# Performance Report – Magnetic Mount Antenna Test

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## Tested Equipment

I tested two magnetic mount cellular antennas from Maximumsignal.com.

- A 5 dbi gain 13" antenna that is included in the Cyfre amplifier kit, and can be purchased separately.
- A 9 dBi gain 39" antenna available as a separate purchase.

The first two pictures below show the 5dBi antenna. On the left, with the Cyfre amplifier kit.

This is the 39” antenna.

**Test Location**

The test was conducted in the mountains of central Colorado – the “front range” – at 8500’. The vehicle was driven away from the town of Woodland Park, into the Pike National Forest. This consisted of varied terrain, including mountain valleys with little cellular reception.

**Test Environment**


I tested this in a vehicle, and moved to various locations that I know have poor reception. The test vehicle was a Jeep Wrangler with a hardtop. Both magnetic mount external antennas were mounted on the hood. This is about 4’ off the ground. While mounting in the center of the roof of the vehicle is technically a better location it is not possible with a mag mount antenna, since the Jeep roof is fiberglass. The location on the hood gave unobstructed 360 degree access to the cellular towers – but a higher location on the roof might have been better. The larger 39” antenna is the black one closest to the windshield, the smaller 13” one is to the right.

An Asus Eee Netbook, the latest version of Verizon VZ Access Manager and a Verizon 727 cellular modem (aircard) was used to test signal at each of three locations. Only 3G testing was done since the aircard is a 3G-only card.

Signal testing was done with a data device because most modern phones no longer have rf antenna ports on them, so testing with a phone would not be typical use. If an antenna is to be used with most phones then an inductive cradle or patch antenna connector would likely be used. Both of these compromise signal to some extent. To get a fair test of the antenna's "raw" capability I wanted a device that was directly connected. Thus the use of the cellular modem.

Signal levels were obtained directly from VZ Access Manager, and recorded along with the "bars" shown.

**Test Results**

Three stops along the test route were made and readings with and without each antenna were recorded. A TNC to FME adaptor was used to connect the antenna cable to the cellular modem adaptor. No extension cables were used.

It appears that VZ Access Manager "tops out" at -117, since I never saw a lower signal level. In any case, -117 is not a usable signal and no device connected at that level.

The test methodology was as follows:

- The antenna loop built into the 727 modem was always left "stowed".
- Readings in each location were taken from the VZAM screen.
- At each location a connection was established to Google via a ping command in a continuous loop.
- Readings were then taken without an antenna, with the short antenna, and with the long antenna.
- For each antenna, it was connected, then 2 minutes were given for signal stabilization.
- After signal stabilization rssi readings were noted every 10-15 seconds for 2+ minutes.

The raw data is in the chart below. All numbers are –xx dBm. I dropped the – for brevity. I noted the "bars" indicated by VZAM; although not a quantitative measure they are of interest to some people.

| Location | No Antenna | 13" Antenna | 39" Antenna | Comments |
|---|---|---|---|---|
| 1 | 3 bars,<br>84,83,81,82<br>81,83, 81,84 | 4 bars<br>68,72,77,72<br>70,71,69,71 | 4 bars<br>72,72,71,70<br>73,75,72,73 | Notice the slightly tighter variance with the bigger antenna |
| 2 | 0-1 bar<br>93,95,109,92<br>106,103,101,97 | 3 bars solid<br>82,85,82,81<br>79,82,83,81<br>83,81,81,77<br>82,79 | 2bars, never 3<br>86,89,87,88<br>84,90,84,85,<br>87,89,86,85,<br>84,87 | The small antenna clearly outperformed the 39" |
| 3 | No Service | 1 bar solid<br>97,96,97,98<br>99,100,98,97<br>98,99,98,97<br>99,97,98,98 | 0-1 bar floating<br>101,101,99,100<br>99,100,99,103<br>103,102,101,103<br>102,104,104,102 | This location is in a mountain valley with no LOS to any towers. |

**Conclusion**

In a decent signal area both antennas performed fairly well, improving the signal quite a bit. The small antenna performed better than its specifications would indicate in all circumstances. With decent signal present it performed about the same as the large antenna.

The interesting thing is that as signal levels degraded the small antenna actually outperformed the larger one. In the most challenging signal area the small antenna had better gain, and held the signal more steady than the larger one.

Antenna specifications by the manufacturers vary considerably and are often best-case testing scenarios. Antennas in real world use always seem to vary from the manufacturers specifications – it is very difficult to believe any of the specs that the manufacturers publish. In this case the small antenna greatly outperformed its specifications, and would be the antenna of choice.