



R | S | G INC.

RESOURCE SYSTEMS GROUP, INC.



**I-95 CORRIDOR
COALITION**

Beyond Boundaries

New England
Transportation Institute



Appropriate AVL Technology for the Rural Transit Provider

Prepared for:
19th National Rural Public and Intercity Bus
Transportation Conference

11/10/2010

- Project Background/Project Objectives
- Technology Choices
 - GPS Units
 - Mapping Software
- What the Customer Sees
- Management Issues
- Ongoing System Costs

Project Background/Objectives

■ Background:

- I-95 Corridor Coalition Demonstration Grant secured by the New England Transportation Institute
- \$200,000 grant + \$50,000 local match

■ Objectives:

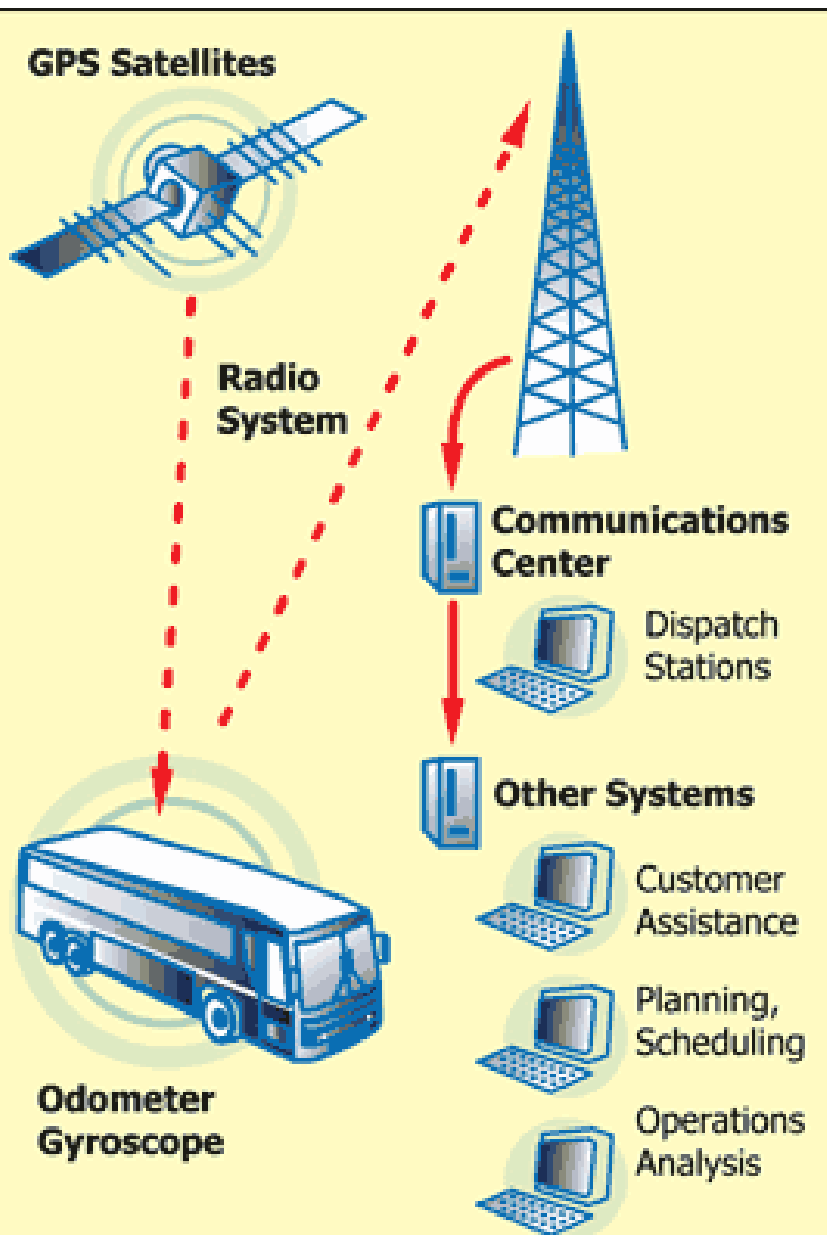
- Investigate the various technologies in an AVL system to determine suitability for rural transit.
- Develop low-cost AVL solutions that can be adopted by rural transit providers.
- Determine costs of a fully-deployed AVL system.

AVL Test Bed - Advance Transit Public Transit System



- Advance Transit Serves 6 Towns in NH/VT
- Free Fare
- 14 hours daily service with 30 minute headways
- 5 Routes, 2 Shuttles
- ~800,000 annual boardings
- Small administrative staff

AVL = Automated Vehicle Location...How It Works

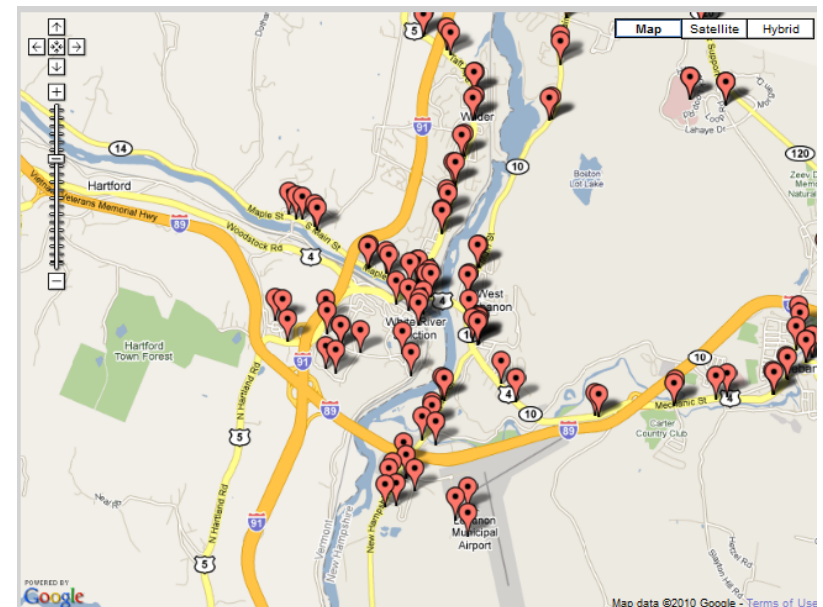
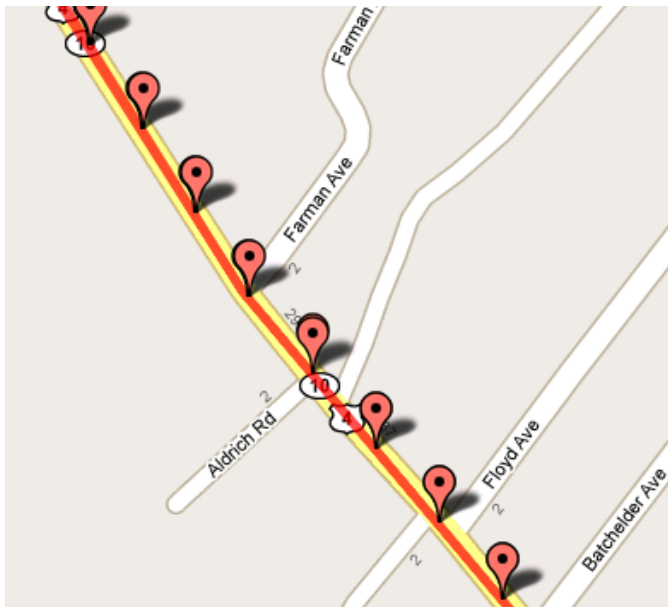


- GPS Unit Obtains Position Every Second
- Position, Speed, Timestamp Transmitted Every 20 Seconds
- Uses iDen Network (G2)
- Server Receives and Processes for Customer Use
 - Online Mapping
 - Dynamic Message Signs
 - Arrival Time Estimates
 - Other

Inside Advance Transit's AVL System -- Mapping

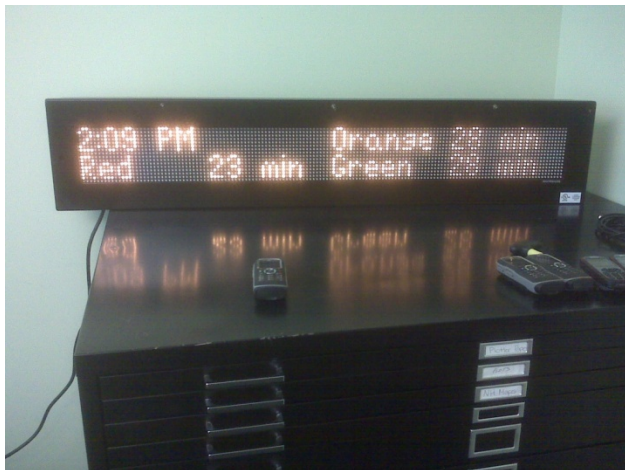
Mapping Solution-Google Maps

- Free for public transit applications.
- Easy-to-use Applications Programming Interface.
- Includes tools to simplify route segmentation, draw shortest paths, and associate bus stops to route segments.
- All Route Topology Can Be Inserted into a Google Transit Feed
- Very familiar tool to the public.



How the Transit Customer Gets Real-Time Information

- AT Website
- Via a phone-in system Interactive Voice Response
- Dynamic Message Signs Purchased with Matching Funds
 - Time
 - Schedule Information
 - Bus Arrival Times
 - 3 Locations
 - What It Took



- Management Issues
 - The Schedule Manifest
 - Assigning GPS Units to Buses
 - Assigning Buses to Routes
 - Update Service Changes
 - Special Messages
 - Managing Hardware (GPS Units)
 - Assigning a Manager
 - New Staffing & IT Requirements

Inside AT's AVL System - Database Programming

Schedule

http://at.rsginc.com/DailySchedule.aspx?RouteID=7

Home Current Schedule Edit information Sign Out

Green Route

Main St. West Leb NB Hartford by Bridge NB Opp. Datamann NB Hanover Inn NB Maynard SB Datamann SB Hartford by Bridge NB Main St. West Leb NB

06:00	2906	06:05	2906	06:13	2906	06:23	2906	06:25	2906	06:35	2906	06:45	2906	06:50	2906
07:00	2906	07:05	2906	07:13	2906	07:23	2906	07:30	2906	07:40	2906	07:50	2906	07:55	2906
08:30	2906	08:35	2906	08:43	2906	08:53	2906	08:55	2906	09:05	2906	-		09:15	2906
09:30	2906	09:35	2906	09:43	2906	09:53	2906	09:55	2906	10:05	2906	10:15	2906	10:20	2906
10:30	2906	-		10:38	2906	10:48	2906	10:50	2906	11:00	2906	11:10	2906	11:15	2906
11:30	2906	11:35	2906	11:43	2906	11:53	2906	11:55	2906	12:05	2906	-		12:15	2906
13:00	2906	13:05	2906	13:13	2906	13:23	2906	13:30	2906	13:40	2906	13:50	2906	13:55	2906
14:00	2906	-		14:08	2906	14:18	2906	14:25	2906	14:35	2906	14:45	2906	14:50	2906
15:00	2906	15:05	2906	15:13	2906	15:23	2906	15:30	2906	15:40	2906	-		15:50	2906
16:00	2906	16:05	2906	16:13	2906	16:23	2906	16:25	2906	16:35	2906	-		16:45	2906
17:00	2906	-		17:08	2906	17:18	2906	17:20	2906	17:30	2906	17:40	2906	17:45	2906

- Select
- 2401
- 2402
- 2403
- 2404
- 2405
- 2407
- 2408
- 2701
- 2702
- 2703
- 2901
- 2903
- 2904
- 2905
- 2906
- 2908
- 2909
- No Bus

- The Need to Integrate with Ongoing Public Outreach
 - AT Website
 - New Information at Bus Stops
 - Trip Planning
 - Social Media
 - Smartphone App

Changes to the Website



UPPER VALLEY TRAVEL GUIDE

HOW TO USE ADVANCE TRANSIT AND RIDESHARE TO AVOID GRIDLOCK (AND FIND FREE PARKING)

ADVANCE TRANSIT

- Home
- News & Updates
- Bus Stops, Fares, Transfers
- Bikes & Wheelchairs
- Holidays
- AT Goals

MAPS & TIMETABLES

- Route Finder
- Blue Route
- Red Route
- Brown Route
- Orange Route
- Green Route
- Dartmouth / Hanover Shuttle
- DHMC Shuttles

ACCESSIBILITY

- Access AT

RIDESHARE

- Upper Valley Rideshare

MORE INFORMATION

- Rider Surveys & Comments
- Planning Documents
- Employment Opportunities
- Contact Us

COMMUNITY LINKS

- Transportation Directory
- Advance Transit Partners

THIS NEW ADVANCE TRANSIT WEB SITE PRESENTS TIMETABLES THAT WENT INTO EFFECT ON JULY 6, 2009.



ALL FREE, ALL THE TIME

Thanks to an innovative partnership in the Upper Valley, rides on all Advance Transit bus routes in Vermont and New Hampshire are free.

Commuters, shoppers, and anyone else who wants to ride can board Advance Transit buses without paying a fare. System-wide free service has been made possible by special increased contributions from Upper Valley towns, Dartmouth College, and the Dartmouth-Hitchcock Medical Center.

AT Executive Director Van Chesnut said the free service is part of a broader effort to decrease traffic congestion in the region. "The College and the Medical Center are taking a lead in this effort in hopes that others will realize the benefits of encouraging people to take the bus instead of driving alone."

"The bus drivers are always cheerful, polite, and helpful. It's fantastic that it's free."
-Lebanon resident

"I really enjoy riding the bus even though I have a car available. Keep up the great work!"
-Hanover resident

"I very much appreciate the service. It is convenient, environmentally right, and economically important in these trying times."
-Grafton resident

The drivers are very helpful with new people, almost like ambassadors for the town & college. I think it's one of the best things about living here."
-Norwich resident

"Everyone is treated respectfully."
-West Lebanon resident

Advance Transit



Google Transit Trip Planner



Real Time Bus Tracking

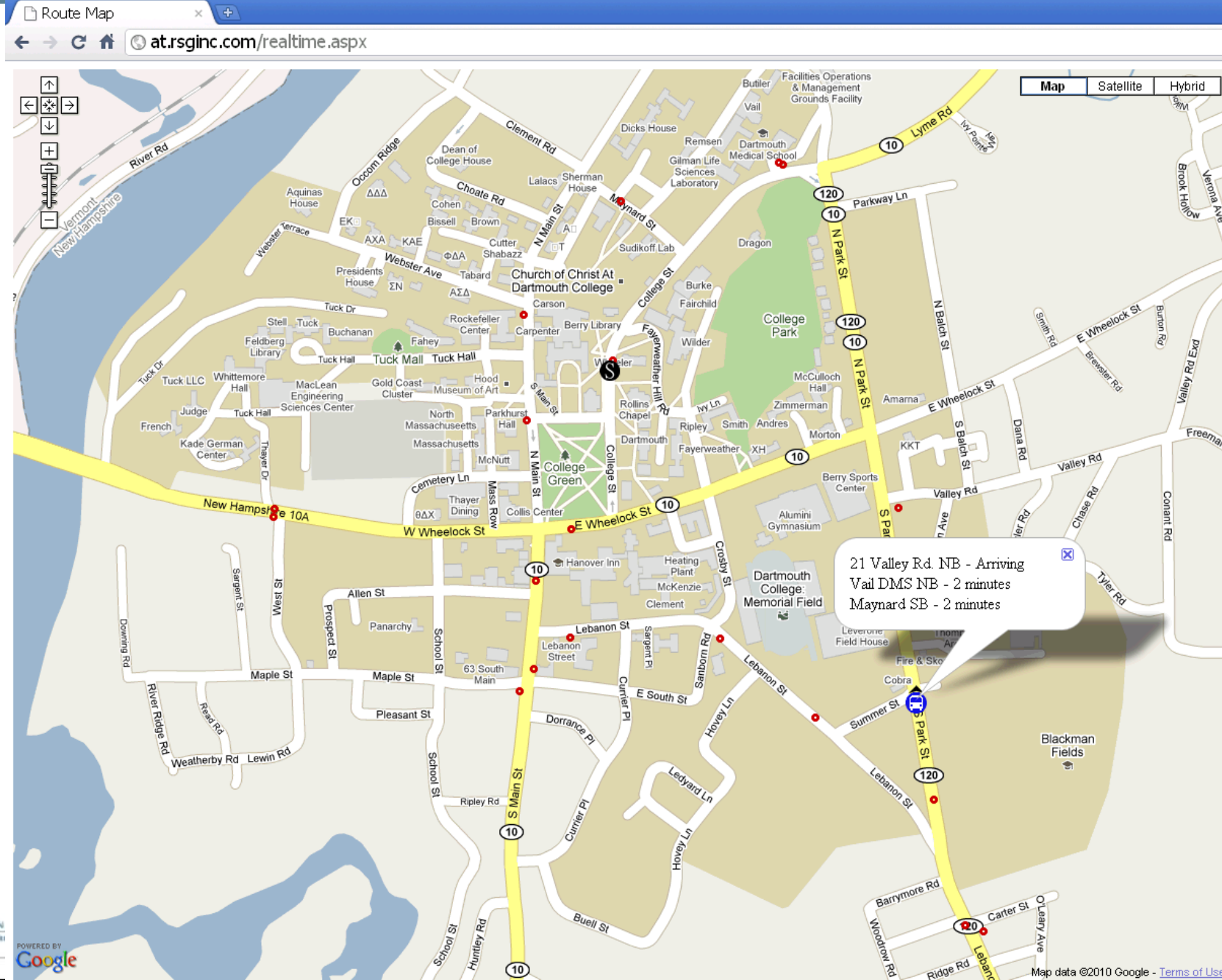


Schedules by Route by Stop



Learn More About AT

Demonstration - <http://at.rsginc.com/realtime.aspx>



AVL System Cost: Operations

AVL System Operating Costs

	Unit Cost		# Units	Monthly Cost
GPS Phone Data Service	\$16.00	per unit per month	32	\$512.00
DMS Electricity	\$5.00	per unit per month	3	\$15.00
DMS Wireless Modem	\$40.00	per unit per month	3	\$120.00
IVR System Annual Cost	\$1,000	set up fee, annual license	1	\$83.33
IVR System Minutes	\$1,000	annual fee for 1000 minutes		\$83.33
Server Hosting	\$0		0	na
Staffing (Advance Transit)	\$1,000	estimated staff time per month		\$1,000
				\$1,813.67

Annual Cost

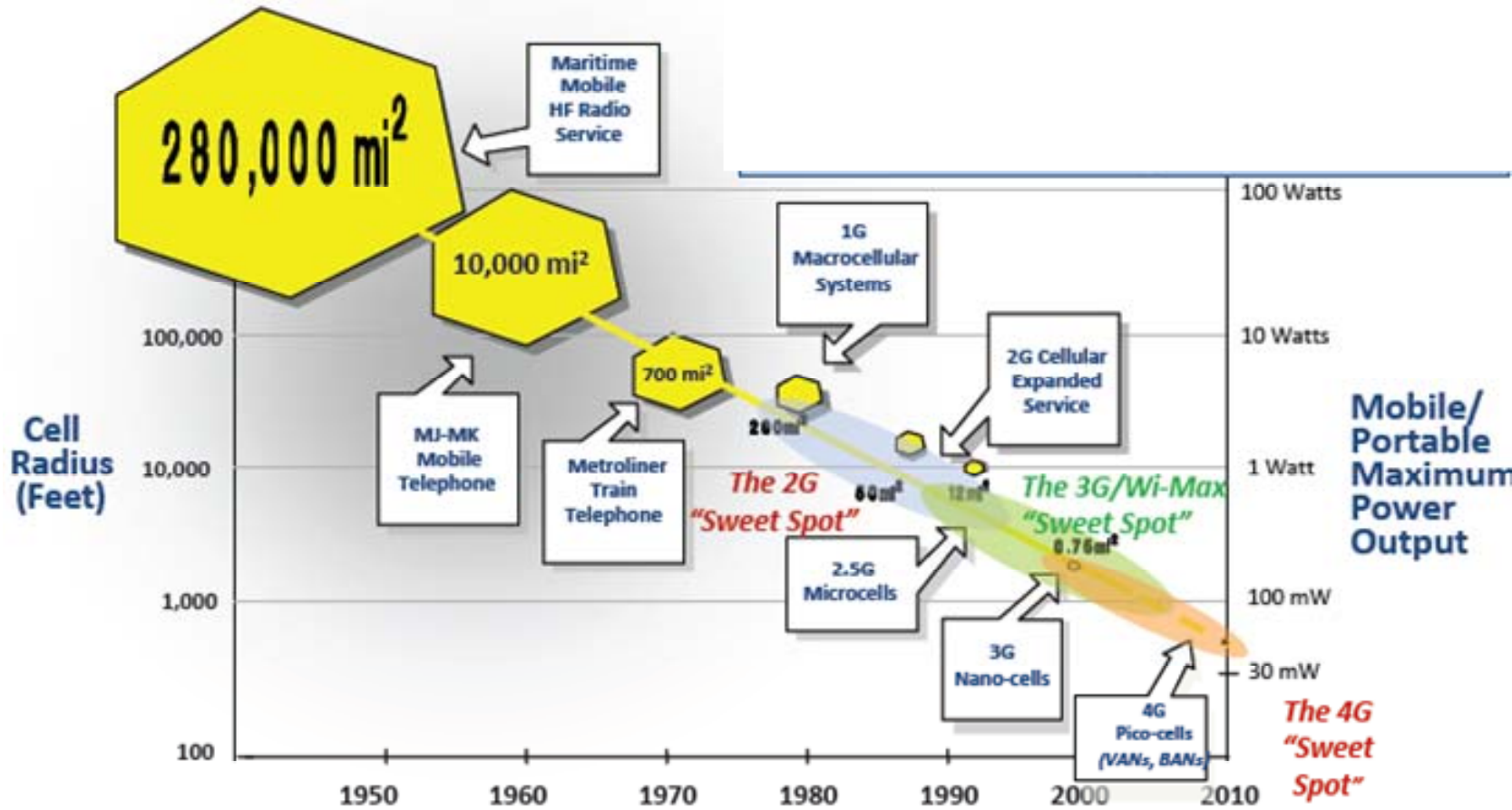
\$21,764.00

The “Real Time Information Industry”

- Costs of Real-Time Information Have Decreased Dramatically
 - GPS Devices
 - Wireless Service Charges
 - Electronic Mapping
- Real Time Information...
 - Becoming commoditized.
 - With greater exposure, has come to be expected by the traveling public.
 - Raises Real Management Issues for the Transit Operator

Inside Advance Transit's AVL System -- GPS Selection

- Sprint-Nextel iDen (2G)
- Low cost, high reliability
- Track record in other applications
- Acceptable accuracy



Benefits of Real Time Traveler Information

- NJT Princeton Bus Rapid Transit (BRT) - 2007
- NJT New Brunswick BRT - 2009
- Chicago RTA - 2009
- TCRP H-37: Characteristics of Premium Transit Services that Affect Choice of Mode - 2009 (Salt Lake City and Portland, OR)
 - Real Time Information Equivalent to 5 Minutes of Saved Travel Time
- Upper Valley Smart Commute Survey Results (2009-2010)

Real time information preference

	Count	Percent
I have no opinion	965	38.4%
An electronic sign at the bus stop indicating the time of the next bus arrival	603	24.0%
A website to check for real-time information about the next bus arrival	490	19.5%
The ability to use a cell-phone to check or receive updates about the next bus arrival	398	15.9%
Other	54	2.2%
Total	2,510	100.0%

Inside AT's AVL System - Real Time Arrival Estimation

2 Methods:

- Simple Averaging Currently Implemented
- Kalman Filter -
 - more computationally-intensive
 - Requires accurate completion of the Schedule Manifest by AT every day.

