City of Harrisonburg

Department of Planning and Community Development

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Memorandum

To: Harrisonburg Planning Commission

From: Adam Fletcher City Planner

RE: Considering Amendments for Telecommunications Regulations

Date: Wednesday, August 14, 2013

Staff has completed its research regarding whether the City's telecommunications regulations should be amended. The result of this work is a comprehensive document, which, as described in the Introduction of the report, explains why the City is investigating telecommunications regulations; what authority the City has in regulating telecommunications; a section describing example regulations; and information about recent and future telecommunication practices that should be understood when considering legislation. The report also includes two appendices consisting of the January 12, 2012 report regarding the City's existing telecommunications regulations as well as an inventory of telecommunications facility locations in the City. Finally, the conclusion of the report includes staff's recommendations for moving forward.

The report was provided to and has already been reviewed by several telecommunication industry representatives from AT&T, NTelos, Shentel, Verizon Wireless, and to two private contractors. The roles of the individuals are diverse and include: the regional General Attorney or other attorneys of major carriers, Real Estate Manager, Site Acquisition Manager, Remote Access Network or RAN Engineer/Strategic Planner, Leasing Coordinator, and Private Contractor. Aside from one private contractor, as of yesterday, staff has received feedback from all of its contacts and will soon review this information and provide it to you as soon as possible.

Please review the report herein and the industry representative comments, once they are provided to you, all by next month's regular meeting on September 11th. The Commission can discuss all of the information and determine how to move forward.

City of Harrisonburg, Virginia

DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT

STAFF REPORT
August 14, 2013

Considering Amendments for Telecommunications Regulations

I. Introduction

The information herein is the result of research and study staff has conducted since January 2012 to assist in deciding whether the City should revise its telecommunications regulations. The document includes an explanation as to why the City is investigating telecommunications regulations; what authority the City has in regulating telecommunications; a section describing example regulations; and information about recent and future telecommunication practices that should be understood when considering legislation. Appendices include current City telecommunications regulations and reported FCC regulated telecommunication facility locations in the City. The question to answer is to what extent, if any, should the City Code be updated and amended to further address land use issues involving telecommunications facilities. Staff recommendations are provided in the conclusion of this report.

For the purposes of this document, "telecommunications" shall refer to mobile device services infrastructure such as towers, antennas, panels, dishes, cabinets, and related pieces of equipment that are erected, or mounted to buildings and other structures, to provide service to personal wireless services facilities technology. Such technology includes but is not limited to personal communication services (PCS) (including cellular phones), smart phones, lap top computers, tablet computers, and other similar devices that use the wireless system authorized and controlled by the Federal Communications Commission (FCC) and further managed by the FCC's Wireless Telecommunications Bureau (WTB).

II. Why is the City Investigating Telecommunications Regulations?

In the past, the City has discussed the idea of adopting new telecommunications controls and regulations to address the ever-changing wireless technology demand. In fact, the idea of adopting more specific telecommunications regulations goes back to 1996 when the City dealt with its first telecommunications request at 1178 South High Street.

The year 1996 is significant for a few reasons. First, on February 8, 1996, President Bill Clinton signed into law the Telecommunications Act of 1996; along with many other things, this legislation granted local governments the authority to regulate telecommunications. At the same time, the City was already working on a comprehensive rewrite of the Zoning Ordinance, and with the adoption of the Telecommunications Act of 1996, the City incorporated relatively basic regulations to govern telecommunications (for the most part, those provisions are the same regulations that remain in place today). The City adopted the revamped Zoning Ordinance on

April 23, 1996. Then, in September 1996, the City reviewed its first telecommunications request to locate equipment on the top of the water tower at 1178 South High Street. During the hearing for the telecommunications special use permit (SUP) request, which was ultimately approved in October, City Council, staff, and City residents discussed the idea of instituting a study on communications towers and to consider things that might need to be changed in the City's existing ordinance dealing with telecommunications. During much of 1996 and 1997, Planning staff conducted a significant amount of research regarding how the City could implement telecommunications regulations. Staff attended regional workshops, communicated often with carriers and providers, and researched and studied how other localities from across the country were implementing the regulatory power granted by the Telecommunications Act of 1996. When much of the research ended in 1997, the regulations that were adopted during the Zoning Ordinance rewrite remained in place.

Since 1996, other public hearings similar to the 1178 South High Street example have sparked discussion on whether the City should adopt additional regulations for telecommunications, but other than discussing this idea and collecting and reviewing examples from other localities, the idea was never pressed and staff ended up working on other matters.

In November 2011, however, this idea was again resurrected during discussion involving a SUP to allow a 124-foot in height telecommunications tower at 1106 Reservoir Street. Planning Commission held a public hearing to review the SUP request on the B-2 zoned property, where in brief, opinions differed regarding whether the SUP should be approved. Even though staff understood that such infrastructure was needed to provide stronger signal strength, capacity and connectivity to that area and generally to the entire City, staff recommended denial of the request believing that such a use would be incompatible with the uses in the surrounding area. Furthermore, staff interpreted that the use was not conforming to the Comprehensive Plan's long term goals for this area of the City. Planning Commission, however, voted 3-2 (with 2 members absent) in favor of recommending approval of the request with conditions that were suggested by staff. During the meeting, the Commission advised staff to evaluate the City's existing regulations and questioned whether the City should do more research regarding more controls and regulations for telecommunications.

In December 2011, City Council held their public hearing regarding the request and ultimately approved the application as suggested by Planning Commission with a 4-1 vote. During this meeting, Council Member David Wiens noted he would like City Council to ask Planning Commission to develop a plan of provisions for collocations. In addition, Council Member Charlie Chenault (also a member of the Planning Commission at that time) noted that Planning Commission spoke briefly about the need of a separate ordinance specifically for telecommunications towers and mentioned the Commission would visit the issue in the future.

Subsequent to the City Council meeting, staff prepared a report that discussed the City's current zoning regulations regarding telecommunications and presented the information to Planning Commission at their January 2012 regular meeting. That report, titled Current Zoning Regulations Regarding Telecommunications, explains which zoning districts allow telecommunications and how they are regulated. The described report provides other detailed information and is included as Appendix A. Table 1 below is a summary of some of the information in that report.

Table 1: Summary of Where and How Telecommunications Are Allowed in the City

Zoning Districts Permitting Telecommunications	Telecommunications Permitted By-Right	Telecommunications Permitted By Special Use Permit
R-1	Not permitted.	Communications facilities necessary for public safety purposes **up to 200 feet in height** (private collocations are permitted).
R-2	Not permitted.	Communications facilities necessary for public safety purposes **up to 200 feet in height** (private collocations are permitted).
R-3 Multiple Dwelling and Medium Density	Not permitted.	Communications facilities necessary for public safety purposes **up to 200 feet in height** (private collocations are permitted).
R-4	Not permitted.	Communications facilities necessary for public safety purposes **up to 200 feet in height** (private collocations are permitted).
R-5	Not permitted.	Not permitted.
R-6	Not permitted.	Not permitted.
R-7	Not permitted.	Not permitted.
U-R	Not permitted.	Communications facilities necessary for public safety purposes **up to 200 feet in height** (private collocations are permitted).
MX-U	Not permitted.	Not permitted.
B-1	Telecommunications equipment and facilities, provided such equipment and facilities are located in an enclosed structure (at **no more than 75 feet in height**).	Telecommunications equipment and facilities not located in an enclosed structure and communications facilities necessary for public safety purposes **up to 200 feet in height** (private collocations are permitted).
B-2	Not permitted.	Communications towers **no more than one hundred twenty-five (125) feet in height** and Communications facilities necessary for public safety purposes **up to 200 feet in height** (private collocations are permitted).
M-1	Communications towers **not more than one hundred twenty-five (125) feet** in height.	Communications towers **more than one hundred twenty-five (125) feet in height** and communications facilities necessary for public safety purposes **up to 200 feet in height** (private collocations are permitted).

***Note: Any City use, determined to be a public use, is permitted by-right in any zoning district.**

During the January 2012 Planning Commission meeting, after reviewing and discussing the report within Appendix A, the Commission advised staff to investigate the options involving telecommunications regulations and offered specific investigatory objectives including:

researching other locality regulations, talking to telecommunications providers about the technology and future technology of telecommunications and the infrastructure necessary to support it, and researching available resources through the Virginia Municipal League (VML). There was also interest in researching regulations that would encourage collocations by-right and decommissioning of infrastructure.

Staff began researching information and writing this document throughout 2012, however other issues arose (among other things the business garden proposal) that slowed the progression of this project. In February 2013 after Planning Commission acted on the business garden proposal, the Commission advised staff to make the telecommunications regulations project a priority rather than focusing efforts on researching and drafting additional agricultural/horticultural regulations or investigating new or revised ordinances associated with accessory structures, which was an issue that had received public attention at that time.

III. What Authority Does the City Have in Regulating Telecommunications?

Before discussing the various options for telecommunications regulations, it is best to understand what authority the City has in regulating them. This authority is primarily outlined within the Telecommunications Act of 1996 with other regulatory provisions included within the recently adopted Middle Class Tax Relief and Job Creation Act of 2012 Section 6409 Wireless Facilities Deployment.

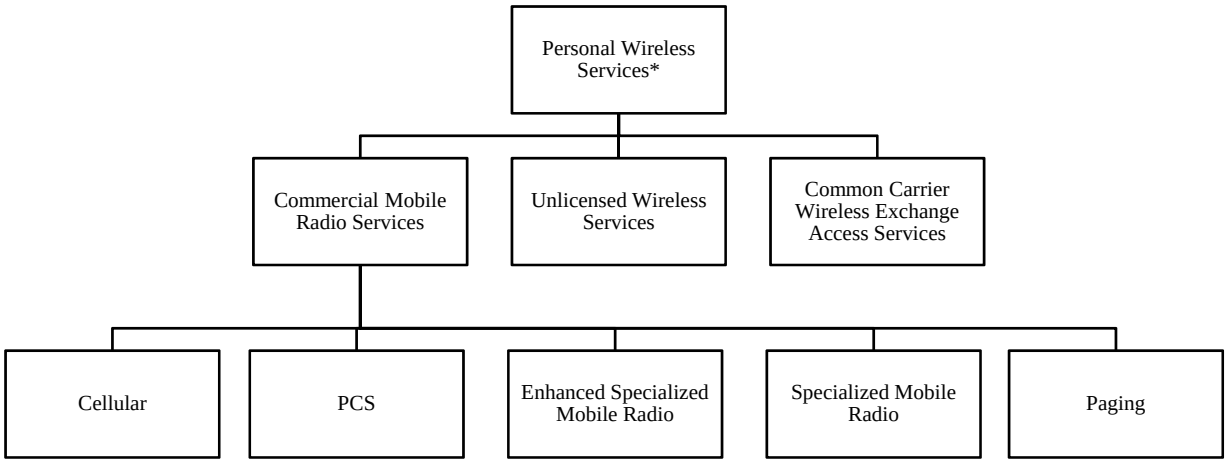
The Telecommunications Act of 1996

The Telecommunications Act of 1996 (the 1996 Act), administered by the FCC, is the main legislation for telecommunications regulations. The 1996 Act amended the Communications Act of 1934, which created the FCC and intended to provide for the regulation of interstate and foreign communication by wire, radio, and for other purposes. As noted by the FCC, the goal of the 1996 Act, was to let anyone enter into the communications business and to let any communications business compete in any market against any other.[1] Within the 1996 Act, local governments were granted authority to regulate telecommunications through zoning practices. This authority is codified in 47 USC § 332 Mobile Services (c) Regulatory Treatment of Mobile Services (7) Preservation of Local Zoning Authority.[2]

47 USC 332 (c) (7) provides local governments the authority to decide the placement, construction, and modification of personal wireless service facilities. Within this legislation the FCC defines "personal wireless service" as: commercial mobile services, unlicensed wireless services, and common carrier wireless exchange access services.[2] It also defines "personal wireless service facilities" as: facilities for the provision of personal wireless services[2] (see Figure 1[3]). In other words, and for the intents and purposes of this document, the legislation allows local governments to regulate the placement, construction, and modification of *telecommunications*—as described in the introduction of this document.

1 Federal Communications Commission. http://transition.fcc.gov/telecom.html.
2 Telecommunications Act of 1996. http://transition.fcc.gov/Reports/1934new.pdf - page 182 of 333.
3 Kreines and Kreines. Planwireless. http://planwireless.com/tehno.htm.

Figure 1: Personal Wireless Service Facility



(*As defined by the FCC)

Note: PCS and cellular phones are different technologies that had operated on separated bandwidths; PCS used digital technology at higher bandwidths while cellular phones used an analog system at lower bandwidths. Mobile devices now primarily operate using digital technology.

More specifically, 47 USC 332 (c) (7), limits state and local government regulatory authority by specifying:[4]

1. Local zoning requirements shall not unreasonably discriminate among providers that compete against one another.
2. Local zoning requirements shall not prohibit or have the effect of prohibiting telecommunications service.
3. Local governments shall act on any request to place, construct, or modify telecommunications within a reasonable period of time. (In 2009, the FCC issued the, commonly known, "shot clock" ruling to provide further guidance on the meaning of "reasonable period of time." The ruling states that local governments must act within 90 days of a collocation application and within 150 days for all other applications.[5])
4. Any decision by a local government to deny a request to place, construct, or modify telecommunications shall be in writing and supported by substantial evidence contained in the written record.
5. Local governments shall not regulate the placement, construction, or modification of telecommunications based upon the environmental effects of radio frequency emissions to the extent that such facilities comply with the FCC's regulations concerning such emissions. (Radio frequency emissions from these facilities are presumed safe as long as they meet the technical standards set by the FCC.[6])

In other words, local governments cannot: outright ban telecommunications, favor one provider (i.e. AT&T, Ntelos, Verizon, and others) over another, purposefully delay regulatory review, or

4 Telecommunications Act of 1996. http://transition.fcc.gov/Reports/1934new.pdf - page 181 of 333.
5 Federal Communications Commission. http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-09-99A1.pdf.
6 Byers, Jackie et al., 1997. *Siting Cellular Towers: What You Need to Know What You Need to Do*. National League of Cities: Washington, D.C. – page 6 of 25.

deny requests due to radio frequency emissions being harmful to the environment or the health of residents. Local governments must also document the reasons for denying requests.

The 1996 Act also specifies that any person adversely affected by any final action or failure to act by the local government may take such matter to court. In addition, any person adversely affected by the local government that may be inconsistent with the limitations specified regarding action based upon radio frequency emissions may petition the FCC for relief.[7]

In summary, local governments are able to implement controls and regulations within the parameters of local zoning authority, which among other things could include: the zoning districts in which telecommunications are permitted or not permitted; height limitations; setbacks; the appearance of telecommunications structures including design, color, screening, and camouflaging mechanisms; and other site design controls. (Note the City currently implements some of these control mechanisms—see Appendix A.)

Section 6409 Wireless Facilities Deployment

Beyond the authority granted to States and local governments by the 1996 Act, new rules regarding telecommunications controls are now in place with the recently approved Middle Class Tax Relief and Job Creation Act of 2012 signed by President Barack Obama in February 2012. Within this legislation, specifically Section 6409 Wireless Facilities Deployment (Section 6409), there is regulatory relief for telecommunications providers that specifies when local governments must lessen or alleviate controls when making particular modifications to existing sites. Among other rules within Section 6409, subsection (a) is the most relevant for state and local governments. Section 6409 (a) is as follows:[8]

> (a) Facility Modifications
>
> 1) In general.—Notwithstanding Section 704 of the Telecommunications Act of 1996 (Public Law 104—104) or any other provision of law, a State or local government may not deny, and shall approve, any eligible facilities request for a modification of an existing wireless tower or base station that does not substantially change the physical dimensions of such tower or base station.
>
> 2) Eligible Facilities Request.—For purposes of this subsection, the term "eligible facilities request" means any request for modification of an existing wireless tower or base station that involves—
>
> A. collocation of new transmission equipment;
>
> B. removal of transmission equipment; or
>
> C. replacement of transmission equipment.
>
> 3) Applicability of Environmental Laws.—Nothing in paragraph (1) shall be construed to relieve the Commission from the Requirements of the National Historic Preservation Act or the National Environmental Policy Act of 1969.

With such new legislation on the books, States and local governments are still applying these new rules to the best of their ability as there has been little time for sound interpretations of the law to be established. Staff has researched this matter, discussed the legislation with the former

7 Telecommunications Act of 1996. http://transition.fcc.gov/Reports/1934new.pdf - page 182 of 333.
8 Middle Class Tax Relief and Job Creation Act of 2012. Public Law 2012—96—Feb. 22, 2012. http://www.gpo.gov/fdsys/pkg/PLAW-112publ96/pdf/PLAW-112publ96.pdf - page 78 of 102.

City Attorney, and has purchased additional educational resources specifically on this topic to understand and implement the new rules as was hopefully intended.

There are several terms and phrases used in Section 6409 that must be understood before one can properly implement the new rules, including: base station, collocation, facility, tower, and substantially change. Section 6409 does not define the use of these terms; therefore, one must refer to several federal documents including the Code of Federal Regulations—47 CFR § 24.5 Terms and Definitions, the FCC's 2004 Nationwide Programmatic Agreement, and the FCC's 2002 Antenna Collocation Programmatic Agreement.

47 CFR 24.5 defines "base station" as:[9]

> *Base Station*: A land station in the land mobile service. (Note: On January 25, 2013, the FCC released a Public Notice that offered guidance for interpretation of Section 6409, where they further described "base station" as consisting of radio transceivers, antennas, coaxial cable, a regular and back-up power supply, and other associated electronics. Also, in the context of Section 6409, the FCC believes it is reasonable to interpret that "base station" shall also include a structure that currently supports or houses an antenna, transceiver, or other associated equipment that constitutes part of a base station. Furthermore, the FCC believes that "base station" encompasses any technological configuration, including distributed antenna systems and small cells.[10])

Then, the 2004 Nationwide Programmatic Agreement defines the following:[11]

> *Collocation*: The mounting or installation of an antenna on an existing tower, building, or structure for the purpose of transmitting radio frequency signals for telecommunications or broadcast purposes.
>
> *Facility*: A tower or an antenna. The term facility may also refer to a tower and its associated antennas.
>
> *Tower*: Any structure built for the sole or primary purpose of supporting Commission-licensed or authorized antennas, including the on-site fencing, equipment, switches, wiring, cabling, power sources, shelters, or cabinets associated with that tower but not installed as part of an antenna as defined herein.

Lastly, the 2002 Antenna Collocation Programmatic Agreement clarifies what is meant by "substantially change." It should be understood, the wording "substantially change" or "substantial change" is not used. Instead, it explains that a *Substantial increase in the size of the tower* occurs when:[12]

> (1) The height of the tower will be increased by more than the greater of: (a) 10% of the height of the tower; or (b) the height extension needed to accommodate one additional antenna array with a separation of 20 feet from the nearest existing antenna. Thus, a 150-foot tower may be increased in height by up to 15 feet without constituting a substantial increase in size. If there is already an antenna at the top of the tower, the tower height may be increased by up to 20 feet plus the height of a new antenna to be located at the new top of the tower.

9 Federal Communications Commission. 47 CFR § 24.5 Terms and Definitions. http://www.gpo.gov/fdsys/pkg/CFR-1999-title47-vol2/pdf/CFR-1999-title47-vol2-sec24-5.pdf - page 1of 2.
10 Federal Communications Commission. January 25, 2013. DA-2047. http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-12-2047A1.pdf. - page 3 of 5.
11 Federal Communications Commission. September 2004. FCC 04-222. Nationwide Programmatic Agreement: Appendix B. http://hraunfoss.fcc.gov/edocs_public/attachmatch/FCC-04-222A3.pdf - page 6 of 29.
12 Federal Communications Commission. January 10, 2002. Antenna Collocation Programmatic Agreement. http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-02-28A1.pdf - page 4 of 12.

(2) More than four new equipment cabinets or more than one new equipment shelter will be added.

(3) The width of the tower will be increased by more than the greater of: (a) 20 feet in any direction from the edge of the tower; or (b) the width of the tower structure at the level of the appurtenance. For example, if the width of the tower structure at the level of the appurtenance is 40 feet, the appurtenance can protrude up to 40 feet from the edge of the tower at that point without constituting a substantial increase in the size of the tower.

(4) Excavation will occur outside the current tower site, defined as the area within the boundaries of the leased or owned property surrounding the tower at the time of the proposed collocation, and including any access or utility easements related to the site.

In brief, to take advantage of Section 6409, a telecommunications provider can only make a modification (as listed) on an existing wireless tower or base station (as defined) and such modification cannot substantially change the characteristics of the eligible facility. Furthermore, to make a modification to an eligible facility, the local government shall make the decision as to whether an eligible facility would be substantially changed.

To date, only one provider in the City has requested, and has received approval, to make modifications to an eligible facility under the provisions of Section 6409.

IV. Regulations in Practice and Other Suggested Legislation

Typical Telecommunications Provisions

According to *Siting Cellular Towers: What You Need to Know, What You Need to Do*[13], a guide book published by the National League of Cities and supported by the American Planning Association, the International City/County Management Association, the National Association of Counties, the National Association of Telecommunications Officers and Advisors, the National League of Cities, and Public Technology, Inc., there are key elements local governments should consider when establishing a telecommunications ordinance. These elements include: specifying application requirements; provisions that maximize the use of collocation (also known as site sharing); addressing if and how public property may be used; safety (which cannot be associated with radio frequency emissions); aesthetics; lighting and structural integrity; maintenance and parking; and abandonment.

Within the guidelines of the 1996 Act, there are almost limitless ways to regulate telecommunications through zoning enforcement. Staff has reviewed many ordinances and has read a multitude of variations currently in practice. Along with the typical regulations one would expect in a telecommunications ordinance (i.e. height limitations, setback minimums, etc.) there are many other things to consider for zoning regulations.

The list below includes a handful of localities selected by staff to demonstrate examples of provisions across a variety of issues. The information does not list or describe every provision from each of the listed localities or model ordinances, nor are there examples from every locality that staff reviewed. Generally, each locality and model ordinance had repeating themes of typical provisions such as height limitations, setback minimums, and different characteristics of regulations depending upon the type of zoning districts in which they are permitted. There is not

13 Byers, Jackie et al., 1997. *Siting Cellular Towers: What You Need to Know What You Need to Do*. National League of Cities: Washington, D.C. – pages 10-13 of 25.

a one-size-fits-all model as some localities take a more restrictive approach requiring public hearings prior to installing any type of facility while others provide some approval by administrative review.

- *Rockingham County, Virginia:*[14] Exempts amateur radios, television reception antennas, and satellite earth station antennas; requires providers to submit an inventory of their equipment by February 1st of each year; prohibits advertising on the facility; encourages providers to conduct a public information meeting if towers are proposed to be taller than 100 feet in height; landscaping is required that effectively screens the view of the support buildings and fence from adjacent property; components of a telecommunications facility that is not operated for a continuous period of six months shall be considered abandoned and must be removed within 90 days; a form a surety in the amount of $10,000.00 or 25 percent of the material costs of the structure (whichever is greater) is required to secure the cost to remove the tower and return the site to its original condition to the extent reasonably possible.
- *Westmoreland County, Virginia:*[15] Limits the sizes of antennas and dishes, which may be larger than otherwise permitted by special exception; limits the height and amount of space the unmanned equipment structures (i.e. equipment sheds and cabinets) can contain on the site; requires photo-imagery or other visual simulation upon application; prohibits the removal of trees within 200 feet of telecommunications towers; requires that all monopoles shall be designed to accommodate at least three providers.
- *City of Charlottesville, Virginia*:[16] Requires all communications facilities to comply with the minimum setback requirements of the zoning district in which they are located; when attaching facilities to an existing structure, the structure shall be at least 40 feet in height and the total height of the communications facility shall not increase the height of the attachment structure by more than 20 feet; structures supporting one communications facility shall be no taller than 70 feet, structures supporting two communications facilities shall be no taller than 100 feet, and structures supporting three or more communications facilities shall be no taller than 150 feet; special use permits are available for facilities above the regulated heights.
- *City of Staunton, Virginia*:[17] Allows the placement of telecommunications on alternative structures such as roofs, walls, water tanks, existing towers, and other structures approved by the zoning administrator so long as the height of the structure is not increased by 20 feet; telecommunications on alternative structures must be identical in color or closely compatible with the structure; requires telecommunications facilities to meet all setback requirements for primary structures for the zoning district in which they are located; requires telecommunication facilities not on alternative structures to be setback 110 percent the height of the tower from structures intended for human habitation.

14 Rockingham County, Virginia Code of Ordinances Chapter 17 Article VII Division 6A Wireless Telecommunication Facilities: http://library.municode.com/HTML/12196/level4/SUHITA_CH17ZO_ARTVIIUSRE_DIV6AWITEFA.html#TOPTITLE.
15 Westmoreland County, Virginia Code of Ordinances Zoning Ordinance Article 4 Supplemental Use Regulations 4-7 Telecommunications Facilities: http://www.westmoreland-county.org/assets/docs/ART%204%20Supp%20Regs.pdf.
16 City of Charlottesville, Virginia Code of Ordinances Chapter 34 Article IX Division 5 Telecommunications Facilities: http://library.municode.com/HTML/12078/level4/CO_CH34ZO_ARTIXGEAPRE_DIV5TEFA.html#TOPTITLE.
17 City of Staunton, Virginia Code of Ordinances Chapter 18.185 Telecommunications Facilities: http://www.codepublishing.com/VA/staunton.html.

- *City of Lexington, Virginia*:[18] Requires applicants to provide an inventory of its existing facilities that are either within the City or within five miles of the City limits of which shall specify the location, height, and design of each tower; regulates aesthetics including evaluating not only the compatibility with their surroundings but also by the extent of visual clutter they create; prohibits artificial lighting unless required by the FCC; in evaluating conditional use permits they consider the proximity of towers to residential structures and residential district boundaries.

- *Louisa County, Virginia*:[19] Exempts antenna support structures, antennas, and/or antenna arrays for AM/FM/TV/HDTV broadcasting transmission facilities licensed by the FCC; exempts wireless communications facilities when it is an accessory use to a business operated on the same property, provided that zoning review determines certain criteria is met, some of which includes that the height of the antenna support structure shall not exceed 100 feet in height, no more than one antenna support structure shall be permitted per property, no support structure is located within 200 feet of a public road, no support structure shall be visible from another support structure, as determined from grade level at the base of the support structure; generally requires that equipment cabinets shall not be visible from pedestrian views; All freestanding telecommunications facilities up to 120 feet in height shall accommodate no less than four antenna arrays, facilities between 121 feet and 150 feet shall accommodate no less than five antenna arrays, and facilities that are 151 feet and taller shall accommodate no less than six antenna arrays; attached non-concealed facilities shall only be allowed on electrical transmission towers and existing light stanchions subject to approval by the community development department and utility company.

- *Alleghany County, North Carolina*:[20] Requires all towers less than 40 feet in height to be registered with the government and requires a special use permit for any tower above 40 feet in height; at the discretion of the County Planner, experts may be contracted to assist with the review at an expense of the applicant not to exceed $5,000.00.; additional users' equipment, which does not add to the tower height, may be added without approval or review (aside from required building permits) and no application or fee is required; collocation is permitted on power poles; stealth or camouflage technology must be used when the proposed tower is within particular viewsheds—one of which is the Blue Ridge Parkway.

- *City of Minnetonka, Minnesota*:[21] Grants staff authority to approve equipment administratively when telecommunications facilities are located on electric transmission towers carrying over 200 kilo volts of electricity, located on support structures that have already received a conditional use permit, and gives staff the authority to grant a one-time 15-foot height extension to towers; grants staff authority to approve facilities located in public right-of-way that meet certain criteria; facilities not eligible for administrative

18 City of Lexington, Virginia Code of Ordinances Part 2 Chapter 420 Article II 420-28 Telecommunications Towers: http://ecode360.com/9735964#9736025.
19 Louisa County, Virginia Code of Ordinances Chapter 86 Article IX Telecommunications Regulations: http://library.municode.com/HTML/12480/level3/CO_CH86ZO_ARTIXTERE.html#TOPTITLE
20 Alleghany County, North Carolina Code of Ordinances 1-166 2001 Wireless Tower Communication Ordinance: http://alleghanycounty-nc.gov/ordinances/1-166.pdf.
21 City of Minnetonka, Minnesota Code of Ordinances Chapter 3 Zoning Regulations Section 300.34 Telecommunications Facilities: http://www.amlegal.com/nxt/gateway.dll/Minnesota/minneton/chapter3zoningregulations?f=templates$fn=default.htm$3.0$vid=amlegal:minnetonka_mn$anc=JD_300.34.

approval must obtain a conditional use permit, where among other guidelines must use stealth design techniques as reasonably possible—financial considerations alone are not justification for failing to provide stealth design; facilities located on an existing building shall not extend more than 15 feet above the height of the building.

- *Cuyahoga County, Ohio (model ordinance)*:[22] Suggests requiring applicants wishing to install a new tower within a quarter mile of another tower to provide written evidence of the contact made with the owners of the other tower that they have inquired about the potential collocation opportunities that are technically feasible locations; encourages underground equipment shelters.
- *Scenic Virginia, Inc. (model ordinance)*:[23] Suggests requiring a balloon test be conducted to illustrate the height of the proposed tower and to notify the local government for when the test would be conducted; to require photographs of the balloon test be taken and submitted upon application; to allow facilities, other than a microwave dish, that are attached to an existing structure and which does not exceed the height of the existing structure and is flush mounted to the structure to be permitted by-right; allow only flush mounted antennas on existing buildings that are painted the same color as the existing building and prohibit such antennas from projecting more than 12 inches from the existing building; require applicants to submit a report each year identifying each user of the existing structure.
- *PCIA (Personal Communications Industry Association) – The Wireless Infrastructure Association (model ordinance)*:[24] Suggests using the term "concealed" rather than "stealth" for facilities that are integrated as an architectural feature of a structure so that the purpose of the facility provides the services necessary while the structure is not readily apparent to a casual observer; concealed antennas must be enclosed, camouflaged, screened, or obscured—examples include but are not limited to flagpoles, bell towers, clock towers, crosses, monuments, smoke stacks, parapets, and steeples; allow towers and support structures by administrative review in any zoning district, except residential districts, at heights that are less than 60 feet; allow concealed facilities by administrative review that are less than 60 feet in height in residential districts; allow concealed telecommunications facilities in any district, except residential districts, up to 150 feet in height; allow towers and support structures by administrative review in industrial districts up to 199 feet in height; allow monopoles and replacement facilities on public property and right-of-ways and on structures such as municipal communication facilities, athletic field lights, traffic lights, street lights, and other utility poles; monopoles and towers shall be setback from all property lines a distance equal to their height.

If revised regulations are desired by the City, one of the more noteworthy examples demonstrated in the list above, and supported by PCIA (the Wireless Infrastructure Association), is the encouragement or requirement of stealth/concealed technology. This type of technology is integrated as an architectural feature of an existing structure or any new support structure designed so that the purpose of the facility or support structure for providing telecommunications services is not readily apparent to a casual observer. Examples of this technology include

22 http://planning.co.cuyahoga.oh.us/documents/pdf/celltower.pdf.
23 http://www.scenicva.org/docs/ordinances/Scenic%20Virginia%20Model%20Cell%20Tower%20Ordinance.pdf.
24 http://www.pcia.com/images/Advocacy_Docs/PCIA_Model_Zoning_Ordinance_June_2012.pdf.

flagpoles, bell towers, clock towers, crosses, monuments, smoke stacks, parapets, steeples, faux trees, and structures intended as art. According to the consulting firm Kreines and Kreines, Inc., Consultants to Cities & Counties on Wireless Planning, and the publisher of the *PlanWireless* newsletter, the term "concealed" should be used in place of "stealth" as the latter is often used synonymously with "sneaky," where the intent is to fool or deceive, and therefore a negative application to use in an ordinance.[25]

Concealed telecommunications technology is in use across the country and locally in Rockingham County in the Massanutten Resort area. The Physical Plant Director for Massanutten Resort explained the resort has four concealed facilities in the form of flagpoles ranging from 90 to 110 feet in height, one of which is located at the entrance to the Massanutten Water Park. The Massanutten Property Owners Association also has a concealed telecommunications facility in the form of a flagpole at 100 feet in height (Figure 2). Furthermore, the associated equipment facility for the concealed flagpole tower, as shown in Figure 2, is located entirely underground within a vault (Figures 3 & 4); a practice that is encouraged within the Cuyohoga County, Ohio telecommunications model ordinance.

Figure 2: A concealed telecommunications facility as a flagpole at Massanutten Village.[26]

25 Kreines and Kreines. Planwireless. http://planwireless.com/700_mhz_%26_aws.htm.
26 Provided by the Administrator of the Massanutten Property Owner's Association (11-16-12).

Figure 3: Front view of the base of the concealed telecommunications flagpole. The underground equipment vault is located in the background of the picture, behind the base of the flagpoles.[26]

Figure 4: Rear view of the base of the concealed telecommunications flagpole. The underground equipment vault is located under this area with only the visible small piece of equipment at the surface.[26]

Figures 5 and 6 demonstrate other concealed technology examples that are in use in Virginia while Figure 7 exhibits a facility located in Liberty, Missouri that serves as a telecommunications tower and a piece of art that honor's the City's commitment to education.

Figure 5: Concealed telecommunications in the form of a tree near Mt. Vernon, VA.[27]

Figure 6: The Unitarian Universalist Church of Roanoke's spire includes telecommunications inside the structure completely concealed from view.[28] The provider, Ntelos, paid to remove the old spire, to install the new spire, and for all of the other necessary equipment.[29]

27 Bedford County, Virginia's Strategic Plan for Commercial Wireless Telecommunications Facilities. Prepared by the Atlantic Group of Companies. August 26, 2002. Page 44 of 88. http://www.co.bedford.va.us/res/Planning/pdf/telecommunications.pdf.
28 Unitarian Universalist Church of Roanoke, Virginia. http://uuroanoke.org/photo.f.htm
29 Podger, Pamela J. November 11, 2006. *The Roanoke Times*. Church Receives Steeple Upgrade. http://www.roanoke.com/news/roanoke/wb/90988.

Figure 7: A 100-foot telecommunications tower disguised as a No. 2 pencil located in Liberty, Missouri.[30] City officials hoped the design of the tower would draw attention to the community's commitment to education at institutions such as William Jewel College and the Liberty School District.[31]

Another noteworthy regulation, as suggested in the examples above, is the requirement in particular situations to have flush mounted antennas that are painted the exact same color as the supporting structure. Although such a regulation is not part of the City's existing regulations, this practice has already been conditioned on a telecommunications SUP in the City. Figure 8 illustrates the flush mounted antennas that have been painted the same color as the Holiday Inn building at 1400 East Market Street in the City—a condition of that property's SUP granted in 2006.

30 News-Press and Gazette Company, NPG Newspapers Inc. http://prewww.kccommunitynews.com/image/28033721/detail.html.
31 Federal Communications Commission. In the Matter of Acceleration of Broadband Deployment Expanding the Reach and Reducing the Cost of Broadband deployment by Improving Policies Regarding Rights of Way and Wireless Facilities Siting. Reply Comments of the City of Liberty, Missouri. WC Docket No. 11-59. http://apps.fcc.gov/ecfs//document/view.action?id=7021711459.

Figure 8: Flush mounted antennas painted the same color as the supporting structure at 1400 East Market Street, Harrisonburg, Virginia.

Legislation for Recent and Future Practices in Telecommunications

The regulations discussed so far are the typical provisions that localities have been implementing since the 1996 Act was approved. Generally speaking, many of these ordinances were formulated to regulate the 1G, 2G, and 3G cell sites, all of which are referred to as "macrocells."[32] These macrocells are the most familiar component of the telecommunications network including but not limited to towers and the antenna installations that are installed on tall buildings, water tanks, and other tall structures (Figures 2 through 8 above are all macrocell sites.) Macrocells form the core of the macrocellular network that allows providers to deliver voice, text, and broadband to wireless subscribers.[33] These facilities are free standing, needing only a landline connection to the Public Switched Telephone Network (PSTN)—the name given to the traditional landline telephone network.[34] They are effective in covering large areas with relatively high capacity, capable of hosting multiple providers, all while transferring radiofrequency signals at high power levels. As technology has changed over the years, macrocells have been upgraded, but the coverage areas have typically not been expanded.[33]

The macrocells have functioned well in receiving and sending voice calls, however, these systems have been strained with the continuous demand for sending and receiving data from and to so many wireless devices. Because of this, "small cells," or "microcells," are the future of the wireless industry (Figure 9)[32].

32 Kreines & Kreines, Inc. *Planwireless: A Newsletter About Planning for Personal Wireless Service Facilities*. December & January 2013. Vol. 17. No. 1.
33 The DAS Forum. February 4, 2013. *Distributed Antenna Systems (DAS) and Small Cell Technologies Distinguished*. http://www.thedasforum.org/wp-content/uploads/2013/02/DAS-And-Small-Cell-Technologies-Distinguished-2_4_13.pdf.
34 Dictionary.com. February 22, 2013. Public Switched Telephone Network. http://dictionary.reference.com/browse/public+switched+telephone+network.

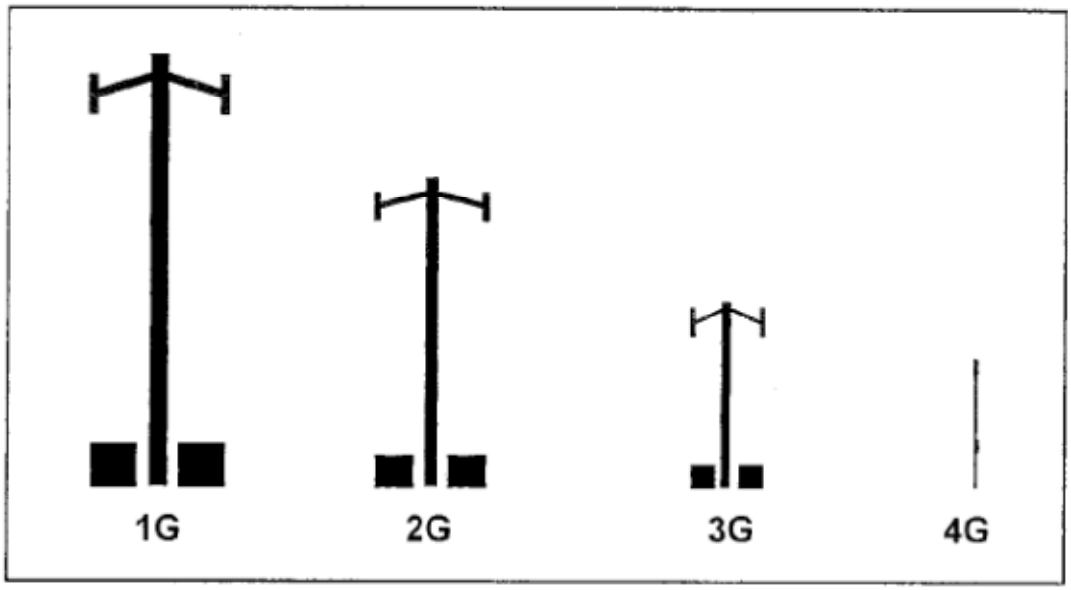


Figure 9: As illustrated in *Planwireless*, the evolution of cell sites will change with 4G. While 1G, 2G, and 3G relied on independent macrocells, 4G will depend on small cell sites.[32]

The solution to serving so many users transferring so much data is having many microcells to work in unison with the macrocells. In years past, providers requested to erect new macrocell telecommunications facilities because of issues with low coverage; however, that is no longer the case as in most populated areas there is wall-to-wall cell site coverage (Figure 10).[32]

As noted above, the wall-to-wall macrocell coverage works well for voice transfer, but data transfer, especially video data and the use of "apps," overwhelm the system and therefore necessitate the installation of microcells. The system works by a macrocell handing off the data to a nearby microcell, which finds its own way through the network, whether it is handed off to another cell site or to what is known as a "hub," to eventually off-load the data to its final destination.[32] For providers to continue properly serving their clients, many microcells can be established within the coverage of macrocells (Figure 11).[32] Although the use of microcells is predicted to increase and be the "future of the wireless industry," this is not a new practice. As noted in an issue of *Planwireless*, a provider in the suburbs of Chicago placed microcells underneath the coverage areas of towers back in 1997 for matters of capacity.[35]

35 Kreines & Kreines, Inc. *Planwireless: A Newsletter About Planning for Personal Wireless Service Facilities*. February & March 2012. Vol. 16. No. 2.

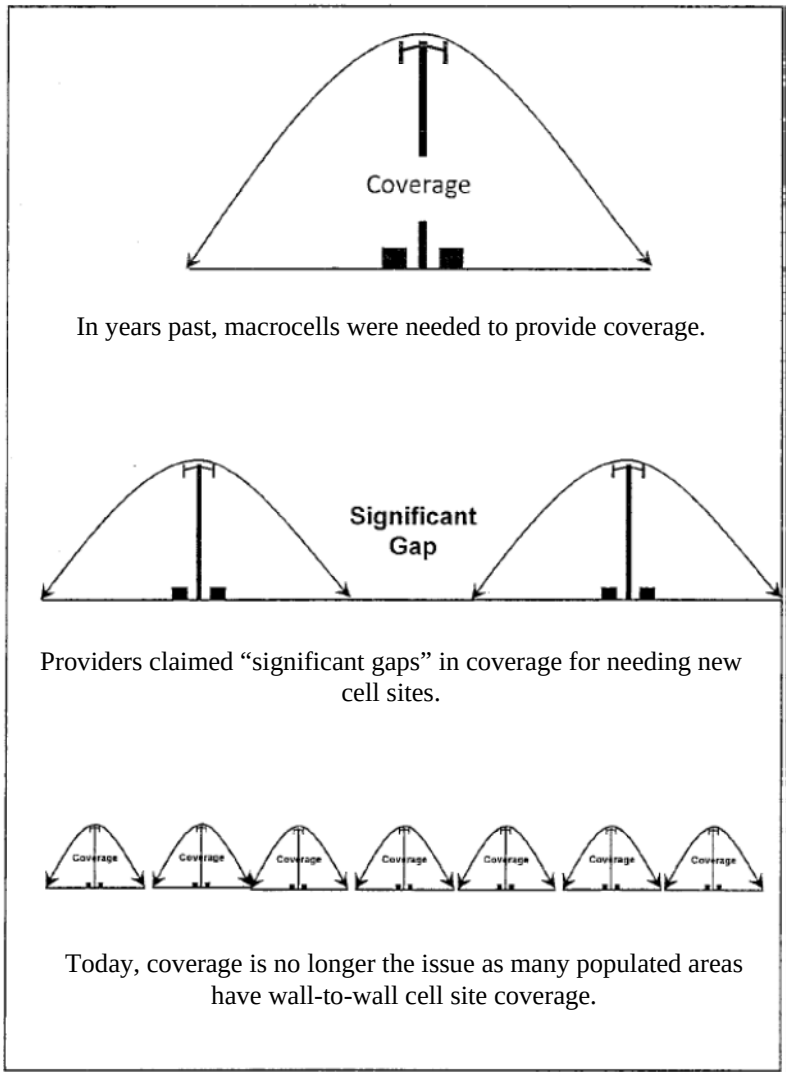


Figure 10: As illustrated in *Planwireless*, the progression of cell site installation due to coverage issues.[32]

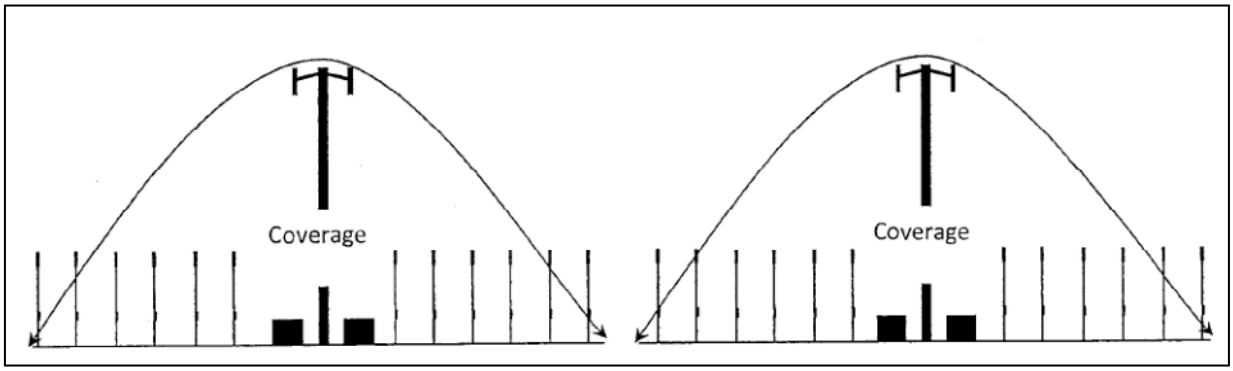


Figure 11: Small cells built within macrocell coverage to support data transfer.[32]

The scenario as generally depicted in Figure 11 is, for the most part, already occurring in the City. The telecommunications tower at 1106 Reservoir Street, the same facility that triggered this telecommunications regulations research project, although may not be classified as a small cell

or microcell, fits the description of the intent of a microcell site. As noted in the staff report for the 1106 Reservoir Street SUP request to allow the telecommunications facility, the tower was needed "to offer a solution for off-loading capacity from the surrounding AT&T antenna locations."[36] In addition, the minutes from the Harrisonburg Planning Commission meeting held on November 9, 2011, reflects the contractor, who represented the applicant for the SUP, stating the site was needed for both "in-building coverage" and was "a solution for off-loading the capacity from the other sites,"[37] both of which are arguments supporting microcell solutions. Adding to this argument, the site is adjacent to a tributary of Blacks Run, which is not in a typically desired higher elevation point within the City.

If this is an example of things to come, then the City may soon have an influx of telecommunication facility requests in areas that were never previously imagined to be desirable. Microcells are solutions to capacity and in-building coverage, but as noted macrocells, like the one recently erected at 1106 Reservoir Street, can also be used as a solution for capacity and in-building coverage. What further makes erecting macrocells so attractive to providers is that they can serve their clients' demands while also making significant amounts of money by having a platform for other carriers to rent space for their equipment. Knowing there is generally no longer significant gaps in coverage, providers will most likely continue demanding to establish macrocell sites, even though microcells could satisfy the service issues, mainly due to the significant economic benefit to their company.

The good news about microcell technology is that it does not only come in the form of smaller towers. This technology can simply be an antenna and a box hanging on a pole or building, which is commonly referred to as a "microcell," a "booster," or a "repeater." Another more complex and involved system, which is sometimes included in the microcell technology category is known as DAS (Distributed Antenna System).[32] (The following information regarding boosters and DAS is not meant to provide a strict, technical understanding of the technology but rather a basic description of what the technology needs to operate and generally how they work.)

Booster and repeater devices are stand alone, short range radio transceivers that are located in specific locations, either indoors or outdoors, where there is often low signal quality and high demand for a telecommunications signal. Typically boosters are hard wired while repeaters are commonly wireless (the wireless technology also includes mobile, in-vehicle capabilities). Some devices are specifically called "microcells" and have defined coverage ranges and can usually support up to 200 users. Pico/metrocells is another example of this technology and have smaller coverage areas of up to 30,000 square feet and can handle about 80 users. Both microcells and pico/metrocells require professional installation. (The James Madison University Festival Conference Center has a professionally installed microcell repeater.) An even smaller device that does not require professional installation and which does not require an existing telecommunications signal, is called a femtocell. These units are located in homes or offices and are connected through a high speed broadband internet connection and usually require specific phone numbers to be registered to the unit. Depending upon the femtocell unit, four to 20 phones can be covered and the registered phones are the only devices that can receive the additional coverage[33] (Figure 12).

36 Planning Commission Staff Report. November 9, 2011. "Communications Tower 1106 Reservoir Street." Special Use Permit.
37 Harrisonburg Planning Commission Minutes November 9, 2011. Special Use Permit 1106 Reservoir Street. Page 7.

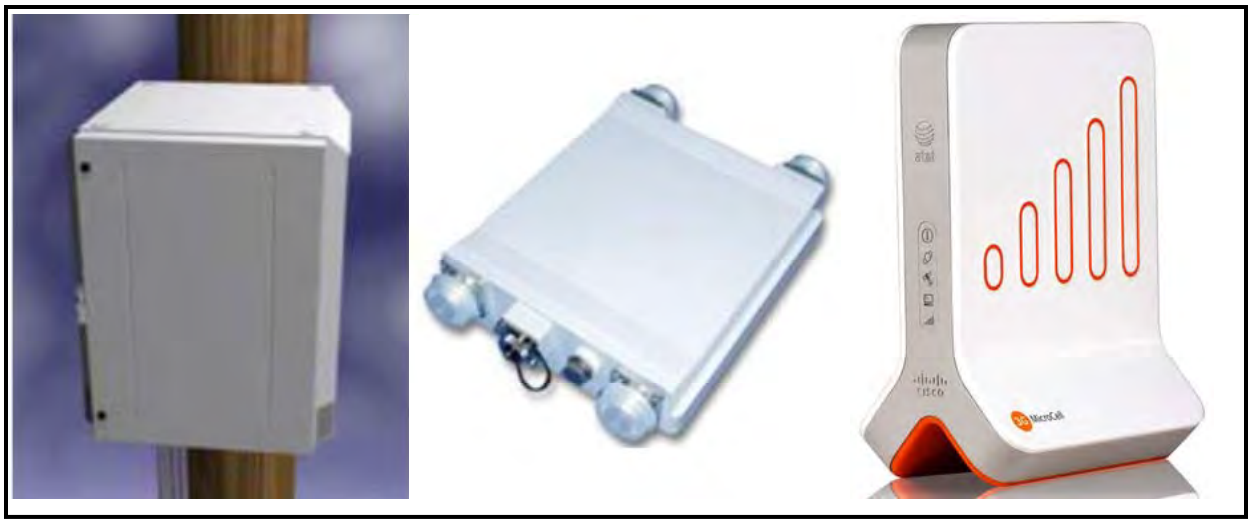


Figure 12: Example of a microcell[33] (left), picocell[33] (center), and femtocell[38] (right).

By some estimates, there are more than 2 million signal boosters in use today. They are used to fill coverage gaps in urban environments, such as buildings, tunnels, and bridges, which benefits individuals working in office buildings, health care facilities, and on educational campuses.[39] They are also used in rural, underserved, and difficult to reach areas. When used properly, they can provide public safety benefits where coverage is deficient or where a signal is blocked or shielded by enabling the public to connect to 911 in an emergency.[39]

From their initial use to the present time, boosters and repeaters have not been heavily regulated by the FCC. The industry has learned, however, that malfunctioning, improperly installed, or technically-deficient boosters may cause harmful interference to commercial and public safety wireless networks. In knowing this, on February 20, 2013, the FCC released a *Report and Order* to incorporate safeguards, generally known as the Network Protection Standard, to mitigate interference to wireless networks.[39] In this report, the FCC categorized the booster technology into two categories: Consumer Signal Boosters and Industrial Signal Boosters.

Consumer signal boosters are designed to be used "out of the box" and are specifically defined by the FCC as: "a bi-directional signal booster that is marketed and sold to the general public for use without modification." These types of devices do not require professional installation and are used for personal use by individuals to improve coverage in a home, car, boat, recreational vehicle and related areas. Subscribers must obtain a form of licensee consent to operate the booster, register the unit with the provider, and the booster must be certified by the FCC. A femtocell, as described and pictured above in Figure 12, is an example of a consumer signal booster. The new rules require consumer signal boosters to have specific technical features to protect against interference. [39]

Industrial signal boosters include a variety of devices that are designed and installed by licensed or qualified professionals and are typically used to serve multiple users and cover large areas such as stadiums, airports, office buildings, hospitals, tunnels, and educational campuses. They are specifically defined by the FCC as: "all signal boosters other than consumer signal boosters." These devices require an FCC license or express license consent to operate. Because

38 Image found at: http://blogs-images.forbes.com/anthonykosner/files/2012/10/3g-microcell_large_verge_medium_landscape.jpeg.
39 Federal Communications Commission. 2013. Report and Order. In the Matter of Amendment of Parts 1, 2, 22, 24, 27, 90 and 95 of the Commission's Rules to Improve Wireless Coverage Through the Use of Signal Boosters. http://transition.fcc.gov/Daily_Releases/Daily_Business/2013/db0320/FCC-13-21A1.pdf.

these devices are installed with explicit licensee consent and close licensee coordination, they do not require particular interference protection. These devices may also require additional antennas, amplifiers, and other components to operate appropriately.[39]

In the February 20, 2013 *Report and Order*, the FCC stated they will no longer accept applications to certify any boosters that do not comply with the new rules, and furthermore, on or after March 1, 2014, all consumer and industrial signal boosters sold and marketed in the United States must meet the new requirements.[39]

Although sometimes referred to as microcell technology, DAS should not be confused with boosters and similar independent microcell devices. The DAS Forum, a broad-based organization dedicated to the DAS component of the nation's wireless network, and made up of leaders focused exclusively on shaping the future of DAS as a viable complement to traditional macrocell sites in challenging environments,[40] states that DAS is being deployed to provide coverage in targeted locations, moving radios closer to the subscriber, and or to providing additional call and data-handling capacity in areas with concentrated demands for wireless service.[33] (Note: As of April 22, 2013, the DAS Forum was renamed the HetNet Forum.[41] The HetNet Forum is a membership body within PCIA. "HetNet" is short for heterogeneous network[40] and is further described below.)

DAS networks include three primary components: 1) a number of remote communications nodes, each having at least one antenna for transmission and reception, 2) a high capacity signal transport medium, which is typically a fiber optic cable (either underground or aerial[42]), connecting the nodes to the central communications hub, and 3) equipment located at the hub site to propagate and/or convert, process or control the signals transmitted and received through the nodes (the hub is where the equipment is stored similar to the equipment found at the base of telecommunications towers). Furthermore, and depending upon the exact environment of the DAS, additional equipment such as amplifiers, remote radio heads, signal converters, and power supplies, may be needed[33] (Figure 13).

DAS can be deployed indoors and outdoors, and it is often desirable in urban areas and within or around college campuses. Indoor DAS networks can be deployed in spaces where large numbers of people congregate such as sports stadiums and arenas, convention centers, and healthcare facilities. Outdoor DAS networks are deployed in targeted locations within areas already covered by macrocells to increase capacity. DAS systems can range from two to hundreds of nodes, and each node transmits radiofrequency signals at much lower power levels than common macrocell sites. Often DAS nodes are attached to utility poles or similar structures (Figure 14) in the public right-of-way covering several blocks, whole neighborhoods, and even entire cities.[33] DAS hubs can be located up to 30 miles away, which could be in different jurisdictions.[35]

40 The DAS Forum. February 21, 2013. About Us: Who We Are. http://www.thedasforum.org/about-us/who-we-are/.
41 The HetNet Forum. http://www.thedasforum.org/the-das-forum-renamed-hetnet-forum/.
42 American Tower. 2011. DAS Solutions: Delivering Coverage and Capacity in Today's Challenging Environments. http://www.americantower.com/marketing227/AmericanTowerDASSolutionsBrochure.pdf.

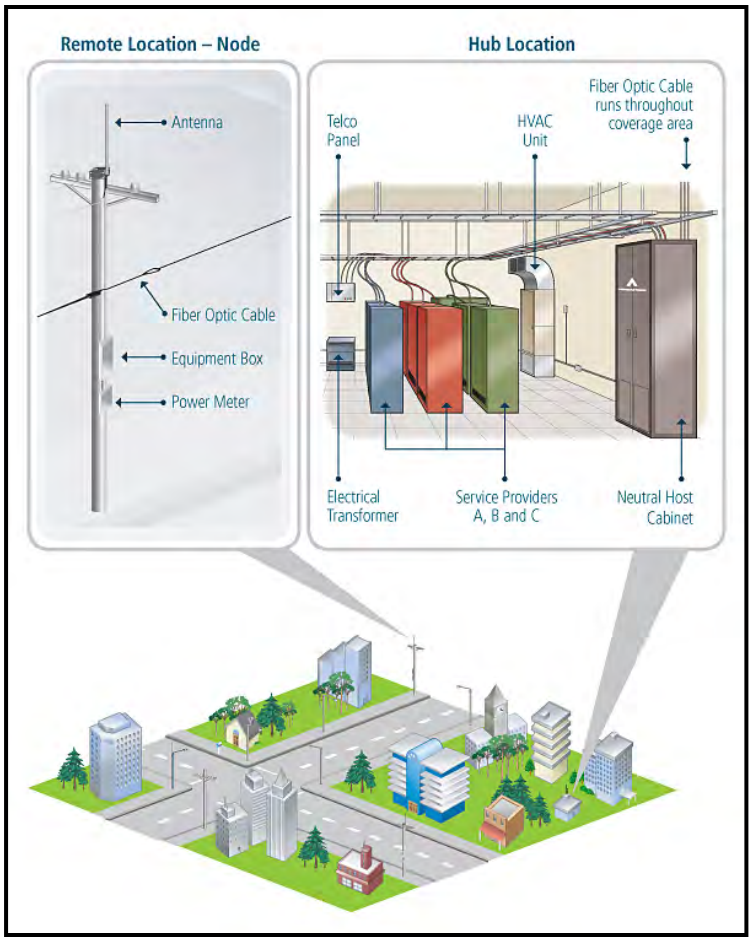


Figure 13: Basic example of an outdoor deployed DAS network. [43]

Figure 14: A DAS node attached to a street light in North Carolina[44] (left), a node attached to a wooden power pole in New Jersey[44] (center), and a close-up view of node equipment (right)[33].

43 Crown Castle. February 22, 2013. We Are Solutions Case Study: Deployment in New York City. http://www.crowncastle.com/das/caseStudies/newYork.pdf.

There are of course advantages and disadvantages with DAS technology. Some of the advantages include: providing low-profile infrastructure, providing coverage in challenging or hard to reach areas, utilizing less power, operating multi-system networks (i.e. PCS, broadband, WiFi, etc.), and it is easier to upgrade.[45] The disadvantages are usually associated with the expense of such systems. Regardless of who the financier is, there is usually significant upfront capital investments needed, especially when deployed outside due to design and installation issues and for the need of miles of fiber optic cabling.[33] Specifically from a provider's perspective, some of the disadvantages are that leases are usually higher than macrocell sites, the coverage area per node is small, and there may be pole attachment issues (i.e. availability or right-of-way/ownership).[42]

Furthermore, depending upon which side of the aisle one falls, DAS deployment may be easy or difficult to implement, and it all depends upon how the locality chooses to regulate the technology. Interestingly, the model ordinance devised by PCIA includes a statement that "no provisions of [the model ordinance] shall apply to the siting of Distributed Antenna Systems (DAS) or wireless facilities located within and intended to provide wireless coverage within a structure."[24] On the other hand, Kreines and Kreines, Inc. contends that microcell technology should require discretionary review and approval, just like macrocells because microcells emit radio frequency radiation—although at lesser amounts—just like macrocells. Kreines and Kreines, Inc. also states that some microcell sites will be close to the macrocells that they support and in such cases the cumulative RFR emissions environment (often called the RF floor) will be raised.[32]

As the City moves forward with considering telecommunications policies and regulations, the term heterogeneous network, or the "HetNet," as mentioned above, should be understood as it is one of the newest identifications or terminologies used when describing the wireless network. The HetNet, as described by 4G Americas—an organization devoted to promoting, facilitating, and advocating for the deployment of the 3rd Generation Partnership Project (3GPP) family of technologies throughout America[46]—in their white paper *Developing and Integrating a High Performance HET-NET*,[47] consists of different wireless technologies working together to provide a seamless wireless experience. It is comprised of traditional large macrocells, microcells, picocells, femtocells, and WiFi networks to offload telecommunications traffic.[47] In addition, the HetNet Forum describes the HetNet as a wireless system, comprised of an array of mobile and wireless technologies and infrastructure that are interoperable with the macrocellular network that provides harmonious voice and data communications.[40] Figure 15 below provides a basic illustration of the HetNet.

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44 HetNet Forum. http://www.thedasforum.org/gallery/outdoor-das-images/, and
http://www.flickr.com/photos/dasforum/6420156075/sizes/o/in/photostream/, and
http://www.flickr.com/photos/dasforum/6420104509/sizes/o/in/photostream/.

45 Malone, Christine A. January 24, 2011. DAS and the Town of Carefree: Technology Overview and Answer to Common Questions. Comp Comm/STM COMM, LLC. http://www.carefree.org/vertical/sites/%7B7E577914-08B7-498C-8013-7E6515AE5610%7D/uploads/%7B05262F5F-E40B-4461-BDE4-327D28E7C812%7D.PDF.

46 4G Americas. About 4G Americas. http://www.4gamericas.org/index.cfm?fuseaction=page&sectionid=106.

47 4G Americas. October 2012. *Developing and Integrating a High Performance HET-NET*. http://www.4gamericas.org/documents/4G%20Americas%20-Developing%20Integrating%20High%20Performance%20HET-NET%20October%202012.pdf.

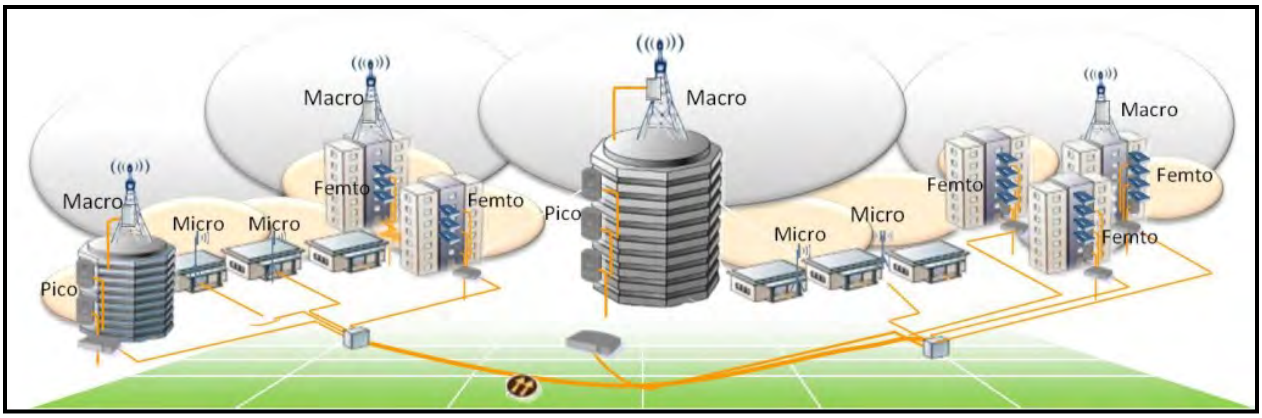

Figure 15: Basic Illustration of the HetNet as included in 4G Americas' *Developing and Integrating a High Performance HET-NET*. Image used from RCRWireless.com.[48]

As noted above, the utilization of existing power poles, street lights, and traffic control infrastructure is very important to the deployment of traditional telecommunications infrastructure, DAS networks, and other microcell installation. Since much of this infrastructure is often desired to be located within public street and alley right-of-ways, other provisions, outside of zoning regulations, must also be devised so that comprehensive telecommunications regulatory control can be properly implemented in the City. In understanding this, input provided by the Department of Public Works and the Harrisonburg Electric Commission will be necessary. Such provisions must work within the confines of 47 USC § 224 Pole Attachments of the 1996 Act, which outlines specific rules regarding rates, terms, and conditions when attaching telecommunications to utility infrastructure, [49] and within the guidelines of the FCC's April 7, 2011 *Report and Order and Order of Reconsideration in the Matter of Implementation of Section 224 of the Act*.[50]

If the City decides to amend the existing telecommunications regulations, planning for the installation of microcell sites must be considered, and if the City does not want towers popping up in places that are considered undesirable, then this technology should be encouraged by ordinance.

V. Conclusion

In returning to the discussion from the City's first telecommunications request in September 1996, a representative of the telecommunications industry stated, "…not only does [telecommunications] service increase the available communications services and therefore help people better communicate, it stimulates economic development… [and]… [i]t promotes economic growth as businesses realize their facilities and executives have access to state-of-the-art communications services." Although that statement was true then, the telecommunications technology has advanced well beyond its intentions in 1996, and therefore that quote is much more relevant and imperative to current lifestyles and the economy today than it was almost 17

48 Image found on RCRWireless.com. RCRWireless: Intelligence On All Things Wireless. Mobile Backhaul Trends and Analysis. http://www.rcrwireless.com/mobile-backhaul/lte-network-architecture-diagram.html.
49 Telecommunications Act of 1996. http://transition.fcc.gov/Reports/1934new.pdf - pages 59 of 333.
50 Federal Communications Commission. April 7, 2011. *Report and Order and Order of Reconsideration in the Matter of Implementation of Section 224 of the Act*. WC Docket No. 07-245. http://www.fcc.gov/document/implementation-section-224-act-national-broadband-plan-our-future-0.

years ago. As identified in a February 2013 published FCC White Paper titled, *The Mobile Broadband Spectrum Challenge: International Comparisons*, the mobile wireless landscape is transforming with mobile broadband networks rising not only as the foundation of communications but also as the infrastructure that supports economic growth and innovation in widespread, consumer focused areas such as healthcare, public safety, education, and social welfare.[51]

As noted by Kreines and Kreines, Inc., since 2009, providers across the country have been steadily making, or requesting to make, upgrades and improvements to existing sites and requesting new sites to locate their infrastructure. In 2010, there was about 600 MHz of spectrum in the United States available for personal wireless services carriers to buy or use, and by 2015, an additional 800 MHz of spectrum could be needed.[3] In addition to this prediction, the FCC believes global mobile data traffic is anticipated to grow eighteen-fold between 2011 and 2016.[44]

Technology has changed significantly over the past 17 years and staff believes it would be good practice to update the City Code by amending the Zoning Ordinance and other policies by further addressing land use issues involving telecommunications facilities. Staff believes the driving force to update these regulations should be in being sensitive to the needs and desires of the Harrisonburg community while providing more opportunities for telecommunications. If Planning Commission agrees, staff will formally begin to draft a telecommunications ordinance.

Although ultimately more provisions would be included in the ordinance and other discussions still must be had—one of which is whether or not existing private property rights relative to telecommunications should be changed—at this time staff recommends some form of the following provisions be incorporated in an ordinance for the City to adopt:

1. To allow telecommunications within more zoning districts.
    a. Such provisions could include allowing telecommunications in residential districts by special use permit only, where providers must utilize concealed technology.
2. To create opportunities for administrative review and approval.
    a. Such provisions could include: allowing the placement of telecommunications by-right on existing roofs, walls, water tanks, existing towers, and other structures within business and industrial districts so long as the height of the structure is not increased or is not increased by a certain height or percentage of the supporting structure—these facilities should also be identical in color or closely compatible with the structure and flush mounted; and allowing concealed facilities by right in business and industrial districts.

    b. Such provisions should not require additional fees aside from such required by building and sub-trade permits.
3. To allow telecommunications in public street right-of-way, other public right-of-way, and on publicly owned properties.
    a. Such provisions could allow, with support from the Department of Public Works and the Harrisonburg Electric Commission, telecommunications on light stanchions, traffic signal infrastructure, and power and other utility poles. In

51 Federal Communications Commission. February 26, 2013. *The Mobile Broadband Spectrum Challenge: International Comparisons.* http://transition.fcc.gov/Daily_Releases/Daily_Business/2013/db0227/DOC-318485A1.pdf.

addition, such facilities, with support from the Harrisonburg City School Board, could be located on athletic facility light poles.

b. These allowances could be permitted by administrative review and approval.

4. To require more information and details be submitted upon application.
    a. Such requirements could include: photo-imagery or other visual simulation; for new towers—a balloon test shall be conducted to illustrate the height of the proposed tower and to notify the City when the test would be conducted and to require photographs of the balloon test be submitted upon application; an inventory of the providers existing facilities that are either within the City or within five miles of the City limits which shall specify the location, height, and design of the facility; and written evidence of the contact made with the owners of nearby facilities that they have inquired about the potential collocation opportunities that are technically feasible locations.
5. To require all telecommunication facilities, not on alternative structures (i.e. existing buildings, water tanks and towers, etc.), be setback 110 percent the height of the tower.
6. To require landscaping or other material that effectively screens the view of the support buildings from adjacent property.
7. To require freestanding telecommunications facilities to be designed to accommodate at least three providers or more depending upon the height of the facility.
8. To prohibit artificial lighting unless required by the FCC.
9. To require a form of surety to secure the cost to remove the tower and equipment and return the site to its original condition to the extent reasonably possible.
10. To allow at the discretion of the Director of Planning and Community Development, or their designated agent, to contract with experts to assist with the review of telecommunications facilities at an expense of the applicant not to exceed a specified amount.
11. To incentivize microcell and DAS technology.

Appendix A: Current Zoning Regulations Regarding Telecommunications

City of Harrisonburg, Virginia

DEPARTMENT OF PLANNING AND COMMUNITY DEVELOPMENT

STAFF REPORT
January 11, 2012

Current Zoning Regulations Regarding Telecommunications

The following report describes the City's current zoning regulations regarding telecommunications towers and equipment. In brief, three zoning districts—B-1, B-2, and M-1—allow private, commercial telecommunications structures through by-right permission or by approval of a special use permit (SUP). Such towers should not be confused with "communications facilities necessary for public safety purposes" or private amateur radio antennas.

The Zoning Ordinance does not define "telecommunications" or "telecommunications equipment;" the term associated with such systems is "communications tower," and is defined as: *a structure that is intended to send and/or receive radio, television and other telecommunications signals*. It is interpreted that this definition includes stand alone towers as well as co-location equipment on buildings and other structures. Nevertheless, the Zoning Ordinance is not consistent with its use of "communications tower" and sometimes only refers to "telecommunications," which staff treats the same as "communications tower" and "communications facilities."

Other than its occurrence in Article F. Definitions, "communications tower" is only referenced three times. First, it occurs within Section 10-3-91, which is the special use permit (SUP) section of the B-2, General Business District. It is listed as subsection (4), where it states: *Communications tower no more than one hundred twenty-five (125) feet in height*. There have been several such SUPs approved in the past, and in 2011, the City approved two requests for this SUP. The first was in July for the property at 130 University Boulevard, at the corner of University Boulevard and Evelyn Byrd Avenue, where Verizon co-located on an existing tower, which now reaches 79 feet in height. The second request occurred recently in November and was located at 1106 Reservoir Street, where AT&T will erect a 125-foot tower. As most are aware, SUPs require public hearings with advertisements in the newspaper, postings of property, notifications sent to adjacent property owners, Planning Commission review, and a decision by City Council.

"Communications tower" is next referenced in Section 10-3-96, which is the M-1, General Industrial District's uses permitted by-right category, listed as subsection (15). The language is exactly the same as that within the B-2 SUP section, where the only difference is the use is by-right and not by SUP. These uses only require administrative approval that could include comprehensive site plan review and obtaining building, electrical, or mechanical permits. An

example of a property owner that took advantage of this by-right allowance is at 922 South High Street. This tower is located near Keister Elementary School's Central Avenue parking lot, but it is accessible from South High Street, diagonally across the street from the Taste of Tai restaurant. It was permitted in January 2007 and reaches a height of 120 feet. The City does not have an easy way to query records to determine exactly how many towers or co-locations on these towers have been permitted per this by-right use.

The last section of the Zoning Ordinance where "communications tower" is referenced is within the SUP category of the M-1, General Industrial District at 10-3-97 (6). The language within that subsection states: *Communications towers more than one hundred twenty-five (125) feet in height*. There have been only two such SUPs reviewed and approved by City Council. The first was in June 2003, when City Council approved a SUP that granted permission to Verstandig Broadcasting to bring their non-conforming, 350-foot towers into conformance with the Zoning Ordinance. The towers are located near Garbers Church Road and were annexed into the City in 1983. The other SUP was located at 30 Kratzer Avenue, where, in August 2004, Nextel Partners requested to co-locate communications equipment at the top of the Cargill Turkey Products, LLC feed tower, which stands at 185 feet in height. Although the SUP was approved, to staff's knowledge, Nextel never co-located their equipment on the feed tower.

The B-1, Central Business District also allows telecommunications equipment, however, the regulations within this district do not refer to the use as "communications tower," but rather as "telecommunications equipment and facilities," which, as a reminder, is not defined by the Zoning Ordinance. This district allows two different uses related to telecommunications. The first is within Section 10-3-84 (9), which permits telecommunications equipment and facilities by-right, provided such equipment and facilities are located in an enclosed structure. This use was added to the list of by-right uses of the B-1 district in 1994 when Shentel wanted to allow telecommunications equipment in the B-1 zoning district as a principle use in a building where they had no offices. The amendment was approved and they subsequently located within the building at 151 South Mason Street. To staff's knowledge, 151 South Mason Street is the only property that has this use. Also in B-1, Section 10-3-85 (2) allows telecommunications equipment and facilities not located in an enclosed structure by SUP. There have been four such requests and all were approved. The first occurred in December 2003 when Shentel received approval to locate on the rooftop of the building at 2 South Main Street (the building at the corner of Court Square and East Market Street). A second permit was approved in July 2005 to allow Verizon to also co-locate on the same rooftop. Then, in August 2005, Cellone received approval to locate on the rooftop of 101 North Main Street (also known as Harrison Plaza where the Police Department, the Fire Department, and the Emergency Communications Center (ECC) is located). Finally, in October 2006, Alltel received approval to also co-locate on the rooftop of Harrison Plaza. Since the time of the Harrison Plaza co-location SUPs, there has been an administrative acceptance of the concept that the City does not have to abide by its own zoning regulations.

There has been some confusion regarding the issue of "co-location." It should be understood that any telecommunications company can co-locate on any structure or building in the B-1, B-2, and M-1 zoning districts so long as they abide by the zoning regulations, which may require SUP approval, and, if necessary, submit and receive approval of a comprehensive site plan and further obtain the proper building, electrical, or mechanical permits. It is up to individual property owners and the interested party to determine if existing structures and buildings have the

physical capacity to allow co-location, and if necessary, these individuals are working in cooperation with the City's Building Inspections Division in receiving approval of appropriate permits, which may be related to a building's structural/physical capacity. One example of a co-location on a building in the B-2 district is on the Holiday Inn structure at 1400 East Market Street. In 2006, T-Mobile received approval of a SUP and mounted their panels to the side of the building. The panels are painted the same color as the building and are disguised extremely well. Although the properties are zoned residentially, co-location is also permitted on the City-owned public safety tower at Tower Street, the water tank at Tower Street, and at the tower behind Stone Spring Elementary School.

To be clear, "communications facilities necessary for public safety purposes" are permitted by SUP in all zoning districts except R-5, R-6, R-7, and MX-U. The use of communication facilities was added to the Zoning Ordinance in 2005 (prior to the creation of the R-5, R-6, R-7, and MX-U districts) in preparation of the installation of the public safety towers now located at Tower Street and near Stone Spring Elementary School. Both properties were granted SUPs in 2005 and both towers reach 199 feet in height. Per ordinance, these towers may reach 200 feet in height, and they may also include rental of space to private communication service providers. Private amateur radio antennas are permitted in all residential districts, including the MX-U district, when such structures are intended for public service and emergency use. These antennas may exceed the height otherwise established within the district so long as the height is justified for proper radio communications. Examples of such antennas would be amateur or ham radio antennas.

Staff does not have an inventory of every communications equipment or tower in the City nor do we know of every structure that may have co-location of telecommunications equipment. With this, it should be recognized that telecommunications equipment could be located on structures that may somehow be non-conforming, or they could even be located in an illegal fashion—meaning they did not receive appropriate permission or located in a place that, by ordinance, would not be permitted. We appreciate when property owners/telecommunication providers contact us regarding location and co-location opportunities; first, so we can ensure they abide by all governing regulations, but also so we can inform the ECC of the situation to ensure that it does not disrupt their communications systems.

Appendix B: Telecommunications Facility Locations

Table 1 includes the telecommunications sites within the City that are regulated by the Federal Communications Commission and were reported to the Virginia State Corporation Commission (SCC) as of September 20, 2012. Additional assistance was provided by the City's Commissioner of Revenue's Office including the Real Estate Office and the Virginia Department of Taxation. (The Verizon Wireless locations were further verified by the Verizon Wireless Real Estate Manager serving the region in which the City is located.) Note this list is intended to be comprehensive, but if there is equipment deployed on sites not listed below, then it was either not required to be reported, not reported to the SCC as of the date listed above, or has simply not been reported. Note that each row number corresponds to the telecommunications facilities numbered on the included map. Table 2 differentiates legal names with common carrier names.

Table 1: Telecommunications Towers, Antennas and Equipment within the City of Harrisonburg

	Tax Map	Physical Property Address	Zoning	Supporting Infrastructure & Height	Company Name(s) and Number of Tenants on Infrastructure
1*	6-C-1	2510 South Main Street	M-1	Tower (Exact height unknown)	1. WWC License, LLC
2	13-A-3	1400 East Market Street	B-2	Holiday Inn Building (42' – Flush mounted antennas)	1. T-Mobile License, LLC
3	14-L-7	1108 Reservoir Street	B-2	Tower (124')	1. New Cingular Wireless PCS, LLC 2. Shenandoah Personal Communications LLC Shentel
4^	17-B-1	206 Port Republic Road	R-3	Tower (Exact height unknown)	1. APC PCS, LLC 2. New Cingular Wireless PCS, LLC 3. Virginia PCS Alliance, L.C. 4. T-Mobile License, LLC
5	19-D-5	904 South High Street	M-1	Tower (120')	1. Verizon Wireless (VAW) LLC 2. APC PCS, LLC
6	20-A-2B	1176 South High Street	M-1	Water Tower (150' – Antennas reach 160')	1. APC PCS, LLC 2. Cook Inlet/VS GSM VII PCS, LLC 3. New Cingular Wireless PCS, LLC 4. T-Mobile License, LLC 5. Virginia PCS Alliance, L.C.
7	25-H-19	320 Chesapeake Avenue	M-1	Tower (199')	1. New Cingular Wireless PCS, LLC

8[#]	32-D-1	670 Vine Street/653 Tower Street	R-2	Tower (199')	1. Verizon Wireless (VAW) LLC 2. T-Mobile License, LLC 3. APC PCS, LLC
9	34-B-1	30 Kratzer Avenue	M-1	Cargill Feed Mill Building (183' – Antennas mounted at 175')	1. New Cingular Wireless PCS, LLC 2. Nextel WIP License Corp.
10[#]	34-P-1	101 North Main Street	B-1	Harrison Plaza Building (66' – Antennas reach 88')	1. WWC License, LLC
11	34-Y-10	2 South Main Street	B-1	Multi-use Building (82'4" – Antennas reach 84'6")	1. APC PCS, LLC 2. Virginia PCS Alliance, L.C. 3. Verizon Wireless (VAW) LLC or WWC License, LLC
12	35-X-9	135 West Market Street	B-1	Rosetta Stone In-Building Base Station/Booster (Height N/A)	1. T-Mobile License, LLC
13	37-C-3	85 Waterman Drive	M-1	Tower (Exact height unknown)	1. APC PCS, LLC
14	41-E-1	166 Charles Street	M-1	Tower (Exact height unknown)	1. APC PCS, LLC
15	56-A-9	1640 Red Oak Street	M-1	Tower (125')	1. T-Mobile License, LLC
16	78-B-2	85 University Boulevard	B-2	Hampton Inn Building (45'2" – Antennas reach 55'6")	1. New Cingular Wireless PCS, LLC 2. Verizon Wireless (VAW) LLC 3. Virginia PCS Alliance, L.C.
17	78-C-1	130 University Boulevard	B-2	Tower (79')	1. WWC License, LLC 2. APC PCS, LLC 3. Verizon Wireless (VAW) LLC
18[@]	91-A-2	1575 Peach Grove Avenue	R-2	Tower (199')	1. Verizon Wireless (VAW) LLC 2. APC PCS, LLC 3. T-Mobile License, LLC

* Property listed by the SCC as an active site, however, Verizon Wireless decommissioned its equipment in 2010. Per a site visit, it appears this site has not been used by a telecommunications company in some time.

^ Property owned by Visitors James Madison University

[#] Property owned by the City of Harrisonburg

[@] Property owned by School Board City of Harrisonburg

Table 2: Wireless Companies Assessed by the State Corporation Commission

Common Carrier Name	Legal Name As Shown in Table 1
AT&T	• New Cingular Wireless PCS, LLC
NTELOS	• Virginia PCS Alliance, L.C.
Sprint-Nextel	• APC PCS, LLC • Nextel WIP License Corp.
Shentel	• Shenandoah Personal Communications LLC Shentel
T-Mobile	• Cook Inlet/VS GSM VII PCS, LLC • T-Mobile License LLC d/b/a T-Mobile Northeast LLC
Verizon Wireless	• Verizon Wireless (VAW) LLC • WWC License, LLC

Telecommunications Facility Locations (September 2012)