

## INDEPENDENT CMOS' QUALITY OF SERVICE SURVEY RESULTS (3<sup>RD</sup> & 4<sup>TH</sup> QUARTER, 2019)

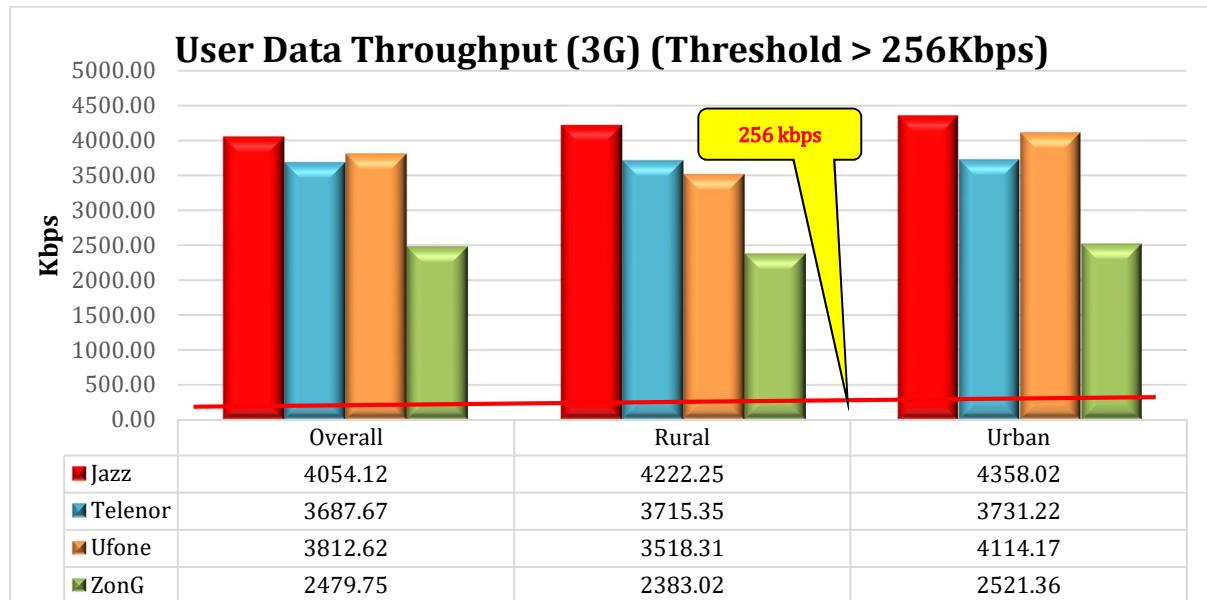
In the 3<sup>rd</sup> & 4<sup>th</sup> Quarter 2019, Pakistan Telecommunication Authority (PTA) has carried out Independent survey to check Quality of Service (QoS) of Cellular Mobile Operators (CMOs) from September to December 2019 in twelve (12) different cities of Baluchistan, Khyber Pakhtunkhwa, Punjab, Sindh and Azad Jammu Kashmir. The names of these cities are as under:

S. No.	Name	S. No.	Name	S. No.	Name
1	Abbottabad	5	Muzaffarabad	9	Swabi
2	Charsadda	6	Sargodha	10	TandoAllahYar
3	Gujranwala	7	Sibbi	11	Taxila
4	Murree	8	Sukkur	12	Thatta

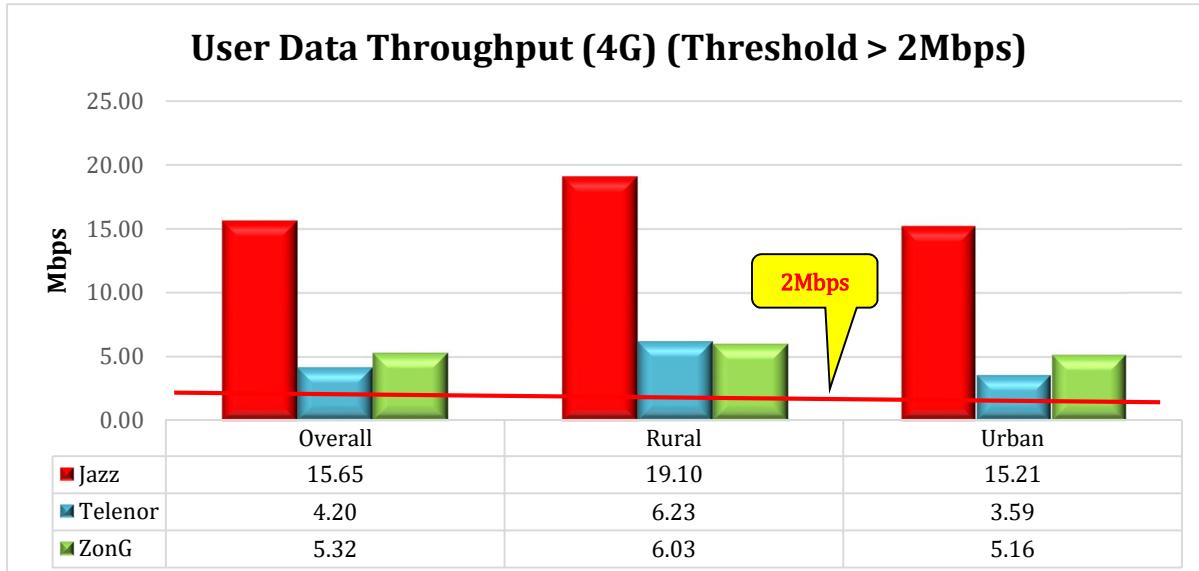
### **DATA – KEY PERFORMANCE INDICATORS**

**Data KPIs.** 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. The data throughput results of all CMOs are as under:*

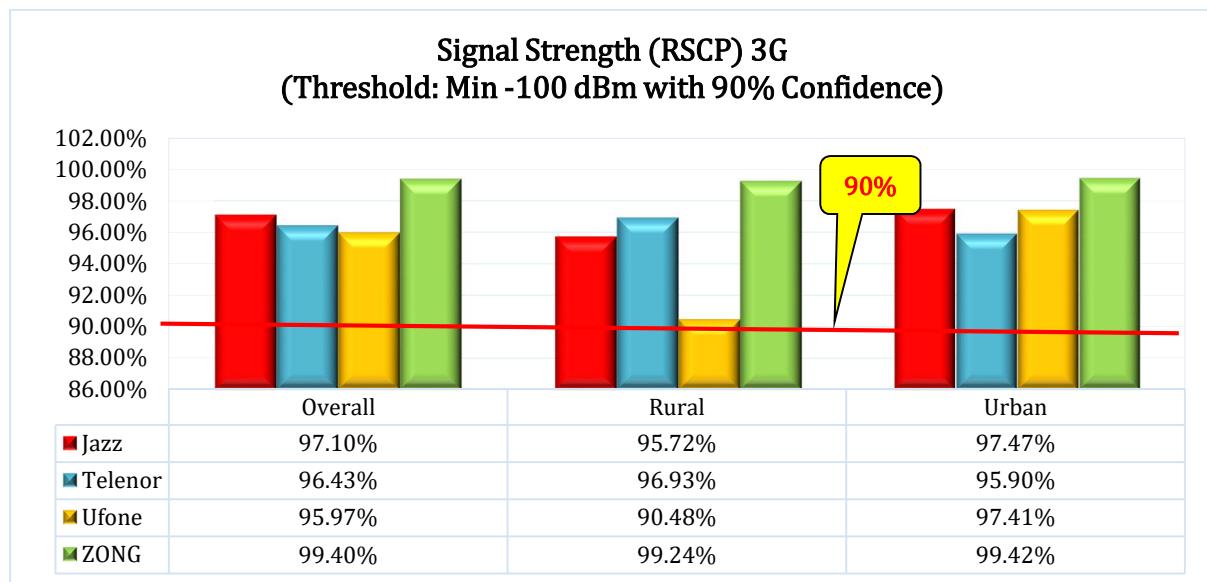


*CMOs User data "throughput" of 3G services found higher than the threshold value of 256Kbps*

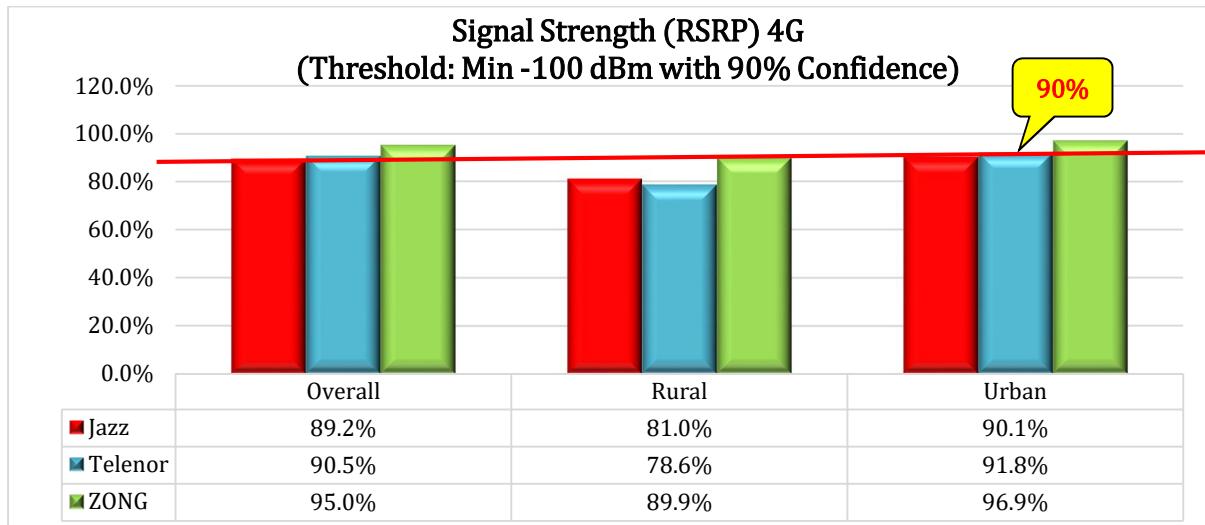


*CMOs User data “throughput” of 4G services found higher than the threshold value of 2Mbps*

**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". The Signal Strength for CMOs are as under:



*RSCP of 3G Network of all CMOs observed to be greater than -100 dBm with 90% confidence*

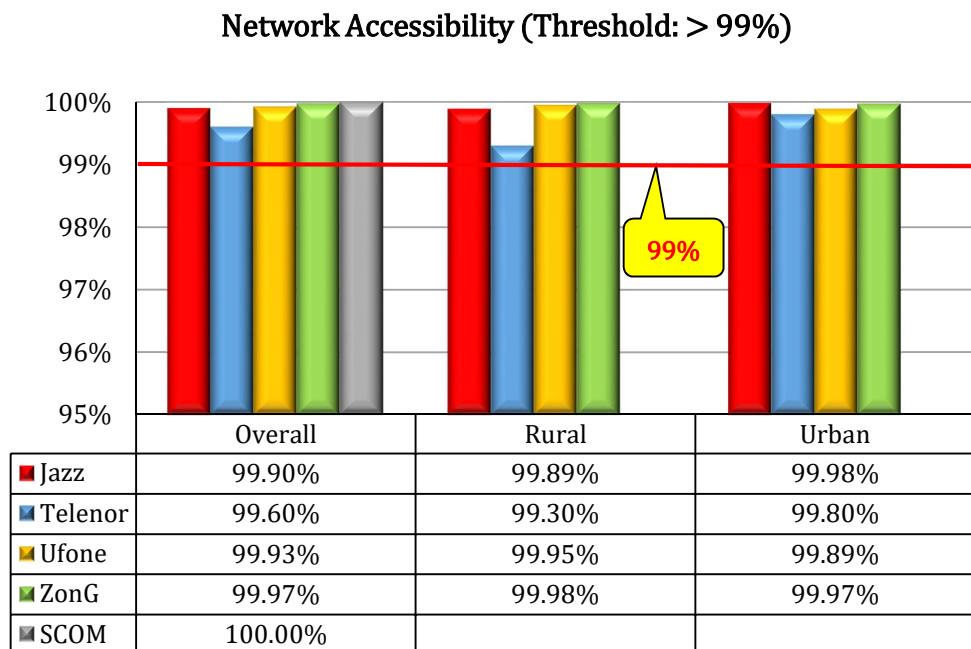


- RSRP of 4G Network falls short of the minimum threshold (-100 dBm with 90 % confidence) both in Urban and Rural Areas
- Telenor and ZonG failed to achieve the desired threshold in Rural Areas.

### VOICE – KEY PERFORMANCE INDICATORS

**Voice KPIs.** The performance of voice services of CMOs has been checked by measuring Network Down Time/Network Accessibility, Grade of Service, Service Accessibility, Call Connection Time, Call Completion Ratio, End-to-End Speech Quality and Session Abnormal Release Rate Key Performance Indicators (KPIs).

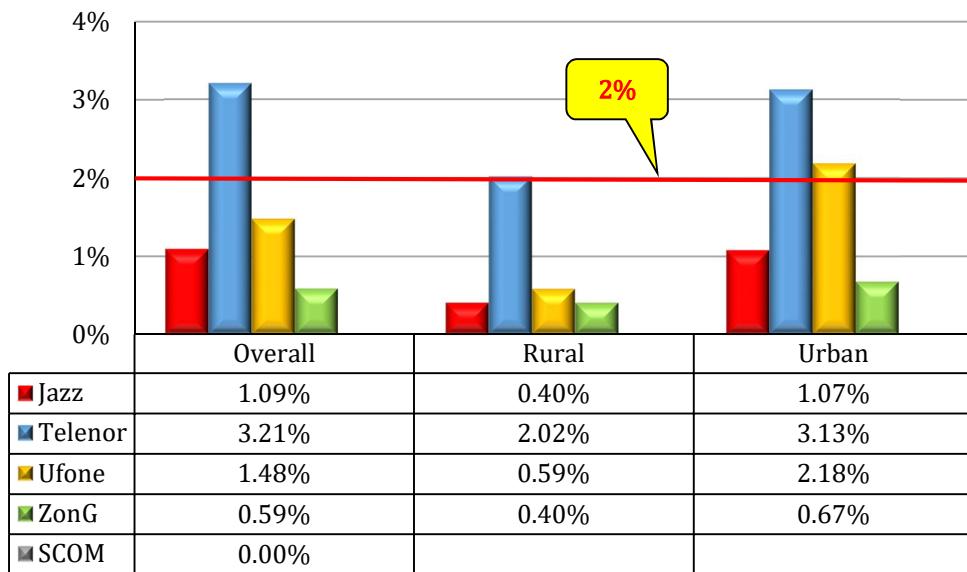
**Network Accessibility.** “The probability that mobile services are available to an end customer display of the network indicator on the mobile equipment”.



*CMOs have met the threshold value of Network Accessibility*

**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”.

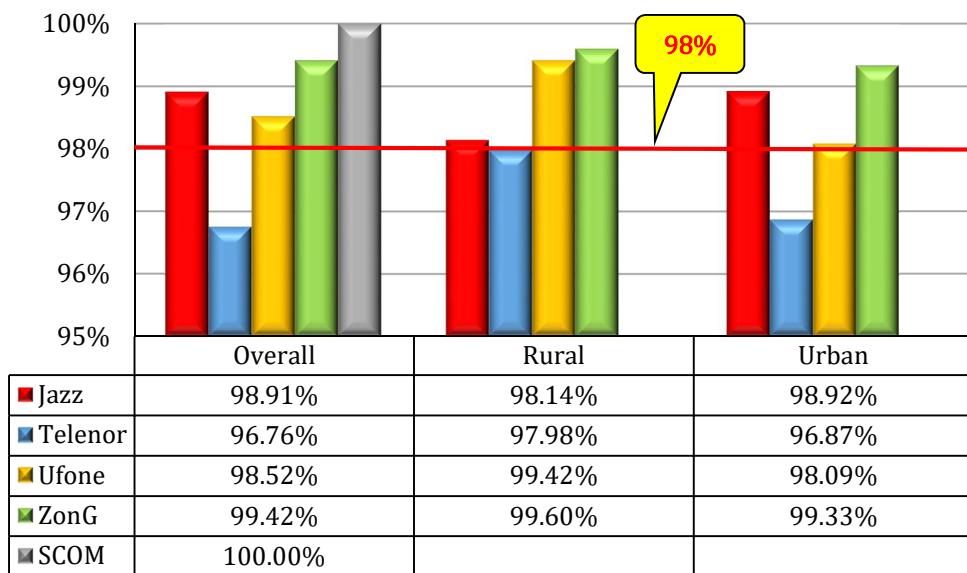
### Grade of Service (Threshold: $\leq 2\%$ )



- Telenor failed to meet the threshold value in both Rural and Urban Areas*
- Ufone was unable to achieve the desired threshold in Urban Areas*

**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”.

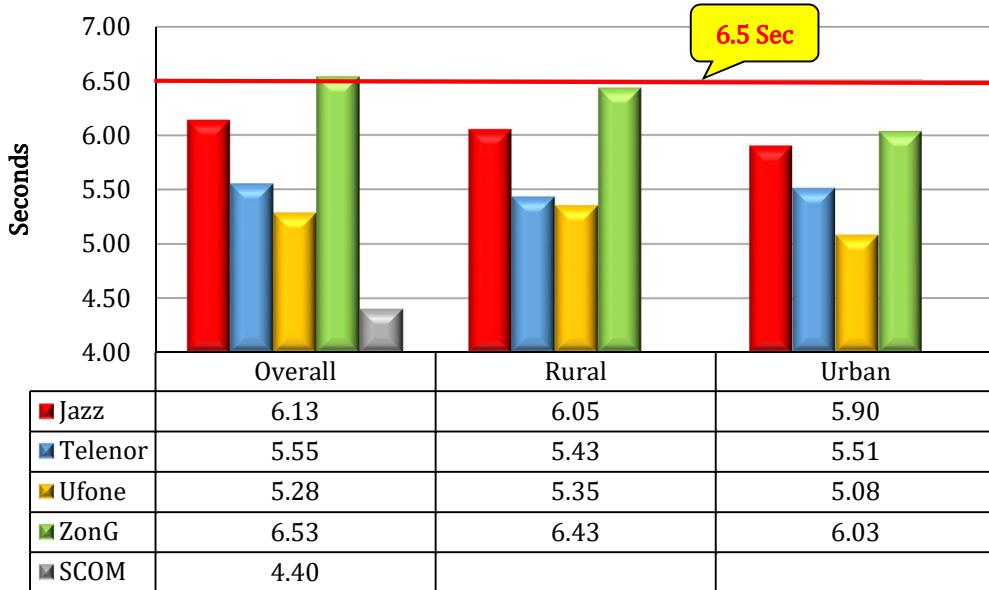
### Service Accessibility (Threshold: $> 98\%$ )



*Telenor failed to achieve the criteria of Service Accessibility in both Urban and Rural Areas*

**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”.

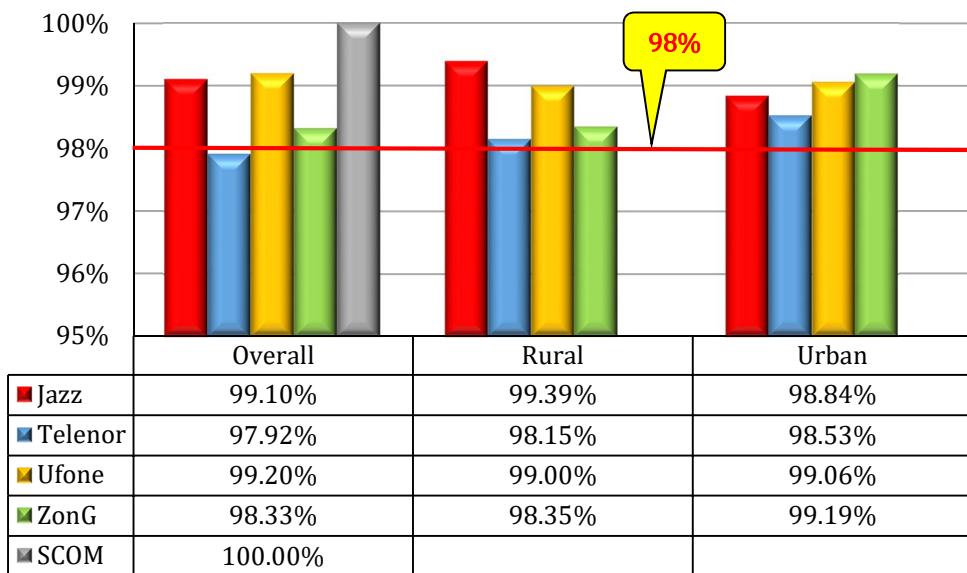
### Call Connection Time (Threshold: $\leq 6.5$ sec)



*ZonG failed to achieve the benchmark of Call Connection Time of 6.5 seconds.*

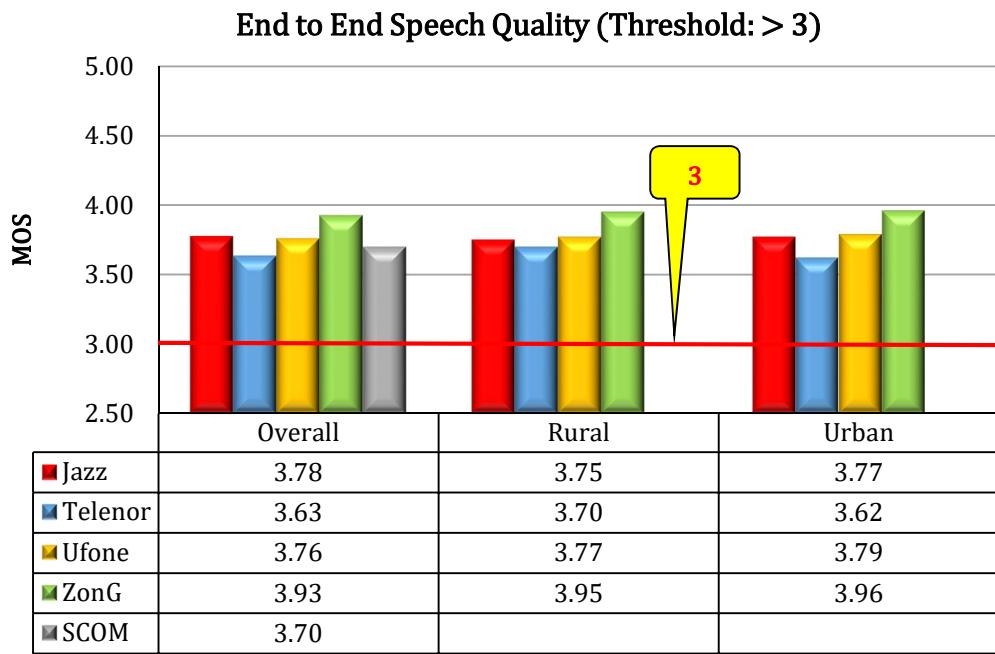
**Call Completion Ratio.** “Call Completion Ratio is the probability that a service, once obtained, will continue to be provided under given conditions for a given time duration or until deliberately terminated by either caller (A-party) or receiver (B-party). In simple words, this KPI provides information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

### Call Completion Ratio (Threshold: > 98%)



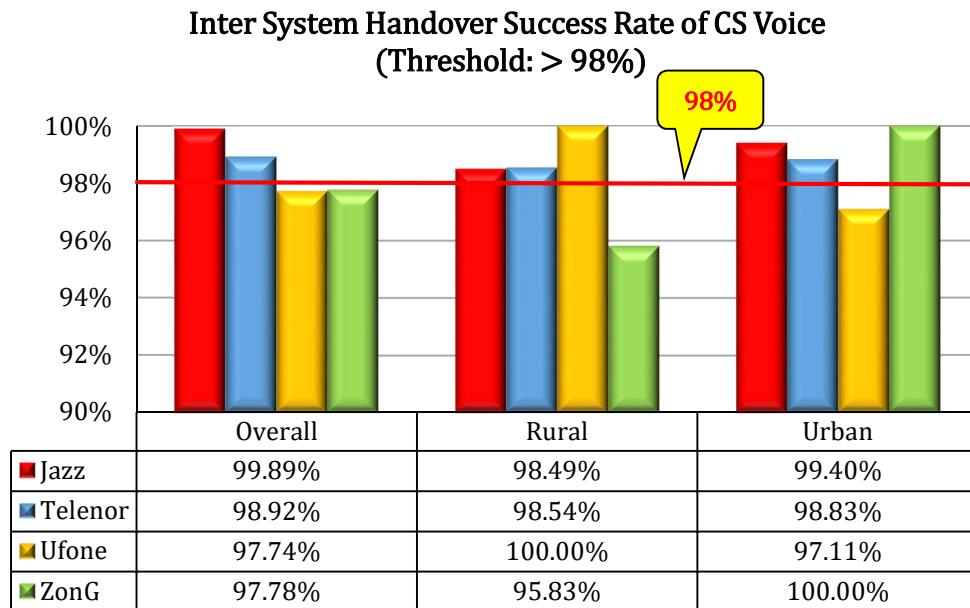
*Telenor failed to meet threshold value of 98%*

**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.



*Mean Opinion Score (MOS) of CMOs found above the threshold value of 3*

**Inter System Handover (ISHO) For Circuit Switched Voice.** “*Inter System Handover is the measurement of successfullness of Handover in 3G/2G for Circuit Switched Voice.*”

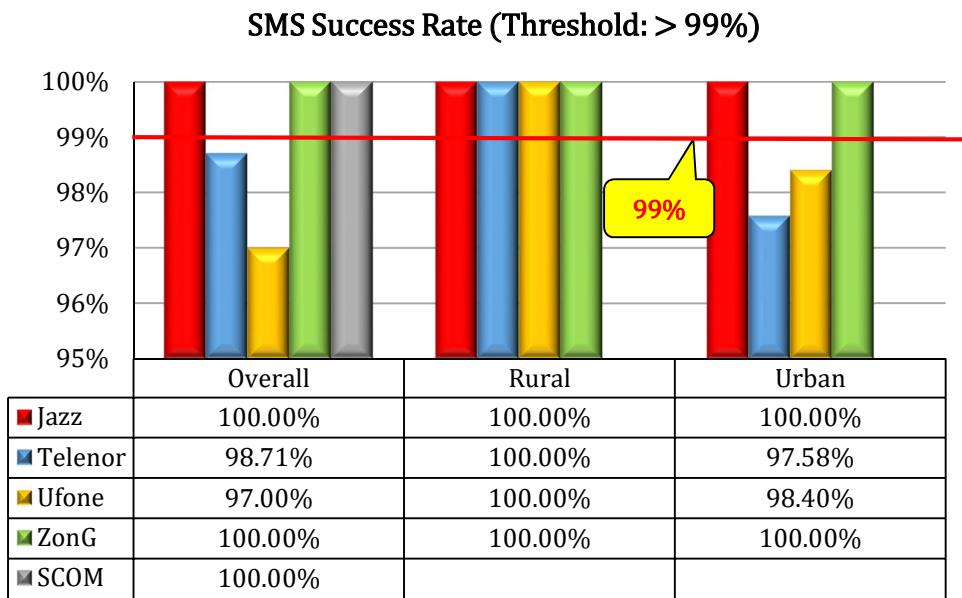


- *Ufone failed to meet the threshold value of 98% in Urban Areas*
- *ZonG failed to meet the threshold value of 98% in Rural Areas*

## SMS – KEY PERFORMANCE INDICATORS

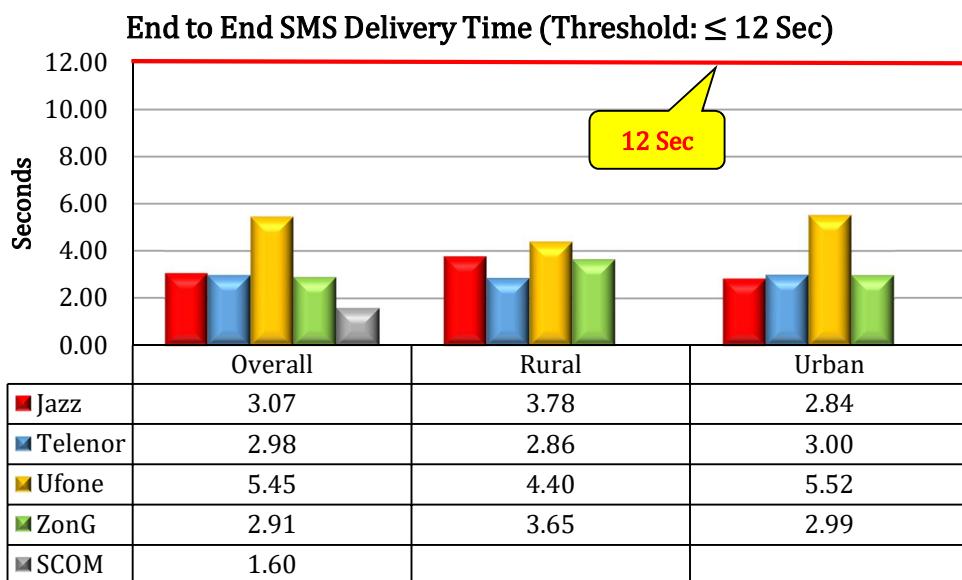
**SMS KPIs.** The performance of SMS services of CMOs has been checked by measuring SMS Success Rate and End-to-End SMS Delivery Time Key Performance Indicators (KPIs).

**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.*



*SMS Success Rate of Telenor and Ufone were observed below 99% in Urban Areas*

**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.*

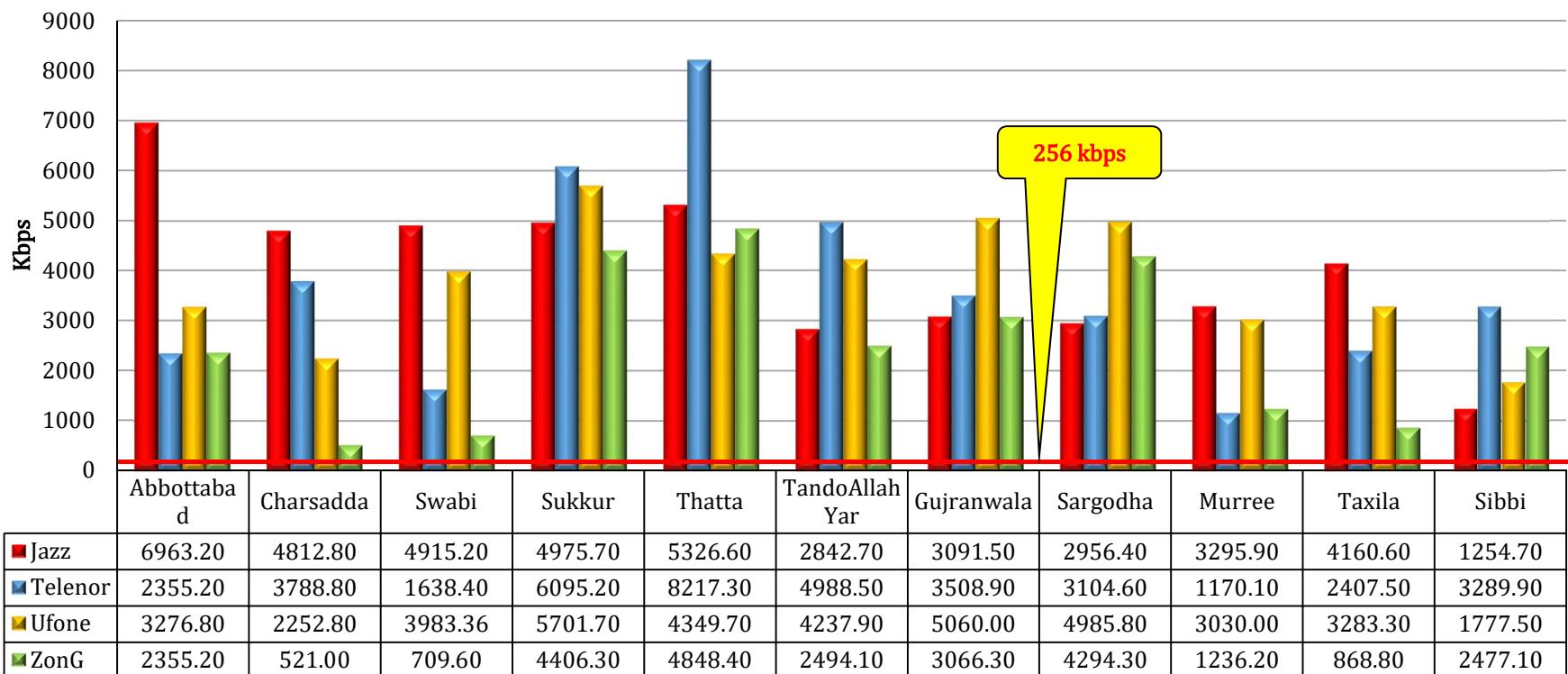


*All CMOs are meeting the threshold for End-to-End SMS Delivery Time of 12 Seconds*

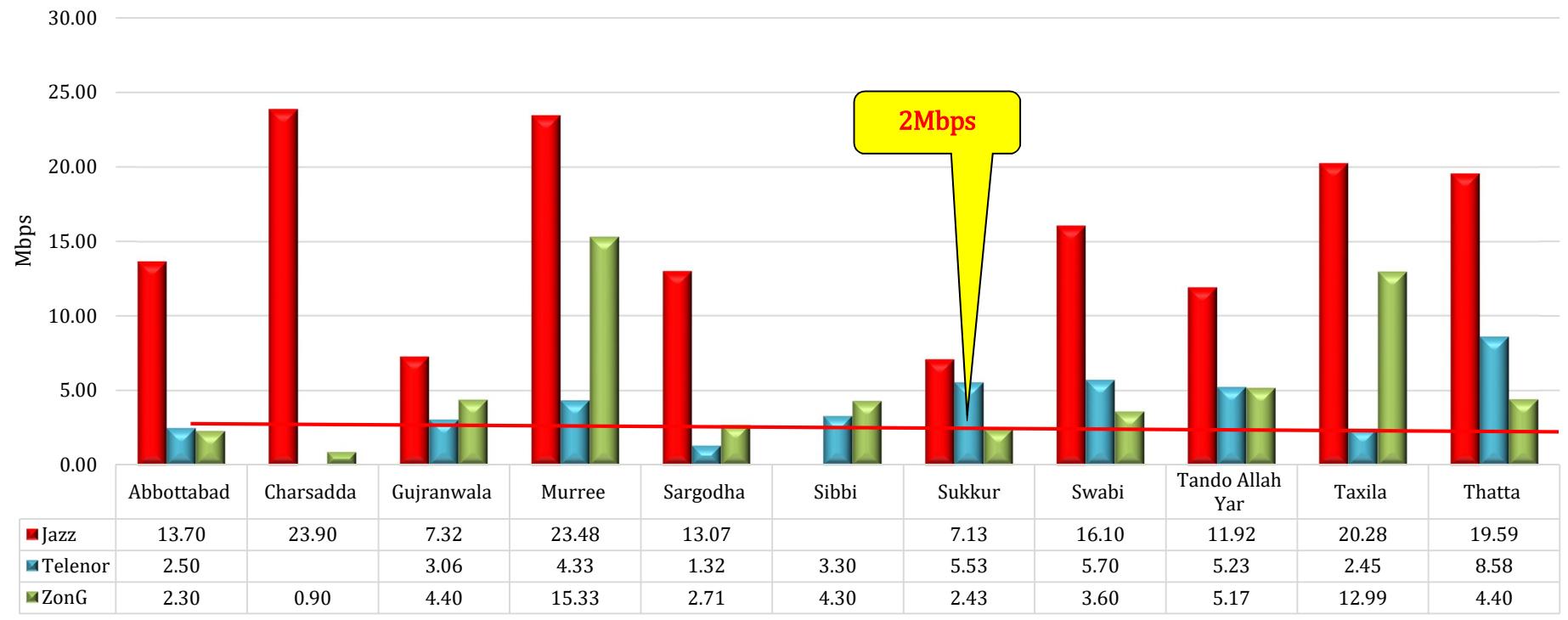
## CITY WISE SURVEY RESULTS

### 1. OVERALL

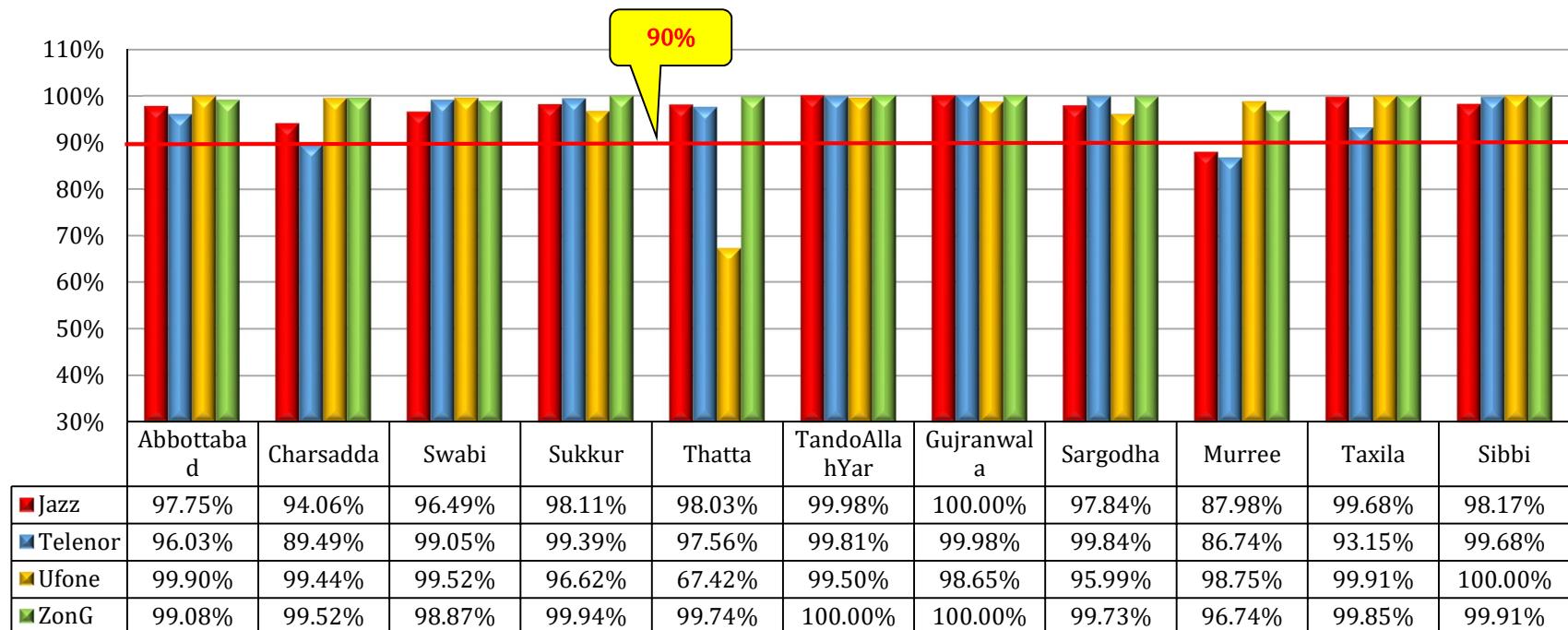
User Data Throughput (Threshold: > 256 kbps)



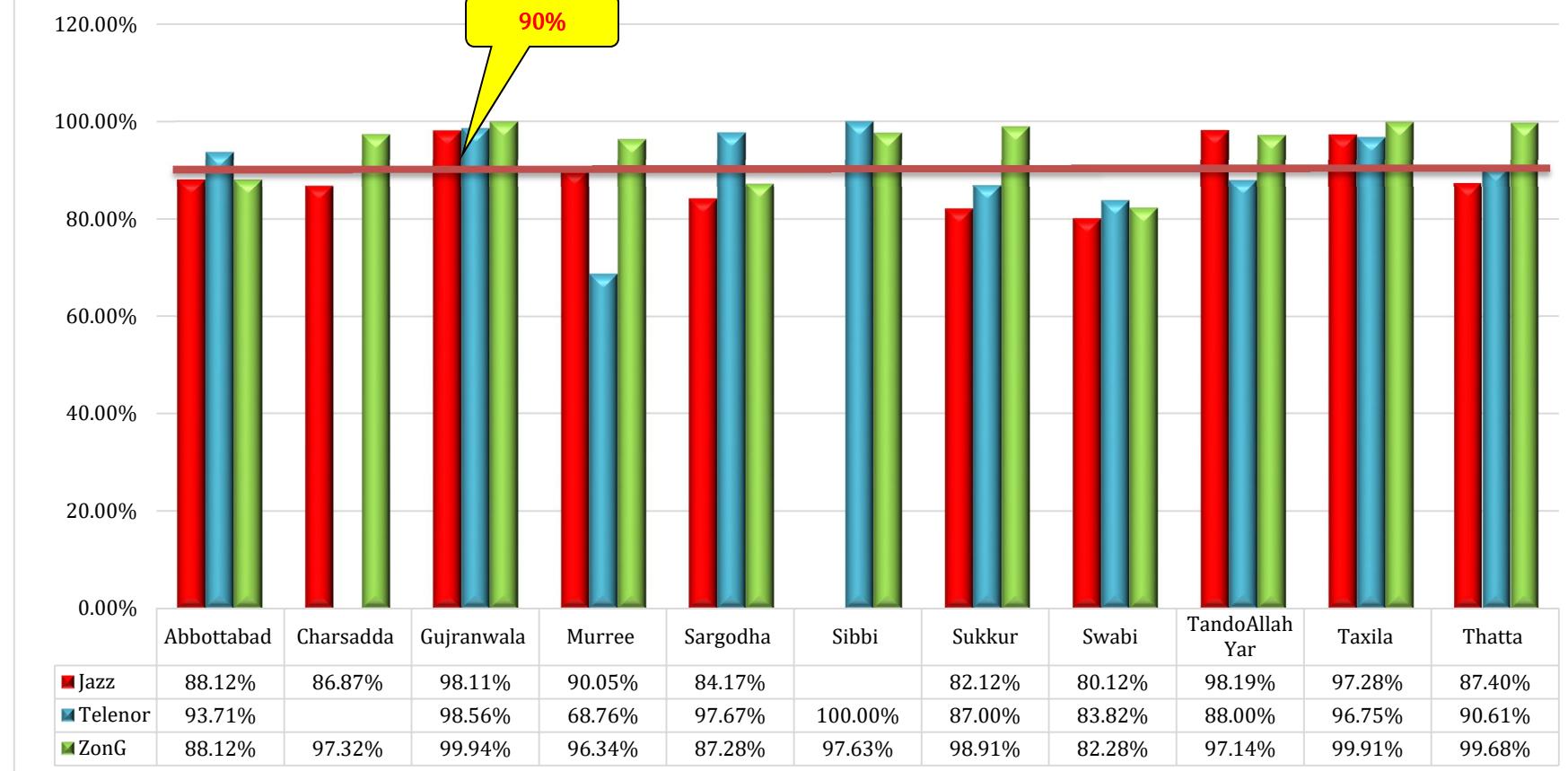
### User Data Throughput 4G (Threshold > 2Mbps)



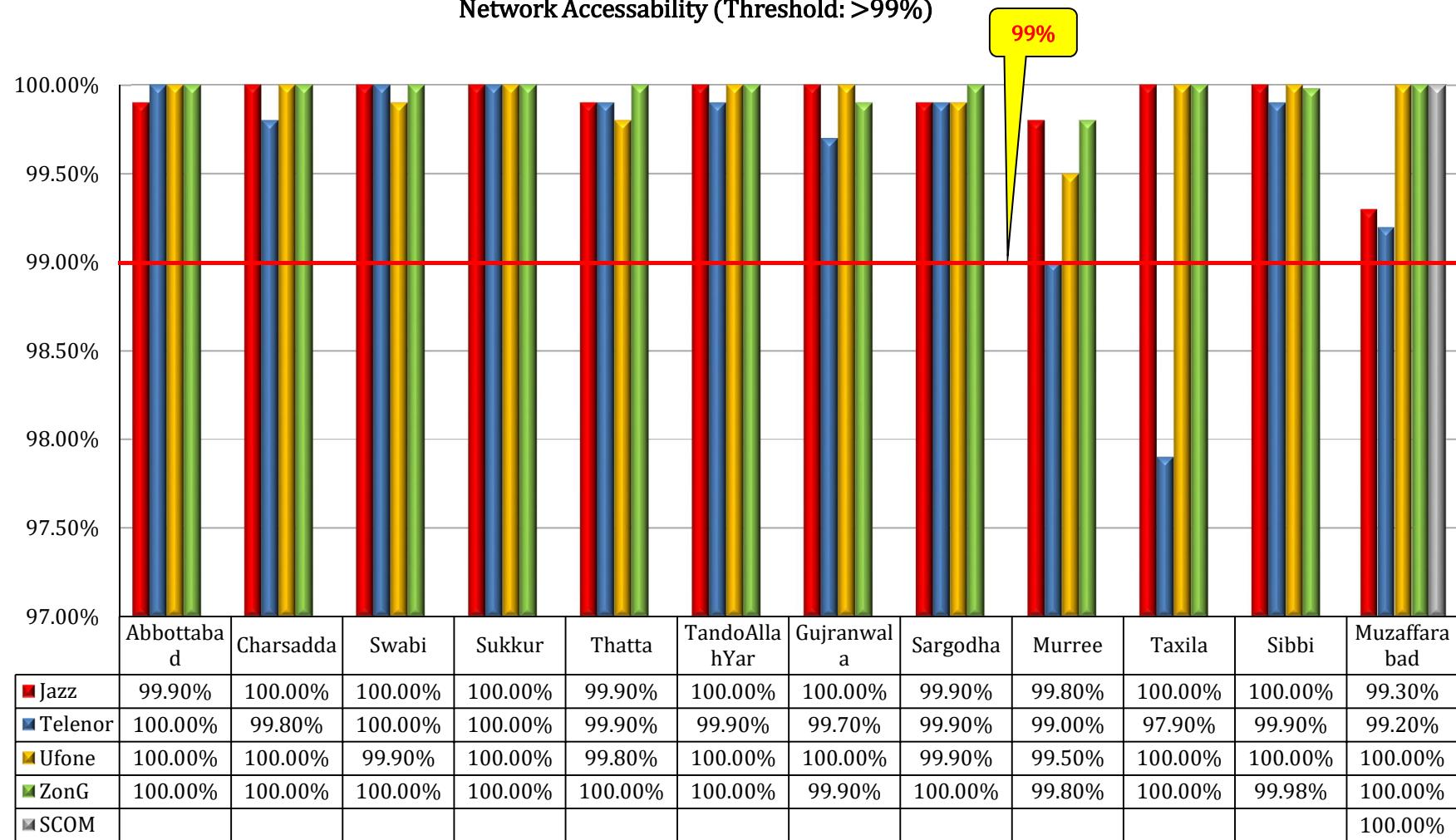
### Signal Strength RSCP- 3G (Threshold: : Min -100dBm with 90% Confidence)



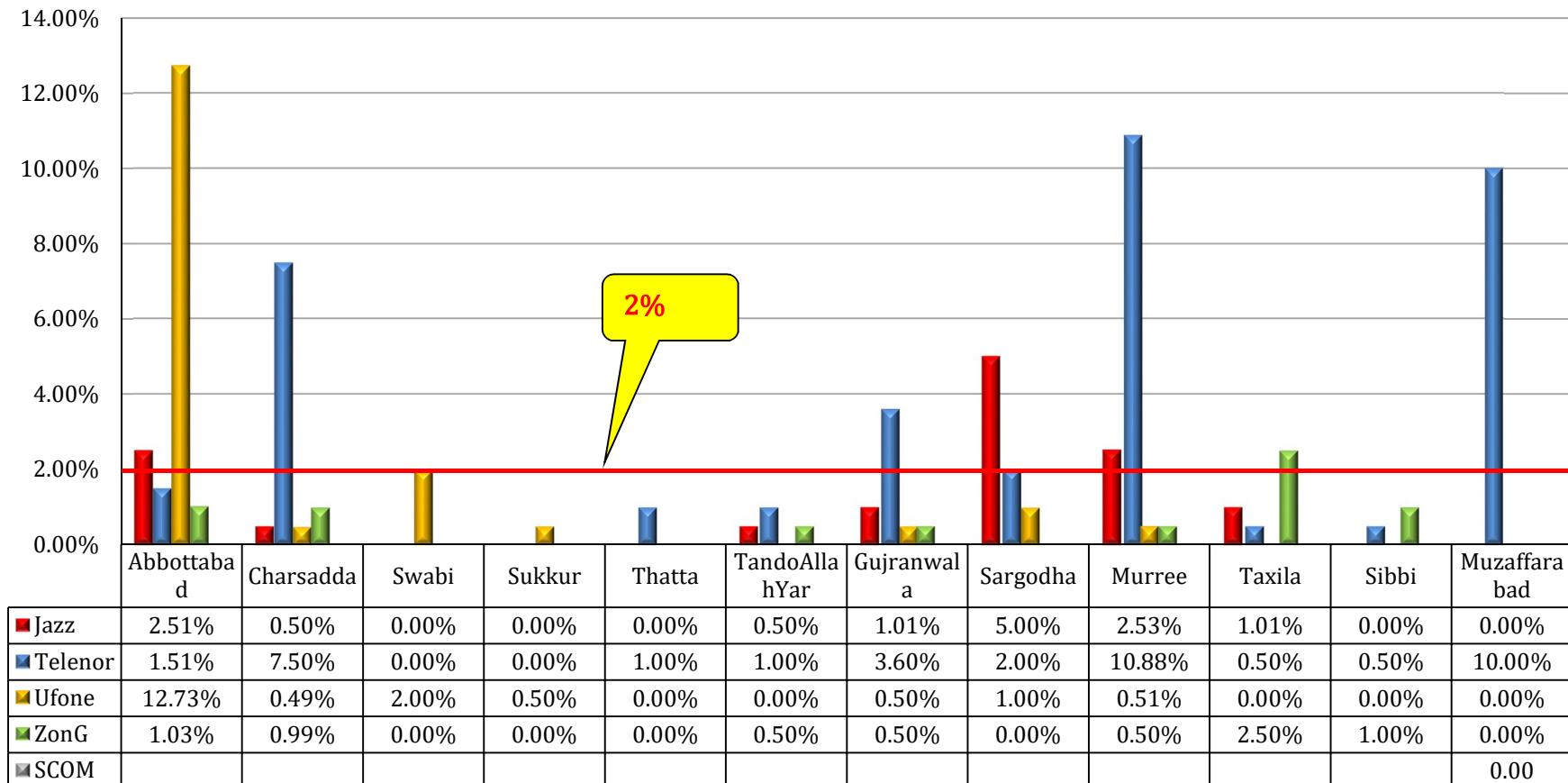
**Signal Strength (RSRP) 4G**  
**(Threshold:Minimum -100dBm with 90% Confidence)**



### Network Accessability (Threshold: >99%)



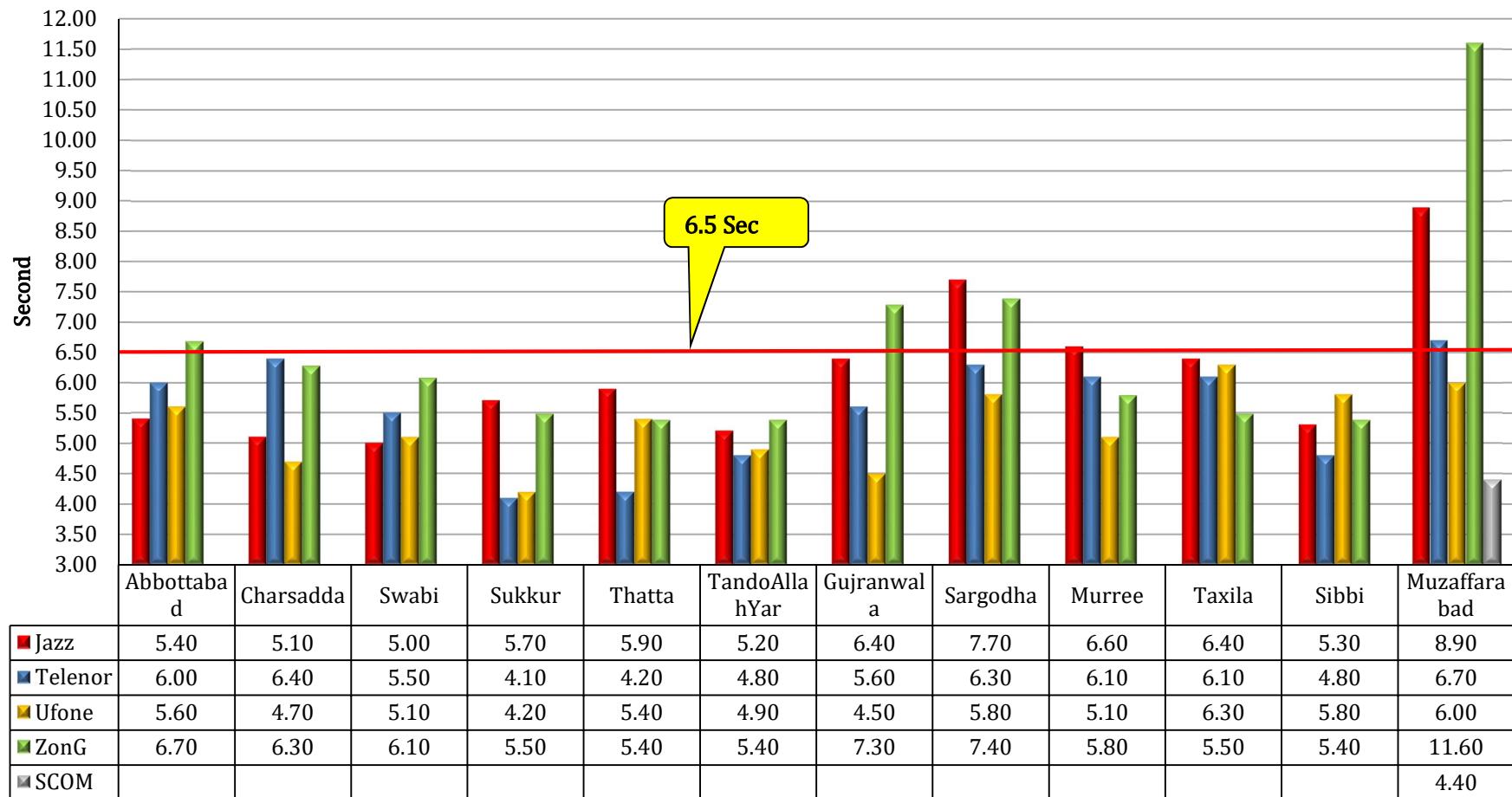
### Grade of Service (Threshold: $\leq 2\%$ )



### Service Accessibility (Threshold: > 98%)

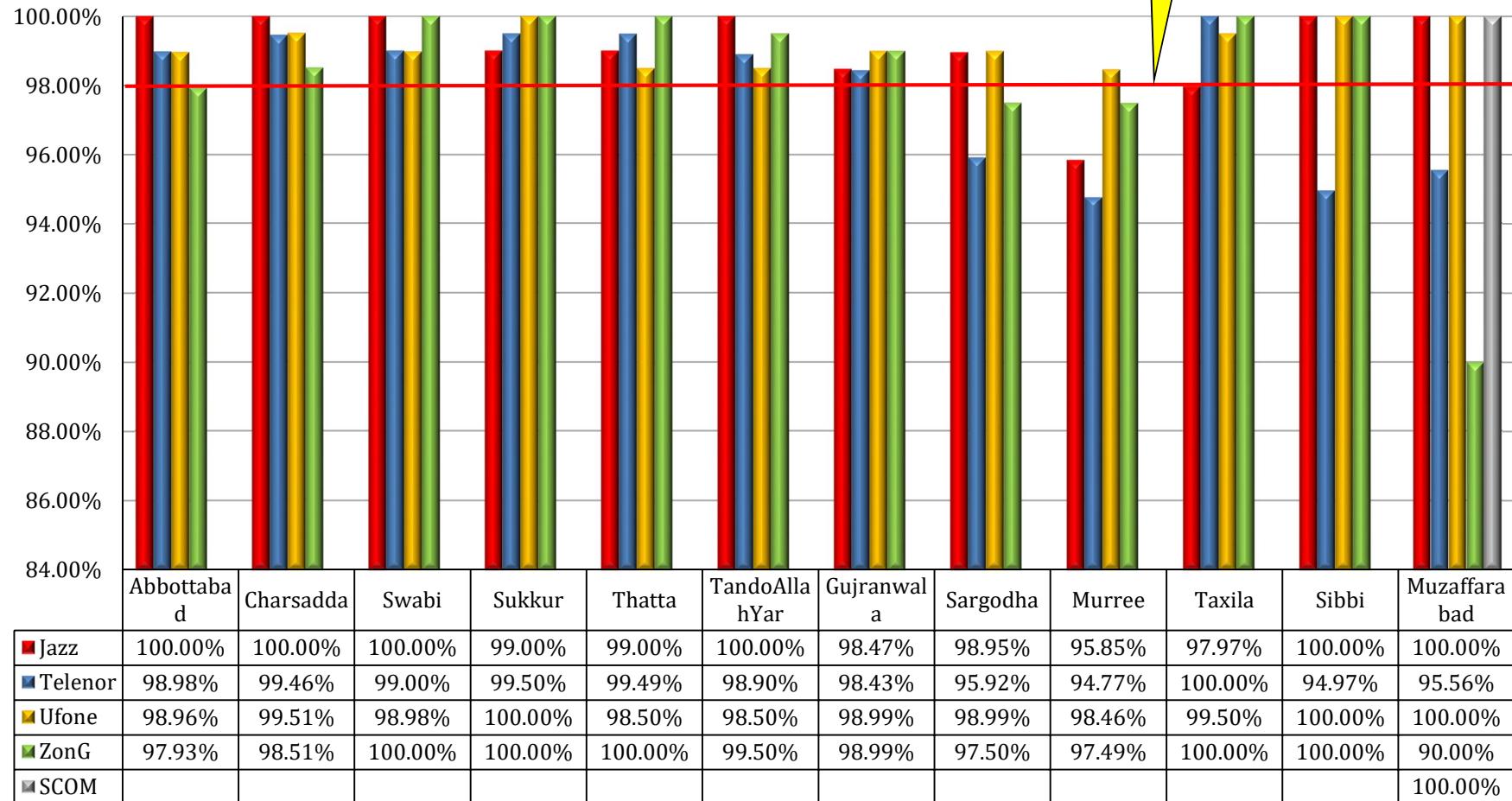


### Call Connection Time (Threshold: $\leq$ 6.5 Sec)

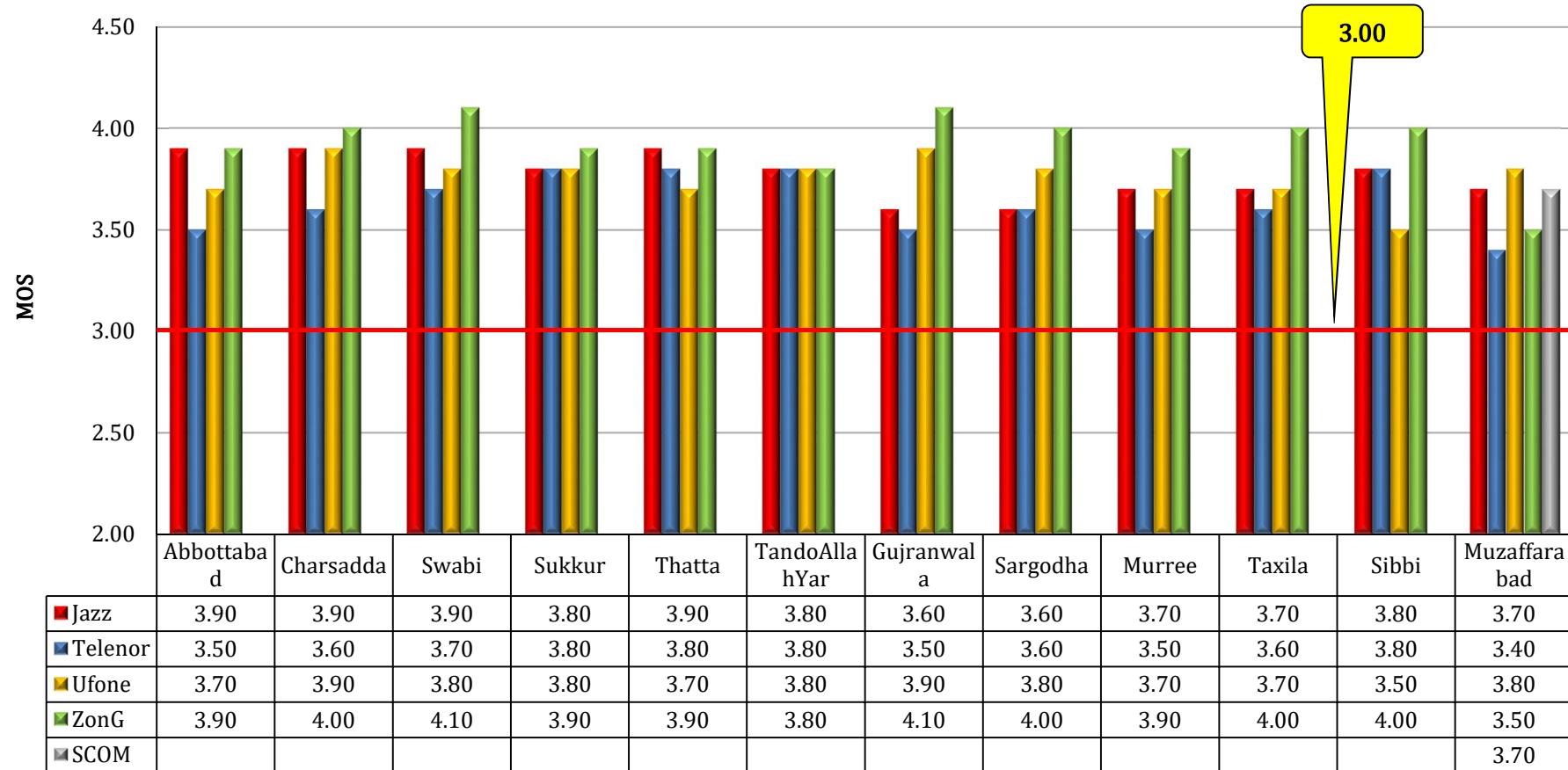


### Call Completion Ratio (Threshold: > 98%)

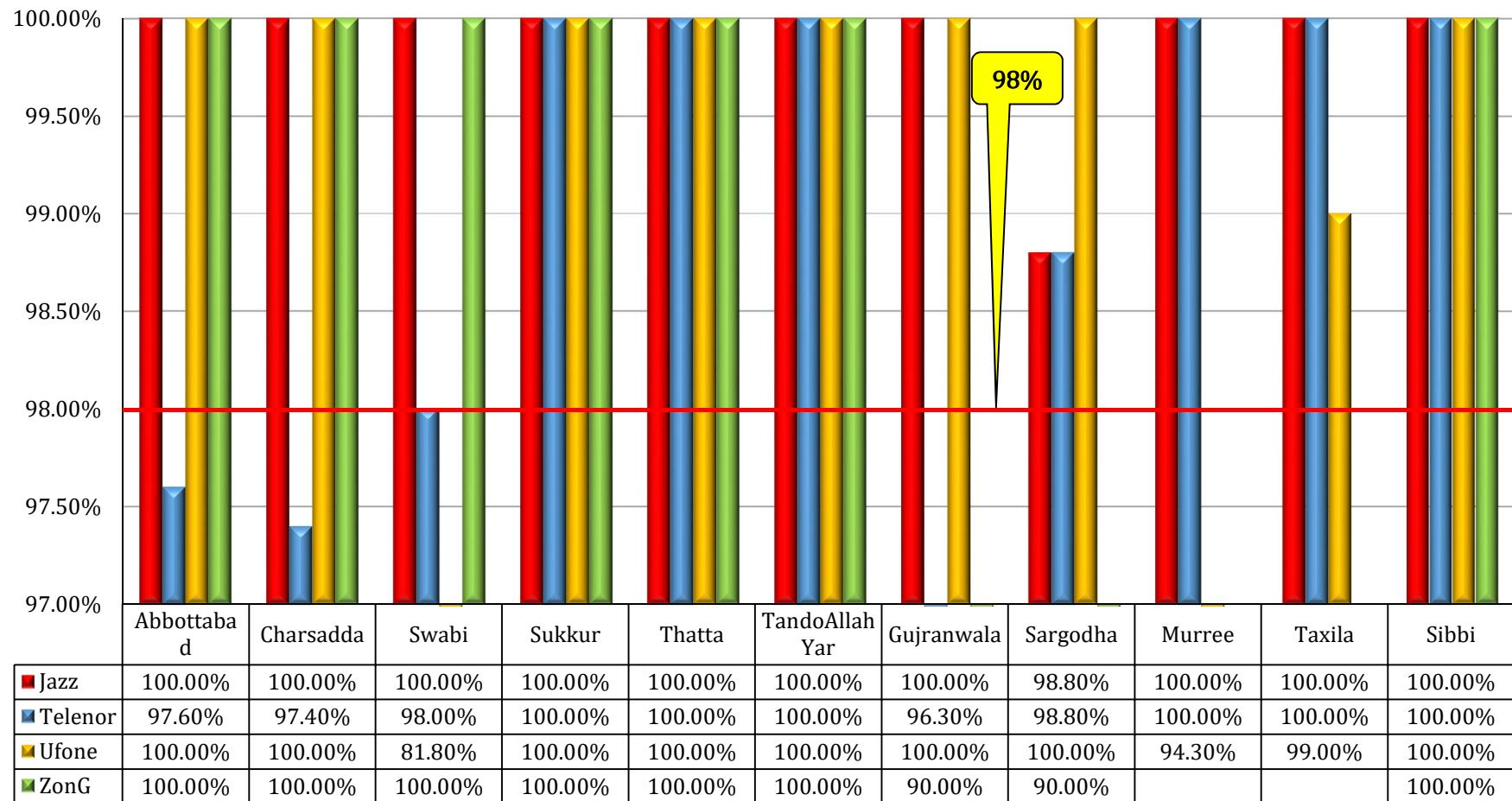
98%



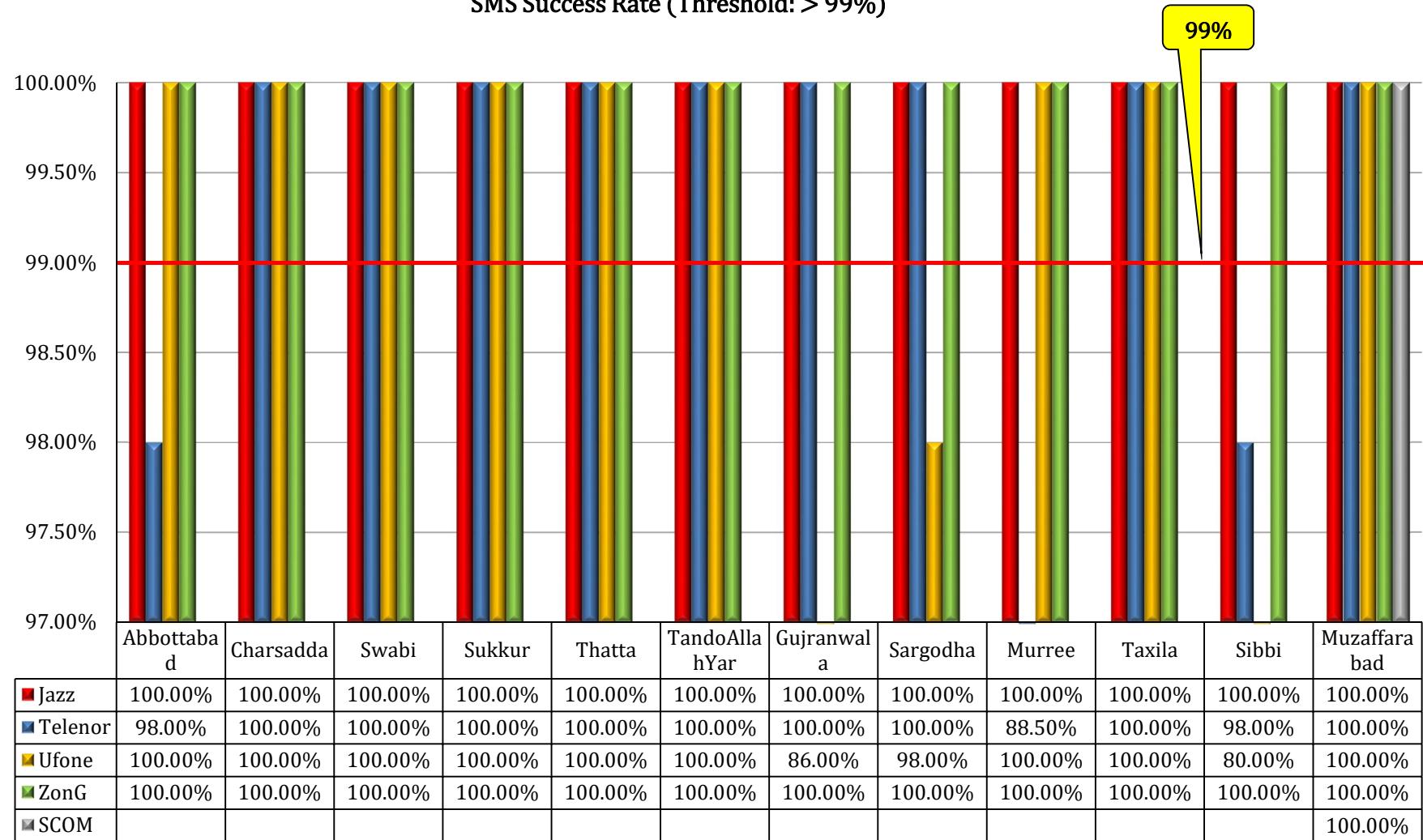
### Mean Opinion Score (Threshold: >3)



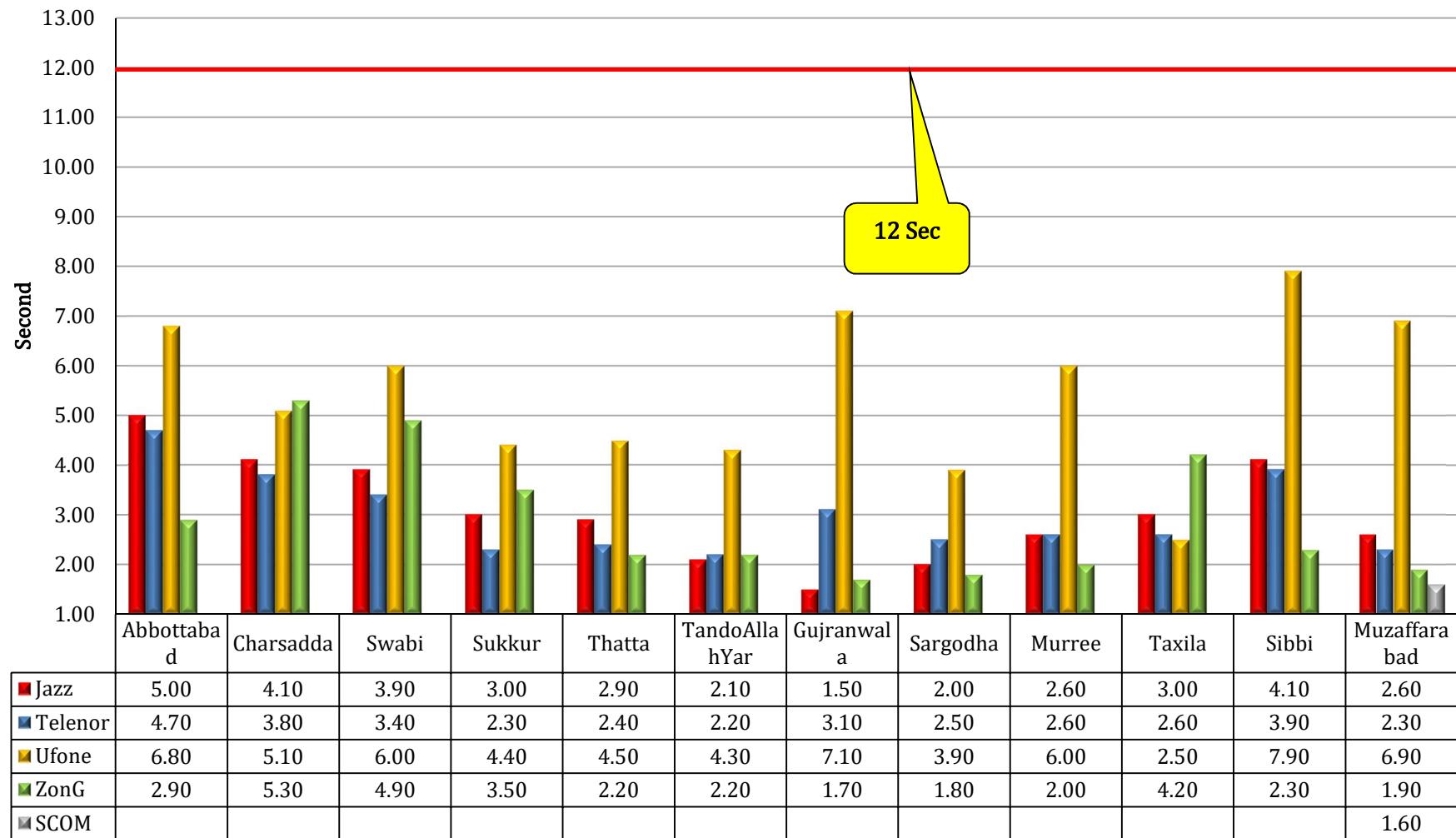
### Inter System Handover Success Rate of CS Voice (Threshold: > 98%)



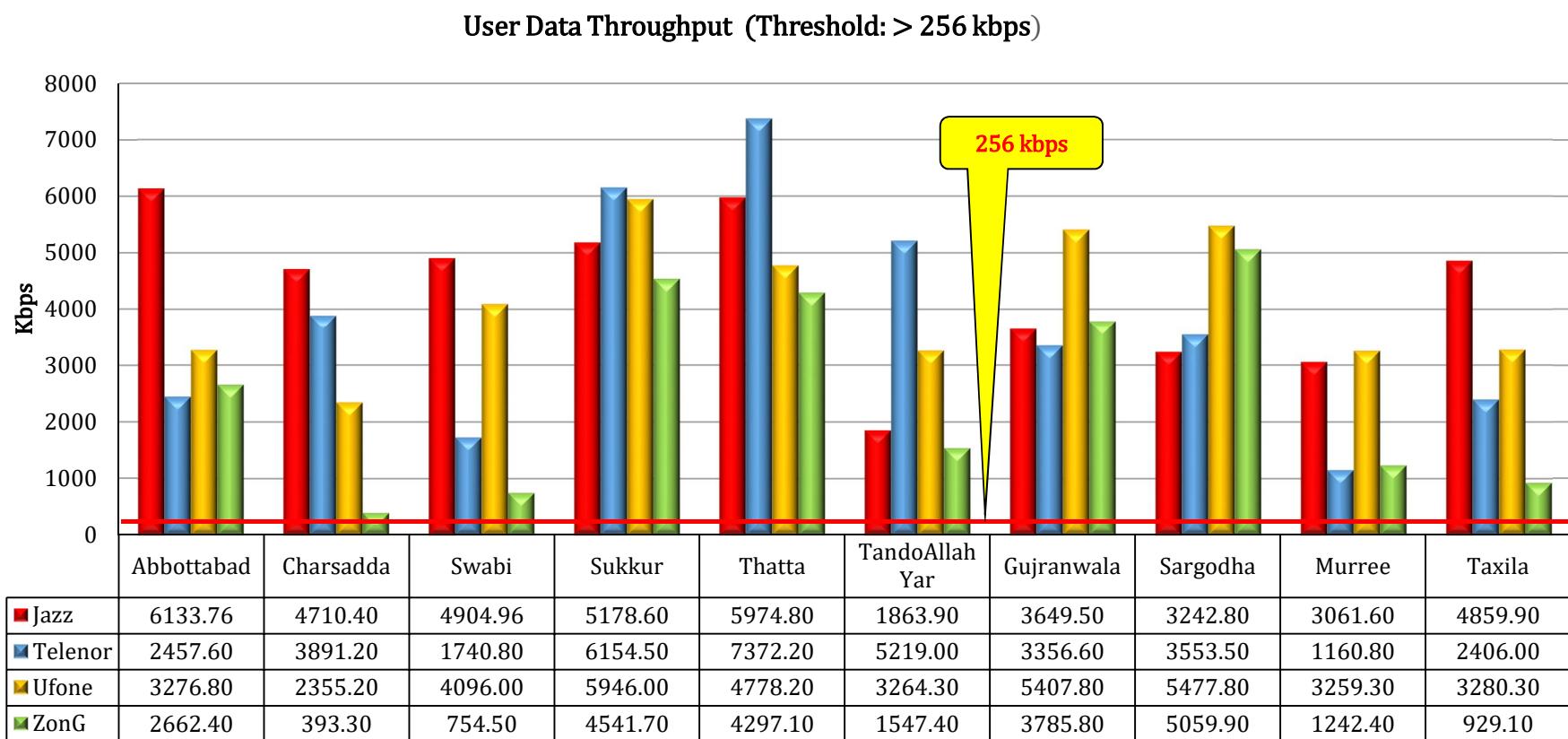
SMS Success Rate (Threshold: > 99%)



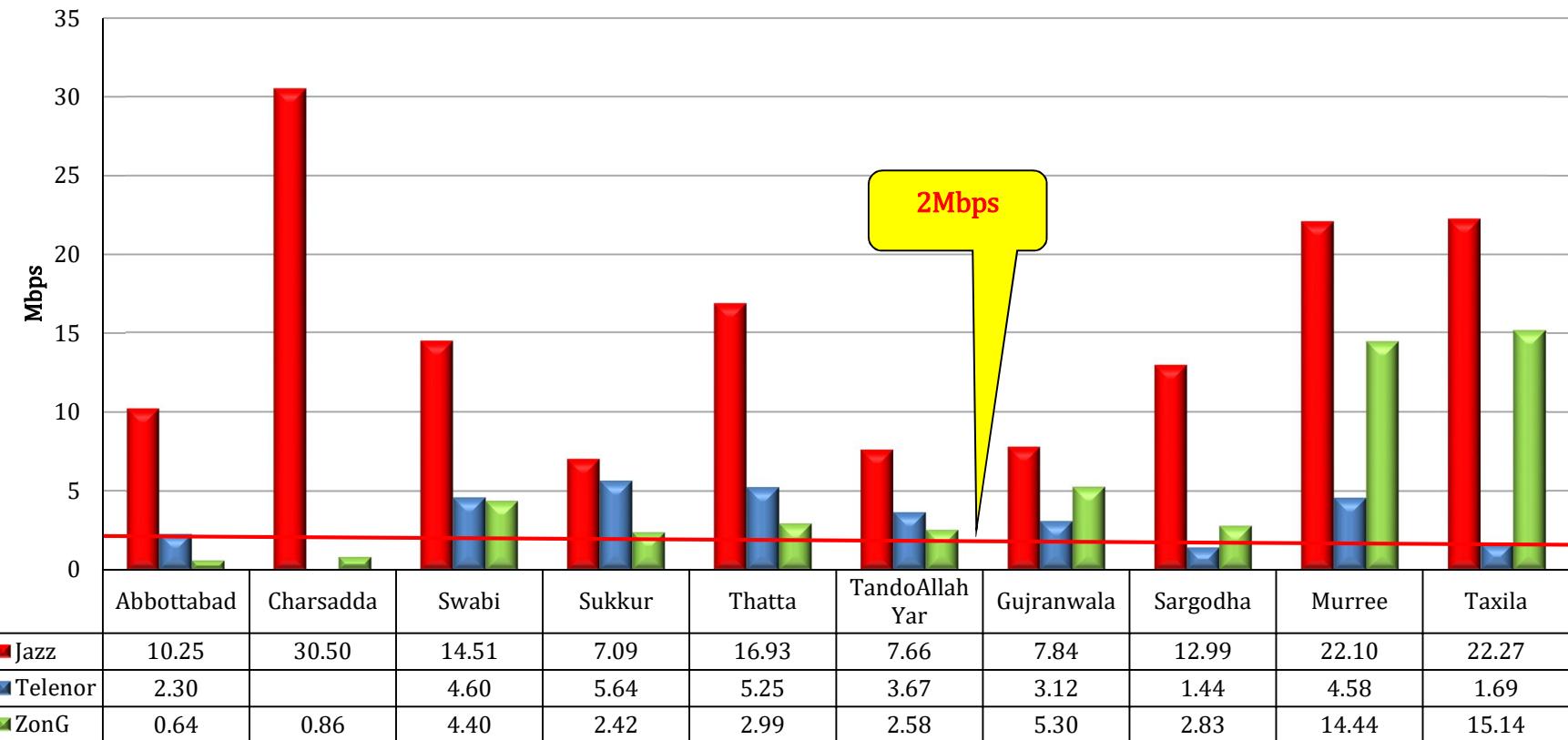
### End to End Delivery Time (Threshold: $\leq 12$ Sec)



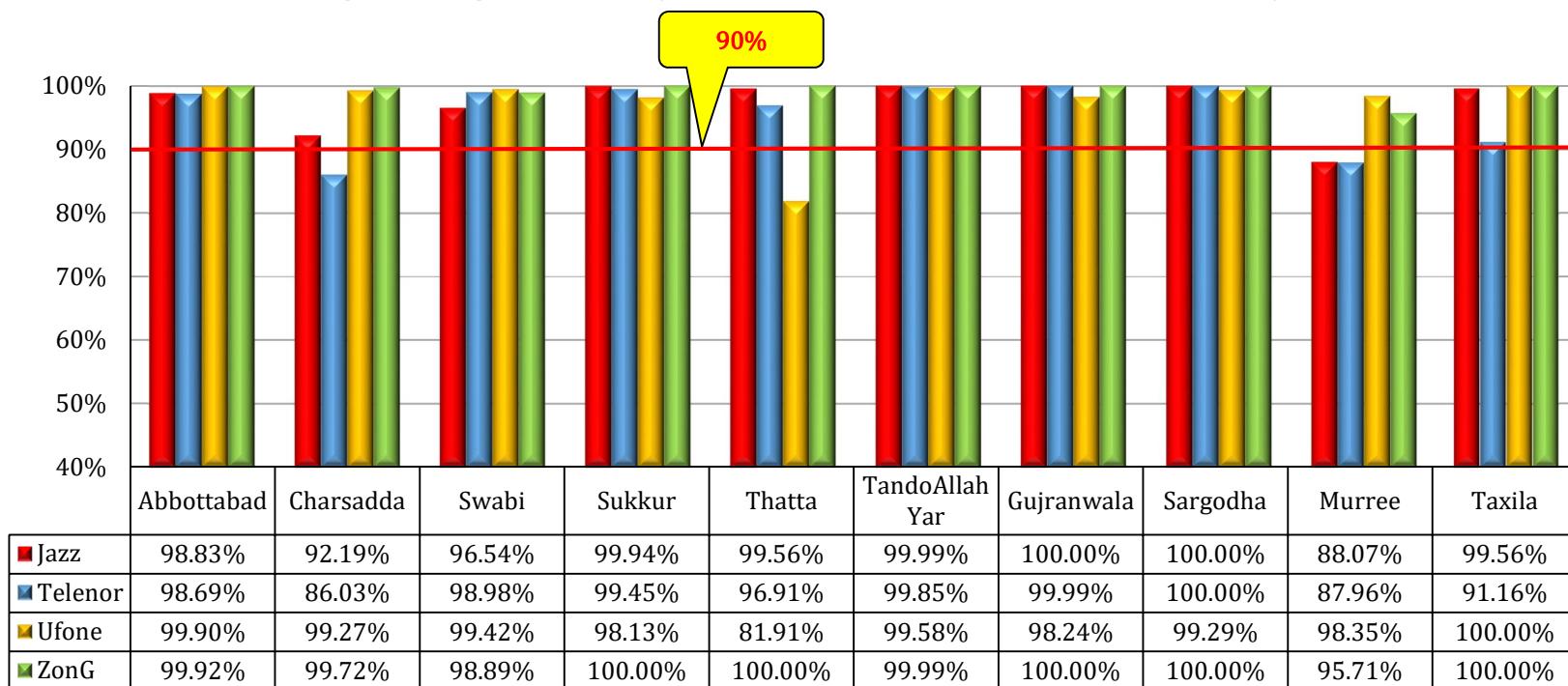
## 2. URBAN AREAS



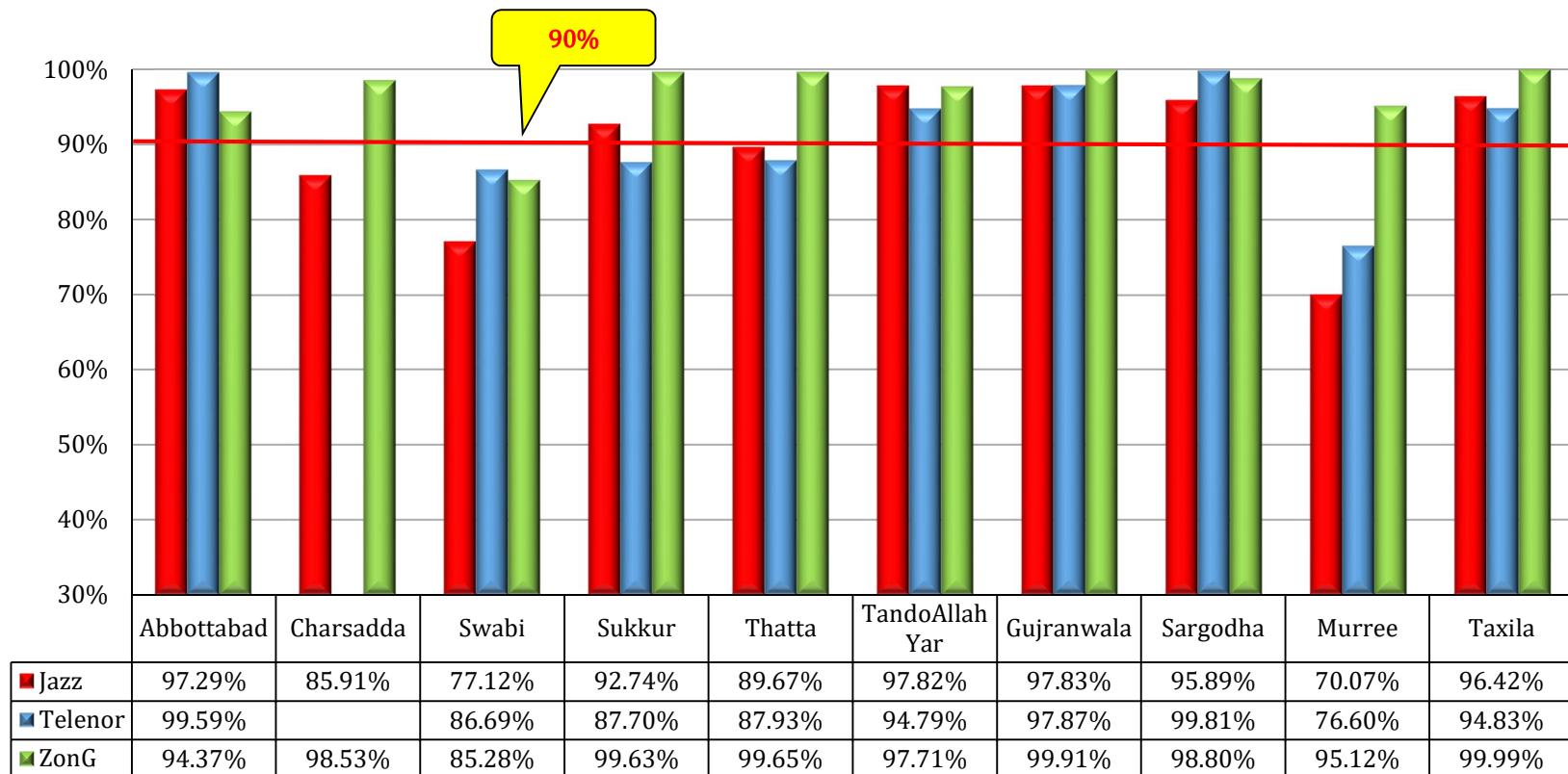
### User Data Throughput (Threshold: > 2Mbps)



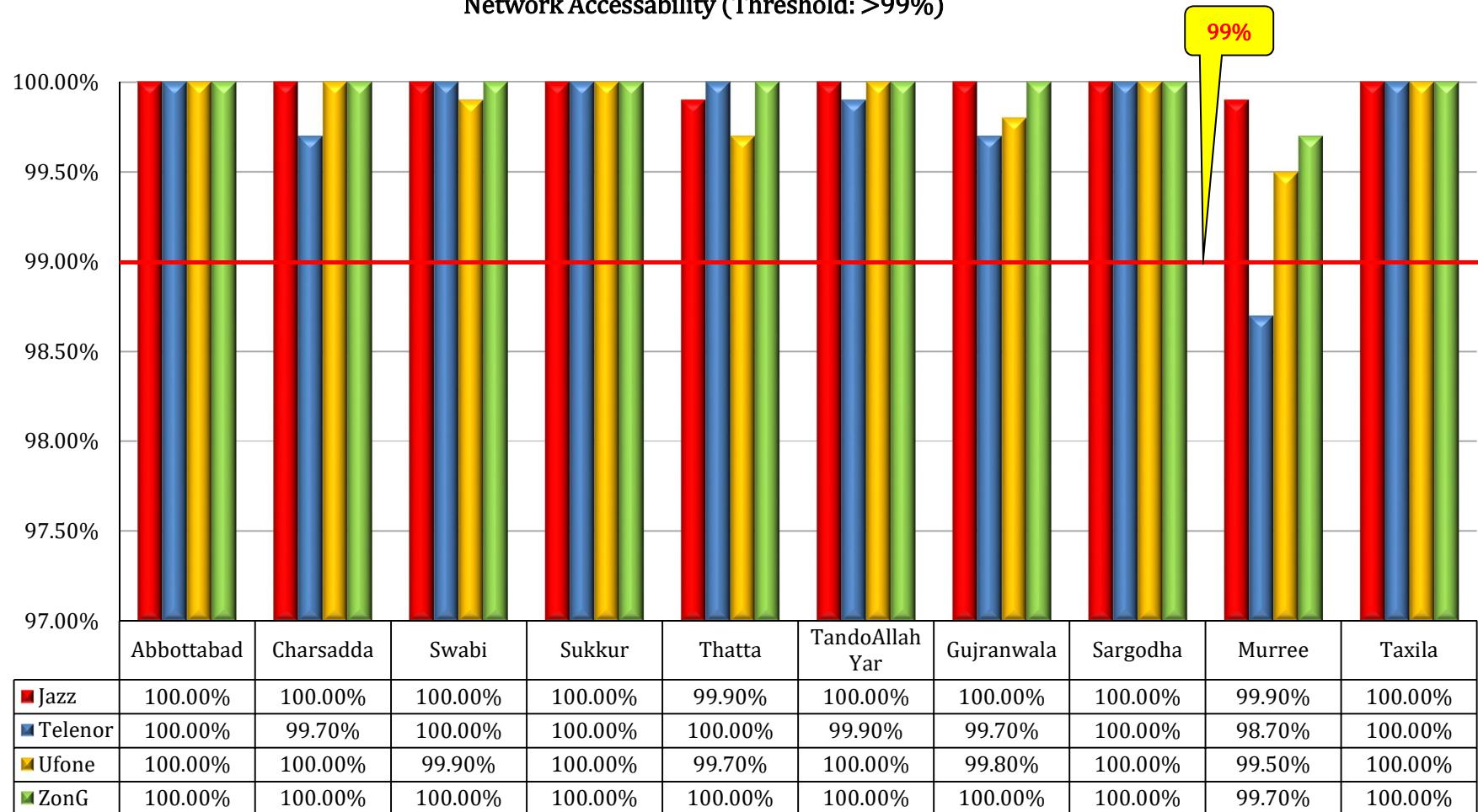
### Signal Strength RSCP– 3G (Threshold: Min -100dBm with 90% Confidence)



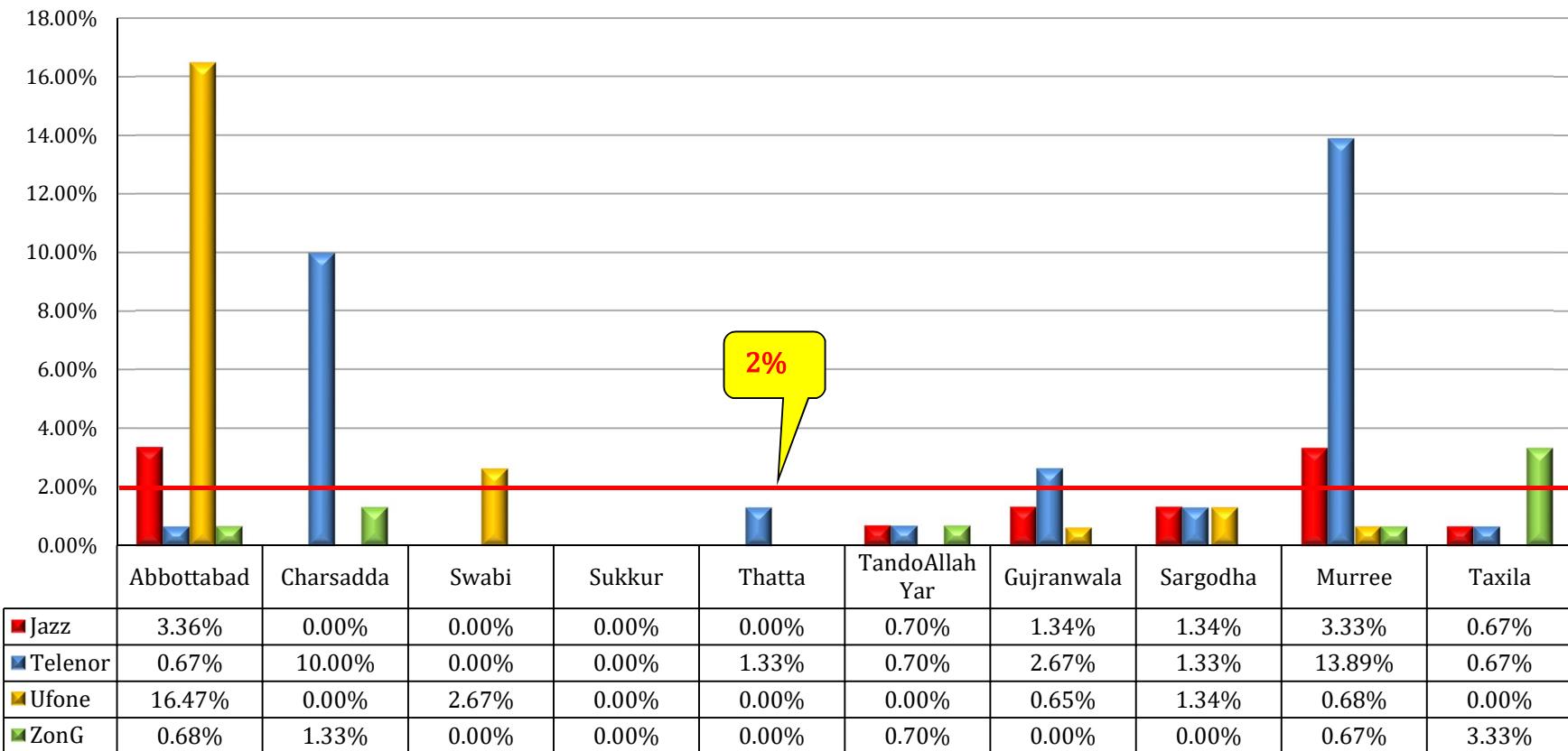
### Signal Strength RSRP- 4G (Threshold: Min -100dBm with 90% Confidence)



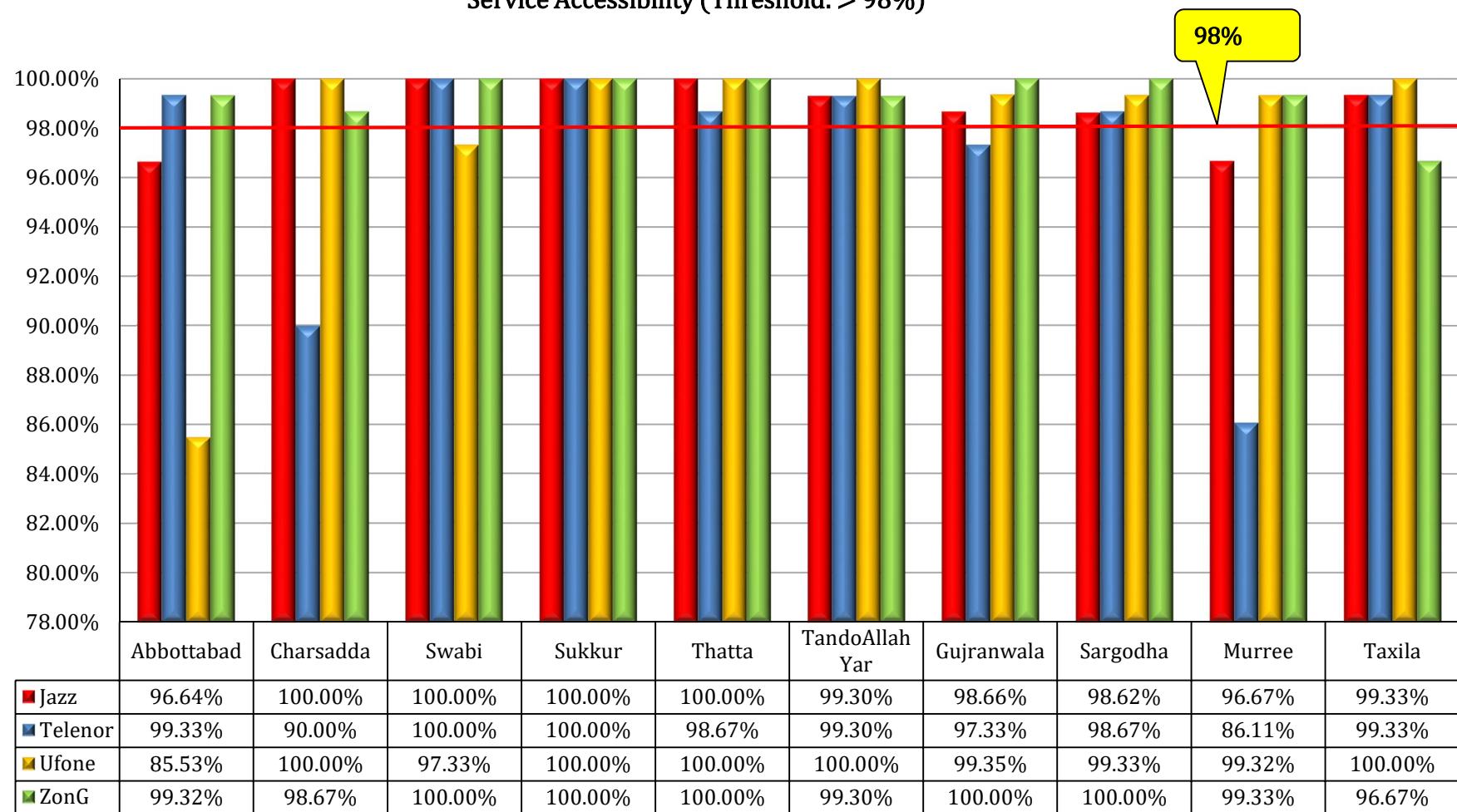
Network Accessability (Threshold: >99%)



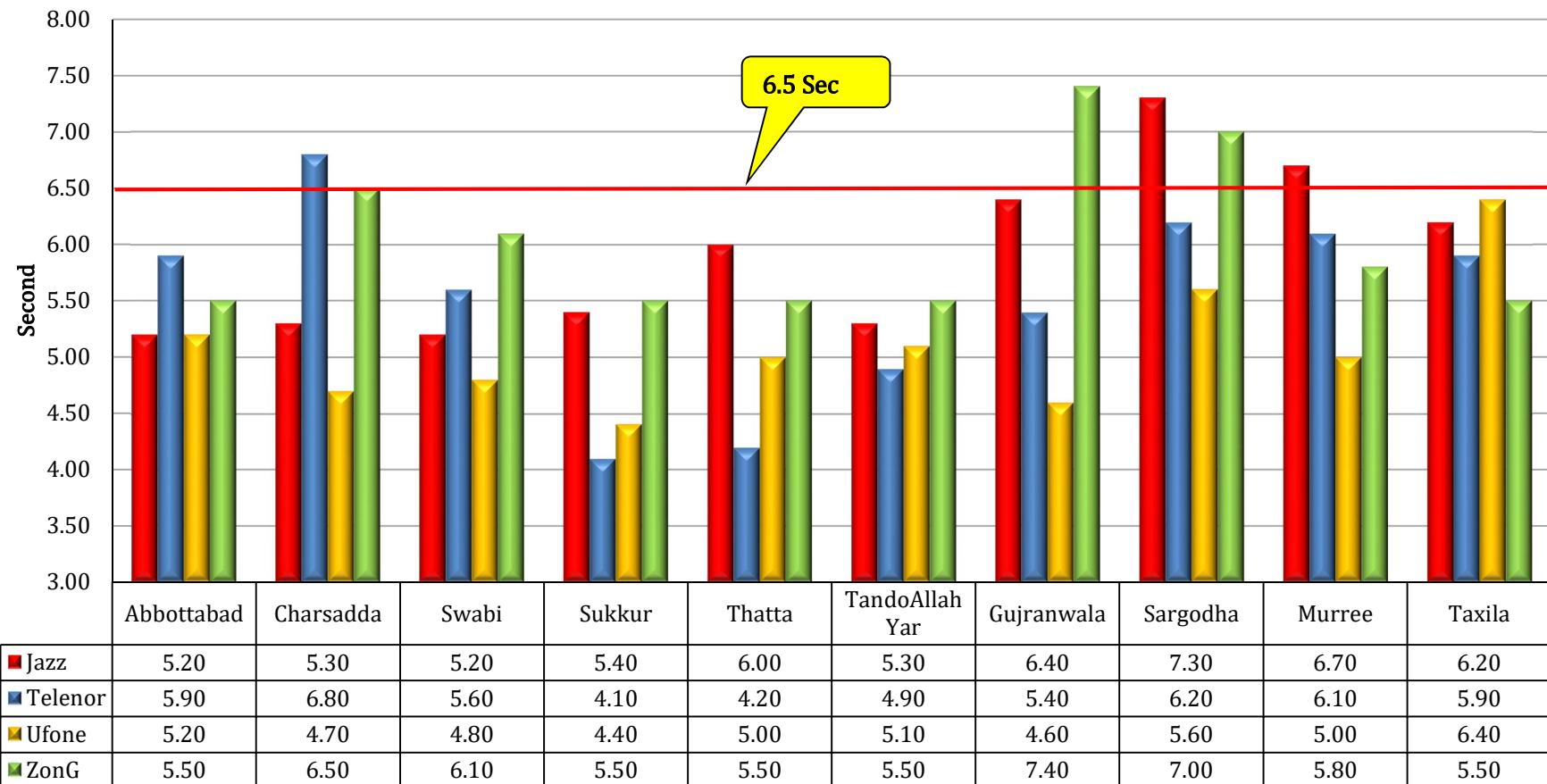
### Grade of Service (Threshold: $\leq 2\%$ )



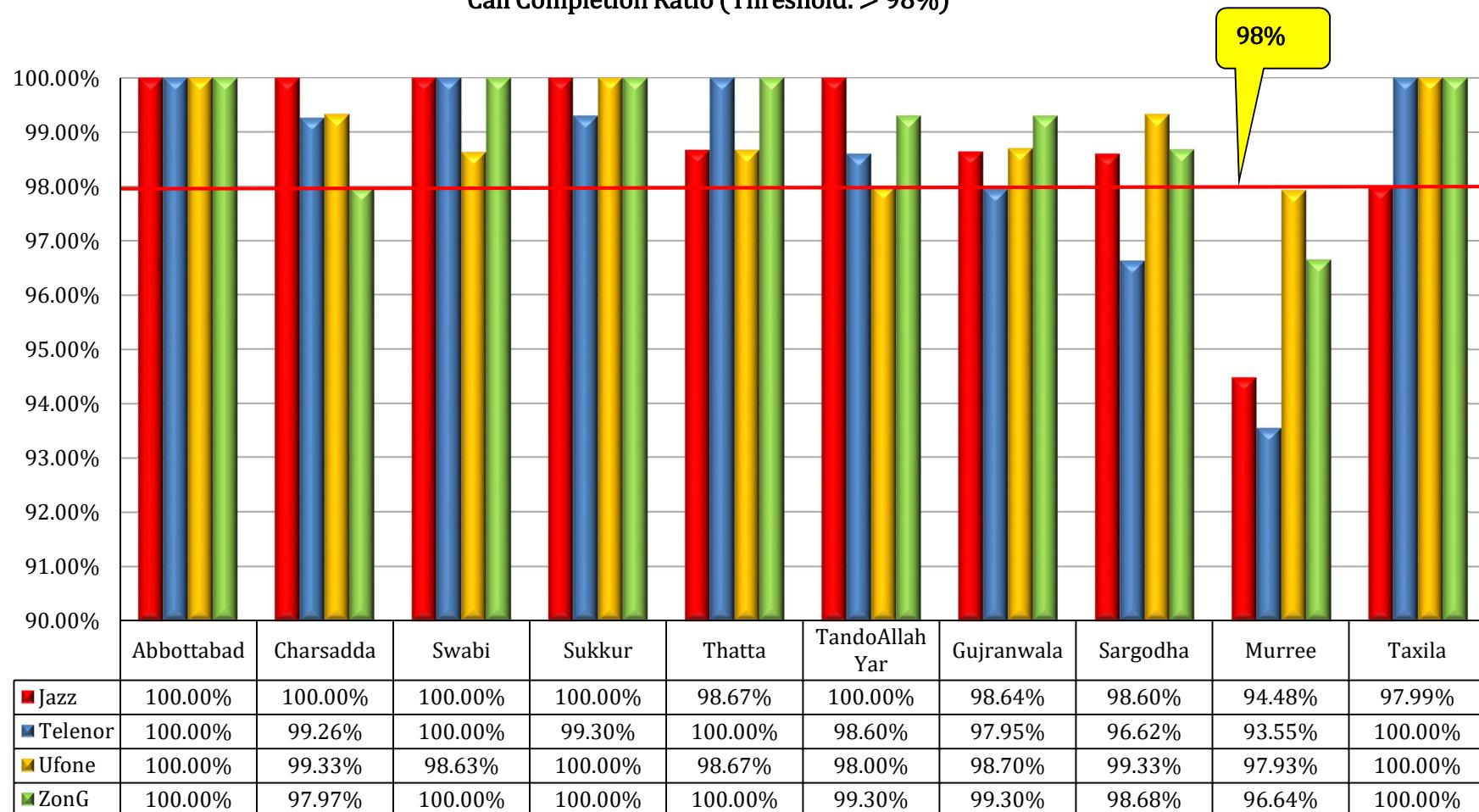
### Service Accessibility (Threshold: > 98%)



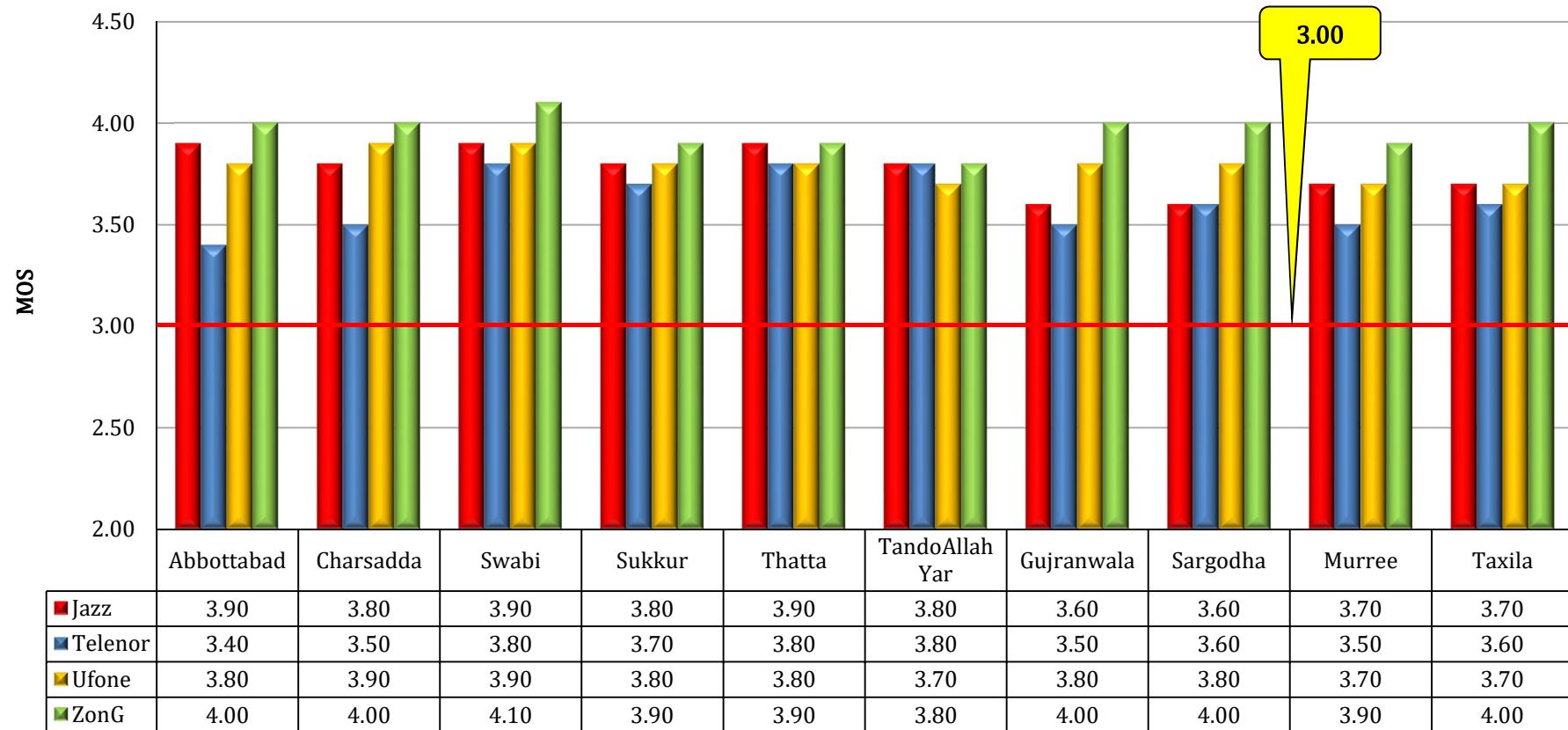
### Call Connection Time (Threshold: $\leq 6.5$ Sec)



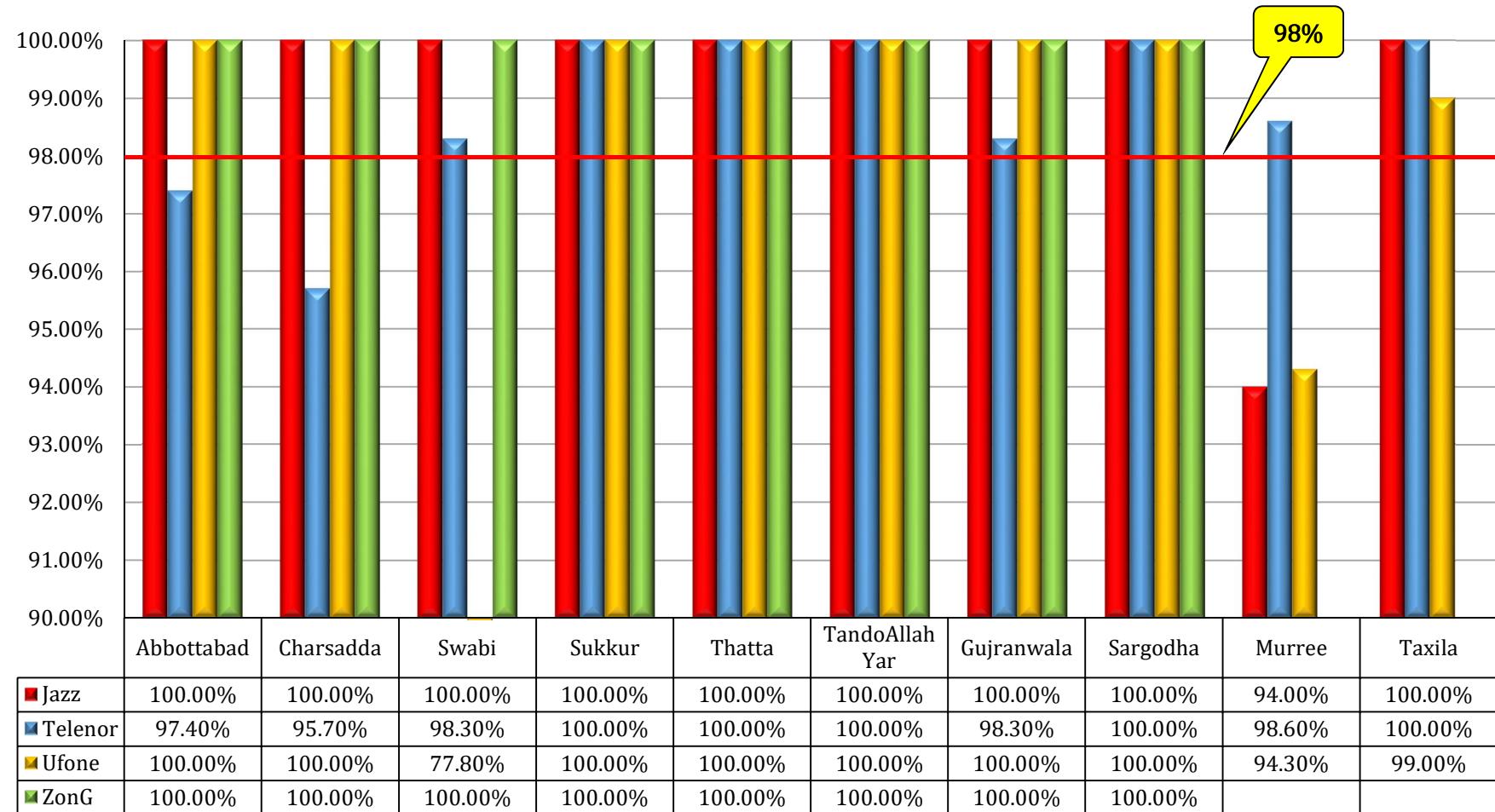
### Call Completion Ratio (Threshold: > 98%)



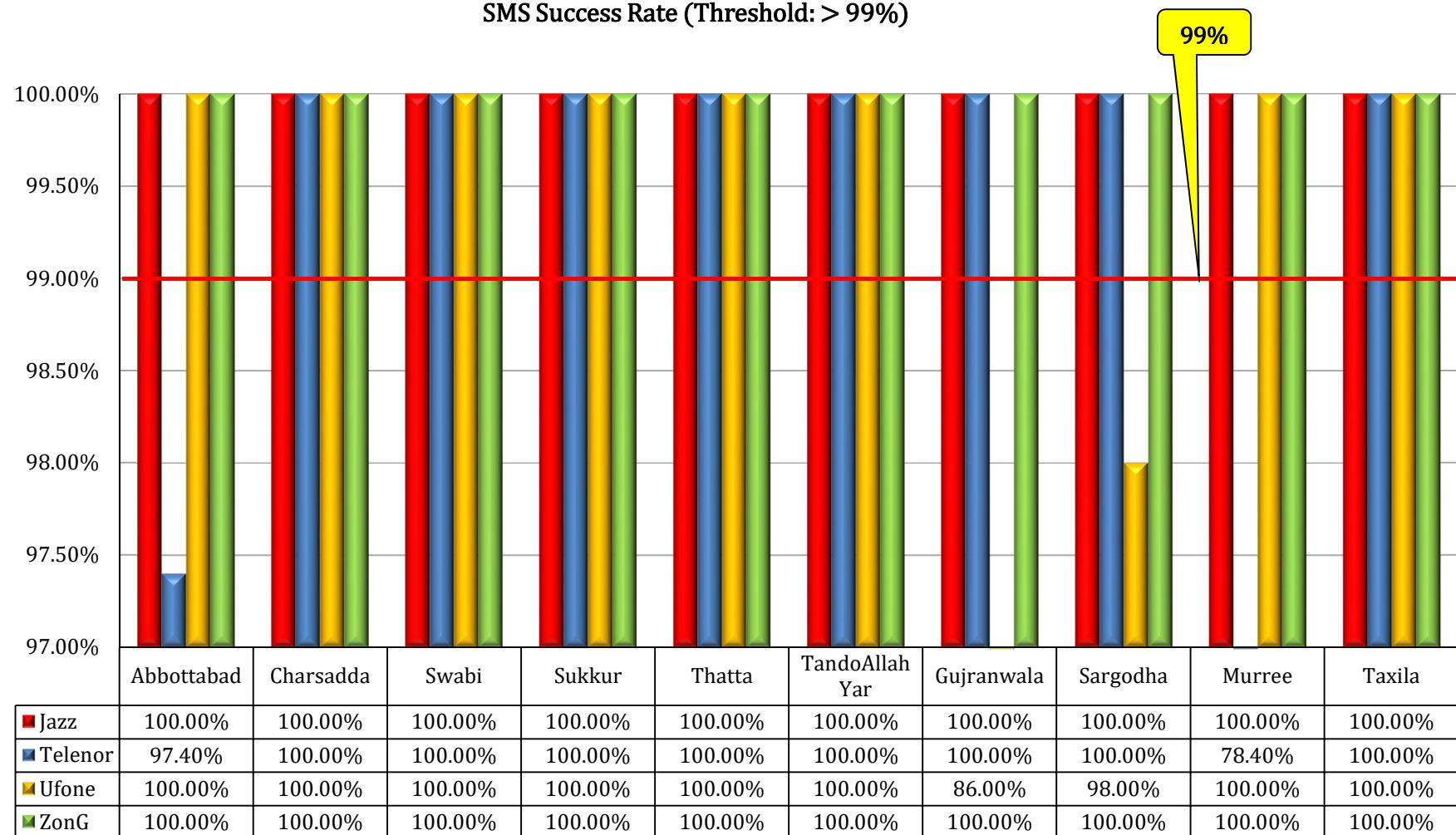
### Mean Opinion Score (Threshold: >3)



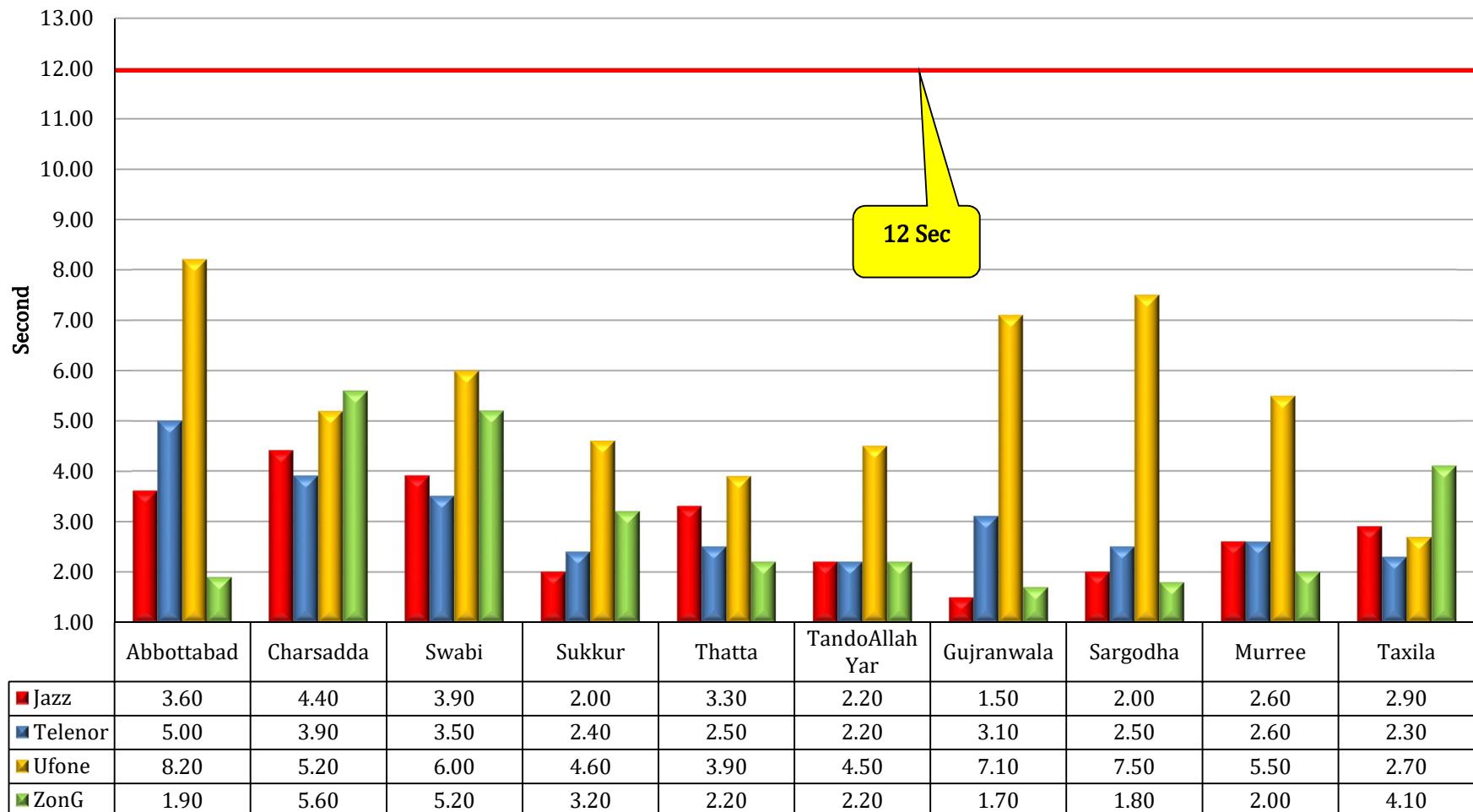
### Inter System Handover Success Rate of CS Voice (Threshold: > 98%)



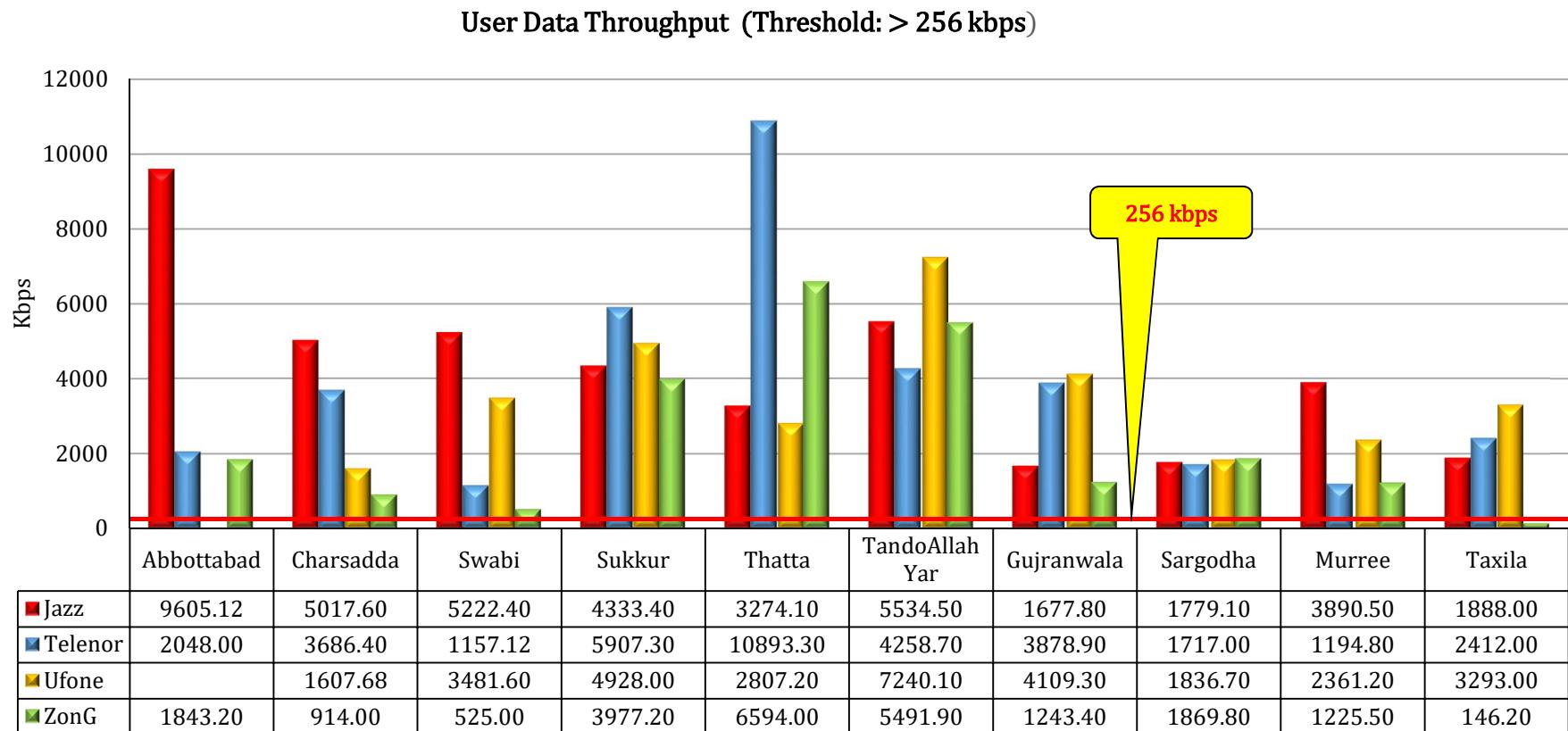
SMS Success Rate (Threshold: > 99%)



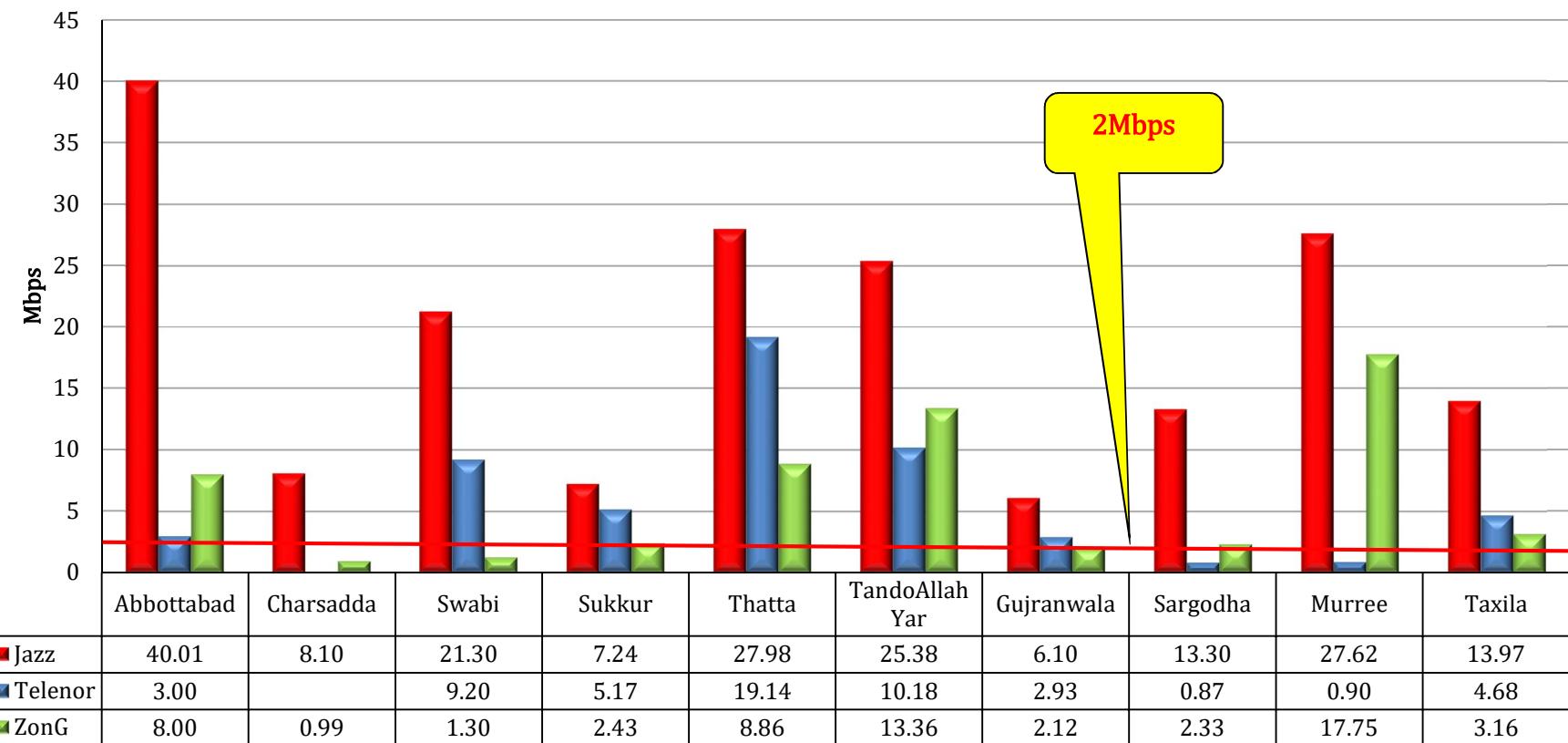
### End to End Delivery Time (Threshold: $\leq 12$ Sec)



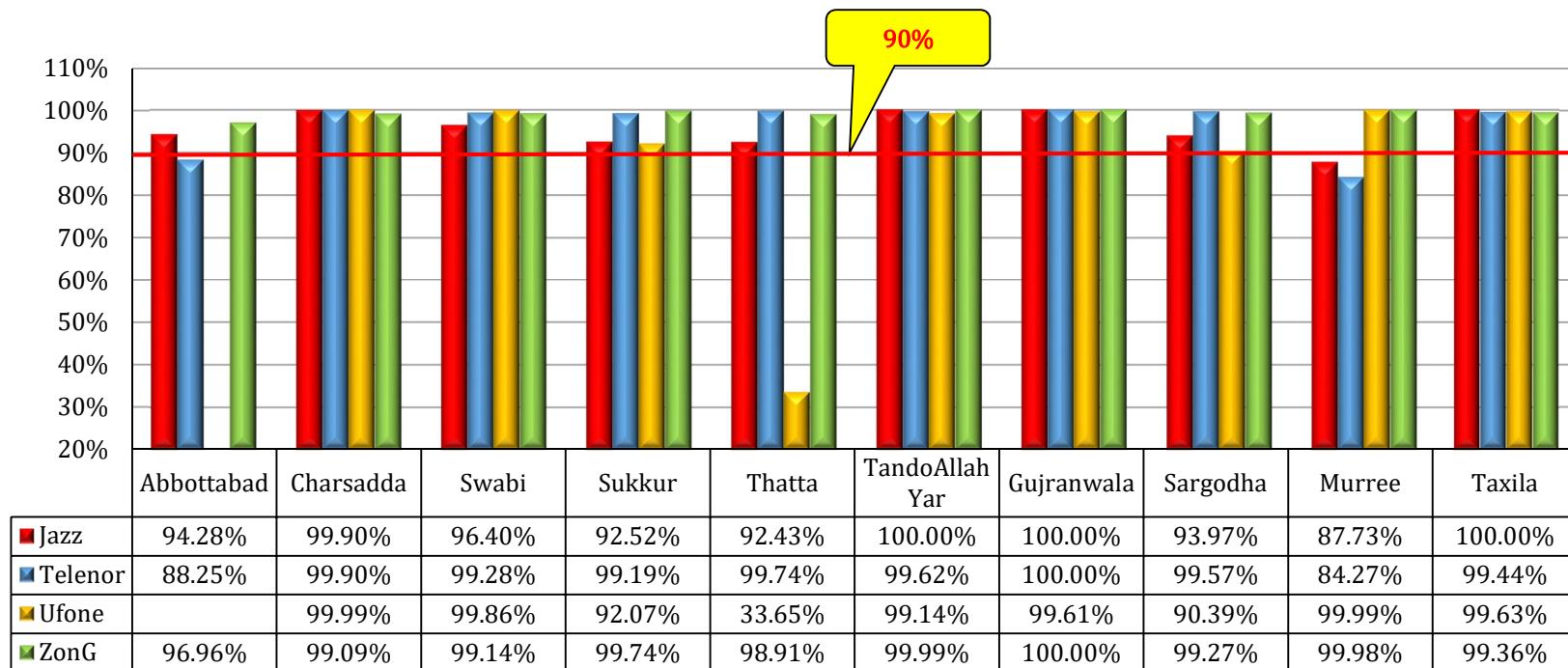
### 3. RURAL/SUB-URBAN AREAS



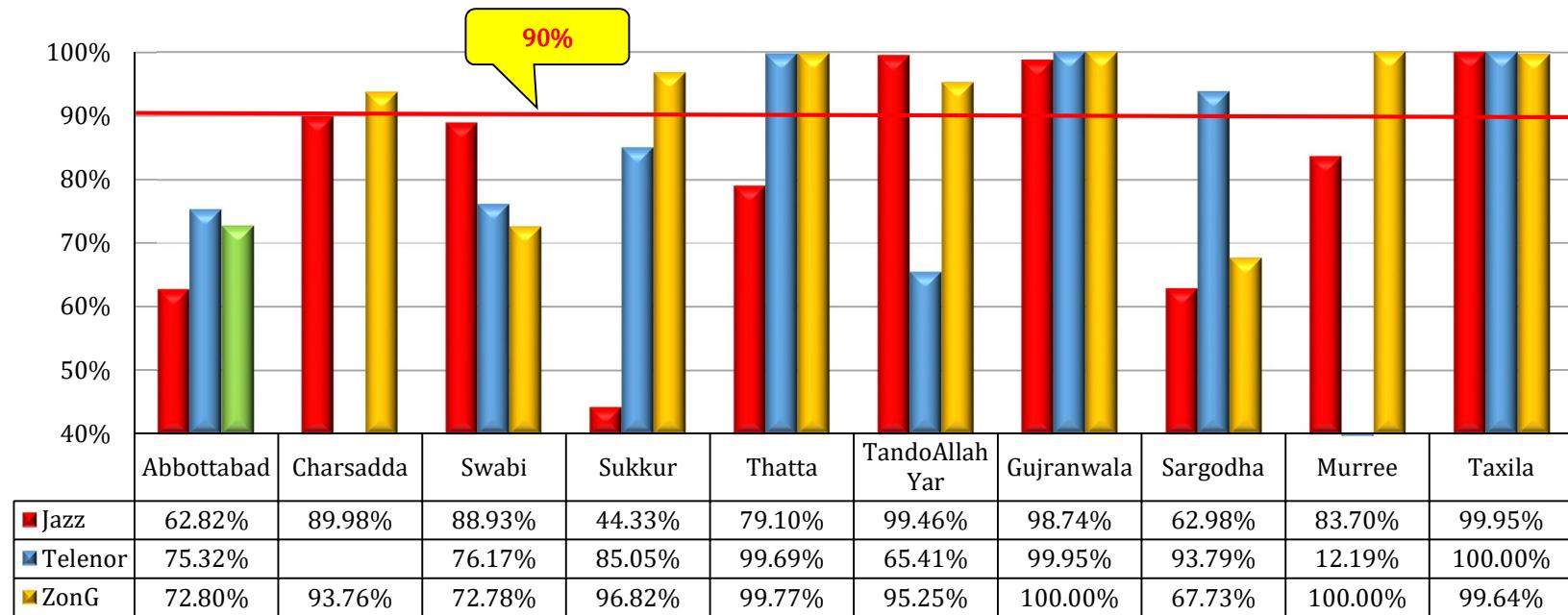
### User Data Throughput (Threshold: > 2Mbps)

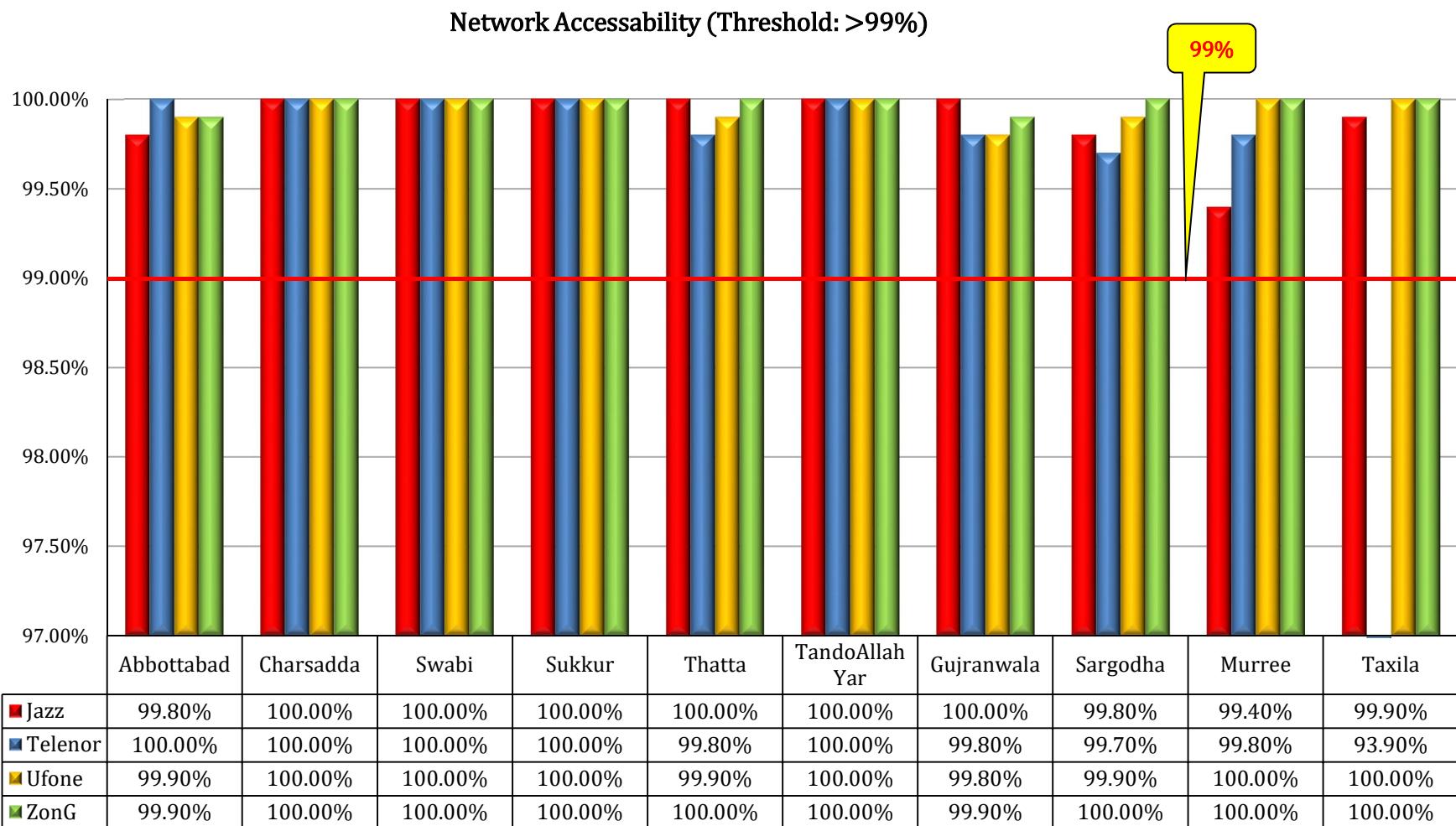


### Signal Strength RSCP- 3G (Threshold: Minimum -100dBm with 90% Confidence)

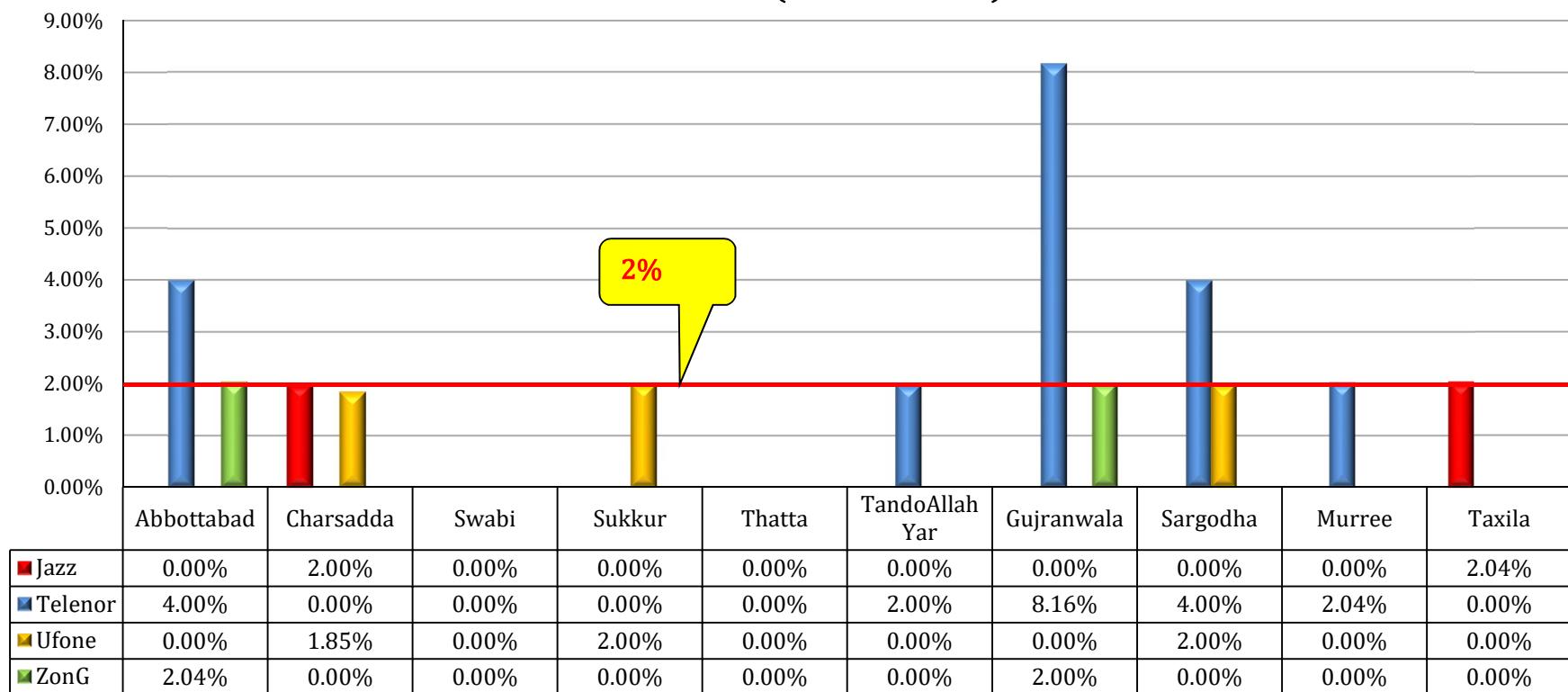


### Signal Strength RSRP- 4G (Threshold: Minimum -100dBm with 90% confidence)

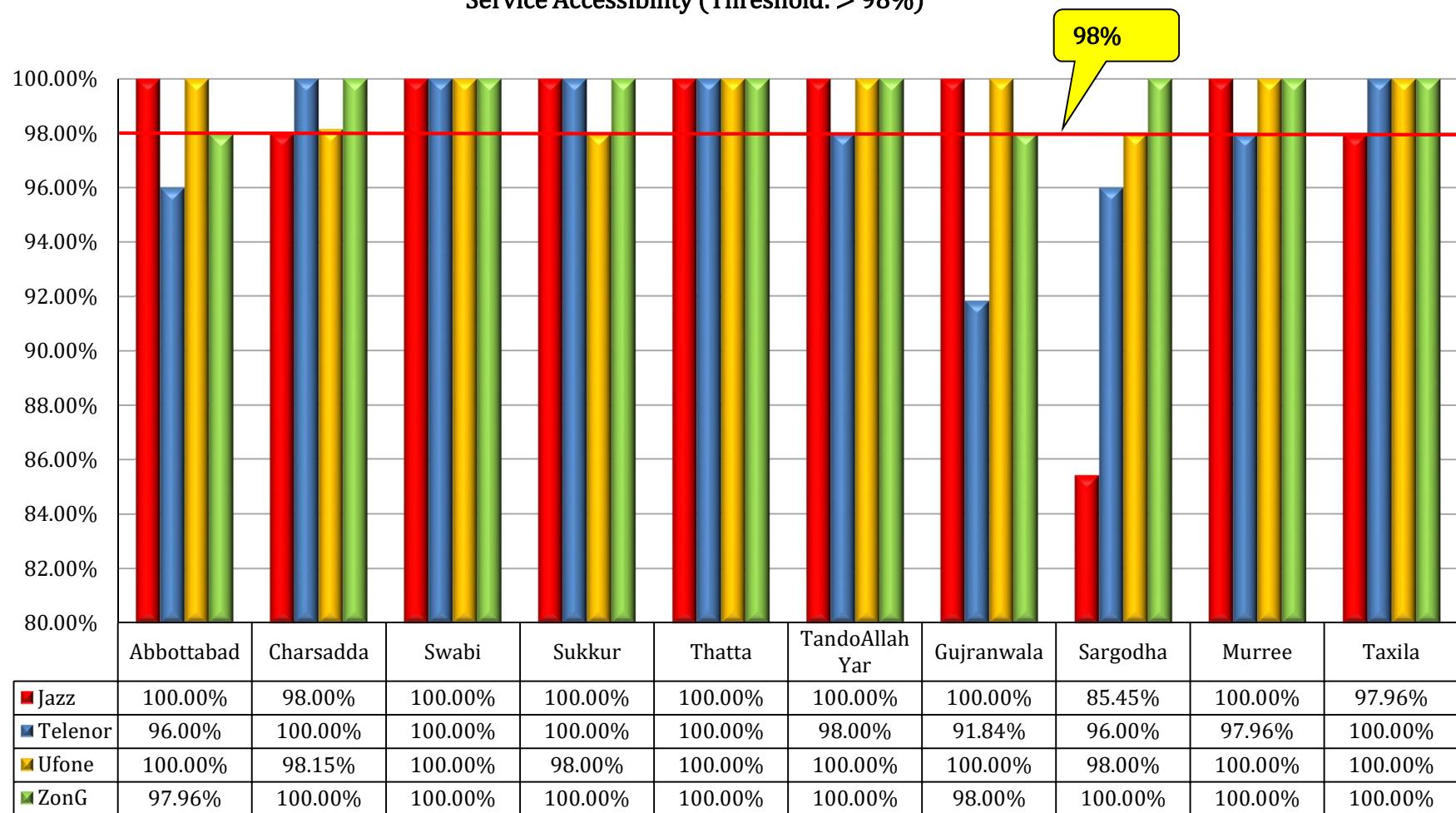




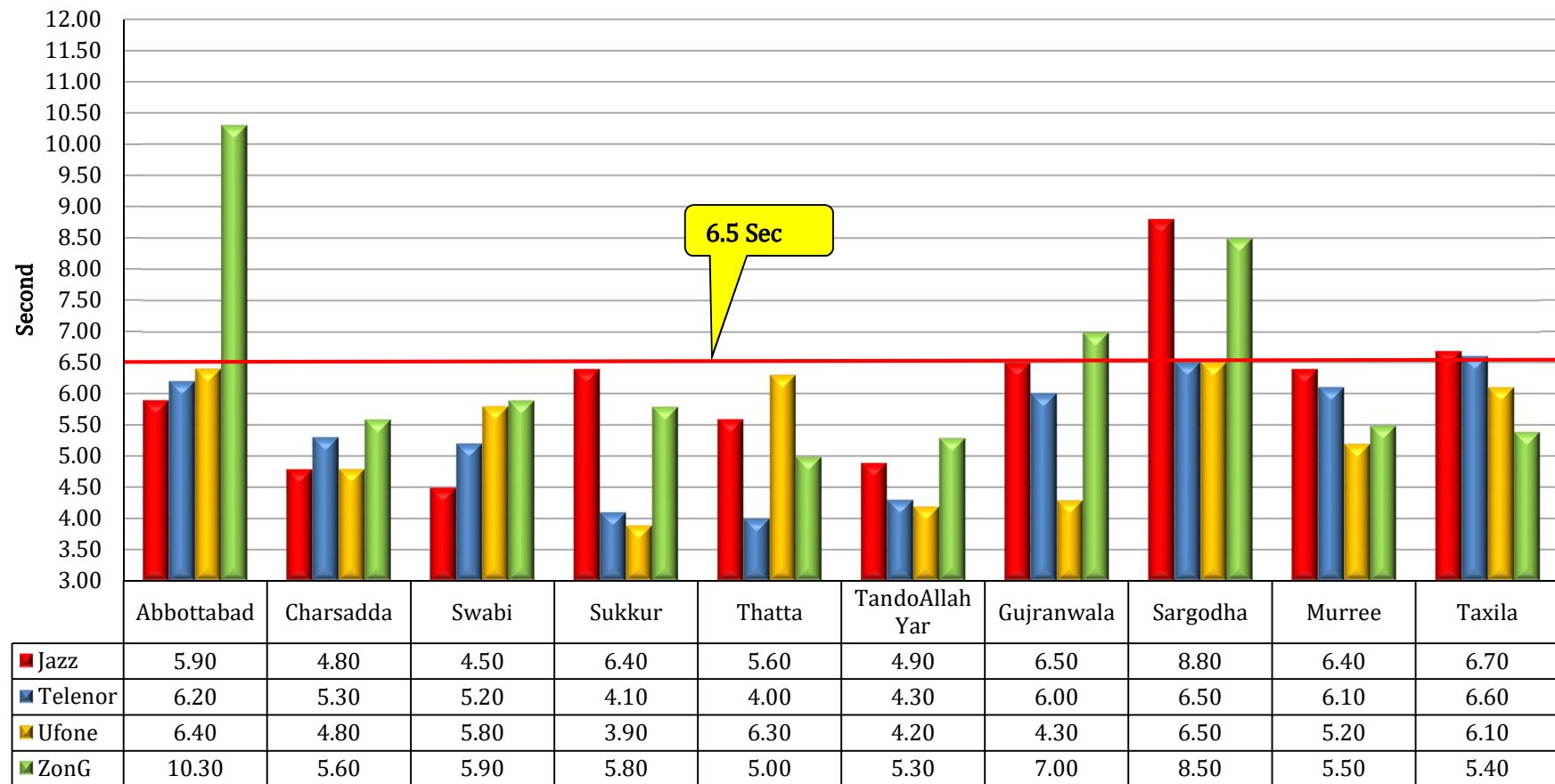
### Grade of Service (Threshold: $\leq 2\%$ )

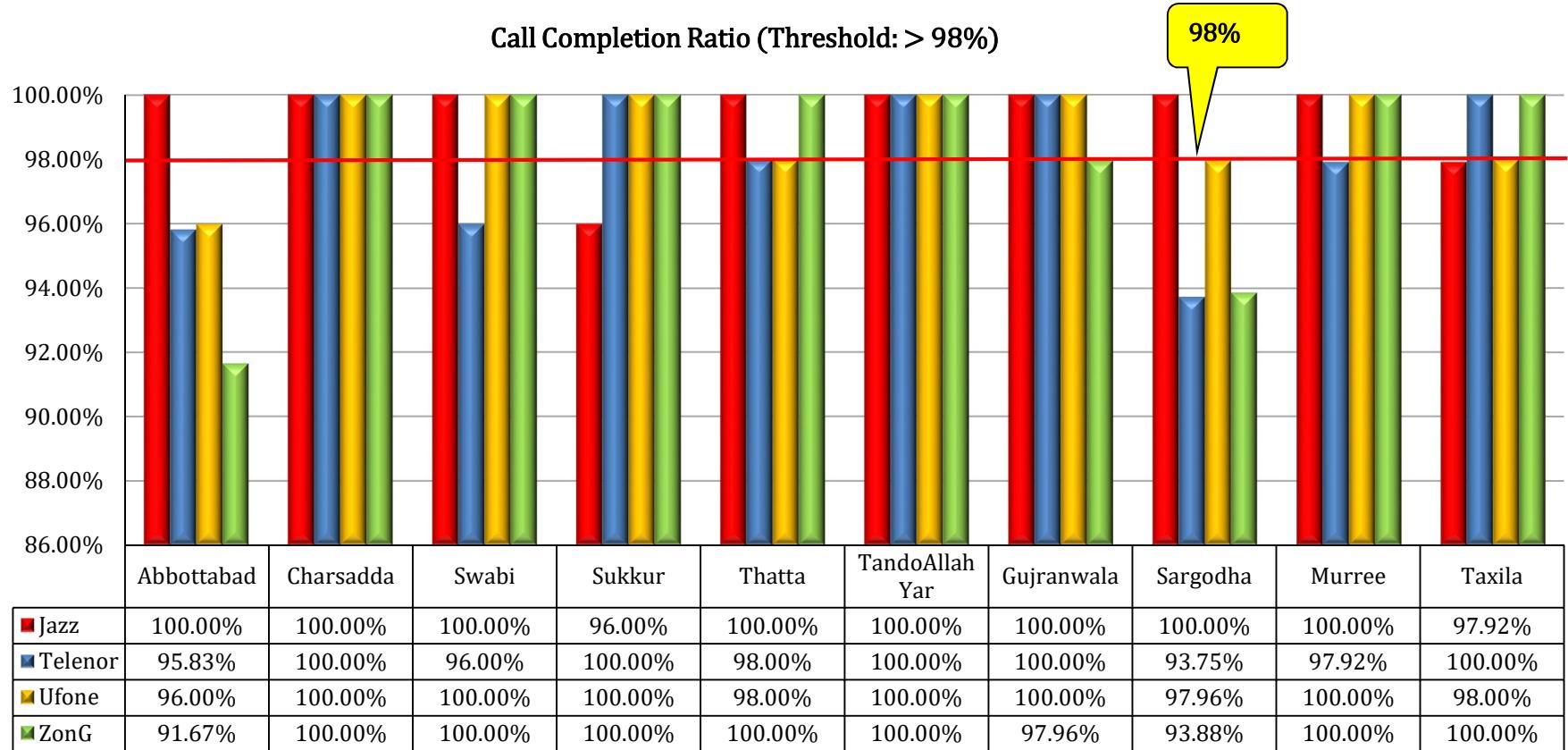


### Service Accessibility (Threshold: > 98%)

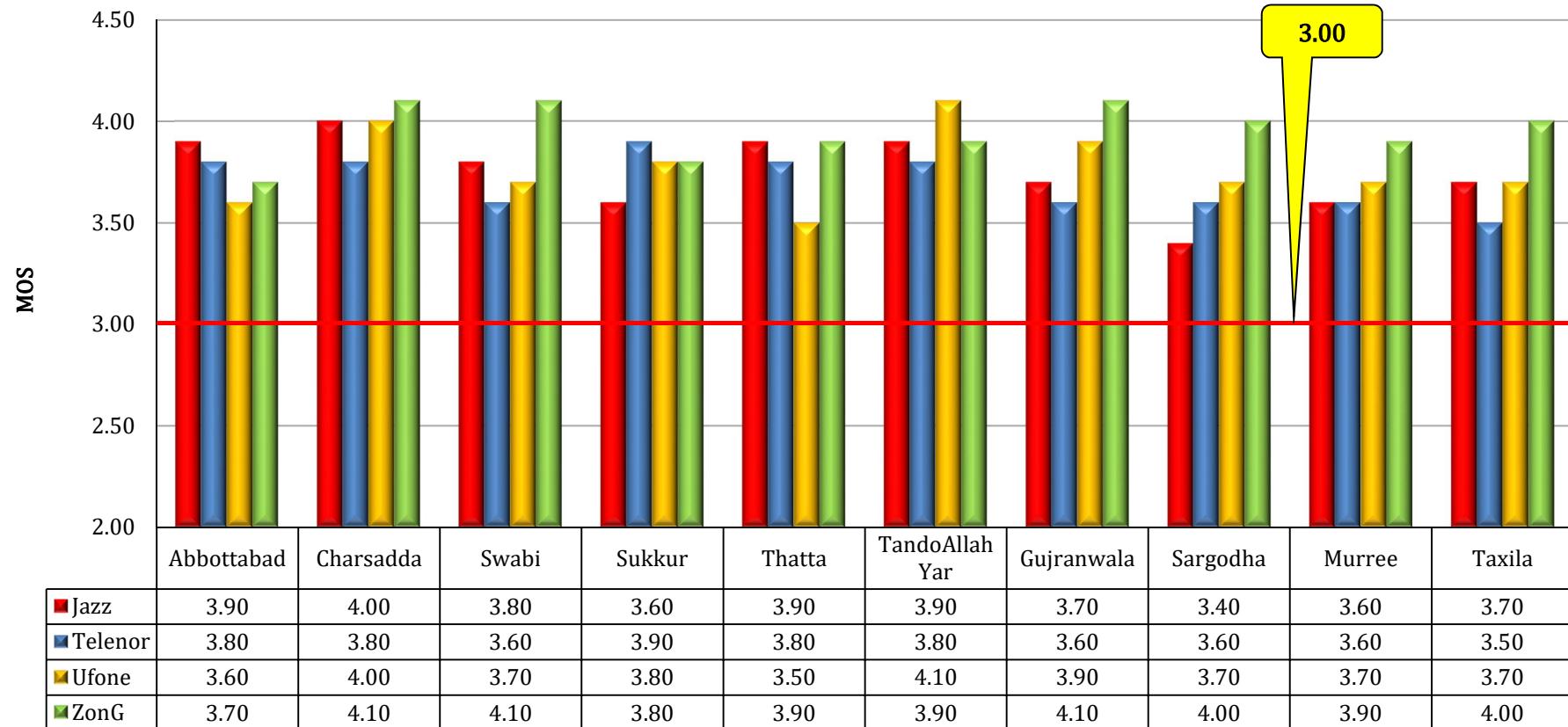


### Call Connection Time (Threshold: $\leq 6.5$ Sec)

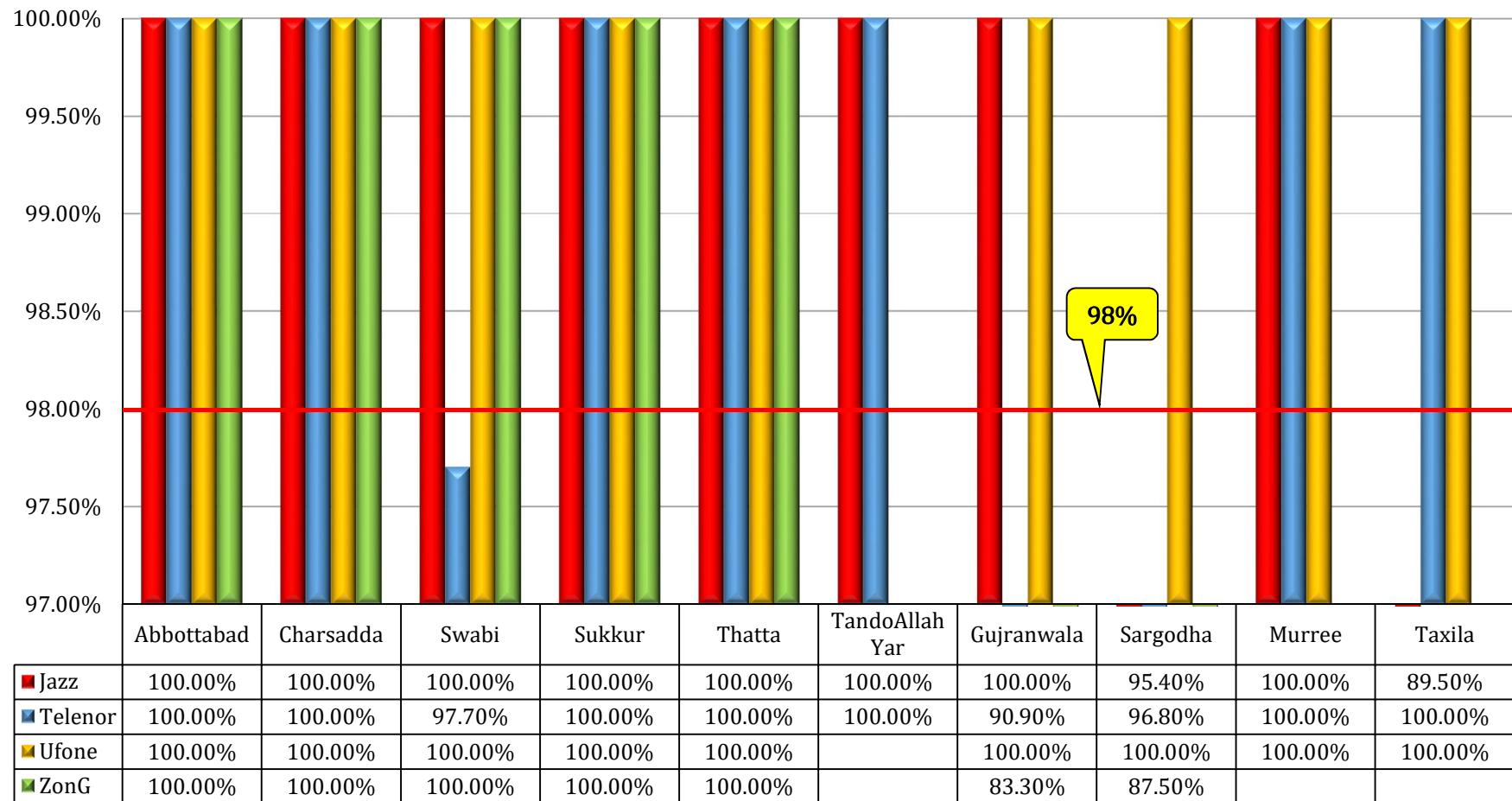




### Mean Opinion Score (Threshold: >3)



### Inter System Handover Success Rate of CS Voice (Threshold: > 98%)



SMS Success Rate (Threshold: > 99%)



### End to End Delivery Time (Threshold: $\leq 12$ Sec)

