

**STATE OF NEW HAMPSHIRE
BEFORE THE
PUBLIC UTILITIES COMMISSION
DOCKET NO. DT 07-027**

**Kearsarge Telephone Company, Wilton Telephone
Company, Hollis Telephone Company, and Merrimack
County Telephone Company Petition for an Alternate
Form of Regulation**

**Testimony of
Josie A. M. Gage
On Behalf of
Staff
October 12, 2007**

1 **Q. Please state your name, occupation, and business address.**

2 A. My name is Josie Gage. I am employed by the New Hampshire Public Utilities
3 Commission (Commission) as a Utility Analyst III in the Telecommunications
4 Division. My business address is 21 S. Fruit St., Suite 10, Concord, New Hampshire,
5 03301. I have a bachelor's degree from Lasell College in Auburndale, MA in
6 Business Administration and a Master of Business Administration degree from
7 Simmons School of Management in Boston, MA. Previous to my work at the
8 Commission, I worked in the field of finance including as a registered representative
9 with A.G. Edwards, also as an analyst with the Massachusetts IOLTA Committee.

10 **Q. What is the purpose of your testimony?**

11 A. The purpose of my testimony is to examine the wireline, broadband or wireless
12 availability in each exchange in Hollis Telephone Company (HTC), Kearsarge
13 Telephone Company (KTC), Merrimack County Telephone Company (MCTC) and
14 Wilton Telephone Company (WTC).

15 **Q. How did you conduct your analysis?**

16 A. I began my analysis by examining information provided by TDS. TDS provided
17 exchange boundary maps which depicted cable television coverage areas and
18 demonstrated where broadband cable modem service is available. The maps also
19 depicted where TDS DSL is available.
20 The maps provided by TDS in their original data responses, and a second set provided
21 in their follow up data responses, were unclear. After inspecting the revised set of
22 maps, Staff had questions of TDS with regard to clarity of the maps and their keys.
23 Through questions asked during the October 1, 2007 technical session it was found

1 that the maps had been prepared with incorrect keys, and that some of the information
2 depicted on the maps was incorrect. A telephone call from Public Utilities
3 Commission counsel to a Salisbury selectman informed us that the indications on the
4 Salisbury exchange map of cable TV availability was overstated. Ultimately, Staff
5 found it increasingly difficult to rely on the information provided by TDS on their
6 exchange maps.

7 Despite these errors, I found that HTC, having only one exchange, had cable modem
8 and cable TV coverage for the majority of the population from Charter
9 Communications Entertainment LLC. On that basis I determined alternative
10 broadband service was available for the majority of customers in Hollis. I found the
11 same was true for WTC, also having only one exchange, which appears to have the
12 majority of its population served by Comcast.

13 In analyzing KTC I looked at the maps provided by TDS and found that among the
14 six exchanges; Andover, Boscawen, Chichester, Meriden, New London, and
15 Salisbury, each of them, with the exception of Salisbury appeared to have broadband
16 or cable TV service for the majority of the population.

17 MCTC's exchanges include Antrim, Bradford, Contoocook, Henniker, Hillsboro,
18 Melvin Village, Sutton, and Warner. Again, it appeared that each of them has
19 broadband or cable TV service available to the majority of the populations there.

20 After I had reviewed the maps TDS provided, I proceeded with further analysis of the
21 Sutton, Salisbury, Wilton and Hollis exchanges, one exchange from each company,
22 with regard to wireless telephone service.

1 **Q. Why did you choose only one exchange in the MCTC areas and one exchange in**
2 **the KTC areas to review?**

3 A. The statute requires availability of a competitive wireline, wireless, or broadband
4 service to a majority of retail customers in each of the exchanges served by the ILEC.
5 Salisbury is an exchange served by KTC and Sutton is an exchange served by MCTC.
6 If the required services are not available to the majority of customers in one of the
7 company's exchanges, the statutory requirement is not satisfied. Based on my initial
8 review, Salisbury and Sutton appeared to be the least well covered, so I began to
9 analyze, more precisely, how available wireline, wireless, or broadband services were
10 in those exchanges.

11 **Q. Who is the broadband provider in the Sutton exchange?**

12 A. TDS Telecom is the provider of broadband in the Sutton exchange. TDS provides
13 DSL in Sutton, but only in conjunction with basic service. Since customers are
14 required to purchase basic service from TDS in order to buy TDS DSL, TDS DSL
15 does not compete with basic local service.

16 **Q. Who are the Cable TV providers in the Sutton exchange and do they provide**
17 **broadband service?**

18 A. The Sutton exchange includes the towns of Sutton, Newbury, and Wilmot.
19 • In the town of Sutton, the Cable TV provider, as registered with the FCC, is MCT
20 Communications, Inc. a subsidiary of TDS. [Please Refer to Exhibit 2 for a list of
21 TDS subsidiaries and affiliated companies from TDS' most recent 10(K) filing

1 with the SEC.] The town of Sutton represents 94.8%¹ of TDS' customers in the
2 Sutton exchange. MCT Communications does not offer a cable modem service.

3 • In the town of Newbury, the Cable TV provider, as registered with the FCC, is
4 MCT Communications, Inc. This represents 0.6% of TDS' customers in the
5 Sutton exchange. MCT Communications does not offer a cable modem service.

6 • In the town of Wilmot, the Cable TV provider, as registered with the FCC, is
7 Comcast of Connecticut/Georgia/Massachusetts/New Hampshire/New York/
8 North Carolina/ Virginia/Vermont, LLC. This represents 0.5% of TDS' customers
9 in the Sutton exchange. Comcast offers a broadband cable modem service.

10 **Q. Who is the broadband provider in the Salisbury exchange?**

11 A. TDS Telecom is the provider of broadband in the Salisbury exchange. As with Sutton,
12 TDS provides DSL in Salisbury, but only in conjunction with basic service. Since
13 customers are required to purchase basic service from TDS in order to buy TDS DSL,
14 TDS DSL does not compete with basic local service.

15 **Q. Who are the Cable TV providers in the Salisbury exchange and do they provide**
16 **broadband service?**

17 A. The Salisbury exchange includes the towns of Salisbury, Webster, Boscawen, and
18 Andover.

19 • In the town of Salisbury, the Cable TV provider, as registered with the FCC, is
20 Comcast of Connecticut/Georgia/Massachusetts/New Hampshire/New York/
21 North Carolina/ Virginia/Vermont, LLC. However, no cable TV provider actually
22 serves the town currently with the exception of the first eight residences in

¹ See TDS' follow up data response to Staff 2-20 for the data used in this calculation.

1 Salisbury on Raccoon Hill Road beginning from the Andover/Salisbury town line
2 which are served from Andover by Comcast. In total the town of Salisbury (less
3 the 8 residents served) represents 71.4% of TDS' customers in the Salisbury
4 exchange.

- 5 • In the town of Webster, no cable TV provider is registered with the FCC. A list of
6 franchise areas provided to Staff by Comcast indicates that the town of Webster is
7 not served by Comcast. This represents 27.2% of TDS' customers in the Salisbury
8 exchange.

- 9 • In the town of Boscawen, the Cable TV provider, as registered with the FCC, is
10 Comcast of Maine/New Hampshire. This represents 0.0% (the number is too
11 small to be represented by one decimal point) of TDS' customers in the Salisbury
12 exchange.

- 13 • In the town of Andover, the Cable TV provider, as registered with the FCC, is
14 Comcast of Connecticut/Georgia/Massachusetts/New Hampshire/New York/
15 North Carolina/ Virginia/Vermont, LLC. This represents 0.0% (the number is too
16 small to be represented by one decimal point) of TDS' customers in the Salisbury
17 exchange.

18 **Q. Please summarize your analysis of broadband availability in the Sutton and**
19 **Salisbury exchanges.**

- 20 A. The majority of customers in Salisbury do not have cable TV or cable modem service.
21 The majority of customers in the Sutton exchange have cable TV available from
22 MCT Communications which does not offer cable modem service. The only
23 broadband available to customers in these exchanges is TDS DSL which, as stated

1 above, I have discounted from my analysis. Accordingly, I have found no evidence of
2 a competitive broadband alternative in either exchange.

3 **Q. Is wireline service available from a provider other than TDS in the TDS**
4 **exchanges?**

5 A. No. The Commission has not authorized wireline CLECs to serve in any franchise
6 other than Verizon's.

7 **Q. How did you analyze wireless service availability?**

8 A. TDS did not provide any specific evidence as to the availability of wireless service by
9 exchange. Staff undertook its own analysis to determine the extent to which service is
10 available to the majority of customers in the Sutton and Salisbury exchanges.

11 **Q. What does the term dBm stand for and how is it used?**

12 A. The term, "dBm" stands for decibels per milliwatt. According to Engineering and
13 Operations in the Bell System edited by R.F. Rey in 1983, "The unit dBm is a
14 logarithmic measure of power with respect to a reference power of 1 milliwatt." It is
15 used to measure the strength or weakness of a signal emitting from a cell site antenna.

16 **Q. Why is this relevant?**

17 A. Although there are wireless providers who will use alternative measuring
18 conventions, dBm is the fundamental (scientific) measurement representing the
19 strength or weakness of the cellular telephone signal. This measurement can be
20 utilized in determining the availability or lack of wireless signal anywhere a user goes
21 with a cellular telephone.

22 **Q. What is the range of dBm at which a cellular telephone signal exists?**

1 A. Cellular telephone signal begins at its very strongest at -50dBm, which is received
2 when standing right under a tower with a cellular antenna belonging to the user's
3 provider on top. A user would literally need to be able to reach out and touch the
4 tower in order to get -50dBm. At -110dBm, cellular telephone signal exists, but is so
5 weak it is unusable.

6 It is important to remember that cellular signal strength works its way down a
7 negative list of numbers (from strong to weak).

8 **Q. What is Staff's understanding of the functionality of a cell phone at varying**
9 **dBm?**

10 A. From various phone calls and email messages Staff has found that views of signal
11 strength and what that means in terms of quality varies based on who is asked. For
12 example, a telephone call to Wilson Electronics, Inc., a manufacturer of cellular
13 handset antennae produced the following scale:

- 14 • -50dBm "crystal clear" connection
- 15 • -90dBm "a decent call" (but not necessarily a clear one)
- 16 • -110dBm gets you "nothing" or "no connection"

17 Email communications with the ConnectME Authority, Maine's state eligible
18 telecommunications carrier program, revealed the following qualifications for them:

- 19 • In determining areas that qualify as **underserved**, a map depicting -85dBm
20 must be filed with the Authority. The Authority considers any signal outside
21 of, or weaker than -85dBm **underserved**.

- 1 • In determining areas that qualify as **unserved**, a map of -95dBm must be filed
2 with the Authority. The Authority considers any signal outside of, or weaker
3 than -95dBm **unserved**.

4 Finally, Staff has found through communications with wireless providers themselves
5 that some coverage maps, which they use to market their services to the public, are
6 based on varying signal strengths. On information and belief wireless providers use
7 -85dBm to depict their strongest signal coverage. Exhibit 3, page 25 shows that
8 AT&T's "Best" coverage is, "...sufficient for most in-building coverage." It further
9 indicates, "However, in-building coverage can and will be adversely affected by the
10 thickness/construction type of walls, or your location in the building (i.e., in the
11 basement, in the middle of the building with multiple walls, etc.)". Their "Good"
12 coverage is, "not great in buildings", and their "Moderate" coverage drops when the
13 user is driving. It is also important to remember while looking at an AT&T coverage
14 map that partner coverage is equal to their "Moderate" coverage.

15 Using these standards, Maine's ConnectME Authority would consider anything less
16 than "best" coverage **underserved**.

17 **Q. Please provide examples of wireless providers' own definitions of what their**
18 **maps depict.**

19 A. Please refer to Exhibit 3 for examples of wireless providers' own definitions of what
20 is depicted on their coverage maps, and coverage map examples for both Sutton and
21 Salisbury exchanges. Many coverage maps include out of network coverage, which is
22 not reliably known by that provider to be dependable. Note that a telephone call
23 between Staff and Sprint/Nextel defined areas in dark green with white dots as areas

1 where, “signal strength information is unavailable” as shown in Exhibit 3 on pages 41
2 and 47. Sprint did not previously provide an explanation in their coverage map key
3 for any area that was dark green with white dots.

4 **Q. How reliable, in terms of quality of service, and guarantee of reliable cellular**
5 **telephone signal strength are providers’ coverage maps, or online coverage**
6 **locators?**

7 A. Wireless providers’ coverage maps are quite unreliable. A wireless provider wants to
8 display to a potential customer the extent to which they could receive a reliable signal
9 in an area, rather than a guarantee that they will receive a reliable signal strength.
10 Also, signal strengths are not defined on these maps. The coverage locator maps are
11 meant to be marketing tools, not a guarantee from the provider on service availability.
12 Staff has found that the provider’s coverage maps depict outdoor coverage in all
13 cases, which does not necessarily represent adequate signal strength inside buildings.
14 Exhibit 3, pages 23, 25, 26, 29, 38, 53, and 57 are web page printouts of wireless
15 coverage in the Sutton and Salisbury exchanges as advertised by providers. Wireless
16 providers admit readily that obstructions such as those in Exhibit 1 (trees, exterior
17 walls, interior walls, basements, discussed below) are likely to break down signal
18 availability, suggesting that the wireless coverage depicted is not necessarily adequate
19 or reliable for in home use.

20 **Q. How far does the average cellular telephone signal project from a wireless**
21 **antenna?**

22 A. Well positioned, adequate equipment will make the difference between why one
23 signal is stronger than another, but on average Staff finds that signal propagates in

1 ranges from 2-5 miles in rural areas. The actual reach of the signal will depend on the
2 positioning (or “pointing”) of the equipment as well as physical terrain and
3 obstructions.

4 Research on aggregate penetration loss changes the picture significantly. Greg
5 Durgin, Theodore S. Rappaport, and Hao Xu, of The Mobile and Portable Radio
6 Research Group at Virginia Polytechnic Institute in Blacksburg Virginia, completed
7 research testing the same type of system as many of the systems here in NH. A
8 summary of the list of common obstacles along with the resulting loss of signal from
9 their paper, *Radio Path Loss and Penetration Loss Measurements in and around*
10 *Homes and Trees at 5.85GHz*, 1998, is provided in Exhibit 1. This list is not inclusive
11 of how the mountainous terrain of NH would erode a cellular signal.

12 **Q. Please show where cellular telephone antennae are located in and around the**
13 **Sutton exchange.**

14 A. Exhibit 4 is a map of all known cellular telephone antennae with a 5 mile radius line
15 drawn around them in and around the Sutton exchange. The radius line is meant as a
16 visual guide. Techniques such as pointing the antennae, and obstructions such as
17 foothills or mountains, etc... were not calculated into the five mile radius lines. Based
18 on my research, I believe that this is the farthest distance a signal could propagate in
19 rural areas and in fact, it is likely that the actual signal does not reach that far in these
20 areas.

21 **Q. Please show where cellular telephone antennae are located in and around the**
22 **Salisbury exchange.**

1 A. Refer to Exhibit 5 for a map of the cellular telephone antennae with a 5 mile radius
2 line around them in and around the Salisbury exchange. As in Exhibit 4, the radius
3 line is meant as a visual guide. Techniques such as pointing the antennae, and
4 obstructions such as foothills or mountains, etc... were not calculated into the five
5 mile radius lines.

6 **Q. Given Staff's analysis of wireless services in the Sutton and Salisbury exchanges,**
7 **what is the estimated availability of cellular signal in either exchange?**

8 A. In the Sutton exchange Staff finds that the availability of wireless signal is restricted
9 mainly to the outdoors by lack of adequate cell sites. While the existing cell sites for
10 Nextel and possibly Verizon serve the Interstate 89 corridor, cellular telephone
11 service is not available to the rest of the exchange population in a manner comparable
12 with wireline service. There is no evidence that wireless service would be reliable in
13 the case of an emergency, especially indoors. It should be noted that U.S. Cellular has
14 the best available coverage in the Sutton exchange, but it is by no means available
15 reliably through the obstructions listed in Exhibit 1, of which there are many in
16 Sutton.

17 In the Salisbury exchange Staff finds that the availability of wireless signal is
18 restricted all but completely to the outdoors, and is unreliable even then. The chance
19 to receive a cell phone signal in the Salisbury exchange is dependant upon wireless
20 providers' attempts to serve Interstate 93, not the Salisbury exchange.

21 Again, Staff emphasizes that antennae and their signal can and will be directed
22 toward a specific target. Providers' antennae are wisely "pointed" up and down
23 interstate highways so as to capture the most users, not into these rural exchanges.

1 Staff found no evidence that wireless service is available to the majority of customers
2 in the Salisbury exchange.

3 **Q. Please explain cellular telephone conditions in the Wilton and Hollis exchanges.**

4 A. Based on the number of antennae in the Wilton and Hollis exchanges, it is likely that
5 wireless providers cover the majority of the population in these exchanges with
6 reasonable cellular telephone signal coverage.

7 **Q. Would you please summarize your testimony?**

8 A. Hollis and Wilton exchanges appear to have wireless and broadband service available
9 to the majority of customers in the exchanges. Staff witness Dr. Chattopadhyay
10 analyzes in his testimony, whether the service is competitive or not.

11 My analysis of the Sutton and Salisbury exchanges revealed no availability of
12 wireline, wireless, or broadband alternatives which are not provided by TDS itself.

13 **Q. Does this conclude your testimony?**

14 A. Yes, it does.