

# **INDEPENDENT QUALITY OF SERVICE** **SURVEY REPORT**

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FOURTH QUARTER 2020

ENFORCEMENT WIRELESS -II  
PTA | F-5/1, ISLAMABAD

# INDEPENDENT QUALITY OF SERVICE SURVEY REPORT

## INTRODUCTION

In order to measure the performance and service quality of 2G (GSM), 3G (UMTS/HSPA+ etc.) and 4G (LTE), of Cellular Mobile Operators (CMOs), independent Quality of Service (QoS) Survey has been carried out from 23<sup>rd</sup> November ~ 11<sup>th</sup> December 2020 in seven (07) different cities of Punjab, Sindh, Khyber Pakhtunkhwa and Balochistan. The name of cities alongwith date of surveys are as under:

<b>S. #.</b>	<b>City</b>	<b>Survey Dates</b>
1.	Kabirwala	24 ~ 27 Nov 2020
2.	Hyderabad	23 ~ 26 Nov 2020
3.	Islamabad	30 Nov ~ 03 Dec 2020
4.	Karachi	30 Nov ~ 04 Dec 2020
5.	Lahore	01 ~ 07 Dec 2020
6.	Quetta	07 ~ 10 Dec 2020
7.	Peshawar	08 ~ 11 Dec 2020

## DRIVE TEST DETAILS

The QoS survey was carried out using the newly procured Automated QoS Monitoring & Benchmarking Tool i.e. "SmartBenchmarker". Drive test teams selected survey routes in such a manner to cover main roads, service roads and majority of sectors/colonies. During the survey, Key Performance Indicators (KPIs) of Data Service, SMS Service and Voice Services have been measured.

## DATA SERVICES – KEY PERFORMANCE INDICATORS RESULTS

The performance of data services of CMOs has been checked by measuring User Data Throughput and Signal Strength (i.e. Received Signal Code Power (RSCP) for 3G and Reference Signal Receive Power (RSRP) for 4G).

**USER DATA THROUGHPUT.** This KPI defines user data rate (Internet speed) to be provided by CMOs to mobile users across the coverage areas.

**CMOs have achieved** the threshold value of minimum 256Kbps of 3G User Data Throughput in all surveyed cities.

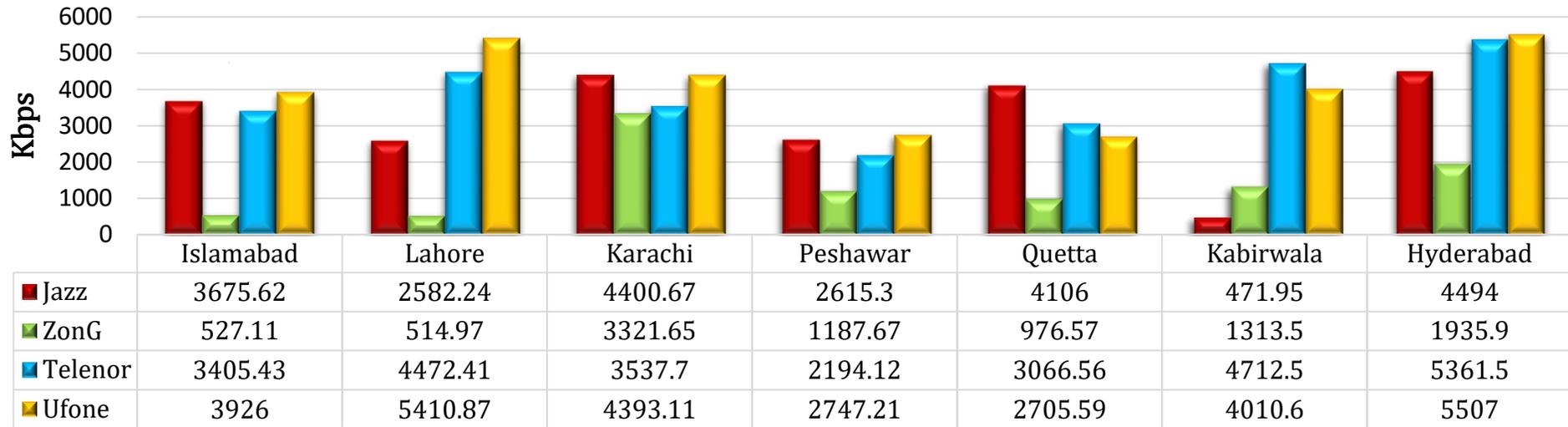
Except **ZonG at Lahore, Peshawar & Kabirwala and Ufone at Quetta**, **CMOs have achieved** the threshold value of minimum 2Mbps of 4G User Data Throughput in surveyed cities.

**SIGNAL STRENGTH.** This KPI defines Received Signal Code Power (RSCP) for 3G and Reference Signal Receive Power (RSRP) for 4G and denotes the power measured by a receiver on a particular physical communication channel. It is used as an indication of signal strength, as a handover criterion, in downlink power control, and to calculate path loss.

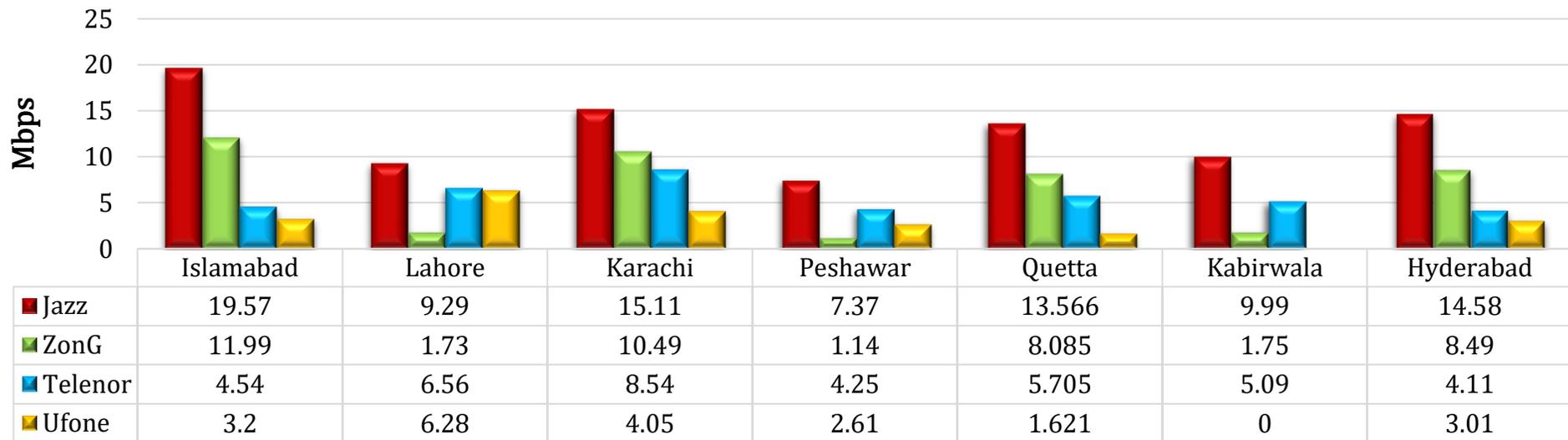
**CMOs have achieved** the threshold value of 3G RSCP of minimum of -100dBm with 90% Confidence Level on surveyed routes of all surveyed cities.

Except **Ufone at Hyderabad**, **CMOs have achieved** the threshold value of 4G RSRP of minimum of -100dBm with 90% Confidence Level on surveyed routes of surveyed cities.

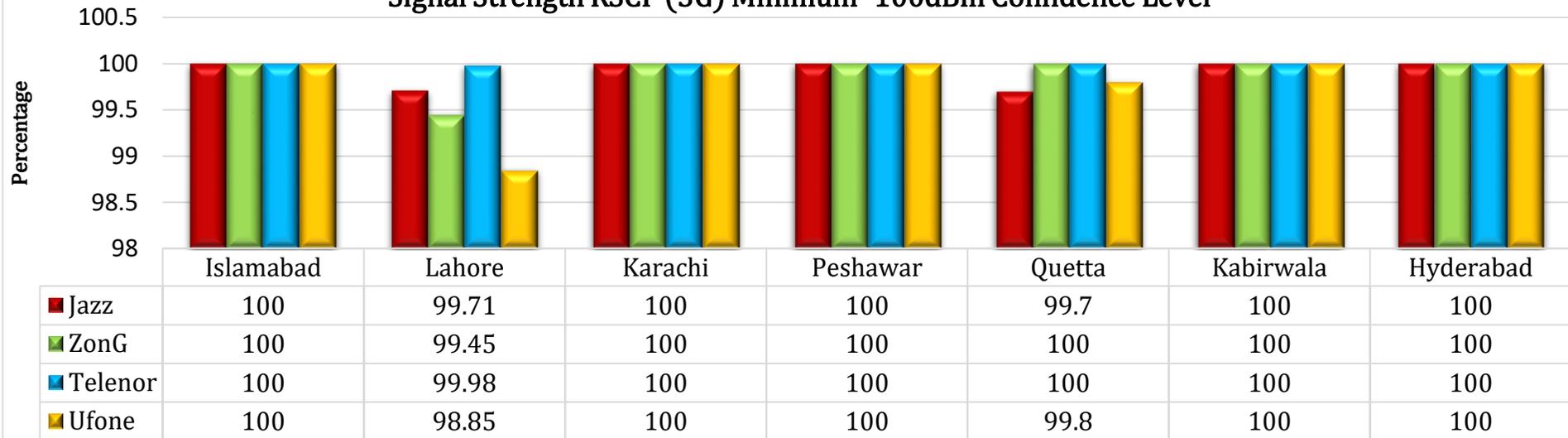
### USER DATA THROUGHPUT (3G)



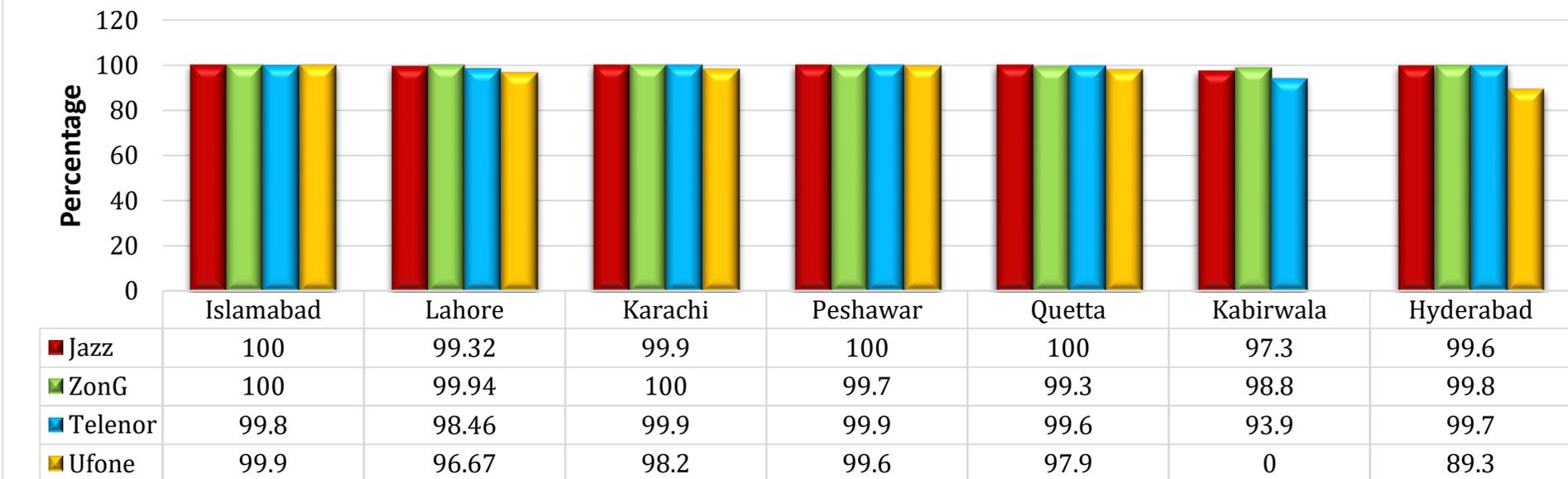
### USER DATA THROUGHPUT (4G)



**Signal Strength RSCP (3G) Minimum -100dBm Confidence Level**



**Signal Strength RSRP (4G) Minimum -100dBm Confidence Level**



## COVERAGE ANALYSIS

Mobile Network Signal Strength is measured in decibels (dBm). Signal Strength can range from approximately -30 dBm to -100 dBm. The closer that number is to 0, the stronger the signal. In general, anything better than -85 decibels is considered a usable signal. In CMOs licenses, Mobile Signal Strength minimum level in outdoor is defined as -100dBm with 90% confidence. The different ranges of signal strength and its effects can be categorized as under:

S. #.	Signal Strength Ranges (dBm)	Signal Strength	
		Category	Description
1.	-65 to 0	Excellent	Strong Signal with Maximum Data Speed
2.	-75 to -65	Good	Strong Signal with Good Data Speed
3.	-85 to -75	Fair	Fair, Useful & Reliable Data Speed is Attainable
4.	-100 to -85	Poor	Marginal Data Speed with Possibility of Drop-Out
5.	-140 to -100	Very Poor / No	Performance will Drop Drastically

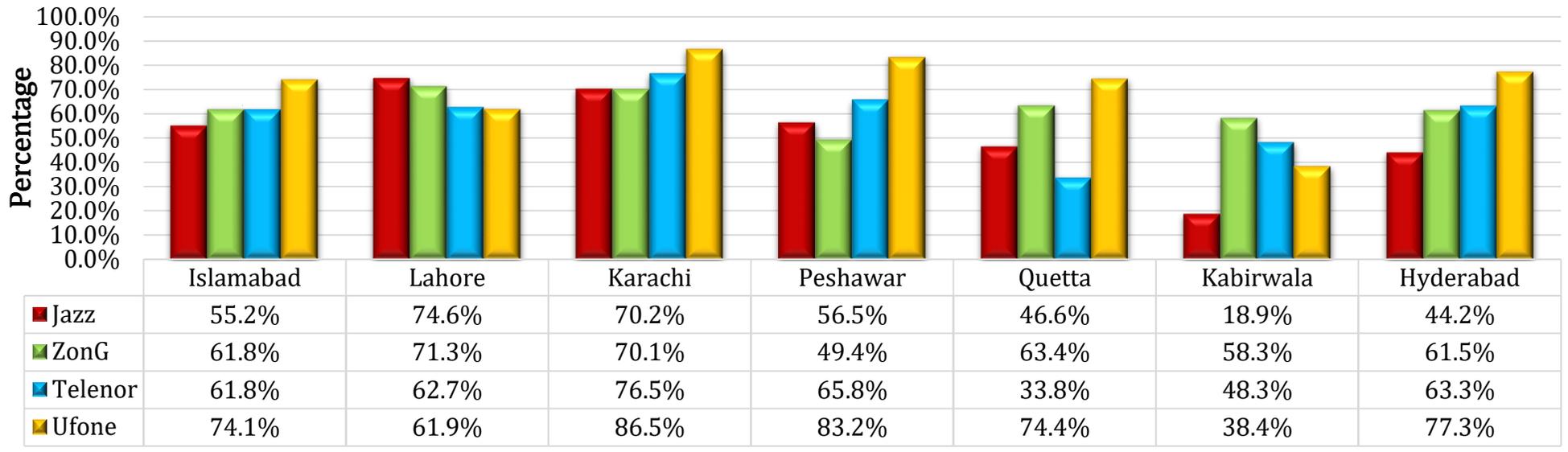
## SIGNAL STRENGTH SAMPLES

The analysis of signal strength samples recorded during drive test on survey routes revealed following:

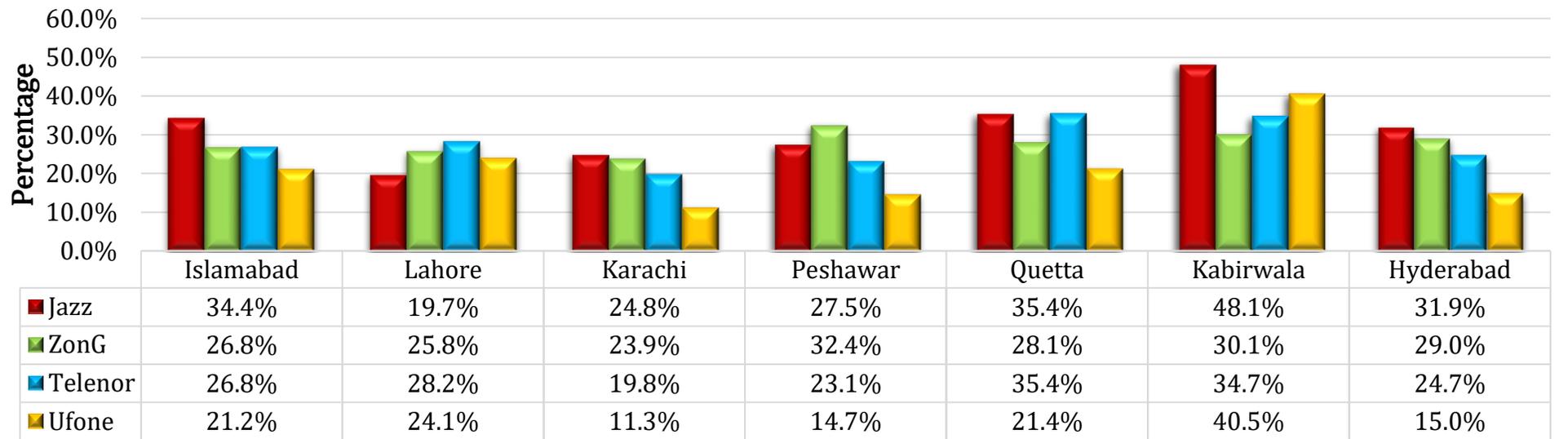
Technology	Category	Coverage/ Signal Strength Survey Results
3G	EXCELLENT	<ul style="list-style-type: none"><li>○ Ufone has greater percentage of 3G Excellent Coverage which resulted into higher 3G User Data Throughput.</li><li>○ The highest percentage of 3G Excellent Coverage was 86.5% of Ufone at Karachi, whereas the lowest percentage was 18.9% of Jazz at Kabirwala.</li><li>○ The average percentage of 3G Excellent Coverage of Ufone, ZonG, Telenor and Jazz was found as 70.8%, 62.3%, 58.9% and 52.3% respectively.</li></ul>
	GOOD	<ul style="list-style-type: none"><li>○ The average percentage of 3G Good Coverage of Jazz, ZonG, Telenor and Ufone was 31.7%, 28%, 27.5% and 21.2% respectively.</li></ul>
	FAIR	<ul style="list-style-type: none"><li>○ The average percentage of 3G Fair Coverage of Jazz, Telenor, ZonG and Ufone was 12.9%, 11.5%, 8.8% and 7.5% respectively.</li></ul>

4G	EXCELLENT	<ul style="list-style-type: none"> <li>○ Jazz has greater percentage of 4G Excellent Coverage which resulted into higher 4G User Data Throughput.</li> <li>○ The highest percentage of 4G Excellent Coverage was 41.7% of Jazz at Karachi, whereas the lowest percentage was 0.8% of Telenor at Kabirwala.</li> <li>○ The average percentage of 4G Excellent Coverage of Jazz, Telenor, ZonG and Ufone, was 22.2%, 17.3%, 14.4% and 6.6% respectively.</li> <li>○ <b><i>Lower percentage indicate that CMOs require further network expansion to serve the customers better.</i></b></li> </ul>
	GOOD	<ul style="list-style-type: none"> <li>○ The average percentage of 4G Good Coverage of ZonG, Jazz, Telenor and Ufone, was 39.1%, 34%, 27.5% and 24.5% respectively.</li> </ul>
	FAIR	<ul style="list-style-type: none"> <li>○ The average percentage of 4G Fair Coverage of Ufone, ZonG, Telenor and Jazz was 33.6%, 33%, 29.7% and 29.2% respectively.</li> </ul>
	POOR	<ul style="list-style-type: none"> <li>○ The average percentage of 4G Poor Coverage of Ufone, Telenor, Jazz and ZonG was 32.3%, 24.3%, 14% and 13.2% respectively.</li> </ul>

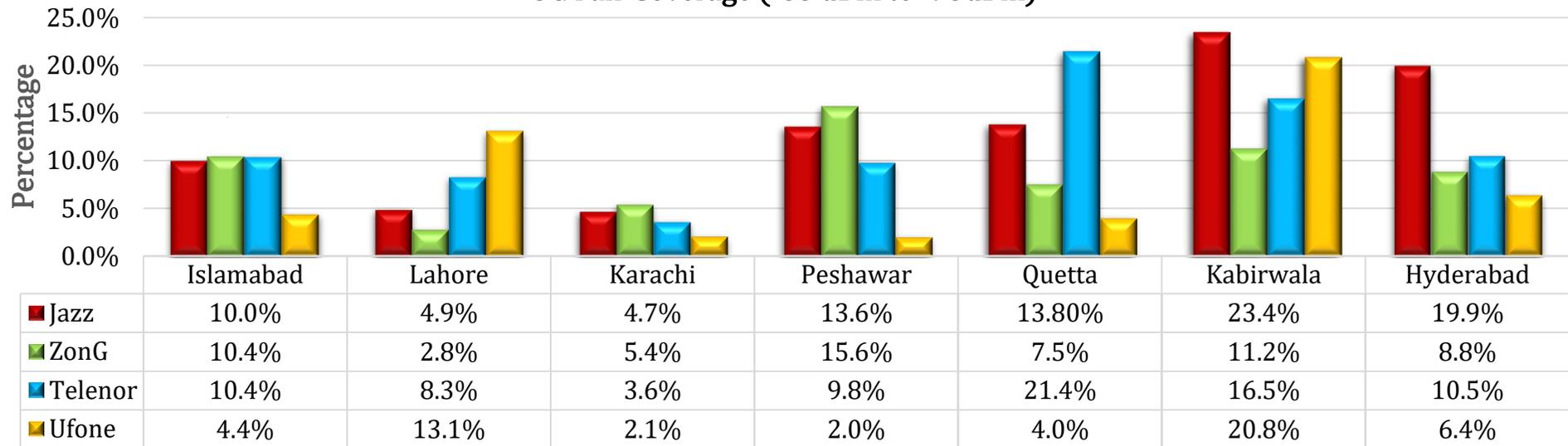
### 3G Excellent Coverage (-65dBm to 0)



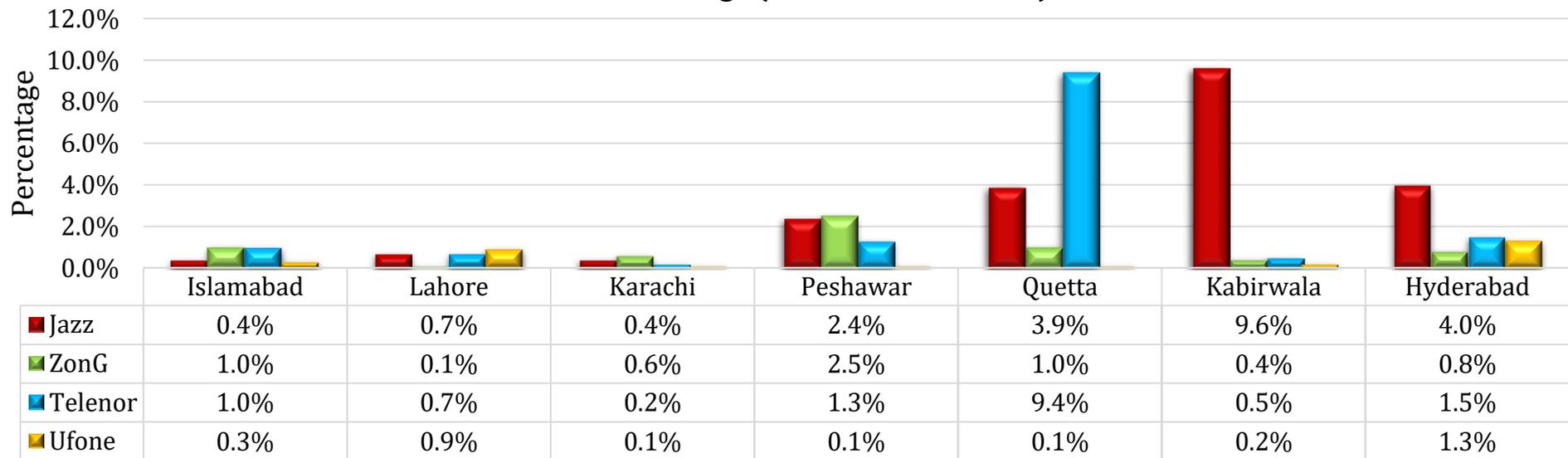
### 3G Good Coverage (-75dBm to -65 dBm)



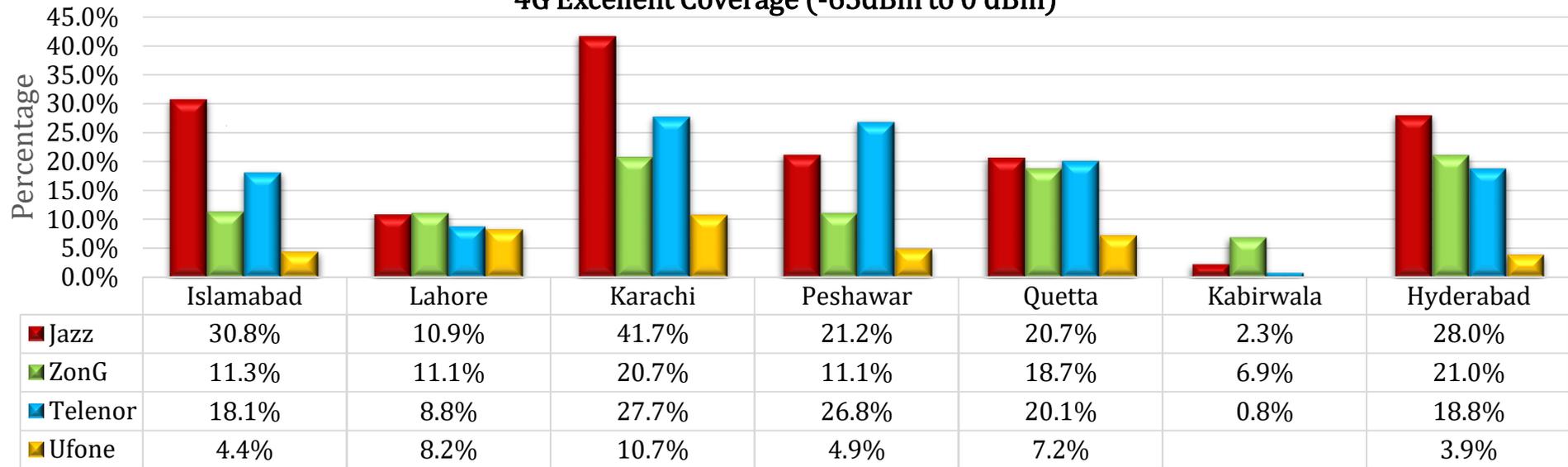
### 3G Fair Coverage (-85 dBm to -75dBm)



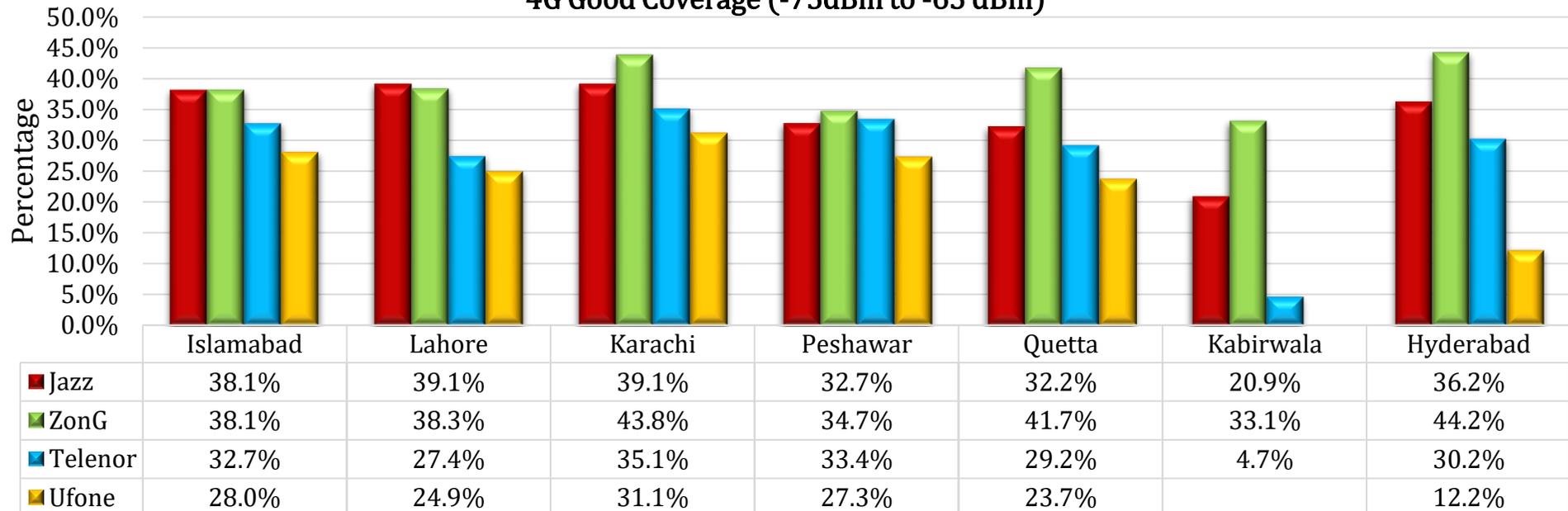
### 3G Poor Coverage (-100dBm to -85 dBm)



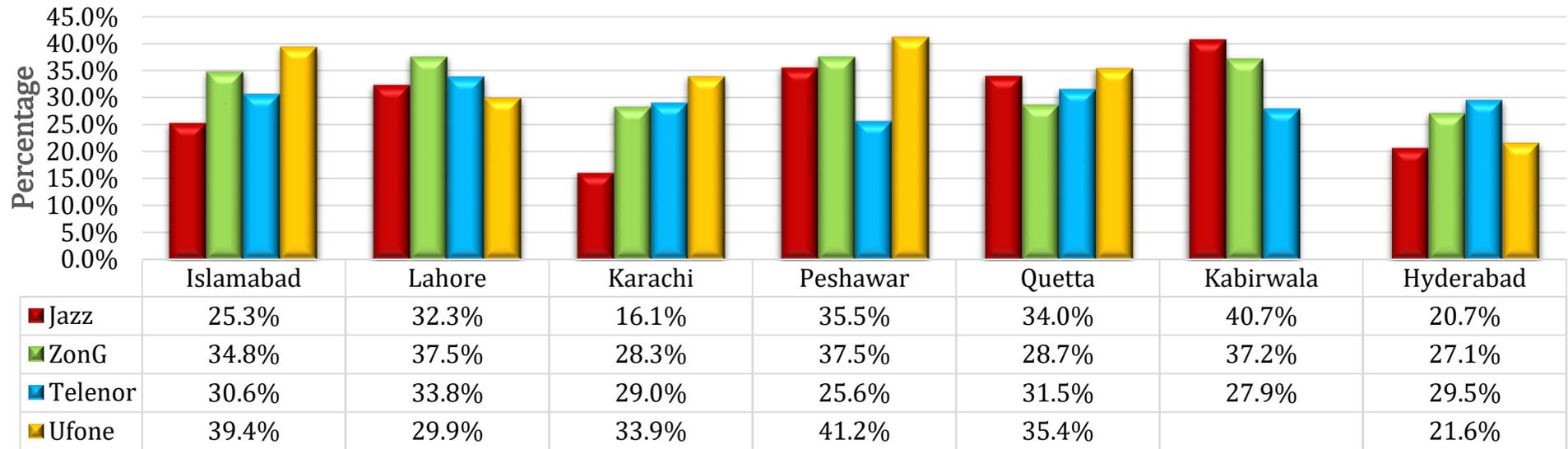
**4G Excellent Coverage (-65dBm to 0 dBm)**



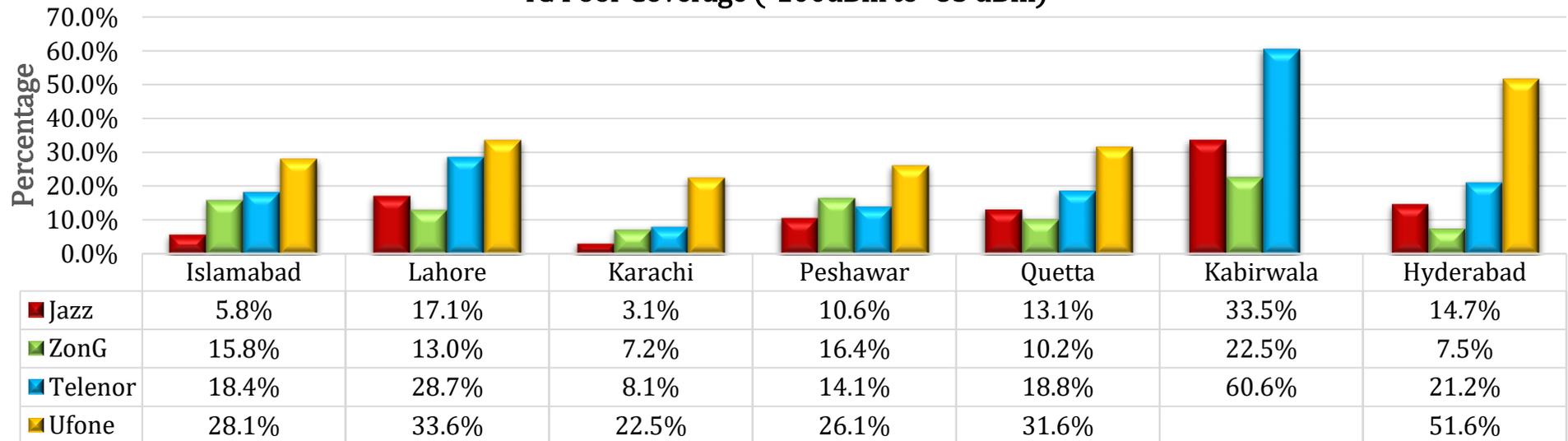
**4G Good Coverage (-75dBm to -65 dBm)**



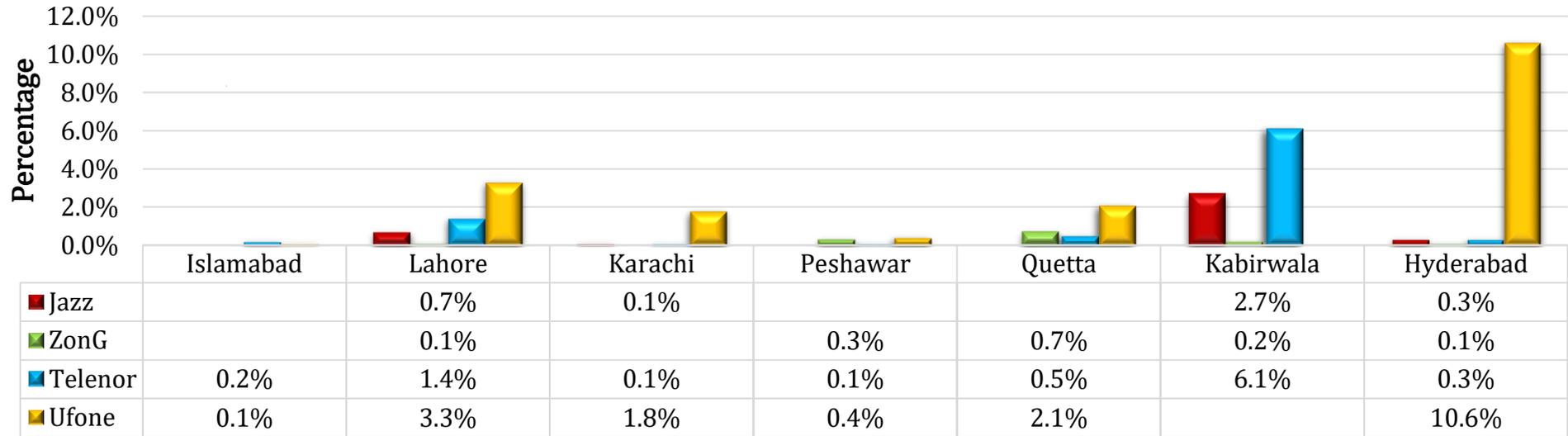
### 4G Fair Coverage (-85 dBm to -75dBm)



### 4G Poor Coverage (-100dBm to -85 dBm)



### 4G Very Poor / No Coverage (-140dBm to -100 dBm)



## **SMS SERVICES - KEY PERFORMANCE INDICATORS RESULTS**

The performance of SMS services of CMOs has been checked by measuring SMS Success Rate and End-to-End SMS Delivery Time.

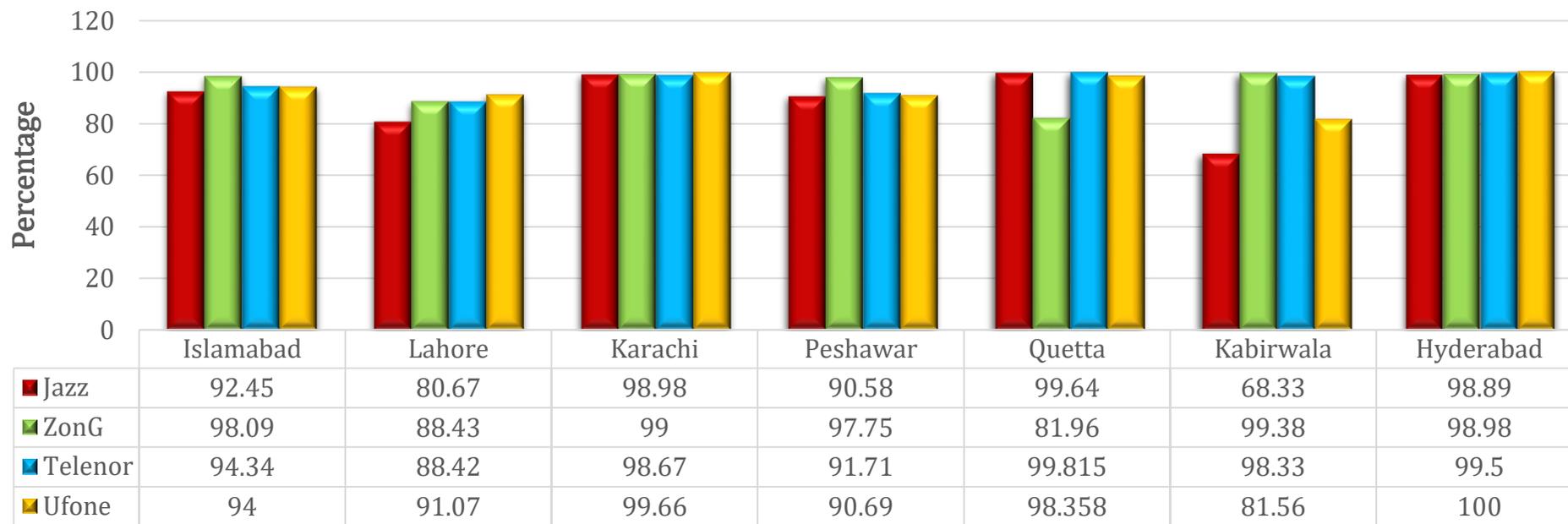
**SMS Success Rate.** SMS Success Rate is the probability that the short message is delivered successfully, end-to-end when requested and display of the relevant information on the mobile phone. It provides information about successful delivery of SMS.

**None of the CMOs** have achieved the threshold value of **SMS Success Rate of 99%** in all surveyed cities.

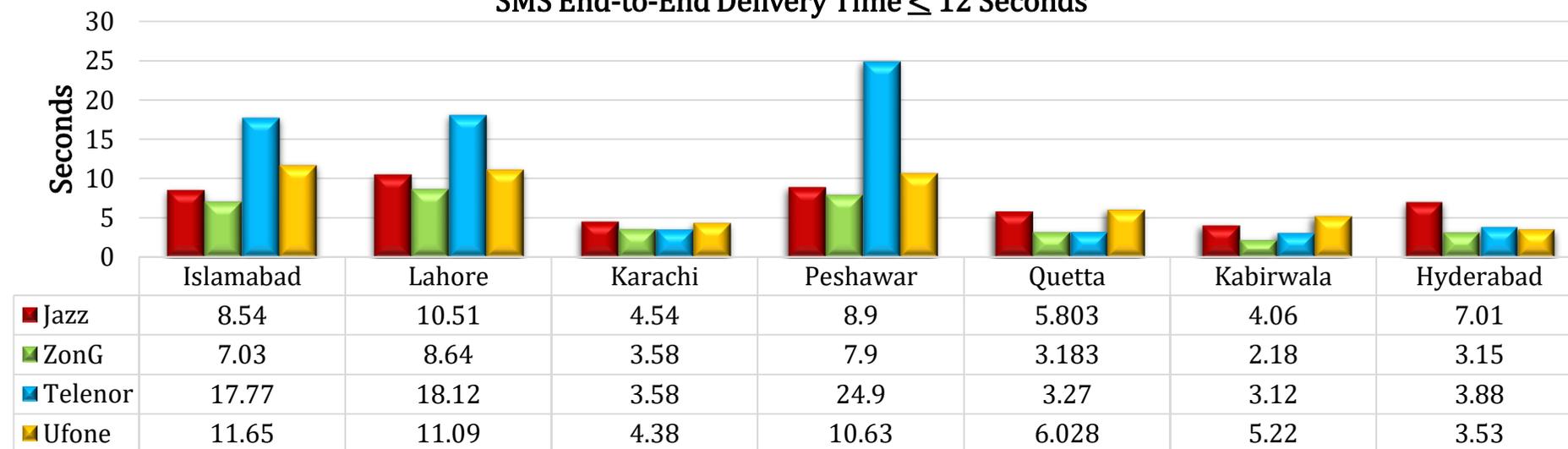
**End-to-End SMS Delivery Time.** End-to-End SMS Delivery Time is the time between sending a short message to a short message center and receiving the very same short message at intended mobile phone (receiver). It provides average time taken for delivery of short message from sender to recipient.

**Except Telenor at Islamabad, Lahore & Peshawar, CMOs have achieved** the threshold value of **SMS End-to End Delivery Time of 12 Seconds** in surveyed cities.

**SMS Success Rate  $\geq$  99%**



**SMS End-to-End Delivery Time  $\leq$  12 Seconds**



## VOICE SERVICES - KEY PERFORMANCE INDICATORS RESULTS

The performance of voice services of CMOs has been checked by measuring Grade of Service, Service Accessibility, Call Connection Time, Call Completion Ratio and End-to-End Speech Quality.

**GRADE OF SERVICE (GOS).** Grade of Service is probability that the end customer cannot access the mobile services when requested if it is offered by display of the network indicator on the mobile phone. In simple words, Grade of Service is Network Blocking.

**None of the CMOs have achieved** the Grade of Service of < 2%, in all the surveyed cities.

**SERVICE ACCESSIBILITY.** Service Accessibility is the probability that the user can access the desired service. A given network accessibility is a precondition for this phase.

**None of the CMOs have achieved** the Service Accessibility of > 98% in all the surveyed cities.

**CALL CONNECTION TIME.** Call Connection Time is the time between sending of complete call initiation information by the caller and in return receipt of call setup notification. In simple words, it is time between dialing a number and hearing ring-back tone.

**None of the CMOs have achieved** the Call Connection Time of < 6.5 Seconds in all the surveyed cities.

**CALL COMPLETION RATIO.** Call Completion Ratio is the probability that a service, once obtained, will continue to be provided under given conditions for a given time duration or until deliberately terminated by either caller (A-party) or receiver (B-party). In simple words, this KPI provides information about Call Drops.

**None of the CMOs have achieved** the Call Completion Ratio of > 98% in all the surveyed cities.

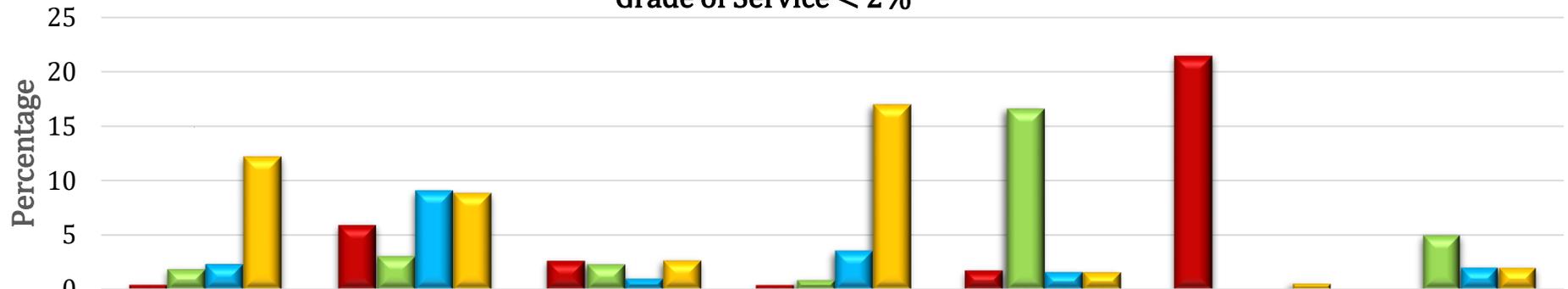
**END-TO-END SPEECH QUALITY.** End-to-End Speech Quality is the degree of speech quality that a listener perceives at the terminal/mobile with a talker at the other end. In simple words, it provides information about clarity of voice.

**None of the CMOs have achieved** the End-to-End Speech Quality/ Mean Opinion Score of  $\geq 3$  in all the surveyed cities.

INTER SYSTEM HANDOVER (ISHO) FOR CIRCUIT SWITCHED VOICE. Inter System Handover is the measurement of successfulness of Handover in 3G/2G for Circuit Switched Voice.

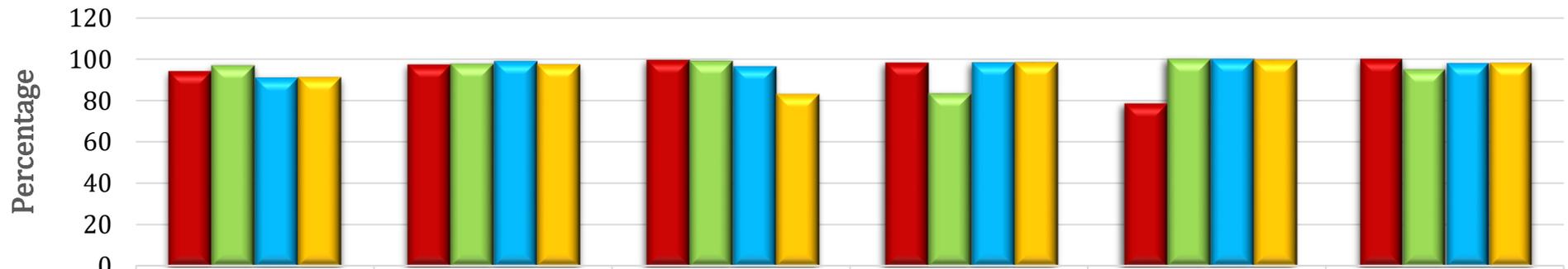
**Telenor & Ufone** have **not achieved** the Inter System Handover for Circuit Switched Voice Only of > 98% in all the surveyed cities.

**Grade of Service < 2%**



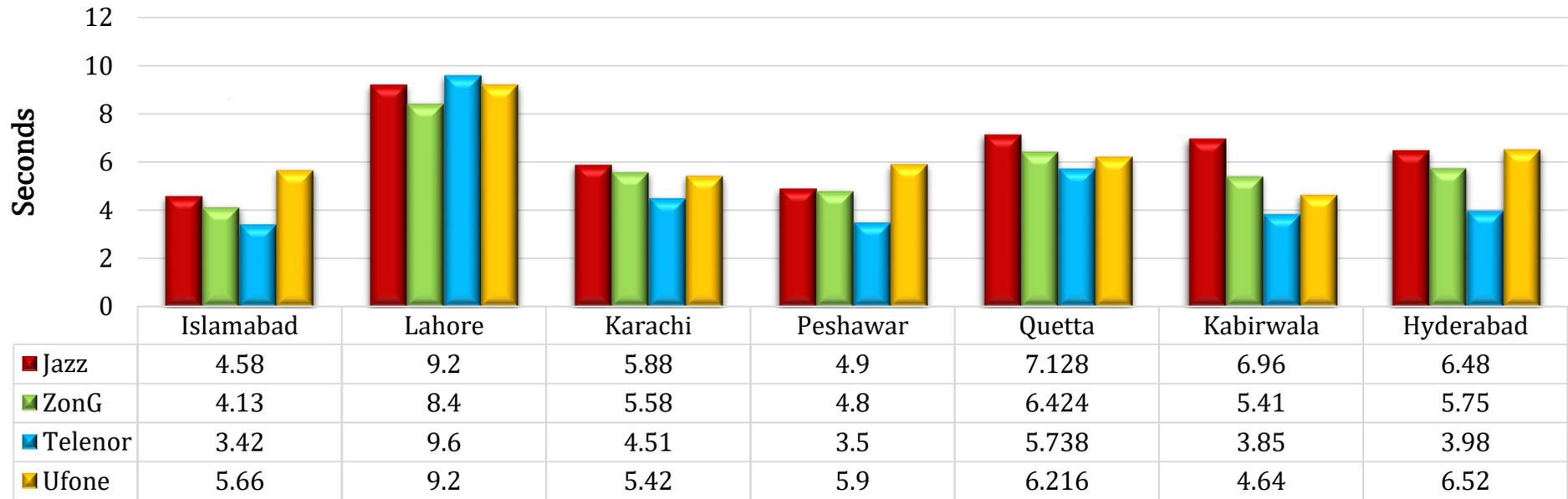
	Islamabad	Lahore	Karachi	Peshawar	Quetta	Kabirwala	Hyderabad
■ Jazz	0.47	5.94	2.67	0.44	1.785	21.43	0
■ ZonG	1.88	3.1	2.33	0.89	16.608	0	5.03
■ Telenor	2.35	9.02	1	3.56	1.608	0	2
■ Ufone	12.21	8.88	2.68	16.96	1.61	0.55	2

**Service Accessibility ≥ 98%**

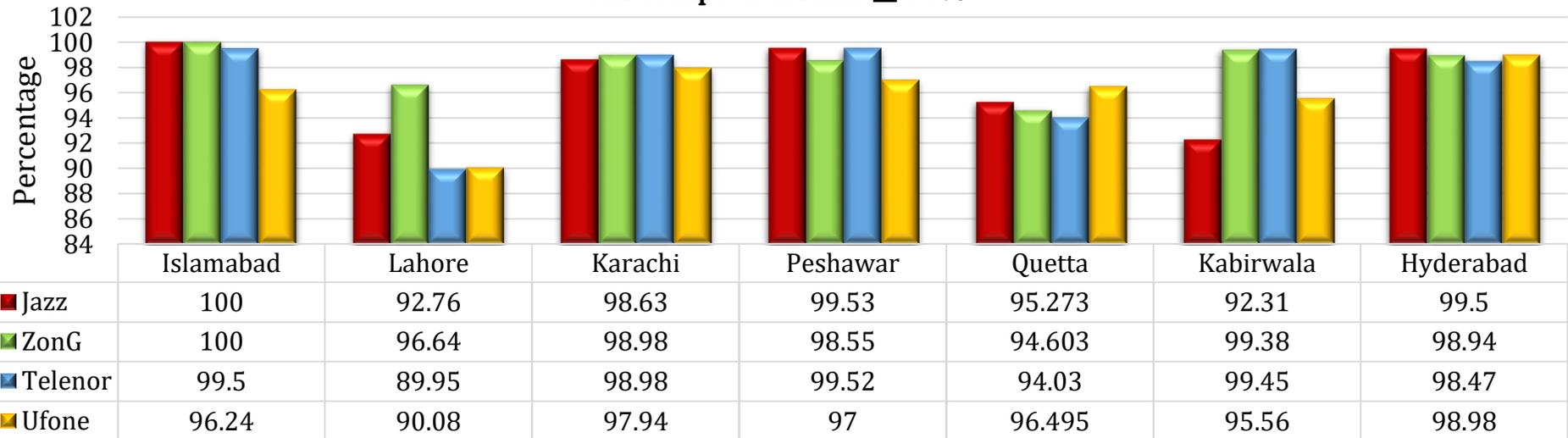


	Lahore	Karachi	Peshawar	Quetta	Kabirwala	Hyderabad
■ Jazz	94.06	97.33	99.56	98.215	78.5	100
■ ZonG	96.9	97.67	99.11	83.393	100	94.97
■ Telenor	90.98	99	96.44	98.393	100	98
■ Ufone	91.12	97.32	83.04	98.39	99.45	98

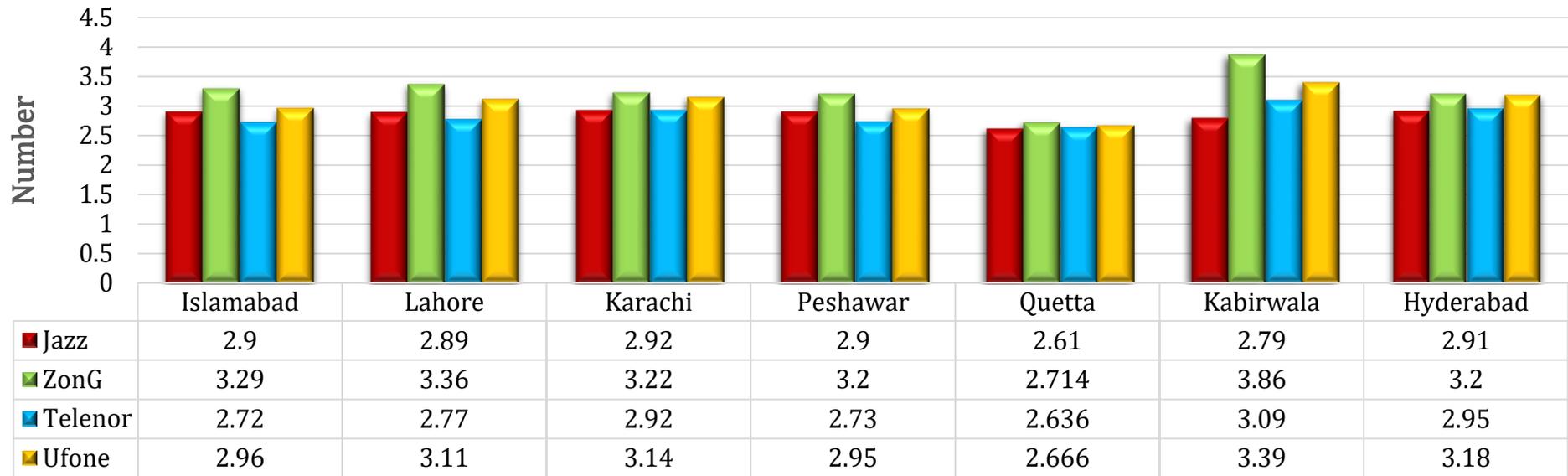
**Call Connection Time  $\leq$  6.5 Seconds**



**Call Completion Ratio  $\geq$  98%**



### Mean Opinion Score > 3



### Inter System Handover for Circuit Switched Voice Only > 98%

