991360	YI	Active	8/12/2024
7	WQNC383	Conterra Ultra Broadband LLC	9750324	CF	Canceled	12/13/2020
8	KCT233	North Carolina State Highway Patrol	1913888	PW	Active	9/28/2022
9	WPUT753	UNIVERSITY OF NORTH CAROLINA	1910066	MW	Active	5/1/2022
10	WPVJ640	UNIVERSITY OF NORTH CAROLINA	1910066	TT	Canceled	12/1/2012
11	WQCT414	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	5/19/2025
12	WQIJ660	UNIVERSITY OF NORTH CAROLINA	1910066	TS	Active	12/1/2020
13	WQOI218	Conterra Ultra Broadband LLC	9750324	CF	Active	10/4/2021
14	WQUP734	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GE	Active	9/4/2024
15	WQVD365	SprintCom, Inc.	2315950	CF	Canceled	1/7/2025
16	KCT232	North Carolina State Highway Patrol	1913888	PW	Active	2/25/2021
17	KNCV390	NORTH CAROLINA, STATE OF	1943000	PW	Active	2/25/2022
18	WPOQ965	UNIVERSITY OF NORTH CAROLINA	1910066	MG	Canceled	12/9/2008
19	WPOY260	ASHVILLE COMMUNICATIONS INC	5486287	YG	Active	8/31/2024
20	WPRZ846	WLOS LICENSEE LLC	4676755	IG	Active	3/19/2021
21	WPUS993	UNIVERSITY OF NORTH CAROLINA	1910066	MW	Active	4/26/2022
22	WQFQ600	HAYWOOD ELECTRIC MEMBERSHIP CORPORATION	4951372	YG	Active	9/11/2026
23	WQLQ547	UNIVERSITY OF NORTH CAROLINA	1910066	TS	Active	12/1/2020
24	WQLX800	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Canceled	9/14/2014
25	WQTA919	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/20/2023
26	WQYV882	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
27	WQYV883	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
28	WPHQ741	PAGEMART II INC	1662097	GS	Canceled	7/24/2010
29	WPHX314	PAGEMART II INC	1662097	GS	Canceled	8/7/2010
30	WQLW340	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Canceled	9/14/2014
31	WQMQ499	North Carolina State Highway Patrol	1913888	MW	Active	10/21/2020
32	WPDV312	NEXTEL LICENSE HOLDINGS 1, INC.	2050078	YX	Canceled	10/31/2010
33	WQNC384	Conterra Ultra Broadband LLC	9750324	CF	Canceled	12/13/2020
34	KNKN626	Cellco Partnership	3290673	CL	Active	10/1/2021

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

35	WQTU422	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	4/15/2024
36	WPYN267	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	9/12/2023
37	WQTF406	PUBLIC SERVICE COMPANY OF NORTH CAROLINA, INC.	1931930	IG	Active	1/23/2024
38	WQYV887	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
39	KNKN890	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CL	Active	10/1/2021
40	WOI6	MACON COUNTY - AWOS	5473939	AF	Active	1/16/2028
41	WQJV840	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029
42	WQSY436	Verizon Wireless (VAW) LLC	3800307	CF	Active	12/9/2023
43	WQWB380	New Cingular Wireless PCS, LLC	3291192	CF	Active	7/7/2025
44	WQXU278	T-MOBILE LICENSE LLC	1565449	CF	Active	6/9/2026
45	WQXU275	T-MOBILE LICENSE LLC	1565449	CF	Active	6/9/2026
46	WQUD571	Verizon Wireless (VAW) LLC	3800307	CF	Active	6/10/2024
47	KNIK412	Macon County Of	1916592	PW	Active	5/16/2024
48	WNUY383	Macon County	1916592	PW	Active	11/28/2025
49	WPII561	Macon County Of	1916592	PW	Active	9/8/2025
50	WPLV338	MACON, COUNTY OF	1916592	PW	Active	3/9/2023
51	WQSY437	Verizon Wireless (VAW) LLC	3800307	CF	Active	12/9/2023
52	WQNQ211	Conterra Ultra Broadband LLC	9750324	CF	Active	4/14/2021
53	WQUC764	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	6/4/2024
54	KGR395	North Carolina State Highway Patrol	1913888	PW	Active	7/21/2025
55	WNUS922	North Carolina State Highway Patrol	1913888	PW	Active	11/1/2025
56	WQCS910	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	5/17/2025
57	WQGF954	North Carolina State Highway Patrol	1913888	MW	Active	1/8/2027
58	WQPA543	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GF	Canceled	7/28/2014
59	WQUL814	UNIVERSITY OF NORTH CAROLINA	1910066	TT	Active	12/1/2020
60	WQUM854	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GE	Active	8/20/2024
61	WREL936	BalsamWest FiberNET, LLC	11291671	MG	Active	10/31/2029
62	KEL394	North Carolina State Highway Patrol	1913888	PW	Active	12/9/2021
63	WQCX999	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	6/21/2025
64	WQGF994	North Carolina State Highway Patrol	1913888	MW	Active	1/8/2027
65	WQOZ754	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GF	Canceled	7/28/2014
66	WQTA254	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GE	Canceled	12/17/2023
67	WQUM851	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GE	Active	8/20/2024
68	WQNQ212	Conterra Ultra Broadband LLC	9750324	CF	Active	4/14/2021
69	WQTF406	PUBLIC SERVICE COMPANY OF NORTH CAROLINA, INC.	1931930	IG	Active	1/23/2024
70	WQVD364	SprintCom, Inc.	2315950	CF	Canceled	1/7/2025
71	WRBK998	T-MOBILE LICENSE LLC	1565449	CF	Active	4/17/2028

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

72	WQOI219	Conterra Ultra Broadband LLC	9750324	CF	Canceled	10/4/2021
73	WQYN734	T-MOBILE LICENSE LLC	1565449	CF	Active	11/21/2026
74	KNHP862	CHEROKEE, COUNTY OF	1913110	PW	Active	4/17/2022
75	WPVX261	VALLEYTOWN FIRE AND RESCUE	6320758	PW	Active	8/28/2022
76	WRDJ862	VALLEYTOWN FIRE AND RESCUE	6320758	PW	Active	5/16/2029
77	WQLR513	North Carolina State Highway Patrol	1913888	MW	Canceled	4/7/2020
78	WQLW339	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Canceled	3/15/2014
79	WQOP315	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GE	Canceled	12/7/2021
80	WQJV815	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029
81	WQJV815	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029
82	WQFZ839	BellSouth Telecommunications, LLC	20882668	CF	Active	11/21/2026
83	WQJV814	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029
84	WQPW611	Conterra Ultra Broadband LLC	9750324	CF	Active	8/31/2022
85	WQTV858	NEW CINGULAR WIRELESS PCS, LLC	3291192	CF	Canceled	4/23/2024
86	WQXY402	T-MOBILE LICENSE LLC	1565449	CF	Active	7/13/2026
87	WQJV819	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029
88	WQKI387	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YF	Canceled	11/22/2010
89	WQLT963	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Canceled	9/14/2014
90	WQMQ504	North Carolina State Highway Patrol	1913888	MW	Active	10/21/2020
91	WQSY958	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Canceled	12/11/2023
92	WQTA420	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Canceled	12/18/2023
93	WNQE698	CHEROKEE, COUNTY OF	1913110	PW	Active	**5/30/2025**
94	WQAG825	CHEROKEE, COUNTY OF	1913110	PW	Active	5/27/2024
95	WQML678	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Canceled	9/14/2014
96	WQMQ999	North Carolina State Highway Patrol	1913888	MW	Active	10/26/2020
97	WQPT602	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GE	Active	8/13/2022
98	WQTB766	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/30/2023
99	WQWY935	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	1/4/2026
100	KNIH904	JACKSON, COUNTY OF	1912658	PW	Active	5/15/2024
101	WPJR506	JACKSON, COUNTY OF	1912658	PW	Active	9/19/2021
102	WQMD999	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Canceled	9/14/2014
103	WQNH886	North Carolina State Highway Patrol	1913888	MW	Active	2/9/2021
104	WQTB689	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/30/2023
105	WQWY933	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	1/4/2026
106	WQXF667	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	2/22/2026
107	WQZG431	T-MOBILE LICENSE LLC	1565449	CF	Active	5/9/2027
108	WQMP294	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Canceled	9/14/2014
109	WPDA658	CLAY COUNTY FIRE & RESCUE INC	3224268	PW	Active	7/12/2024

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

110	WPQY488	North Carolina State Highway Patrol	1913888	GP	Canceled	11/29/2025
111	WQNG985	North Carolina State Highway Patrol	1913888	MW	Active	2/3/2021
112	WQQS305	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YF	Canceled	1/29/2014
113	WQRW897	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	8/7/2023
114	WQWY934	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	1/4/2026
115	KQL720	North Carolina State Highway Patrol	1913888	PW	Active	12/9/2021
116	WQRF870	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GE	Canceled	5/6/2023
117	WQSZ983	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/17/2023
118	WQTS770	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GE	Active	4/4/2024
119	WQWY812	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	12/30/2025
120	KNIK412	Macon County Of	1916592	PW	Active	5/16/2024
121	WPRV578	North Carolina State Highway Patrol	1913888	GE	Active	2/15/2021
122	WQNH471	North Carolina State Highway Patrol	1913888	MW	Active	2/7/2021
123	WQQS300	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YF	Canceled	7/28/2014
124	WQTB708	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/30/2023
125	WPQY651	North Carolina State Highway Patrol	1913888	GP	Canceled	12/1/2025
126	WQNF473	North Carolina State Highway Patrol	1913888	MW	Active	1/19/2021
127	WQQT373	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YF	Canceled	7/28/2014
128	WQTA415	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/18/2023
129	WQWY810	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	12/30/2025
130	WQXF666	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	2/22/2026
131	WPQY584	North Carolina State Highway Patrol	1913888	GE	Canceled	11/30/2025
132	WQNF688	North Carolina State Highway Patrol	1913888	MW	Active	1/24/2021
133	WQQS299	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YF	Canceled	7/28/2014
134	WQTG579	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	1/29/2024
135	WPYN279	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	9/12/2023
136	WQNQ208	Conterra Ultra Broadband LLC	9750324	CF	Active	4/14/2021
137	WQUC674	New Cingular Wireless PCS, LLC	3291192	CF	Canceled	6/4/2024
138	WQVB521	Verizon Wireless (VAW) LLC	3800307	CF	Active	12/16/2024
139	WQXR309	NEW CINGULAR WIRELESS PCS, LLC	3291192	CF	Active	5/16/2026
140	WRBR700	T-MOBILE LICENSE LLC	1565449	CF	Active	5/31/2028
141	WQOI902	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	10/12/2021
142	WQSM447	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	10/30/2023
143	WQQS302	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YF	Canceled	7/28/2014
144	WQTB656	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/27/2023
145	WQWY811	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	12/30/2025
146	WQYI346	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	10/6/2026
147	WREL937	BalsamWest FiberNET, LLC	11291671	MG	Active	10/31/2029

148	WQOP613	North Carolina State Highway Patrol	1913888	MW	Active	12/9/2021
149	WQOY795	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YF	Canceled	7/28/2014
150	WQTB745	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/30/2023
151	WRAI816	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	SY	Active	11/30/2027
152	WZZ895	Duke Energy Business Services, LLC	20991360	IG	Active	8/31/2023
153	WQST662	Verizon Wireless (VAW) LLC	3800307	CF	Active	11/13/2023
154	WRCJ706	Verizon Wireless (VAW) LLC	3800307	CF	Active	10/22/2028
155	WQJV823	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029
156	WPHM257	North Carolina State Highway Patrol	1913888	GE	Canceled	6/28/2025
157	WQNA965	North Carolina State Highway Patrol	1913888	MW	Active	11/30/2020
158	WQTB657	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/27/2023
159	WQUK980	NEW CINGULAR WIRELESS PCS, LLC	3291192	CF	Active	8/6/2024
160	WRDG645	Verizon Wireless (VAW) LLC	3800307	CF	Active	4/24/2029

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Clay County Frequencies

Number	Call Sign	Holder	Frequency	Radio Service	Status	Exp Date
1	B020	Clearwire Spectrum Holdings III LLC	18399998	BR	Active	3/28/2026
2	KNKN890	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CL	Active	10/1/2021
3	KYB873	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	1916568	PW	Active	5/22/2022
4	KYY914	CLAY, COUNTY OF	1913078	PW	Active	9/22/2022
5	L000009337	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	12/3/2021
6	WAH566	United Telephone Company of the Carolinas LLC	1777036	CF	Active	2/1/2021
7	WHN702 Lease	SC EDUCATIONAL TELEVISION COMMISSION	1861160	ED	Active	12/3/2021
8	WNSY673	NORTHEAST KNOX UTILITY DISTRICT	4136081	IG	Active	3/5/2022
9	WPDA658	CLAY COUNTY FIRE & RESCUE INC	3224268	PW	Active	7/12/2024
10	WPXW642	CLAY, COUNTY OF	1913078	PW	Active	6/23/2023
11	WQFW517	CLAY, COUNTY OF	1913078	PW	Active	10/21/2026
12	WQGF994	North Carolina State Highway Patrol	1913888	MW	Active	1/8/2027
13	WQGL642	CLAY, COUNTY OF	1913078	PW	Active	2/23/2027
14	WQHC416	State of North Carolina Division of Emergency Management	4604864	PW	Active	6/26/2027
15	WQHD432	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/3/2027
16	WQJL771	State of North Carolina Division of Emergency Management	4604864	PW	Active	10/27/2028
17	WQJV816	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029
18	WQNL789	CLAY, COUNTY OF	20545489	IG	Active	3/16/2021
19	WQRI566	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	1916568	PW	Active	5/21/2023
20	WQRW897	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	8/7/2023
21	WQTU433	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	4/15/2024
22	WQVZ971	New Cingular Wireless PCS, LLC	3291192	CF	Active	6/26/2025
23	WQVZ972	New Cingular Wireless PCS, LLC	3291192	CF	Active	6/26/2025
24	WQWP787	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	10/21/2025
25	WQWY934	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	1/4/2026
26	WQXU274	T-MOBILE LICENSE LLC	1565449	CF	Active	6/9/2026
27	WQXU280	T-MOBILE LICENSE LLC	1565449	CF	Active	6/9/2026
28	WQYK932	Sprint Spectrum License Holder LLC	25738147	BR	Active	3/28/2026
29	WRCW568	North Carolina State Highway Patrol	1913888	MW	Active	2/13/2029
30	WRCW569	North Carolina State Highway Patrol	1913888	MW	Active	2/13/2029

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Graham County Frequencies

Number	Call Sign	Holder	Frequency	Radio Service	Status	Exp Date
1	B020	Clearwire Spectrum Holdings III LLC	18399998	BR	Active	3/28/2026
2	KGR395	North Carolina State Highway Patrol	1913888	PW	Active	7/21/2025
3	KNBR738	GRAHAM CO RESCUE SQUAD	4217170	PW	Active	12/16/2021
4	KNFQ675	GRAHAM, COUNTY OF	1912799	PW	Active	8/28/2022
5	KNKN626	Cellco Partnership	3290673	CL	Active	10/1/2021
6	KNKN707	Cellco Partnership	3290673	CL	Active	10/1/2021
7	KNKN890	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CL	Active	10/1/2021
8	KSS728	BROOKFIELD SMOKY MOUNTAIN HYDROPOWER LLC	21957402	IG	Active	4/4/2021
9	KTI747	GRAHAM COUNTY SHERIFF DEPARTMENT	19782499	PW	Active	12/15/2021
10	KYB872	STATE OF NORTH CAROLINA DOT	1916568	PW	Active	5/22/2022
11	KYL959	PHILLIPS & JORDAN INC	1961275	IG	Active	4/20/2023
12	WAH566	United Telephone Company of the Carolinas LLC	1777036	CF	Active	2/1/2021
13	WLI708	CHEROKEE BROADCASTING COMPANY, INC.		AS	Active	12/1/2019
14	WNNG596	GRAHAM, COUNTY OF	1912799	PW	Active	12/9/2023
15	WNNG608	GRAHAM, COUNTY OF	1912799	PW	Active	12/9/2023
16	WNQE698	CHEROKEE, COUNTY OF	1913110	PW	Active	5/30/2025
17	WNUS922	North Carolina State Highway Patrol	1913888	PW	Active	11/1/2025
18	WNYH459	QUALLA HOUSING AUTHORITY	1957455	PW	Active	1/27/2022
19	WNZW983	CHEROKEE, COUNTY OF	1913110	PW	Active	2/4/2023
20	WPAF844	CHEROKEE TRIBAL COMMISSION	7195498	PW	Active	8/5/2022
21	WPFX890	Duke Energy Business Services, LLC	20991360	YJ	Active	9/13/2025
22	WPJU698	AMS Spectrum Holdings, LLC	19131390	IK	Active	10/31/2026
23	WPMM437	GRAHAM, COUNTY OF	1912799	PW	Active	9/16/2023
24	WPPA513	NORTH CAROLINA, STATE OF	4604526	PW	Active	9/23/2024
25	WPQI661	EASTERN BAND OF CHEROKEE INDIANS	1953462	PW	Active	7/28/2025
26	WPRJ407	North Carolina State Highway Patrol	1913888	GP	Active	10/12/2025

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

27	WPTB756	WESTERN CAROLINA COMMUNICATION SYSTEMS	5484365	IG	Active	8/23/2021
28	WPVX261	VALLEYTOWN FIRE AND RESCUE	6320758	PW	Active	8/28/2022
29	WPYN279	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	9/12/2023
30	WPZB673	Graham County Schools	9598764	IG	Active	12/22/2023
31	WQAN607	GRAHAM, COUNTY OF	1912799	PW	Active	7/8/2024
32	WQBB937	ROBBINSVILLE, TOWN OF	1913813	PW	Active	9/16/2024
33	WQBV723	NORTH CAROLINA, STATE OF	1943000	PW	Active	12/23/2024
34	WQCS910	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	5/17/2025
35	WQGF954	North Carolina State Highway Patrol	1913888	MW	Active	1/8/2027
36	WQGF994	North Carolina State Highway Patrol	1913888	MW	Active	1/8/2027
37	WQHC416	State of North Carolina Division of Emergency Management	4604864	PW	Active	6/26/2027
38	WQHD432	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/3/2027
39	WQJJ213	State of North Carolina Division of Emergency Management	4604864	PW	Active	9/25/2028
40	WQMQ642	NC DEPT OF TRANSPORTATION	1916568	PW	Active	10/22/2020
41	WQMQ999	North Carolina State Highway Patrol	1913888	MW	Active	10/26/2020
42	WQNQ208	Conterra Ultra Broadband LLC	9750324	CF	Active	4/14/2021
43	WQNQ209	Conterra Ultra Broadband LLC	9750324	CF	Active	4/14/2021
44	WQOT812	BROOKFIELD SMOKY MOUNTAIN HYDROPOWER LLC	21957402	IG	Active	1/28/2022
45	WQPP837	STECOAH, TOWNSHIP OF	1843325	PW	Active	7/17/2022
46	WQPP844	Balsamwest FiberNet LLC	11291671	NN	Active	7/17/2022
47	WQQQ368	Verizon Wireless (VAW) LLC	3800307	CF	Active	2/12/2023
48	WQQY970	Verizon Wireless (VAW) LLC	3800307	CF	Active	3/28/2023
49	WQST662	Verizon Wireless (VAW) LLC	3800307	CF	Active	11/13/2023
50	WQTB656	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/27/2023
51	WQTW259	Duke Energy Business Services, LLC	20991360	MG	Active	4/24/2024
52	WQTW260	Duke Energy Business Services, LLC	20991360	MG	Active	4/24/2024
53	WQUL814	UNIVERSITY OF NORTH CAROLINA	1910066	TT	Active	12/1/2020

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

54	WQUM854	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GE	Active	8/20/2024
55	WQVB521	Verizon Wireless (VAW) LLC	3800307	CF	Active	12/16/2024
56	WQWY811	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	12/30/2025
57	WQXR309	NEW CINGULAR WIRELESS PCS, LLC	3291192	CF	Active	5/16/2026
58	WQXR519	NEW CINGULAR WIRELESS PCS, LLC	3291192	CF	Active	5/17/2026
59	WQXU280	T-MOBILE LICENSE LLC	1565449	CF	Active	6/9/2026
60	WQYB312	MEADOW BRANCH VOLUNTEER FIRE DEPT	25697640	PW	Active	8/5/2026
61	WQYI346	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	10/6/2026
62	WQYK932	Sprint Spectrum License Holder LLC	25738147	BR	Active	3/28/2026
63	WQYV886	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
64	WQYV900	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
65	WRAE470	Town of Fontana Dam	26411280	IG	Active	10/24/2027
66	WRAU454	T-MOBILE LICENSE LLC	1565449	CF	Active	3/6/2028
67	WRBR700	T-MOBILE LICENSE LLC	1565449	CF	Active	5/31/2028
68	WRBX490	T-MOBILE LICENSE LLC	1565449	CF	Active	7/17/2028
69	WRDG645	Verizon Wireless (VAW) LLC	3800307	CF	Active	4/24/2029
70	WREL934	BalsamWest FiberNET, LLC	11291671	MG	Active	10/31/2029
71	WREL935	BalsamWest FiberNET, LLC	11291671	MG	Active	10/31/2029
72	WREL936	BalsamWest FiberNET, LLC	11291671	MG	Active	10/31/2029
73	WREL937	BalsamWest FiberNET, LLC	11291671	MG	Active	10/31/2029
74	WRL400	Duke Energy Business Services, LLC	20991360	IG	Active	1/27/2025

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Haywood County Frequencies

Number	Call Sign	Holder	Frequency	Radio Service	Status	Exp Date
1	B020	Clearwire Spectrum Holdings III LLC	18399998	BR	Active	3/28/2026
2	KCT232	North Carolina State Highway Patrol	1913888	PW	Active	2/25/2021
3	KIN778	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	1916568	PW	Active	5/22/2022
4	KIO70	WLOS LICENSEE, LLC	4676755	TS	Active	12/1/2020
5	KIW26	STATE OF NORTH CAROLINA, DEPARTMENT OF TRANSPORTATION	1916568	MW	Active	6/25/2022
6	KIX457	Norfolk Southern Railway Company	4228979	IG	Active	6/12/2025
7	KKW342	BLUE RIDGE PAPER PRODUCTS	4614681	IG	Active	1/8/2021
8	KNAE787	MC DOWELL, COUNTY OF	4553665	PW	Active	12/13/2020
9	KNCA728	HAYWOOD, COUNTY OF	1916196	PW	Active	2/22/2023
10	KNCV390	NORTH CAROLINA, STATE OF	1943000	PW	Active	2/25/2022
11	KNDD694	NORTH CAROLINA, STATE OF	4604526	PW	Active	7/15/2022
12	KNDD697	NORTH CAROLINA, STATE OF	4604526	PW	Active	7/15/2022
13	KNEB911	NORTH CAROLINA, STATE OF	1912013	PW	Active	1/4/2023
14	KNEH819	Duke Energy Business Services, LLC	20991360	IG	Active	9/30/2023
15	KNEN288	BLUE RIDGE PAPER PRODUCTS	4614681	IG	Active	9/24/2021
16 Pending Application	KNFE705	Haywood County 911 Communications	5473350	PW	Active	10/30/2025
17	KNIK559	MAGGIE VALLEY, TOWN OF	1909910	PW	Active	1/31/2024
18	KNJL509	HAYWOOD ELECTRIC MEMBERSHIP COOPERATIVE	4951372	IG	Active	7/11/2024
19	KNKN626	Cellco Partnership	3290673	CL	Active	10/1/2021
20	KNKN890	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CL	Active	10/1/2021
21	KNNS443	SAUNOOK VOLUNTEER FIRE DEPARTMENT	4610499	PW	Active	4/15/2021
22	KQL720	North Carolina State Highway Patrol	1913888	PW	Active	12/9/2021
23	KTI749	WAYNESVILLE, TOWN OF	12308912	PW	Active	5/29/2023
24	KTI750	CANTON, TOWN OF	5029913	PW	Active	12/5/2021
25	KUR783	CATALOOCHEE SKI SLOPES INC	7672108	IG	Active	12/17/2022
26	KVB587	BLUE RIDGE PAPER PRODUCTS	4614681	IG	Active	1/8/2021
27	KWH639	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	1916568	PW	Active	5/22/2022
28	L000001919	Fixed Wireless Holdings, LLC	10490498	ED	Active	5/10/2025
29	L000001928	Fixed Wireless Holdings, LLC	10490498	ED	Active	12/30/2023
30	L000008350	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	1/22/2022
31	L000039813	Fixed Wireless Holdings, LLC	10490498	ED	Active	4/12/2025
32	L000039898	Fixed Wireless Holdings, LLC	10490498	ED	Active	1/22/2022
33	WAH566	United Telephone Company of the Carolinas LLC	1777036	CF	Active	2/1/2021
34	WCA964	CLYDE, TOWN OF	1915305	PW	Active	1/24/2022
35	WDN365	Haywood County 911 Communications	5473350	PW	Active	4/10/2022

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

36	WDT889	WLOS LICENSEE, LLC	4676755	TI	Active	12/1/2020
37	WFW710	CLEAR CHANNEL BROADCASTING LICENSES, INC.	1587971	AS	Active	12/1/2019
38	WHE965	CAPSTAR TX, LLC	19362953	RP	Active	12/1/2019
39	WHR598 Lease	University of North Carolina System Office	5794433	ED	Active	12/30/2023
40	WHY350	CAPSTAR TX, LLC	19362953	AS	Active	12/1/2019
41	WIQ84	CANTON, TOWN OF	5029913	PW	Active	12/5/2021
42	WLD661	CAPSTAR TX, LLC	19362953	RP	Active	12/1/2019
43	WLI947	WLOS LICENSEE, LLC	4676755	TI	Active	12/1/2020
44	WLL474	WLOS LICENSEE, LLC	4676755	TI	Active	12/1/2020
45	WME944	WLOS LICENSEE, LLC	4676755	TI	Active	12/1/2020
46	WNAW646	UNIVERSITY OF NORTH CAROLINA	1910066	PW	Active	4/12/2023
47	WNBL383	UNIVERSITY OF NORTH CAROLINA	1910066	PW	Active	7/5/2025
48	WND616 Lease	ASHEVILLE-BUNCOMBE TECHNICAL COMMUNITY COLLEGE	1957810	ED	Active	1/22/2022
49	WND617 Lease	ASHEVILLE CHRISTIAN ACADEMY	5088620	ED	Active	1/22/2022
50	WNHH914	NATIONAL SKI PATROL SYSTEM INC	4254397	PW	Active	10/29/2021
51	WNHT396	WASTE MANAGEMENT HOLDINGS INC.	4161543	IG	Active	1/6/2022
52	WNJD579	AUMAN, THOMAS J:AUMAN, ALICE A DBA BSG ENTERPRISES	3346996	IG	Active	8/14/2022
53	WNKB380	MAGGIE VALLEY, TOWN OF	1950070	PW	Active	10/13/2022
54	WNKS257	BLUE RIDGE PAPER PRODUCTS	4614681	IG	Active	1/14/2023
55	WNKS259	BLUE RIDGE PAPER PRODUCTS	4614681	IG	Active	1/14/2023
56	WNNZ376	COMMUNICATION SERVICE INC	1949304	IG	Active	2/18/2023
57	WNQX211	WHITLEYS COMMUNICATION SERVICE INC	6286066	IG	Active	12/14/2024
58	WNRL520	North Carolina State Highway Patrol	1913888	PW	Active	3/1/2025
59	WNRL525	North Carolina State Highway Patrol	1913888	PW	Active	3/1/2025
60	WNSO487	North Carolina State Highway Patrol	1913888	PW	Active	6/22/2025
61	WNUG276	CENTER PIGEON VOLUNTEER FIRE DEPARTMENT INC	1943695	PW	Active	10/21/2023
62	WNVK594	BLUE RIDGE PAPAER PRODUCTS	4614681	IG	Active	2/7/2021
63	WNWZ880	BLUE RIDGE PAPER PRODUCTS	4614681	IG	Active	3/10/2022
64	WNXS984	BLUE RIDGE PAPER PRODUCTS	4614681	IG	Active	11/1/2021
65	WNYM581	BLUE RIDGE PAPER PRODUCTS	4614681	IG	Active	2/19/2022
66	WNZS864	RCS Communications Group	1961481	IK	Active	7/19/2029
67	WNZS866	AMS Spectrum Holdings, LLC	19131390	IK	Active	6/17/2028
68	WNZW464	MOUNTAIN PROJECTS INC	7056690	IG	Active	7/7/2022
69	WPBI337	BLUE RIDGE PAPER PRODUCTS	4614681	YO	Active	1/14/2023
70	WPCH361	Duke Energy Business Services, LLC	20991360	IG	Active	5/20/2023
71	WPCM756	AMS Spectrum Holdings, LLC	19131390	GS	Active	6/23/2028
72	WPDJ570	NYAL PLEMMONS CONTRACTING INC	9746371	IG	Active	10/6/2023
73	WPEI915	AMS Spectrum Holdings, LLC	19131390	IK	Active	2/17/2020
74	WPEQ688	CAROLINA COMMUNICATIONS & ELECTRONICS INC	1961481	IK	Active	5/19/2029

75	WPGS478	ENGLE, VERNON DBA BLUE RIDGE MOUNTAIN PAGING	6174353	IG	Active	3/20/2025
76	WPIS459	MAGGIE VALLEY, TOWN OF	1909910	PW	Active	1/14/2023
77	WPJE273	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	2/1/2021
78	WPJG499	COMMUNICATION SERVICE INC	1949304	IG	Active	6/15/2021
79	WPKN548	WHITLEYS COMMUNICATIONS SERVICE	4349254	IG	Active	5/13/2022
80	WPKR657	CLYDE, TOWN OF	1915305	IG	Active	6/16/2022
81	WPKT477	Haywood County 911 Communications	5473350	PW	Active	7/1/2022
82	WPKX379	CRUSO VOLUNTEER FIRE DEPARTMENT	7484934	PW	Active	9/2/2022
83	WPLT673	NORTH CANTON UNITED FIRE DEPARTMENT	3217494	PW	Active	1/30/2023
84	WPLU210	CATALOOCHEE RANCH INC	7359433	IG	Active	2/9/2023
85	WPLW538	LAKE LOGAN FIRE DEPT	8180820	PW	Active	3/20/2023
86	WPMM294	JUNALUSKA COMMUNITY VOL FIRE DEPT	9023805	PW	Active	9/15/2023
87	WPMX286	COMMUNICATION SERVICE INC	1949304	YG	Active	3/5/2024
88	WPOY260	ASHVILLE COMMUNICATIONS INC	5486287	YG	Active	8/31/2024
89	WPPG948	blue ridge mountain paging	4786182	IG	Active	12/16/2024
90	WPPX712	CATALOOCHEE SKI AREA INC	7672108	IG	Active	3/6/2025
91	WPQI676	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	1916568	PW	Active	7/28/2025
92	WPRJ402	North Carolina State Highway Patrol	1913888	GP	Active	10/12/2025
93	WPRU733	BellSouth Telecommunications, LLC	20882668	CF	Active	2/6/2021
94	WPRZ846	WLOS LICENSEE LLC	4676755	IG	Active	3/19/2021
95	WPTQ621	WAYNESVILLE, TOWN OF	12308912	PW	Active	11/26/2021
96	WPUM863	Haywood County 911 Communications	5473350	PW	Active	3/28/2022
97	WPUQ436	Haywood County 911 Communications	5473350	PW	Active	4/12/2022
98	WPUS993	UNIVERSITY OF NORTH CAROLINA	1910066	MW	Active	4/26/2022
99	WPUT209	UNIVERSITY OF NORTH CAROLINA	1910066	MW	Active	4/26/2022
100	WPUT433	WAYNESVILLE, TOWN OF	12308912	PW	Active	4/29/2022
101	WPUV847	Haywood County 911 Communications	5473350	PW	Active	5/13/2022
102	WPXV561	CLYDE FIRE DEPARTMENT	8441552	PW	Active	6/17/2023
103	WPYM736	Norfolk Southern Railway Company	4228979	IG	Active	9/10/2023
104	WPZW904	North Carolina, State of, Department of Transportation	1916568	PW	Active	3/31/2024
105	WQAP353	WAYNESVILLE POLICE DEPT	12308912	PW	Active	7/14/2024
106	WQAQ892	WAYNESVILLE FIRE DEPARTMENT	10257921	PW	Active	7/21/2024
107	WQAR206	Duke Energy Business Services, LLC	20991360	YI	Active	7/22/2024
108	WQAV229	Duke Energy Business Services, LLC	20991360	YI	Active	8/12/2024
109	WQAV946	Norfolk Southern Railway Company	4228979	IG	Active	8/17/2024
110	WQBA730	Norfolk Southern Railway Company	4228979	IG	Active	9/9/2024
111	WQBB463	Duke Energy Business Services, LLC	20991360	YI	Active	9/14/2024
112	WQBN573	Norfolk Southern Railway Company	4228979	IG	Active	11/10/2024
113	WQBN764	Norfolk Southern Railway Company	4228979	IG	Active	11/15/2024

114	WQBV571	HAYWOOD COUNTY EMERGENCY SERVICES	5473350	PW	Active	12/22/2024
115	WQCC514	Norfolk Southern Railway Company	4228979	IG	Active	1/28/2025
116	WQCM633	CANTON, TOWN OF	1915479	PW	Active	4/8/2025
117	WQCM973 Lease	BLUE RIDGE COMMUNITY COLLEGE	1951433	ED	Active	4/12/2025
118	WQCQ841	BellSouth Telecommunications, LLC	20882668	CF	Active	5/4/2025
119	WQCR737 Lease	University of North Carolina System Office	5794433	ED	Active	5/10/2025
120	WQDC715	Norfolk Southern Railway Company	4228979	IG	Active	7/25/2025
121	WQFI265	Norfolk Southern Railway Company	4228979	IG	Active	7/20/2026
122	WQFM394	Norfolk Southern Railway Company	4228979	IG	Active	8/16/2026
123	WQFQ600	HAYWOOD ELECTRIC MEMBERSHIP CORPORATION	4951372	YG	Active	9/11/2026
124	WQFV600	CRABTREE IRONDUFF VOLUNTEER FIRE DEPARTMENT	15311699	PW	Active	10/16/2026
125	WQFX538	North Carolina, State of, Dept of Transportation	1916568	PW	Active	10/30/2026
126	WQFZ839	BellSouth Telecommunications, LLC	20882668	CF	Active	11/21/2026
127	WQGI934	DLP Haywood Regional Medical Center, LLC	23745896	IG	Active	2/1/2027
128	WQGK918	Norfolk Southern Railway Company	4228979	IG	Active	2/20/2027
129	WQHC414	State of North Carolina Division of Emergency Management	4604864	PW	Active	6/26/2027
130	WQHD432	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/3/2027
131	WQHE205	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/10/2027
132	WQHE207	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/10/2027
133	WQHE412	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/11/2027
134	WQHG649	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/24/2027
135	WQID313	Norfolk Southern Railway Company	4228979	IG	Active	1/8/2028
136	WQIU464	Norfolk Southern Railway Company	4228979	IG	Active	5/15/2028
137	WQJB354	FINES CREEK FIRE DEPARTMENT	17768813	PW	Active	7/14/2028
138	WQJJ210	State of North Carolina Division of Emergency Management	4604864	PW	Active	9/25/2028
139	WQJL275	CANTON POLICE DEPARTMENT	18153478	PW	Active	10/20/2028
140	WQJM500	Skyrunner, Inc.	18137133	NN	Active	4/17/2020
141	WQJV814	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029
142	WQJV815	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029
143	WQKD409	NORFOLK SOUTHERN RAILWAY COMPANY	4228979	IG	Active	4/7/2029
144	WQKV759	CANTON, TOWN OF- FIRE DEPARTMENT	18862052	PW	Active	9/29/2019
145	WQKX572	Norfolk Southern Railway Company	4228979	IG	Active	10/19/2029
146	WQLI215	UNIVERSITY OF NORTH CAROLINA	1910066	MW	Active	1/26/2030
147	WQNH766	Conterra Ultra Broadband LLC	9750324	CF	Active	2/8/2021
148	WQNH767	Conterra Ultra Broadband LLC	9750324	CF	Active	2/8/2021

149	WQNN332	Daniel Boone Council Inc	20586822	IG	Active	3/29/2021
150	WQPK615	HAYWOOD COUNTY 911 COMMUNICATIONS	5473350	PW	Active	6/15/2022
151	WQSC768	Lake Junaluska Conference & Retreat Center	1954379	IG	Active	9/3/2023
152	WQSZ983	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/17/2023
153	WQTA919	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/20/2023
154	WQTB763	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/30/2023
155	WQTS770	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GE	Active	4/4/2024
156	WQUD985	PISGAH HIGH SCHOOL	23689144	IG	Active	6/12/2024
157	WQUJ669	Blue Ridge Southern Railroad	23768674	IG	Active	7/28/2024
158	WQVT423	LAUREL RIDGE COUNTRY CLUB	24549396	IG	Active	5/6/2025
159	WQVV848	LAKE LOGAN FIRE DEPT	23239866	PW	Active	5/22/2025
160	WQWY812	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	12/30/2025
161	WQXC844	CITY OF CANTON	25241225	IG	Active	2/2/2026
162	WQXM820	BELLSOUTH TELECOMMUNICATIONS, LLC	20882668	CF	Active	4/18/2026
163	WQXY402	T-MOBILE LICENSE LLC	1565449	CF	Active	7/13/2026
164	WQXY403	T-MOBILE LICENSE LLC	1565449	CF	Active	7/13/2026
165	WQYK932	Sprint Spectrum License Holder LLC	25738147	BR	Active	3/28/2026
166	WQYV882	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
167	WQYV889	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
168	WRAW522	CONSOLIDATED METCO	27246818	IG	Active	3/26/2028
169	WRCK929	NORTH CAROLINA, STATE OF	15560188	PW	Active	10/29/2028
170	WRCZ983	SHINING ROCK CLASSICAL ACADEMY	28149268	IG	Active	3/8/2029
171	WREN772	HAYWOOD COMMUNITY COLLEGE	11048303	IG	Active	11/14/2029
172	WXK616	NORTH CAROLINA STATE OF	1943000	PW	Active	4/7/2023
173	WZN274	County of Buncombe	1913219	PW	Active	9/7/2024

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Jackson County Frequencies

Number	Call Sign	Holder	Frequency	Radio Service	Status	Exp Date
1	B020	Clearwire Spectrum Holdings III LLC	18399998	BR	Active	3/28/2026
2	KAW491	TRANSYLVANIA, COUNTY OF	1917111	PW	Active	11/23/2022
3	KCT233	North Carolina State Highway Patrol	1913888	PW	Active	9/28/2022
4	KIN777	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	1916568	PW	Active	5/6/2022
5	KLC952	NORTH CAROLINA, STATE OF	5473400	PW	Active	8/14/2021
6	KNEU964	JACKSON PAPER MANUFACTURING COMPANY	1834381	IG	Active	11/17/2021
7	KNID889	TRANSYLVANIA, COUNTY OF	1917111	PW	Active	11/30/2024
8	KNIH904	JACKSON, COUNTY OF	1912658	PW	Active	5/15/2024
9	KNIK412	Macon County Of	1916592	PW	Active	5/16/2024
10	KNJL509	HAYWOOD ELECTRIC MEMBERSHIP COOPERATIVE	4951372	IG	Active	7/11/2024
11	KNKN890	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CL	Active	10/1/2021
12	KPK960	WESTERN NORTH CAROLINA PUBLIC RADIO	1844042	RP	Active	12/1/2019
13	KTI749	WAYNESVILLE, TOWN OF	12308912	PW	Active	5/29/2023
14	KTI757	MACON, COUNTY OF	1916592	PW	Active	10/27/2021
15	KTI759	MACON, COUNTY OF	1916592	PW	Active	10/16/2021
16	L000001919	Fixed Wireless Holdings, LLC	10490498	ED	Active	5/10/2025
17	L000001928	Fixed Wireless Holdings, LLC	10490498	ED	Active	12/30/2023
18	L000006094	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	12/18/2026
19	L000006095	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	12/7/2025
20	L000006096	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	12/7/2025
21	L000007746	Independent Spectrum Greenville, LLC	20069100	ED	Active	5/26/2020
22	L000007776	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	5/26/2020
23	L000008350	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	1/22/2022
24	L000009337	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	12/3/2021
25	L000039813	Fixed Wireless Holdings, LLC	10490498	ED	Active	4/12/2025
26	L000039898	Fixed Wireless Holdings, LLC	10490498	ED	Active	1/22/2022
27	WAH566	United Telephone Company of the Carolinas LLC	1777036	CF	Active	2/1/2021
28	WDN296	JACKSON, COUNTY OF	1912658	PW	Active	4/28/2023
29	WDN312	JACKSON, COUNTY OF	1912658	PW	Active	4/28/2023
30	WGN209	NORTH CAROLINA, STATE OF	4604526	PW	Active	2/4/2021
31	WHN702 Lease	SC EDUCATIONAL TELEVISION COMMISSION	1861160	ED	Active	12/3/2021
32	WHN712 Lease	SC EDUCATIONAL TELEVISION COMMISSION	1861160	ED	Active	12/18/2026
33	WHQ305 Lease	SC EDUCATIONAL TELEVISION COMMISSION	1861160	ED	Active	12/7/2025
34	WHR481 Lease	SC EDUCATIONAL TELEVISION COMMISSION	1861160	ED	Active	12/7/2025

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

35	WHR598 Lease	University of North Carolina System Office	5794433	ED	Active	12/30/2023
36	WIQ85	JACKSON, COUNTY OF	1912658	PW	Active	12/23/2022
37	WLW738	NSAC, LLC	3768553	BR	Active	5/1/2021
38	WLX247 Lease	AREA COMMISSION OF GREENVILLE TECHNICAL COLLEGE	1884832	ED	Active	5/26/2020
39	WLX277 Lease	AREA COMMISSION OF GREENVILLE TECHNICAL COLLEGE	1884832	ED	Active	5/26/2020
40	WND616 Lease	ASHEVILLE-BUNCOMBE TECHNICAL COMMUNITY COLLEGE	1957810	ED	Active	1/22/2022
41	WND617 Lease	ASHEVILLE CHRISTIAN ACADEMY	5088620	ED	Active	1/22/2022
42	WNEI462	Duke Energy Business Services, LLC	20991360	MG	Active	5/3/2020
43	WNIY755	Duke Energy Business Services, LLC	20991360	IG	Active	5/26/2022
44	WNKP645	JACKSON, COUNTY OF	1912658	PW	Active	1/6/2023
45	WNNT355	SAPPHIRE MANAGEMENT CO	1940402	IG	Active	3/2/2024
46	WNTH717	North Carolina State Highway Patrol	1913888	MW	Active	2/5/2021
47	WNUD268	Duke Energy Business Services, LLC	20991360	IG	Active	5/6/2022
48	WNVD388	JACKSON, COUNTY OF	6957229	PW	Active	5/28/2022
49	WNVJ268	North Carolina State Highway Patrol	1913888	PW	Active	1/30/2021
50	WNWW275	SYLVA, TOWN OF	1913441	PW	Active	7/16/2021
51	WNWW307	TRANSYLVANIA, COUNTY OF	1917111	PW	Active	9/30/2023
52	WNYH459	QUALLA HOUSING AUTHORITY	1957455	PW	Active	1/27/2022
53	WNYK398	Duke Energy Business Services, LLC	20991360	YO	Active	11/18/2023
54	WNYQ764	CHEROKEE TRIBAL COMMISSION	1953462	PW	Active	3/3/2022
55	WNZN417	TRANSYLVANIA, COUNTY OF	1917111	PW	Active	2/18/2023
56	WPAF844	CHEROKEE TRIBAL COMMISSION	7195498	PW	Active	8/5/2022
57	WPAW879	JACKSON, COUNTY OF	13231907	PW	Active	4/8/2025
58	WPCW305	JACKSON, COUNTY OF	1912658	PW	Active	8/5/2023
59	WPEI915	AMS Spectrum Holdings, LLC	19131390	IK	Active	2/17/2020
60	WPFC964	JACKSON, COUNTY OF	1912658	PW	Active	6/16/2024
61	WPGS478	ENGLE, VERNON DBA BLUE RIDGE MOUNTAIN PAGING	6174353	IG	Active	3/20/2025
62	WPIG388	SYLVA TOWNSHIP	1913441	PW	Active	9/5/2025
63	WPII561	Macon County Of	1916592	PW	Active	9/8/2025
64	WPJE273	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	2/1/2021
65	WPJI656	HIGHLANDS, TOWN OF	1914811	PW	Active	6/29/2024
66	WPJR506	JACKSON, COUNTY OF	1912658	PW	Active	9/19/2021
67	WPJW737	AMS Spectrum Holdings, LLC	19131390	IK	Active	11/22/2021
68	WPLV338	MACON, COUNTY OF	1916592	PW	Active	3/9/2023
69	WPLZ605	HIGHLANDS, TOWN OF	1914811	PW	Active	5/27/2024
70	WPMP952	WADE HAMPTON GOLF CLUB	1936335	IG	Active	10/30/2023
71	WPMT578	RICE, JOEL S.	9710435	IG	Active	12/14/2023
72	WPOY260	ASHVILLE COMMUNICATIONS INC	5486287	YG	Active	8/31/2024
73	WPPG948	blue ridge mountain paging	4786182	IG	Active	12/16/2024

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

74	WPQC484	NORFOLK SOUTHERN RAILWAY COMPANY	4228979	IG	Active	5/19/2025
75	WPQC964	MACON COUNTY SCHOOL BOARD	13491980	IG	Active	5/25/2025
76	WPQI661	EASTERN BAND OF CHEROKEE INDIANS	1953462	PW	Active	7/28/2025
77	WPRF792	TRANSYLVANIA, COUNTY OF	1917111	PW	Active	9/1/2025
78	WPRH303	SUNSTATE COMMUNICATIONS INC	6843387	IG	Active	9/21/2025
79	WPSH663	JACKSON COUNTY FIRE COMMISSION	1912658	PW	Active	4/30/2021
80	WPSH899	JACKSON COUNTY FIRE COMMISSION	1912658	PW	Active	5/2/2021
81	WPSI654	JACKSON COUNTY FIRE COMMISSION	1912658	PW	Active	5/10/2021
82	WPSJ257	Tri County Regional Water Distribution	1684125	IG	Active	5/16/2021
83	WPSK209	JACKSON COUNTY FIRE COMMISSION	1912658	PW	Active	5/25/2021
84	WPSK520	JACKSON COUNTY FIRE COMMISSION	1912658	PW	Active	5/31/2021
85	WPSK838	JACKSON COUNTY FIRE COMMISSION	5469150	PW	Active	6/5/2021
86	WPTB756	WESTERN CAROLINA COMMUNICATION SYSTEMS	5484365	IG	Active	8/23/2021
87	WPTQ253	DLP Harris Regional Hospital, LLC	23745904	PW	Active	11/20/2021
88	WPTY361	JACKSON COUNTY TRANSIT	1912658	PW	Active	1/11/2022
89	WPTZ988	CHEROKEE FISH & GAME	1953462	PW	Active	1/22/2022
90	WPUD760	Tuckaseigee Water & Sewer Authority	1938349	IG	Active	2/12/2022
91	WPUT209	UNIVERSITY OF NORTH CAROLINA	1910066	MW	Active	4/26/2022
92	WPUV511	JACKSON COUNTY FIRE COMMISSION	1912658	PW	Active	5/9/2022
93 Pending Application	WPVL973	Harrah's NC Casino Company LLC	6972871	IG	Active	7/12/2022
94	WPWH467	JACKSON COUNTY OF	6443485	PW	Active	11/18/2022
95	WPXK595	BALSAM MOUNTAIN PRESERVE	8293664	IG	Active	4/23/2023
96	WPYF326	CWS SYSTEMS, INC.	6104897	IG	Active	7/30/2023
97	WPYM736	Norfolk Southern Railway Company	4228979	IG	Active	9/10/2023
98	WPYN269	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	9/12/2023
99	WPYN275	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	9/12/2023
100	WPYP454	Norfolk Southern Railway Company	4228979	IG	Active	9/22/2023
101	WPZC414	Norfolk Southern Railway Company	4228979	IG	Active	12/24/2023
102	WPZL278	JACKSON COUNTY RESCUE SQUAD	1912658	PW	Active	2/4/2024
103	WQAB514	JACKSON COUNTY ADMINISTRATION/PUBLIC WORKS	1912658	PW	Active	4/28/2024
104	WQAB585	TRANSYLVANIA, COUNTY OF	1917111	PW	Active	4/28/2024
105	WQAV861	CWS SYSTEMS, INC.	6104897	IG	Active	8/17/2024
106	WQAY856	JACKSON COUNTY BOARD OF EDUCATION	10823771	IG	Active	8/30/2024
107	WQBB688	WESTERN CAROLINA COMMUNICATIONS SYSTEMS	5484365	IG	Active	9/15/2024
108	WQBB902	SOUTHWESTERN COMMUNITY COLLEGE	10981157	IG	Active	9/16/2024
109	WQBN764	Norfolk Southern Railway Company	4228979	IG	Active	11/15/2024
110	WQCA947	NORTH CAROLINA, STATE OF	1943000	PW	Active	1/20/2025
111	WQCM973 Lease	BLUE RIDGE COMMUNITY COLLEGE	1951433	ED	Active	4/12/2025

112	WQCR737 Lease	University of North Carolina System Office	5794433	ED	Active	5/10/2025
113	WQCT414	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	5/19/2025
114	WQCX726	BEAR LAKE RESERVE OWNERS ASSOCIATION INC.	13550066	IG	Active	6/20/2025
115	WQDD605	CHEROKEE DEPARTMENT OF TRANSPORT	1953462	PW	Active	7/30/2025
116	WQDH424	MACON, COUNTY OF	1916592	PW	Active	8/26/2025
117	WQDU833	HIGH HAMPTON INCORPORATED	13426879	IG	Active	11/3/2025
118	WQEQ845	Great Smoky Mountains Railroad	14778955	IG	Active	3/28/2026
119	WQER761	Duke Energy Business Services, LLC	20991360	IG	Active	3/30/2026
120	WQER763	Duke Energy Business Services, LLC	20991360	IG	Active	3/30/2026
121	WQEU572	JACKSON, COUNTY OF	1912658	PW	Active	4/18/2026
122	WQEY897	DLP HARRIS REGIONAL HOSPITAL LLC	23745904	IG	Active	5/22/2026
123 Pending Application	WQFC354	Harrah's NC Casino Company LLC	6972871	YG	Active	6/13/2026
124	WQFI265	Norfolk Southern Railway Company	4228979	IG	Active	7/20/2026
125	WQFP529	TUCKASEIGEE WATER & SEWER AUTHORITY	1938349	IG	Active	8/31/2026
126	WQFP530	TUCKASEIGEE WATER & SEWER AUTHORITY	1938349	IG	Active	8/31/2026
127	WQFP540	GLENVILLE CASHIERS RESCUE SQUAD	15021678	PW	Active	8/31/2026
128	WQFQ666	BALSAM MOUNTAIN PRESERVE	8293664	IG	Active	9/11/2026
129	WQFV974	WESTERN CAROLINA UNIVERSITY	6609523	RP	Active	12/1/2019
130	WQFY758	WESTERN CAROLINA UNIVERSITY POLICE DEPARTMENT	7328073	PW	Active	11/9/2026
131	WQFZ564	WESTERN CAROLINA UNIVERSITY	6609523	AS	Active	12/1/2019
132	WQFZ568	WESTERN CAROLINA UNIVERSITY	6609523	AS	Active	12/1/2019
133	WQGJ667	TRANSYLVANIA, COUNTY OF	1917111	PW	Active	2/7/2027
134	WQGU437	CASHIERS RESORT COMMUNITY, LLC	16246852	IG	Active	4/18/2027
135	WQGW508	Duke Energy Business Services, LLC	20991360	IG	Active	5/7/2027
136	WQHE205	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/10/2027
137	WQHE208	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/10/2027
138	WQHI251	TOWN OF CHEROKEE (QUALLA BOUNDARY INDIAN RESERVATION)	6734784	IG	Active	8/2/2027
139	WQHK461	HAYWOOD ELECTRIC MEMBERSHIP CORPORATION	4951372	YG	Active	8/21/2027
140	WQIF523	TOWN OF CHEROKEE, QUALLA BOUNDRY, INDIAN RESERVATION	6734784	IG	Active	1/24/2028
141	WQJI682	MACON COUNTY EMERGENCY SERVICES	1916592	PW	Active	9/23/2028
142	WQJI985	WESTERN CAROLINA UNIVERSITY	17839663	IG	Active	9/25/2028
143	WQJJ210	State of North Carolina Division of Emergency Management	4604864	PW	Active	9/25/2028
144	WQJJ213	State of North Carolina Division of Emergency Management	4604864	PW	Active	9/25/2028
145	WQJN474	CULLASAJA HOA INC	18134015	IG	Active	11/7/2028
146	WQJV815	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

147	WQJV821	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029
148	WQJV823	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029
149	WQKC379	TOWN OF CHEROKEE (QUALLA BOUNDARY INDIAN RESERVATION)	6734784	IG	Active	3/26/2029
150	WQKX572	Norfolk Southern Railway Company	4228979	IG	Active	10/19/2029
151	WQLA764	CWS SYSTEMS INC	19226679	IG	Active	11/16/2019
152	WQLH686	CHEROKEE CENTRAL SCHOOLS	19173335	PW	Active	1/22/2020
153	WQLT576	Norfolk Southern Railway Company	4228979	IG	Active	4/21/2020
154	WQMQ996	CWS SYSTEMS INC.	19226679	IG	Active	10/26/2020
155	WQMR200	CWS SYSTEMS INC.	19226679	IG	Active	10/26/2020
156	WQMR201	CWS SYSTEMS INC.	19226679	IG	Active	10/26/2020
157	WQMR307	CWS SYSTEMS INC.	19226679	IG	Active	10/27/2020
158	WQNA965	North Carolina State Highway Patrol	1913888	MW	Active	11/30/2020
159	WQND734	BURNINGTOWN-IOTLA VOLUNTEER FIRE & RESCUE, INC.	20154290	PW	Active	1/3/2021
160	WQNF473	North Carolina State Highway Patrol	1913888	MW	Active	1/19/2021
161	WQNH886	North Carolina State Highway Patrol	1913888	MW	Active	2/9/2021
162	WQNH888	North Carolina State Highway Patrol	1913888	MW	Active	2/9/2021
163	WQNN563	CWS SYSTEMS, INC.	19226679	IG	Active	3/31/2021
164	WQNN564	CWS SYSTEMS, INC.	19226679	IG	Active	3/31/2021
165	WQNN784	CWS SYSTEMS, INC.	19226679	IG	Active	4/4/2021
166	WQNN785	CWS SYSTEMS, INC.	19226679	IG	Active	4/4/2021
167	WQNN786	CWS SYSTEMS, INC.	19226679	IG	Active	4/4/2021
168	WQNP222	CWS SYSTEMS, INC.	19226679	IG	Active	4/6/2021
169	WQNQ389	Norfolk Southern Railway Company	4228979	IG	Active	4/18/2021
170	WQOI902	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	10/12/2021
171	WQOK704	Norfolk Southern Railway Company	4228979	IG	Active	10/28/2021
172	WQOS356	JACKSON, COUNTY OF	13231907	PW	Active	1/13/2022
173	WQPA523	TUCKASEIGEE WATER & SEWER AUTHORITY	1938349	IG	Active	3/20/2022
174	WQPH552	Camp Merrie Woode	21632427	IG	Active	5/18/2022
175	WQPX593	DLP Harris Regional Hospital, LLC	23745904	PW	Active	9/11/2022
176	WQPZ601	BEAR LAKE RESERVE	21889597	IG	Active	9/27/2022
177	WQQQ368	Verizon Wireless (VAW) LLC	3800307	CF	Active	2/12/2023
178	WQQR812	WADE HAMPTON GOLF CLUB	1936335	IG	Active	2/20/2023
179	WQQY970	Verizon Wireless (VAW) LLC	3800307	CF	Active	3/28/2023
180	WQRF808	BALSAM MOUNTAIN PRESERVE	8293664	IG	Active	5/4/2023
181	WQTB657	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/27/2023
182	WQTB689	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/30/2023
183	WQTF406	PUBLIC SERVICE COMPANY OF NORTH CAROLINA, INC.	1931930	IG	Active	1/23/2024
184	WQTW257	Duke Energy Business Services, LLC	20991360	MG	Active	4/24/2024

185	WQTW258	Duke Energy Business Services, LLC	20991360	MG	Active	4/24/2024
186	WQTW259	Duke Energy Business Services, LLC	20991360	MG	Active	4/24/2024
187	WQTW260	Duke Energy Business Services, LLC	20991360	MG	Active	4/24/2024
188	WQUI281	NEW CINGULAR WIRELESS PCS, LLC	3291192	CF	Active	7/15/2024
189	WQUK980	NEW CINGULAR WIRELESS PCS, LLC	3291192	CF	Active	8/6/2024
190	WQUP734	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GE	Active	9/4/2024
191	WQUX779	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	11/12/2024
192	WQVE954	Tuckaseigee Water and Sewer Authority	1938349	IG	Active	1/22/2025
193	WQVE987	Tuckaseigee Water and Sewer Authority	1938349	IG	Active	1/23/2025
194	WQWY933	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	1/4/2026
195	WQXB492	WESTERN CAROLINA UNIVERSITY	17839663	IG	Active	1/21/2026
196	WQXF667	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	2/22/2026
197	WQXQ758	Jackson County Airport Authority	25481888	AF	Active	5/11/2026
198	WQXW767	JACKSON COUNTY AIRPORT AUTHORITY	25481888	PW	Active	6/29/2026
199	WQYH839	HAYWOOD ELECTRIC MEMBERSHIP CORPORATION	4951372	YG	Active	10/4/2026
200	WQYK932	Sprint Spectrum License Holder LLC	25738147	BR	Active	3/28/2026
201	WQYU578	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/25/2027
202	WQYV882	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
203	WQYV883	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
204	WQYV885	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
205	WQYV886	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
206	WQYV887	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
207	WQYV889	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
208	WQYV899	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
209	WQYV900	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
210	WQZG430	T-MOBILE LICENSE LLC	1565449	CF	Active	5/9/2027
211	WQZG431	T-MOBILE LICENSE LLC	1565449	CF	Active	5/9/2027
212	WRAB626	Harrahs Cherokee Smokey Mountain Casino	6972871	YG	Active	2/17/2020
213	WRAB628	Harrahs Cherokee Smokey Mountain Casino	6972871	IG	Active	2/17/2020
214	WRAQ721	WADE HAMPTON PROPERTY OWNERS ASSOCIATION	27028265	IG	Active	1/31/2028
215	WRBK998	T-MOBILE LICENSE LLC	1565449	CF	Active	4/17/2028
216	WRBX490	T-MOBILE LICENSE LLC	1565449	CF	Active	7/17/2028
217	WRCJ254	Verizon Wireless (VAW) LLC	3800307	CF	Active	10/17/2028
218	WRCJ260	Verizon Wireless (VAW) LLC	3800307	CF	Active	10/17/2028
219	WRCJ544	Verizon Wireless (VAW) LLC	3800307	CF	Active	10/19/2028
220	WRDH280	Verizon Wireless (VAW) LLC	3800307	CF	Active	4/29/2029
221	WRDH344	Verizon Wireless (VAW) LLC	3800307	CF	Active	4/29/2029

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

222	WRDN977	Skyrunner, Inc	18137133	MG	Active	6/17/2029
223	WRDN979	Skyrunner, Inc	18137133	MG	Active	6/17/2029
224	WRDP892	Skyrunner, Inc	18137133	MG	Active	6/24/2029
225	WRDY613	TRANSYLVANIA COUNTY	1917111	PW	Active	8/20/2029
226	WREM835	MOUNTAINTOP GOLF & LAKE CLUB	28943751	IG	Active	11/7/2029
227	WXF805	JACKSON, COUNTY OF	1912658	PW	Active	4/28/2023
228	WXY280	NATIONAL SKI PATROL SYSTEM INC	4254397	PW	Active	11/3/2022
229	WZC529	JACKSON, COUNTY OF	6443485	PW	Active	10/5/2022
230	WZZ897	Duke Energy Business Services, LLC	20991360	IG	Active	1/27/2025
231	WZZ899	Duke Energy Business Services, LLC	20991360	IG	Active	5/26/2022

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Macon County Frequencies

Number	Call Sign	Holder	Frequency	Radio Service	Status	Exp Date
1	B020	Clearwire Spectrum Holdings III LLC	18399998	BR	Active	3/28/2026
2	KEK2	Drake Enterprises LTD	6287379	AF	Active	3/31/2029
3	KEL394	North Carolina State Highway Patrol	1913888	PW	Active	12/9/2021
4	KFJ535	SANTAS LAND INC	4368429	IG	Active	7/4/2022
5	KJZ37	North Carolina State Highway Patrol	1913888	PW	Active	6/12/2024
6	KNIK412	Macon County Of	1916592	PW	Active	5/16/2024
7	KNKN626	Cellco Partnership	3290673	CL	Active	10/1/2021
8	KNKN890	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CL	Active	10/1/2021
9	KNKQ351	Cellco Partnership	3290673	CL	Active	10/1/2022
10	KNNV741	COMMUNICATION SERVICE INC	1949304	IG	Active	6/12/2021
11	KPK956	WESTERN NORTH CAROLINA PUBLIC RADIO	1844042	RP	Active	12/1/2019
12	KPM431	CHARISMA RADIO CORP.	4310801	RP	Active	12/1/2019
13	KQS395	SUTTON RADIOCASTING CORPORATION	1886688	RP	Active	12/1/2019
14	KTI758	MACON, COUNTY OF	1916592	PW	Active	10/27/2021
15	L000009337	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	12/3/2021
16	WAH566	United Telephone Company of the Carolinas LLC	1777036	CF	Active	2/1/2021
17	WHN702 Lease	SC EDUCATIONAL TELEVISION COMMISSION	1861160	ED	Active	12/3/2021
18	WIQ87	MACON, COUNTY OF	1916592	PW	Active	10/16/2021
19	WMG365	CHARISMA RADIO CORP.	4310801	AS	Active	12/1/2019
20	WNAW648	UNIVERSITY OF NORTH CAROLINA	1910066	PW	Active	11/21/2024
21	WNCU595	Macon County	1916592	PW	Active	6/19/2025
22	WNDJ372	MACON COUNTY EMERGENCY SERVICES	1916592	PW	Active	8/14/2025
23	WNHT685	GEORGIA POWER COMPANY	1858604	IG	Active	1/20/2022
24	WNJR304	NATIONAL SKI PATROL SYSTEM INC	4254397	PW	Active	8/20/2022
25	WNJU640	MOUNTAIN RETREAT & LEARNING CENTER INC	7217839	IG	Active	8/29/2022
26	WNKP645	JACKSON, COUNTY OF	1912658	PW	Active	1/6/2023
27	WNMS926	CULLASAJA CLUB INC	1980226	IG	Active	9/29/2023
28	WNRG751	FRANKLIN, TOWN OF	1914993	PW	Active	2/14/2025
29	WNRL517	North Carolina State Highway Patrol	1913888	PW	Active	3/1/2025
30	WNUD268	Duke Energy Business Services, LLC	20991360	IG	Active	5/6/2022
31	WNUY383	Macon County	1916592	PW	Active	11/28/2025
32	WNVD388	JACKSON, COUNTY OF	6957229	PW	Active	5/28/2022
33	WNYH459	QUALLA HOUSING AUTHORITY	1957455	PW	Active	1/27/2022
34	WNYK926	COMMUNICATION SERVICE INC	1949304	IG	Active	2/8/2022
35	WNZA490	North Carolina State Highway Patrol	1913888	PW	Active	4/6/2022
36	WOI6	MACON COUNTY - AWOS	5473939	AF	Active	1/16/2028

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

37	WPAW879	JACKSON, COUNTY OF	13231907	PW	Active	4/8/2025
38	WPBC512	FRANKLIN, TOWN OF	1914993	PW	Active	11/18/2022
39	WPBV267	WEST MACON VOLUNTEER FIRE & RESCUE INC	7268055	PW	Active	3/25/2023
40	WPDA658	CLAY COUNTY FIRE & RESCUE INC	3224268	PW	Active	7/12/2024
41	WPFS820	HIGHLAND VOLUNTEER FIRE & RESCUE	1914811	PW	Active	10/11/2024
42	WPHN440	Macon County	1916592	PW	Active	6/13/2025
43	WPII561	Macon County Of	1916592	PW	Active	9/8/2025
44	WPJI656	HIGHLANDS, TOWN OF	1914811	PW	Active	6/29/2024
45	WPLV338	MACON, COUNTY OF	1916592	PW	Active	3/9/2023
46	WPLY958	WILDCAT CLIFFS COUNTRY CLUB	8739120	IG	Active	4/20/2023
47	WPLZ605	HIGHLANDS, TOWN OF	1914811	PW	Active	5/27/2024
48	WPMQ816	OTTO FIRE DISTRICT	9710393	PW	Active	11/10/2023
49	WPMT865	J & B DISPOSAL INC	9199563	IG	Active	12/21/2023
50	WPNU201	HIGHLANDS FALLS COMMUNITY ASSOCIATION INC	11087863	IG	Active	6/16/2024
51	WPPX926	TOTAL COMMUNICATION SYSTEMS INC	1932102	IK	Active	3/7/2020
52	WPQA946	MH Mission Hospital, LLLP	28162501	PW	Active	5/2/2025
53	WPQB865	HIGHLANDS COUNTRY CLUB	13453618	IG	Active	5/12/2025
54	WPQD412	MH Angel Medical Center, LLLP	28162352	IG	Active	5/31/2025
55	WPRV578	North Carolina State Highway Patrol	1913888	GE	Active	2/15/2021
56	WPSH205	MACON, COUNTY OF	4608550	PW	Active	4/23/2021
57	WPSI476	JACKSON COUNTY FIRE COMMISSION	7225741	PW	Active	5/8/2021
58	WPTL592	MH Highlands-Cashiers Medical Center, LLLP	28162410	PW	Active	10/25/2021
59	WPTQ253	DLP Harris Regional Hospital, LLC	23745904	PW	Active	11/20/2021
60	WPTY361	JACKSON COUNTY TRANSIT	1912658	PW	Active	1/11/2022
61	WPVP573	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	1916568	PW	Active	7/25/2022
62	WPYQ470	FRANKLIN, TOWN OF	1914993	PW	Active	9/29/2023
63	WQAB514	JACKSON COUNTY ADMINISTRATION/PUBLIC WORKS	1912658	PW	Active	4/28/2024
64	WQAD239	MACON COUNTY PUBLIC SCHOOLS	9462227	IG	Active	5/7/2024
65	WQCX999	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	6/21/2025
66	WQDK468	FRANKLIN, CITY OF	1914993	PW	Active	9/17/2025
67	WQEX389	CLARKS CHAPEL FIRE AND RESCUE	14838973	PW	Active	5/9/2026
68	WQFH206	MH Highlands-Cashiers Medical Center, LLLP	28162410	IG	Active	7/13/2026
69	WQFN645	CULLASAJA CLUB INC.	1980226	IG	Active	8/24/2026
70	WQFQ600	HAYWOOD ELECTRIC MEMBERSHIP CORPORATION	4951372	YG	Active	9/11/2026
71	WQFQ643	HENRY, MALCOLM F	11638640	IG	Active	9/11/2026
72	WQGF954	North Carolina State Highway Patrol	1913888	MW	Active	1/8/2027
73	WQGF994	North Carolina State Highway Patrol	1913888	MW	Active	1/8/2027
74	WQHE412	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/11/2027

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

75	WQIG282	MOUNTAIN VALLEY FIRE AND RESCUE INC.	17081811	PW	Active	1/30/2028
76	WQJI682	MACON COUNTY EMERGENCY SERVICES	1916592	PW	Active	9/23/2028
77	WQJM500	Skyrunner, Inc.	18137133	NN	Active	4/17/2020
78	WQJN474	CULLASAJA HOA INC	18134015	IG	Active	11/7/2028
79	WQJV840	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/15/2029
80	WQJW205	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	1/20/2029
81	WQLA967	State of North Carolina Division of Emergency Management	4604864	PW	Active	11/17/2029
82	WQMN870	Shaw Industries	6797591	YG	Active	10/7/2020
83	WQNF473	North Carolina State Highway Patrol	1913888	MW	Active	1/19/2021
84	WQNH471	North Carolina State Highway Patrol	1913888	MW	Active	2/7/2021
85	WQNQ208	Conterra Ultra Broadband LLC	9750324	CF	Active	4/14/2021
86	WQNQ209	Conterra Ultra Broadband LLC	9750324	CF	Active	4/14/2021
87	WQNQ212	Conterra Ultra Broadband LLC	9750324	CF	Active	4/14/2021
88	WQOS356	JACKSON, COUNTY OF	13231907	PW	Active	1/13/2022
89	WQPB342	MH Mission Hospital, LLLP	28162501	IG	Active	3/27/2022
90	WQPP844	Balsamwest FiberNet LLC	11291671	NN	Active	7/17/2022
91	WQPX593	DLP Harris Regional Hospital, LLC	23745904	PW	Active	9/11/2022
92	WQSY436	Verizon Wireless (VAW) LLC	3800307	CF	Active	12/9/2023
93	WQSY437	Verizon Wireless (VAW) LLC	3800307	CF	Active	12/9/2023
94	WQTB708	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/30/2023
95	WQTB745	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/30/2023
96	WQUL814	UNIVERSITY OF NORTH CAROLINA	1910066	TT	Active	12/1/2020
97	WQUM851	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	GE	Active	8/20/2024
98	WQVF948	OLD EDWARDS HOSPITALITY GROUP	10981041	IG	Active	1/30/2025
99	WQWB380	New Cingular Wireless PCS, LLC	3291192	CF	Active	7/7/2025
100	WQWB381	New Cingular Wireless PCS, LLC	3291192	CF	Active	7/7/2025
101	WQXU275	T-MOBILE LICENSE LLC	1565449	CF	Active	6/9/2026
102	WQXU276	T-MOBILE LICENSE LLC	1565449	CF	Active	6/9/2026
103	WQXU278	T-MOBILE LICENSE LLC	1565449	CF	Active	6/9/2026
104	WQXU279	T-MOBILE LICENSE LLC	1565449	CF	Active	6/9/2026
105	WQYK932	Sprint Spectrum License Holder LLC	25738147	BR	Active	3/28/2026
106	WRAI816	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	SY	Active	11/30/2027
107	WRBX892	New Cingular Wireless PCS, LLC	3291192	CF	Active	7/20/2028
108	WRBX893	New Cingular Wireless PCS, LLC	3291192	CF	Active	7/20/2028
109	WRCA683	DUKE ENERGY BUSINESS SERVICES, LLC	20991360	IG	Active	8/10/2028
110	WRCJ254	Verizon Wireless (VAW) LLC	3800307	CF	Active	10/17/2028
111	WRCJ260	Verizon Wireless (VAW) LLC	3800307	CF	Active	10/17/2028
112	WRCJ706	Verizon Wireless (VAW) LLC	3800307	CF	Active	10/22/2028

113	WRCJ707	Verizon Wireless (VAW) LLC	3800307	CF	Active	10/22/2028
114 Pending Application	WRCN258	SOUTHERN CONCRETE MATERIALS INC.	7961923	IG	Active	11/16/2028
115	WRCY474	MACON, COUNTY OF	1916592	PW	Active	2/26/2029
116	WRDH706	BalsamWest FiberNET, LLC	11291671	MG	Active	5/1/2029
117	WRDH707	BalsamWest FiberNET, LLC	11291671	MG	Active	5/1/2029
118	WZZ895	Duke Energy Business Services, LLC	20991360	IG	Active	8/31/2023
119	WZZ896	Duke Energy Business Services, LLC	20991360	IG	Active	1/27/2025

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Swain County Frequencies

Number	Call Sign	Holder	Frequency	Radio Service	Status	Exp Date
1	B020	Clearwire Spectrum Holdings III LLC	18399998	BR	Active	3/28/2026
2	KIF608	GOVERNMENT SERVICES INC DBA FONTANA VILLAGE	1944602	IG	Active	6/19/2022
3	KNGJ585	SWAIN, COUNTY OF	1915909	PW	Active	3/2/2025
4	KNIH904	JACKSON, COUNTY OF	1912658	PW	Active	5/15/2024
5	KNKN890	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CL	Active	10/1/2021
6	KNNG227	WHITLEYS COMMUNICATIONS SERVICE	6286066	IG	Active	12/14/2025
7	KON342	CHEROKEE, TOWN OF	7195498	PW	Active	5/5/2025
8	KSS728	BROOKFIELD SMOKY MOUNTAIN HYDROPOWER LLC	21957402	IG	Active	4/4/2021
9	L000001919	Fixed Wireless Holdings, LLC	10490498	ED	Active	5/10/2025
10	L000001928	Fixed Wireless Holdings, LLC	10490498	ED	Active	12/30/2023
11	L000005757	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	7/19/2029
12	L000007752	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	7/5/2026
13	L000007753	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	7/5/2026
14	L000008350	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	1/22/2022
15	L000015076	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	2/4/2020
16	L000024074	Clearwire Spectrum Holdings III, LLC	18399998	ED	Active	12/16/2019
17	L000039813	Fixed Wireless Holdings, LLC	10490498	ED	Active	4/12/2025
18	L000039898	Fixed Wireless Holdings, LLC	10490498	ED	Active	1/22/2022
19	WAH566	United Telephone Company of the Carolinas LLC	1777036	CF	Active	2/1/2021
20	WHR598 Lease	University of North Carolina System Office	5794433	ED	Active	12/30/2023
21	WHR732 Lease	Pellissippi State Community College	1779586	ED	Active	7/5/2026
22	WHR733 Lease	Pellissippi State Community College	1779586	ED	Active	7/5/2026
23	WLX221 Lease	JOHNSON UNIVERSITY	1758986	ED	Active	12/16/2019
24	WLX223 Lease	THE NORTHERN ARIZONA UNIVERSITY FOUNDATION, INC.	5024237	ED	Active	7/19/2029
25	WLX224 Lease	NATIONAL CONFERENCE ON CITIZENSHIP	6106371	ED	Active	2/4/2020
26	WND616 Lease	ASHEVILLE-BUNCOMBE TECHNICAL COMMUNITY COLLEGE	1957810	ED	Active	1/22/2022
27	WND617 Lease	ASHEVILLE CHRISTIAN ACADEMY	5088620	ED	Active	1/22/2022
28	WNYH459	QUALLA HOUSING AUTHORITY	1957455	PW	Active	1/27/2022
29	WNYQ764	CHEROKEE TRIBAL COMMISSION	1953462	PW	Active	3/3/2022
30	WPAF844	CHEROKEE TRIBAL COMMISSION	7195498	PW	Active	8/5/2022
31	WPBJ546	SWAIN, COUNTY OF	1917137	PW	Active	12/23/2022
32	WPBM219	SWAIN, COUNTY OF	1917137	PW	Active	1/11/2023
33	WPBP940	SWAIN, COUNTY OF	1917137	PW	Active	2/4/2023
34	WPBR869	SWAIN, COUNTY OF	1917137	PW	Active	2/18/2023
35	WPCB485	EBCI TRIBAL FIRE DEPARTMENT	4219515	PW	Active	6/8/2024
36	WPGS478	ENGLE, VERNON DBA BLUE RIDGE MOUNTAIN PAGING	6174353	IG	Active	3/20/2025

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

37	WPGT928	SWAIN, COUNTY OF	1917137	PW	Active	3/14/2025
38	WPJW737	AMS Spectrum Holdings, LLC	19131390	IK	Active	11/22/2021
39	WPLH778	SWAIN, COUNTY OF	1917137	PW	Active	5/9/2022
40 Pending Application	WPLI820	Harrah's NC Casino Company LLC	6972871	IG	Active	9/29/2022
41	WPNP901	CHEROKEE TRIBAL COMMISSION	10813095	PW	Active	4/27/2024
42 Pending Application	WPNR304	BRYSON CITY, TOWN OF	10503001	PW	Active	5/12/2024
43	WPQI661	EASTERN BAND OF CHEROKEE INDIANS	1953462	PW	Active	7/28/2025
44	WPQY894	North Carolina State Highway Patrol	1913888	GP	Active	12/6/2025
45	WPSK838	JACKSON COUNTY FIRE COMMISSION	5469150	PW	Active	6/5/2021
46	WPTZ988	CHEROKEE FISH & GAME	1953462	PW	Active	1/22/2022
47	WPUV511	JACKSON COUNTY FIRE COMMISSION	1912658	PW	Active	5/9/2022
48	WPVL998	CHEROKEE BOYS CLUB	6084495	PW	Active	7/12/2022
49	WPXQ623	CHEROKEE TRIBAL EMS	1953462	PW	Active	5/21/2023
50	WPYN275	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	9/12/2023
51	WQAH723	SWAIN,COUNTY OF	1917137	PW	Active	6/2/2024
52	WQCM973 Lease	BLUE RIDGE COMMUNITY COLLEGE	1951433	ED	Active	4/12/2025
53	WQCR737 Lease	University of North Carolina System Office	5794433	ED	Active	5/10/2025
54	WQDD605	CHEROKEE DEPARTMENT OF TRANSPORT	1953462	PW	Active	7/30/2025
55	WQEQ845	Great Smoky Mountains Railroad	14778955	IG	Active	3/28/2026
56	WQHD432	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/3/2027
57	WQHG649	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/24/2027
58	WQHG650	State of North Carolina Division of Emergency Management	4604864	PW	Active	7/24/2027
59	WQHI251	TOWN OF CHEROKEE (QUALLA BOUNDARY INDIAN RESERVATION)	6734784	IG	Active	8/2/2027
60	WQIF523	TOWN OF CHEROKEE, QUALLA BOUNDRY, INDIAN RESERVATION	6734784	IG	Active	1/24/2028
61	WQIR825	SWAIN,COUNTY OF	1917137	PW	Active	4/25/2028
62	WQJJ213	State of North Carolina Division of Emergency Management	4604864	PW	Active	9/25/2028
63	WQKC379	TOWN OF CHEROKEE (QUALLA BOUNDARY INDIAN RESERVATION)	6734784	IG	Active	3/26/2029
64	WQKF751	SWAIN,COUNTY OF	1917137	PW	Active	5/2/2029
65	WQLI280	PADDLE INN RAFTING COMPANY	19095090	IG	Active	1/27/2020
66	WQNF473	North Carolina State Highway Patrol	1913888	MW	Active	1/19/2021
67	WQNH471	North Carolina State Highway Patrol	1913888	MW	Active	2/7/2021
68	WQNH888	North Carolina State Highway Patrol	1913888	MW	Active	2/9/2021
69	WQNQ209	Conterra Ultra Broadband LLC	9750324	CF	Active	4/14/2021
70	WQNQ212	Conterra Ultra Broadband LLC	9750324	CF	Active	4/14/2021
71	WQNY605	CHEROKEE TRIBAL CHILDCARE SERVICE	20685145	PW	Active	7/8/2021
72	WQOI902	USCOC OF GREATER NORTH CAROLINA, LLC	2840767	CF	Active	10/12/2021
73	WQOT812	BROOKFIELD SMOKY MOUNTAIN HYDROPOWER LLC	21957402	IG	Active	1/28/2022
74	WQPX959	EASTERN BAND OF CHEROKEE INDIANS	21516638	PW	Active	9/14/2022

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

75	WQSM447	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	10/30/2023
76	WQTA415	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	12/18/2023
77	WQTG579	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	YE	Active	1/29/2024
78	WQUD570	Verizon Wireless (VAW) LLC	3800307	CF	Active	6/10/2024
79	WQUD571	Verizon Wireless (VAW) LLC	3800307	CF	Active	6/10/2024
80	WQWH293	CHEROKEE INDIAN HOSPITAL AUTHORITY	24809865	IG	Active	8/20/2025
81	WQWY810	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	12/30/2025
82	WQXF666	NORTH CAROLINA STATE HIGHWAY PATROL	1913888	PW	Active	2/22/2026
83	WQYK932	Sprint Spectrum License Holder LLC	25738147	BR	Active	3/28/2026
84	WQYV886	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
85	WQYV888	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
86	WQYV900	T-MOBILE LICENSE LLC	1565449	CF	Active	2/7/2027
87	WRAB633	Harrahs Cherokee Smokey Mountain Casino	6972871	IG	Active	2/17/2020
88	WRBK994	T-MOBILE LICENSE LLC	1565449	CF	Active	4/17/2028
89	WRBK998	T-MOBILE LICENSE LLC	1565449	CF	Active	4/17/2028
90	WRCE628	BRYSON CITY, TOWN OF	10503001	IG	Active	9/12/2028
91 Pending Application	WRCN258	SOUTHERN CONCRETE MATERIALS INC.	7961923	IG	Active	11/16/2028
92 Pending Application	WRDK985	KAMSTRUP WATER METERING, LLC	26415570	IG	Active	5/23/2029
93	WREB615	EASTERN BAND OF CHEROKEE INDIANS	28784064	IG	Active	9/12/2029
94	WRL638	STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION	1916568	PW	Active	5/22/2022

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

[This Page Intentionally Left Blank]

Appendix F Provider Meeting Notes

Additional information on the four providers are shown below. These meeting notes include the representatives met with from each company.

Skyrunner

Interview with: *Don Davis – Owner*
Art Mandler – Partner
J. J. Boyd – Technology Manager

Skyrunner is a privately held company. They have 27 employees and have been in business since 1997. They are a regional wireless provider, based in Asheville, that has a focus in the western area of the state and is providing service in an 18-county area. They are the largest WISP in the state and has over 8,000 customers of which 70% are residential and 30% are businesses. In Haywood County, their largest customer base in the SWC region, they have over 1,000 subscribers.

Skyrunner offers solutions of both fiber and wireless to the home depending on the concentration of homes and the needs of the customers. They strive to provide 25/3 service at a minimum. Today, FTTH is just a small fraction of their customer base, they have just over 100 fiber to the home customers, however they see this as an area of high growth.

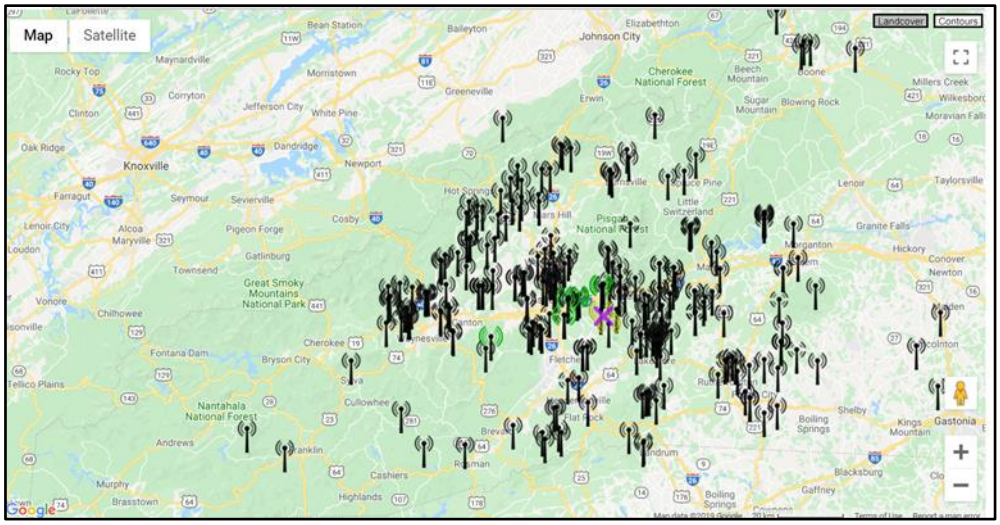
Skyrunner has partnered with local government in the past, having built a "turnkey" system for the town of Andrews in Cherokee County many years ago. They have worked representatives from a number of counties in the area including Haywood, Rutherford, Transylvania, Buncombe and McDowell. In some cases, the county has a fiber system or a fiber connection, they have used that to backhaul Internet.

Skyrunner has hundreds of tower locations and other access points from which they provide service. They both own towers and rent space on others. On the towers they rent space they require between 5 and 10 feet of tower space depending on type of equipment and desired coverage. Their equipment is not heavy and typically has no issues with wind loading on a tower. They generally spend between $8,000 and 30,000 on a tower location depending on the type of tower and equipment needed.

Staff stated they can "work with any spot that has a view" even a site on a bald mountain which will have a grassy top instead of trees. Skyrunner has even installed wireless antennas under home

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

decks that are above other potential customers. Below is a map that shows Skyrunner access points in use and potential future locations that are being considered.



Current Access Points and Potential Future Locations

Skyrunner require as few as 5 to 10 customers to justify the installation of a new access point hub to start a service area. From there they would look to expand their service to others. As an innovative way to increase coverage they have given current customers with vertical assets such as grain silos, or homes on the side of a mountain, a reduced month price to deploy additional antennas.

Skyrunner Radio Antenna and View Shed

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

In the SWC region, their largest presence is at the top of Chambers mountain in Haywood County. At this location they have equipment on 5 different towers This location is fiber fed.

Chambers Mountain

The company has standardized on Ubiquity equipment for the wireless end of their service and have a couple different manufacturers for backhaul equipment. As a WISP Skyrunner wants access fiber for both connections to vertical assets as well as a backhaul means. In addition, they provide fiber to the user-based services in other areas and may look at _____ as a possible marketplace as well.

Skyrunner is looking to expand its service into other areas around the state and are seeking PPP type relationships with local governments. In particular they are interested in counties that have physical assets such as towers and/or fiber and will assist with financing such as grants and loans. With that said, the owner of Skyrunner stated they are most interested in opportunities that are brought to them that put all the pieces together, meaning identified customer demand, vertical asset availability, backhaul availability and _____.

They are open to revenue sharing and desire time adjusted costs to get a project up and running. They have been working on a number of projects with residential developers were the developer is installing fiber to the home as they are building the neighborhoods. The developers are allowing Skyrunner access to the fiber at no cost. In Jackson County around the Cashiers area alone they stated there are 70 communities that are interested in their service.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Although not in all 7 counties of the SWC today, Skyrunner would be open to discussions with county representatives to explore options to enter the county's unserved marketplace. Skyrunner is not interested in areas that another WISP is serving. They for situations based on a revenue-based compensation model for the use of county assets.

SkyFi

Interview with: Travis Lewis - Owner

SkyFi is a wireless provider located in Sylva, NC. SkyFi began operation in 2015. SkyFi has provided services to rural NC since their inception and looks forward to future expansions into new areas given the right environment and opportunity. They currently have 6 employees of which a couple are part time. They have over 800 customers today and are looking to expand. They provide service to both residential and business customers.

They have a mixture of legacy (older) equipment installed at start up and current technology which means they have areas that higher bandwidth service available than other areas. For residential service plans start at 4 Mbps, however all new installs have a 25/3 Mbps capabilities. They provide unlimited data with no data caps and no contracts.

In early 2019 SkyFi was awarded $223,645 by the NC Broadband Infrastructure Office GREAT Grant for an area in Jackson County. Matching funds were $120,000. "They watch every penny they spend" he areas for the grant fund included Caney Fork, East Laporte and East Cope Creek. Its estimated to reach 400-500 residential customer that currently had limited or no internet access. Funding would construct two to four new towers.

They are currently only in Jackson County and a small area of Macon County. SkyFi is providing service from their own tower locations. In Jackson County they have 8 or 9 towers that are 120 feet and manufactured by Rohn. Today, they are not on any county owned assets but do lease land from the county to locate 3 of their towers. One of these towers is on Kings Mountain and the other is at the local airport. They have a tower on Forest Service land which is the cheapest rent. And the rest of the towers are on private land or land that they own. The company's primary tower is on commercial land that they own.

The business case for putting up a new tower in an area consists of: the cost of the tower all in is about $40,000, over five years financing it is approximately $700 per month. This does <u>not</u> include to cost of backhaul and Internet to the tower. The average customer is paying between $50 and $60

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

per month for service. So, at a minimum they need 14 customers just to pay for the tower and equipment. This approach is based on educated guess and knowledge of the area.

In working with Jackson County everything costs money, whether its on a county owned asset or using county land. However, Jackson County has reduced their costs for leasing land and worked with them on tower permitting fees. Past fees were directed at the cellular industry that can afford higher costs. In Swain County the local government is much more pro rural broadband provider. SkyFi approached Transylvania County a few years ago but did not want them there. Tower permits are always a concern when working with a County.

Jackson County went after ARC grant funds twice to help SkyFi build towers but was denied both times because the grants will only cover equipment and studies.

They have standardized on Ubiquiti equipment at the 5.2 and 5.3 Ghz frequencies. However, they are currently considering a switch to Cambium equipment for better performance on future implementations. Because the area they serve is so mountainous they have the ability to reuse the same frequencies without the threat of bleed over from one area to the next.

Their current service level agreements are best effort, however if a service issues effects a large number of customers or is deemed critical, they will provide repair service at any time of day or night.

They currently purchase Internet from a number of companies, including ERC and Segra. Balsam West was stated as too expensive, especially for a not for profit. The cost of Internet service to the towers varies. Years ago, it started out as high as $10 per meg and is now $1 to $2 dollars per meg.

Their Internet upstream is fiber at 2 tower locations and microwave to the rest. They have a main business office in Sylva.

At this time SkyFi is not interested in going after federal grants, because the post grant award reporting is too restrictive, and they may or may not apply for the GREAT grant this year.

They are not currently a WISPA member and don't see the value, up to $1,000 per year, to maintain a membership.

The owner declined to give his tower locations citing concerns about competitors knowing his area of service.

They need the help of the SWC to keep expanding.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

In terms of future plans for the area, the owner of SkyFi believes another 10 to 12 towers would cover Jackson County and give the unserved areas the bandwidth they need. Lastly the owner does not believe new providers should be encouraged to come into areas that are already served by his company as there are plenty of unserved areas to go around.

SkyWave

Interview with: James Sutton - Owner

SkyWave is a wireless Internet provider located in Bryson City, NC. SkyWave began operation in 2017. SkyWave Internet serve areas of Bryson City as well as other parts of Swain County. The owner for Skywave has received assistance from SkyFi in neighboring Jackson County during start up and current operations.

SkyWave has 5 employees of which 1 is part time. They have about 800 customers today and are looking to expand. They provide service to both residential and business customers.

Since they are a relatively new business, they have installed current technology which means they have areas that higher bandwidth service available areas they serve. For residential service plans start at 4 Mbps and go up to 50 Mbps for the custom plan. They provide unlimited data with no data caps and no contracts.

In early 2019 SkyFi was awarded $180,000 by the NC Broadband Infrastructure Office GREAT Grant for an area in Swain County and a small border area in Macon County. Matching funds were $96,000.

They are currently only in Swain County and a small area of Macon County. SkyWave is providing service from their own tower locations and some others. In Swain County they have 8 towers that are about 100 feet tall and manufactured by Rohn. They have access to towers on Frye Mountain, Collwe Mountain and Tater Knob plus they have company owned towers on Rockledge Subdivision (or Watia Point), at the Swain County Chamber of Commerce, Charleston Overlook and another tower on Sawmill Creek. They can use customer locations as access points to daisy chain or hop a signal to an otherwise unserved area.

Two of the company's towers are fiber fed, the others are linked wirelessly using microwave technology. Skywave gets wholesale Internet service BalsamWest and ERC. BalsamWest service was reported as reliable because the fiber backbone is set up in a region ring.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

They have standardized on Ubiquiti equipment at the 5.2 and 5.3 Ghz frequencies. Because the area they serve is so mountainous they have the ability to reuse the same frequencies without the threat of bleed over from one area to the next.

The business case for putting up a new tower in an area consists of finding the right areas that can support the initial cost of placing a tower and installing equipment. Generally speaking, SkyWave looks for areas where over 150 homes can be seen from the targeted tower location. In addition, staff at SkyWave keep a log of people that call in or register online inquiring for service. Site surveys at home locations are free to find out if SkyWave's signal is strong enough to provide service from an existing access point. Otherwise once a high enough number of people have shown interest in a particular area that area is reviewed for expansion of service. Skywave staff used the information collected in the 2017 SWC Survey campaign to help determine new areas to expand service.

Swain County has a broadband committee and has been very easy to work with.

SWC help them apply for the GREAT grant.

Their current service level agreements are best effort, however if a service issues effects a large number of customers or is deemed critical they will provide repair service at any time of day or night.

SkyWave is planning to apply again for the GREAT grant this year.

They are not currently a WISPA member and don’t see the value, but may reconsider in the future. With that said, the owner stated he would like to see WISPA aggregate all of its providers Internet service and create a state wide contract with one or two providers to reduce costs to all.

They need the continued help of the SWC to keep expanding.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

[This Page Intentionally Left Blank]

Appendix G Regional Vertical Asset Database

Name	Owner	Street	City	County	Latitude	Longitude	Class	Status	Documented Height - M	Height Estimated -
1290597	American Towers, LLC	1201 Red Marble Rd	Andrews	Cherokee	35.220722	-83.738917	LTOWER - Lattice Tower	Constructed	77.7	NA
NC08542-B	Belleview	195 Lance Rd.	Murphy	Cherokee	35.009894	-84.081824	MTOWER - Monopole	Constructed	NA	50
1257674	Cellco Partnership	66 Hunter Ridge	Murphy	Cherokee	35.027722	-84.156389	TOWER - Free standing or Guyed	Constructed	93.3	NA
1287251	Cellco Partnership	Nehemiah Loop Rd	Murphy	Cherokee	35.023417	-84.239972	LTOWER - Lattice Tower	Constructed	102.1	NA
NC14958-S	Cherokee 3, NC	NULL	Marble	Cherokee	35.131944	-83.983055	SST - Self Supporting	Status Unknov	No height availa	Not estimated
1203185	Cherokee Broadcasting Company, Inc	Parr Pl	Murphy	Cherokee	35.066667	-83.999444	TOWER - Free standing or Guyed	Constructed	138	NA
1257938	Cherokee County	1312 Valley View Hights	Andrews	cherokee	35.182222	-83.850556	POLE - Any type of Pole	Constructed	22.8	NA
138_Upper_V	Choice Hotels	138 Upper Valley River Lane	Andrews	Cherokee	35.20612	-83.82601	Rooftop Site	Constructed	NA	10
CH32	Conway Consult SBA Inventory	No Street Reference	Marble	Cherokee	35.15471389	-83.922941	SST - Self Supporting	Constructed	NA	50
1000282	Crown Atlantic Company LLC	301 Robin Road	Murphy	Cherokee	35.083917	-84.045306	TOWER - Free standing or Guyed	Constructed	70.1	NA
CH16	Crown Castle	1321 Andrews Road	Murphy	Cherokee	35.10589	-84.01445	Rooftop Site	Constructed	NA	10
CH17	Crown Castle	2042 Us 19	Murphy	Cherokee	35.1067	-84.0087	Rooftop Site	Constructed	NA	10
CH20	Crown Castle	110 Hwy 64 W	Murphy	Cherokee	35.11798	-83.93963	Rooftop Site	Status Unknov	No height availa	Not estimated
CH7	Crown Castle	110 A Highway 64 W	Murphy	Cherokee	35.05991	-83.96638	Rooftop Site	Status Unknov	No height availa	Not estimated
CH21	multi-site	END OF FAIN PEAK ROAD	Murphy	Cherokee	35.127195	-84.026075	three self supportings	Constructed	NA	50
CH28	North Carolina State Highway Patrol	National Forest Road	Andrews	Cherokee	35.257822	-83.795452	SST - Self Supporting	Constructed	NA	50
CH27	Owner not identified	Joanna Bald next to fire towe	Andrews	Cherokee	35.257565	-83.795415	TOWER - Free standing or Guyed	Constructed	NA	50
CH18	Owner Not Identified	(nearest) 405 Beechwood Acr	Charleston	Cherokee	35.112031	-83.991251	Water Tower	Constructed	NA	20
CH24	Owner Not Identified	155 Palmer Lane	Marble	Cherokee	35.185836	-83.918151	Water Tower	Constructed	NA	45
CH10	Owner Not Identified	3955 US 64 Alt	Murphy	Cherokee	35.075803	-83.965727	Water Tower	Constructed	NA	45
CH22	Owner not identified	160 Overlook Drive	Murphy	Cherokee	35.150097	-84.174912	SST - Self Supporting	Constructed	NA	50
CH23	Owner Not Identified	160 Overlook Drive	Murphy	Cherokee	35.150121	-84.174552	Water Tower	Constructed	NA	45
NC08770-B	Peachtree	445 Redbelt Ln	Murphy	Cherokee	35.09798	-83.935374	MTOWER - Monopole	Constructed	NA	50
1252229	Pegasus Tower Company, LTD	US Hwy 19	Andrews	Cherokee	35.196806	-83.782056	Class unknown	Granted	77.4	NA
NC08543-B	Poorhouse Mountain	4246 Harshaw Road	Murphy	Cherokee	35.056833	-83.989496	MTOWER - Monopole	Constructed	NA	50
1222381	RADFORD COMMUNICATIONS INC	113 harmony rd	Murphy	cherokee	35.111944	-84.008056	TOWER - Free standing or Guyed	Constructed	61.4	NA
1288980	SBA Towers VI, LLC	280 Wolf Mountain Rd	Murphy	Cherokee	35.016167	-84.29375	MTOWER - Monopole	Constructed	60.6	NA
1267403	UNITED STATES CELLULAR CORPORATIO	916 Hideway Mtn Drive	Murphy	Cherokee	35.043722	-84.241639	POLE - Any type of Pole	Constructed	34.7	NA
841971	WET HOLLOW	127 CHURCH OF CHRIST ROAD	MURPHY	CHEROKEE	35.061527	-84.065464	MTOWER - Monopole	Constructed	NA	25
CHT1	Airport Main Rotating Beacon	Northwest	Not specified	Cherokee	35.201371	-83.874769	Green White	Constructed	15	NA
CHT3	East TAC	1312 Valley View Hights Lane	Not specified	Cherokee	35.182096	-83.850361	Red Beacon	Constructed	21	NA
CHT9	Fain Mtn - owned by Bill Forsyth	2143 Fain Peak	Murphy	Cherokee	35.127063	-84.026375	SST - Self Supporting	Constructed	50	NA
CHT8	Joanna Bald	No Street Reference	Not specified	Cherokee	35.2574	-83.795172	TOWER - Free standing or Guyed	Constructed	30	NA
CHT2	NE Terrain Obstruction	6723 Airport Road	Not specified	Cherokee	35.203207	-83.849216	Red Beacon		70	NA
CHT7	North TAC	18243 Joe Brown Hwy	Murphy	Cherokee	35.187316	-84.195295	TOWER - Free standing or Guyed	Structure used	15	NA
CHT10	State Highway Patrol VIPER	CCSO on Regal St. 577 Regal S	Murphy	Cherokee	35.103171	-84.029152	TOWER - Free standing or Guyed	Constructed	117	NA
CHT4	SW Terrain Obstruction	153 Castle Lane	Not specified	Cherokee	35.186538	-83.865458	Red Beacon		70	NA
CHT6	West TAC	17946 West US 64	Murphy	Cherokee	35.016142	-84.284829	TOWER - Free standing or Guyed	Constructed	21	NA
CHT5	Wolf Creek Repeater Site	1246 Charles Laney Road	Murphy	Cherokee	35.044788	-84.245898	TOWER - Free standing or Guyed	Constructed	21	NA
NC08771-B	Brasstown	150 Meyers Rd	Brasstown	Clay	35.044544	-83.929502	MTOWER - Monopole	Constructed	NA	50

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Name	Owner	Street	City	County	Latitude	Longitude	Class	Status	Documented Height - M	Height Estimated -
CH34	Crown Castle	368 BUZZARD RIDGE	Hayesville	Clay	35.021917	-83.823333	SST - Self Supporting	Constructed	NA	75
CL2	Crown Castle	439 ASH LOOP ROAD	Hayesville	Clay	35.028222	-83.703422	MTOWER - Monopole	Constructed	NA	50
CL4	Crown Castle	391 Courthouse Drive	Hayesville	Clay	35.043282	-83.830495	SST - Self Supporting	Constructed	NA	50
420878	Dyer Goye, NC	3614 Hwy 64	Hayesville	Clay	35.046075	-83.872878	MTOWER - Monopole	Constructed	NA	50
1275676	North Carolina State Highway Patrol	Chunky Gal Gap, Forsythia Rd	Hayesville	Clay	35.061722	-83.6325	TOWER - Free standing or Guyed	Constructed	36.5	NA
CL3	Owner not identified	41 Courthouse Drive	Hayesville	Clay	35.037715	-83.828118	SST - Self Supporting	Constructed	NA	50
1258424	SBA Towers VI, LLC	11176 Highway 64E	Hayesville	Clay	35.036472	-83.629111	LTOWER - Lattice Tower	Constructed	77.7	NA
CLT1	Chunky Gal Mtn	No Street Reference	Not specified	Clay	35.061817	-83.632282	TOWER - Free standing or Guyed	Constructed	NA	50
CLT5	Clay County Jail	391 Courthouse Drive	Hayesville	Clay	35.043271	-83.830499	SST - Self Supporting	Constructed	60	NA
CLT6	Owner not identified	570 Eagles View Cir	Hayesville	Clay	34.998416	-83.734596	MTOWER - Monopole	Constructed	18	NA
CLT7	Owner not identified	Davy Mtn	Hayesville	Clay	34.999316	-83.859304	MTOWER - Monopole	Constructed	30	NA
1277325	Crown Atlantic Company LLC	4100 Long Creek Rd	Robbinsville	Graham	35.258167	-83.795611	TOWER - Free standing or Guyed	Constructed	53.6	NA
GR3	Crown Castle	2554 Shell Stand Road	Robbinsville	Graham	35.369553	-83.657056	MTOWER - Monopole	Constructed	NA	50
1249708	North Carolina State Highway Patrol	Joanna Bald	Andrews	Graham	35.25755556	-83.79527778	LTOWER - Lattice Tower	Constructed	38	NA
GR2	Owner Not Identified	225 South Main Street	Robbinsville	Graham	35.318633	-83.808049	tall ground mounted tower in tre	Constructed	NA	25
1263890	Pegasus Tower Company, LTD.	Tallulah Rd	Robbinsville	Graham	35.266806	-83.692528	Class unknown	Granted	77.4	NA
1308158	Southern Towers, LP	Johns Drive	Robbinsville	Graham	35.330472	-83.817972	Class unknown	Constructed	68.2	NA
GCWT2	Owner not identified	2457 Long Creek Rd	Cheoah	Graham	35.279789	-83.818113	Water Tank	Constructed	NA	15
GCWT3	Owner not identified	589 Black Bear Trail	Lake Santeelah	Graham	35.36354	-83.864941	Water Tank	Constructed	NA	15
GCWT1	Owner not identified	615 Fort Hill Rd	Robbinsville	Graham	35.315611	-83.792972	Water Tank	Constructed	NA	15
GCWT4	Town of Robbinsville	199 Junaluka Dr	Not specified	Graham	35.3186	-83.808088	Water Tank	Constructed	No height availa	Not estimated
HA48	American Tower	268 Reservoir Drive	Waynesville	Haywood	35.488669	-82.974828	Stealth - Micropole	Constructed	NA	25
1203978	American Tower Limited Partnership	45 Jilly Drive	Clyde	Haywood	35.542944	-82.918111	TOWER - Free standing or Guyed	Constructed	60.7	NA
1206135	American Tower Limited Partnership	160 boundary street	Waynesville	Haywood	35.499417	-83.004556	TOWER - Free standing or Guyed	Constructed	60.9	NA
1205573	American Towers LLC	190 Industrial Park Dr	Waynesville	Haywood	35.516778	-82.968528	TOWER - Free standing or Guyed	Constructed	58.5	NA
HA18	Cellular Telephone	1778 Setzercove Road	Maggie Valley	Haywood	35.517295	-83.115968	MTOWER - Monopole	Constructed	NA	50
3777_Soco_Rc	Choice Hotels	3777 Soco Road	Maggie Valley	Haywood	35.51736	-83.09089	Rooftop Site	Constructed	NA	10
232_Phillips_	Choice Hotels	232 Phillips Rd	Waynesville	Haywood	35.506443	-82.99709	Rooftop Site	Constructed	NA	10
1009809	Crown Atlantic Company LLC	2384 Sugarbush Lane	Canton	Haywood	35.46722222	-82.82777778	TOWER - Free standing or Guyed	Constructed	70	NA
1006300	Crown Atlantic Company LLC	Off US Hwy 23-74	Waynesville	Haywood	35.45816667	-83.03666667	TOWER - Free standing or Guyed	Constructed	60	NA
HA1	Crown Castle	Frying Pan Mountain Lookout	Canton	Haywood	35.39392	-82.77433	SST - Self Supporting	Constructed	NA	75
HA24	Crown Castle	25 New Clyde Hwy. (a/k/a US	Canton	Haywood	35.5322	-82.85496	Rooftop Site	Constructed	NA	10
HA25	Crown Castle	24 New Clyde Highway	Canton	Haywood	35.53275	-82.8557	Rooftop Site	Constructed	NA	10
HA29	Crown Castle	660 Champion Drive	Canton	Haywood	35.5394	-82.8447	Rooftop Site	Constructed	NA	10
HA35	Crown Castle	737 Champion Dr.	Canton	Haywood	35.553915	-82.852222	Rooftop Site	Constructed	NA	10
HA5	Crown Castle	2384 Sugarbush Lane	Canton	Haywood	35.467518	-82.827838	SST - Self Supporting	Constructed	NA	75
HA6	Crown Castle	197 Love Joy Road	Canton	Haywood	35.468422	-82.885347	MTOWER - Monopole	Constructed	NA	50
HA39	Crown Castle	2304 Lookout Point	Clyde	Haywood	35.568456	-82.907836	SST - Self Supporting	Constructed	NA	50
HA16	Crown Castle	3282 Soco Rd.	Maggie Valley	Haywood	35.51526	-83.082909	Rooftop Site	Constructed	NA	10
HA13	Crown Castle	15 Lee St	Waynesville	Haywood	35.49975	-82.98702	Rooftop Site	Constructed	NA	10

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Name	Owner	Street	City	County	Latitude	Longitude	Class	Status	Documented Height - M
HA14	Crown Castle	667 Russ Avenue	Waynesville	Haywood	35.5016	-82.9889	Rooftop Site	Constructed	NA
HA15	Crown Castle	670 Russ Ave	Waynesville	Haywood	35.5025	-82.98874	Rooftop Site	Constructed	NA
HA19	Crown Castle	488 JUSTICE TRAIL	Waynesville	Haywood	35.518133	-83.016214	MTOWER - Monopole	Constructed	NA
HA2	Crown Castle	251 Jude Lane	Waynesville	Haywood	35.458092	-83.036274	SST - Self Supporting	Constructed	NA
HA22	Crown Castle	132 Access Road	Waynesville	Haywood	35.5276	-82.9478	Rooftop Site	Constructed	NA
HA32	Crown Castle	147 Boyd Farm Road	Waynesville	Haywood	35.545368	-83.032214	MTOWER - Monopole	Constructed	NA
HA40	Crown Castle	223 CRAWFORD RD	Waynesville	Haywood	35.579372	-82.950769	MTOWER - Monopole	Constructed	NA
HA7	Crown Castle	3187 Pigeon Rd	Waynesville	Haywood	35.473075	-82.938667	MTOWER - Monopole	Constructed	NA
SE00044	Haywood	1052 HUNGRY CREEK ROAD	Cruso	Haywood	35.395917	-82.769833	MTOWER - Monopole	Status Unknov	No height availa
VZW-03750	Lake Junaluska - VZW	660 Sleepy Hollow Drive	Waynesville	Haywood	35.535892	-82.98329	TOWER - Free standing or Guyed	Status Unknov	No height availa
SE00046	MAGGIE VALLEY	3330 DELLWOOD ROAD	Dellwood	Haywood	35.522639	-83.020278	Rooftop Site?	Constructed	No height availa
HA34	North Carolina State Highway Patrol	No Street Reference	Ivy Hill	Haywood	35.547871	-83.004456	Class unknown	Status Unknov	No height availa
1266358	North Carolina State Highway Patrol	1000 Huckleberry Ln	Maggie Valley	Haywood	35.494333	-83.146194	TOWER - Free standing or Guyed	Constructed	36.5
HA42	North Carolina State Highway Patrol	179 Climbing Bear Ridge	Waynesville	Haywood	35.633205	-83.034455	SST - Self Supporting	Constructed	NA
HA47	Owner Not Identified	above (SE) of Waterville Pow	Cataloochee	Haywood	35.770382	-83.095559	tank with antennas	Constructed	NA
HA43	Owner not identified	Crabtree Bald - old buildings	Crabtree	Haywood	35.649694	-82.913069	TOWER - Free standing or Guyed	Constructed	NA
HA12	Owner Not Identified	155-169 Garci Drive	Waynesville	Haywood	35.499642	-83.004672	Ground Tank on Hill - next to cell	Constructed	NA
HA27	Owner Not Identified	588 Mouzon Road	Waynesville	Haywood	35.53584	-82.980086	Ground Tank on Hill	Constructed	NA
HA8	Owner Not Identified	269 Reservoir Drive	Waynesville	Haywood	35.487843	-82.974911	Ground Tank on Hill	Constructed	NA
PTC-393	Owner not identified	3712 Crabtree Rd	Waynesville	Haywood	35.572701	-82.955867	Rooftop Site	Constructed	NA
1288007	P.T. Attachment Solutions, LLC	Walters Lake/Dam Road	Clyde	Haywood	35.69675	-83.048139	MTOWER - Monopole	Constructed	48.2
1222978	Pinnacle Towers LLC	Frying Pan Mountain Lookout	Waynesville	Haywood	35.39391667	-82.77444444	TOWER - Free standing or Guyed	Constructed	55.5
1297377	Prime Tower Development LLC	561 hazelwood ave	Waynesville	Haywood	35.476722	-83.006639	MTOWER - Monopole	Constructed	54.9
1002063	Saga Communications of North Caroli	117 Radio Hill	Canton	Haywood	35.532778	-82.865833	Class unknown	Constructed	77.7
1222795	SBA Properties, LLC	Rosalie Lane and Kevin Ct	Waynesville	Haywood	35.658639	-82.994444	TOWER - Free standing or Guyed	Constructed	42.7
1239307	SBA Structures LLC	US Route 23	Franklin	Haywood	35.21944444	-83.34805556	TOWER - Free standing or Guyed	Constructed	53
1055842	SBA Towers, LLC	State Road 1004	Canton	Haywood	35.5575	-82.819167	TOWER - Free standing or Guyed	Constructed	42.1
1055854	SBA Towers, LLC	State Road 1599	Canton	Haywood	35.539444	-82.792722	TOWER - Free standing or Guyed	Constructed	39
1216536	SBA Towers, LLC	239 bob wood dr	Canton	Haywood	35.528472	-82.845806	LTOWER - Lattice Tower	Constructed	53.6
1056163	SBA Towers, LLC	Clyde View Heights Rd	Clyde	Haywood	35.525028	-82.893972	TOWER - Free standing or Guyed	Constructed	60.3
1060880	SBA Towers, LLC	State Road 1534	Clyde	Haywood	35.568306	-82.907639	TOWER - Free standing or Guyed	Constructed	36.6
1065350	SBA Towers, LLC	159 Lea Plant Rd	Waynesville	Haywood	35.468778	-83.006556	TOWER - Free standing or Guyed	Constructed	60.7
1224808	SBA Towers, LLC	361 STICK WEED TRL	Waynesville	Haywood	35.602056	-83.016806	MTOWER - Monopole	Constructed	48.8
NC09088-B	Shelton Laurel	848 DICKS TRL	Waynesville	Haywood	35.676833	-83.038778	MTOWER - Monopole	Constructed	NA
1035173	Sinclair Communications, LLC	Mount Pisgah	Canton	Haywood	35.425556	-82.756667	TOWER - Free standing or Guyed	Constructed	103.2
1002136	SKYCOUNTRY BROADCASTING INC DBA	Chestnut Mountain, Dutch Co	Canton	Haywood	35.520833	-82.806389	TOWER - Free standing or Guyed	Constructed	61.8
NC08579-B	Sol Ray	4204-4998 Panther Creek Rd	Clyde	Haywood	35.632733	-82.986672	MTOWER - Monopole	Constructed	NA
1275283	United States Cellular Corporation	110 Sandy Lane	Canton	Haywood	35.53925	-82.813611	TOWER - Free standing or Guyed	Constructed	46.9
1267399	UNITED STATES CELLULAR CORPORATIC	Longarm Rd	Lake Junaluska	Haywood	35.73375	-83.051278	POLE - Any type of Pole	Constructed	46.9
1275765	University of North Carolina	Chambers Mountain, Lookout	Clyde	Haywood	35.568611	-82.907278	TOWER - Free standing or Guyed	Constructed	59

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Name	Owner	Street	City	County	Latitude	Longitude	Class	Status	Documented Height - M	Height Estimated -
88629	BALSAM GAP NC	SR 1462	Sylva	Jackson	35.441053	-83.1196	SST - Self Supporting	Constructed	NA	50
372898	Cashiers	450 Hwy 64	Cashiers	Jackson	35.114917	-83.109222	MTOWER - Monopole	Constructed	NA	50
JA7	CATV	1710 Gold City Lane site A	Sylva	Jackson	35.264399	-83.316338	Rooftop Site	Constructed	NA	10
JA2	Cellular Telephone	52 Perennial Drive	Cashiers	Jackson	35.113313	-83.097815	SST - Self Supporting	Constructed	NA	50
1235_E._Main	Choice Hotels	1235 E. Main Street	Sylva	Jackson	35.3611	-83.20087	Rooftop Site	Constructed	NA	10
1298996	CMB Systems, Inc.	92 US Hwy 64 West	Cashiers	jackson	35.113861	-83.101889	BMAST - Building with Mast	Constructed	6.2	NA
JA41	Conway Consult SBA Inventory	No Street Reference	Whittier	Jackson	35.42277644	-83.32916533	MTOWER - Monopole	Status Unknov	No height availa	Not estimated
NC00893-A	Cowee	Cowee Bald Road, #70 (Cowe	Franklin	Jackson	35.327638	-83.33573	SST - Self Supporting	Constructed	NA	75
1058525	Crown Atlantic Company LLC	US Hwy 441	Savannah	Jackson	35.299778	-83.269972	LTOWER - Lattice Tower	Constructed	47.5	NA
JA1	Crown Castle	108 Gana Sita Cir	Cashiers	Jackson	35.110994	-83.095483	MTOWER - Monopole	Constructed	NA	50
JA5	Crown Castle	326 TURKEY KNOB ROAD	Cashiers	Jackson	35.143983	-83.162911	SST - Self Supporting	Constructed	NA	75
JA28	Crown Castle	638 FORGET ME NOT LANE	Qualla	Jackson	35.459735	-83.332458	MTOWER - Monopole	Constructed	NA	50
JA16	Crown Castle	2533 US 441 SOUTH	Sylva	Jackson	35.347028	-83.256139	MTOWER - Monopole	Constructed	NA	50
JA17	Crown Castle	1454 E Main St	Sylva	Jackson	35.36042	-83.20165	Rooftop Site	Constructed	NA	10
JA19	Crown Castle	215 RADIO DRIVE	Sylva	Jackson	35.366937	-83.221472	SST - Self Supporting	Constructed	NA	50
JA20	Crown Castle	375 E Main St	Sylva	Jackson	35.3737	-83.2226	Rooftop Site	Constructed	NA	10
JA23	Crown Castle	2807 Hwy 74 East	Sylva	Jackson	35.391647	-83.183519	Rooftop Site	Constructed	NA	10
JA30	Crown Castle	584 Casino Trail	Whittier	Jackson	35.46336	-83.31239	Rooftop Site	Constructed	NA	10
JA31	Crown Castle	622 Casino Trail	Whittier	Jackson	35.4667	-83.3214	Rooftop Site	Constructed	NA	10
1002043	Five Forty Broadcasting Company, LLC	1846 Skyalnd Dr	Sylva	Jackson	35.393056	-83.193889	2Tower - Multiple Structures	Constructed	74.7	NA
1298566	Jackson County Airport Commission	Jackson County Airport	Sylva	Jackson	35.31388889	-83.20111111	MTOWER - Monopole	Constructed	45.7	NA
JA18	multi-site	769 Ridgeway Drive	Sylva	Jackson	35.366781	-83.221218	TOWER - Free standing or Guyed	Constructed	NA	50
1275000	North Carolina State Highway Patrol	Jackson County Airport	Cullowhee, NC	Jackson	35.314028	-83.201056	TOWER - Free standing or Guyed	Constructed	42.6	NA
1299624	North Carolina State Highway Patrol	3521 Tower Rd	Sapphire	Jackson	35.132417	-82.9835	LTOWER - Lattice Tower	Constructed	54.8	NA
JA32	Owner Not Identified	71 Hyatt Cove Road	EBCI	Jackson	35.497863	-83.16218	Ground Tank on Hill - up hill fron	Constructed	NA	30
JA33	Owner not identified	end of BIA road 506 off Blue F	EBCI	Jackson	35.524299	-83.236243	self supporting (3 of 3)	Constructed	NA	50
JA35	Owner not identified	end of BIA road 506 off Blue F	EBCI	Jackson	35.524406	-83.236139	self supporting (2 of 3)	Constructed	NA	50
JA36	Owner not identified	end of BIA road 506 off Blue F	EBCI	Jackson	35.524612	-83.236134	self supporting (1 of 3)	Constructed	NA	50
JA3	Owner not identified	3459 Tower Road	Sapphire	Jackson	35.13205	-82.983171	SE tower of two self supporting	Constructed	NA	50
JA15	Owner Not Identified	372 West College Drive	Sylva	Jackson	35.345675	-83.20619	Ground Tank on Hill	Constructed	NA	10
JA21	Owner Not Identified	687 Allen Street	Sylva	Jackson	35.38204	-83.21787	Ground Tank on Hill	Constructed	NA	10
JA22	Owner Not Identified	93 Arnold Hill	Sylva	Jackson	35.387268	-83.197717	Ground Tank on Hill	Constructed	NA	10
JA26	Owner not identified	1221 East View Road	Sylva	Jackson	35.435368	-83.118798	SUSPECT but in antennasearch.co	Status Unknov	No height availa	Not estimated
413210	Sapphire Valley, NC Duke	230 Hebron Lane	Sylva	Jackson	35.417608	-83.107358	MTOWER - Monopole	Constructed	NA	50
1253955	SBA Infrastructures, LLC	626 Sheeprock Cove Rd	Cherokee	Jackson	35.460306	-83.300694	MTOWER - Monopole	Constructed	50.3	NA
1230097	SBA Properties, LLC	3873 US Hwy 74	Addie	Jackson	35.395056	-83.163861	TOWER - Free standing or Guyed	Constructed	60.7	NA
1230431	SBA Properties, LLC	1224 Laurel Knob Road	Cashiers	Jackson	35.129278	-83.132611	TOWER - Free standing or Guyed	Constructed	86.9	NA
88662	SYLVA NC	272 Radio Road	Sylva	Jackson	35.366378	-83.221117	SST - Self Supporting	Constructed	NA	75
NC-5015	TOXAWAY	3461 TOWER RD	Sapphire	Jackson	35.13217	-82.98353	SST - Self Supporting	Constructed	NA	75
1267392	UNITED STATES CELLULAR CORPORATIC	1707 Spruce Pine Rd	Sylva	Jackson	35.462222	-83.106583	POLE - Any type of Pole	Constructed	21.3	NA

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Name	Owner	Street	City	County	Latitude	Longitude	Class	Status	Documented Height - M	Height Estimated -
1014581	UNIVERSITY OF NORTH CAROLINA	Cowee Bald Mountain	Franklin	Jackson	35.327778	-83.336389	Multiple Lattice Towers	Constructed	65.2	NA
1251323	Western North Carolina Public Radio,	Jackson County Airport	Cullowhee, NC	Jackson	35.31425	-83.20125	TOWER - Free standing or Guyed	Constructed	15.2	NA
JCWT1	Owner not identified	180 Clearwood Dr	Whittier	Jackson	35.426735	-83.355933	Water Tank	Constructed	NA	15
1297005	Apex Towers, LLC	1155 windy gap rd	Franklin	Macon	35.200917	-83.397417	MTOWER - Monopole	Constructed	43.3	NA
1252234	Apex Towers, LLC	Murphy Rd	Mars Hill	Macon	35.0985	-83.558417	MTOWER - Monopole	Constructed	52.7	NA
1320_E._Main	Choice Hotels	1320 E. Main Street	Franklin	Macon	35.192787	-83.36368	Rooftop Site	Constructed	NA	10
MA29	Crown Castle	6644 NEEDMORE ROAD	Bryson City	Macon	35.292126	-83.507177	MTOWER - Monopole	Constructed	NA	25
MA13	Crown Castle	526 LOWERY LANE	Franklin	Macon	35.144444	-83.401667	SST - Self Supporting	Constructed	NA	50
MA14	Crown Castle	751 CRAWFORD RD.	Franklin	Macon	35.151442	-83.503578	MTOWER - Monopole	Constructed	NA	25
MA15	Crown Castle	999 Georgia Road	Franklin	Macon	35.16132	-83.39226	Rooftop Site	Constructed	NA	10
MA16	Crown Castle	1036 Georgia Rd	Franklin	Macon	35.16613	-83.38997	Rooftop Site	Constructed	NA	10
MA17	Crown Castle	6 Hyatt Rd	Franklin	Macon	35.1663	-83.3913	Rooftop Site	Constructed	NA	10
MA23	Crown Castle	313 Cunningham Rd.	Franklin	Macon	35.184307	-83.356838	Rooftop Site	Constructed	NA	10
MA25	Crown Castle	U.S. Highway 23 & 441 By-Pass	Franklin	Macon	35.19194	-83.36141	Rooftop Site	Constructed	NA	10
MA28	Crown Castle	1747 GOLD CITY LANE	Franklin	Macon	35.264139	-83.317139	MTOWER - Monopole	Constructed	NA	50
MA32	Crown Castle	1711 Huckleberry Creek Rd	Franklin	Macon	35.328019	-83.336342	SST - Self Supporting	Constructed	NA	75
MA6	Crown Castle	274 PINE CIR	Highlands	Macon	35.079844	-83.211069	MTOWER - Monopole	Constructed	NA	50
1237135	Crown Castle South LLC	120 Cunningham Rd	Franklin	Macon	35.186417	-83.354333	POLE - Any type of Pole	Constructed	60.7	NA
1231162	Crown Communication Inc.	Youns Mountain Rd	Franklin	Macon	35.219278	-83.347889	TOWER - Free standing or Guyed	Constructed	56.4	NA
1286915	Duke Energy Business Services, LLC	271 Npl Loop Rd	Franklin	Macon	35.215556	-83.355778	MTOWER - Monopole	Constructed	35.1	NA
1249097	Global Tower, LLC. through American	1108 Smithbridge Township	Otto, NC	Macon	35.039472	-83.392417	TOWER - Free standing or Guyed	Constructed	54.5	NA
MA36	multisite	Fishers Peak Road (Va state l	Franklin	Macon	36.55945	-80.823318	LTOWER - Lattice Tower	Constructed	NA	75
1236205	NCDOT Aviation	Macon County Airport	Franklin	Macon	35.22275	-83.415	TOWER - Free standing or Guyed	Constructed	8.3	NA
1249999	North Carolina State Highway Patrol	HP-1313, 3530 Wayah Bald Rd	Franklin	Macon	35.173417	-83.580861	LTOWER - Lattice Tower	Constructed	36.5	NA
1276009	North Carolina State Highway Patrol	Scaly Mt, Hickory Knut Rd	Franklin	Macon	35.035389	-83.272778	LTOWER - Lattice Tower	Constructed	54.8	NA
1280798	North Carolina State Highway Patrol	Addington Bridge Rd	Franklin	Macon	35.109611	-83.390972	TOWER - Free standing or Guyed	Constructed	97.5	NA
MA34	North Carolina State Highway Patrol	No Street Reference	Greens Creek	Macon	35.332562	-83.339796	Class unknown	Status Unknov	No height availa	Not estimated
MA2	North Carolina State Highway Patrol	No Street Reference	Scaly Mountain	Macon	35.011757	-83.316265	Class unknown	Status Unknov	No height availa	Not estimated
MA31	North Carolina State Highway Patrol	426 Cove Creek Road	Sylva	Macon	35.327893	-83.336136	SST - Self Supporting	Constructed	NA	50
MA22	Owner not identified	303 Rogers Rd	Franklin	Macon	35.179741	-83.352904	Guyed Tower	Constructed	NA	25
MCWT2	Owner not identified	419 Worley Rd	Highland	Macon	35.041171	-83.19531	Water Tank	Constructed	NA	15
1245867	SBA Towers VI, LLC	89 Fishhawk Rd	Franklin	Macon	35.12925	-83.298306	LTOWER - Lattice Tower	Constructed	53.6	NA
1258377	SBA Towers VI, LLC	1009 Love Cove Rd	Franklin	Macon	35.138667	-83.470139	MTOWER - Monopole	Constructed	53	NA
NC09089-B	Stephen Creek	1123 Dendy Orchard Rd	Highlands	Macon	35.094591	-83.276618	MTOWER - Monopole	Constructed	NA	75
1050328	Sutton Radiocasting Corporation	180 Radio Hill Rd	Franklin	Macon	35.211111	-83.368611	TOWER - Free standing or Guyed	Constructed	62.4	NA
MCT2	Cowee Bald	No Street Reference	Not specified	Macon	35.327432	-83.335785	TOWER - Free standing or Guyed	Constructed	NA	60
MCT3	Owner not identified	700 Satulah Ridge Rd	Highlands	Macon	35.040914	-83.194764	MTOWER - Monopole	Constructed	NA	30
MCWT1	Owner not identified	Wayah Rd	Topton	Macon	35.266977	-83.678904	Water Tank	Constructed	NA	30
MCT1	Wine Spring Bald	No Street Reference	Not specified	Macon	35.173019	-83.580798	TOWER - Free standing or Guyed	Constructed	NA	60
1282123	1 Source Wireless, LLC	1389 Marr Creek Rd	Almond	Swain	35.328167	-83.478944	Unknown	Granted	No height availa	Not estimated

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Name	Owner	Street	City	County	Latitude	Longitude	Class	Status	Documented Height - M	Height Estimated -
1243221	Cellco Partnership	336 Parton Rd	Bryson City	Swain	35.37038889	-83.50916667	TOWER - Free standing or Guyed	Constructed	63	NA
1279595	Cherokee Broadband Enterprise	5110 Mount Noble Rd	Cherokee	Swain	35.496583	-83.334444	TOWER - Free standing or Guyed	Constructed	60.6	NA
44_Tsalagi_R	Choice Hotels	44 Tsalagi Road	Cherokee	Swain	35.474983	-83.33459	Rooftop Site	Constructed	NA	10
US_441_North	Choice Hotels	US 441 North Bypass	Cherokee	Swain	35.46741	-83.3221	Rooftop Site	Constructed	NA	10
1000280	Crown Atlantic Company LLC	268 Wells Street	Bryson City	Swain	35.436333	-83.435528	TOWER - Free standing or Guyed	Constructed	76.2	NA
SW4	Crown Castle	500 Veterans Blvd.	Bryson City	Swain	35.421054	-83.443784	Rooftop Site	Constructed	NA	10
SW5	Crown Castle	150 HWY 19 South	Bryson City	Swain	35.42633	-83.45013	Rooftop Site	Constructed	NA	10
SW11	Crown Castle	US-19 / US-441 X SR1390	Cherokee	Swain	35.47693	-83.32428	Rooftop Site	Constructed	NA	10
SW12	Crown Castle	20 River Road	Cherokee	Swain	35.476947	-83.32074	Rooftop Site	Status Unknov	No height availa	Not estimated
SW13	Crown Castle	44 Tsalagi Road	Cherokee	Swain	35.477058	-83.334089	Rooftop Site	Constructed	NA	10
SW14	Crown Castle	1223 Tsali Boulevard	Cherokee	Swain	35.49401	-83.314015	Rooftop Site	Constructed	NA	10
SW9	Crown Castle	US 441 North Bypass	Cherokee	Swain	35.468853	-83.319489	Rooftop Site	Status Unknov	No height availa	Not estimated
SW8	Crown Castle	1385 OWLE DRIVE	Whittier	Swain	35.437778	-83.376056	MTOWER - Monopole	Constructed	NA	50
VZW-03707	Ellaville - VZW	Off US Highway 19	Ellaville, GA	Swain	35.434759	-83.412812	TOWER - Free standing or Guyed	Status Unknov	No height availa	Not estimated
1268623	Georgia-Carolina Radiocasting Comp	Possum Holler	Bryson City	Swain	35.427333	-83.426806	Class unknown	Granted	22.9	NA
VZW-03679	LAUADA - VZW	PARTON ROAD	Bryson City	Swain	35.366202	-83.509409	TOWER - Free standing or Guyed	Status Unknov	No height availa	Not estimated
413211	Lauda, NC	336 Parton Rd	Bryson City	Swain	35.370378	-83.509156	SST - Self Supporting	Constructed	63	NA
1276477	North Carolina State Highway Patrol	Fry Mountain	Bryson City	Swain	35.381611	-83.414417	TOWER - Free standing or Guyed	Constructed	45.7	NA
1280547	North Carolina State Highway Patrol	1800 Big Rockys Road	Bryson City	Swain	35.413056	-83.500556	TOWER - Free standing or Guyed	Constructed	54.8	NA
1276478	North Carolina State Highway Patrol	Mt Noble, BIA Hwy 477	Cherokee	Swain	35.496111	-83.334278	LTOWER - Lattice Tower	Constructed	59.4	NA
1280549	North Carolina State Highway Patrol	Potato Knob, 350 Wilson Dr	Robbinsville	Swain	35.386389	-83.772667	TOWER - Free standing or Guyed	Constructed	38.1	NA
SCT1	Owner not identified	450 Shady Drive	Bryson City	Swain	35.329462	-83.572965	TOWER - Free standing or Guyed	Constructed	NA	75
SW6	Owner not identified	151 Winding Way	Bryson City	Swain	35.428463	-83.438082	Class unknown	Status Unknov	No height availa	Not estimated
SW10	Owner not identified	282 Seven Clans Lane	Cherokee	Swain	35.47134	-83.327444	SST - Self Supporting	Status Unknov	No height availa	Not estimated
SW18	Owner not identified	Clingmans Dome off Clingma	Foumeys Creek	Swain	35.562121	-83.497392	TOWER - Free standing or Guyed	Constructed	NA	50
1252230	SBA Towers IV, LLC	US Hwy 19	Bryson City	Swain	35.337972	-83.622028	TOWER - Free standing or Guyed	Constructed	60.7	NA
1249096	SBA Towers V, LLC	222 Shady Dr	Bryson City	Swain	35.329778	-83.573083	LTOWER - Lattice Tower	Constructed	78	NA
SCT2	Owner not identified	1800-1373 Big Rockys Rd	Bryson City	Swain	35.412907	-83.500171	TOWER - Free standing or Guyed	Constructed	NA	75
CLT4	Owner not identified	Bell Knob Mtn	Hiawassee	Towns Count	34.959613	-83.728302	TOWER - Free standing or Guyed	Structure used	No height availa	Not estimated
CLT3	Owner not identified	Rocky Top Mtn	Ivylog	Union	34.981956	-84.003629	LTOWER - Lattice Tower	Constructed	60	NA

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Appendix H Manufacturers Coverage Map

Cambium

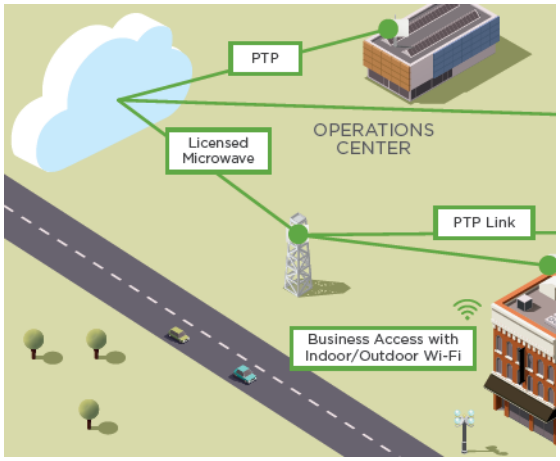
About Cambium Networks

Cambium Networks is a leading global provider of wireless broadband solutions that connect the unconnected. Through its extensive portfolio of reliable, scalable, and secure narrowband, Wi-Fi, and wireless broadband point-to-point (PTP) and point-to-multipoint (PMP) platforms managed by cloud-based software, Cambium Networks makes it possible for enterprises, government and military agencies, utility companies, Internet service providers, and public safety networks to build powerful communications networks that reach users from 250 kilometers across mountain tops down to the last meter and intelligently manage their infrastructure through end-to-end network visibility and actionable analytics. Headquartered outside Chicago and with R&D centers in the U.S., Ashburton, U.K., and Bangalore, India, Cambium Networks sells through a range of trusted global distributors. For more information, visit:

www.cambiumnetworks.com

LEADING SERVICE PROVIDERS ARE DISCOVERING THAT NO ONE TECHNOLOGY FITS ACROSS THE ENTIRE NETWORK.

Best practice is to evaluate the business opportunity in a given area and select technology to satisfy that use case. By aligning the ideal technology with their growth strategy, network operators can build and maintain a loyal customer base as needs and the network evolve.



Wireless broadband solutions that operate in both the licensed and unlicensed spectrum are proven to connect millions of users around the world, and technology from Cambium Networks is designed to provide the spectral efficiency, coverage, and capacity to offer consistently reliable wireless connectivity to business and residential subscribers.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

High Capacity – Wireless networks can be designed to simultaneously support downloading of streaming video, uploading of video surveillance information, voice calls, and data sharing.

• Security – Network can use specified frequencies for public safety. Access networks can be configured with password authentication that meets PCI compliance standards for secure transactions.

• Affordability – Wireless solutions provide an attractive return on investment when compared with leased lines, fiber, copper, or other solutions.

• Reliable – With millions of wireless broadband modules deployed in 150 countries around the world, Cambium Networks solutions are proven to work in any climate or application.

Proven Solutions

• Long Range Point-to-Point Wireless Backhaul

    • Licensed Microwave and Unlicensed Backhaul

• Wide-Area Point-to-Multipoint Wireless Access

    • Licensed and Unlicensed Wide Area Networks

• Wide-Area Narrowband connectivity for SCADA communications

    • Available in 220, 450, 700 and 900 MHz licensed and unlicensed bands

• Enterprise-class Wi-Fi Access Networks

    • Indoor Wi-Fi networks

    • Outdoor hotspot and Wi-Fi networks

• Single Pane of Glass Network Management

    • Bird's eye view of Field Area Network

    • Rapid on-boarding and provisioning of new nodes

    • End-to-end performance and fault management

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

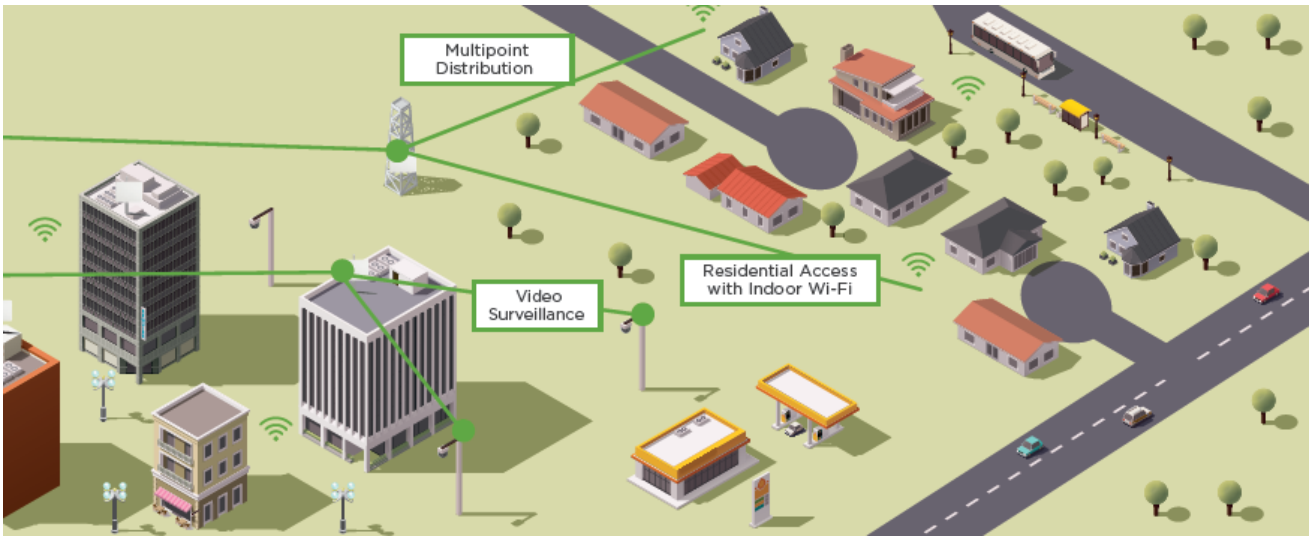
• Centralized firmware and software management

The Cambium Difference

• Spectral Efficiency – Providing the highest amount of information transfer in the least amount of scarce spectrum with industry award winning throughput.

• Scalability – Connecting up to thousands of individual locations with a synchronized network that enables RF frequencies to be re-used throughout the network, providing the highest level of connectivity in the least total amount of spectrum.

• Reliability – Deploying wireless broadband that consistently works right the first time and continues over the long haul.



• Total Cost of Ownership – Minimizing the total cost of network ownership with one IP-based wireless network, comprised of licensed and unlicensed backhaul and access components, which can be rapidly deployed and perform reliably with minimum maintenance cost.

• Sustainability – Solutions are designed to operate for years from a supplier with a legacy of stability and sustainable product evolution.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Cambium 365 and 5 Coverage Map

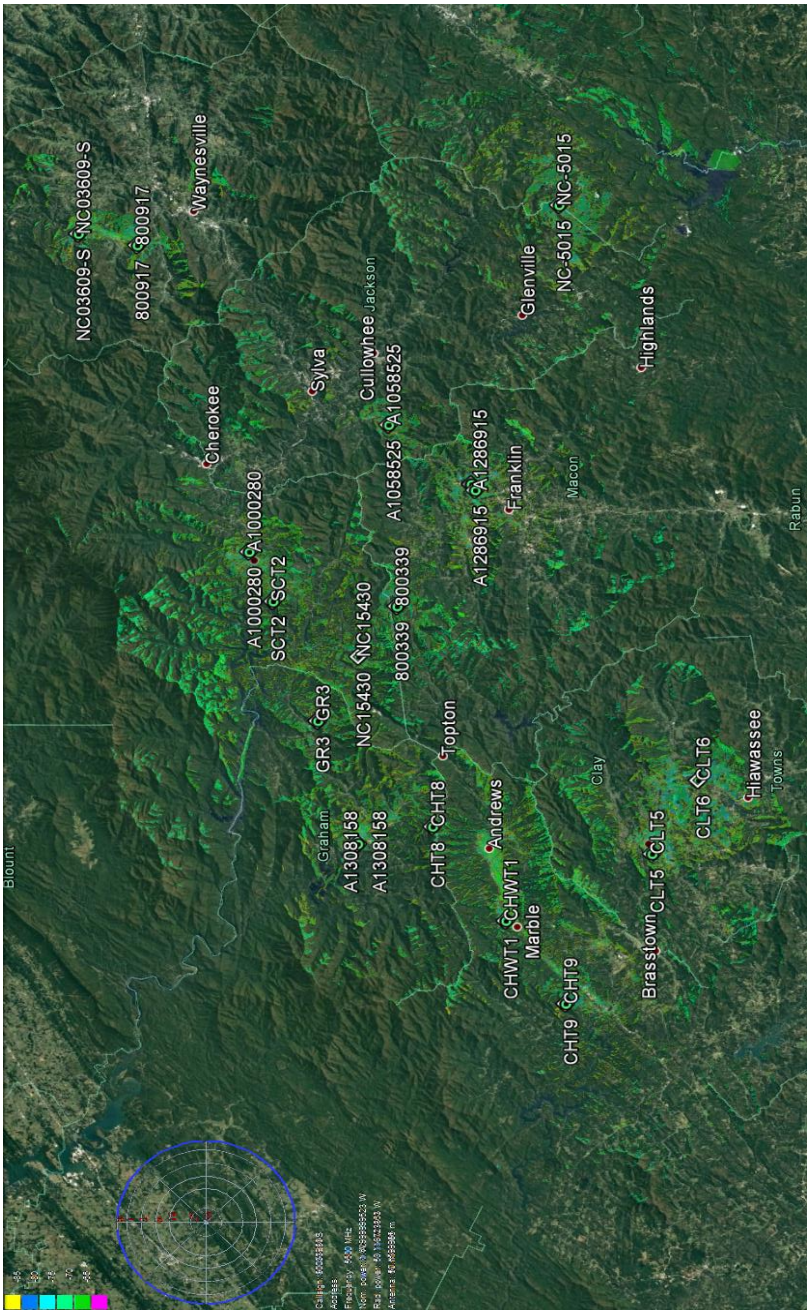


FIGURE 43 CAMBIUM COVERAGE MAP

Radwin

Radwin Executive Summary

RADWIN has a rich history of engineering and deploying Broadband Wireless Access (BWA) solutions and services to a broad set of broadband services providers worldwide. RADWIN has more than 20 years proven track record with over 1 Million radios installed in 170 countries.

RADWIN believes that our solutions, services and broadband service providers network will provide these 17 counties in western of North Carolina with a strategic partner that provides a set of best in class solutions and a long-term relationship that meets the growth plan. In this proposal, RADWIN is including solutions that are available in the market today and upcoming solutions that will be available in 2020.

RADWIN's Network Highlights

- A robust set of Sub-6Ghz, JET DUO and JET Alpha base station and subscriber radio access solution which is generally available in the market today.
- An industry leading Television White Space (TVWS), low-band spectrum, PtMP base station and subscriber radio access solution, developed in partnership with Microsoft, which will be generally available in the market in the second quarter of 2020.

- A comprehensive set of network Operations Service and Support (OSS) software solutions and tools for radio access network and associated broadband services life cycle management.
- RADWIN Professional Services offerings to support the entire life cycle of broadband network services offerings to customers.
- Not targeted to fulfill this proposal but more future growth, included in this proposal, RADWIN will include a highlight on our latest development, A 60 Ghz, high-band spectrum, mesh radio solution, developed in partnership with Facebook which will be generally available in the market in the end of 2020.

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

RADWIN Solutions Differentiator:

- ***Fiber-Like Experience***. RADWIN's Bi-Beam™ radio technology delivers the industry's highest broadband capacity with the best user experience, in a way that was once only possible when using fiber.
- ***Best-In-Class Radio Frequency Interference Immunity***. Bi-Beam technology utilizes a narrow antenna beam to provide outstanding radio interference immunity to provide maximum subscriber throughput and sector spectrum utilization.
- ***Support for both Service Level Agreement (SLA) and Best Effort Broadband Services***. RADWIN's solution enables service delivery of both strict SLA and best-effort services. This allows the service provider to serve both enterprises and consumers using a single platform for reduced investment and greater operational flexibility.
- ***Carrier Class and Built to Last***. RADWIN manufacturers ruggedized carrier-grade equipment to endure harsh weather conditions and last longer. This cuts costs of ongoing replacements and reduces maintenance calls.
- ***Lowest Total Cost of Ownership***. RADWIN's multi-band portfolio of products, advanced radio performance technology, and comprehensive set of broadband services life cycle management tools all work together in concert. This enables service providers to cover a wider area with fewer base stations, towers and backhaul to save on infrastructure costs and maintenance.

Western North Carolina Project – RADWIN Radio Planning Report

The following section will cover preliminary report on RADWIN JET PRO base station and HSU Pro 250M and 50Mbps Integrated subscriber unit for counties in Western North Carolina. NOTE: This is a preliminary report. Site survey and spectrum analysis is required prior to installation to confirm results.

RADWIN provides feasibility studies of microwave radio paths in support of bidding efforts or when equipment has been purchased by the Client. Feasibility studies are performed using information provided by or on behalf of the Client. Results of the feasibility study are provided to the Client and may include:

1. Network Overview map
2. Path Profile
3. Path Calculations
4. Availability calculations
5. Bill of Materials

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

*** Feasibility studies are preliminary in nature and are not intended to represent a final design. It does not take into account foliage, man-made obstructions or outside interference. Therefore, no guarantee is provided, and the Client assumes all risks associated with installing any equipment based on a feasibility study.

General Notes

1. Plan was conceived using the 5.8GHz band and 40MHz channels
2. HSU 250 and 50Mbps units spelled out in the plan for all sites. Options for different HSUs available.
3. Estimated JET PRO AGL height at 200 ft. True height TBD
4. Used mount heights 20ft as the baseline for all targets. Additional height required to satisfy terrain exceptions

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Radwin Coverage Maps

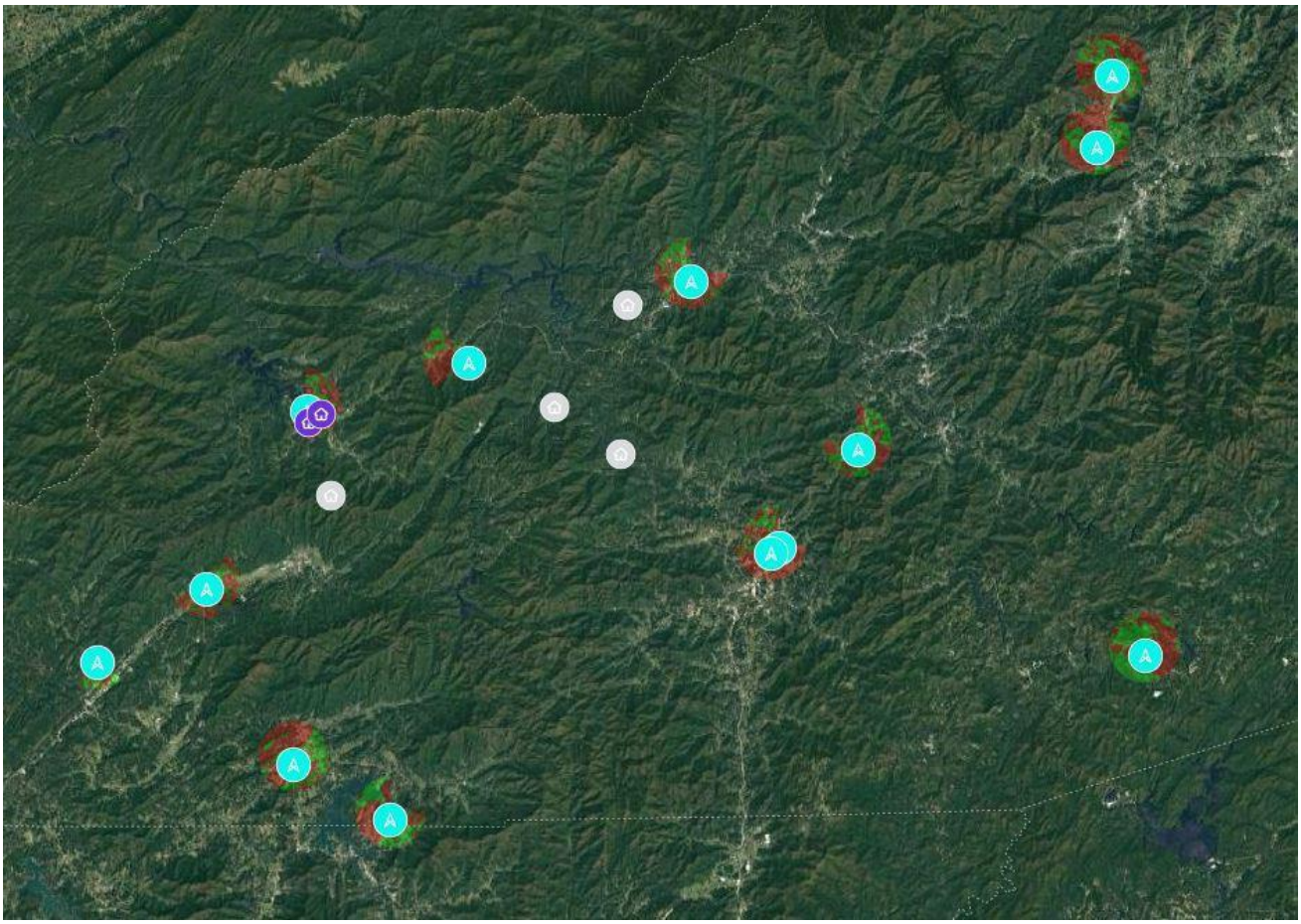


FIGURE 44 RADWIN OVERALL

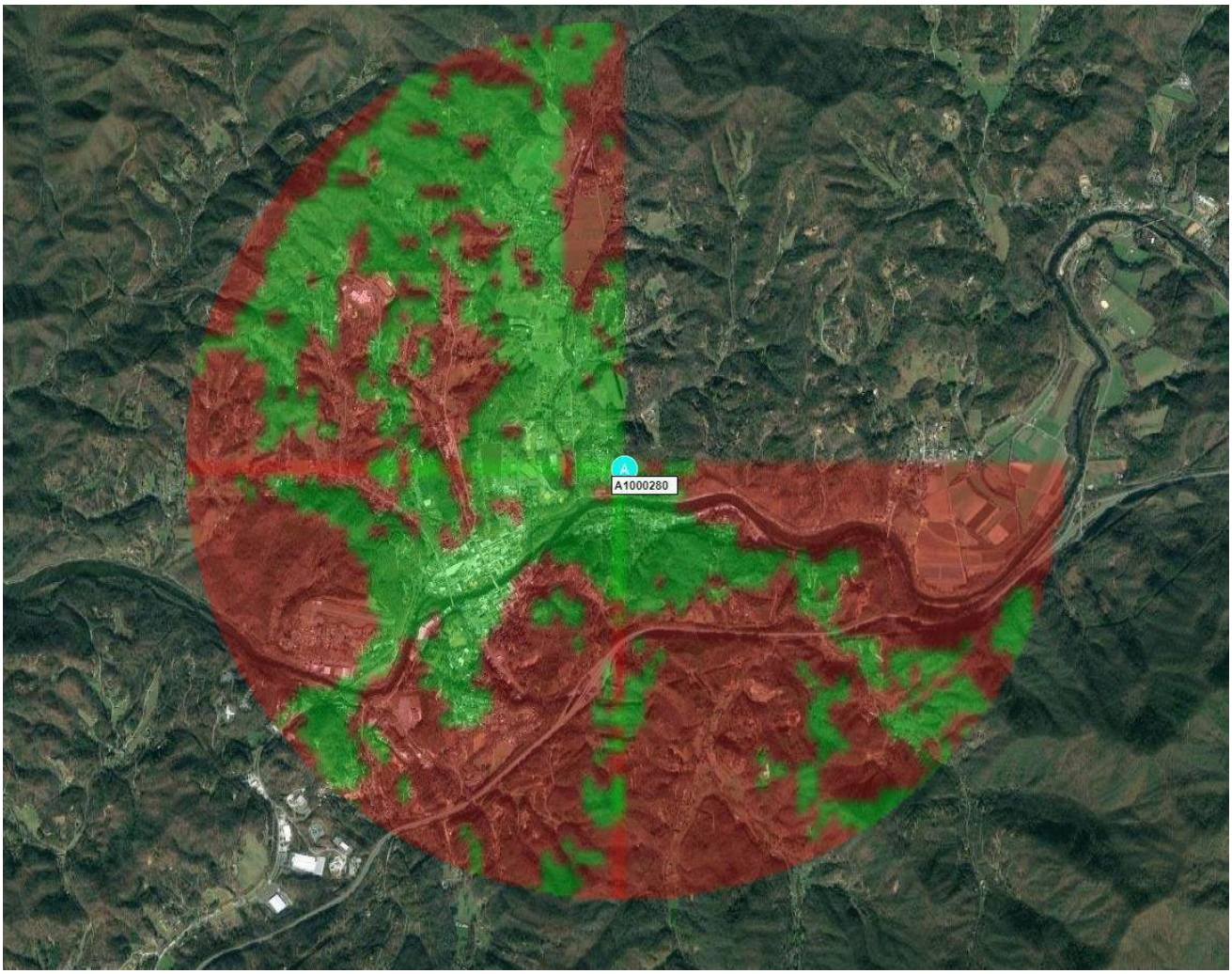


FIGURE 45 TOWER 1000280

A1000280 Nominet: TVWS Availability 2 10Mhz channels at 16dbm 35.436333, -83.435528

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

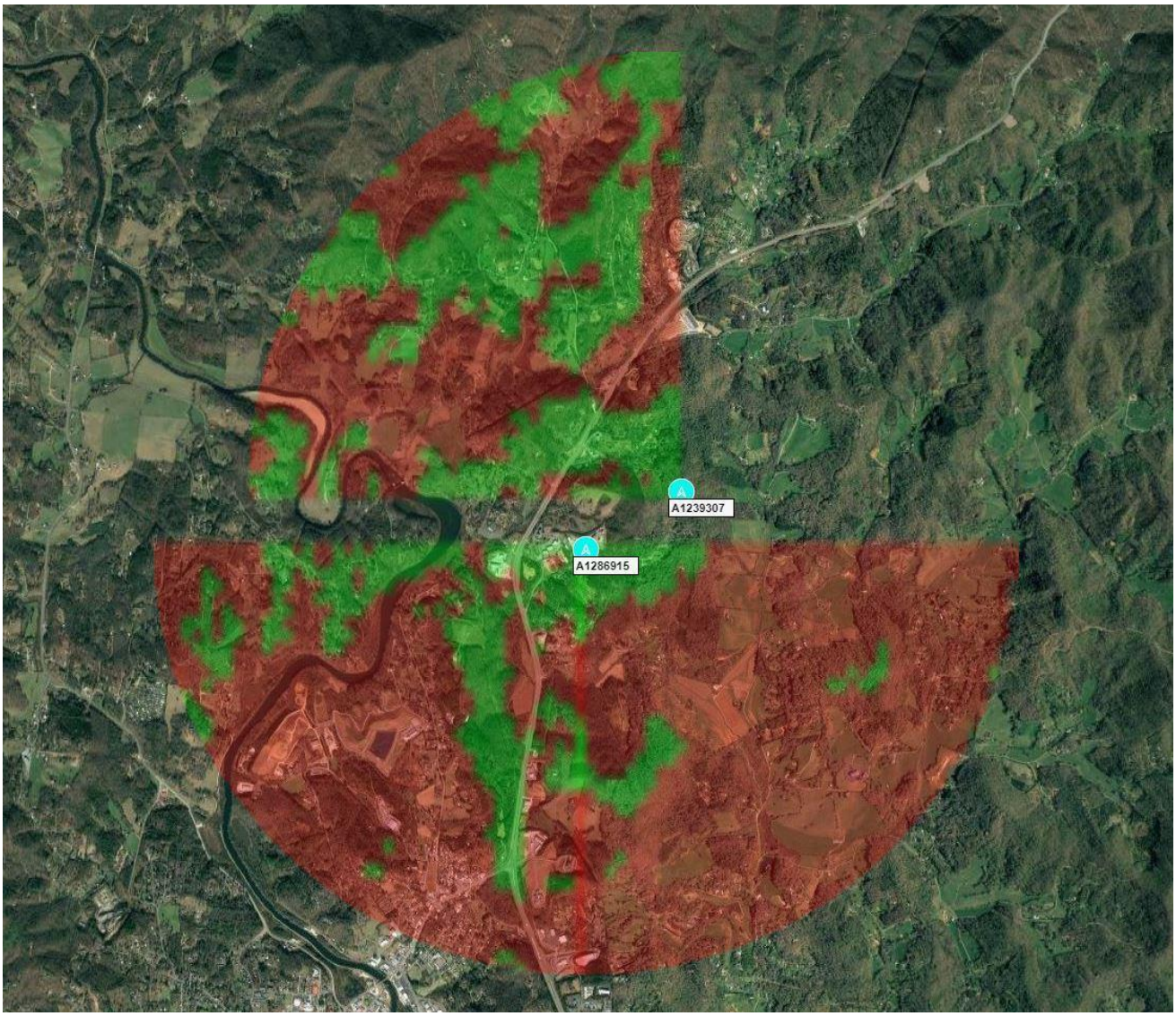


FIGURE 46 TOWER A1286915

A1286915 Nominet: TVWS Availability 2 10Mhz channels at 16dbm 35.215556, -83.355778

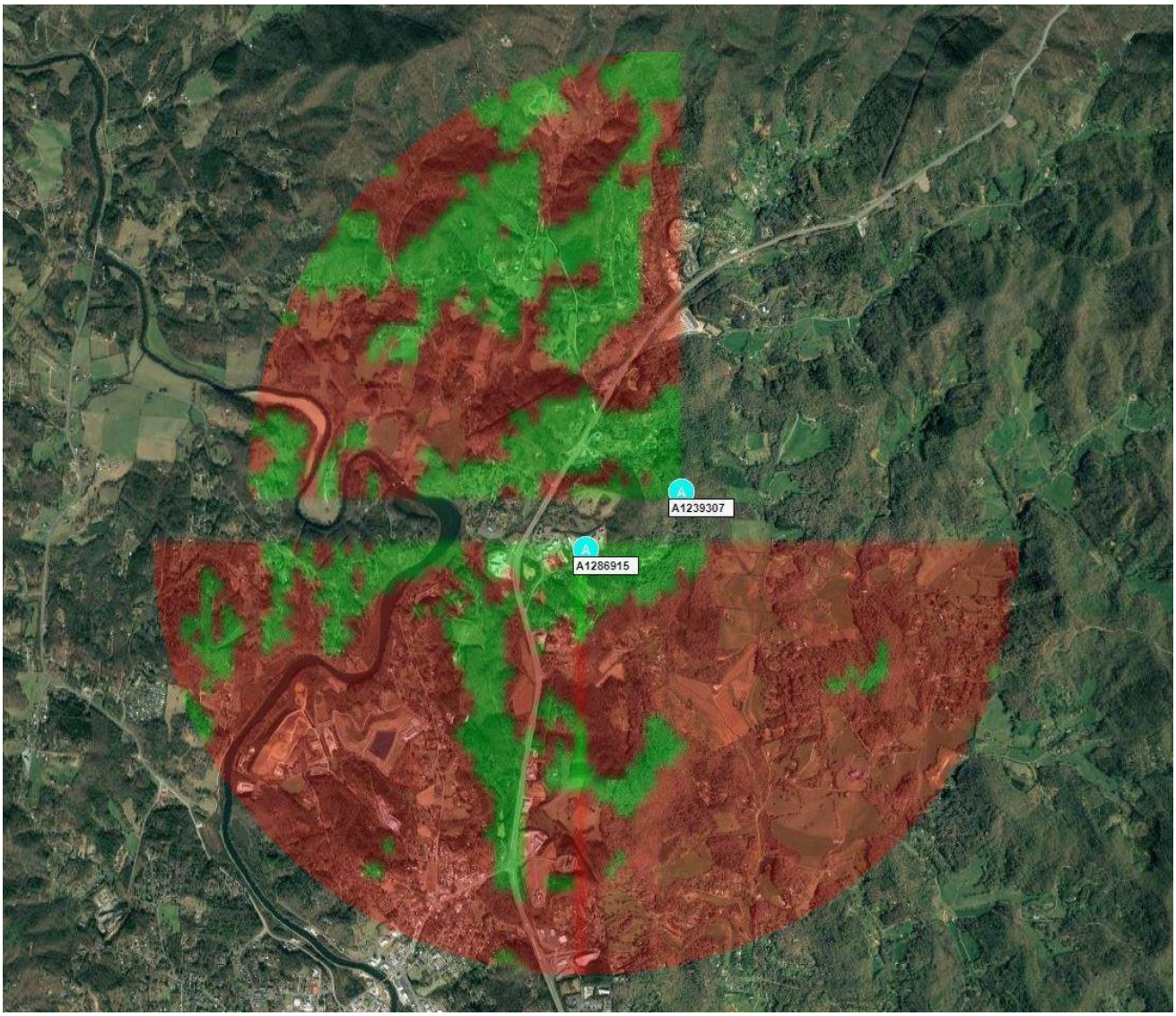


FIGURE 47 A1239307

A1239307 Nominet: TVWS Availability 2 10Mhz channels at 16dbm 35.219389, -83.347917

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

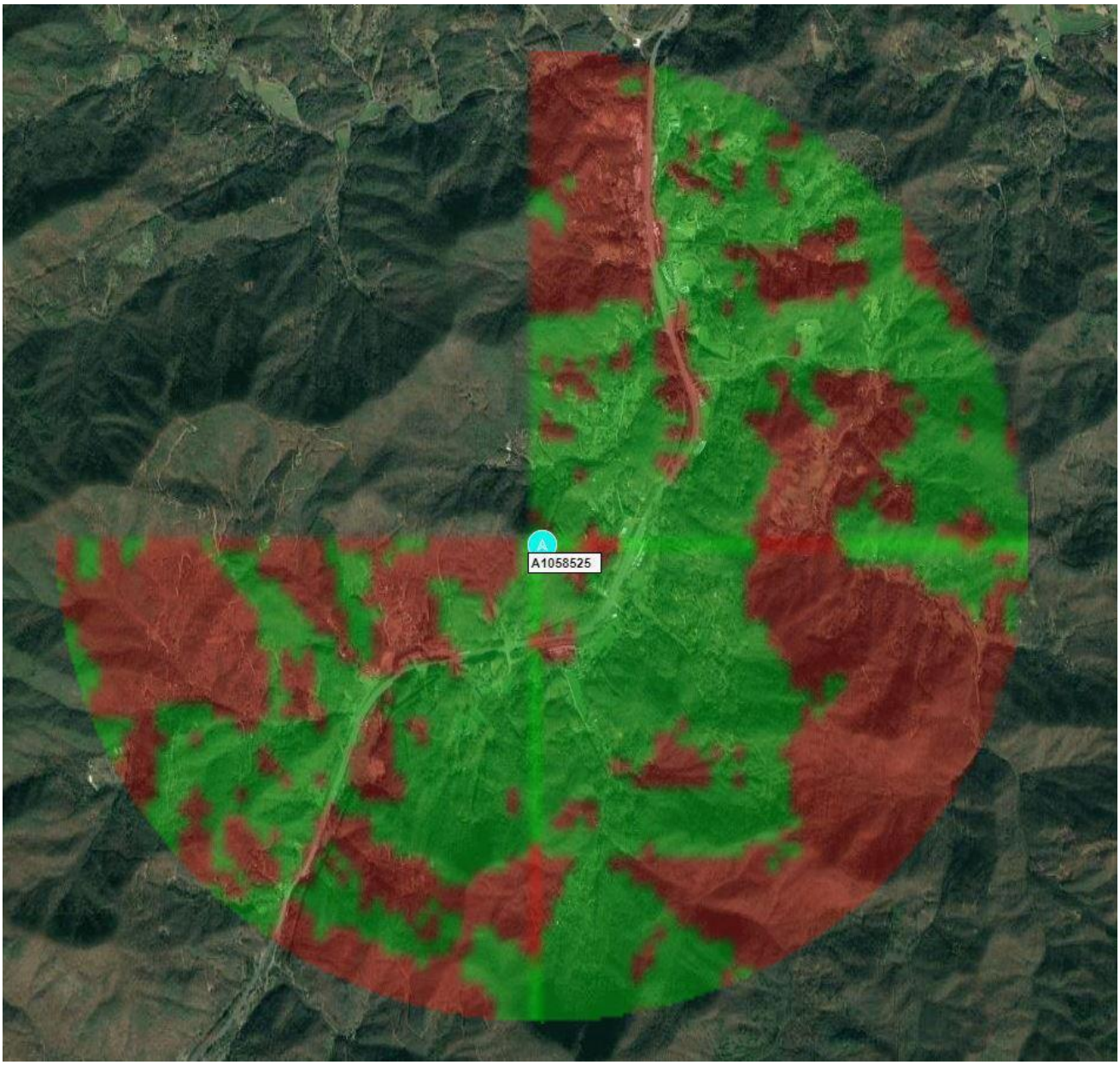


FIGURE 48 TOWER 1058525

A1058525 Nominet: TVWS Availability 1 10Mhz channels at 16dbm 35.299778, -83.269972

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

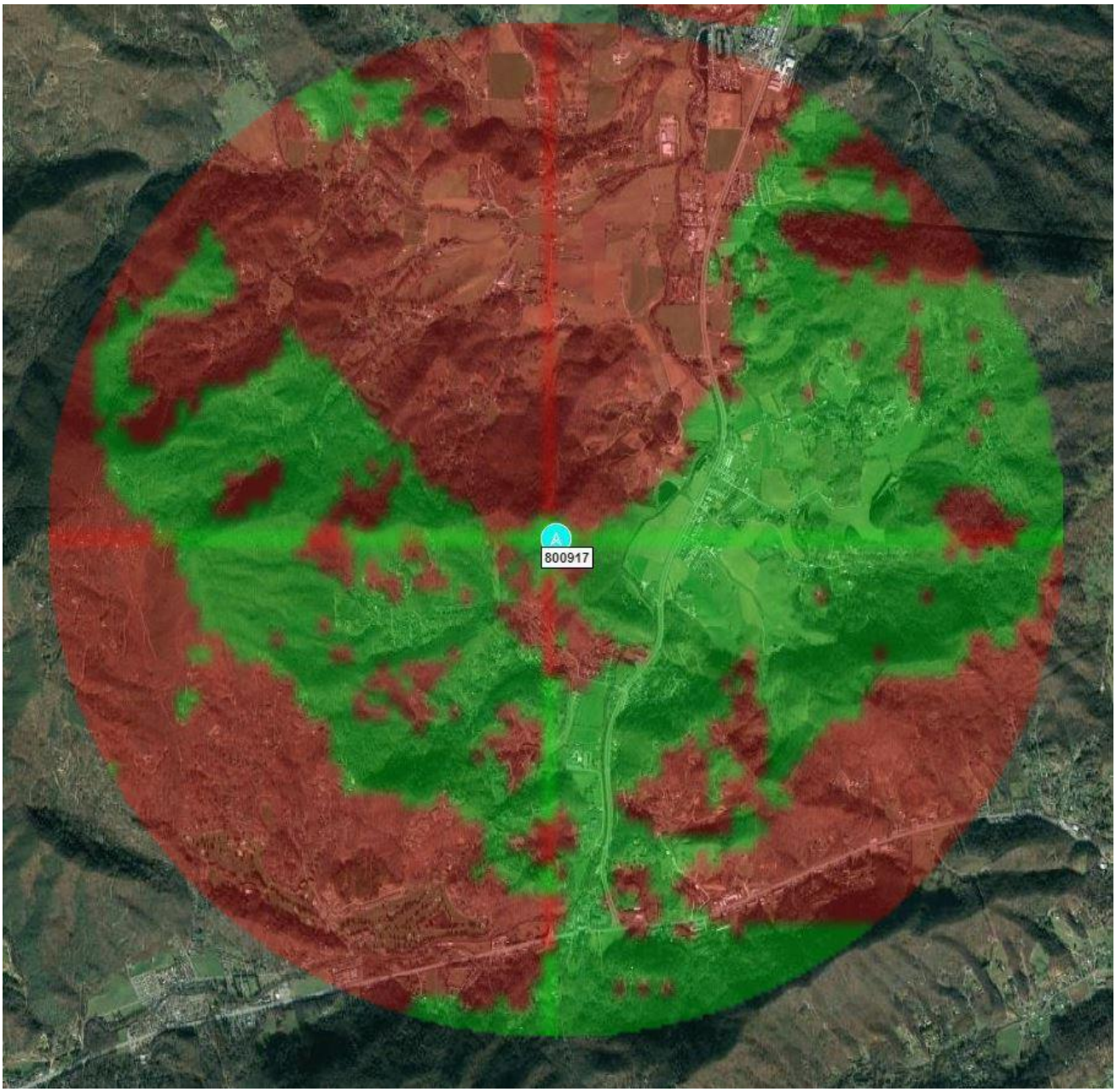


FIGURE 49 TOWER 800917

800917 Nominet: TVWS Availability 2 10Mhz channels at 16dbm 35.544528, -83.032558

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

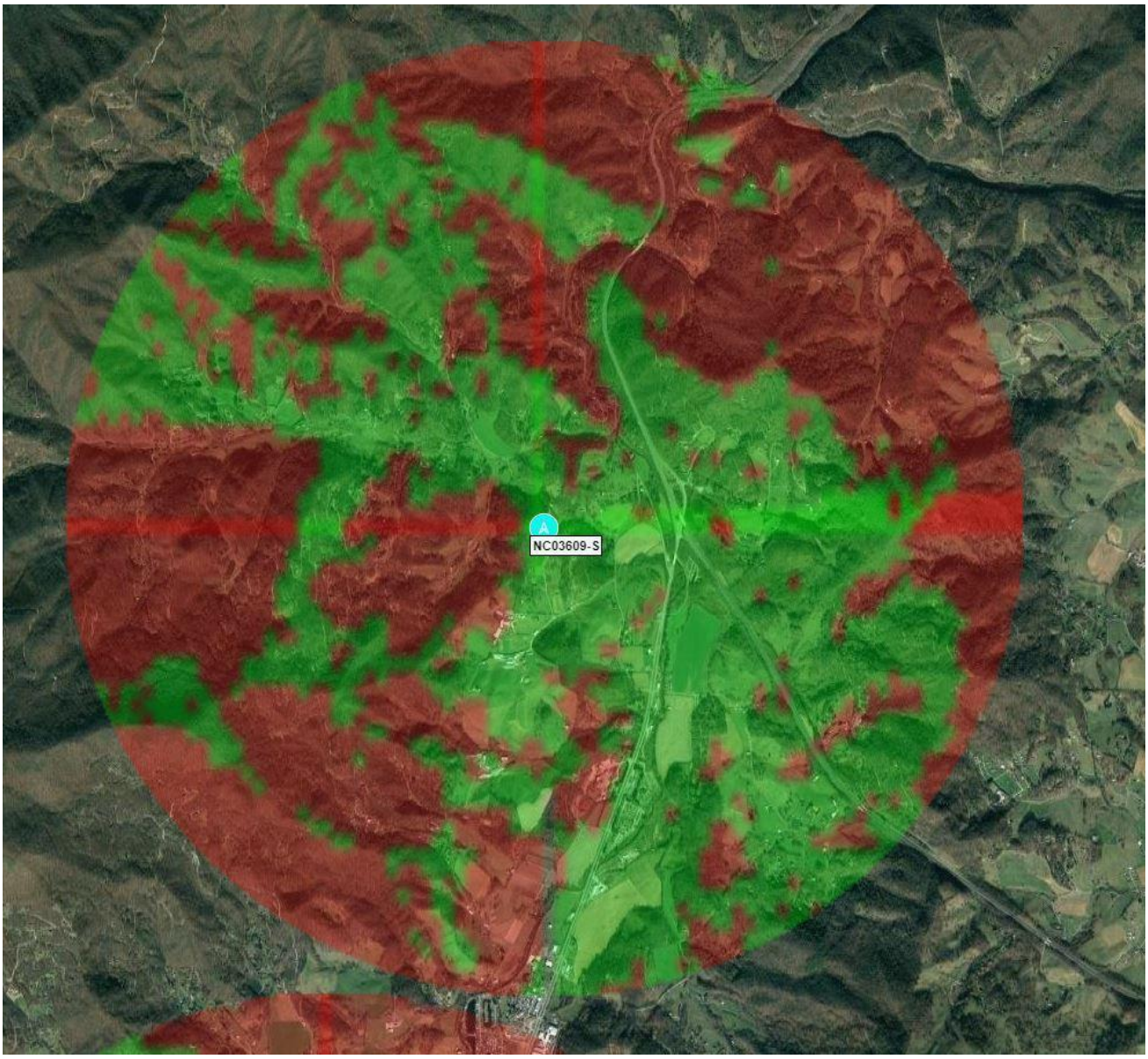


FIGURE 50 TOWER NC03609

NC03609 Nominet: TVWS Availability 2 10Mhz channels at 16dbm 35.602044, -83.016811

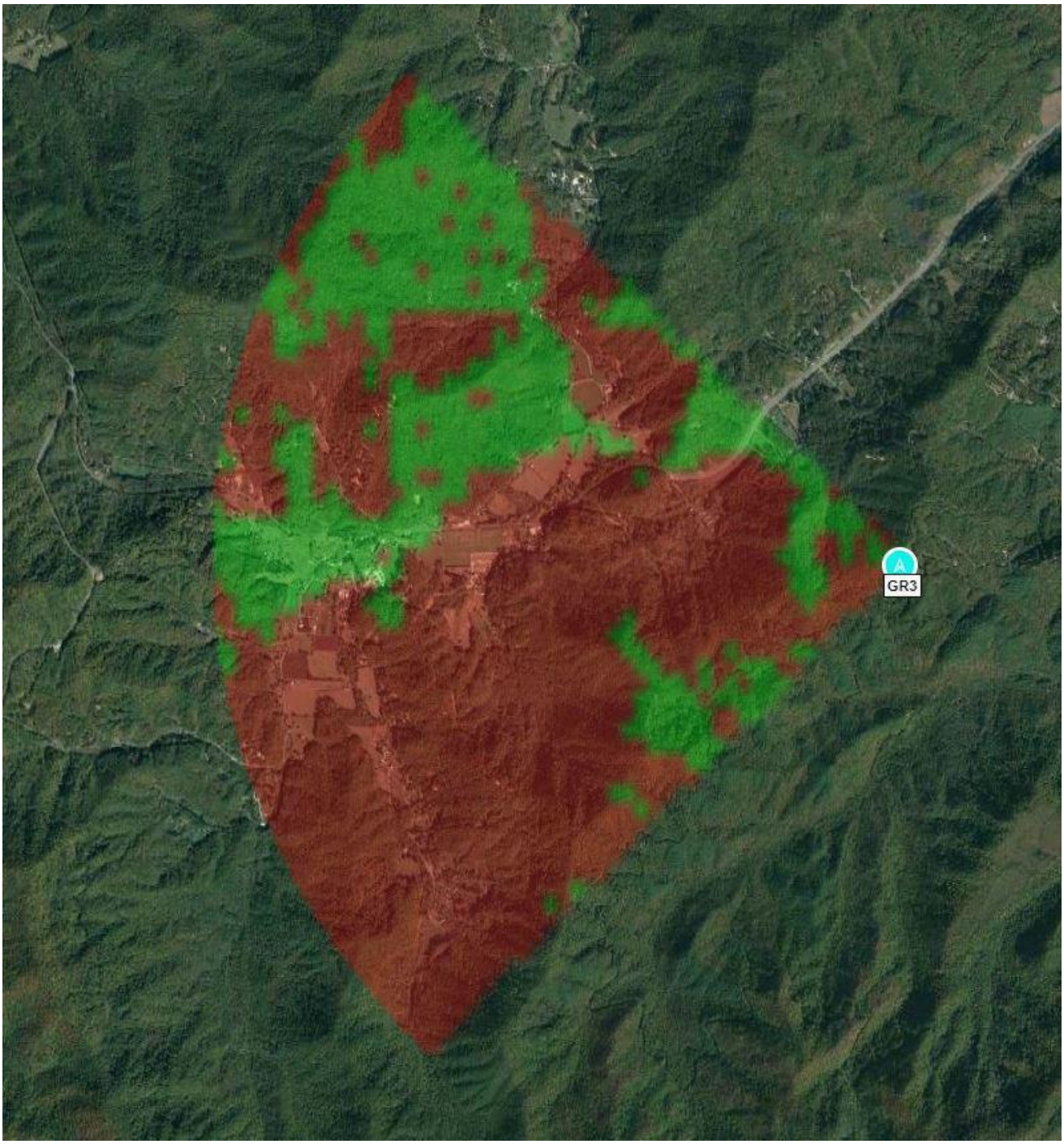


FIGURE 51 TOWER GR3

GR3 Nominet: TVWS Availability 3 10Mhz channels at 16dbm 35.37202, -83.66930

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

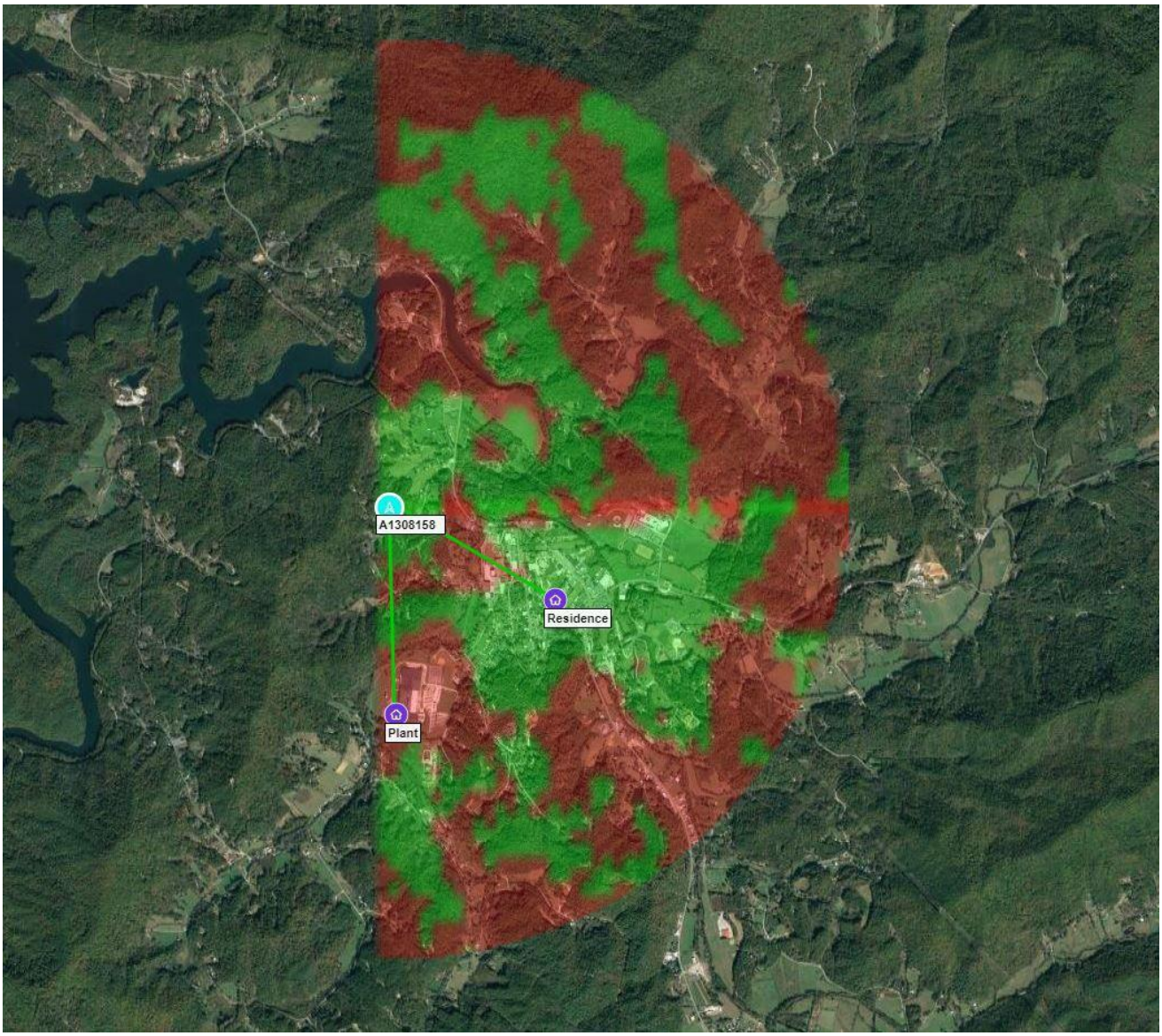


FIGURE 52 TOWER A1308158

A1308158 Nominet: TVWS Availability 4 10Mhz channels at 16dbm 35.330472, -83.817972

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

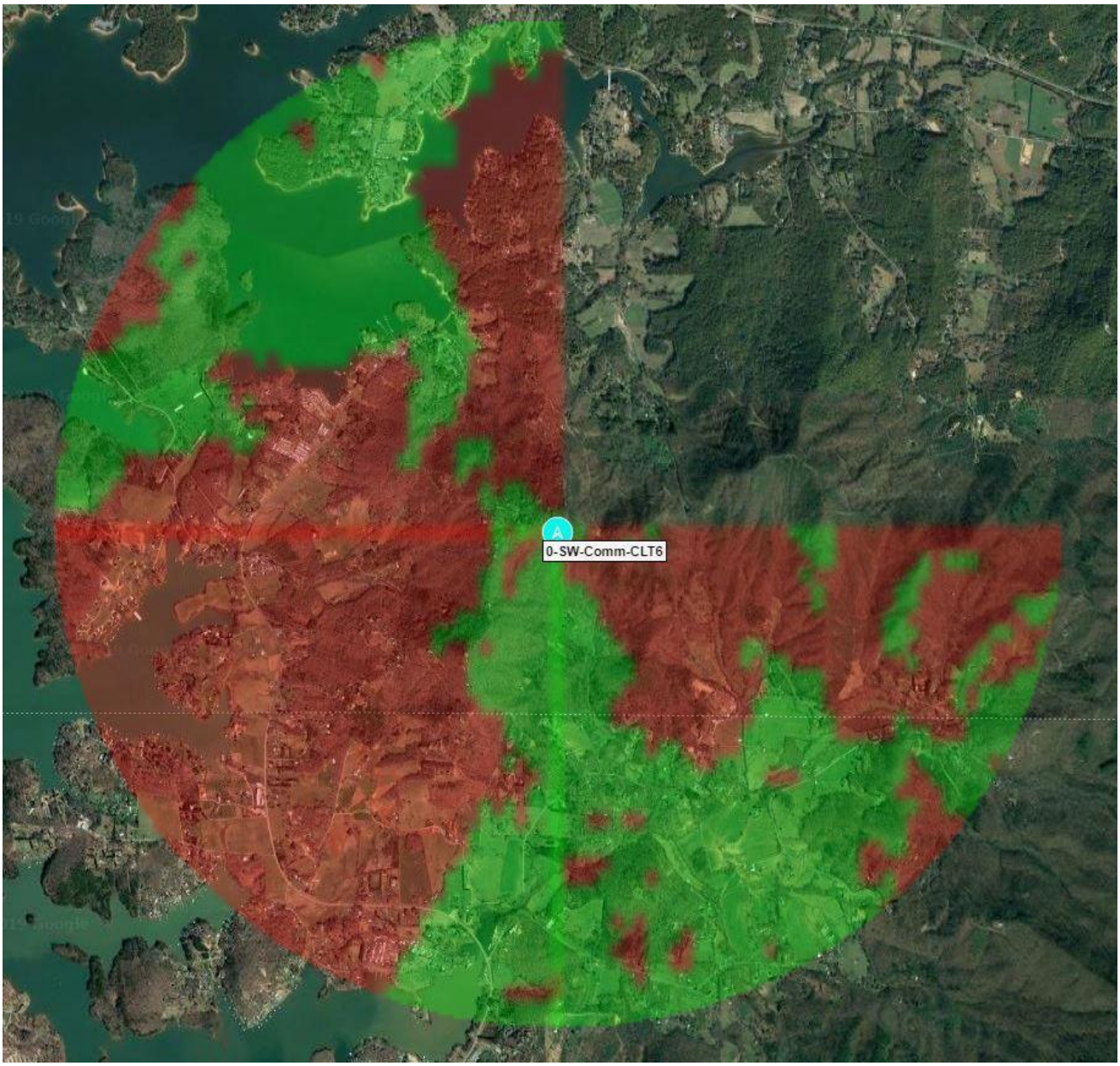


FIGURE 53 TOWER CLT6

CLT6 Nominet: TVWS Availability 4 10Mhz channels at 16dbm 34.99212,-83.73401

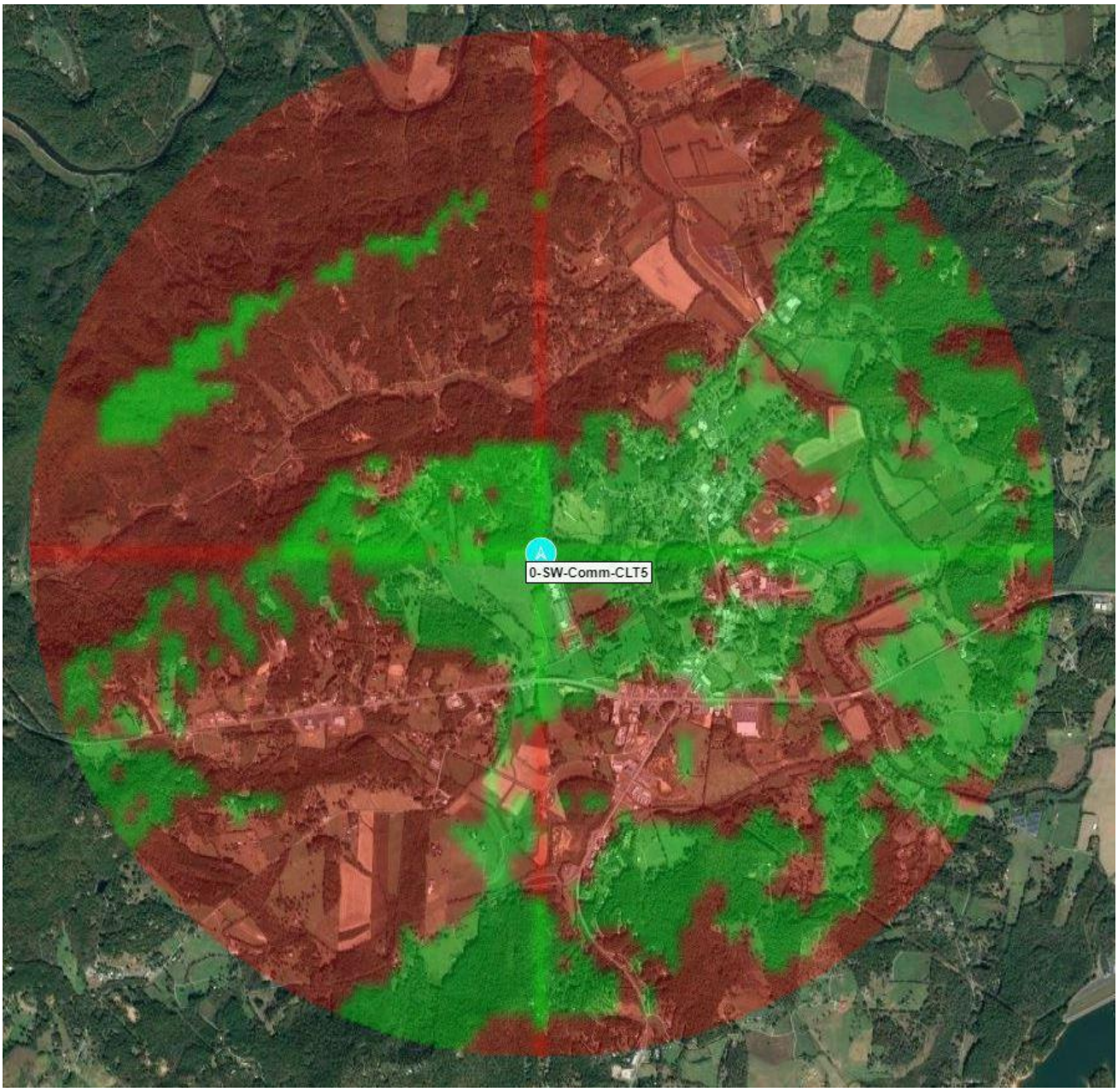


FIGURE 54 TOWER CLT5

CLT5 Nominet: TVWS Availability 3 10Mhz channels at 16dbm 35.043271, -83.830499

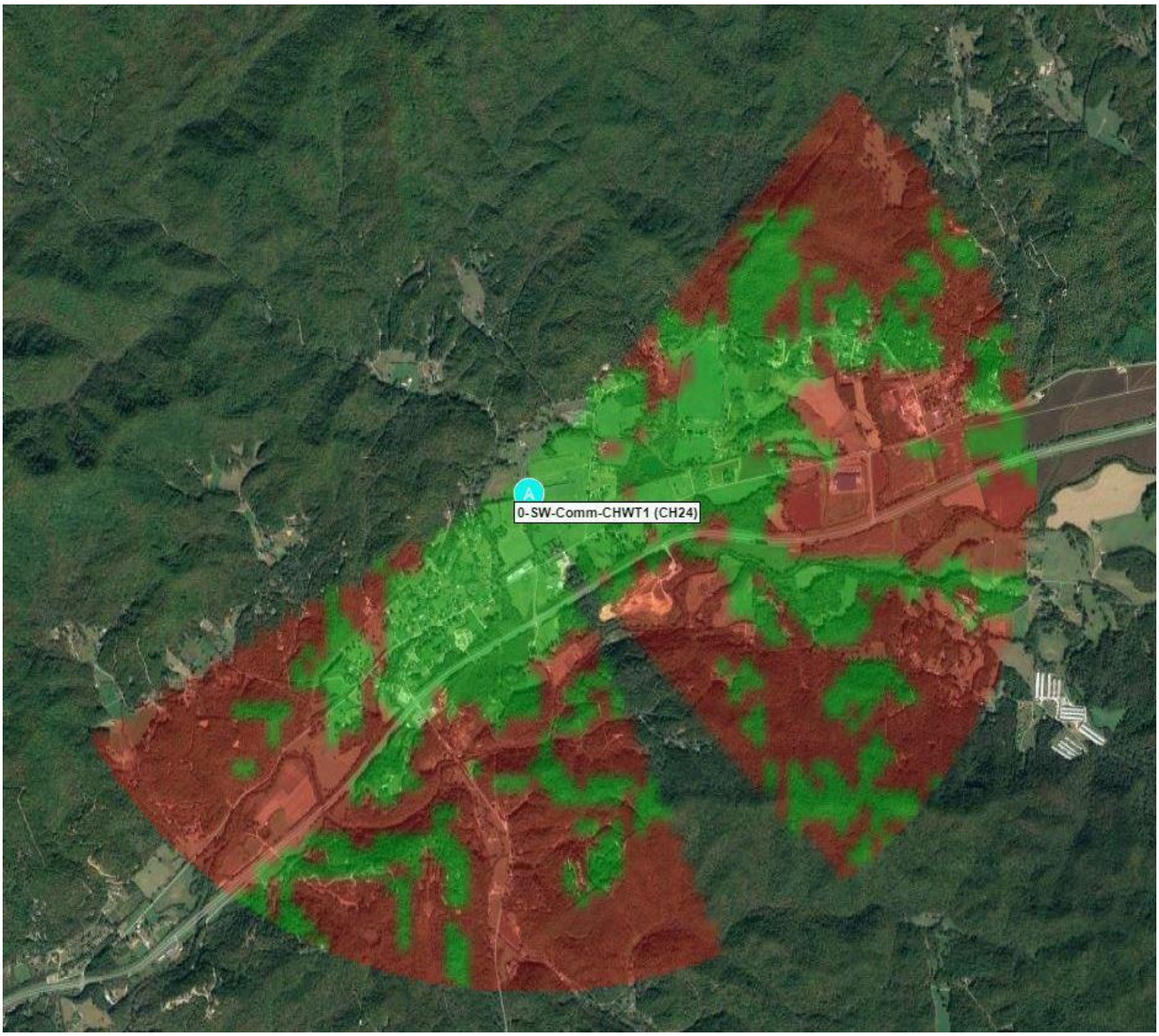


FIGURE 55 TOWER CHWT1

CHWT1 Nominet: TVWS Availability 3 10Mhz channels at 16dbm 35.185836, -83.918151

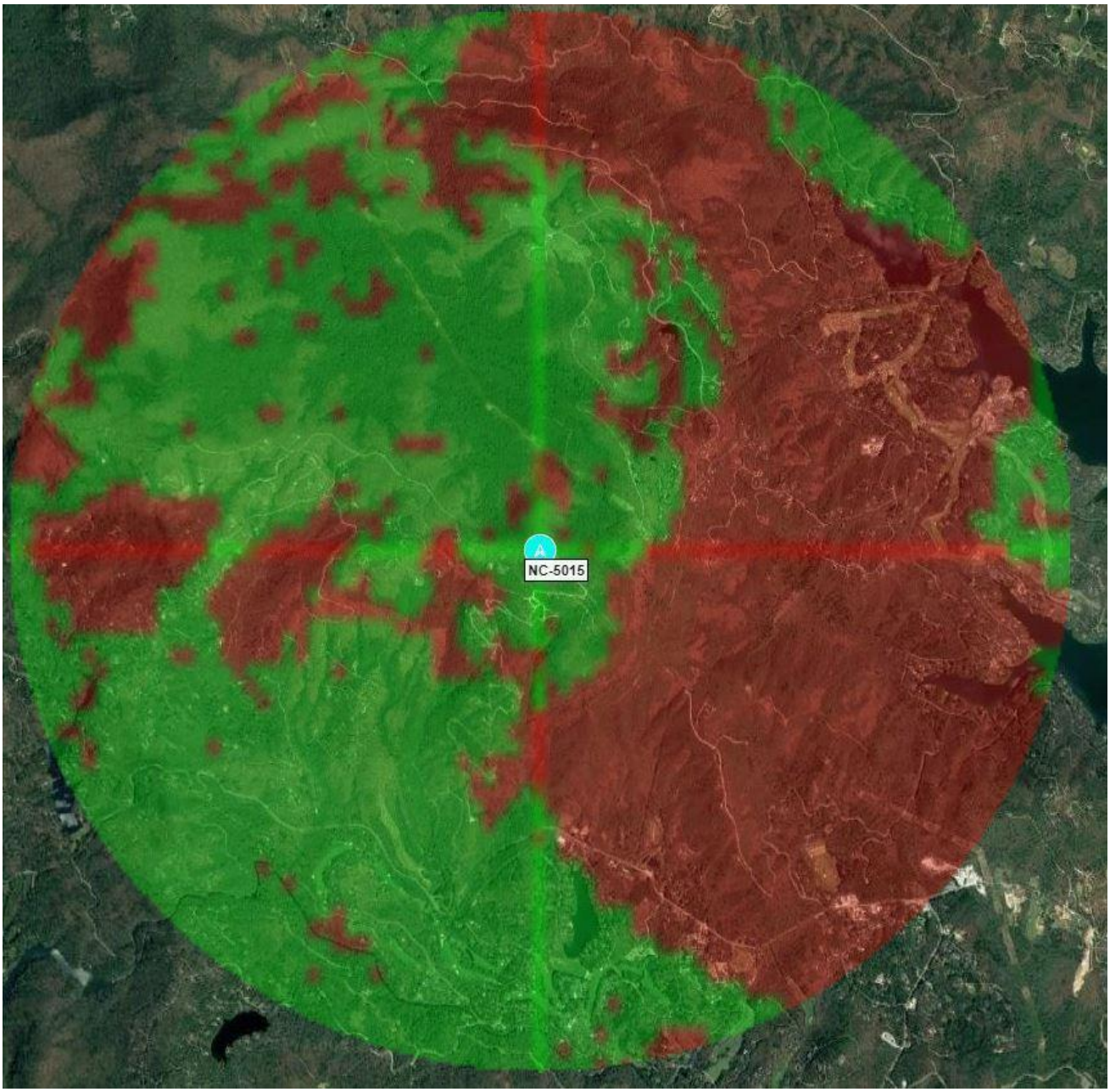


FIGURE 56 TOWER NC5015

NC5015 Nominet: TVWS Availability 1 10Mhz channels at 16dbm 35.11122, -82.97396

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

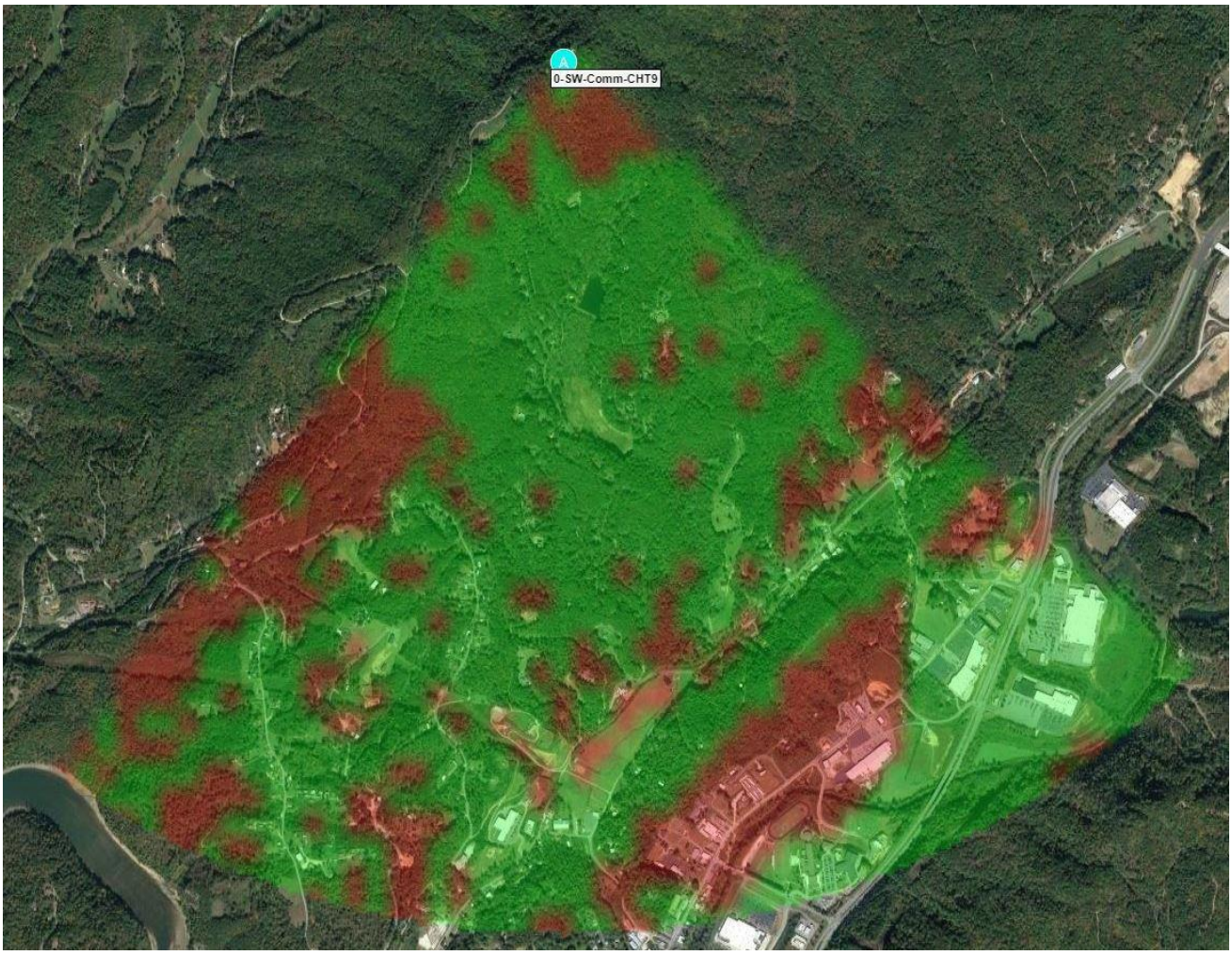


FIGURE 57 TOWER OSWCHT9

OSWCHT8 Nominet: TVWS Availability 4 10Mhz channels at 16dbm 35.27504, -83.76307

800339 Nominet: TVWS Availability 2 10Mhz channels at 16dbm 35.292126, -83.507177

SCT2 Nominet: TVWS Availability 1 10Mhz channels at 16dbm 35.413061, -83.500407

NC15430-A Nominet: TVWS Availability 2 10Mhz channels at 16dbm 35.329777, -83.573083

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

HBS: OSWCHT9-180

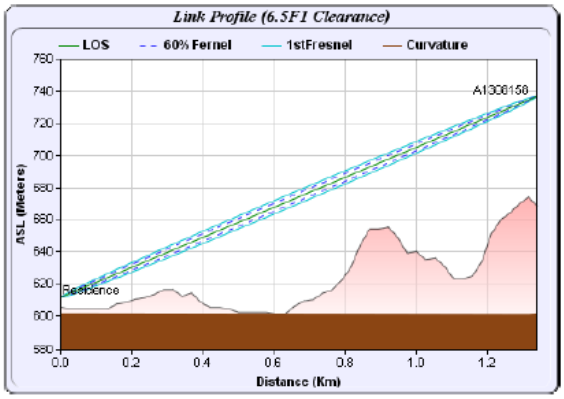
Properties

Product	RW5000/HBS/5PG5/F3F5/IC/JET-DUO/INT
Site Name	0-SW-Comm-CHT9
Frequency (MHz)	None
CBW (MHz)	40
Azimuth (Deg°)	173.9
Elevation (Deg°)	0
Antenna Beam Width (Deg.)	90
DL / UL Ratio	80% / 20%
CIR / Best Effort Ratio	50% / 50%
DL CIR Allocation	0%
UL CIR Allocation	0%
CIR Number Of Users	0
Best Effort Number Of Users	0
CIR Aggregated Capacity (Mbps)	0

FIGURE 58 EXAMPLE OF RADWIN BASE STATION PARAMETERS

HBS Link: Residence_A1308158

HBS Name	Family	CBW	Distance	Polar	Service	Availability	Frequency	RFP
A1308158-135	RW5000	40 MHz	0.837 miles	Dual	(50 Mbps/50 Mbps DL/UL DBA Peak)	99.9994%	5800 MHz	E



Properties	A1308158	Residence
Unit Name	A1308158-135	HSU
Height above Sea	2415.3543 ft	2004.9081 ft
Antenna Height	223.7533 ft	20 ft
Regulation	5.8 GHz FCC/IC	5.8 GHz FCC/IC
Product ID	RW5000/HBS/5PG5/F3F5/IC/JET-DUO/INT	RW5000/SU-Air/5H50/F58/FCC/INT
Antenna	Integrated Antenna	Integrated Antenna
Rate	300 Mbps	300 Mbps
TX Power	15 dBm	14 dBm
EIRP	36 dBm	40 dBm
RSSI	-57.7 dBm	-56.7 dBm
Fade Margin	7.3 dB	7.3 dB
HSS	HSC	INU
Azimuth	135°	300.4°
Elevation	-4.4°	5.3°

FIGURE 59 EXAMPLE OF RESIDENCE LINK PARAMETERS

Telrad in a Nutshell

Who is Telrad?

- A 67 year old global provider of telecommunications solutions
- Serving over 300 customers with over 4 million lines deployed in 150 countries

What do we do?

- Provide innovative, end-to-end, LTE-based broadband wireless solutions for service providers and private networks
- Enable the delivery of robust, standards based services while improving total cost of ownership

Telrad

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

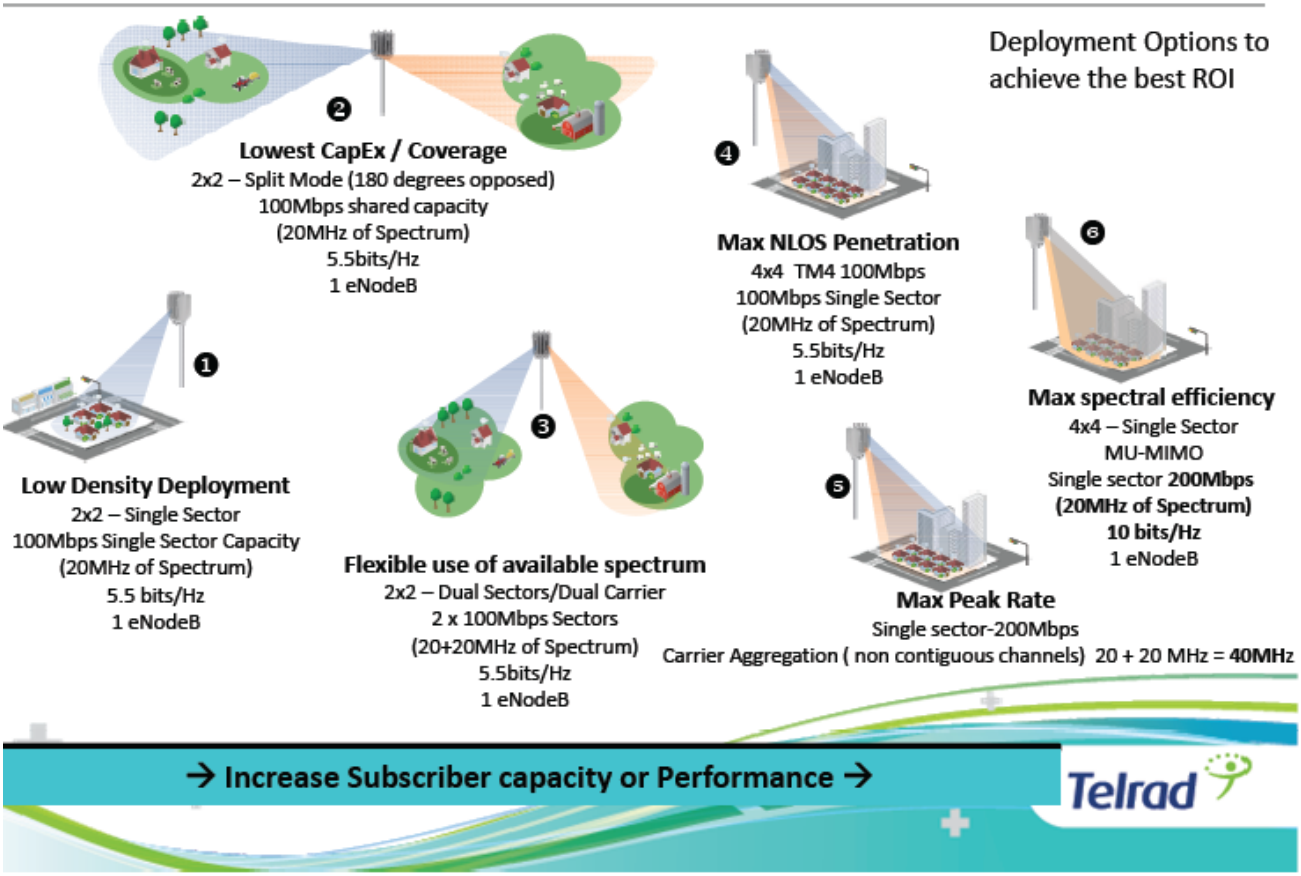
Winning Substantial Customers

- Midco
  - Currently serving 385K customers with fiber and cable
  - Will be deploying over 100K wireless subscribers over the next 5 years
- Poda
  - National wireline provider in Czech Republic
  - Invested in 40Mhz of 3.5GHz spectrum in 2017
  - Rolling out national FWA network to cover rural
- Point Broadband
  - Startup WISP in West Point, GA
  - Focused on fixed BWA in the Southeast U.S.
  - Combined focus on 3.65GHz and 2.5GHz
- Redzone Wireless
  - WISP in Rockland, ME
  - Currently servicing two major markets
  - Building coverage across the entire state

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Telrad Business Model - Deployment Flexibility

1 Radio, Multiple Deployment Options



5GHz

- Single device supporting
  - 20MHz – 40MHz
- High capacity and density per-eNB (20MHz)
  - 220Mbps aggregate capacity
  - 20MHz with 2-user MU MIMO
- High peak rate (40MHz)
  - 270Mbps aggregate sector capacity
  - 2 x 20MHz carrier aggregation
- Available as either connectorized (Compact 1000) or with integrated Antenna (BreezeU100)

Telrad

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Telrad Coverage Maps – Under Development Jan 17 2020

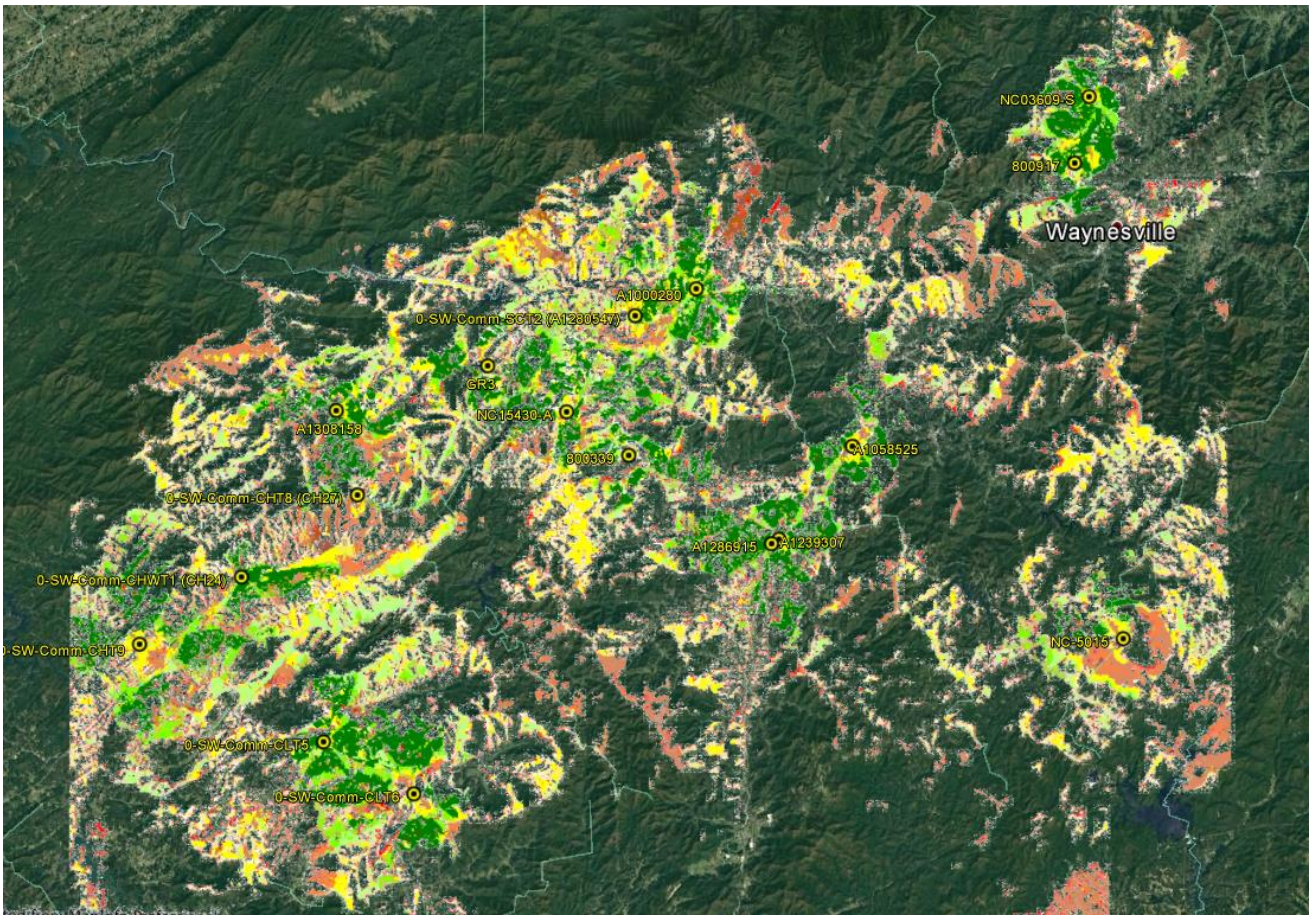


FIGURE 60 TELRAD SINR COVERAGE MAP

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

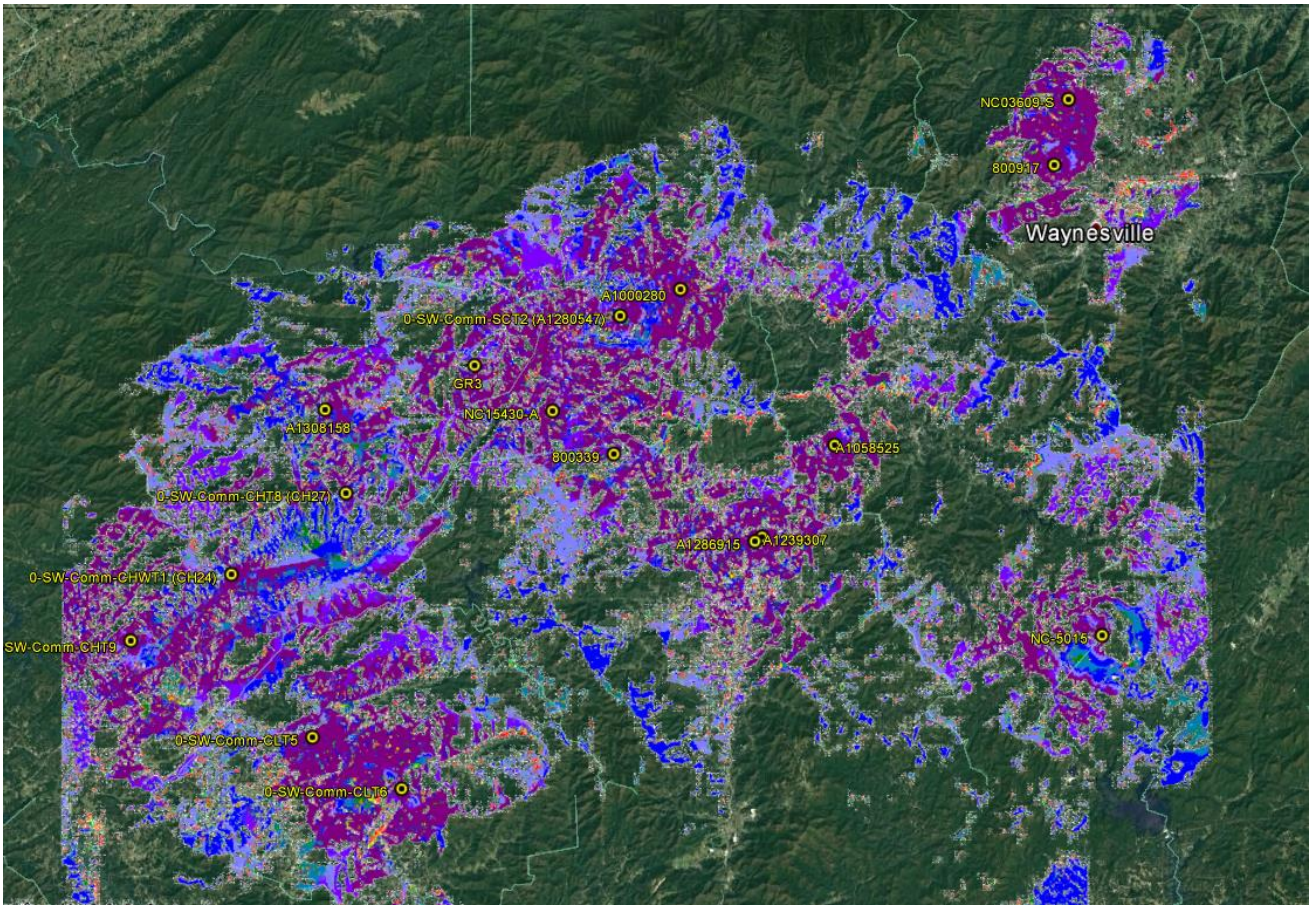


FIGURE 61 TELRAD RSSI COVERAGE MAP

Telrad Parameters

5GHz legend:

Average	Legend	RSSI	RSSI
28		-57.4 dBm	MAX
27		-58.5 dBm	-57.4 dBm
26		-64.4 dBm	-58.5 dBm
25		-67.5 dBm	-64.4 dBm
23		-69.6 dBm	-67.5 dBm
21		-71.6 dBm	-69.6 dBm
19		-73.4 dBm	-71.6 dBm
16		-76.5 dBm	-73.4 dBm
12		-78.0 dBm	-76.5 dBm
8		-81.6 dBm	-78.0 dBm
4		MIN	-81.6 dBm

Average	Legend	SINR	SINR
28		26.2 dB	999.0 dB
27		24.8 dB	26.2 dB
26		23.8 dB	24.8 dB
25		23.0 dB	23.8 dB
23		22.3 dB	23.0 dB
21		21.2 dB	22.3 dB
19		20.1 dB	21.2 dB
16		19.5 dB	20.1 dB
12		18.3 dB	19.5 dB
8		17.3 dB	18.3 dB
4		-999.0 dB	17.3 dB

Planning Assumptions

The exact location of the Base stations, their number and the final planning was according to the input. Telrad did not perform a final thorough site survey, radio survey and EME survey. During the next phase, it would be better to consider the base stations deployment and the distribution of potential subscribers (CPEs' locations, height, azimuth, correct MCS and penetration). All of these

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

will be according to demand in the area. Other issues, such as availability of communication infrastructure, tower heights, and area coverage will take into account after final Base stations locations are determined.

In some cases, due to GIS inaccuracy, there could be some inaccuracy in the results of the simulation and it can never achieve 100% accuracy to the real measurements in the field .

The simulations where carried out using 16 clutters and DTM information only, however due to lack of other information such as buildings layer and vegetation layer (Not Supplied) it is impossible to provide accurate results .

The simulations assume outdoor CPEs align and associate to their correct sector, to avoid interference.

It is important to emphasize that for FIX outdoor CPEs the planning tool assumes correct alignment and association. These CPEs are using directional antenna and the correct alignment and association is critical for operation of the Radio network. Thus, in case additional FIX outdoor CPEs will be add to the network in the future, it is the customer responsibility to align and associate all the FIX outdoor CPEs to their correct sector. The simulations and fade margin based on CPE and BS structure. Additional attenuation loss taken into consideration due to the environment type. In case of blocking (by trees, building …) the coverage area will be less.

The radio simulation was done for outdoor subscribers at clear Line of Sight (LOS) or close to clear LOS condition to the subscriber' UE location.

Outdoor CPE must install professionally, with optimal height and alignment toward serving eNB sector. Outdoor CPEs in the sector should be >= QAM64 (MCS19) and average of MCS24. Telrad providing SINR coverage layer indicating estimated performance per CPE location base on the above. Prior to selecting location for CPE installation, it is required to verify minimum estimated coverage performances, as the planning based on missing or partially missing building and vegetation layers. Otherwise, the sector will not reach its capacity goal. Actual sector capacity driven by the mixture of the sector’s CPEs performance. For the network densification, all sites should be down-tilted to minimize interference affect.

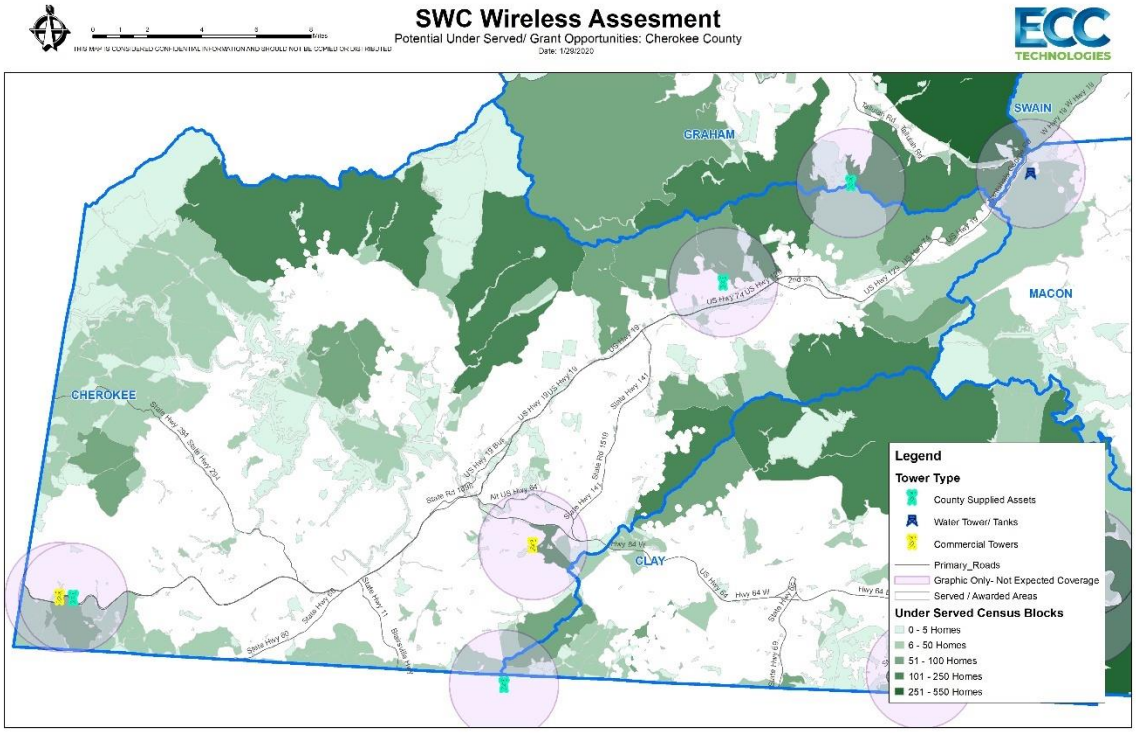
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

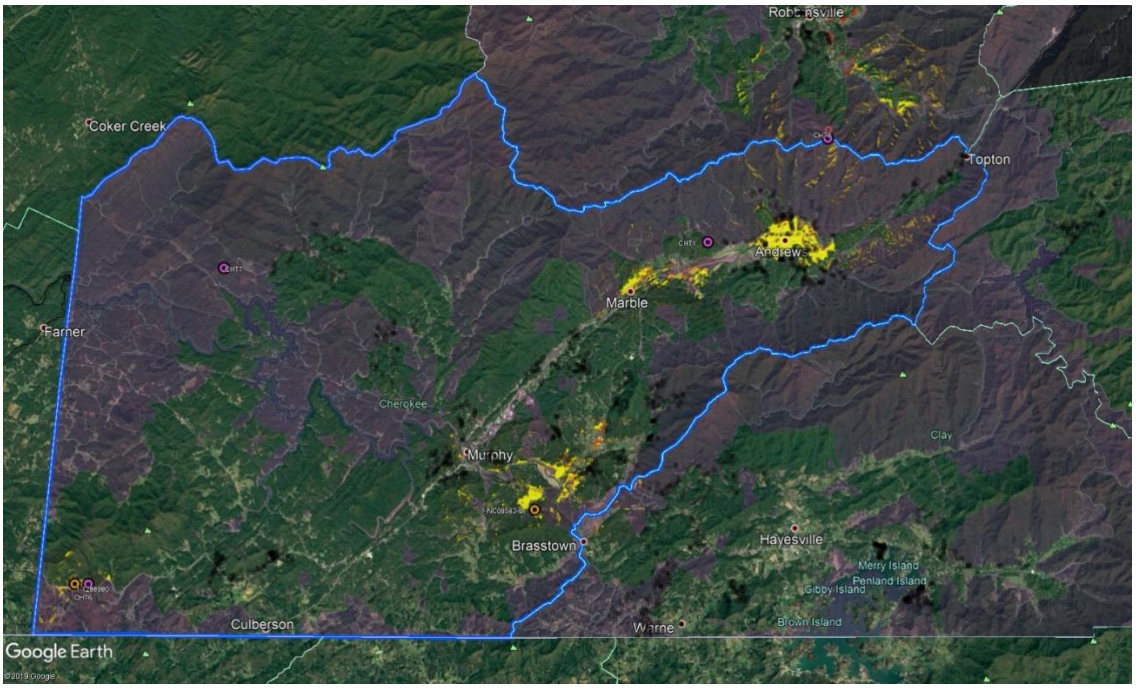
Assuming no other system operating on the area with 50MHz below and above the required allocations.

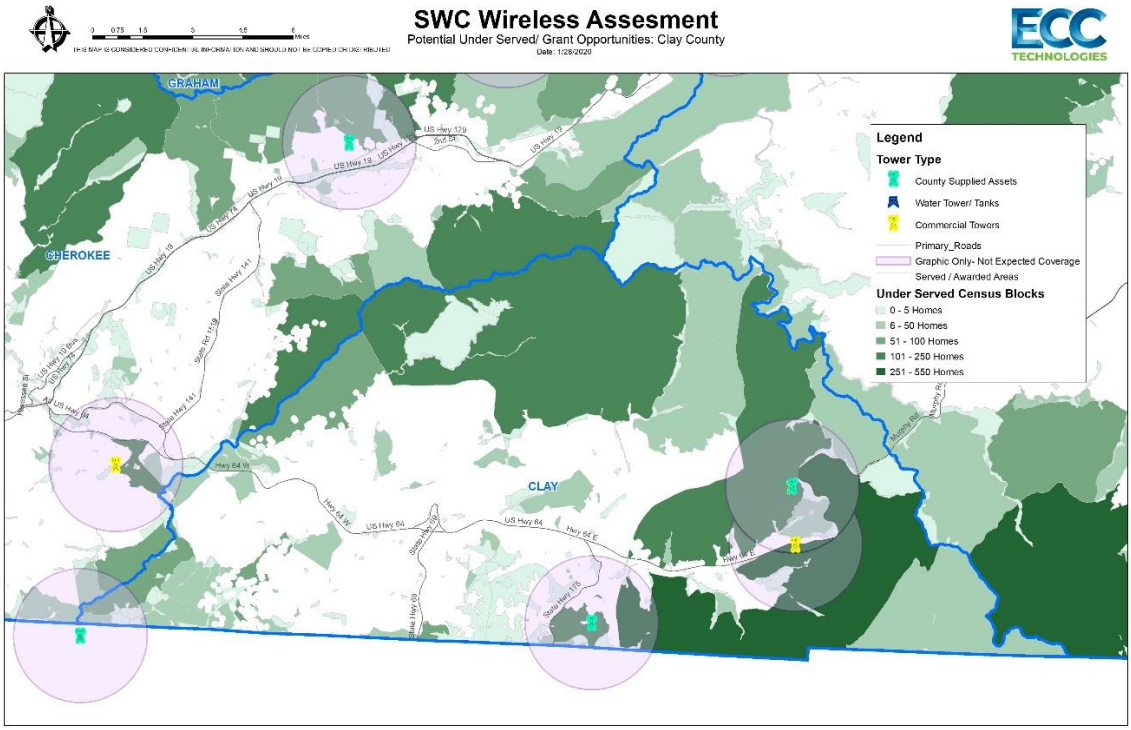
The installation must keep distance from other system and providing information on any other system install in area of the active system. The installation must have the ability for high down-tilt and limit reflection from the roof itself. High tilt is not available on short pole at roof center. Assuming that the BS antenna height is 5m above the building height, with no reflection from the roof or near objects .

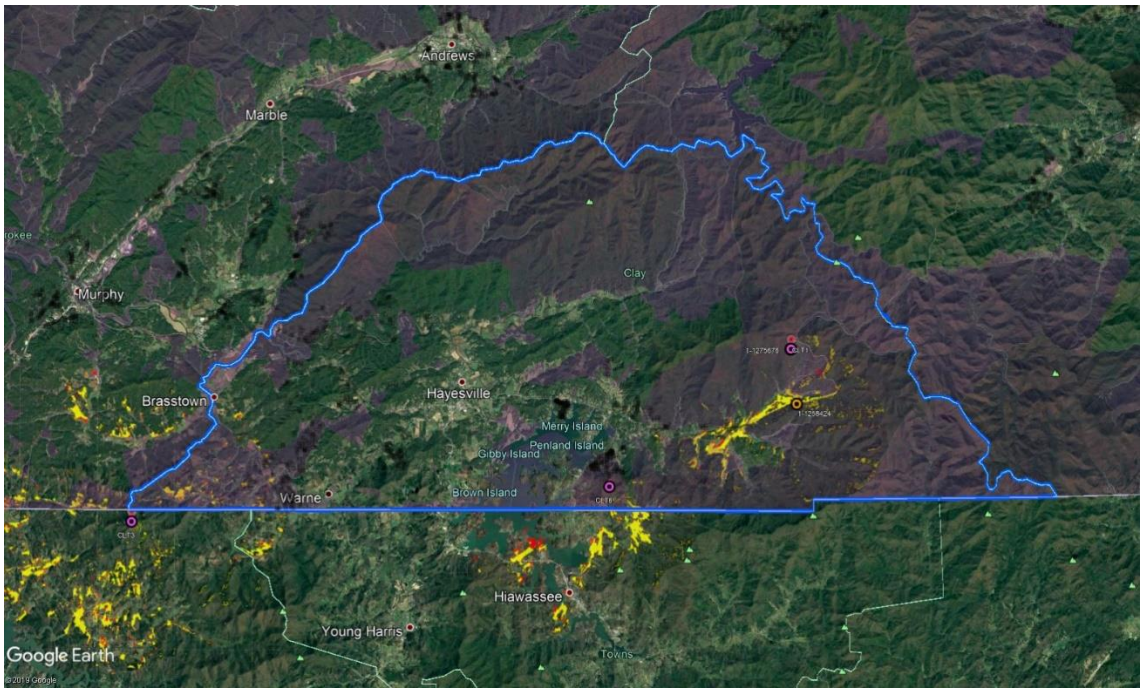
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

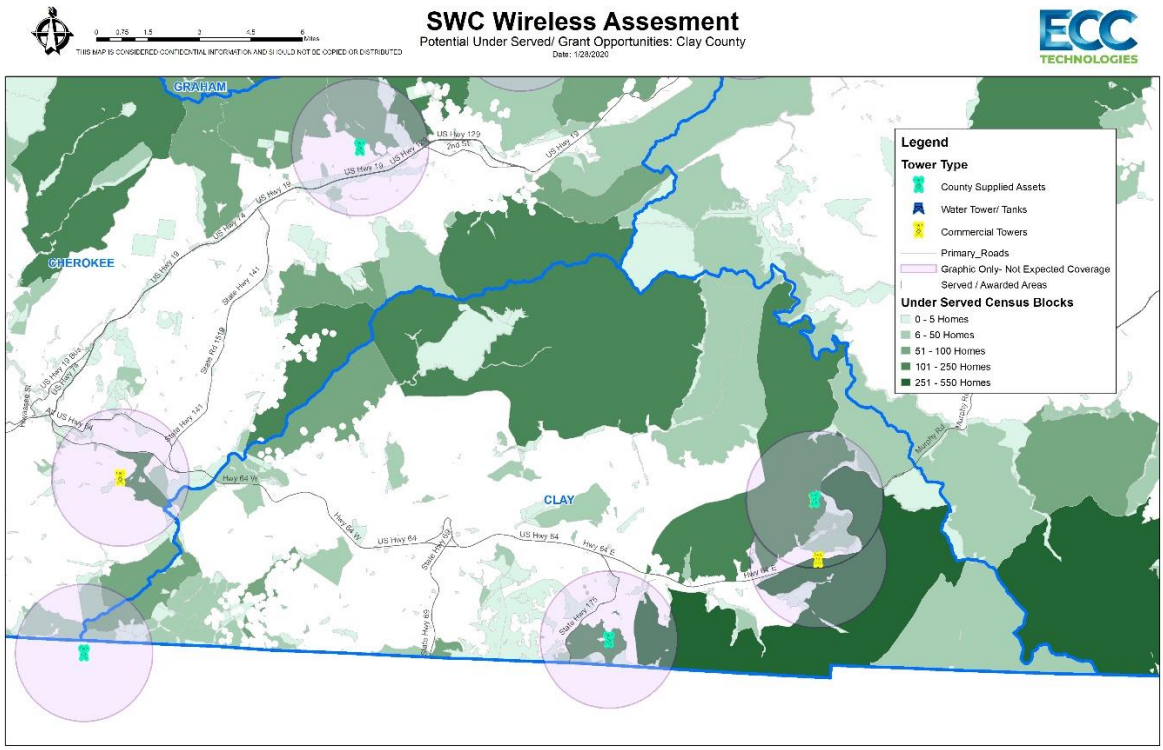
Appendix I - Under 10/1 Towers by County

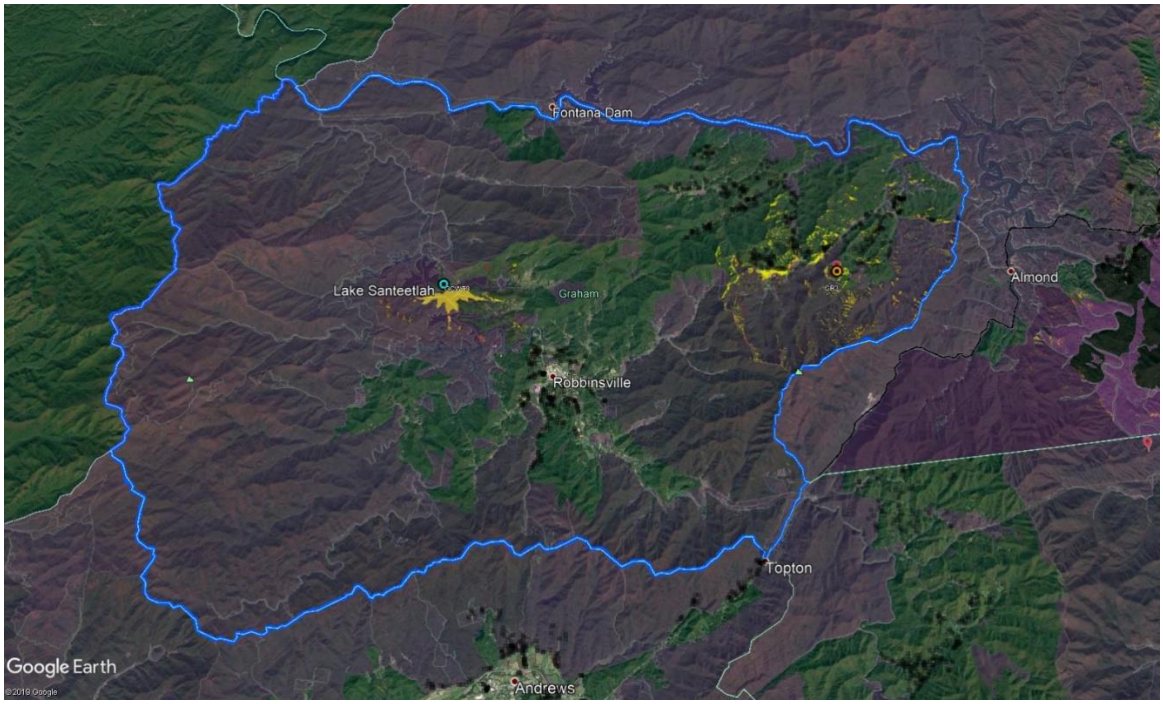


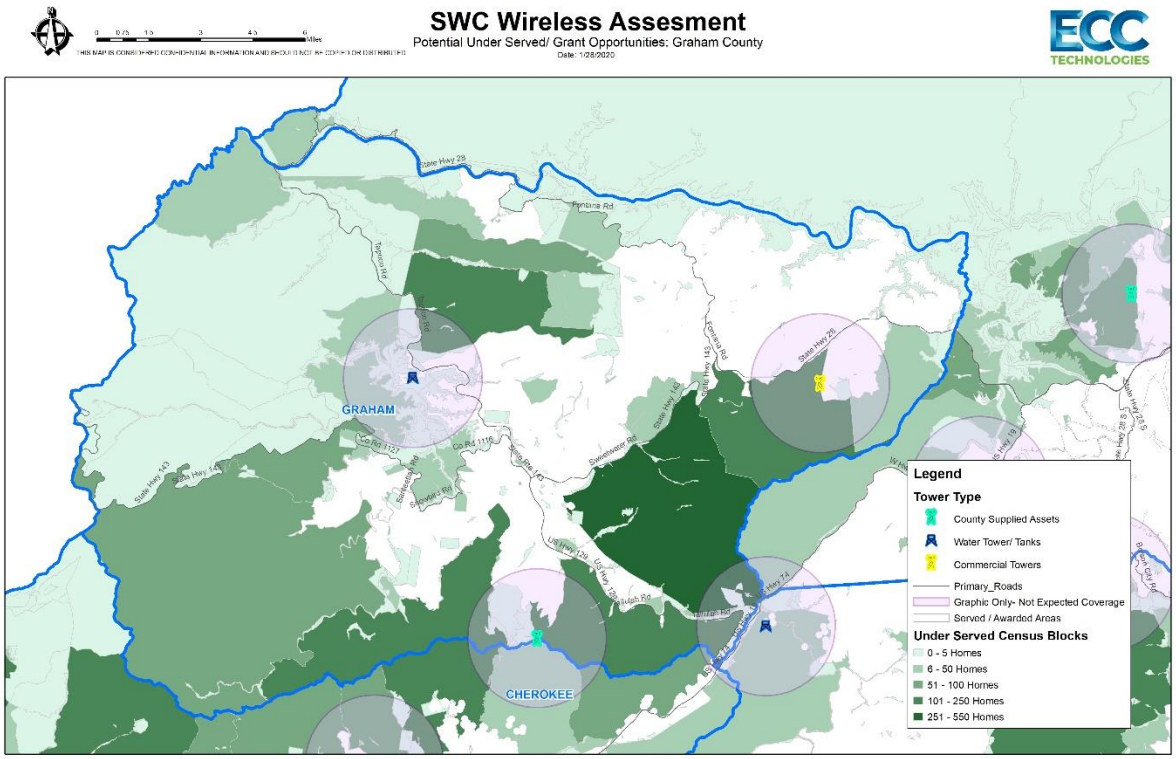


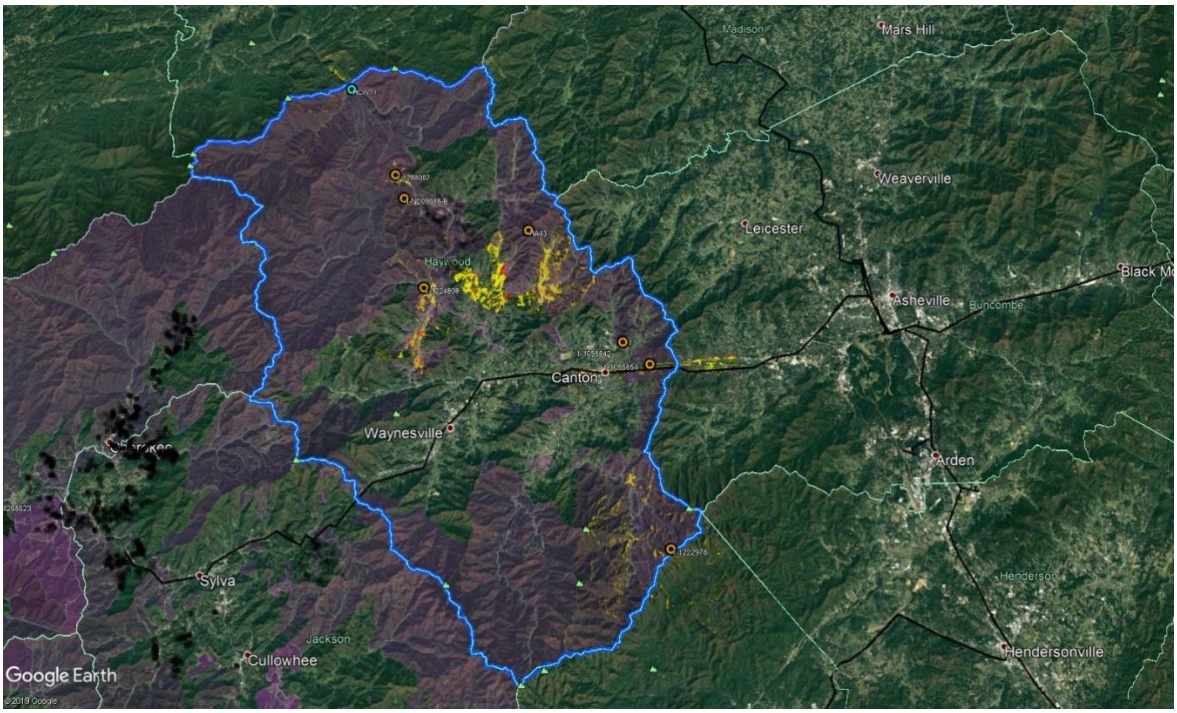

SWC Wireless Assesment
Potential Under Served/ Grant Opportunities: Clay County
Date: 1/28/2020
GRAHAM
CHEROKEE
CLAY
Legend
Tower Type
County Supplied Assets
Water Tower/ Tanks
Commercial Towers
Primary_Roads
Graphic Only- Not Expected Coverage
Served / Awarded Areas
Under Served Census Blocks
0 - 5 Homes
6 - 50 Homes
51 - 100 Homes
101 - 250 Homes
251 - 550 Homes


Andrews
Marble
Murphy
Clay
Brasstown
Hayesville
Merry Island
Penland Island
Gibby Island
Warne
Brown Island
Hiawassee
Young Harris
Towns
Google Earth

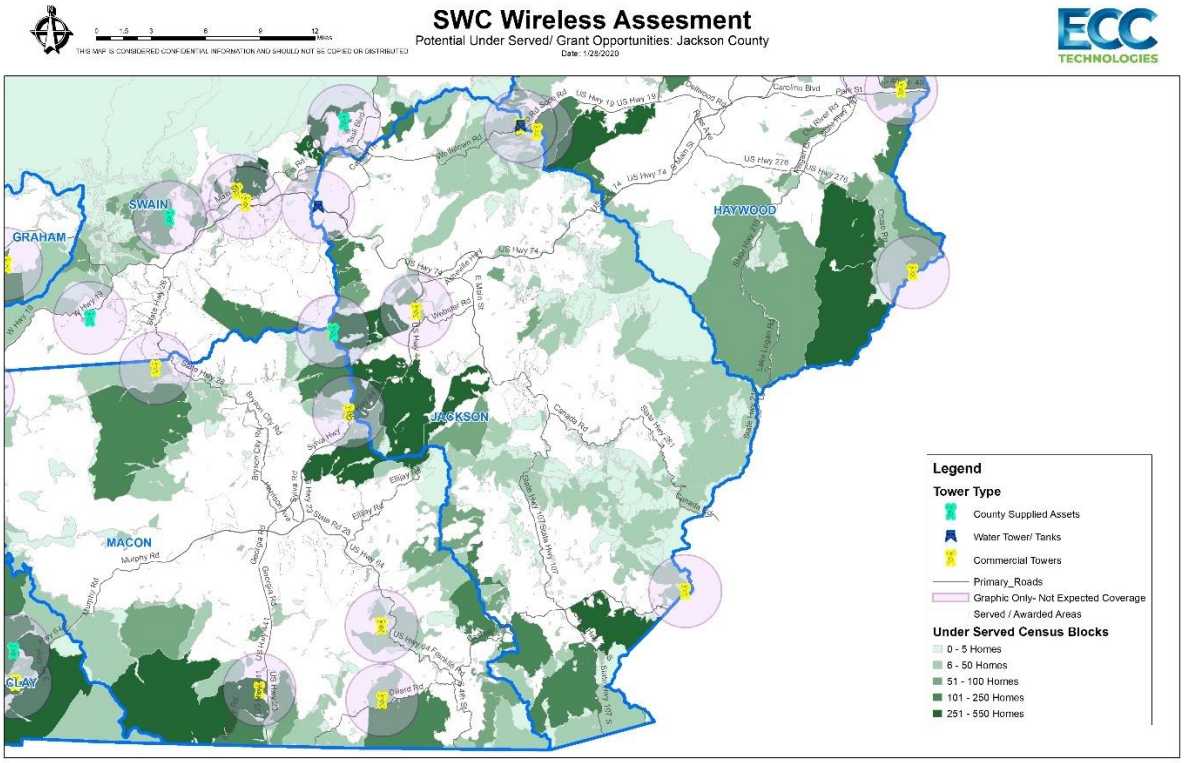

SWC Wireless Assesment
Potential Under Served/ Grant Opportunities: Clay County
Date: 1/28/2020
THIS MAP IS CONSIDERED CONFIDENTIAL INFORMATION AND SHOULD NOT BE COPIED OR DISTRIBUTED
GRAHAM
CHEROKEE
CLAY
Legend
Tower Type
County Supplied Assets
Water Tower/ Tanks
Commercial Towers
Primary_Roads
Graphic Only- Not Expected Coverage
Served / Awarded Areas
Under Served Census Blocks
0 - 5 Homes
6 - 50 Homes
51 - 100 Homes
101 - 250 Homes
251 - 550 Homes

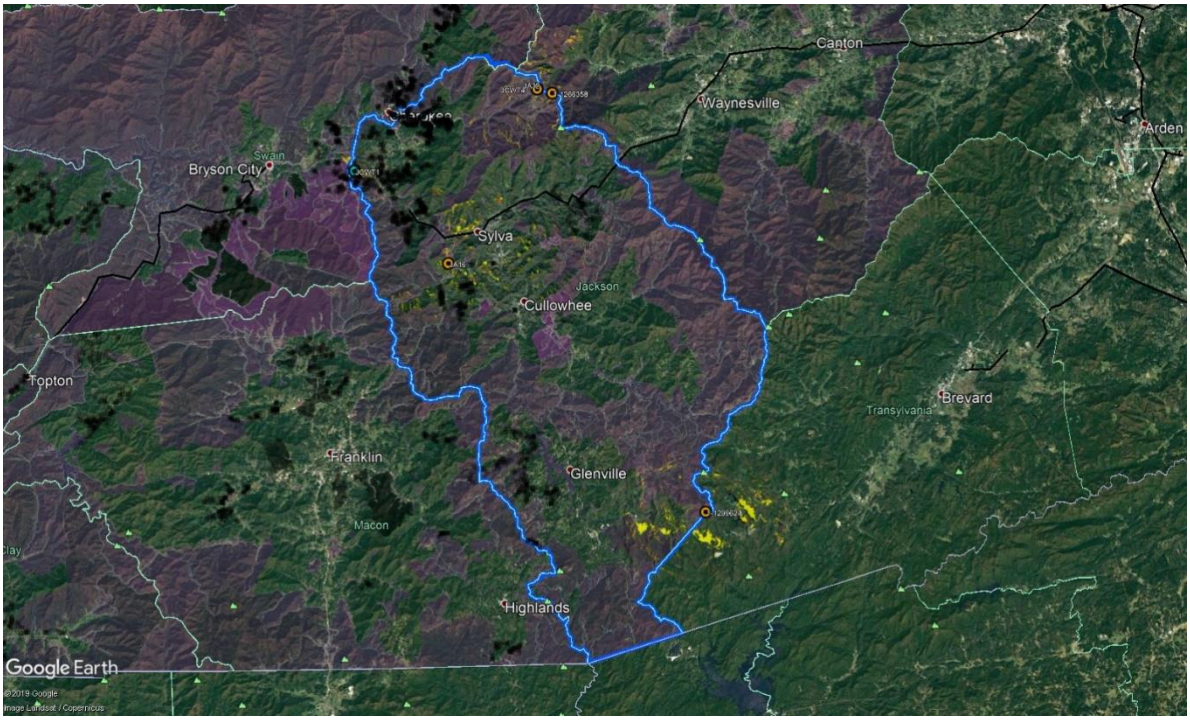

Fontana Dam
Lake Santeetlah
Graham
Almond
Robbinsville
Topton
Andrews
Google Earth

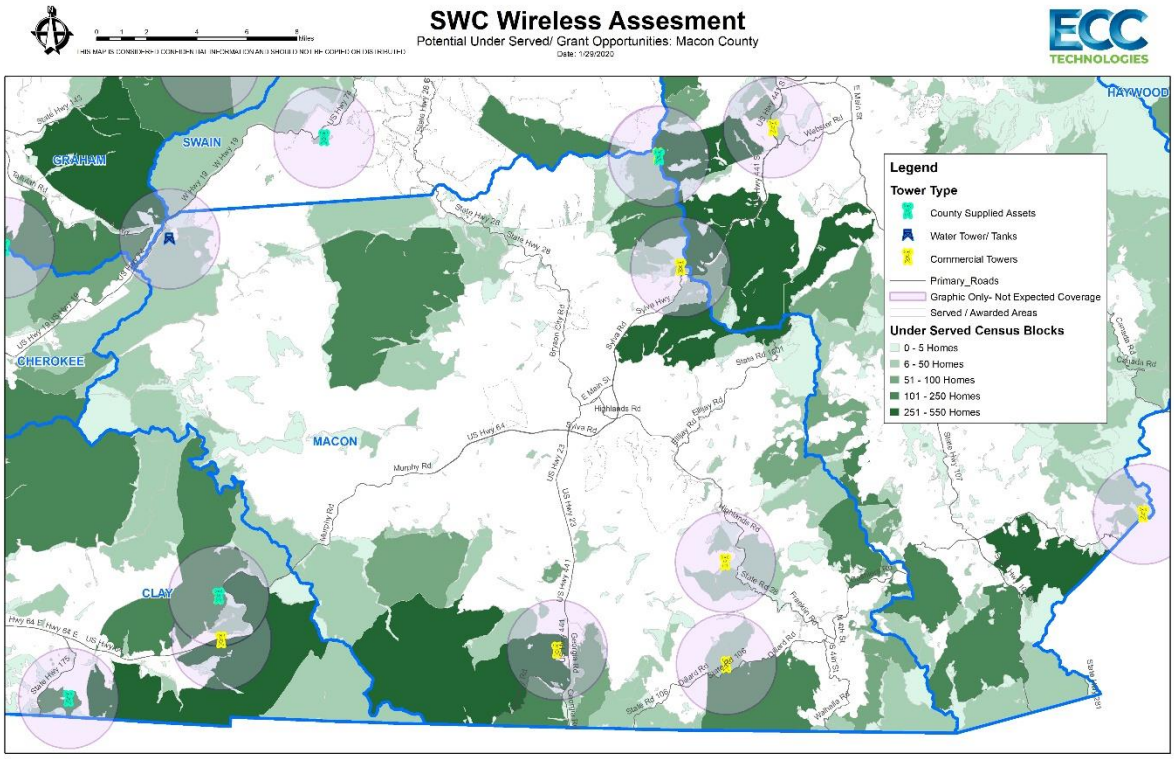


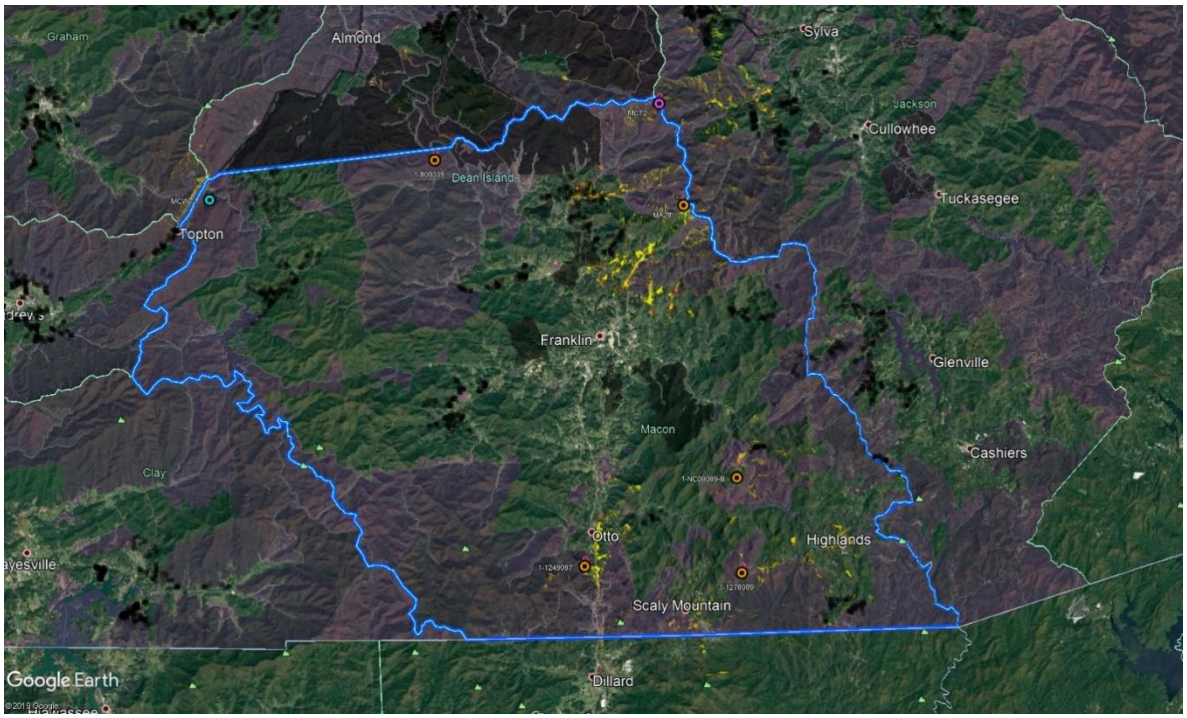


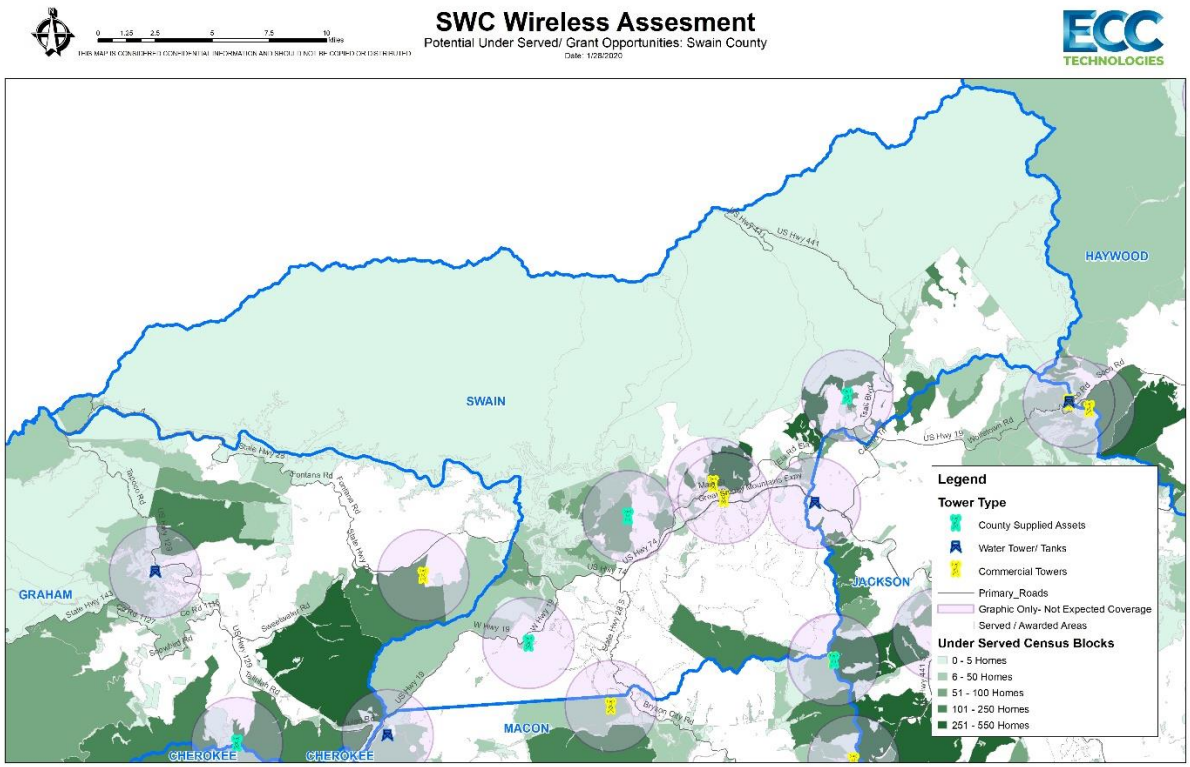
Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

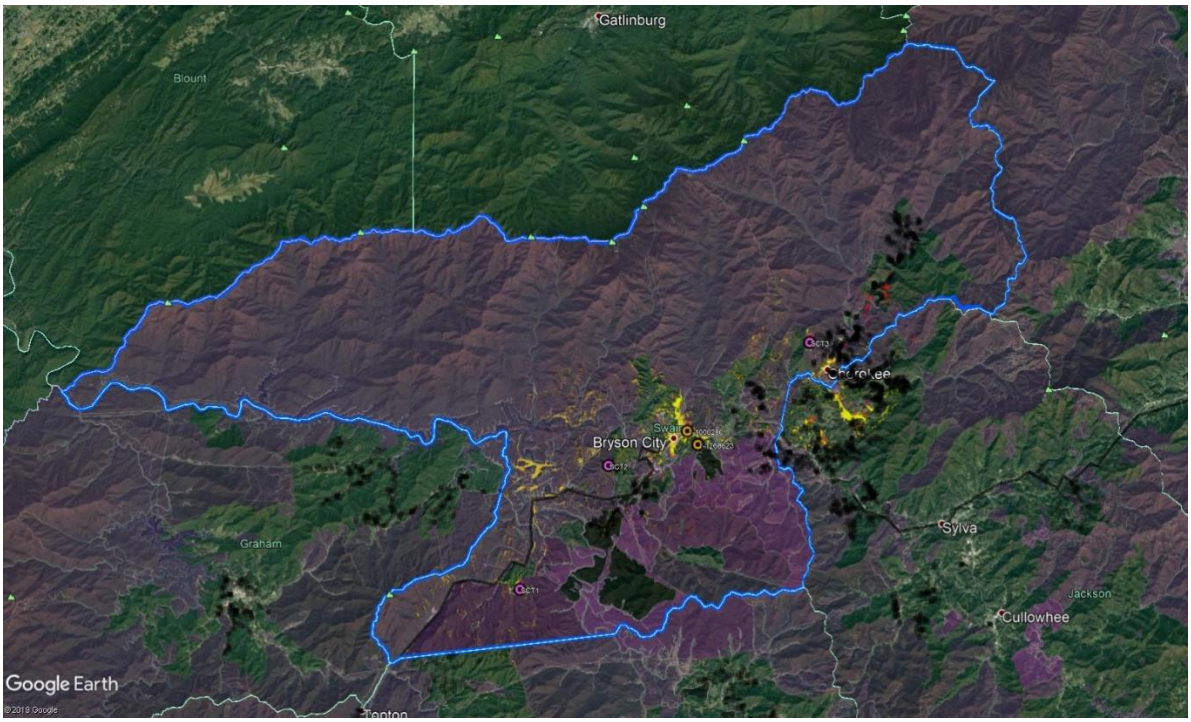

SWC Wireless Assesment
Potential Under Served/ Grant Opportunities: Jackson County
Date: 1/28/2020
THIS MAP IS CONSIDERED CONFIDENTIAL INFORMATION AND SHOULD NOT BE COPIED OR DISTRIBUTED
SWAIN
GRAHAM
HAYWOOD
JACKSON
MACON
CLAY
Legend
Tower Type
County Supplied Assets
Water Tower/ Tanks
Commercial Towers
Primary_Roads
Graphic Only- Not Expected Coverage
Served / Awarded Areas
Under Served Census Blocks
0 - 5 Homes
6 - 50 Homes
51 - 100 Homes
101 - 250 Homes
251 - 550 Homes


Canton
Waynesville
Arden
Bryson City
Swain
Sylva
Jackson
Cullowhee
Topton
Brevard
Transylvania
Franklin
Glenville
Macon
Highlands
Google Earth


SWC Wireless Assesment
Potential Under Served/ Grant Opportunities: Macon County
Date: 1/29/2020
GRAHAM
SWAIN
HAYWOOD
CHEROKEE
MACON
CLAY
Legend
Tower Type
County Supplied Assets
Water Tower/ Tanks
Commercial Towers
Primary_Roads
Graphic Only- Not Expected Coverage
Served / Awarded Areas
Under Served Census Blocks
0 - 5 Homes
6 - 50 Homes
51 - 100 Homes
101 - 250 Homes
251 - 550 Homes


Graham
Almond
Sylva
Jackson
Cullowhee
Dean Island
Tuckasegee
Topton
Franklin
Glenville
Macon
Cashiers
Clay
Otto
Highlands
Scaly Mountain
Dillard
Google Earth


SWC Wireless Assesment
Potential Under Served/ Grant Opportunities: Swain County
Date: 1/28/2020
SWAIN
HAYWOOD
GRAHAM
JACKSON
MACON
CHEROKEE
CHEROKEE
Legend
Tower Type
County Supplied Assets
Water Tower/ Tanks
Commercial Towers
Primary_Roads
Graphic Only- Not Expected Coverage
Served / Awarded Areas
Under Served Census Blocks
0 - 5 Homes
6 - 50 Homes
51 - 100 Homes
101 - 250 Homes
251 - 550 Homes


Gatlinburg
Blount
Bryson City
Graham
Sylva
Jackson
Cullowhee
Google Earth

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Index

1996 Act, 266, 267, 268, 269
1996 Telecommunications Act, 2, 129
600 MHz, 135
American Tower, 81, 87, 126, 143
Antenna, 35, 213, 272, 321
Antenna Gain, 35
Appalachian, 156, 185, 200
Appalachian Regional Commission, 156
ARC, 156, 323
AT&T, 81, 135, 164
auctions, 134
BAAT, 7, 19, 21, 22, 23, 24, 25, 132, 133, 137, 138, 139, 140, 141, 143, 145, 147, 152
backbone, 155, 163, 166, 167, 169, 170, 173, 325
backhaul, 14, 166, 167, 169, 173, 319, 321, 322, 323, 337, 341
BalsamWest, 3, 154, 155, 289, 291, 296, 297, 314, 325
Base station, 213
base stations, 165, 166, 189, 216, 249, 273, 341, 365
BIO, 2, 3, 81, 152, 155
broadband, 281
Broadband Aggregation & Adoption Tool, 19
Broadband Assessment, 11
Broadband Infrastructure Office, 3, 29, 81, 152, 155, 323, 325
Building Permit, 129, 249
CAF, 7, 25, 28, 29, 156
Cambium, 5, 8, 35, 163, 323, 335, 336, 337, 339
Camouflage towers, 280
CBRS, 135, 162
Channel width, 35
Cherokee County, 1, 2, 5, 7, 20, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 48, 49, 50, 90, 92, 94, 138, 154, 287, 319
Cherokee County Project, 138
Clay County, 1, 2, 5, 7, 20, 51, 52, 53, 54, 55, 57, 96, 98, 100, 139, 154, 293
Clay County Project, 139
Client gain, 35
Connect America Fund, 1, 28, 156
Connect American Fund, 7, 28, 29
coverage, 7, 13, 35, 132, 133, 138, 153, 163, 169, 192, 241, 251, 275, 319, 320, 336, 366
Crown Atlantic, 81, 143
Crown Castle, 81, 87, 126, 139, 141, 143, 145, 147
dark fiber, 157, 174
Ethernet, 167
FAA, 188, 200, 203, 207, 214, 221, 222, 227, 252, 272, 273
FCC, 1, 3, 4, 7, 12, 15, 25, 27, 28, 34, 81, 126, 129, 130, 134, 135, 138, 139, 140, 141, 143, 145, 147, 151, 156, 162, 183, 187, 188, 189, 191, 192, 207, 214, 222, 224, 226, 235, 247, 248, 252, 266, 267, 268, 269, 271, 272, 273, 274, 275, 276
Federal Aviation Administration, 188, 191, 203, 214, 252, 257, 272
Fiber Interface Device, 166
Fiber optic, 172
fiber to the home, 134, 153, 164, 319, 322
FID, 166
fixed wireless, 13, 14, 34, 81, 87, 132, 149, 152, 157, 158, 163, 164, 165, 167, 173, 187, 247
Fixed wireless, 135
Form 477, 25, 27
Frequencies, 5, 15, 283, 287, 293, 294, 298, 304, 311, 315
Frequency, 35, 162, 287, 293, 294, 298, 304, 311, 315
FTTH, 134, 153, 154, 167, 319
Funding, 2, 133, 323
GIS, 1, 172, 366

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

Google Earth, 12, 83, 84, 87, 172
GPON, 167
Graham County, 1, 2, 4, 7, 15, 20, 34, 58, 60, 61, 62, 63, 102, 140, 264, 294, 295
Graham County Project, 140
grant, 12, 16, 132, 133, 134, 135, 148, 152, 153, 155, 156, 157, 158, 195, 209, 213, 227, 233, 238, 323, 324, 326
Grants, 2, 133, 134, 156
Great Grant, 1, 7, 25, 29, 30, 31, 134, 157
Guyed towers, 201, 279
Haywood, 1, 2, 4, 5, 7, 20, 65, 66, 67, 68, 88, 104, 106, 141, 153, 157, 181, 183, 185, 186, 191, 192, 196, 197, 198, 200, 207, 298, 299, 300, 301, 319, 321
Haywood County, 1, 2, 4, 5, 7, 20, 65, 66, 67, 68, 104, 106, 128, 141, 157, 183, 185, 186, 191, 192, 196, 197, 198, 200, 207, 298, 299, 300, 319, 321
Haywood County Project, 141
Height, 126, 138, 139, 140, 141, 143, 145, 147, 214
hybrid, 14, 167, 170
IIOT, 173
Information Age Appalachia, 156
Internet, 3, 28, 81, 88, 132, 153, 154, 155, 163, 164, 168, 170, 172, 173, 281, 319, 323, 324, 325, 326, 335
Jackson, 1, 2, 4, 5, 7, 20, 69, 70, 71, 72, 73, 88, 108, 110, 112, 143, 152, 153, 181, 212, 214, 215, 216, 217, 218, 219, 220, 223, 226, 227, 228, 230, 231, 232, 233, 234, 237, 238, 241, 244, 304, 309, 322, 323, 324, 325
Jackson County, 1, 2, 4, 5, 7, 20, 69, 70, 71, 72, 73, 108, 110, 112, 128, 143, 152, 153, 212, 214, 215, 216, 217, 218, 219, 220, 223, 226, 227, 228, 230, 231, 232, 233, 234, 237, 238, 241, 304, 309, 322, 323, 324, 325
Jackson County Project, 143
last mile, 134, 152, 164, 165, 166, 167, 168, 173
Last mile, 164, 165, 168, 171
Lateral, 167
Lattice Towers, 4, 279
Line of sight, 81
Loan, 135
LOS, 165, 366
Macon, 1, 2, 4, 5, 8, 20, 52, 74, 75, 76, 77, 88, 114, 116, 118, 145, 152, 181, 245, 246, 248, 249, 253, 254, 257, 258, 288, 290, 304, 305, 311, 312, 323, 325
Macon County, 1, 2, 4, 5, 8, 20, 52, 74, 75, 76, 77, 114, 116, 118, 128, 145, 152, 245, 246, 248, 249, 253, 254, 257, 258, 288, 290, 304, 305, 311, 312, 323, 325
Macon County Project, 145
Manufacturers, 5, 15, 335
Middle Mile, 3, 164, 167
Monopole, 4, 8, 76, 139, 140, 141, 143, 145, 215, 280
NCDIT, 155, 157
NLOS, 169
ordinances, 13, 128, 129, 181, 223, 225, 235, 236, 239, 243
partnerships, 136, 153
PCS, 129, 165, 187, 188, 247, 267, 269, 272, 275, 276, 283, 284, 287, 288, 289, 291, 293, 296, 309, 313, 314
peering, 164, 168
Phase 1, 7, 11, 14, 21, 22, 23, 24, 132
Phase 2, 11, 176
physical surveys, 87
point to multipoint, 166
point to point, 162, 166, 167
poles, 33, 165, 166, 188, 219, 280, 281
PON, 167
POP, 167, 265
propagation, 13, 34, 87, 88, 133, 136, 138, 139, 140, 141, 143, 145, 147, 148, 251
Propagation, 1, 34, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 48, 49, 50, 51, 52, 53, 54, 55, 57, 59, 60, 61, 62, 63, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80
PTP, 167, 335

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.

public safety, 33, 81, 87, 188, 208, 212, 248, 254, 276, 335, 336
public safety towers, 33
public/private partnership, 134
Quality of Service, 81
Radio Frequency, 34, 165, 341
Radio Service Codes, 5, 283
radio tower, 83
Radwin, 5, 6, 8, 9, 163, 340, 343, 357
RDOF, 156
Reconnect Grant, 134
Regional Vertical Asset Database, 5, 15, 328
Registrations, 126
reverse auction, 134, 156
Rooftops, 4, 281
router, 164, 166, 167, 168, 170
Rural Digital Opportunity Fund, 156
SBA Towers, 81, 145
Service Providers, 2, 151
site visit, 13, 224
Site Visits, 2, 12, 87
SkyFi, 3, 5, 152, 322, 323, 324, 325
Skyrunner, 5, 302, 310, 313, 319, 320, 321, 322
SkyRunner, 3, 153
Sky-Tek, 3, 154
SkyWave, 3, 5, 7, 30, 153, 324, 325, 326
SMR, 129, 187, 188, 247, 267, 269, 272, 274, 275, 284, 285
Southwestern Commission, 1, 7, 8, 11, 12, 13, 14, 15, 16, 83, 137, 148, 150, 155, 163, 172, 176
Southwestern Regional Commission, 11
spectrum, 129, 134, 135, 151, 152, 157, 162, 218, 219, 224, 267, 269, 271, 273, 335, 337, 340, 341
speed test, 19, 20
Strategic Planning, 2, 13, 132
subscriber, 164, 167, 168, 170, 272, 275, 340, 341, 366
survey, 11, 19, 20, 88, 132, 137, 152, 226, 235, 341, 365
Swain County, 1, 2, 4, 5, 8, 20, 33, 34, 78, 79, 80, 120, 122, 124, 128, 147, 153, 260, 315, 323, 324, 325, 326
Swain County Project, 147
Switches, 166
Telecommunications Act of 1996, 185, 186, 266, 267, 273, 276
Telrad, 6, 9, 163, 359, 363, 364, 365, 366
Tier 1, 155, 157
Tier 2, 155, 157
T-Mobile, 135
Tower ID, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 48, 49, 50, 51, 52, 53, 54, 55, 57, 58, 60, 61, 62, 63, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 90, 92, 94, 96, 98, 100, 102, 104, 106, 108, 110, 112, 114, 116, 118, 120, 122, 124
Tower Ordinance, 2, 4, 13, 128, 212, 245, 260
Tower Ordinances, 4, 15, 128, 181
Transmit power, 35
TVWS, 162, 340, 344, 345, 346, 347, 348, 349, 350, 351, 352, 353, 354, 355, 356
Under 10/1 Towers by County, 6, 369
unlicensed, 135, 157, 168, 218, 219, 269, 271, 335, 336, 337
unserved, 13, 34, 136, 138, 139, 140, 141, 143, 145, 147, 148, 153, 155, 156, 322, 324, 325
USDA, 12, 134, 156
Utility pole, 216
Verizon Wireless, 81, 288, 291, 295, 296, 308, 310, 313, 314, 317
vertical assets, 11, 12, 13, 33, 34, 81, 83, 87, 88, 137, 154, 165, 280, 320, 321
Vertical Assets, 1, 4, 5, 7, 12, 15, 81, 83, 85, 279, 282
VIPER, 45, 79, 81, 147
WAN, 173
WAP, 164, 165, 166, 167, 171
water towers, 33, 34, 81, 84, 87, 214, 247, 281, 282
Wireless Access Points, 166

wireless spectrum analyzer, 157
Wireless Technology, 3, 14, 163
WISP, 88, 152, 153, 154, 164, 165, 168, 169, 319, 321, 322
WISPA, 151, 324, 326
WISPs, 84, 151, 155, 165, 169, 281
zoning, 129, 215, 226, 235, 239, 266, 267, 273, 275

Proprietary and Confidential. No further distribution without the expressed written permission of ECC Technologies or the Southwestern Commission.