Madison County/MGI
Challenge response for the 2019 VATI Proposal

The VATI grant submitted by Madison County, in partnership with Madison Gigabit Internet (MGI) received two challenges. The following information is provided by the applicants as a further explanation of any existing coverage overlap related to the challenges submitted by the two providers.

General discussion of raw data used.

From a recent news story (https://www.dailyyonder.com/rural-download-speeds-worse-reported-microsoft-study-says/2019/02/05/30193/):

> "It is also known that the FCC dataset has multiple issues:
> 1. It is not validated by consumers or third-party entities.
> 2. Entire blocks are considered served if just one business or home in that block has service.
> 3. The rates are based on maximum advertised speeds, not technical measurement."

The problem is the way the FCC data is reported and what the content is allowed to mean, versus reality on the ground.

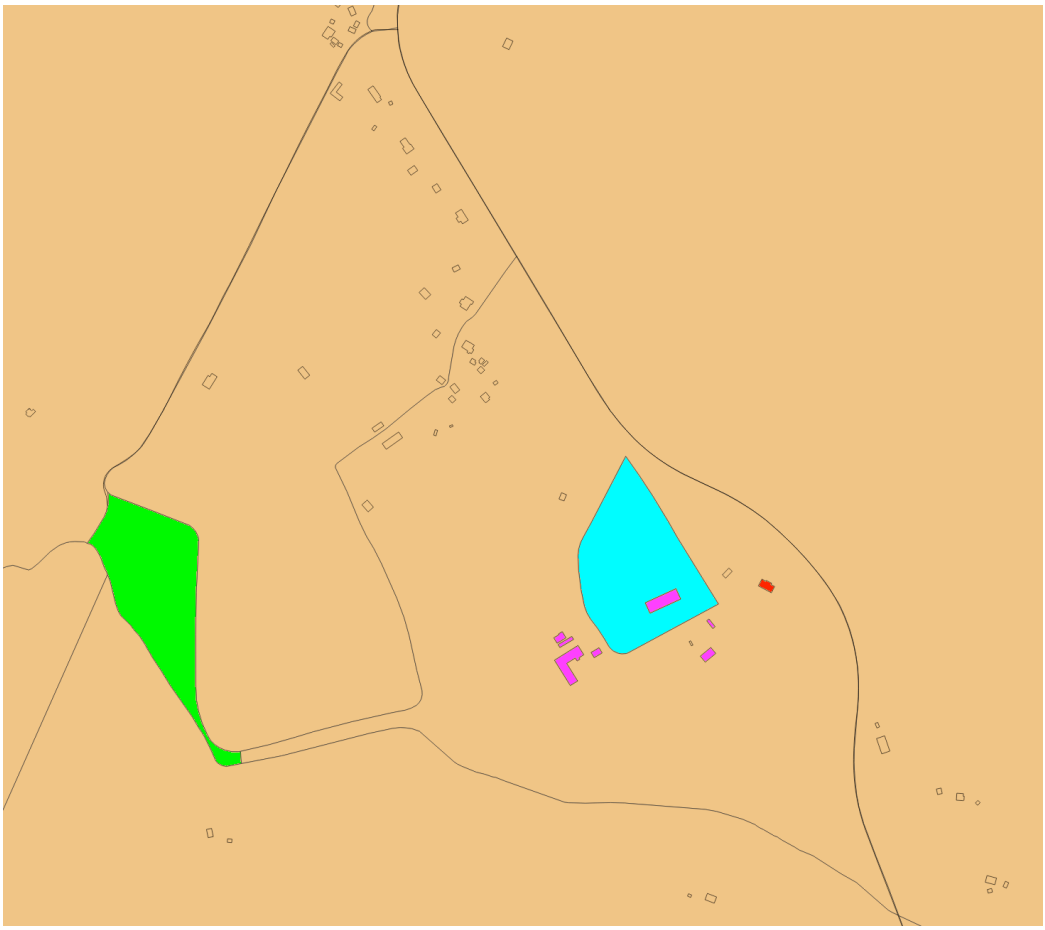
FCC data is based on census blocks. A census block is a region on the ground, nothing more. It may or may not have any dwellings. There is no minimum number, no minimum size for the block. A block can be so small as to contain only a single house (such does exist in Madison County), or large enough to have a couple hundred. It's not about the count or the density, even if it looks like it might be.

Given the FCC's own admittance that their data isn't very good, it is impossible to know from that data exactly what a wireless provider's actual coverage territory is. In addition, since the FCC's rule about coverage reporting, if a provider is, or can, serve even one location in a census block, it can claim to be serving the entire block, even if that one location is less than 1% of the possible customers.. When the "block" is tiny (as some in Madison are—perhaps only a single house), that is an accurate correlation. But when the block is large(r), seeing it fully colored in this image is misleading.

If the manufacturer of a radio says "450 megabits throughput" you might repeat that to the FCC. It wouldn't necessarily be wrong, but it's certainly not accurate. MGI experience is that a radio that the manufacturer claims does 500 megabits actually does 120 megabits. This disparity means a provider can claim excellent performance is possible without that actually being what is delivered in reality.

Madison Gigabit's reported numbers are ones we actually measure at customer locations, using "speedtest.net" as our standard.

This is a detailed example from County and Federal GIS data:



The tiny variable-size rectangles are actual buildings. The tan areas are the federal census blocks (www.census.gov), whose boundaries are the long black lines.

The blue region is a census block. It has one single structure in it. That structure is part of Rock Hill Lumber, a business at that location, not a dwelling. The small red rectangle is the owner's house.

The green region to the left is another census block. It has no homes or structures of any kind, yet it is still a census block.

The mostly-empty census block on the right is about 50 times larger than the blue one, but it only has three dwellings, at the far lower right (each one has a smaller shed or two).

Being able to reach into a census block with a radio signal does not mean being able to provide real service in that block, or that a provider can or does have actual customers in the block.

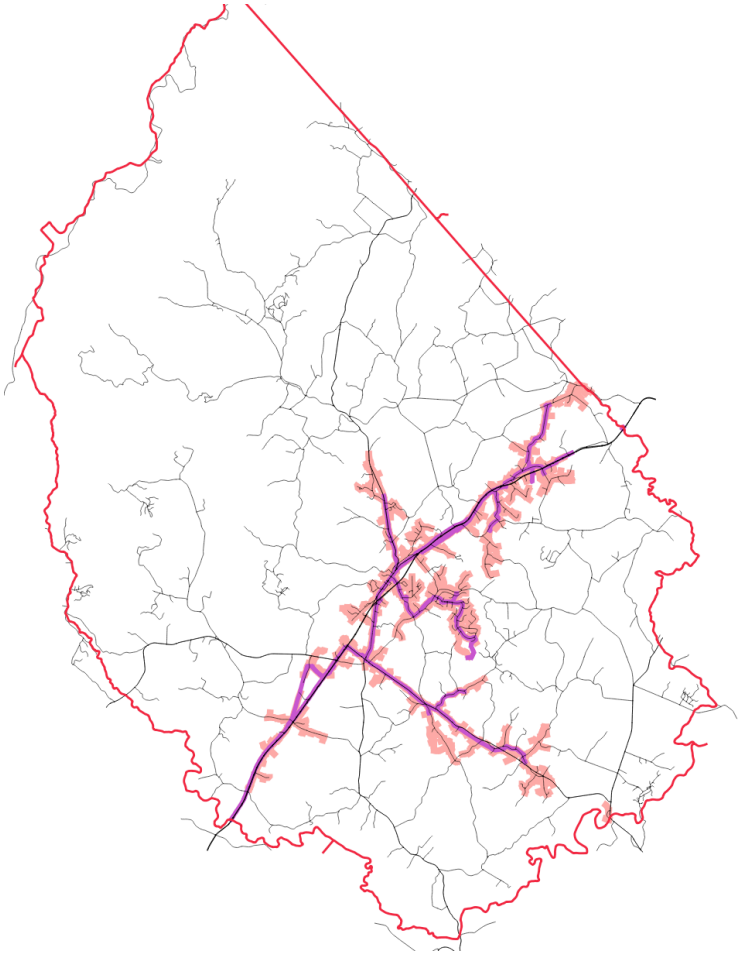
Given the very hilly nature of terrain in Madison, it's not certain that a block even COULD be served this way—there are quite a few that are sufficiently surrounded by hills that a dwelling in the center simply cannot be reached, even if the entire surrounding area IS served.

The FCC data cannot be taken to provide anything other than a suggestion of coverage.

A further explanation of any existing coverage overlap, regarding two providers who challenged the proposal: Comcast and Virginia Broadband.

1. Comcast

The map below is the coverage map of **Comcast** within Madison County, as supplied by Comcast.



There are two components to Comcast infrastructure in Madison County.

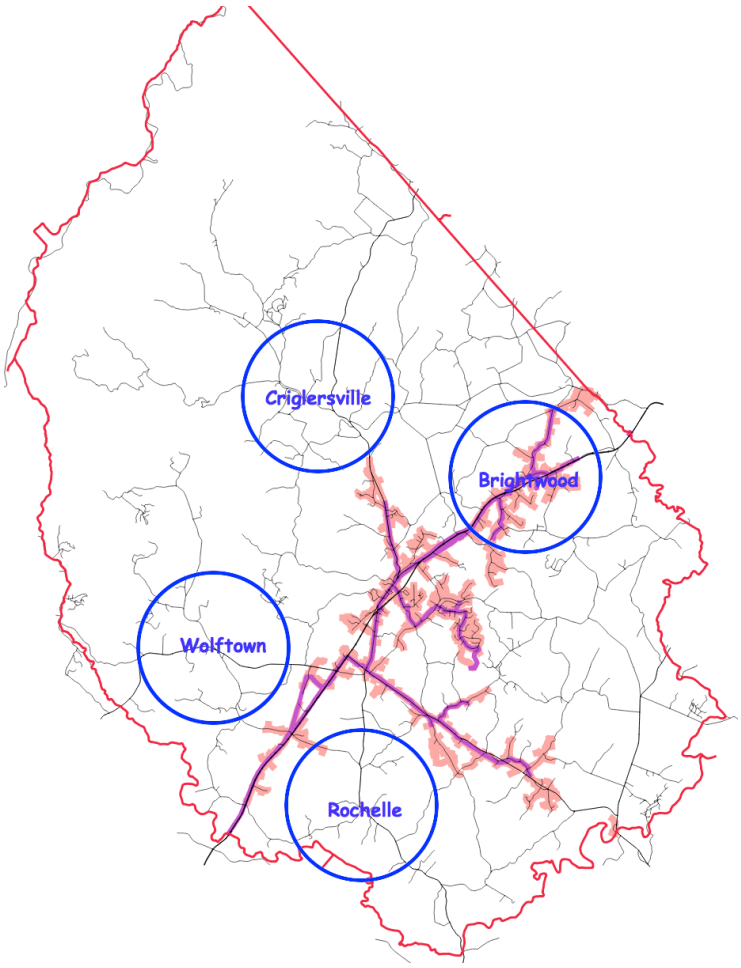
Fiber infrastructure is shown as purple lines in the map above and does not serve individual homes or businesses. This coverage generally runs along Route 29, east Route 230, Oak Park Road into the Malvern neighborhood, and north along Route 231.

Co-axial infrastructure, or the more traditional “Cable company” space is shown in pink in the above map. It extends short distances beyond the fiber infrastructure.

It should be noted that the line thicknesses shown here do not equate to coverage *area*, but are enlarged to make the paths visible at the whole-County scale. Along those roads, Comcast serves homes physically located within about 100 feet of the road, but does not generally provide service to homes

located some distance back with a driveway out to those roads.

Here is the same map, showing the approximate areas Madison Gigabit Internet (MGI) proposes to serve in the VATI application:



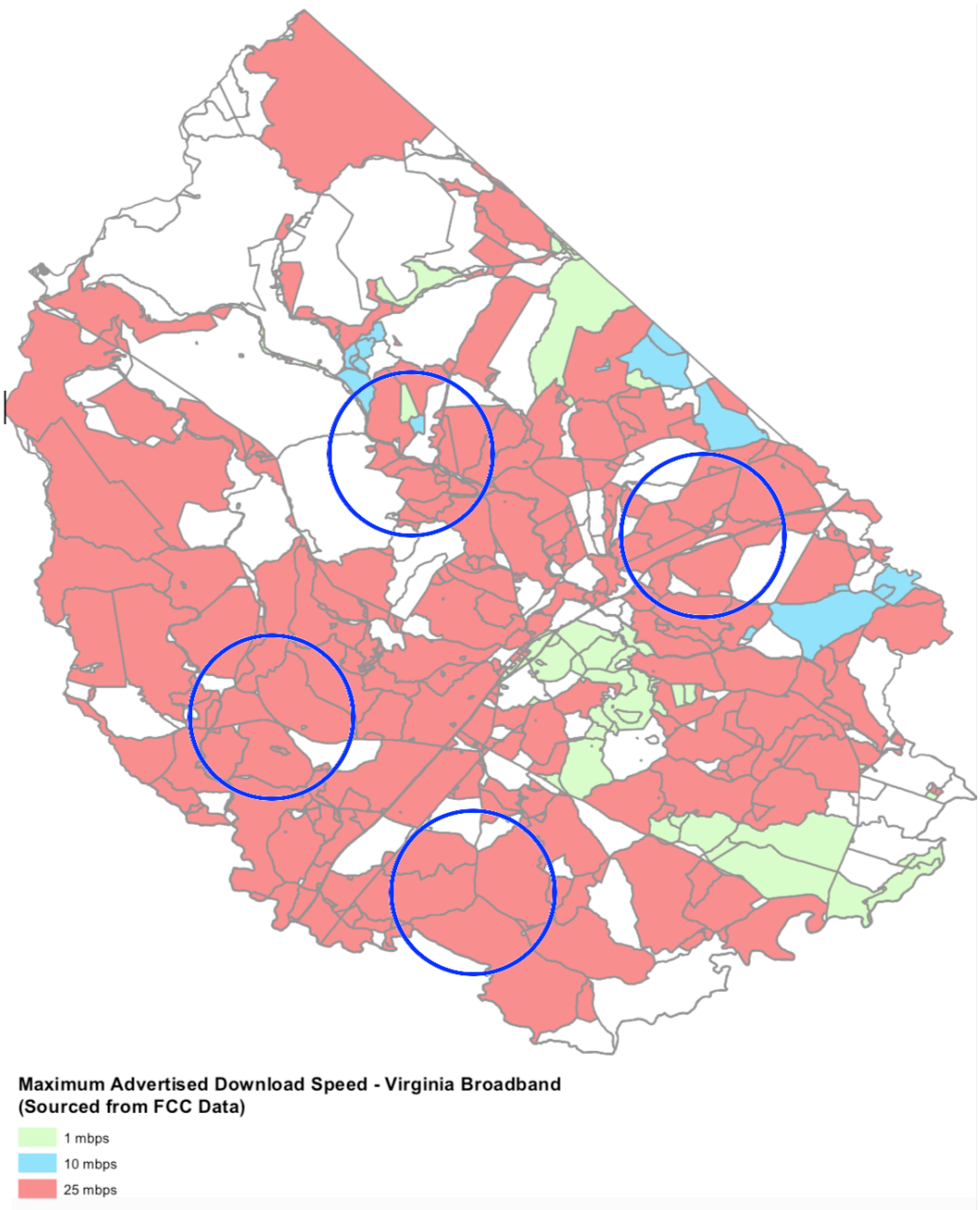
The four blue circles are the approximate coverage areas in this proposal; the circles in this image are two-mile radius, for visual clarity. On the ground, each one will be less due to terrain issues in the vicinity. Remembering that the Comcast lines are wide for visibility, there is overlap only in the Brightwood circle, and it is limited to area near Route 29. MGI proposes to work towards the homes farther off Route 29, away from the Comcast area. Brightwood offers a couple of elevation high-spots where it would be appropriate to place a tower and offer local service, one on either side of Route 29.

Each circle represents 25% of the planned coverage area in this proposal. 10% overlap would equal 40% of one circle. The actual overlap here is far less than 40% of one circle, and MGI does not seek to poach Comcast customers, but to extend over/beyond their current/likely reach, especially northwest.

In addition, Comcast's reported-to-the-FCC performance exceeds MGI current offering capability by a factor of two or more, so we are not really competing with them, and in fact we recommend Comcast to people who have it available and need service immediately. (In addition, if Comcast would wire the entire county soon, we would be thrilled.)

2. **Virginia Broadband**

This is the map of VABB coverage in the FCC data, and the same MGI planned coverage areas.



Acknowledging that anecdotes are not data, we have anecdotal reports that VABB's performance is unreliable, slow and has limited coverage. Having not perceived a need to retain those anecdotes as they arrived, we listened to but did not record them.

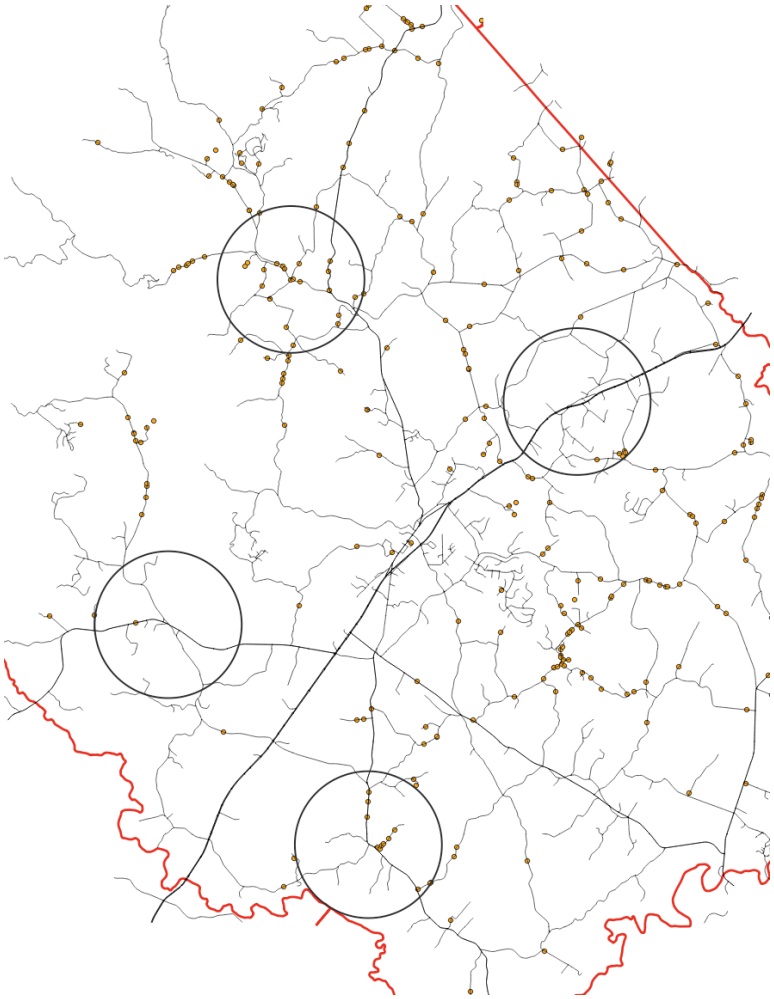
The above map shows the maximum advertised download speed based on FCC data reported by Virginia Broadband. VABB appears to cover the entire county, so it would be impossible to NOT have nearly 100% overlap.

Data received as part of the VATI challenge process reflects a more accurate view of VABB service in Madison County, shown below:

The above map is the VABB customer presence in Madison County customer data provided in the challenge. There are 266 locations identified and they are broadly, but sparsely distributed. These locations do not correspond 1:1 with the census-block map based on the applicant's GIS analysis.

The MGI plan for coverage only overlaps to a small extent with the service locations identified above. Overlaying 1.5-mile-radius expected coverage circles on the customer map, shows that approximately 35 VABB customers (13% of their Madison customers) are in those circles. In addition, VABB has publicly announced at the Madison Country Board of Supervisors meeting that they will be expanding in Madison, so the MGI plan is not hindering them in any way.

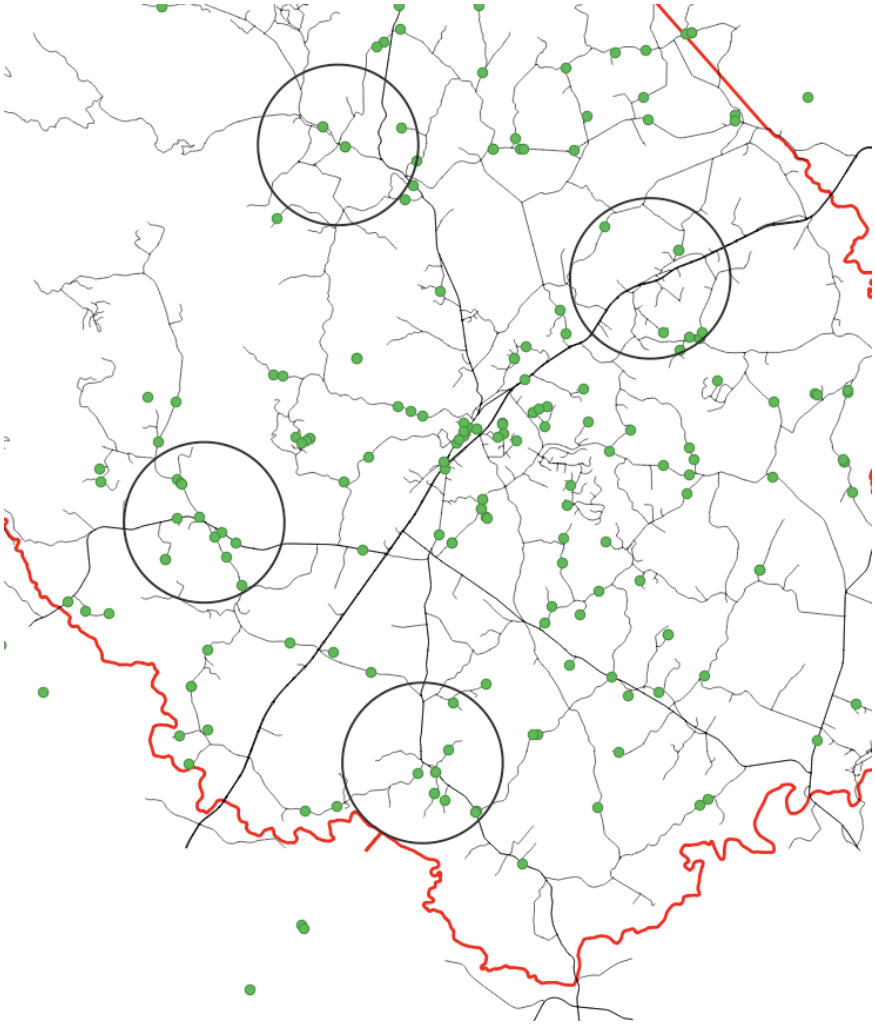
Here is the corresponding overlap map:



There is very little overlap in the Brightwood (NorthEast) circle (5 service locations), even less in the Wolftown (West) circle (2 locations). Rochelle (South) has a small amount (10 locations), and Criglersville (North) has more (19 locations).

While we consider these circular areas to be good candidate locations, they are not certainties. There are several others under consideration at this time, including Haywood, Madison town, Aroda/Radiant.

This is the map of county residents who have told us directly (via a website registration) that they are interested in our service:



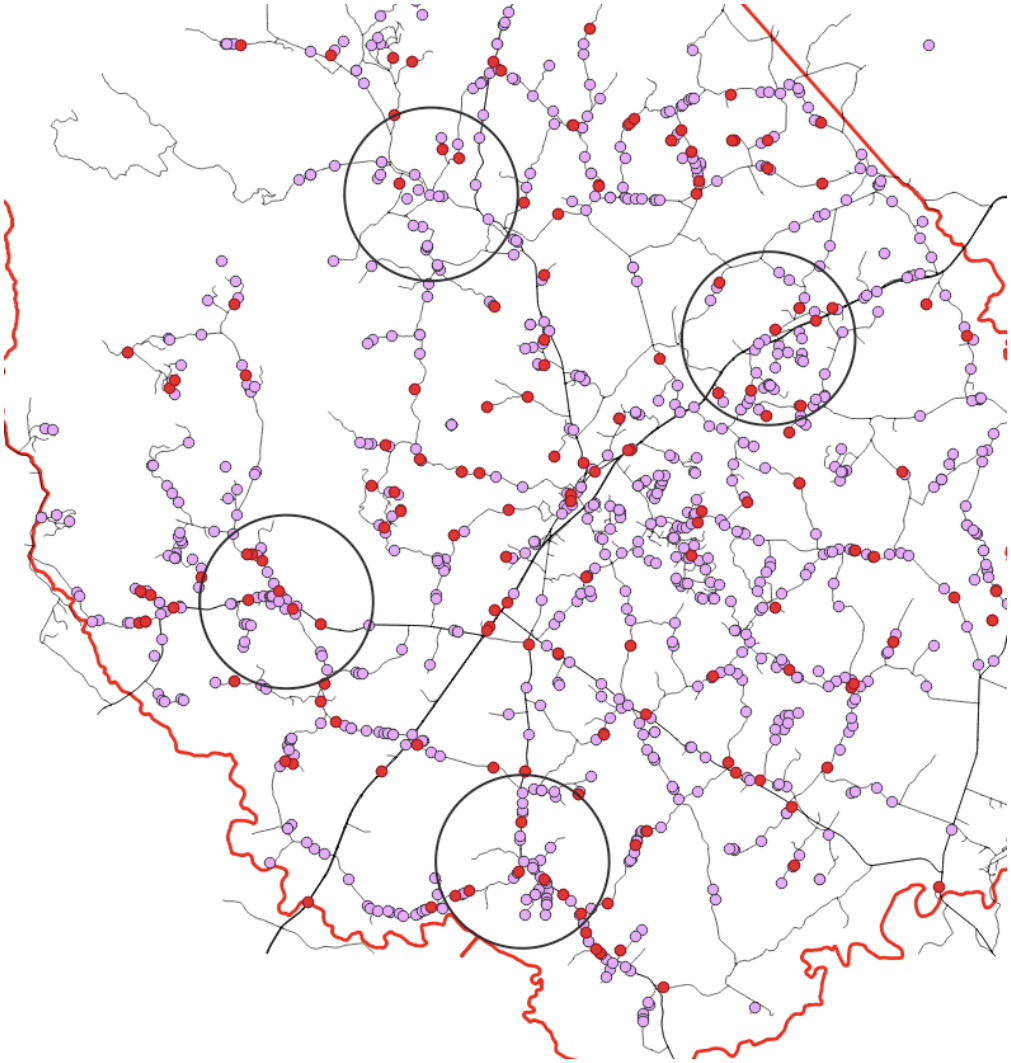
Wolftown (W) and Rochelle (S) are the most obvious targets, which is why they are first and second in our planning order.

There are more people whom we have spoken to directly than have registered, but we only have an approximate location for them.

In addition, there are existing VABB customers who have contacted MGI and said they want better service than what they have.

Acknowledging that anecdotes are not data, we have anecdotal reports that VABB's performance is unreliable, slow and has limited coverage. Having not perceived a need to retain those anecdotes as they arrived, we listened to but did not record them.

This is the map of residences from the CIT study mentioned in the original proposal:



The purple and red small circles are two halves of the same dataset. The concentrations in Wolftown (W), Rochelle (S), and Brightwood (NE) are clearly places to go early. Malvern would be too if Comcast wasn't already serving that neighborhood.

The response rate for the CIT data was 1000+ surveys returned, from 5000+ households. The distribution across the county is reasonably even, with the heaviest area being Malvern, SE of the town of Madison; Malvern is largely Comcast already, although there too we have talked to people who would take our service.

VABB's complaint about the technical plan is wrong. Our technical approach is different from theirs, and will avoid the problems they have about performance and reliability.

We have already demonstrated in our own internal testing that the hardware is capable of doing what we are planning, else we'd have a different plan. The open question is about scale-up rather than functionality—primarily whether the radios can handle the quantity of service locations.

We are addressing this by using 24GHz full-duplex radios/antennas in the middle-mile stretches, and 5GHz half-duplex sector antennas for the last-mile stretches. This means that the wireless paths that have to carry the most traffic have higher data capacity by using higher radio frequency, and can transmit and receive simultaneously.

We plan to use a 24GHz radio/antenna at the ground station, to another 24GHz radio at the Blakey tower, and for that radio to feed the four others that reach the four circle end-points. Those end-points are the locations for building a tower, upon which we will also place the half-duplex sector antennas to reach customer locations.

Using the sector antennas at the end-points means that each sector does not get overloaded with customers. Reported anecdotal evidence suggests that 40-50 is the limit for these units.

Existing MGI service locations are using only the 5GHz half-duplex radios, and have 95-megabit service. We are expecting the higher-frequency full-duplex units to do at least double that.

The random nature of human activity means that we don't all try to drive to the shopping mall at exactly the same time, and we don't all try to download big movies at the same time. MGI's existing service locations have not shown saturation unless we are performing tests to explicitly do that. We expect that load will increase as customer count increases, of course, and we will be studying upgrade options the entire time.

MGI does understand about rain fade, absorption frequencies, etc. We acknowledge that these are concerns for wireless signals, but so far our usage and testing indicates different results from what VABB reports, and that our approach is sound.

From VABB's own website, as captured on a cell phone.