



STATE OF NEW HAMPSHIRE  
BEFORE THE  
PUBLIC UTILITIES COMMISSION

DT 07-027

KEARSARGE TELEPHONE COMPANY, WILTON TELEPHONE COMPANY, INC.,  
HOLLIS TELEPHONE COMPANY, INC. AND MERRIMACK COUNTY  
TELEPHONE COMPANY  
PETITION FOR ALTERNATIVE FORM OF REGULATION

SUPPLEMENTAL TESTIMONY OF MICHAEL C. REED  
ON BEHALF OF MERRIMACK COUNTY TELEPHONE COMPANY AND  
KEARSARGE TELEPHONE COMPANY

JANUARY 29, 2009

1     **Q.     Please state your name and occupation.**

2     A.     My name is Michael C. Reed. I am employed by TDS Telecom (“TDS”) as  
3             Manager, State Government Affairs in TDS’ Government and Regulatory Affairs  
4             department. I have responsibility for state regulatory and legislative affairs in  
5             Maine, New Hampshire, Vermont, New York, and Pennsylvania.

6  
7     **Q.     Have you testified previously in this Docket?**

8     A.     Yes. I submitted direct testimony in this Docket on March 1, 2007 and rebuttal  
9             testimony on November 15, 2007.

10  
11    **Q.     On what basis are you submitting your supplemental testimony?**

12    A.     Merrimack County Telephone Company (“MCT”) and Kearsarge Telephone  
13             Company (“KTC”) “may update their testimony on availability and the level of  
14             competition” at any time within one year of the issuance of Order 24,852, dated  
15             April 23, 2008, issued in this Docket (the “Order”). Order, p. 30.

16  
17    **Q.     What is the purpose of your supplemental testimony?**

18    A.     My supplemental testimony presents, explains and offers factual support for an  
19             updated measurement of the availability of competitive service within the service  
20             territories of MCT and KTC. For ease of reference, MCT and KTC sometimes  
21             are collectively referred to as the “TDS Companies” in this supplemental  
22             testimony.

23

1     **Q.     Do you have new evidence to present to the New Hampshire Public Utilities**  
2           **Commission (the “Commission”)?**

3     A.     Yes. Through this supplemental testimony and the exhibits presented and  
4           discussed herein, I provide new evidence which demonstrates that wireless  
5           service is available to the majority of the retail customers in the Sutton and  
6           Salisbury exchanges.

7

8     **Q.     Did the Commission find a lack of availability of wireless service in the**  
9           **Sutton and Salisbury exchanges in the Order?**

10    A.     Yes.

11

12    **Q.     Briefly summarize the Commission’s findings in this regard.**

13    A.     On Page 29 of the Order, the Commission found that “The TDS Companies’  
14           reliance on wireless coverage estimates by wireless providers is not sufficient to  
15           demonstrate availability of third party offerings. We find that Staff’s analysis of  
16           antenna locations and likely signal distances in the Salisbury and Sutton  
17           exchanges supports a finding of lack of availability.”

18

19    **Q.     Do you have any additional evidence showing that wireless service is**  
20           **available to the majority of the customers in the Sutton and Salisbury**  
21           **exchanges?**

22    A.     Yes. At significant effort and expense, the TDS Companies retained a company  
23           known as C Squared Systems, LLC (“C Squared”) to physically measure the

1 strength of the wireless signal available throughout the Sutton and Salisbury  
2 exchanges.

3  
4 **Q. Why did the TDS Companies retain C Squared to undertake this work?**

5 A. C Squared is a New Hampshire Radio Frequency Engineering and Consulting  
6 firm. This company specializes in providing, among other things, benchmarking  
7 services and utilizes state-of-the-art technology, industry requirements, RF design  
8 and optimization clarity required for successful wireless networks, to measure the  
9 strength of the wireless signal available along specific drive routes. C Squared  
10 provided these benchmarking services and provided detailed information  
11 concerning the wireless signal strength throughout the Sutton and Salisbury  
12 exchanges.

13  
14 **Q. Please explain the process C Squared used to measure the strength of the**  
15 **wireless signal available in the Sutton and Salisbury exchanges.**

16 A. C Squared drove 90% of all major commuter and secondary roads in the  
17 exchanges while performing wireless signal measuring tests using carrier-specific  
18 handsets to collect wireless data. C Squared then provided, for each of the  
19 Salisbury and Sutton exchanges, a detailed report of testing referred to as the  
20 "Multi-Carrier Benchmarking Reports" and developed related coverage maps.  
21 Six wireless networks were measured: AT&T Mobility, Sprint-Nextel iDEN,  
22 Sprint-Nextel CDMA, T-Mobile, US Cellular and Verizon Wireless. The carrier-  
23 specific handsets were programmed to make continuous long calls ending only

1 when the respective network could no longer support the call. Upon call  
2 termination, the system redialed the call and the process continued. The tests  
3 were recorded and entered every 600 milliseconds, or every 0.6 seconds.  
4

5 **Q. Please summarize the results of the testing and the Multi-Carrier**  
6 **Benchmarking Reports prepared by C Squared.**

7 A. The results of the testing clearly indicate that the majority of the customers in the  
8 Sutton exchange and the majority of the customers in the Salisbury exchange have  
9 access to a good or very good wireless signal as measured by the Received Signal  
10 Strength Indication (RSSI) tests. The detailed results of the testing completed for  
11 the Multi-Carrier Benchmarking Reports will be covered later in this testimony.  
12

13 **Q. Are you sponsoring any exhibits and, if so, please list the exhibits?**

14 A. Yes. I am sponsoring Exhibits A through G, all designated as confidential and  
15 proprietary information. These exhibits are being submitted pursuant to RSA  
16 378:43, as the information contained therein pertains to the provision of  
17 competitive services; set forth trade secrets or other confidential information  
18 falling within the scope of RSA 378:43,II(b); and are not general public  
19 knowledge or published elsewhere, the TDS Companies having taken measures to  
20 prevent dissemination of the information in the ordinary course of business.  
21 These exhibits were prepared at my direction. The exhibits are:  
22 Exhibit A - Map entitled "Sutton, NH - Wireless Signal Strength and MCT  
23 Customer Locations";

1 Exhibit B - Map entitled "Salisbury, NH - Wireless Signal Strength and KTC  
2 Customer Locations";  
3 Exhibit C - Multi-Carrier Benchmarking Report Maps of the Sutton Exchange;  
4 Exhibit D - Multi-Carrier Benchmarking Report Maps of the Salisbury Exchange;  
5 Exhibit E - Multi-Carrier Benchmarking Report of the Sutton Exchange;  
6 Exhibit F - Multi-Carrier Benchmarking Report of the Salisbury Exchange; and  
7 Exhibit G - State of New Hampshire, Cellular Coverage Density Map.  
8

9 **Q. Please explain Exhibits A and B to your supplemental testimony.**

10 A. Exhibits A and B are maps of the Sutton and Salisbury exchanges which illustrate  
11 the test drive routes completed by C Squared and depict the strongest wireless  
12 signal strength based on RSSI of the combined six carriers tested. The RSSI of >  
13 -85dBm (very good) is depicted in green and the RSSI of -85dBm to -90dBm  
14 (good) is depicted in yellow. Once the maps of the drive route and signal strength  
15 were provided by C Squared, we then plotted the physical locations of our  
16 customers. As clearly demonstrated in Exhibits A and B, the majority of the  
17 customers in the Sutton and Salisbury exchanges have access to a very good or  
18 good wireless signal.  
19

20 **Q. Please explain Exhibits C and D.**

21 A. Exhibits C and D are maps provided by C Squared. Page 1 shows the drive routes  
22 taken within the Sutton and Salisbury exchanges. The drive routes, which were  
23 developed by C Squared, allowed them to test approximately 90% of all major

1 commuter and secondary roads in the Sutton and Salisbury exchanges. Please  
2 note these are the same drive routes as indicated in Exhibits A and B. Pages 2-4  
3 show the strongest wireless signal available from each of the six wireless  
4 networks along the Sutton and Salisbury exchange drive routes. Areas on the  
5 drive routes shown in green indicate where the strongest wireless signal available  
6 is greater than -85dBm. Areas on the drive routes shown in yellow indicate where  
7 the strongest wireless signal available is between -85dBm and -90dBm. The  
8 strongest wireless signal available must have been at least as strong as -90dBm to  
9 be shown on Exhibits C and D. Please note the signals plotted on Exhibits A and  
10 B are a compilation of the strongest signals of the six carriers shown on Pages 2-4  
11 in Exhibits C and D.

12  
13 **Q. Why did you exclude wireless signal measurements not as strong as -90dBm**  
14 **on the drive route in Exhibits A through D?**

15 A. The testimony of the Commission Staff relied on two sources to determine the  
16 definition of a good wireless signal. As shown on Pages 7-8 of her direct  
17 testimony, Staff witness Josie Gage stated that she contacted the ConnectME  
18 Authority, Maine's state eligible telecommunications carrier program, and found  
19 that they viewed any area that had a wireless signal weaker than -95dBm as being  
20 unserved. That criterion implies that any area that has a wireless signal stronger  
21 than -95dBm is being served by a wireless signal.

22

1 In addition, on Page 7 of her direct testimony, Ms. Gage stated that Wilson  
2 Electronics, Inc., a manufacturer of cellular handset antennae, viewed a call with  
3 signal strength of -90dBm as being a decent call, but not necessarily a clear one.  
4 That criterion implies that any area that has a wireless signal equal to or stronger  
5 than -90dBm is being served by a wireless signal.

6  
7 Taking the more conservative of those two estimates, while keeping in mind that  
8 wireless signal strength works its way down a negative list of numbers from  
9 strong to weak, we determined that a wireless signal of -90dBm or stronger is a  
10 conservative benchmark level for determining whether or not an area is being  
11 served by a wireless signal. As a result, any wireless signal that was not at least  
12 as strong as -90dBm was excluded from Exhibits A, B, C and D.

13  
14 **Q. How do you define a wireless signal that is either between -90dBm and -**  
15 **85dBm, or stronger than -85dBm?**

16 **A.** Based on the information included in the response directly above, and discussions  
17 with members of C Squared, I define a good wireless signal as having between -  
18 90dBm and -85dBm signal strength. I define a wireless signal stronger than -  
19 85dBm as a very good wireless signal.

20  
21 **Q. Please describe the full range of tests and the process C Squared used to**  
22 **obtain and evaluate the wireless signal strengths in the Sutton and Salisbury**  
23 **exchanges.**



1 A. The full report of the complete range of tests and the process used by C Squared is  
2 included in Exhibit E for Sutton and Exhibit F for Salisbury. We retained C  
3 Squared with the goal of having outside expert(s) professionally evaluate wireless  
4 coverage details that the Commission identified in the Order as lacking regarding  
5 the two most rural exchanges within the service territories of MCT and KTC. The  
6 full reports include the method and equipment used in data collection, how the  
7 drive route was developed, as well as how customer usage was emulated  
8 including time of day use. The reports contain the information for each carrier  
9 tested, descriptions of all analysis and statistical information and the breakdown  
10 of the performance among the carriers plotted on individual maps.

11  
12 **Q. Did the testing parameters recommended and utilized by C Squared meet**  
13 **your needs for this docket?**

14 A. Yes. I believe these submissions far exceed what would or should be required for  
15 identifying the availability of an alternative service. The methods employed  
16 along with the accompanying detailed analysis, provide with certainty the  
17 availability of wireless service in the two most rural exchanges of KTC and MCT.

18  
19 **Q. You mention many testing results above. Can you point to key results you**  
20 **utilized for your analysis that demonstrate the level of wireless coverage**  
21 **available in the Sutton exchange?**

22 A. While all the results are important and even carriers with limited coverage add to  
23 the cumulative availability of coverage in the exchange, I believe the Commission

1 should focus on three carriers summarized on Table 2, Page 3 of Exhibit E.  
2 Verizon Wireless test results showed 72% of the recorded measurements with a  
3 good or very good signal. Sprint-Nextel CDMA test results showed 53% of the  
4 recorded measurements with a good or very good signal. The test results for US  
5 Cellular showed 74% of the recorded measurements with a good or very good  
6 signal. Although the coverage in many locations is similar for each carrier, some  
7 carriers provide a better signal in parts of the area than others. What this means to  
8 customers is that in most of the exchange they not only have a choice of using  
9 wireline or wireless, they also have a choice among wireless carriers either  
10 through differences in technology or through wireless carrier roaming agreements.  
11 For example, in some instances the testing indicates that customers might have a  
12 better signal utilizing one carrier of a certain technology to better serve their  
13 needs. Even if a customer location is limited to a signal from only one wireless  
14 carrier, customers still have a choice of wireless or wireline. I believe these  
15 choices meet the statutory requirement for availability under the statute at issue in  
16 this Docket, RSA 374:3-b.

17  
18 **Q. Can you point to key results you utilized for your analysis that demonstrate**  
19 **the level of wireless coverage available in the Salisbury exchange?**

20 **A.** While all the results are important and even carriers with limited coverage add to  
21 the cumulative availability of coverage to the exchange, the Commission can  
22 focus on three carriers summarized on Table 2, Page 3 of Exhibit F. Verizon  
23 Wireless test results showed 64% of the recorded measurements with a good or

1 very good signal. Sprint-Nextel CDMA test results showed 63% of the recorded  
2 measurements with a good or very good signal. US Cellular test results showed  
3 65% of the recorded measurements with a good or very good signal. As  
4 mentioned above, the coverage in many locations is similar for each of the  
5 carriers; this cannot be viewed as cumulative coverage, as each of the carriers  
6 does provide a better signal in some parts of the area than others. Again, this  
7 means customers not only have a choice between wireline or wireless, they also  
8 have a choice among wireless carriers. Even if a customer location is limited to a  
9 signal from only one wireless carrier, customers still have the choice of either  
10 wireless or wireline service.

11  
12 **Q. Please explain how this additional testing and resulting data provides the**  
13 **Commission with certainty that wireless service is available to the majority**  
14 **of customers in the Sutton and Salisbury exchanges.**

15 A. In its Order the Commission stated that: “The TDS Companies’ reliance on  
16 wireless coverage estimates by wireless providers is not sufficient to demonstrate  
17 availability of third party offerings.” Order, p. 29. The Order further states that:  
18 “We find that Staff’s analysis of antenna locations and likely signal distances in  
19 the Salisbury and Sutton exchanges supports a finding of lack of availability.”  
20 Order, p. 29.

21 The additional test results provided in this testimony are actual data from detailed  
22 tests performed throughout the Sutton and Salisbury exchanges and does not rely  
23 on the wireless carriers’ self-reported data or efforts to evaluate the signal

1 strengths using tower locations, etc. The combination of the signal strength test  
2 results provided by a third party expert unaffiliated with either the TDS  
3 Companies or the wireless providers and the location of customers as shown in  
4 Exhibits A and B, should enable the Commission to find that the Sutton and  
5 Salisbury exchanges both have an alternative service available to the majority of  
6 customers.

7  
8 **Q. Please explain Exhibit G.**

9 A. In Exhibits A and B to my direct testimony, I estimated that wireless  
10 telecommunications is offered in virtually 100% of the service area within MCT  
11 and KTC. As stated on Page 8 of my direct testimony, “The wireless coverage  
12 information was gathered using a map database product, ‘CoverageRight,’ which  
13 displays service deployment coverage areas of wireless carriers.” Exhibit G  
14 shows the CoverageRight map with the Sutton and Salisbury exchanges outlined,  
15 and indicates that wireless telecommunications is offered to virtually 100% of the  
16 service areas within these two exchanges.

17  
18 **Q. Have you drawn any conclusions by comparing the results of the wireless**  
19 **testing shown in Exhibits A-F and the CoverageRight map shown in Exhibit**  
20 **G?**

21 A. Yes. Exhibits A, B, C, D, E, and F demonstrate that the majority of the customers  
22 in the Sutton and Salisbury exchanges have access to a good or very good  
23 wireless signal from at least one wireless provider. The wireless coverage shown

1 on the CoverageRight map, Exhibit G, is consistent with the actual measurements  
2 provided by C Squared. As a result, the C Squared evidence shows that it is  
3 reasonable for the Commission to rely upon the CoverageRight maps for  
4 determining which exchanges have wireless service available to the majority of  
5 their customers. In addition, I would add that the New York State Public Service  
6 Commission ("NYPSC") in CASE 07-C-0349, In the Matter of Examining a  
7 Framework For Regulatory Relief, relied on the American Roamer  
8 CoverageRight maps in determining the level of wireless competition in the ILEC  
9 areas of NY. In that case, the NYPSC held in relevant part that:

10 "In order to verify the companies' wireless availability estimates, the  
11 Department purchased wireless coverage maps from American Roamer  
12 Inc.(www.americanroamer.com). The American Roamer maps rely upon  
13 generally accepted methodologies to identify where coverage "holes" exist in  
14 service areas. The Department of Public Service's Geographic Information  
15 Service (GIS) unit overlaid GIS versions of the American Roamer maps with  
16 maps in the GIS system which show ILEC service territory boundaries and  
17 residential household locations. The GIS unit then counted the number of  
18 households in each ILEC service territory which are also contained within areas  
19 which the American Roamer maps indicate have reasonable cellular coverage."  
20 (NYPSC in CASE 07-C-0349, ORDER ADOPTING FRAMEWORK, ps. 8-9).

21  
22 **Q. You mentioned earlier in this testimony that the Commission relied on the**  
23 **Staff's analysis of antenna locations and likely signal distances as the criteria**

1           **to determine wireless availability. What was Staff's finding regarding the**  
2           **average distance a wireless signal could propagate in rural areas?**

3       A.     Staff found that on average a wireless "signal propagates in ranges from 2-5 miles  
4           in rural areas. The actual reach of the signal will depend on the positioning (or  
5           "pointing") of the equipment as well as physical terrain and obstructions"  
6           (Prefiled Testimony of Ms. Josie Gage, October 12, 2007 ("Gage Testimony"), at  
7           ps. 9-10).

8  
9       **Q.     How did Staff show the antennae locations and likely wireless signal**  
10       **distances in the Salisbury and Sutton exchanges?**

11      A.     Exhibits 4 and 5 to the testimony of Staff witness Josie Gage ("Gage Exhibits 4  
12           and 5") are maps of cellular telephone antennae with a purported 5 mile radius  
13           line drawn around them in and around the Sutton and Salisbury exchanges (Gage  
14           Testimony, at p. 10).

15  
16      **Q.     Why did Ms. Gage choose to draw the radius lines to a distance of 5 miles?**

17      A.     Per her testimony, Ms. Gage found that 5 miles "is the farthest distance a signal  
18           could propagate in rural areas and in fact, it is likely that the actual signal does not  
19           reach that far in these areas" (Gage Testimony, at p. 10).

20  
21      **Q.     When Gage Exhibits 4 and 5 are viewed, how much of the territory in the**  
22       **Sutton and Salisbury exchanges is covered by the purported 5 mile radius**  
23       **lines drawn around the cellular telephone antennae?**

1 A. I read Gage Exhibits 4 and 5 to indicate that very little of the territory in the  
2 Sutton and Salisbury exchanges is covered by the 5 mile radius lines drawn on  
3 those two exhibits. I believe that the exhibits only show a radius line of well  
4 under 2 miles, which dramatically understates the territory in the Sutton and  
5 Salisbury exchanges covered by those wireless antennae.  
6  
7

8 **Q. What do you expect Gage Exhibits 4 and 5 would have shown had the radius**  
9 **lines been drawn around the cellular antennae to show a 5 mile radius?**

10 A. Had Gage Exhibits 4 and 5 been created with a 5 mile radius, I believe the  
11 exhibits almost certainly would show that the vast majority of the customers  
12 within the Sutton and Salisbury exchanges would be within the 5 mile radius of at  
13 least one wireless antenna. This would not only have been consistent with what  
14 the C Squared measurements prove, but also consistent with the CoverageRight  
15 map.  
16

17 **Q. Based on the new evidence provided through this supplemental testimony, do**  
18 **you believe the TDS Companies have demonstrated the Sutton and Salisbury**  
19 **exchanges have wireless service available to the majority of their customers?**

20 A. Yes.  
21

1     **Q.     MCT and KTC have multiple exchanges. Did the Commission issue any**  
2           **findings related to the availability of alternative services at the other MCT**  
3           **and KTC exchanges in the Order?**

4     A.     No. Once the Commission found that alternatives did not exist in the Sutton and  
5           Salisbury exchanges, neither MCT nor KTC could receive approval of an  
6           alternative regulation plan. As a result, the Commission did not need to issue any  
7           findings related to the availability of alternatives other than at the Sutton and  
8           Salisbury exchanges.

9  
10    **Q.     At this time, are there any other exchanges in MCT or KTC that you would**  
11       **like to address related to the availability of wireless service?**

12    A.     Yes. We would like to again confirm the availability of wireless service in the  
13       MCT exchanges of Bradford and Warner, and the KTC exchange of Andover.

14  
15    **Q.     Why are you providing updated support for the availability of wireless**  
16       **service at some, but not all of the exchanges in MCT and KTC?**

17    A.     As shown in Exhibit E to my direct testimony, the MCT exchanges of Antrim,  
18       Contoocook, Henniker, Hillsboro and Melvin Village, as well as the KTC  
19       exchanges of Boscawen, Chichester, Meriden and New London have an  
20       alternative service, cable broadband, which is available to a majority of the  
21       customers in each of those exchanges.

22



1     **Q.     Does Exhibit G show that wireless service is available to the majority of**  
2           **customers within the MCT exchanges of Bradford and Warner, and the KTC**  
3           **exchange of Andover?**

4     A.     Yes. Exhibit G is the CoverageRight map which includes the outline of all the  
5           TDS exchanges in New Hampshire, including Bradford, Warner, and Andover.  
6           This exhibit shows that wireless telecommunications is available to virtually  
7           100% of the service areas within these three exchanges. As the TDS Companies  
8           have shown with the extensive actual testing in the Sutton and Salisbury  
9           exchanges, the CoverageRight map is an accurate representation of the  
10          availability of wireless service in the state of New Hampshire.

11

12    **Q.     Based on the new evidence you have provided, do you believe the TDS**  
13          **Companies have demonstrated that all exchanges in MCT and KTC have an**  
14          **alternative service available to the majority of customers in each of their**  
15          **exchanges?**

16    A.     Yes.

17

18    **Q.     Does this conclude your supplemental testimony?**

19    A.     Yes.