

Wireless Overview

**Prepared by Telecom Wireless - Thomson West
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Introduction

Thomson West's Telecom Wireless Department manages and maintains over 2,000 wireless devices and supports a customer base of more than 5,000 domestic and international users. This report includes a general overview of some wireless assumptions to consider when evaluating vendors, service quality, and issues with wireless technology. In addition, there are five vendor responses outlining the coverage areas in Eagan, Minnesota. There are additional vendors available in Minnesota, but for the purposes of this report, only the vendors Thomson West utilizes will be discussed.

Based on Thomson West's experiences in Eagan, Minnesota, the following vendors are rated in order of coverage from Excellent to Average: Verizon Wireless, AT&T Wireless, T-Mobile, Sprint PCS, and Nextel.

General Overview

This section outlines a few, but not all, assumptions about wireless service across vendors.

- The handheld user may receive better outbound service than inbound service. Signal strength varies depending on if the call is an inbound call or outbound call. Outbound calls receive the signal strength from phone; inbound calls receive signal strength from the tower. If the tower is not functioning with a strong signal the inbound calls may go straight to voice mail.
- Temperature of the handheld (cold or hot) can affect the service and quality of calls.
- Congestion on the wireless network may affect signal strength.
- Tolerant levels / expectations of customers can predict whether complaints will be reported, that is, some people simply endure their service, others expect it to work wherever and whenever.
- Depending on location of the cell phone user at the time of use, there may not be **any** wireless vendor that could provide coverage. Some of the factors that effect service includes: remote location, low valley, heavy foliage, or climate.
- The age of the handheld has a direct effect on the service quality. Upgrading a handheld can be a simple solution to poor quality.
- Depending on network technology, some handhelds will roam onto other networks, resulting in increased coverage. However, not all vendors allow this, for example, Nextel does not offer roaming out of their network.
- Roaming only occurs when the networks are alike and a roaming partnership is in place with the two vendors.

Vendor Overview

Sprint PCS

Coverage for all four area codes looks excellent. Because the zip codes are right next to each other, below is a summary of the area around those zip codes. Remember: If there is an area not covered by Sprint PCS, roaming packages are available for \$5.

The Minneapolis/St. Paul PCS market phase one coverage area includes the seven-county metropolitan area, outer-ring suburbs, and commuter rural communities. Currently, Sprint PCS covers 2,850 square miles. The coverage footprint is circular in shape with an approximate size of 66 miles east west by 58 miles north south. Coverage extends up Interstate 94 towards St. Cloud.

Minneapolis Major Highways:

North: Interstate 35, US Highway 169, State Highway 65 and the Interstate 494/694 ring

East: Interstate 94, State Highway 36, US Highway 8

South: Interstate 35, US Highways 52 and 169 and the Interstate 494/694 ring

West: US Highways 212 and 12, State Highways 5 and 7

Northwest: Interstate 94, US Highway 10, State Highway 55

More Detailed Boundary:

North: From Maple Grove, coverage extends 25 miles beyond Rogers and 10 miles beyond Monticello to the northwest on Interstate 94, 5 miles beyond Becker on Highway 10, and 5 miles beyond Elk River on Highway 169. Directly north on Highway 47, coverage extends 10 miles past Anoka to the town of St. Francis and on Highway 65 past Ham Lake to county road 22, serving the cities of Brooklyn Park, Coon Rapids, Oak Grove, and Blaine. Coverage continues to the northeast on Interstate 35 five miles north of Stacy and on Highway 61 through Forest Lake to serve the Lindstrom area communities.





East: To the east of the Twin Cities, coverage includes communities such as Hugo, Mahtomedi and White Bear Lake, stretching out along Highway 36 to the St. Croix River Valley. It includes Stillwater, Bayport and Hudson, Wisconsin. According to TSNO, all of Woodbury is covered.

South: To the southeast along Highway 10, coverage extends through Cottage Grove roughly seven miles beyond Hastings, Minnesota and Prescott, Wisconsin. South along Highway 52, digital service covers Inver Grove Heights, Coates and Hampton, 21 miles south of Interstate 494. Bloomington, Burnsville, Eagan, Apple Valley, Farmington, and Lakeville are also covered. Sprint PCS coverage reaches 19 miles south of Interstate 494 along Interstate 35. In the area of Highways 169, 101 and 13, Prior Lake, Shakopee, and Carver have service. The following map is a graphical illustration of the Sprint PCS local coverage.



[Click to enlarge](#)

Sprint PCS® Phones with [dual-band capability](#) allow you to make and receive calls in covered locations off the network. [Single-band](#) Sprint PCS Phones must be on the Sprint Nationwide PCS Network to make or receive calls.

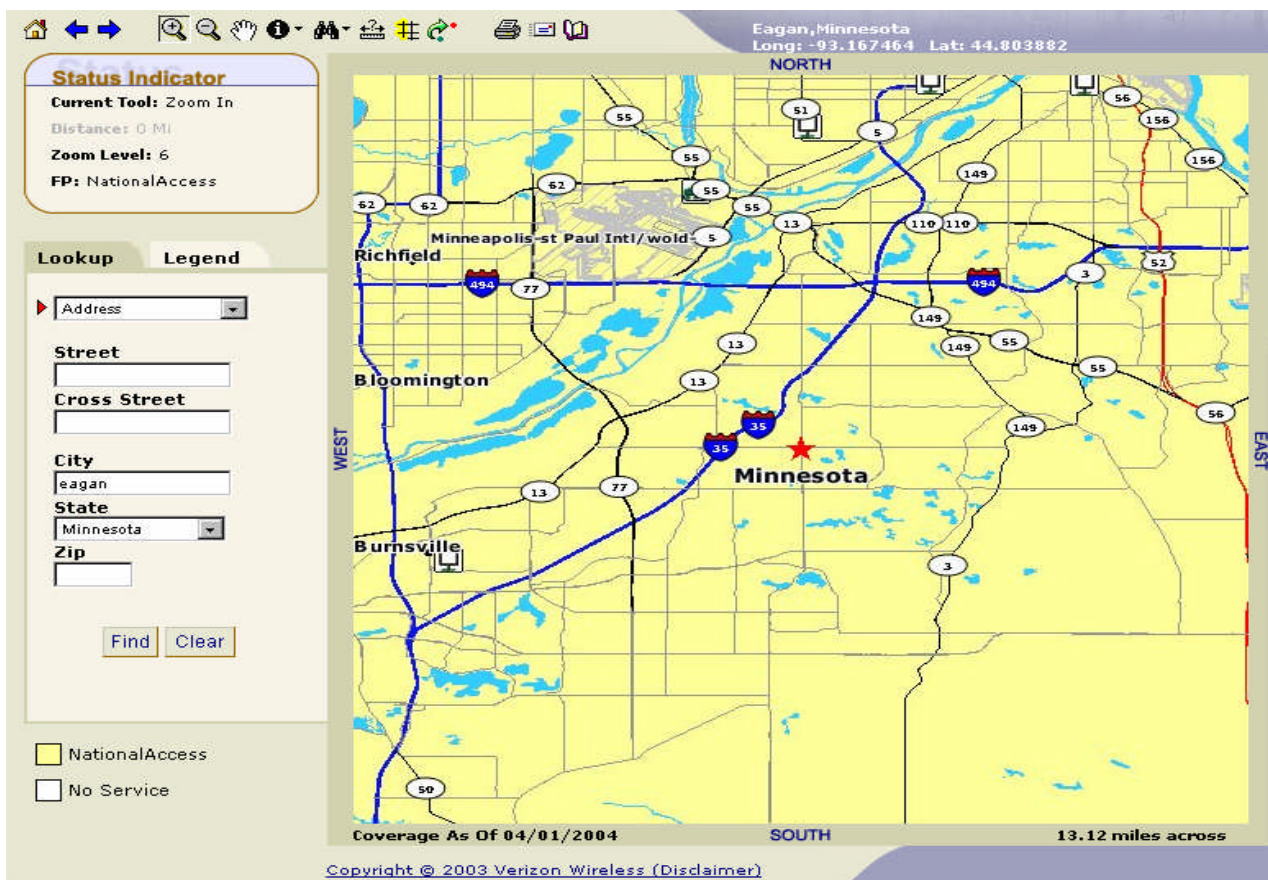
-  [Sprint Nationwide PCS Network](#)
-  [Additional PCS Service](#)
-  [Off-Network Roaming-Analog](#)
-  Planned Future Service

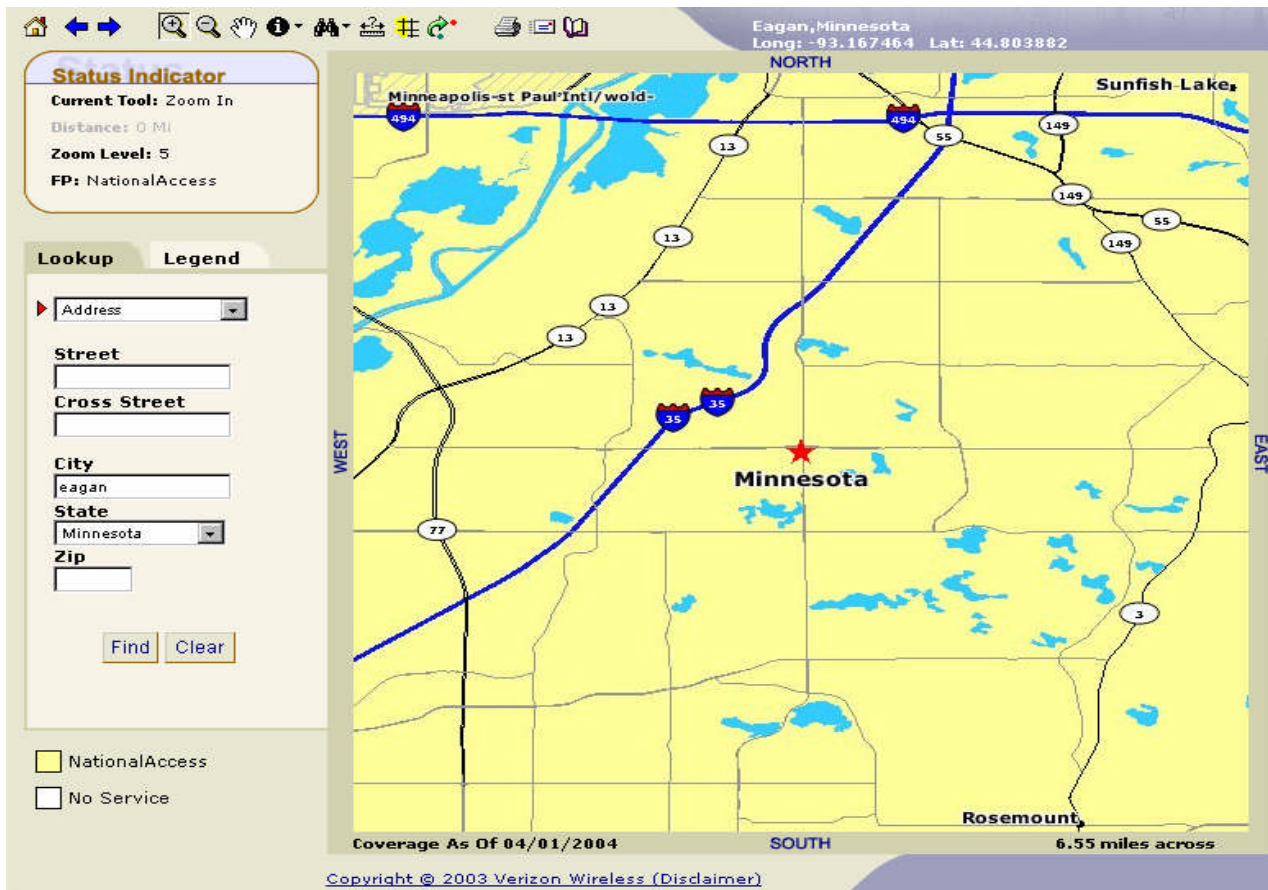
Verizon Wireless

The attached summary indicates full analog, digital, and full National Access (1X) data coverage in these markets. Evolution Data Only (EVDO) is the premier high-speed data network. Verizon Wireless announces that the 1XEV-DO 2.4 Mbps (300-600 kbps) network will be available for Verizon Wireless data consumers in 2005. EVDO is expected in 2005. The map attached also indicates coverage in the Eagan area, specifically, 1X coverage. In summary, short of the EVDO product, Verizon Wireless provides superb coverage for this market and offers all of its voice and data products and devices for use in this market.

Here is a zip code analysis for the Eagan zips. **Y** indicates service availability.

Zip	Name	County/State	Analog	Digital	1X	EVDO
55120	St. Paul	Dakota, MN	Y	Y	Y	N
55121	St. Paul	Dakota, MN	Y	Y	Y	N
55122	St. Paul	Dakota, MN	Y	Y	Y	N
55123	St. Paul	Dakota, MN	Y	Y	Y	N





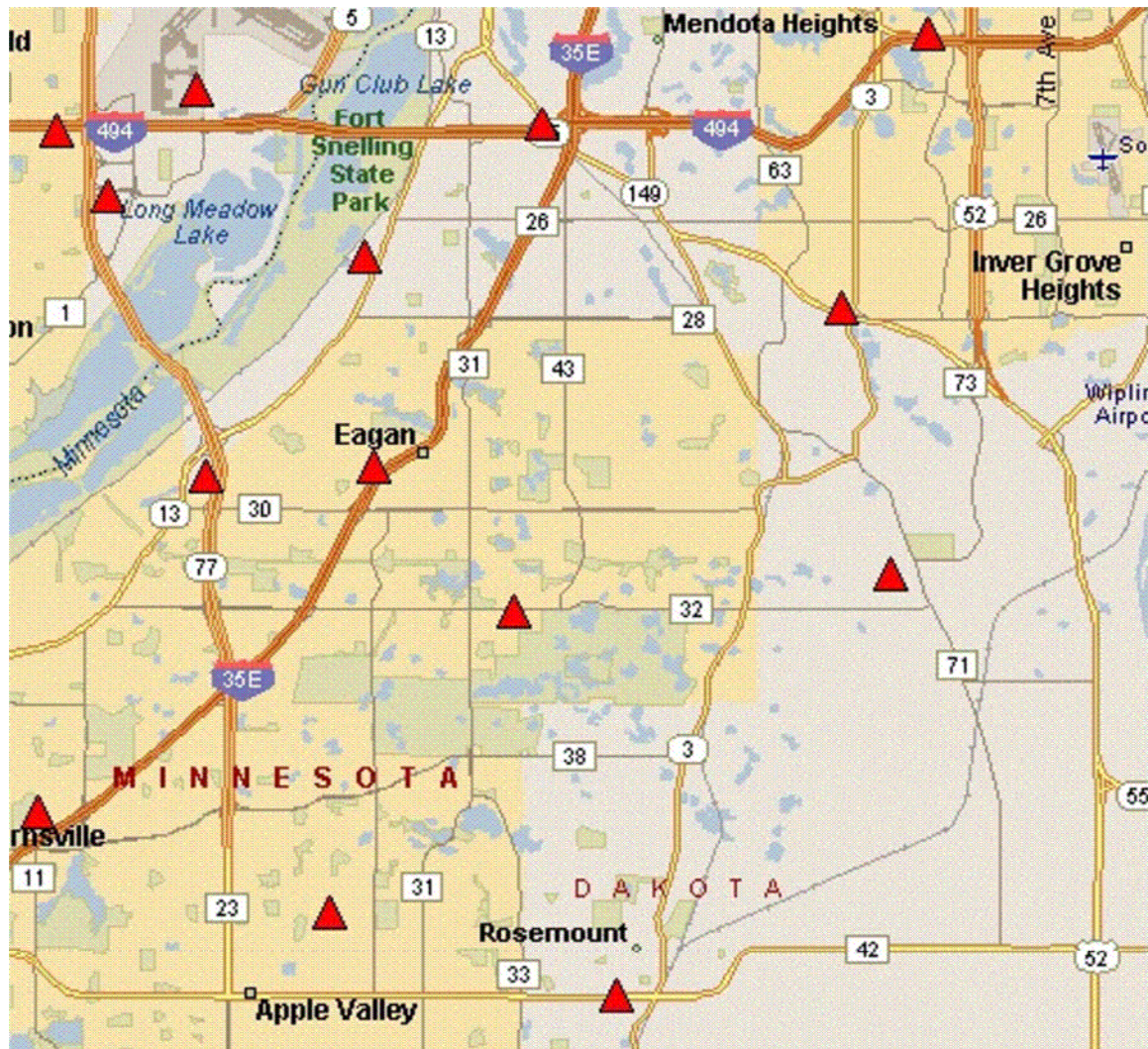
AT&T Wireless

- Currently, there are eight Eagan sites providing coverage in Eagan. See locations on the attached map.
- Problem areas are in low-lying, heavily wooded areas such as Pilot Knob and Thomas Lake, and the low areas along Diffley near Dodd Road.
- Cedar Avenue south of Interstate 35E is also challenging. There is a site planned to go on the Eagan water tower in this location. The water tower provides much lower antenna elevations than what is preferred or needed to provide optimal coverage; however, it is all that is available.
- The hilly and wooded terrain south of Interstate 35E makes Radio Frequency design challenging due to tower zoning regulations. Towers need to be relatively tall to cover low-lying areas and location is critical. This can be overcome by building smaller sites, however, this is not cost effective.
- Areas to the north of Interstate 35E are equally challenging due to the relative height of the terrain (e.g., Minnesota River Valley). There is excellent coverage in

these areas with sites at Cedar and Highway 13, Highway 13 and Lone Oak Rd., and Interstate 35E and Interstate 494.

- AT&T Wireless provides Time Division Multiple Access (TDMA) and Analog coverage on the 850MHz band and GSM/GPRS/EDGE on both 850 and 1900 MHz bands.

The below map displays (red triangles) AT&T Wireless cell sites



T-Mobile

Attached is the most targeted map for the metro area. This does not address Eagan only, but most of Eagan should be covered. However, there could be certain areas where coverage may be poor, such as heavily wooded areas or valleys. If there is interest in a particular area (e.g., the user's house), T-Mobile can check the coverage in that area if the vendor is given a mailing address.

