What is ITS?

Intelligent Transportation Systems, or ITS, encompass a broad range of wireless and wire-line communications-based information, control and electronics technologies.

When integrated into the transportation system's infrastructure, and in vehicles themselves, these technologies relieve congestion, improve safety and enhance American productivity.

Using electronics, communications, and computers in an integrated manner to improve safety and efficiency.
Development of ITS

- 1939 World Fair – Futurama
- 1960s/70s – Beginnings of ITS research
  - Japan – CACS (Comprehensive Automobile Control System)
  - US – ERGS (Electronic Route Guidance System)
  - Germany –
- 1980s/mid-90s – Technological reforms, increased ITS funding
  - Japan – RACS (Road/Automobile Communication System)
  - Europe – PROMETHEUS (Program for a European Traffic System with Higher Efficiency and Unprecedented Safety) – auto manufacturers
  - Europe – DRIVE (Dedicated Road Infrastructure for Vehicle Safety in Europe) – European Community
- 1991 – ISTEA (Intermodal Surface Transportation Efficiency Act)
- 1998 – TEA-21 (Transportation Equity Act for the 21st Century)
- Public-private partnerships

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Foundations of ITS

- Architecture
  - Common Framework for planning, defining, integrating ITS
    - Functions
    - Physical entities or subsystems
    - Information & data flows
- Standards
  - Industry consensus that defines how system components operate
    - 110 standards in development: 81 published, 12 approved, 7 in ballot, 10 in development
- Telecommunications
  - Wired/wireless, public/private, network/short range

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ITS Architecture

- Functions
- Physical entities
- Information flows
- Data flows

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ITS Standards

- Why standards?
  - Open & non-proprietary
  - Ensure interoperability and efficiency
  - Conformity with FHWA Rule/FTA Policy on ITS Architecture and Standards
- NTCIP = National Transportation Communications for ITS Protocol
  - Interoperability
  - Interchangeability
- Examples
  - NTCIP 1202 – Object Definitions for Actuated Traffic Signal Controller (ASC) Units
  - NTCIP 1203 – Object Definitions for Dynamic Message Signs (DMS)
  - ITE 9603-2 – Advanced Transportation Controller (ATC) Cabinet
  - NTCIP 9010 – XML in ITS Center-to-Center Communications
  - SAE J2540/3 – National Names Phrase List
  - NTCIP 1408 – TCIP Fare Collection (FC) Business Area Objects

Telecommunications

- Rapidly evolving technology
- Different channels, different needs
  - Center-to-Center
  - Center-to-Field
  - Center-to-Vehicle/Traveler
  - Field-to-Field
  - Field-to-Vehicle
- Leased costs have been overestimated

ITS Technology Overview

Intelligent Infrastructure
- Arterial Management
- Freeway Management
- Transit Management
- Incident Management
- Emergency Management
- Electronic Payment
- Traveler Information
- Information Management
- Crash Prevention and Safety
- Roadway Operations and Maintenance
- Road Weather Management
- Commercial Vehicle Operations
- Intermodal Freight

Intelligent Vehicle
- Collision Avoidance Systems
- Collision Notification Systems
- Driver Assistance Systems
Arterial Management

- Traffic control
  - Transit Signal Priority
  - Emergency Vehicle Preemption
  - Advanced Signal Systems
- Lane Management
  - HOV facilities
  - Reversible Flow
  - Emergency Evacuation
- Parking Management
  - Surveillance
  - Information Dissemination
  - Enforcement

Freeway Management

- Ramp Control
- Lane Management
  - HOV facilities
  - Reversible Flow
  - Pricing
  - Special Events
  - Surveillance
  - Information Dissemination
  - Enforcement

Transit Management

- Safety & Security
  - In-Vehicle Surveillance
  - Facility Surveillance
- Transportation Demand Management
  - Ridesharing/matching
  - Dynamic Routing/Scheduling
  - Service Coordination
- Fleet Management
  - AVL/CAD
  - Maintenance
  - Planning
- Information Dissemination
  - In-vehicle
  - Roadside/Terminal
  - Internet/Wireless/Phone
Incident Management

- Surveillance & Detection
  - Detectors
  - Video
  - Wireless E911
- Mobilization & Response
  - AVL/CAD
  - Response Routing
- Information Dissemination
  - DMS
  - HAR
- Clearance & Recovery
  - Investigation
  - Video
  - Temporary Traffic Control

Emergency Management

- HazMat Management
  - Tracking
  - Detection
  - Driver Authentication
  - Route Planning
- Emergency Medical Services
- Response & Recovery
  - Early Warning System
  - Response Management
  - Evacuation & Re-entry Management

Electronic Payment

- Toll Collection
- Transit Fare Payment
- Parking Fee Payment
- Multi-Use Payment
  - Multiple modes
  - Private commerce
Traveler Information

- Pre-trip information
  - Internet/Wireless
  - 5-1-1
  - TV/Radio
- En-route information
  - Wireless
  - 5-1-1
  - Radio
- Tourism & Events

Information Management

- Data Archiving

Crash Prevention and Safety

- Road Geometry Warning Systems
  - Ramp Rollover
  - Curve Speed Warning
  - Downhill Speed Warning
  - Overweight/Overwidth Warning
- Highway-Rail Crossing Systems
- Intersection Collision Warning
- Pedestrian Safety
- Bicycle Warning Systems
- Animal Warning Systems
Roadway Operations and Maintenance

- Information Dissemination
  - Portable DMS
  - HAR
  - Internet/Wireless/Phone
- Asset Management
  - Fleet Management
  - Infrastructure Management
- Work Zone Management
  - Temporary Traffic Management
  - Variable Speed Limit
  - Intrusion Detection

Road Weather Management

- Surveillance, Monitoring & Prediction
  - Pavement Conditions
  - Atmospheric Conditions
  - Water Level
- Information Dissemination
- Traffic Control
  - Variable Speed Limits
  - Vehicle Restrictions (Chains, High-Profile Vehicles)
- Response & Treatment
  - Fixed Winter Maintenance
  - Mobile Winter Maintenance

Commercial Vehicle Operations

- Credentials Administration
  - Electronic Funds
  - Electronic Registration/Permitting
- Safety Assurance
  - Electronic Screening
    - Safety Screening
    - Border Clearance
    - Weight Screening
- Carrier Operations & Fleet Management
  - AVL/CAD
  - On-Board Monitoring
- Security Operations
Intermodal Freight

- Freight Tracking
- Asset Tracking
- Freight Terminal Processes
- Drayage Operations
- Freight-Highway Connector System
- International Border Crossing Practices

Collision Avoidance Systems

- Intersection Collision Warning
- Obstacle Detection
- Lane Change Assistance
- Lane Departure Warning
- Rollover Warning
- Road Departure Warning
- Forward Collision Warning
- Rear Impact Warning

Collision Notification Systems

- Mayday/ACN
- Advanced ACN
Driver Assistance Systems

- Navigation/Route Guidance
- Driver Communication
- Vision Enhancement
- Object Detection
- Adaptive Cruise Control
- Intelligent Speed Control
- Lane Keeping Assistance
- Roll Stability Control
- Drowsy Driver Warning Systems
- Precision Docking
- Coupling/Decoupling
- On-Board Monitoring

More Resources

- US DOT/FHWA – ITS Joint Program Office
  http://www.its.dot.gov
- ITS America – Trade organization
  http://www.itsa.org
- NTOC – National Transportation Operations Coalition
  http://www.ntoctalks.com/
- ITS National Architecture
  http://www.iritis.com/itsarch/
- ITS Standards
  http://www.its.gov/standards
- ITS Telecommunications
  http://www.its.gov/telecom/

Questions?

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