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## **Field Study: Performance Comparison Between Public (GPRS) and Private (IPMN) Networks in Los Angeles (CA) County**

### Purpose:

To compare the throughput and availability between an IPMobileNet private network and a public network in a simulated dispatch operation.

### Scope:

Perform a side-by-side comparison between a public network and a private network. The comparison focused on the relay time and success rate of the messages sent between a mobile PC and a network controller. Packet relay time and message success rate (retry) percentage were logged.

### Methodology:

The test was performed January 20, 2004 from 02:12 PM to 02:30 PM.

The private network is an IPMobileNet IP Series 19.2 mobile data system, operated by Los Angeles County Sheriffs Department (LASD). It consists of fourteen IPMobileNet base stations operating on a single frequency pair in the 470 MHz range, supporting approximately 200 vehicles equipped with IPMobileNet radios. The public network utilized was a Los Angeles-area GPRS system.

The test was conducted in an LASD vehicle with an IPMobileNet radio installed, connected to a Data911 mobile data computer. The vehicle also had a Sony notebook with Sierra Wireless GPRS card installed.

IPLinkView is a system utility that provides the ability to visually monitor uplink and downlink packet activity in a half-duplex mode. Unlike the Ping command, IPLinkView does not require successful uplink and downlink of the same packet to report statistics.

IPLinkView software was installed in both the Data911 mobile computer (private system mobile data computer) and the Sony notebook (public system mobile data computer). IPLinkView was also installed in the LASD network controller and a similar computer/controller connected to the GPRS Network.

### Route:

The vehicle route traveled began in Pico Rivera to East Los Angeles to Cerritos and back to Pico Rivera. The total test route covered approximately 75 miles of freeway and surface streets in South Eastern Los Angeles County.

Results:

The following graphs and tables document the results of the testing. It was noted during the testing that the public network had continuous packet loss at high rates of vehicle speed while the private network continued to operate reliably.

**LASD Private Network**

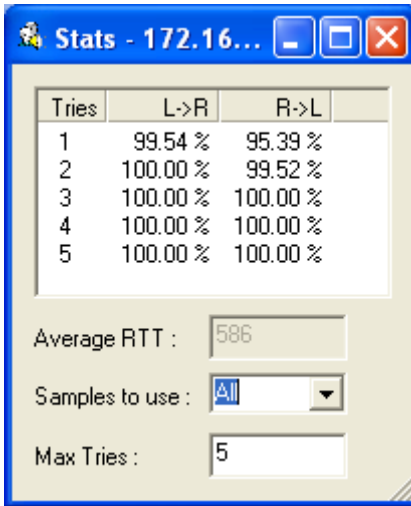


Figure 1

Average Round Trip Time: **586 ms**

Downlink Success Rate  
 1<sup>st</sup> Try: **99.54%**

Downlink Retries to  
 Achieve 100%: **2**

Uplink Success Rate 1<sup>st</sup> Try: **95.39%**

Uplink Retries to Achieve 100%: **3**

Connection Loss - **No downtime**

**AT & T Public Network**

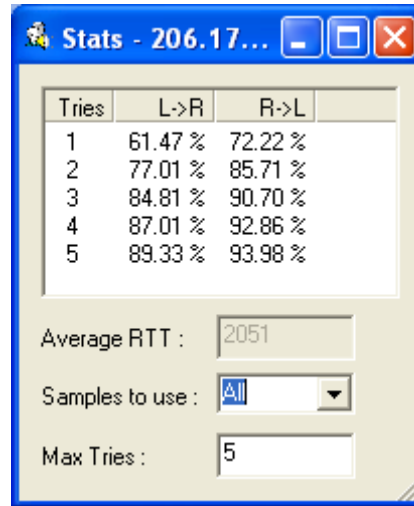


Figure 2

Average Round Trip Time: **2051 ms**

Downlink Success Rate  
 1<sup>st</sup> Try: **61.47%**

Downlink Retries to  
 Achieve 100%: **Fail**

Uplink Success Rate 1<sup>st</sup> Try: **72.22%**

Uplink Retries to Achieve 100%: **Fail**

Connection Loss - **8 Minutes**

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In the charts below, green bars indicate successful transmission. Red bars indicate a failure.

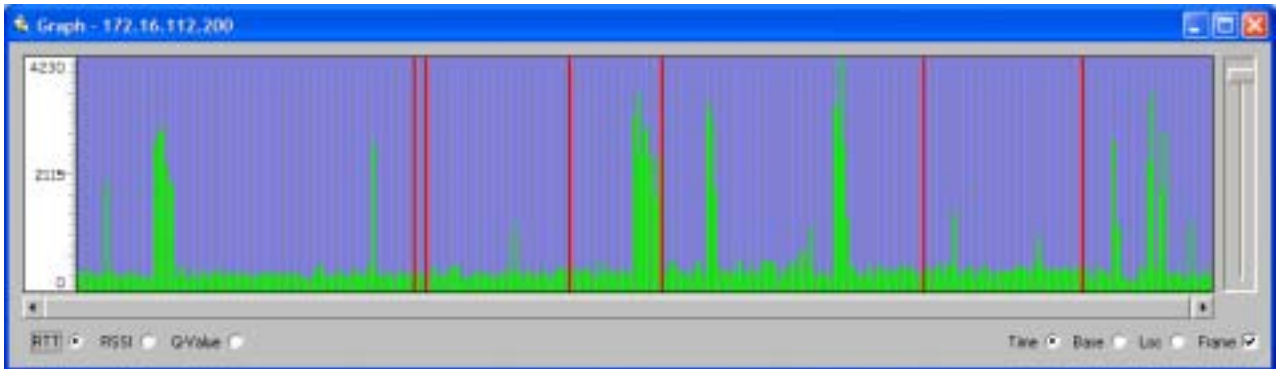


Figure 3

### LASD Private Network - Round Trip Time Graph

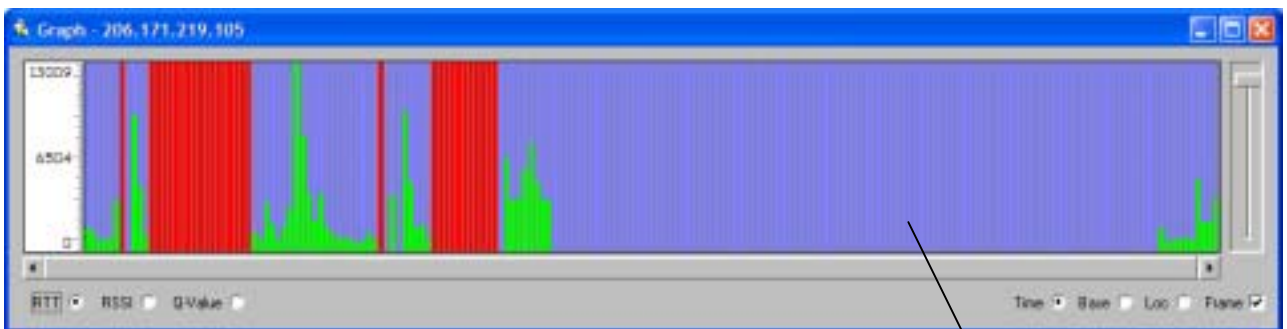


Figure 4

### AT & T Public Network - Round Trip Time Graph

Connection Lost

#### Discussion:

The graphs and tables document the results of the testing. Three things can be learned from this test.

- 1) The IP Series system provides a much more **reliable wireless connection** than AT&T GPRS, (see message success rates in Figures 1 and 2).
- 2) The **IP Series system is fast**, with a round trip message time of half a second, while the GPRS system averaged more than two seconds (see Figures 3 and 4).
- 3) The IP Series system is **bandwidth efficient**. An excellent level of first-time message success rates, combined with reliable channel connection keeps the system free from congestion generated by message retries and waiting for channel access.