

2010 Transpo

# Applications of Cell Phones in Urban Transportation

by Steve Dickerson, December 14, 2010



# “Engineering” Fundamentals

- The social cost of the driving function using a passenger as driver is small.
- For some trips there is no practical substitute for the single occupant car (or taxi) because of low demand for route/unit time.
- In Atlanta, there is rarely a shortage of cars for individual trips, only a shortage of keys
- The capacity of a lane of freeway or arterial street or rail line is nearly proportional to vehicle occupancy.
- Currently about 5% of urban trips are by mass transit, 10% by pooling.
- Essentially all commuters have cell phones. These devices provide capability to provide real-time data to and from people and computers.



# Economic Fundamentals

- The cost of building new lane miles and operating cars is known and is *about* \$20M? per lane mile.
- The capacity of a lane is 2000 cars/hour. Vans similar, buses 1000
- For a 6 hour/day peak usage this makes the cost per auto mile at 5% real discount 32 ¢/mi
- Operating a car costs 40¢/mi., marginal
- People value time of travel at 40% of wage rate, waiting at 100%.
- A great fraction of the cost of expanding the roads system is based on the employment trip.

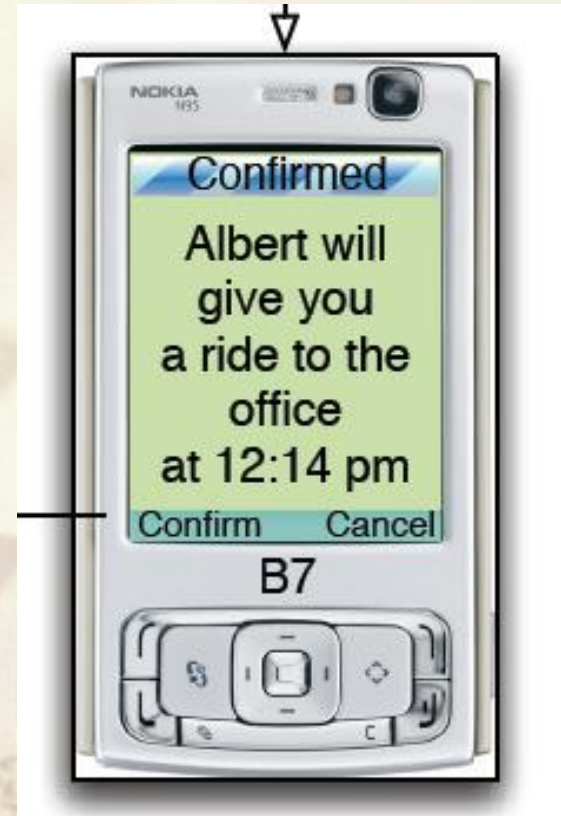


# For Example Your Cell Phone Can Automatically

- Tells you “exactly” when and where to meet your ride
- Assign to you a shared car near your office or home when needed
- Allows you to access to the auto
- pay your fares, tolls, MARTA, car rentals and van and car pools, automatically. Minus incentives
- Count people in HOT lanes
- Dynamic ramp metering



# More Modern Cell Phone



Courtesy of Commute Communities, Israel

# To IMPLEMENT

- All vehicles, trains, buses, vans, cars, taxis, and shared cars have locating technology, e.g., largely GPS based
- All passengers and vehicles have cellular systems [“free” for passengers]
- Computers run the system using digital communications with passengers and vehicles



**The Technology is  
Here and Now  
(2007)...and  
remarkably cheap**



I just paid \$100  
Blackberry 8310  
with  
TelNav GPS  
Web service  
Music  
Bluetooth



# Fundamentals: of Implementation

- All participating passengers, *subscribers*, have cellular phones (or 2-way pagers).
- Subscribers are registered by Internet for standard trips that are associated with defined origins and destinations and time of day, e.g., a trip to work or a car rental from work location
- Each standard trip could be requested by pressing a single digit on a cellular phone in transit menu. Or dial 511 option 7?
- Shared rental cars would not require a key.
- Payment of fares and fees would be all electronic and likely show up on your cell phone bill.
- There would be subsidies of the information system



# For reference

## MARTA Subsidy Level (2001)

- 267300 weekday passengers
- \$331 M operating budget for 2001
- \$1238/ passenger/yr., \$858 subsidy
- \$3.3 B of capital cost, all subsidy
- \$331 M at 10%/year...~=operating
- \$2000/year approximate annual subsidy per weekday passenger
- BUT 40 vehicle mi./day diverted during peak hours saves almost \$3200/yr. in road costs



# Possible Economic Arrangement

- Private firms provide IIT (information intensive transportation) under contract to State agency
- Subscribers pay base cost of cell phone, pager, or PDA but not additional cost of transportation information services
- Pooling and car rental subsidies subject to current methods...IRS breaks, corporate sponsorship to reduce parking cost



# User Cell Information

## Server for Cell Phones

270 million in US

GM's OnStar, Chrysler's UConnect,  
Ford's, Sync, Acura's, HandsFreeLink  
\$35 for equivalent hardware

**Mobile Provider**



PDA



GPS



Mobile client  
(WAP/Web Browsing)



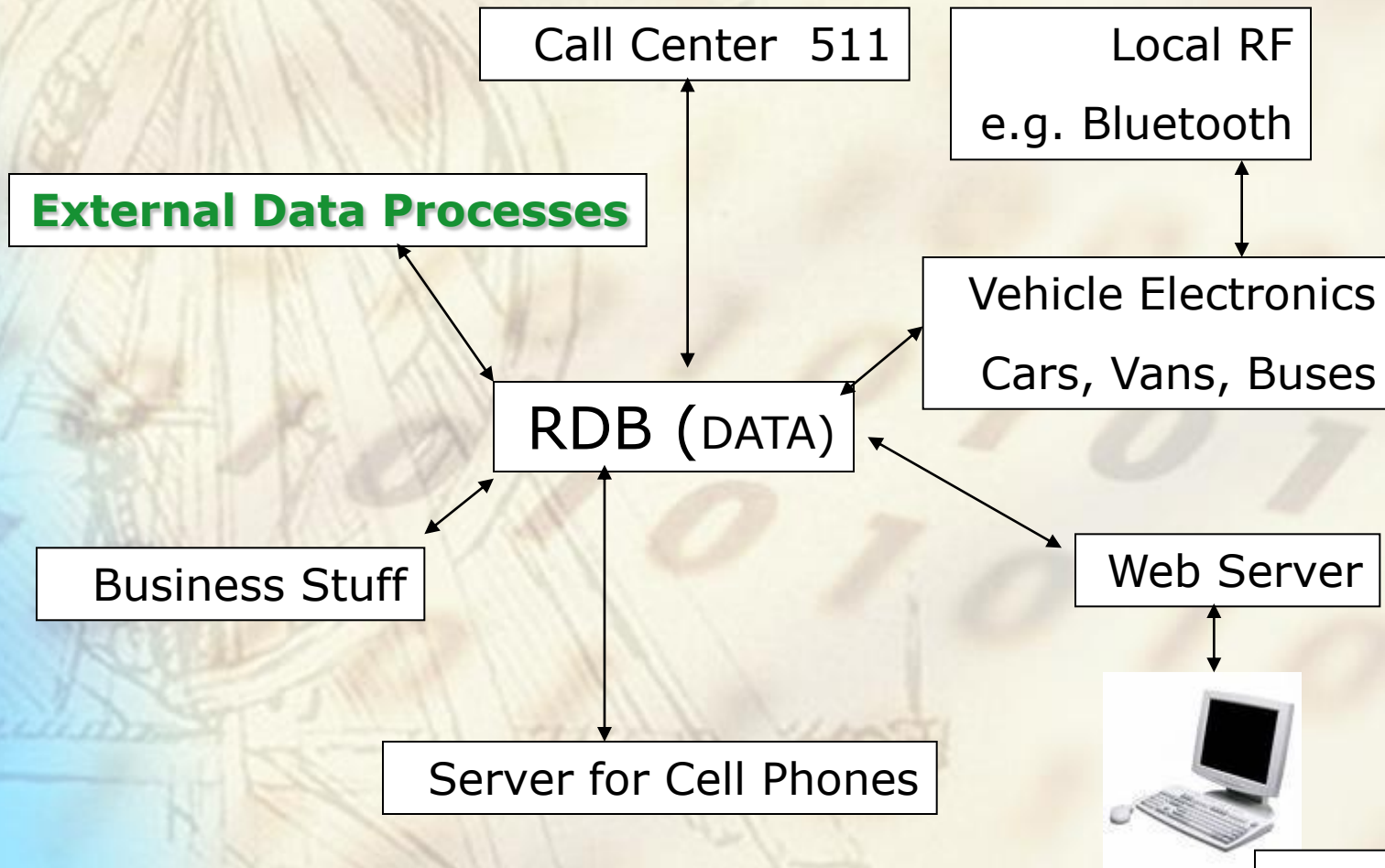
SMS - Text  
messaging



Smart mobile  
client



# System Elements



# Activities to Implement

- Software for all common phones
- Add to 511 system, gives manual support
- Car share on line with cell reservations
- MARTA on line with bus/train info
- Vanpool on line with locating system
- Subsidy and legal issues
- See SBIR 11.1-FH4: Intelligent Ridesharing in Real-Time



# Relevant Patent

- **Abstract**
- A communications and computing based urban transit system based on digital cellular communication, GPS locating technology, and digital computers to provide real-time command and control of passengers and vehicles with the objective of minimizing the social costs of urban transportation.
- **Inventors:**
- **Dickerson; Stephen L. (Atlanta, GA)**
- **Assignee:**
- **Georgia Tech Research Corp. (Atlanta, GA)**
- **Appl. No.:**
- **09/826,272**
- **Filed:**
- **April 4, 2001**

