Additional Applications for E-ZPass

- TRANSCOM - Transmit
  - Traffic Management
  - Incident Detection
- Commercial Vehicle Operations
- Border Crossing
- Parking

E-ZPass

What are requirements of technology at 5.9 GHz?

- Multiple Agencies migrating at once?
- Uninterrupted Service to (5+?) millions of customers
- Exchanging 5+ million tags
- Maintaining Interoperable Reciprocal Systems
- Use of technology for related applications

E-ZPass

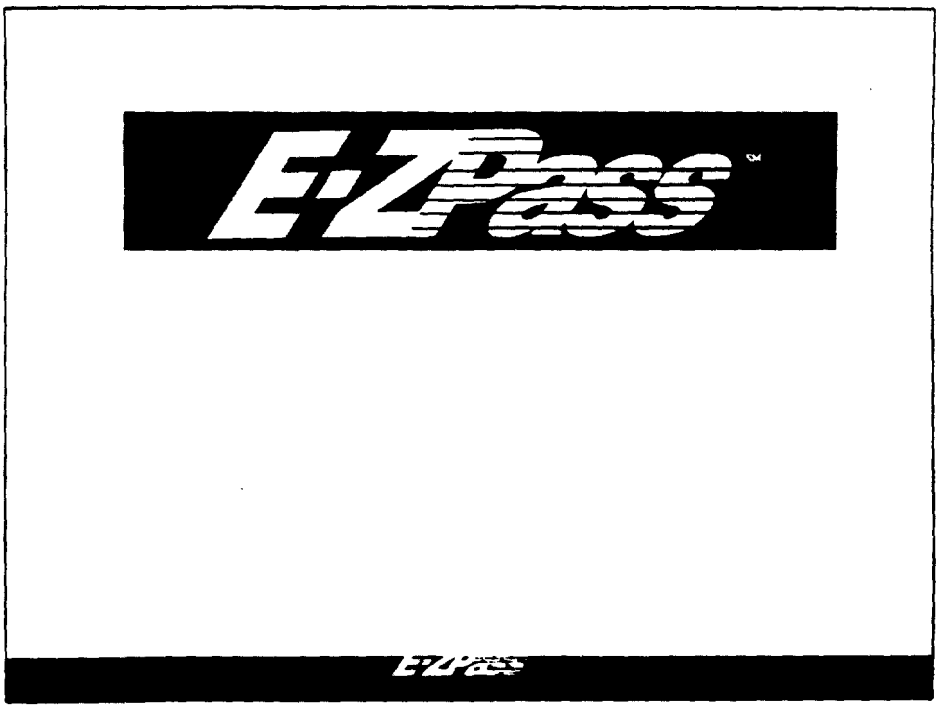
Expectations of Technology at 5.9 GHz

- Performance Reliability
- Non-Interfering & Compatible with existing equipment
- Non-Proprietary
- Interoperability with related technologies

E-ZPass

Challenge is to develop technology that, at a minimum, performs as well as our current technology, at a reasonable cost
AND
provides a method for migration *without* interrupting current service to millions of customers

E-ZPass


E-ZPass
E-ZPass

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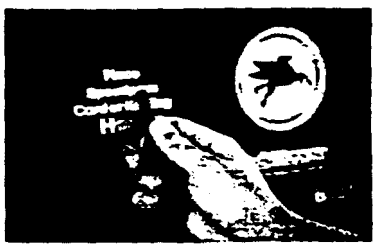
TIRIS Technology by Texas Instruments



TIRIS Technology by Texas Instruments™

Jim Bucklar - Texas Instruments
December 16, 1999

1

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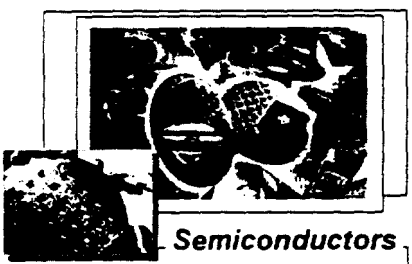
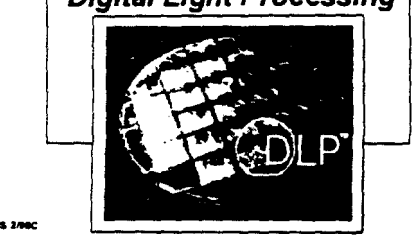
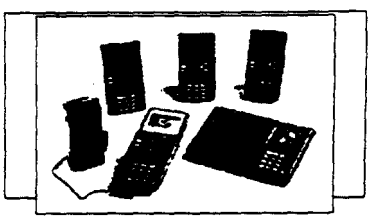
Businesses of Texas Instruments



Semiconductors

Digital Light Processing





Calculators

Materials & Controls

TIRIS 2/99C

2

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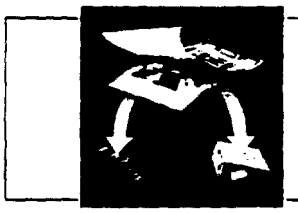
TIRIS Technology by Texas Instruments

TIRIS Radio Frequency Identification Market Segments

Automatic Recognition of Consumers



Tag-it™ Smart Labels

Automotive Security

General Applications

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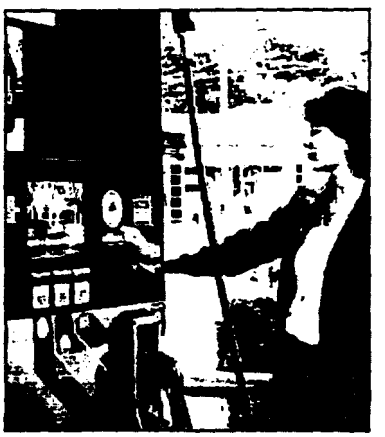
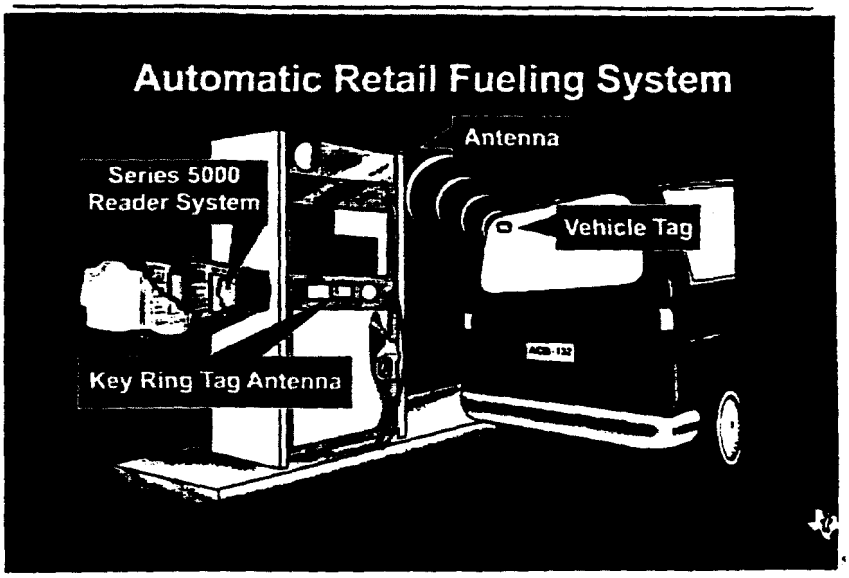
Automatic Recognition of Customers with RFID

- ARC = Use of RFID transponder by a consumer for Loyalty or Payment
- ARC Provides:
  - Speed
  - Convenience
  - Flexibility
  - Peace of Mind
  - Hi-Tech Buying
- ARC Programs:
  - Loyalty/ID Only
  - Credit Payment (via host)



TIRIS Technology by Texas Instruments

Automatic Retail Fueling System



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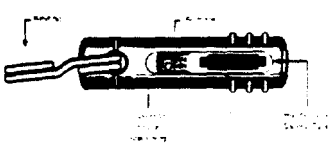
Keyfob/Vehicle Tag Summary

- Keyfob Transponders Deployed = 4M+.
- 134.2kHz Proven Technology (70M+ tags deployed).
- 134.2kHz Passive RFID Frequency Approved Over the Entire World.
- DST Solution with Challenge Response Security Feature.



- Vehicle Transponders Deployed = 850K+.
- Current Production Field Performance has been Excellent.
- Developed Frequency Agility and Frequency Hop Features. ETSI Compliant (support 4Q98 international rollout).
- DST Solution with Challenge Response Security Feature.

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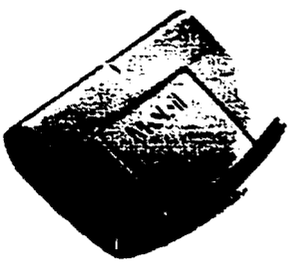
Vehicle Tag – LUHF

- Read range: 5'x 5' in front of dispenser.
- Light on and off within 1/2 second of driving by the dispenser.
- Authentication process.
- Light remains on during fueling.
- Receipt printed, if preferred.



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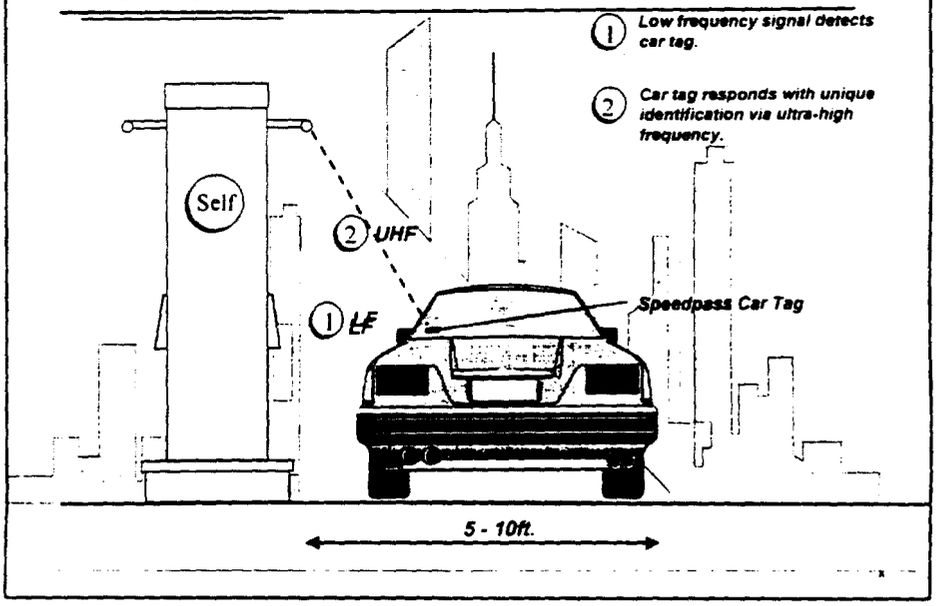
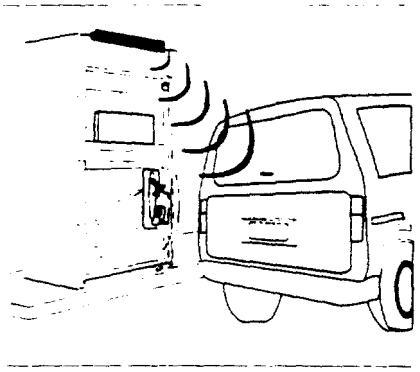


Down Link
Dispenser to Transponder



- 134.2 kHz
- Range: up to 7-10 feet
- Tag Type Inquiry
- Station ID
- Dispenser ID
- DST Challenge
- Request for Data
  - Customer Specific
  - Future Applications

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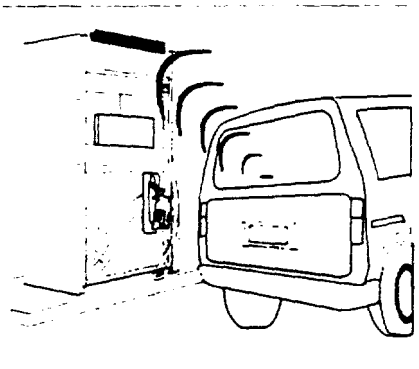
Up Link
Transponder to Dispenser



- 903 MHz
- Range: Guaranteed 7 ft
- Oil Company ID
- Tag Location Data
- Tag ID
- Customer Specific Data
- Response to Challenge
- Future Application Data

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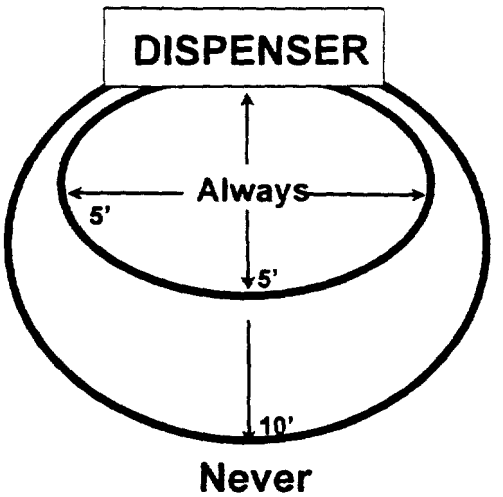
LUHF Vehicle Tag - localization



Introduction to ITS Info-communications Forum Japan

5.9GHz Stakeholders Workshop

December 16, 1999

ITS America

Sam Oyama

Japan

ITS Info-communications Forum, Japan

- Objectives
  - R&D on ITS Info-communications systems as well as studies into the possibility of turning these systems into standards
  - Gathering, exchange and provision of information on ITS info-communications systems
  - Close contact with relevant organizations in promoting development of ITS info-communications systems
  - Public awareness campaigns on ITS info-communications systems

ITS Info-communications Forum, Japan

- History
  - February 1999, TTC's List of DSRC Applications
  - July 1999, Forum Establishment
- Membership
  - Private sector(Manufacturers, Telecommunications Carriers, Broadcasting companies, ...)
  - MPT, NPA, MITI, MOT and MOC
- Board of directors
  - Chairman: Shoichiro Toyoda(TOYOTA Motor)
  - Vice-chairman: Mitsutoshi Hatori(Professor, National Center for Science Information Systems)

ITS Info-communications Forum, Japan

- Organization(More than 200)

  General Assembly
  - R&D Committee
    - ITS Info-communications Platform EG
    - Roadside Communications System EG
    - Inter-vehicle Communications EG
    - ITS Mobil Communications System EG
    - ITS Broadcasting System EG
  - Survey Committee
    - Planning and Survey EG
    - Public Relations EG

ITS Info-communications Forum, Japan

- **DSRC related working group**
  - **Roadside Communications System Expert Group**
    - **Deployment(Realization) WG**
    - **Wireless Communications System WG**
    - **Protocol WG**
    - **Roadside Network WG**
    - ***Security Ad-hoc G.***
    - ***Cruise-Assistance System Ad-hoc G.***

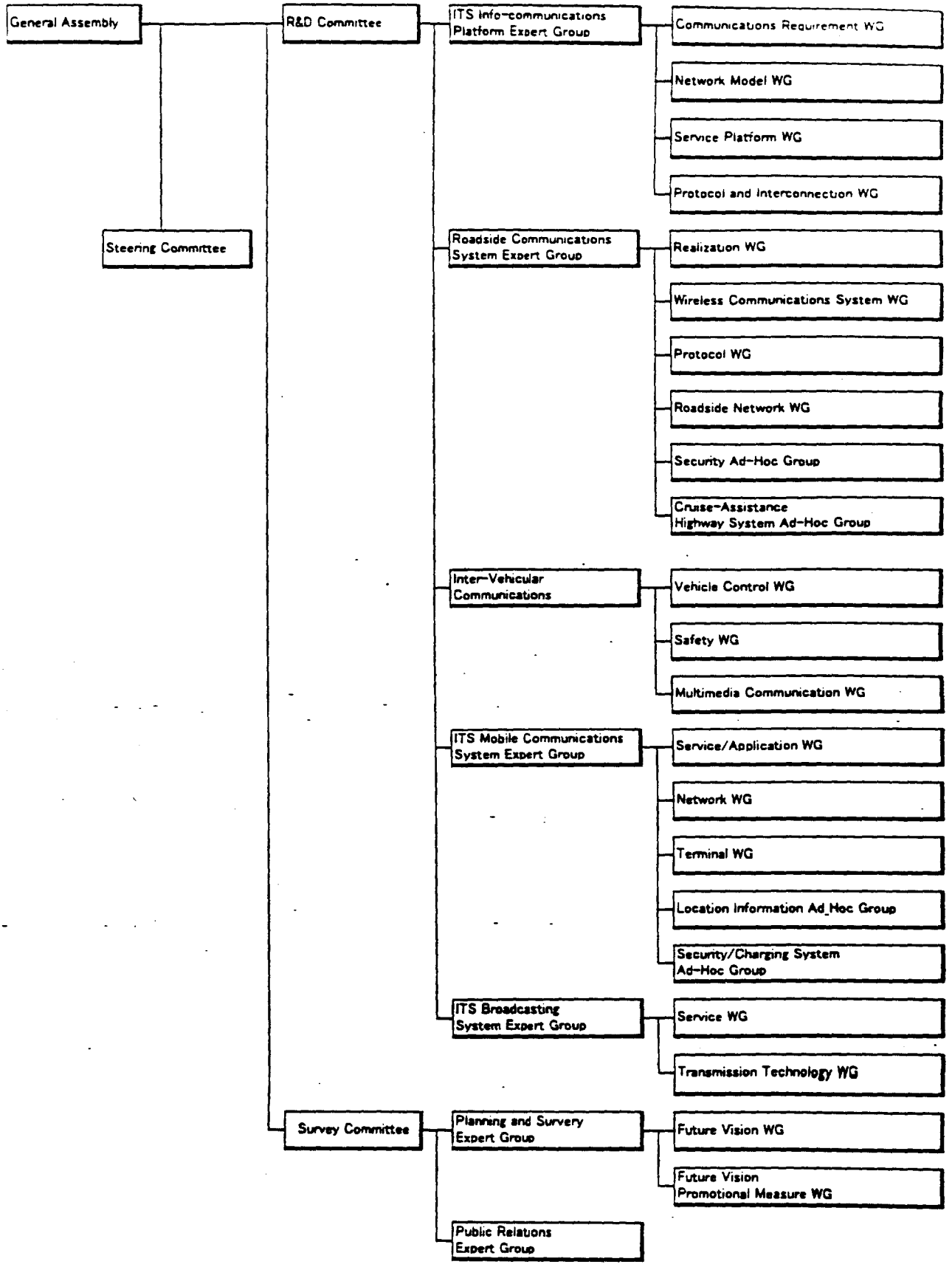
ITS Info-communications Forum, Japan

- **How to join for the Forum?**
  - **Contact to the Secretariat:**

Kazumasa Nakamura
ARIB(Association of Radio Industries and Businesses)
Nittochi Bldg., 14Floor
1-4-1 Kasumigaseki, Chiyoda-ku
Tokyo 100-0013
Japan

Phone:+81-3-5510-8598
FAX: +81-3-3592-1103
E-mail: nakamura@arib.or.jp

Organization of the ITS Info-communications Forum



Tomorrow's Electronics in Today's Automobiles

ITS Data Bus

IDB FORUM

Open Architecture - DSRC Vehicle Opportunities

5.9GHz Stakeholders Workshop – 16 December 99
Holiday Inn Capitol, Washington DC

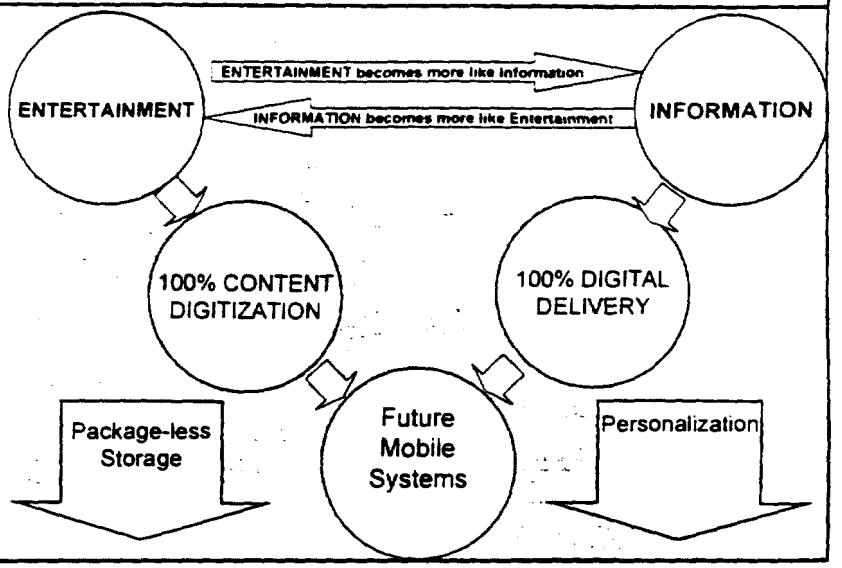
Arlan Stehney
Executive Director
IDB Forum

IDB

The vehicle will be transformed into a "Pathway" for digital media, control and communications.

IDB

Mixed Media Future



IDB

Digital Music Distribution

- **Digital Delivery of Music over the Internet**
- **No media is needed**
- **"Pipeline" of digital content into vehicles**
- **Copyright protection**

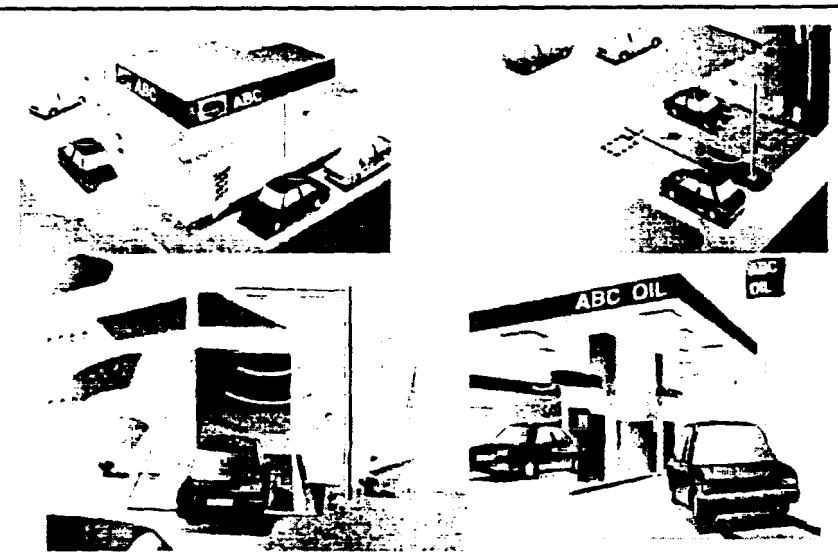
IDB

Portable Devices

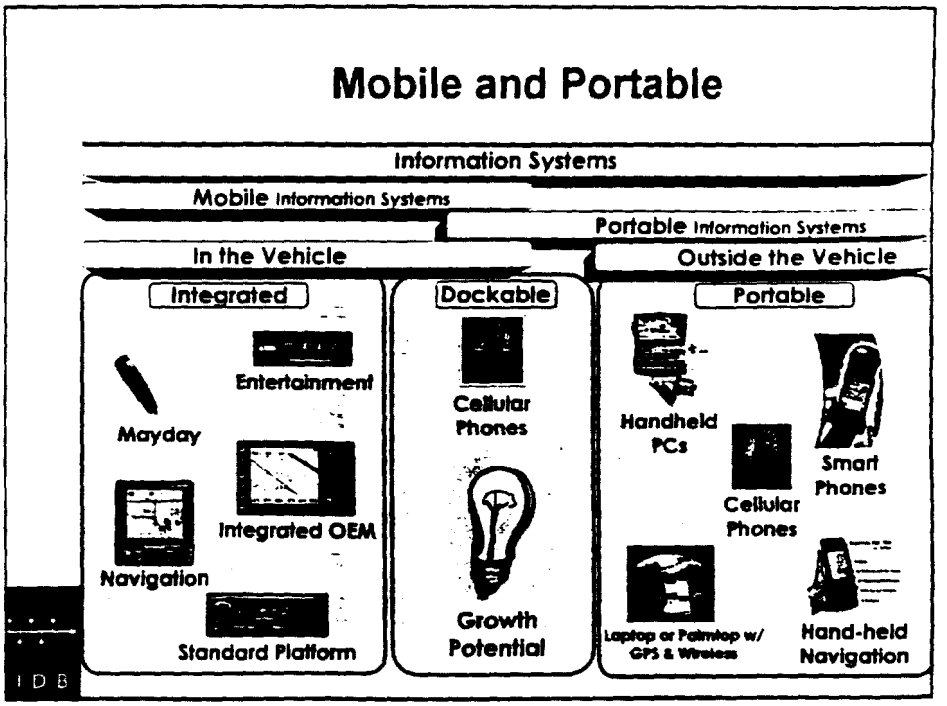
- **Key Drivers**
  - *Large Consumer Market*
    - *Wireless Phones 63 million*
    - *Handheld PC's 3.9 million worldwide in 1998*
  - **High consumer product demand**
  - **Shorter product life cycle**
  - **Promotes *faster* Technology Enhancements and Merging of Technologies**

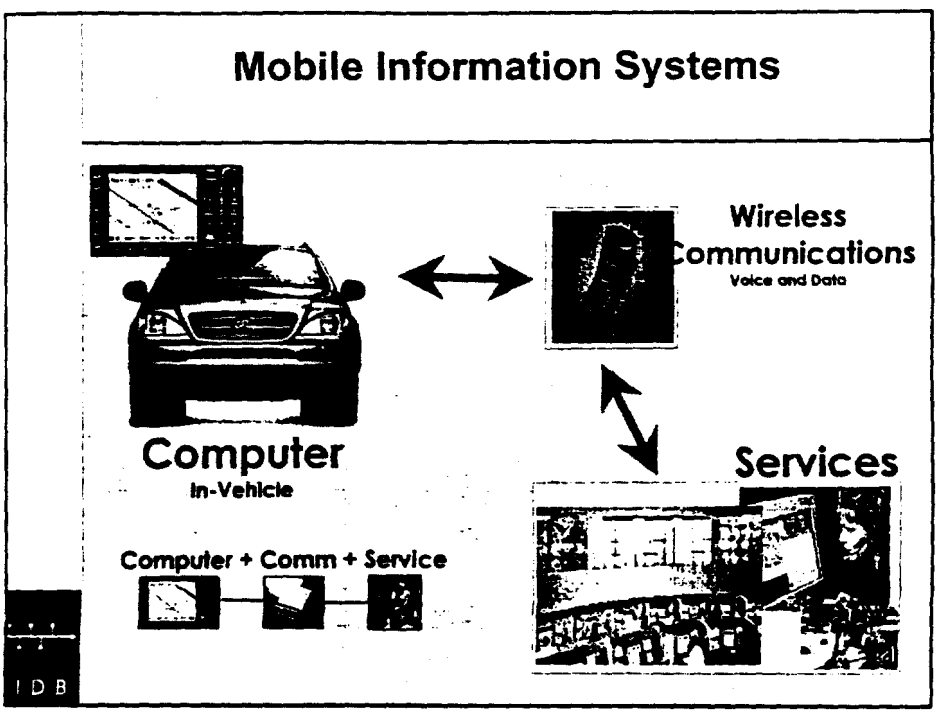
IDB

Dedicated Short Range Communication



IDB


Mobile and Portable
Information Systems
Mobile Information Systems
Portable Information Systems
In the Vehicle
Outside the Vehicle
Integrated
Dockable
Portable
Entertainment
Mayday
Integrated OEM
Navigation
Standard Platform
Cellular Phones
Growth Potential
Handheld PCs
Cellular Phones
Smart Phones
Laptop or Palmtop w/ GPS & Wireless
Hand-held Navigation
IDB


Mobile Information Systems
Wireless Communications
Voice and Data
Computer
In-Vehicle
Services
Computer + Comm + Service
IDB

Applications

Applications

Navigation
Route Guidance,
Points of Interest

E911/Roadside
Automatic Emergency Contact,
Roadside Assistance

Traffic Information
Real-time, Detailed,
Dynamic Route Guidance

Theft Recovery
Vehicle Tracking

Person to Person Communications
Cellular, Paging, E-mail

Remote Vehicle Access
Remote Diagnostics,
Remote Door Unlock

General Information
News, Sports, Stocks, Weather,
Web Browsing

E-Commerce
Tolls, parking, gas

Driver Benefits

Convenience
Information and services at the fingertips

Safety
Safety net for unplanned events

Business
Increase productivity

Entertainment
The next step beyond radio

Delivery Methods

Internet
Cellular, Satellite

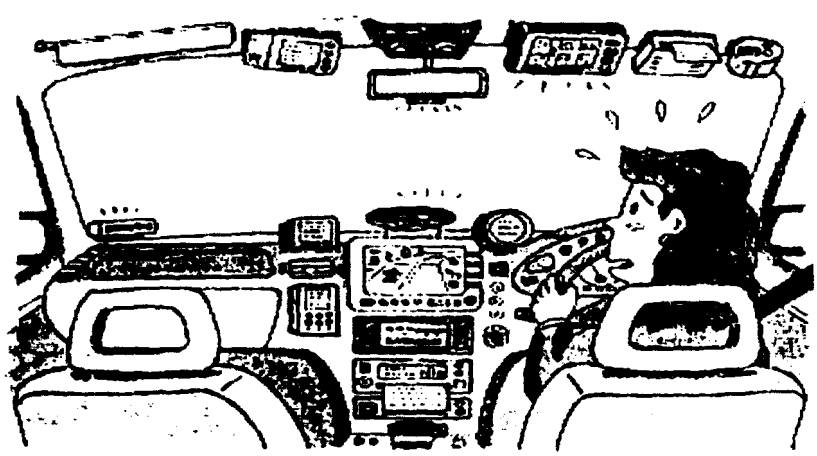
Intranet
Cellular, Satellite

Direct Connect
Cellular, Paging, DSRC

Broadcast
Radio, TV, RBDS, Subcarrier, Dedicated, SDAR, Paging

IDB

The need is obvious...



IDB

(Postscript) State DOT Concerns

- Caltrans unable to participate here directly...
- State DOTs are major stakeholders here, with heavy investments in legacy systems:
  - need substantial research and testing to justify changes from current legacy systems
  - need migration plan with enough time for state decision making and procurement processes
  - need direct involvement in the process to obtain "buy in"

PATH

(Postscript) State DOT Concerns

- Great breadth of state interests in DSRC:
  - Caltrans wireless Ethernet network (traffic operations, maintenance, construction)
  - Statewide ATIS and traveler information center
  - Electronic toll collection
  - HOV enforcement
  - remote traffic monitoring stations
  - remote weather information systems
  - Freeway Service Patrols
  - automated work zone warning systems
  - operations and maintenance fleet management
  - AHS

PATH

RF Priority Control

A 3M Perspective

Mike Duoos

Market Opportunity

- 250,000 signalized intersections
- _____ emergency vehicles
- _____ transit vehicles

Priority Control Customers

- Priority vehicle operators are users
- Traffic engineers are implementers

Priority Control Goals

- Safe, smooth, efficient route for emergency vehicles
- Better service for transit customers
- Minimum disruption to normal traffic
- Minimum disruption to traffic control

RF Priority Control Requirements

- Continuous communication
- Large communication zones (1000 meters)
- Vehicle position and speed
- High security
- High reliability

3M's Position

- 3M is developing RF Priority Control now
- If Priority Control is accommodated at 5.9 GHz, 3M will develop 5.9 GHz solution

Truck OE Perspective

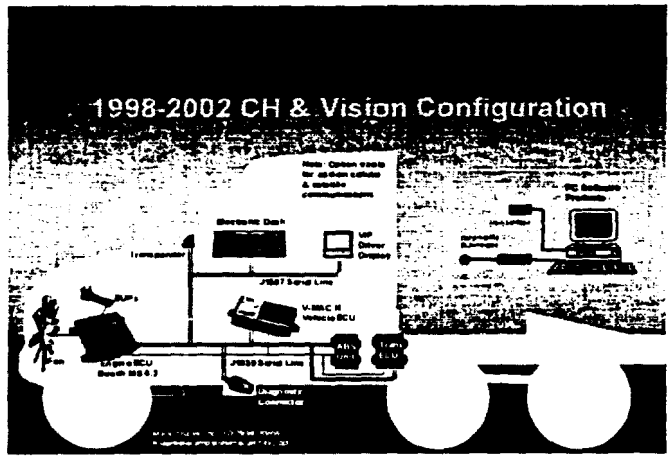
5.9 GHz Stakeholders Workshop

Dec. 16, 1999

Washington, DC

Guy T Rini
Mack Trucks, Inc

V-MAC III Architecture



Guiding Principles

- ✓One Standard
- ✓Support Open and Proprietary Data
- ✓On Board Gateway to Networks

1. One Standard for All

- ✓Light Duty
- ✓Medium Duty
- ✓Heavy Duty

2. Support Open and Proprietary Data

- ✓Logistics
- ✓Driver Management
- ✓Fleet Management
- ✓Service and Inspection
- ✓Internet Access
- ✓Future Bus

3. On Board Gateway to Networks

- ✓Powertrain
- ✓Vehicle Electronics
- ✓IDB/ AMIC
- ✓PLC-4TRUCKS
- ✓Next Generation

Emerging Wireless Technologies

- ✓IRDA
- ✓Bluetooth
- ✓IDB
- ✓PLC-4TRUCKS
- ✓DSRC?

Concerns

- ✓Antenna design / installation
- ✓Open Field Vs. Fixed Lane
- ✓Standard body works slowly?
  - history
  - meetings too far apart
  - right to continue to disagree