



**EnVision Wireless**  
Design|Optimization|Consulting|Drive Testing

**GPRS Data Network Quality Surveys**  
Sample Report

Last Updated:  
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**Agilent Technologies**

*Authorized Services Provider*

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## 1. Executive Summary

EnVision Wireless has been contracted by Client to conduct an analysis of their GPRS data network. These studies provide an objective, unbiased view of the quality of service for each market evaluated. This report presents the results for the sample survey conducted in October of 2003.

EnVision Wireless uses the Agilent Nitro Data Test technology to benchmark data service. This equipment allows for an accurate, repeatable network evaluation. Results collected in this method are useful for comparison at the local level and can also be effectively used to compare performance on a much larger scale by ranking relative network statistics country wide to assess regional performance and differences.

In keeping with previous collaborative work between EnVision Wireless and Client, the following parameters were measured during the mobile test:

- **RLC Throughput (kbps)** - current data throughput when TBF is open. This value is calculated, over a one second window, from the RLC ACK/N-ACK on the blocks of data sent and received. The calculation includes retransmission and header bits.
- **LLC Throughput (kbps)** - LLC layer measurements gives an indication of the effective RLC/MAC throughput and illustrates the impact of RF operations such as cell reselections on the performance.
- **RLC Block Error Rate** - Displays the percentage block error rate for RLC. The values shown are a percentage of the blocks sent on the downlink with bad CRC over the reporting period.
- **RX Lev (dBm)** - Received power level at the mobile station in dBm. It is decoded directly from the phone data using a simple conversion.
- **RX Quality** - The service signal quality on the GPRS downlink. This metric is reported in values from 0-7 and is measured over a full set of traffic and SACCH frames.
- **C Value (dBm)** - The received average carrier level. This value is shown in dBm.
- **Downlink TBF State** - Displays the temporary block flow (TBF) status for the Uplink and Downlink. When the temporary block flow is OPEN, the block frame is being transmitted. When the temporary block flow is CLOSED, the block frame is not being transmitted.
- **Uplink and Downlink Coding Schemes** - Displays the coding scheme being used for the Uplink and Downlink. The coding schemes are reported as CS1, CS2, CS3, CS4. CS1 offers the highest data protection and CS4 offers the lowest data protection. As networks are in the initial turn-on stages, these values may be fixed.

The following table summarizes the overall average results of the survey. For detailed results, please refer to Section 3 of this report.

**Table 1: Overall Survey Results**

Carrier	RLC Downlink Throughput (kbps)	LLC Downlink Throughput (kbps)	RLC BLER	RLC Re TX BLER	RX Lev (dBm)	RX Quality	C Value (dBm)
Sample	2.64	2.21	8.61	12.67	-72.12	1.7	-71.26

## 2. Test Parameters

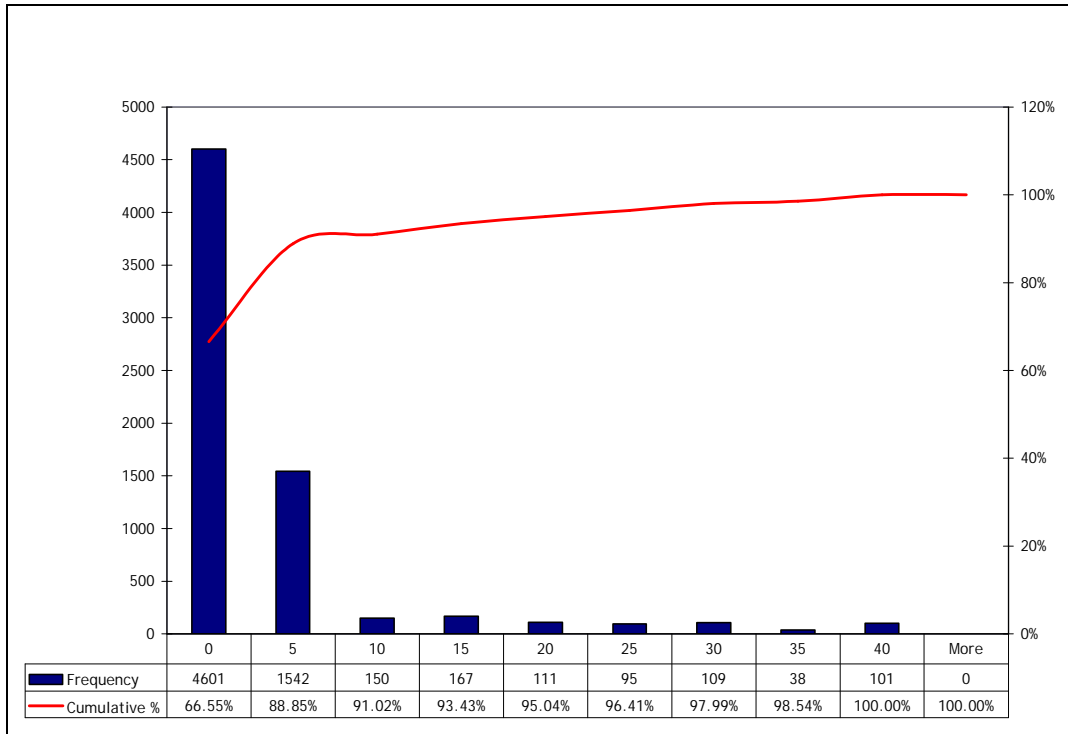
This section provides a summary of the test parameters used during the project.

Test Parameter	Value
Networks surveyed	Client GPRS
Hardware used	Direct Connect
Handsets used	Sagem OT96M
Software used	Agilent E6474A
Kilometers surveyed	Approximately 200
Drive route selection methodology	Highways - A Roads (A2, A10, A4, A16, A13)
Data collection window	7:00 a.m. - 7:00 p.m. daily
Test sequence	Wait 30 seconds -> Connect -> Wait 5 seconds -> <a href="http://www.google.nl">http://www.google.nl</a> -> Wait 5 seconds -> Disconnect -> Repeat
Drive test vehicle	Standard passenger vehicle
Handset location	Cradles near headrests
Antenna location	Internal
Dates of survey	2 August 2003

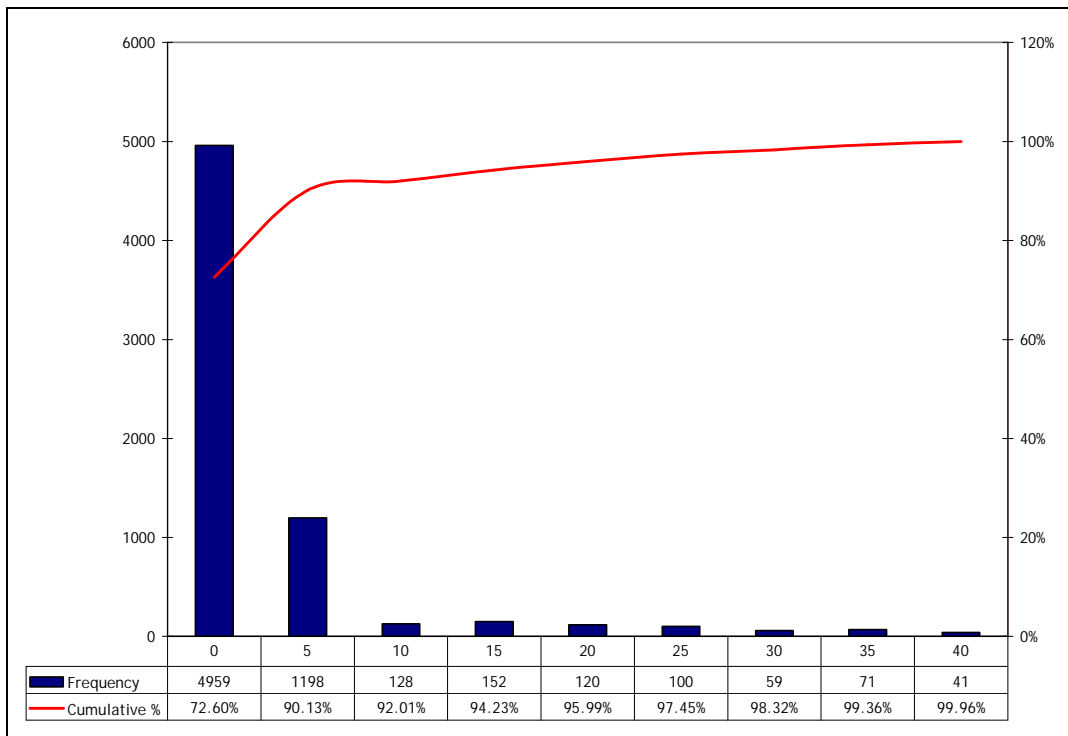
### **3. Results**

This section provides the graphical results of the data performance survey. Graphs are provided for the following metrics:

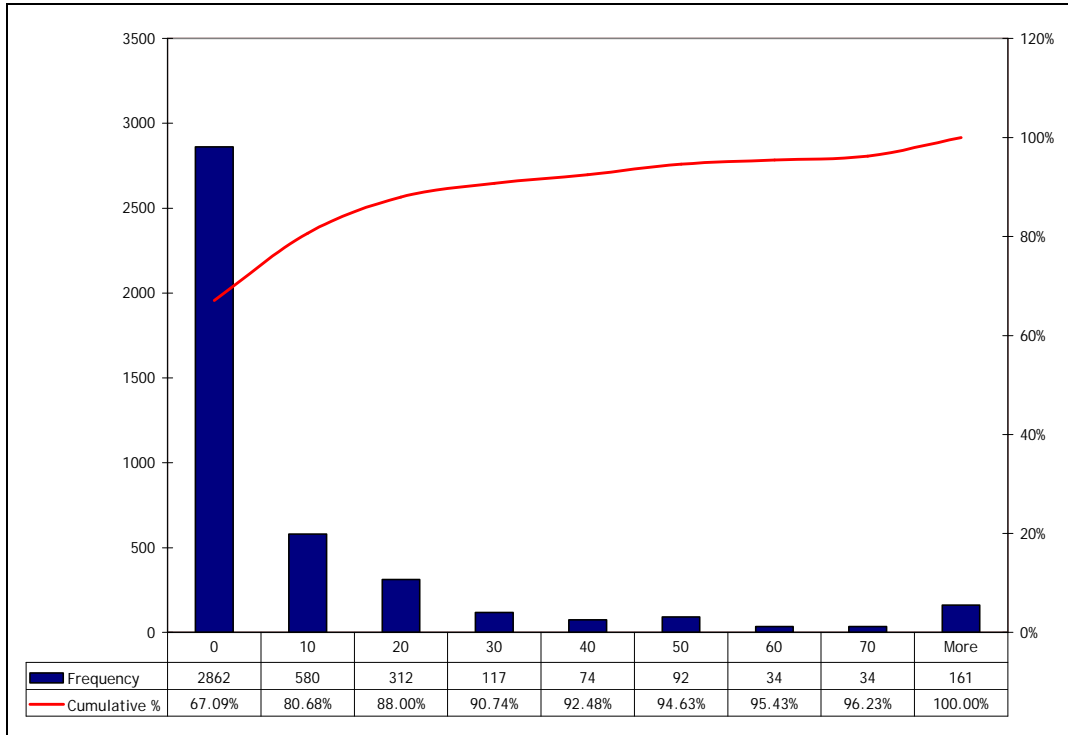
- RLC Throughput (kbps)
- LLC Throughput (kbps)
- RLC Block Error Rate
- RX Lev (dBm)
- RX Quality
- C Value (dBm)
- Downlink TBF State
- Uplink and Downlink Coding Schemes



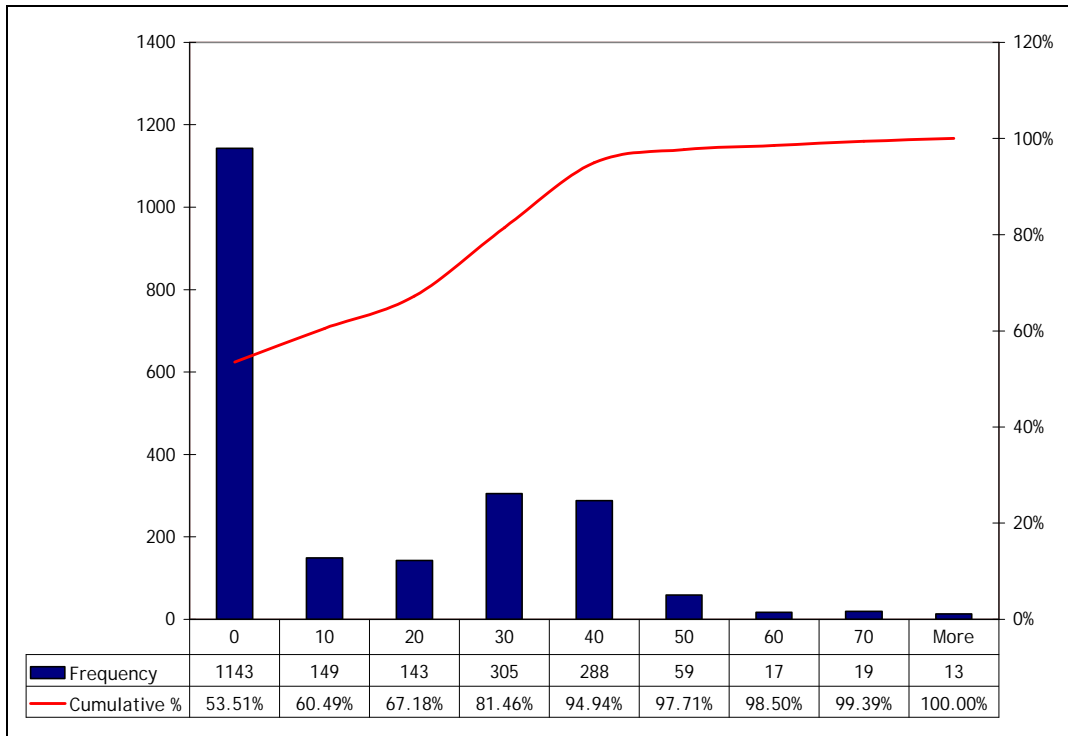
**Figure 1: RLC Down Link Throughput (kbps)**



**Figure 2: LLC Down Link Rate Throughput (kbps)**



**Figure 3: RLC Block Error Rate**



**Figure 4: RLC Retransmit Block Error Rate**

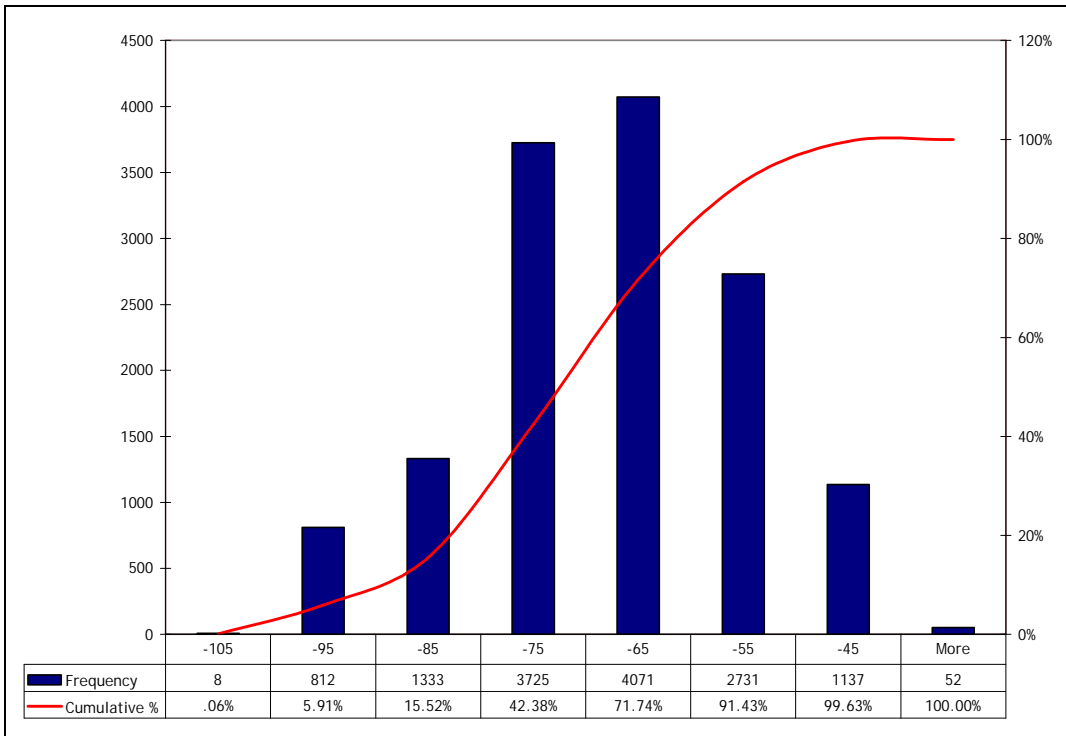


Figure 5: RX LEV (in dBm)

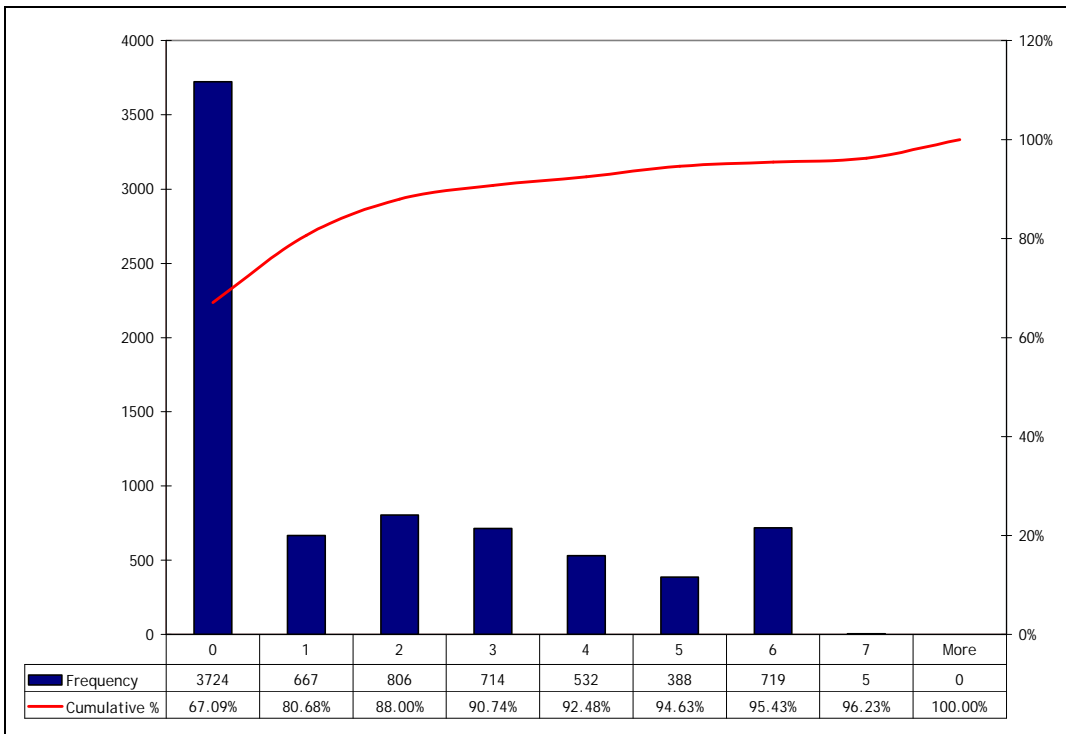
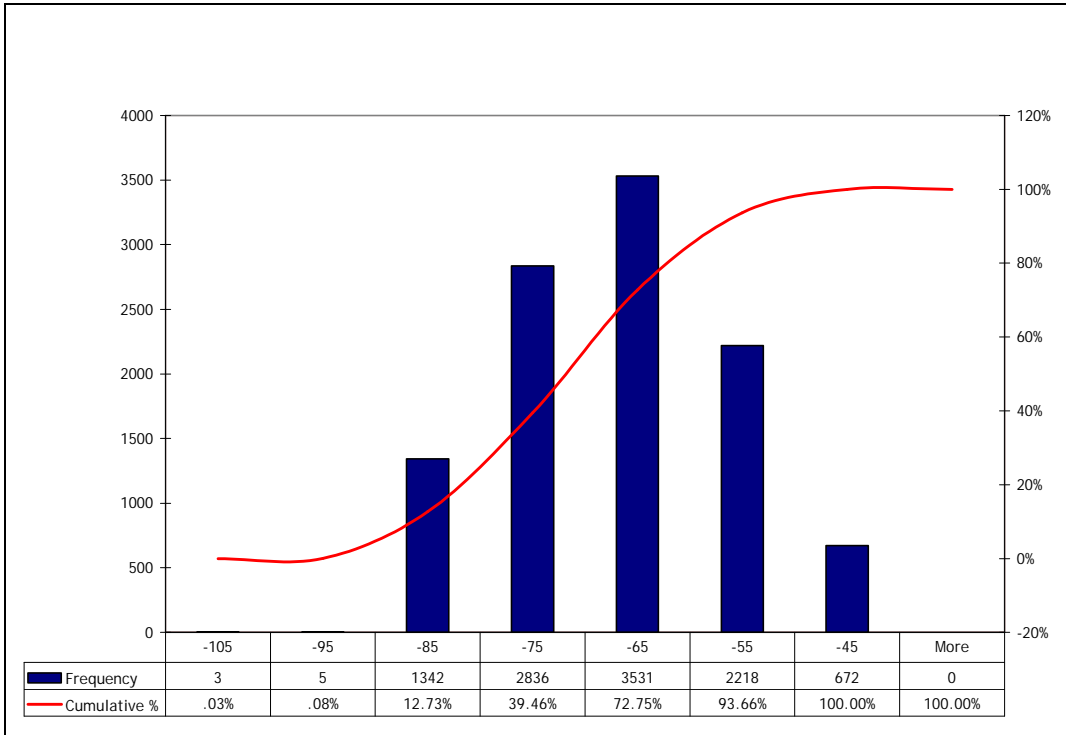
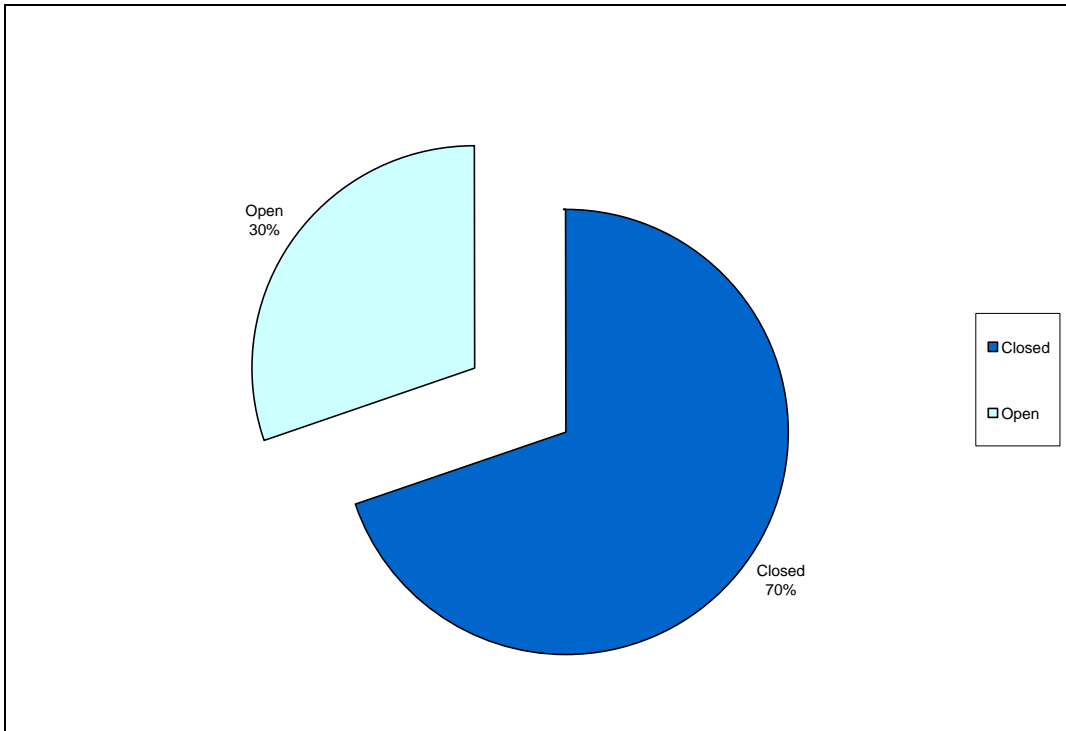


Figure 6: RX Quality



**Figure 7: C Value (dBm)**



**Figure 8: Downlink TBF State**

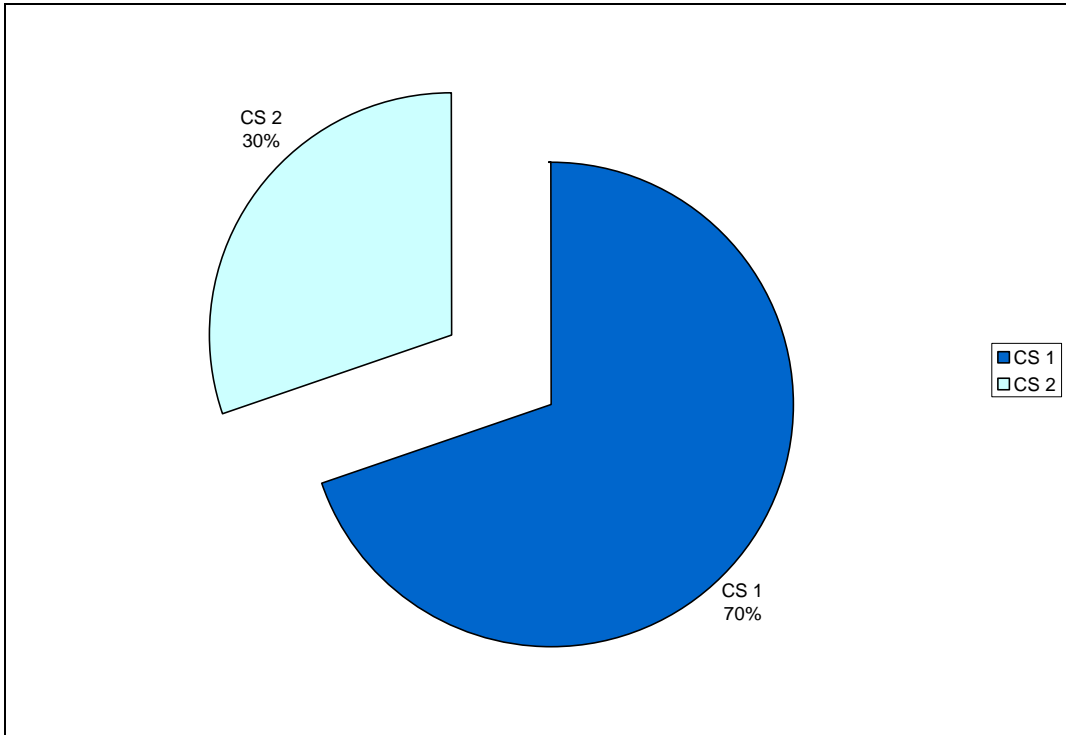


Figure 9: Down Link Coding Scheme

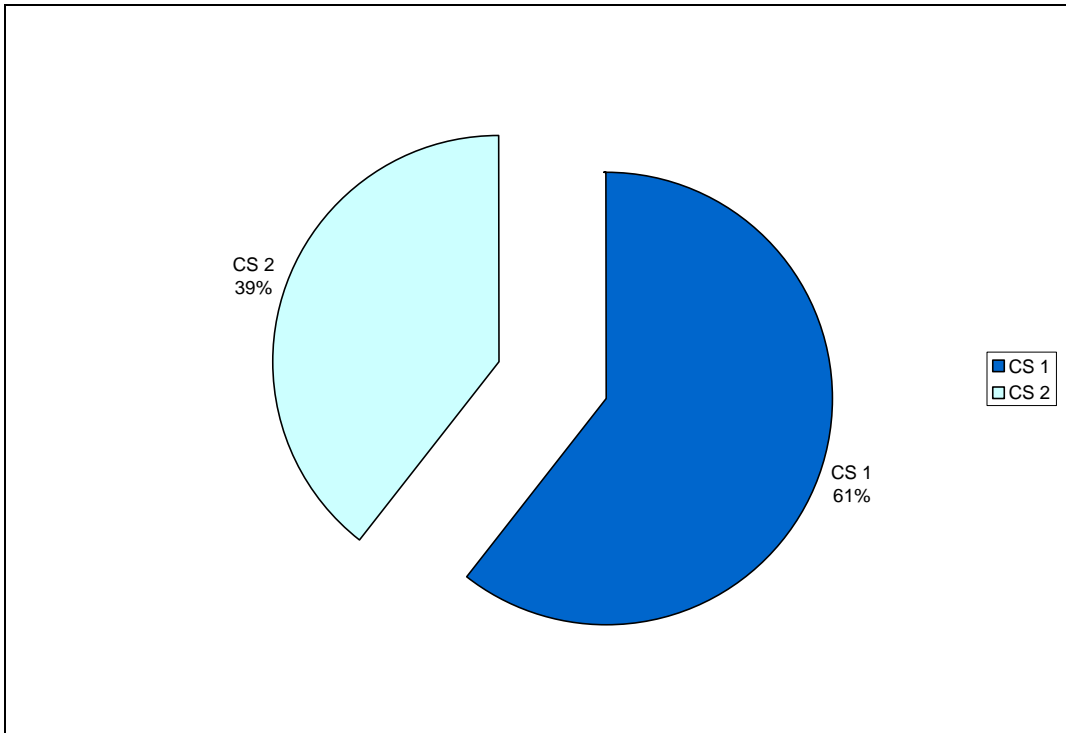


Figure 10: Up Link Coding Scheme

#### 4. Geographic Plots

The following geographic plots are attached to this report.

Netherlands
Downlink RLC Throughput (kbps)
Downlink LLC Throughput (kbps)
Downlink RLC Block Error Rate
Downlink Retransmitted RLC Block Error Rate
RX Lev (dBm)
RX Qual