TDRA | هيئة تنظيم الاتصالات والحكومة الرقمية
TELECOMMUNICATIONS AND DIGITAL GOVERNMENT REGULATORY AUTHORITY

United Arab Emirates

Mobile Network Quality of Service Benchmarking Report

Media Report 2024

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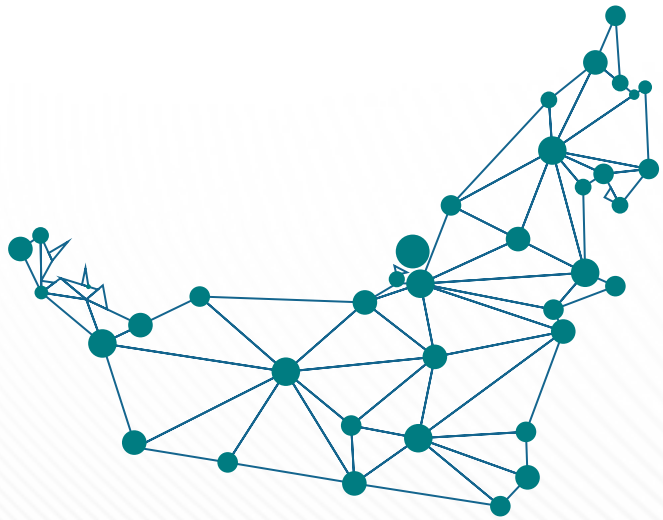
BACKGROUND

The UAE is an ICT leader in the Gulf region. The Telecommunications and digital Government Regulatory Authority (TDRA) plays a vital role in maintaining the highest standards of the ICT sector. It is achieved by ensuring country-wide reach of mobile services and a constant improvement in the quality of offered services. To encourage the highest standards in mobile services, the TDRA has carried out an extensive benchmarking survey of the Mobile networks in the UAE. The results of the survey are discussed with mobile licensees (Etisalat and du) to enable the operators to further ~~enhance~~ enhancement in the quality of mobile services offered.

1. The survey was conducted in Q3 and Q4 of 2024, covering more than 29,095 km of the UAE's roads, making approximately 86,379 voice calls on each operator's network and testing the full range of data services available across all technologies (2G, 3G, 4G and 5G).

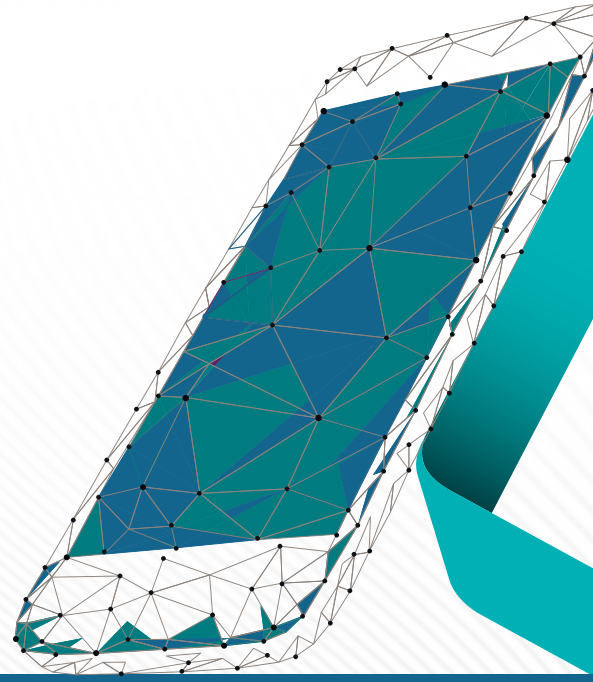
2. All Regions including Abu Dhabi, Ajman, Al-Ain, Al-Fujairah, Dubai, Ras Al-Khaimah, Sharjah, Um-Al Quwain, and the Western Region were covered. Testing was performed in the cities and towns of all the emirates as well as on the main roads in the UAE. Quality of mobile services was also tested in 50 key indoor locations across the UAE.



WHAT WAS MEASURED?

The survey addressed 2nd, 3rd, 4th and 5th generation mobile networks for both licensees (Du and Etisalat). Key performance indicators used in the survey include:

1. VOICE CALL COMPLETION SUCCESS RATE
2. VOICE CALL SETUP SUCCESS RATE
3. VOICE CALL DROP RATE
4. VOICE QUALITY
5. GOOD COVERAGE
6. DATA TRANSFER RATE
7. LATENCY



DEFINITION

USER SIMULATION QUALITY OF SERVICE (QOS)

1. **Voice Call Completion Success Rate:** The measure of calls that were successfully set up and normally terminated for Mobile-to-Fixed Mode, note that a high Call Completion Success Rate is desirable.

2. **Voice Call Setup Success Rate:** Percentage of attempts that resulted in successful voice call setup for Mobile-to-Fixed Mode, note that a high Call Setup Success Rate is desirable.

3. **Voice Call Drop Rate:** This refers to the disconnection of mobile calls by the network during a 90-second call holding period for each call in Mobile-to-Fixed Mode, note that a low Call Drop Rate is desirable. The target is to achieve a ratio of less than 2% call drop rate.

4. **Voice Quality:** The overall voice quality rate is equal to the average voice quality on the downlink and uplink, which refers to the network's ability in achieving an acceptable level of voice quality using the Mean Opinion Score (MOS) measure and a score of 2.8 has been set as the MOS threshold for Mobile-to-Fixed, where a high Voice Quality Rate is desirable.

5. **Good Coverage Level:** This is based on signal strength and refers to the network's ability in achieving a signal strength of -100 dBm or higher, which is considered as a level of good coverage, enough to provide a typical user with all requested services.

6. **Data Transfer Rate:** This is rate at which data is transmit-ted over the application protocol levels. Provided in Megabits per second (Mbps). Both FTP & HTTP protocols have been tested:

   FTP (File Transfer Protocol):
   used to upload files from a workstation to an FTP server or download files from an FTP server to a workstation. FTP uses 1 TCP connection for user data transfer, and another TCP connection for signaling purposes.

   HTTP (Hyper Text Transfer Protocol):
   used to transfer files from a Web server onto a browser in order to view a Web page that is on the Internet. May use 1 or more TCP connections, depending on configuration. A 1 GB file was used to test the network speed from a performance point of view, over a period of 10 seconds in downlink and 400MB file was used in uplink.

7. **Data Latency:** This metric reflects the time (in ms) that data packets need to travel from a User Terminal through the operator's network, to a remote server and return – also known as Average Ping Duration. The shorter the Data Latency, the better is user perceived responsiveness of the data network, which is important for real-time applications. In each test, a series of 10 pings are sent and average round trip time is calculated.

METHODOLOGY

To ensure that the testing provides a fair competitor comparison of the service provided by the mobile networks, and that it provides a reliable basis for the encouragement of ever-improving quality of service throughout the UAE, the TDRA has employed state – of – the – art test equipment and services. By using the latest equipment; the TDRA ensured the measurements were done in a manner, that was statistically valid, repeatable, technically consistent, providing absolute comparability of KPIs for all networks, technology independent, using ITU & ETSI standards as a minimum, and are robust enough to stand legal scrutiny of claims.

The equipment measures "Key Performance Indicators" that directly relate to the public's experience through Outdoor (in-car user experience) and Indoor user experience. These include network coverage, dropped calls and the clarity of calls.

The ratio of Mobile Originated /Mobile Terminated voice Calls (MOC/MTC) was 1/1. The call test scenario consisted of a 90 second holding period followed by a 40 second idle time. For measurement purposes a suitable model of top smartphone were used.

Results Interpretation

In interpreting the results, it should be noted that:

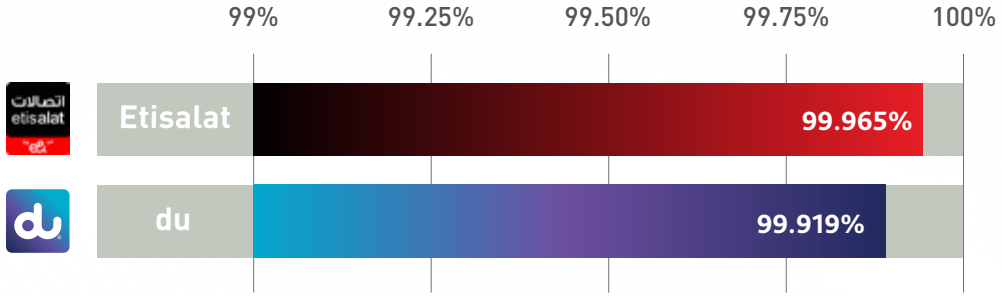
The drive test results represent a snapshot of the mobile service provider's network in-car user experience based on the specified routes during the time of day when the measurements were carried out and using a particular type of handset. The reported level of service quality may therefore not be exactly comparable with the consumer's own experience.

Consumers should not treat the drive test results as recommended best buys. Factors such as price plans, value added services, customer care and support are not captured in this report.

SURVEY RESULTS - OUTDOOR

Voice Call Completion Success Rate

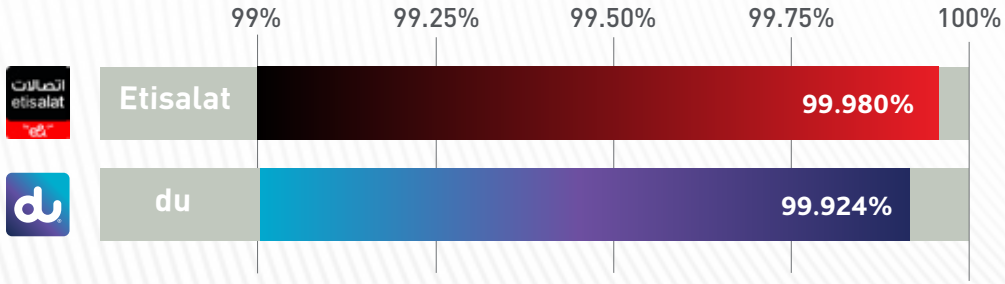
This parameter measures the capability of the network to successfully set up a call and terminate it normally. The call completion success rate shown below is based on approximately 19,780 voice call attempts per operator.



Call Completion
Success Rate in Outdoor Coverage

Voice Call Setup Success Rate

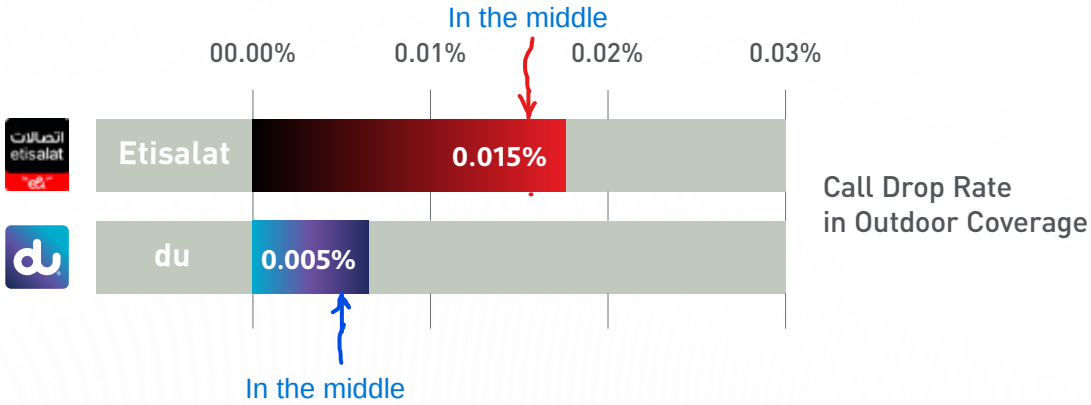
This parameter measures the capability of the network to successfully set up a call.
The call setup success rate below is based on more than 19,780 voice calls attempts for each operator.



Call Setup
Success Rate in Outdoor Coverage

CALL DROP RATE - OUTDOOR

A call is dropped when it is disconnected prematurely during the 90-second holding period. Call drop may occur due to poor coverage, interference or other network related issues. The Call Drop Rate statistics for each mobile network are shown below based on approximately 19,780 voice call attempts per operator:



Lower is Better

METHODOLOGY

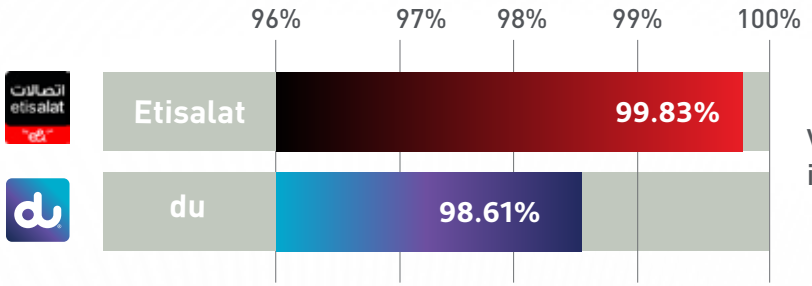
The MOS method is a means to provide an objective result of voice quality of calls in the operator's network. In each call, speech samples are sent in the uplink and downlink direction. These samples are then analyzed in both directions to measure the speech quality using the ITU-T Rec. P.863 (POLQA) algorithm. This is a recognized method widely used to evaluate voice quality showing the following categories:

Result (MOS) Quality Conversation description

Result (MOS)	Quality	Conversation Description
5	Excellent	Understandable without interference noise
4	Good	Understandable with minor interference noise
3	Acceptable	Fairly understandable
2	Not good	Requires a lot of effort to understand
1	Poor	Not understandable

VOICE QUALITY - OUTDOOR

Based on the definition that an acceptable level of voice quality is one with an opinion score of at least "2.8", the percentage of samples with opinion scores greater than "2.8" for each mobile network is as shown:



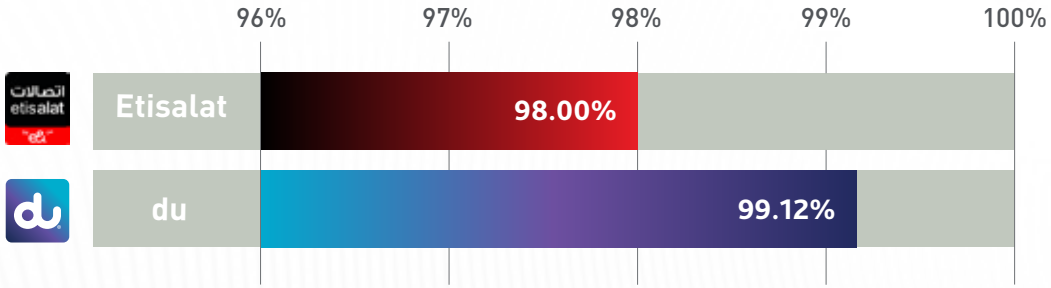
Voice quality (% of sample with MOS> 2.8) in Outdoor Coverage

SERVICE COVERAGE LEVEL – 5G OUTDOOR

Service Coverage Level – 5G
This parameter measures the availability of service coverage in the regions. Therefore, it measures the network's ability to achieve the minimum signal strength of - 128dBm.

Charts in this section were constructed based on data from a scanner which continuously measured all available technologies and carriers, and their respective signal level.

As 5G is currently still in a deployment phase, apart from the percentage of good coverage, an absolute level of 5G Service Coverage is presented below. This metric was constructed with minimal required signal strength considered as RSRP > -128dBm



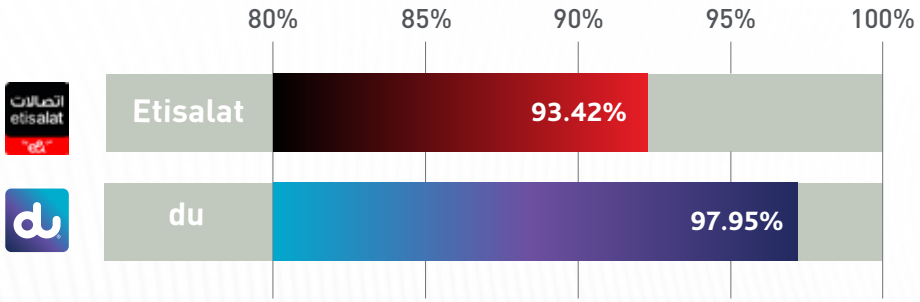
5G Service Coverage Level
(% of unique geographic locations with SS RSRP > -128dBm)

GOOD COVERAGE LEVEL - LTE (4G) - OUTDOOR

This parameter measures the availability of service coverage in the regions. Therefore, it measures the network's ability to achieve the minimum signal strength of - 110dBm.

Charts in this section were constructed based on data from a scanner which continuously measured all available technologies and carriers, and their respective signal level.

Since LTE has been widely deployed, an absolute level of LTE Good Coverage is presented below. This metric was constructed with minimal required signal strength considered as RSRP> -110 dBm

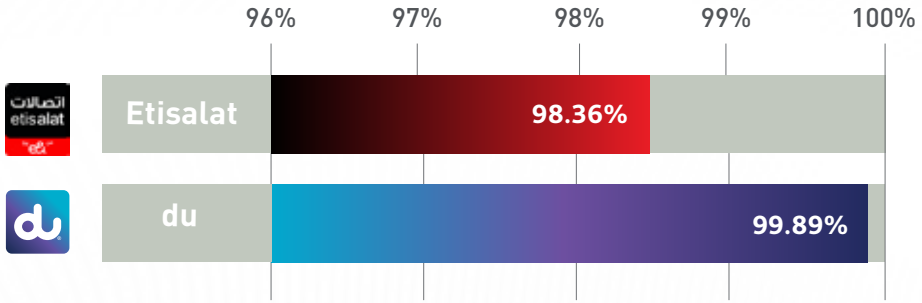


LTE Service Coverage Level
(% of unique geographic locations with RSRP> -110 dBm)

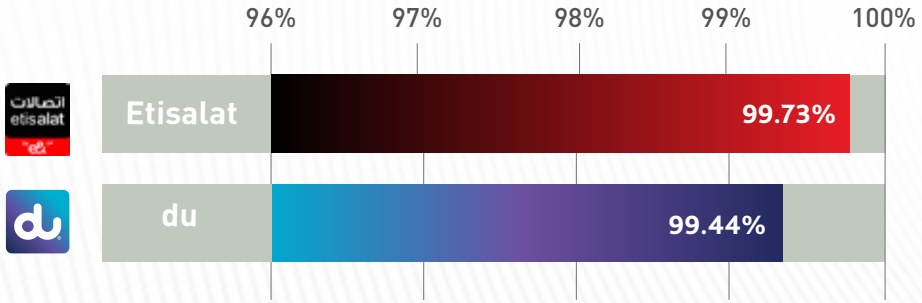
GOOD COVERAGE LEVEL - GSM and UMTS - OUTDOOR

This parameter measures the availability of service coverage in the regions. Therefore, it measures the network's ability to achieve the minimum signal strength of -100dBm.

Charts in this section were constructed based on data from a scanner which continuously measured all available technologies, carriers and their respective signal level.



GSM Good Coverage Level
(% of samples with RxLev > -100 dBm)



UMTS Good Coverage Level
(% of samples with RSCP> -100 dBm)

DATA TRANSFER RATE - OUTDOOR

1. **Packet Data Performance (Throughputs):**
   This is the rate at which data is transmitted over the application protocol layers. Provided in Megabits per second (Mbps), where 1 Megabit = 1,000,000 bits. Both FTP & HTTP have been tested.

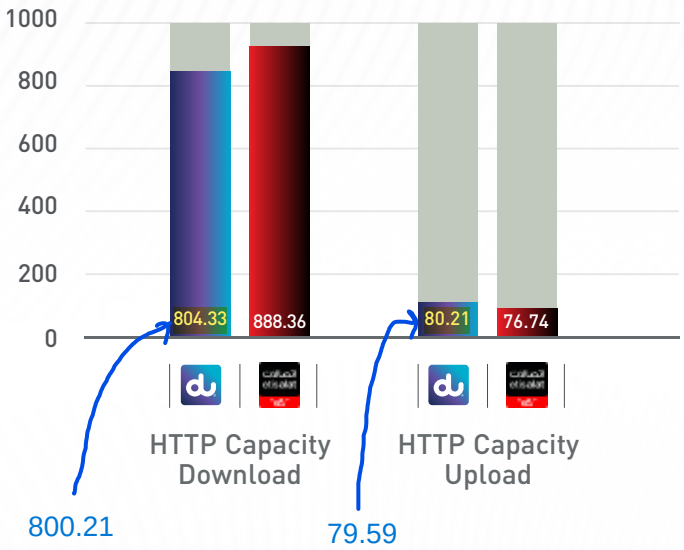
2. **FTP (File Transfer Protocol):**
   This test was used to download small files from an FTP server to a Mobile Device. A file size of 3 MB was used for the test.

3. **HTTP (Hyper Text Transfer Protocol):**
   This test was used to transfer small files from a Mobile Device onto the Server. A file size of 1 MB was used for the test.

4. **HTTP Browser test:**
   This test was used to download a complete web page using the HTTP protocol.

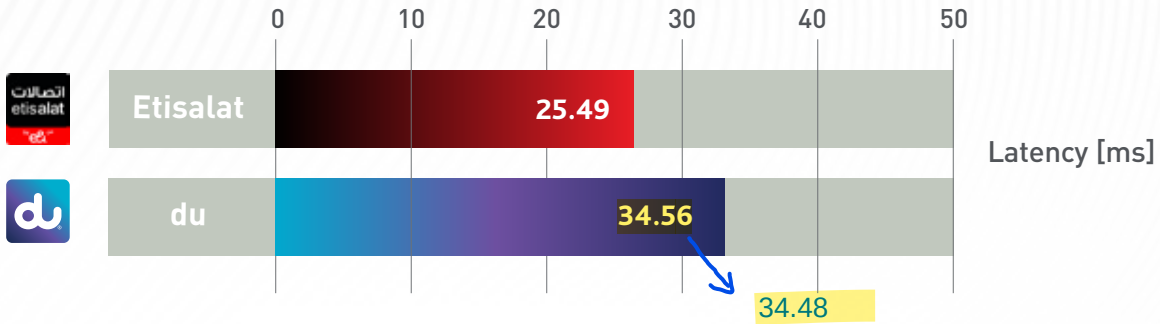
5. **Capacity Test:**
   This test provides a level of real-world throughputs that the network can deliver under stressed, highly-utilized conditions. The capacity test sets up multiple, simultaneous and parallel HTTP threads which transfer large files (1GB) in downlink and (400MB)in uplink, over a fixed period of time (10s) to exercise the Mobile network, to 100% of its technical capability.

DATA TRANSFER RATE IN AUTO MODE (5G/4G/3G/2G) - OUTDOOR



Data Transfer Rate [Mbps]

LATENCY IN AUTO MODE (5G/4G/3G/2G) - OUTDOOR

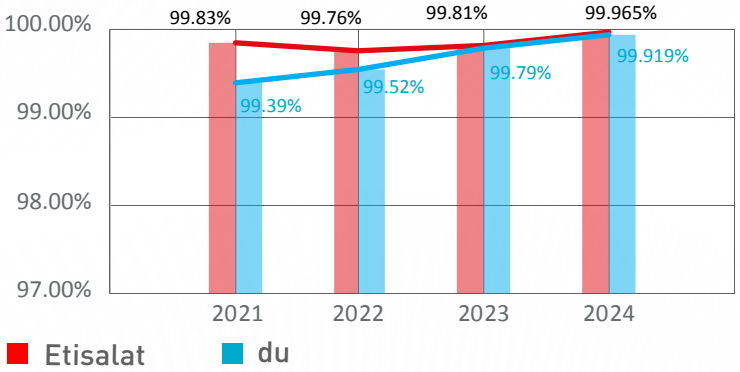


Delay before a transfer of data begins (Lower is Better).

MOBILE NETWORK PERFORMANCE TRENDS - OUTDOOR

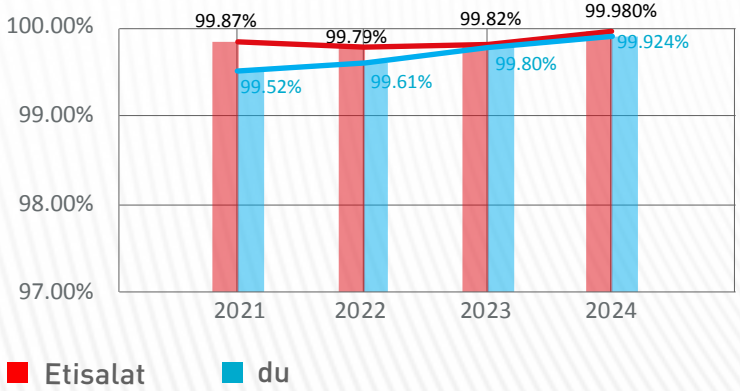
The below graphs compare the performance of both Etisalat's and Du's mobile networks in terms of the major Quality of Service Parameters over the past 4 years (2021- 2024).

Voice Call Completion Success Rate - Outdoor



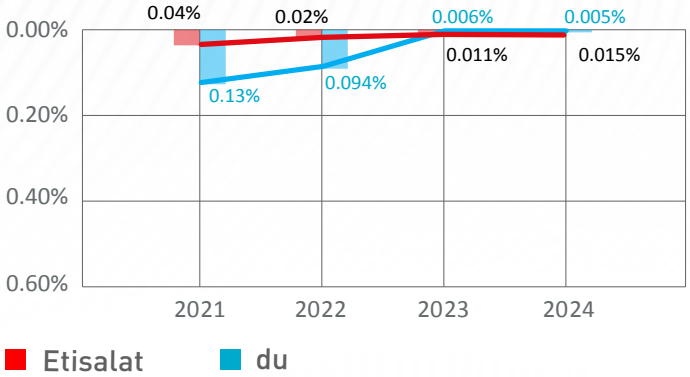
Voice Call Completion Success rate in Outdoor Coverage - Trend

Voice Call Setup Success Rate - Outdoor



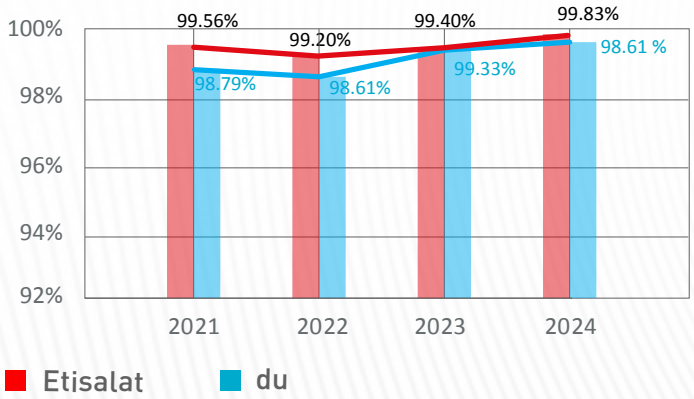
Voice Call Setup Success Rate in Outdoor Coverage - Trend

VOICE CALL DROP RATE - OUTDOOR



Voice Call Drop Rate in Outdoor Coverage -Trend

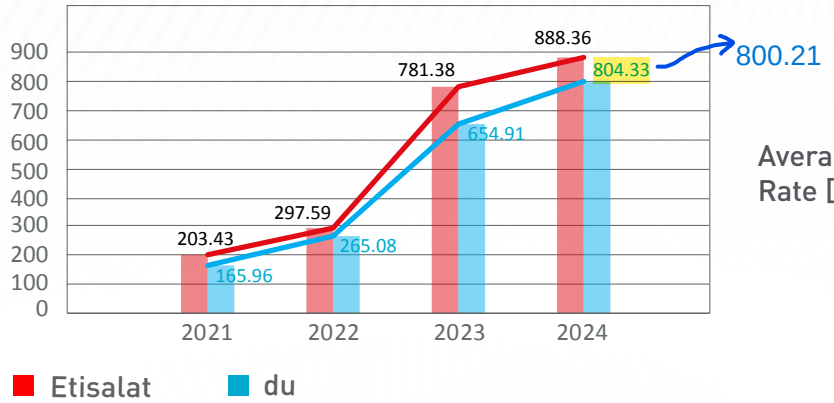
VOICE QUALITY - OUTDOOR



Voice quality (% of samples with MOS > 2.8) in Outdoor coverage - Trend

HTTP CAPACITY DOWNLINK DATA TRANSFER RATE IN AUTO MODE - OUTDOOR

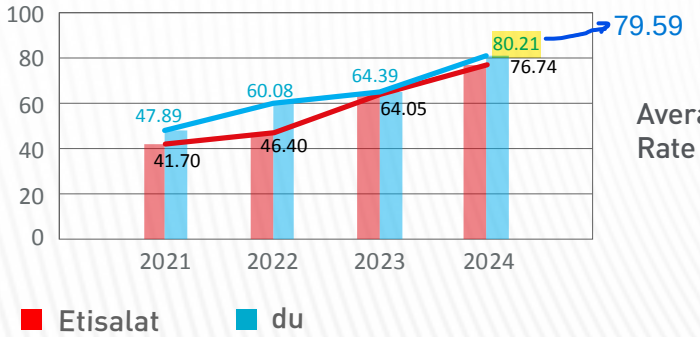
(5G/4G/3G/2G) Outdoor coverage



Average Data Transfer Rate [Mbps] - Outdoor

HTTP CAPACITY UPLINK DATA TRANSFER RATE IN AUTO MODE - OUTDOOR

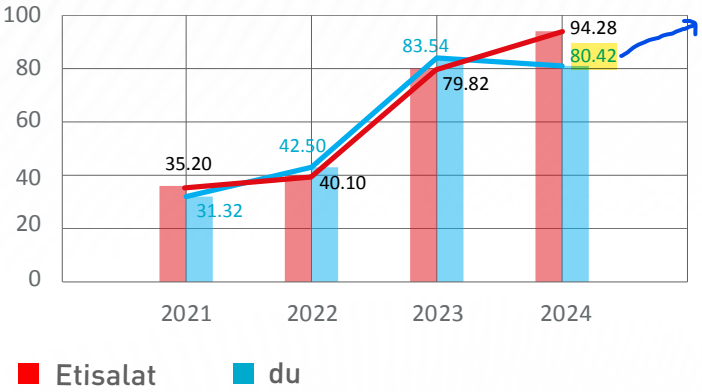
(5G/4G/3G/2G) Outdoor coverage



Average Data Transfer Rate [Mbps] - Outdoor

FTP DOWNLINK DATA TRANSFER RATE IN AUTO MODE - OUTDOOR

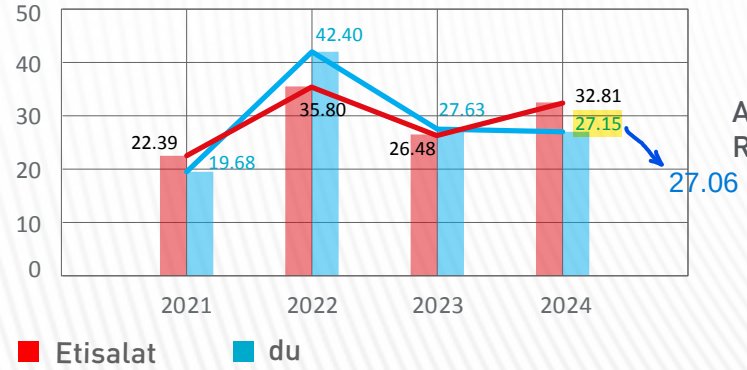
(5G/4G/3G/2G) Outdoor coverage



Average Data Transfer Rate [Mbps] - Outdoor

HTTP UPLINK DATA TRANSFER RATE IN AUTO MODE - OUTDOOR

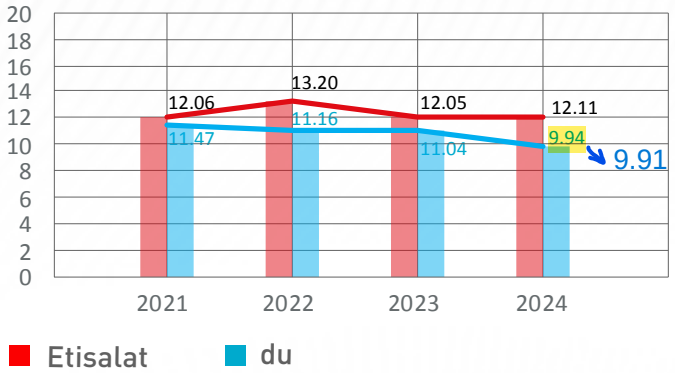
(5G/4G/3G/2G) Outdoor coverage



Average Data Transfer Rate [Mbps] - Outdoor

HTTP CAPACITY DOWNLINK DATA TRANSFER RATE IN DUAL MODE - OUTDOOR

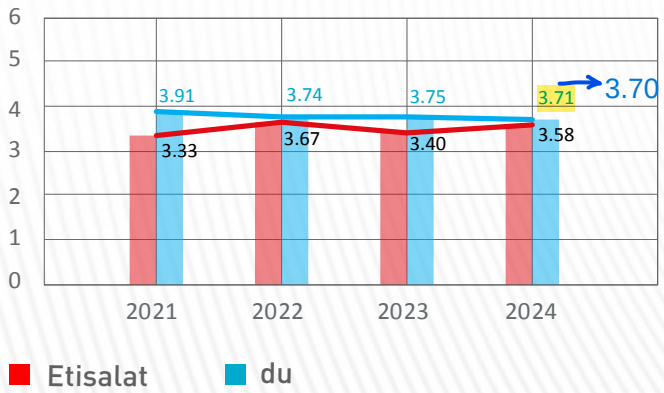
(3G/2G) Outdoor coverage



Average Data Transfer Rate [Mbps]

HTTP CAPACITY UPLINK DATA TRANSFER RATE IN DUAL MODE - OUTDOOR

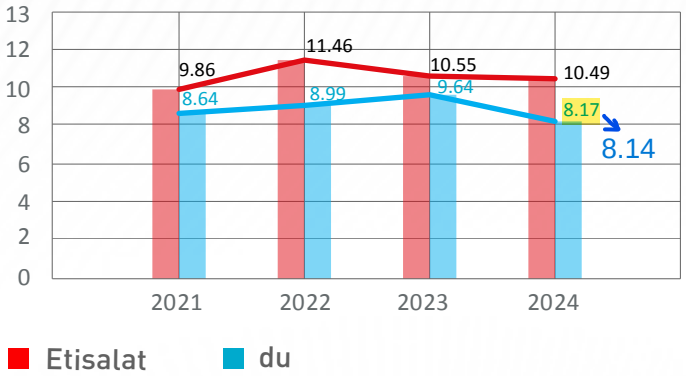
(3G/2G) Outdoor coverage



Average Data Transfer Rate [Mbps]

FTP DOWNLINK DATA TRANSFER RATE IN DUAL MODE - OUTDOOR

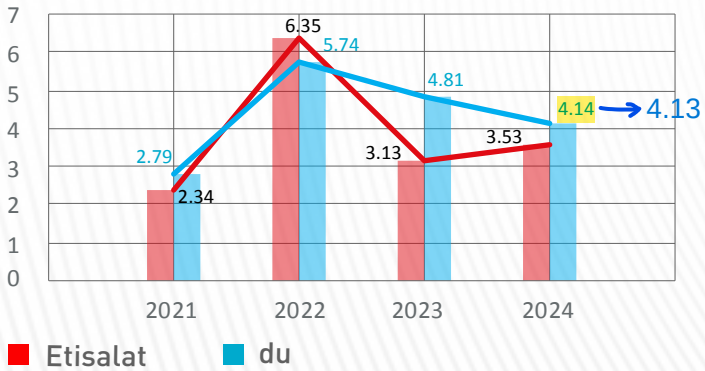
(3G/2G) FTP protocol Outdoor coverage



Average Data Transfer Rate [Mbps]

HTTP UPLINK DATA TRANSFER RATE IN DUAL MODE - OUTDOOR

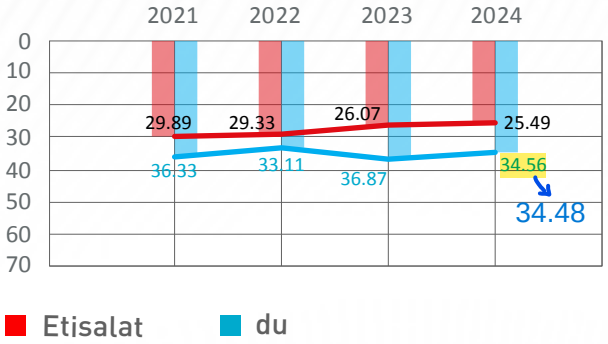
(3G/2G) HTTP protocol Outdoor coverage



Average Data Transfer Rate [Mbps]

LATENCY IN AUTO MODE - OUTDOOR

(5G/4G/3G/2G) Outdoor coverage

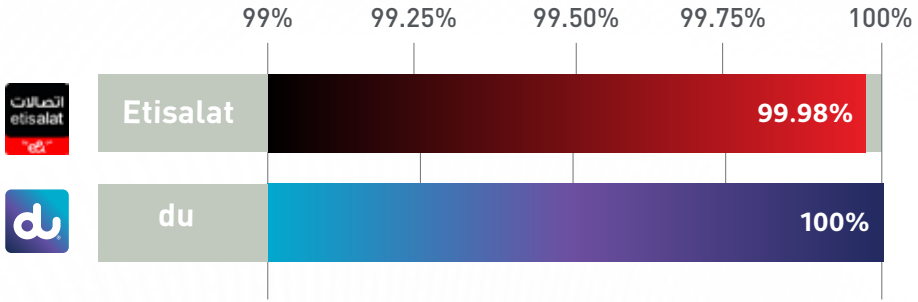


Average Round Trip Time [ms]

SURVEY RESULTS - INDOOR

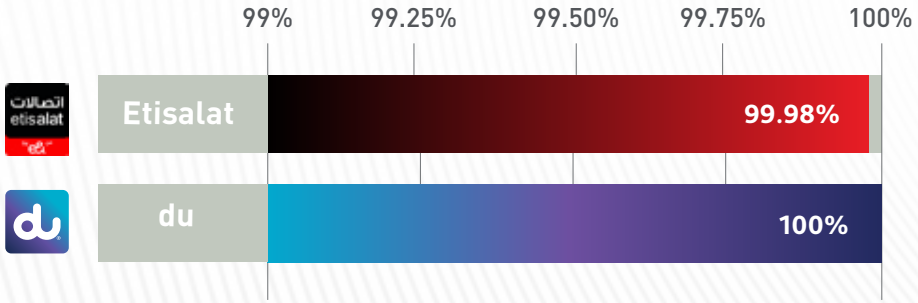
The TDRA has conducted an Indoor Benchmarking Survey similar to the Outdoor Benchmarking Survey of 50 Indoor locations. The results have shown that the licensees (Etisalat and Du) achieved very good results in the KPI's of voice and data services in 2G, 3G,4G and 5G.

Voice Call Completion Success Rate



Call Completion Success Rate in Indoor Coverage

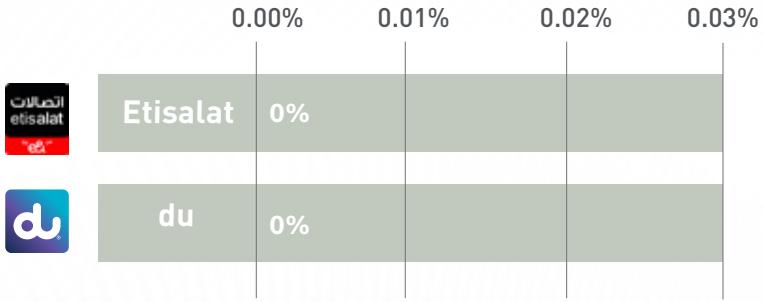
Voice Call Setup Success Rate



Call Setup Success Rate in Indoor Coverage

CALL DROP RATE - INDOOR

A call is dropped when it is disconnected prematurely during the 90-second holding period. Call drop may occur due to poor coverage, interference or other network related issues. The Call Drop Rate statistics for each mobile network are shown below based on approximately 5,487 voice call attempts per operator:

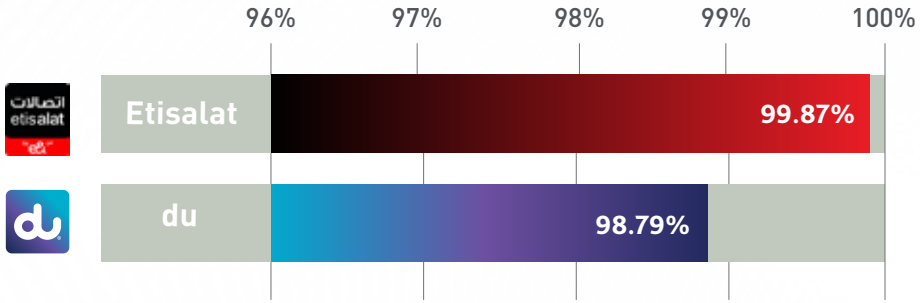


Call Drop Rate in Indoor Coverage

Lower is Better

VOICE QUALITY - INDOOR

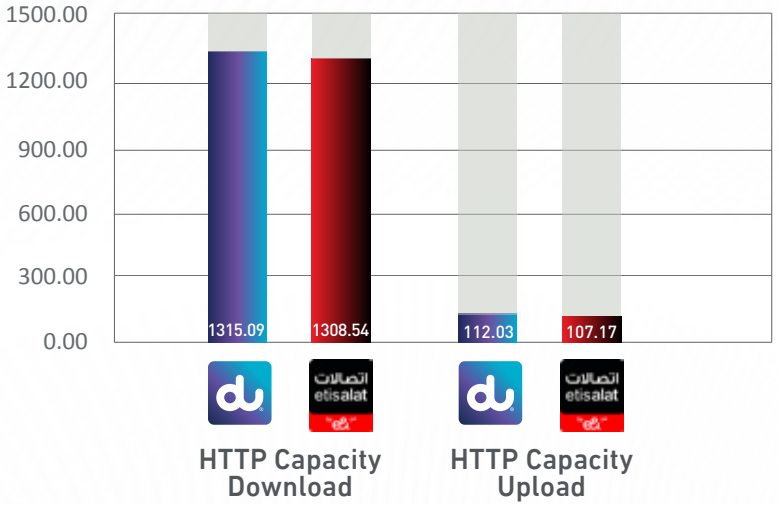
Based on the definition that an acceptable level of voice quality is one with an opinion score of at least "2.8", the percentage of samples with opinion scores greater than "2.8" for each mobile network is as shown:



Voice quality (% of sample with MOS > 2.8) in Indoor Coverage

DATA TRANSFER RATE OVERALL IN AUTO MODE - INDOOR

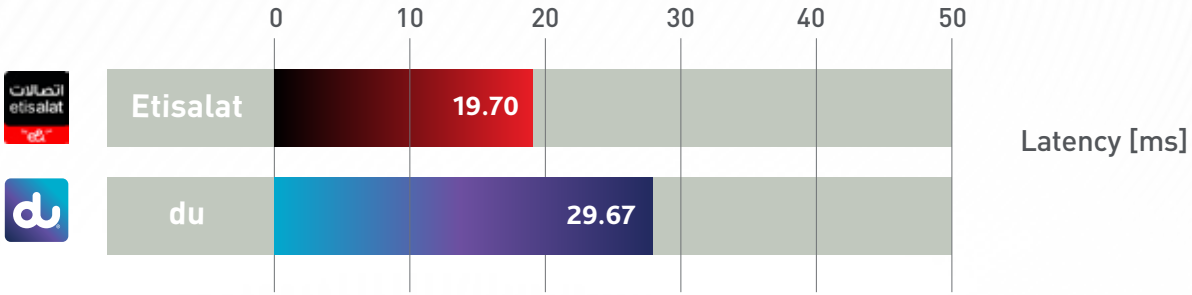
(5G/4G/3G/2G)



Data Transfer Rate [Mbps] - Indoor

LATENCY IN AUTO MODE - INDOOR

(5G/4G/3G/2G)



Delay before a transfer of data begins (Lower is Better).

Thank you