هيئة تنظيم الاتصالات
Telecommunications Regulatory Authority

Mobile Network Performance Benchmarking

Governorate of Dakhiliyah

Regulatory & Compliance Unit
Quality of Service Department

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1. Background

A comprehensive field test was conducted independently by TRA to assess and benchmark the performance of Omantel and Ooredoo mobile voice and data networks in Al Dakhiliyah Governorate.

Field Survey Date & Time: 4th – 8th May 2015 from 9:00 A.M. to 10:00 P.M.

Services Tested

Network	Service	Technology
Omantel	Voice	2G, 3G
	Data	3G, 4G
Ooredoo	Voice	2G, 3G
	Data	3G, 4G

Test Area

Governorate	Wilayat
Dakhiliyah	Bidbid, Samail, Izki, Nizwa (including Jabal Al Akhdar), Bahla, Al Hamra, Manah, Adam

2. Test Methodology

The following test configuration was used for measurements:

Service Tested	Technology Mode	Objective	Test sequence	KPIs measured
Omantel-Mobile voice	Open (2G, 3G)	To check network accessibility, retain-ability, mobility, service integrity and coverage	Calls of 60 sec duration with a 20 sec idle wait time between them to allow for cell reselection from 2G to 3G mode.	CSSR, CDR, CSR, RxLev, RSCP.
Omantel-Mobile data	Open (2G, 3G, 4G)	To check data network performance and coverage	HTTP file download from the service providers network and ping test.	Latency, Ping Packet Success Rate, Avg. downlink throughput, RSCP, RSRP.
Ooredoo-Mobile voice	Open (2G, 3G)	To check network accessibility, retain-ability, mobility service integrity and coverage	Calls of 60 sec duration with a 20 sec idle wait time between them to allow for cell reselection from 2G to 3G mode	CSSR, CDR, CSR, RxLev, RSCP.
Ooredoo-Mobile data	Open (2G, 3G,4G)	To check data network performance and coverage	HTTP file download from the service providers network and ping test.	Latency, Ping Packet Success Rate, Avg. downlink throughput, RSCP, RSRP.

3. Key Performance Indicators Definition

Mobile voice performance was measured based on the following set of KPIs:

Call Setup Success Rate (CSSR)– This indicator is used to measure the percentage of calls successfully established without facing blockage in the network as a ratio of the total number of call attempts made to access and establish a voice call. (to check network accessibility)

Call Drop Rate (CDR) – This indicator is used to measure the percentage of calls dropped due to technical problems or coverage gaps in the service provider's network as a ratio of the total number of calls successfully established. (to check network retain-ability)

Call Success Rate (CSR) – This indicator is used to measure the percentage of calls successfully established without facing blockage in the network as a ratio of the total number of call attempts made to access and establish a voice call and then successfully terminated from the user-end without being dropped or disconnected from the network side due to a technical irregularity. (to check service integrity)

Mobile data performance was measured based on the following set of KPIs:

Packet Latency - Packet delay, which represents the time taken for data packets to pass through the GPRS bearer in a round-trip time from the mobile to the server in the service provider's core network and back to the mobile. (to check delay in the network)

Ping Packet Success Rate is the percentage of packets lost between designated routes in the network. It is used to indicate the loss of data packets during transmission over a telecommunications network. (to check data integrity)

HTTP Average downlink throughput - This is the average downlink throughput (rate at which data/bits are transferred to the user) experienced by a user while downloading content from the Internet. (to check download speed)

Performance Indicators Definition continued

Coverage is assessed based on the following radio parameters:

Reference Signal Received Power (RSRP) – This indicator measures the linear average of the received power on reference signal resource elements in the downlink during the drive test (to check 4G coverage).

Received Signal Code Power (RSCP) – This indicator measures the received signal code power of the pilot channel in the downlink during the drive test (to check 3G coverage).

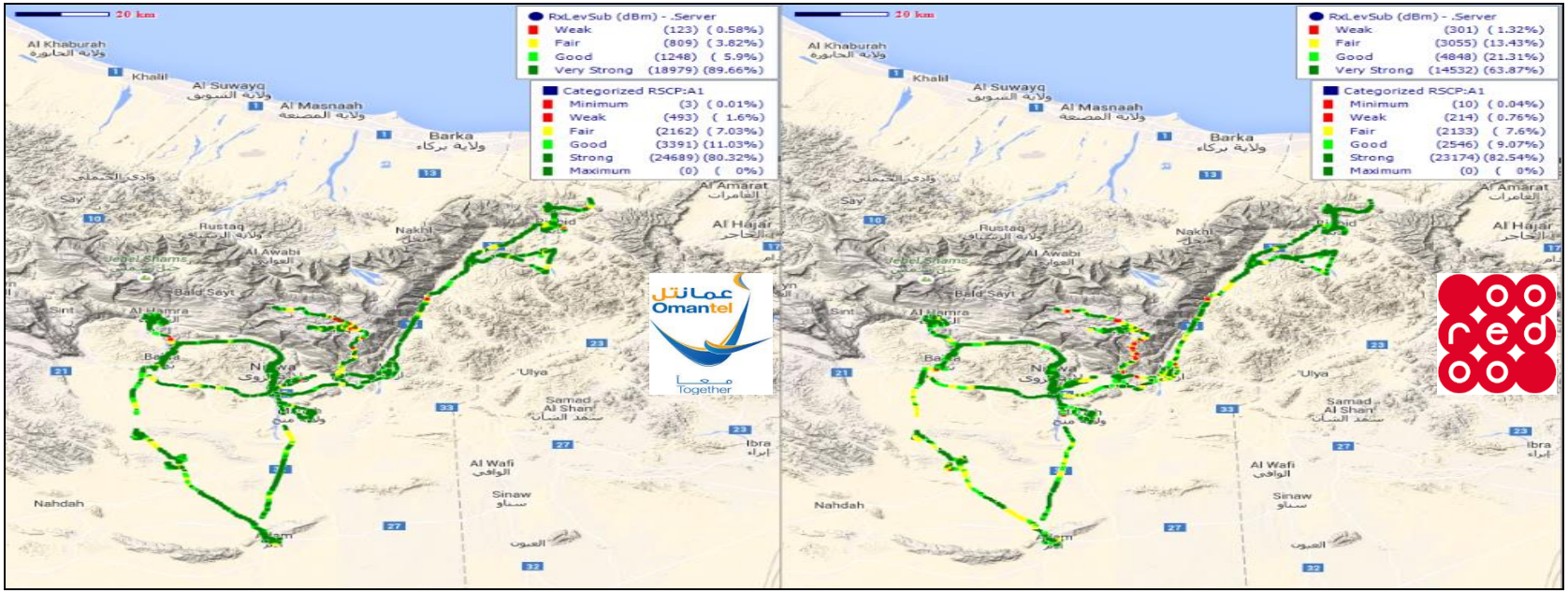
Received Signal Level (RxLevSub) - This indicator measures the received signal strength in downlink during the drive tests (to check 2G coverage).

The following convention is used for the coverage plot.

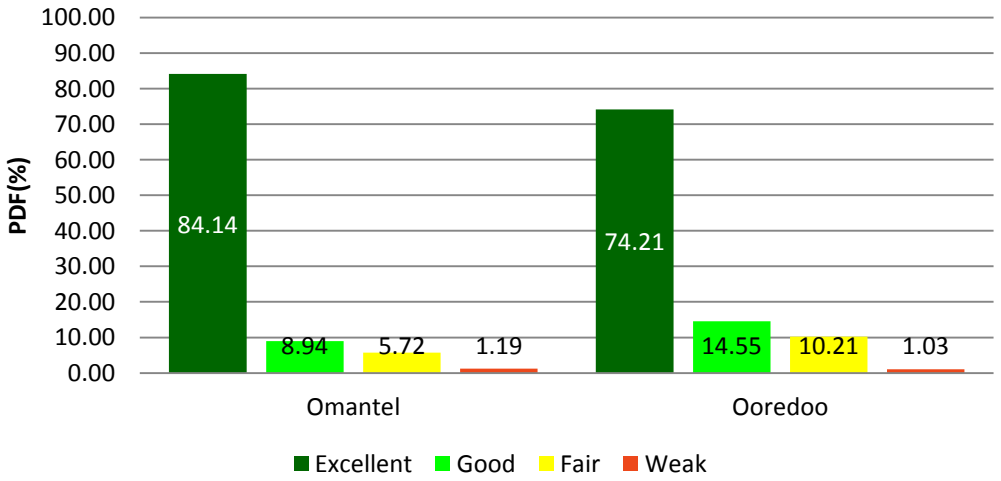
Serving Cell RSRP (dBm)		3G CPICH RSCP (dBm)		2G RxLevSub (dBm)			
	Range		Range		Range	Classification	Penetration
	>= - 85		>= -80		>= -75	Excellent	Indoor
	>= -95 and < -85		>=-87 and <-80		>=-82 and <-75	Good	
	>= -105 and < -95		>=-100 and <-87		>=-95 and <-82	Fair	In-Car
	>= 120 and < -105		<-100		<-95	Weak	Outdoor Only

4. Results

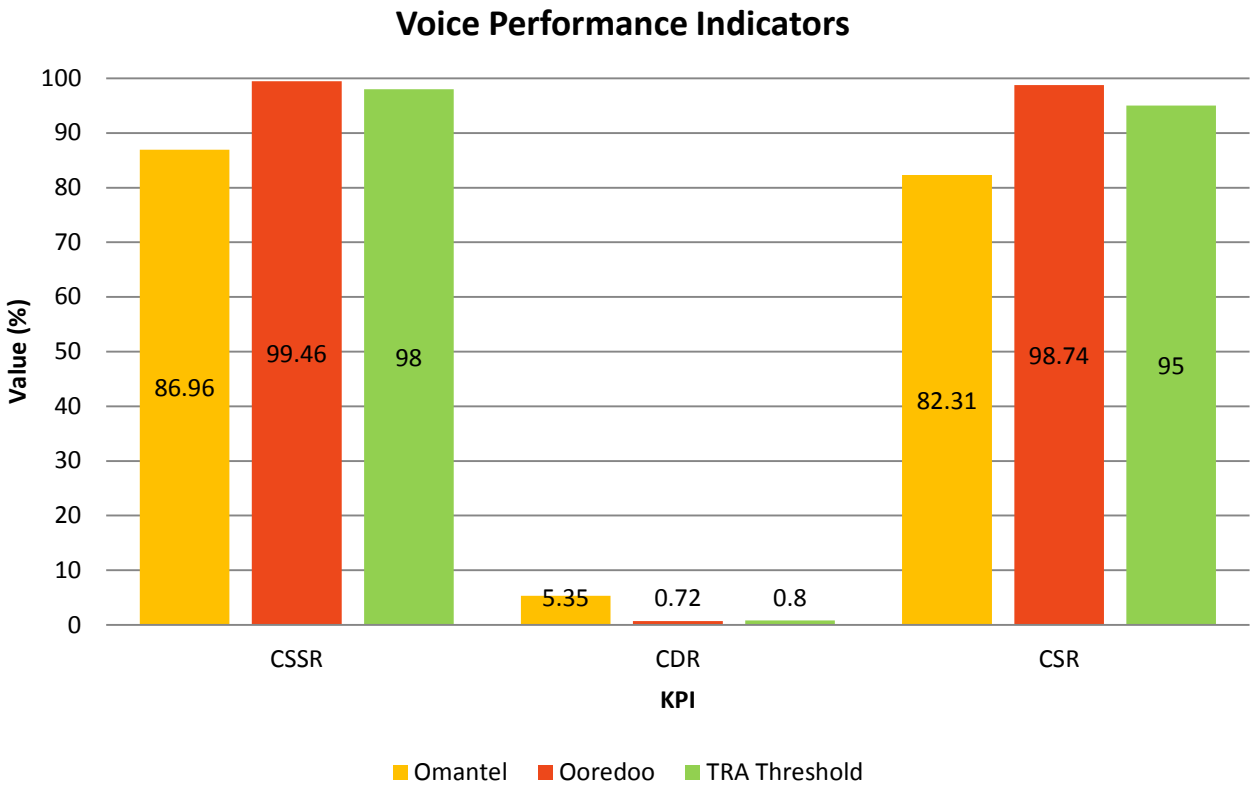
4.1 Mobile Voice Coverage



Voice Coverage Distribution



4.2 Mobile Voice Performance

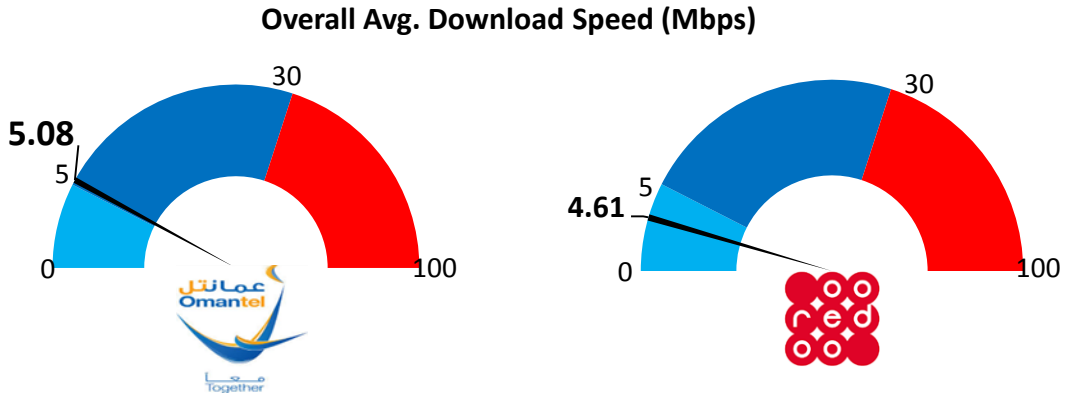


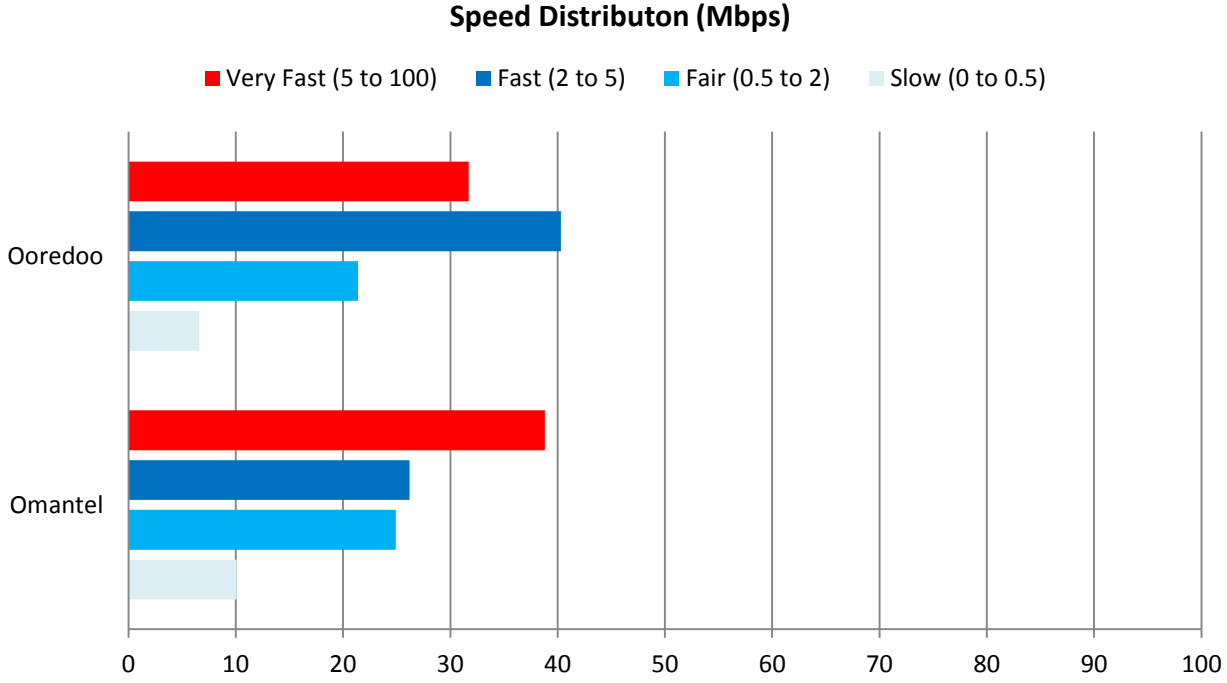
CSSR: Call Setup Success Rate (Higher is better)

CDR: Call Drop Rate (Lower is Better)

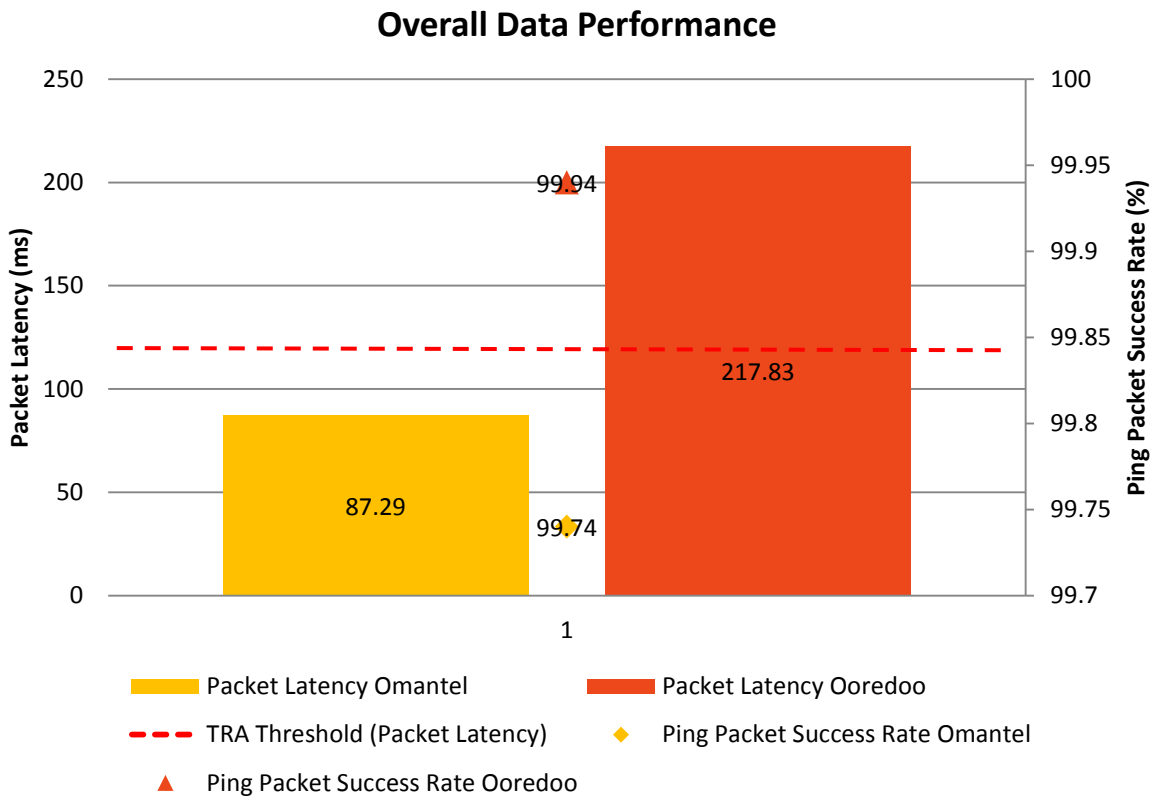
CSR: Call Success Rate (Higher is better)

4.3 Mobile Data Download Speed



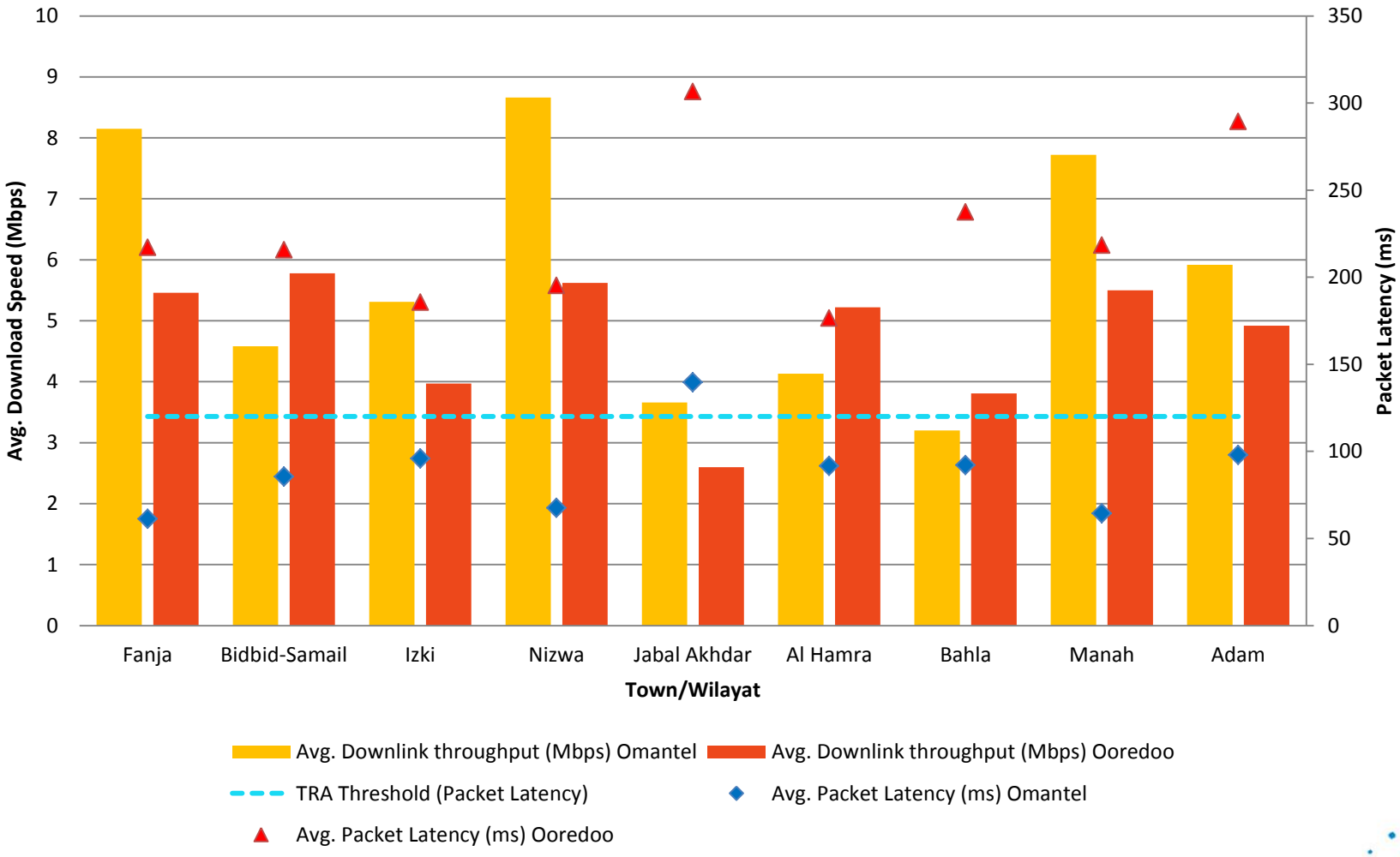


4.4 Mobile Data Performance



Packet Latency (ms): Lower is Better, **Ping Packet Success Rate:** Higher is Better

4.5 Mobile Data Performance Per Town/Wilayat



5 Conclusion

- In General, Omantel mobile network exhibits stronger voice coverage than Ooredoo throughout the Governorate of Al Dakhiliyah.
- Ooredoo mobile network lacks basic voice coverage on the Jabal Akhdar access road from Birkat Al Mouz to the top of the mountain.
- Ooredoo mobile network exhibits better voice performance than Omantel network with all KPIs meeting the TRA thresholds.
- Omantel mobile network exhibits poor voice performance with all KPIs not-meeting the TRA thresholds. Call blocking is found to be significantly high throughout the Governorate of Al Dakhiliyah on Omantel network.
- Omantel mobile data network has good LTE footprint throughout the main Wilayat centers. No LTE coverage was found on Ooredoo data network throughout Al Dakhiliyah Governorate.
- Omantel mobile data network exhibits good data performance with overall high download speeds and low network delay which is within the TRA threshold.
- Ooredoo mobile data network exhibits fair data performance with overall good download speeds but the network delay is extremely high and does not meet the TRA threshold in any Wilayat or Town.

Basis of results and conclusion

- The coverage information is based on the geographical drive test route used during the measurement exercise.
- The exercise has been conducted independently by the Authority without sharing any prior information with the service providers about the type of tests being performed or location.
- The results of the exercise are based on the data collected from the field at a certain instance of time and day; network behaviour may vary with traffic variations over time and events.
- Industry standard tools and work best practices have been used during the whole exercise.