

Exhibit No:

4

Issue: Network Design & Reliability;
Services and Service Quality

Witness: Kevin Lowell

Type of Exhibit: Direct Testimony

Sponsoring Party: U.S. Cellular

Case No: TO-2005-0384

MISSOURI PUBLIC SERVICE COMMISSION

CASE NO: TO-2005-0384

FILED

NOV 23 2005

Missouri Public
Service Commission

DIRECT TESTIMONY

OF

KEVIN LOWELL

ON BEHALF OF

USCOC OF GREATER MISSOURI, LLC d/b/a U.S. CELLULAR

July 12, 2005

Exhibit No. 4
Case No(s) TO-2005-0384
Date 10/26/05 Rptr KF

BEFORE THE PUBLIC SERVICE COMMISSION
OF THE STATE OF MISSOURI

In the Matter of the Application of USCOC of)
Greater Missouri, LLC for Designation as an)
Eligible Telecommunications Carrier) Case No. TO-2005-0384
Pursuant To The Telecommunications Act Of)
1996)


AFFIDAVIT OF KEVIN LOWELL

I, Kevin Lowell, under penalty of perjury affirm and state this 12th day of July, 2005:

1. My name is Kevin Lowell. I am employed by United States Cellular Corporation, as Senior Director, Network Operations and Engineering. My office is located at 1210 South Detroit, Tulsa, Oklahoma 74120.

2. Attached hereto and made a part hereof for all purposes is my Direct Testimony on behalf of USCOC of Greater Missouri, LLC d/b/a U.S. Cellular, having been prepared in written form for introduction into evidence in the above-captioned docket.

3. I have knowledge of the matters set forth therein. I hereby affirm that my answers contained in the attached testimony to the questions propounded, including any attachment thereto, are true and accurate to the best of my knowledge, information and belief.



KEVIN LOWELL

1 **Q. PLEASE DESCRIBE U.S. CELLULAR'S NETWORK IN MISSOURI.**

2

3 A. U.S. Cellular is licensed to serve a substantial portion of rural Missouri with a
4 combination of cellular and PCS licenses. To date, we have built out our network to cover the
5 highways and major towns, and are now expanding to small towns and rural areas. High-cost
6 support will accelerate our ability to expand our coverage and improve service quality to people
7 in rural Missouri.

8 **Q. DOES U.S. CELLULAR PROVIDE VOICE-GRADE ACCESS TO THE PUBLIC**
9 **SWITCHED TELEPHONE NETWORK?**

10 A. Yes. U.S. Cellular provides all customers with the ability to make and receive phone
11 calls, with a bandwidth of approximately 2700 hertz within the 300 to 3000 hertz frequency
12 range granted to all carriers on the public switched telephone network ("PSTN").

13 **Q. DOES U.S. CELLULAR PROVIDE CUSTOMERS WITH LOCAL USAGE?**

14

15 A. Yes. U.S. Cellular offers a large number of rate plans that include a variety of local
16 calling areas and varying numbers of local calling minutes. In addition, U.S. Cellular will
17 comply with any and all minimum local usage requirements adopted by this Commission or the
18 Federal Communications Commission ("FCC").

19 **Q. DOES U.S. CELLULAR PROVIDE DUAL-TONE, MULTI-FREQUENCY**
20 **("DTMF") SIGNALING, OR ITS FUNCTIONAL EQUIVALENT?**

21 A. Yes. U.S. Cellular currently uses out-of-band digital signaling and in-band multi-
22 frequency ("MF") signaling that is functionally equivalent to DTMF signaling.

23 **Q. DOES U.S. CELLULAR PROVIDE SINGLE-PARTY SERVICE OR ITS**
24 **FUNCTIONAL EQUIVALENT?**

25 A. Yes. U.S. Cellular provides a dedicated message path for the length of all customer calls.
26 All of our customers use single party connections.

1 **Q. DOES U.S. CELLULAR PROVIDE ACCESS TO EMERGENCY SERVICES?**

2 A. Yes. U.S. Cellular currently provides all of its customers with access to emergency
3 services through standard 911 service, in all areas where it has coverage. Standard 911 service
4 enables a customer of U.S. Cellular or another customer roaming on its network to reach a Public
5 Safety Answering Point ("PSAP") designated for receipt of 911 calls and have the call directed
6 to the appropriate emergency service provider.

7 The improved coverage resulting from the receipt of federal high-cost Universal Service
8 Fund ("USF") support will result in more areas where 911 calls can be completed. Such
9 improved coverage will also result in more areas in which a customer can make non-emergency
10 calls, for example to a tow truck or an auto repair facility. Farmers, plumbers, and other business
11 people working away from a landline phone will be able to communicate with their employees
12 and suppliers.

13 U.S. Cellular's network has also been upgraded to offer E-911 Phase II service. U.S.
14 Cellular is delivering Phase II in certain areas of Missouri where the PSAPs are Phase II capable
15 and where there have been requests for Phase II service.

16 U.S. Cellular uses a handset-based solution to provide E-911. That is, U.S. Cellular sells
17 phones with a Global Positioning System ("GPS") chip embedded within them that enable a
18 person to be accurately located anywhere they receive a usable signal. If this Application is
19 granted and U.S. Cellular adds more towers, the availability of 911 service will improve.

20 **Q. DOES U.S. CELLULAR PROVIDE ACCESS TO OPERATOR SERVICES?**

21 A. Yes. Customers may dial "411" direct connect services for directory assistance (see
22 below), which connects the caller to a live operator who can also arrange for the billing or
23 completion of a call.

1 **Q. DOES U.S. CELLULAR PROVIDE ACCESS TO INTEREXCHANGE SERVICE?**

2 A. Yes. Customers may make and receive interexchange or toll calls through direct
3 interconnection arrangements that U.S. Cellular has with interexchange carriers ("IXCs").

4 **Q. DOES U.S. CELLULAR PROVIDE EQUAL ACCESS?**

5 A. No. It is my understanding that equal access is not a supported service and that the FCC
6 does not require wireless carriers to provide equal access to interexchange services. However,
7 U.S. Cellular understands that the FCC may require it to provide equal access in any area in
8 which the ILEC ceases to operate as an ETC. Although U.S. Cellular believes it is highly
9 unlikely that any ILEC in its service area will withdraw as an ETC, U.S. Cellular will be
10 prepared to provide equal access at the FCC's direction if this situation arises.

11 **Q. DOES U.S. CELLULAR PROVIDE ACCESS TO DIRECTORY ASSISTANCE?**

12 A. Yes. Customers may access to directory assistance by dialing 411 or (NPA) 555-1212.

13 **Q. DOES U.S. CELLULAR PROVIDE TOLL LIMITATION FOR QUALIFYING
14 LOW-INCOME CONSUMERS?**

15 A. U.S. Cellular currently has no Lifeline customers in Missouri because only carriers
16 designated as an ETC can participate in Lifeline. Once designated as an ETC, U.S. Cellular will
17 participate in Lifeline and Link-up, and will provide toll blocking capability. Today, U.S.
18 Cellular provides toll-blocking services for international calls and "900 number" calls. U.S.
19 Cellular has the technology to provide toll blocking and will use this technology to provide the
20 service to its Lifeline customers, at no additional charge.

21 **Q. WHAT TYPE OF HANDSETS ARE AVAILABLE TO CUSTOMERS OF U.S.
22 CELLULAR?**

23 A. U.S. Cellular offers a variety of phone equipment units to its customers. Handheld
24 phones offer a variety of features, including: varying size, battery life, productivity tools (phone

1 number directory, calendar, clock), integrated voice dialing, distinctive ringing tones, and others
2 which vary depending on the model chosen.

3 **Q. IS U.S. CELLULAR'S NETWORK ENGINEERED TO OPERATE RELIABLY**
4 **AND IN EMERGENCIES?**

5 A. Yes. Because we operate in a very competitive business, we make every effort to ensure
6 that our network operates reliably. In our Missouri network, U.S. Cellular places a premium on
7 network reliability and the ability to perform in emergencies. For example:

- 8 • U.S. Cellular uses redundant transport and switching facilities, signaling transfer points,
9 and signaling links. Transport from the cell sites to switch facilities is via high-reliability
10 microwave with availability objectives of greater than 99.9999%. Transport from U.S.
11 Cellular's switching facilities to the PSTN is via protected fiber and copper circuits.
12 Signaling transfer points (STP's) are located in Tulsa and Knoxville, with completely
13 independent signaling links to both STP's. Loss of either STP or associated links will not
14 affect the remaining unit. Each switch has multiple routes to various end offices
15 connected to the PSTN which provides for alternate routing in the event that a central
16 office is compromised.
- 17 • While physical reliability and redundancy of the network are fundamental to U.S.
18 Cellular's ability to remain functional during an emergency, network capacity is equally
19 important.
- 20 • All microwave hops are hot-standby/diversity links. If one path goes down, another is
21 available.
- 22 • The trunking of U.S. Cellular's switches to the outside world is supported by two STPs
23 that provide alternate routes out of U.S. Cellular's switching core should one facility be

1 down.

2 • All cell sites and switch facilities are equipped with battery backups and have standby
3 generators. Battery backups are sized to provide a minimum of four hours of operation in
4 case of complete loss of commercial power. U.S. Cellular has backup diesel generators
5 capable of operation for at least 24 hours without refueling which can be deployed
6 throughout our networks immediately. We also have diesel generators at our switching
7 centers which start up immediately upon loss of commercial power.

8 • Tower facilities are designed to withstand 125 MPH winds with ½" ice loading. In the
9 eighteen (18) years since U.S. Cellular first launched service, it has experienced no tower
10 structural failures. U.S. Cellular has four (4) tower crews dedicated to the maintenance of
11 its Missouri network.

12 • All data bases are electronically backed up with relevant data stored in fireproof storage
13 units.

14 • U.S. Cellular has two (2) territorial field teams currently in place in Columbia and Joplin,
15 so as to allow for quick dispatch of field personnel in the event of problems requiring on-
16 site repair. The goal is to have no more than a one-hour dispatch time to the site in the
17 event of a service-affecting emergency. Once dispatched, all of our technicians are given
18 the same orders: Fix the problem immediately and stay on duty until the problem is fixed.

19 • U.S. Cellular has an alarm system in place that tracks and informs U.S. Cellular personnel
20 24/7 of service-affecting issues. If a door opens at a cell site, or there is any problem with
21 a site, our on-call technician is paged immediately; and

22 • All on-call personnel have remote computer access to the system so as to enable them to
23 work on our system immediately without having to travel. This enables many issues to be
24 resolved in minutes without the need for a service call.

1 **Q. HOW DOES U.S. CELLULAR MANAGE EMERGENCY SITUATIONS?**

2 A. U.S. Cellular's Emergency Operations Center (EOC) is located in Schaumburg, Illinois.
3 The EOC is the single point of contact for U.S. Cellular Operations during any event that causes
4 a high-level service outage to its customers.

5 The EOC Conference Center, a space dedicated solely for Emergency Operations,
6 coordinates information, response, recovery actions, and company resources. The objective of
7 the EOC is to optimize communication and coordinate effective information management during
8 periods where major mobilization of company resources is required. While the Field Operations
9 groups deal with outages on a daily basis, the EOC can be implemented to augment Network
10 Operations during high-level service outages or interruptions.

11 High-level service outages/interruptions are defined as follows.

- 12 1. A single event that has the potential to or has caused a network outage, or
13 severe service disruption, to an entire U.S. Cellular market area.
- 14 2. An unplanned event that can cause death or significant injuries to
15 employees.
- 16 3. An event that has the potential to or has caused a network outage, or
17 severe service disruption, where there are no prospects of restoration
18 within 24 hours (i.e., Mobile Telephone Switching Office [MTSO] fire.)
- 19 4. Any forecasted weather event that may have the potential to impact a
20 significant number of cell site, microwave or MTSO facilities (i.e., ice
21 storm, hurricane or other related natural disaster).
- 22 5. Any potential catastrophic network outage, or service disruption event
23 where a U.S. Cellular President, Director or Officer of the company has
24 requested implementation of the Emergency Operations Center.

1 **Q. CAN YOU DESCRIBE HOW U.S. CELLULAR MONITORS ITS SERVICE**
2 **QUALITY?**

3 A. U.S. Cellular actively monitors its service quality in the following functional areas:

- 4 1. Established Call Rate at the Beginning of the Call Set-up Process
- 5 2. Established Call Rate on the Traffic Channel
- 6 3. Traffic Channel Congestion
- 7 4. Network Utilization and Blocking for Network Trunks
- 8 5. Network Quality in terms of CDMA specific measurements such as Uplink and
9 Downlink Receive Quality.

10 Network measurements are analyzed daily, although many are available on a real-time basis.

11 **Q. CAN YOU DESCRIBE U.S. CELLULAR'S CALL COMPLETION RATE?**

12 A. Our call completion rate is roughly 98%. This is based on switch reports that monitor
13 customer access attempts and record each failure. The number of failures is subtracted from total
14 accesses to give our completion rate.

15 **Q. PLEASE DESCRIBE HOW U.S. CELLULAR MANAGES NETWORK**
16 **CONGESTION ISSUES.**

17 A. We take an aggressive and proactive approach to network blocking in both the radio
18 frequency and interconnect areas. Statistical data at the RF channel and network trunk level is
19 analyzed daily and monitored in real time. At the RF channel level, we monitor the Traffic
20 Channel (TCH) congestion counters which give an indication of the usage in that particular
21 sector. We utilize the Erlang B equations for initial cell site capacity calculations and use the
22 $P=.01$ grade of service objective. In addition, U.S. Cellular deploys full rate RF channels as
23 normal engineering practice.

1 With regard to the network interconnect area, we employ a similar philosophy in that
2 network trunks are engineered to the $P=.01$ blocking level per the Erlang B equations with the
3 following assumptions:

4 Infinite Traffic Sources

5 Equal Traffic Density per Source

6 Lost Calls Cleared

7 **Q. WHAT TOOLS DOES U.S. CELLULAR USE TO DESIGN ITS NETWORK SO**
8 **AS TO ENSURE THAT CONSUMERS RECEIVE HIGH-QUALITY SERVICE?**

9 A. U.S. Cellular uses an RF analysis program called PlanetEV, sold by Marconi, for its
10 network coverage models, assumptions, and coverage predictions. This tool has been in use
11 within the RF industry for several years and is considered to be one of the more powerful on the
12 market. U.S. Cellular generates reverse link coverage plots to the +15 dBm level transmitted
13 from the mobile antenna. While the maximum mobile output power is at a +23 dBm level, U.S.
14 Cellular has taken a more conservative approach and tends to under-predict for its published
15 maps. Coverage contours to the +15 dBm mobile transmit signal level are calculated for each
16 sector for each site and merged into a large Composite. Each contour takes into account the net
17 sum of all transmission line losses, antenna gains and the individual radiation patterns of each
18 antenna. Once this is done, the net path loss attributed to the distance from the mobile subscriber
19 to the base station is applied to arrive at the required mobile transmit power as measured at the
20 mobile antenna.

21 **Q. HOW DOES U.S. CELLULAR ENSURE THAT ITS NETWORK WILL**
22 **OPERATE AT A HIGH LEVEL?**

23 A. The biggest factor in customer satisfaction is network consistency. This is achieved by
24 designing our system so that the handset can effectively communicate with the base station and

1 dropped calls are minimized. We use our predictive tools to overestimate the "path loss" from
2 the base station to the mobile, which means U.S. Cellular locates cell sites and calculates the
3 density of cell sites by predicting more degradation in signal from the tower than what actually
4 occurs in the field. U.S. Cellular also underestimates the signal strength at the mobile, which
5 means that our handsets are transmitting at a higher power than the model. In sum, we use our
6 models very conservatively so that when we actually construct the facilities, performance in the
7 field is at a level far above the standard wireless engineering design. Upon installation of new
8 facilities, U.S. Cellular conducts drive tests to verify these results. If they do not prove out, U.S.
9 Cellular makes adjustments necessary to deliver the high level of service quality that it intends to
10 provide to a given area.

11 **Q. WHAT TYPE OF EQUIPMENT WILL U.S. CELLULAR PROVIDE TO**
12 **REQUESTING CONSUMERS?**

13 A. U.S. Cellular intends to provide every requesting customer with a handset, which is
14 normally what customers want when they seek our service. If a customer lives in an area outside
15 of our current coverage area, we have a number of ways to extend service. The types of
16 equipment available that U.S. Cellular can use to extend signal coverage to requesting customers
17 include, but are not limited to, cell extenders, repeaters, and Yagi antennas (antennas installed on
18 the roof or elsewhere at the customer's premises which focus the transmit and receive power in a
19 single direction). We are using this equipment successfully in Missouri and other states and
20 intend to continue to use it in Missouri.

21 **Q. WHY IS SERVICE QUALITY IMPORTANT TO U.S. CELLULAR?**

22 A. Every business must differentiate itself from its competition. U.S. Cellular is not a
23 national carrier. Our business has been built by focusing on rural areas. We believe that if our

1 network is better than our competitors' networks, we can capture consumers and keep them from
2 switching to other carriers.

3 **Q. WHAT OTHER STEPS DOES U.S. CELLULAR TAKE TO ENSURE SERVICE**
4 **QUALITY?**

5 A. U.S. Cellular's customer service representatives can be reached toll-free and airtime-free
6 any time during business hours. If a call is an emergency or is reporting an outage, the system
7 permits a customer to page U.S. Cellular 24/7. Customer service representatives may be
8 contacted through a number of convenient methods, including: (1) visiting any of the company's
9 locally-owned retail/customer service locations; (2) dialing a 1-888 toll-free number from any
10 phone; (3) dialing 611, toll-free and airtime-free, from a wireless handset; or (4) by contacting
11 our customer care center through the e-mail address provided on our web site at
12 www.uscellular.com.

13 **Q. WHAT IS U.S. CELLULAR'S CHURN RATE?**

14 A. Currently it is 1.59% per month. Over time it has fluctuated between 1-2% per month or
15 12-24% per year. This is well below the national average for major carriers, which is roughly
16 18-38% per year. We measure churn by comparing how many subscribers disconnect our
17 service each month to our number of total subscribers.

18 **Q. CAN YOU DESCRIBE THE COVERAGE CURRENTLY PROVIDED BY U.S.**
19 **CELLULAR IN MISSOURI?**

20 A. To date, we have constructed facilities primarily in major towns along the major highways
21 and have begun spreading out into rural communities. The addition of high-cost USF support
22 will accelerate our construction plans to fill in the remaining areas within our service area.

23 **Q. HOW WILL HIGH-COST USF SUPPORT HELP U.S. CELLULAR TO**
24 **IMPROVE SERVICE TO MISSOURI'S RURAL CONSUMERS?**

1 A. U.S. Cellular will construct new facilities with high-cost USF support to improve service
2 quality levels to rural Missouri consumers. The difference between our network today and that
3 of wireline carriers is that they have been subsidized for decades, and continue to be. As a result,
4 they are capable of providing a high level of service quality at the end of their lines. We provide
5 high service quality levels in every area where we have strong signal strength. Just like
6 incumbent local exchange carriers ("ILECs"), there are many areas where we would like to
7 provide service but cannot do so without USF support. We have committed in Missouri to
8 extend our service to customers upon reasonable request in rural areas if support is provided.
9 When ILECs began serving Missouri, there were vast areas that did not have service. Through
10 USF funding, ILECs had an opportunity to extend service to rural areas. U.S. Cellular would
11 like that same opportunity. We have areas where signal strength is weak and where our business
12 plan would only support construction of new facilities with high-cost USF support. U.S. Cellular
13 will use that support to construct facilities to improve signal strength and serve consumers with
14 top-quality mobile service that urban consumers enjoy today.

15 **Q. DOES THIS CONCLUDE YOUR TESTIMONY?**

16 A. Yes.