



# ENPRO 371-Bus Tracker

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Our Goal is to develop a cost effective  
bus tracking system based on  
affordable radio-frequency technology  
that will increase customer satisfaction,  
safety and mass transit utilization.

# Organization

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## ✦ Marketing

- ◆ Develop Survey
- ◆ Clearly define competitor profiles
- ◆ Clearly define customer profiles

## ✦ Engineering

- ◆ Obtain engineering assistance
- ◆ Research Technologies
- ◆ Estimate cost of product

## ✦ Information Technologies

- ◆ Estimate cost of implementing real-time tracking via web
- ◆ Improve and maintain both internal and external website
- ◆ Manage project portfolio



# Opportunity

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- ✦ Mass transit systems, federal and local governments and organizations are searching for cost effective ways to increase mass transit utilization, customer satisfaction and safety.

# Research

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✧ Customers

✧ Potential Technology

✧ Competitors

✧ Cost

# Customers

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## ✧ Primary

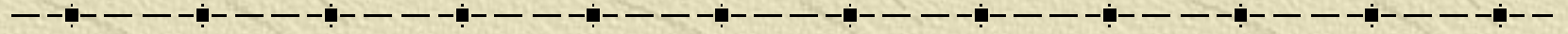
- ◆ School Boards

## ✧ Secondary

- ◆ School Bus Companies
- ◆ Parents



# Survey Results--Parents



- ✦ Improve time management
- ✦ Emergency Notification Feature very useful
- ✦ Improves satisfaction with bus service
- ✦ Increases child safety

# Survey Results—School Districts

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- ✦ Improve efficiency of bus service
- ✦ Reduce stress for drivers, parents, and district employees
- ✦ Improve communication between driver and bus coordinator
- ✦ Simplifies notifying parents of emergencies
- ✦ Reduce bus delays
- ✦ Reduce incentives for drivers to speed in order to keep to the schedule



# Survey Results –Bus Companies

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- ✧ Suggested use of a simple tracking system—rely on radios for communication
  - ✧ Contacted by other competitors -- systems not implemented due to extremely high prices
  - ✧ Expressed great interest in our product



# Potential Technologies

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## ✧ Global Positioning System (GPS)

- ◆ Accurate but expensive

## ✧ Radio Frequency

- ◆ Less accurate but cost effective
- ◆ Independent system

## ✧ Internet

- ◆ Most users are still on a dial-up connection
- ◆ Not everyone can afford equipment/connection

## ✧ Telephone

- ◆ Device may be in use
- ◆ Cost incurred for each notification

# Potential Technologies

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## ✧ Cell Phone

- ✧ Cost incurred for each notification
- ✧ Internet enable service \$50/month
- ✧ Dependent on cell phone service area

## ✧ Pager

- ✧ Device may be in use
- ✧ Cost incurred for each notification



# Competitor Profile #1

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✦ Here comes the bus

## ◆ Features

- Provides real time bus tracking

## ◆ Technology

- Utilizes GPS based navigation system

## ◆ Price

- \$85/year for in home receiver
- \$3000-5000 software cost
- \$725/bus hardware and installation
- Schools can receive financial assistance w/ 10% student sign up



## HOW SCHOOL BUS POSITIONING WORKS

**1** Global Positioning Satellites send radio transmissions back to Earth.

**2** A GPS receiver mounted inside a school bus picks up satellite transmissions and uses the information to calculate the location of the bus.

**GPS transmitter**

**3** The GPS unit relays information back to the school district, where a computer system creates a real-time map showing the location of all buses, speed and direction of travel.

**4** Using a home receiver, parents will see on the display how far the bus is from the bus stop in miles and minutes.

**Home receiver**

# Competitor Profile #2

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## ✧ GeoSpatial Technologies

### ◆ Features

- Real-time vehicle information and location

### ◆ Technology

- Utilizes Geographic Information Systems (GIS), Global Positioning Systems (GPS), wireless communication, and Internet Map Server technology

### ◆ Price

Pricing differs depending upon degree and type of hardware implementation. Each individual contract is separately evaluated and priced accordingly.

# How it works

The bus-detection device uses technology called a global-positioning system, or GPS, which utilizes satellites to help locate and track the bus.

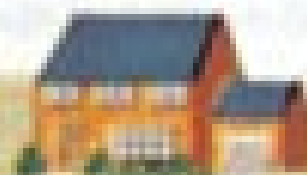
An antenna mounted on the bus receives information from the satellite, giving the exact location of the bus.

That data is sent to a receiver in the family's home.

Through a digital readout, the receiver tells the family how far away the bus is, down to a tenth of a mile.



2.6 miles





# Competitor Profile #3

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## NextBus

### Features

Provides real-time arrival information updated at regular intervals

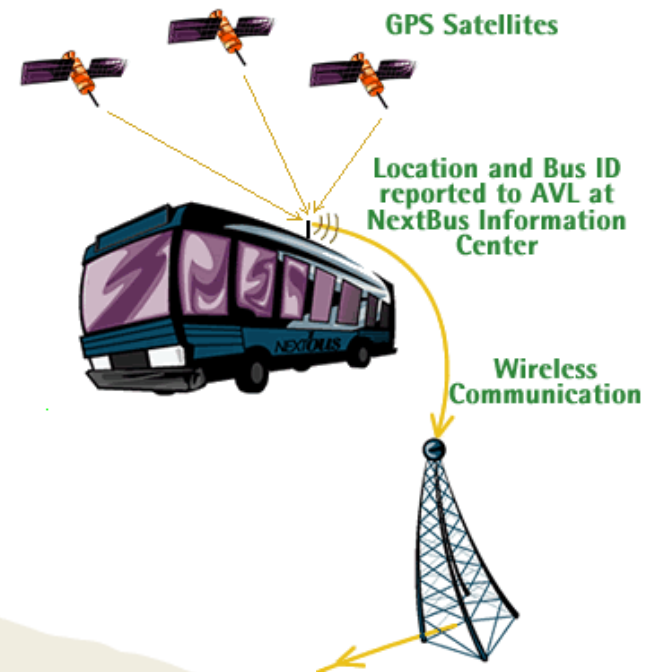
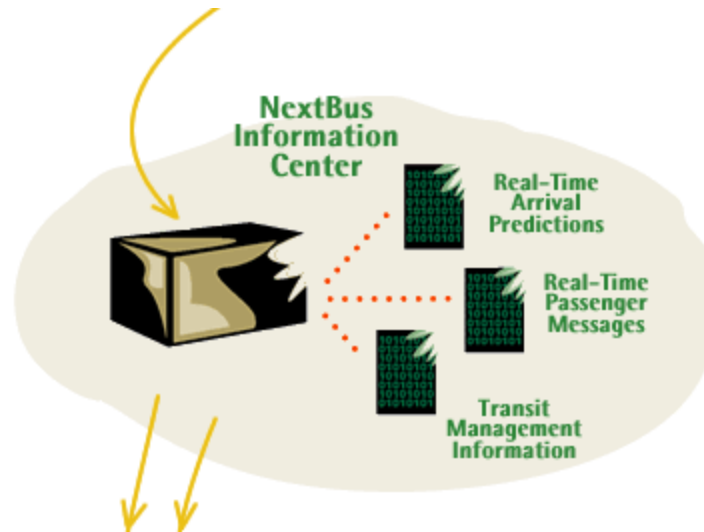
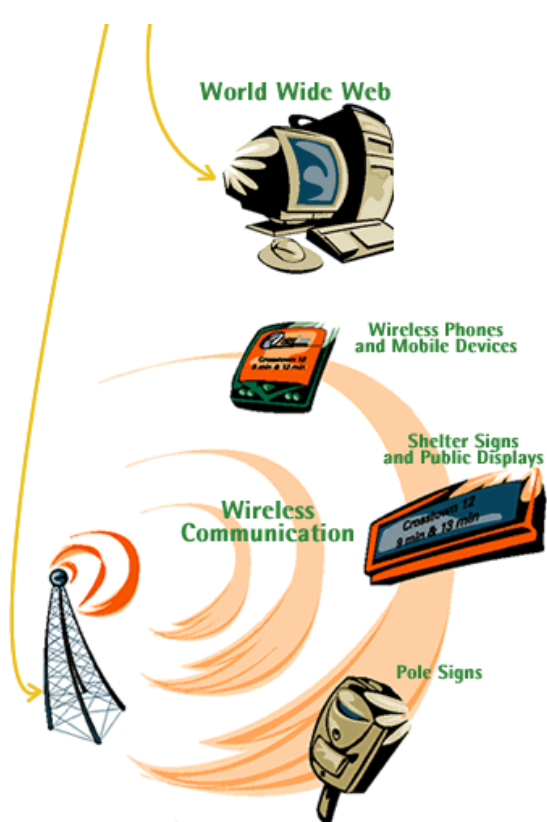
### Technology

- Utilizes GPS based navigation system in conjunction with advanced computer modeling

### Price

Pricing differs depending upon size of contract

Recently received \$9.6 million dollar contract from city of San Francisco to update MUNI transportation line



# Bustracker Profile

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## ◆ Features

- Provides real-time arrival information updated at regular intervals

## ◆ Technology

- Radio Frequency based system with web interface

## ◆ Price

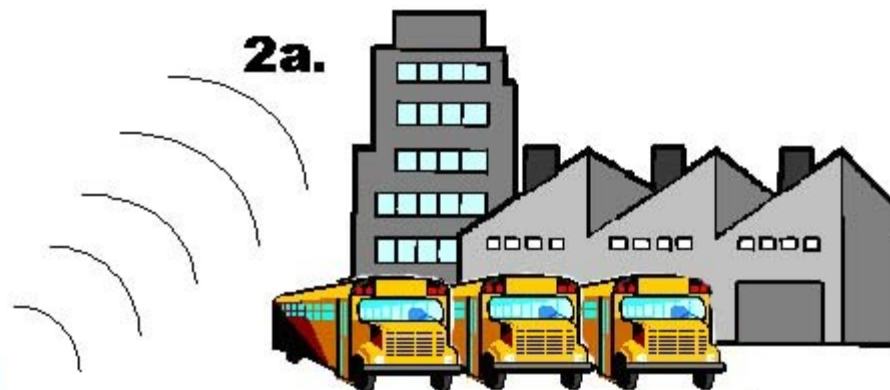
- \$10/month for Parents
- Approximately \$100 per bus including installation



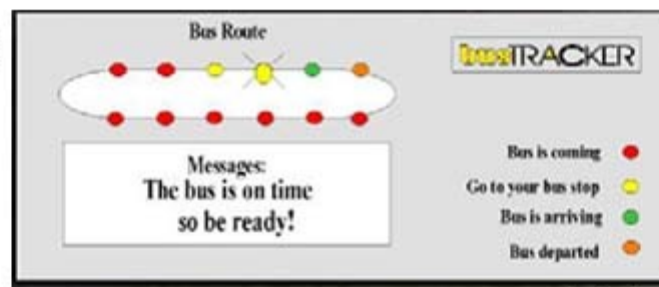
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**2a.**



**2b.**



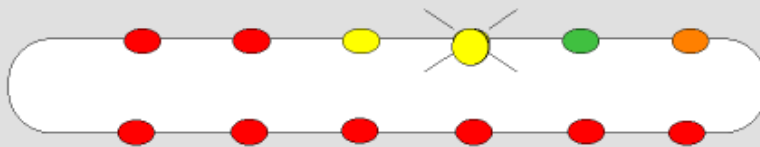
**3.**



**4.**



### Bus Route



**Messages:**  
**The bus is on time**  
**so be ready!**

**bus**TRACKER

**Bus is coming** ●

**Go to your bus stop** ●

**Bus is arriving** ●

**Bus departed** ●

# Cost to the Customer

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## ✦ Competitors

### ◆ Extremely accurate but expensive (GPS)

- Initial cost per rider is approximately **\$13.18**

$$\$725/55 \text{ riders} = \$13.18$$

## ✦ Bus Tracker

### ◆ Accurate and cost effective (RF Technology)

- Initial cost per rider is approximately \$1.81

$$\$100/55 \text{ riders} = \$1.81$$



# Progress Made

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- ✦ Customer and Competitor profiles more clearly defined
- ✦ Advantages/Disadvantages of potential technologies more clearly defined
- ✦ Refined product concept
- ✦ Established relationship with manufacturer to produce the product.

# Going Forward

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- ✦ Build prototypes that incorporate latest revisions to the concept
- ✦ Run pilot program
- ✦ Refine concept based on analysis of pilot program data

# Risks

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✦ What could cause us to fail

- ◆ Technical problems
- ◆ Market issues
- ◆ Competitive issues

✦ How we will mitigate these risks

- ◆ Pilot Program



# Conclusion

## ✧ Why our business is important

- ◆ Safety
- ◆ Efficiency
- ◆ Convenience

## ✧ Why we will succeed

- ◆ Clear Need for product

## ✧ Why should someone support us

- ◆ Profit potential is considerable given the large market with few competitors



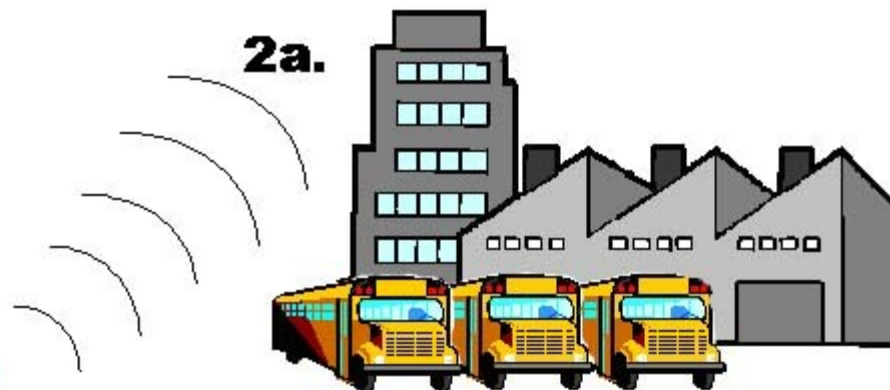
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Questions?

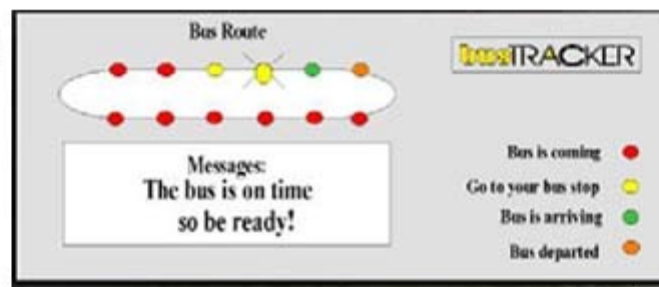
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**4.**

