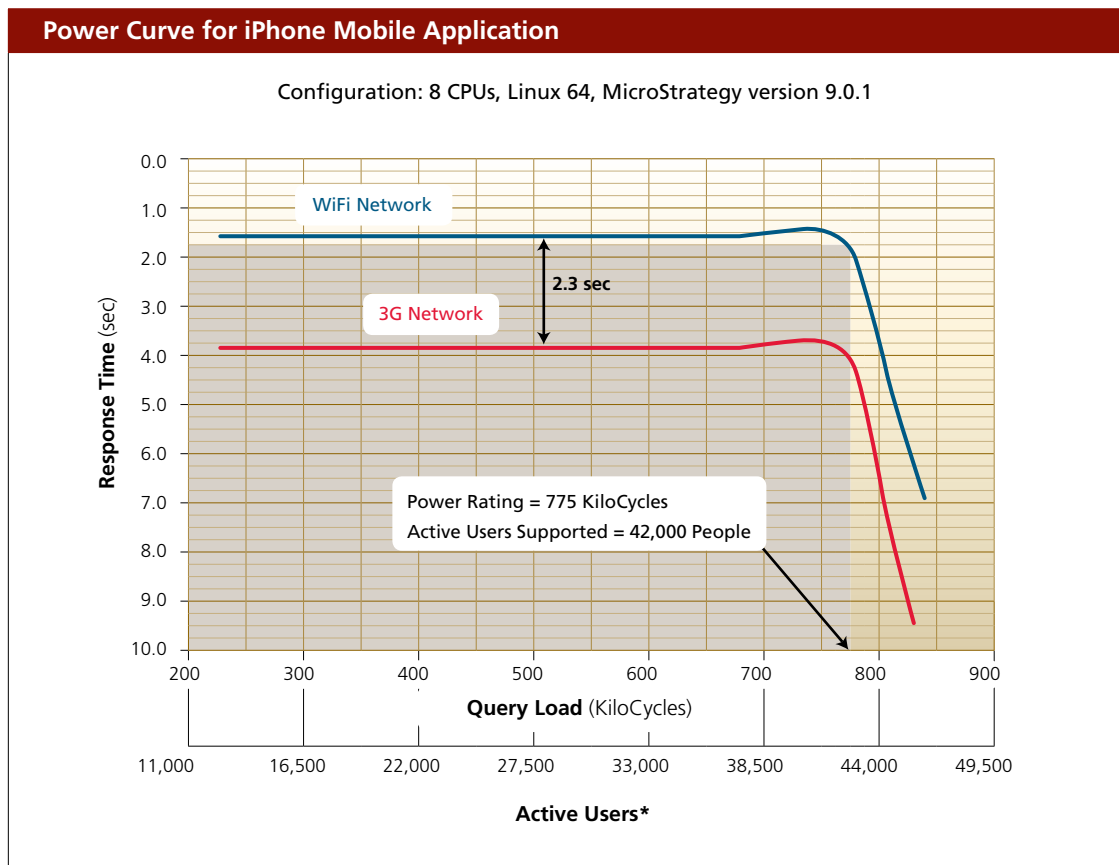


## Performance Envelope for MicroStrategy iPhone Applications

Performance tests were conducted using an iPhone mobile BI application typical of mobile applications. The application contained 14 distinct interlinked data screens. The test application accessed in-memory datasets derived from a 500 GB database that contained over 20M transaction-level records. More detail about the test set up and test application are shown on the reverse side. Test results are shown in the diagram below:



\* Active users are defined as people who perform their BI interaction during the peak hour. A good rule-of-thumb for converting active users to total user population is to assume that 20% of the total population is active during the peak hour.

### Results and Observations

1. The fastest average response time speed was 1.6 seconds and it occurred at the lightest load levels using the WiFi network connection.
2. The system exhibited the same performance behavior on both WiFi and 3G networks, but the 3G network imposed an additional 2.3 second response time penalty because of 3G latency and lower bandwidth.
3. The system exhibited consistently fast response time behavior even as the query loads were increased from 200 KiloCycles to almost 780 KiloCycles.
4. This 8-CPU system achieved a maximum Power Rating of 775 KiloCycles, indicating the system can support a sustained query load of over 775,000 queries per hour without saturating the system.
5. The maximum number of active mobile users this configuration can support is approximately 42,000. This equates to approximately 210,000 actual users assuming a 20% ratio of active users to total users.

### Test Configuration

**Client**  
Web Browser

Load: Borland Silk Performer®  
Op Sys: Windows 2003  
CPUs: Intel Xeon® 3.06GHz  
Memory: 4 GB  
Browser: Mozilla Firefox 3.x  
HW List: \$1,299

**Web Server**  
MicroStrategy Web

MicroStrategy: Version 9.0.1m  
Op Sys: Windows 2003 64-bit  
Server: Single Node: Dell M710  
CPUs: 8x Intel Xeon® 2.83 GHz  
Memory: 16 GB  
App Server: Tomcat 5.5  
HW List: \$6,399

**BI Server**  
MicroStrategy Intelligence Server

MicroStrategy: Version 9.0.1m  
Op Sys: RedHat Linux ES 5.4  
Server: Single Node: Dell M710  
CPUs: 8x Intel Xeon® 2.83 GHz  
Memory: 144 GB  
HW List: \$11,522

Total HW List: \$14,620

### Test Application

**Application:** Restaurant Trends v.1.15

- Restaurant point-of-sale Analysis
- Available via iTunes – MicroStrategy Mobile
- Live data, 140k checks added daily

**Interlinked Screens:**

- 9 screen filling dashboards
- 57 different analyses
- Screens are interconnected with links preserving filtering

**Database:** SQL Server 2008

- Logical: 5 Dimensions, 48 attributes
- Physical: 900GB. 529M row fact table, 124M Checks, 3 years worth of data

### Test Methodology

- Borland Silk Performer® based test scripts simulate typical workload of users accessing the MicroStrategy BI Server by driving traffic volume to a target load according to a predesigned usage pattern.
- After that the end-to-end response time for each user interaction is measured for a whole hour ignoring the warm-up and cool-down phases. The results are aggregated for display.

### Usage Pattern

- MicroStrategy's iPhone or iPad software uses standard http requests to communicate with the BI server. Mobile specific web traffic is generated by a specific mobile usage pattern. Simulating thousands of users realistically simulates a mobile deployment.
- Each user executes a script simulating a typical workflow (9 steps).

### Test Setup

- Borland Silk Performer® simulates iPhone usage by submitting identical requests directly to the BI Server using a WiFi network connection. The measured results are displayed in the "WiFi Network" line in the graph.
- The public 3G network is not suited to conduct stress tests.
- Manual tests in single user mode within 3G network are used to calculate the "3G overhead." This overhead of 2.3 sec is added to the stress test results to estimate the performance under 3G.

### Definitions and Assumptions

- 1 KiloCycle represents the ability to support 1,000 user requests per hour with less than a 2-second average response time.
- Active mobile users submit on average 18.5 queries per hour.
- Not more than 20% of total user community is active at any given point.

Note: All test results described here are specific to the above described application and should not be used for sizing other applications.