

		<b>China Telecom Cloud TeleDB</b>		TPC-DS: 3.2.0 TPC-Pricing: 2.9.0 Report Date: 6-Dec-2024																						
Total System Cost	TPC-DS Throughput	Price / Performance	System Available Date																							
¥ 7,225,937 RMB	<b>40,206,063</b> QphDS@10000GB	¥ 179.53 RMB/kQphDS@10000GB	6-Dec-2024																							
Dataset Size	Database Manager	Operating System	Other Software	Cluster																						
10,000GB	TeleDB V5.1	CentOS Linux release 7.9.2009	No	Yes																						
<b>ECX Server details (22 ECXs):</b> <ul style="list-style-type: none"> <li>Processors: 4x Intel Xeon Gold 6348H</li> <li>Memory: 768 GB (24x 32 GB DDR4)</li> <li>Storage:               <ul style="list-style-type: none"> <li>2x 480 GB SSD Local Disks (RAID-1)</li> <li>4x 3.2 TB NVMe (RAID-10)</li> </ul> </li> <li>Network:               <ul style="list-style-type: none"> <li>Bandwidth (Gbit/s): 25.0</li> </ul> </li> </ul>			<table border="1"> <caption>Elapsed Time Breakdown</caption> <thead> <tr> <th>Category</th> <th>Value</th> <th>Percentage</th> </tr> </thead> <tbody> <tr> <td>T_TT1</td> <td>2,811.6</td> <td>38.85%</td> </tr> <tr> <td>T_DM1</td> <td>19.3</td> <td>0.27%</td> </tr> <tr> <td>T_DM2</td> <td>19.4</td> <td>0.27%</td> </tr> <tr> <td>T_Load</td> <td>509.0</td> <td>7.03%</td> </tr> <tr> <td>T_Power</td> <td>847.8</td> <td>11.71%</td> </tr> <tr> <td>T_TT2</td> <td>3,030.2</td> <td>41.87%</td> </tr> </tbody> </table>			Category	Value	Percentage	T_TT1	2,811.6	38.85%	T_DM1	19.3	0.27%	T_DM2	19.4	0.27%	T_Load	509.0	7.03%	T_Power	847.8	11.71%	T_TT2	3,030.2	41.87%
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			<b>Elapsed Time</b>																							
<b>Benchmarked Configuration</b>			<b>Elapsed Time</b>																							
Load includes backup = No			RAID-10																							
<b>System Configuration</b>			China Telecom Cloud TeleDB Cluster																							
Servers:			22 * China Telecom Cloud ECX Compute																							
Total Processors/Cores/Threads:			2,112 cores																							
Total Memory:			16,896 GB																							
Total Storage:			278,949.74 GB																							
Storage Ratio:			27.9																							
<b>Server Configuration:</b>			Per node																							
Processors/Cores/Threads:			88/2,112/4,224																							
Memory:			24 * 32GB DDR4																							
Network:			25 Gbit/s																							
Storage Device:			2 * 480GB SSD Local Disk and 4 * 3.2TB NVMe SSD																							



## China Telecom Cloud TeleDB

TPC-DS: 3.2.0  
 TPC-Pricing: 2.9.0  
 Report Date: 25-Sep-2024

Description	Part Number	Price Source	List Price	Quantity	Extended Price	3-Yr. Maintenance Price
<b>Hardware</b>						
China Telecom Cloud ECX Compute Server:	N/A					
4x Intel Xeon Gold 6348H CPU @ 2.30 GHz (RMB/Yr.)	N/A	1	115,200.00			
24x 32 GB DDR4 (RMB/Yr.)	N/A	1	46,080.00			
2x 480 GB SSD (RMB/Yr.)	N/A	1	921.60			
4x 3.2 TB NVMe SSD (RMB/Yr.)	N/A	1	19,968.00			
<b>Server Total (RMB/Yr.)</b>		1	182,169.60	66	12,023,193.60	incl.
Discount (See Note 1)	45%				-6612756.48	0.00
<b>Software</b>						
TeleDB V5.1 software license buyout with a complimentary 1yr. 7x24 Support	N/A	1	150,000.00	22	3300000	0.00
2yr. 7x24 Support	N/A	1	16,500.00	44	0.00	726,000.00
Discount (See Note 1)	45%				-1815000	399,300.00
<b>Other</b>						
Thinkpad E14 laptop	N/A	2	3,799.00	1	3,799.00	incl.
				<b>Total</b>	6,899,236.12	326,700.00
Source: 1 - China Telecom Cloud; 2 - jd.com					<b>3-Year Cost of Ownership RMB:</b>	<b>7,225,937</b>
Note 1: Discount applies to all line items where Price Source = 1					<b>QphDS@10000:</b>	<b>40,206,063</b>
Benchmark results and test methodology audited by Doug Johnson, InfoSizing					<b>RMB/kQphDS@10000:</b>	<b>179.73</b>

Prices used in TPC benchmarks reflect the actual prices a customer would pay for a one-time purchase of the stated Line Items. Individually negotiated discounts are not permitted. Special prices based on assumptions about past or future purchases are not permitted. All discounts reflect standard pricing policies for the listed Line Items. For complete details, see the pricing section of the TPC Benchmark Standard. If you find that the stated prices are not available according to these terms, please inform the TPC at [pricing@tpc.org](mailto:pricing@tpc.org). Thank you.



# China Telecom Cloud TeleDB

TPC-DS: 3.2.0  
TPC-Pricing: 2.9.0  
Report Date: 6-Dec-2024

Metric Details		
Name	Value	Description / Unit
SF	10,000	Scale Factor 10TB
S	8	Total Throughput Streams
Sq	4	Streams / Throughput Test
Q	396	Queries / Throughput Test
T_LD	0.0057	hours@10000
T_PT	0.9420	hours@10000
T_TT	1.6228	hours@10000
T_DM	0.0108	hours@10000

Secondary Metrics		
Name	Value	Unit
T_Load	509.0	seconds@10000
T_Power	847.8	seconds@10000
T_TT1	2,811.6	seconds@10000
T_TT2	3,030.2	seconds@10000
T_DM1	19.3	seconds@10000
T_DM2	19.4	seconds@10000

Test Timeline				
Test	Start	End	Seconds	hh:mm:ss
Load	2024-12-06 01:31:52.562	2024-12-06 01:40:21.520	508.958000 6	0:08:29
Audit/Admin	2024-12-06 01:40:21.553	2024-12-06 02:20:10.478	2388.925	0:39:49
Power	2024-12-06 02:20:10.570	2024-12-06 02:34:18.280	847.710	0:14:08
TT-1	2024-12-06 02:34:18.395	2024-12-06 03:21:09.908	2,811.513	0:46:52
DM-1	2024-12-06 03:21:10.012	2024-12-06 03:21:29.225	19.213	0:00:19
TT-2	2024-12-06 03:21:29.324	2024-12-06 04:11:59.344	3,030.020	0:50:30
DM-2	2024-12-06 04:11:59.442	2024-12-06 04:12:18.798	19.356	0:00:19

Stream	Start Time	End Time	Seconds	hh:mm:ss
Power - 0	2024-12-06 02:20:10.570	2024-12-06 02:34:18.280	847.710	0:14:08
TT-1 - 1	2024-12-06 02:34:18.395	2024-12-06 03:18:33.795	2,655.400	0:44:15
TT-1 - 2	2024-12-06 02:34:18.395	2024-12-06 03:21:09.908	2,811.513	0:46:52
TT-1 - 3	2024-12-06 02:34:18.396	2024-12-06 03:17:26.183	2,587.787	0:43:08
TT-1 - 4	2024-12-06 02:34:18.395	2024-12-06 03:17:33.961	2,595.566	0:43:16
DM-1 - 1	2024-12-06 03:21:10.012	2024-12-06 03:21:19.566	9.554	0:00:10
DM-1 - 2	2024-12-06 03:21:19.611	2024-12-06 03:21:29.225	9.614	0:00:10
TT-2 - 5	2024-12-06 03:21:29.324	2024-12-06 04:11:59.344	3,030.020	0:50:30
TT-2 - 6	2024-12-06 03:21:29.324	2024-12-06 04:04:29.768	2,580.444	0:43:00
TT-2 - 7	2024-12-06 03:21:29.325	2024-12-06 04:05:22.755	2,633.430	0:43:53
TT-2 - 8	2024-12-06 03:21:29.325	2024-12-06 04:05:55.191	2,665.866	0:44:26
DM-2 - 3	2024-12-06 04:11:59.442	2024-12-06 04:12:09.009	9.567	0:00:10
DM-2 - 4	2024-12-06 04:12:09.052	2024-12-06 04:12:18.798	9.746	0:00:10

### Timing Intervals for Queries (in Seconds)

Que ry	Power	Throughput Test 1										Throughput Test 2									
		Strea m 0	Strea m 1	Strea m 2	Strea m 3	Strea m 4	Min	25th	Medi an	75th	Max	Strea m 5	Strea m 6	Strea m 7	Strea m 8	Min	25th	Medi an	75th	Max	
1	9.1	9.7	8.1	10.0	8.0	8.00	8.08	8.90	9.78	10.0	10.1	9.8	12.2	8.5	8.50	9.48	9.95	10.6	12.2		
2	2.6	17.1	14.9	19.7	28.4	14.9	16.5	18.40	21.8	28.4	15.3	15.1	20.7	26.3	15.1	15.2	18.00	22.1	26.3		
3	8.8	10.7	5.0	9.7	8.0	5.00	7.25	8.85	9.95	10.7	8.2	9.0	6.5	11.5	6.50	7.78	8.60	9.63	11.5		
4	53.8	96.1	90.8	91.6	66.1	66.1	84.6	91.20	92.7	96.1	83.0	72.2	107.7	69.7	69.7	71.5	77.60	89.1	107.7		
5	4.0	36.1	33.4	26.0	26.2	26.0	26.1	29.80	34.0	36.1	18.6	26.7	29.9	32.2	18.6	24.6	28.30	30.4	32.2		
6	9.0	10.3	8.3	8.0	8.5	8.00	8.23	8.40	8.95	10.3	14.5	10.1	7.6	9.3	7.60	8.88	9.70	11.2	14.5		
7	19.0	14.8	28.1	18.6	26.1	14.8	17.6	22.35	26.6	28.1	22.1	15.8	20.0	15.6	15.6	15.7	17.90	20.5	22.1		
8	17.3	24.4	51.3	52.1	25.3	24.4	25.0	38.30	51.5	52.1	26.3	21.7	28.0	25.8	21.7	24.7	26.05	26.7	28.0		
9	4.0	27.7	28.2	20.7	25.4	20.7	24.2	26.55	27.8	28.2	18.6	24.4	28.7	24.4	18.6	22.9	24.40	25.4	28.7		
10	11.5	9.5	15.6	9.6	9.5	9.50	9.50	9.55	11.1	15.6	7.7	13.3	14.2	9.8	7.70	9.28	11.55	13.5	14.2		
11	3.4	54.6	50.7	48.0	64.0	48.0	50.0	52.65	56.9	64.0	48.5	77.6	54.0	56.5	48.5	52.6	55.25	61.7	77.6		
12	3.9	7.5	5.1	4.8	4.6	4.60	4.75	4.95	5.70	7.50	3.2	4.3	4.4	4.6	3.20	4.03	4.35	4.45	4.60		
13	3.7	39.7	19.5	35.9	29.2	19.5	26.7	32.55	36.8	39.7	62.0	27.3	36.4	28.1	27.3	27.9	32.25	42.8	62.0		
14	5.5	77.4	69.4	61.3	66.4	61.3	65.1	67.90	71.4	77.4	83.8	61.8	107.6	63.4	61.8	63.0	73.60	89.7	107.6		
15	8.9	12.7	17.6	11.9	18.2	11.9	12.5	15.15	17.7	18.2	6.8	12.2	12.0	7.2	6.80	7.10	9.60	12.0	18.2		
16	3.4	70.2	83.9	85.5	105.7	70.2	80.4	84.70	90.5	105.7	78.1	25.9	64.3	115.6	25.9	54.7	71.20	87.4	115.6		
17	17.2	13.8	17.7	15.1	13.6	13.6	13.7	14.45	15.7	17.7	13.9	15.3	11.9	20.5	11.9	13.4	14.60	16.6	20.5		
18	3.4	18.4	14.0	16.3	19.0	14.0	15.7	17.35	18.5	19.0	21.7	20.3	15.0	13.6	13.6	14.6	17.65	20.6	21.7		
19	29.2	21.5	18.9	22.5	21.4	18.9	20.7	21.45	21.7	22.5	20.3	24.4	22.2	24.8	20.3	21.7	23.30	24.5	24.8		
20	5.2	6.6	4.4	5.2	5.8	4.40	5.00	5.50	6.00	6.60	3.7	7.0	6.3	4.8	3.70	4.53	5.55	6.48	7.00		
21	11.2	11.6	27.8	15.7	21.9	11.6	14.6	18.80	23.3	27.8	11.1	23.0	14.4	10.3	10.3	10.9	12.75	16.5	23.0		
22	7.7	9.3	8.5	18.3	13.8	8.50	9.10	11.55	14.9	18.3	10.8	11.1	8.1	11.3	8.10	10.1	10.95	11.1	18.3		
23	6.7	169.3	152.3	205.4	173.3	152.3	165.05	171.3	181.33	205.4	193.1	178.4	190.8	161.5	161.5	174.18	184.6	191.38	193.1		
24	5.7	95.8	81.5	95.6	91.2	81.5	88.7	93.40	95.6	95.8	80.1	80.6	128.0	96.2	80.1	80.4	88.40	104.15	128.0		
25	32.8	16.7	18.6	15.5	16.2	15.5	16.0	16.45	17.1	18.6	18.8	14.1	27.3	17.2	14.1	16.4	18.00	20.9	27.3		
26	8.1	11.1	10.5	17.5	8.4	8.40	9.98	10.80	12.7	17.5	14.8	11.7	10.5	12.8	10.5	11.4	12.25	13.3	17.5		
27	2.6	17.1	23.7	21.0	18.1	17.1	17.8	19.55	21.6	23.7	26.1	24.5	14.7	13.4	13.4	14.3	19.60	24.9	26.1		
28	3.5	66.5	66.0	60.0	57.2	57.2	59.3	63.00	66.1	66.5	66.1	66.6	59.0	71.1	59.0	64.3	66.35	67.7	71.1		
29	17.9	14.6	14.8	15.5	11.6	11.6	13.8	14.70	14.9	15.5	8.4	21.8	12.0	13.3	8.40	11.1	12.65	15.4	21.8		
30	7.7	9.8	9.4	8.5	9.7	8.50	9.18	9.55	9.73	9.80	7.8	8.0	9.2	8.1	7.80	7.95	8.05	8.38	9.20		
31	4.3	17.3	26.2	19.2	30.3	17.3	18.7	22.70	27.2	30.3	25.5	17.7	23.9	12.4	12.4	16.3	20.80	24.3	30.3		
32	6.2	8.3	14.7	7.3	6.3	6.30	7.05	7.80	9.90	14.7	7.6	9.0	7.7	9.4	7.60	7.68	8.35	9.10	14.7		
33	3.8	16.2	13.6	14.8	21.0	13.6	14.5	15.50	17.4	21.0	19.1	16.8	15.6	10.9	10.9	14.4	16.20	17.3	21.0		
34	5.8	19.5	14.1	36.1	21.6	14.1	18.1	20.55	25.2	36.1	13.1	24.2	22.5	32.7	13.1	20.1	23.35	26.3	36.1		
35	24.5	19.6	14.3	16.4	15.5	14.3	15.2	15.95	17.2	19.6	17.5	21.7	25.3	18.3	17.5	18.1	20.00	22.6	25.3		
36	2.9	19.5	18.3	16.1	17.7	16.1	17.3	18.00	18.6	19.5	18.1	15.2	21.6	16.2	15.2	15.9	17.15	18.9	21.6		
37	7.9	13.5	9.8	11.8	9.6	9.60	9.75	10.80	12.2	13.5	6.7	16.9	8.9	9.8	6.70	8.35	9.35	11.5	13.5		
38	2.5	17.3	22.4	26.4	21.0	17.3	20.0	21.70	23.4	26.4	22.2	19.0	28.2	24.2	19.0	21.4	23.20	25.2	28.2		
39	10.2	14.4	19.5	13.3	15.2	13.3	14.1	14.80	16.2	19.5	8.8	11.5	16.0	15.7	8.80	10.8	13.60	15.7	19.5		
40	7.5	7.9	8.5	9.9	7.7	7.70	7.85	8.20	8.85	9.90	11.3	12.2	8.7	7.5	7.50	8.40	10.00	11.5	12.2		
41	3.1	3.3	2.5	3.2	2.9	2.50	2.80	3.05	3.23	3.30	2.4	3.4	3.1	6.6	2.40	2.93	3.25	4.20	6.60		
42	8.0	7.6	8.8	13.7	7.8	7.60	7.75	8.30	10.0	13.7	8.2	8.8	6.9	11.7	6.90	7.88	8.50	9.53	13.7		
43	12.6	11.4	42.1	11.5	13.7	11.4	11.4	12.60	20.8	42.1	7.8	12.0	12.2	11.7	7.80	10.7	11.85	12.0	20.8		
44	12.1	12.8	10.9	21.6	14.5	10.9	12.3	13.65	16.2	21.6	13.9	16.3	14.5	12.1	12.1	13.4	14.20	14.9	21.6		
45	8.0	8.7	7.8	6.3	12.7	6.30	7.43	8.25	9.70	12.7	11.3	11.1	12.2	8.9	8.90	10.5	11.20	11.5	12.7		

46	3.0	19.5	12.6	18.2	27.8	12.6 0	16.8 0	18.85	21.5 8	27.8 0	18.5	26.0	16.5	20.1	16.5 0	18.0 0	19.30	21.5 8	26.0 0
47	4.1	22.4	14.6	21.0	23.7	14.6 0	19.4 0	21.70	22.7 3	23.7 0	14.6	22.3	19.9	22.4	14.6 0	18.5 8	21.10	22.3 3	22.4 0
48	3.3	21.4	17.9	32.7	59.5	17.9 0	20.5 3	27.05	39.4 0	59.5 0	25.9	30.1	29.7	19.3	19.3 0	24.2 5	27.80	29.8 0	30.1 0
49	4.1	20.9	21.5	33.8	24.2	20.9 0	21.3 5	22.85	26.6 0	33.8 0	52.1	31.1	28.6	25.5	25.5 0	27.8 3	29.85	36.3 5	52.1 0
50	9.5	11.2	8.7	9.1	10.2	8.70	9.00	9.65	10.4 5	11.2 0	15.6	8.7	7.6	17.3	7.60	8.43	12.15	16.0 3	17.3 0
51	3.0	58.6	54.3	73.3	67.8	54.3 0	57.5 3	63.20	69.1 8	73.3 0	68.0	48.7	58.3	51.4	48.7 0	50.7 3	54.85	60.7 3	68.0 0
52	9.2	19.3	13.3	14.8	19.1	13.3 0	14.4 3	16.95	19.1 5	19.3 0	18.7	15.6	18.3	15.0	15.0 0	15.4 5	16.95	18.4 0	18.7 0
53	11.6	11.0	10.8	9.9	14.9	9.90	10.5 8	10.90	11.9 8	14.9 0	8.9	10.2	8.2	11.2	8.20	8.73	9.55	10.4 5	11.2 0
54	3.1	38.9	32.4	30.2	27.4	27.4 0	29.5 0	31.30	34.0 3	38.9 0	29.8	17.3	16.5	38.9	16.5 0	17.1 0	23.55	32.0 8	38.9 0
55	6.1	8.9	14.3	8.3	7.9	7.90	8.20	8.60	10.2 5	14.3 0	8.4	7.3	7.7	8.3	7.30	7.60	8.00	8.33	8.40
56	2.6	17.0	17.8	25.8	16.9	16.9 0	16.9 8	17.40	19.8 0	25.8 0	20.6	24.9	16.3	18.2	16.3 0	17.7 3	19.40	21.6 8	24.9 0
57	12.9	11.3	10.7	12.8	10.2	10.2 0	10.5 8	11.00	11.6 8	12.8 0	13.0	14.9	10.0	11.6	10.0 0	11.2 0	12.30	13.4 8	14.9 0
58	11.4	12.2	11.6	16.0	16.2	11.6 0	12.0 5	14.10	16.0 5	16.2 0	14.7	10.0	13.1	10.7	10.0 0	10.5 3	11.90	13.5 0	14.7 0
59	3.4	37.2	31.3	38.8	43.4	31.3 0	35.7 3	38.00	39.9 5	43.4 0	23.6	36.7	31.7	38.3	23.6 0	29.6 8	34.20	37.1 0	38.3 0
60	4.1	41.7	18.1	25.3	34.3	18.1 0	23.5 0	29.80	36.1 5	41.7 0	24.1	23.8	26.1	30.3	23.8 0	24.0 3	25.10	27.1 5	30.3 0
61	10.7	22.4	25.3	13.4	14.5	13.4 0	14.2 3	18.45	23.1 3	25.3 0	15.6	18.8	16.2	43.0	15.6 0	16.0 5	17.50	24.8 5	43.0 0
62	6.7	5.8	7.3	5.7	5.9	5.70	5.78	5.85	6.25	7.30	4.7	6.9	8.4	6.8	4.70	6.28	6.85	7.28	8.40
63	10.5	15.7	10.1	8.1	10.7	8.10	9.60	10.40	11.9 5	15.7 0	10.2	13.7	11.0	6.7	6.70	9.33	10.60	11.6 8	13.7 0
64	3.4	96.1	332.2	60.0	58.1	58.1 0	59.5 3	78.05	155. 13	332. 20	581.0	121.3	69.3	66.4	66.4 0	68.5 8	95.30	236. 23	581. 00
65	3.1	22.0	19.9	20.3	19.8	19.8 0	19.8 8	20.10	20.7 3	22.0 0	20.9	25.2	31.6	48.9	20.9 0	24.1 3	28.40	35.9 3	48.9 0
66	11.0	12.2	8.9	17.8	14.2	8.90	11.3 8	13.20	15.1 0	17.8 0	12.6	12.9	12.8	12.0	12.0 0	12.4 5	12.70	12.8 3	12.9 0
67	3.9	97.8	110.6	99.1	115.0	97.8 0	98.7 8	104.8 5	111. 70	115. 00	140.0	97.4	111.9	118.7	97.4 0	108. 28	115.3 0	124. 03	140. 00
68	3.3	31.9	26.5	25.0	22.1	22.1 0	24.2 8	25.75	27.8 5	31.9 0	18.9	30.7	22.9	20.8	18.9 0	20.3 3	21.85	24.8 5	30.7 0
69	7.1	8.6	9.4	13.4	10.1	8.60	9.20	9.75	10.9 3	13.4 0	11.8	9.8	13.5	9.2	9.20	9.65	10.80	12.2 3	13.5 0
70	5.5	18.8	26.6	20.8	32.5	18.8 0	20.3 0	23.70	28.0 8	32.5 0	15.5	26.3	23.0	53.5	15.5 0	21.1 3	24.65	33.1 0	53.5 0
71	5.3	41.8	20.0	18.8	19.0	18.8 0	18.9 5	19.50	25.4 5	41.8 0	23.4	26.7	31.8	28.9	23.4 0	25.8 8	27.80	29.6 3	31.8 0
72	15.5	14.6	18.2	23.8	20.1	14.6 0	17.3 0	19.15	21.0 3	23.8 0	12.6	46.4	22.1	17.7	12.6 0	16.4 3	19.90	28.1 8	46.4 0
73	12.1	10.2	15.3	12.0	11.2	10.2 0	10.9 5	11.60	12.8 3	15.3 0	12.0	13.4	12.2	14.8	12.0 0	12.1 5	12.80	13.7 5	14.8 0
74	4.1	97.4	33.2	48.1	46.1	33.2 0	42.8 8	47.10	60.4 3	97.4 0	48.0	51.8	50.5	121.7	48.0 0	49.8 8	51.15	69.2 8	121. 70
75	28.1	25.4	25.4	31.5	30.4	25.4 0	25.4 0	27.90	30.6 8	31.5 0	16.9	34.5	25.6	22.8	16.9 0	21.3 3	24.20	27.8 3	34.5 0
76	9.3	14.3	20.7	20.6	16.3	14.3 0	15.8 0	18.45	20.6 3	20.7 0	14.5	21.0	13.2	12.1	12.1 0	12.9 3	13.85	16.1 3	21.0 0
77	2.9	20.9	16.8	14.4	27.9	14.4 0	16.2 0	18.85	22.6 5	27.9 0	20.4	18.7	24.4	16.0	16.0 0	18.0 3	19.55	21.4 0	24.4 0
78	3.6	175.8	149.9	147.5	140.3	140. 30	145. 70	148.7 0	156. 38	175. 80	153.9	169.2	132.5	158.1	132. 50	148. 55	156.0 0	160. 88	169. 20
79	3.9	20.1	24.3	18.8	22.3	18.8 0	19.7 8	21.20	22.8 0	24.3 0	20.7	19.7	22.3	32.8	19.7 0	20.4 5	21.50	24.9 3	32.8 0
80	27.2	34.9	39.5	37.3	30.3	30.3 0	33.7 5	36.10	37.8 5	39.5 0	38.5	30.1	33.3	30.8	30.1 0	30.6 3	32.05	34.6 0	38.5 0
81	13.4	17.0	10.4	15.2	12.7	10.4 0	12.1 3	13.95	15.6 5	17.0 0	10.4	11.6	14.0	8.6	8.60	9.95	11.00	12.2 0	14.0 0
82	11.7	11.8	14.2	13.1	11.5	11.5 0	11.7 3	12.45	13.3 8	14.2 0	7.9	12.7	15.2	13.9	7.90	11.5 0	13.30	14.2 3	15.2 0
83	5.8	7.1	12.5	7.8	16.5	7.10	7.63	10.15	13.5 0	16.5 0	8.4	12.4	7.4	6.6	6.60	7.20	7.90	9.40	12.4 0
84	2.6	17.6	27.6	17.1	17.5	17.1 0	17.4 0	17.55	20.1 0	27.6 0	18.4	20.5	20.5	21.1	18.4 0	19.9 8	20.50	20.6 5	21.1 0
85	14.9	14.4	12.7	14.9	12.3	12.3 0	12.6 0	13.55	14.5 3	14.9 0	12.2	14.0	17.8	13.6	12.2 0	13.2 5	13.80	14.9 5	17.8 0
86	6.4	11.8	10.2	8.0	6.4	6.40	7.60	9.10	10.6 0	11.8 0	4.4	9.3	6.6	6.6	4.40	6.05	6.60	7.28	9.30
87	3.8	17.7	26.9	18.6	19.2	17.7 0	18.3 8	18.90	21.1 3	26.9 0	20.6	20.0	22.9	19.7	19.7 0	19.9 3	20.30	21.1 8	22.9 0
88	4.1	22.4	22.5	20.9	24.1	20.9 0	22.0 3	22.45	22.9 0	24.1 0	23.0	30.5	28.4	21.4	21.4 0	22.6 0	25.70	28.9 3	30.5 0
89	16.6	10.0	7.6	11.8	14.1	7.60	9.40	10.90	12.3 8	14.1 0	12.2	15.4	15.4	14.7	12.2 0	14.0 8	15.05	15.4 0	15.4 0
90	4.2	5.2	6.6	4.9	11.1	4.90	5.13	5.90	7.73	11.1 0	5.1	4.5	4.6	4.8	4.50	4.58	4.70	4.88	5.10
91	5.2	4.7	10.6	5.0	5.6	4.70	4.93	5.30	6.85	10.6 0	4.1	5.0	4.9	5.8	4.10	4.70	4.95	5.20	5.80
92	7.4	4.7	3.4	6.4	6.4	3.40	4.38	5.55	6.40	6.40	4.7	8.4	6.5	4.7	4.70	4.70	5.60	6.98	8.40
93	11.0	12.2	11.1	10.7	11.7	10.7 0	11.0 0	11.40	11.8 3	12.2 0	17.9	11.6	11.6	13.6	11.6 0	11.6 0	12.60	14.6 8	17.9 0

94	2.4	15.4	36.4	17.5	18.5	15.4 0	16.9 8	18.00	22.9 8	36.4 0	36.9	18.4	42.9	33.3	18.4 0	29.5 8	35.10	38.4 0	42.9 0
95	5.1	102.2	87.4	60.4	79.3	60.4 0	74.5 8	83.35	91.1 0	102. 20	61.7	62.9	56.6	61.5	56.6 0	60.2 8	61.60	62.0 0	62.9 0
96	2.7	5.9	6.6	7.3	7.2	5.90	6.43	6.90	7.23	7.30	4.4	14.7	6.2	5.6	4.40	5.30	5.90	8.33	14.7 0
97	2.7	24.3	25.8	28.7	16.9	16.9 0	22.4 5	25.05	26.5 3	28.7 0	20.7	18.5	18.8	20.9	18.5 0	18.7 3	19.75	20.7 5	20.9 0
98	11.1	9.4	10.6	9.5	9.0	9.00	9.30	9.45	9.78	10.6 0	9.6	12.0	9.9	9.8	9.60	9.75	9.85	10.4 3	12.0 0
99	5.7	8.6	9.7	13.2	10.8	8.60	9.43	10.25	11.4 0	13.2 0	5.7	9.8	19.1	7.2	5.70	6.83	8.50	12.1 3	19.1 0

**Timing Intervals for Refresh Functions (in Seconds)**

Function	DM-1		DM-2		Min	25th	Median	75th
	Run 1	Run 2	Run 3	Run 4				
DF_CS	3.0	3.0	2.9	3.1	2.90	2.98	3.00	3.03
DF_I	2.1	2.0	1.9	1.9	1.90	1.90	1.95	2.03
DF_SS	2.9	3.0	2.9	3.1	2.90	2.90	2.95	3.03
DF_WS	3.0	3.0	2.9	3.1	2.90	2.98	3.00	3.03
LF_CR	2.7	2.7	2.8	2.8	2.70	2.70	2.75	2.80
LF_CS	3.9	3.9	4.0	4.0	3.90	3.90	3.95	4.00
LF_I	2.5	2.6	2.7	2.5	2.50	2.50	2.55	2.63
LF_SR	2.6	2.6	2.6	2.6	2.60	2.60	2.60	2.60
LF_SS	3.8	3.8	3.8	3.9	3.80	3.80	3.80	3.83
LF_WR	2.6	2.6	2.8	2.7	2.60	2.60	2.65	2.73
LF_WS	3.8	4.0	3.9	4.0	3.80	3.88	3.95	4.00